

Technical Support Document
NOC Approval Order No. 21AQ-C255 Second Revision
Microsoft Corporation - East Wenatchee Data Center Campus
AQPID No. B0170071
East Wenatchee, WA

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1. Project Summary

Microsoft Corporation (the source) is a data center facility classified as a 'Synthetic Minor 80 Percent Source' for NOX emissions and a 'Synthetic Minor Source' for CO emissions. The source operates multiple existing emissions units at the EAT02 building.

This reviews the expansion of the source, that is construction of additional data center buildings referred to as EAT03, EAT04, and EAT05. The project includes the installation and operation of 63 additional diesel-fired emergency engines to power electrical generators at the data center.

The Notice of Construction (NOC) application forms for the East Wenatchee Data Center Campus expansion were submitted by the source on August 2, 2022. Since only the forms were submitted, the Washington State Department of Ecology (Ecology) immediately determined the initial application to be incomplete per WAC 173-400-111. Additional NOC application materials were received by Ecology on October 19, 2022, June 30, 2023, and October 6, 2023.

2. Application Processing

a. Public Notice

This project is subject to a mandatory 30-day public comment period per: WAC 173-400-171(3)(b) for increases in emissions of toxic air pollutants above acceptable source impact levels; and WAC 173-400-171(3)(k) for an order issued under WAC 173-400-091 that establishes limitations on a source's potential to emit. The comment period is scheduled for <start date> through <end date>. If comments are received during the public comment period, response will be contained in a separate document.

b. State Environmental Policy Act

Ecology's existing Determination of Nonsignificance, issued on August 18, 2021, stands for the revised project. This determination was made by Ecology's Fran Sant, during a call between her and I, on December 19, 2022.

3. Applicable Regulations

a. State Regulations

i. Minor New Source Review Applicability

Per WAC 173-400-110, an NOC application and an order of approval must be issued by the permitting authority prior to the establishment of a new source or modification.

As stated in the NOC application and consistent with Ecology's review, the new gensets are being constructed this project and therefore are subject to minor new source review (NSR).

A. Exempt Equipment

This project did not include any equipment with air emissions.

B. Potential to Emit (Potential Emissions)

The potential emissions from the project are greater than the exemption levels listed under WAC 173-400-110(5) as shown below in Tables 1 and 2 (in bold).

Table 1. Potential emissions for pollutants listed under WAC 173-400-110(5), versus the NSR Exemption Levels

Pollutant	Potential Emissions (tons/year)	Minor NSR Exemption (tons/year)
Carbon Monoxide (CO)	151	5.0
Lead (Pb)	0.009	0.005
Nitrogen Oxides (NO _x)	1,411	2.0
PM ₁₀	23	0.75
PM _{2.5}	23	0.5
Total Suspended Particulates (TSP)	23	1.25
Sulfur Dioxide (SO ₂)	0.24	2.0
Volatile Organic Compounds, total (VOC)	17	2.0

Table 2. Potential TAP emissions, versus the de minimis emission values

Pollutant	Potential Emissions (pounds/AP)	De Minimis (pounds/AP)	Averaging Period (AP)
1,3-Butadiene	4.9E+02	2.7E-01	year
Acetaldehyde	1.8E+03	3.0E+00	year
Acrolein	3.6E+00	1.3E-03	24-hr
Ammonia	3.8E+02	1.9E+00	24-hr
Arsenic & inorganic arsenic compounds	3.6E+00	2.5E-03	year
Benz[a]anthracene	2.4E+00	4.5E-02	year
Benzene	4.2E+02	1.0E+00	year
Benzo[a]pyrene	2.0E+00	8.2E-03	year
Benzo[b]fluoranthene	3.9E+00	4.5E-02	year
Benzo[k]fluoranthene	3.9E+00	4.5E-02	year
Cadmium & compounds	3.4E+00	1.9E-03	year
Carbon monoxide	6.1E+02	1.1E+00	1-hr
Chlorobenzene	2.1E-02	3.7E+00	24-hr
Chromium(III), soluble particulates	5.4E-02	3.7E-04	24-hr
Chromium(VI) & compounds	2.2E-01	3.3E-05	year
Chrysene	2.2E+00	4.5E-01	year
Copper & compounds	1.8E-02	9.3E-03	1-hr
Dibenz[a,h]anthracene	2.1E+00	4.1E-03	year
Diesel engine exhaust, particulate (DEEP)	3.0E+01	2.7E-02	year
Ethyl benzene	2.4E+01	3.2E+00	year
Formaldehyde	3.9E+03	1.4E+00	year
Hydrogen chloride	2.0E+01	3.3E-02	24-hr
Indeno[1,2,3-cd]pyrene	2.1E+00	4.5E-02	year
Lead & compounds	1.9E+01	1.0E+01	year
Manganese & compounds	3.3E-01	1.1E-03	24-hr
Mercury, elemental	2.1E-01	1.1E-04	24-hr
Naphthalene	8.0E+01	2.4E-01	year
n-Hexane	2.9E+00	2.6E+00	24-hr
Nickel & compounds	8.7E+00	3.1E-02	year
Nitrogen dioxide	5.6E+02	4.6E-01	1-hr
Polycyclic aromatic hydrocarbons	4.1E+00	8.2E-03	year
Propylene	5.0E+01	1.1E+01	24-hr
Selenium & selenium compounds	2.4E-01	7.4E-02	24-hr
Sulfur dioxide	9.5E-01	4.6E-01	1-hr
Toluene	1.1E+01	1.9E+01	24-hr
Xylene (mixture)	4.6E+00	8.2E-01	24-hr

ii. Prevention of Significant Deterioration (PSD)

PSD would apply to the project based on uncontrolled, 500 hour-per-year potential emissions. However, the allowable emissions prior to and after this project are well below the major thresholds for PSD applicability. The source did not submit a PSD Applicability Determination application; therefore, Ecology's PSD program did not issue a PSD Applicability Determination for this project.

iii. Other Applicable Requirements

In accordance with WAC 173-400-113, the proposed new source must comply with all applicable emission standards adopted under Chapter 70A.15 RCW. The following applicable emission standards are associated with the proposed project:

A. 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 gensets. The standard is specified as an emission limit under Approval Condition 2.c.v.C.

B. Emission Standards for Combustion and Incineration Units

WAC 173-400-050(1) limits emissions of particulate matter from combustion units to 0.23 gram per dry cubic meter at standard conditions (0.10 grains per dry standard cubic foot) of exhaust gas. This standard applies to each of the proposed gensets. The standard is specified as an emission limit under Approval Condition 2.c.v.B.

C. Standards of Performance for New Sources

WAC 173-400-115(1)(a) adopts by reference 40 C.F.R. Part 60, Subpart IIII as the regulation existed on August 24, 2022. Subpart IIII was since revised on January 24, 2023. However, the revisions were specific to: engines used in Alaska and marine offshore installations; and confidential information provisions for engine manufacturers. Therefore, requirements of the state-adopted version are equivalent to the current federal version. Subpart IIII applies to the proposed genset (discussed below).

b. Federal Regulations

In accordance with WAC 173-400-113, the proposed new source must comply with all applicable new source performance standards (NSPS) included in 40 C.F.R. Part 60, national emission standards for hazardous air pollutants (NESHAPs) included in 40 C.F.R. Part 61, and NESHAPs for source categories included in 40 C.F.R. Part 63. The following applicable emission standards are associated with the proposed project:

i. Standards of Performance for New Stationary Sources

The ICE NSPS (40 C.F.R. Part 60, Subpart IIII) applies to each genset engine. The regulation specifies:

- Criteria for classification as emergency engines.
- Tier-2 emission standards for the engines.
- Fuel, monitoring, compliance, and notification requirements for the Permittee.

The Tier-2 emission standards specified by the regulation were the basis of the emission limits listed under Approval Conditions 2.c.i and 2.c.ii.

ii. National Emission Standards for Hazardous Air Pollutants for Source Categories

The RICE NESHAP (40 C.F.R. Part 63, Subpart ZZZZ) applies to each genset engine. However, each engine is also subject to the ICE NSPS (see above). At 40 C.F.R. 63.6590(c), the NESHAP specifies that compliance shall be met by meeting the requirements of the NSPS; therefore, no further requirements apply to the engines.

4. Emissions

a. Emission Factors

i. Criteria Air Pollutants (Except Lead) and VOC

Emission-unit specific emission factors for CO, NO_x, PM, and unburned hydrocarbons were provided by the manufacturer. The manufacturer data was treated in the following manner:

- Unburned hydrocarbons were assumed to be equivalent to VOC and NMHC.
- DEEP was taken to be the manufacturer-measured PM.
- The sum of PM and hydrocarbon emissions (assuming all condense) was used for comparison to the exemption levels for PM_{2.5}, PM₁₀, and total suspended particulates.

The emission factor for SO₂ was calculated by the consultant, based on the sulfur content of ultra-low-sulfur diesel and an average heating value of diesel fuel, assuming complete conversion of sulfur to SO₂.

ii. Lead, non-Criteria Toxic Air Pollutants, and Hazardous Air Pollutants

Fuel-usage based emission factors were employed for lead, toxic air pollutants (other than CO, NO_x, and SO₂), and hazardous air pollutants. For each pollutant, the highest emission factor from the following sources was utilized:

- EPA's AP-42 Compilation of Air Pollutant Emission Factors, 5th Edition, Volume 1, Chapter 3.4 - Large Stationary Diesel and All Stationary Dual-fuel Engines, October 1996 (> 600 hp).
- VCAPCD's AB 2588 Combustion Emission Factors, for diesel internal combustion, dated May 17, 2001. Bulk 'PAH's (including naphthalene)' was reduced for the stated naphthalene value, with the remainder treated as having 5 percent of the risk of benzo(a)pyrene. Total chromium was reduced for the stated hexavalent chromium value, with the remainder treated as soluble chromium(III) particles.
- California Air Toxics Emission Factor (CATEF) database, for ICE-diesel, accessed December 28, 2022. Duplicated entries were deleted from dataset; pollutants with multiple data points were averaged.

b. Best Available Control Technology | Best Available Control Technology for Toxics

Per the definition of best available control technology (BACT), application of BACT shall not "result in emissions of any pollutants which will exceed the emissions allowed by any applicable standard under 40 C.F.R. Part 60 and Part 61". As such, the starting point for the BACT analysis was the Tier-2 emission standards for nonroad engines with rated power exceeding 560 kW.

The consultant provided a summary of previously conducted BACT analyses for data center gensets. Paired with Ecology's experience with this sector, this was sufficient to support a presumptive BACT determination for the project that the emissions of Tier-2 certified engines meet: BACT for CO, lead, NO_x, particulate, and VOC; and tBACT for the TAPs that triggered review.

c. Additional Voluntary Emission Controls

The source proposed voluntary installation of catalyzed diesel particulate filter (cDPF) and urea-based selective catalytic reduction (SCR) controls for some engines. Specifically, the controls will be installed on the CAT C175-16 engines located in the EAT03, EAT04, and EAT05 buildings (60 engines in total). Vendor-provided control efficiency information was applied to the engine manufacturer emission factors.

The SCR portion of the controls are for NO₂ emissions. Due to the potential of not reaching the minimum-required SCR catalyst temperature, no control efficiency was applied to emissions at 10 percent engine load. For modeling of NO₂ impacts, a 20-minute warm up period was assumed 25-100 percent engine loads. For calculating allowable emissions, a less-conservative (but still within vendor parameters) 15-minute warm up period was assumed for 50-100 percent engine loads. The cDPF portion of the controls will remove particulate (including metals) and VOC with an 85 percent and 50 percent removal efficiency, respectively. Thus, the controls reduced the modeled impacts of the project to demonstrate compliance with ambient standards.

Ecology inquired whether the manufacturer’s warrantee covers the source’s planned use of hydrotreated vegetable oil (HVO) fuel. Caterpillar’s Lafayette Engine Center provided a letter of warrantee; the letter affirmed that HVO fuel conforming to Caterpillar specification-document SEBU6251-21 may be used in the engines and aftertreatment components without impact to the Caterpillar warranty.

d. Allowable Emissions

The allowable emissions from the project, considering all emission and operational limits contained in the approval order, are shown in the table below.

Table 3. Allowable emissions for pollutants listed under WAC 173-400-110(5)

Pollutant	All Units (tons/year)
CO	12.1
Pb	0.0025
NO _x	99.0
PM ₁₀	2.7
PM _{2.5}	2.7
TSP	2.7
SO ₂	0.2
VOC	2.3

5. **Ambient Air Quality Standards**

As specified in WAC 173-400-113, the proposed new or modified source(s) must not cause or contribute to a violation of any ambient air quality standard. This includes the ambient air quality standards for both criteria and toxic air pollutants.

a. Pollutants Listed Under WAC 173-400-110 (Except TAPs)

VOC is not a criteria air pollutant; therefore, dispersion modeling of VOC emissions was not conducted for this project. While, under the right conditions, VOC is a precursor for ozone and secondary PM_{2.5} (both are criteria pollutants), this source’s VOC emissions are not expected to contribute to National Ambient Air Quality Standards (NAAQS) or Washington Ambient Air Quality Standards (WAAQS) exceedances.

To satisfy the requirements of Chapter 173-476 WAC, modeling was performed for emissions of CO, NO₂, and PM. The modeling demonstrates that the emissions increase as a result of the project will not exceed the NAAQS or WAAQS. The modeling results are included in the table below.

Table 4. Criteria Pollutant Modeling Results

Criteria Pollutant	Averaging Period	Modeled Concentration	NAAQS
CO	1-hr	3,560	40,000
CO	8-hr	1,660	10,000
NO ₂	1-hr	129	188
NO ₂	year	15	100
PM _{2.5}	24-hr	29	35
PM _{2.5}	year	7.1	12
PM ₁₀	24-hr	101	150

b. Toxic Air Pollutants

In accordance with WAC 173-460-040, new TAP sources must meet the requirements of Chapter 173-460 WAC, unless they are exempt by WAC 173-400-110(5).

As shown in Table 2, minor NSR is required for the project. As such, the new emission units must comply with WAC 173-460-070 (ambient impact requirement). The facility may demonstrate compliance with the ambient impact requirement by either showing that the emissions increase is less than the small quantity emissions rates (SQER) or through dispersion modeling. The table below includes the estimated emissions increases associated with the project and the applicable SQER; emissions above the SQER are in bold.

Table 5. TAP Analysis (pounds per averaging period)

Toxic Air Pollutant	Allowable Emissions	SQER	Averaging Period
1,3-Butadiene	1.8E+02	5.4E+00	year
Acetaldehyde	6.4E+02	6.0E+01	year
Acrolein	3.3E+00	2.6E-02	24-hr
Ammonia	1.4E+02	3.7E+01	24-hr
Arsenic & inorganic arsenic compounds	9.6E-01	4.9E-02	year
Benz[a]anthracene	7.5E-01	8.9E-01	year
Benzene	1.5E+02	2.1E+01	year
Benzo[a]pyrene	7.2E-01	1.6E-01	year
Benzo[b]fluoranthene	1.4E+00	8.9E-01	year
Benzo[k]fluoranthene	1.4E+00	8.9E-01	year
Cadmium & compounds	8.9E-01	3.9E-02	year
Carbon monoxide	2.9E+02	4.3E+01	1-hr
Chlorobenzene	1.9E-02	7.4E+01	24-hr

Toxic Air Pollutant	Allowable Emissions	SQER	Averaging Period
Chromium(III), soluble particulates	3.4E-02	7.4E-03	24-hr
Chromium(VI) & compounds	6.0E-02	6.5E-04	year
Chrysene	8.0E-01	8.9E+00	year
Copper & compounds	2.7E-02	1.9E-01	1-hr
Dibenz[a,h]anthracene	7.6E-01	8.2E-02	year
Diesel engine exhaust, particulate (DEEP)	1.1E+03	5.4E-01	year
Ethyl benzene	8.9E+00	6.5E+01	year
Formaldehyde	1.4E+03	2.7E+01	year
Hydrogen chloride	1.8E+01	6.7E-01	24-hr
Indeno[1,2,3-cd]pyrene	7.5E-01	8.9E-01	year
Lead & compounds	5.0E+00	1.4E+01	year
Manganese & compounds	1.8E-01	2.2E-02	24-hr
Mercury, elemental	1.1E-01	2.2E-03	24-hr
Naphthalene	2.9E+01	4.8E+00	year
n-Hexane	2.6E+00	5.2E+01	24-hr
Nickel & compounds	2.3E+00	6.2E-01	year
Nitrogen dioxide	2.8E+02	8.7E-01	1-hr
Polycyclic aromatic hydrocarbons	2.2E+01	1.6E-01	year
Propylene	4.5E+01	2.2E+02	24-hr
Selenium & selenium compounds	1.3E-01	1.5E+00	24-hr
Sulfur dioxide	3.6E+00	1.2E+00	1-hr
Toluene	1.0E+01	3.7E+02	24-hr
Xylene (mixture)	4.1E+00	1.6E+01	24-hr

For the TAPs that exceeded the SQER, modeling was performed to satisfy the requirements of Washington’s state toxics rule in Chapter 173-460 WAC. The modeling demonstrates that the emissions increase as a result of the project will not exceed the acceptable source impact level (ASIL) screening thresholds, with the exception of DEEP and NO₂. The modeling results are included in the table below.

Table 6. TAP Modeling Results (µg/m³)

Toxic Air Pollutant	Maximum Modeled Concentration	ASIL	Averaging Period
1,3-Butadiene	1.1E-02	3.3E-02	year
Acetaldehyde	3.9E-02	3.7E-01	year
Acrolein	2.3E-01	3.5E-01	24-hr

Toxic Air Pollutant	Maximum Modeled Concentration	ASIL	Averaging Period
Ammonia	9.9E+00	5.0E+02	24-hr
Arsenic & inorganic arsenic compounds	5.9E-05	3.0E-04	year
Benzene	9.4E-03	1.3E-01	year
Benzo[a]pyrene	4.4E-05	1.0E-03	year
Benzo[b]fluoranthene	8.8E-05	5.5E-03	year
Benzo[k]fluoranthene	8.7E-05	5.5E-03	year
Cadmium & compounds	5.5E-05	2.4E-04	year
Carbon monoxide	2.2E+03	2.3E+04	1-hr
Chromium(III), soluble particulates	2.4E-03	1.0E-01	24-hr
Chromium(VI) & compounds	3.7E-06	4.0E-06	year
Dibenz[a,h]anthracene	4.7E-05	5.0E-04	year
Diesel engine exhaust, particulate (DEEP)	6.8E-02	3.3E-03	year
Formaldehyde	8.7E-02	1.7E-01	year
Hydrogen chloride	1.3E+00	9.0E+00	24-hr
Manganese & compounds	1.2E-02	3.0E-01	24-hr
Mercury, elemental	8.0E-03	3.0E-02	24-hr
Naphthalene	1.8E-03	2.9E-02	year
Nickel & compounds	1.4E-04	3.8E-03	year
Nitrogen dioxide	2.3E+03	4.7E+02	1-hr
Polycyclic aromatic hydrocarbons	1.3E-03	2.0E-02	year
Sulfur dioxide	2.8E+01	6.6E+02	1-hr

As shown in the table above, all TAPs except DEEP and NO₂ are below their associated ASIL. A Second Tier Health Impact Assessment (HIA) was conducted for DEEP and NO₂ and submitted separately from the NOC application, per WAC 173-460-090. Ecology reviewed the assessment and recommended approval of the project because. Ecology’s analysis and recommendations are included in the document titled, “Second Tier Review Recommendation for: Microsoft Corporation East Wenatchee Data Center Phases EAT 03, 04, and 05 [Includes Consideration of EAT 02 Emissions]”, January 2024.

Appendix A – Federal Rule Applicability

1. 40 C.F.R. Part 60, Subpart IIII

Example: The ICE NSPS (40 C.F.R. Part 60, Subpart IIII) applies to each engine. The applicable portions the rule appear to be:

Citation	Subject	Notes
60.4202(a)(2)	Manufacturer emission standards	Specifies that 2008 model year and later emergency stationary CI ICE with a maximum engine power ≥ 37 kWm and $\leq 2,237$ kWm be certified to the standards specified in 40 C.F.R. Part 1039, Appendix I (Tier 2 emission standards) for all pollutants and the smoke standards specified in 40 C.F.R. 1039.105.
60.4202(b)(2)	Manufacturer emission standards	Specifies that 2011 model year and later emergency stationary CI ICE with a maximum engine power $\geq 2,237$ kWm and a displacement of < 10 liters per cylinder be certified to the standards specified in 40 C.F.R. Part 1039, Appendix I (Tier 2 emission standards) for all pollutants and the smoke standards specified in 40 C.F.R. 1039.105.
60.4205(b)	Owner/Operator emission standards	Directs owners and operators of 2007 model year and later emergency stationary CI ICE to comply with the emission standards for new nonroad CI engines in §60.4202.
60.4209(a)	Owner/Operator monitoring requirements	Directs owners and operators of stationary CI that don't meet the standards applicable to non-emergency engines to install a non-resettable hour meter prior to startup of each engine.
Table 8 to Subpart IIII of Part 60	Applicability of General Provisions to Subpart IIII	The table lists what portions of 40 C.F.R. 60 Subpart I are applicable, including notification and recordkeeping requirements.

Note: While the CAT C175-16 engines in the EAT03, EAT04, and EAT05 buildings are equipped with catalyzed diesel particulate filters and selective catalytic reduction, 40 C.F.R. the controls are not required for compliance with the emission standards in 40 C.F.R. 60.4204.