

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A) Approval Order No. 11AQ-E399
AIR CONTAMINANT SOURCE FOR)
YAHOO! INC.)
YAHOO! DATA CENTER)

TO:

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Yahoo! Inc.
701 First Avenue
Sunnyvale, CA 94089

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Quincy, WA 98848

1. EQUIPMENT

The following table contains a list of equipment that was evaluated for this order of approval. Existing MTU Detroit Diesel emergency generator unit identification numbers R through 12 were approved in Notice of Construction (NOC) approval Order No. 07AQ-E241 issued on November 13, 2007. New unit identification numbers 13 through 22 were proposed in the NOC application for the Phase 5 Expansion for the Yahoo! Data Center located in Quincy, and submitted to Ecology on September 20, 2010.

Table 1.1: 2.5 eMW Engine & Generator Serial Numbers				
Phase	Unit ID	Engine SN	Generator SN	Manuf. date
1	R	527103530	81 28288 A505	12/14/06
	1	527103852	81 28288 A205	2/16/07
	2	527103897	81 28288 A305	2/19/07
	3	527103898	81 28288 A105	2/19/07
	4	527104004	81 28288 A405	3/1/07
2	5	527104645	81 28976 A404	9/12/07
	6	527104646	81 28597 A405	9/12/07
	7	527105840	81 28597 A101	8/8/08
	8	527104665	81 28597 A105	9/12/07
3	9	527105203	81 28597 A505	2/1/08
	10	527105204	81 28976 A104	2/1/08
	11	527105205	81 28976 A204	2/1/08
	12	527105206	81 28976 A304	2/1/08
5	13	527107949	WA-527124	9/16/10
	14	527107950	WA-575140	9/16/10
	15	527107951	WA-575127	9/16/10
	16	527107948	WA-575180	9/16/10
	17			
	18			
	19			
	20			
	21			
	22			

Table 1.2: Cooling Towers installed under NOC 07AQ-E241			
Total Units	Manufacturer & Model	# Cooling Towers Per Unit	Total # Cooling Towers
6	Evapco Model AT 212-636	2	12

2. PROJECT SUMMARY

2.1 Original Project: Phases 1-3

Yahoo! Inc. submitted a Notice of Construction (NOC) application on January 24, 2007, for the installation of the Yahoo! Data Center at 1010 Yahoo! Way, Quincy, in Grant County. The Yahoo! Data Center will be used as an electronic data storage and data access facility. The primary air contaminant sources at the facility consist of thirteen (13) MTU Detroit Diesel, Inc. Model 16V4000 G83 B3 diesel engines that power Newage AvK Model DSG 86 L1-4s generators. The servers at the Yahoo! Data Center are cooled by six Evapco Model AT 212-636 two cell evaporative cooling units. The Yahoo! Data Center is supported by associated equipment such as fuel tanks, cooling water storage and treatment, and electrical systems. The MTU Detroit Diesel engines are used to power emergency backup electrical generators in case of a failure of the Grant County PUD hydroelectric power grid.

Notice of Construction Approval Order No. 07AQ-E241 was issued on November 13, 2007. The Order limited operation of each generator to 400 hours per year for combined break-in, maintenance, and emergency backup electrical generation. The diesel engines were restricted to 49,296 gallons/day and 821,600 gallons/year of low sulfur (less than 0.0015 wt %), EPA on-road specification No. 2 distillate diesel oil.

2.2 Expansion Project: Phase 5

Yahoo! Inc. submitted a NOC application on September 20, 2010, to expand the Yahoo! Data Center. The expansion project will increase the size of the facility by approximately 151,000 square feet, and will include ten (10) 2.28 MWm MTU Detroit Diesel, Inc. Model 16V4000 G83 diesel engines that power Newage AvK Model DSG 86 L1-4s generators. The additional servers at the Yahoo! Data Center expansion will not use evaporative cooling systems. Operation of the ten (10) MTU Detroit Diesel engines will be limited to 100 hours per year each, and will be restricted to no more than 103,551 gallons per year of low sulfur (less than 0.0015 wt %), EPA on-road specification No. 2 distillate diesel oil.

Yahoo! has proposed to reduce allowed operation of the existing 13 generators from 400 hours per year to 200 hours per year for combined break-in, maintenance, and emergency backup electrical generation. Yahoo! also proposes to reduce allowed diesel fuel for the existing generators from 821,600 gallons/year to 410,800 gallons per year of low sulfur (less than 0.0015 wt %), EPA on-road specification No. 2 distillate diesel oil. Engine exhaust stack heights will be raised from 15 feet to 20 feet above ground level.

The operating reductions being proposed in the 2010 Yahoo! Expansion project will result in an annual total decrease in potential engine combustion emissions from the Yahoo! Data

Center, and will reduce most potential ambient impacts. Annual permitted facility fuel allocation will decrease from 821,600 gallons as allowed in NOC Approval Order No. 07AQ-E241 to 514,351 gallons under the expansion project approval order.

Table 2.1: Potential to Emit for the Yahoo! Data Center Generators			
Pollutant	Existing Units R thru 12 Potential To Emit	Expansion Units 13 thru 22 Potential To Emit	Total Facility Potential to Emit
Criteria Pollutant	tons/yr	tons/yr	tons/yr
2.1.1 NO _x	35	11	46
2.1.2 CO	13	6.1	19.1
2.1.3 SO ₂	80 lb/yr	22 lb/yr	102 lb/yr
2.1.4 PM _{2.5}	1.2	0.35	1.6
2.1.5 VOC	80 lb/yr	349 lb/yr	429 lb/yr
Toxic Air Pollutants (TAPs)			
2.1.6 Primary NO ₂ *	3.5	1.1	4.6
2.1.7 DEEP**	1.2	0.35	1.6
2.1.8 Carbon monoxide	13	6.1	19.1
2.1.9 Sulfur dioxide	4.0E-02	1.0E-02	5.1E-02
Carbon based TAPs			
2.1.10 Acrolein	2.1E-04	5.59E-05	2.7E-04
2.1.11 Benzene	2.1E-02	5.5E-03	2.6E-02
2.1.12 Propylene	7.47E-02	1.98E-02	9.4E-02
2.1.13 Toluene	7.5E-03	1.99E-03	9.5E-03
2.1.14 Xylenes	5.2E-03	1.37E-03	6.5E-03
2.1.15 Formaldehyde	2.1E-03	5.6E-04	2.7E-03
2.1.16 Acetaldehyde	6.7E-04	1.79E-04	8.5E-04
Poly Aromatic Hydrocarbons			
2.1.17 Naphthalene	3.5E-03	9.22E-04	4.4E-03
2.1.18 Benz(a)anthracene	1.7E-05	4.41E-06	2.1E-05
2.1.19 Chrysene	4.1E-05	1.1E-05	5.2E-05
2.1.20 Benzo(b)fluoranthene	3.0E-05	7.9E-06	3.8E-05
2.1.21 Benzo(k)fluoranthene	5.8E-06	1.55E-06	7.4E-06
2.1.22 Benzo(a)Pyrene	6.9E-06	1.82E-06	8.7E-06
2.1.23 Indeno(1,2,3-cd)pyrene	1.1E-05	2.94E-06	1.4E-05
2.1.24 Dibenz(a,h)anthracene	9.2E-06	2.45E-06	1.2E-05

* Assumed to be equal to 10% of the total NO_x emitted.

** DEEP is diesel engine exhaust particulate, which is equal to PM_{2.5} emissions.

2.3 There are no small emergency engines to power fire water pumps or cooling water pre-treatment facility. Washington Administrative Code (WAC) 173-400-110(4)(h)(xxxix), as adopted on the date of this Order, exempts all emergency engines below 500 bhp.

2.4 The Yahoo! Data Center was constructed with 6 Evapco Model USS 212-636 cooling units to dissipate heat from the electronic servers. Each Model USS 212-636 unit has two cooling towers and two fans. Each individual cooling tower has a design recirculation rate of 2460 gallons per minute.

Table 2.2: Cooling Towers Emission Limits		
Pollutant	Max loading conc. mg/l	Emission rate Total Lbs/yr
2.4.1 Arsenic	0.002	0.00263
2.4.2 Barium	0.013	0.0171
2.4.3 Cadmium	0.003	0.00395
2.4.4 Chromium III	0.0047	0.00618
2.4.5 Copper	0.0032	0.00421
2.4.6 Iron	0.0665	0.0875
2.4.7 Lead	0.0005	0.000658
2.4.8 Manganese	0.002	0.00263
2.4.9 Mercury	0.0003	0.000395
2.4.10 Particulate ¹	3200	4210
¹ All particulate is considered to be 10 microns or less in diameter		

3. 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:

3.1 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.

3.2. The proposed project, if constructed and operated as herein required, will utilize best available control technology (BACT) as defined below:

Pollutant(s)	BACT Determination
Particulate matter (PM), carbon monoxide and volatile organic compounds	Restricted operation of EPA Tier-2 certified engines, and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.
Nitrogen oxides (NOx)	Good combustion practices; an engine design that incorporates fuel injection timing retard, turbocharger and a low-temperature after-cooler; EPA Tier-2 certified engines; and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.
Sulfur dioxide	Use of ultra-low sulfur diesel fuel containing no more than 15 parts per million by weight of sulfur.

- 3.3 The proposed project, if constructed and operated as herein required, will utilize best available control technology for toxic air pollutants (tBACT) as defined below:

Toxic Air Pollutant(s)	tBACT Determination
Acetaldehyde, carbon monoxide, acrolein, benzene, benzo(a)pyrene, 1,3-butadiene, diesel engine exhaust particulate, formaldehyde, toluene, total PAHs, propylene, xylenes	Restricted operation of EPA Tier-2 certified engines, and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.
Nitrogen dioxide	Good combustion practices; an engine design that incorporates fuel injection timing retard, turbocharger and a low-temperature after-cooler; EPA Tier-2 certified engines; and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.
Sulfur dioxide	Use of ultra-low sulfur diesel fuel containing no more than 15 parts per million by weight of sulfur.

4. HEALTH IMPACT ANALYSIS

Ecology has evaluated the cumulative health risks associated with diesel engine exhaust particulate and nitrogen dioxide emissions from the proposed project, in accordance with WAC 173-460-100. Ecology has concluded that the cumulative health risks from the project are acceptable. Approval of the project will result in a greater environmental benefit to the state of Washington based on emissions reductions. The Third Tier Petition was approved on February 10, 2011. The Technical Support Document for the Third Tier Review dated February 8, 2011 that contains the analysis for the Third Tier approval determination is hereby incorporated into this Notice of Construction Approval Order.

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

- 1.1 Notice of Construction Approval Order No. 07AQ-E241 issued on November 13, 2007 is hereby rescinded and replaced entirely by this Order.
- 1.2 Yahoo! shall schedule a meeting with Quincy School District officials by no later than April 15, 2011. The meeting will include administrators from any elementary or secondary school at the discretion of the Quincy School District officials. The purpose of the meeting will be to both communicate, and better understand, any potential concerns or complaints that local schools may have regarding emergency generator maintenance testing and operation. In addition, Yahoo! will provide school administrators and District Officials with a direct telephone contact to one or more of the Yahoo! Data Center managers. The school administrators and District Officials

shall also be provided a maintenance testing schedule as contained in this Order, and will update the school whenever Ecology-approved changes occur in the maintenance testing schedule. As decided by the school administrators, District Officials, and Yahoo!, an ongoing relationship between the school and Yahoo! shall be established.

2. EQUIPMENT RESTRICTIONS

- 2.1. The twenty-three (23) MTU Detroit Diesel, Inc. Model 16V4000 G83 B3 diesel engines or equivalents that power the 2.28 MWm (2.0 eMW) Newage AvK Model DSG 86 L1-4s generators shall be certified by the manufacturer to meet 40 CFR 89 Tier II emission levels or other specifications as required by the EPA at the time the engines are installed.
- 2.2. The only engines and electrical generating units approved for operation at the Yahoo! Data Center are those listed in Table 1.1 above.
- 2.3. Manufacture and installation of the first 4 of 10 engine/generator sets proposed for the Phase 5 expansion project shall occur by July 1, 2011. The manufacture and installation of the last 6 of 10 engine/generator sets proposed for the expansion project shall occur by July 1, 2013. If the manufacture and installation of these engines has not completed within the above schedule, a NOC application may be required prior to installation.
- 2.4. 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.
- 2.5. The 13 existing 2.28 MWm engine-generator exhaust stack heights shall be increased from 15 feet to greater than or equal to 20 feet above ground level.
- 2.6. The 10 expansion 2.28 MWm engine-generators exhaust stack heights shall be greater than or equal to 30 feet above ground level.

3. OPERATING LIMITATIONS

- 3.1. The fuel consumption at the Yahoo! Data Center facility shall be limited to a total of 514,351 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 (3) year period using monthly rolling totals.
- 3.2. The 13 existing engines shall be limited to 410,800 gallons per year of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.0015 weight percent sulfur) and not operate more than 200 hours per year per engine. Total annual fuel consumption by the 13 engines may be averaged over a three (3) year period using monthly rolling totals.
- 3.3. The 10 expansion project engines shall be limited to 103,551 gallons per year of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.0015 weight percent sulfur) and not operate more than 100 hours per year per engine. Total annual fuel consumption by the 10 engines may be averaged over a three (3) year period using monthly rolling totals.

- 3.4. The 23 Yahoo! Data Center engines are limited to the following hours of operation, fuel limits, and number of engines operating concurrently. Except as provided in Condition 3.11, the 13 existing engines are limited as follows in Table 3.4a, and the 10 expansion engines are limited as follows in Table 3.4b:

Table 3.4a: 13 Existing Engines Operating Restrictions				
Operating Activity	Hours/year per generator	Operating Load (%)	Diesel Fuel Gallons/year	# Operating Concurrently
Maintenance Testing	12	100	24,648	1
Load Testing	4	100	8216	1
Electrical Bypass	36	100	73,944	2
Power Outage	148	100	303,992	13
Total	200		410,800	

Table 3.4b: 10 Expansion Engines Operating Restrictions				
Operating Activity	Hours/year per generator	Operating Load (%)	Diesel Fuel Gallons/year	# Operating Concurrently
Maintenance Testing	12	0%	1896	1
Load Bank Testing	4	100	5892	1
Electrical Bypass	36	2 at 40, or 1 at 80	43,020	2
Power Outage	48	8 at 90, 2 at 10	52743	10
Total	100		103,551	

- 3.5. Operation of the 23 Yahoo! Data Center generators for required monthly maintenance testing shall be limited to approximately one hour per month per engine for a total of 12 hours per year. The 13 existing engines are limited to an average electric load of 100% of the standby rating during testing. The 10 expansion engines will be maintenance tested at 0% electric load. Only one generator shall be operated at a time during monthly maintenance testing.
- 3.6. Operation of the 23 Yahoo! Data Center generators for required annual load testing shall be limited to approximately 4 hours per year per engine at an average electric load of 100% of the standby rating. The 10 expansion engines are limited to one engine operating concurrently at an average load of 100% of the standby rating.
- 3.7. Operation of the 23 Yahoo! Data Center generators for electrical bypass shall be limited to approximately 36 hours per year per engine. The 13 existing engines are limited to two engines operating concurrently at an average load of 100% of the standby rating. The 10 expansion engines are limited to two engines operating concurrently for electrical bypass maintenance at an average load of 40% of the standby rating, and 4 hours of total engine runtime per day.
- 3.8. The 13 existing generators operating for emergency power generation shall be limited to approximately 148 hours per year per engine at an average electrical load of 100% of the standby rating. The 10 expansion generators operating for

emergency power generation shall be limited to approximately 48 hours per year per engine at an average electrical load of 74% of the standby rating. No more than eight (8) expansion engines shall operate at greater than 90% load during any power outage.

- 3.9. The twenty-three (23) Yahoo! Data Center generator engines require maintenance testing each month. To mitigate engine emission impacts, Yahoo! will perform all maintenance testing during daylight hours, and at least 80% of all maintenance testing within a contiguous two week period each month. Engine maintenance and testing may take place outside of these time restrictions upon coordination by Yahoo! with the other data centers in northeast Quincy to minimize engine emission impacts to the community. Yahoo! shall maintain records of the coordination communications with the other data centers, and those communications shall be available for review by Ecology. Approved days for testing can be re-negotiated at any time as approved in writing by Ecology, and will not trigger revision or amendment of this Order.
- 3.10. The 6 evaporative cooling units with a total of 2 cooling towers per unit shall each have a mist eliminator that will maintain the maximum drift rate to no more than 0.001 percent of the circulating water rate.
- 3.11. Start-up testing of the 10 expansion generators is restricted as follows:
 - 3.11.1 Prior to beginning normal operation of the new engines, each generator engine may operate for no more than 16 hours for startup testing at an average load of 83%.
 - 3.11.2 Except during site integration testing as specified below, only one engine shall be operated at any one time during start-up testing.
 - 3.11.3 During a site integration test, up to six generator engines may operate concurrently for up to four hours at a time at a load of 100%.
 - 3.11.4 Combined engine runtime during startup testing shall not exceed sixteen hours over two days.
 - 3.11.5 All startup testing shall be conducted during daylight hours.
 - 3.11.6 Fuel use limits and emission limits contained in Approval Conditions 3.4 and 5, respectively, remain in effect during start-up testing.

4. GENERAL TESTING AND MAINTENANCE REQUIREMENTS

- 4.1. Yahoo! will follow engine-manufacturer's recommended diagnostic testing and maintenance procedures to ensure that each of the twenty-three (23) 2.28 MWm engines will conform to 40 CFR 89 emission specifications throughout the life of each engine.

- 4.2. Within 12 months of installation of any new expansion engine approved in this Order, Yahoo! shall measure concentrations of nitric oxide (NO), nitrogen dioxide (NO₂), carbon monoxide (CO), sulfur dioxide (SO₂) and oxygen (O₂) leaving that engine's exhaust stack in accordance with Approval Condition 4.3. This testing will serve to demonstrate compliance with the emission limits contained in Approval Conditions 5.3.1, 5.3.2, 5.3.3, 5.13.1, 5.13.2 and 5.13.3, and as an indicator of proper operation of the engines. Additional periodic testing shall be conducted according to Approval Condition 4.4.
- 4.3. The following procedure shall be used for each test for the 10 expansion engines required by Approval Condition 4.2 unless an alternate method is proposed by Yahoo! and approved in writing by Ecology prior to the test.
 - 4.3.1 Initial emissions testing shall be combined with start-up testing and subsequent emissions testing shall be combined with pre-scheduled monthly maintenance 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 is not allowed.
 - 4.3.2 A portable emissions instrument analyzer may be used. The analyzer model must be approved in writing by Ecology prior to the first required test. 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.
 - 4.3.3 Three test runs shall be conducted for each engine. Each run must last at least 15 minutes. Analyzer data shall be recorded at least once every 5 minutes during the test. Engine electrical power output shall be recorded during testing.
 - 4.3.4 Emissions measurement shall be conducted at each of the proposed average engine loads of 0%, 80%, and 100% that correspond to scheduled engine testing scenarios in Approval Condition 3.4 and Table 3.4b. Monthly testing emission rates were evaluated at 10% load due to the lack of manufacture emissions data at 0% load. Actual monthly testing will occur at 0% load. Emissions measurements need not be conducted at 90% load because a power outage is not scheduled operation.
 - 4.3.5 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. At the conclusion of the manufacturer's warranty term for each engine, or 60 months from engine delivery date, or 3,000 hours of operation, whichever occurs first, Yahoo! shall pursue one of the following options to verify compliance with federal emissions standards and the emission limits in this Order:

- 4.4.1 Emission testing of each engine for DEEP, NO₂, CO, total nitrogen oxides, and non-methane hydrocarbon (NMHC) emission rates to determine continuing compliance with the 40 CFR 89 Tier II emission standards (the applicant may replace the dynamometer requirement in Subpart E of 40 CFR 89 with corresponding measurement of gen-set electrical output). The testing of each engine shall be repeated every 60 months after its first test. The engine testing may be staged to test 5 engines in each 12 month period.
- 4.4.2 Re-evaluating BACT and tBACT and health risks of the facility's operations based on the previous 5 years of actual operations and actual power reliability data.
- 4.4.3 Show compliance with the manufacturer's maintenance requirements by renewing or extending engine manufacturer's maintenance contracts.
- 4.4.4 Any combination of the above three options, or an alternative method approved by Ecology in writing.
- 4.4.5 This requirement is in addition to any testing required by Approval Condition 4.2 above.
- 4.5 All engines shall be equipped with a properly installed and maintained non-resettable meter that records total operating hours.
- 4.6 Each of the 10 new expansion engines shall be connected to a properly installed and maintained fuel flow monitoring system that records the amount of fuel consumed by that engine during each period of operation.
- 4.7 Ecology may require additional testing as allowed in WAC-173-400-105(4) at its discretion.

5 EMISSION LIMITS

The twenty-three 2.28 MWm engine-generators shall meet the following emission limits. If required to demonstrate compliance with the g/kW-hr average emission limits through emissions testing, Yahoo! shall average emission rates for 5 individual operating loads (10%, 25%, 50%, 75% and 100%) according to 40 CFR §89.410 and Table 2 of Appendix B to 40 CFR Part 89, Subpart E.

- 5.1 Each existing engine shall not exceed NO_x emissions of 5.4 g/kW-hr.
- 5.2 Each expansion project engine shall not exceed NO_x emissions of 6.3 g/kW-hr if built before January 1, 2011. The NO_x emission factor for engines built after January 1, 2011 shall comply with 40 CFR Part 60, Subpart IIII, or any other applicable EPA requirement, in effect at the time the engines are installed.
- 5.3 Nitrogen dioxide (NO₂) emissions from each of the 10 expansion project engines shall not exceed the following emission rates at the stated loads, based on emission factors derived from source testing:

	Operating Scenario	Operating Load	Emissions Limit (lb/hr) per engine
5.3.1	Annual Load Testing	100%	3.5
5.3.2	Startup Testing	80%	2.3
5.3.3	Monthly Maintenance	10%	0.34
5.3.4	Electrical Bypass/Maintenance	80%	2.3
5.3.5	Power Outages	90%	2.9

- 5.4 Each existing engine shall not exceed VOC emissions of 0.2 g/kW-hr.
- 5.5 Each expansion engine shall not exceed VOC emissions of 0.1 g/kW-hr.
- 5.6 Each existing engine shall not exceed CO emissions of 2.0 g/kW-hr.
- 5.7 Each expansion project engine shall not exceed CO emissions of 3.50 g/kW-hr if built before January 1, 2011. The CO emission factor for engines built after January 1, 2011 shall comply with 40 CFR Part 60, Subpart IIII, or any other applicable EPA requirement, in effect at the time the engines are installed.
- 5.8 Each existing engine shall not exceed PM emissions of 0.19 g/kW-hr.
- 5.9 Each expansion project engine shall not exceed PM emissions of 0.20 g/kW-hr if built before January 1, 2011. The PM emission factor for engines built after January 1, 2011 shall comply with 40 CFR Part 60, Subpart IIII, or any other applicable EPA requirement, in effect at the time the engines are installed.
- 5.10 The total amount of PM emissions from operating all 10 expansion project engines during each year shall not exceed 0.35 tons/yr, based on load specific emission factors supplied by the engine manufacturer.
- 5.11 The total amount of PM emissions from operating all 23 engines during each year shall not exceed 1.6 tons/yr, based on load specific emission factors supplied by the engine manufacturer. All PM emissions shall be considered diesel engine exhaust particulate (DEEP) emissions and all DEEP emissions shall be considered PM_{2.5} emissions.
- 5.12 Visual emissions from each diesel engine 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.
- 5.13 SO₂ emissions from each diesel engine exhaust stack shall not exceed 0.03 lbs/hr, based on emission factors derived from source testing.

	Operating Scenario	Operating Load	Emissions Limit (lb/hr) per engine
5.13.1	Annual Load Testing	100%	0.031
5.13.2	Startup Testing	80%	0.025
5.13.3	Monthly Maintenance	0% (eval at 10%)	0.0033
5.13.4	Electrical Bypass/Maintenance	80%	0.025
5.13.5	Power Outages	90%	0.028

6 OPERATION AND MAINTENANCE MANUALS

A site-specific O&M manual for the Yahoo! 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 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 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.
- 6.2 Normal operating parameters and design specifications.
- 6.3 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.

- 8.1 Fuel receipts with amount of diesel and sulfur content for each delivery to the facility.
- 8.2 Total annual hours of operation for each diesel engine.
- 8.3 Operational mode and duration for each start-up of each diesel engine.
- 8.4 Annual gross power generated by facility-wide operation of the backup electrical generators.
- 8.5 Upset condition log for each engine and generator that includes date, time, duration of upset, cause, and corrective action.
- 8.6 Recordkeeping required by Title 40 CFR Part 60 Subpart IIII.
- 8.7 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 to purchase the engine/generator sets identified in Equipment Table 1.1 above, Yahoo! 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.

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.

9.2.1 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, and a listing of each start-up of each diesel engine that shows the mode and duration of each type of operation.

9.2.2 Written notification that the O&M manual has been developed and updated within 60 days after the issuance of this Order.

9.3 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 Yahoo!'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.

9.4 Yahoo! 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. This notification does not alleviate Yahoo! from annual reporting of operations contained in any section of Approval Condition 9.

10 STACK TESTING

10.1 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:

10.1.1 As soon as possible in advance of such testing, the Permittee shall submit a testing protocol for Ecology approval that includes the following information:

10.1.1.1 The location and Unit ID of the equipment proposed to be tested.

10.1.1.2 The operating parameters to be monitored during the test and the personnel assigned to monitor the parameters during the test.

10.1.1.3 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.

10.1.1.4 Time and date of the test and identification and qualifications of the personnel involved.

10.1.1.5 A description of the test methods or procedures to be used.

10.1.2 Test Reporting: test reports shall be submitted to Ecology within 45 days of completion of the test and shall include, at a minimum, the following information:

10.1.2.1 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.

10.1.2.2 Time and date of the test and identification and qualifications of the personnel involved.

- 10.1.2.3 A summary of results, reported in units and averaging periods consistent with the applicable emission standard or limit.
- 10.1.2.4 A summary of control system or equipment operating conditions.
- 10.1.2.5 A summary of production related parameters.
- 10.1.2.6 A description of the test methods or procedures used including all field data, quality assurance/quality control procedures and documentation.
- 10.1.2.7 A description of the analytical procedures used including all laboratory data, quality assurance/quality control procedures and documentation.
- 10.1.2.8 Copies of field data and example calculations.
- 10.1.2.9 Chain of custody information.
- 10.1.2.10 Calibration documentation.
- 10.1.2.11 Discussion of any abnormalities associated with the results.
- 10.1.2.12 A statement signed by the senior management official of the testing firm certifying the validity of the source test report.

11 GENERAL CONDITIONS

- 11.1 **Commencing/Discontinuing Construction and/or Operations:** This approval shall become void if operation of the Yahoo! Data Center backup emergency diesel electric generators is discontinued at the facility for a period of eighteen (18) months, unless prior written notification is received by Ecology at the address in Condition 7 above.
- 11.2 **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.
- 11.3 **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 emergency diesel electric generators, and be available for review upon request by Ecology.
- 11.4 **Equipment Operation:** Operation of the engine/generator sets 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.
- 11.5 **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.
- 11.6 **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.

- 11.7 **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.
- 11.8 **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:

- 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 provisions of their circumstances, and the reminder of this authorization, shall not be affected thereby.

You have a right to appeal this permit. To appeal this you must:

- File your appeal with the Pollution Control Hearings Board within 30 days of the "date of receipt" of this document. Filing means actual receipt by the Board during regular office hours
- Serve your appeal on the Department of Ecology within 30 days of the "date of receipt" of this document. Service may be accomplished by any of the procedures identified in WAC 371-08-305(10). "Date of receipt" is defined at RCW 43.21B.001(2).

Be sure to do the following:

- Include a copy of (1) the permit you are appealing and (2) the application for the permit.
- Serve and file your appeal in paper form; electronic copies are not accepted.

1. To file your appeal with the Pollution Control Hearings Board

Mail appeal to:

The Pollution Control Hearings Board
PO Box 40903
Olympia WA 98504-0903

OR

Deliver your appeal in person to:

The Pollution Control Hearings Board
4224 – 6th Ave SE Rowe Six, Bldg 2
Lacey, WA 98503

2. To serve your appeal on the Department of Ecology

Mail appeal to:

The Department of Ecology
Appeals Coordinator
P.O. Box 47608
Olympia, WA 98504-7608

Deliver your appeal in person to:

OR The Department of Ecology
Appeals Coordinator
300 Desmond Dr SE
Lacey, WA 98503

3. And send a copy of your appeal to:

Karen K. Wood
Air Quality Program
Department of Ecology
4601 N. Monroe Street
Spokane, WA 99205-1295

For additional information visit the Environmental Hearings Office Website:

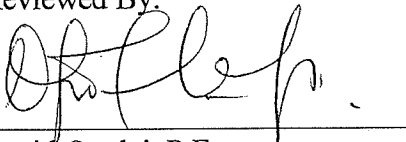
<http://www.eho.wa.gov>

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

<http://www.l.leg.wa.gov/CodeReviser>

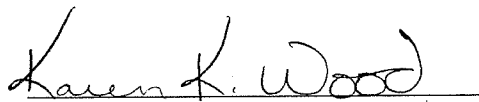
DATED this 28th day of March, 2011, at Spokane, Washington.

Reviewed By:



David Ogulei, P.E.
Science & Engineering Section
Department of Ecology
State of Washington

Approved By:



Karen K. Wood, Section Supervisor
Eastern Regional Office
Department of Ecology
State of Washington

April 1, 2011 KKW

