Cle Elum Critical IT Infrastructure Project

Notice of Construction Application/New Source Review

Puget Sound Energy

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Quality information

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1. Introduction

Puget Sound Energy (PSE) is submitting this Notice of Construction Application for two 1,000 kWe emergency diesel powered generators. The emergency generators will support PSE's Critical IT Infrastructure Project (IT Project) at the Cle Elum site near PSE's Cascade substation. The proposed IT project will be a minor air emission source that will require an air permit.

The balance of this document is divided into sections, which address each component of the air permitting process as noted below:

- Section 2.0 – Project Description
- Section 3.0 – Air Pollutant Emissions Estimates (Criteria and Toxic Air Pollutants)
- Section 4.0 – Emission Standard Compliance
- Section 5.0 – Best Available Control Technology
- Section 6.0 – Ambient Air Impact Analysis
- Section 7 SEPA Compliance

Additional details to support the permit application are presented in the Appendices listed below:

- Appendix A – Washington Department of Ecology Forms
- Appendix B – Emission Calculations and Operating Data
- Appendix C – Cummins Data Sheets
- Appendix D – Process Flow Diagram and Plot Plan
- Appendix E – Air Quality Modeling Files

2. Project Description (Section III of the NOC Application Form)

2.1 Facility Description

Puget Sound Energy is proposing to install a Critical IT Infrastructure Project at a parcel of land in Cle Elum, WA to replace existing aging facilities throughout PSE's service territory and to mitigate potential risks associated with recovery and availability of critical IT applications following a major natural disaster, such as an earthquake or flood. Installing the IT Project at the Cle Elum site in Eastern Washington would minimize this risk by providing geographical separation between critical IT facilities located in seismic fault and flood zones in Western Washington.

The proposed IT Project would consist of up to 5 pre-built server modular units, including utility support pods, an emergency back-up power source (two diesel generators), and modular mechanical system all installed on a concrete slab and surrounded by security fencing. The entire IT Project footprint is expected to be less than 0.5 acres and would be located next to the existing PSE substation in Cle Elum. The location of the site is shown in Figure 2-1. A plot plan is shown in Figure 2-2.

On-site construction of the emergency diesel generator emission units is expected to start in January 2018.

2.2 Diesel Powered Emergency Generators

The new emission sources will be two Cummins DQFAD 1,000 kWe diesel powered emergency generator sets. The generators will each be powered by Cummins QST30-G5-NR2 diesel engines rated at 1,482 bhp for standby operations. Specifications for the emergency generators are presented in Appendix C.

Each generator will be operated only as an emergency generator, with usage and runtime hours limited to those for "emergency generators" by the federal New Source Performance Standard (NSPS) Subpart IIII. NSPS Subpart IIII requires that emergency engines satisfy Tier 2 emission standards as defined by the federal regulations (40 CFR Part 89). Even though the federal regulations require the emergency generators to satisfy only U.S. Environmental Protection Agency (EPA) Tier 2 emission limits, PSE voluntarily proposes the use of a catalyzed diesel particulate filter to achieve 85% control of diesel engine exhaust particulate (DEEP) emissions.

The emission estimates in Table 2-1 and ambient air impact modeling included in this permit application are based on the operating modes listed below:

- Routine testing of 2 engines for 1 hr/month at 40% load resulting in 24 total hr/yr at 40% load.
- Emergency operation of 2 engines for 4 days per year at 40% load resulting in 192 total hr/yr at 40% load.
- Load testing of 2 engine for 2.5 hr/yr at 100% load resulting in 5 total hr/yr at 100% load.
- Commissioning of 2 engines for 25 hr/yr at up to 100% load resulting in 50 total hr/yr at 100% load.

Based on above worst case operating scenarios total operating hours are expected to be limited to 271 hr/yr. Fuel use will not exceed 10,261 gal/yr.

2.3 Compliance with State and Federal Regulations

The diesel engines powering the proposed generators will comply with the following applicable air regulations, in accordance with the Clean Air Act. These requirements are specified in:

- Chapter 70.94 Revised Code of Washington (RCW) (Washington Clean Air Act)
- Chapter 173-400 Washington Administrative Code (WAC) (General Regulations for Air Pollution Sources)
- Chapter 173-460 WAC (Controls for New Sources of Toxic Air Pollutants)
- 40 Code of Federal Regulations (CFR) Part 60 Subpart A (General Provisions)
- 40 CFR Part 60 Subpart IIII (Stationary Compression Ignition Internal Combustion Engines)
- 40 CFR Part 63 Subpart ZZZZ [National Emission Standards for Hazardous Air Pollutants (NESHAP) for Reciprocating Internal Combustion Engines (RICE)].

Specifically, the proposed project includes sources of air contaminants and will follow applicable air contaminant regulations as listed in:

- RCW 70.94.152
- WAC 173-400-113
- WAC 173-460-040.

The facility is located in an attainment area for all Clean Air Act criteria pollutants. Since the maximum potential-to-emit for all criteria pollutants will be less than 250 tons per year, PSE is applying for an approval order to meet minor New Source Review (NSR) requirements. Facilities that produce more than 100 tons per year of any criteria pollutant are considered major sources under the federal regulation 40 CFR Part 70 and the state regulation WAC 173-410 et seq., and those that produce less than 100 tons per year are considered minor sources. Potential-to-emit estimates provided in Section 2.0 demonstrate that the facility will emit:

- Less than 100 tons per year of any criteria pollutant [particulate matter (PM), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and volatile organic compounds (VOCs)
- Less than 10 tons per year of any EPA hazardous air pollutant (HAP)
- Less than 25 tons per year of total HAPs.

As a result, neither a Prevention of Significant Deterioration (PSD) NSR pre-construction permit nor a Title V operating permit is required.

NSR requirements for sources and portable sources are specified in WAC 173-400-110. Construction of new emission units that have the potential to emit below the levels listed in WAC 173-400-110, Table 110(5) is exempt from NSR requirements. Potential project emissions are compared to the Washington NSR exemption levels in Table 2-1. Only potential emissions of DEEP exceed the applicable Washington minor NSR exemption level.

Table 2-1: NSR Exemption Levels

Pollutant	Potential Emissions [(a)]	NSR Exemption ton/yr	Exempt Yes or No
Carbon Monoxide	0.1271	5.0	Yes
Nitrogen Oxides	1.0309	2.0	Yes
PM_{10}	0.0549	0.75	Yes
$PM_{2.5}$	0.0549	0.5	Yes
Sulfur Dioxide	0.0246	2.0	Yes
Volatile Organic Compounds	0.0215	2.0	Yes
Air Toxic Emissions			
Diesel Engine Exhaust Particulate Matter	0.00500	0.00032	No
Other Air Toxic Emissions	Variable, depending on pollutant		Yes

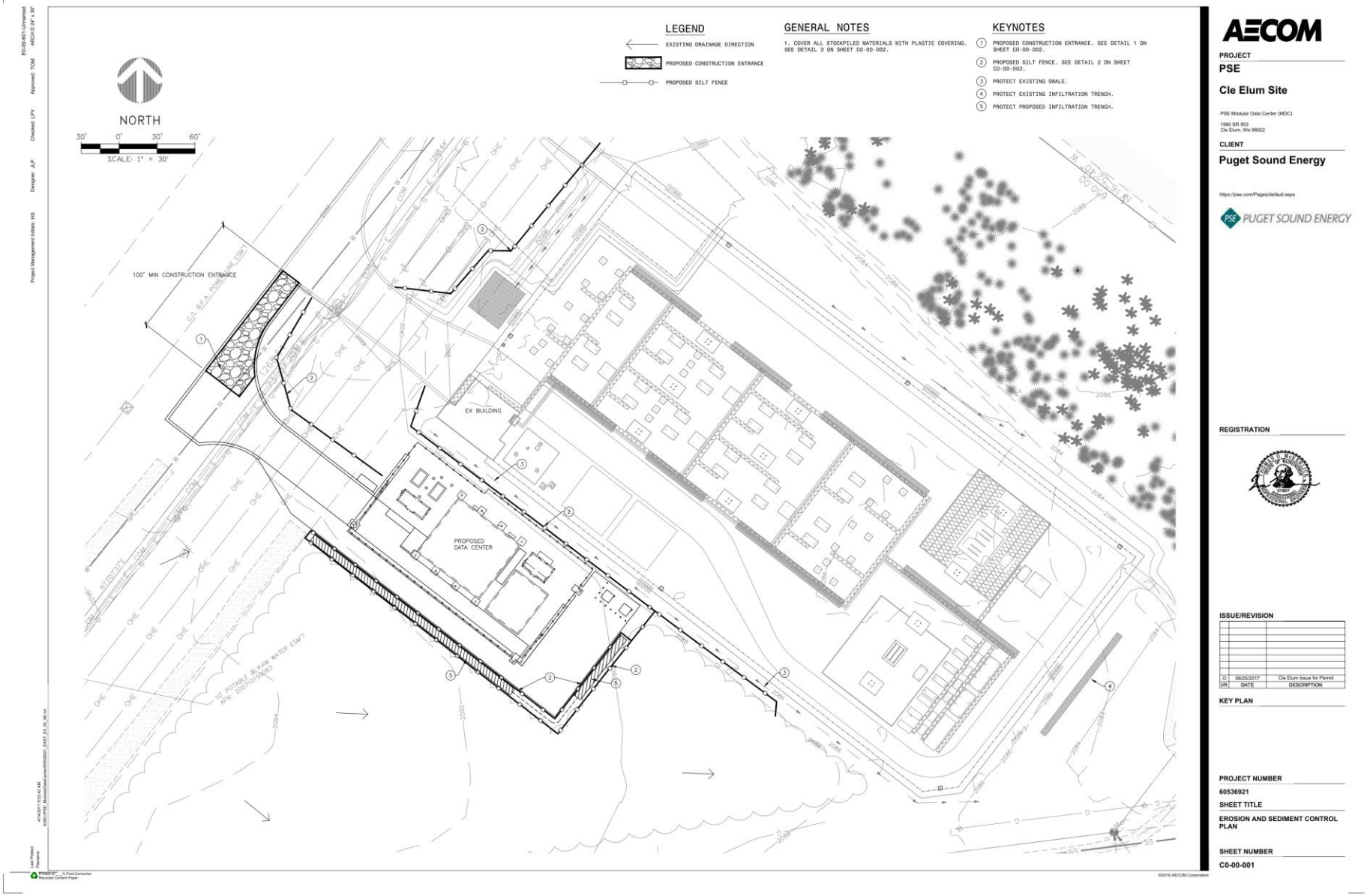
[(a)] Potential emissions are for 2 engines operated for a combined total of 238 hours/year with a DPF and 7,854 gal/year..

The generators will be operated in a manner that satisfies the definition and operating requirements of "emergency engines" according to the federal regulations NSPS Subpart IIII and NESHAP Subpart ZZZZ. NSPS Subpart IIII requires that each emergency generator shall be manufactured and certified to meet EPA Tier 2 emission limits and operate only for limited times and circumstances. NESHAP Subpart ZZZZ dictates that compliance with the NSPS regulations for emergency engines at area sources of HAPs constitutes compliance for Subpart ZZZZ.

Figure 2-1: Cle Elum IT Project Location



Figure 2-2: Plot Plan



3. Air Pollutant Emission Estimates (Sections V and VI of the NOC Application Form)

Air pollutant emissions rates were calculated for the two emergency diesel generators described in earlier sections of this application per the requirements of WAC 173-400-113 and WAC 173-460-050. Emission rates were quantified for criteria pollutants and toxic air pollutants (TAPs). The basis for the emission calculations is described in the following sections. Detailed calculations are presented in Appendix B.

Emission estimates are based on the operating modes listed below:

- Routine testing of 2 engines for 1 hr/month at 40% load resulting in 24 total hr/yr at 40% load.
- Emergency operation of 2 engines for 4 days per year at 40% load resulting in 192 total hr/yr at 40% load.
- Load testing of 2 engine for 2.5 hr/yr at 100% load resulting in 5 total hr/yr at 100% load.
- Commissioning of 2 engines for 25 hr/yr at up to 100% load resulting in 50 total hr/yr at 100% load.

Based on above worst case operating scenarios total operating hours are expected to be limited to 271 hr/yr. Fuel use will not exceed 10,261 gal/yr.

3.1 Criteria Pollutants

Emission factors (g/bhp) of VOCs, NOx, CO, DEEP before control, and SO_2 were based on an Exhaust Emission Data Sheet provided by Cummins which is presented in Appendix C. DEEP emissions after control were based on the use of a catalyzed diesel particulate filter to achieve 85% control. Cummins emission factors and related operating data were available for loads of 25%, 50%, 75%, and full standby (100%). Emission factors for 40% load were derived by linear interpolation between the 25% and 50% load data.

DEEP emissions are based on EPA non-road emissions testing (ISO 8178) which is micro-dilution tunnel test using a filter at 125 ºF. $PM_{10}/PM_{2.5}$ emissions assume the use of EPA Methods 201a and 202. EPA Method 202 uses an ice-cooled condenser with an outlet temperature at 68 ºF that may result in higher condensable emissions. In order to conservatively account for possible higher condensable emissions based on EPA Methods 201a and 202, $PM_{10}/PM_{2.5}$ emissions were assumed to be the sum of DEEP and hydrocarbons.

Tables B-1 to B-3 in Appendix B present the detailed emission calculations. Annual emissions of NOx are estimated as 1.0 tons/yr. Emissions of other pollutants are all less than 0.13 tons/yr. All potential criteria pollutant emissions are less than Washington NSR exemption thresholds.

3.2 Toxic Air Pollutants

Emissions of toxic air pollutants were based on the operating scenarios described above as well as several additional operating restrictions. Maximum 1-hour emissions are based on one engine operating at 100% load for one hour. The two engines will not be load tested at 100% load at the same time. Commissioning will also result in less emissions than one engine at 100% load. Maximum 1-hour emissions of NO_2 are conservatively based on 20% of the maximum 1-hour NOx emission rate. Maximum daily emissions are based on 2 engines operating at 40% load for 24 hours. This operating scenario could occur during an emergency. Maximum annual emissions are based on the worst case operating scenario described in Section 3.1, maximum annual fuel use at 10,261 gal/yr and 1,385 MMBtu/yr.

Detailed emission calculations are presented in Table B-4 in Appendix B. Emissions of DEEP are 16 times the Small Quantity Exemption Rate. Emissions of other toxic air pollutants are each well below the applicable Small Quantity Exemption Rate.

4. Emission Standard Compliance (Sections VII of the NOC Application Form)

The emergency diesel generators are subject to the emission control requirements under NSPS Subpart IIII, “Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.” The runtime limits requested for the generators satisfy the definition of “emergency generator” as specified by NSPS Subpart IIII. Based on that definition of “emergency generators,” NSPS Subpart IIII indicates that the new generators are subject to EPA Tier 2 emission limits as specified by 40 CFR Part 89.

PSE will conduct all notifications, generator maintenance, recordkeeping, and reporting as required by NSPS Subpart IIII.

The new generators are also subject to the NESHAP requirements under Subpart ZZZZ, “National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (RICE).” NESHAP Section 63.6590(c)(1) specifies requirements for emergency RICEs that are also subject to NSPS Subpart IIII. Because the Cle Elum IT facility will be an “area source” of federal HAPs, NESHAP Section 63.6590(c)(1) dictates that the new emergency generators comply with Subpart ZZZZ as long as PSE operates the generators in compliance with NSPS Subpart IIII.

5. Best Available Control Technology (Section VIII of the NOC Application Form)

Best available control technology (BACT) is an emission limitation based on the maximum degree of reduction that can be achieved for each air pollutant emitted from any new or modified stationary source. BACT is determined using a "top-down" approach as described in the EPA's draft *New Source Review Workshop Manual: Prevention of Significant Deterioration and Non-Attainment Area Permitting.* The following five steps are involved in the top-down process:

Step 1: The first step in the top-down analysis is to identify all available control technologies that can be practically applied for each emission unit.

Step 2: The second step is to determine the technical feasibility of potential control options and to eliminate options that are demonstrated to be technically infeasible.

Step 3: The third step is to rank all remaining options based on control effectiveness, with the most effective control alternative at the top.

Step 4: The fourth step is to evaluate the remaining control alternatives. If the top-ranked control alternative is considered unacceptable based on disproportionate economic, environmental, and/or energy impacts, it is discarded.

Step 5: The fifth and final step is to choose the top-ranked alternative from the list of control options remaining after applying Steps 1 through 4. This option becomes the BACT, including the resulting emission rate.

The "top-down" approach was used in this analysis to evaluate available pollution controls for the the Cle Elum ITProject.

5.1 Identification of Available and Technically Feasible Emission Controls (Steps 1, 2, and 3)

Based on many BACT analyses for large emergency generator projects in Washington, the following technologies were considered commercially available and technically feasible for the IT Project:

- Integrated Control Package consisting of an integrated diesel particulate filter, diesel oxidation catalyst, and urea-based selective catalytic reduction. This system is highly efficient for control of NOx, $PM_{2.5}$/DEEP, CO, VOCs, and particulate and gaseous toxic air pollutants. This technology would provide the maximum removal efficiencies for all pollutants.
- Urea-based selective catalytic reduction system. This system is highly efficient for control of NOx and NO_2. .
- Catalyzed diesel particulate filter, which includes a diesel particulate filter and a oxidation catalyst in a single package. This system is highly efficient for control of $PM_{2.5}$/DPM, CO, VOCs, and particulate and gaseous toxic air pollutants..
- Oxidation catalyst by itself. This system is highly efficient for removal of CO, VOCs, and gaseous TAPs. It is marginally effective for removal of $PM_{2.5}$/DPM.
- Emission controls inherent to EPA Tier 2-certified engines.

5.2 Evaluate Technically Feasible Emission Control Technologies (Step 4)

The available technologies listed in Section 5.1 have been evaluated for many, recent emergency generators air permits in Washington.[1] In every case, emission controls inherent to Tier 2-certified engines was determined to be BACT because the available add-on emission controls were not cost effective. As recently as June 2017, in a draft permit for a group of 3,000 kWe emergency generators, the Washington Department of Ecology determined that emission controls inherent to Tier 2-certified engine was BACT for both criteria and toxic air pollutants.[2] Because the 1,000 kWe emergency proposed for the IT Project are smaller than the generators in the most recent draft permit as well as generators in other permits, the cost effectiveness for add-on emission controls would be higher due to economies of scale.

For the IT Project, potential emissions of all criteria pollutants are below the WAC 173-400-110, Table 110(5) NSR permitting exemption levels. Only potential emissions of DEEP exceed the toxic air pollutant Small Quantity Emission Rate listed in WAC 173-460-150. Although previous BACT determinations in Washington for other similar diesel generator projects demonstrate that BACT is no add-on controls, cost analyses of the catalyzed diesel particulate filter and oxidation catalyst alone options were conducted for the IT Project.

Tables B-6 and B-7 in Appendix B provide capital and annual cost estimates for a catalyzed diesel particulate filter. As shown Table B-7, the cost effectiveness for a catalyzed diesel particulate filter is $602,000 per ton of emissions controlled. Due to the excessive costs, the use of a catalyzed diesel particulate filter is not BACT.

Tables B-8 and B-9 in Appendix B provide capital and annual cost estimates for an oxidation catalyst. As shown Table B-9, the cost effectiveness for an oxidation catalyst is $897,000 per ton of emissions controlled. Due to the excessive costs, the use of an oxidation catalyst is not BACT.

5.3 Recommended BACT(Step 5)

Although add-on emission controls are technically feasible, they are not BACT due to very high cost effectiveness. Therefore, emission controls inherent to EPA Tier 2-certified engines is proposed as BACT. However, PSE will voluntarily install catalyzed diesel particulate filters to reduce DEEP emissions by 85%.

[1] Data Centers and Air Quality | Business and Industry Requirements | Air Quality Program | Washington State Department of Ecology

[2] http://www.ecy.wa.gov/programs/air/quincydatacenter/docs/Vantage_Prelim_Detada.pdf

6. Ambient Air Impact Analysis(Section IX of the NOC Application Form)

The proposed emergency diesel generators will result in annual emission increases of DEEP in excess of the Small Quantity Emission Rates (SQER). As stated in Sections 3.1 and 3.2, all criteria pollutants are less than Washington NSR exemption thresholds and all toxic air pollutants are each well below their SQER (except DEEP). Therefore modeling was performed to demonstrate that the annual DEEP emissions associated the new diesel generators would not exceed the Acceptable Source Impact Level (ASIL).

Appendix B (Tables B-1 through B-4) contains an evaluation of each emitted criteria and toxic air pollutant versus its corresponding Washington NSR exemption thresholds or SQER, as applicable.

For DEEP modeling, the analyses were performed in accordance with the United State Environmental Protection Agency (USEPA) "Guideline on Air Quality Models" (GAQM)[3] along with guidance from Washington State Department of Ecology (Ecology).

6.1 Dispersion Model

AERSCREEN[4] is USEPA's recommended screening-level air quality model based on the AERMOD[5] modeling system. The AERSCREEN model consists of two main components: 1) the MAKEMET program which generates a site-specific matrix of screening-level meteorological conditions for input to the AERMOD model; and 2) the AERSCREEN command-prompt interface program. AERSCREEN interfaces with MAKEMET for generating the meteorological matrix, but also interfaces with AERMAP and BPIPPRM to automate the processing of terrain and building information respectively, and interfaces with the AERMOD model utilizing the SCREEN option to perform the modeling runs.

The latest version of AERMOD (Version 16216r) was utilized with the AERSCREEN interface to perform this screening-level modeling for the new diesel generators. Specifically, AERSCREEN was utilized to model the engines to produce normalized ground-level concentrations that were then used to analyze compliance with the ASIL for DEEP. The modeling used AERSCREEN defaults, included building downwash, terrain considerations, and rural dispersion.

6.2 Aerodynamic Downwash Analysis

The USEPA's Building Profile Input Program (BPIP-Version 04274) that is appropriate for use with PRIME algorithms in AERMOD was used to incorporate downwash effects into the AERSCREEN model simulation. The direction-specific building data was generated with the BPIP PRIME program by passing a BPIP input file directly into the AERSCREEN interface. BPIP PRIME addresses the entire structure of the wake, from the cavity immediately downwind of the building, to the far wake. Because BPIP PRIME addresses cavity impacts, a separate analysis of the potential downwashing plume's cavity impacts was not addressed. A plot of the building structures used to generate the BPIP input file along with the engine stack locations is shown in **Figure 6-1**.

Please note, since the stacks are so closely located, and AERSCREEN can only model 1 source at a time, only one model iteration was performed even though two stacks are shown in **Figure 6-1**.

[3] USEPA 2017. Guideline on Air Quality Models (Revised). Codified in the Appendix W to 40 CFR Part 51. Office of Air Quality Planning and Standards, Research Triangle Park, NC. January 17, 2017.

[4] AERSCREEN User's Guide. USEPA-454/B-16-004 (December 2016). Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

[5] User's Guide for the AMS/EPA Regulatory Model (AERMOD). USEPA-454/B-16-011 (December 2016). Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

Figure 6-1: Buildings and CT Stack Location Included in the BPIP Input File



6.3 Receptor Grid and AERMAP Processing

AERMAP was used as a part of the AERSCREEN interface to assimilate terrain datasets for use within the model. An array of receptors was created using a minimum ambient distance of 8 meters from the source. Receptor distances are automatically calculated within AERSCREEN depending on the user specified final receptor distance, which was set to be 5 kilometers. The receptor spacing values used between zero and 5 kilometers is every 25 meters, as defined in the AERSCREEN Users Guide

The AERSCREEN terrain option was used in modeling. Topographic elevations are assigned to each receptor using United States Geological Survey 1 arc second resolution National Elevation Dataset (NED) topographic maps using AERMAP (Version 11103) within the AERSCREEN interface.

6.4 Meteorological Data Processing

MAKEMET was utilized as part of the AERSCREEN package to generate the meteorological inputs to AERSCREEN. The MAKEMET program generates a matrix of meteorological conditions, in the form of AERMET-ready surface (AERSCREEN.sfc) and profile (AERSCREEN.pfl) files, based on user-specified surface characteristics, ambient temperatures, minimum wind speed, and anemometer height.

The current version of MAKEMET also allows the user to specify the minimum wind speed to include in the matrix and the anemometer height as well. MAKEMET has the capability to include the adjustment to surface friction velocity, u*, that is also a part of AERMET. These options have been included to facilitate comparisons of AERSCREEN estimates to estimates from AERMOD in a refined mode to eliminate differences that may be due to either the minimum wind speed in the refined data or the anemometer height. MAKEMET also allows the user to specify a single wind direction or a range of wind directions for the meteorological matrix. This option may be useful for applications involving building downwash to ensure that building dimensions for all sectors are included in the screening analysis.

For this study MAKEMET was run using default options within AERSCREEN. AERSCREEN's default options for MAKEMET utilize an anemometer height of 10 meters with a minimum threshold wind speed of 0.5 m/s. The default minimum and maximum ambient temperature thresholds of 250K and 310K were also utilized.

A surface characteristics file was generated utilizing AERSURFACE and input into the AERSCREEN interface to run MAKEMET. AERSURFACE was run at the proposed project location with 1992 USGS National Land Cover Dataset assuming a five season profile including the winter with snow season for the months of December, January, and February. The remaining seasonal classifications were as follows:

- Late autumn after frost and harvest, or winter with no snow – October, November
- Transitional spring (partial green coverage, short annuals) – March, April, May
- Midsummer with lush vegetation – June, July, August
- Autumn with unharvested cropland – September

6.5 Source Data

The air dispersion modeling analysis was conducted for the engines using emission rates and flue gas exhaust characteristics (flow rate and temperature) consistent with the anticipated mode of annual operation which is 216 total hours of operation for both generators at 40% load and 55 hours of total operation for both generators at 100% load although only 1 generator will operate at 100% load at a given time.

The AERSCREEN modeling was conducted for each load case individually and the results were then added together to estimate the total concentration. A summary of the exhaust data and emissions (per generator) is provided in **Table 6-1** along with the modeled stack parameters and emissions.

Table 6-1: Modeling Stack Parameters for each CT Load Case

Description	Units	Gen 1 or Gen 2 @ 100% Load	Gen 1 @ 40% Load	Gen 2 @ 40% Load	40% Load Modeled Data
Operating Hours	hr	55.0	216.0		
Stack Height	ft	33.71	33.71	33.71	33.71
Stack Diameter	ft	1.17	1.17	1.17	1.17
Stack Flow	acfm	8,108	4,099	4,099	4,099
Stack Velocity	ft/s	126.40	63.91	63.91	63.9
Stack Gas Temp	ºF	890.0	704.0	704.0	704.0
DEEP Emission Rate	TPY	0.00148	0.00352		0.00352

6.6 Modeling Results

The modeled concentrations for annual DEEP are shown in **Table 6-2**. The DEEP modeled concentrations were compared to the ASIL. The DEEP modeled concentrations shown in **Table 6-2** are well below the ASIL. The maximum annual concentration occurs 30.0 meters (98.4 ft.) away from the modeled stack.

Table 6-2: DEEP Modeling Results

Load	Toxic Pollutant	Averaging Period	Modeled Concentration (ug/m^3)	ASIL (ug/m^3)	ASIL Exceeded	% of ASIL
40%	DEEP	Annual	0.0017	0.0033	No	52%
100%	DEEP	Annual	0.0004	0.0033	No	12%
Combined	DEEP	Annual	0.0021	0.0033	No	64%

7. SEPA Compliance (Section IV of the NOC Application Form)

The final SEPA checklist and SEPA determination is provided in Appendix F.

Appendix A: Washington Department of Ecology Notice of Construction Forms

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Construction Application

A notice of construction permit is required before installing a new source of air pollution or modifying an existing source of air pollution. This application applies to facilities in Ecology's jurisdiction. Submit this application for review of your project. For general information about completing the application, refer to Ecology Forms ECY 070-410a-g, "Instructions for Ecology's Notice of Construction Application."

Ecology offers up to 2 hours of free pre-application help. We encourage you to schedule a pre-application meeting with the contact person specified for the location of your proposal (see below). For more help than the initial 2 free hours, submit Part 1 of the application and the application fee. You may schedule a meeting with us at any point in the process.

Completing the application, enclose it with a check for the initial fee and mail to:

WA Department of Ecology
Cashiering Unit
P.O. Box 47611
Olympia, WA 98504-7611

For Fiscal Office Use Only:
001-NSR-216-0299-000404

Check the box for the location of your proposal. For help, call the contact listed below.		
	Ecology Permitting Office	**Contact**
☒ **CRO**	**Chelan, Douglas, Kittitas, Klickitat, or Okanogan County** Ecology Central Regional Office – Air Quality Program	Lynnette Haller (509) 457-7126 lynnette.haller@ecy.wa.gov
☐ **ERO**	**Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Stevens, Walla Walla, or Whitman County** Ecology Eastern Regional Office – Air Quality Program	Jolaine Johnson (509) 329-3452 jolaine.johnson@ecy.wa.gov
☐ **NWRO**	**San Juan County** Ecology Northwest Regional Office – Air Quality Program	Dave Adler (425) 649-7267 david.adler@ecy.wa.gov
☐ **IND**	**Kraft and Sulfite Paper Mills and Aluminum Smelters** Ecology Industrial Section – Waste 2 Resources Program Permit manager: _____	James DeMay (360) 407-6868 james.demay@ecy.wa.gov
☐ **NWP**	**U.S. Department of Energy Hanford Reservation** Ecology Nuclear Waste Program	Phil Gent (509) 372-7983 phil.gent@ecy.wa.gov

To request ADA accommodation, call (360) 407-6800, 711 (relay service), or 877-833-6341 (TTY).

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Construction Application

Check the box for the fee that applies to your application.

New project or equipment

[X]	**$1,500: Basic project** initial fee covers up to 16 hours of review
[ ]	**$10,000: Complex project** initial fee covers up to 106 hours of review

Change to an existing permit or equipment

[ ]	**$200: Administrative or simple change** initial fee covers up to 3 hours of review Ecology may determine your change is complex during completeness review of your application. If your project is complex, you must pay the additional $675 before we will continue working on your application.
[ ]	**$875: Complex change** initial fee covers up to 10 hours of review
[ ]	**$350** flat fee: **Replace or alter control technology equipment** (WAC 173-400-114) Ecology will contact you if we determine your change belongs in another fee category. You must pay the fee associated with that category before we will continue working on your application.

Read each statement, then check the box next to it to acknowledge that you agree.	
[X]	The initial fee you submitted may not cover the cost of processing your application. Ecology will track the number of hours spent on your project. If the number of hours Ecology spends exceeds the hours included in your initial fee, Ecology will charge you $95 per hour for the extra time.
[X]	You must include all information in this application. Ecology may not process your application if it does not include all the information requested.
[X]	Submittal of this application allows Ecology staff to inspect your facility.

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Construction Application

I. Project, Facility, and Company Information

1. Project Name	Cle Elum Critical IT Infrastructure Project
2. Facility Name	Cascade
3. Facility Street Address	1980 SR 903, Cle Elum, 98922
4. Facility Legal Description	IT Facility
5. Company Legal Name (if different than Facility Name)	Puget Sound Energy, Inc.
6. Company Mailing Address (street, city, state, zip)	9523 Willows Rd. NE, Redmond, WA 98052, Mail Stop: RDN02, Attn: Chris Perez

II. Contact Information and Certification

1. Facility Contact Name (who will be on-site)	Steven J Brooks
2. Facility Contact Mailing Address (if different than Company Mailing Address)	9523 Willows Road NE, Redmond WA 98052
3. Facility Contact Phone Number: 425-398-6075	4. Facility Contact Email: Steve.Brooks@pse.com
5. Billing Contact Name (who should receive billing information)	Alex Stamsos
6. Billing Contact Mailing Address (if different than Company Mailing Address)	AECOM, 111 SW Columbia, Suite 1500, Portland, OR 97201-5850, Attn: Alex Stamsos
7. Billing Contact Phone Number: 503-830-9397	8. Billing Contact Email: Alexandra.Stamsos@aecom.com
9. Consultant Name (optional – if 3rd party hired to complete application)	Jeffrey Connors
10. Consultant Organization/Company	AECOM
11. Consultant Mailing Address (street, city, state, zip)	250 Apollo Drive, Chelmsford, MA 01824
12. Consultant Phone Number: 978-905-2166	13.Consultant Email: Jeffrey.Connors@AECOM.COM
14. Responsible Official Name and Title (person responsible for project policy or decision-making)	Steve Brooks, Advisor IT Infrastructure Facilities Engineer
15. Responsible Official Mailing Address	9523 Willows Rd. NE, Redmond, WA 98052, Mail Stop: RDN02, Attn: Steve Brooks
16. Responsible Official Phone: 425-398-6075	17. Responsible Official Email: Steve.Brooks@PSE.com

18. Responsible Official Certification and Signature

I certify that the information on this application is accurate and complete.

Signature Steven J Brooks Date 8/29/2017

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Construction Application
Part 2: Technical Information

The Technical Information may be sent with this application to the Ecology Cashiering Unit, or may be sent directly to the appropriate Ecology office along with a copy of this application.

For al l sections, check the box next to each item as you complete it.

III. Project Description

Attach the following to your application:

- [X] Description of your proposed project
- [X] Projected construction start and completion dates
- [X] Operating schedule and production rates
- [X] List of all major process equipment with manufacturer and maximum rated capacity
- [X] Process flow diagram with all emission points identified
- [X] Plan view site map
- [X] Manufacturer specification sheets for major process equipment components
- [X] Manufacturer specification sheets for pollution control equipment
- [X] Fuel specifications, including type, consumption (per hour and per year), and percent sulfur

IV. State Environmental Policy Act (SEPA) Compliance

Check the appropriate box below.

- [ ] SEPA review is complete.
  Include a copy of the final SEPA checklist and SEPA determination (e.g., DNS, MDNS, EIS) with your application.

- [ ] SEPA review has not been conducted.

  - [ ] If SEPA review will be conducted by another agency, list the agency. You must provide a copy of the final SEPA checklist and SEPA determination before Ecology will issue your permit.

    Agency Reviewing SEPA:

    _____

  - [ ] If SEPA review will be conducted by Ecology, fill out a SEPA checklist and submit it with your application. You can find a SEPA checklist online at http://www.ecy.wa.gov/programs/sea/sepa/forms.htm.

DEPARTMENT OF ECOLOGY
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V. Emissions Estimations of Criteria Pollutants

Does your project generate air pollutant emissions? [X] Yes [ ] No

If yes, provide the following information about your air pollutant emissions:

[X] Air pollutants emitted, such as carbon monoxide (CO_2), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), and volatile organic compounds (VOC), particulate matter ($PM_{2.5}$, PM_{10}, TSP), sulfur dioxide (SO_2)

[X] Potential emissions of criteria air pollutants in tons per hour, tons per day, and tons per year (include calculations)

[ ] Fugitive air pollutant emissions – pollutant and quantity Not applicable.

VI. Emissions Estimations of Toxic Air Pollutants

Does your project generate toxic air pollutant emissions? [X] Yes [ ] No

If yes, provide the following information about your toxic air pollutant emissions:

[X] Toxic air pollutants emitted (specified in WAC 173-460-150[1])

[X] Potential emissions of toxic air pollutants in pounds per hour, pounds per day, and pounds per year (include calculations)

[ ] Fugitive toxic air pollutant emissions - pollutant and quantity Not applicable.

VII. Emission Standard Compliance

Does your project comply with all applicable standards identified? [X] Yes [ ] No

[X] Provide a list of all applicable new source performance standards, national emission standards for hazardous air pollutants, national emission standards for hazardous air pollutants for source categories, and emission standards adopted under the Washington Clean Air Act, Chapter 70.94 RCW.

VIII. Best Available Control Technology

[X] Provide a complete evaluation of Best Available Control Technology (BACT) for your proposal. Toxic BACT provided.

[1] http://apps.leg.wa.gov/WAC/default.aspx?cite=173-460-150

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IX. Ambient Air Impacts Analyses

Does your project cause or contribute to a violation of any ambient air quality standard or acceptable source impact level? ☐ Yes ☒ No

Provide the following:

☐ Ambient air impacts analyses for criteria air pollutants (including fugitive emissions)

☒ Ambient air impacts analyses for toxic air pollutants (including fugitive emissions)

☒ Discharge point data for each point included in ambient air impacts analyses (include only if modeling is required)

- ☒ Exhaust height
- ☒ Exhaust inside dimensions (diameter or length and width)
- ☒ Exhaust gas velocity or volumetric flow rate
- ☒ Exhaust gas exit temperature
- ☒ Volumetric flow rate
- ☒ Discharge description (i.e., vertically or horizontally) and if there are any obstructions (e.g., raincap)
- ☒ Emission unit(s) discharging from the point
- ☒ Distance from the stack to the nearest property line
- ☒ Emission unit building height, width, and length
- ☒ Height of tallest building on-site or in the vicinity, and the nearest distance of that building to the exhaust
- ☒ Facility location (urban or rural)

Appendix B: Emission Calculations and Operating Data

Table B-1 Operating Data and Emission Rates

Parameter	Units	Load					
Load	**%**	**25%[a]**	**40%[b]**	**50%[a]**	**75%[a]**	**80%[b]**	**100%[a]**
Generator Load	kWe	250	400	500	750	800	1,000
Engine Load	kW	277	442	553	829	884	1,105
Engine Load	bhp	371	593	741	1,112	1,186	1,482
Fuel	gal/hr	19.1	29.1	35.8	54.1	57.7	72.2
Fuel	MMBtu/hr	2.58	3.93	4.83	7.30	7.79	9.75
Fuel	Btu/bhp-hr	6,950	6,629	6,522	6,571	6,572	6,577
HC (unburned HC) / VOC	g/bhp-hr	0.120	0.108	0.100	0.080	0.078	0.070
NOx	g/bhp-hr	4.170	4.788	5.200	3.870	3.886	3.950
CO	g/bhp-hr	0.660	0.480	0.360	0.480	0.516	0.660
Diesel Engine Exhaust Particulate Matter (DEEP)	g/bhp-hr	0.190	0.166	0.150	0.120	0.118	0.110
SO_2	g/bhp-hr	0.110	0.104	0.100	0.100	0.102	0.110

(a) Cummins Exhaust Emission Data Sheet, 100 DQFAD.

(b) Estimated by AECOM

Table B-2 Hourly Emission Rates

Pollutant	Units	Load						Maximum
Load	%	25%	40%	50%	75%	80%	100%	
HC (unburned HC) / VOC	lb/hr	0.098	0.141	0.163	0.196	0.204	0.229	0.229
NOx	lb/hr	3.411	6.260	8.495	9.483	10.157	12.906	12.906
CO	lb/hr	0.540	0.628	0.588	1.176	1.349	2.156	2.156
Diesel Engine Exhaust Particulate Matter (DEEP) before control [(a)]	lb/hr	0.155	0.217	0.245	0.294	0.308	0.359	0.359
Diesel Engine Exhaust Particulate Matter (DEEP) after Control [(a)]	lb/hr	0.0233	0.0326	0.0368	0.0441	0.0463	0.0539	0.0539
PM_{10} [(b)]	lb/hr	0.1215	0.1737	0.2001	0.2401	0.2501	0.2826	0.283
$PM_{2.5}$ [(b)]	lb/hr	0.1215	0.1737	0.2001	0.2401	0.2501	0.2826	0.283
SO_2	lb/hr	0.090	0.136	0.163	0.245	0.267	0.359	0.359

(a) 85% control based on a catalyzed diesel particulate filter. No credit is being claimed for VOC or CO emission control.

(b) Diesel particulate matter emissions are based on EPA non-road emissions testing (ISO 8178) which is micro-dilution tunnel test using a filter at 125 ºF. PM_{10}/$PM_{2.5}$ emissions assume the use of EPA Methods 201a and 202. EPA Method 202 uses an ice-cooled condenser with an outlet temperature at 68 ºF that may result in higher condensable emissions. In order to conservatively account for possible higher condensable emissions based on EPA Methods 201a and 202, PM_{10}/$PM_{2.5}$ emissions were assumed to be the sum of diesel particulate emissions and hydrocarbons.

Table B-3 Operating Scenarios and NSR Applicability

Pollutant	Units	Load						Total	NSR Exemption ton/yr	Exempt Yes or No
Load	%	25%	40%	50%	75%	80%	100%			
Total Engine hours (a)	hr/yr	0	216.0	0	0	0	55.0	261.0		
Total Engine load	bhp/yr	0	128,088	0	0	0	81,510	209,598		
Total Fuel use	gal/yr	0	6,290	0	0	0	3,971	10,261		
Total Fuel use	MMBtu/yr	0	849	0	0	0	536	1,385		
HC (unburned HC) / VOC	ton/yr	0.0000	0.0152	0.0000	0.0000	0.0000	0.0063	0.0215	2.0	Yes
NOx	ton/yr	0.0000	0.6760	0.0000	0.0000	0.0000	0.3549	1.0309	2.0	Yes
CO	ton/yr	0.0000	0.0678	0.0000	0.0000	0.0000	0.0593	0.1271	5.0	Yes
Diesel Engine Exhaust Particulate Matter (DEEP) before control	ton/yr	0.0000	0.0234	0.0000	0.0000	0.0000	0.0099	0.00333		
Diesel Engine Exhaust Particulate Matter (DEEP) after control	ton/yr	0.0000	0.00352	0.0000	0.0000	0.00000	0.00148	0.00500	0.00032	No
PM_{10}	ton/yr	0.0000	0.0387	0.0000	0.0000	0.0000	0.0162	0.0549	0.75	Yes
$PM_{2.5}$	ton/yr	0.0000	0.0387	0.0000	0.0000	0.0000	0.0162	0.0549	0.5	Yes
SO_2	ton/yr	0.0000	0.0147	0.0000	0.0000	0.0000	0.0099	0.0246	2.0	Yes

(a) Worst case emissions based on:
Routine testing of 2 engines for 1 hr/month at 40% load resulting in 24 total hr/yr at 40% load.
Emergency operation of 2 engines for 4 days per year at 40% load resulting in 192 total hr/yr at 40% load.
Load testing of 2 engine for 2.5 hr/yr at 100% load resulting in 5 total hr/yr at 100% load.
Commissioning of 2 engines for 25 hr/yr at up to 100% load resulting in 50 total hr/yr at 100% load.

Table B-4 Emissions of Toxic Air Pollutants

Maximum Heat Inputs and Power Outputs

Averaging Period	Operating Scenario	Operating Rate		Daily and Annual Operation	
One hour	1 engine at full load, 1 hour	9.75	MMBtu/hr		
		1,482	bhp/hr		
One day	2 engines at 40% load, 24 hours	3.93	MMBtu/hr	188.7	MMBtu/day
		593	bhp/hr	14,232	bhp/day
One year	See Table B-3			1,385	MMBtu/yr
				209,598	bhp/yr

Emissions

Pollutant	CAS No.	Emission Factor	Facility Emissions		SQER		SQER Ratio	SQER Exceeded
Diesel Engine Exhaust Particulate Matter (DEEP)	None	See Table B-3	10.00	lb/yr	0.64	lb/yr	15.64	***Yes***
CO	630-80-0	See Table B-3	4.31	lb/1-hr	50.40	lb/1-hr	0.09	No
SO_2	7449-09-05	See Table B-3	0.27	lb/1-hr	1.45	lb/1-hr	0.19	No
NO_2	10102-44-0	See Table B-3	0.86	lb/1-hr	3.64	lb/1-hr	0.24	No
Acetaldehyde	75-07-0	2.52E-05 lb/MMBtu	3.49E-02	lb/yr	71.00	lb/yr	4.92E-04	No
Acrolein	107-02-8	7.88E-06 lb/MMBtu	1.49E-03	lb/day	0.01	lb/day	1.88E-01	No
Benzene	71-43-2	7.76E-04 lb/MMBtu	1.07E-00	lb/yr	6.68	lb/yr	1.61E-01	No
Benzo(a)anthracene	56-55-3	6.22E-07 lb/MMBtu	8.62E-04	lb/yr	1.74	lb/yr	4.95E-04	No
Benzo(a)pyrene	50-32-8	2.57E-07 lb/MMBtu	3.56E-04	lb/yr	0.17	lb/y	2.05E-03	No
Benzo(b) fluoranthene	205-99-2	1.11E-06 lb/MMBtu	1.54E-03	lb/yr	1.74	lb/yr	8.84E-04	No
Benzo(k) fluoranthene	207-08-9	2.18E-07 lb/MMBtu	3.02E-04	lb/yr	1.74	lb/y	1.74E-04	No

Emissions

Pollutant	CAS No.	Emission Factor		Facility Emissions		SQER		SQER Ratio	SQER Exceeded
Chyrsene	218-01-9	1.53E-06	lb/MMBtu	2.12E-03	lb/yr	17.40	lb/yr	1.22E-04	No
Dibenz(a,h)anthracene	53-70-3	4.14E-07	lb/MMBtu	5.73E-04	lb/yr	0.16	lb/yr	3.58E-03	No
Formaldehyde	50-00-0	7.89E-05	lb/MMBtu	1.09E-01	lb/yr	32.00	lb/yr	3.42E-03	No
Ideno(1,2,3-cd)pyrene	193-39-5	4.14E-07	lb/MMBtu	5.73E-04	lb/yr	1.74	lb/yr	3.30E-04	No
Naphthalene	91-20-3	1.30E-04	lb/MMBtu	1.80E-01	lb/yr	5.64	lb/yr	3.19E-02	No
Propolyene	115-07-1	2.79E-03	lb/MMBtu	5.26E-01	lb/day	394.00	lb/day	1.34E-03	No
Toluene	108-88-3	2.81E-04	lb/MMBtu	5.30E-02	lb/day	657.00	lb/day	8.07E-05	No
Xylenes	95-47-6	1.93E-04	lb/MMBtu	3.64E-02	lb/day	58.00	lb/day	6.28E-04	No

Notes:

(a) DEEP, CO, SO_2, NOx emission factors are from Table B-1. Other emission factors are form AP-42 Tables 3.4-3 and 3.4-4.

(b) NO_2 is conservative assumed to be 20% of NOx emissions.

Table B-5 Stack Data [(a)]

Parameter	Units	Load					
Load	**%**	**25%**	**40%**	**50%**	**75%**	**80%**	**100%**
Exhaust flow at 1 atm	acfm	2,780	3,812	4,500	6,370	6,604	7,540
Site elevation	ft	2,670	2,670	2,670	2,670	2,670	2,670
Atmospheric pressure at site	atm	0.93	0.93	0.93	0.93	0.93	0.93
Exhaust flow at site	acfm	2,989	4,099	4,839	6,849	7,101	8,108
Exhaust temperature	ºF	620	704	760	814	829	890
Exhaust velocity	ft/s	46.6	63.9	75.4	106.8	110.7	126.4
Stack diameter	inches	14.0	14.0	14.0	14.0	14.0	14.0
Height above grade	ft	33.71	33.71	33.71	33.71	33.71	33.71

(a) Exhaust flow at 1 atm and temperature at 25%, 50%, 75% and 100% standby are based on Cummins Exhaust Emission Data sheet. Data at 40% and 80% load are estimates by AECOM.

Table B-6 Capital Cost Estimate for Diesel Particulate Filter

Cost Category	One Emergency Generator	Factor	Basis for Cost and Factor
Capacity, kWe	**1,000**		
DIRECT COSTS:			
PURCHASED EQUIPMENT			
(a) Primary and Auxiliary Equipment (PE)	$74,600	Scaled from Caterpillar estimate for 2,500 kWe based on the 0.6 rule. [(a)]	
(b) Instrumentation & Controls	$0	Assume no cost	
(c) Sales Tax	$4,849	6.5% of PE	Washington state tax
(d) Freight	$3,730	5% of PE	EPA Cost Manual[(a)]
TOTAL PURCHASED EQUIPMENT Cost (PEC):	$83,179		
DIRECT INSTALLATION			
(a) Enclosures and structural supports	$0	Assume no cost	
(b) Installation	$2,079	Assume 2.5% of PEC based on 1/2 of EPA cost	EPA Cost Manual[(b)]
(c) Electrical	$0	Assume no cost	
(d) Piping	$0	Assume no cost	
(f) Insulation	$0	Assume no cost	
(g) Painting	$0	Assume no cost	
TOTAL DIRECT INSTALLATION (DI):	**$2,079**		
TOTAL DIRECT COST (DC):	**$85,258**		
INDIRECT COSTS			
INDIRECT INSTALLATION			
(a) Engineering & Project Management	$4,159	Assume 5.0% of PEC based on 1/2 of EPA cost	EPA Cost Manual[(b)]
(b) Construction & Field Expenses	$2,079	Assume 2.5% of PEC based on 1/2 of EPA cost	EPA Cost Manual[(b)]
(c) Contractor Fees	$8,318	10% of PEC based on EPA cost	EPA Cost Manual[(b)]
(d) Startup Expenses	$1,664	2% of PEC based on EPA cost	EPA Cost Manual[(b)]
(g) Performance Tests	$832	1% of PEC based on EPA cost	EPA Cost Manual[(b)]
(h) Contingencies	$2,495	3% of PEC based on EPA cost	EPA Cost Manual[(b)]
TOTAL INDIRECT COST:	**$19,547**		
TOTAL INSTALLED COST (TIC)	**$104,800**		

(a) Final Notice of Construction Supporting Information Report Microsoft Project Oxford Data Center, Quincy, Washington. Page 171. June 11, 2014.

(b) EPA Air Pollution Control Cost Manual, Sixth Edition, Section 4, Page 2-44. EPA/452/B-002-001. January 2002.

Table B-7 Annual Cost Estimate for Diesel Particulate Filter

Cost Category	One Emergency Generator	Factor	Basis for Cost and Factor
Capital Cost			
Total Installed Cost	$ 104,800	See Table B-6	
Source Capacity, kWe	1,000		
Diesel engine, bhp	1,482		
DEEP Emissions before Control, ton/yr	0.0333	Calculated	
Control Efficiency, %	85.0%		
DEEP Emissions after Control, ton/yr	0.00500	Calculated	
DEEP Emission Reduction, ton/yr	0.02832	Calculated	
Annual Costs, $/yr			
Catalyst Replacement Cost	$ -	See total operation and maintenance below	
Operating Labor	$ -		
Supervisor	$ -		
Maintenance Labor	$ -		
Maintenance Materials	$ -		
Electricity	$ -		
Overhead	$ -		
Total Operation and Maintenance	$ 2,964	$2/installed bhp [(a)]	
Taxes, Insurance, and Administration	$ 4,192	4% of total installed cost based on EPA cost	EPA Cost Manual[(b)]
Capital Recovery	$ 9,892	7.0%, 20 years, 0.0944 x (TCI-catalyst) [(c)]	EPA Cost Manual[(b)]
Total Annual Cost	$ 17,048	Calculated	
DEEP Emission Reduction, ton/yr	0.02832	Calculated	
Cost Effectiveness, $ per ton DEEP emission reduction	$ 602,000	Calculated	

(a) Final Notice of Construction Supporting Information Report Microsoft Project Oxford Data Center, Quincy, Washington. Page 172. June 11, 2014.

(b) EPA Air Pollution Control Cost Manual, Sixth Edition, Section 4, Page 2-44. EPA/452/B-002-001. January 2002.

(c) For consistency, EPA recommends 7% interest and a 20 year life.
EPA Air Pollution Control Cost Manual, Sixth Edition, Section 4, Page 2-13. EPA/452/B-002-001. January 2002.

Table B-8 Capital Cost Estimate for a Diesel Oxidation Catalyst

Cost Category	One Emergency Generator	Factor	Basis for Cost and Factor
Capacity, kWe	**1,000**		
DIRECT COSTS:			
PURCHASED EQUIPMENT			
(a) Primary and Auxiliary Equipment (PE)	$30,100	Scaled from Caterpillar estimate for 2,500 kWe based on the 0.6 rule. [(a)]	
(b) Instrumentation & Controls	$0	Assume no cost	
(c) Sales Tax	$1,957	6.5% of PE	Washington state tax
(d) Freight	$1,505	5% of PE	EPA Cost Manual[(a)]
TOTAL PURCHASED EQUIPMENT Cost (PEC):	$33,562		
DIRECT INSTALLATION			
(a) Enclosures and structural supports	$0	Assume no cost	
(b) Installation	$839	Assume 2.5% of PEC based on 1/2 of EPA cost	EPA Cost Manual[(b)]
(c) Electrical	$0	Assume no cost	
(d) Piping	$0	Assume no cost	
(f) Insulation	$0	Assume no cost	
(g) Painting	$0	Assume no cost	
TOTAL DIRECT INSTALLATION (DI):	**$839**		
TOTAL DIRECT COST (DC):	**$34,401**		
INDIRECT COSTS			
INDIRECT INSTALLATION			
(a) Engineering & Project Management	$1,678	Assume 5.0% of PEC based on 1/2 of EPA cost	EPA Cost Manual[(b)]
(b) Construction & Field Expenses	$839	Assume 2.5% of PEC based on 1/2 of EPA cost	EPA Cost Manual[(b)]
(c) Contractor Fees	$3,356	10% of PEC based on EPA cost	EPA Cost Manual[(b)]
(d) Startup Expenses	$671	2% of PEC based on EPA cost	EPA Cost Manual[(b)]
(g) Performance Tests	$336	1% of PEC based on EPA cost	EPA Cost Manual[(b)]
(h) Contingencies	$1,007	3% of PEC based on EPA cost	EPA Cost Manual[(b)]
TOTAL INDIRECT COST:	**$7,887**		
TOTAL INSTALLED COST (TIC)	**$42,300**		

(a) Final Notice of Construction Supporting Information Report Microsoft Project Oxford Data Center, Quincy, Washington. Page 175. June 11, 2014.
(b) EPA Air Pollution Control Cost Manual, Sixth Edition, Section 4, Page 2-44. EPA/452/B-002-001. January 2002.

Table B-9 Annual Cost Estimate for a Diesel Oxidation Catalyst

Cost Category	One Emergency Generator	Factor	Basis for Cost and Factor
Capital Cost			
Total Installed Cost	$ 42,300	See Table B-8	
Source Capacity, kWe	1,000		
Diesel engine, bhp	1,482		
DEEP Emissions before Control, ton/yr	0.0333	Calculated	
Control Efficiency, %	20.0%		
DEEP Emissions after Control, ton/yr	0.02666	Calculated	
DEEP Emission Reduction, ton/yr	0.00666	Calculated	
Annual Costs, $/yr			
Catalyst Replacement Cost	$ -	See total operation and maintenance below	
Operating Labor	$ -		
Supervisor	$ -		
Maintenance Labor	$ -		
Maintenance Materials	$ -		
Electricity	$ -		
Overhead	$ -		
	$ 296	$0.2/installed bhp [(a)]	
Taxes, Insurance, and Administration	$ 1,692	4% of total installed cost based on EPA cost	EPA Cost Manual[(b)]
Capital Recovery	$ 3,993	7.0%, 20 years, 0.0944 x (TCI-catalyst) [(c)]	EPA Cost Manual[(b)]
Total Annual Cost	$ 5,981	Calculated	
DEEP Emission Reduction, ton/yr	0.00666	Calculated	
Cost Effectiveness, $ per ton DEEP emission reduction	$ 897,000	Calculated	

(a) Final Notice of Construction Supporting Information Report Microsoft Project Oxford Data Center, Quincy, Washington. Page 176. June 11, 2014.

(b) EPA Air Pollution Control Cost Manual, Sixth Edition, Section 4, Page 2-44. EPA/452/B-002-001. January 2002.

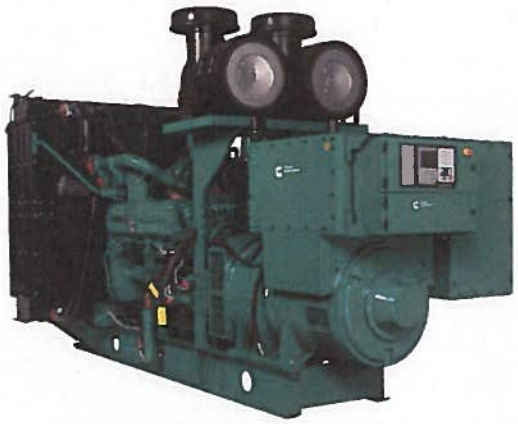
(c) For consistency, EPA recommends 7% interest and a 20 year life.
EPA Air Pollution Control Cost Manual, Sixth Edition, Section 4, Page 2-13. EPA/452/B-002-001. January 2002.

Appendix C: Cummins Data Sheets

Specification sheet

Diesel generator set QST30 series engine

680 kW - 1000 kW 60 Hz



Description

Cummins Power Generation commercial generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary standby and prime power applications.

Features

Cummins® heavy-duty engine - Rugged 4-cycle, industrial diesel delivers reliable power, low emissions and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Permanent magnet generator (PMG) - Offers enhanced motor starting and fault clearing short-circuit capability.

Circuit Breakers - Option for manually-and/or electrically-operated circuit breakers

Control system - The PowerCommand® electronic control is standard equipment and provides total generator set system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, AmpSentry™ protection, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

Masterless Paralleling - An optional electrically operated circuit breaker can be added for a simple masterless paralleling solution.

Cooling system - Standard integral set-mounted radiator system, designed and tested for rated ambient temperatures, simplifies facility design requirements for rejected heat.

NFPA - The generator set accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

Model	Standby rating 60 Hz kW (kVA)	Prime rating 60 Hz kW (kVA)	Continuous rating 60 Hz kW (kVA)	Data sheets 60 Hz
DQFAA	750 (938)	680 (850)		D-3329
DQFAB	800 (1000)	725 (907)		D-3330
DQFAC	900 (1125)	818 (1023)		D-3331
DQFAD	1000 (1250)	900 (1125)		D-3332

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Generator set specifications

Governor regulation class	ISO 8528 Part 1 Class G3
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
Radio frequency emissions compliance	IEC 61000-4-2: Level 4 Electrostatic discharge IEC 61000-4-3: Level 3 Radiated susceptibility

Engine specifications

Bore	140 mm (5.51 in)
Stroke	165.0 mm (6.5 in)
Displacement	30.5 liters (1860 in^3)
Configuration	Cast iron, V, 12 cylinder
Battery capacity	1800 amps minimum at ambient temperature of -18 °C to 0 °C (0 °F to 32 °F)
Battery charging alternator	35 amps
Starting voltage	24 volt, negative ground
Fuel system	Direct injection: number 2 diesel fuel, fuel filter, automatic electric fuel shutoff
Fuel filter	Triple element, 10 micron filtration, spin-on fuel filters with water separator
Air cleaner type	Dry replaceable element
Lube oil filter type(s)	Four spin-on, combination full flow filter and bypass filters
Standard cooling system	High ambient radiator

Alternator specifications

Design	Brushless, 4 pole, drip proof, revolving field
Stator	2/3 pitch
Rotor	Single bearing flexible discs
Insulation system	Class H on low and medium voltage, Class F on high voltage
Standard temperature rise	150 °C standby at 40 °C ambient
Exciter type	PMG (permanent magnet generator)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform total harmonic distortion	< 5% no load to full linear load, < 3% for any single harmonic
Telephone influence factor (TIF)	< 50 per NEMA MG1-22.43
Telephone harmonic factor (THF)	< 3

Available voltages

60 Hz line-neutral/line-line

- 120/208
- 139/240
- 220/380
- 230/400
- 240/416
- 277/480
- 347/600

Note: Consult factory for other voltages.

Generator set options and accessories

Engine
- ☐ 208/240/480 V coolant heater for ambient above 4.5 °C (40 °F)
- ☐ 208/240/480 V coolant heater for ambient below 4.5 °C (40 °F)

Control panel
- ☐ PowerCommand 3.3
- ☐ Run relay package
- ☐ Ground fault indication
- ☐ Paralleling configuration
- ☐ Remote fault signal package
- ☐ Exhaust gas temperature sensor
- ☐ 120/240 V 100 W control anti-condensation heater

Alternator
- ☐ 80 °C rise
- ☐ 105 °C rise
- ☐ 125 °C rise
- ☐ 120/240 V 300 W, anti-condensation heater
- ☐ Temperature sensor - RTDs, 2/phase
- ☐ Temperature sensor – alternator bearing RTD
- ☐ Differential current transformers

Exhaust system
- ☐ Industrial grade exhaust silencer
- ☐ Residential grade exhaust silencer
- ☐ Critical grade exhaust silencer

Cooling system
- ☐ Remote radiator

Generator set
- ☐ AC entrance box
- ☐ Battery
- ☐ Battery rack with hold-down - floor standing
- ☐ Circuit breaker - set mounted
- ☐ Disconnect switch - set mounted
- ☐ PowerCommand Network
- ☐ Remote annunciator panel
- ☐ Spring isolators
- ☐ 2 year warranty
- ☐ 5 year warranty
- ☐ 10 year major components warranty

Note: Some options may not be available on all models - consult factory for availability.

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PowerCommand 3.3 Control System



An integrated microprocessor based generator set control system providing voltage regulation, engine protection, alternator protection, operator interface and isochronous governing. Refer to document S-1570 for more detailed information on the control.

AmpSentry – Includes integral AmpSentry protection, which provides a full range of alternator protection functions that are matched to the alternator provided.

Power management – Control function provides battery monitoring and testing features and smart starting control system.

Advanced control methodology – Three phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.

Communications interface – Control comes standard with PCCNet and Modbus interface.

Regulation compliant – Prototype tested: UL, CSA and CE compliant.

Service - InPower™ PC-based service tool available for detailed diagnostics, setup, data logging and fault simulation.

Easily upgradeable – PowerCommand controls are designed with common control interfaces.

Reliable design – The control system is designed for reliable operation in harsh environment.

Multi-language support

Operator panel features

Operator/display functions

- Displays paralleling breaker status
- Provides direct control of the paralleling breaker
- 320 x 240 pixels graphic LED backlight LCD
- Auto, manual, start, stop, fault reset and lamp test/panel lamp switches
- Alpha-numeric display with pushbuttons
- LED lamps indicating generator set running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop

Paralleling control functions

- First Start Sensor System selects first generator set to close to bus
- Phase Lock Loop Synchronizer with voltage matching
- Sync check relay
- Isochronous kW and kVar load sharing
- Load govern control for utility paralleling
- Extended Paralleling (baseload/peak shave) Mode
- Digital power transfer control, for use with a breaker pair to provide open transition, closed transition, ramping closed transition, peaking and base load functions,

Alternator data

- Line-to-neutral and line-to-line AC volts
- 3-phase AC current
- Frequency
- kW, kVar, power factor kVA (three phase and total)

Engine data

- DC voltage
- Engine speed
- Lube oil pressure and temperature
- Coolant temperature
- Comprehensive FAE data (where applicable)

Other data

- Genset model data
- Start attempts, starts, running hours, kW hours
- Load profile (operating hours at % load in 5% increments)
- Fault history
- Data logging and fault simulation (requires InPower)

Standard control functions

Digital governing

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 3-phase, 4-wire line-to-line sensing
- Configurable torque matching

AmpSentry AC protection

- AmpSentry protective relay
- Over current and short circuit shutdown
- Over current warning
- Single and three phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse Var shutdown
- Field overload shutdown

Engine protection

- Battery voltage monitoring, protection and testing
- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown
- Fuel-in-rupture-basin warning or shutdown
- Full authority electronic engine protection

Control functions

- Time delay start and cool down
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop
- Data logging
- Cycle cranking
- Load shed
- Configurable inputs and outputs (4)
- Remote emergency stop

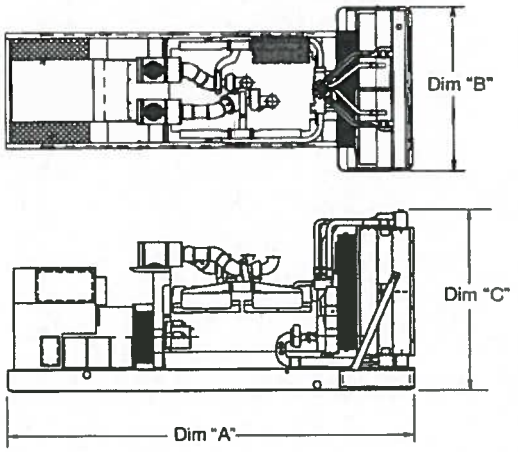
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Emergency standby power (ESP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-time running power (LTP):
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

Prime power (PRP):
Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base load (continuous) power (COP):
Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.



This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number.

Do not use for installation design

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Set Weight* dry kg (lbs)	Set Weight* wet kg (lbs)
DQFAA	4287 (168.8)	1990 (78.3)	2355 (92.7)	6633 (14625)	6896 (15205)
DQFAB	4287 (168.8)	1990 (78.3)	2355 (92.7)	6857 (15117)	7120 (15697)
DQFAC	4287 (168.8)	1990 (78.3)	2355 (92.7)	7335 (16172)	7598 (16752)
DQFAD	4287 (168.8)	1990 (78.3)	2355 (92.7)	7594 (16742)	7857 (17322)

* Weights represent a set with standard features. See outline drawings for weights of other configurations.

Codes and standards

Codes or standards compliance may not be available with all model configurations – consult factory for availability.

ISO 9001	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.	UL	The generator set is available listed to UL 2200, Stationary Engine Generator Assemblies for all 60 Hz low voltage models. The PowerCommand control is Listed to UL 508 - Category NITW7 for U.S. and Canadian usage. Circuit breaker assemblies are UL 489 Listed for 100% continuous operation and also UL 869A Listed Service Equipment.
PTS	The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins Power Generation products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.	U.S. EPA	Engine certified to Stationary Emergency U.S. EPA New Source Performance Standards, 40 CFR 60 subpart IIII Tier 2 exhaust emission levels. U.S. applications must be applied per this EPA regulation.
CSA	All low voltage models are CSA certified to product class 4215-01.	International Building Code	The generator set package is available certified for seismic application in accordance with the following International Building Code: IBC2000, IBC2003, IBC2006, IBC2009 and IBC2012.

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

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Power Generation

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Generator set data sheet

Power Generation

Model:	**DQFAD**
Frequency:	**60**
Fuel type:	**Diesel**
KW rating:	**1000 standby**
	900 prime
Emissions level:	**EPA NSPS Stationary Emergency Tier 2**

Exhaust emission data sheet:	**EDS-1063**
Exhaust emission compliance sheet:	**EPA-1097**
Sound performance data sheet:	**MSP-1038**
Cooling performance data sheet:	**MCP-156**
Prototype test summary data sheet:	**PTS-266**
Standard set-mounted radiator cooling outline:	**A049K674**
Optional set-mounted radiator cooling outline:	**A053G789**
Optional heat exchanger cooling outline:	
Optional remote radiator cooling outline:	**A053G787**

Fuel consumption

	Standby				Prime				Continuous
	kW (kVA)				kW (kVA)				kW (kVA)
Ratings	1000 (1250)				900 (1125)				
Load	**1/4**	**1/2**	**3/4**	**Full**	**1/4**	**1/2**	**3/4**	**Full**	**Full**
US gph	18.7	36.4	54.2	71.9	16.9	32.4	48.0	63.5	
L/hr	70.6	137.8	205.1	272.3	64.0	122.8	181.5	240.3	

Engine

	Standby rating	Prime rating	Continuous rating
Engine manufacturer	Cummins Inc.		
Engine model	QST30-G5 NR2		
Configuration	Cast iron, V 12 cylinder		
Aspiration	Turbocharged and low temperature aftercooled		
Gross engine power output, kWm (bhp)	1112 (1490)	1007 (1350)	
BMEP at set rated load, kPa (psi)	2417 (351)	2160 (313)	
Bore, mm (in)	140 (5.51)		
Stroke, mm (in)	165 (6.5)		
Rated speed, rpm	1800		
Piston speed, m/s (ft/min)	9.91 (1950)		
Compression ratio	14.7:1		
Lube oil capacity, L (qt)	154 (162.8)		
Overspeed limit, rpm	2100 ±50		
Regenerative power, kW	82		

Fuel flow

Maximum fuel flow, L/hr (US gph)	570 (150)	
Maximum fuel inlet restriction, kPa (in Hg)	27 (8.0)	
Maximum fuel inlet temperature, °C (°F)	66 (150)	

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Air

	Standby rating	Prime rating	Continuous rating
Combustion air, m^3/min (scfm)	88 (3150)	81 (2880)	
Maximum air cleaner restriction, kPa (in H_2O)	6.2 (25)		
Alternator cooling air, m^3/min (cfm)	204 (7300)		

Exhaust

Exhaust flow at rated load, m^3/min (cfm)	211 (7540)	195 (6950)	
Exhaust temperature, °C (°F)	477 (890)	467 (873)	
Maximum back pressure, kPa (in H_2O)	6.8 (27)		

Standard set-mounted radiator cooling

Ambient design, °C (°F)	56 (132.8)		
Fan load, kW_m (HP)	33.1 (44.4)		
Coolant capacity (with radiator), L (US gal)	167(44)		
Cooling system air flow, m^3/min (scfm)	1097.5 (38753)		
Total heat rejection, MJ/min (Btu/min)	48.9 (46455)	43.9 (41660)	
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)		
Maximum fuel return line restriction kPa (in Hg)	67.5 (20)		

Optional set-mounted radiator cooling (Cu/Br)

Ambient design, °C (°F)	50 (122)		
Fan load, kW_m (HP)	43 (57)		
Coolant capacity (with radiator), L (US gal)	201 (53.2)		
Cooling system air flow, m^3/min (scfm)	962 (34000)		
Total heat rejection, MJ/min (Btu/min)	48.9 (46455)	43.9 (41660)	
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)		
Maximum fuel return line restriction kPa (in Hg)	67.5 (20)		

Optional heat exchanger cooling

Set coolant capacity, L (US gal)			
Heat rejected, jacket water circuit, MJ/min (Btu/min)			
Heat rejected, aftercooler circuit, MJ/min (Btu/min)			
Heat rejected, fuel circuit, MJ/min (Btu/min)			
Total heat radiated to room, MJ/min (Btu/min)			
Maximum raw water pressure, jacket water circuit, kPa (psi)			
Maximum raw water pressure, aftercooler circuit, kPa (psi)			
Maximum raw water pressure, fuel circuit, kPa (psi)			
Maximum raw water flow, jacket water circuit, L/min (US gal/min)			
Maximum raw water flow, aftercooler circuit, L/min (US gal/min)			
Maximum raw water flow, fuel circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, jacket water circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, aftercooler circuit, L/min (US gal/min)			
Minimum raw water flow at 27 °C (80 °F) inlet temp, fuel circuit, L/min (US gal/min)			
Raw water delta P at min flow, jacket water circuit, kPa (psi)			
Raw water delta P at min flow, aftercooler circuit, kPa (psi)			
Raw water delta P at min flow, fuel circuit, kPa (psi)			
Maximum jacket water outlet temp, °C (°F)			
Maximum aftercooler inlet temp, °C (°F)			
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)			
Maximum fuel return line restriction, kPa (in Hg)			

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Optional remote radiator cooling[1]

	Standby rating	Prime rating	Continuous rating
Set coolant capacity, L (US gal)			
Max flow rate at max friction head, jacket water circuit, L/min (US gal/min)	992 (262)		
Max flow rate at max friction head, aftercooler circuit, L/min (US gal/min)	303 (80)		
Heat rejected, jacket water circuit, MJ/min (Btu/min)	22.67 (21500)	21.01 (19925)	
Heat rejected, aftercooler circuit, MJ/min (Btu/min)	18.35 (17400)	15.69 (14885)	
Heat rejected, fuel circuit, MJ/min (Btu/min)			
Total heat radiated to room, MJ/min (Btu/min)	6.1 (5753)	5.6 (5301)	
Maximum friction head, jacket water circuit, kPa (psi)	69 (10)		
Maximum friction head, aftercooler circuit, kPa (psi)	48 (7)		
Maximum static head, jacket water circuit, m (ft)	14 (46)		
Maximum static head, aftercooler circuit, m (ft)	14 (46)		
Maximum jacket water outlet temp, °C (°F)	104 (220)	100 (212)	
Maximum aftercooler inlet temp at 25 °C (77 °F) ambient, °C (°F)	41 (105)		
Maximum aftercooler inlet temp, °C (°F)	62 (143)	56 (133)	
Maximum fuel flow, L/hr (US gph)			
Maximum fuel return line restriction, kPa (in Hg)	67.5 (20)		

Weights[2]

Unit dry weight kgs (lbs)	7594 (16742)
Unit wet weight kgs (lbs)	7857 (17322)

Notes:
[1] For non-standard remote installations contact your local Cummins Power Generation representative.
[2] Weights represent a set with standard features. See outline drawing for weights of other configurations.

Derating factors

Standby	Engine power available up to 701 m (2300 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 3.5% per 305 m (1000 ft) and 7% per 10 °C (18 °F).
Prime	Engine power available up to 727 m (2385 ft) at ambient temperatures up to 40 °C (104 °F). Above these elevations, derate at 3.5% per 305 m (1000 ft) and 7% per 10 °C (18 °F).
Continuous	

Ratings definitions

Emergency standby power (ESP):	**Limited-time running power (LTP):**	**Prime power (PRP):**	**Base load (continuous) power (COP):**
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

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Alternator data

Voltage	Connection[1]	Temp rise degrees C	Duty[2]	Single phase factor[3]	Max surge kVA[4]	Surge kW	Alternator data sheet	Feature Code
120/208-139/240	12-lead	125/105	S/P		4234	1019	ADS-312	B252
240/416-277/480	12-lead	125/105	S/P		4234	1019	ADS-312	B252
277/480	Wye, 3-phase	125/105	S/P		3866	1018	ADS-311	B276
220/380-277/480	Wye, 3-phase	125/105	S/P		4602	1018	ADS-330	B282
220/380-277/480	Wye, 3-phase	105/80	S/P		4602	1018	ADS-330	B283
210/380-277/480	Wye, 3-phase	80	S		5521	1024	ADS-331	B284
240/416-277/480	Wye	125/105	S/P		4234	1019	ADS-312	B288
347/600	3-phase	125/105	S/P		3866	1021	ADS-311	B300
347/600	3-phase	105/80	S/P		4234	1024	ADS-312	B301
347/600	3-phase	80	S		4602	1004	ADS-330	B604

Notes:

[1] Limited single phase capability is available from some three phase rated configurations. To obtain single phase rating, multipy the three phase kW rating by the Single Phase Factor[3]. All single phase ratings are at unity power factor.

[2] Standby (S), Prime (P) and Continuous ratings (C).

[3] Factor for the *Single Phase Output from Three Phase Alternator* formula listed below.

[4] Maximum rated starting kVA that results in a minimum of 90% of rated sustained voltage during starting.

Formulas for calculating full load currents:

Three phase output

$$\frac{\text{kW} \times 1000}{\text{Voltage} \times 1.73 \times 0.8}$$

Single phase output

$$\frac{\text{kW} \times \text{SinglePhaseFactor} \times 1000}{\text{Voltage}}$$

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

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Cooling System Data
DQFAD

Enhanced Ambient Air Temperature Radiator Cooling System

	Fuel Type	Duty	Rating (kW)	Max Cooling @ Air Flow Static Restriction, Unhoused (inches water/mm water)					Housed in Free Air, No Air Discharge Restriction		
				0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4	F200	F201	F202
				Maximum Allowable Ambient Temperature, Degree C							
60Hz	Diesel	Standby	1000	67	65	61	58	55	64	62	62
		Prime	900	67	64	60	56	54	64	62	62

Notes:

1. Data shown are anticipated cooling performance for typical generator set.
2. Cooling data is based on 1000 ft (305 m) site test location.
3. Generator set power output may need to be reduced at high ambient conditions. Refer generator set data sheet for derate schedules.
4. Cooling performance may be reduced due to several factors including but not limited to: Incorrect installation, improper operation, fouling of the cooling system, and other site installation variables.

Power Generation

Exhaust Emission Data Sheet
1000DQFAD
60 Hz Diesel Generator Set

Engine Information:

Model:	Cummins Inc. QST30-G5 NR2	Bore:	5.51 in. (139 mm)
Type:	4 Cycle, 50°V, 12 Cylinder Diesel	Stroke:	6.5 in. (165 mm)
Aspiration:	Turbocharged and Low Temperature aftercooled	Displacement:	1860 cu. in. (30.4 liters)
Compression Ratio:	14.7:1		
Emission Control Device:	Aftercooled (Air-to-Air)		

PERFORMANCE DATA	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby	Full Prime	
BHP @ 1800 RPM (60 Hz)	371	741	1112	1482	1322	
Fuel Consumption (gal/Hr)	19.1	35.8	54.1	72.2	63.9	
Exhaust Gas Flow (CFM)	2780	4500	6370	7540	6950	
Exhaust Gas Temperature (°F)	620	760	814	890	873	
EXHAUST EMISSION DATA						
HC (Total Unburned Hydrocarbons)	0.12	0.10	0.08	0.07	0.08	
NOx (Oxides of Nitrogen as NO2)	4.17	5.20	3.87	3.95	4.00	
CO (carbon Monoxide)	0.66	0.36	0.48	0.66	0.58	
PM (Particular Matter)	0.19	0.15	0.12	0.11	0.11	
SO2 (Sulfur Dioxide)	0.11	0.10	0.10	0.11	0.10	
Smoke (Bosch)	0.88	0.80	0.79	0.73	0.75	

All Values are Grams/HP-Hour, Smoke is Bosch #

TEST CONDITIONS

Data was recorded during steady-state rated engine speed (± 25 RPM) with full load (±2%). Pressures, temperatures, and emission rates were stabilized.

Fuel Specification:	46.5 Cetane Number, 0.035 Wt.% Sulfur; Reference ISO8178-5, 40CFR86.1313-98 Type 2-D and ASTM D975 No. 2-D.
Fuel Temperature:	99 ± 9 °F (at fuel pump inlet)
Intake Air Temperature:	77 ± 9 °F
Barometric Pressure:	29.6 ± 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H2O/lb dry air
Reference Standard:	ISO 8178

The NOx, HC, CO and PM emission data tabulated here were taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

Power Generation

2017 EPA Tier 2 Exhaust Emission Compliance Statement 1000DQFAD Stationary Emergency

60 Hz Diesel Generator Set

Compliance Information:

The engine used in this generator set complies with Tier 2 emissions limit of U.S. EPA New Source Performance Standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII when tested per ISO8178 D2.

Engine Manufacturer:	Cummins Inc
EPA Certificate Number:	HCEXL030.AAD-029
Effective Date:	11/17/2016
Date Issued:	11/17/2016
EPA Engine Family (Cummins Emissions Family):	HCEXL030.AAD (D573)

Engine Information:

Model:	QST30 / QST30-G / QST30-G5 NR2	Bore:	5.51 in. (140 mm)
Engine Nameplate HP:	1490	Stroke:	6.5 in. (165 mm)
Type:	4 Cycle, 50°V, 12 Cylinder Diesel	Displacement:	1860 cu. in. (30.5 liters)
Aspiration:	Turbocharged and CAC	Compression Ratio:	14.0:1
Emission Control Device:	Electronic Control	Exhaust Stack Diameter:	2 - 8 in.

Diesel Fuel Emission Limits

D2 Cycle Exhaust Emissions

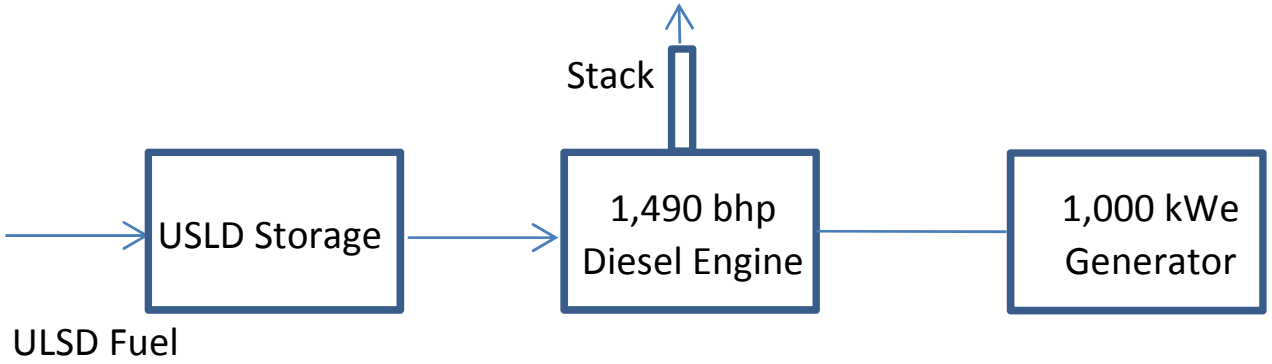
	Grams per BHP-hr			Grams per kWm-hr		
	NOx + NMHC	CO	PM	NOx + NMHC	CO	PM
Test Results - Diesel Fuel (300-4000 ppm Sulfur)	4.4	0.5	0.10	5.9	0.7	0.13
EPA Emissions Limit	4.8	2.6	0.15	6.4	3.5	0.20
Test Results - CARB Diesel Fuel (<15 ppm Sulfur)	4.0	0.5	0.08	5.4	0.7	0.11
CARB Emissions Limit	4.8	2.6	0.15	6.4	3.5	0.20

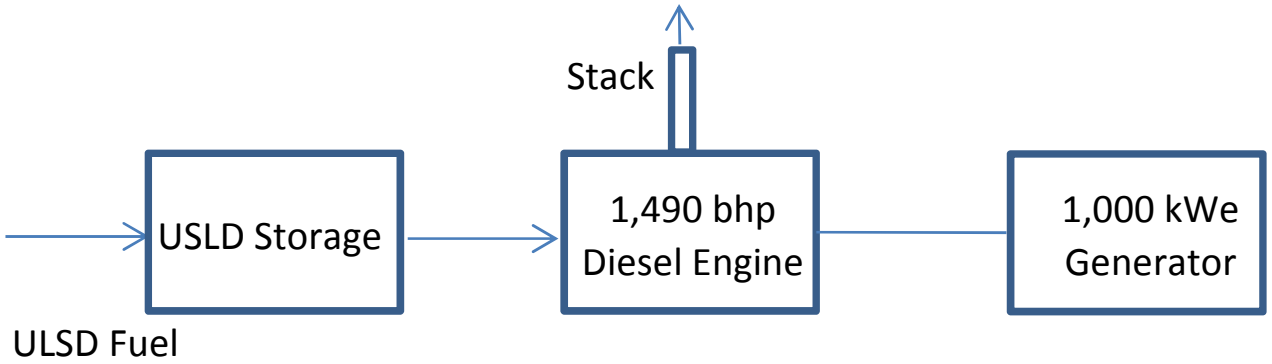
The CARB emission values are based on CARB approved calculations for converting EPA (500 ppm) fuel to CARB (15 ppm) fuel.
Test Methods: EPA/CARB Nonroad emissions recorded per 40CFR89 (ref. ISO8178-1) and weighted at load points prescribed in Subpart E, Appendix A for Constant Speed Engines (ref. ISO8178-4, D2)

Diesel Fuel Specifications: Cetane Number: 40-48. Reference: ASTM D975 No. 2-D.
Reference Conditions: Air Inlet Temperature: 25°C (77°F), Fuel Inlet Temperature: 40°C (104°F). Barometric Pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb) of dry air; required for NOx correction, Restrictions: Intake Restriction set to a maximum allowable limit for clean filter; Exhaust Back Pressure set to a maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results.
Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

Appendix D: Process Flow Diagram and Plot Plan





Process Flow Diagram

E0-00-601 Unnamed ARCH D 24" x 36"
Approved: TOM
Checked: LPY
Designer: JLP
Project Management Initials: HS

LEGEND

- EXISTING DRAINAGE DIRECTION
- PROPOSED CONSTRUCTION ENTRANCE
- PROPOSED SILT FENCE

GENERAL NOTES

1. COVER ALL STOCKPILED MATERIALS WITH PLASTIC COVERING. SEE DETAIL 3 ON SHEET C0-00-002.

KEYNOTES

1. PROPOSED CONSTRUCTION ENTRANCE. SEE DETAIL 1 ON SHEET C0-00-002.
2. PROPOSED SILT FENCE. SEE DETAIL 2 ON SHEET C0-00-002.
3. PROTECT EXISTING SWALE.
4. PROTECT EXISTING INFILTRATION TRENCH.
5. PROTECT PROPOSED INFILTRATION TRENCH.

NORTH

30' 0' 30' 60'

SCALE: 1" = 30'



AECOM

PROJECT

PSE

Cle Elum Site

PSE Modular Data Center (MDC)

1980 SR 903
Cle Elum, Wa 98922

CLIENT

Puget Sound Energy

https://pse.com/Pages/default.aspx

PUGET SOUND ENERGY

REGISTRATION

THOMAS O. McKAY
STATE OF WASHINGTON
37907
REGISTERED
PROFESSIONAL ENGINEER

ISSUE/REVISION

I/R	DATE	DESCRIPTION
O	08/25/2017	Cle Elum Issue for Permit

KEY PLAN

PROJECT NUMBER

60536921

SHEET TITLE

EROSION AND SEDIMENT CONTROL PLAN

SHEET NUMBER

C0-00-001

Last Plotted: 4/14/2017 8:52:42 AM
File Name: A:\Wo\1-PSE_ModularDataCenter\60536921_EAST_E0_00_AE.rvt

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Appendix E: Air Quality Modeling Files

Appendix F: Final SEPA Checklist and SEPA Determination

CITY OF CLE ELUM
FINAL DETERMINATION OF NONSIGNIFICANCE (DNS)
October 17, 2017

DESCRIPTION OF PROPOSAL:	Proposed Modular Data Center addition to the existing PSE Substation to provide reliable IT capability to the PSE network.
PROPONENT:	Puget Sound Energy
LOCATION OF PROPOSAL:	1980 SR 903 (parcels 414235, 444235)
LEAD AGENCY:	City of Cle Elum; Cle Elum, Washington
DETERMINATION:	The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.
ACTION:	This DNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal for 14 days from the date below. Comments must be submitted by 4:30 pm November 1, 2017.

RESPONSIBLE OFFICIAL:	Lucy Temple
POSITION/TITLE:	City Planner
ADDRESS:	119 W. First Street, Cle Elum, WA 98922
PHONE NUMBER:	(509) 674-2262

DATE: October 17, 2017 **Signature:**_____

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

***Instructions for applicants*:**

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use “not applicable” or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background

1. Name of proposed project, if applicable:
   Cascade Modular Data Center

2. Name of applicant: **Puget Sound Energy, Inc. (PSE)**

3. Address and phone number of applicant and contact person:

Steve Brooks
9523 Willows Road NE
Redmond, WA 98052

4. Date checklist prepared:
October 5, 2017

5. Agency requesting checklist:
City of Cle Elum

6. Proposed timing or schedule (including phasing, if applicable):
Construction on the site will begin on the site in September 2017, to be completed in January 2018.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.
No.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

Documentation prepared for the previous Cascade Substation project:

- **Geotechnical Report (December 2011)**
- **Cascade SEPA (December 2011)**
- **Cascade Forest Practices Application/Notification (June 2012)**
- **Cultural Resource Inventory Report (August 2012)**
- **Stormwater Site Plan Drainage Report (March 2012)**
- **Drainage Memo for Asphalt Drive (January 2013)**

Documentation prepared for current Modular Data Center project:

- **Forest Practices Application/Notification (July 2017)**
- **Notice of Construction Air Permit Application / New Source Review (Sept 2017)**
- **SEPA Checklist (Oct 2017)**

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.
No.

10. List any government approvals or permits that will be needed for your proposal, if known.

- **City of Cle Elum Building Permit**
- **WA State Department of Natural Resources Forest Practices Permit**
- **WA State Labor & Industries**
- **Department of Ecology Notice of Construction / Air Permit**

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

Proposing to install a Critical IT Infrastructure Project (IT Project) at Cle Elum to replace existing aging facilities throughout PSE's service territory and to mitigate potential risks associated with recovery and availability of critical IT applications following a major natural disaster, such as an earthquake or flood. Installing the IT Project at Cle Elum in Eastern Washington would minimize this risk by providing geographical separation between critical IT facilities located in seismic fault and flood zones in Western Washington.

The proposed IT Project will consist of six prebuilt server modular units, including utility support pods, an emergency back-up power source, and modular mechanical system all installed on a concrete slab and surrounded by security fencing. The project will be installed on property owned by PSE that is currently developed as an electrical substation. The gross floor area of the data center and supporting buildings is approximately 4,500 square feet. The overall site including driveway is a little more than one acre.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The project is located in the city of Cle Elum at 1980 State Route 903. The parcel number for the property is 444235 and it is located in the NE ¼ of Section 28, Township 20 North, Range 15 East. The legal description and a site plan and vicinity map are included with this checklist.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site:

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other _____

The site is essentially flat and situation approximately 2,100 feet above sea level.

b. What is the steepest slope on the site (approximate percent slope)?

The property is relatively flat with slopes ranging from 0-5%.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

The NRCS maps indicate the soil type in the area is primarily Roslyn Ashy Sandy Loam with 0-5% slopes. No prime farmland is indicated in this area.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

There is no indication or known history of unstable soils in the vicinity of the site.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

A total of approximately 14,800 square feet (.34 acre) will be cleared of trees and topsoil containing organic materials. The site will be leveled and approximately 2 feet of unsuitable material will be removed, or 1,100 cubic yards. Approximately 1,100 cubic yards of suitable fill material will be imported to provide a level surface for placement of equipment pads. The fill material is sourced from a pit owned by Ellensburg Cement Products and located at 141 Tree Farm Road, Easton, Washington, 98925.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Yes. During the site clearing and construction phase, exposed soil subject to wind and water erosion.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Approximately 30% of the site will be covered with impervious surfaces after project construction. This percentage includes the impervious area of the Cascade Substation existing on site.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Temporary erosion control best management practices (BMPs) will be employed during construction to control erosion and sedimentation. BMPs used will include construction entrance, silt fence, and plastic sheeting of stock piles. Additionally water will be used for dust control. The amount of cleared area will be minimized to retain as much vegetation on site as possible.

2. Air

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

The project will require backup power during emergency situations. The planned emergency power source is two diesel generators that will run only in the event of a catastrophic event that brings down the data center's main power source as well as infrequent, scheduled testing for required maintenance purposes.

- **Routine testing of 2 engines for 1 hr/month at 40% load resulting in 24 total hr/yr at 40% load.**
- **Emergency operation of 2 engines for 4 days per year at 40% load resulting in 192 total hr/yr at 40% load as a 3 year rolling average calculated monthly.**
- **Load testing of 2 engine for 2.5 hr/yr at 100% load resulting in 5 total hr/yr at 100% load.**
- **Commissioning of 2 engines for 25 hr/yr during the first year only at up to 100% load resulting in 50 total hr/yr at 100% load for the first yr and 16.67 total hr/yr as a 3-year rolling average calculated monthly.**

Based on above operating scenarios total operating hours are expected to be limited to 238 hr/yr as a 3-year rolling average calculated monthly. Fuel use will be limited to 7,854 gal/yr as a 3-year rolling average calculated monthly. Potential-to-emit estimates calculated in the air permit demonstrate that the facility will emit:

- **Less than 100 tons per year of any criteria pollutant [particulate matter (PM), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), and volatile organic compounds (VOCs).**
- **Less than 10 tons per year of any EPA hazardous air pollutant (HAP)**
- **Less than 25 tons per year of total HAPs.**

Facilities that produce less than 100 tons per year are considered minor sources.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

See section B.2.a that identifies the project's plan for minimal use of the generators. In addition, PSE has opted to use a catalyzed diesel particulate filter to further reduce particulate emission levels and achieve 85% control of diesel engine exhaust particulate (DEEP) emissions, as indicated in the air permit application.

3. **Water**

a. Surface Water:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

There are no surface water bodies on the site. Crystal Creek is located about 600 feet northeast of the site.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

No, the project will not require any work within 200 feet of the described waters.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

None.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

The proposal will not require surface water withdrawals or diversions.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

The proposal does not lie within a 100-year floodplain.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

The proposal does not involve any discharges of water materials wot surface waters.

b. Ground Water:

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

No groundwater will be withdrawn from wells or water discharged to groundwater for the proposed project.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

No waste materials will be discharged into the ground as a result of the proposed project.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Potential sources of runoff could include precipitation from rain and snow. In addition, condensation produced from the cooling block will create drainage of

approximately 1,600 gallons of water per year. The condensation will drain from the cooling block and flow overland to the infiltration trench located on the east side of the site. The site is graded towards the three infiltration trenches on site that are sized to accommodate all of the site runoff and direct drainage into the ground for storms up to the 25-year storm event as required by the Stormwater Management Manual for Eastern Washington. Please refer to site plan sheet C0-00-101 for grading and drainage plan.

2) Could waste materials enter ground or surface waters? If so, generally describe.
No.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.
No.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:
Temporary erosion control measures will be implemented during construction. Infiltration trenches will capture runoff after construction is completed.

4. **Plants**

a. Check the types of vegetation found on the site:

____ deciduous tree: alder, maple, aspen, other
__x__evergreen tree: **fir**, cedar, **pine**, other
__x__shrubs
__x__grass
____ pasture
____ crop or grain
____ Orchards, vineyards or other permanent crops.
____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
____water plants: water lily, eelgrass, milfoil, other
____other types of vegetation

b. What kind and amount of vegetation will be removed or altered?
Douglas firs, Ponderosa pines and shrubs will be cleared in an area approximately 74 feet by 200 feet for the installation of the data center.

c. List threatened and endangered species known to be on or near the site.
There are no known endangered plant species on or near the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:
Existing vegetation on the site will be preserved wherever possible. The developed site will include buildings and asphalt paving. The yard surrounding each will be compacted gravel. No landscaping is proposed.

e. List all noxious weeds and invasive species known to be on or near the site.
None known.

5. **Animals**

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Examples include:

birds: hawk, heron, eagle, songbirds, other:
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other _____

b. List any threatened and endangered species known to be on or near the site.
According to the Washington Department of Fish and Wildlife PHS database, the site has listed occurrences of Northern Spotted Owl and Sharp-tailed Snake. The site is also listed as having a regular concentration of Elk (see response below).

c. Is the site part of a migration route? If so, explain.
The site is located in an area known as the Domerie Flats Elk Winter Concentration Area.

d. Proposed measures to preserve or enhance wildlife, if any:
None.

e. List any invasive animal species known to be on or near the site. None.
None.

6. **Energy and Natural Resources**

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.
Electricity from Puget Sound Energy would be used to power and cool the project modules.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.
No.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:
The project modules utilize an efficient design with close-coupled cooling equipment. A "free-air" cooling system will be used except in extreme heat and cold conditions.

7. **Environmental Health**

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

There are no known environmental hazards or waste products created by this project.

1) Describe any known or possible contamination at the site from present or past uses.

None.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

None.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

Per section B.2.a, diesel generators will be located on site, requiring the storage of diesel fuel. Fuel will be stored inside a double wall tank generator enclosure with a 110% rupture basin to ensure leak containment.

4) Describe special emergency services that might be required.

None.

5) Proposed measures to reduce or control environmental health hazards, if any:

The following actions are being taken the reduce or control environmental health hazards:

- **The project plans to use the diesel generators only in case of emergency and for infrequent scheduled testing for maintenance purposes. See section B.2.a for proposed schedule and particulate emission estimates.**
- **PSE has opted to use a catalyzed diesel particulate filter to further reduce particulate emission levels and achieve 85% control of diesel engine exhaust particulate (DEEP) emissions, as indicated in the air permit application.**
- **Fuel for diesel generators will be stored within a double wall tank generator enclosure with a 110% rupture basin.**
- **Procedures for fuel filling will require vendor lay down absorbent pads prior to refilling and have their own spill kit on hand in addition to the site provided spill kit.**

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

None.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Short-term temporary noise would be generated during construction of the project. Long-term noise would be generated during operation of the project from:

- **Cooling fans on when in operation during emergency situations. Cooling fans will operate at approximately 80 dBA at 7 meters from the source and be reduced to 60 dBA at 30 meters from the source.**
- **Emergency generator only when in operation. Generators will operate at no more than 60 dB(A) at 14 meters from the source.**

Sound levels at the adjacent school properties during these infrequent, emergency situations when the chillers and generators will be operating will be negligible, less than 5 dBA.

3) Proposed measures to reduce or control noise impacts, if any:

Sound attenuating features have been selected for the diesel generators to hold the noise levels at the 60 dBA at 14 meters from the source.

8. **Land and Shoreline Use**

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

The site is currently developed as an electric substation. The proposed project will not affect current land uses.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

No.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

No.

c. Describe any structures on the site.

The site is currently developed with an electric substation. Structures include substation equipment such as switchgear, breakers, towers and transformers, surrounded by a security fence.

d. Will any structures be demolished? If so, what?

No.

e. What is the current zoning classification of the site?

Planned Mixed Use.

f. What is the current comprehensive plan designation of the site?

Planned Mixed Use.

g. If applicable, what is the current shoreline master program designation of the site?
Not applicable.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.
No.

i. Approximately how many people would reside or work in the completed project?
None.

j. Approximately how many people would the completed project displace?
None.

k. Proposed measures to avoid or reduce displacement impacts, if any:
Not applicable.

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:
The proposed project is being co-located with other utility infrastructure.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:
Not applicable.

9. **Housing**

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.
None.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.
None.

c. Proposed measures to reduce or control housing impacts, if any:
None.

10. **Aesthetics**

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?
28 feet.

b. What views in the immediate vicinity would be altered or obstructed?
None.

c. Proposed measures to reduce or control aesthetic impacts, if any:
None.

11. **Light and Glare**

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?
The project will utilize directed motion-based lighting for the immediate area.

b. Could light or glare from the finished project be a safety hazard or interfere with views?
No.

c. What existing off-site sources of light or glare may affect your proposal?
None.

d. Proposed measures to reduce or control light and glare impacts, if any:
The project will utilize directed motion-based lighting rather than continuously operating lights.

12. **Recreation**

a. What designated and informal recreational opportunities are in the immediate vicinity?
There are several trails to the south of the site which are part of the Washington State Horse Park.

b. Would the proposed project displace any existing recreational uses? If so, describe.
The proposed project will not displace any existing recreational uses since the project will remain within the parcel of land owned by PSE.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:
None.

13. **Historic and cultural preservation**

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe.
No.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.
No.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.
In 2012 PSE prepared an Archaeological Resources Inventory as part of the development of the substation on the site. The report was submitted to DAHP on August 7th, 2012.

In July of 2017, PSE contacted the Yakama Nation and discussed the proposed addition of a data center at this site. The tribe had no concerns with the project.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Site disturbance will be limited to those areas of the site necessary for the construction of the proposed project. No permit is required from DAHP for this project.

14. **Transportation**

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.
The site is access from State Route 903.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?
No.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

None.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).
No.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

1 trip per month.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.
No.

h. Proposed measures to reduce or control transportation impacts, if any:

None.

15. **Public Services**

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

No.

b. Proposed measures to reduce or control direct impacts on public services, if any.
Not applicable.

16. **Utilities**

a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other fiber communications

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.
The project will require electric service from Puget Sound Energy Utility.

C. Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: Steven J Brooks

Name of signee Steven J Brooks

Position and Agency/Organization Sr Advisor IT Facilities Engineer

Date Submitted: 10/16/2017