

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A NEW)
AIR CONTAMINANT SOURCE FOR) Preliminary Determination
MICROSOFT CORPORATION)
COLUMBIA DATA CENTER)

TO: Michael Wind
Microsoft Corporation
Columbia Data Center
501 Port Industrial Parkway
Quincy, WA 98848

EQUIPMENT

1. A list of equipment that was evaluated for this order of approval is contained in Tables 1.a through 1.c.

Table 1.a: 2.5 eMW Engine & Generator Serial Numbers				
Phase	Unit ID	Engine SN	Generator SN	Build date
CO1/1	1	SBK000170	G4B00130	8/14/06
“	2	SBK000179	G4B00132	8/25/06
“	3	SBK000169	G4B00128	8/10/06
“	4	SBK000181	G4B00133	8/28/06
“	5	SBK000176	G4B00131	8/25/06
“	6	SBK000168	G4B00129	8/10/06
“	7	SBK000160	G4B00125	7/21/06
“	8	SBK000159	G4B00127	7/19/06
“	9	SBK000162	G4B00126	7/24/06
“	10	SBK000158	G4B00124	7/19/06
“	11	SBK000172	G4B00113	8/18/06
“	12	SBK00990	KHD00231	8/15/10
CO1/2	1	SBK000208	G4B00173	11/1/06
“	2	SBK000214	G4B00171	11/6/06
“	3	SBK000211	G4B00176	11/3/06
“	4	SBK000213	G4B00177	11/6/06
“	5	SBK000201	G4B00178	10/20/06
“	6	SBK000171	G4B00112	8/17/06
“	7	SBK000212	G4B00175	11/6/06
“	8	SBK000205	G4B00170	10/30/06
“	9	SBK000210	G4B00172	11/3/06
“	10	SBK000200	G4B00179	10/20/06
“	11	SBK000209	G4B00174	11/2/06
“	12	SBK00989	KHD00230	8/14/10
CO3.2	25	SBK00949	G8D00117	7/25/10
“	26	SBK00947	G8D00116	7/16/10
“	27	SBK00945	G8D00115	7/15/10

Table 1.a: 2.5 eMW Engine & Generator Serial Numbers				
Phase	Unit ID	Engine SN	Generator SN	Build date
“	28	SBK00953	G8D00119	7/28/10
“	29	SBK00951	G8D00118	7/28/10
CO3.1	30	SBK01014	G8D00142	10/6/10
“	31	SBK01012	G8D00141	10/5/10
“	32	SBK01030	G8D00146	10/14/10
“	33	SBK01027	G8D00145	10/13/10
CO3.3	34	SBK01013	G8D00140	9/30/10
“	35	SBK01015	G8D00144	10/7/10
CO6	1			
“	2			
“	3			
“	4			
“	5			

Table 1.b: Fire Pump Engine SN			
Unit ID	Engine SN	Engine Size	Build Year
CO1	Pe6068t602182	149 bhp	2006
CO2	Pe6068t679482	149 bhp	2007

Table 1.c: Cooling Towers			
Unit ID	# Cooling Tower Banks	# Cooling Tower Units per Bank	Total # Cooling Tower Units
CO1	1	18	18
CO2	1	18	18
Total	2	na	36

DETERMINATIONS

In relation to this project, the State of Washington Department of Ecology (Ecology), pursuant to Revised Code of Washington (RCW) 70.94.152, Washington Administrative Code (WAC) 173-460-040, and WAC 173-400-110, makes the following determinations:

1. The project, if constructed and operated as herein required, will be in accordance with applicable rules and regulations, as set forth in Chapter 173-400 WAC, and Chapter 173-460 WAC, and the operation thereof, at the location proposed, will not emit pollutants in concentrations that will endanger public health.
2. The proposed project, if constructed and operated as herein required, will provide all known, available, and reasonable methods of emission control.

THEREFORE, IT IS ORDERED that the project as described in the Notice of Construction application and more specifically detailed in plans, specifications, and other information submitted to Ecology is approved for construction and operation, provided the following conditions are met:

APPROVAL CONDITIONS

1. ADMINISTRATIVE CONDITION

- a. Notice of Construction Approval Order No.14AQ-E553 is rescinded and replaced entirely with the issuance of this Order.
- b. Mountain View Elementary School administrators shall be provided a maintenance testing schedule as contained in the permit, and Microsoft shall update the school whenever Ecology-approved changes occur in the maintenance testing schedule. As decided by the school administrators and Microsoft, an ongoing relationship between the school and Microsoft should be established.

2. EQUIPMENT RESTRICTIONS

- a. The 40 Caterpillar Model 3516C 2.5 eMW engines used to power the electrical generators shall be operated in accordance with applicable 40 CFR 60, Subpart IIII requirements including but not limited to: certification by the manufacturer to meet the 40 CFR 89 EPA Tier 2 emissions levels as required by 40 CFR 60.4202; and installed and operated as emergency engines, as defined in 40 CFR 60.4219.
 - i. At the time of the effective date of this permit, Tier 4 interim and Tier 4 final certified engines (as specified in 40 CFR 1039.102 Table 7 and 40 CFR 1039.101 Table 1, respectively), are not required for 2.5 MWe electrical generators used for emergency purposes as defined in 40 CFR 60.4219 in attainment areas in Washington State. Any engines installed at the Columbia Data Center after Tier 4 or other limits are implemented by EPA for emergency generators, shall meet the applicable specifications as required by EPA at the time the emergency engines are installed.
- b. The only Caterpillar Model 3516C 2.5 eMW engines and electrical generating units approved for operation at the Columbia Data Center are those listed in Table 1.a above.
- c. Manufacture and installation of the CO6 engine/generator sets identified in Table 1.a shall take place by **July 30, 2021**. If the manufacture and installation of these engines has not been completed by **July 30, 2021**, a NOC application may be required prior to installation.
- d. Replacement of failed engines with identical engines (same manufacturer and model) requires notification prior to installation, but will not require Notice of Construction unless there is an emission rate increase from the replacement engines.

e. Table 2 – Emergency Generator Exhaust Stack Height Requirements

Quantity	Location	Minimum Height (feet)	Stack Diameter (inches)	Height Above Roof (feet)
20	CO1 and CO2 Building	38'	18"	8'
4	CO1 and CO2 Ground Level	20'	18"	
11	CO3.1, CO3.2, CO3.3 Ground Level	31'	18"	
5	CO6 Building	38'	24"	12.5'

3. OPERATING LIMITATIONS

- a. The fuel consumption at the Columbia Data Center facility shall be limited to a total of 439,493 gallons per year and 88,800 gallons per day of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.00150 weight percent sulfur). Total annual fuel consumption by the facility may be averaged over a three (3) year period using monthly rolling totals.
- b. The 35 CO1, CO2, and CO3 generators shall not operate more than 100 hours per year per engine at an average capacity of 53% of full standby capacity. Individual units may be operated at a higher load than 53% of full standby capacity as long as no emission limit is exceeded. Annual operating hours may be averaged over all 35 CO1, CO2, and CO3 generators.
- c. Operation of the 11 CO3.1, CO3.2, and CO3.3 generators for electrical bypass shall be limited to approximately 44 hours per year each at an average electrical load of 40% of the standby rating. No more than two engines shall operate at the same time during any electrical bypass operation.
- d. Each of the 35 CO1, CO2 and CO3 generator engines require maintenance and testing for approximately one hour per month. To mitigate engine emission impacts, Microsoft Corporation will perform at least 80% of all maintenance testing from 7:00 AM until 5:00 PM on Monday through Wednesday with no more than 3 engines tested concurrently. Engine maintenance and testing may take place outside of these restrictions upon coordination by Microsoft with the other data centers in Quincy to minimize engine emission impacts to the community. Microsoft shall maintain records of the coordination communications with the other data centers, and those communications shall be available for review by Ecology. This schedule can be re-negotiated at any time as approved in writing by Ecology, and will not trigger revision or amendment of this Order.
- e. CO1 and CO2 each have 1 bank of 6 cooling units with a total of 18 cooling towers each. Each individual unit shall have a mist eliminator that will maintain the maximum drift rate to no more than 0.0005 percent of the circulating water rate.
- f. Operation of the 11 CO3 generators for power outage emergencies shall be limited to a maximum of 48 hours per engine per calendar year at a maximum average electrical load of 85%.
- g. The five CO6 generators shall not operate more than 80 hours per year per engine. Annual operating hours may be averaged over all CO6 generators in service. The five CO6 generators shall not operate more than 94 hours per engine for the first year of operation to include commissioning.
- h. Operation of more than one CO6 generator for more than 15 hours per generator in any 24-hour period shall not occur more than three times in any three calendar year period.
- i. The operation of more than one CO6 generator, operating concurrently at any one time, shall not occur on more than 21 calendar days in any three calendar year period.
- j. There is no limit on the number of days that operation of one CO6 generator at a time can occur, but operation under this scenario is limited to daytime hours only (7:00 am to 7:00 pm).

4. GENERAL TESTING AND MAINTENANCE REQUIREMENTS

- a. Microsoft Columbia Data Center will follow engine-manufacturer's recommended diagnostic testing and maintenance procedures to ensure that each of the forty 2.5 eMW engines will conform to 40 CFR 89 emission specifications throughout the life of each engine.
- b. Following installation and commissioning of each individual generator, but prior to the transfer of a batch of engines to Microsoft ownership, to demonstrate the engines are commissioned and programmed to run within the Tier 2 emission limits in Condition 5.b, for PM (filterable only), NO, NO₂, NMHC, and CO emissions measurement shall be conducted for one engine from each batch or control generation. Testing shall be conducted at the loads of 100 percent, 75 percent, 50 percent, 25 percent and 10 percent using weighted averaging according to Table 2 of Appendix B to Subpart E of 40 CFR 89. Testing may be conducted using 40 CFR 1065.
- c. Within 60 months of the first engine installation of each phase of installation, and every 60 months thereafter, the Columbia Data Center shall measure emissions of particulate matter (PM), Volatile Organic Compounds (VOC), nitric oxide (NO), nitrogen dioxide (NO₂), carbon monoxide (CO), and oxygen (O₂) from at least one representative engine from each batch of engines installed, in accordance with Approval Condition 4.d. This testing will serve to demonstrate compliance with the emission limits contained in Condition 5.a; confirm that the engine's emissions remain within the EPA Tier 2 certification specifications, and as an indicator of proper operation of the engines. The selection of the engine(s) to be tested shall be subject to prior approval by Ecology and shall be defined in the source test protocol submitted to Ecology no less than 30 days in advance of any compliance-related stack sampling conducted by Microsoft. Each engine tested shall be the engine from each batch of engines installed with the most operating hours since an engine of that batch was last tested.
- d. The following procedures shall be used for each test for the engines required by Approval Condition 4.b and 4.c unless an alternate method is proposed by Microsoft and approved in writing by Ecology prior to the test:
 - i. Periodic emissions testing should be combined with pre-scheduled maintenance testing and annual load bank testing. Additional operation of the engines for the purpose of emissions testing beyond the operating hour and fuel consumptions limits authorized by this Order may be allowed by Ecology upon request.
 - ii. For the five load tests, testing shall be performed at each of the five engine torque load levels described in Table 2 of Appendix B to Subpart E of 40 CFR Part 89, and data shall be reduced to a single-weighted average value using the weighting factors specified in Table 2. Microsoft may replace the dynamometer requirement in Subpart E of 40 CFR Part 89 with corresponding measurement of gen-set electrical output to derive torque output.
 - iii. For all tests, the F-factor described in Method 19 shall be used to calculate exhaust flow rate through the exhaust stack, except that EPA Method 2 shall be used to calculate the flow rate for purposes of particulate testing (Method 2 is not required if

- 40 CFR 1065 is used). Fuel meter data measured according to Approval Condition 4.f shall be included in the test report, along with the emissions calculations.
- iv. Three test runs shall be conducted for each engine, except as allowed by the sampling protocol from 40 CFR 1065. Each run shall last at least 60 minutes except as allowed by the sampling protocol from 40 CFR 1065. Source test analyzers and engine control unit data shall be recorded at least once every minute during the test. Engine run time and torque output (measured kW to convert to torque) and fuel usage shall be recorded during each test run for each load and shall be included in the test report.
 - v. In the event that any stack test indicates non-compliance with the emission limits in Condition 5, Microsoft shall repair or replace the engine and repeat the test on the same engine plus two additional engines from the same phase of installation as the engine showing non-compliance. Test reports shall be submitted to Ecology within 60 days of the final day of testing. Test reports shall be submitted to the address in Condition 7.
 - vi. For the gaseous pollutants (NO_x, CO, and NMHC), Microsoft may propose using a portable emissions instrument analyzer for subsequent rounds of periodic source testing if initial testing of engines show compliance with each of the Tier 2 emission standards referenced in Condition 4.b. The use of an analyzer and the analyzer model shall be approved in writing by Ecology prior to testing. The analyzer shall be calibrated using EPA Protocol 1 gases according to the procedures for drift and bias limits outlined in EPA Methods 7E and Method 10. Alternate calibration procedures may be approved in advance by Ecology.
 - k. Each engine shall be equipped with a properly installed and maintained non-resettable meter that records total operating hours.
 - l. Each engine shall be connected to a properly installed and maintained fuel flow monitoring system that records the amount of fuel consumed by the engine during each operation.

5. EMISSION LIMITS

The forty 2.5 MWe engines shall meet the follow emission rate limitations:

- a. To demonstrate compliance with the g/kW-hr EPA Tier 2 average emission limits through stack testing, the Columbia Data Center shall conduct exhaust stack testing and averaging of emission rates for five individual operating loads (10 percent, 25 percent, 50 percent, 75 percent, and 100 percent) according to 40 CFR §89.410, Table 2 of Appendix B, 40 CFR Part 89, Subpart E, and/or 40 CFR Part 60, Subpart IIII, or any other applicable EPA requirement in effect at the time the engines are installed. The Tier 2 emission limits for the 40 engine generators:
 - i. NMHC and NO_x: 6.4 g/kW-hr
 - ii. CO: 3.5 g/kW-hr
 - iii. PM (filterable): 0.20 g/kw-hr
- b. Total annual facility-wide emissions shall not exceed the 12-month rolling average emissions for PM₁₀, PM_{2.5}, CO, NO_x, VOC, SO₂, DEEP, and NO₂ as listed in Table 3.

Table 3 Criteria Pollutant and Toxic Air Pollutant Emission Limits for Total Facility Columbia CO1, CO2, CO3, CO6 (Tons/Year)		
Pollutant	Annual Emissions	Annual with CO6 Commissioning Emissions
PM smaller than 10 microns in diameter (PM ₁₀)	14.18	14.23
PM smaller than 2.5 microns in diameter (PM _{2.5}) ^(a)	6.38	6.43
PM _{2.5} /PM ₁₀ (Gens Only)	2.88	2.93
Carbon monoxide (CO)	5.71	5.96
Nitrogen oxides (NO _x)	37.1	39.0
Volatile organic compound (VOC)	2.31	2.35
Sulfur dioxide (SO ₂)	0.05	0.05
Diesel Engine Exhaust Particulate (DEEP)*	0.60	0.62
Nitrogen Dioxide (NO ₂)**	3.67	3.86
* All PM emissions from the generator engines are PM _{2.5} , and all filterable PM _{2.5} from the generator engines is considered Diesel Engine Exhaust Particulate (DEEP).		
** NO ₂ is assumed to be equal to 10 percent of the total NO _x emitted.		

- c. Visual emissions from each diesel electric generator exhaust stack shall be no more than 5 percent, with the exception of a ten (10) minute period after unit start-up. Visual emissions shall be measured by using the procedures contained in 40 CFR 60, Appendix A, Method 9.

6. OPERATION AND MAINTENANCE MANUALS

A site-specific O&M manual for the Microsoft Columbia Data Center facility equipment shall be developed and followed. Manufacturers' operating instructions and design specifications for the engines, generators, cooling towers, and associated equipment shall be included in the manual. The O&M manual shall be reviewed annually and be updated to reflect any modifications of the equipment or its operating procedures. Emissions that result from failure to follow the operating procedures contained in the O&M manual or manufacturer's operating instructions may be considered proof that the equipment was not properly installed, operated, and/or maintained. The O&M manual for the diesel engines and associated equipment shall at a minimum include:

- a. Manufacturer's testing and maintenance procedures that will ensure that each individual engine will conform to the EPA Tiered Emission Standards appropriate for that engine throughout the life of the engine.
- b. Normal operating parameters and design specifications.
- c. Operating maintenance schedule.

7. SUBMITTALS

All notifications, reports, and other submittals shall be sent to:

Washington State Department of Ecology
Air Quality Program
4601 N. Monroe Street
Spokane, WA 99205-1295

8. RECORDKEEPING

All records, Operations and Maintenance Manual, and procedures developed under this Order shall be organized in a readily accessible manner and cover a minimum of the most recent 60-month period. The following records are required to be collected and maintained.

- a. Fuel receipts with amount of diesel and sulfur content for each delivery to the facility.
- b. Annual hours of operation for each diesel engine.
- c. Annual number of start-ups for each diesel engine.
- d. Annual gross power generated by facility-wide operation of the emergency backup electrical generators.
- e. Upset condition log for each engine and generator that includes date, time, duration of upset, cause, and corrective action.
- f. Recordkeeping required by 40 CFR Part 60 Subpart IIII.
- g. Air quality complaints received from the public or other entity, and the affected emissions units.

9. REPORTING

- a. Within 10 business days after entering into a binding agreement to purchase the engine/generator sets identified in Equipment Table 1.a above, Microsoft Corporation shall notify Ecology in writing. The serial number of the engine and the generator, and the engine build date will be submitted prior to installation of each engine.
- b. The following information will be submitted to the AQP at the address in Condition 7 above by January 31 of each calendar year.
 - i. Monthly rolling annual total summary of air contaminant emissions, monthly rolling hours of operation with annual total, and monthly rolling gross power generation with annual total.
 - ii. Written notification that the O&M manual has been developed and updated within 60 days after the issuance of this Order.
- c. Any air quality complaints resulting from operation of the emissions units or activities shall be promptly assessed and addressed. A record shall be maintained of Microsoft Corporation's action to investigate the validity of the complaint and what, if any, corrective action was taken in response to the complaint. Ecology shall be notified within three (3) days of receipt of any such complaint.

10. STACK TESTING

Any emission testing performed to verify conditions of this Approval Order or for submittal to Ecology in support of this facility's operations shall be conducted as follows:

- a. At least 30 days in advance of such testing, the Permittee shall submit a testing protocol for Ecology approval that includes the following information:
 - i. The location and Unit ID of the equipment proposed to be tested.
 - ii. The operating parameters to be monitored during the test and the personnel assigned to monitor the parameters during the test.
 - iii. A description of the source including manufacturer, model number and design capacity of the equipment, and the location of the sample ports or test locations.
 - iv. Time and date of the test and identification and qualifications of the personnel involved.
 - v. A description of the test methods or procedures to be used.
- b. Test Reporting: test reports shall be submitted to Ecology within 60 days of completion of the test and shall include, at a minimum, the following information:
 - i. A description of the source including manufacturer, model number and design capacity of the equipment, and the location of the sample ports or test locations.
 - ii. Time and date of the test and identification and qualifications of the personnel involved.
 - iii. A summary of results, reported in units and averaging periods consistent with the applicable emission standard or limit.
 - iv. A summary of control system or equipment operating conditions.
 - v. A summary of production related parameters.
 - vi. A description of the test methods or procedures used including all field data, quality assurance/quality control procedures and documentation.
 - vii. A description of the analytical procedures used including all laboratory data, quality assurance/quality control procedures and documentation.
 - viii. Copies of field data and example calculations.
 - ix. Chain of custody information.
 - x. Calibration documentation.
 - xii. Discussion of any abnormalities associated with the results.
 - xiii. A statement signed by the senior management official of the testing firm certifying the validity of the source test report.

11. GENERAL CONDITIONS

- a. **Commencing/Discontinuing Construction and/or Operations:** This Approval Order shall become invalid if construction of the equipment described in the NOC application is not commenced within 18 months after receipt of the Approval Order. If construction or operation of a portion or all of the equipment described in the NOC application is discontinued for a period of 18 months, the portion of the Approval Order regulating the inactive equipment shall become invalid. Ecology may extend the 18-month period upon a satisfactory showing that an extension is justified.
- b. **Compliance Assurance Access:** Access to the source by representatives of Ecology or the EPA shall be permitted upon request. Failure to allow such access is grounds for enforcement action under the federal Clean Air Act or the Washington State Clean Air Act, and may result in revocation of this Approval Order.
- c. **Availability of Order and O&M Manual:** Legible copies of this Order and the O&M manual shall be available to employees in direct operation of the emergency diesel electric generators, and be available for review upon request by Ecology.

- d. **Equipment Operation:** Operation of the Caterpillar Model 3516C units and related equipment shall be conducted in compliance with all data and specifications submitted as part of the NOC application and in accordance with the O&M manual, unless otherwise approved in writing by Ecology.
- e. **Modifications:** Any modification to the generators, engines, or cooling towers and their related equipment's operating or maintenance procedures, contrary to information in the NOC application, shall be reported to Ecology at least 60 days before such modification. Such modification may require a new or amended NOC Approval Order.
- f. **Activities Inconsistent with the NOC Application and this Approval Order:** Any activity undertaken by the permittee or others, in a manner that is inconsistent with the NOC application and this determination, shall be subject to Ecology enforcement under applicable regulations.
- g. **Obligations under Other Laws or Regulations:** Nothing in this Approval Order shall be construed to relieve the permittee of its obligations under any local, state or federal laws or regulations.
- h. **Fees:** Per WAC 173-455-120, this Approval Order and related regulatory requirements have a fee associated for review and issuance. This Order is effective upon Ecology's receipt of the fee, for which Ecology's fiscal office will provide a billing statement.

All plans, specifications, and other information submitted to the Department of Ecology relative to this project and further documents and any authorizations or approvals or denials in relation thereto shall be kept at the Eastern Regional Office of the Department of Ecology in the "Air Quality Controlled Sources" files, and by such action shall be incorporated herein and made a part thereof.

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

1. Violation of any terms or conditions of this authorization;
2. Obtaining this authorization by misrepresentation or failure to disclose fully all relevant fact.

The provisions of this authorization are severable and, if any provision of this authorization, or application of any provisions of their circumstances, and the remainder of this authorization, shall not be affected thereby.

YOUR RIGHT TO APPEAL

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

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

- File your appeal and a copy of this Approval Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.

- Serve a copy of your appeal and this Approval Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

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

ADDRESS AND LOCATION INFORMATION

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

For additional information visit the Environmental Hearings Office

Website: <http://www.eho.wa.gov>

To find laws and agency rules visit the Washington State Legislature Website:

<http://www1.leg.wa.gov/CodeReviser>

DATED this day of January, 2020, at Spokane, Washington.

Prepared By:

Reviewed By:

Jenny Filipy, P.E.
Eastern Regional Office
Department of Ecology
State of Washington

David T. Knight, Section Supervisor
Eastern Regional Office
Department of Ecology
State of Washington