APPENDIX E (Errata June 4, 2015 to correct Table E-4) ~~(March 2015)~~
REVISED EMISSION CALCULATIONS & AMBIENT IMPACT ASSESSMENT
AIR QUALITY APPROVAL ORDER REVISION APPLICATION
SABEY INTERGATE-QUINCY DATA CENTER
QUINCY, WASHINGTON

This appendix presents the revised generator runtime scenarios, revised emission calculations, and revised AERMOD[1] ambient air quality dispersion modeling to support the 2015 revised air quality permit revision application for the Sabey Intergate-Quincy Data Center (Sabey) in Quincy, Washington.

SUMMARY OF REVISED ASSUMPTIONS

This revised set of emission calculations and AERMOD dispersion modeling incorporates the following changes to the emission calculations that were originally provided to the Washington State Department of Ecology (Ecology) in June 2011 to support Sabey's original permit application:

- Short-term emission rate estimates for particulate matter (PM) and diesel engine exhaust particulate matter (DEEP) are now based on maximum emission rates (from the worst-case condition for DEEP emission under 25 percent load). This is the load at which Caterpillar's data indicate mass emission rates for PM are highest.
- Short-term emission rate estimates for nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs), and AP-42 (EPA 1995) gaseous toxic air pollutants (TAPs) are now based on the assumption that the generators always run at the operating load that would emit the maximum amount for these pollutants, which is 100 percent load according to emission rates reported by Caterpillar.
- The annual-average emission rate estimates for PM, DEEP, NO_x, CO, VOCs, and TAPs are based on 57.5 operating hours per year with an emission rate derived by averaging those rates reported by Caterpillar for 10 percent, 25 percent, 50 percent, 75 percent, and 100 percent loads.
- The short-term and annual emission rates have been updated to account for the "black puff factors" applied to the first 15 minutes during each cold start. Those "black puff factors" were derived from the recent air quality permit application for the Microsoft Project Oxford Data Center (Landau Associates 2014) and correspond to 1.26 for PM and VOC emissions and 1.56 for CO emissions.
- All permitted emissions, allowed during a 3-year rolling average period, to occur in a single 12-month period (as a "maximum theoretical annual emission" rate) was used to evaluate compliance with all annual National Ambient Air Quality Standards (NAAQS) and the annual Acceptable Source Impact Levels (ASILs).
- The 70-year average emission rate for DEEP, which is used to evaluate the 70-year DEEP cancer risk, was revised upward to include the initial emissions from generator commissioning and the emissions from periodic stack emission testing.

[1] AERMOD = American Meteorological Society (AMS)/U.S. Environmental Protection Agency (EPA) regulatory model.

REVISED ACTIVITY-SPECIFIC ALLOWABLE RUNTIMES AND LOAD LIMITS

Sabey requests that the allowable activity-specific runtime limits and load limits (specified by Table 3.2 of the current Approval Order) be revised for two reasons: 1) to provide more flexibility for the allowable runtime limits for combined power outages and scheduled electrical bypass transformer maintenance; and 2) to allow a full range of allowable loads for combined power outages, scheduled electrical bypass transformer maintenance, and corrective testing, when the generators might have to activate at random, variable loads between 10 and 100 percent. Sabey's requested revisions to Table 3.2 of the Approval Order are shown below.

Table 3.2: Engine Operating Restrictions (Revisions March-2015)

Operating Activity	Average hours/year per engine, 3-year monthly rolling totals	Average Operating Electrical Loads (%)	Facility-Wide Diesel fuel gallons/year, 3-year monthly rolling totals	# Operating Concurrently
Monthly Testing	16.5	~~Idle~~ Zero electrical load to50%		4
Annual Load Bank Testing	6	100%		4
Combined Electrical Bypass and Power Outage	~~15~~35	Any random load from zero to 100% ~~75%~~		22 during electrical bypass; 44 during power outage; 1 during corrective testing
~~Corrective Tests~~	~~12~~	~~50%~~		~~1~~
~~Power Outage~~	~~8~~	~~75%~~		~~44~~
Total	57.5		263,725	

Based on Sabey's requested revisions, the new worst-case runtime scenarios for the ambient impact analysis for annual DEEP, 24-hour PM_{10}, and 98th-percentile 24-hour $PM_{2.5}$[2] are as follows:

- For annual DEEP—acknowledging the possibility for a "maximum theoretical annual emission" under random variable loads between 10 and 100 percent—the worst-case runtime scenario would be to operate under a steady 25 percent operating load for 57.5 hours within a single year.
- For 2nd-highest 24-hour PM_{10}, it would be theoretically possible to have two power outages per year, each lasting 17.5 hours per outage (35 hours / 2 outages = 15.5 hours/outage).
- For 98th-percentile 24-hour $PM_{2.5}$, it would be theoretically possible to have eight outages per year, each lasting 4.4 hours (35 hours / 8 outages = 4.4 hours/outage).

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[2] PM_{10} = Particulate matter with an aerodynamic diameter less than or equal to 10 microns.
$PM_{2.5}$ = Particulate matter with an aerodynamic diameter less than or equal to 2.5 microns.

Revised Worst-Case Load-Specific Emission Estimates from Caterpillar

The emission calculations for Sabey's original June 2011 application assumed that emissions would vary based on the engine load characteristics of each individual activity. However, for this application for revisions, Sabey requests that the load limits for each individual activity be replaced with a more flexible, facility-wide runtime limit. This is so that Sabey could theoretically operate any generator at any load, for any reason. To account for this consideration:

- The short-term (1-hour and 24-hour) emission rates were adjusted upward under the worst-case assumptions that the generators always operate at the load for which the currently-permitted emission for each pollutant is highest (as listed in Tables 5.2 through 5.5 of the current Approval Order).
- The annual-average emission rates were derived by averaging the currently-permitted emission limits at 10 percent, 25 percent, 50 percent, 75 percent, and 100 percent loads, with the assumption that over the course of a full year (and especially over a 70-year period) the generator load could vary randomly across all loads because the server demand randomly varies.
- For the purpose of calculating the emission rates for the gaseous TAPs described by AP-42 (EPA 1995), which have emission factor units of pounds per million British thermal units of fuel input (lbs/MMBTU), we assumed that the fuel consumption during every hour of generator usage would be equal to the fuel rate at 100 percent generator load.

Based on these worst-case assumptions, the assumed emission rate for each pollutant is listed in Table E-1. The yellow-highlighted cells in the table indicate the worst-case load that was assumed to occur at all times.

70-Year Average Runtimes for Initial Generator Commissioning and Periodic Stack Emission Testing

Sabey's 2011 Second-Tier Risk Report for DEEP did not consider the 70-year average DEEP contributions by either initial generator commissioning or periodic stack testing. However, emissions from those activities are now incorporated into this revised analysis. Sabey's current Approval Order allows for up to 30 hours of runtime per generator for initial commissioning, so it was assumed that each of the 44 generators would be commissioned once, with a runtime of 30 hours at an average generator load of 50 percent, with the hourly emission corresponding to the "Average of All Loads" value listed in Table E-1. To estimate the contribution from periodic stack emission testing, it was assumed that Sabey will eventually be required to conduct emission testing on up to 16 generators. It was assumed that each stack test will require 30 hours of generator runtime, at an average load of 50 percent, with the hourly emission corresponding to the "Average of All Loads" value listed in Table E-1. The 30 hours per year of runtime for emission testing is in addition to the allowable 57.5 hours per year for Sabey's routine annual activity. The 70-year average contribution by these activities was calculated by distributing these emissions from initial commissioning and periodic stack testing evenly over 70 years.

COLD START "BLACK PUFF" CONDITIONS

Sabey's original 2011 application did not consider the emissions caused by the "black puff" lasting for about 30 seconds after each cold start. However, those "black puff" emissions were incorporated in these revised calculations. Black puff factors were derived from the recent air quality permit application for the Microsoft Project Oxford Data Center (Landau Associates 2014). The black puff factor for PM and VOCs was 1.26 and for CO the black puff factor was 1.56. These were applied to the short-term and annual emission rates for emergency diesel generators at Sabey in order to correct for the first 15 minutes of each generator cold start.

A detailed evaluation for the number of cold starts that Sabey might conduct each year was not attempted for these revised calculations. Instead, the same cold-start assumptions that were included in the emission calculations for the Microsoft Project Oxford Data Center were applied to Sabey diesel generators. Microsoft estimated that the combined 15-minute cold-start periods would comprise 17 percent of its generators' total annual runtime (15 hours per year of aggregated cold-start runtime, out of 86 hours per year of total generator runtime). Therefore, "black puff factors" were applied to 17 percent of Sabey's requested 57.5 hours per year under the following runtime scenarios: annual routine runtime, commissioning runtime, and stack emission testing runtime. The black puff factors were also applied to the first 15 minutes of each short-term runtime scenario.

THEORETICAL MAXIMUM ANNUAL RUNTIME AND EMISSIONS

Sabey's current Approval Order specifies the runtime limits as 3-year rolling averages, so in theory Sabey could emit the total allowable emissions within any 3-year rolling period in one single year. This "maximum theoretical annual" condition was used when evaluating compliance with the single-year annual ambient standards (the NAAQS and the ASILs) and for calculation of the chronic (annual-average) TAP non-cancer hazard quotients. However, we did not apply the "maximum theoretical annual" approach to our calculation of the 70-year average DEEP cancer risks because it is appropriate to evaluate long-term cancer risks based on the average lifetime exposure concentrations rather than the maximum single-year concentration.

REVISED FACILITY-WIDE EMISSION RATES

The facility-wide emission rates were re-calculated using the revised assumptions described in the preceding sections. Screenshots of the revised emission calculation spreadsheets are provided in Attachment E-1. The revised facility-wide emission rates are listed in the Table E-2.

As shown in Table E-2, the facility-wide DEEP rate listed in Condition 5 of the current Approval Order (0.809 tons/year) is higher than the value presented in Sabey's June 2011 permit application addendum and Ecology's June 2011 DEEP Second-Tier Risk Analysis (which was 0.31 tons/year). The revised facility-wide PM emission rate for routine activities (which is 0.463 tons/year, not including initial commissioning or periodic stack testing) is higher than the value proposed in Sabey's June 2011 application.

REVISED FIRST-TIER TOXIC AIR POLLUTANT ASSESSMENT (COMPARED TO SMALL-QUANTITY EMISSION RATES)

The emission rate for each TAP was recalculated using the revised assumptions described above. Table E-3 shows a comparison of these revised TAP emission rates to Ecology's Small-Quantity Emission Rate (SQER) thresholds.

The annual-average emission rates listed in Table E-3 are based on the "maximum theoretical annual emission" values that assume all of the allowable emissions within a 3-year rolling period occur in a 12-month period. As listed in Table E-3, the following TAPs exhibit worst-case emission rates exceeding their respective SQERs: DEEP, CO, primary nitrogen dioxide (NO_2), benzene, 1,3-butadiene, and naphthalene. Compliance with the ASILs is described in a later section.

UPDATED AERMOD MODELING RUNS (USED TO DEVELOP DISPERSION FACTORS)

The June 2011 AERMOD modeling runs were updated for this March 2015 revision request. A DVD of the revised AERMOD files has been provided to Ecology under separate cover. Two new AERMOD runs were used to develop "dispersion factors" for the maximum short-term impacts and the annual-average impacts:

- The short-term dispersion factors (for averaging periods of 24 hours, 8 hours, or 1 hour) are for a runtime condition consisting of a 24-hour power outage, with all generators operating at only 25 percent load (the load at which the PM emission rate is highest). A screenshot of the AERMOD stack parameters is provided in Attachment E-1, Table E1-6. The input stack temperature was based on the value measured during the most recent stack emission test. The derivation of these dispersion factors are shown in Attachment E-1, Table E1-8.
- AERMOD modeling for the 24-hour PM_{10} NAAQS is based on the 2^{nd}-highest 24-hour value. The modeling for the 98^{th}-percentile 24-hour $PM_{2.5}$ NAAQS was based on the 1^{st}-highest value in order to provide a conservatively high assessment.

- The annual-average dispersion factor is for the runtime scenario of all generators operating under random, variable load (between 10 and 100 percent), over the course of the entire year. The input stack exhaust temperatures were the average of temperatures under 10 percent, 25 percent, 50 percent, 75 percent, and 100 percent loads. These five iterative loads are taken from the most recent stack test results and supplemented by data from Caterpillar. A screenshot of the AERMOD stack parameters is provided in Attachment E-1 (Table E1-6).

COMPLIANCE WITH AMBIENT AIR QUALITY LIMITS

The worst-case emission rates and calculations, for each generator runtime scenario used in comparison to the NAAQS and ASIL, are shown in the spreadsheet screenshots provided in Attachment E-1 (Table E1-7). The forecast ambient concentrations were then calculated by applying the previously discussed dispersion factors. The total cumulative ambient impacts were calculated by applying regional background concentrations (provided by Ecology) and "local background" impacts derived from AERMOD modeling of other local data centers and industrial facilities. Detailed calculations are provided in Attachment E-1 (Table E1-8). Table E-4 summarizes the modeling results for each TAP whose emission rate exceeds the SQER and for each criteria air pollutant. The key runtime assumptions used to model compliance are described below.

Sabey requests that Table 3.2 of the Approval Order be revised to consolidate the allowable runtimes for outages, electrical bypass, and corrective testing into a single flexible category with a combined runtime limit of 35 hours per year. Theoretically, for the purpose of calculating the 2nd-highest daily PM_{10} emissions, Sabey could use that entire 35 hours for unplanned power outages, and theoretically those outages could be distributed over 2 or more days. Therefore, the emissions calculations and AERMOD modeling for 24-hour PM_{10} assume two consecutive outages of 17.5 hours (35 hours / 2 outages = 17.5 hours/outage) occurring at the worst-case condition (under a steady 25 percent operating load). The 2nd-highest daily PM_{10} emission rate (including the "black puff factor" correction) is 440 lbs/day.

Sabey requests that Table 3.2 of the Approval Order be revised to consolidate the allowable runtimes for outages, electrical bypass, and corrective testing into a single flexible category with a combined runtime limit of 35 hours per year. Theoretically, for the purpose of calculating the 8th-highest daily $PM_{2.5}$ emissions, Sabey could use that entire 35 hours for power outages, and theoretically those outages could be distributed over 8 or more days per year. Therefore, the emissions calculations and AERMOD modeling for the 98th-percentile 24-hour $PM_{2.5}$ assume eight consecutive outages of 4.4 hours (35 hours / 8 outages = 4.4 hours/outage) occurring under worst-case conditions (25 percent load). The 8th-highest daily $PM_{2.5}$ emission rate (including the "black puff factor" correction) is 112 lbs/day.

REQUIRED DEEP SECOND-TIER RISK ASSESSMENT

To accommodate the requested flexibility in the allowable range of engine operating loads, Sabey requests that the allowable DEEP emission rate be increased. Based on such an increase, the modeled worst-case DEEP concentration exceeds the ASIL [0.00333 micrograms per cubic meter (ug/m^3)]. Therefore, as requested by Ecology, a complete DEEP Second-Tier Risk Analysis (Landau Associates 2015) has been submitted under separate cover. That risk assessment demonstrates the following:

- The revised DEEP risk assessment assumes a Sabey baseline of zero emissions. Therefore, we have evaluated the total emissions from the Intergate-Quincy Data Center, not just the incrementally increased emissions caused by this requested permit revision.
- From the 70-year average DEEP emission rate of 0.467 tons per year (which includes emissions from stack testing, initial engine commissioning, and the black-puff factor correction for cold-start operation), the maximum DEEP cancer risk at any receptor, caused solely by Sabey emissions, is only 9-per-million (compared to the previous 2011 value of 6-per-million), which is less than Ecology's second-tier approval threshold of 10-per-million.
- The maximum cumulative DEEP cancer risk caused by Sabey and other DEEP emission sources within the modeling range (including roads, railroads, and other data centers) is only 47 per-million (compared to the previous 2011 value of 39-per-million), which is less than the specific community-wide threshold of 100-per-million that Ecology has established for the city of Quincy. This cumulative increase accounts not only for the project-related increase but the updated addition of the Vantage Data Center (permitted in 2012) that has added a local DEEP source since the original 2011 evaluation. In fact, most of the increase in DEEP impact since 2011 is from this new Vantage Data Center.

AMBIENT NO_2 IMPACTS EXCEEDING THE ASIL

Sabey requests that the allowable limit for the 1st-highest NO_x emission rate be retained at the current limit of 990 lbs/hour (as set by Condition 5.7 of the current Approval Order). That is the same facility-wide NO_x emission rate that was evaluated in Ecology's 2011 Technical Support Document for Second Tier Review (Ecology2011). In that evaluation, Ecology demonstrated that the occurrences of Sabey's emissions causing exceedances of the NO_2 ASIL would be very infrequent, so Ecology determined that Sabey's NO_x emissions will not cause an unacceptable risk to the public.

POLLUTANTS REQUIRING SPECIAL PERMIT CONDITIONS BASED ON MODELED AMBIENT IMPACTS EXCEEDING LIMITS

Sabey proposes the following emission limits and operational limits to ensure its facility-wide emissions do not exceed values that would cause the ambient concentrations to exceed either the NAAQS or the ASILs.

- Sabey requests that the current operational limits (allowable load, allowable runtime, and number of generators operating simultaneously) for monthly testing and annual load bank testing (currently set by Table 3.2 of the Approval Order) be retained without change. The current limits were set based on Sabey's previous 2011 Monte Carlo modeling for the 98thpercentile 1-hour NO_2 NAAQS. Monthly and annual generator testing are the only activities that can realistically be anticipated to occur for more than 8 days per year (electrical bypass maintenance will be done only on a triennial basis, and it is inconceivable that more than 2 or 3 days of power outages could realistically occur on a regular basis). Therefore, maintaining the current operational limits for monthly testing and annual load bank testing is the best strategy for ensuring compliance with the 1-hour NO_2 NAAQS.

- The actual 1st-highest 1-hour NO_x emission rate should continue to be limited to 990 lbs/hour during a power outage to ensure that the ambient NO_x impact is no more than documented in Ecology's 2011 NO_2 second-tier risk analysis. That is the limit set by the current Approval Order. Based on the low emission rates that have been demonstrated to date by Sabey's stack emission testing, Sabey is confident that the actual NO_x emissions during a 44-generator, facility-wide power outage would be well below that limit, even if some of the generators activate at loads as high as 100 percent. Sabey additionally proposes that a new Approval Order Condition 6.4 require Sabey to retain records of the actual NO_x emissions during each unplanned outage or scheduled electrical bypass event.

REFERENCES

Ecology. 2011. *Technical Support Document for Second Tier Review, Sabey Data Center, Quincy, Washington*. Washington State Department of Ecology. June 22.

EPA. 1995. *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources*. Fifth Edition. AP-42. Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency. January.

Landau Associates. 2015. Report: *Second-Tier Risk Analysis for Diesel Engine Exhaust Particulate Matter, Sabey Intergate-Quincy Data Center, Quincy, Washington*. Prepared for Intergate Quincy LLC. March 2.

Landau Associates. 2014. *Final Notice of Construction Supporting Information Report, Microsoft Project Oxford Data Center, Quincy, Washington*. Prepared for The Microsoft Corporation. June 11.

ATTACHMENTS

Table E-1: Revised Caterpillar Load-Specific Emission Factors for Diesel Generators
Table E-2: Revised Facility-Wide Emission Rates
Table E-3: Revised Toxic Air Pollutant Emission Rates Compared to SQERs
Table E-4: Revised Cumulative Ambient Impacts Caused by Requested Permit Revisions

Attachment E-1: Screenshots of January 2015 Revised Emission Calculation Spreadsheets

TABLE E-1
REVISED CATERPILLAR LOAD-SPECIFIC EMISSION FACTORS FOR DIESEL GENERATORS
SABEY INTERGATE-QUINCY DATA CENTER
QUINCY, WASHINGTON

Generator Electrical Load	Currently-Permitted Emission Rate at Each Load (lbs/hour)			
	PM/DEEP	**NO_x**	**CO**	**VOCs**
100%	0.23	41.9	16.9	0.91
75%	0.22	22.5	12.7	1.11
50%	0.27	15.3	8.75	1.13
25%	0.57	9.4	3.9	0.95
10%	0.45	6.49	4.05	1.0
Average of All Loads (Used for Annual Average)	0.35	18.9	9.4	1.0

Yellow-highlighted values indicate worst-case values used for revised emission calculations.

TABLE E-2
REVISED FACILITY-WIDE EMISSION RATES
SABEY INTERGATE-QUINCY DATA CENTER
QUINCY, WASHINGTON

Pollutant	Original June 2011 Application (tons/year)	Permit Limit in Current Approval Order (tons/year)	Revised January 2015 Emission Calculation for Routine Activity (tons/year)	January 2015 Theoretical Maximum Year (Single Year of 3-Year Rolling Period) (tons/year)
PM	0.31	0.809	0.463	1.39
70-year Average DEEP	0.31	0.809	0.467 (includes commissioning and periodic stack testing)	N/A
NO_x	26.5	29.5	23.9	71.7
CO	14.15	14.15	11.89	35.7
VOCs	1.14	1.14	1.43	4.3

TABLE E-3
REVISED TOXIC AIR POLLUTANT EMISSIONS COMPARED TO SQERS
INTERGATE-QUINCY DATA CENTER
QUINCY, WASHINGTON

Pollutant	SQER	Units	Sabey Emission	SQER Ratio
DEEP	0.639	lbs/yr, max year of 3-year period	2,778	4,347
CO	50.2	lbs/1-hour	848	16.9
SO_2	1.45	lbs/1-hour	1.16	0.80
Primary NO_2	1.03	lbs/1-hour	991	962
Benzene	6.62	lbs/yr, max year of 3-year period	112.2	17
Toluene	657	lbs/24-hr day	5.60	0.009
Xylenes	58	lbs/24-hr day	3.88	0.07
1,3-Butadiene	1.13	lbs/yr, max year of 3-year period	2.8	2.50
Formaldehyde	32	lbs/yr, max year of 3-year period	10.3	0.32
Acetaldehyde	71	lbs/yr, max year of 3-year period	3.3	0.05
Acrolein	0.00789	lbs/24-hr day	0.1580	20.0
Benzo(a)pyrene	0.174	lbs/yr, max year of 3-year period	0.0167	0.10
Benzo(a)anthracene	1.74	lbs/yr, max year of 3-year period	0.081	0.05
Chrysene	17.4	lbs/yr, max year of 3-year period	0.199	0.011
Benzo(b)fluoranthene	1.74	lbs/yr, max year of 3-year period	0.144	0.08
Benzo(k)fluoranthene	1.74	lbs/yr, max year of 3-year period	0.014	0.01
Dibenz(a,h)anthracene	0.16	lbs/yr, max year of 3-year period	0.022	0.14
Ideno(1,2,3-cd)pyrene	1.74	lbs/yr, max year of 3-year period	0.027	0.015
Propylene	394	lbs/24-hr day	56.1	0.14
Naphthalene	5.64	lbs/yr, max year of 3-year period	18.8	3.33

Note: Shaded cells indicate exceedance of SQER.

TABLE E-4 (Errata revision 6-4-2015)
REVISED CUMULATIVE AMBIENT IMPACTS CAUSED BY REQUESTED PERMIT REVISIONS
INTERGATE-QUINCY DATA CENTER
QUINCY, WASHINGTON

Pollutant and Averaging Time		**Emission Rates for January 2015 Resubmittal**		**Ambient Impacts (μg/m^3)**			
		Emission Rate Including "Black Puff" Factor	**Emission Rate Units**	**Sabey Increment (includes 3x factor for annual average values)**	**Regional and Local Background**	**Total Ambient Impact**	**NAAQS or ASIL**
PM_{10}							
2nd-high 24-hr during 2nd consecutive 17-hour facility-wide outage	lbs/day facility-wide	440	lbs/day during 2nd consecutive 17-hour outage	45	85	130	150
$PM_{2.5}$							
1st-high 24-hr during 8th consecutive 4.4-hour power outage	lbs/day facility-wide	112	lbs/day during 8th consecutive 4.4 hour outage	12	22	34	35
Annual (ultra-worst-case max year of 3-year rolling)	facility-wide annual	0.463	tons/yr	0.307 (3x the annual average)	6.5	6.8	12
Carbon Monoxide							
2nd-high 1-hr during facility-wide outage	lbs/hr facility-wide	848	lbs/hr	6,223	842	7,065	40,000
2nd-high 8-hr during facility-wide outage	lbs/hr facility-wide	848	lbs/hr	3,014	482	3,496	10,000
Nitrogen Dioxide							
NO_2 ASIL, 1st-highest 1-hr during facility-wide outage ~~1-hr NAAQS, 1st-highest during electrical bypass~~	lbs/hr NO_x, facility-wide	1st-highest facility-wide 1-hour NO_x emissions limited to 990 lbs/hour, the same value that was evaluated in the 2011 NO_2 Second-Tier Risk Assessment. See the worksheet "2015 NAAQS-ASIL Scenarios" for a range of example operating scenarios that can satisfy that emission limit with worst-case NO_x emission factors.					
1-hr NO2 NAAQS Based on 2011 Monte Carlo Modeling ~~NO_2 ASIL, 1st-highest 1-hr during facility-wide outage~~	lbs/hr NO_x, facility-wide	The current load limits and runtime limits for monthly testing, annual load bank testing, and corrective testing listed in Table 3.2 of the current Approval Order should be retained to ensure the 8th-highest daily 1-hr NO_x emission rates are consistent with the values that Sabey used for the NO_2 Monte Carlo modeling in 2011.					
Annual (ultra-worst-case max year of 3-year rolling)	facility-wide annual	23.9	tons/yr	15.8 (3x the annual average)	2.8	18.6	100
Toxic Air Pollutants							
Annual DEEP at onsite tenant (ultra-worst case, 3x annual average)	facility-wide annual	0.463	tons/yr	0.307 (3x the annual average)	Annual DEEP ASIL = 0.0033		
1,3-butadiene annual at onsite tenant (ultra-worst case, 3x annual	tons/yr facility-wide	4.71E-04	tons/yr	0.00031 (3x the annual	1,3-butadiene annual ASIL = 0.00588		

TABLE E-4 (Errata revision 6-4-2015)
REVISED CUMULATIVE AMBIENT IMPACTS CAUSED BY REQUESTED PERMIT REVISIONS
INTERGATE-QUINCY DATA CENTER
QUINCY, WASHINGTON

average)				average)	
Naphthalene annual at onsite tenant (ultra-worst case, 3x annual average)	tons/yr facility-wide	3.13E-03	tons/yr	0.0021 (3x the annual average)	Naphthalene annual ASIL = 0.0294
1st-high acrolein 24-hr at onsite tenant (ultra-worst case)	lbs/day facility-wide	0.158	lbs/day	0.0170	Acrolein 24-hr ASIL = 0.06
Benzene annual at onsite tenant (ultra-worst case, 3x annual average)	facility-wide annual	1.87E-02	tons/yr	0.012 (3x the annual average)	Benzene annual ASIL = 0.0345

Note: Theoretical maximum annual impact assumes the allowable emissions in a 3-year rolling period occur in one single year.

Capital Cost for Integrated Control Package (SCR, DPF and DOC)

Cost Category	Cost Factor	Source of Cost Factor	Quant.	Unit Cost	Subtotal Cost
Direct Costs					
Purchased Equipment Costs					
2000 kWe emission control package	ROM cost estimate by Caterpillar		32	$168,178	$5,381,696
Combined systems FOB cost					$5,381,696
Instrumentation	Assume no cost	Assume no cost	0	0	0
Sales Tax	WA state tax	WA state tax	6.5%	--	$349,810
Shipping	0.05A	EPA Cost Manual	5.0%	--	$269,085
Subtotal Purchased Equipment Cost, PEC					$6,000,591
Direct Installation Costs					
Enclosure structural supports	Assume no cost	Assume no cost	32	$5,000	$160,000
Installation	1/2 of EPA Cost Manual	1/2 of EPA Cost Manual	2.5%	--	$150,015
Electrical	Assume no cost	Assume no cost	0	0	0
Piping	Assume no cost	Assume no cost	0	0	0
Insulation	Assume no cost	Assume no cost	0	0	0
Painting	Assume no cost	Assume no cost	0	0	0
Subtotal Direct Installation Costs					$310,015
Site Preparation and Buildings (SP)	Assume no cost	Assume no cost	0	0	0
Total Direct Costs, DC (PEC + Direct Installation + Site Prep)					$6,310,606
Indirect Costs (Installation)					
Engineering	0.025*PEC	1/4 of EPA Cost Manual	2.5%	--	$150,015
Construction and field expenses	0.025*PEC	1/2 of EPA Cost Manual	2.5%	--	$150,015
Contractor Fees	From DIS data center	From DIS data center	6.8%	--	$425,584
Startup	0.02*PEC	EPA Cost Manual	2.0%	--	$120,012
Performance Test (Tech support)	0.01*PEC	EPA Cost Manual	1.0%	--	$60,006
Contingencies	0.03*PEC	EPA Cost Manual	3.0%	--	$180,018
Subtotal Indirect Costs, IC					$1,085,649
Total Capital Investment (TCI = DC+IC)					$7,396,255
					TCI per gen $231,133

Cost-Effectiveness for Integrated Control Package (SCR, DPF and DOC)

Item	Quantity	Units	Unit cost	Subtotal
Annualized Capital Recovery				
Total Capital Cost				$7,396,255
Capital Recovery Factor, 25 yrs, 4% discount rate				0.08401
Subtotal Annualized 25-year Capital Recovery Cost				$473,434
Direct Annual Costs				
Annual Admin charges	2% of TCI (EPA Manual)		0.02	$147,925
Annual Property tax	1% of TCI (EPA Manual)		0.01	$73,963
Annual Insurance	1% of TCI (EPA Manual)		0.01	$73,963
Annual operation and maintenance costs: Mid-range CARB value would account for urea, fuel for pressure drop, increased inspections, periodic OEM visits	129,228	Installed hp	$1.50	$193,842
Subtotal Direct Annual Costs				$489,692
Total Annual Cost (Capital Recovery + Direct Annual Costs)				**$963,126**
Uncontrolled emissions (Combined Pollutants)				37.6
Annual Tons Removed (Combined Pollutants)				32.94
Cost Effectiveness ($ per tons combined pollutant destroyed)				**$29,238**

Installed HP:	No. Gens	Each BHP	Total BHP
	44	2937	129228

Annual O&M Cost Based on CARB Factors

Annual operation + maintenance (lowermost CARB estimate)	131,552	Installed hp	$1.50	$197,328

Criteria Pollutants Multi-Pollutant Cost-Effectiveness (Reasonable vs. Actual Control Cost)

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NOX	$10,000	22.08	$220,806	per year
CO	$5,000	9.51	$47,564	per year
VOC	$10,000	1.00	$10,006	per year
PM (FH+BH)	$23,200	0.347	$8,046	per year
Other				
Total Reasonable Annual Control Cost for Combined Pollutants			**$286,422**	**per year**
Actual Annual Control Cost			**$963,126**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnages (Nominal-Controlled) — **57.5 <--hrs per year**

Pollutant	PM (FH+BH)	CO	VOC	NOX	Other
Tier-2 Uncontrolled TPY	**0.408**	**11.891**	**1.429**	**23.9**	
Controlled TPY	**0.061**	**2.378**	**0.429**	**1.828**	
Tons Removed/Year	**0.347**	**9.513**	**1.001**	**22.081**	
Combined Uncontrolled Tons/yr	37.64				
Combined tons/yr Removed	32.94				
100%-load Removal Effcy	85%	80%	70%	92%	
Annualized Cost ($/yr)	$963,126	$963,126	$963,126	$963,126	$963,126
Indiv Poll $/Ton Removed	$2,777,181	$101,245	$962,535	$43,619	

TAPs Multi-Pollutant Cost-Effectiveness (Reasonable vs. Actual Control Cost)

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO2	$20,000	2.21	$44,161	per year
CO	$5,000	9.51	$47,564	per year
Benzene	$20,000	0.0131	$262	per year
DEEP (FH+BH)	$23,200	0.347	$8,046	per year
Total Reasonable Annual Control Cost for Combined Pollutants			**$100,033**	**per year**
Actual Annual Control Cost			**$963,126**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH+BH)	CO	Benzene	NO2	1,3-butadiene
Tier-2 Uncontrolled TPY	**0.41**	**11.89**	**0.0187**	**2.39**	4.71E-04
Controlled TPY	**0.061**	**2.378**	**0.006**	**0.183**	1.41E-04
Tons Removed/Year	**0.347**	**9.513**	**0.013**	**2.208**	**0.000**
Combined Uncontrolled Tons/yr	14.71				
Combined tons/yr Removed	12.0807				
100%-load Removal Effcy	85%	80%	70%	92%	
Annualized Cost ($/yr)	$963,126	$963,126	$963,126	$963,126	
Indiv Poll $/Ton Removed	$2,777,181	$101,245	$73,603,364	$436,186	$2,921,545,286
Combined TAPs $/Ton Removed	$79,724				

Capital Cost for Catalyzed-DPF

Cost Category	Cost Factor	Source of Cost Factor	Quant.	Unit Cost	Subtotal Cost
Direct Costs					
Purchased Equipment Costs					
2000 kWe emission control package	ROM cost estimate by Caterpillar		32	$115,067	$3,682,144
Combined systems FOB cost					$3,682,144
Instrumentation	Assume no cost	Assume no cost	0	0	0
Sales Tax	WA state tax	WA state tax	6.5%	--	$239,339
Shipping	0.05A	EPA Cost Manual	5.0%	--	$184,107
Subtotal Purchased Equipment Cost, PEC					$4,105,591
Direct Installation Costs					
Enclosure structural supports	Assume no cost	Assume no cost	32	$5,000	$160,000
Installation	1/2 of EPA Cost Manual	1/2 of EPA Cost Manual	2.5%	--	$102,640
Electrical	Assume no cost	Assume no cost	0	0	0
Piping	Assume no cost	Assume no cost	0	0	0
Insulation	Assume no cost	Assume no cost	0	0	0
Painting	Assume no cost	Assume no cost	0	0	0
Subtotal Direct Installation Costs					$262,640
Site Preparation and Buildings (SP)	Assume no cost	Assume no cost	0	0	0
Total Direct Costs, DC (PEC + Direct Installation + Site Prep)					$4,368,230
Indirect Costs (Installation)					
Engineering	0.025*PEC	1/4 of EPA Cost Manual	2.5%	--	$102,640
Construction and field expenses	0.025*PEC	1/2 of EPA Cost Manual	2.5%	--	$102,640
Contractor Fees	From DIS data center	From DIS data center	6.8%	--	$297,292
Startup	0.02*PEC	EPA Cost Manual	2.0%	--	$82,112
Performance Test (Tech support)	0.01*PEC	EPA Cost Manual	1.0%	--	$41,056
Contingencies	0.03*PEC	EPA Cost Manual	3.0%	--	$123,168
Subtotal Indirect Costs, IC					$748,907
Total Capital Investment (TCI = DC+IC)					$5,117,138
					TCI per gen
					$159,911

Cost-Effectiveness for Catalyzed-DPF

Item	Quantity	Units	Unit cost	Subtotal
Annualized Capital Recovery				
Total Capital Cost				$5,117,138
Capital Recovery Factor, 25 yrs, 4% discount rate				0.06401
Subtotal Annualized 25-year Capital Recovery Cost				$327,548
Direct Annual Costs				
Annual Admin charges	2% of TCI (EPA Manual)		0.02	$102,343
Annual Property tax	1% of TCI (EPA Manual)		0.01	$51,171
Annual Insurance	1% of TCI (EPA Manual)		0.01	$51,171
Annual operation + maintenance (lowermost CARB estimate)	129,228	Installed hp	$1.00	$129,228
Subtotal Direct Annual Costs				$333,914
Total Annual Cost (Capital Recovery + Direct Annual Costs)				**$661,461**
Uncontrolled emissions (Combined Pollutants)				37.6
Annual Tons Removed (Combined Pollutants)				10.86
Cost Effectiveness ($ per tons combined pollutant destroyed)				**$60,907**

Installed HP:	No. Gens	Each BHP	Total BHP
	44	2937	129228

Annual O&M Cost Based on CARB Factors

Annual operation + maintenance (lowermost CARB estimate)	129,228	Installed hp	$1.00	$129,228

Criteria Pollutants Multi-Pollutant Cost-Effectiveness (Reasonable vs. Actual Control Cost)

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NOX	$10,000	0.00	$0	per year
CO	$5,000	9.51	$47,564	per year
VOC	$10,000	1.00	$10,006	per year
PM (FH+BH)	$23,200	0.35	$8,046	per year
Other				
Total Reasonable Annual Control Cost for Combined Pollutants			**$65,616**	**per year**
Actual Annual Control Cost			**$661,461**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnages (Nominal-Controlled)

Pollutant	PM (FH+BH)	CO	VOC	NOX	Other
Tier-2 Uncontrolled TPY	**0.408**	**11.891**	**1.429**	**23.909**	
Controlled TPY	**0.061**	**2.378**	**0.429**	**23.909**	
Tons Removed/Year	**0.347**	**9.513**	**1.001**	**0.000**	
Combined Uncontrolled Tons/yr	37.6				
Combined tons/yr Removed	10.86				
Quoted Removal Effcy	85%	80%	70%	0%	
Annualized Cost ($/yr)	$661,461	$661,461	$661,461	$661,461	$661,461
Indiv Poll $/Ton Removed	$1,907,328	$69,534	$661,055	#DIV/0!	

TAPs Multi-Pollutant Cost-Effectiveness (Reasonable vs. Actual Control Cost)

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO2	$20,000	0.00	$0	per year
CO	$5,000	9.51	$47,564	per year
Benzene	$20,000	0.0131	$262	per year
DEEP (FH+BH)	$23,200	0.347	$8,046	per year
Total Reasonable Annual Control Cost for Combined Pollutants			**$55,871**	**per year**
Actual Annual Control Cost			**$661,461**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH+BH)	CO	Benzene	NO2
Tier-2 Uncontrolled TPY	**0.41**	**11.89**	**0.0187**	**2.39**
Controlled TPY	**0.061**	**2.378**	**0.006**	**2.391**
Tons Removed/Year	**0.347**	**9.513**	**0.013**	**0.000**
Combined Uncontrolled Tons/yr	14.71			
Combined tons/yr Removed	9.87			
Overall Cold-Start Removal Effcy	85%	80%	70%	0%
Annualized Cost ($/yr)	$661,461	$661,461	$661,461	$661,461
Indiv Poll $/Ton Removed	$1,907,328	$69,534	$50,549,739	#DIV/0!
Combined TAPs $/Ton Removed	$66,999			

Capital Cost for DOC (alone)

Cost Category	Cost Factor	Source of Cost Factor	Quant.	Unit Cost	Subtotal Cost
Direct Costs					
Purchased Equipment Costs					
2000 kWe emission control package	ROM cost estimate by Caterpillar		32	$30,828	$986,496
Combined systems FOB cost					$986,496
Instrumentation	Assume no cost	Assume no cost	0	0	0
Sales Tax	WA state tax	WA state tax	6.5%	--	$64,122
Shipping	0.05A	EPA Cost Manual	5.0%	--	$49,325
Subtotal Purchased Equipment Cost, PEC					$1,099,943
Direct Installation Costs					
Structural supports	Additional cost, based on Caterpillar cost estimate for Microsoft Columbia Data Center		32	$5,000	$160,000
Installation	1/2 of EPA Cost Manual	1/2 of EPA Cost Manual	2.5%	--	$27,499
Electrical	Assume no cost	Assume no cost	0	0	0
Piping	Assume no cost	Assume no cost	0	0	0
Insulation	Assume no cost	Assume no cost	0	0	0
Painting	Assume no cost	Assume no cost	0	0	0
Subtotal Direct Installation Costs					$187,499
Site Preparation and Buildings (SP)	Assume no cost	Assume no cost	0	0	0
Total Direct Costs, DC (PEC + Direct Installation + Site Prep)					$1,287,442
Indirect Costs (Installation)					
Engineering	0.025*PEC	1/4 of EPA Cost Manual	2.5%	--	$27,499
Construction and field expenses	0.025*PEC	1/2 of EPA Cost Manual	2.5%	--	$27,499
Contractor Fees	From DIS data center	From DIS data center	6.8%	--	$93,810
Startup	0.02*PEC	EPA Cost Manual	2.0%	--	$21,999
Performance Test (Tech support)	0.01*PEC	EPA Cost Manual	1.0%	--	$10,999
Contingencies	0.03*PEC	EPA Cost Manual	3.0%	--	$32,998
Subtotal Indirect Costs, IC					$214,804
Total Capital Investment (TCI = DC+IC)					$1,502,245
					TCI per gen $46,945

Cost-Effectiveness for DOC (alone)

Item	Quantity	Units	Unit cost	Subtotal
Annualized Capital Recovery				
Total Capital Cost				$1,502,245
Capital Recovery Factor, 25 yrs, 4% discount rate				0.06401
Subtotal Annualized 25-year Capital Recovery Cost				$96,159
Direct Annual Costs				
Annual Admin charges	2% of TCI (EPA Manual)		0.02	$30,045
Annual Property tax	1% of TCI (EPA Manual)		0.01	$15,022
Annual Insurance	1% of TCI (EPA Manual)		0.01	$15,022
Annual operation + maintenance (lowermost CARB estimate)	129,228	Installed hp	$0.20	$25,846
Subtotal Direct Annual Costs				$85,935
Total Annual Cost (Capital Recovery + Direct Annual Costs)				**$182,094**
Uncontrolled emissions (Combined Pollutants)				37.6
Annual Tons Removed (Combined Pollutants)				10.60
Cost Effectiveness ($ per tons combined pollutant destroyed)				**$17,187**

Installed HP:

No. Gens	Each BHP	Total BHP
44	2937	129228

Annual O&M Cost Based on CARB Factors

Annual operation + maintenance (lowermost CARB estimate)	131,552	Installed hp	$0.20	$26,310

Criteria Pollutants Multi-Pollutant Cost-Effectiveness (Reasonable vs. Actual Control Cost)

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NOX	$10,000	0.00	$0	per year
CO	$5,000	9.51	$47,564	per year
VOC	$10,000	1.00	$10,006	per year
PM (FH+BH)	$23,200	0.08	$1,893	per year
Other				
Total Reasonable Annual Control Cost for Combined Pollutants			**$59,463**	**per year**
Actual Annual Control Cost			**$182,094**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnages (Nominal-Controlled)

Pollutant	PM (FH+BH)	CO	VOC	NOX	Other
Tier-2 Uncontrolled TPY	**0.408**	**11.891**	**1.429**	**23.909**	
Controlled TPY	**0.326**	**2.378**	**0.429**	**23.909**	
Tons Removed/Year	**0.082**	**9.513**	**1.001**	**0.000**	
Combined Uncontrolled Tons/yr	37.6				
Combined tons/yr Removed	10.60				
Quoted Removal Effcy	20%	80%	70%	0%	
Annualized Cost ($/yr)	$182,094	$182,094	$182,094	$182,094	$182,094
Indiv Poll $/Ton Removed	$2,231,546	$19,142	$181,982	#DIV/0!	

TAPs Multi-Pollutant Cost-Effectiveness (Reasonable vs. Actual Control Cost)

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO2	$20,000	0.00	$0	per year
CO	$5,000	9.51	$47,564	per year
Benzene	$20,000	0.0131	$262	per year
DEEP (FH+BH)	$23,200	0.082	$1,893	per year
Total Reasonable Annual Control Cost for Combined Pollutants			**$49,719**	**per year**
Actual Annual Control Cost			**$182,094**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH+BH)	CO	Benzene	NO2	1,3-butadiene
Tier-2 Uncontrolled TPY	**0.41**	**11.89**	**0.0187**	**2.39**	4.71E-04
Controlled TPY	**0.326**	**2.378**	**0.006**	**2.391**	1.41E-04
Tons Removed/Year	**0.082**	**9.513**	**0.013**	**0.000**	**0.000**
Combined Uncontrolled Tons/yr	14.71				
Combined tons/yr Removed	9.61				
Overall Cold-Start Removal Effcy	20%	80%	70%	0%	
Annualized Cost ($/yr)	$182,094	$182,094	$182,094	$182,094	
Indiv Poll $/Ton Removed	$2,231,546	$19,142	$13,915,870	#DIV/0!	$552,363,927
Combined TAPs $/Ton Removed	$18,953				

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Capital Cost for SCR (alone)

Cost Category	Cost Factor	Source of Cost Factor	Quant.	Unit Cost	Subtotal Cost
Direct Costs					
Purchased Equipment Costs					
2000 kWe emission control package	ROM cost estimate by Caterpillar		32	$135,803	$4,345,696
Combined systems FOB cost					$4,345,696
Instrumentation	Assume no cost	Assume no cost	0	0	0
Sales Tax	WA state tax	WA state tax	6.5%	--	$282,470
Shipping	0.05A	EPA Cost Manual	5.0%	--	$217,285
Subtotal Purchased Equipment Cost, PEC					$4,845,451
Direct Installation Costs					
Enclosure structural supports	Assume no cost	Assume no cost	32	$5,000	$160,000
Installation	1/2 of EPA Cost Manual	1/2 of EPA Cost Manual	2.5%	--	$121,136
Electrical	Assume no cost	Assume no cost	0	0	0
Piping	Assume no cost	Assume no cost	0	0	0
Insulation	Assume no cost	Assume no cost	0	0	0
Painting	Assume no cost	Assume no cost	0	0	0
Subtotal Direct Installation Costs					$281,136
Site Preparation and Buildings (SP)	Assume no cost	Assume no cost	0	0	0
Total Direct Costs, DC (PEC + Direct Installation + Site Prep)					$5,126,587
Indirect Costs (Installation)					
Engineering	0.025*PEC	1/4 of EPA Cost Manual	2.5%	--	$121,136
Construction and field expenses	0.025*PEC	1/2 of EPA Cost Manual	2.5%	--	$121,136
Contractor Fees	From DIS data center	From DIS data center	6.8%	--	$347,381
Startup	0.02*PEC	EPA Cost Manual	2.0%	--	$96,909
Performance Test (Tech support)	0.01*PEC	EPA Cost Manual	1.0%	--	$48,455
Contingencies	0.03*PEC	EPA Cost Manual	3.0%	--	$145,364
Subtotal Indirect Costs, IC					$880,381
Total Capital Investment (TCI = DC+IC)					$6,006,968
					TCI per gen $187,718

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Cost-Effectiveness for SCR (alone)

Item	Quantity	Units	Unit cost	Subtotal
Annualized Capital Recovery				
Total Capital Cost				$6,006,968
Capital Recovery Factor, 25 yrs, 4% discount rate				0.06401
Subtotal Annualized 25-year Capital Recovery Cost				$384,506
Direct Annual Costs				
Annual Admin charges	2% of TCI (EPA Manual)		0.02	$120,139
Annual Property tax	1% of TCI (EPA Manual)		0.01	$60,070
Annual Insurance	1% of TCI (EPA Manual)		0.01	$60,070
Annual operation + maintenance (CARB estimate). Mid-range CARB value would account for urea, fuel for pressure drop, increased inspections, periodic OEM visits	129,228	Installed hp	$1.50	$193,842
Subtotal Direct Annual Costs				$434,121
Total Annual Cost (Capital Recovery + Direct Annual Costs)				**$818,627**
Uncontrolled emissions (Combined Pollutants)				37.6
Annual Tons Removed (Combined Pollutants)				22.08
Cost Effectiveness ($ per tons combined pollutant destroyed)				**$37,074**

Installed HP:	No. Gens	Each BHP	Total BHP
	44	2937	129228

Annual O&M Cost Based on CARB Factors

Annual operation + maintenance (lowermost CARB estimate)	131,552	Installed hp	$1.50	$197,328

Criteria Pollutants Multi-Pollutant Cost-Effectiveness (Reasonable vs. Actual Control Cost)

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NOX	$10,000	22.08	$220,806	per year
CO	$5,000	0.00	$0	per year
VOC	$10,000	0.00	$0	per year
PM (FH+BH)	$23,200	0.00	$0	per year
Other				
Total Reasonable Annual Control Cost for Combined Pollutants			**$220,806**	**per year**
Actual Annual Control Cost			**$818,627**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnages (Nominal-Controlled)

Pollutant	PM (FH+BH)	CO	VOC	NOX	Other
Tier-2 Uncontrolled TPY	**0.408**	**11.891**	**1.429**	**23.909**	
Controlled TPY	**0.408**	**11.891**	**1.429**	**1.828**	
Tons Removed/Year	**0.000**	**0.000**	**0.000**	**22.081**	
Combined Uncontrolled Tons/yr	37.6				
Combined tons/yr Removed	22.08				
Quoted Removal Effcy	0%	0%	0%	92%	
Annualized Cost ($/yr)	$818,627	$818,627	$818,627	$818,627	$818,627
Indiv Poll $/Ton Removed	#DIV/0!	#DIV/0!	#DIV/0!	$37,074	

TAPs Multi-Pollutant Cost-Effectiveness (Reasonable vs. Actual Control Cost)

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO2	$20,000	2.21	$44,161	per year
CO	$5,000	0.00	$0	per year
Benzene	$20,000	0.0000	$0	per year
DEEP (FH+BH)	$23,200	0.000	$0	per year
Total Reasonable Annual Control Cost for Combined Pollutants			**$44,161**	**per year**
Actual Annual Control Cost			**$818,627**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH+BH)	CO	Benzene	NO2
Tier-2 Uncontrolled TPY	**0.41**	**11.89**	**0.0187**	**2.39**
Controlled TPY	**0.408**	**11.891**	**0.019**	**0.183**
Tons Removed/Year	**0.000**	**0.000**	**0.000**	**2.208**
Combined Uncontrolled Tons/yr	14.71			
Combined tons/yr Removed	2.21			
Overall Cold-Start Removal Effcy	0%	0%	0%	92%
Annualized Cost ($/yr)	$818,627	$818,627	$818,627	$818,627
Indiv Poll $/Ton Removed	#DIV/0!	#DIV/0!	#DIV/0!	$370,744
Combined TAPs $/Ton Removed	$370,744			

Technical Data
Munters AHUs

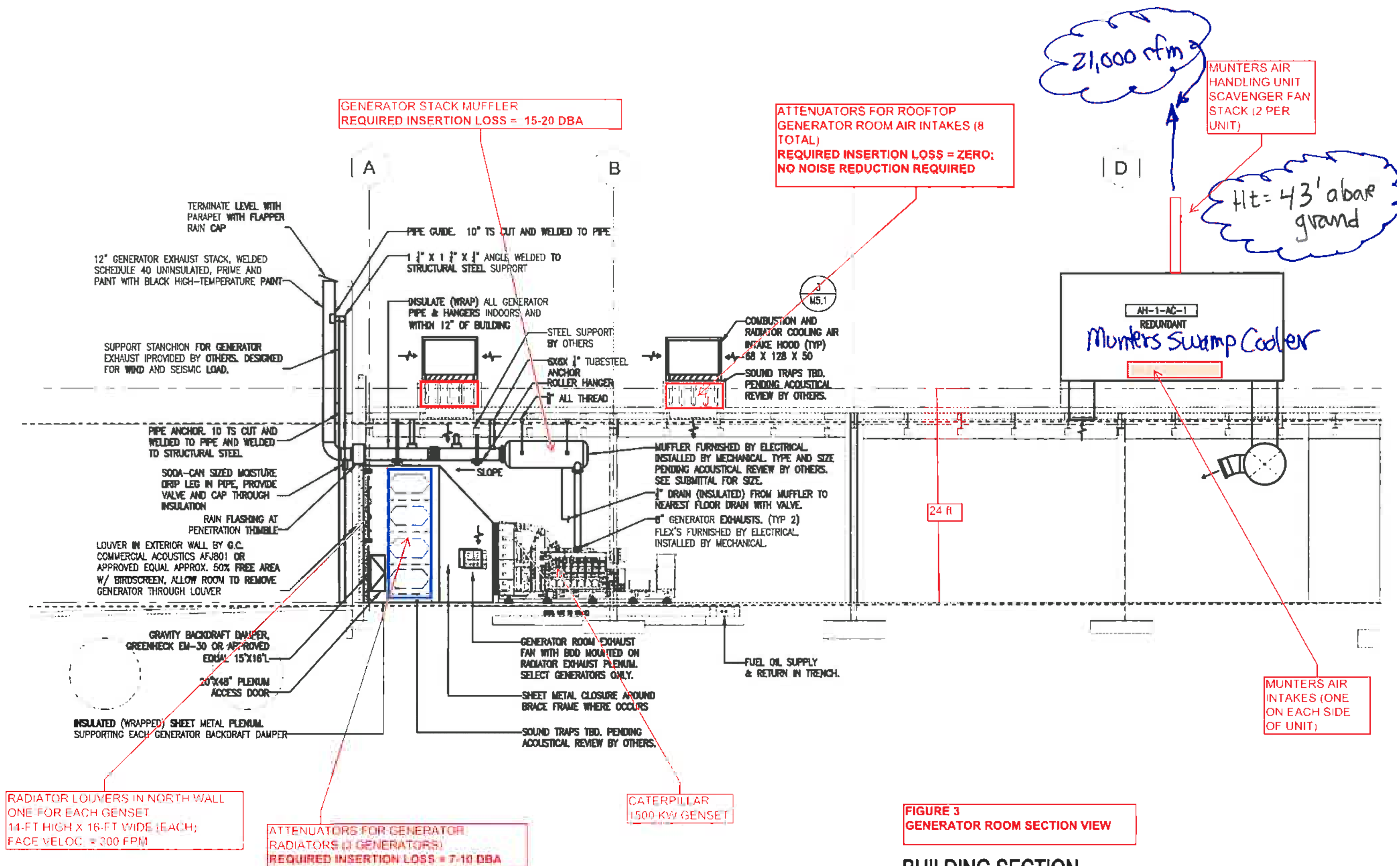

FIGURE 3
GENERATOR ROOM SECTION VIEW

1
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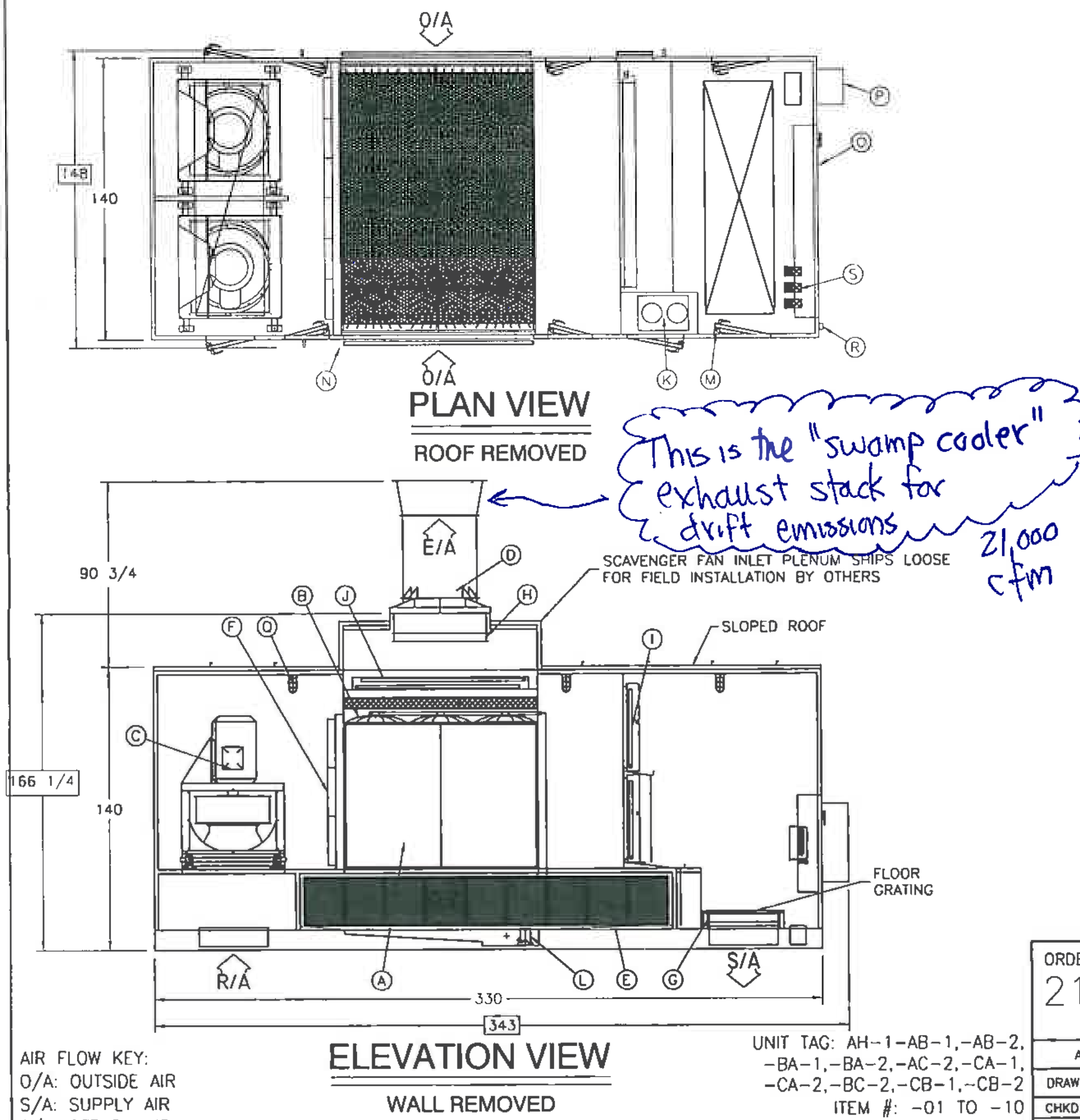
BUILDING SECTION



MAJOR COMPONENTS:

A. POLYMER TUBE HEAT EXCHANGER
B. INDIRECT EVAPORATIVE SPRAY
C. SUPPLY FAN WITH DIRECT DRIVE MOTOR
D. SCAVENGER FAN WITH DIRECT DRIVE MOTOR
E. O/A FILTER BANK (PERMANENT ALUMINIUM)
F. R/A FILTER RACK (FOR USE BY OTHERS)
G. SUPPLY AIR ISOLATION DAMPER
H. SCAVENGER FAN ISOLATION DAMPERS
I. DX COOLING COIL (EVAPORATOR)
J. REFRIGERATION CONDENSER COIL
K. COMPRESSOR COMPARTMENT
L. IEC RECIRCULATION PUMP
M. HINGED UNIT ACCESS DOOR (TYPICAL)
N. BOLT-ON UNIT ACCESS PANEL (TYPICAL)
O. UNIT ELECTRICAL PANEL
P. AUTOMATIC ELECTRICAL TRANSFER SWITCH
Q. VAPOR-PROOF LIGHT (TYPICAL)
R. LIGHT SWITCH AND GFCI RECEPTACLE
S. FAN MOTOR VARIABLE FREQUENCY DRIVE

NOTES:

1. MINIMUM 3'-0" CLEARANCE REQUIRED FOR SERVICE ACCESS (COILS MAY REQUIRE MORE ACCESS FOR REMOVAL).
2. FOR DRAIN AND CONNECTION LOCATIONS, SIZES, AND QUANTITIES SEE M-AA02.
3. FOR BASE FRAME DWG SEE M-AA03.
4. FOR ROOF CURB DWG SEE M-AA04
5. FOR REFRIGERATION PIPING SEE M-AA05.
6. FOR IEC PIPING SEE M-AA06.
7. UNIT OVERALL ENVELOPE DIMENSIONS ARE SHOWN IN BOXED DIMENSIONS.
8. WEATHER HOODS MAY BE SHIPPED IN PIECES FOR ASSEMBLY AND INSTALLATION BY OTHERS.
9. ATTENUATION OF FAN SOUND POWER LEVELS, IF REQUIRED, IS BY OTHERS.

SCAVENGER FAN WEIGHT: 700 LBS EACH (1,400 LBS TOTAL)
SCAVENGER FAN INLET PLENUM WEIGHT: 730 LBS
EST. UNIT SHIPPING WEIGHT: 22,600 LBS
EST. UNIT OPERATING WEIGHT: 26,200 LBS

AIR FLOW KEY:
O/A: OUTSIDE AIR
S/A: SUPPLY AIR
R/A: RETURN AIR
E/A: EXHAUST AIR

UNIT TAG: AH-1-AB-1,-AB-2,
-BA-1,-BA-2,-AC-2,-CA-1,
-CA-2,-BC-2,-CB-1,-CB-2
ITEM #: -01 TO -10
S/O NUMBER: -0001 TO -0010
UNIT QUANTITY: 10 TOTAL

ORDER NO. 21119476		Munters	
		ORDER NAME: SABEY QUINCY BLDG C	
APPROVALS	DATE	UNIT TYPE	PACKAGED VENTILATOR
DRAWN: HIPES	4/18/11	TITLE	MECHANICAL LAYOUT
CHKD		SIZE: A	DWG NO M-AA01
APPD			
SHEET 1 OF 1	SCALE: NTS	MODEL	PV-W35-PVT

Wilder, James

From: Chris Thomas [ChrisT@McKinstry.com]
Sent: Wednesday, May 11, 2011 6:18 PM
To: Wilder, James
Cc: Thomas Tellefson; Jeff Sloan; Rick Rubalcaba
Subject: Quincy IGC Building C Quad 3 AHU Questions

Jim,

Answers to your questions from yesterday:

1. The evaporative cooling spray pump flow rate for each of the AHU's is 80 GPM.
2. The sump conductivity level at which the control sequence is set to start bleed down of the sump is 10,000 uS.

Note that starting mid day tomorrow I will be on vacation until 5/31/11. Please use Thomas Tellefson as your point of contact during this time period.

Thanks,

Chris Thomas
Senior Project Manager
McKinstry Co.
Mobile: (206) 786-4586
Main Office VM: (206) 768-7735
Fax: (206) 832-8735
www.mckinstry.com
"For The Life Of Your Building"

Munters AHU
Emission Calculations

JW
6/22/11

Intergate-Quincy Wet Cooling AHU drift

3 gens = 12 AHU × 80 gpm each = 960 gpm/3 gens
= 320 gpm/gen

Est. TDS ≃ 7,500 mg/L @ EC Setpoint: 10,000 uS/cm

Assume drift = 0.001%, a typical mid-performance value
(MSFT used 0.001%)

Facility-Wide Drift:

44 gens × 320 gpm/gen = 14,000 gal/min
× 24 hrs/day × 60 min/hr
20,275,000 gal/day
× 8.34 #/gal
169×10^6 lbs/day
(169 e6)

Liquid drift rate = $\frac{0.001}{100}$ × 169 e^6 lbs/day

= 1,690 lbs H_2O/day

TDS in drift (Combined 44 gens) = 7,500 $\frac{mg}{L}$ × 10^{-6} × 1,690 lbs H_2O/day

= 12.7 lbs/day PM2.5
(for combined 44 gens)

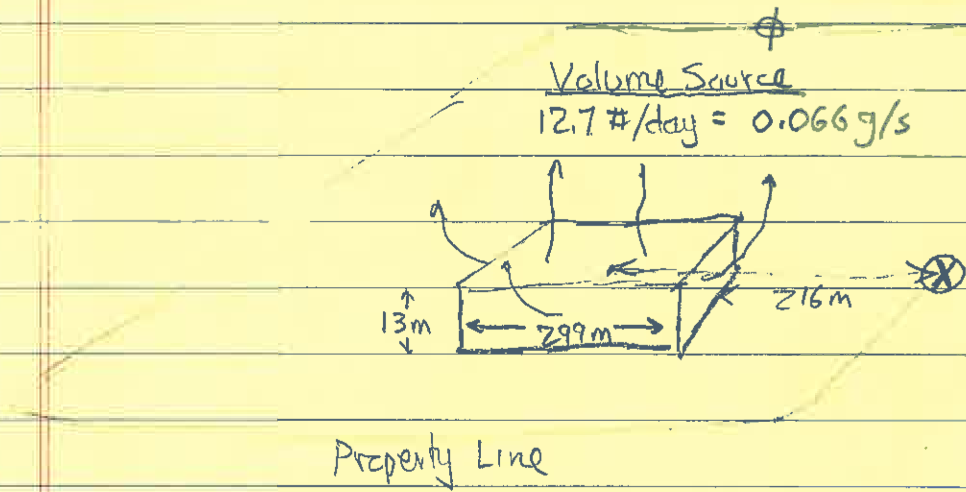
Screen3 = 12.7 #/day × $\frac{454 g}{lb}$ × $\frac{1}{24}$ × $\frac{1}{3600}$ = 0.066 g/sec

SCREEN 3
Modeling

JW
6/22/11

Sabey SCREEN3 for Rooftop AHUs

3 bldgs each 81m x 216
Total bldg area = 3 x 81 x 216 = 52,500 m^2
Equivalent square = 229m x 229 m
Distance from site centroid to bdy ≈ 216 m
Model as a Volume Source to capture bldg wakes



Volume Source Impact
1-hr = 0.2488 ug/m^3
24-hr = 0.0996 ug/m^3

Conclusion:

Full-buildout Sabey PM2.5 impact by AHUs = 0.0966 ug/m^3
24-hr PM2.5

```
 ***   SCREEN3 MODEL RUN   ***
 *** VERSION DATED 96043 ***

Sabey-Quincy AHU Drift-Volume-Source

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        VOLUME
   EMISSION RATE (G/S)      =     0.660000E-01
   SOURCE HEIGHT (M)        =       13.1000
   INIT. LATERAL DIMEN (M)  =      299.0000
   INIT. VERTICAL DIMEN (M) =      299.0000
   RECEPTOR HEIGHT (M)      =        1.5000
   URBAN/RURAL OPTION       =         RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.


BUOY. FLUX =    0.000 M**4/S**3;  MOM. FLUX =    0.000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	0.000	0	0.0	0.0	0.0	0.00	0.00	0.00	
100.	0.000	0	0.0	0.0	0.0	0.00	0.00	0.00	
200.	0.000	0	0.0	0.0	0.0	0.00	0.00	0.00	
300.	0.000	0	0.0	0.0	0.0	0.00	0.00	0.00	
400.	0.000	0	0.0	0.0	0.0	0.00	0.00	0.00	
500.	0.000	0	0.0	0.0	0.0	0.00	0.00	0.00	
600.	0.000	0	0.0	0.0	0.0	0.00	0.00	0.00	

```
  700.   0.2466          4     1.0     1.0    320.0   13.10  328.41  301.53    NO
  800.   0.2427          4     1.0     1.0    320.0   13.10  333.58  301.89    NO
  900.   0.2389          4     1.0     1.0    320.0   13.10  338.74  302.25    NO
 1000.   0.2353          4     1.0     1.0    320.0   13.10  343.89  302.61    NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
  644.   0.2488          4     1.0     1.0    320.0   13.10  325.56  301.33    NO

 DWASH=   MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

*********************************
*** SCREEN DISCRETE DISTANCES ***
*********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST     CONC              U10M   USTK  MIX HT   PLUME   SIGMA   SIGMA
   (M)   (UG/M**3)    STAB  (M/S)  (M/S)   (M)    HT (M)  Y (M)   Z (M)  DWASH
-------  ----------   ----  -----  -----  ------  ------  ------  ------  -----
  216.    0.000         0     0.0    0.0     0.0    0.00    0.00    0.00

 DWASH=   MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION          MAX CONC     DIST TO    TERRAIN
  PROCEDURE          (UG/M**3)     MAX (M)     HT (M)
--------------      -----------   -------    -------
SIMPLE TERRAIN       0.2488          644.         0.
```

Derivation of

"Allowable AHU Emissions"

To Acheive

1.0 ug/m³ PM2.5 Impact

JW
6/23/11

Allowable AHU Emission Factor

Full-buildout Sabey: 12.7 #/day PM2.5
44 gens
1500 KWe x 0.66 load

Sabey's actual PM2.5 per KW cooling =

$$\frac{12.7 \text{ \#/day}}{44 \text{ gens} \times 1500 \text{ Kwe} \times 0.66}$$

$$= 0.00029 \frac{\text{\#/day}}{\text{KW cooling}}$$

This causes ambient PM2.5 = 0.0996 ug/m³ 24-hr

Let's say an "acceptable" PM2.5 impact = 1.0 ug/m³.

In that case the allowable full-buildout AHU emission factor would be

$$0.00029 \frac{\text{\#/day}}{\text{KW}} \times \frac{1.0 \text{ ug/m}^3}{0.0996 \text{ ug/m}^3}$$

$$= 0.00293 \text{ \#/day} / \text{KW of cooling}$$

ICF INTERNATIONAL

Memorandum

Date:	June 23, 2011
To:	Greg Flibbert, Ecology
cc:	John ford and John Sasser, Sabey Data Centers
From:	Jim Wilder, ICF Seattle
Subject:	**PM2.5 Impacts from Sabey Air Handling Units**

This memo presents estimates of the full buildout PM2.5 emissions caused by droplet drift from the rooftop “swamp cooler” air handling units (AHUs) at the Sabey Data Center in Quincy.

Description of Munters Air Handling Units

The first tenant will have an electrical load that requires 3 generators. Their building cooling will be provided by 12 Munters rooftop AHUs. I understand the Munters units are similar to those sold by other vendors. Technical information for those Munters units is attached. Each Munters AHU unit will normally operate using no water, using just natural forced air ventilation to cool the building. The evaporative “swamp cooler” will automatically activate when the temperature reaches a value that is too high to use simple forced air ventilation. For emission calculations I assumed the evaporative section will operate 24 hrs/day, which is actually unlikely to occur.

The evaporative cooler on each Munters AHU will recirculate a small volume of water (80 gpm per AHU) over cooling coils. A small fan (21,000 cfm) will pass air over the cooling coils. The recirculation water will gradually concentrate the total dissolved solids (TDS) in the feed water until it reaches a TDS concentration of 7,500 mg/L. At that point the unit will automatically blow down the recirculation water to the sewer. For emission calculations I assumed the TDS in the recirculation water will always be 7,500 mg/L which is the upper range value.

The Munters AHUs will use much less water and air than the conventional industrial mechanical-draft cooling towers that were installed by Microsoft. To compare the relative water usage and airflows I have expressed them as “flowrate per kW of cooling capacity”. Table 1 compares the water usage and air flowrates for the Munters AHUs compared to Microsoft’s EVAPCO mechanical draft cooling towers. On a “per-kW of cooling” basis the Munters AHUs recirculate less water and the blow less air, so it is reasonable to assume they will generate less drift droplets. The moist, warm air will be exhausted through vertical stacks, 443 feet above ground.

Table 1. Assumed Engineering Values for Sabey AHUs

Parameter	Typical Sabey AHU	Microsoft Mechanical Draft Cooling Towers
General Design Parameters		
TDS Concentration for City Water Supply	Approx. 300 mg/L	Approx. 300 mg/L
TDS Concentration for Recirculating Cooling Water Inside the Cooling System Device	7,500 mg/L	1, 072 mg/L
Recirculating Water Flowrate Per KW of Cooling Capacity	0.24 gpm per KW cooling	0.58 gpm per KW cooling
Air flowrate Per KW of Cooling Capacity	64 cfm per KW cooling	240 cfm per KW cooling
Assumed Droplet Drift Fraction, Percentage of Recirculation Flowrate	0.001%	0.001%

Full-Buildout AHU Drift Emissions

Table 2 summarizes the full-buildout PM2.5 emission rates, assuming every tenant at the entire Intergate-Quincy data center will use AHUs similar to the Munters units. My hand calculations are attached. Assuming every one of the full-buildout AHUs operates in "swamp cooler" evaporative mode for 24 hrs/day, the estimated PM2.5 emission rate is only 12.7 lbs/day.

Table 2. Full Buildout PM2.5 Emissions From AHUs

Hours/Day of Swamp Cooler Operation at Full Load	24 hrs/day
Recirculation Water Flowrate for 44 generator Buildout 176 AHUs x 80 gpm/AHU)	14,080 gpm
Recirculation Water TDS Concentration	7,500 mg/L
Drift Fraction, Percentage of Recirculation Flow	0.001%
Daily Use of Evaporative Cooling	24 hrs/day
Drift PM2.5 Emissions for Full Buildout	12.7 lbs/day

SCREEN3 Modeling of AHU Drift PM2.5 Impacts

I used the SCREEN3 model. I combined the full buildout facility into a "Volume Source", with the lateral dimensions of the volume source equal to the floor space of the combined full buildout tenant buildings, and the height of the volume source set to 13 meters (the height of the 43-ft tall AHU exhaust stacks). The SCREEN3 value for the 1-hour PM2.5 impact is only 0.2488 ug/m3. I scaled the 1-hour value by 0.40 to derive the 24-hour PM2.5 impact of only 0.0996 ug/m3.

Table 3 compares the SCREEN3 PM2.5 impact from the AHUs to the AERMOD predictions of PM2.5 from the industrial emissions at Sabey, Intuit, Yahoo, and CELITE. The forecast AHU impact is much less than the impact from the generators. After adding Clint Bowman's background value, the combined PM2.5 impact is only 26.3 ug/m3 compared to the NAAQS of 35 ug/m3. Clearly, the full-buildout AHU emissions are a negligible contributor to ambient PM2.5.

Table 3. AHU Drift Contribution to Overall PM2.5 Impacts at Forecast Full-Buildout AHU Emission Rates (12.7 lbs/day)
(Source: May 3, 2011 email from Jim Wilder to Ranil)

Operation	**24-Hr PM2.5 Impact (ug/m3)**
Sabey 44 Full Buildout Generators	4.19
Sabey Full-Buildout AHU Drift	**0.0996**
Intuit	0.12
Celite	0.8
Yahoo	0.12
Impact From Combined Industrial Sources	**5.3**
Regional Background (Clint Bowman)	21
Grant Total Impact	26.3
Allowable NAAQS Limit	35

REQUESTED PERMITTING STRATEGY

The PM2.5 impacts caused by typical "swamp cooler" rooftop evaporative coolers are clearly negligible. Therefore, we request that Ecology not impose any operating restrictions on the use of those types of units.

It is possible that some future tenants might elect to use conventional mechanical-draft cooling towers similar to Microsoft's. Even if they do so, the ambient impacts would not be significant. For the original CO1/CO2 project at Microsoft, ICF used SCREEN3 to model their cooling towers and forecast a PM2.5 impact of only 3.29 ug/m3 caused by their 24-generator facility. The cooling tower impacts would presumably have been even lower if we had used ISC or AERMOD. Therefore, that impact also appears to be of little concern. Therefore, we suggest that Ecology should impose few, if any, operational restrictions on the use of conventional mechanical-draft cooling units.

Huitsing, Gary (ECY)

From: Jim Wilder <JWilder@landauinc.com>
Sent: Friday, May 22, 2015 12:07 PM
To: Palcisko, Gary (ECY); Huitsing, Gary (ECY)
Cc: Jim Wilder
Subject: RE: Sabey-Quincy: DEEP emission limit reduced to 0.42 tons/year

Hi Gary - I see no problem with your revised facility-wide annual DEEP emission limit. Sabey will have no difficulty complying with the 0.408 tpy limit.

Jim Wilder, 425-329-0320

From: Palcisko, Gary (ECY) [mailto:gpal461@ECY.WA.GOV]
Sent: Friday, May 22, 2015 11:38 AM
To: Huitsing, Gary (ECY); Jim Wilder
Subject: RE: Sabey-Quincy: DEEP emission limit reduced to 0.42 tons/year

One minor clarification for the Sabey emission limit.

I believe when we talked on the phone, I told you the highest risk at the property in question was about 11 per million. You used that risk level to scale a long-term permissible average emission rate. Scaling factor was (9.9 / 11). Unfortunately, I was not exact with the risk level. It was 11.3325 in one million. To obtain a risk of 9.9 in one million, the emission rate would need to be scaled by (9.9/11.3325)= 0.874172.

The previous emission rate (0.467 tpy) scaled by (0.874172) = 0.408 tpy.

Do you believe Sabey will be comfortable with this emission limit in their permit?

Gary Palcisko
Air Quality Program
WA Dept. of Ecology
300 Desmond Drive
PO Box 47600
Lacey WA 98504-7600

Phone: 360-407-7338

From: Huitsing, Gary (ECY)
Sent: Wednesday, May 06, 2015 6:00 PM
To: Jim Wilder
Cc: Dale Spencer; Palcisko, Gary (ECY); Flibbert, Gregory S. (ECY)
Subject: RE: Sabey-Quincy: DEEP emission limit reduced to 0.42 tons/year

Hi Jim,

Per our phone conversation today, a separate report is not necessary. We accept the email below as documentation of Sabey's concurrence to reduce the facility-wide DEEP emission limit so that the calculated DEEP cancer risk at the closest residential property line is less than 9.9-per-million. For compliance purposes, we will continue applicable recording keeping and reporting requirements from the original permit into the revised permit.

We will review the attachment in your email (regarding Sabey's request to revise Tables 5.2-5.5 of the Approval Order) as part of our completeness determination for the NOC and 2nd tier review applications.

Thank you.

Gary Huitsing, P.E.

Air Quality Program
Washington Department of Ecology
360 407-6314

From: Jim Wilder [mailto:JWilder@landauinc.com]
Sent: Wednesday, May 06, 2015 10:55 AM
To: Huitsing, Gary (ECY)
Cc: Jim Wilder; Dale Spencer; Palcisko, Gary (ECY)
Subject: Sabey-Quincy: DEEP emission limit reduced to 0.42 tons/year

Hello Gary - I have returned from my vacation. For Sabey-Quincy, can you please call me to discuss the mechanism for how you would like us to document our concurrence to reduce the facility-wide DEEP emission limit to 0.42 tons/year (36 month rolling basis), so the calculated DEEP cancer risk at the closest residential property line is less than 9.9-per-million?

As we discussed on the telephone last month, Sabey is comfortable with that 0.42 tpy facility-wide DEEP emission limit because it is very conservative. However, Sabey does not propose to reduce the requested generator runtime limits or the individual-generator hourly emission limits. Instead, each year Sabey will report its actual annual facility-wide DEEP emission rates as already required by the permit, to demonstrate compliance with the 0.42 tpy facility-wide limit.

As we discussed, the 0.42 tpy limit is very conservative because it was based on the following combination of conservative assumptions:

- The 0.42 tpy value assumes all 44 of the generators will be the largest possible size (2.0 MWe). In reality, Sabey expects that many of the generators will be smaller (1.5 MWe).

- The 0.42 tpy value assumes that every year, all 44 generators will be run for 35 hours per year for combined power outages and/or electrical bypass. Sabey anticipates it will actually run its generators for only a small fraction of that amount in typical years.

- The 0.42 tpy value assumes that all 44 generators will always run at only 25% load, at which the DEEP emission rate is highest (maximum of 0.57 lbs/hr each generator). Sabey anticipates it will actually run its generators at 50%-100% loads, at which the DEEP emission rate is much lower (only 0.22-0.27 lbs/hr).

Based on this combination of extremely conservative assumptions in the permit application, Sabey anticipates having no difficulty demonstrating its actual DEEP emissions are only a small fraction of the permitted 0.42 tpy limit.

Also, as we discussed last month Sabey wishes to revise Tables 5.2-5.5 of the Approval Order, so the revised per-generator hourly emission limits will match the revised, conservative lbs/hr emission rates we used for our revised application. See the attached file for our requested changes.

So, when is a good time to teleconference to discuss these changes?

Jim Wilder ♦ Senior Associate Engineer

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