

**STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY**

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

TO: Jaymes Kirkham  
Microsoft Corporation  
1515 Port Industrial Pkwy  
Quincy, WA 98848

On January 27, 2014, Ecology received a Notice of Construction (NOC) application submittal from the Microsoft Corporation (Microsoft), requesting approval for Phases 1 and 2 of a new facility named the Oxford Data Center located at 1515 Port Industrial Parkway in Quincy, WA. Approval Order 14AQ-E537 was issued on August 15, 2014. On April 8, 2016 Ecology received an NOC from Microsoft requesting revisions to Approval Order 14AQ-E537 and changing the facility name to the MWH Data Center (or MWH). The application was considered complete on September 20, 2016.

On March 6, 2018, Ecology received a NOC application from Microsoft, requesting an expansion of the MWH Data Center MWH 03/04/05/06. The application was considered complete on June 7, 2018.

**EQUIPMENT**

A list of equipment for this project is provided in Tables 1.a–1.d below. Engine sizes listed in Tables 1.a–1.c and 2.a -2.b are in megawatt (MWe) units with the “e” indicating “electrical” based on generator power ratings listed on the engine specifications provided with the application. MWe is the assumed engine power rating unit for all Approval Conditions related to this Order.

<b>Table 1.a. 2.5 MWe Engine &amp; Generator Serial Numbers for MWH 01 &amp; 02</b>				
<b>Phase/Building</b>	<b>Unit ID</b>	<b>Engine SN</b>	<b>Generator SN</b>	<b>Date of Commission Completion</b>
<b>Primary Emergency Generators</b>				
Ph 1/AZA, Cell 1	MWH01.AS1.AZA.CE1.XXX.GEN1	DD500650	G7J00455	11/13/2015
“Cell 2	MWH01.AS1.AZA.CE2.XXX.GEN1	DD500647	G7J00451	11/13/2015
“Cell 3	MWH01.AS1.AZA.CE3.XXX.GEN1	DD500655	G7J00458	11/13/2015
“Cell 4	MWH01.AS1.AZA.CE4.XXX.GEN1	DD500642	G7J00446	11/13/2015
Ph 1/AZB, Cell 1	MWH01.AS1.AZB.CE1.XXX.GEN1	DD500625	G7J00440	9/21/2015
“Cell 2	MWH01.AS1.AZB.CE2.XXX.GEN1	DD500641	G7J00442	9/21/2015

**Table 1.a. 2.5 MWe Engine & Generator Serial Numbers for MWH 01 & 02**

Phase/Building	Unit ID	Engine SN	Generator SN	Date of Commission Completion
"Cell 3	MWH01.AS1.AZB.CE3.XXX.GEN1	DD500626	G7J00439	11/13/2015
"Cell 4	MWH01.AS1.AZB.CE4.XXX.GEN1	DD500637	G7J00441	11/13/2015
Ph 1/AZC, Cell 1	MWH01.AS1.AZC.CE1.XXX.GEN1	DD500651	G7J00456	11/13/2015
"Cell 2	MWH01.AS1.AZC.CE2.XXX.GEN1	DD500657	G7J00457	11/13/2015
"Cell 3	MWH01.AS1.AZC.CE3.XXX.GEN1	DD500663	G7J00459	11/13/2015
"Cell 4	MWH01.AS1.AZC.CE4.XXX.GEN1	DD500644	G7J00447	11/13/2015
Ph 1/AZD, Cell 1	MWH01.AS1.AZD.CE1.XXX.GEN1	DD500643	G7J00445	9/21/2015
"Cell 2	MWH01.AS1.AZD.CE2.XXX.GEN1	DD500645	G7J00448	9/21/2015
"Cell 3	MWH01.AS1.AZD.CE3.XXX.GEN1	DD500664	G7J00460	11/13/2015
"Cell 4	MWH01.AS1.AZD.CE4.XXX.GEN1	DD500648	G7J00450	11/13/2015
Ph 2/AZA, Cell 1	MWH02.AZA.CE1.GEN01	SBK02066-O	G7J00739	12/6/2017
"Cell 2	MWH02.AZA.CE2.GEN01	SBK02088-H	G7J00754	12/6/2017
"Cell 3	MWH02.AZA.CE3.GEN01	SBK02107-N	G7J00759	12/6/2017
"Cell 4	MWH02.AZA.CE4.GEN01	SBK02068-F	G7J00738	12/6/2017
Ph 2/AZB, Cell 1	MWH02.AZB.CE1.GEN01	SBK02056-C	G7J00732	4/9/2018
"Cell 2	MWH02.AZB.CE2.GEN01	SBK02070-G	G7J00741	4/9/2018
"Cell 3	MWH02.AZB.CE3.GEN01	SBK02069-P	G7J00740	7/13/2018
"Cell 4	MWH02.AZB.CE4.GEN01	SBK02081-J	G7J00748	4/9/2018
Ph 2/AZC, Cell 1	MWH02.AZC.CE1.GEN01	SBK02082-L	G7J00749	8/22/2017
"Cell 2	MWH02.AZC.CE2.GEN01	SBK02098-K	G7J00758	8/22/2017
"Cell 3	MWH02.AZC.CE3.GEN01	SBK02048-B	G7J00731	8/22/2017
"Cell 4	MWH02.AZC.CE4.GEN01	SBK02094-I	G7J00755	8/22/2017
Ph 2/AZD, Cell 1	MWH02.AZD.CE1.GEN01	SBK02058-D	G7J00735	6/7/2018
"Cell 2	MWH02.AZD.CE2.GEN01	SBK02064-E	G7J00736	6/7/2018
"Cell 3	MWH02.AZD.CE3.GEN01	SBK02085-M	G7J00752	6/7/2018
"Cell 4	MWH02.AZD.CE4.GEN01	SBK02046-A	G7J00730	6/7/2018
<b>Reserve Emergency Generators</b>				
Phase/Building	Unit ID	Engine SN	Generator SN	Date of Commission Completion
Ph 1/AZA	MWH01.AS1.AZA.ELECR1.GEN1	SBK02010-B	G7J00710	
Ph 1/AZB	MWH01.AS1.AZB.ELECR1.GEN1	SBK02009-A	G7J00709	
Ph 1/AZC	MWH01.AS1.AZC.ELECR1.GEN1	SBK02012-C	G7J00711	
Ph 1/AZD	MWH01.AS1.AZD.ELECR1.GEN1	SBK02011-D	G7J00712	
Ph 2/AZA	MWH02.AZA.ELECR1.GEN01	SBK02113-Q	G7J00762	12/6/2017
Ph 2/AZB	MWH02.AZB.ELECR1.GEN01	SBK02117-R	G7J00764	4/9/2018
Ph 2/AZC	MWH02.AZC.ELECR1.GEN01	SBK02119-S	G7J00768	8/22/2017
Ph 2/AZD	MWH02.AZD.ELECR1.GEN01	SBK02120-T	G7J00769	6/7/2018



Table 2.a. 3.0 MWe Engine & Generator Serial Numbers for MWH 03/04/05/06				
Building	Unit ID	Engine SN	Generator SN	Date of Commission Completion
<b>MWH 04</b>				
<b>MWH 05</b>				
<b>MWH 06</b>				

<b>Table 2.a 3.0 MWe Engine &amp; Generator Serial Numbers for MWH 03/04/05/06</b>				
<b>Building</b>	<b>Unit ID</b>	<b>Engine SN</b>	<b>Generator SN</b>	<b>Date of Commission Completion</b>
<b>MWH 06</b>				

<b>Table 2.b 1.0 MWe/1.5 MWe Engine &amp; Generator Serial Numbers for MWH 03/04/05/06</b>				
<b>Building</b>	<b>Unit ID</b>	<b>Engine SN</b>	<b>Generator SN</b>	<b>Date of Commission Completion</b>
<b>MWH 03</b>				
<b>MWH 04</b>				
<b>MWH 05</b>				
<b>MWH 06</b>				

<b>Table 2.c Fluid Coolers for MWH 03/04/05/06</b>	
<b>Phase/Building</b>	<b>Total # Fluid Coolers</b>
MWH 03	16
MWH 04	40
MWH 05	40
MWH 06	40
Total	136

## PROJECT SUMMARY

### 1. Phase 1 and 2 Installed Equipment Summary:

The MWH Data Center contains four Phase 1 Availability Zone (AZ) buildings designated AZ-A, AZ-B, AZ-C, AZ-D; four core network room (CNR) buildings; an administrative building; and four phase 2 AZ buildings designated AZ-A, AZ-B, AZ-C, AZ-D. MWH Phases 1 and 2 have forty (40) Caterpillar Model 3516C-HD-TA diesel powered electric emergency generators in the activity zone buildings with a power rating of 2.5 MWe per generator, four (4) Caterpillar Model 3516C-TA diesel powered electric emergency generators in the CNR buildings with a power rating of 2.0 MWe per generator, and one (1) Caterpillar Model C27ATAAC diesel powered electric emergency generator in the administrative building with a power rating of 0.75 MWe. Eight (8) of the 40 combined Phases 1 and 2 engines rated 2.5 MWe are reserve emergency generators (reserve engines). The words “engine,” or “generator” are used synonymously through the remainder of this permit to refer to the overall unit.

MWH uses cooling towers (Phase 1 will use SPX-Marley Model MD5008PAF2; Phase 2 use EVAPCO cooling towers with similar design values) to dissipate heat from the AZ buildings. Each cooling tower has four cells and four fans. Each of the eight AZ buildings will have four cooling towers for a total of thirty-two (32) cooling towers. Each of the thirty-two individual cooling towers has a design recirculation rate of 950 gallons per minute (gpm) and 143,600 cubic feet per minute (cfm).

### 2. MWH 03/04/05/06 Equipment Summary:

- Four (4) Cummins Model 1500DQGAF or Caterpillar (CAT) Model C32 or 3512C generators. The 1,000-kilowatt and 1,500-kilowatt electrical generators will have a combined capacity of up to 6.0 megawatts electrical (MWe).
- Sixty-eight (68) Cummins Model C3000 D6e or CAT Model C175 generators. The 68 3.0-MWe generators will have a combined capacity of 204 MWe.
- All generators will be Tier 2-certified and will be equipped with a catalyzed diesel particulate filter (DPF) and urea-based selective catalytic reduction (SCR) to be compliant with EPA Tier 4 emission standards.
- One hundred thirty-six (136) Baltimore Aircoil Company (BAC) Model HXV-1012C-24T-L-2 evaporative fluid coolers or an equivalent cooling tower model.

Combined MWH 01/02/03/04/05/06 emissions for MWH are contained in Tables 3.a and 3.b.

<b>Table 3.a Criteria Pollutants<sup>(b)</sup> Potential to Emit for Total Facility MWH 01/02/03/04/05/06 (Tons/Year)</b>			
<b>Pollutant</b>	<b>Annual Emissions</b>	<b>Theoretical Maximum Emissions</b>	<b>Theoretical Maximum with Commissioning Emissions</b>
PM smaller than 10 microns in diameter (PM <sub>10</sub> )	39.3	46.1	47.6
PM smaller than 2.5 microns in diameter (PM <sub>2.5</sub> ) <sup>(a)</sup>	13.6	20.3	21.9
PM <sub>2.5</sub> /PM <sub>10</sub> (Gens Only)	3.4	10.1	11.7
Carbon monoxide (CO)	12.7	38.1	41.5
Nitrogen oxides (NO <sub>x</sub> )	58.5	175.4	190.2
Volatile organic compound (VOC)	5.7	17.0	19.7
Sulfur dioxide (SO <sub>2</sub> )	0.21	0.62	0.70
<sup>(a)</sup> All PM emissions from the generator engines are PM <sub>2.5</sub> , and all filterable PM <sub>2.5</sub> from the generator engines is considered Diesel Engine Exhaust Particulate (DEEP).			
<sup>(b)</sup> Pollutants above WAC 173-400-110(5) de minimis levels.			

<b>Table 3.b Toxic Air Pollutants<sup>(c)</sup> Potential To Emit for Total Facility MWH 01/02/03/04/05/06 (Tons/Year)</b>			
<b>Pollutant</b>	<b>Annual Emissions</b>	<b>Theoretical Maximum Facility Emissions</b>	<b>Theoretical Maximum with Commissioning Emissions</b>
CO	12.7	38.1	41.5
Ammonia	4.0	12.0	13.6
DEEP <sup>(a)</sup>	1.3	3.8	4.1
SO <sub>2</sub>	0.21	0.62	0.70
Primary nitrogen dioxide (NO <sub>2</sub> ) <sup>(b)</sup>	5.9	17.5	19.0
Benzene	7.3E-02	2.2E-01	2.6E-01
Toluene	2.6E-02	7.9E-02	9.4E-02
Xylenes	1.8E-02	5.4E-02	6.4E-02
1,3-Butadiene	3.7E-03	1.1E-02	1.3E-02
Formaldehyde	7.4E-03	2.2E-02	2.62E-02
Acetaldehyde	2.4E-03	7.1E-03	8.4E-03
Acrolein	7.4E-04	2.2E-03	2.6E-03
Benzo(a)pyrene	2.4E-05	7.2E-05	8.6E-05
Benzo(a)anthracene	5.8E-05	1.7E-04	2.1E-04
Chrysene	1.4E-04	4.3E-04	5.1E-04
Benzo(b)fluoranthene	1.0E-04	3.1E-04	3.7E-04
Benzo(k)fluoranthene	2.0E-05	6.1E-05	7.2E-05
Dibenz(a,h)anthracene	3.2E-05	9.7E-05	1.2E-04
Ideno(1,2,3-cd)pyrene	3.9E-05	1.2E-04	1.4E-04
Napthalene	1.2E-02	3.7E-02	4.3E-02
Propylene	2.6E-01	7.8E-01	9.3E-01
Fluoride	4.8E-03	4.8E-03	4.8E-03
Manganese	7.5E-04	7.5E-04	7.5E-04
Copper	2.6E-03	2.6E-03	2.6E-03
Chloroform	2.6E-04	2.6E-04	2.6E-04
Bromodichloromethane	2.6E-04	2.6E-04	2.6E-04
Bromoform	6.9E-03	6.9E-03	6.9E-03
<sup>(a)</sup> DEEP is considered filterable (front-half) particulate emissions. <sup>(b)</sup> NO <sub>2</sub> is assumed to be equal to 10 percent of the total NO <sub>x</sub> emitted. <sup>(c)</sup> Pollutants above WAC 173-460-150 de minimis levels.			

## DETERMINATIONS

In relation to this project, the Washington State 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 meet applicable air quality requirements as defined in Table 4.a:

<b>Table 4.a Best Available Control Technology (BACT) Determinations</b>	
<b>Pollutant(s)</b>	<b>BACT Determination</b>
PM, CO, and VOCs	a. Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219. b. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. c. Use of high-efficiency drift eliminators which achieve a liquid droplet drift rate of no more than 0.0005 percent of the recirculation flow rate within each cooling tower.
NO <sub>x</sub>	a. Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219, and satisfy the written verification requirements of Approval Condition 2.e. b. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.
SO <sub>2</sub>	Use of ultra-low sulfur diesel fuel containing no more than 15 parts per million by weight of sulfur.

3. The proposed project, if constructed and operated as herein required, will utilize Best Available Control Technology for toxic air pollutants (TAPs) (tBACT) as defined below:

<b>Table 4.b tBACT Determinations</b>	
<b>TAPs</b>	<b>tBACT Determination</b>
Acetaldehyde, CO, acrolein, benzene, benzo(a)pyrene, 1,3-butadiene, DEEP, formaldehyde, toluene, total PAHs, xylenes, chrysene, benzo(a)anthracene, naphthalene, benzo(b)fluoranthene, propylene, dibenz(a,h)anthracene, Ideno(1,2,3-cd)pyrene, fluoride, manganese, copper, chloroform, bromodichloromethane, bromoform,	Compliance with the VOC and PM BACT requirement.
Ammonia	MWH 01 & 02 - No more than 15 parts per million volume-dry (ppmvd) at 15 percent oxygen per engine. MWH 03/04/05/06 – No more than 40 parts per million volume-dry (ppmvd) at 15 percent oxygen per engine.
NO <sub>2</sub>	Compliance with the NO <sub>x</sub> BACT requirement.
SO <sub>2</sub>	Compliance with the SO <sub>2</sub> BACT requirement.

4. In accordance with WAC 173-460-090, the applicant has submitted a second tier health risk analysis for DEEP and NO<sub>2</sub> ambient impacts. Ecology has concluded that this project has satisfied all requirements of a second tier analysis.

**THEREFORE, IT IS ORDERED** that the project as described in the NOC 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. 17AQ-E002 is rescinded and replaced entirely with this Approval Order.
- b. The emergency engine generators approved for operation by this Order are to be used solely for those purposes authorized for emergency generators under 40 CFR 60, Subpart III. This includes the hourly operation requirements described in 40 CFR 60.4211(f), except that there shall be no operation of this equipment to produce power for demand-response arrangements, peak shaving arrangements, nor to provide power as part of a financial arrangement with another entity, nor to supply power to the grid.
- c. The MWH Data Center shall coordinate engine maintenance and testing schedules with Dell and the Microsoft Columbia Data Center in Quincy to minimize overlap between data center scheduled testing. Microsoft shall maintain records of the coordination communications with the other data centers, and those communications shall be available for review by Ecology.

### **2. EQUIPMENT RESTRICTIONS**

- a. The sixty eight (68) 3.0 MWe engines, thirty-two (32) 2.5 primary MWe engines, eight (8) 2.5 MWe reserve engines, four (4) 2.0 MWe engines, four (4) 1.0 MWe or 1.5 MWe, and the single (1) 0.750 MWe engine shall be operated in accordance with applicable 40 CFR 60, Subpart III 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 0.750 MWe, 1.0 MWe, 1.5 MWe, 2.0 MWe, 2.5 MWe and 3.0 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 MWH 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. Each engine shall be equipped with selective catalytic reduction (SCR) and catalyzed diesel particulate filter (DPF) controls to meet with emission requirements of EPA Tier 4 engines. The only engines and electrical generating units approved for operation at the MWH Data Center are those listed in Tables 1.a -1.c and 2.a -2.b above.
- c. Replacement of failed engines with identical engines (same manufacturer and model) requires notification prior to installation, but will not require NOC unless there is an emission rate increase from the replacement engines.

d. Table 5 Stack Dimension Requirements

Quantity	Engine Size	Minimum Stack Height (feet)	Maximum Stack Diameter (inches)	Height above building roof (feet)
68	3.0 MWe	72'	30"	26'+
40	2.5 MWe	40'	22"	12'
4	2.0 MWe	40'	22"	19'
4	1.0/1.5 MWe	72'	24"	26'+
1	0.75 MWe	35'	14"	12'

- e. In addition to meeting EPA Tier 2 certification requirements, the source shall have written verification from the engine manufacturer that each engine of the same make, model, and rated capacity installed at the facility uses the same electronic Programmable System Parameters, i.e., configuration parameters, in the electronic engine control unit.

3. OPERATING LIMITATIONS

- a. Fuel consumption at the MWH Data Center facility shall be limited to a total of 1,898,945 gallons per year and 506,310 gallons per day of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.00150 weight percent sulfur). Total facility annual fuel consumption may be averaged over a three (3) year period using monthly rolling totals.
- b. The one hundred nine (109) MWH Data Center primary engines and eight (8) reserve engines shall not exceed the following load specific engine hour limits:
  - i. Each engine shall not exceed 86 hours per year of operation averaged across all generators in service over a 36-month rolling average. If a reserve engine is used to temporarily replace a primary engine during a power outage, then the actual runtime for the reserve engine shall be deducted from the primary engine's allowable runtime.
  - ii. Each reserve engine shall not exceed 40 hours per year for purposes other than stack testing or power outages, averaged across all reserve generators in service over a 36-month rolling period.
  - iii. For commissioning events, each engine shall not exceed a one-time total of 50 hours of operation over a full range of loads, averaged over all facility engines commissioned in that year.

- iv. Stack testing shall be conducted according to the testing requirements and the schedule in Approval Condition 4. Each engine shall operate no more than 45 hours per stack testing event. If more than 45 hours are needed for re-testing to satisfy Approval Condition 4.d, those hours should be deducted from other preapproved hours in Approval Condition 3.b. Additional operation of the engines for the purpose of emissions testing beyond the operating time and fuel consumption limits authorized by this Order will be considered by Ecology upon request in writing.
  - v. Daily generator usage of all MWH 01 and 02 generators combined (including reserve engines), shall not exceed a maximum limit of 160 generator hours per calendar day, except during up to four days per year of emergency power outage.
  - vi. Operation of more than five MWH 03/04/05/06 generators for more than 18 hours per generator in any 24-hour period shall not occur more than three times in any 3 calendar year period.
  - vii. The operation of more than five MWH 03/04/05/06 generators, operating concurrently at any one time, shall not occur on more than 18 calendar days in any 3 calendar year period.
  - viii. The operation of between three and five MWH 03/04/05/06 generators operating concurrently at any one time shall not occur on more than 24 calendar days in any 3 calendar year period. Operation during this scenario is limited to daytime hours only (7:00 am to 7:00 pm).
  - ix. The operation of two MWH 03/04/05/06 generators operating concurrently at any one time shall not occur on more than 144 calendar days in any 3 calendar year period. Operation during this scenario is limited to daytime hours only (7:00 am to 7:00 pm).
  - x. There is no limit on the number of days that operation of one MWH 03/04/05/06 generator at a time can occur, but operation under this scenario is limited to daytime hours (7:00 am to 7:00 pm).
  - xi. Concurrent operation of generators occurs when two or more generators operate at exactly the same moment. Generators are considered to operate concurrently even on occasions when the operational overlap occurs for just a short period of time (e.g., 1 minute or less). Sequential operation of generators is not considered concurrent operation even if multiple generators operate in the same minute, hour, or day.
- c. All of the thirty-two (32) MWH 01 and 02 cooling towers and the one hundred thirty-six (136) MWH 03/04/05/06 fluid coolers shall comply with the following conditions:
- i. Each individual cooling tower unit or fluid cooler unit shall use a mist eliminator that achieves a liquid droplet drift rate of no more than 0.0005 percent of the recirculation flow rate within each cooling tower.
  - ii. Chemicals containing hexavalent chromium cannot be used to pre-treat the cooling tower or fluid cooler makeup water.

#### 4. GENERAL TESTING AND MAINTENANCE REQUIREMENTS

- a. The MWH Data Center will follow engine-manufacturer's recommended diagnostic testing and maintenance procedures to ensure that each of the sixty-eight (68) 3.0 MWe engines, thirty-two (32) 2.5 MWe primary engines, eight (8) reserve engines, four (4) 2.0 MWe engines, four (4) 1.0 MWe or 1.5 MWe engines and one (1) 0.750 MWe engine will conform to applicable engine specifications in Approval Condition 2.a, 2.b, and applicable emission specifications in Approval Condition 5 throughout the life of each engine.
- b. Any emission testing performed to verify conditions of this Approval Order or for submittal to Ecology in support of this facility's operations, requires that Microsoft comply with all requirements in 40 CFR 60.8 except subsection (g). 40 CFR 60.8(g) may be required by Ecology at their discretion. A test plan will be submitted to Ecology at least 30 days prior to testing that will include 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.
  - iii. A description of the source including manufacturer, model number, 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.
- c. The MWH Data Center shall source test engines as described in Approval Condition 4.d to show compliance with emission limits in Table 6.
- d. The following testing requirements are for ammonia, PM, NO<sub>x</sub>, CO, and non-methane hydro-carbons (NMHC). The test methods in Table 6 shall be used for each test event unless an alternate method is proposed by Microsoft and approved in writing by Ecology prior to the test. Test reports shall be submitted to Ecology as provided in Condition 9.e of this Order.

Table 6. Emission Limits and Testing Requirements				
Pollutant	Load Test	Test Method <sup>(a)</sup>	Emission Limits	Compliance Test Frequency
PM	Five-load weighted avg.	EPA Method 5 or alternative method from 40 CFR 1065	0.03 g/kW-hr	See Approval Conditions 4.d.iv, 4.d.v, 4.d.vi, 4.d.vii, 4.d.viii, 4.d.ix.
NO <sub>x</sub>	Five-load weighted avg.	EPA Method 7E, or alternative method from 40 CFR 1065	0.67 g/kW-hr	
CO	Five-load weighted avg.	EPA Method 10, or alternative method from 40 CFR 1065	3.5 g/kW-hr	
NMHC/VOC	Five-load weighted avg.	EPA Method 25A and EPA Method 18; or alternative method from 40 CFR 1065	0.19 g/kW-hr	
Ammonia	100%-load (± 2%)	BAAQMD Method ST-1B or EPA Method 320 or EPA CTM-027; or alternative method suitable for use with 40 CFR 1065	0.19 lb/hr (0.75 MWe)	
			0.50 lb/hr (1.5 MWe)	
			0.48 lb/hr (2.0 MWe)	
			0.61 lb/hr (2.5 MWe)	
			0.95 lb/hr (3.0 MWe)	
(a) In lieu of these requirements, Microsoft may propose an alternative test protocol to Ecology in writing for approval.				

- i. 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. For 40 CFR 1065 field-testing, each test run shall be done within 8 percent of the target load value, 5 percent of maximum. 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. Engine load rate shall be crosschecked using engine control unit torque data.
- ii. 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.
- iii. 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. Analyzer and engine control unit data shall be recorded at least once every minute during the test. Engine run time and torque output (calculated from kilowatt-electrical and crosschecked against data from the engine control unit) and fuel usage shall be recorded during each test run for each load and shall be included in the test report.

- iv. For the 3.0 MWe and 1.5 MWe engines or new engine models or manufacturers or control generation other than those in Tables 1.a-1.c, and 2.a-2.b, at least one representative engine from each manufacturer and each size engine from each manufacturer shall be tested initially with the Five-load test as soon as possible after commissioning.
- v. Every 60 months after initial source testing, Microsoft shall test at least one 2.5 MWe engine and one 3.0 MWe engine, including the engine with the most operating hours as long as it is a different engine from that which was tested during the previous 60 month interval testing.
- vi. In the event that any source test of a 1.0 MWe 1.5 MWe, 2.0 MWe, 2.5MWe or a 3.0 MWe engine shows non-compliance with any applicable Table 6 emission standards for the engines specified in Approval Condition 2.a, Microsoft shall repair or replace the engine and repeat the test on the same engine plus two additional equivalent engines. If the 0.750 MWe engine fails a test, it shall be repaired or replaced and retested.
- e. Each engine shall be equipped with a properly installed and maintained non-resettable meter that records total operating hours.
- f. Each engine shall be connected to a properly installed and maintained fuel flow monitoring system (either certified physical or generator manufacturer provided software) that records the amount of fuel consumed by the engine.

## 5. EMISSION LIMITS

The sixty-eight (68) 3.0 MWe engines, thirty-two (32) primary 2.5 MWe engines, eight (8) reserve engines, four (4) 2.0 MWe engines, four (4) 1.0 MWe or 1.5 MWe engines, and the one (1) 0.750 MWe engine shall meet the follow emission rate limitations:

- a. Each emergency engine shall not exceed the applicable emission limits in Table 6.
- b. Total annual facility-wide emissions shall not exceed the 36-month rolling average emission estimates for PM<sub>10</sub>, PM<sub>2.5</sub>, CO, NO<sub>x</sub>, VOC, SO<sub>2</sub>, DEEP, NO<sub>2</sub>, and ammonia as listed in Tables 3.a and 3.b.
- c. Visual emissions from each diesel engine exhaust stack shall be no more than five percent, with the exception of a two (2) minute period after unit start-up. Visual emissions shall be measured by using the procedures contained in 40 CFR 60, Appendix A, Method 9.
- d. The actual 1-hour aggregate NO<sub>x</sub> emissions from all engines operating in any hour shall not exceed 1,167 lb. Actual NO<sub>x</sub> emissions shall be based on algebraic equations of the most accurate load-specific NO<sub>x</sub> emission factors available. NO<sub>x</sub> emission records shall be maintained as provided in Condition 8(f)(v).

## 6. OPERATION AND MAINTENANCE MANUALS

A site-specific O&M manual for the MWH Data Center facility equipment shall be developed and followed. Manufacturer's operating instructions and design specifications for the engines, generators, cooling towers, fluid coolers and associated equipment shall be included in the manual. The manual shall include the manufacturer's recommended procedures for low-load generator operation. The O&M manual shall 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.

- a. The O&M manual for the diesel engines, engine exhaust control equipment, cooling towers, fluid coolers and associated equipment shall at a minimum include:
  - i. Manufacturer's testing and maintenance procedures that will ensure that each individual engine (and engine exhaust control equipment) will conform to the EPA Emission Standards appropriate for that engine (and engine exhaust control equipment) throughout the life of the engine (and engine exhaust control equipment).
  - ii. Normal operating parameters and design specifications.
  - iii. Operating maintenance schedule.
  - iv. Specification sheet for cooling towers and fluid coolers verifying 0.0005 percent drift rating, water flow, airflow, makeup water rate, and a list of chemicals used to pre-treat cooling tower and fluid cooler makeup water.

## 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  
Or:  
Emissions.inventory@ecy.wa.gov

## 8. RECORDKEEPING

All records, O&M 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 except as required for stack testing in Condition 8.c. Any records required to be kept under the provisions of this Order shall be provided within 30 days to Ecology upon request. 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. Monthly, annual, and 36-month rolling fuel usage.
- c. Monthly, annual, and 36-month rolling hours of operation for each diesel engine. The cumulative hours of operation for each engine shall be maintained for the life of the engine while at Microsoft, and shall include which engines have been stack tested, and the report information from Condition 9.e.
- d. Annual number of start-ups for each diesel engine.
- e. Annual gross electrical power in MWe generated by facility-wide operation of the emergency backup electrical generators.
- f. Record of each operational period for each engine with the following information:
  - i. Date of engine operation,
  - ii. engine unit ID,
  - iii. reason for operating: an operational period for an engine will be identified as one of the following reasons for operating: EMERGENCY SITUATIONS, STACK TESTING, COMMISSIONING, MAINTENANCE CHECKS, READINESS TESTING, DEVIATION OF VOLTAGE OR FREQUENCY, or UNSPECIFIED NON-EMERGENCY SITUATIONS,
  - iv. duration of operation, and percent of generator electrical load, for each category of generator load,
  - v. For each unplanned power outage that activates 30 or more engines in an hour, record the actual 1-hour NO<sub>x</sub> emission rate from all operating engines, as provided in Conditions 5.d and 9.b.vi.
- g. Upset condition log for each emission unit (the 109 engines, 8 reserve engines, 32 cooling towers, and 136 fluid coolers) and their respective control units that include unit ID, date, time, duration of upset, cause, and corrective action.
- h. Applicable recordkeeping for emergency engines required by 40 CFR Part 60, Subpart III Section 60.4214 (b), (c), and (d).
- i. Air quality complaints received from the public or other entity, the affected emissions units and any actions taken by Microsoft in response to those complaints.

## 9. REPORTING

- a. The serial number, manufacturer make and model, and standby capacity for each engine and 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 to report operating conditions for the previous calendar year. This information may be submitted with annual emissions information requested by the AQP.

- i. Monthly, annual, and 36-month rolling total summary of all air contaminant emissions for pollutants listed in Tables 3.a and 3.b of this approval order.
  - ii. Monthly, annual, and 36-month rolling facility-wide generator hours of operation.
  - iii. Gross power generation with annual total as specified in Approval Condition 8.e.
  - iv. Monthly, annual, and 36-month rolling total summary of fuel usage (in gallons) compared to Approval Condition 3.a.
  - v. Calendar year annual total runtime hours.
  - vi. For each power outage operating scenario described in Condition 8.f.v, the aggregate NO<sub>x</sub> emission rate for all operating engines during each hour in which the NO<sub>x</sub> emission rate exceeds 1,167 lb/hour.
- c. Written notification that the O&M manual described in Approval Condition 6 has been developed and updated within 60 days after the issuance of this Order. A copy of the most current O&M manual will be provided to Ecology if requested.
- d. 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.
- e. Stack test reports of any engine shall be submitted to Ecology within 60 days of completion of the test and shall include, at a minimum, the following information:
- i. The information from Conditions 4.b.iii, 4.b.iv, and 4.b.v including field and analytical laboratory data, quality assurance/quality control procedures and documentation.
  - ii. A summary of results, reported in units and averaging periods consistent with the applicable emission standard or limit.
  - iii. A summary of control system or equipment operating conditions.
  - iv. A summary of operating parameters for the diesel engines being tested.
  - v. Copies of field data and example calculations.
  - vi. Chain of custody information.
  - vii. Calibration documentation.
  - viii. Discussion of any abnormalities associated with the results.
  - ix. A statement signed by the senior management official of the testing firm certifying the validity of the source test report.
- f. Microsoft shall notify Ecology by e-mail or in writing within 24 hours of any engine operation of greater than 60 minutes if such engine operation occurs as the result of a power outage or other unscheduled operation.

## 10. 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 eighteen (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 eighteen (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 cooling towers, and be available for review upon request by Ecology.
- d. **Equipment Operation:** Operation of the generator units, cooling towers, 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, cooling towers or fluid coolers 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 Order, 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.

All plans, specifications, and other information submitted to 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 facts.

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><b>Department of Ecology</b> Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503</p>	<p><b>Department of Ecology</b> Attn: Appeals Processing Desk P.O. Box 47608 Olympia, WA 98504-7608</p>
<p><b>Pollution Control Hearings Board</b> 1111 Israel Road SW, Suite 301 Tumwater, WA 98501</p>	<p><b>Pollution Control Hearings Board</b> P.O. 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 July 2018, at Spokane, Washington.

Prepared By:

Approved By:

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Jenny Filipy, P.E.  
Air Quality Program  
Department of Ecology  
State of Washington

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David T. Knight, Section Manager  
Air Quality Program  
Department of Ecology  
State of Washington