

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A) Preliminary Determination of
NEW AIR CONTAMINANT SOURCE) Approval For
FOR VANTAGE DATA CENTERS) **Approval Order No. 18AQ-E043**
VANTAGE-QUINCY DATA CENTER)

TO: Mark Johnson
Vantage Data Centers
2101 M Street NE
Quincy, WA 98848

EQUIPMENT

The list of equipment that was evaluated for this order of approval consists of seven MTU Model 20V4000 diesel engines used to power emergency electrical generators, Model MTU 3000, and eight Caterpillar Model 3516E diesel engines powering Caterpillar SR5 electrical generators.

The seven MTU 3.0 megawatt (MWe) generators will have a combined capacity of 21 MWe. The eight Caterpillar 2.75 MW engine generators will have a combined capacity 22 MW for a facility total of 43 MW. The generators will be installed in two phases. Phase 1 is in place and consists of five 3.0 MWe generators that were installed within 18 months of initial approval. Two additional Phase 1 engines are not yet installed, but approved in earlier approvals. Phase 2 will consist of a total of eight additional 2.75 MWe generators to be installed in one additional building by January 1, 2020.

Table 1.1: Engine & Generator Serial Numbers						
Project Phase	DC BLDG	Unit ID	Capacity MWe	Engine SN	Generator SN	Build date
1	DC1	1 MTU	3.0	34487-1-1	28420-01	9/1/2013
"	DC1	2 MTU	3.0	34487-1-2	28420-0	9/1/2013
"	DC1	3 MTU	3.0	34487-1-3	28420-0	9/1/2013
"	DC1	4 MTU	3.0	34487-1-4	34571-01	9/1/2014
"	DC1	5 MTU	3.0	34487-1-5	34707-01	9/1/2014
"	DC1	6 MTU	3.0			
"	DC1	7 MTU	3.0			
2	DC2	8 CAT	2.75			
"	DC2	9 CAT	2.75			
"	DC2	10 CAT	2.75			
"	DC2	11 CAT	2.75			
"	DC2	12 CAT	2.75			
"	DC2	13 CAT	2.75			
"	DC2	14 CAT	2.75			
"	DC2	15 CAT	2.75			

The Vantage Data Center will utilize indirect evaporative cooling units to dissipate heat from electronic equipment at the facility, thus eliminating evaporative cooling tower emissions from the project.

PROJECT SUMMARY

The Vantage Data Center Phase 1 construction will consist of Building 1 with the five engine-generators already in place, and two additional engine generators yet to be installed. Phase 2 construction will consist of Building 2 with eight slightly smaller engine generators for a facility total of 15 engine generators. The data center will be leased for occupancy by companies that require a fully supported data storage and processing facility. Vantage will own and operate the engine/generators.

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 or interfere with attainment of the national ambient air quality standards.
2. The proposed project, if constructed and operated as herein required, will utilize best available control technology (BACT) as defined in Approval Conditions below.
3. The proposed project, if constructed and operated as herein required, will utilize best available control technology for toxic air pollutants (tBACT).

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 are met:

APPROVAL CONDITIONS

1. ADMINISTRATIVE CONDITIONS

1.1. The engine generators approved for operation by this order are to be used solely for those purposes described in application materials as further limited by the conditions of this Order. 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.

1.2. Upon issuance of this Approval Order, Approval Order No. 16AQ-E043 is rescinded and replaced entirely by the evaluations and conditions of this approval.

2. EQUIPMENT RESTRICTIONS

2.1. Any engine used to power the electrical generators shall be certified by the manufacturer to meet 40 CFR 60 Tier II emission levels or other more restrictive specifications

required by the EPA at the time the engines are installed. Each engine to be installed must be permanently labeled by the manufacturer as an emergency engine in accordance with 40 CFR § 60.4210(f). Each engine approved in this Order must operate as an emergency engine as defined at 40 CFR 60, Subpart IIII or 40 CFR 63, Subpart ZZZZ, and as limited by the other conditions of this approval.

- 2.2. The only engines and electrical generating units approved for operation at the Vantage Data Center are those listed by serial number in Table 1.
- 2.3. Replacement of failed engines with identical engines (same manufacturer and model) requires notification prior to installation, but will not require new source review unless there is an increase in emission rates or ambient impacts.
- 2.4. The installation of any new engines after January 1, 2020, will require notification to Ecology that includes engine manufacturer's specification sheets. Ecology will determine whether new source review is required based on various factors including whether the new engines will have either an increased emission rate or result in an emission concentration that may increase impacts over those evaluated for this approval Order, or if an update to the current BACT analysis is necessary.
- 2.5. The five existing (Phase 1) MTU Model 20V4000 engine exhaust stack heights shall be greater than or equal to 43 feet above ground level. The remaining two MTU Model 20V4000 engines exhaust stack heights shall be greater than or equal to 48 feet above ground level for engines providing power to Buildings 1. The stacks shall be no more than 26 inches in diameter. The Phase 2 engines serving Building 2 shall have stacks that are 48 feet above ground level and no more than 26 inches in diameter. Vantage Data Centers shall verify that, for the phases of the Quincy project, exhaust stack parameters such as diameter, height, and exhaust rate and velocity do not result in ambient impacts greater than what was evaluated for this project.
- 2.6. The manufacture and installation of the 15 engine/generator sets proposed for Buildings 1 and 2 of the project shall occur by January 1, 2020. If the manufacture and installation of the engines has not been completed by the above date, new source review may be required prior to continued installation, and ambient air quality impacts will be re-evaluated if new source review is required. Vantage may request an extension of this time schedule, and Ecology may approve an extension without revision to this Order.
- 2.7. This Order only applies to the seven MTU Model 20V4000 engines, each with a rated full standby capacity of 4678 hp, and the eight Caterpillar Model 3516E engines with a rated full standby capacity of 4043 hp that were proposed in the Notice of Construction application for this amendment of the facility approval. On a case-by-case basis, Ecology may require additional ambient impacts analyses prior to installation of engines not listed in Table 1.

3. OPERATING LIMITATIONS

- 3.1. The fuel consumption at the Vantage Data Center facility at build-out (two buildings with a total of 15 engines) shall be limited to a total of 135,153 gallons per year 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-year period using monthly rolling totals.

- 3.2. Except as provided in Approval Condition 3.5, the 15 Vantage Data Center engines are limited to the following average hours of operation, and averaging periods:
 - 3.2.1. Each engine shall not exceed 45 hours of operation (at any load, for any purpose, including commissioning) per year, on a rolling monthly three-year average, and averaged over all engines in service.
 - 3.2.2. Each MTU engine shall not exceed an annual fuel consumption of 9,315 gallons, averaged over a three-year period using monthly rolling totals, and averaged over all MTU engines in service.
 - 3.2.3. Each Cat 3516E engine shall not exceed an annual fuel consumption of 8,744 gallons, averaged over a three-year period using monthly rolling totals, and averaged over all Cat engines in service
 - 3.3. A load bank will be used for electrical energy dissipation whenever prescheduled monthly maintenance testing, corrective testing or annual load bank testing occurs above idle.
 - 3.4. The 15 engines, seven MTU Model 20V4000 engines, eight Cat 3516E engines, at the Vantage Data Center require periodic scheduled operation. To mitigate engine emission impacts, Vantage Data Center will perform all scheduled engine maintenance testing, bypass operations, and load testing during daylight hours. The Vantage Data Center shall develop an operating schedule that shall be available for review by Ecology upon request. Changes to the operating schedule will not trigger revision or amendment of this Order if approved in advance by Ecology.
 - 3.5. During a site integration test, no more than eight generator engines may operate concurrently for no more than 10 continuous hours.
 - 3.6. All startup and commissioning testing shall be conducted during daylight hours.
 - 3.7. Following start-up, commissioning testing, and the initial certification testing of one engine of each batch of engines installed, the number of hours each engine has run, the fuel consumed during the testing, and the date shall be recorded. Data shall be provided to Ecology on request.
- 4. GENERAL TESTING AND MAINTENANCE REQUIREMENTS**
- 4.1. The Vantage Data Center will follow engine-manufacturer's recommended diagnostic testing and maintenance procedures to ensure that each engine will conform to the emission limits in Condition 5 of this approval throughout the life of each engine.
 - 4.2. Following installation and commissioning, but prior to the transfer of a batch of engines to Vantage ownership, to demonstrate the engines are commissioned and programmed to run within the Tier 2 emission limits in Condition 5.2, PM (filterable only), NO, NO₂, NMHC, and CO emissions measurement shall be conducted for one engine from each batch of engines installed. 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.

- 4.3. Within 60 months of the first engine installation of each phase of installation, and every 60 months thereafter, the Vantage 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 4.4.2 and 4.4.3. This testing will serve to demonstrate compliance with the emission limits contained in Condition 5.3; 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 Vantage. 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.
- 4.4. The following procedures shall be used for each test for the engines required by Approval Condition 4.3 unless an alternate method is proposed by the Vantage Data Center and approved in writing by Ecology prior to the test:
 - 4.4.1. Periodic emissions testing should be combined with other pre-scheduled maintenance testing and annual load bank engine testing. Additional operation of the engines for the purpose of emissions testing beyond the operating hours allowed in this Order must be approved by Ecology in writing.
 - 4.4.2. To demonstrate that the engines satisfy the engine manufacturer's not to exceed emissions rates, PM (filterable and condensable), non-methane hydrocarbons (NMHC), NO, NO₂, and CO emission measurement shall be conducted on a representative engine(s) from each phase of installation. This testing shall utilize EPA Reference Methods from 40 CFR 60, 40 CFR 51, and /or 40 CFR 1065, and shall be conducted at the single load point the engines have operated at during the preceding five year period (e.g. for first five engines of Phase 1, 33 percent), and at the highest load the engines have supported or at 100 percent electrical output, if the highest load is less than 90 percent. Emission limits are contained in Condition 5.3.
 - 4.4.3. The F-factor method, as described in EPA Method 19, may be used to calculate exhaust flow rate through the exhaust stack. The fuel meter data, as measured according to Approval Condition 4.6, shall be included in the test report, along with the emissions calculations.
 - 4.4.4. In the event that any stack test indicates non-compliance with the emission limits in Condition 5, Vantage 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.

- 4.5. Each engine shall be equipped with a properly installed and maintained non-resettable meter that records total operating hours.
- 4.6. Each engine shall be connected to a properly installed and maintained fuel flow monitoring system that records the amount of fuel consumed by that engine.
- 4.7. Concurrent operation of all generators in service for more than three hours shall not exceed one day per calendar year, averaged over three years. Additionally, concurrent operation of all generators in service for three hours or less shall not exceed three days per calendar year.
- 4.8. In addition to operation in accordance with Condition 4.7, concurrent operation of generators shall be limited to a maximum of eight generators located in a single building. These engines may be operated no more than four hours per day and for no more than six days per calendar year. Concurrent operation of generators physically located in two or more buildings is not allowed under this condition.

5. EMISSION LIMITS

- 5.1. The 15 engines shall meet the emission rate limitations contained in this section. The limits are for an engine operating in a steady-state mode (warm) and do not include emission rates during initial commissioning testing of the engines. The annual limits may be averaged over a rolling monthly three-year period. Unless otherwise approved by Ecology in writing, compliance with emission limits for those pollutants that are required to be tested under Approval Conditions 4.2 and 4.3 shall be based on emissions test data determined according to those approval conditions.
- 5.2. To demonstrate compliance with the g/kW-hr EPA Tier II average emission limits through stack testing, the Vantage 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 III, or any other applicable EPA requirement in effect at the time the engines are installed. The Tier 2 emission limits for the 15 engine generators (both MTU and Cat):
 - 5.2.1. NMHC and NOx: 6.4 g/kW-hr
 - 5.2.2. CO: 3.5 g/kW-hr
 - 5.2.3. PM (filterable): 0.20 g/kw-hr
- 5.3. Emissions from each of the seven MTU Model 20V4000 engines rated at 4678 brake horse power shall not exceed the following emission rates at the stated loads, based on not-to-exceed emission rates stated in application materials:

MTU Model 20V4000 Emission Rates						
Fraction of Full Engine Power	1	0.75	0.50	0.25	0.10	
Engine Power [kWm]	3490	2618	1745	872	349	
Nox - g/kWh	8	6.5	5.6	4.9	9	
NO2 - g/kWh	0.9	0.8	0.6	0.6	1.1	

CO - g/kWh		1.4	1.3	1.6	3.4	6.6
HC - g/kWh		0.2	0.29	0.44	0.68	2.48
PM (f) - g/kWh		0.06	0.08	0.19	0.41	1.03

5.4. Emissions from each of the eight Cat Model 3516E engines rated at 4043 brake horse power shall not exceed the following emission rates at the stated loads, based on not-to-exceed emission rates stated in application materials:

Cat Model 3516E Emission Rates						
Fraction of Full Engine Power	1	0.75	0.50	0.25	0.10	
Engine Power [BHP]	4043	3072	2102	1131	549	
Nox - g/HP-HR	6.14	5.03	3.70	3.48	8.68	
NO2 - g/HP-HR	0.614	0.503	0.370	0.348	0.868	
CO - g/HP-HR	1.16	0.78	0.69	2.17	3.74	
HC - g/HP-HR	0.14	0.18	0.26	0.38	0.56	
PM (f) - g/HP-HR	0.09	0.06	0.08	0.25	0.24	

5.5. Diesel Engine Exhaust Particulate (DEEP: filterable only) emissions from all 15 engines shall not exceed 0.189 tons per year averaged over a rolling monthly three-year period.

5.1 Total Particulate Matter (PM=PM2.5) emissions from all 15 engines combined shall not exceed 0.8 tons/yr averaged over a rolling monthly three-year period.

5.2 Nitrogen Oxides emissions from all 15 engines combined shall not exceed 24 tons per year averaged over a rolling monthly three-year period.

5.3 Nitrogen dioxide (NO2) emissions from all 15 engines combined shall not exceed 2.0 tons/yr averaged over a rolling monthly three-year period.

5.4 Volatile organic compound (VOC) emissions from all 15 engines combined shall not exceed 0.05 tons/yr averaged over a rolling monthly three-year period.

5.5 Carbon Monoxide (CO) emissions from all 15 engines combined shall not exceed 3.6 tons/yr averaged over a rolling monthly three-year period.

5.6 Sulfur dioxide emissions from all 15 engines combined shall not exceed 0.014 tons/yr averaged over a rolling monthly three-year period.

5.7 Visual emissions from each diesel electric generator exhaust stack shall be no more than five percent, with the exception of a five-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

6.1. A site-specific O&M manual for the Vantage Data Center facility equipment shall be developed and followed. Manufacturers' operating instructions and design specifications for the engines, generators, and associated equipment shall be included in the manual.

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. The O&M manual for the diesel engines and associated equipment shall at a minimum include:

- 6.1.1. Manufacturer's testing and maintenance procedures that will ensure that each individual engine will conform to the EPA Tier Emission Standards appropriate for that engine throughout the life of the engine.
- 6.1.2. Normal operating parameters and design specifications.
- 6.1.3. Operating and maintenance schedules.

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

8.1. 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. 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:

- 8.1.1. Fuel receipts with amount of diesel and sulfur content for each delivery to the facility.
- 8.1.2. Monthly and annual hours of operation for each diesel engine.
- 8.1.3. Purpose, electrical load, and duration of runtime for each diesel engine during any periods of operation.
- 8.1.4. Annual gross power generated by or for each independent tenant at the facility and total annual gross power generated by the facility.
- 8.1.5. Upset condition log for each engine and generator that includes date, time, duration of upset, cause, and corrective action.
- 8.1.6. Air quality complaints received from the public or other entity, and the affected emissions units.

9. REPORTING

9.1. Within 10 business days after entering into a binding agreement with a new tenant, Vantage shall notify Ecology of such agreement. The serial number, manufacturer make

and model, standby capacity, and date of manufacture of engines proposed will be submitted prior to installation of engines in any of the phases of this project.

- 9.2. The following information will be submitted to the AQP at the address in Condition 7 above by January 31 of each calendar year. This information may be submitted with annual emissions information requested by the AQP.
 - 9.2.1. Monthly rolling annual total summary of air contaminant emissions
 - 9.2.2. Monthly rolling hours of operation for each engine with annual total
 - 9.2.3. Monthly rolling gross power generation with annual total as specified in Approval Condition 8.1.4
 - 9.2.4. A log of each start-up of each diesel engine that shows the date, the purpose, fuel usage, and duration of each period of operation
- 9.3. Any air quality complaints resulting from operation of the emissions units or activities shall be promptly assessed and addressed. Vantage shall maintain a record of the action taken 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 days of receipt of any such complaint.
- 9.4. Vantage 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. This notification does not alleviate Vantage from annual reporting of operations contained in any section of Approval Condition 9.

10. GENERAL CONDITIONS

- 10.1. **Commencing/Discontinuing Construction and/or Operations:** The portion(s) of this approval regulating future phases of construction shall become void if construction of the planned phase of the facility is not begun within 18 months of permit issuance or if facility operation is discontinued for a period of 18 months or more. In accordance with WAC 173-400-111(7)(c), each phase of construction must commence within 18 months of the projected and approved construction dates in this Order.
- 10.2. **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.
- 10.3. **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 diesel electric generation station, and be available for review upon request by Ecology.
- 10.4. **Equipment Operation:** Operation of the 15 engine generators (Seven MTU Model 20V4000, Eight Cat Model 3516E) diesel engines used to power emergency electrical generators 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.

- 10.5. **Modifications:** Any modification to the generators or engines, and their related equipment 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.
- 10.6. **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.
- 10.7. **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 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.

Nothing in this approval shall be construed as obviating compliance with any requirement of law other than those imposed pursuant to the Washington Clean Air Act and rules and regulations thereunder.

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

- a. Violation of any terms or conditions of this authorization
- b. 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 provision to any circumstance is held invalid, the application of such provision to other 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. 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. 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 XX day of Month, at Spokane, Washington.

PREPARED BY:

APPROVED BY:

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