Compliance Assurance Monitoring (CAM)
Water Injection for Nitrogen Oxides (NO_X) Control
Frederickson Generating Facility

BACKGROUND

I. EMISSIONS UNIT

Description: General Electric (GE) Frame 7, Type 7101E Simple Cycle Combustion Turbine
Identification: Units 1 & 2
Facility: Puget Sound Energy – Frederickson Generating Station, Frederickson, WA

II. APPLICABLE REGULATIONS, EMISSION LIMIT, AND MONITORING REQUIREMENTS

Regulatory Order:	Puget Sound Clean Air Agency (PSCAA) Notice of Construction Approval #8436 dated October 9, 2002
Emission Limit:	NO_X emissions from each unit shall not exceed 144 lbs/hr per unit when firing natural gas. NO_X emissions from each unit shall not exceed 246 lbs/hr per unit when firing #2 distillate. NO_X emissions from the entire facility shall not exceed 530 tons per year.
Monitoring Requirements:	NO_X emissions from Units 1 & 2 shall be measured every 10,000 hours of Units 1 & 2's operation or at least once every five years during the Air Operating Permit term. Emission testing shall be done at the most frequent load level and shall follow Title 40 Code of federal Regulations (CFR) Part 60 Subpart A, Appendix A method 20 or 7E, and the relevant parts of 40 CFR 60.335.
Monitoring Requirements:	Puget Sound Energy (PSE) shall report NOx emissions annually in the Emissions Inventory Report to PSCAA. Per 40 CFR 60.334, NOx emission calculations shall be based on fuel consumption, the NOx emission factors from the most recent source test, and the water injection/turbine load relationships. Using a continuous monitoring system, PSE shall record water injection (lbs/sec), fuel use (lbs/sec), and actual water injection to fuel ratio, required water injection to fuel ratio, and ambient air temperature at least once per minute of operation and compute hourly average fuel consumption rate, water injection rate, and hourly water to fuel ratio from all readings taken over each clock hour.

III. Control Technology

Water injection shall be used to control NO_X from Units 1 & 2 during operation. The key elements of the monitoring approach are presented in Table 1.

TABLE 1. POINT SOURCE EMISSION UNITS AT PUGET SOUND ENERGY - FREDERICKSON

REQUIREMENT	PARAMETER
I Indicator:	
A. Measurement Approach	Emissions Stack Testing
	NO_X emissions from Units 1 & 2 shall be measured every 10,000 hours of Unit's operation or once every five years. 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).
II. Indicator Range:	
A. Indicator Range Emissions Stack Testing QIP Threshold	An acceptable range of NO_X emissions includes a total concentration of no more than 144 lbs/hr per unit during natural gas combustion and no more than 246 lbs/hr per unit during #2 distillate combustion (allowance) for heat rate and fuel bound nitrogen in any one-hour period.
	Any one hour period during which NO_X emissions exceed 144 lbs/hr per unit during natural gas combustion and exceed 246 lbs/hr per unit during #2 distillate combustion (allowance) for heat rate and fuel bound nitrogen, shall be reported to PSCAA within 30 days after the end of the month that the exceedance occurred. If necessary, corrective actions shall be taken immediately.
B. Indicator Range Water-To-Fuel Ratio Monitoring QIP Threshold	An acceptable water-to-fuel ratio shall be in compliance with 40 CFR 60.322(a).
	For any one hour period during which the average water-to-fuel ratio falls below the NO_X compliance limit as calculated in 40 CFR 60.332(a) and determined by the GE compliance chart, activate alarm and notify PSCAA within 12 hours. For any one-hour period the average water-to-fuel ratio falls below the minimums established in the GE compliance chart shall be reported to PSCAA within 30 days after the end of the month that the event occurred. If necessary, corrective actions shall be taken immediately.

TABLE 1 CONTINUED. POINT SOURCE EMISSION UNITS AT PUGET SOUND ENERGY - FREDERICKSON

III. Performance Criteria:	
A. Data Representativeness	NO_X emissions testing shall be measured from the Unit's exhaust stack by source testing. Emission test results shall meet the data quality requirements of the test methodology. Water-to-fuel ratio and fuel consumption monitoring system shall be accurate to within ± 5.0 percent and comply with 40 CFR 60.334 (a)
B. Verification of Operational Status	Emissions tests shall be performed as specified. The monitoring system shall be operated according to manufacturer specifications.
C. QA/QC Practices and Criteria	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.
III. Performance Criteria:	
D. Monitoring Frequency and Data Collection Procedures	On a semi-annual basis, PSE shall submit to PSCAA the certified AOP compliance reports for the preceding 6 months in written (or electronic if permitted by PSCAA) form to PSCAA within 30 days of the end of each six-month period. (Unless a different testing and reporting schedule has been approved by PSCAA). In the case of an exceedance, the report shall document the month of the exceedance occurred, the endurance and magnitude of the exceedance, the probable cause of the occurrence, correction actions taken or planned, and the name of any other agency contacted. PSCAA 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.

JUSTIFICATION

I. BACKGROUND

The General Electric (GE) Frame 7, Type 7101E simple cycle dual-fueled combustion turbine (Units 1 & 2) are located at the Frederickson Generating Station. Each turbine has the capability to supply a gross power output of approximately 75 MW. NO_X emissions from Units 1 & 2 are controlled using water injection.

II. RATIONALE FOR SELECTION OF PERFORMANCE INDICATORS

The NO_X performance indicators were selected based on the approval conditions outlined in the Frederickson Generating Station's Air Operating Permit No. 10028.

Stack testing every 10,000 hours of Unit's operation or once every five years and fuel monitoring shall be considered satisfactory to determine performance regarding NO_X emissions on a concentration or mass basis.

The water-to-fuel ratio system indicates compliance with requirements to maintain NO_X emissions at or below 144 lbs/hr (on gas) and 246 lbs/hr (on oil), by comparing the recorded water-to fuel ratios against the GE compliance chart. Compliance with this condition is further confirmed with the periodic stack testing.

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

These indicators are justified by 40 CFR 64.4, which states, "If an owner or operator relies on presumptively acceptable monitoring, no further justification for the appropriateness of that monitoring should be necessary other than an explanation of the applicability of such monitoring to the unit in question." Units 1 & 2 are already performing these monitoring methods required by the New Source Performance Standards (NSPS) subpart GG and therefore may use them to satisfy the monitoring requirements of this CAM plan.

III. RATIONALE FOR SELECTION OF INDICATOR RANGES

The indicator range is selected to show compliance with the conditions of the Frederickson Station's Air Operating Permit No 10028. Stack testing and fuel monitoring shall provide data to calculate NO_X emissions on an annual basis and provide an accurate estimate of emission concentration within the exhaust stack of Units 1 & 2. Water-to-fuel monitoring shall provide information to determine compliance with 40 CFR 60.335.

TEST AND IMPLEMENTATION PLAN

I. TEST PLAN

NO_x emissions from Units 1 & 2 shall be measured every 10,000 hours of Units 1 & 2 operation. 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.

On a semi-annually basis, PSE shall submit to PSCAA Certification of reports for the preceding 6 months in written (or electronic if permitted by PSCAA) form to PSCAA within 30 days of the end of each six-month period (unless a different testing and reporting schedule has been approved by PSCAA).

In the case of an exceedance, the report shall document the month of the exceedance occurred, the endurance and magnitude of the exceedance, the probable cause of the occurrence, correction actions taken or planned, and the name of any other agency contacted.

PSCAA 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 Units 1 & 2.