State of Washington
Department of Ecology
Technical Support Document (TSD)

Source Name: **Microsoft Corporation – Columbia Data Center**
Source Location: **501 Port Industrial Parkway, Quincy, WA 98848**
County: **Grant**
Approval Order No.: **20AQ-E002**
Permit Reviewer: **Jenny Filipy**

<u>Background and Description for Order 20AQ-E002</u>

On October 17, 2019, Ecology received a Notice of Construction application from Microsoft Corporation, requesting an expansion of the Columbia Data Center – CO6. The expansion would include five 2.5 MWe emergency backup generator engines. Columbia Data Center was previously permitted for 37 engines and only installed 35 engines. The CO6 expansion will bring the total number of permitted backup emergency engines to 40 and all 2.5 MWe in size. Microsoft Columbia will also reduce the annual operating hours per emergency generator for CO1 and CO2 from 121 hours to 100 hours and for CO3 from 104 hours to 100 hours. Initial review the application was considered incomplete. The application was considered complete on November 22, 2019. A 30 day public comment period was conducted from December 11, 2019 through January 10, 2020, with no public hearing. SEPA checklist review was conducted by the City of Quincy on November 14, 2019. The City of Quincy decided that the few additional engines was within the scope of the previous SEPA determination of non-significance for the facility.

<u>Emission Units and Pollution Control Equipment</u>

<table>
<tr><th colspan="6">Table 1 - Emergency Generator Engines and Cooling Equipment
Columbia CO1, CO2, CO3 and CO6</th></tr>
<tr><th>Buildings</th><th>Quantity</th><th>Engines</th><th>Model</th><th>Engine Control</th><th>Cooling Eq.</th></tr>
<tr><td>CO1</td><td>12</td><td rowspan="4">2.5 MWe</td><td rowspan="4">Caterpillar Model 3516C</td><td rowspan="4">All engines will meet EPA Tier 2 standards</td><td rowspan="2">36 - Cooling Towers (0.0005% drift rate)</td></tr>
<tr><td>CO2</td><td>12</td></tr>
<tr><td>CO3</td><td>11</td><td rowspan="2">No emissions from CO3 and CO6 cooling systems</td></tr>
<tr><td>CO6</td><td>5</td></tr>
</table>

Existing Approval Orders

Approval Order No.: 14AQ-E553 – See pages 8-23 for technical support document for Columbia CO1, CO2 and CO3.

Enforcement Issue(s)

There are no enforcement actions for this site.

Recommendation

Staff recommends that the operation of the Columbia Data Center – CO6 be approved. This recommendation is based on the following facts and conditions: Information used in this review was derived from the application received 10/17/19 and additional information received on 11/14/2019. Hours of engine operation in the permit were based on modeling inputs.

Emission Calculations

Table 2 - Criteria Pollutant and Toxic Air Pollutant Emission Limits for Total Facility Columbia CO1, CO2, CO3, CO6 (Tons/Year)		
Pollutant	**Annual Emissions**	**Annual with CO6 Commissioning Emissions**
PM smaller than 10 microns in diameter (PM_{10})	14.18	14.23
PM smaller than 2.5 microns in diameter ($PM_{2.5}$)[(a)]	6.38	6.43
PM2.5/PM10 (Gens Only)	2.88	2.93
Carbon monoxide (CO)	5.71	5.96
Nitrogen oxides (NO_X)	37.1	39.0
Volatile organic compound (VOC)	2.31	2.35
Sulfur dioxide (SO_2)	0.05	0.05
Diesel Engine Exhaust Particulate (DEEP)*	0.60	0.62
Nitrogen Dioxide (NO_2)**	3.67	3.86
* All PM emissions from the generator engines are $PM_{2.5}$, and all filterable $PM_{2.5}$ from the generator engines is considered Diesel Engine Exhaust Particulate (DEEP). ** NO_2 is assumed to be equal to 10 percent of the total NOx emitted.		

Table 3 - Toxic Air Pollutants[c] Potential To Emit for Total Facility Columbia CO1, CO2, CO3, CO6 (Tons/Year)		
Pollutant	**Annual Emissions (lb/yr)**	**Annual Emissions (tons/year)**
Carbon Monoxide, CO	11,920	5.96
DEEP[a]	1,240	0.62
Sulfur Dioxide, SO_2	100	0.05
Primary nitrogen dioxide (NO_2)[b]	7,720	3.86
Benzene	47.19	0.024
Toluene	17.08	0.0085
Xylenes	11.73	0.0059
1,3-Butadiene	2.38	0.00119
Formaldehyde	4.80	0.0024
Acetaldehyde	1.53	0.00077
Acrolein	0.48	0.00024
Benzo(a)pyrene	0.016	0.0000078
Benzo(a)anthracene	0.038	0.000019
Chrysene	0.093	0.000047
Benzo(b)fluoranthene	0.067	0.000034
Benzo(k)fluoranthene	0.013	0.0000066
Dibenz(a,h)anthracene	0.021	0.000011
Ideno(1,2,3-cd)pyrene	0.025	0.000013
Naphthalene	7.90	0.0040
Propylene	169.63	0.085
Fluoride	11.06	0.0055
Manganese	1.07	0.00054
Copper	0.36	0.00018
Chloroform	0.35	0.00018
Bromodichloromethane	0.35	0.00018
Bromoform	9.2	0.0046
Vanadium	0.71	0.00036

[a] DEEP is filterable (front-half) particulate emissions.

[b] NO_2 is assumed to be equal to 10 percent of the total NO_X emitted.

[c] Pollutants above WAC 173-460-150 de minimis levels.

Potential emissions are above the exemption limits in WAC 173-400-110(5) of 2.0 tpy NOx therefore the facility is subject to New Source Review (NSR). An action that triggers NSR is subject to review under WAC 173-460-040 for each toxic air pollutant. See 'State Rule Applicability' section for further information on TAPs.

Limited Potential to Emit

Modeling demonstrated the facility would not cause or contribute to a violation of the NAAQS based on worst-case load emissions for Caterpillar engines. Engines were limited to 80 hours per year with one year with commissioning total up to 94 hours.

County Attainment Status

Table 4 – NAAQS Attainment	
Pollutant	**Status**
PM_{10}	attainment
SO_2	attainment
NO_2	attainment
Ozone	attainment
CO	attainment
Lead	attainment

Part 70 Permit Determination

The Columbia Data Center is not subject to the Part 70 Permit requirements because the potential to emit (PTE) of:

(1) Each criteria pollutant is less than one hundred (100) tons per year;
(2) A single hazardous air pollutant (HAP) is less than ten (10) tons per year, and;
(3) Any combination of HAPs is less than twenty-five (25) tons per year.

Federal Rule Applicability

(1) New Source Performance Standard (NSPS) 40 CFR Part 60 Subpart IIII for Stationary Compression Ignition Internal Combustion Engines is applicable to this source. Requires each generator be manufactured and certified to meet EPA Tier 2 emission limits.
(2) National Emission Standards for Hazardous Air Pollutants (NESHAPs) 40 CFR Part 63 Subpart ZZZZ for Reciprocating Internal Combustion Engines is applicable to this source. Requires each generator be manufactured and certified to meet EPA Tier 2 emission limits and meet all requirements of 40 CFR Part 60 Subpart IIII.

NAAQS

Dispersion modeling was submitted which showed operation of the facility as permitted would not cause or contribute to a NAAQS exceedance.

Table 5 - Estimated CO6 Project and Background Impacts Compared to NAAQS						
Pollutant	NAAQS Primary/ Secondary	WA State Stds	Modeled Scenario	Modeled Impacts[a] (µg/m^3)	Background (µg/m^3) Reg[b]. + Local	Total Impact (µg/m^3)
Carbon Monoxide (CO) 8-hour average 1-hour average	10,000 / -- 40,000 / --	10,000 40,000	Unplanned power outage	357 [d] 675 [d]	--	--
Sulfur Dioxide (SO_2) 3-hour average 1-hour average	--/ 1,310 200	1,310 200	Unplanned power outage	2.7 [d] 3.2 [d]	--	--
Particulate Matter (PM_{10}) 24-hour average	150	150	Unplanned power outage of 15 hours	29 [d,e]	118	147
Particulate Matter ($PM_{2.5}$) Annual average 24-hour average	12 / 15 35	12 35	Theo. Max Yr Ranked Day 8	0.088 4.3 [d,f]	-- 23.1	-- 27
Nitrogen Oxides (NOx) Annual average 1-hour average	100 188 / --	100	Theo Max Yr Ranked Day 8	3.2 [e] 139 [d,f]	13.4 40	17 179

Notes:

[a]Maximum design value concentration of proposed new sources alone.

[b]Regional background level obtained form Idaho Department of Environmental Quality for model and monitoring data from July 2014 through June 2017 (IDEQ; accessed August 16, 2019).

[c]Cumulative concentrations are calculated for pollutant's where project related contributions are above the Significant Impact Level.

[d]Reported values represent the 1st-highest modeled impacts.

[e]It was assumed that local data centers were concurrently operating in facility-wide power outage mode. The Lamb Weston facility was modeled as continuously operating at PTE rates. All cooling towers were modeled as continuously operating at PTE rates.

[f]For quarterly and triennial operations one engine is running at a time and operations may occur any time during daytime hours (7am to 7pm). Local background modeling for this scenario assumed nearby data centers were not operating any generators. The Lamb Weston facility was modeled as continuously operating at PTE rates. All cooling towers were modeled as continuously operating at PTE rates.

[g]For cumulative NO_2 1-hour average modeling, there are receptors located within a nearby sources' own property boundary. Due to this, we subtract the contribution of that source to receptors on its property and report only cumulative totals of all other sources in the model at those receptors. The project + local background concentration is 141 µg/m^3 using the maximum 3-year average.

Stack Parameters

The following table shows the stack height and diameter requirements that were used in the site modeling.

Table 6 - Emergency Generator Exhaust Stack Height Requirements				
Quantity	Location	Minimum Height (feet)	Stack Diameter (inches)	Height Above Roof (feet)
20	CO1 and CO2 Building	38’	18”	8’
4	CO1 and CO2 Ground Level	20’	18”	
11	CO3.1, CO3.2, CO3.3 Ground Level	31’	18”	
5	CO6 Building	38’	24”	12.5’

State Rule Applicability and Best Available Control Technology (BACT)

The proposed installation of emergency backup generators is subject to the requirements of:

(1) WAC 173-400-113 - Requirements for new sources in attainment or unclassifiable areas, is the State regulation that defines the evaluations of Microsoft Corporation. The subsections of WAC 173-400-113 require the following:

  (a) WAC 173-400-113(1): “The proposed new source will comply with all applicable new source performance standards (NSPS), national emission standards for hazardous air pollutants (NESHAP)….” New Source Performance Standard (NSPS) 40 CFR Part 60 Subpart IIII for Stationary Compression Ignition Internal Combustion Engines and National Emission Standards for Hazardous Air Pollutants (NESHAPs) 40 CFR Part 63 Subpart ZZZZ for Reciprocating Internal Combustion Engines are applicable to this source.

  (b) WAC 173-400-113(2): “The proposed new source or modification will employ BACT for all pollutants not previously emitted or whose emissions would increase as a result of the new source or modification.” See the following BACT Table:

Table 7 - Best Available Control Technology (BACT) Determinations	
Pollutant(s)	**BACT Determination**
PM, CO, and VOCs	Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. Use of high-efficiency drift eliminators which achieve a liquid droplet drift rate of no more than 0.0005 percent of the recirculation flow rate within each cooling tower.
NO_X	Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219, and satisfy the written verification requirements of Approval Condition 2.e.

Table 7 - Best Available Control Technology (BACT) Determinations	
Pollutant(s)	**BACT Determination**
	Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.
SO_2	Use of ultra-low sulfur diesel fuel containing no more than 15 parts per million by weight of sulfur.

(i.) The BACT and tBACT emission limitation is EPA's Tier 2 standards. The cost effectiveness (as dollars per ton of pollutant removed) of installing the Tier 4 integrated control package for control of NOx ($75,030), PM_{10}/$PM_{2.5}$ ($8.5 million), CO ($643,612), VOCs ($4.9 million), combined criteria air pollutants ($65,766), and combined toxic air pollutants ($356,431). The forecast cost effectiveness for control of individual and combined pollutants exceeds Ecology's thresholds for cost effectiveness; therefore, the Tier 4 integrated control package is cost-prohibitive for reducing criteria and toxic air pollutant emissions. The BACT cost evaluation for Diesel Oxidation Catalysts (DOC) for controlling CO ($9,992), VOC ($75,457), and PM ($447, 911) dipped into the range that we would consider requiring additional control (Combined $8,653 per ton). However, this CO6 project is well below the New Source Review thresholds for CO, VOC, and PM_{10}/$PM_{2.5}$ (5 tons per year for CO and 2 tons per year for VOC, 0.75 and 0.5 tons per year PM_{10} and $PM_{2.5}$), so we will not require this additional emission control.

(c) WAC 173-400-113(3): "Allowable emissions from the proposed new source or modification will not delay the attainment date for an area not in attainment, nor cause or contribute to a violation of any air quality standard."

(d) WAC 173-400-110(2)(d): "If the proposed project will increase emissions of toxic air pollutants regulated under chapter 173-460 WAC, then the project must meet all applicable requirements of that program." See the following tBACT Table:

Table 8 - tBACT Determinations	
TAPs	**tBACT Determination**
Acetaldehyde, CO, acrolein, benzene, benzo(a)pyrene, 1,3-butadiene, DEEP, formaldehyde, toluene, total PAHs, xylenes, chrysene, benzo(a)anthracene, napthalene, benzo(b)fluoranthene, propylene, dibenz(a,h)anthracene, Ideno(1,2,3-cd)pyrene, fluoride, manganese, copper, chloroform, bromodichloromethane, bromoform,	Compliance with the VOC and PM BACT requirement.
NO_2	Compliance with the NO_X BACT requirement.
SO_2	Compliance with the SO_2 BACT requirement.

Conclusion

Ecology has determined the applicant, Microsoft Corporation, has satisfied all of the requirements of New Source Review for its proposal to expand the Columbia Data Center by five 2.5 MWe emergency backup generators in Quincy, WA. The operation of this facility shall be subject to the conditions of the attached proposed Approval Order No. 20AQ-E002.

BACKGROUND: Order No. 14AQ-E553, July 2014 Cooling Tower Changes

Microsoft Corporation (Microsoft) submitted a Notice of Construction application for the Columbia Data Center on April 21, 2014. The project consists of a change to the existing cooling tower operation from using well water to using pre-treated wastewater from the City of Quincy's industrial wastewater treatment plant. The resulting changes will lead to an increase in cooling tower cycling of the water, reducing water discharge to the City's industrial sewer system, and significantly increasing particulate emissions caused by cooling tower drift.

Additional information was requested regarding BACT for the cooling towers on April 28, 2014. Additional supporting information was received on May 30, 2014. Upon further inquiry to the original supplier of the cooling towers a guarantee of 0.0005 percent efficiency was provided for the cooling towers drift eliminators.

This project, triggered a 30 day public comment period for PM, but not for PM_{10} and $PM_{2.5}$. The public comment period was held for the draft approval order from June 19 through July 29, 2014. The comments submitted, and Ecology's response to comments, are appended to this document. All original comments submitted are provided in Section 1 of Appendix A to this Technical Support Document (for Approval Order No. 14AQ-E553). Section 2 of Appendix A is the original comments with Ecology's responses. **The comments received did not result in a change to Ecology's draft approval.**

BACKGROUND: Order No. 13AQ-E497, April 10, 2013 Corrected Revision

A correction to Approval Condition 1.1 was made to rescind Order Nos. 10AQ-E374 and 13AQ-E493. Order No. 13AQ-E497 was issued on April 10, 2013.

BACKGROUND: Order No. 13AQ-E493, April 8, 2013 Revision

Microsoft-Yes Toxic Air Pollution-No (MYTAPN) appealed Notice of Construction Approval Order No. 10AQ-E374 to the Pollution Control hearings Board. Case PCHB 10-162 was decided on July 25, 2012, and required revision of Order No. 10AQ-E374. Ecology revised the Order as specified in the PCHB decision. In addition to revising the Order, new CO1/1, CO1/2, CO3.1, and CO3.3 engine serial numbers were included in the Equipment section. No other changes were made to the Order.

BACKGROUND: Order No. 10AQ-E374, October 26, 2010

Microsoft submitted a NOC application on May 14, 2010 for the Phased CO3.2 (Phase I), CO3.1 (Phase II), and CO3.3 (Phase II) Expansion of the Columbia Data Center, hereafter referred to as the Microsoft Expansion. The Microsoft Expansion consists of the addition of three new buildings with thirteen 2.5 electrical-megawatts (MW) generators powered by Caterpillar 3516C engines, one smaller 111 kWm diesel firewater pump, and no evaporative coolers.

Microsoft has asked for a NO_x emission limitation for the Columbia Data Center plus the Microsoft Expansion of 89.4 tons per year. Further, Microsoft would like to limit fuel usage at the original Columbia Data Center plus the Microsoft Expansion to 439,493 gallons of on-road specification ultra-low sulfur diesel fuel. The NO_x limit of 89.4 tons per year is currently allowed in NOC Approval Order No. 09AQ-E308. These limits will be achieved by reducing the hours of operation and fuel usage of the original 24 engines permitted at the Columbia Data Center.

BACKGROUND: Order No. 09AQ-E308, August 28, 2009

Microsoft Corporation (Microsoft) submitted a Notice of Construction (NOC) application for the Columbia Data Center on October 23, 2006. The Columbia Data Center project consisted of twenty-four 2.5 MW generators powered by Caterpillar 3516C engines and 2 banks of evaporative coolers. The generators have a capacity of 60 Megawatts.

The Department of Ecology (Ecology) issued Order No. 07AQ-E230 on August 8, 2007 to Microsoft. Subsequently, Microsoft notified Ecology's Air Quality Program (AQP) that several small engines were missed in the original NOC application, and Microsoft submitted a NOC application for a minor modification on June 12, 2009. Ecology's Eastern Regional Office (ERO) approved the minor modification by issuing Order No. 09AQ-E308 on August 28, 2009. NOC Approval Order No. 09AQ-E308 included all the approval conditions of 07AQ-E230, and rescinded Order No. 07AQ-E230. The Microsoft Columbia Data Center has a single Air Quality permit.

NOC Approval Order No. 09AQ-E308 allows each engine to operate for an average of 285 hours per year, limits total fuel to 890,021 gallons of road specification diesel fuel, and restricts NO_x emissions to 89.4 tons per year.

1. PROJECT DESCRIPTION

1.1 Microsoft, Columbia Data Center uses 12 Evapco Model USS-312-454 mechanical draft cooling towers to cool the computer servers inside CO1 and CO2 buildings. Microsoft currently uses well water with scale forming minerals (calcium and magnesium), which require scale inhibitor chemicals and biocide additives in addition to frequent water discharge (or blow down) to the City of Quincy (City) industrial sewer system. Microsoft proposes to change cooling tower feed water to pre-treated wastewater from the City's industrial wastewater treatment plant and to increase the water cycling from less than 3 cycles to 100 cycles before blow down. The new cycling protocol licensed by Water Conservation Technology International (WCTI) will greatly decrease water discharge to the City's sewer system and increase particulate matter emissions.

The Microsoft Expansion consists of three buildings with thirteen 2.5 MW generators powered by Caterpillar 3516C engines. Microsoft reduced the fuel usage at the Columbia Data Center from 890,021 gallons per year to 439,493 gallons per year. The 13 Microsoft Expansion engines will be limited to 139,493 gallons of on-road specification diesel fuel per year. The fuel limitation for the original 24 engines at the Columbia Data Center will be reduced to 300,000 gallons per year. The new facility-wide fuel limit will be 439,493 gallons of on-road specification diesel fuel per year. The new fuel limit will be achieved by reducing the hours of operation of the original 24 engines permitted. Microsoft agreed to limit the fuel usage as follows:

Table 1: Summary of Fuel Use Limitation

Project	Historical allowed fuel usage (gallons per year)	Proposed allowed fuel usage (gallons per year)	Percent reduction (Total)
CO 1 & 2	890,021	300,000	66.3%
CO3.2 (Phase I), CO3.1 (Phase II), & CO3.3 (Phase II)	-	139,493	
Total	890,021	439,493	50.6%

2. EMISSIONS

2.1 Potential to Emit Criteria and Toxic Air Pollutant Emissions

Table 2.1.1: Potential to Emit for Microsoft Columbia Data Center - Generators

Pollutant	Emission Factor	Emission Factor Reference	Existing Units 1 thru 24 Potential To Emit[1]	Expansion Units 25 thru 37 Potential To Emit	Facility Potential to Emit
Criteria Pollutant	g/kW-hr		tons/yr	tons/yr	tons/yr
NO_x	6.12	§89.112a	30.1	13.9	44.0
CO	3.50	§89.112a	2.1	8.0	10.1
SO_2	15 ppm/gal	MassBal	0.032	0.015	0.047
$PM_{2.5}$	0.200	§89.112a	0.58	0.45	1.03
VOC	0.282	CEC-05-049	1.4	0.60	2.0
Toxic Air Pollutants					
Primary NO_2	0.62	10% NO_x	3.01	1.39	4.40

Table 2.1.1: Potential to Emit for Microsoft Columbia Data Center - Generators					
Pollutant	**Emission Factor**	**Emission Factor Reference**	**Existing Units 1 thru 24 Potential To Emit[1]**	**Expansion Units 25 thru 37 Potential To Emit**	**Facility Potential to Emit**
Diesel Engine Exhaust Particulate	0.200	$PM_{2.5}$	0.58	0.45	1.03
Carbon monoxide	3.50	CO	2.1	8.0	10.1
Sulfur dioxide	15 ppm/gal	SO_2	0.032	0.015	0.047
Carbon based TAPs	lbs/MMBtu				
Acrolein	8.04E-06	AP-42 §3.4	2.29E-03	7.90E-05	2.37E-03
Benzene	7.92E-04	"	2.16E-02	7.80E-03	2.94E-02
Toluene	2.87E-04	"	7.75E-03	2.80E-03	1.06E-02
Xylenes	1.97E-04	"	5.39E-03	1.90E-03	7.29E-02
1,3 Butadiene	1.99E-05	"	2.02E-03	2.00E-04	2.22E-03
Formaldehyde	8/05E-05	"	5.39E-02	7.90E-04	5.47E-02
Acetaldehyde	2.57E-05	"	2.29E-02	2.50E-04	2.32E-02
Benzo(a)Pyrene	1.31E-07	"	3.71E-06	1.30E-06	5.01E-06
PAH (sum)	3.96E-06	"	na	3.90E-05	na
PAH (w/ TEF)	5.08E-07	"	na	5.00E-06	na

[1] **Potential to Emit** accounts for reduction in fuel use from the existing engines.

2.2 Maximum Operation

Table 2.2.1: Microsoft Expansion 13 Generator Engines Annual Operations				
No.	**Operation**	**Average Load**	**Annual Hours**	**kW-hr/yr**
1	Scheduled Testing	10%	12*	57,720
2	Power Outage	85%	48	1,342,560
3	UPS Maintenance	40%	44	659,516
4	Total Operations	53%	104	2,059,796

* Maximum of one hour per month operation.

2.3 Tier 4 transitional emissions referenced in NOC Approval Order No. 10AQ-E374 can be found in the following EPA document:

Report No. NR-009c
EPA 420-P-04-009
Revised April 2004
Appendix A, Table A2, page A8

Table 2.2: Tier 4 Transitional emission factors				
Pollutant	**NMHC**	**CO**	**NO_x**	**PM**

g/hp-hr	0.282	0.076	0.460	0.069
g/kWm-hr[1]	0.378	0.102	0.617	0.093

[1]Conversion factor of 0.74558

2.4 Total emissions from the two banks of cooling towers shall be less than or equal to the amounts contained in the following Table:

Table 2.3: Combined Cooling Tower Emissions				
Pollutant	**Water supply conc. Mg/l**	**Recirc. water conc. Mg/l**	**Emission rate lbs/yr**	**Emission rate tons/yr**
TDS as TSP	1,500	150,000	53520	26.8
PM_{10}			22478	11.3
$PM_{2.5}$			6958	3.5
Fluoride	0.31	31	11.06	
Manganese	0.03	3	1.07	
Copper	0.01	1	0.36	
Vanadium	0.02	2	0.71	
Chloroform	0.0004	0.04	0.35	
Bromodichloromethane	0.0004	0.04	0.35	
Bromoform	0.0105	0.0105	9.2	

* There shall be no hexavalent chromium added to treat the cooling tower water.

2.5 The Columbia Data Center has four small emergency engines consist of three 149 bhp engines to power fire water pumps and one 398 bhp emergency engine to power the cooling water pre-treatment facility. The three fire water pump engines and the cooling water pre-treatment engine are considered permit exempt under Washington Administrative Code (WAC) 173-400-110(4)(h)(xxxix), and will not be further addressed in the Approval Order.

3. APPLICABLE REQUIREMENTS

The proposal by Microsoft 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 Columbia Data Center is regulated by the requirements specified in:

3.1 Chapter 70.94 Revised Code of Washington (RCW), Washington Clean Air Act,
3.2 Chapter 173-400 Washington Administrative Code (WAC), General Regulations for Air Pollution Sources,
3.3 Chapter 173-460 WAC, Controls for New Sources of Toxic Air Pollutants, and
3.4 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.

4. 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 the cooling tower WCTI project, the CO1 and CO2 cooling towers are currently equipped with the most efficient drift eliminators that are commercially available. Ecology determines BACT for particulate matter for the cooling towers to be 0.0005 percent efficient drift eliminators as designed.

Ecology is implementing the "top-down" approach for determining BACT for the proposed diesel engines. The first step in this approach is to determine, for each proposed emission unit, the most stringent control available for a similar or identical emission unit. If that review can show that this level of control is not technically or economically feasible for the proposed source, then the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objections.[2] The "top-down" approach shifts the burden of proof to the applicant to justify why the proposed source is unable to apply the best technology available. The BACT analysis must be conducted for each pollutant that is subject to new source review.

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.

4.1 BACT ANALYSIS FOR NOx

Microsoft reviewed EPA's RACT/BACT/LAER Clearinghouse (RBLC) database to look for NOx add-on controls recently installed on internal combustion engines. The RBLC provides a listing of BACT determinations that have been proposed or issued for large facilities within the United States, Canada and Mexico. Microsoft's review of the RBLC found that urea -based selective catalytic reduction (SCR) was the most stringent add-on control option demonstrated on diesel engines. The application of the SCR technology for NOx control was therefore considered the top-case control technology and evaluated for technical feasibility and cost-effectiveness.

[1] RCW 70.94.030(7) and WAC 173-400-030(12)
[2] J. Craig Potter, EPA Assistant Administrator for Air and Radiation memorandum to EPA Regional Administrators, "Improving New Source Review (NSR) Implementation", December 1, 1987.

The most common BACT determination identified in the RBLC for NOx control was compliance with EPA Tier 2 standards using engine design, including exhaust gas recirculation (EGR) or fuel injection timing retard with turbochargers. Other NOx control options identified through a literature review include water injection and NOx adsorbers.

4.1.1 ***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 a lean ultralow sulfur fuel is required to achieve good NOx destruction efficiencies. SCR can reduce NOx emissions by up to 90-95 percent while simultaneously reducing hydrocarbon (HC), CO and PM emissions.

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, testing and storm avoidance loads. There are also complications of managing and controlling the excess ammonia (ammonia slip) from SCR use.

Microsoft has evaluated the cost effectiveness of installing and operating SCR systems on each of the proposed diesel engines. The analysis indicates that the use of SCR systems would cost approximately $23,500 per ton of NOx removed from the exhaust stream. A previous survey by Ecology found that the permitting agencies surveyed have required installation of NOx controls as BACT with expected operational costs ranging from $143 to $9,473 per ton of NOx removed. Ecology concludes that while SCR is a demonstrated emission control technology for diesel engines, it is not economically feasible for this project. Therefore, Ecology rejects this NOx control option as BACT.

4.1.2 ***NOx adsorbers.*** The use of NOx adsorbers (sometimes called lean NOx traps) is a catalytic method being developed and tested by diesel engine manufacturers to reduce NOx emissions, primarily from mobile sources. The NOx adsorber contains a catalyst (e.g., zeolite or platinum) that is used to "trap" NOx (NO and NO_2) molecules found in the exhaust. NOx adsorbers can achieve NOx reductions greater than 90% at typical steady-state exhaust gas temperatures.

However, as of this writing, NOx adsorbers are experimental technology and are, therefore, very expensive. Additionally, a literature search did not reveal any indication that this technology is commercially available for stationary backup generators. Thus, Ecology rejects NOx adsorbers as BACT for the proposed diesel engines.

4.1.3 ***Combustion Controls and Tier 2 compliance.*** Diesel engine manufacturers typically use proprietary combustion control methods to achieve the emission reductions needed to meet applicable EPA tier standards. Common controls include fuel injection timing retard and exhaust gas recirculation. Injection timing retard reduces the peak flame temperature and NOx emissions, but may lead to higher fuel consumption. Microsoft will install Caterpillar engines that will use a combination of combustion control methods, including fuel injection timing retard, to comply with EPA Tier-2 emission limits.

4.1.4 ***Other control options***. Other NOx control options, such as water injection, were rejected because there was no indication that they are commercially available and/or effective in new large diesel engines.

4.1.5 **BACT determination for NOx**

Ecology determines that BACT for NOx is the use of good combustion practices, an engine design that incorporates fuel injection timing retard, turbocharger and a low-temperature aftercooler, EPA Tier-2 certified engines, and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.

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

Microsoft reviewed the available published literature and the RBLC and identified the following demonstrated technologies for the control of diesel engine exhaust particulate, carbon monoxide and volatile organic compounds from the proposed diesel engines:

4.2.1 ***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.

Microsoft has evaluated the cost effectiveness of installing and operating DPFs on each of the proposed diesel engines. The analysis indicates that the use of DPFs would cost approximately $270,000 per ton of engine exhaust particulate removed from the exhaust stream, assuming 48 hours per year of emergency operation. A previous survey by Ecology found that none of the permitting agencies surveyed had required installation of a particulate matter control device (as BACT) that was expected to cost more than $23,200 per ton of particulate removed.

Since the estimated DPF cost effectiveness value for the proposed Microsoft project far exceeds the $23,200 per ton upper limit, Ecology concludes that the use of DPFs is not economically feasible for this project. Therefore, Ecology rejects this control option as BACT for particulate matter.

4.2.2 ***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.

Microsoft has evaluated the cost effectiveness of installing and operating DOCs on each of the proposed diesel engines. If the cost effectiveness of DOC use is evaluated using the total amount of carbon monoxide, particulate matter and hydrocarbons reduced, the normalized operational cost estimate becomes $4,500 per ton of pollutants removed, assuming 48 hours per year of emergency operation. The corresponding DOC cost effectiveness value assuming only carbon monoxide destruction is approximately $5,000 per ton of carbon monoxide removed. If particulate matter and hydrocarbons are individually considered, the cost effectiveness values become $387,610 and $116,500 per ton of pollutant removed, respectively.

Microsoft acknowledges that DOC technology is commercially available and "would be reliable". A previous survey by Ecology found that the permitting agencies surveyed have required installation of carbon monoxide controls as BACT on other types of emission units, with expected operational costs ranging from $300 to $9,795 per ton of carbon monoxide removed. The upper level of that range is suspect and it is possible that that number actually reflects California BACT which is typically equivalent to a Lowest Achievable Emissions Rate (LAER) limit. In Washington, costs for controlling CO from combined cycle natural gas electric generating facilities are usually in the $3,500 to $5,000 range. The cost effectiveness estimates calculated for Microsoft's project fall within this range when all pollutants to be controlled are considered, or if only carbon monoxide is considered.

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

Diesel oxidation catalysts can reduce particulate matter by up to 30%, hydrocarbons by up to 50%, and carbon monoxide by approximately 90%, Ecology considered applying diesel oxidation catalysts as BACT for these compression ignition engines. The fact that the oxidation catalyst also reduced approximately 25% of the diesel engine exhaust particulate emissions from the proposed new engines made this option attractive to Ecology. Microsoft's offer to reduce fuel usage by 50% even with the instillation of the 13 new engines, would result in a reduction of more than 7 times the amount of diesel engine exhaust particulate being reduced over the use of an oxidation catalyst. Therefore, Ecology determines BACT for particulate matter, carbon monoxide and volatile organic compounds is restricted operation of the EPA Tier-2 certified engines, and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.

4.3 BACT ANALYSIS FOR SULFUR DIOXIDE

4.3.1 Ecology and Microsoft did not find any add-on control options commercially available and feasible for controlling sulfur dioxide emissions from diesel engines. Microsoft's proposed BACT for sulfur dioxide is the use of ultra-low sulfur diesel fuel (15 ppm by weight of sulfur). Using this control measure, sulfur dioxide emissions would be limited to 0.015 tons per year.

4.3.2 **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.

4.4 BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS

Best Available Control Technology for Toxics (tBACT) means BACT, as applied to toxic air pollutants.[3] 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 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 1 below. As illustrated by Table 1, Ecology has determined that compliance with BACT, as determined above, satisfies the tBACT requirement.

Table 1. 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

[3] WAC 173-460-020

Xylenes	Compliance with the VOC BACT requirement

5. AMBIENT AIR MODELING

For the cooling tower WCTI project, particulate matter (PM_{10} and $PM_{2.5}$) ambient air quality impacts were modeled using EPA's AERMOD dispersion model. Building downwash and impacts from Columbia Data Center generators, Dell Data Center generators, Project Oxford generators and cooling towers, and Con-Agra Food stack emissions were all accounted for in the modeling. The ambient impacts caused by cooling tower emissions are less than the NAAQS and WAAQS, after adding local and regional background levels.

For Microsoft Expansion project, ambient air quality impacts at and beyond the property boundary were modeled using EPA's AERMOD dispersion model, with EPA's PRIME algorithm for building downwash. For purposes of demonstrating compliance with the national ambient air quality standards (NAAQS) and acceptable source impact levels (ASILs), Microsoft assumed the entire Columbia Data Center would experience 2 full days of power outage, in which case 12 backup engines were assumed to operate at their rated load at the same time, and the 13th engine running at idle (approximately 10% load). For engine testing, Microsoft assumed that all 13 engines were tested on a single day (with five engines operating at the same time) while operating at low (i.e., approximately 10%) load.

The AERMOD model used the following data and assumptions:

5.1 Five years of sequential hourly meteorological data (2004–2008) from Moses Lake Airport were used. Twice-daily upper air data from Spokane were used to define mixing heights.
5.2 Digital topographical data (in the form of Digital Elevation Model files) for the vicinity were obtained from BeeLine software.
5.3 Each generator was modeled with a stack height of 31- feet above local ground.
5.4 The existing CO1/CO2 data center building, the proposed new CO3.2 (Phase I), CO3.1 (Phase II) and CO3.3 (Phase II) server buildings, and each expansion generator's acoustical enclosure were included to account for building downwash.
5.5 The receptor grid for the AERMOD modeling was established using a 10-meter grid spacing along the facility boundary extending to a distance of 300 meters from each facility boundary. A grid spacing of 25 to 50 meters was used for distances more than 300 meters from the boundary.
5.6 1-hour NO_2 concentrations at and beyond the facility boundary were modeled using the Plume Volume Molar Ratio Method (PVMRM) module, with default concentrations of 40 parts per billion (ppb) of background ozone, and an equilibrium NO_2 to NOx ambient ratio of 90%. For purposes of modeling NO_2 impacts, the primary NOx emissions at the stack exit were assumed to consist of 10% NO_2 and 90% nitric oxide by mass.
5.7 Dispersion modeling is sensitive to the assumed stack parameters (i.e., flowrate and exhaust temperature). The stack temperature and stack exhaust velocity at each generator

stack were set to values corresponding to the engine loads for each type of testing and power outage. Stack parameters are provided in Appendix E.

Except for diesel engine exhaust particulate which is predicted to exceed its ASIL, AERMOD model results show that no NAAQS or ASIL will be exceeded at or beyond the property boundary. As required by WAC 173-40-090, emissions of diesel engine exhaust particulate are further evaluated in the following section of this document.

6. THIRD TIER REVIEW FOR DIESEL ENGINE EXHAUST PARTICULATE

As discussed above, proposed emissions of diesel engine exhaust particulate (DEEP) from the 13 additional engines exceed the regulatory trigger level for toxic air pollutants (also called an Acceptable Source Impact Level, (ASIL). A second or third tier review is required for DEEP in accordance with WAC 173-460-090 or WAC 173-460-100, respectively.

Microsoft's existing computer data center is currently one of three data centers operating in the rural town of Quincy, WA. The three data centers utilize dozens of large (>2 MW) diesel engines to supply backup power in support of data center operations. Additionally, due to the April, 2010 enactment of the *Computer Data Centers – Sales and Tax Exemption* law in Washington State, several companies have expressed interest in expanding existing or developing new data centers in Quincy. Thus, more large diesel-powered generators will be needed to supply backup power for the additional data centers.

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 Microsoft's proposal on a community-wide basis. The community-wide evaluation approach considers the cumulative impacts of DEEP emissions resulting from Microsoft'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 third tier review requirements of WAC 173-460-100.

The results of Ecology's evaluation of cumulative risks associated with Microsoft's project are included in a separate technical support document. Please refer to that technical support document for a discussion and evaluation of the risks associated with diesel engine exhaust particulate emitted by Microsoft.

7. CONCLUSION

Based on the above analysis, Ecology concludes that operational changes to the cooling towers and operation of the 13 generators will not have an adverse impact on air quality. Ecology finds that Microsoft has satisfied all requirements for NOC approval.

******END OF MICROSOFT 2010 EXPANSION TSD** ****

NOC APPROVAL ORDER NO. 09AQ-E308 NON-NSR MODIFICATIONS (RWK)

On June 12, 2009, Microsoft Corporation (MSN) submitted a request to modify its order of approval (No. 07AQ-E230) to add 3 emergency diesel engines MSN omitted from its original application (installed and operating at this time) and to extend the period of time allowed for construction of the 23rd and 24th large engines approved in Order 07AQ-E230. WAC 173-460 and WAC 173-400 were revised in the period of time since the MSN data center was approved, adding an exemption from NSR for emergency engines equal to or smaller than 500 HP. Each of the three existing engines included in the June 12, 2009 request qualifies for this exemption if it is new equipment. Because the engines are in place already, they were installed subject to the rules in place at the time of installation and so, are subject to BACT and t-BACT and the other requirements of NSR if their addition to this project involves increases in emissions. The application indicates that these engines will be operated solely for diagnostic and readiness testing, that the facility diesel fuel limit is not to be changed, and that the engines will satisfy the BACT requirements imposed on the large engine generators approved in 07AQ-E230, so this proposal is a project not subject to NSR under old 400 and 460 or new 400 and 460.

The emission inventory for this project does not change with the addition of these engines because MSN has agreed to retain the facility-wide fuel limit of Approval Order 07AQ-E230. The smaller engines do not emit significantly different levels of pollutants for a given energy output, and will not change the inventory if the overall fuel consumption limit is not changed.

This modification to the MSN Approval Order, then, is to identify the 3 engines omitted from the earlier order, include NSPS paperwork requirements as approval conditions if they are not already requirements for the large engines, and to agree to extend the period of time allowed for MSN to start construction of engines 23 and 24.

FINDINGS & EVALUATIONS FOR NOC APPROVAL ORDER NO. 07AQ-E230 (RWK)

Microsoft Corporation (MSN) submitted a Notice of Construction (NOC) application on October 23, 2006, for the installation of the Columbia Data Center located at 501 Port Industrial Parkway, Quincy, in Grant County. The Columbia Data Center will be used by MSN as an electronic data storage facility. Air contaminant sources at the facility consist of twenty-four (24) Caterpillar Model 3516C-TA diesel powered generator units with a combined 100 percent standby rating capacity of 60 megawatts (MW) used for emergency backup power, six banks of evaporative cooling towers on three buildings, and associated support equipment such as fuel tanks, cooling water storage and treatment, and electrical systems. The generators will be used to provide emergency backup electrical power to the Grant County PUD hydroelectric power grid. Operation of each generator has been estimated at 70 hours per year for maintenance purposes and a maximum of 215 hours per year of operation for emergency backup electrical generation. The diesel generators will exclusively burn ultra-low sulfur (less than 0.0015 wt %), EPA on-road specification No. 2 distillate diesel oil.

The Ecology Air Quality Program (AQP or Ecology) reviewed the October 23, 2006, NOC application and responded to MSN with a completeness determination dated October 26, 2006. MSN responded to the completeness determination on January 10, 2007, and Ecology informed MSN that a Tier II analysis would be necessary in correspondence dated January 11, 2007. The Tier II analysis was considered complete based on submittals from MSN dated March 14, May

10, June 5 and 6, 2007. The MSN NOC application was considered complete on June 25, 2007, and the Preliminary Determination was issued for the project on June 25, 2007. After a thirty day public comment period, NOC approval ORDER No. 07AQ-E230 was issued on August 8, 2007.

FINDINGS:

1. LAWS AND REGULATIONS

The proposal by Microsoft 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 Columbia Data Center is regulated by the requirements specified in:

1.1 Chapter 70.94 Revised Code of Washington (RCW), Washington Clean Air Act,
1.2 Chapter 173-400 Washington Administrative Code (WAC), General Regulations for Air Pollution Sources,
1.3 Chapter 173-460 WAC, Controls for New Sources of Toxic Air Pollutants, and
1.4 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.

2. EMISSIONS

2.1 Operation of the twenty-four 2006 model year Caterpillar Model 3516C-TA diesel engines coupled to Caterpillar Model SR5 generators will result in the following potential emissions based on 70 hours of planned diagnostic testing and 215 hours of full standby operation per year. Emission factors for Criteria Pollutants are based upon emission rate guarantees by the manufacturer. The Toxic Air Pollutants (TAPs) are based on AP-42 emission rate factors.

Table 2.1: Generator and Fire Pump Engines Potential to Emit		
Pollutant	**Hourly Emissions**	**Annual Emissions**
Criteria Pollutant (Caterpillar)	(lbs/hr)	(tons/yr)
2.1.1 Nitrogen Oxides (NO_x)	648	89.4
2.1.2 Carbon Monoxide (CO)	45	6.27
2.1.3 Sulfur Dioxide (SO_2)	0.61	0.094
2.1.4 Particulate Matter (PM_{10})	12	1.71
2.1.5 Hydrocarbons (HC)	30	4.18
Toxic Air Pollutants (AP-42)		
2.1.6 Nitric Oxide (NO)	402	55.41
2.1.7 Acrolein	0.49	0.0068
2.1.8 Benzene	0.46	0.064
2.1.9 Toluene	0.17	0.023

2.1.10 Xylenes	0.12	0.016
2.1.11 1,3 Butadiene	0.01	0.006
2.1.12 Formaldehyde	1.18	0.16
2.1.13 Acetaldehyde	0.49	0.068
2.1.14 Benzo(a)Pyrene	0.000077	0.000011

2.2 Cooling tower emissions are mass balance calculations based on the concentrations of toxic air pollutants in the City of Quincy municipal water supply and the worst case amount of bromine in the NALCO biocide.

BACT

As required by WAC 173-400-113, this project shall use Best Available Control Technology (BACT) to control criteria air contaminant emissions. BACT for the diesel electric generators and the cooling towers is as follows:

3.1 The use of EPA on-road Specification No. 2 distillate fuel oil with a sulfur content of 0.0015 weight percent or less.

3.2 The use of generator engines certified to EPA Tier II (40 CFR 89) emission standards for NOx, CO, and HC.

3.3 The use of mist eliminators on all the cooling tower units that will maintain the maximum drift rate to less than 0.001 percent of the circulating water rate, reducing criteria and toxic air pollutant emissions.

4.

4. T-BACT

As required in WAC 173-460-040(4)(b), this project shall use Best Available Control Technology for Toxics (T-BACT) to control toxic emissions. T-BACT for this project is the same as BACT.

MODELING

Dispersion modeling was conducted by the applicant to evaluate near-source and distant impacts. The modeling evaluation did not result in any exceedances of either criteria or toxic ambient air quality standards.

6.1 The dispersion modeling was conducted using ISCST3 for criteria and toxic air pollutants from the twenty-four (24) diesel electric generators. Acrolein and nitric oxide were the only air pollutants that exceeded the acceptable source impact level (ASIL). A Tier II risk analysis was required by Ecology in correspondence dated January 11, 2007. MSN submitted information dated March 14, May 10, June 5 and 6, 2007, to complete the Tier II risk analysis. Ecology determined that alternative risk based exposure limits to nitric oxide and acrolein that were above the ASIL would be adequately protective of public health with a five foot exhaust stack extension on all the diesel electric generators to reduce acrolein to below the alternative risk based exposure limit. Exhaust stack extensions raising the engine genset stacks five feet higher than proposed in the application were also determined to reduce impacts of NO emissions. NO is expected to be removed from the list of compounds requiring review under WAC 173-460 in the on-going WAC 173-460 rule revision process (anticipated to be completed prior to significant operations at this facility).

The facility will have six banks of cooling tower units installed, two banks in each of the three buildings. Each bank of cooling towers will have eighteen (18) cooling units (total 108 cooling towers). Dispersion modeling was also conducted for the worst-case toxic air pollutant and PM_{10} emission rates from the six sets of cooling towers. EPA model SCREEN3 ambient impacts were below the ASIL for toxic air pollutant and the National Ambient Air Quality Standards (NAAQS) for PM_{10} emissions. No further dispersion modeling was conducted.