Technical Support Document for
Notice of Construction Approval Order No. 19AQ-C234
Sabey Data Center Properties
East Wenatchee, WA

Prepared by: Ryan Vicente, PE

1.0 Project Summary

Sabey Data Center Properties' Intergate Columbia II data center (herein referred to as 'the Permittee') is supported by up to 22 new diesel-fired emergency generators. The source is classified as a synthetic minor with multiple new emissions units.

2.0 Application Processing

2.1 Public Notice

Receipt of the application was posted on Ecology's Public Involvement Calendar from 7/16/18 through 7/31/18; no requests for a public comment period were received. However, public notice is required because the applicant submitted a petition for second-tier review under WAC 173-460-090.

2.2 Applicant Review

The Permittee reviewed multiple drafts of the permit, with comments on each submitted. Additional data was subsequently submitted to support requested revisions, including remodeling of emissions.

2.3 SEPA

Ecology's Air Quality Program issued a determination of nonsignificance on 9/10/18 for the air pollutant emissions portion of the project.

3.0 Applicable Regulations

3.1 State Regulations

3.1.1 New Source Review Applicability

The unrestricted potential to emit (PTE) of the source exceeds the exemption levels listed in Table 110(5) of WAC 173-400-110 for four pollutants: carbon monoxide, nitrogen oxides, particulate matter, and volatile organic compounds. Therefore, the project is subject to new source review per WAC 173-400-110(2).

The unrestricted PTE of the source exceeds the WAC 173-460-150 de minimis emission values for 17 toxic air pollutants (TAPs), as listed in Appendix A. Therefore, the project is subject to new source review per WAC 173-400-110(2) and WAC 173-460-040(1).

3.1.2 General Standards for Maximum Emissions

WAC 173-400-040(2) generally limits visible emissions from all sources to no more than three minutes of 20 percent opacity, in any one hour, of an air contaminant from any emissions unit. This standard applies to each of the proposed engines. However, the limit has been set at 5% opacity in recent permits for this source sector. Therefore, only the lower limit is specified in for all operations, including startup, in Condition 4.3.3.

3.1.3 Emission Standards for Combustion and Incineration Units

WAC 173-400-050(1) limits emissions of particulate matter from combustion units to 0.1 grains per dry standard cubic foot (dscf) of exhaust gas. This standard applies to each of the proposed engines. The consultant calculated that the maximum[1] manufacturer-measured emissions of particulate from each engine is below the standard; however, the calculation did not include condensed hydrocarbons. A quick review of source test reports for two data centers in the Quincy, Washington area indicates that similarly sized engines emit PM at rates below this standard, lending further credibility to the submitted demonstration. The emission limit is specified in Conditon 4.3.2.

WAC 173-400-050(2) limits emissions of total carbonyls from incinerators. Since the engines are not incinerators, this standard does not apply to source.

3.1.4 Emission Standards for General Process Units

The WAC 173-400-030 definition of general process units excludes combustion from procedures which would trigger such categorization. Therefore the standards for general process units of WAC 173-400-060 do not apply to this source.

3.1.5 Emission Standards for Sources Emitting Hazardous Air Pollutants

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

3.1.6 Standards of Performance for New Sources

By way of the adoption by reference specified at WAC 173-400-115(1)(a), Title 40 Code of Federal Regulations (C.F.R.) Part 60 Subpart IIII applies to each engine, as the regulation existed on January 24, 2018. The ICE NSPS was last revised on July 7, 2016; therefore, requirements of the state-adopted version are equivalent to the current federal version (discussed below).

[1] Based on vendor specified not-to-exceed emission rates.

3.2 Federal Regulations

3.2.1 National Emission Standards for Hazardous Air Pollutants for Source Categories

Title 40 C.F.R. Part 63 Subpart ZZZZ (a.k.a. the RICE NESHAP) applies to each engine. Condition 1 of the Order requires compliance with this regulation. However, each engine is also subject to the ICE NSPS (see below). Title 40 C.F.R. §63.6590(c) specifies that the engines shall meet the requirements of the NESHAP by meeting the requirements of NSPS; therefore, no further requirements apply to the engines.

3.2.2 Standards of Performance for New Stationary Sources

Title 40 C.F.R. Part 60 Subpart IIII (a.k.a. the ICE NSPS) applies to each engine. The regulation specifies:

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

Condition 1 of the Order requires general compliance with Subpart IIII. The Tier-2 and Tier-3 emission standards specified by the regulation were the basis of the CO, NO_X, non-methane hydrocarbon, and PM BACT emission limits listed under Condition 4.3.1 of the Order. I also verified the proposed annual operation scenarios meet the regulation's requirements for emergency stationary engines.

4.0 Emissions

4.1 Emission Factors

- Emission-unit specific emission factors were taken from manufacturer data sheets and from consultant requested documentation. Manufacturer factors included values for CO, NO_X, PM, and unburned hydrocarbons (considered VOCs). Diesel particulate was taken to be the sum of PM and hydrocarbon emissions.

- The emission factor for SO_2 was calculated based up the sulfur content of ultra-low-sulfur diesel, and the average heating value of diesel fuel. Complete conversion of sulfur to SO_2 was assumed.

- Generic stationary diesel-engine emissions factors for 15 additional toxic air pollutants were taken from *EPA's AP-42 Compilation of Air Pollutant Emission Factors, 5th Edition, Volume 1,* Chapter 3.4, Tables 3.4-3 and 3.4-4.

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

The consultant proposed installation of engines certified to meet the Title 40 C.F.R. §89.112 Tier-2 and Tier-3 emission standards for nonroad engines for the main gensets and house gensets, respectively. Recent permits for this source sector have established that Tier-2 compliant engines employ: BACT for CO, NO_X, PM, and VOC; and tBACT for the TAPs subject to review. Therefore, the proposed engines are accepted.

5.0 Ambient Air Quality Standards

5.1 Pollutants listed under WAC 173-400-110

The PTE of the source, as limited by the Order, is below each of the criteria pollutant WAC 173-400-110 Table 110(5) exemption level for all pollutants except SO_2. In keeping with prior practice within this section, it is assumed that the exemption level was based on a concentration which would not cause or contribute to violation of the National Ambient Air Quality Standards (NAAQS) or Washington Ambient Air Quality Standards (WAAQS). Therefore, modeling was not required for SO_2.

AERMOD modeling was performed for CO, NO_X, and PM emissions; the modeled stack parameters and emission rates are detailed in Appendix B. The plume volume molar ratio method (PVMRM) option was performed for NO_X emissions, and an NO_2/NO_X in-stack ratio (ISR) of 0.1 was utilized. Additionally, a probabilistic analysis (a.k.a. the 'Monte Carlo' approach, based on an programing script developed by Ecology) was used for NO_2 emissions estimation. The modeling demonstrated that estimated concentrations of all three pollutants will remain below the NAAQS primary and secondary standards.

5.2 Toxic Air Pollutants

Modeling was required for acrolein, benzene, CO, DEEP, NO_2, and SO_2 emissions, as those TAPs are emitted above their respective WAC 173-460-150 small quantity emission rates. The modeling demonstrated that estimated concentrations of all TAPs will remain below acceptable source impact level concentrations.

Appendix A – Potential to Emit Without NOC Approval.

The table below lists the toxic air pollutants evaluated as part of this project. The potential to emit for all 22 of the Permittee's proposed engines was considered, as calculated per guidance specified in EPA OAQPS memo *Calculating Potential to Emit (PTE) for Emergency Generators*, issued 9/6/1995. EPA recommends that the PTE for emergency generators be determined based upon an estimate of the maximum amount of hours the generator could operate, taking into account (1) the number of hours power would be expected to be unavailable and (2) the number of hours for maintenance activities. The memo states that EPA believes 500 hours is an appropriate default assumption for estimating the number of hours that an emergency generator could be expected to operate under worst-case conditions.

CAS No.	Pollutant	De Minimis Exceeded?	SQER Exceeded?
75-07-0	acetaldehyde	-	-
107-02-8	acrolein	yes	yes
56-55-3	benz[a]anthracene	-	-
71-43-2	benzene	yes	yes
50-32-8	benzo[a]pyrene	yes	-
205-99-2	benzo[b]fluoranthene	-	-
207-08-9	benzo[k]fluoranthene	-	-
218-01-9	chrysene	-	-
630-08-0	carbon monoxide	yes	yes
53-70-3	dibenz[a,h]anthracene	yes	-
-	diesel engine exhaust, particulate	yes	yes
50-00-0	formaldehyde	yes	-
193-39-5	indeno[1,2,3-cd]pyrene	-	-
108-38-3	m-xylene	yes	-
91-20-3	naphthalene	yes	-
10102-44-0	nitrogen dioxide	yes	yes
95-47-6	o-xylene	yes	-
115-07-1	propylene	-	-
106-42-3	p-xylene	yes	-
7446-09-5	sulfur dioxide	yes	yes
108-88-3	toluene	-	-

Appendix B – Modeled Stack Parameters and Emission Rates

Table 1: Modeled minimum stack parameters for each main-genset, at the five loads specified under Title 40 C.F.R. §89.424(a).

Parameter	Percentage of gross engine power output (load)					Units
	100%	75%	50%	25%	10%	
Engine load	3,028	2,271	1,514	757	303	kWm
Temperature[a]	835	728	594	402	576	°F
	446	387	312	205	302	°C
Velocity[a]	190	160	126	79	47	ft/sec
	58	49	38	24	14	m/sec

[a] The temperature and velocity for 10% load are specific to the Cummins model QSK78-G12 engine. Meanwhile, the temperatures and velocities for 25-100% load are the lowest values associated with the five different engines originally analyzed for this project, including the Cummins engine.

Table 2: Modeled maximum emission rates for each main-genset, at the five loads specified under Title 40 C.F.R. §89.424(a).

Pollutants	Emission Rate (g/kWm-hr)				
	100% load (3,028 kW)	75% load (2,271 kW)	50% load (1,514 kW)	25% load (757 kW)	10% load (303 kW)
CO	3.16	1.45	1.21	1.58	4.91
NMHC[a]	0.27	0.35	0.52	0.98	2.01
NO_X	11.16	7.67	5.93	5.85	11.1
PM	0.34	0.31	0.27	0.27	0.91

[a] NMHC = Non-methane hydrocarbons.