TECHNICAL SUPPORT DOCUMENT
NOTICE OF CONSTRUCTION APPROVAL ORDER
VANTAGE DATA CENTERS MANAGEMENT COMPANY, LLC
VANTAGE-QUINCY DATA CENTER
MAY, 2012

1. BACKGROUND

Starting in 2006, internet technology companies became interested in the City of Quincy in Grant County as a good place to build data centers. Data centers house the servers that provide e-mail, manage instant messages, and run applications for our computers. Grant County has a low-cost, dependable power supply and an area wide fiber optic system. During 2007 and 2008, the Ecology Air Quality Program (AQP) issued approval orders to Microsoft Corporation, Sabey Intergate Inc., and Intuit Inc. that allowed them to construct and operate data centers.

In 2010, the Washington State Legislature approved a temporary sales tax exemption for data centers building in Grant County and other rural areas. To qualify for the tax exemption, the data center must have at least 20,000 square feet dedicated to servers and start construction before July 1, 2011. The AQP has received permit applications from Microsoft Corporation and Sabey Intergate Inc. for expansion of their existing data centers in Quincy. Dell Marketing, LP and Sabey Intergate Quincy, LLC have also submitted applications for new data centers in Quincy that have been approved for construction and operation.

To build or expand, a data center company must first apply to the Washington Department of Ecology (Ecology) for a permit called a "notice of construction approval order" (NOC). Its purpose is to protect air quality. The NOC is needed because data centers use large, diesel-powered backup generators to supply electricity to the servers during power failures. Diesel engine exhaust contains both criteria and toxic air pollutants. As part of the permit review process, Ecology carefully evaluates whether the diesel exhaust from a data center's backup generators cause health problems.

2. EXECUTIVE SUMMARY

Vantage Data Centers Management Company, LLC submitted a Notice of Construction (NOC) application received by Ecology on February 10, 2012, for the phased installation of the Vantage-Quincy Data Center, to be sited North West of the junction of Road 11 NW and Road O NW, Quincy, in Grant County. A legal description of the parcel is the SE 1/16 of Section 4 and the SW 1/16 of Section 3, Township 20 North, Range 24 East, Willamette Meridian. The Vantage-Quincy Data Center will be leased to independent tenants. The primary air contaminant sources at the facility consist of 17-3000 kilowatt (kWe) electric generators powered by diesel engines. The generators will have a power capacity of up to 51 MWe, and will provide emergency backup power to the facility during infrequent disruption of Grant County PUD electrical power service. The project construction will be phased (up to 4 phases, phase 1 with 7 generators) over several years depending on customer demand.

Review of the February 10, 2012 NOC application began on February 11, 2012, and a notification that more information was necessary was issued on February 22, 2012 by the Department of Ecology under the supervision of the Eastern Regional Office Section Manager (Wood). Partial response to the request for additional information was received by Ecology on

March 19, 2012. The NOC application was considered complete as of May 1, 2012. The final draft Preliminary Determination (i.e., Proposed Decision) was submitted to Ecology HQ on , for review and to facilitate completion of the second tier review. The Preliminary Determination was issued on . Public review began on approximately , and ended on .

3. PROJECT DESCRIPTION

The Ecology Air Quality Program (AQP) received a Notice of Construction (NOC) application for the Vantage-Quincy Data Center on February 10, 2012. The Vantage-Quincy Data Center, hereafter referred to as Vantage, consists of phased construction of 4 data center buildings, 3 smaller structures housing generators, and a future substation. Construction will occur in phases with the first phase to be construction of a center with 5 primary generators and 2 described as 'reserve'. The timing of Phases 2-4 depends on customer demand and is not yet determined. Phase 1 is expected to be operational around the end of 2012 and includes the 5 primary and 2 reserve generators all of which are to be MTU 3000, three 3.0 Megawatt (MWe) electric generators powered by 4678 brake horse power MTU Model 20V4000 diesel engines. Phase 2, 3, and 4 construction are identified as Data Center 2 (phase 2 - 3 primary engine generators, plus 1 reserve), Data Center 3 (phase 3 - 3 primary engine generators, plus 1 reserve), and a Building described as 'ETC' (phase 4 - 1 primary engine generator plus 1 reserve). The sequence of expected construction was not described. The Vantage-Quincy generators will have a total combined capacity of approximately 51 MWe upon final build out of the four Phases. The Vantage-Quincy Data Center will be leased for occupancy by independent tenant companies that require fully supported data storage and processing space although all engine/generators are expected to be owned and operated by Vantage.

Vantage has requested operational limitations on the Vantage-Quincy facility to reduce emissions below major source thresholds and to minimize air contaminant impacts to the community. Vantage has indicated that diesel fuel usage at Vantage-Quincy will be less than 169,500 gallons of ultra-low sulfur diesel fuel. Individual engine operating limits of 85 hours per year for the engines serving Building 1 are also implied in the application materials.

Air contaminant emissions from the Vantage-Quincy Data Center project have been calculated based entirely on operation of the emergency generators. Table 1a contains criteria pollutant potential to emit for all phases of the Vantage-Quincy Data Center project. Table 1b contains toxic air pollutant potential to emit for all phases of the Vantage-Quincy Data Center project.

Table 1a: Criteria Pollutant Maximum Year Potential to Emit for Vantage-Quincy Data Center (including commissioning and stack testing)		
Pollutant	**Emission Factor (EF) Reference**	**Facility Emissions**
Criteria Pollutant		tons/yr
2.1.1 NOx Total	Engine NTE* + PC** Vendor Guarantee	7.58
2.1.2 CO	Engine NTE* + PC** Vendor Guarantee	1.46

2.1.3 SO_2	Engine NTE* + PC** Vendor Guarantee	0.023
2.1.4 $PM_{2.5}$/DEEP	Engine NTE* + PC** Vendor Guarantee	0.280
2.1.5 VOC	Engine NTE* + PC** Vendor Guarantee	0.40
2.1.6 Primary NO_2	Assumed 10% of NOx	0.76

Table 1b: Toxic Air Pollutant Maximum Year Potential to Emit for Vantage-Quincy Data Center		
Pollutant	**AP-42 Section 3.4 EF**	**Facility Emissions**
Organic Toxic Air Pollutants	Lbs/MMbtu	tons/yr
2.1.7 Propylene	2.79E-03	8.6E-03
2.1.8 Acrolein	7.88E-06	2.12E-04
2.1.9 Benzene	7.76E-04	2.09E-03
2.1.10 Toluene	2.81E-04	7.58E-04
2.1.11 Xylenes	1.93E-04	5.21E-04
2.1.12 Napthalene	1.30E-04	4.01E-04
2.1.13 1,3 Butadiene	1.96E-05	5.28E-05
2.1.14 Formaldehyde	7.89E-05	2.12E-04
2.1.15 Acetaldehyde	2.52E-05	6.79E-05
Poly Aromatic Hydrocarbons (PAH)		
2.1.16 Benzo(a)Pyrene	1.29E-07	3.77E-07
2.1.17 Benzo(a)anthracene	6.22E-07	1.82E-06
2.1.18 Chrysene	1.53E-06	4.49E-05
2.1.19 Benzo(b)fluoranthene	1.11E-06	3.26E-06
2.1.20 Benzo(k)fluoranthene	1.09E-07	3.20E-07
2.1.21 Dibenz(a,h)anthracene	1.73E-07	5.09E-07
2.1.22 Ideno(1,2,3-cd)pyrene	2.07E-07	6.09E-07
2.1.23 PAH (no TEF)	3.88E-06	1.14E-05
2.1.24 PAH (apply TEF)	4.98E-07	1.47E-06
State Criteria Pollutant Air Toxics		
2.1.25 DEEP/$PM_{2.5}$	NTE + PC Guarantee	0.280
2.1.26 Carbon monoxide	NTE + PC Guarantee	1.46
2.1.27 Sulfur dioxide	NTE + PC Guarantee	0.023
2.1.28 Primary NO_2***	10% total NOx	0.76
2.1.29 Ammonia	Maximum 10 ppmv	0.36

* Engine Manufacturer 'Not To Exceed'
** Pollution Control Equipment Vendor Guarantee
***Assumed to be equal to 10% of the total NOx emitted.

The Vantage Center will rely on cooling systems to dissipate heat from electronic equipment at the facility. These were not addressed in application materials. Cooling systems will be limited by conditions of approval to those emitting no air contaminants (non-evaporative).

4. APPLICABLE REQUIREMENTS

The proposal by Vantage Data Center qualifies as a new source of air contaminants as defined in Washington Administrative Code (WAC) 173-400-110 and WAC 173-460-040, and requires Ecology approval. The installation and operation of the Vantage-Quincy Data Center is regulated by the requirements specified in:

4.1 Chapter 70.94 Revised Code of Washington (RCW), Washington Clean Air Act,
4.2 Chapter 173-400 Washington Administrative Code (WAC), General Regulations for Air Pollution Sources,
4.3 Chapter 173-460 WAC, Controls for New Sources of Toxic Air Pollutants, and
4.4 Title 40 CFR Part 60 Subpart IIII

All state and federal laws, statutes, and regulations cited in this approval shall be the versions that are current on the date the final approval order is signed and issued.

5. BEST AVAILABLE CONTROL TECHNOLOGY

Best Available Control Technology (BACT) is defined[1] as "*an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation under chapter 70.94 RCW emitted from or which results from any new or modified stationary source, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant. In no event shall application of the "best available control technology" result in emissions of any pollutants which will exceed the emissions allowed by any applicable standard under 40 CFR Part 60 and Part 61….*"

For this project, Vantage proposed installation of engines with diesel particulate filters (DEEP Control) treated to also serve as oxidation catalysts (VOC and CO control) and selective catalytic reduction (NOx Control). With these proposed controls, Vantage avoided the formal process of a "top-down" approach for determining BACT for the proposed diesel engines. Vantage also established a control cost criteria for future data center diesel engines at a budget-level estimate of $47,714 per ton of combined pollutants controlled.

[1] RCW 70.94.030(7) and WAC 173-400-030(12)

The proposed diesel engines will emit the following regulated pollutants which are subject to BACT review: nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter (PM, PM_{10} and $PM_{2.5}$) and sulfur dioxide.

5.1 BACT ANALYSIS FOR NOx

5.1.1 ***Selective Catalytic Reduction.*** The SCR system functions by injecting a liquid reducing agent, such as urea, through a catalyst into the exhaust stream of the diesel engine. The urea reacts with the exhaust stream converting nitrogen oxides into nitrogen and water. The use of ultra-low sulfur (10-15 ppmw S) fuel is required to achieve good NOx destruction efficiencies. SCR can reduce NOx emissions by up to 90-95 percent.

For SCR systems to function effectively, exhaust temperatures must be high enough (about 200 to 500°C) to enable catalyst activation. For this reason, SCR control efficiencies are expected to be relatively low during the first 20 to 30 minutes after engine start up, especially during maintenance, and testing loads. There are also complications of managing and controlling the excess ammonia (ammonia slip) from SCR use.

5.1.6 **BACT determination for NOx**

Ecology determines that BACT for NOx is:

a. Use of urea-based SCR with ammonia slip no greater than 15 ppmv at 15% O_2;
b. Use of EPA Tier 2 certified engines, pre-control, if the engines are installed and operated as emergency engines, as defined at 40 CFR§60.4219; or applicable emission standards found in 40 CFR Part 89.112 Table 1 and 40 CFR Part 1039.102 Tables 6 and 7 if Model Year 2011 or later engines are installed and operated as non-emergency engines; and
c. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.
d. NOx emission levels reflecting the vendor guaranteed 90 percent reduction in NOx from that emitted by a Tier 2 certified engine.

5.2 BACT ANALYSIS FOR PARTICULATE MATTER, CARBON MONOXIDE AND VOLATILE ORGANIC COMPOUNDS

5.2.1 ***Diesel particulate filters (DPFs)***. These add-on devices include passive and active DPFs, depending on the method used to clean the filters (i.e., regeneration). Passive filters rely on a catalyst while active filters typically use continuous heating with a fuel burner to clean the filters. The use of DPFs to control diesel engine exhaust particulate emissions has been demonstrated in multiple engine installations worldwide. Particulate matter reductions of up to 85% or more have been reported. Therefore, this technology was identified as the top case control option for diesel engine exhaust particulate emissions from the proposed engines.

Vantage has proposed installation and operation of DPFs on each of the proposed diesel engines. Ecology accepts this option, in its combined form as an oxidation catalyst, as BACT for these engines.

5.2.2 ***Diesel oxidation catalysts***. This method utilizes metal catalysts to oxidize carbon monoxide, particulate matter, and hydrocarbons in the diesel exhaust. Diesel oxidation catalysts (DOCs) are commercially available and reliable for controlling particulate matter, carbon monoxide and hydrocarbon emissions from diesel engines. While the primary pollutant controlled by DOCs is carbon monoxide (approximately 90% reduction), DOCs have also been demonstrated to reduce up to 30% of diesel engine exhaust particulate emissions, and more than 50% of hydrocarbon emissions.

5.2.4 **BACT Determination for Particulate Matter, Carbon Monoxide and Volatile Organic Compounds**

Ecology determines BACT for particulate matter, carbon monoxide and volatile organic compounds is:

a. Use of the proposed catalytic DPF; and
b. Use of EPA Tier 2 certified engines pre-control if the engines are installed and operated as emergency engines, as defined at 40 CFR§60.4219; or applicable emission standards found in 40 CFR Part 89.112 Table 1 and 40 CFR Part 1039.102 Tables 6 and 7 if Model Year 2011 or later engines are installed and operated as non-emergency engines; and
c. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.
d. CO, VOC, and PM emission levels reflecting a 90, 90, and 87 percent reduction in the levels of these pollutants, respectively, from the levels emitted by a Tier 2 certified engine.

5.3 BACT ANALYSIS FOR SULFUR DIOXIDE

5.3.1 Ecology did not find any add-on control options commercially available and feasible for controlling sulfur dioxide emissions from diesel engines. Vantage Quincy's proposed BACT for sulfur dioxide is the use of ultra-low sulfur diesel fuel (maximum of 15 ppm by weight of sulfur). Using this control measure, sulfur dioxide emissions would be limited to 0.020 tons per year.

5.3.2 **BACT Determination for Sulfur Dioxide**

Ecology determines that BACT for sulfur dioxide is the use of ultra-low sulfur diesel fuel containing no more than 15 parts per million by weight of sulfur.

5.4 BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS

Best Available Control Technology for Toxics (tBACT) means BACT, as applied to toxic air pollutants.[2] The procedure for determining tBACT follows the same procedure used above for determining BACT. Under state rules, tBACT is required for all toxic air pollutants for which

[2] WAC 173-460-020

the increase in emissions will exceed de minimis emission values as found in WAC 173-460-150.

For the proposed project, tBACT must be determined for each of the toxic air pollutants listed in Table 2 below. As indicated in Table 2, Ecology has determined that compliance with BACT, as determined above, satisfies the tBACT requirement.

Table 2. tBACT Determination

Toxic Air Pollutant	tBACT
Acetaldehyde	Compliance with the VOC BACT requirement
Acrolein	Compliance with the VOC BACT requirement
Benzene	Compliance with the VOC BACT requirement
Benzo(a)pyrene	Compliance with the VOC BACT requirement
1,3-Butadiene	Compliance with the VOC BACT requirement
Carbon monoxide	Compliance with the CO BACT requirement
Diesel engine exhaust particulate	Compliance with the PM BACT requirement
Formaldehyde	Compliance with the VOC BACT requirement
Nitrogen dioxide	Compliance with the NOx BACT requirement
Sulfur dioxide	Compliance with the SO_2 BACT requirement
Toluene	Compliance with the VOC BACT requirement
Total PAHs	Compliance with the VOC BACT requirement
Xylenes	Compliance with the VOC BACT requirement

6. AMBIENT IMPACTS ANALYSIS

Vantage obtained the services of ICF International Consultants to conduct air dispersion modeling for Vantage Data Center's generators to demonstrate compliance with ambient air quality standards and acceptable source impact levels. Each generator was modeled as a point source. ICF used EPA's AERMOD dispersion model to determine ambient air quality impacts caused by emissions from the proposed generators at the property line and beyond, and at the rooftops of the proposed data center buildings to be occupied by tenants. The ambient impacts analysis indicates that no National Ambient Air Quality Standards (NAAQS) are likely to be exceeded.

6.1 AERMOD Dispersion Modeling Methodology

AERMOD is an EPA "preferred" model (40 CFR Part 51, Appendix W, Guideline on Air Quality Models) for simulating local-scale dispersion of pollutants from low-level or elevated sources in simple or complex terrain.

The following data and assumptions were used in the application of AERMOD:

- Input data for for the AERMET meteorological processor included five years of sequential hourly surface meteorological data (2004–2008) from Moses Lake, WA and twice-daily upper air data from Spokane.

- Digital topographical data for the vicinity were obtained from the Micropath Corporation.

- All 17 generator stacks at Building 1, Building 2 and building 3 were set at a height of 41 feet above local finished grade. The generator stacks on the ETC building were set at a height of 43.8 feet above local finished grade.

- The planned data center buildings were included to account for building downwash. EPA's PRIME algorithm was used for simulating building downwash.

- For purposes of modeling compliance with the NAAQS, it was assumed the entire data center would experience a total 24 hours of power outage or storm avoidance per year (nominally 8 hours of power outage and 16 hours of storm avoidance) and that this would be spread over 5 calendar days per year, during which time all backup engines were assumed to operate for their assigned times and at their assigned loads for power outage conditions.

- 1-hour NO2 concentrations were modeled using the Plume Volume Molar Reaction Model (PVMRM) module, with the following default concentrations: 40 parts per billion (ppb) of ozone, and a NO2/NOX ambient ratio of 90%. For purposes of modeling NO2 impacts, the primary NOX emissions were assumed to be 10% NO2 and 90% nitric oxide (NO) by mass.

- Emissions from commissioning testing and stack emission testing are equal to 27% of the emissions from full-buildout routine testing plus power outages. The worst-year annual-average impacts were estimated by manually scaling the previous annual-average AERMOD results by a factor of 1.27.

- For the Health Impacts Assessment modeling conducted for DPM, the emissions from all modes of operation other than power outages were assumed to occur between 7 am to 7 pm.

- A Cartesian, rectangular receptor grid whose density diminished with distance, was used to model the property line and beyond for all AERMOD applications. In addition, fenceline receptors (10-meter spacing) and discrete receptors where rooftop air intakes are located, were also used. The receptor categories and number of receptors for each category are as follows:

Fenceline receptors in 10 meter (m) spacing	237
Receptors in 10 m spacing out to 350 m from the sources	6,765
Receptors in 25 m spacing out to 800 m from the sources	4,176
Receptors in 50 m spacing out to 2000 m from the sources	5,952
Rooftop receptors	25
Total number of the receptors	17,155

6.2 Assumed Background Concentrations

Background concentrations for all species were provided by Ecology (Bowman, 2010). These are:

PM10 (24-hour average)	60 $\mu g/m^3$
PM2.5 (98th percentile 24-hour average)	21 $\mu g/m^3$

NO_2 (98th percentile 1-hour value)	29 μg/m^3
DEEP (annual average)	0.103 μg/m^3

These regional values do not include "local background" caused by industrial facilities near the proposed Vantage data center, namely the existing Sabey, Yahoo, and Intuit data centers and the Celite manufacturing plant. The local background impacts were modeled separately, assuming a mixture of permit limits, a full area-wide power outage or maximum emitting test modes. Their combined contributions at the receptor that is maximally impacted by Vantage-only emissions are:

PM_{10} (24-hour average)	0.002 μg/m^3
$PM_{2.5}$ (24-hour average)	0.08 μg/m^3
NO_2 (1-hour average)	0.02 μg/m^3

Table 3 provides a summary of the modes of operation of the diesel engines proposed by Vantage. Table 4 is a summary of annual emissions after full buildout of the Vantage project. When each engine is installed, a commissioning test sequence occurs, described in Table 5. The impacts of the emissions anticipated from this project were modeled using worst case scheduling of these activities. The results of the modeling and a comparison to the NAAQS are shown in Table 6 for criteria pollutants. Table 7 provides the impacts modeled for Toxic Air Pollutants (TAPs) whose emission rates exceeded the Small Quantity Emission Rate (SQER) in WAC 173-460. TAPs with emission rates that exceed the SQER must be evaluated further and trigger a Tier 2 Health Impact Assessment if modeling shows the emission rates result in impacts above the ASIL.

Table 3. Summary of Diesel Generator Operating Modes

Generator		Weekly Testing			Monthly Testing			Quarterly Testing			Annual Full Building			Annual Step			Unscheduled Maintenance				Outage and Storm Avoidance		
3000 kWe MTU																	Corrective Generator Maintenenace		Transformer Maintenance			Storm Avoid-ance	Outage
Gen #	Gen Bldg	% Load	Hrs/test	Hrs/yr	% Load	Hrs/test	Hrs/yr	% Load	Hrs/test	Hrs/yr	% Load	Hrs/test	Hrs/yr	% Load	Hrs/test	Hrs/yr	% Load	Hrs/yr	% Load	Hrs/yr	% Load	Hrs/yr	Hrs/yr
DC1-1P	DC1	10	0.5	20	10	1	6	81.3	0.75	3	81.3	6	6	100	0.5	0.5	100	8	81.3	8	81.3	16	8
DC1-2P	DC1	10	0.5	20	10	1	6	81.3	0.75	3	81.3	6	6	100	0.5	0.5	100	8	81.3	8	81.3	16	8
DC1-3P	DC1	10	0.5	20	10	1	6	81.3	0.75	3	81.3	6	6	100	0.5	0.5	100	8	81.3	8	81.3	16	8
DC1-4P	DC1	10	0.5	20	10	1	6	81.3	0.75	3	81.3	6	6	100	0.5	0.5	100	8	81.3	8	81.3	16	8
DC1-5P	DC1	10	0.5	20	10	1	6	81.3	0.75	3	81.3	6	6	100	0.5	0.5	100	8	81.3	8	81.3	16	8
DC1-6R	DC1	10	0.5	20	10	1	6	10	0.75	3	10	6	6	100	0.5	0.5	100	8	10	8	10	16	8
DC1-7R	DC1	10	0.5	20	10	1	6	10	0.75	3	10	6	6	100	0.5	0.5	100	8	10	8	10	16	8
DC2-1P	DC2	10	0.5	20	10	1	6	90	0.75	3	90	6	6	100	0.5	0.5	100	8	90	8	90	16	8
DC2-2P	DC2	10	0.5	20	10	1	6	90	0.75	3	90	6	6	100	0.5	0.5	100	8	90	8	90	16	8
DC2-3P	DC2	10	0.5	20	10	1	6	90	0.75	3	90	6	6	100	0.5	0.5	100	8	90	8	90	16	8
DC2-4R	DC2	10	0.5	20	10	1	6	10	0.75	3	10	6	6	100	0.5	0.5	100	8	10	8	10	16	8
DC3-1P	DC3	10	0.5	20	10	1	6	90	0.75	3	90	6	6	100	0.5	0.5	100	8	90	8	90	16	8
DC3-2P	DC3	10	0.5	20	10	1	6	90	0.75	3	90	6	6	100	0.5	0.5	100	8	90	8	90	16	8
DC3-3P	DC3	10	0.5	20	10	1	6	90	0.75	3	90	6	6	100	0.5	0.5	100	8	90	8	90	16	8
DC3-4R	DC3	10	0.5	20	10	1	6	10	0.75	3	10	6	6	100	0.5	0.5	100	8	10	8	10	16	8
ETC-1P	ETC	10	0.5	20	10	1	6	93.3	0.5	3	93.3	6	6	100	0.5	0.5	100	8	93.3	8	93.3	16	8
ETC-2R	ETC	10	0.5	20	10	1	6	10	0.5	3	10	6	6	100	0.5	0.5	100	8	10	8	10	16	8
Cool Down at 10% Load, Each Engine, Primary and Reserve:									0.5	2		0.5	0.5		0.5	0.5		1		0.5		4	1

Table 4. Summary of Facility-Wide Emission Rates for Full Buildout Scenario

Pollutant	Weekly, Monthly, Quarterly Testing & Cool Down (ton/yr)	Annual Facility-wide and Step Tests (ton/yr)	Storm Avoidance & Unplanned Outage (24 hrs/yr) (ton/yr)	De-energized Building and Transformer and CorrectiveTesting (ton/yr)	Total Emissions (ton/yr)
PM2.5 (DPM) Normal Year	0.07	0.021	0.07	0.025	0.19
NOX	1.2	0.71	2.17	1.89	5.97
CO	0.36	0.1	0.38	0.29	1.13
VOC	0.19	0.02	0.1	0.06	0.37
SO2	0.0	0.0	0.0	0.0	0.02
Primary Nitrogen Dioxide (NO2)	0.12	0.07	0.22	0.189	0.6

Table 5. Runtime Scenario for Initial Startup and Commissioning Tests

Day of Test	Test Description	No. of Typical Hours	Average Load
	Manufacturer Tests		
Day 1	8 hours at full load, 1 generator any given day	8	100%
Day 2	12 hours at 75%, 1 generator any given day	12	75
	Functional Performance Tests		
Day 3	20 hours, Full (100%) Load, 1 generator any given day	20	100%
	Summary of Per-Engine Startup Quantities		
Calendar Days of Testing (Each Generator)			3-4
Runtime Hours Each Generator			40
kWm-hrs During Testing (Each Generator)			111,000
Fuel Usage During Testing (Each Generator- gals)			8,692
NOx Emissions Each Generator			614 lbs
DPM Emissions During Testing (Each Generator)			18.6 lbs

Table 6:
Modeled Concentrations of Criteria Pollutants (with background) and comparison to Ambient Air Quality Standards

Pollutant and Time Frame	Background plus Modeled Concentration – ug/m^3	National Ambient Air Quality Standard - ug/m^3	Percent of Standard
PM_{10} 24 Hour	82.2	150	55%
PM_{10} Annual	0.056	50	0.1%
$PM_{2.5}$ 24 Hour	26.1	35	74%
$PM_{2.5}$ Annual	0.056	15	0.4%
NO_2 1- Hour	166	188	88.3%
CO 1-Hour	203	40,000	0.5%
CO 8-Hour	113	10,000	1.1%
SO_2 1-Hour	3.6	319	1.1%
SO_2 3-Hour	2.9	1300	0.2%
SO_2 24 Hour	1.5	365	0.4%
SO_2 Annual	2.3E-8	80	3E-8%

Table 7: Modeled Concentrations of Toxic Air Pollutants and Comparison to Acceptable Source Impact Levels (ASILs)

Pollutant and Time Frame		Modeled Concentration – ug/m3	Acceptable Source Impact Level – ASIL ug/m^3	Comparison of Modeled to ASIL
DEEP	Annual	0.0335	0.0033	1015%
NO_2	1-Hour	334.5	470	71.2%
Acrolein	24 Hour	0.0016	0.06	3%
Ammonia	24 Hour	23	70.8	32%

As is indicated in Tables 6 and 7, only Diesel Engine Exhaust Particulate (DEEP) exceeded the regulatory trigger level (the ASIL) for that pollutant. At this concentration, DEEP is required to be further evaluated in a Second Tier Toxics Review in accordance with WAC 173-460-90.

7. STORM AVOIDANCE HOURS

As indicated in Table 3, there are 16 hours per year assigned for operating the engine generators in 'storm avoidance' mode. This is a mode of operation not allowed for the four data centers already approved in the Quincy area. Vantage has proposed to demonstrate the necessity of these hours for its first of four buildings (first seven engine-generators). This demonstration will be required for each new tenant at the data center facility. The approval order allows these hours for the first building, but eliminates them for the following phases of the project without demonstration satisfactory to Ecology that these run-time hours are a necessity.

8. SECOND TIER REVIEW FOR DIESEL ENGINE EXHAUST PARTICULATE EMISSIONS

Proposed emissions of diesel engine exhaust particulate (DEEP) from the seventeen (17) Vantage engines exceed the regulatory trigger level for toxic air pollutants (also called an Acceptable Source Impact Level, (ASIL)). A second tier review is required for DEEP in accordance with WAC 173-460-090.

Large diesel-powered backup engines emit DEEP, which is a high priority toxic air pollutant in the state of Washington. In light of the potential rapid development of other data centers in the Quincy area, and recognizing the potency of DEEP emissions, Ecology decided to evaluate Vantage's proposal on a community-wide basis. The community-wide evaluation approach considers the cumulative impacts of DEEP emissions resulting from Vantage's project, and includes consideration of prevailing background emissions from existing permitted data centers and other DEEP sources in Quincy. This evaluation was conducted under the second tier review requirements of WAC 173-460-090.

Under WAC 173-460-090, Vantage was required to prepare a health impact assessment. The HIA presents an evaluation of both non-cancer hazards and increased cancer risk attributable to Vantage's increased emissions of DEEP. Vantage also reported the cumulative risks associated with Vantage and prevailing sources in their HIA document. This cumulative DEEP related risk estimate was based on the latest cumulative air dispersion modeling work performed by Ecology. The Vantage HIA document along with a brief summary of Ecology's review will be available on Ecology's website.

9. CONCLUSION

Based on the above analysis, Ecology concludes that operation of the seventeen (17) generators at Vantage will not have an adverse impact on local air quality. Ecology finds that Vantage has satisfied all requirements for NOC approval.

****END OF VANTAGE TSD ****