State of Washington Department of Ecology
Notice of Construction Approval Order

In the matter of approving a new air contaminant source for Puget Sound Energy	)))	**Order No. 18AQ-C225**

To: **Puget Sound Energy**
9523 Willows Rd NE
Redmond, WA, 98922

Project Summary

Puget Sound Energy's Cascade IT Facility, herein referred to as the Permittee, is a modular data center located at 1980 SR 903, Cle Elum, Washington, in Kittitas County.

The project consists of installation and operation of two new diesel-fired emergency generators. The generators support a modular data center.

Legal Authority: The two diesel engines powering the emergency generators qualify as new sources of air contaminants under WAC 173-400-110, filed May 31, 2016 and as new sources of toxic air pollutants under WAC 173-460-040, filed May 20, 2009. The emission units were reviewed under the legal authority of RCW 70.94.152 and the applicable rules and regulations adopted thereunder.

It is Ordered that the Permittee is subject to the following conditions:

Approval Conditions

1.0 Laws and Regulations

The proposed source shall comply with all state and federal laws and regulations, including:

- Title 40 Code of Federal Regulations (C.F.R.) Part 60 Subpart IIII — Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
- Title 40 C.F.R. Part 63 Subpart ZZZZ — National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.
- Title 40 C.F.R. Part 60 Subpart A — General Provisions and Part 63 Subpart A — General Provisions, where applicable.

2.0 Emission Units

This Order approves two Cummins 1,000-kW diesel-fired emergency generator sets, model DQFAD, each powered by a Cummins model QST30-G5 NR2 engine.

3.0 Potential Emissions

The project may produce up to the following estimated controlled stationary source emissions:

Pollutant	Emergency Generators (pounds per year)
Carbon monoxide (CO)	254
Nitrogen oxides (NO_X)	2,060
Particulate matter (PM)[a]	53.1
Sulfur dioxide	49.2
Volatile Organic Compounds	43.0
Toxic Air Pollutants (TAPs)[b]	
Diesel engine exhaust, particulate	10.0

[a] Since both emission units are combustion sources, it is assumed that PM = PM_{10} = $PM_{2.5}$.

[b] TAPs with potential-to-emit in excess of their respective Small Quantity Emission Rate, as listed in WAC 173-460-150, filed May 20, 2009.

4.0 Operational Limitations

4.1 Production Limits

4.1.1 Fuel usage for both engines shall be limited to:

4.1.1.1 A total of 10,261 gallons during the initial 12-month period of commissioning and ongoing operation.

4.1.1.2 A total of 6,650 gallons per rolling 12-month period thereafter.

4.1.2 Routine testing of each engine shall be limited to 1 hour per month, and 12 hours per rolling 12-month period, at 40% load.

4.1.3 Load testing of each engine shall be limited to 2.5 hours per rolling 12-month period at 100% load.

4.1.4 Emergency operation of each engine shall be limited to 96 hours per rolling 12-month period at 40% load.

4.1.5 Operation of each engine for commissioning purposes shall be limited to a total of 25 hours at up to 100%.

4.2 **Equipment Restrictions**

4.2.1 Only ultra-low-sulfur diesel, No. 2 fuel oil containing a sulfur content of no greater than 15 parts per million, shall fuel the engines.

4.2.2 Both engines shall be certified, operated, and maintained for conformance with the emission standards listed in Condition 4.3.1.

4.2.2.1 Replacement of failed engines with like or equivalent engines requires Ecology review and written approval prior to installation.

4.2.2.2 Modifications that change emission rates from this project, including replacement engines with different emission rates may require a Notice of Construction application.

4.2.3 The generators shall only be operated for reliability or maintenance testing and to provide emergency backup electrical power to the data center. Under no circumstances shall the generators be utilized to satisfy a financial arrangement with any entity (e.g. curtailment rate structures, load shedding, or distributed power generation), or to provide electrical power to any electric power provider or user without first submitting a Notice of Construction application and receiving prior approval from Ecology.

4.2.4 Each engine shall be equipped with a catalyzed diesel particulate filter.

4.2.4.1 The filters shall accomplish at least 85% reduction of diesel-engine particulate emissions from the engines' exhaust.

4.2.4.2 The engines shall not operate without catalyzed diesel particulate filter emissions control at any time.

4.2.5 Testing of the engines shall be coordinated to prevent:

4.2.5.1 Load testing of the two engines at the same time.

4.2.5.2 Routine testing of one engine while the other is load tested.

4.2.6 The exhaust stack for each engine shall have an inside diameter of 14.0 inches and extend to a height of 33.7 feet above grade. The stacks shall be installed such that bends, obstructions, and building interferences with exhaust dispersion are minimized.

4.2.7 Exhaust from the exhaust stacks for each engine shall be discharged vertically. Any rain stack cap that interferes with vertical dispersion is prohibited.

4.3 **Emission Limits**

4.3.1 Engine emissions shall not exceed the Tier-2 emissions standards listed at Title 40 C.F.R. 89.112, as required by Title 40 C.F.R. 60.4205(b). Those standards are:

Pollutant(s)	Emission Standard (g/kW-hr)
NMHC[a] + NO_X	6.4
CO	3.5
PM	0.20

[a] NMHC = Non-Methane Hydrocarbons

4.3.2 Visible emissions from each engine shall not exceed 5 percent opacity.

4.3.3 There shall be no visible emissions from either engine at the property boundary.

5.0 Operation & Maintenance

5.1 The Permittee shall follow all recommended installation, configuration, operation, and maintenance provisions supplied by the emission unit manufacturers.

5.2 Emission unit specific operations and maintenance (O&M) manuals shall be developed by the Permittee; manufacturer's instructions may be referenced.

5.2.1 O&M manuals shall, at a minimum, include:

5.2.1.1 Normal operating parameters for the emissions units.

5.2.1.2 A maintenance schedule for the emissions units.

5.2.1.3 Monitoring and record keeping requirements.

5.2.1.4 A description of the monitoring procedures.

5.2.1.5 Actions for abnormal control system operation.

5.2.2 O&M manual development shall be completed within 30 days of issuance of this Order.

5.2.3 O&M manuals shall be reviewed and updated at least annually to reflect any modifications to the emission units or operating procedures.

5.3 Emission units shall be operated and maintained in accordance with the O&M manuals. Failure to follow the requirements of the O&M manuals, and the adequacy of the O&M manuals, will be two of the factors considered by Ecology in determining whether the source is properly operated and maintained.

5.4 Regular O&M records shall be kept at the source. These O&M records shall be available for inspection by Ecology, organized in a readily accessible manner, and retained for at least five years.

5.5 The Permittee shall provide notification of generator-set commissioning, for each unit, to the Department of Ecology's Central Regional Air Quality section within one week of starting such activities.

6.0 Monitoring & Recordkeeping

To enable Ecology and the permittee to observe that the equipment is operating properly, monitoring and recordkeeping requirements shall include, but are not be limited to, the following:

6.1 Fuel receipts displaying the quantity of diesel and sulfur content for each delivery shall be maintained.

6.2 Each engine shall be equipped with a properly installed and maintained non-resettable meter which tracks hours of operation.

6.2.1 The annual hours of operation for each engine shall be compiled monthly, on a rolling 12-month basis.

6.2.2 An operation log shall be maintained for each engine. The logs shall indicate the purpose of each period of engine operation, the hours operated, and the corresponding operating load.

6.3 Replacement of catalyzed diesel particulate filters shall be documented.

6.4 An upset condition log shall be maintained for each engine. The log shall include the date, time, duration, cause, and corrective action taken for each upset.

7.0 Testing

7.1 The Permittee shall follow Cummins recommended diagnostic testing and maintenance procedures to ensure that each engine will conform to the emission standards listed in Condition 4.3.1 throughout the life of each unit.

7.2 At the conclusion of the manufacturer's warranty term (24 months from completion of engine commissioning), the Permittee shall either:

7.2.1 Satisfy manufacturer requirements to extend the warranty term, to cover at least engine emission rates and the catalyzed diesel particulate filters.

7.2.2 Perform emission testing for one representative engine, usually the engine with the most hours of operation, to demonstrate ongoing compliance with the emission standards listed in Condition 4.3.1.

7.3 Once emission testing is triggered by Condition 8.2:

7.3.1 Testing shall be repeated every 60 months thereafter, with each test performed on a different engine from that tested previously.

7.3.2 In the event that any source test shows non-compliance with any emission standard listed in Condition 4.3.1:

7.3.2.1 The engine that failed the test shall be repaired or replaced.

7.3.2.2 The emission test shall be repeated, on both engines, within 60 days of the failed test.

7.3.3 Periodic emission testing shall be combined with pre-scheduled maintenance testing and load testing. Additional operation of the engines

for the purpose of emission testing beyond the operating hour and fuel consumption limits authorized by this Order may be allowed by Ecology upon request.

7.4 The following procedures shall be used for each test required by Condition 8.2, unless an alternate method is proposed and approved in writing by Ecology prior to the test:

7.4.1 Testing for NMHC shall be determined by EPA Methods 18 and 25A. Alternatively, methane measurement using EPA Method 18 may be eliminated if all hydrocarbons measured using EPA Method 25A are considered NMHC.

7.4.2 Testing for NO_X shall be determined by EPA Method 7E.

7.4.3 Testing for CO shall be determined by EPA Method 10.

7.4.4 Testing for PM shall be determined by EPA Methods 5 and 202.

7.4.5 Testing for exhaust opacity shall be determined by EPA Method 9.

7.4.6 The F-factor method described in EPA Method 19 shall be used to calculate exhaust flow rate through the exhaust stack, except that EPA Method 2 shall be used to calculate the flow rate for purposes of particulate emission testing.

7.4.7 Testing shall be performed at each of the five load levels described in Title 40 C.F.R. Part 89, Subpart E, Appendix B, Table 2, and data for each pollutant shall be reduced to a single weighted average value using the weighting factors specified in that table. Three test runs shall be conducted for each engine at each load condition. Each test run must be at least 60 minutes.

7.4.7.1 For each pollutant, compliance shall be demonstrated by comparing the single weighted-average value to the corresponding Condition 4.3.1 emission standard.

7.4.7.2 For purposes of determining the engine brake horsepower during each test run, the dynamometer requirement in Title 40 C.F.R. Part 89, Subpart E shall be replaced with corresponding measurement of generator electrical output and derivation of the mechanical horsepower output based on engine-specific performance curves provided by the manufacturer.

7.4.8 Analyzer data shall be recorded at least once every minute during tests. Engine runtime, measured generator electrical output, measured fuel usage, and the derived engine mechanical horsepower output shall be recorded during each test run, for each load, and shall be included in the test report.

7.4.9 Fuel usage data shall be recorded during tests and shall be included in the test report.

7.5 A test plan shall be submitted to Ecology at least 30 days prior to any test.

7.6 Test reports shall be submitted to Ecology within 30 days of the test. The report shall contain emission calculations.

8.0 General Conditions

8.1 **Availability of Order** - Legible copies of this Order and the O&M Manual shall be on-site in a location known by and available to employees in direct operation of the described equipment and available to Ecology upon request.

8.2 **Equipment Operation** - Operation of the facility shall be conducted in compliance with all data and specifications submitted as part of the NOC application process and in accordance with the O&M manual, unless otherwise approved in writing by Ecology.

8.3 **Activities Inconsistent with this Order** - Any activity undertaken by the permittee, or others, in a manner which is inconsistent with the application of this Order, shall be subject to Ecology enforcement under applicable regulations.

8.4 **Compliance Assurance Access** - Access to the source by the United States Environmental Protection Agency or the Department of Ecology shall be permitted upon request for the purposes of compliance assurance inspections. Failure to allow access is grounds for revocation of this Order.

8.5 **Recordkeeping** - Records of all data shall be maintained in a readily retrievable manner for a period of five years and be made available at the plant site to authorized representatives of Ecology upon request.

8.6 **Discontinuing Construction** - This Order shall become invalid if construction is not commenced within 18 months after the receipt of final approval, if construction is discontinued for a period of 18 months or more, or if construction is not complete within a reasonable time. Ecology may extend the 18-month period upon a satisfactory showing that an extension is justified.

8.7 **Discontinuing Operation** - It shall be grounds for rescission of this approval if physical operation is discontinued for a period of 18 months or more. Ecology may extend the 18-month period upon a satisfactory showing that an extension is justified.

8.8 **Registration** - Periodic emissions inventory and other information may be requested by Ecology. Information will be submitted within 30 days of receiving the request, unless otherwise specified. All fees will be paid by the date specified.

8.9 **Testing** - When complaint investigation, visible emissions observations or other information obtained by Ecology indicates the need to measure emissions, Ecology may require the permittee to conduct material analysis or air emission testing. This testing requirement is in addition to any testing required by Ecology under WAC 173-400-105.

8.10 **Outdoor Burning** - No outdoor burning shall be performed on-site.

8.11 **Obligations Under Other Laws or Regulations** - Nothing in this Order shall be construed so as to relieve the permittee of its obligations sunder any state, local, or federal laws or regulations.

8.12 **Maintaining Compliance** - It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

Authorization may be modified, suspended or revoked in whole or part for cause, including, but not limited to, the following:

I. Violation of any terms or conditions of this authorization.

II. Obtaining this authorization by misrepresentation or failure to disclose fully all relevant facts.

The provisions of this authorization are severable and, if any provision of this authorization or application of any provision to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this authorization, shall not be affected thereby.

YOUR RIGHT TO APPEAL

You have a right to appeal this Order to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. “Date of receipt” is defined in RCW 43.21B.001(2).

To appeal you must do all of the following within 30 days of the date of receipt of this Order:

- File your appeal and a copy of this Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Order on Ecology in paper form - by mail or in person (see addresses below). E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel RD SW STE 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

DATED in Union Gap, Washington, on January 29, 2018.

Prepared by:

Ryan Vicente

Ryan Vicente, PE
Air Quality Program
Department of Ecology
State of Washington



Approved by:

Sanjay Barik, Section Manager
Central Regional Office
Department of Ecology
State of Washington

Technical Support Document for
Notice of Construction Approval Order No. 18AQ-C225
Puget Sound Energy – Cascade IT Facility
Cle Elum, WA

Prepared by: Ryan Vicente, PE, as of 1/29/18

1.0 Project Summary

Puget Sound Energy's Cascade IT Facility (the Permittee) is constructing a modular data center. The project qualifies as a minor source with two new diesel-fired emergency generators.

2.0 Application Processing

2.1 Timeliness

Application Received (date)	Initial Completeness Determination (date)	# of days from App Received to Initial Completeness Determination (target = 30)	Complete Application Received (date)	Draft Permit Proposed (date)	# of days from Complete Application to Draft Permit (target = 60)	Public Comment Period closed (date)	Date Final Decision issued	# of days from complete application received to final decision issued (target = 60)	Start to finish total days from application in to final decision out
9/8/17	9/18/17	10	1/5/18	-	-	11/29/17	1/29/18	24	143

2.2 Public Notice

Receipt of the application was posted on Ecology's Public Involvement Calendar from 11/14/17 through 11/29/17. No requests for a public comment period were received; therefore, no additional public notice is required.

2.3 Applicant Review

The applicant and consultant were sent a draft of the permit for factual review on 1/18/18. Comments from consultant were transmitted via a phone call on 1/22/18. The consultant requested: a change in wording prohibiting stack caps (wanted wording that allowed hinged counter-weighted flaps); and an allowance to extend manufacturer warrantee of the engines, in lieu of testing after the initial warrantee period expires. I made both revisions to the permit as requested. No remodeling was needed for the requested revisions.

2.4 Fees

The fee for this action is $1,500 ('basic project' category) + $95 per hr after 16 hours. Ecology received payment of the $1,500 on 7/10/17 (initial application fee was transferred to this project after the project was relocated). I spent 47 hours on this permit action. An additional fee of $2,945, was invoiced on 1/29/18; payment was received the same day.

2.5 SEPA

The City of Cle Elum issued a Determination of Nonsignificance on 10/17/17.

3.0 Applicable Regulations

3.1 State Regulations

3.1.1 New Source Review Applicability

The unrestricted potential to emit (PTE) of the source exceeded the WAC 173-400-110 Table 110(5) exemption levels for five criteria pollutants: carbon monoxide, nitrogen oxides, PM_{10}, $PM_{2.5}$, and total suspended particulates. Therefore, the project is subject to new source review per WAC 173-400-110(2).

The unrestricted PTE of the source exceeded the WAC 173-460-150 de minimis emission values for nine Toxic Air Pollutants (TAPs): acrolein, benzene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, diesel engine exhaust particulate, formaldehyde, naphthalene, and nitrogen dioxide. Therefore, the project is subject to new source review per WAC 173-400-110(2) and WAC 173-460-040(1).

3.1.2 General Standards for Maximum Emissions

WAC 173-400-040(2) generally limits visible emissions from all sources to no more than three minutes of 20 percent opacity, in any one hour, of an air contaminant from any emissions unit. However, this source category has routinely been limited by 'presumptive BACT' within our region to 5 percent opacity. The lower limit is specified in the Approval Order.

3.1.3 Emission Standards for Combustion and Incineration Units

WAC 173-400-050(1) limits emissions of PM from combustion units to 0.1 grains per dry standard cubic foot (dscf) of exhaust gas. I verified that the proposed BACT/tBACT for the project limits emissions to no more than 0.005 grains/dscf. The higher limit was not included in the permit.

3.1.4 Emission Standards for General Process Units

The WAC 173-400-030 definition of general process units excludes combustion from procedures which would trigger such categorization. Therefore, standards under that section do not apply to this project.

3.1.5 Emission Standards for Sources Emitting Hazardous Air Pollutants

No area source rules, National Emissions Standards for Hazardous Air Pollutants (NESHAPs), applicable to this source category are adopted by reference at WAC 173-400-075(6)(c)(i).

3.1.6 Standards of performance for new sources.

By way of the adoption by reference specified at WAC 173-400-115(1)(a), Title 40 Code of Federal Regulations (40 C.F.R.) Part 60 Subpart IIII (the ICE NSPS) applies to both engines, as the regulation existed on January 1, 2016. The ICE NSPS was last revised on July 7, 2016; however, changes to the regulation were limited to Tier 4 certified engines and engines in Alaska. Therefore, requirements of the state-adopted version are equivalent to the current federal version (discussed below).

3.2 Federal Regulations

3.2.1 National Emission Standards for Hazardous Air Pollutants for Source Categories

40 C.F.R. Part 63 Subpart ZZZZ (the RICE NESHAP) applies to both engines. Condition 1 of the Order requires compliance with this regulation.

However, both engines are also subject to the ICE NSPS (see below). For such scenarios, 40 C.F.R. §63.6590(c) specifies that the engines shall meet the requirements of the NESHAP by meeting the requirements of NSPS; no further requirements apply to the engines.

3.2.2 Standards of Performance for New Stationary Sources

40 C.F.R. Part 60 Subpart IIII (the ICE NSPS) applies to both engines. The regulation specifies:

- Criteria for classification as emergency engines.
- Emission standards for the engines.
- Fuel, monitoring, compliance, testing, and notification requirements for the Permittee.

Condition 1 of the Order requires general compliance with this regulation. The applicable emission standards specified by the regulation were accepted as BACT; they are specified as emission limits in Condition 4.3.4 of the Order. I also verified the proposed annual operation scenarios meet the regulations requirements for emergency stationary engines.

4.0 Emissions

4.1 Emission Factors

Emission unit specific emission factors were taken from the *Cummins Exhaust Emission Data Sheet (EDS-1063)* for unburned hydrocarbons (considered VOCs), NO_X, CO, diesel-engine exhaust particulate (DEEP), and SO_2. Generic stationary diesel-engine emissions factors for 15 additional Toxic Air Pollutants were taken from *EPA's AP-42 Compilation of Air Pollutant Emission Factors, 5th Edition, Volume 1*, Chapter 3.4, Tables 3.4-3 and 3.4-4.

4.2 Best Available Control Technology | Best Available Control Technology for Toxics

The Permittee considered multiple alternatives in their BACT/tBACT analysis:

- An 'Integrated Control Package' consisting of a diesel-particulate filter, diesel-oxidation catalyst, and urea-based selective catalytic reduction.
- A urea-based selective catalytic reduction system by itself.
- Catalyzed diesel-particulate filter (a diesel-particulate filter and a diesel-oxidation catalyst in a single package).
- A diesel-oxidation catalyst by itself.
- Emission controls inherent to EPA Tier 2-certified engines.

In the analysis, the consultant successfully demonstrated that add-on emission controls were cost prohibitive; therefore, the consultant proposed EPA Tier-2 certification as BACT and tBACT. I agree that the proposal meets or exceeds: BACT for emissions of PM, VOC (unburned hydrocarbons), NO_X, CO, and SO_2; and tBACT for emissions of DEEP. For the remainder of the TAPs subject to review, I accept the AP 42 emissions factors as meeting BACT due to lack of information to indicate otherwise.

4.3 Additional Voluntary Emission Controls

The Permittee and applicant proposed voluntary installation of catalyzed diesel-particulate filters for each engine. The filters were proposed in order to lower the PTE of DEEP such that modeled concentrations of the pollutant do not exceed the ASIL. As a result, the source impact analysis was acceptable and approval of the project may be issued through this first-tier review.

5.0 Ambient Air Quality Standards

Modeling was required for DEEP and NO_2, as those TAPs are emitted above their respective WAC 173-460-150 small quantity emission rates. The modeling demonstrated that estimated concentrations of both TAPs will remain below acceptable source impact level concentrations.

Since the PTE of the source, as limited by the Order, was below each of the criteria pollutant WAC 173-400-110 Table 110(5) exemption levels, modeling was not required for criteria pollutants. This is in keeping with prior practice within this section, where it is assumed that the exemption levels were based on concentrations which would not cause or contribute to violations of the National Ambient Air Quality Standards (NAAQS) or Washington Ambient Air Quality Standards (WAAQS).