DEPARTMENT OF
ECOLOGY
State of Washington

Response to Comments

Draft Revisions to Sabey Data Center Air Quality Permit 16AQ-E011

Public Comment Period:
December 10, 2015 – January 10, 2016

Summary of a public comment period and responses to comments on revisions to an existing air permit

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Introduction

Any new air pollutant source must meet emissions standards set by EPA and meet the requirements of the Washington State Clean Air Act. Ecology's Air Quality Program manages air pollution within the state and is responsible for ensuring that those federal and state standards are met. The Air Quality Program does this by writing permits to regulate emissions from various sources. The Air Quality Program's goal is to safeguard public health and the environment by preventing and reducing air pollution.

Before construction can begin on a new air pollution source or before changes can be made to an existing air pollution source, the applicant must apply to Ecology for an air quality permit. This permit is called a Notice of Construction. The application for the Notice of Construction requires the applicant describe all air contaminant emissions from the project, identify the federal air regulations that apply, describe the project's emission control technology, and prove that air quality standards won't be violated.

If emissions of toxic air pollutants exceed levels set in state regulations, a Health Impact Assessment must also be conducted to prove that there is minimal health risk to the community. Ecology reviews applications for projects and develops conditions of approval to ensure that the project will comply with the Washington Clean Air Act, RCW 70.94 and the corresponding WAC developed to implement RCW 70.94.

If the project meets these requirements, Ecology must approve the Notice of Construction application.

This Response to Comments is prepared for the purpose of:

Proposed permit:	Revisions to the Sabey Data Center Air Quality Permit 11AQ-E424 Quincy, Grant County, WA
Comment period:	December 10, 2015 – January 10, 2016
Date final permit issued:	Approval Order 16AQ-E011 issued on April 20, 2106

This document and other documents related to Ecology's final action on this draft permit can be viewed online at: http://www.ecy.wa.gov/programs/air/quincydatacenter/index.html.

Reason for Changing the Permit

Ecology issued a permit to the Sabey Data Center in August 2011. The permit allowed Sabey to install 44 diesel generators and associated cooling equipment, capable of producing 88 megawatts of emergency backup electrical power. Sabey applied to Ecology to revise their existing air permit called a notice of construction approval order.

A notice of construction revision is required when facilities plan to modify equipment, operations, or existing permit requirements. As part of the permit revision process, Ecology reviews emissions of air contaminants to ensure that public health is protected and all applicable regulations are followed.

Sabey proposed to allow options in engine suppliers; reduce the size of some of the diesel engines; and modify testing, monitoring, and recordkeeping requirements. Sabey also asked to extend the deadline to install all 44 diesel engines.

Public Involvement Actions

Ecology's Air Quality Program identifies innovative ways to connect with the Quincy community. Below is a list of advertisements, media reports, and outreach efforts (see *Appendix A* for copies of these items). Many community members continue to help spread the word about this project and assist in directing the outreach in a more meaningful way. Thank you.

Press Release
12/10/2015 – "Quincy data center needs revised air permit"
12/10/2015 – "Un centro de datos en Quincy necesita modificar un permiso de aire"

Legal Advertisements
12/10/2015 – *Quincy Valley Post Register*
12/10/2015 – *El Mundo* in Spanish

Display Advertisements
12/10/2015 – *Quincy Valley Post Register*
12/10/2015 – *Columbia Basin Herald*
12/11/2015 – *The Wenatchee World*
12/24/2015 – *El Mundo* in Spanish
12/31/2015 – *Quincy Valley Post Register*

Public Involvement Calendar
12/11/2015 – Posted notice of comment period to Ecology's website
https://fortress.wa.gov/ecy/publiccalendar/

Document Repository
12/08 & 22/2015 – Quincy City Hall
12/08 & 22/2015 – Quincy Library
12/10 & 22/2015 – Ecology's website
http://www.ecy.wa.gov/programs/air/quincydatacenter/index.html

Quincy Listserv Emails
12/08/2015 – "Sabey Comment Period Coming and Oxford Update"
12/10/2015 – "Sabey Comment Period Open!"
01/04/2016 – "Sabey Public Comment Period Ends Soon"

Twitter & Text Alerts
English and Spanish Twitter posts and text alerts were sent on December 10 & 17, 2015, and January 5, 2016.

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Response to Comments

Ecology accepted comments on the draft revisions to Sabey Data Center's air permit from December 10, 2015 through January 11, 2016. Three people submitted written comments. Their name, comments, and corresponding comment numbers begin on Page 11. In this section, questions identified from those comments are listed and followed by Ecology's response.

To view the comment as it was originally submitted, including any supporting documentation referenced in the comment, please see *Appendix B: Public Comments Received in Original Format.*

Ecology thanks all commenters for providing comment.

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PATRICIA MARTIN, COMMENTS 1-50

Comment #1
How many emergency fire pumps does the Sabey facility have onsite and why aren't their emissions included in the permit?

Ecology Response to Comment #1
Sabey has three (3) 73 horsepower (hp) diesel powered pumps and three (3) 297 hp generators associated with fire suppression and building safety (fire suppression support). They were not included with the emissions estimates in Sabey's application because equipment related to "fire suppression" is "exempt from new source review" under Washington Administrative Code (WAC) 173-400-110(4)(h)(xxix) miscellaneous emission unit and activity exemptions.

Emissions from these exempt equipment units contribute 0.00239 tons per year (tpy) of particulate matter (PM), 0.166 tpy of NOx, 0.0261 tpy of CO, and 0.003 tpy of VOC, which are approximately 0.6%, 0.7%, 0.2%, and 0.2% of total facility emissions for these pollutants, respectively. These emission estimates are based on the assumption that the three 73hp pumps and three 297hp building safety generators will operate for a total 41 hours per year and 40 hours per year respectively, averaged over three year rolling periods. These hours take into account frequent scheduled testing, an assumed 24 hours of annual power outage, and one fire per year.

Comment #2
Does the Sabey Quincy have other emergency engines whose emission are not accounted for in this permit such as emergency engines for water pumps, building lighting, etc.?

Ecology Response to Comment #2
No. The only emergency engines at Sabey are those covered by the permit and those discussed in Ecology's Response to Comment #1.

Comment #3
Are the permit limits issued under WAC 173-400-091? If not, under what authority are the limits being issued?

Ecology Response to Comment #3
The permit limits are issued under the requirements of Chapter 70.94 RCW, including RCW 70.94.152. They are not issued under WAC 173-40 0-091.

Comment #4
Are the limits in this permit federally enforceable? If so, why doesn't the permit indicate that the permit is federally enforceable?

Ecology Response to Comment #4

The permit limits concerning criteria pollutants are federally enforceable. There is no requirement that the permit indicate that these provisions are federally enforceable.

Comment #5

Where can the public appeal a federally enforceable permit?

Ecology Response to Comment #5

See 42 U.S.C. § 7604.

Comment #6

Emission estimates are based on a 10% NO2 stack emission rate. Is the conversion of NO to NO2 after release from the stack also considered when modeling for compliance with the 1-hr NO2 and annual NO2 NAAQS?

Ecology Response to Comment #6

Yes. One-hour NO2 concentrations were modeled using the Plume Volume Molar Ratio Method (PVMRM) module, with default ozone concentrations of 40 parts per billion (ppb), and an equilibrium NO2/NOX ambient ratio of 90 percent. For purposes of modeling NO2 impacts, the primary NOX emissions were assumed to be 10% NO2 and 90% nitric oxide (NO) by mass.

Comment #7

Does Sabey's NAAQS modeling for PM2.5 (annual and 24-hr); PM10 (annual and 24-hr); and NO2 (1-hr and annual) include the emissions from commissioning of the engines? Does Sabey's WAAQS and TAP modeling include emissions from the commissioning of engines?

Ecology Response to Comment #7

For NAAQS and WAAQS Sabey modeled what was estimated to be peak allowable emissions, which was estimated to occur after all engines had been commissioned and were fully operating. For TAPS, commissioning was included in the 70 year risk analysis modeling.

Comment #8

What background ozone level is Sabey using during modeling? How was this level chosen? Did Sabey model for ground level ozone?

Ecology Response to Comment #8

The default 40 ppb ozone concentration was used in the ambient air quality analysis for the original Sabey Data Center permitting action in 2011. This value was deemed to be appropriate based on the average summertime ozone values of 30 ppb monitored in 2010. Because ozone concentrations are highly temperature dependent, most ozone monitors operate only during the summer months. Because no increases in NOx emission rates were requested as part of this permit revision, no new NOx modeling was required.

Ambient ground level ozone analysis is not typically conducted for minor new source review projects, especially in ozone attainment areas.

Comment #9

The generators from the 2011 Approval Order and those listed in the Preliminary Determination have different serial numbers and are smaller than permitted. Why the difference? Were any emission differences modeled for compliance with the NAAQS before the engines were installed? If so, please provide.

Ecology Response to Comment #9

In 2011, Ecology originally permitted Sabey to install 44 -2MW emergency generators. As part of the permit revision, Sabey requested flexibility in the size of engines that they could install. The engines cannot be larger than 2 MW, but they may be smaller. These smaller engines must meet emission limits in approval condition 5. For modeling purposes, Sabey assumed that all engines would be 2 MW. Smaller engines may be installed as long as they meet the emission limits in the permit.

Comment #10

Ecology is allowing for the use of any diesel engine meeting the emission limitations provided in the permit. Considering that each engine is itself a "source" for purposes of the FCAA, under what authority is Ecology allowing this non-specific permitting to occur?

Ecology Response to Comment #10

Under the FCAA, each engine is an emission unit - not a source. Sabey must report to Ecology, the make, model, and serial number of each engine and generator prior to installation. The engines must meet the emission limits contained in the permit. There is nothing in the federal or state Clean Air Acts that precludes this arrangement.

Comment #11

Under Condition 4.2 Ecology has removed the requirement to measure 02 emissions during testing. Please reinstate this requirement as it is a necessary component of analysis. If it is not being reinstated, please provide supporting evidence for its removal.

Ecology Response to Comment #11

Measurement of oxygen is useful where emission limits are expressed as a concentration (e.g., ppm or grains per dscf). The emission limits for the data center engines are mass emission rates, so any dilution does not change the mass and therefore oxygen is not needed. However, some of the reference method options from condition 4.3.3 include measurement of oxygen, so it is not necessary for the permit to specifically mention the need to measure oxygen during emission testing.

Comment #12

Is the emission testing (4.3.1) required in the permit considered when determining

compliance with NAAQS, WAAQS and TAPs?

Ecology Response to Comment #12
The emissions produced as part of emissions testing were factored in to the total emissions for determining compliance with applicable air quality standards and regulations. Condition 4.3.1 requires that emissions testing be combined with other pre-scheduled maintenance and testing and load bank testing.

Comment #13
Condition 4.3.2 requires that only the filterable portion of PM be tested using the "weighting factor average according to Table 2 of Appendix B to Subpart E of 40 CFR 89". These rules do not consider the "cold start" or condensable emissions. Without these emissions Ecology will not know if emission estimates in the permit are reliable or if compliance with NAAQS has been achieved. Please require that both the filterable and condensable portion of the PM be included in the engine tests, as well as, require that all testing begin at a "cold start" so that accurate emission rates and exposures can be determined.

Ecology Response to Comment #13
Emission tests required by this permit are intended to demonstrate continued compliance with NSPS. Cold start and condensable emissions were factored into emissions estimates used in dispersion modeling and demonstrated that emissions from engines meeting the NSPS requirements would comply with the NAAQS. Ecology has explored the utility of condensable testing of data center engines using EPA Method 202. The results of Method 202 testing appeared to contain unexplained variation such that the value of the data is limited. To take condensable PM into account, Sabey performed the NAAQS analysis assuming that all hydrocarbons (HC) emitted from the Sabey engines will condense to form particulate matter, and including the total HC emission estimates as condensable particulate. This analysis, which overestimates condensable particulate matter emissions, demonstrated again that emissions from engines that comply with EPA's NSPS requirements comply with the NAAQS. By showing continued compliance with the NSPS tier 2 standards every 5 years as required by the permit, the applicant will also show compliance with the NAAQS because modeling results were evaluated to take into account cold start factors and condensable estimates. Also, the dilution tunnel system required in Table 2 of Appendix B to Subpart E of 40 CFR 89 accounts for some of the condensable (see also Response to Comment #19).

Comment #14
Condition 4.3.3 should require EPA Method 5 and Method 202 to test for both filterable and condensable particulate. As a federally enforceable permit, the analysis required should provide proof that the assumptions made for emission rates and limitations are valid and support any determination made that the permit complies with NAAQS.

Ecology Response to Comment #14
Ecology believes that the testing required by this approval will reliably demonstrate whether the engines satisfy the compliance criteria (emission limitations) in this approval order. It is intended that by showing continued compliance with the NSPS tier 2 standards every 5 years as required by the permit, the applicant will also show compliance with the NAAQS because modeling results were evaluated to take into account condensable estimates by assuming that all hydrocarbons condense to form particulate. Non-methane hydrocarbon emissions will be quantified as part of the tier 2 engine testing requirements.

Comment #15
Condition 5.2 testing should also be set to measure PM by EPA Method 5 and 202; NOx, NO, N02 and CO by Method 2 and 19, and NMHCs by an approved EPA Method that does not involve averaging weighted loads or exempting startup, i.e., “cold starts".

Ecology Response to Comment #15
Emission tests required by this permit are intended to demonstrate continued compliance with NSPS. Testing is required for PM, CO, NOx and NMHC. NOx consists of NO2 and NO. Cold start factors were accounted for in facility emission estimates and modeling when demonstrating compliance with NAAQS. Compliance with the NSPS 5-mode weighted average test, which is EPA approved, is intended to show compliance with the NAAQS. No other testing is needed because, as discussed in Response to Comment #13, modeling demonstrated that emissions from engines that meet EPA’s NSPS requirements will comply with the NAAQS.

Comment #16
Table 5.3 Condition 5.2.2 bases the NMHC on the 5-load weighted average of engines under the Tier 2 compliance scheme, which does not include condensable or cold start emissions. Please identify the emission limit for NMHCs in a manner that is considered enforceable as a practical matter as required under the FCAA.

Ecology Response to Comment #16
The NSPS requires that tier 2 engines comply with the following limits: 3.5 g/kW-hr for CO, 0.20 g/kW-hr for particulate matter, and 6.4 g/kW-hr for the sum of NOx and NMHC. The emission limit Table 5.3 of the permit is consistent with the NSPS. The numbering system in the tables is incorrect and will be corrected in the final permit. Cold start factors and condensables were accounted for in facility emission estimates and modeling when demonstrating compliance with NAAQS. Compliance with the NSPS 5-mode weighted average test, which is EPA approved, is intended to show compliance with the NAAQS. No other testing is needed because, as discussed in Response to Comment #13, modeling demonstrated that emissions from engines that meet EPA’s NSPS requirements will comply with the NAAQS.

Comment #17
Condition 5.3.1 is based on the assumption that 10% of the NOx emitted from the stack is N02. Did Sabey consider the secondary formation of N02 from NO after the emissions left

the stack? If not, why not?

Ecology Response to Comment #17
Yes. Ecology used the Plume Volume Molar Ratio Method (PVMRM) module, with default ozone concentrations of 40 parts per billion (ppb), and an equilibrium NO2/NOX ambient ratio of 90 percent. PVMRM calculates the amount of NO that forms NO_2 as the plume disperses. For purposes of modeling NO2 impacts, the primary NOX emissions were assumed to be 10% NO2 and 90% nitric oxide (NO) by mass.

Comment #18
What O3 value did Sabey use when modeling N02? From what information was this O3 value derived?

Ecology Response to Comment #18
See Response to Comment #8.

Comment #19
Condition 5.5.1 which sets the emission limit of 0.57 lbs/hr is based on Caterpillar's NTE at 25% load. The NTE does not include condensable and cold start emissions and is therefore not worst case emission. Because Ecology is allowing a range of loads, the emission rate and limitation must be based on worst-case engine operations. Sabey claims that to be 25% load, but this number does not include condensable or cold start emissions. Because the permit is federally enforceable to protect the NAAQS, these worst case emissions must be accounted for and modeled for compliance with NAAQS. Please adjust this emission limit to reflect worst case scenario and reevaluate BACT based upon the new emissions data.

a. The calculation of 0.57 lbs/hr does not equal 0.408 tpy, nor does it consider condensable and cold start emissions as claimed in Condition 5.7. The correct calculation is: (0.57 lb/hr)(57 Shrs/yr)(44 engines) = 1442 lbs/yr or **0.72 tons/year**

Ecology must model the worst case scenario. The worst case scenario for particulate matter is: *NTE at 25% load (0.57 lbs/hr)+ condensable "back-half" + "cold start "black puff.* Sabey's 44 engine emissions will exceed 0.72 tpy by a significant amount when these additional parameters are considered, especially when real world engine operation and multiple cold-starts are considered.

Ecology Response to Comment #19
Sabey's analysis included the condensable PM fraction. First, Caterpillar's reported PM emission rate of 0.57 lbs/hour at 25% load, as well as Caterpillar's reported emissions at other loads, includes a portion of the condensable PM fraction, because it is based on stack test data using EPA's dilution tunnel sampling system as required for Tier-2 certification under federal regulations 40 CFR Part 89. The dilution tunnel system used to determine compliance with Tier 2 requirements collects more PM than is collected by the Method 5 front half filterable test.

In addition, in response to this comment, Ecology requested that Sabey review alternate ways to estimate condensable particulate. One way to estimate condensable particulate includes using the actual values from the Method 202 stack test performed on one of the larger engines from Microsoft Columba. Another even more stringent approach is to assume that all hydrocarbons condense to form particulate matter. Sabey opted to reevaluate condensable PM by using the more stringent approach, assuming all hydrocarbons condense. Using this approach, Sabey demonstrated that particulate emissions would still comply with the NAAQS. The final TSD provides an updated NAAQS comparison for the highest estimated emissions as well as revised BACT costs showing BACT conclusions, which are unaffected by these revisions.

For the short-term 24-hr PM analyses, Sabey used an emission rate of 1.52 lb/hr based on the worst-case warmed-up DEEP emission rate of 0.57 lbs/hr at 25% load plus the associated HC emission rate at that load of 0.95 lb/hr, and applied the cold-start adjustment to the first 15 minutes of runtime.

Draft Permit Condition 5.7 gives the annual limit for PM as 0.408 tpy. That number includes only the filterable portion of PM. As discussed above, for the final permit, Sabey made the extremely conservative assumption that all the hydrocarbons (HC) emitted by the engines would condense to form PM. Using this assumption to account for condensable PM, the long term limit on overall total PM emissions from all 44 engines would increase to 1.73 tpy (0.408 tpy DEEP + 1.32 tpy VOC (VOCs are HCs)).

The cold start factors used by Ecology and Sabey are discussed in detail in Response to Comment #34.

The 0.57 lb/hr limit for DEEP emissions and the 1.52 lb/hr limit for total PM in Conditions 5.6.1 and 5.6.2 are the hourly maximum per engine. These limits mean that, at no time may an engine emit more than 0.57 lb/hr of DEEP (1.52 lb/hr total PM). These short-term limits do not authorize Sabey's engines to emit 0.57 lb/hr of DEEP (1.52 lb/hr total PM) on a long-term basis. The long-term maximum allowable emissions of DEEP is 0.408 tpy (1.73 tpy total PM). The short-term and long-term limits are independent limits that both apply and both must be met.

Because DEEP is defined as the filterable portion of particulate matter, there is no need to include the condensable portion when defining the DEEP limit in approval condition 5.7. For clarity, the final permit will be revised to include separate tons per year emission limits for total PM and DEEP instead of combining them as in the preliminary determination.

For the annual PM and annual DEEP modeling, Sabey applied the facility-wide emission limit. As described in Appendix E of Sabey's March 2015 application report entitled "Revised Request for Approval Order Revision", Sabey originally calculated the 70-year average DEEP emission rate to be 0.467 tons per year, which included the condensable fraction from Caterpillar's dilution-tunnel test data, emissions from generator commissioning and stack testing, and a "black puff" adjustment for cold starts. This annual-average DEEP and HC emission calculation assumed the

annual-average warmed-up emission rates are 0.35 lbs/hour and 1.0 lbs/hr respectively, which are the average of Caterpillar's reported NTE values at 10%, 25%, 50%, 75%, and 100% loads. Sabey used that 70-year average DEEP emission rate of 0.467 tons/year to model DEEP cancer risks in Quincy. As described in Ecology's Technical Support Document, Sabey agreed to accept a more stringent DEEP emission limit of only 0.408 tons/year, to ensure the modeled DEEP cancer risk at any location on the nearby occupied parcel is less than 9.9-per-million. Sabey is required to report their actual emissions annually for actual runtimes and actual generator loads, for comparison to the facility-wide annual permit limits for DEEP (0.408 tpy) and total PM (1.73 tpy) in Conditions 5.9 and 5.10.

Comment #20

Condition 5.8 sets a limit of 99 lbs/hr and 2.39 tpy for N02. Again there appears to be a miscalculation.

a. Condition 5.3.1: (4.19 lbs/hr)(44 engines)(57.5 hrs) = **5.3 tons per year**

Ecology Response to Comment #20

The 4.19 lb/hr limit for NO2 emissions in Table 5.4 (Condition 5.3.1) is the hourly maximum per engine. This limit means that, at no time may an engine emit more than 4.19 lb/hr of NO2. This short-term limit does not authorize Sabey's engines to emit 4.19 lb/hr of NO2 on a long-term basis. The long-term maximum allowable emissions of NO2 is 2.39 tpy (Condition 5.8). The short-term and long-term limits are independent limits that both apply and both must be met.

For annual emission estimates, the applicant used annual averaged emission factors as explained in the technical support document and application. For NOx, this factor is 18.9 lb/hr as provided in Table E-1 of the application. This factor results in a NOx estimate of 23.9 tpy consistent with PTE table in the technical support document (TSD) Condition 9.2 requires that Sabey report annual emissions to Ecology. Sabey's annual NOx emissions must be less than 23.9 tons per year over a 3 year rolling average. The final permit will also include a PTE table. NO2 is assumed to be 10% of NOX or 2.39 tpy.

Comment #21

Condition 5.2.1sets a limit of 41.9 lbs/hr for NOx. Ecology does not state what the NOx PTE is in the Preliminary Determination, however, it appears that NOx PTE has increased substantially from the 2011 Approval Order.

a. (41.9 lbs/hr)(44 engines)(57.5 hrs) = 106,007 lbs or **53 tons per year** (>2011)
b. (41.9 lb/hr}(41.5hrs/yr)[3](44 engines) = 77246.8 lbs = **38.6 tons per year** (>2011)

[3]minus 16.5hrs at 0-50% load

Ecology Response to Comment #21

The 41.9 lb/hr limit for NOx emissions in Table 5.3 (Condition 5.2.1) is the hourly maximum per engine. This limit means that, at no time may an engine emit more than 41.9 lb/hr of NOx. This

short-term limit does not authorize Sabey's engines to emit 41.9 lb/hr of NOx on a long-term basis. The long-term maximum allowable emissions of NOx is 23.9 tpy. This long-term limit was not included in the draft permit, but is consistent with the PTE table in the technical support document. The final permit will include the long-term NOx limit of 23.9 tpy. The short-term and long-term limits are independent limits that both apply and both must be met. The annual limit of 23.9 tpy NOx is lower than the PTE of 29.49 tpy in the 2011 Approval Order.

Comment #22

Ecology uses Caterpillar's NTE for HC's at 50% load (1.13 lbs/hr). This doesn't include cold starts or condensable emissions.

a. (1.13 lb/hr)(57.5hrs/yr)(44 engines) = 2858.9 lbs/yr; or 1.43 tons per year

Please explain how the use of a 50% load for VOC's is worst case when VOCs are highest at lower loads?

Ecology Response to Comment #22

The Caterpillar specification for hydrocarbons provided with the application lists the highest emissions of 1.13 lb/hr at 50% load, with an annual average emission factor of 1.0 lb/hr calculated by the applicant in Table E-1 of the application. Table E1-2 of the application calculated emissions of 1.49 tpy after including a cold start factor of 1.26. The application errantly transcribed the pre-cold start factor of 1.43 tpy onto their requested changes into table 2.a of Appendix B of the application. Ecology used the errant value of 1.43 tpy in the application instead of 1.49 tpy. For other pollutant annual emission estimates, the applicant used annual averaged emission factors. For consistency, the applicant could have used the annual averaged emission factor for VOC of 1.0 lb/hr. Using the 1.0 lb/hr VOC emission factor, it appears that VOC annual emission estimates would be 1.32 tpy in which case the draft permit has overestimated VOC emissions by approximately 0.11 tpy. The final permit will include the corrected value of 1.32 tpy. The particulate matter condensable concerns are not applicable to gaseous hydrocarbons. The final TSD with revised BACT costs show that BACT conclusions are unchanged.

Comment #23

Condition 5.4.1 sets a limit of 16.9 lbs/hr for CO. Ecology does not identify a PTE for Carbon Monoxide (CO). Please identify the expected PTE for CO under a new permit.

Ecology Response to Comment #23

The PTE for CO under the new permit is 13 tpy. For annual emission estimates, the applicant used annual averaged emission factors as explained in the technical support document and application. For CO, this factor is 9.4 lb/hr as provided in Table E-1 of the application. This factor results in a CO estimate of 11.9 tpy consistent with PTE table in the technical support document (TSD).

Table E1-2 of the application calculated emissions of 13 tpy after including a cold start factor of 1.56. The applicant errantly transcribed the pre-cold start factor of 11.89 tpy onto the requested

changes in table 2.a of Appendix B of the application. Although the analysis to determine NAAQS compliance was based on 13 tpy (see March 4, 2015 NOC application Table E1-2), Ecology used the errant value of 11.89 tpy in the permit instead of 13 tpy. The final permit will include the corrected value of 13 tpy. The final permit will also include a PTE table. The final TSD with revised BACT costs shows that BACT conclusions are unchanged.

Comment #24

Condition 5.9 and 5.10 regarding VOCs and 502 respectively, does not set an emission limit that is enforceable as a practical matter as defined under the FCAA. The Preliminary Determination only establishes an annual emission limit of 2860 lb/yr on a 36-month rolling average, when emission limits must be shorter term, i.e., hourly, daily. Please correct this in the permit and set emission limits that are enforceable as a practical matter.

Ecology Response to Comment #24

WAC 173-400-110(5) exempts from new source review sources with annual emissions of less than 2 tpy of VOCs and Sulfur Dioxide. These are considered de minimis emissions. Sabey's emissions of VOCs (1.32 tpy) and SO2 (0.028 tpy) qualify for this exemption. Regardless, Ecology included enforceable emission limits for both VOCs and SO_2 in the permit. SO_2 emissions are limited by the amount of sulfur present in fuel. Condition 3.1 limits sulfur content in fuel to 15 ppm or less and also limits the amount of fuel that can be consumed by Sabey, therefore a separate condition for SO2 in the draft permit was determined to be unnecessary and is not included in the final permit. Ecology determined that under the circumstances, the annual VOC annual limit is sufficient. The non-resettable meter on each engine, and the requirement for Sabey to record this information, make these limits enforceable.

Comment #25

Condition 5.11 increases visible emissions from a 5% opacity factor to a 10% opacity factor. Why?

Ecology Response to Comment #25

Condition 5.11 in the preliminary determination increased visible emissions to levels above 5% for loads between 5% and 20%. An increase to 10% was requested by the applicant for loads between 5% and 20 %, because it appeared to reflect more accurate opacity conditions of the engines at those loads. According to the applicant, the 1.5 MWe engines sometimes reach 6% opacity when operating at 10 percent load, but are below 5% opacity when operating at zero load, 50%, 75% and 100%. After further discussions with the applicant, it was learned that only one of 10 engines tested had an opacity reading of 6%. This may have been due to a control unit programming issue rather than the operational load. After a re-test, the same engine had a 5% opacity reading. Based on this information, Ecology has revised Condition 5.11 so that the final permit requires a visual emission limit of 5% for all loads.

Comment #26

Under Operation and Maintenance Manuals Ecology requires that the "O&M manual

shall include the manufacturers' recommended protocols for extended low-load operation." If Ecology is concerned about operations at low-load and extended operations at low-load, it would seems more appropriate for Ecology to have this manual prior to approving this permit.

Ecology Response to Comment #26
The purpose of requiring an O&M manual is to ensure that engines are being operated in a manner that is consistent with manufacturer's guidelines. Ecology feels that having it available upon request is sufficient.

Comment #27
Condition 8.4 should reflect the current knowledge about the operation of large diesel engines and compliance with 1-hr N02 NAAQS. Please amend this condition to require NOx emission calculations whenever the facility is without power for one hour or more, regardless of how many engines are running.

Ecology Response to Comment #27
Ecology required that short-term NOx emission rates be calculated when more than 16 engines operate at one time because the only way that the facility would emit greater than the permitted 990 lbs NOx per hour is if all 44 engines were operating at 75% load simultaneously. Ecology determined that tracking the simultaneous operation of 16 or more engines provides sufficient information because operation of fewer than 16 engines is not likely to result in NOx emissions greater than 990 lb/hr regardless of load. Furthermore, condition 9.2.4 requires Sabey to track the duration, purpose, and fuel usage for each engine regardless of how many engines operate at any given time.

Comment #28
Condition 8.5 removed the word "tenant" and replaced it with "building quadrant". This is not acceptable. Only proprietary information is protected under the CAA. If an entity is registered with the State of Washington to do business, its name is not proprietary information. Providing the name of the tenant prevents a situation where another data center might lease out space to circumvent becoming a major facility under the Act. Each independent tenant should report, including their name, consistent with the required NOC form.

Ecology Response to Comment #28
This facility is limited to 44 engines regardless of how many tenants will occupy the space. Furthermore, emissions estimates were calculated assuming the facility would have no more than 44 engines that satisfy the requirements of the permit. Condition 9.1 of the permit already requires that Sabey report to Ecology each independent tenant company name and contact information.

Comment #29
Reporting requirements under Condition 9.5 must require fuel receipts.

Ecology Response to Comment #29
Ecology has added a new condition 8.2 to the permit requesting "Monthly and annual fuel usage." In addition, Reporting conditions in 9.2 were revised or supplemented (conditions 9.2.1, 9.2.2, and 9.2.3) to include 3-year rolling averages. These changes are sufficient to ensure compliance with the fuel requirements in the permit.

Comment #30
Condition 10.4 regarding the 44 engines should state specifically which engines are allowed under the permit.

Ecology Response to Comment #30
All engines that Sabey uses must meet the requirements of the permit. Condition 9.1 of the permit requires Sabey to add specific engine information to Table 1.1 before installing each engine. Condition 2.2 has been modified to clarify what types of engines can be installed.

Comment #31
Condition 10.6 regarding enforcement should be implemented. Sabey was permitted to install certain engines under the 2011 Approval Order and did not. Did Ecology undertake an enforcement action against Sabey?

Ecology Response to Comment #31
Ecology has not taken enforcement action against Sabey. Emissions from the 1.5 MW engines Sabey has installed are the same as or lower than approved in 2011. When considering enforcement Ecology generally weighs the risk of environmental harm. In this case, it is not believed that such a risk exists.

Comment #32
Ecology should include a provision that engine operational logs and records, as generated by the engines, shall be available to the public upon request. The citizenry cannot be assured that there will be compliance with the permits without access to this information.

Ecology Response to Comment #32
The engine operational logs as generated by the engines are not available to Sabey. The diesel engines are not directly monitored. The generators connected to the diesel engines are monitored. When the diesel engines are serviced by the contractor, data from the engines needed to fill in times, duration of run, and fuel consumed, are reported to the facility after the engine checks are made. Engine operational data (fuel control, operational parameters) are only available to the service provider through the manufacturer interface. Therefore, they are not available to Ecology and cannot be provided to the public upon request. Ecology is adding reporting requirements to the permit (See conditions 9.2.1, 9.2.2.

and 9.2.3). This information will be provided to the public upon request.

Comment #32a

The Statement above YOUR RIGHT TO APPEAL has been edited and now reads:
"The provisions of this authorization are severable and, if any provision of this authorization, or application of any provisions of their circumstances, and the remainder of this authorization, shall not be affected thereby."

Please retain the original language in the 2011 Approval Order.

Ecology Response to #32a

The commenter is correct. The provision cited above is missing language that was inadvertently removed. The language from the 2011 Approval Order will be reinstated.

Comment #33

Sabey has been encouraged by Ecology (see Dec. 5, 2014 incompleteness letter) to "average" its loads rather than take load-specific limits. In doing so, Sabey must model the "worst case" scenario for each of the individual pollutants based on the load at which they are emitted in highest concentration. Sabey assumes that worst case is 25% load for PM and 100% for CO, VOCs, NOx and TAPs.

Appendix E states that Sabey used 100% load to represent the maximum emissions for NOx, CO, VOCs and TAPs. Carbon monoxide, VOCs and TAPs are known to be emitted during periods of incomplete combustion and are highest at lower loads. Basing emissions of CO, VOCs and TAPs at 100% load would not be worst-case and suggests that condensable and cold start emissions were not considered. Please do not issue this permit based on this flawed assumption.

Ecology Response to Comment #33

The commenter is correct that page 1 of Appendix E states that Sabey used 100% load for NOx, CO, VOCs and TAPs. The statement on page 1 of Appendix E is incorrect. In fact, Sabey's application provided Caterpillar's load-specific not to exceed (NTE) emission data. Table E-1 of Appendix E indicates the worst-case short term emissions occur at 100% load for NOx and CO, 50% load for VOC, and 25% load for PM/DEEP. Sabey modeled maximum short-term emissions assuming engines operate at the load that generates the highest amount of a pollutant. Additionally, Sabey applied cold-start factors in the AERMOD modeling for PM10, PM2.5, DEEP and CO to account for increased emissions that occur when starting cold engines.

Comment #34

Appendix E limits the application of the "cold start" factor to the first 15 minutes of engine operation. Because the information[4] from which Sabey derives its "cold start" factor is based on emissions that take place in the first 30 seconds of the engine startup, the mass of the emissions should be added to each engine run and recorded as part of

the emission rate. This mass emission that takes place in the first 30 seconds should also be accounted for in modeling for compliance with NAAQS, WAAQS and TAPs.

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[4] 2005 *AIR QUALITY IMPLICATIONS OF BACKUP GENERATORS IN CALIFORNIA,* VOLUME TWO: EMISSION MEASUREMENTS FROM CONTROLLED AND UNCONTROLLED BACKUP GENERATORS

Ecology Response to Comment #34

Appendix E of NOC Application shows that Sabey included a 30-second "cold start spike" during each cold start in their modeled short-term ambient impacts for PM10, PM2.5 and CO. The "cold start spike" includes the mass of emissions generated during a cold start. Sabey included a high number of cold starts per year per engine (approximately 39) in their 70-year-average DEEP modeling.

The only published cold-start data that Ecology is aware of is the California Energy Commission's (CEC) 2005 report entitled "Air Quality Implications of Backup Generators in California" cited by the commenter. The cold start emission data in that report appear to have been taken from a series of pre-Tier 2 engines. The CEC report lists emission factors (expressed as g/kW-hr), and a chart that shows detailed information about the emission concentrations of NOx, CO and VOC during the first 30 seconds of a cold start. The g/kW-hr emission factors for these older engines cannot be used to directly calculate emissions from Sabey's new EPA Tier-2 certified engines, which are required to comply with cleaner standards. Therefore, Sabey used the cold-start data from the older engines to calculate a "cold spike factor" or "black puff factor", which is the percentage increase in the emissions during the first 15 minutes of cold start compared to 15 minutes of emissions from a fully warmed up engine. Because we are not aware of additional cold-start data, Sabey assumed the cold-start factors for the older engines tested by CEC are the same as the cold-start factor for a new Tier-2 certified engine. This assumption likely overestimates the cold-start emissions from Tier 2 engines.

The California Energy Commission chart (Figure 19 in their report) shows the cold start spike in emissions lasts for only about 20 seconds, but Sabey averaged that spike over a 15-minute period, then used the 15-minute cold start factor to calculate the 1-hour, 24-hour, and annual-average emissions by assuming a reasonably high number of cold starts. For the first 15 minute cold start period, the calculated "15-minute cold spike factors" are 1.26 for PM and VOC, and 1.56 for CO. The choice of the 15-minute average cold start period does not affect the calculated results for the calculated 1-hour, 24-hour, and annual-average emissions. The same 1-hour, 24-hour and annual-average emission rates would result if you assumed cold-start periods of different durations.

As described on Page 4 of Appendix E of the NOC Application, Sabey's annual-average PM/DEEP emissions accounted for 9.8 hours/year of cold-start conditions (17% of the allowable 57.5 hrs/year = 9.8 hrs/yr). If each cold start lasts for 15 minutes, then Sabey accounted for 39 cold

starts per year for each generator (9.8 hrs/hr / 0.25 hrs/cold start = 39 cold starts per year). That is more than the "real world" 16 cold starts per engine per year that have recently occurred at the facility.

As listed in Tables D and F of Attachment E-1 of Sabey's Appendix E, to model the short-term emissions and ambient impacts during facility-wide power outages, Sabey applied those 15-minute cold spike factors to simulate the initial emissions after a cold start. As listed in Table E1-2 of Attachment E-1 of Sabey's Appendix E, to model the 70-year average DEEP emissions, Sabey applied the cold start factors to 9.8 hours of DEEP emissions per year (out of the total allowable 57.5 hours/year of runtime). That is equivalent to 39 cold starts per year, with each cold start lasting 15 minutes.

Even with this approach, which mostly likely overestimates cold starts, the calculated facility-wide 24-hour average and annual-average emission rates are not significantly increased by adding the brief cold starts. The relatively small emission increase caused by adding the cold starts can be seen by evaluating the data in Table E1-2 and Table F in Attachment E-1 of Sabey's Appendix E of their March 2015 report. The data in Table E1-2 show the 70-year average DEEP emissions increased by only 4% as a result of adding 39 cold starts per year. The data in Table F show the 24-hour average PM10 emission rate during a facility-wide power outage increased by only 0.4% as a result of adding a cold start.

Comment #35

Appendix E assumes that operating at 25% load for the 57.5 hours within a single year is worst-case scenario for annual DPM. Please model the real-world 16 cold starts per year on all 44 engines plus the remaining 57.5 hours to determine which is worst-case. See attached Sabey operational records.

Ecology Response to Comment #35

As described on Page 4 of Appendix E of the NOC Application, Sabey's modeling of annual-average PM/DEEP emissions accounted for 9.8 hours/year of cold-start conditions (17% of the allowable 57.5 hrs/year = 9.8 hrs/yr). If each cold start lasts for 15 minutes, then Sabey accounted for 39 cold starts per year for each generator (9.8 hrs/hr / 0.25 hrs/cold start = 39 cold starts per year). That is more than the "real world" 16 cold starts per year that have recently occurred at the facility. Also, as noted in Response to Comment #37, the average engine runtime at Sabey due to planned and unplanned outages over the last three years (2013, 2014, and 2015) has been significantly less than the 57.5 hours of total runtime allowed by the permit.

Comment #36

For 24-hour PM10 and PM2.5 similar real-world operational scenarios should be run for purposes of compliance. In addition to the 16 cold starts per engine per year, Quincy has on average at least 2 outages each year in excess of 1-hr.

Ecology Response to Comment #36

As described on Page 4 of Appendix E of the NOC Application, Sabey's modeling of annual-average DEEP emissions (which are PM10 and PM 2.5 emissions) accounted for 9.8 hours/year of cold-start conditions (17% of the allowable 57.5 hrs/year = 9.8 hrs/yr). If each cold start lasts for 15 minutes, then Sabey accounted for 39 cold starts per year for each generator (9.8 hrs/hr / 0.25 hrs/cold start = 39 cold starts per year). That is more than the "real world" 16 cold starts per year that have recently occurred at the facility.

Comment #37

What was the total engine runtime at Sabey for power outages in 2013, 2014 and 2015? Please provide this information so the public can understand how closely this Preliminary Determination aligns with real-world operation.

Ecology Response to Comment #37

Sabey reports the following duration of power outages, both planned and unplanned:

2013: 3 generators totaling 4:54 hours of runtime; average = 1:38 hours/yr/generator

2014: 5 generators totaling 10 hours of runtime; average = 2 hours/yr/generator

2015: 10 generators totaling 46 hours of runtime; average = 4:36 hours/yr/generator

Including these short actual durations of power outages, Sabey's actual runtimes due to planned and unplanned outages have been lower than the 8 hours/year of runtime allowed by the current permit (Approval Order No. 11AQ-E424) for power outages and the 56.5 hours/year of total runtime allowed by the Preliminary Determination modifying that permit.

Comment #37a

Emission Assumptions: I take exception to the cold start factor used in the permit. Attached is an excerpt from the 2005 *AIR QUALITY IMPLICATIONS OF BACKUP GENERATORS IN CALIFORNIA,* VOLUME TWO: EMISSION MEASUREMENTS FROM CONTROLLED AND UNCONTROLLED BACKUP GENERATORS demonstrating that average emission factor in g/kW-hr for CO, THC, NOx and PM is 24.3, 22.5, 55.4 and 17.7 averaged over 30 minutes. Since most of Sabey's engine operations, with the exceptions of power outages and commissioning, are approximately 30 minutes long these cold start emission factors should be included in the emission modeling and compliance with NAAQS. (Please note that the narrative below the graph erroneously refers to Figure 20). These emissions occur within the first 30 seconds of every cold start, i.e., engine startup, and therefore should be added into every emission calculation used for PTE, NAAQS, WAAQS and TAP compliance. Failure to do so significantly underestimates risk to our community.

Ecology Response to Comment #37a

The average emission factors from the California report do not apply to Sabey's Tier 2 engines because they come from dirtier Tier 1 engines that don't meet EPA's Tier 2

standards. Please see Response to Comment #34 regarding the cold start analysis used for the Sabey permit.

Comment 37b

Additionally, the modeling should better reflect the actual engine operations. In reviewing engine operational logs from 2011, 2012 and the only one submitted for 2013, Sabey operated its engines between 14 and 16 times each year. With the exception of power outages, the engines are usually operated one at time.

Ecology Response to Comment #37b

Sabey modeled 57.5 hours per year of runtime per engine, which is much higher than their reported actual runtimes. Sabey modeled approximately the equivalent of 39 cold starts per engine per year with each cold start lasting 15 minutes. Compared to the reported 16 cold starts per year, Sabey's accounting for approximately 39 cold starts per engine per year most likely overestimates emissions from cold starts.

Comment 37c

This permit should not be issued until the actual operating scenario is modeled for compliance with NAAQS, WAAQS and for TAPs. Cold start factors are significant and should be modeled with the 44 engines operating at worse case real-world scenarios.

Ecology Response to Comment #37c

As described in Response to Comment #34, Sabey's modeled emission rates included cold start factors applied to worst-case operating scenarios. These scenarios form the basis for the maximum conditions approved by the permit. For example Sabey requests to be allowed to operate for 35 hours per year for combined unplanned outages and electrical bypass. As described in NOC Application Appendix E, Sabey assumed the worst possible scenario where there will be 8 facility-wide power outages every year lasting 4.4 hours after a cold start (35 hours/yr divided by 8 events = 4.4 hours per outage). Because the PM2.5-NAAQS is based on the 8th-highest 24-hour impact, this scenario represents a worst-case with regard to PM2.5 emission rates for NAAQS compliance purposes. Sabey used similar worst-case analyses for the other NAAQS and TAP modeling.

Comment #37d

Sabey also relies upon the AP-42 for TAP emissions. The AP-42 was not designed for the purpose of NAAQS compliance.[5] Other regulatory models such as SPECIATE may have more accurate emission rates for both PM and TAPs.

> "SPECIATE[6] is the EPA repository of total organic compound (TOC) and particulate matter (PM) speciation profiles for emissions from stationary and mobile air pollution sources. The profiles are key inputs to air quality modeling and source-receptor modeling applications. SPECIATE essentially provides emissions factors and information for

pollutants, from both controlled and uncontrolled processes, at a level of detail that is not adequately or traditionally presented in AP-42."

Please do not issue this permit without reviewing the SPECIATE database for updated emission factors for PM and TAPs. Please provide documentation of emission rates for the appropriate sized engines from the SPECIATE database.

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[5] "Emissions factors were originally established only for use in estimating emissions for developing national emissions inventories." http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0174-0001

[6] http://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=164604

Ecology Response to Comment #37d

Ecology could not find information suggesting that SPECIATE emission profiles are more accurate, or even as accurate as AP-42 hydrocarbon emission factors for the engines to be used at Sabey. According to the background document for AP-42 Section 3.4, hydrocarbon emission factors were based on a 630 kW (850 hp) diesel engine. While AP-42 Section 3.4 emission factor ratings for hydrocarbons are not A-rated, the EFs appear to be more representative of the 1500 kW to 2000 kW Sabey engines based on size than the smaller 313 kW (420 hp) size tractor engine used to develop SPECIATE emission profiles.

Ecology does not have an official hierarchy of emission factors but where specific manufacturer data or other source specific emission data (Continuous Emissions Monitoring Systems or CEMS, etc.), is not available, Ecology has relied on the emission factors from AP-42 as a consistent EPA based approach, satisfactory for the purposes of this permit.

Emissions of the criteria pollutant referred to as “particulate matter” or PM, and the TAP referred to as “diesel engine exhaust, particulate” or DEEP were estimated by Sabey using manufacturer test emission factors. They were not estimated using AP-42.

Comment #37e

Meteorology: The 5-year meteorological data used in Sabey's 2011 Approval Order was for the period 2004-2008, and now Sabey is using older data from 2001-2005. Why is this being allowed? Ecology is aware that 40 CFR 51 Appendix W requires the use of the most recent meteorological data. To use old data suggests manipulation to avoid failing the NAAQS.

Ecology Response to Comment #37e

The inter-annual variation of meteorology is sufficiently consistent that any five year period meeting quality assurance and completeness requirements is acceptable. The equipment and procedures for taking and reporting weather observations at airports have changed little since the installation of automated (ASOS) equipment. The requirement for a contiguous five year period reduces the possibility of cherry-picking, and the choice of a particular five year period for the analysis cannot be depended on to confer an advantage to the applicant.

Comment #38
Was condensable particulate considered in the permitting of Sabey in 2011? If yes, please provide proof.

Ecology Response to Comment #38
The analysis used for the 2011 Sabey permit did not consider condensable particulate matter based on Method 202 and did not assume all hydrocarbon was condensable particulate. It did however, include some condensable particulate because it was based on manufacturer emission factors derived from dilution tunnel test results. Upon approval of the 2015 preliminary determination, the final approval order will rescind and replace the entire 2011 permit. Condensable particulate was considered in the 2015 preliminary determination. See also the Response to Comment #19.

Comment #39
Because condensable particulate was not included during permitting of Yahoo!, Intuit, Dell and Microsoft Columbia, please provide updated background information and modeling to demonstrate that the condensable particulate has been evaluated as part of the NAAQS, WAAQS and TAPs, as well as, the DPM cancer and chronic health review under Ecology's community-wide approach.

Ecology Response to Comment #39
With regard to the chronic risk and hazards attributable to diesel engine exhaust, particulate (DEEP), the condensable portion of particulate need not be considered because DEEP is defined as filterable particulate only.

With regard to the NAAQS and WAAQS, the analysis used for Sabey followed acceptable procedures for estimating their direct impact by using the most recent methods of estimating emissions. The ambient impacts of these emissions were combined with an estimate of background concentrations. Background concentrations of criteria pollutants have been calculated for Washington, Oregon, and Idaho using a combination of air quality model runs and observations (http://lar.wsu.edu/nw-airquest/lookup.html). This technique uses observed concentrations to reduce model errors to produce a best estimate of background concentrations in unmonitored areas. Nearby (competing – generally only those on the east side of Quincy in the case of Sabey) sources were modeled with their permitted emissions as required by Appendix W of 40 CFR 51.

In addition, Ecology has agreed to go beyond any permitting requirements to periodically complete community wide modeling which will include many of the more recent estimating procedures.

Comment #40
Cold start factors were not considered in the modeling of Intuit, Yahoo!'s original permit or Microsoft Columbia. Have emission estimates for these facilities been updated in the modeling

to provide proof of Sabey's compliance with NAAQS, WAAQS and TAPs off-site and as part of the HIA community wide approach?

Ecology Response to Comment #40

Cold start factors were considered in the modeling for the Sabey application. The analysis used for Sabey followed acceptable procedures for estimating their direct impact by using the most recent methods of estimating emissions combined with an estimate of background concentrations. Background concentrations of criteria pollutants have been calculated for Washington, Oregon, and Idaho using a combination of air quality model runs and observations (http://lar.wsu.edu/nw-airquest/lookup.html). This technique uses observed concentrations to reduce model errors to produce a best estimate of background concentrations in unmonitored areas. Nearby (competing – generally only those on the east side of Quincy in the case of Sabey) sources were modeled with their permitted emissions as required by Appendix W of 40 CFR 51.

In addition, Ecology has agreed to go beyond any permitting requirements to periodically complete community wide modeling which will include many of the more recent estimating procedures.

Comment #41

Please provide the following:

a. the serial numbers of the engines and generators in currently in use at Sabey;
b. the manufacturer; and
c. the capacity of the engines in MWe.

Ecology Response to Comment #41

Table 1.1 of the preliminary determination provides the information requested for the engines that were installed at Sabey at the time Ecology received the application from Sabey.

Comment #42

What "average" operational load are the PTE's based on? Please include a PTE chart in the new permit similar to the one in the 2011 Approval Order. Citizens should not have to go digging to find these enforceable parameters.

Ecology Response to Comment #42

In response to this this comment, a PTE chart will now be included in the final permit. The enforceable emission limits for NOx, filterable PM (DEEP), and CO are listed in Section 5 of the permit as well as the allowable engine loads for each pollutant. The PTEs are based on estimated maximum hours of operations allowed by the permit and also on the emission factors listed in Table E-1 of the application. For long-term operations, the engines are assumed to operate at these average loads. For short-term operation, the engines may not exceed the maximum loads listed in Section 5 of the permit.

Comment #43

Compliance with NAAQS PM2.5 and PM10 requires both condensable and filterable particulate matter be considered. Why is Ecology requiring that only the filterable portion of particulate matter be tested under the GENERAL TESTING AND MAINTENANCE REQUIREMENTS4.3.2.

Ecology Response to Comment #43

In determining whether the Sabey project would comply with the NAAQS, Ecology and Sabey added cold start factors and a hydrocarbon factor to take into account condensable particulate matter to the emissions of engines meeting EPA's Tier 2 standards. The analysis demonstrated that, even with the addition of the cold start factors and taking condensable PM into account, emissions from engines that meet EPA's Tier 2 standards comply with the NAAQS. Therefore, Ecology determined that as long as Sabey's engines continue to comply with EPA's Tier 2 standards, the NAAQS will be protected. The emission tests required by this permit are adequate because they are designed to demonstrate continued compliance with EPA's Tier 2 standards.

Comment #44

Each engine is a "source" for purposes of the CAA. Please cite to the authority allowing Ecology can allow "any engine" with a rated capacity of less than 2.0 to satisfy the permitting requirements for a NOC Order and New Source Review.

Ecology Response to Comment #44

Under the FCAA, each engine is an emission unit - not a source. Sabey must report to Ecology, the make, model, and serial number of each engine and generator prior to installation. The engines must meet the emission limits contained in the permit. There is nothing in the federal or state Clean Air Acts that precludes this arrangement.

Comment #45

Why is Sabey being allowed to use performance data from 2008 and a 2006 Tier 2 certified engine?

Ecology Response to Comment #45

Ecology is requiring all engines to meet current Tier 2 standards (as defined by NSPS) regardless of the year the engine is built or the performance data provided with the application.

Comment #46

Why does Sabey make the BACT determination when that is the responsibility of Ecology? Has Ecology or the State of Washington entered into an agreement, whether formal or not, that data centers locating in Quincy will not be required to use air pollution controls?

Ecology Response to Comment #46
Sabey proposed BACT. Ecology reviewed and accepted Sabey's proposed BACT because it was deemed to meet appropriate guidelines.

Comment #47
Sabey is using the same background numbers as Vantage, but Microsoft's Oxford has added 32 engines, Amway has natural gas boilers, and condensable and cold start emissions were not considered with many of the permits. Please revise the background concentrations to include Oxford, Amway, condensable and cold start emissions and then model for compliance with NAAQS, WAAQS, TAPs and the community wide cancer risk before issuing this permit. Please provide proof of these corrected emission factors and modeling.

Ecology Response to Comment #47
The analysis used for Sabey followed acceptable procedures for estimating their direct impact by using the most recent methods of estimating emissions combined with an estimate of background concentrations. Background concentrations of criteria pollutants have been calculated for Washington, Oregon, and Idaho using a combination of air quality model runs and observations (http://lar.wsu.edu/nw-airquest/lookup.html). This technique uses observed concentrations to reduce model errors to produce a best estimate of background concentrations in unmonitored areas. Nearby (competing – generally only those on the east side of Quincy in the case of Sabey) sources were modeled with their permitted emissions as required by Appendix W of 40 CFR 51. Emissions from Microsoft's Oxford facility and from Amway were not included because they are on the other side of town and assumed to not overlap with emissions from Sabey.

Ecology has agreed to go beyond any permitting requirements to periodically complete community wide modeling which will include many of the more recent estimating procedures.

Comment #47a
For over 8 years Ecology impermissibly allowed data centers in Quincy to model emissions based on the NSPS limits which do not consider the condensable portion of the particulates emitted and does not consider the cold start "black puff', which is exempted during performance testing of the engines prior to entering the market place. 40 CFR 89.406 and .407. In their haste and enthusiasm to permit as many data centers as possible in Quincy, the agency charged with protecting our health has failed in its mission. The agency has acted as a broker of air, rather than a protector of it; and only time will tell what cost will be paid by the health of our community.

Please reject this permit and require that an honest attempt be made at modeling.

Ecology Response to Comment #47a
In issuing the earlier data center permits, Ecology considered PM emissions using the analyses accepted at the time the permits were issued based on the scientific information available at the

time. Since that time, understanding of the contribution of condensable PM and cold starts has increased. Accordingly, in analyzing this new Sabey permit, Ecology is taking into account the new information available concerning cold starts and condensable PM. Ecology has no basis for denial of the application: we have required all available and technically defensible analyses, all required controls, and we've required suitable limitations through the conditions of approval.

Comment #48

One thing that I forgot to note in my comments was that the Caterpillar bids were based on only 6 DOCs, DPFs, etc., rather than on 34 units. My question for Sabey and Ecology is isn't there a discount on that many units?

Ecology Response to Comment #48

Ecology does not know whether such a discount exists. The cost per control units provided in the application are approximately similar to other recent data center estimates.

Comment #49

My comments are a large file so I am sending them again in 2 emails, plus an additional one that includes Jim Wilder's cold start factor that is based on the same example I provide in my comments today. I am asking for Ecology to review the cold start factor excerpt information against the information that Jim Wilder derived from the same example. I would like to know if they comport.

Ecology Response to Comment #49

The cold start factors used in the Sabey analysis are based on the same information that was used by Jim Wilder. The approach used for Sabey is similar to the approach used by Jim Wilder. Please see Response to Comment #34 for a detailed discussion regarding cold-start adjustments to emission calculations.

Comment #50

Attached are the cold start factors that Jim Wilder used during the Dell permitting. If these are not the ones he has used here I would like to know how the latest ones were derived. I also want to know how these calculations comport with the graph he and I both used that show 24.3, 22.5, 55.4 and 17.7 g/kW-hr for CO, THC, NOx and PM respectively.

Ecology Response to Comment #50

Please see Response to Comment #34 regarding cold-start adjustments to emission calculations.

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DANNA DALPORTO, COMMENTS 51-67

Comment #51

My first comment is to express my concern for the timing of the public comment period. The public was presented the complex operational changes to the Sabey permit in the thirty-day period from December 10, 2015, to January 10, 2016. (Exhibit A) These 30 days bracket the Christmas and New Year celebration time. This is family time. This season of the year is when college students return home for vacations and family from far and wide come home for celebrations. I feel that choosing this time period was intended to limit public involvement and is a hindrance to the public comment process. This annoying and inconsiderate choice of timing for public comment has been done before. The public comment period for Vantage was December 11, 2012 to January 11, 2013. (Exhibit B)

The Sabey permit revision started with documents being submitted to Ecology in March 2015. The various documents were revised and a letter was sent to Karen Wood of Spokane Ecology on November 16, 2015, indicating that the public comment period could begin "when you are ready to do so." (Exhibit C) I read that statement and concluded that the public comment period could have been earlier in 2015 and not during the Holiday Season. I have contacted Ecology and requested specifics on who chose the December 10, 2015-January 10, 2016, dates for public comment.

Ecology Response to Comment #51

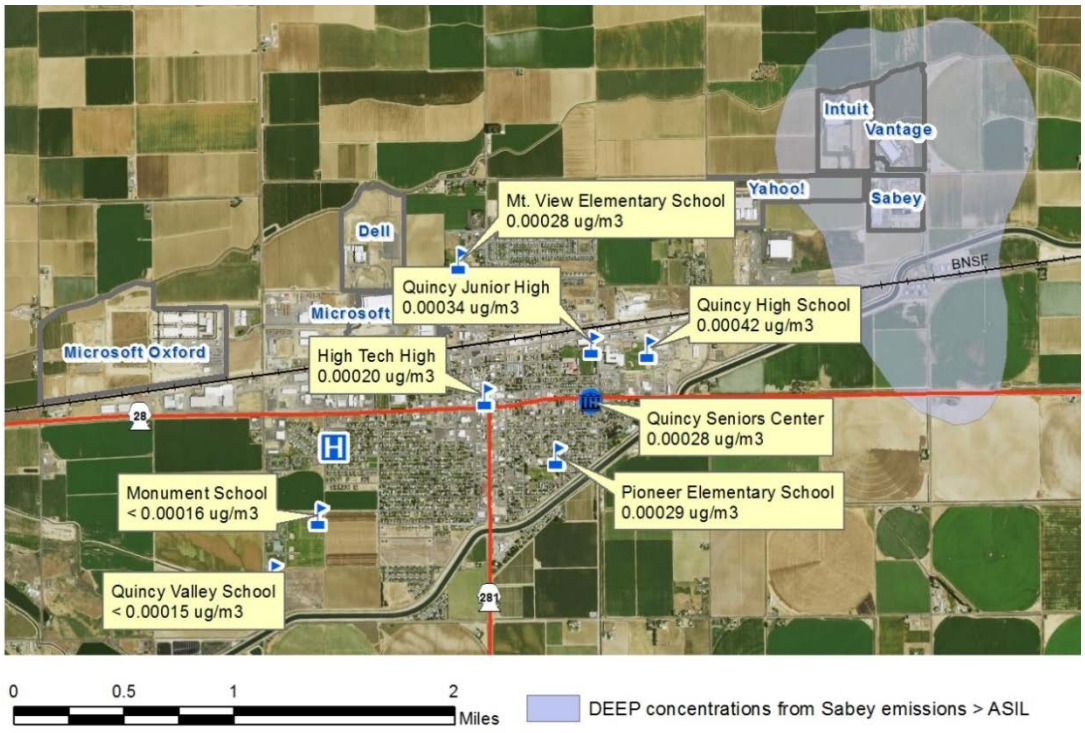
Ecology has made significant efforts to involve the Quincy community in data center projects. Many steps must be accomplished prior to starting a Public Comment Period. The process of initiating a Public Comment Period in Quincy consists of several chronological procedures – including translating public notices into Spanish, and placing ads and notices in relevant newspapers – which usually takes anywhere from two to four weeks to complete. All this must occur after our technical staff have prepared their preliminary decisions on the projects and have all of their paperwork ready for public review. In this case, it took Ecology staff from November 16 to December 10 to take the steps required to initiate the public comment period. Ecology could not delay the Public Comment Period until after the holidays because the Clean Air Act requires Ecology to make timely decisions on project proposals.

Comment #52

The March 2015 Revised HIA/Sabey Risk Analysis has a chart of Exposure Frequencies for Each Receptor Type. The chart lists the exposure of School-Student as 7 (years) Elementary and 4 (years) for HS and College. (Exhibit D) I believe the data is incorrect. The Quincy school system is a K-12 system so Quincy children are exposed to the cancer causing agents for 13 years. I do not understand the category for college student, as there is no college in Quincy. I request the Sabey documents represent the facts.

Ecology Response to Comment #52

When evaluating the possible exposure to toxic air pollutants at a given receptor, Ecology considers the land use surrounding the emitting facility. For example, people are more likely to be exposed frequently and for a longer duration if the source impacts residential locations because people spend much of their time at home. In this case, people working in offices or attending school in the area are likely only exposed to Sabey related DEEP during the hours that they spend working or attending school near the facility. In the HIA, Landau Associates presented general exposure durations and exposure frequencies which apply to specific receptor activities. Because Sabey's emissions did not result in estimated diesel particulate concentrations in excess of the diesel particulate ASIL at any school in Quincy, Ecology did not require that Sabey specifically evaluate school exposures.



Regardless, the commenter is correct in that there is no college in Quincy.

In order to be fully responsive to the comment, Ecology analyzed a school scenario in which a child is exposed to Sabey's allowable DEEP emissions for his or her entire K-12 schooling. The estimated increased risk of cancer for a K-12 student in Quincy schools attributable to Sabey's allowable emissions is approximately 0.003 in one million. This estimate, shown in the following table, assumes a child begins at Pioneer Elementary (K-3) and progresses to Monument Elementary (4-6), Quincy Junior High (7-8), and Quincy High (9-12).

The formula used to determine lifetime increased cancer risk posed by Sabey's DEEP emissions is:

Risk = $\frac{C_{air} \times URF \times EF_1 \times EF_2 \times ED}{AT}$

Parameter	Description	Units	Pioneer Elementary (K-3)	Monument Elementary (4-6)	Quincy Junior High (7-8)	Quincy High (9-12)
C_{air}	Concentration in Air at Receptor Location	ug/m3	0.00029	0.00016	0.00034	0.00042
URF	Unit Risk Factor	$(ug/m3)^{-1}$	0.0003, or alternatively 300 per million per ug/m3			
EF1	Exposure Frequency	Days per year	190			
EF2	Exposure Frequency	Fraction of Day	0.333			
ED	Exposure Duration	Years	4	3	2	4
AT	Averaging Time	Days in a 70 yr lifetime	25550			
Risk	Lifetime increased risk of Cancer	Risk per million	0.00087	0.00036	0.00050	0.00125
Total Risk K-12			0.00298			

Comment #53

Throughout the Sabey documents the emissions are listed as 70-year averages. (Exhibit E) (Exhibit F) The Quincy data center construction has been built for the long- term and the community has been lead to believe that 70+ years will be data center effective life. In the Sabey Technical Support Documents for Preliminary Determination, November 16, 2015, the evaluated cost effectiveness of installing and operating DOC's was discussed. Bullet number four of page 15 explains the "annualized" costs over 25 years are $182,094. (Exhibit G) In all of the BACT and tBACT data for emission controls, Ecology gives costs and expenses for the emission controls and most always states that controls are not cost effective and therefore are rejected as BACT and tBACT. The "annualized" costs over 25 years are very different than the "annualized" costs over 70 years. I want to see the calculations used by Ecology and data center developers to determine cost effectiveness for emission controls. If the "annualized" numbers are based on 25 years and not 70+ years, the effective life of these diesel engines, I believe the price for controls would be more affordable and the public should expect emission controls on all the data center diesel engines. The cost of the emission controls is surely a business expense and therefore a business deduction so Quincy residents do not understand why data center

developers and Ecology do not insist on emission controls to protect the public. To repeat myself: I want to see the calculations used by Ecology and the data center developers to determine cost effectiveness for emission controls. If I do not understand the calculations, I want Clint Bowman of Ecology to explain the process to me.

Ecology Response to Comment #53

The BACT analysis is based on EPA manual EPA/452/B-02-001, which uses annualization periods from one to 25 years. 25 years in this case is the expected life of equipment. With the exception of buildings, few objects have lifetimes longer than a few decades. Therefore their annualized costs use the expected lifetime of the equipment. To extend the calculation beyond the lifetime of the equipment would require including the capitol cost of replacement. Each lifetime would be expected to incur the same expenses (neglecting inflation and any cost reduction due to improvement in production). In the case of Sabey, the annualized cost after 75 years (end-of-life of the third set of equipment) would be the same as the 25 year cost used in the application.

70 years is related to human life expectancy, and is the value currently used for assessments of long-term health risks of exposure to carcinogens.

Sabey's application, which can be found on Ecology's data center website, provides the calculations used for the BACT analysis. In addition, Section 4.2.1.2 of the technical support document (TSD) (also posted on Ecology's data center web site) provides an example of how BACT costs were calculated. The TSD also explains why Ecology accepts tier 2 engines as BACT and is not requiring tier 4 emission controls.

Comment #54

"Black Puff ' cold-start considerations are new to me in the Quincy data center permits. The chart on Landau Associates 2015 Response Letter\Revised Sabey-Quincy AO Revision Request, page 2 (Exhibit F) states that "Black Puff ' is "accounted for in the annual-average and short-term emission rates and AMEROD modeling". My comment is the annual average for Sabey Quincy "Black Puff ' is not possible to determine. The frequency of cold starts is an unknown. In reading the Sabey permit application, there are many unknowns because the Sabey facility will have up to eight different tenants in the building. The eight different tenants would be operating their own engines so each tenant could have very different operating behaviors therefore the number of "Black Puff" starts is impossible to know. The amount of material expended in a cold start is considerable so making an average of that amount will not be accurate. Explain how Sabey can average in the "Black Puff ' cold start into their short-term emission rates without knowing the operational patterns of their tenants.

Ecology Response to Comment #54

All tenants at the facility are required to meet the conditions in the permit, which are based on conservatively high estimates of engine usage. For example, as discussed in Response to Comment #34, the actual number of cold starts per engine per year is about 16. The analysis for

this permit assumed 39 cold starts per engine per year - more than double the actual number of cold starts that have been occurring.

Refer to the Response to Comment #34 for a thorough discussion of cold starts.

Comment #55

The Preliminary Determination for Sabey Intergate lists in EQUIPMENT a variety of engines and manufacturers that can be permitted in the facility. The 2011 and 20115 emission data for the permit was compiled from the original engines: Caterpillar 3512C-1.5 MWe, Caterpillar 3516C-2.0 MWe. (Exhibit H) The various engine manufacturers have their 9wn emission data based on the operation of their engines. With the addition of as many as four new engines with two different manufacturers, I believe it will be necessary to compile all new data for the Sabey Intergate emissions based on these different engines. Because of these unknowns, as well as the unknown operational patterns of the Sabey tenants, the technical assumptions for this permit cannot be valid and therefore Sabey Revised 2015 Permit cannot be valid.

Ecology Response to Comment #55

Regardless of which manufacturer ultimately supplies the engines to Sabey, the engines must meet the requirements and conditions in the permit. Sabey has shown that if the engines meet the emission limits contained in the permit, the facility will satisfy the NAAQS and the requirements for toxic air pollutants.

Comment #56

In the Preliminary Determination, November 16, 2015, Ecology is allowing Sabey to install new engines up to July 1, 2019. (Exhibit I) This date, so far in the future, does not satisfy my need and request for Ecology to monitor the development and build-out of this facility. Because of the complexity of the tenant control of the engines, I am concerned about the concurrent running of the engines and the number of cold-starts to emit toxins. I want to be able to see the operational logs as well as the records of the coordination communications with other data centers intended to minimize engine emission impacts (Exhibit J) and I want Ecology not to allow the build out to continue to 2019.

Ecology Response to Comment #56

The timing for the installation of the engines for the three Sabey phases is based on tenant occupancy/demand, which is unknown at the time this permit is being written. Conditions 2.4 and 10.1 of the new permit require that Sabey begin construction within 18 months of issuance and allow engines to be installed at the facility until July 1, 2019. These conditions are consistent with the provisions in Washington Administrative Code 173-400-111(7) and provide Sabey with some flexibility in the building schedule.

The analysis for this permit modeled 39 cold starts per engine per year - more than twice the actual 16 cold starts per engine per year - and found that even with this high number of cold starts, the emissions meet Second Tier Toxic Review Approval criteria and the NAAQS. In

addition, Condition 1.4 of the permit requires the tenants to coordinate operations to minimize community impacts. Finally, all the tenants at the Sabey facility are responsible for ensuring the facility does not exceed the annual emission limits set in the permit for all pollutants.

Ecology has added new reporting requirements (see Conditions 9.2.1, 9.2.2 and 9.2.4). Together, the reporting requirements in Section 9 of the permit will provide Ecology with sufficient information to determine whether the facility is operating in accordance with the requirements of the permit. Information reported to Ecology is available to the public upon request.

Comment #57

In the Preliminary Determination, November 16, 2015, Ecology is allowing five years (60 months) to pass from the initial testing of an engine (each size engine from each manufacturer) for the repeated testing of that type of engine. (Exhibit K) Five years is too long between testing to check out the emissions of engines. I want Ecology to explain why they are allowing 5 years between testing.

Ecology Response to Comment #57

Ecology has found that addressing controller factory set-up errors during post-commissioning testing can minimize the likelihood of poor performing engines. Ecology believes that the testing frequency required by this approval order will demonstrate whether the engines continue to satisfy the compliance criteria (emission limitations) in this approval order. Testing the engine with the most runtime hours every five years reduces emissions compared to more frequent testing, yet also allows monitoring of engine performance of the most used engines.

Comment #58

The operation of engines in the Preliminary Determination is very confusing. On Page 5, Table 3.2, the Annual Engine Operating Restrictions list the average Operating Electrical Loads (%) as Zero to 50% for Monthly Testing. Testing at 50% does not represent the worst-case scenario for some toxic emission. How can Monthly Testing not be done at a range of loads? (Exhibit L) On Page 7 of the same document, Section 4.2 and 4.3.2 list compliance with Tier 2 average emission limits and has specific electrical loads to determine emissions: 100%, 75%, 50%, 25% and 10%. (Exhibit K) The previous data center documents had these specific load percentages for emission testing. Page 8, 9 and 10 of the Preliminary Determination has those same Operating Electrical Load percentages. (Exhibit M) I want Ecology to explain the variations in the charts that would allow Monthly Testing to be done from Zero % to 50 % and not at the 100%, 75%, 50%, 25% and 10% levels.

Ecology Response to Comment #58

The comment appears to confuse the monthly testing required to ensure that the engines are operational with the 5-mode stack testing required to determine whether the engine emissions meet the requirements of this permit. Monthly testing is implemented by Sabey (and tenants) for maintenance purposes, whereas stack testing is a monitor of compliance with emission limits consistent with NSPS requirements for tier 2 engines. Ecology is allowing variation in loads for

monthly testing because Sabey has demonstrated that proposed loads in Table 3.2 of the permit are in compliance with the NAAQS.

This permit allows Sabey to perform the monthly testing at any load between 0% and 50% because experience has shown that this range of loads reflects the real world needs for operating the engines during monthly testing. In order to authorize Sabey to run the engines at any level within this range of loads, Ecology required extensive modeling to demonstrate that no matter the load, emissions from the engines will meet the requirements of the NAAQS and the ASILs.

Comment #59

Two references were made in Sabey documents to the data from the Microsoft Oxford Permit 2015. (Exhibit N) (Exhibit O) There are two incorrect assumptions from these documents. First, the "Black Puff" factors derived from the 15-minute cold start is not correct. The factors from cold start are to be determined from a 30-minute time frame. Second, the Microsoft Oxford Data Center 2015 Permit is experiencing yet another revision (third?) and has not been finalized. No information should be used from an incomplete document that has yet to be approved by Ecology.

Ecology Response to Comment #59

See the Response to Comment #34 for a complete discussion of the cold start factors used for analyzing the emissions from Sabey's engines and why they are appropriate. The Microsoft Oxford data center is operating under Approval Order No. 14AQ-E537. The current effort to revise Approval Order No. 14AQ-E537 does not involve any changes to the cold start black puff factors that were used for analyzing emissions from the Microsoft Oxford engines for Approval Order No. 14AQ-E537.

Comment #60

I am referencing a November 16, 2015 letter from Chris Hanlon-Meyer, Science and Engineering Section Manager, Air Quality Program, Washington Department of Ecology to Ms. Karen Wood, Department of Ecology, Eastern Regional Office, Spokane, Washington. (Exhibit C) This letter talks about the March 2015, Sabey submittal to revise their permit to allow their generators to operate over a wider range of operating loads. This increases air pollution. This letter describes the previous Sabey estimate was seven (7) in one (1) million from cancer to a new estimate of 9.9 in one (1) million.

Another document (Exhibit P) determines that concentrations exceeding 0.0333ug/m3 (10 in one million) occurred in portions of a residential parcel near Sabey. Ecology documents limit individual data centers from exceeding the 0.0333ug/m3 (10 in one million). I want to know how this permit can be allowed if the 10 in one million has been exceeded. Over ten in one million cancers is a violation of the per cancer rate, per single facility, to be allowed in Quincy.

Ecology Response to Comment #60

Sabey originally proposed an annual average emission limit of 0.467 tons per year of diesel particulate. Modeling demonstrated that this emission limit would result in an increased risk of more than 10 in one million excess cancers on portions of the maximally impacted residential parcel north of Sabey. Ecology therefore lowered the annual average emission limit to 0.408 ton per year to ensure that the increased cancer risk would be below 10 in one million at all portions of the maximally impacted residential parcel north of Sabey. To demonstrate compliance with this limit, Sabey must record and report their annual emissions each year.

Comment #61

Exhibit P has a footnote that Sabey has agreed to accept lower emissions limits that what was reported in the HIA. The footnote about the lower emissions possibly refers to an email exchange between Jim Wilder (Landau-Sabey) and two Ecology employees, Gary Huitsing and Gary Palcisko. (Exhibit Q) This dialogue in May 2015, discusses the inability of Sabey to be below 10 in one million facility wide cancer risk. The Sabey engineer offers: "Sabey wishes to revise the Tables 5.2-5.5 of the Approval Order, so the revised per generator hourly emissions limits will match the revised, conservative lbs/hr emissions rates we used for our revised application". Hustsing [sic] responds that a "separate report is not necessary. We accept the email below as documentation of Sabey's concurrence to reduce the facility-wide DEEP emissions limit so that the calculated risk …is less than the 9.9-per-million." Following Hustings [sic] acceptance of an email (instead of a revised document that could be reviewed by Ecology and seen by the public) for Sabey intent to lower emissions, Palcisko reports the calculations need to be further adjusted to make the risk lower that the highest reported risk of 11 per million. The permitting requirements for air quality indicate that the modeling must be done based on the "worst case scenario" and not a toxicologist's suggestion to keep the emissions under a certain tonnage. At the end of the emails, Wilder states that Sabey will "have no difficulty complying with the 0.408 tpy limit". The 10 per million cancers is one of the benchmark requirements of the method Ecology is using to permit data centers in Quincy. As far back as May 2015, Sabey was having difficulty meeting that benchmark. I am astonished to see the casual way this issue was handled. Ecology is accepting an email for a permit instead of requiring a revision of the testing and a correction of the documents? I want to see how that statement is reflected in the permit. I want to be able to read this permit and know that Sabey is operating properly and safely. I suspect Sabey is tinkering with the operating loads to lower emissions. In the past, the public has not been allowed to see the operating records. Quincy residents do not know if these modifications are being followed to protect the public. I want to know how Sabey can be allowed to operate, without emission controls, and still be within the limits of Ecology standards. Explain to me how this permit was determined to be valid with these operational flaws.

Ecology Response to Comment #61

In accordance with the emails identified in Comment #61 and Ecology's Response to Comment #60, Condition 5.7 in the draft permit specifies "DEEP emissions from all 44 engines combined shall not exceed 0.408 tons/yr (816 lbs/yr), on a 36-month rolling basis". Modeling showed that

if DEEP emissions are limited to 0.408 tons/year the excess cancer risk caused by those emissions will remain below 10 cancers per million, as required by Ecology regulations.

Condition 9.2 requires "The following information will be submitted to the AQP at the address in Condition 7 above by January 31 of each calendar year. This information may be submitted with annual emissions information requested by the AQP:
9.2.1 Monthly rolling annual total summary of the air contaminant emissions of concern in this permit;
9.2.2 Monthly rolling hours of operation with annual total;
9.2.3 Monthly rolling gross power generation with annual total as specified in Approval Condition;
8.4, 9.2.4 A listing of each start-up of each diesel engine that shows the purpose, fuel usage, and duration of each period of operation."

This information, once Ecology receives it from Sabey, is available to the public upon request.

Comment #62
Referencing the November 16, 2015, letter from Chris Hanlon-Meyer to Karen Wood, Ecology has determined that cumulative impacts of DEEP emissions in the area of Sabey have increased cancer risk up to approximately 58 in one million at a location about 3/4 mile south of Sabey near State Route 28. (Exhibit C) A reason is given that most of the DEEP exposure is from trucks traveling on the highway. I have looked at the maps of the modeling for DEEP and the cumulative plume from Sabey, Intuit, Vantage and Yahoo all overlap with the highway emissions. (Exhibit R) The highway emissions would not be a 58 in one million cancer risk by themselves·. The conclusion is that the location of these data centers and their emissions has greatly increased the risk of cancer for anyone living in that area. Studying the Ecology-developed map illustrating the DEEP concentrations the Microsoft Oxford facility, I looked at the emissions surrounding the train track and highway 28. The Oxford map shows no concentrations of DEEP along the train track and highway 28 just west of the Oxford facility. (Exhibit S) These are the same transportation routes that Chris Hanlon-Meyer determines to be the reason for the elevated cancer risks south of Sabey. I believe these maps clearly show the data centers to be the cause of the increases in DEEP south of Sabey. I want to know how Ecology can permit a data center with toxic emissions that overlap with background emissions and raise the cancer risk to 58 in one million. Sabey must put emission controls on the diesel generators to protect public safety.

Ecology Response to Comment #62
The reason there appears to be no concentration of DEEP related to SR 28 and the train track west of the Microsoft Oxford data center in Exhibit S is that the inputs to the dispersion model did not contain emissions from these sources much beyond the western extent of the Oxford facility.

The relative contribution of Quincy Data Centers to DEEP exposure in Quincy depends on location. Ecology evaluated residential exposures to DEEP in the area where Sabey's allowable emissions would result in levels above the ASIL. In Table 3 of the HIA recommendation document (available at http://www.ecy.wa.gov/programs/air/quincydatacenter/docs/RevHIStmt.pdf), Ecology presents the contribution of each source of DEEP to the total cumulative DEEP risk. At the **maximum cumulatively exposed receptor**, which is located south of Sabey and where the excess cancer risk is 58 in one million, approximately 86% of the estimated DEEP exposure (causing 49 excess cancers per million) comes from SR 28. Conversely, at the **maximally impacted residential receptor,** which is located north of Sabey and has an excess cancer risk of 28 in one million, 83% of the estimated DEEP exposure (causing approximately 23 cancers per million) comes from allowable emissions from the data centers (Sabey (33%), Vantage (22%), Intuit (17%), and Yahoo! (10%)).

The law generally requires Ecology to analyze emissions of toxic air pollutants on a project-by-project basis and to authorize the construction and operation of any project that increases excess cancer risk by less than 10 in a million. Recognizing the limits of this approach in light of the number of data center projects locating in Quincy, Ecology adopted the community-wide approach, which may require the use of additional controls (more than BACT), once the number of excess cancers from all sources of DEEP in Quincy reaches 100 per million in areas where the potential for ambient impacts from data centers is substantial. The Sabey project meets both parameters: DEEP emissions from the project itself will cause fewer than 10 excess cancers per million, and with the Sabey emissions, excess cancers per million caused by DEEP from all sources in Quincy are still below 100 in a million.

Comment #63

The Technical Support Document, November 16, 2015, made a statement about the "community-wide basis": In light of the rapid development of other data centers in the Quincy area, and recognizing the potency of DEEP emissions Ecology decided to evaluate Sabey's proposal in a community-wide basis, even though it is not required to do so by state law. (Exhibit T) I have complained about the community-wide construct in other public comments and I will continue to do so. The community-wide basis is a fabrication. Ecology has never submitted this "formula-invention" to a peer review and it is not part of the Ecology rules or guidelines that have been part of established Ecology operational procedure. This guideline only applies in Quincy. There is no rule or law on record that community wide has been approved as an Ecology benchmark. When the gates were opened for multiple data centers to be built in close proximity in Quincy, Washington, Ecology invented the magic number of 100 per cancers in a million as an arbitrary standard for limits on construction. By doing this, as long as the cancers were below 10 in a million for each facility, the construction could continue with no apparent limits on dangerous emissions such as N02 and the taps. The community wide is a shield for Ecology to allow data center construction to smother Quincy in toxic air. If community wide had any validity, the 58 cancers per million south of Sabey would trigger emission controls on Sabey as well as all of the data centers east of Quincy.

Ecology Response to Comment #63

The community-wide approach was conceived as a result of concerns about the possibility of rapid development of data centers in Quincy. Ecology was concerned that multiple data centers could be closely located and cause incremental risks that would be allowable by rule, but yet result in cumulative impacts of concern. Washington's air toxics rule (WAC 173-460 Controls for New Sources of Toxic Air Pollutants) still applies to all new sources proposed in Quincy or anywhere else in Washington. This rule is intended to limit the amount of toxic air pollutants emitted by new sources of air pollution. One aspect of the community-wide approach that is different is that an additional consideration is made to evaluate risks posed by existing sources of diesel particulate in addition to the risks posed by a new source.

The community-wide limit of 100 excess cancers per million was developed after looking at requirements adopted in other states and at federal requirements adopted by US EPA. The Pollution Control Hearings Board has ruled that this community-wide limit is not arbitrary or capricious. See *MYTAPN v. Ecology and Microsoft*, PCHB No. 10-162, Order On Summary Judgment, September 22, 2011.

It should be noted that engines meeting EPA's tier 2 standards have emission controls. Otherwise, they would not be able to meet the tier 2 standards.

Comment #64

The Sabey Intergate-Quincy Data Center Technical Support Document, November 16, 2015, uses five years of sequential hourly meteorological data 2001-2005 from Moses Lake Airport. (Exhibit U) 40 CFR 51 Appendix W 8.3.1.2 Recommendations are that the years used for the air quality model should be from the most recent, readily available 5-year period. (Exhibit V) This 2001-2005 data is ten years old. In the 2011 application Sabey used 2004-2008 meteorological data. Explain to me why Sabey is allowed to use older (2001-2005) weather data for the new 2015 Permit? Weather is not constant and I believe that data centers developers should use recent data, as recommended by 40 CFR 51 Appendix W 8.3.1.2. I believe that Ecology should require use of current data. I have argued in the past that use of Moses Lake Airport data does not represent weather in Quincy. Ecology response to Comment 35 in the Microsoft Oxford Public Comment Document, July 9, 2015, *, appears to be the basis for Ecology choosing Moses Lake Airport as the standard for meteorology for Quincy. Ecology makes this statement: "In previous actions, the Pollution Control Hearings Board (PCHB) has agreed that Moses Lake meteorology is sufficiently representative of conditions in Quincy to provide a basis for air dispersion modeling in Quincy." (Exhibit W) I am requesting the document that verifies the statement that the PCHB agreed on Moses Lake for Quincy air. My question to Ecology is this: In what way does the Pollution Control Hearing Board have a scientific foundation to make the determination about the weather in Quincy? I think this determination has no basis in scientific fact and I do not accept this finding. The City of Quincy must have a monitor for air quality and weather. Ecology continues to deny Quincy residents an honest and true window into the air quality of our community. Ecology reports that personnel and funding are the basis for not having air monitors. I regret that I cannot accept

those reasons and I will continue to argue for technical support, especially if Ecology continues to permit facilities in Quincy without actually knowing the air quality. I believe that Ecology is avoiding the instillation of an air monitor because the monitor would verify that Quincy air is toxic. The placement and the timing of a monitor is critical. An air monitor must be placed to collect the most representative air samples and the monitor must be installed for J6S days (one entire year). The recent extended inversions need to be captured as well as the cycles of wind and weather from the Columbia River. Everything being done in Quincy is being done on modeling and technical calculations. I think it is well past time to find out how reliable these mathematical computations are. I am requesting air monitors for Quincy and a recent meteorological basis for modeling. *The Microsoft Oxford 2015 Permit is still not finalized and the public comments from the July 9, 2015, Microsoft Oxford Public Hearing have not been published.

Ecology Response to Comment #64

It does not matter whether the modeling uses meteorological data from the 2001-2004 time period or the 2005-2008 time period. This is because the inter-annual variation of meteorology is sufficiently consistent that data from the same station for any five year period meeting quality assurance and completeness requirements will provide substantially the same results. In addition, the equipment and procedures for taking and reporting weather observations at airports have changed little since the installation of automated (ASOS) equipment. The requirement for a contiguous five year period reduces the possibility of cherry-picking, and the choice of a particular five year period for the analysis cannot be depended on to confer an advantage to the applicant.

Ecology's modeler has repeatedly explained to the PCHB why meteorological data from Moses Lake provides a better estimate of weather in Quincy for purposes of determining air dispersion than meteorological data from Ephrata. The PCHB has acknowledged such in the previous data center appeals, stating, for example, in its decision in the Yahoo appeal, "Ecology's air modeling expert offers a technical opinion that the effects of the slight variations in topography between Moses Lake and Ephrata or Quincy would be very subtle, and any resulting effect on the air dispersion modeling would be to understate dispersion in Quincy and overstate the concentration of pollutants."

Ecology is aware of the commenter's interest in monitoring and cause and effect studies for the Quincy area ambient air. Ecology continually evaluates monitoring needs across the state of Washington, prioritizing its monitoring efforts within available funding and staffing levels. As part of this effort, Ecology recently completed a thorough review of its statewide ambient air monitoring network and is evaluating many areas, including Quincy, for potential future monitoring. Ecology is currently exploring avenues to fund and staff a potential monitor in Quincy, particularly to help inform the 2017 Community-Wide Risk Analysis to be completed under PCHB Order.

Comment #65

The Revised HIA\Sabey Risk Analysis, March 3, 2015, reports that Landau used "The local background emissions estimates from the Vantage Data Center- used in this HIA-were previously derived in that project's HIA (ICF 2012)". (Exhibit X) Recent considerations in emission testing have taken into account the large amount of material involved in "Black Puff" cold start. Using the 2012 Vantage background data is not reliable or current and not acceptable for the veracity of this application. I want to know how Ecology would read this information and not request a proper background emission test. I am requesting a revised, updated and accurate background test for the permitting of Sabey engines.

Ecology Response to Comment #65

Contrary to the statements made in Comment 65, the background emissions from the Vantage Data Center used for the Sabey analysis did include "Black Puff" cold start factors. The background concentration of diesel particulates used in the Sabey analysis assumed the existing data centers emit all the diesel particulate they are permitted to emit. In determining the permitted emissions of diesel particulate from the Vantage Data Center, ICF used "Black Puff" factors to account for higher emission rates from colder engines. These "Black Puff" factors are similar to those used in estimating emissions from Sabey.

Comment #66

The Sabey-Intergate facility has different operational issues than the standard commercial, company owned facility. Having as many as eight different tenants, each operating independently, has made for many unknown factors affecting this permit. (Exhibit Y) Are each of these tenants going to have their own diesel engine operator? How can the public know if these engines are operating under the guidelines of a permit? The March 2015 Revised AO Request describes some of the operational variations for this facility. Sabey has asked to use two different models of two different manufacturer's engine in the further build-out of the facility. I do not think this permit clearly defines the operational limits to engine loads and engine cold-start to understand the emission composition. Sabey has asked for more flexibility (operating from 0% to 100%) and if Ecology allows this range of flexibility, there is no way to know if the facility is in compliance with emission limits. Given the necessity for Sabey to lower emissions to be below the 10 per million limit for permit compliance (Exhibit P) (Exhibit Q), I believe that emission controls must be required for the safe operation of the Sabey facility. For public safety, I am requesting that Ecology require emission controls on the Sabey- Intergate Data Center.

Ecology Response to Comment #66

All the engines used at the Sabey facility are required to meet EPA's tier 2 standards. As described in detail in Response to Comment #'s 13, 19, 22, 33, 34, and 35, Sabey has demonstrated through modeling that the facility will comply with emissions limits when operating with the load flexibility listed in Table 3.2 of the permit. Permit record keeping and reporting conditions require Sabey to report the reasons for operating engines, the engine load, and engine duration. From this information, it can be determined if Sabey meets applicable emission requirements in

their permit. In addition, the permit requires that stack testing be performed on at least one engine of every make and model engine used at the facility.

Comment #67

I am requesting colored city-wide emission maps for DEEP, N02, PM2.5, PM10, and Ozone that goes from Oxford east to include Sabey. On the maps I want the 5 public schools, the one private school, the hospital and the Senior Center identified. The other document I want is the regional background for Quincy for the years 2008 and 2015.

Ecology Response to Comment #67

City-wide concentration maps are not available for PM_{10}, or ozone. The only $PM_{2.5}$ map created for Quincy was an early attempt (in 2008) to understand the potential implications of a system-wide power outage in Quincy. This effort relied on assumptions that are not consistent with the current approach to modeling emissions from Quincy data center engines.

The most recent city-wide map available for DEEP was created for the 2014 Microsoft Oxford permit, and was later adjusted to account for increased DEEP emissions as part of the Oxford and Sabey permit revision requests. The most recent city-wide NO_2 outage map was produced in 2014 for the Microsoft Oxford permit. Sabey's revised permit did not increase permitted NOx outage emission rates, therefore, this map was not adjusted. Regardless in response to this comment, Ecology created the following two maps showing concentrations of DEEP in Quincy including emissions from Sabey consistent with the permit revision request, and the estimated recurrence intervals (in years) that NO_2 levels would reach a level of concern if all data centers experienced a simultaneous outage for 8 hours per year. The locations of the schools, hospital, and senior center are identified as requested (Figures I and II on the following two pages).

Figure I.

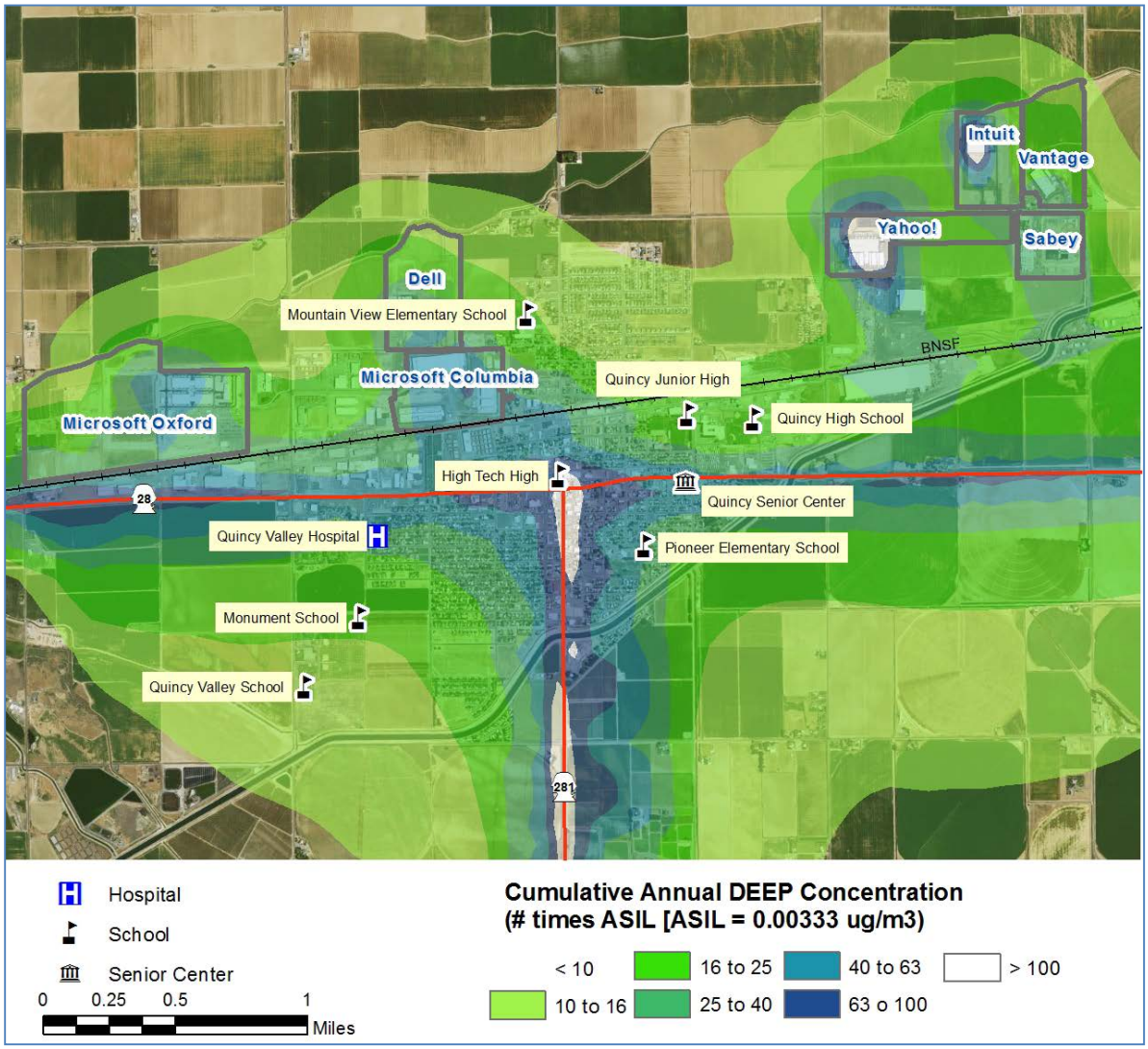
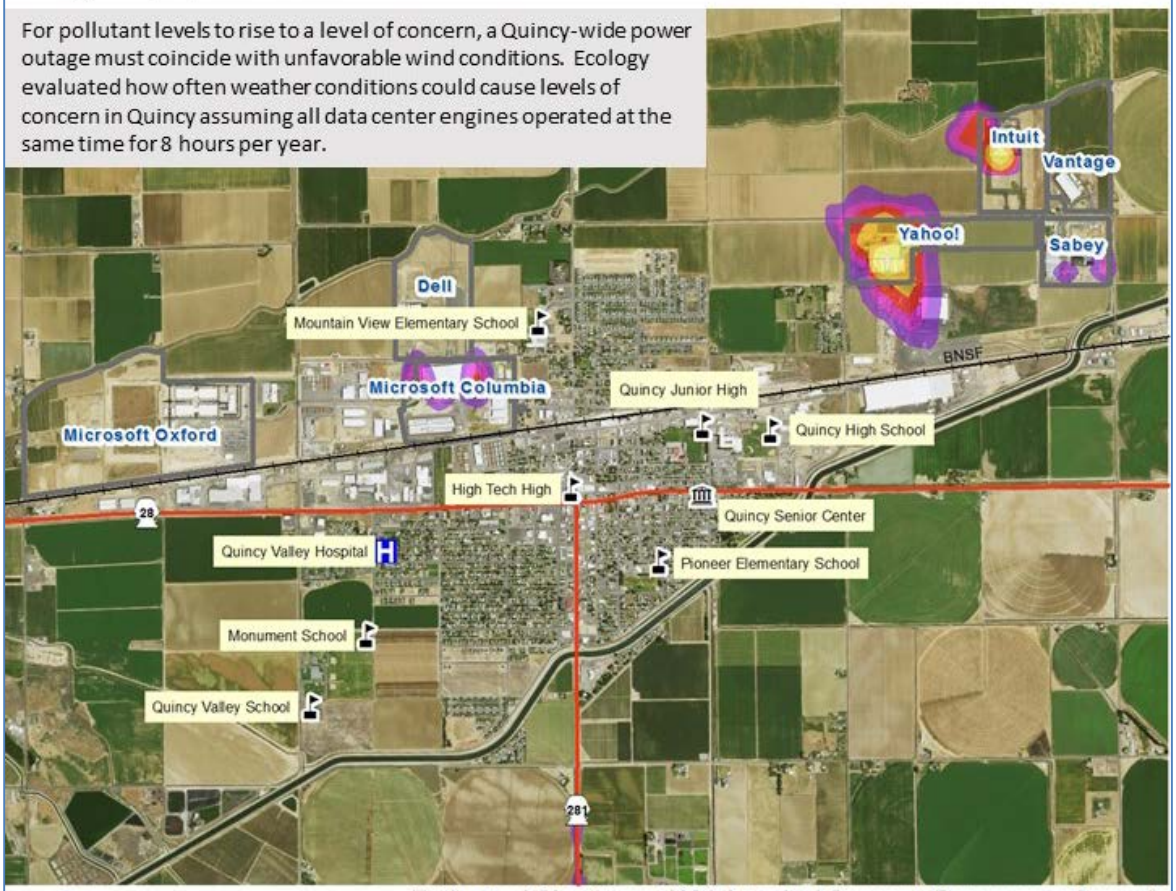

Intuit
Vantage
Yahoo!
Sabey
Dell
Mountain View Elementary School
BNSF
Microsoft Columbia
Quincy Junior High
Microsoft Oxford
Quincy High School
High Tech High
Quincy Senior Center
28
Quincy Valley Hospital
Pioneer Elementary School
Monument School
Quincy Valley School
281
Hospital
School
Senior Center
0 0.25 0.5 1
Miles
Cumulative Annual DEEP Concentration
(# times ASIL [ASIL = 0.00333 ug/m3)
< 10
16 to 25
40 to 63
> 100
10 to 16
25 to 40
63 o 100

Figure II.

If all data center engines run at the same time, how frequently would estimated pollutant levels become a concern?

Colors below represent the amount of time (in years) between each possible pollutant occurrence. A pollutant occurrence means that a pollutant could be present at a level of concern. Occurrences are modeled at 1 hr intervals. Purple means occurrences could happen once every 50 to 100 yrs while white means occurrences could happen once every 2 to 3 yrs. Clear means there is not likely to be an occurrence during most people's lifetime.

For pollutant levels to rise to a level of concern, a Quincy-wide power outage must coincide with unfavorable wind conditions. Ecology evaluated how often weather conditions could cause levels of concern in Quincy assuming all data center engines operated at the same time for 8 hours per year.



Hospital
School
Senior Center
0 0.25 0.5 1
Miles

Estimated Short-term NO2 Level of Concern Recurrence [years] (Model Run April 2014)

2 to 3 | 6 to 12 | 25 to 50 | > 100
3 to 6 | 12 to 25 | 50 to 100

Assumes 8 Hours of System-wide Outage per Year

WILLIAM RILEY, COMMENT 68

Comment #68

I am in full support of the requested changes by Sabey Integrate to enhance by modifying their original Air Quality permit. A personal visit to the site reveals no toxic emissions and the Grant County PUD power outages are rare and of minimum duration. The rapid air movement of the land adjoining the Columbia River and the Quincy area shows minimum risk of stagnant polluted air.

Ecology Response to Comment #68

Ecology appreciates the commenter's support.

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Appendix A:
Public Notices and Outreach Materials

- Press releases – English & Spanish
- Public Involvement Calendar Entry
- Legal notices – English & Spanish
- Display advertisements – English & Spanish
- Public Comment Period Fact Sheet (Publication 15-02-022)
- QUINCY-DATA-CENTERS Listserv emails and Tweets

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Department of Ecology News Release - December 10, 2015

Quincy data center needs revised air permit

QUINCY – A data center in Quincy is proposing to modify an existing air permit to better fit facility operations and growth. These changes require a revised air permit to ensure protection of human health and the environment.

Data centers house servers that store digital data, handle email, manage instant messages and run applications for computers. The Sabey Integrate Quincy data center uses cooling units to keep equipment from overheating, as well as backup generators in case of power outages.

The Washington Department of Ecology is seeking comment on the changes to Sabey's original permit issued in 2011. That permit allowed operation of up to 44 backup generators that run on diesel.

Diesel engine exhaust contains fine particles and other gases that can cause health problems for people who are exposed frequently and at high enough levels.

The proposed changes to the permit include flexibility for potential use of smaller generators and improvements on testing procedures. It also allows a longer term for phased growth and adds clarification to certain conditions. Additional conditions to protect public health from air pollution include limits on the amount of fuel and number of hours the engines can operate.

Submit comments

Comments and questions on the draft air permit should be addressed to Kari Johnson, Department of Ecology, Air Quality Program, 4601 N. Monroe, Spokane, WA 99205.

Comments will be accepted from Dec. 10 through Jan. 10.

Review the revised permit

- Ecology's website
- Ecology's Eastern Regional Office, 4601 N. Monroe, Spokane
- Quincy City Hall, 104 B Street SW
- Quincy Library, 208 Central Ave S

Contact:

Brook Beeler, communications, 509-329-3478, @ecyspokane

DEPARTMENT OF ECOLOGY
State of Washington
http://www.ecy.wa.gov

Departamento de Ecología del Estado de Washington – NOTICIAS – 10 de diciembre de 2015

Un centro de datos en Quincy necesita modificar un permiso de aire

QUINCY – Un centro de datos en Quincy está proponiendo modificar un permiso de aire existente para acomodar mejor las operaciones y el crecimiento de la facilidad. Estos cambios requieren modificar el permiso de aire para asegurar la continua protección de la salud humana y el medio ambiente.

Los centros de datos contienen servidores que graban data en forma digital, manejan correo electrónico y mensajes de texto instantáneo, y corren aplicaciones para otras computadoras. El centro de datos de Sabey Integrate en Quincy utiliza unidades de enfriamiento para prevenir el sobrecalentamiento de los equipos así como también utiliza generadores de electricidad de emergencia en casos de apagones.

El Departmento de Ecología del estado de Washington solicita sus comentarios acerca de los propuestos cambios al permiso original emitido a Sabey en el 2011. Eso permiso permite la operación de hasta 44 generadores de emergencia corriendo en combustible diesel.

El escape de un motor diesel contiene partículas finas y otros gases que pueden causar problemas de salud a personas expuestas frecuentemente y a niveles suficientemente altos.

Los cambios que se proponen al permiso incluyen añadir flexibilidad para potencialmente usar generadores más pequeños y hacer mejoras a los procedimientos de pruebas. También los cambios les permitirá tener un tiempo más largo para crecer en etapas, y provee clarificación de ciertas condiciones en el permiso. Condiciones adicionales para proteger la salud del público contra la contaminación del aire incluyen límites en la cantidad de combustible y el número de horas que pueden operar los motores.

Para someter comentarios

Por favor someta sus preguntas y comentarios acerca del borrador del permiso de aire a Kari Johnson (kari.johnson@ecy.wa.gov), Departmento de Ecología, El Programa de Calidad del Aire, 4601 N. Monroe, Spokane, WA 99205.

Comentarios serán aceptados desde el 10 de diciembre del 2015 al 10 de enero del 2016.

Pueden revisar el permiso en:

- El sitio web de Ecología
- La oficina de la región este de Ecología, 4601 N. Monroe, Spokane
- La alcaldía de Quincy, 104 B Street SW
- La biblioteca de Quincy, 208 Central Ave S

Contact:

Brook Beeler, communicaciones, 509-329-3478, @ecyspokane

DEPARTMENT OF ECOLOGY State of Washington http://www.ecy.wa.gov

Public Involvement Calendar

Public Involvement Calendar

The Public Involvement Calendar is designed to engage the public in our **decision-making process.** We encourage you to read Frequently Asked Questions about Effective Public Commenting.

Activities that are educational only or are co-sponsored by Ecology may be found under the "More Ecology Events" link in the left column of this page. We invite your **feedback** about this Public Involvement Calendar.

Public Hearings, Meetings, Workshops, Open Houses

(Next 21 days. Use the search feature (right) for events beyond 21 days.)

Dec 10 2015 Public Comment Period - Quincy
Jan 11 2016 Sabey Intergate Data Center - Revised Air Permit

Sabey has applied for a revision to their existing air quality permit in Quincy. Sabey was previously permitted to install 44 diesel generators and associated cooling equipment. Sabey has proposed to modify the existing permit to allow for options in engine suppliers, to reduce the size of some of the diesel engines, and to modify testing, monitoring and recordkeeping requirements.

More Information: More Information
Location:

Quincy , WA
Sponsor: Ecology
ECY ERO
Contact: Kari Johnson
(509) 329-3502 / kajo461@ecy.wa.gov

First 1 Last

Search Calendar

This search feature accesses only **decision-making events.**

Search

Select date range:
Today & Next 21 Days

Select city....
All Cities

....or county:
All Counties

Select event type:
All Types

Select keyword:
All Keywords
401
Air
Aquifer

Enter Search Text:

Search

Search Help

Copyright © Washington State Department of Ecology. See http://www.ecy.wa.gov/copyright.html.

Printed Screenshot: 12/15/2015

Public Notices

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY NOTICE OF APPLICATION TO CONSTRUCT AN AIR POLLUTION SOURCE

The State of Washington Department of Ecology (Ecology) has received an application to revise a Notice of Construction (NOC) Approval Order for an existing air pollution source. The Sabey Intergate Quincy, LLC., Data Center (Sabey) submitted a NOC air quality permit application on October 7, 2014, to revise NOC Approval Order 11AQ-E424 issued on August 26, 2011. Sabey Data Center is located at 2200 M Street NE, Quincy, Grant County, Washington.

The NOC application requests the following changes to the existing Approval Order 11AQ-E424:

- Allow any of three manufacturers to supply generators instead of just Caterpillar.
- Allow generators of up to 2.0 MWe instead of specifically 2.0 MWe.
- Assume max theoretical annual emissions may occur in a single year when using 3-year rolling averaging for pollutants with annual average limits.
- Consolidate runtime limits by allowing worst-case emissions approach instead of load-based approach.
- Account for initial generator commissioning and periodic stack testing in DEEP averaging.
- Account for black-puff cold start adjustments.
- Include a recording keeping requirement to demonstrate compliance with the 1-hr NOx std.

In addition, Ecology has included the following provisions to the proposed Approval Order:

- For new engines, at least one representative engine from each manufacturer and each size engine from each manufacturer shall be tested immediately after commissioning.
- Periodic testing to occur every 60 months of at least one engine, including the engine with the most operating hours as long as it is a different engine from that which was tested during the previous 60 month interval testing.
- Extended the permit phased-in installation date from July 1, 2014 to July 1, 2019.
- Added some updated wording for clarity of the applicable regulations.

The primary air contaminant emission units at the Sabey Data Center have not increased with this application. There will continue to be 44 emergency electrical generators powered by diesel engines and 176 cooling units.

Air contaminant emissions from the diesel engines and the cooling units include criteria and toxic air pollutants below major source thresholds. Changes in the operating conditions requested by Sabey will result in the following total potential to emit (PTE) from the existing and proposed diesel engines: Nitrogen oxide (NOx) emissions are estimated to be 23.9 tons per year; volatile organic compounds (VOCs) emissions are estimated at 1.43 tons per year; carbon monoxide (CO) emissions are estimated at 11.9 ton per year; sulfur dioxide (SO2) emissions are estimated at 0.028 tons per year; and lead (Pb) emissions are estimated to be negligible. For toxic air pollutants (TAPs): diesel engine exhaust particulate (DEEP) emissions at full operation are estimated at 0.408 ton per year; and primary nitrogen dioxide (NO2) emissions are estimated at 2.39 ton per year. Several other TAPs will also be emitted in very small amounts. Because the proposed revisions would allow an increase in DEEP emissions, Ecology required a Second Tier Health Impact Assessment to evaluate health risks. Ecology review of these health risks concluded that DEEP impacts to the community due to the Sabey Data Center will meet the protective requirements contained in Chapter 173-460 WAC.

The cooling units will emit particulates (PM10 and PM2.5) estimated at 2.32 tons per year.

After review of the completed Notice of Construction application and other information on file with the agency, Ecology has determined that this project proposal will conform to all requirements as specified in Chapter 173-400 WAC.

Copies of the Notice of Construction Preliminary Determination, the Second Tier Petition Recommendation, the Notice of Construction application, and other relevant documents are available for public review at the following locations:

- Online at http://www.ecy.wa.gov/programs/air/quincydatacenter/
- Department of Ecology, Eastern Regional Office, 4601 N. Monroe, Spokane, WA 99205
- City of Quincy, 104 B Street SW, Quincy, WA 98848
- Quincy Library, 208 Central Ave S. Quincy, WA, 98848

The public is invited to comment on this project proposal. Written comments will be accepted on this proposal from December 10, 2015 through January 10, 2016. A public hearing will be held if Ecology determines that there is significant public interest. For additional information on the project and to submit comments, contact Kari Johnson at Ecology's Spokane Office, 4601 N. Monroe, Spokane, WA 99205-1295, at KAJO461@ecy.wa.gov or 509-329-3502.

To request ADA accommodation for disabilities, call Ecology at 509-329-3400. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341. **Para asistencia en español: Gregory Bohn 509-454-4174, Richelle Perez 360-407-6084, o preguntas@ecy.wa.gov.**

Published in the Quincy Valley Post-Register on December 10, 2015.

Public Notices

Help Wanted

ALL AROUND GENERAL HANDYMAN needed for roofing, painting, yard work, indoor cabinetry, etc. Call Larry at 509-398-5930.
rts

NEWSPAPER CARRIERS needed for once a week delivery of QVPR in Quincy SW section of town. Call Guy at 509-683-3010.
rts

ANNOUNCEMENT OF VACANCY

Positions: Transportation Bus Driver/5 HR
Transportation Specialist 8/HR
School Year: 2015-2016

Visit our website at www.qsd.wednet.edu<**http://www.qsd.wednet.edu**> for complete job-postings and our on-line application process. Contact Velma at 509-787-4571 at the Quincy School District for more information. The Quincy School District is an equal opportunity employer.
12/7

Help Wanted

NEWSPAPER CARRIERS needed part-time, motor delivery for Quincy area. Call Guy at 509-683-3010.
rts

KRB2 Logistics, LLC.

Regional Dry Van Truck Driver (Class A CDL)
Must have a valid Class A CDL.
Must be able to pass a drug test, background check and supply references.
Maintain a safe and clean work environment and driving record.
Conduct oneself in a professional manner at all times.
Must have organizational skills for logging driving hours and loads.
Ensure accuracy of packing slips and delivered loads.
Conduct daily inspection of trucks.
Must comply with all safety & DOT rules and regulations.
$ DOE, Health Insurance
Home weekly.
Contact: 1-509-398-5708
11/19-12/31

Help Wanted

LIBRARIAN POSITION OPEN

Librarian position at the North Central Regional Library's branch in George, WA. The position is 21 hours per week with benefits available. Duties include working with adults and children. Handling all aspects of library duties including the Integrated Library System, shelving, programming, etc. Qualifications include High School Diploma or equivalent, basic computer skills, excellent customer service. Complete job descriptions and applications available at www.ncrl.org , Quincy Public Library, or George Public Library. All applications and resumes need to be submitted to The North Central Regional Library, Attn: HR/Payroll Dept, 16 N Columbia St, Wenatchee WA 98801 No later than Monday, December 14, 2015.
12/10

Services

PIANO LESSONS - Jonathan Pinkerton is also available for weddings, events, accompanying, choirs, instrumentalists, banquets, parties, etc. Call 797-5134.

WINDOW WASHING
by Dan Perry
NEW PHONE NUMBER
(509) 398-2782
Serving Quincy, George, Ephrata, Sunland, Crescent Bar & Western Washington.
It's time to wash those windows!

EL DEPARTAMENTO DE ECOLOGÍA DEL ESTADO DE WASHINGTON
AVISO DE SOLICITUD PARA CONSTRUCCIÓN DE UNA FUENTE DE POLUCIÓN AL AIRE

El Departamento de Ecología del Estado de Washington (Ecología) ha recibido una solicitud para cambiar un Orden Aprobado de un Aviso de Construcción (NOC, por sus siglas en inglés) para una fuente existente de polución al aire. El centro de datos de la compañía Sabey Intergate Quincy, LLC. (Sabey) entregó una solicitud relacionada con su permiso de calidad de aire en el 7 de octubre, 2014, que quiere revisar el Orden Aprobado de NOC #11AQ-E424 emitido el 26 de agosto, 2011. El Centro de Datos Sabey está ubicado en 2200 Calle M NE, Quincy, Condado de Grant, Washington.

La solicitud de NOC contiene los siguientes cambios al existente Orden Aprobado 11AQ-E424:

- Permite que se usa tres fabricantes de generadores en vez de solo la compañía Caterpillar.
- Permite que se usa generadores hasta la capacidad de 2.0 MWe en vez de específicamente 2.0 MWe.
- Asuma que el máximo teorético de emisiones anuales podría ocurir en un solo año cuando calculando un promedio corrido de 3-años para los contaminantes que tienen límites basados en el promedio anual.
- Consolide los límites de operación de los generadores al permitir que se usa el método basado en emisiones de caso-peor en vez del método basado en carga.
- Aumente las emisiones en las calculaciones promedias DEEP que están asociadas con las pruebas iniciales de los generadores tanto como las pruebas periódicas de las emisiones que salen de los sistemas de escapes.
- Aumente las emisiones que ocurren durante los adjustes de encendido frio de humo-negro.
- Incluye un requisito para mantener un record escrito para demostrar cumplimiento con la norma de NOx de una hora.

En adición, Ecología ha incluido los siguientes provisiones en el Orden Aprobado:

- Para los motores nuevos, se debe probar inmediatamente después de su instalación por lo menos un motor representante de cada fabricante y un motor de cada tamaño de cada fabricante.
- Cada 60 meses, se debe probar por lo menos un motor, incluyendo el motor con la mayor cantidad de horas de operación tal que seá un motor diferente que los que fueron probados durante la prueba anterior de 60 meses.
- Se extendió la fecha para completar la instalación de los generadores según el permiso desde el primer de julio, 2014 hasta el primer de julio, 2019.
- Incluyieron algunas palabras nuevas para clarificar las regulaciones aplicables.

Los equipos primarios que emitarán contaminación al aire no aumentan con esta solicitud. Tales equipos sigue siendo los 44 generadores de electricidad de emergencia que usan el combustible diésel y las 176 unidades de enfriamiento.

Los contaminantes emitidos al aire por los motores de diésel y las unidades de enfriamiento incluyen contaminantes de aire de criterio y tóxico que son debajo de los límites para fuentes mayores. Los cambios para operar el sitio que Sabey solicitó resultarán en el siguiente potencial total para emitir (PTE, por sus siglas en inglés) desde los propuestos motores diésel: se estiman las emisiones de óxido de nitrogeno (NOx) al 23.9 toneladas por año; se estiman las emisiones de los compuestos orgánico volátiles (VOCs, por sus siglas en inglés) al 1.43 toneladas por año; se estiman las emisiones del monóxido de carbono (CO, por sus siglas en inglés) al 11.9 toneladas por año; se estiman las emisiones de dióxido de sulfuro (SO2, por sus siglas en inglés) al 0.028 toneladas por año; y se estiman las emisiones de plomo (Pb) al ser insignificante.

Para los contaminantes de aire tóxicos (TAPs, por sus siglas en inglés): se estiman las emisiones de partículas del escape de motores diésel (DEEP, por sus siglas en inglés) durante la operación completa al 0.408 toneladas por año; y se estiman las emisiones primarias del dióxido de nitrógeno (NO2, por sus siglas en inglés) al 2.39 toneladas por año. También se emitarán varios otros TAPs en cantidades muy pequeñas. Debido a que las propuestas revisiones permitirán un aumento en las emisiones de DEEP, Ecología requirió una Segunda Evaluación de Impactos a la Salud para evaluar los riesgos a la salud humana. Ecología repasó estos riesgos y concluyó que los impactos de DEEP a la comunidad asociados con el Centro de Datos Sabey cumplirán con los requisitos protectivos contenidos en Capítulo 173-460 en el Código Administrativo del Estado de Washington (WAC, por sus siglas en inglés).

Se estiman que las unidades de enfriamiento emitirán particuladas (PM10 y PM2.5, por sus siglas en inglés) al 2.32 toneladas por año.

Después de estudiar la solicitud completada de NOC y otra información mantenida por la agencia, Ecología ha determinado que este propuesto proyecto conformará con todos los requisitos especificados en Capítulo 173-400 WAC.

Los siguientes documentos están disponibles para la revisión del público: copias de la Determinación Preliminar del Aviso de Construcción, la Recomendación de la Segunda Petición, la solicitud del Aviso de Construcción, y otros documentos relevantes. Se puede revisar los documentos en:

- El internet al http://www.ecy.wa.gov/programs/air/quincydatacenter
- En la Oficina de la Región Este de Ecología, 4601 N. Monroe, Spokane, WA 99205
- En la Municipalidad de Quincy, 104 Calle B SW, Quincy, WA 98848
- En la Biblioteca Pública de Quincy, 208 Central Ave S. Quincy, WA, 98848

Se invita al público comentar sobre este propuesto proyecto. Se aceptarán comentarios escritos sobre este proyecto desde el 10 de diciembre, 2015 hasta el 10 de enero, 2016. Si hay suficiente interés pública, Ecología tendrá una audiencia pública. Para obtener información adicional sobre el proyecto y también para entregar los comentarios, debe comunicarse con Kari Johnson en la Oficina de la Región Este de Ecología, 4601 N. Monroe, Spokane, WA 99205-1295, o por correo electrónico al KAJO461@ecy.wa.gov, o por teléfono al 509-329-3502.

Para solicitar acomodación ADA para las personas discapacitadas, debe comunicarse con Ecología al 509-329-3400. Las personas con discapacidad auditiva pueden llamar al Servicio de Retransmisión de Washington al 711. Las personas con discapacidad de habla pueden llamar a TTY al 877-833-6341. **Para asistencia en español, comuníquese con Gregorio Bohn al 509-454-4174, Richelle Perez al 360-407-6084, o al** preguntas@ecy.wa.gov.

COMMUNITY BULLETIN

Seniors: You're invited to dinner

The menu for the weekly Thursday dinner at the Quincy Senior Center includes a baked potato with ham, corn chowder, green salad, rolls, ice cream and cookies.

The $6 dinner starts at 6 p.m. and games follow.

Dominoes winners were Mark Owens and Susan Lacy. Bridge winners were Judy Bryant and Lorain Greenwalt. Pinochle winners were Lorain Greenwalt and Betty Boorman.

Help fight hunger at Quincy Market

Quincy Market is inviting people to donate groceries to the Quincy Food Bank through its annual Help Fight the Hunger campaign.

For a $10 donation, customers can purchase a bag of groceries at the store that then will be donated to the food bank. The bag of groceries is filled with $20 worth of food; Quincy Market is matching any $10 donation.

The campaign is running now through the end of December.

Santa Claus also will be visiting Quincy Market from noon to 3 p.m. on Dec. 19. Customers are invited to bring their children for free photos with Santa. The photos are sponsored by Pepsi and IGA.

Holiday lighting contest returns

Get those holiday lights up before Dec. 13 if you want to participate in the Quincy Valley Lions' Christmas lighting contest.

Judges will choose the top residential and commerical decorations that catch their eyes. To enter, send an email to mdcordova53@gmail.com. Email your name, address and phone number for judging.

The winner of the residential category will get a gift certificate to a local business. The winner of the commercial category will get a traveling trophy to brag about.

Holly Starr to give free Christmas concert

Quincy's own Holly Starr is coming home for a free Christmas concert, 6:30 p.m. on Dec. 19 at the Quincy High School Performing Arts Center. A $5 suggested donation is appreciated. The Christian singer and songwriter also will share music from her newest album and fourth studio release, "Everything I Need."

Get your tickets now for Old-Fashioned Christmas

Perhaps one of the area's most popular events, the Old-Fashioned Christmas at the historic Pioneer Church, is 7 p.m. Dec. 19 and 5 p.m. Dec. 20.

The event includes live music and a tree lighting. It is free; however, attendees must have tickets to ensure seating. Pick up tickets at the Post-Register, CliftonLarsonAllen, Barb's Place or the chamber. Or call 787-4685 and leave a message.

Holidays to impact city garbage collection

The city of Quincy reminds residents that because Christmas and New Year's Day fall on Fridays, garbage pickups will be on the Saturday following the holidays.

Festive flutist

Tammara Green/Post-Register

Monument Elementary music teacher and flutist Carol Cooke accompanied the combined choir during this year's Community Christmas Concert, hosted by Quincy Valley Allied Arts on Sunday. About 50 people attended the annual event, which kicks off the holidays with a festive community gathering.

Nation

Bridge lets travelers walk from San Diego to Tijuana

By RICHARD MAROSI
TNS

SAN DIEGO — It's a rare convenience along an international boundary better known for maddening and unpredictable bottlenecks: a pedestrian bridge that soars over one of the most heavily fortified spots on the border and delivers travelers into the main terminal of Tijuana International Airport.

The enclosed, 390-foot Cross Border Xpress opened Wednesday, signaling a new era in cross-border travel and easing the way for more Southern Californians to use the airport as a gateway to destinations across Mexico.

Backers of the privately funded venture see it as another key piece of border infrastructure geared toward boosting tourism and commerce after years of economic decline.

The $120 million bridge becomes a third border crossing in San Diego, located roughly between the heavily trafficked San Ysidro and Otay Mesa ports of entry. Ticketed passengers, who can park on the U.S. side or get dropped off, pay $18 to walk to and from the airport terminal.

The airport funnels more than 2 million Southern Californians annually to more than 30 destinations across Mexico. Upon their return to California, travelers typically have to wait as long as two hours to clear customs at the Otay Mesa or San Ysidro ports of entry.

The bridge, staffed 24 hours a day by U.S. Customs and Border Protection agents, reduces wait times to minutes.

The convenience is one of the biggest draws for Jared Gomez, a plastics salesman who drove from Carson, south of Los Angeles, on Wednesday morning to take a flight to Culiacan. "This is a big deal," he said. "When I come back I won't have to get in that pedestrian line. I'll just cross here, get in my car and go."

The Tijuana airport is already popular with people such as Gomez who seek lower airfares or access to regional destinations that aren't easily reached from U.S. airports. Among the destinations are Guadalajara, Tepic and Leon. There are also three weekly flights to Shanghai. Tijuana airport officials estimate that 60 percent of the 4.5 million travelers who use the airport annually come from Southern California.

Alejandro Tamayo/TNS

Viry Martino, from Mexico City, in San Diego on Wednesday, on opening day for the Cross Border XPress pedestrian bridge between San Diego and the Tijuana Airport. Martino, the first traveler to use the bridge, was given flowers to celebrate the event.

The bridge has the look and feel of a modern airport terminal, with soaring ceilings, polished concrete floors and spacious corridors. Among the few signs tipping off the bridge's unique status is a metal plaque midway down the span that marks the boundary between the U.S. and Mexico.

"So far, so good," said Veronica Obregon, who had just gotten off a flight from Mexico City with her husband. The couple liked the convenience, but fretted at the bridge's $18 cost each way, which would climb if they had traveled with their children.

"It's a great idea. It saves a lot of time, but it's a bit expensive," she said.

Pricing for children and seniors is 20 percent cheaper than adult tickets. Children younger than 2 cross for free.

The project was built by Otay Tijuana Venture, whose Mexican and U.S. investors include Chicago real estate mogul Sam Zell. It took years to develop and had to overcome a series of local and federal regulatory hurdles.

The bridge represents a scaled-back vision of a more ambitious effort, first floated by San Diego officials in the 1990s, to create a binational airport with runways on both sides of the border.

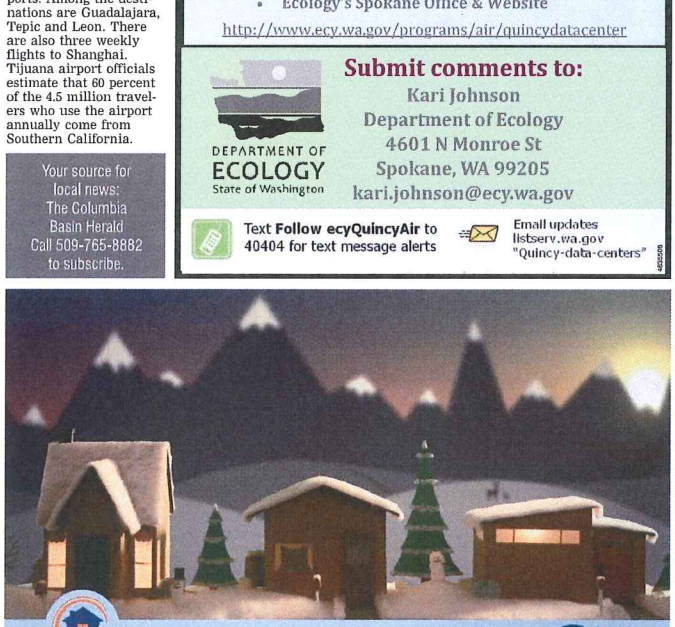
Building a bridge in the area would have been difficult decades ago when the area was a chaotic no-man's land used by migrants making illegal dashes into California. The area now bristles with fortifications. The bridge takes travelers up and over a double-fenced border enforcement zone criss-crossed by U.S. Border Patrol vehicles.

For security reasons, travelers cannot see the border panorama from the bridge. The windows are frosted glass. Although there are pedestrian toll bridges spanning the Texas-Mexico border, this is the first connected to an airport. Otay Tijuana Venture agreed to fund the operations of Customs and Border Protection inside the facility.

Officials on both sides of the border hope the bridge works as another piece in their plan to integrate the region's economies. Another recent project expanded the number of entry lanes at the San Ysidro port of entry, and a new pedestrian crossing is planned to open next year.

Officials expect the bridge to give the region an advantage in the competition for more tourism and investment in Tijuana's maquiladora sector, which draws business travelers from across the U.S. and Asia.

"This will be a great new option for travel between the U.S. and Mexico," said Jerry Sanders, president of the San Diego Regional Chamber of Commerce. "It is unique in the world, and we expect (the bridge) will be a catalyst for economic growth in our region on both sides of the border."



Plug in

TODAY

Community

- **Book-It Theatre presents "The Secret Garden":** 10 a.m., Omak Public Library, free, ncrl.org
- **Empty Bowls pottery painting event:** 3 to 8 p.m., Wenatchee Community Center, 662-6156, cdcac.org
- **George Halekas, "The Roots of Music:** Exploring Earth's Soundscapes," presentation: 6:30 p.m., Leavenworth Public Library, 548-7923
- **Mike Bills, live music:** 7 to 9 p.m., Pybus Public Market, 888-3900
- **Snowy Owl Family Christmas Radio Show:** 7 p.m., Snowy Owl Theater, 548-6347, icicle.org
- **Wenatchee Valley Symphony Orchestra and Fabulous Feet Academy of Ballet, "The Nutcracker":** 7 p.m., Numerica Performing Arts Center, numericapac.org, 663-2787
- **Winter Wonder II:** 7 p.m., Merc Playhouse, Twisp, 997-7529
- **Leavenworth Village Voices 2015 Christmas in the Mountains Concert:** 7:30 to 9:30 p.m., Leavenworth Church of the Nazarene, leavenworthvillagevoices.org
- **Leavenworth Summer Theater, "Agatha Christie's The Mousetrap":** 8 to 10:15 p.m., Leavenworth Festhalle, 548-2000

SATURDAY

Community

- **Empty Bowls pottery painting event:** 9 a.m. to 2 p.m., Wenatchee Community Center, 662-6156, cdcac.org
- **Snowmobile and ATV Swap Meet:** 9 a.m. to 4 p.m., Pybus Public Market, 888-3900
- **Winthrop Christmas Bazaar:** 9 a.m., Winthrop Barn and Auditorium, 996-2117
- **Hilfreiche Hausfrauen Club Annual Craft Fair:** 9:30 a.m. to 3:30 p.m., Leavenworth Community United Methodist Church, 548-6222
- **Leavenworth Community United Methodist Women's Christmas Lighting Bake Sale, Craft Fair and Luncheon:** 9:30 a.m. to 3:30 p.m., Community United Methodist Church, 548-5619
- **"The Magic Flute," Opera broadcast:** 9:55 a.m., Snowy Owl Theater, 548-6347, icicle.org
- **Book-It Theatre presents "The Secret Garden":** 10:30 a.m., Twisp Public Library, ncrl.org
- **Columbia Heights Holiday Bazaar:** 10:30 a.m. to 3:30 p.m., Columbia Heights, 1550 Cherry St., Wenatchee, 662-8646
- **Christmas Lighting Festival 2015:** 11 a.m. to 6 p.m., downtown Leavenworth, 548-5807
- **Miracle on Main Street:** 11 a.m. to 7 p.m., downtown Ephrata, ephratawachamber.com
- **Manson Village of Lights, Christmas "reindeer" pictures:** 12 to 3 p.m., Leffler Field, lakechelan.com
- **Leavenworth Summer Theater, "Agatha Christie's The Mousetrap":** 1 p.m., Leavenworth Festhalle, 548-2000
- **Photos with Santa Claus:** 1 to 3 p.m., Pybus Public Market, 888-3900
- **"Christmas in the Land of Oz":** 2 p.m., Masquers Theater, Soap Lake, 246-2611, masquers.com
- **Wenatchee Figure Skating Club Holiday Ice Show, "Santa's Sleigh Ride":** 4:30 p.m., The Rink at Town Toyota Center, 667-7847
- **"21st Annual Festival of Trees," auctions and dinner:** 5:30 p.m. and 7 p.m., Grant County Fairgrounds 4H Building, Moses Lake, habitatmoseslake.org
- **Snowy Owl Family Christmas Radio Show:** 7 p.m., Snowy Owl Theater, 548-6347, icicle.org
- **Wenatchee Valley Symphony Orchestra and Fabulous Feet Academy of Ballet, "The Nutcracker":** 7 p.m., Numerica Performing Arts Center, numericapac.org, 663-2787
- **Winter Wonder II:** 7 p.m., Merc Playhouse, Twisp, 997-7529

SUNDAY

Community

- **Christmas Lighting Festival 2015:** 11 a.m. to 6 p.m., downtown Leavenworth, 548-5807
- **Build a Gingerbread House:** 1 to 3 p.m., Pybus Public Market, 888-3900
- **Leavenworth Summer Theater, "Agatha Christie's The Mousetrap":** 1 p.m., Leavenworth Festhalle, 548-2000
- **Photos with Santa Claus:** 1 to 3 p.m., Pybus Public Market, 888-3900
- **"Christmas in the Land of Oz":** 2 p.m., Masquers Theater, Soap Lake, 246-2611, masquers.com
- **Gary Bowling and Marvin Tucker:** 2 p.m., Wenatchee Valley Senior Activity Center, 662-7036
- **Wenatchee Figure Skating Club Holiday Ice Show, "Santa's Sleigh Ride":** 2 and 4:30 p.m., The Rink at Town Toyota Center, 667-7847
- **Wenatchee Valley Symphony Orchestra and Fabulous Feet Academy of Ballet, "The Nutcracker":** 2 p.m., Numerica Performing Arts Center, numericapac.org, 663-2787
- **Seahawks Fan Rally:** 3 p.m., Pybus Public Market, 387-1177
- **Okanogan Valley Orchestra and Chorus Christmas Concert:** 3 p.m., Omak Performing Arts Center, ovocinfo@gmail.com, 425-299-0339
- **Village Voices "Echoes of the Season":** 4 p.m., Leavenworth Church of the Nazarene, 548-5807
- **Wenatchee Valley Applealres Annual Christmas Concert:** 4 p.m., Calvary Bible Church, Wenatchee, 470-8804

Death notices

ESTEBAN RAMIREZ

Esteban Ramirez, 87, of Brewster, died Wednesday, Dec. 9, 2015. Arrangements are by Barnes Chapel, Brewster.

Officials to assess safety of threatened cabin

BY MIKE IRWIN
World staff writer

CASHMERE — A cabin threatened by surging rain runoff in Mission Creek remained precariously perched Thursday at the edge of a creek bank washed out by the rising current. Renters were still not allowed to enter the house, which has been deemed unsafe by county officials.

Chelan County Sheriff's emergency management specialist Rich Magnussen said a geotech engineer has been called to survey damage to the creek bank and the home's foundation. That assessment will determine if Charla Cross and Shelley Wilks, the couple renting the house, will be allowed to retrieve their belongings.

"We're just hoping to get out all the Christmas gifts we bought early for family and friends," a tearful Cross said Thursday. "We're in limbo right now."

Magnussen said officials remain unsure about the stability of the creek bank. "As water recedes, the bank can become even more unstable as pressure (from creek water) declines," he said.

The only entry into the house is through a door off the front porch, said Magnussen. The porch's front supports are dangling over the water, he said.

World photo/Don Seabrook

Mission Creek, swollen by recent rains, threatens a house Wednesday. Officials remain unsure about the stability of the creek bank.

Cross and Wilks evacuated the cabin early Wednesday after discovering that the rain-swollen creek had eroded away 25 feet of yard, which included their satellite dish, a barbecue, iron bench and a fenced space for their three dogs. The water had dug under a corner of the house to threaten its foundation.

County budget approved; revenue concerns loom

BY CHRISTINE PRATT
World staff writer

WENATCHEE — Chelan County commissioners Tuesday approved a strong, $94.44 million, countywide 2016 budget amid worries that projected declines in sales tax revenue will necessitate cutbacks in future years.

The county expects its sales tax revenue will drop by about $1 million annually after the near-certain annexation next year of the Olds Station industrial area into the city of Wenatchee.

The Holden mine cleanup, a major construction project near Lake Chelan, has generated $350,000 to $500,000 per year in sales tax revenue for the county, officials say. It's uncertain for how much longer that project will continue.

These revenue sources, says Commissioner Keith Goehner, have been key to the county's building a healthy, $7 million reserve fund that could supplement spending for a while, but would become quickly depleted if other revenue isn't found or spending cuts made.

"We're very fortunate to be in the financial position we're in," Commissioner Keith Goehner said Wednesday. "We've maintained a conservative approach and it's really paid off. When we look at the long-term probability that will we not have those revenue sources... it certainly will be a major concern going forward."

The county's $37 million general fund expense budget, which pays for cops, courts and all other county services that don't generate their own revenue, is about 4 percent higher than last year, driven by state-increased retirement rates and some local salary increases.

Some $300,000 in general fund reserves will go to the regional jail this year, because jail revenues over the last several years from housing contract prisoners have fallen short of covering jail expenses.

General fund revenues are budgeted slightly less, at $36.64 million, but Brad Posenjak, chief deputy auditor, said he expects expenses to equal or come in slightly less than revenues by year's end, since county departments often underspend their budgets.

The county will again receive $2.6 million from the federal government to compensate it for having a high percentage of tax-exempt federal lands, Posenjak said.

Sales and property tax revenue are the county's two biggest sources of funding.

Despite the annexation, county property tax revenues are expected to remain largely intact, because that lost revenue can be spread to all remaining taxpayers in the unincorporated county.

Alcoa's looming idling of its Wenatchee Works aluminum smelter and elimination of nearly 430 family-wage jobs could also have negative revenue impacts by reducing area retail spending. If most employees and their families leave the area it also could reduce construction fees and real estate sales, which this year are expected to contribute $1.66 million to county coffers, Posenjak said.

The shutdown is expected to be even more harmful on the county's junior taxing districts — everything from schools districts to fire districts — which could be squeezed out of their property tax revenues, officials have said.

Idling the smelter will also reduce the property tax value of Wenatchee Works, its income, buildings and equipment from the current $57 million to the value of only its land and buildings, County Assessor Deanna Walter has said.

Despite the revenue reductions, the county is still required to provide courts, jail, policing, land services and administration to everyone in the county, Goehner said.

"We went through the process of cutting out anything we considered discretionary years ago, so we really are pretty tight," Goehner said. "If we have a diminishing tax base, it will be more difficult to maintain the services we have. And we have to maintain them."

Christine Pratt: 665-1173
pratt@wenatcheeworld.com

Public Comment Period

December 10, 2015 - January 10, 2016
for draft air permit to
Sabey Intergate Data Center

Documents for review are available at:

- Quincy City Hall, 104 B Street SW
- Quincy Library, 208 Central Ave. S
- Ecology's Spokane Office & Website

http://www.ecy.wa.gov/programs/air/quincydatacenter

DEPARTMENT OF ECOLOGY
State of Washington

Submit comments to:
Kari Johnson
Department of Ecology
4601 N Monroe St
Spokane, WA 99205
kari.johnson@ecy.wa.gov

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Email updates

América Latina

MÉXICO

Sismo de 6,4 sacude sur de México

Foto Notimex

CHIAPAS (Agencias)— Un sismo de magnitud 6,4 sacudió el sur de México, sin que se reportaran daños o víctimas.

El Servicio Geológico de Estados Unidos informó que el temblor tuvo su epicentro en el estado sureño de Chiapas, cerca de la frontera con Guatemala. Inicialmente reportó que la magnitud fue de 6,6, pero después la modificó a la baja a 6,4.

Autoridades de protección civil refirieron que el movimiento, ocurrido a las 13:49 horas, fue sentido en los estados sureños de Oaxaca, Chiapas y Tabasco. Con su epicentro a 37 kilómetros al sur de Tonalá, Chiapas, el sismo dejó daños menores en algunas viviendas.

El Oaxaca, algunas oficinas de gobierno fueron evacuadas, entre ellas la Secretaría de Seguridad Pública.

"Ya pensé que no iba a parar", dijo Vilma Santiago, asustada, quien estaba en el segundo piso de un edificio cuando se registró el sismo esta tarde de jueves.

Vilma, que había acudido en busca de información a las oficinas de la Procuraduría Federal del Consumidor, dijo que al momento del temblor les dieron indicaciones para evacuar el edificio y como pudo bajó las escaleras.

"Fue fuerte, se sintió mover la escalera. Ya ni llegué a recibir la información, ni me registré", afirmó.

Algunos turistas y residentes desalojaron edificios en la ciudad colonial de Oaxaca.

COSTA RICA

Rompe con el SICA por tema de migrantes cubanos

SAN JOSÉ (Agencias)— Costa Rica rompió de manera parcial con el Sistema de Integración Centroamericana (SICA), ante el rechazo de Belice, Guatemala y Nicaragua a buscar una solución conjunta al tema de los migrantes cubanos varados en su territorio.

El rompimiento se dio en El Salvador durante la cumbre de presidentes del SICA, luego que el mandatario costarricense Luis Guillermo Solís instó a sus homólogos a llegar a un acuerdo para los miles de cubanos que permanecen en Costa Rica y que se dirigen hacia Estados Unidos.

"Sin embargo la propuesta no fue atendida, ante lo cual el presidente (Solís) y el canciller Manuel A. González optaron por no continuar su participación en la reunión", informó aquí en un comunicado el gobierno costarricense.

El texto aclaró que "el retiro de Costa Rica se aplicará sólo a los organismos de carácter político del SICA, no de aquellos de tipo económico, comercial o técnico".

Foto Notimex

CHILE

Santa Claus debe soportar intenso calor prenavideño

SANTIAGO (Agencias)— Los representantes de Santa Claus, más conocido en Chile como el "Viejito Pascuero", deben soportar cada año el intenso calor de la temporada prenavideña, con temperaturas que superan los 30 grados centígrados.

Vistiendo el grueso y tradicional atuendo rojo, y con una campana en su mano, los representantes de Santa Claus en este país sudamericano reciben con paciencia, y bastante calor, a los niños y sus cartas en varios centros comerciales de la capital chilena.

Don Jacinto, que luce una barba blanca natural y lentes ópticos, lleva varios años como "ayudante" oficial del "Viejito Pascuero" y asevera a Notimex: "Esta es mi vida cada diciembre. Me gusta mucho escuchar a los niños y a los más grandes también".

Foto Notimex

BRASIL

Alertan sobre millonario tráfico de animales

RÍO DE JANEIRO (Agencias)— Cada año más de 38 millones de animales, sobre todo aves, son retirados de sus habitats y comercializados de forma ilegal en Brasil, uno de los países con mayor biodiversidad del planeta y donde más incidencia tiene el tráfico de especies.

"La mayoría de animales comercializados tienen como destino ser mascotas de la gente, pero también hay coleccionistas que compran especies raras en vías de extinción. O incluso empresas farmacéuticas que llevan a cabo operaciones de biopiratería con arañas o sapos", explicó a Notimex Dimas Marques, investigador de la Universidad de Sao Paulo.

Aseguró que el 80 por ciento de las especies traficadas son pájaros y que, a pesar de que Brasil supone entre un 5.0 y un 15 por ciento total del comercio ilegal mundial de especies, la diferencia del país sudamericano con otros como Indonesia o Tailandia es que la compraventa es para consumo del mercado doméstico.

"Brasil no es un país exportador de animales. El 60 ó 70 por ciento de las especies comercializadas ilegalmente son para el mercado brasileño", subrayó Marques, cuyo trabajo se centra en el estudio y combate del tráfico de especies.

Foto Notimex

PERIODO DE COMENTARIO PUBLICO

desde el 17 de diciembre, 2015 hasta el 17 de enero, 2016

Borrador de las revisiones al permiso para emisiones del aire para el sitio

Centro de Datos de Sabey Intergate

Documentos estarán disponibles para examinar en :

- **Alcaldía de Quincy, 104 Calle B, SW**
- **Biblioteca de Quincy, 208 Avenida Central, S**
- **Sitio Web del Departamento de Ecología:** http://www.ecy.wa.gov/programs/air/quincydatacenter
- **La Oficina de la región este de Ecología en la cuidad de Spokane**

DEPARTMENT OF ECOLOGY
State of Washington

Someta sus comentarios a:

Kari Johnson
Department of Ecology
4601 N Monroe St
Spokane, WA 99205
kari.johnson@ecy.wa.gov

Textea a Follow ecyQuincyAir o al 40404 para mensajes de alerta de texto

Para actualizaciones por correco electrónico Listserv.wa.gov "Quincy-data-centers"

This ad contains a date typo. The comment period dates of December 10, 2015 - January 10, 2016, were correctly advertised in all other media and publications, including the Spanish legal notice published in El Mundo *on December 10, 2015. As January 10th was a Sunday, comments were accepted through January 11, 2016. No Spanish comments were received.*

Public Comment Period

December 10, 2015 - January 10, 2016

for draft air permit to

Sabey Intergate Data Center

Documents for review are available at:

- Quincy City Hall, 104 B Street SW
- Quincy Library, 208 Central Ave. S
- Ecology's Spokane Office & Website

http://www.ecy.wa.gov/programs/air/quincydatacenter

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DEPARTMENT OF ECOLOGY
State of Washington

Public Comment Period

Air Quality Program **December 2015**

Sabey Intergate Data Center Draft Revised Air Permit

Para asistencia en español: Gregory Bohn (509) 454-4174, Richelle Perez (360) 407-6084, o preguntas@ecy.wa.gov.

Sabey Intergate applied to Ecology to revise their existing air quality permit in Quincy. The public comment period is **December 10, 2015 through January 10, 2016.**

Data centers house the servers that provide email, manage instant messages, and run applications for our computers.

The Permit

Sabey Intergate applied to Ecology to revise their existing air permit called a "notice of construction approval order" (NOC). An NOC revision is required when facilities plan to modify equipment, operations, or existing permit requirements. As part of the permit revision process, Ecology reviews emissions of air contaminants to ensure that public health is protected and all applicable regulations are followed.

Sabey Intergate was previously permitted to install 44 diesel generators and associated cooling equipment, capable of producing 88 megawatts of emergency backup electrical power. Sabey proposes to allow options in engine suppliers; reduce the size of some of the diesel engines; and modify testing, monitoring, and recordkeeping requirements. Sabey also asks to extend the deadline to install all 44 diesel engines.

To protect the public from air pollution, the proposed NOC includes the following conditions:

- limit the amount of fuel that can be burned,
- limit the total hours per year the diesel engines can operate,
- test diesel engines to make sure air pollution control equipment works.

How Ecology Evaluates Diesel Engine Exhaust

During review of a permit application, Ecology evaluates how much air pollution the project will add. Ecology cannot approve a permit that allows air pollutants to be emitted at levels that cause health problems.

MORE INFORMATION

Public Comment Period
December 10, 2015 – January 10, 2016

Documents available at
http://www.ecy.wa.gov/programs/air/quincydatacenter

Quincy City Hall
104 B Street SW
Quincy, WA 98848

Quincy Library
208 Central Avenue South
Quincy, WA 98848

Ecology Eastern Regional Office
4601 North Monroe Street
Spokane, WA 99205

Submit comments to
Kari Johnson, Public Involvement Coordinator
See Ecology address above
(509) 329-3502
kari.johnson@ecy.wa.gov

Contact information
Jolaine Johnson, Permit Manager
See Ecology address above
(509) 329-3452
jolaine.johnson@ecy.wa.gov

For special accommodations or documents in alternate format, call (509) 329-3400, 711 (relay service), or 877-833-6341 (TTY).

Ecology uses computer models to estimate where air pollution will be carried by the wind as well as the amount of air pollution. Ecology reviews the results from computer models to assess possible health risks.

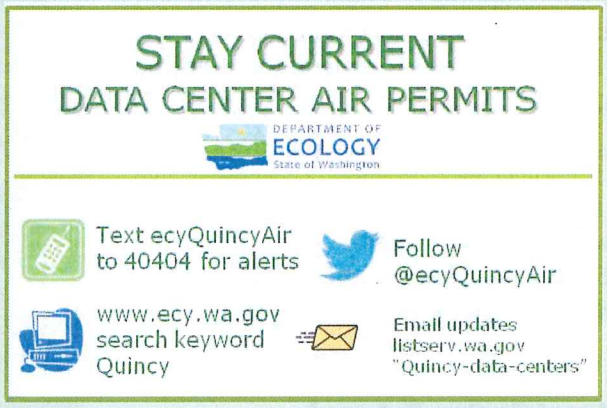
The Health Risks of Diesel Exhaust

The toxic air pollutants in diesel exhaust include nitrogen dioxide, carbon monoxide, organic compounds, and tiny particles called diesel exhaust particulates. Ecology evaluated the levels of all these pollutants during the permit review process. Diesel exhaust particles and nitrogen dioxide are the pollutants most likely to be produced in high enough amounts to potentially affect health. For more information about the health effects of these pollutants, read Ecology's publication "*Focus on Diesel Exhaust Health Risks*." This is available in English and Spanish.

Community Modeling

Ecology evaluates the emissions from each individual data center as well as the combined emissions from all data centers and other air pollution sources in the area. To do this, a computer model adds any new data center emissions to those from other air pollution sources and determines if the total emissions are likely to be harmful to human health. This computer modeling process is called "community modeling." Community modeling was used in Quincy because so many data centers are located in Quincy.

For special accommodations or documents in alternate format, call (509) 329-3400, 711 (relay service), or 877-833-6341 (TTY).



Johnson, Kari D. (ECY)

From: Johnson, Kari D. (ECY) <KAJO461@ECY.WA.GOV>
Sent: Tuesday, December 08, 2015 2:57 PM
To: QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject: Sabey Comment Period Coming and Oxford Update

Hello Quincy Data Center Interested Parties,

- **New Outreach Specialist:** Allow me to introduce myself. My name is Kari Johnson, and I'm the new Education & Outreach Specialist for the Air Program at Ecology's Eastern Regional Office (ERO). Some of you may know me as the Public Disclosure Coordinator for ERO, a position I held for seven years. I'm very excited to continue the great work of Beth Mort, supporting our terrific local communities in Eastern Washington.

- **Sabey Public Comment Period:** Sabey Intergate applied for revisions to its air permit for Sabey Data Center. Sabey is proposing changes to the way it operates and tests backup generators at its data center in Quincy. These changes require modification of an existing air permit that was issued on August 26, 2011. The proposed permit includes flexibility for potential use of smaller generators and improvements on testing procedures. It also allows a longer term for phased growth and adds clarification to certain conditions. Additional conditions to protect public health from air pollution include limits on the amount of fuel and number of hours the engines can operate. Ecology is seeking public comment on the changes to Sabey's permit. **The public comment period will open on December 10, 2015. Watch for an email this Thursday for more information, and where to access documents for review.**

- **Update on Oxford:** Thank you to those who participated in the May-July 2015 public comment period for revisions to the air permit for Microsoft Oxford Data Center. Microsoft has since applied for additional revisions, and the new permit application is currently under review. The public's comments and Ecology's response from last summer's comment period will remain in draft form until a second comment period is completed. Notification will be sent when the second public comment period is available.

Please feel free to contact me with any questions. I look forward to working with you!

Kari

Kari Johnson (509) 329-3502 kari.johnson@ecy.wa.gov
Department of Ecology, Eastern Regional Office
Environmental Education & Community Outreach Specialist

Para asistencia en español: Gregory Bohn 509-454-4174, Richelle Perez 360-407-6084, o preguntas@ecy.wa.gov

***

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Tips on Effective Public Commenting.
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Johnson, Kari D. (ECY)

From: Johnson, Kari D. (ECY) <KAJO461@ECY.WA.GOV>
Sent: Thursday, December 10, 2015 12:07 PM
To: QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject: Sabey Comment Period Open!

Hello Quincy Data Center Interested Parties,

The Sabey Public Comment Period has begun. Sabey Intergate applied for revisions to its air permit for Sabey Data Center. Sabey is proposing changes to the way it operates and tests backup generators at its data center in Quincy. These changes require modification of an existing air permit that was issued on August 26, 2011. The proposed permit includes flexibility for potential use of smaller generators and improvements on testing procedures. It also allows a longer term for phased growth and adds clarification to certain conditions. Additional conditions to protect public health from air pollution include limits on the amount of fuel and number of hours the engines can operate. Ecology is seeking public comment on the changes to Sabey's permit.

The public comment period will be open from December 10, 2015 through January 10, 2016.

The documents associated this project are available online here: http://www.ecy.wa.gov/programs/air/quincydatacenter

Or at the following repositories:

Quincy City Hall
104 B Street SW
Quincy, WA 98848

Quincy Library
208 Central Ave. S
Quincy, WA 98848

Ecology's Spokane Office
4601 N Monroe St
Spokane, WA 99205

Submit comments to:
Kari Johnson, Education & Outreach Specialist
Department of Ecology
4601 N Monroe St
Spokane, WA 99205
kari.johnson@ecy.wa.gov

Feel free to contact me with any questions.

Have a wonderful day.

Kari

Kari Johnson (509) 329-3502 kari.johnson@ecy.wa.gov
Department of Ecology, Eastern Regional Office
Environmental Education & Community Outreach Specialist

Para asistencia en español: Gregory Bohn 509-454-4174, Richelle Perez 360-407-6084, o preguntas@ecy.wa.gov

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Johnson, Kari D. (ECY)

From: Johnson, Kari D. (ECY) <KAJO461@ECY.WA.GOV>
Sent: Monday, January 04, 2016 12:07 PM
To: QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject: Sabey Public Comment Period Ends Soon

Happy New Year, Quincy Data Center Interested Parties!

Ecology's Public Comment Period for Sabey ends this Sunday, January 10, 2016. Sabey Intergate applied for revisions to its air permit for Sabey Data Center. Sabey is proposing changes to the way it operates and tests backup generators at its data center in Quincy. These changes require modification of an existing air permit that was issued on August 26, 2011. The proposed permit includes flexibility for potential use of smaller generators and improvements on testing procedures. It also allows a longer term for phased growth and adds clarification to certain conditions. Additional conditions to protect public health from air pollution include limits on the amount of fuel and number of hours the engines can operate. Ecology is seeking public comment on the changes to Sabey's permit.

Here is a quick reference Focus Sheet.

The documents associated this project are available online here: http://www.ecy.wa.gov/programs/air/quincydatacenter

Or at the following repositories:

Quincy City Hall
104 B Street SW
Quincy, WA 98848

Quincy Library
208 Central Ave. S
Quincy, WA 98848

Ecology's Spokane Office
4601 N Monroe St
Spokane, WA 99205

Submit comments in writing to:
Kari Johnson, Education & Outreach Specialist
Department of Ecology
4601 N Monroe St
Spokane, WA 99205
kari.johnson@ecy.wa.gov

Feel free to contact me with any questions.

Have a wonderful day.

Kari

Kari Johnson (509) 329-3502 kari.johnson@ecy.wa.gov
Department of Ecology, Eastern Regional Office
Environmental Education & Outreach Specialist

Para asistencia en español: Gregory Bohn 509-454-4174, Richelle Perez 360-407-6084, o preguntas@ecy.wa.gov

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Visit our Quincy Data Centers webpage for more information.
Text "Follow ecyQuincyAir" to 40404 to receive updates.
Tips on Effective Public Commenting.
Find out what is happening in your city on our Public Involvement Calendar.
Sign up for the Quincy Data Centers Listserv.

Mande por texto "Follow ecyQuincyAir" a 40404 para alertas de texto
Visite nuestro página web Quincy Data Centers webpage para más información.
Infórmese de lo que pasa en su ciudad en nuestro calendario Public Involvement Calendar buscando por su ciudad.
Obtenga consejos sobre haciendo comentarios públicos eficaces Effective Public Commenting.
Inscríbase para obtener información electrónica Quincy Data Centers Listserv.

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Brook Beeler @ecyspokane · 10 Dec 2015

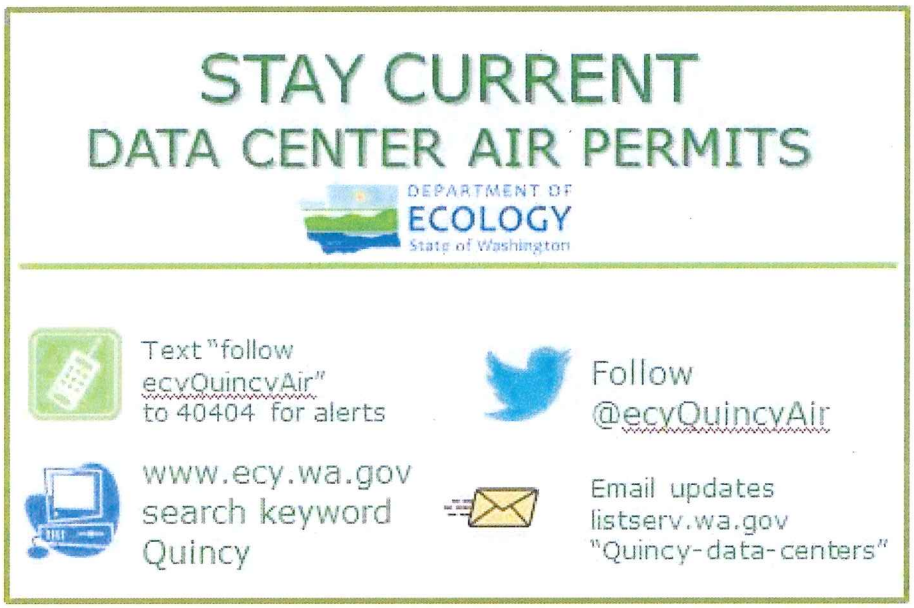
Playing matchmaker. Revising data center's permit to reflect facility operations and show the air some love ❤

ecy.wa.gov/news/2015/179....

2

Brook Beeler @ecyspokane · 10 Dec 2015

Keep up with what's happening in #QuincyWA with air permits.



1

Quincy Air @ecyQuincyAir · 10 Dec 2015 View translation

Hay información nueva con respecto al Centro de Datos para @SABEY. ecy.wa.gov/news/2015/179e...

Quincy Air @ecyQuincyAir · 10 Dec 2015

New info on #QuincyWA data center. @SABEY applies for permit revision. ecy.wa.gov/news/2015/179....

Brook Beeler @ecyspokane · 17 Dec 2015

Taking comments on a revised air permit for @SABEY data center until Jan. 10. ecy.wa.gov/news/2015/179....

> **Quincy Air** @ecyQuincyAir
>
> Review draft air permit and documents for @SABEY data center at #QuincyWA Library or Quincy City Hall.

1

Quincy Air @ecyQuincyAir · 17 Dec 2015

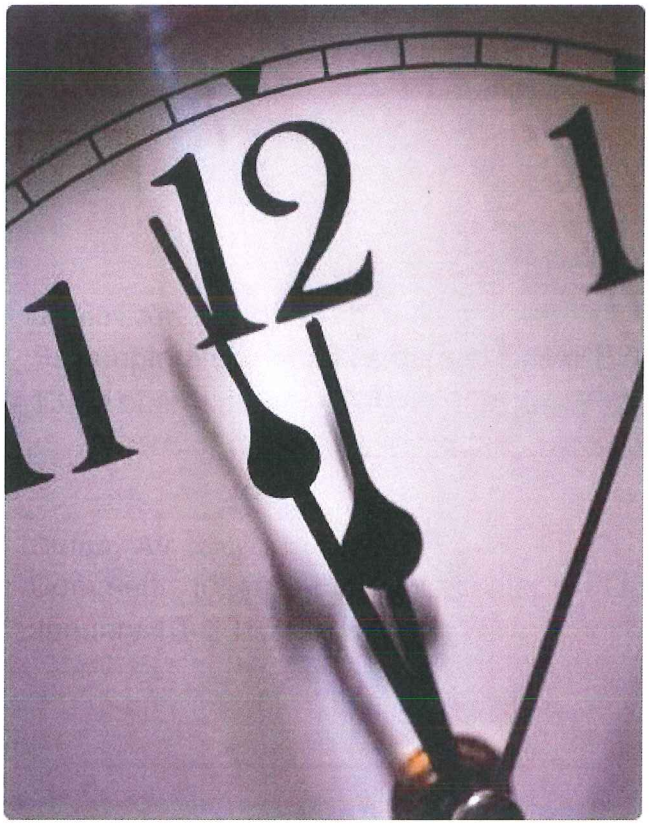
Examinar el permiso de emisiones al aire y otros documentos en la Biblioteca de Quincy o en la Municipalidad de Quincy a #QuincyWA.

Quincy Air @ecyQuincyAir · 17 Dec 2015

Review draft air permit and documents for @SABEY data center at #QuincyWA Library or Quincy City Hall.

Brook Beeler @ecyspokane · Jan 5

There is still time to get us your feedback on @SABEY data center air permit in Quincy. ecy.wa.gov/news/2015/179....



Quincy Air @ecyQuincyAir · Jan 5 View translation

Se aceptará comentarios para el @SABEY Centro de Datos hasta el 13 de enero. #QuincyWA

Quincy Air @ecyQuincyAir · Jan 5

Comments for @SABEY data center in #QuincyWA accepted through January 10, 2016.

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Appendix B:
Public Comments Received in Original Format

Handwritten numbers were added to reference the corresponding Comment Numbers and Responses in the report. Handwritten date corrections were made with approval of the commenter.

COMMENTER	FORMAT	DATE RECEIVED	COMMENT NOs
Patricia Martin	Email	01/11/2016	1-50
Danna Dal Porto	Email & mail	01/09/2016 & 01/11/2016	51-67
William Riley	Email	01/04/2016	68

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January 11, 2016

Kari Johnson, WSDOE
460 N. Monroe St.
Spokane, WA 99205

RE: Sabey Proposed permit

Dear Ms. Johnson,

Please accept my comments on Sabey's Preliminary Determination. As noted in an earlier email (January 7, 2016), not all of the information regarding the permitting process was provided to the public during the comment period, including the October 7, 2014 NOC Application and Ecology's December 5, 2014 incompleteness letter. Failure to have provided these documents for public review is a violation of WAC 173-401-800(2)(e)[1] and WAC 173-400-171(5)[2] which require that all information must be provided during the comment period. Ecology did not provide these documents, and it is unknown to the public at this time if there were other documents, including communications, air quality modeling, etc. that were part of the deliberative process and that should also have been made part of record for review.

PDR
Done
2/5/16

Please consider this a public records request for any supporting materials, analysis, etc., produced by Sabey or its consultant between October 7, 2014 and December 10, 2015 that were part of the deliberative process and that should have been provided to the public under a broad interpretation of WAC 173-401-800(2)(e) and WAC 173-400-171(5).

The public comment should be extended so we have adequate time to review all information against the Preliminary Determination. With that said, let me first begin with several questions I have regarding the Sabey permit.

1. How many emergency fire pumps does the Sabey facility have onsite and why aren't their emissions included in the permit?

2. Does the Sabey Quincy have other emergency engines whose emissions are not accounted for in this permit such as emergency engines for water pumps, building lighting, etc.?

3. Are the permit limits issued under WAC 173-400-091? If not, under what authority are the limits being issued?

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[1] *The permitting authority must make available for public inspection, in at least one location near the chapter 401 source, **all** non-proprietary information contained in the permit application, draft permit and supporting materials.*

[2] The information submitted by the applicant, any applicable preliminary determinations, including analyses of the effects on air quality, must be available for public inspection in at least one location near the proposed project.

4. Are the limits in this permit federally enforceable? If so, why doesn't the permit indicate that the permit is federally enforceable?

5. Where can the public appeal a federally enforceable permit?

6. Emission estimates are based on a 10% NO_2 stack emission rate. Is the conversion of NO to NO_2 after release from the stack also considered when modeling for compliance with the 1-hr NO2 and annual NO2 NAAQS?

7. Does Sabey's NAAQS modeling for PM2.5 (annual and 24-hr); PM10 (annual and 24-hr); and NO2 (1-hr and annual) include the emissions from commissioning of the engines? Does Sabey's WAAQS and TAP modeling include emissions from the commissioning of engines?

8. What background ozone level is Sabey using during modeling? How was this level chosen? Did Sabey model for ground level ozone?

9. The generators from the 2011 Approval Order and those listed in the Preliminary Determination have different serial numbers and are smaller than permitted. Why the difference? Were any emission differences modeled for compliance with the NAAQS before the engines were installed? If so, please provide.

10. Ecology is allowing for the use of any diesel engine meeting the emission limitations provided in the permit. Considering that each engine is itself a "source" for purposes of the FCAA, under what authority is Ecology allowing this non-specific permitting to occur?

11. Under Condition 4.2 Ecology has removed the requirement to measure O2 emissions during testing. Please reinstate this requirement as it is a necessary component of analysis. If it is not being reinstated, please provide supporting evidence for its removal.

12. Is the emission testing (4.3.1) required in the permit considered when determining compliance with NAAQS, WAAQS and TAPs?

13. Condition 4.3.2 requires that only the filterable portion of PM be tested using the "weighting factor average according to Table 2 of Appendix B to Subpart E of 40 CFR 89". These rules do not consider the "cold start" or condensable emissions. Without these emissions Ecology will not know if emission estimates in the permit are reliable or if compliance with NAAQS has been achieved. Please require that both the filterable and condensable portion of the PM be included in the engine tests, as well as, require that all testing begin at a "cold start" so that accurate emission rates and exposures can be determined.

14. Condition 4.3.3 should require EPA Method 5 and Method 202 to test for both filterable and condensable particulate. As a federally enforceable permit, the analysis required should provide proof that the assumptions made for emission rates and limitations are valid and support any determination made that the permit complies with NAAQS.

15. Condition 5.2 testing should also be set to measure PM by EPA Method 5 and 202; NOx, NO, NO2 and CO by Method 2 and 19, and NMHCs by an approved EPA Method that does not involve averaging weighted loads or exempting startup, i.e., "cold starts".

16. Table 5.3 Condition 5.2.2 bases the NMHC on the 5-load weighted average of engines under the Tier 2 compliance scheme, which does not include condensable or cold start emissions. Please identify the emission limit for NMHCs in a manner that is considered enforceable as a practical matter as required under the FCAA.

17. Condition 5.3.1 is based on the assumption that 10% of the NOx emitted from the stack is NO2. Did Sabey consider the secondary formation of NO2 from NO after the emissions left the stack? If not, why not?

18. What O3 value did Sabey use when modeling NO2? From what information was this O3 value derived?

19. Condition 5.5.1 which sets the emission limit of 0.57 lbs/hr is based on Caterpillar's NTE at 25% load. The NTE does not include condensable and cold start emissions and is therefore not worst case emission. Because Ecology is allowing a range of loads, the emission rate and limitation must be based on worst-case engine operations. Sabey claims that to be 25% load, but this number <u>does not</u> include condensable or cold start emissions. Because the permit is federally enforceable to protect the NAAQS, these worst case emissions must be accounted for and modeled for compliance with NAAQS. Please adjust this emission limit to reflect worst case scenario and reevaluate BACT based upon the new emissions data.
    a. The calculation of 0.57 lbs/hr does not equal 0.408 tpy, nor does it consider condensable and cold start emissions as claimed in Condition 5.7. The correct calculation is:

        (0.57 lb/hr)(57.5hrs/yr)(44 engines) = 1442 lbs/yr or **<u>0.72 tons/year</u>**

    Ecology must model the worst case scenario. The worst case scenario for particulate matter is: *NTE at 25% load (0.57 lbs/hr) + condensable "back-half" + "cold start" black puff.* Sabey's 44 engine emissions will exceed 0.72 tpy by a significant amount when these additional parameters are considered, especially when real world engine operation and multiple cold-starts are considered.

20. Condition 5.8 sets a limit of 99 lbs/hr and 2.39 tpy for NO2. Again there appears to be a miscalculation.
    a. Condition 5.3.1: (4.19 lbs/hr)(44 engines)(57.5 hrs) = **<u>5.3 tons per year</u>**

21. Condition 5.2.1 sets a limit of 41.9 lbs/hr for NOx. Ecology does not state what the NOx PTE is in the Preliminary Determination, however, it appears that NOx PTE has increased substantially from the 2011 Approval Order.
    a. (41.9 lbs/hr)(44 engines)(57.5 hrs) = 106,007 lbs or **53 tons per year** (>2011)
    b. (41.9 lb/hr)(41.5hrs/yr)[3](44 engines) = 77246.8 lbs = **38.6 tons per year** (>2011)

22. Ecology uses Caterpillar's NTE for HC's at 50% load (1.13 lbs/hr). This doesn't include cold starts or condensable emissions.
    a. (1.13 lb/hr)(57.5hrs/yr)(44 engines) = 2858.9 lbs/yr; or 1.43 tons per year

    Please explain how the use of a 50% load for VOC's is worst case when VOCs are highest at lower loads?

23. Condition 5.4.1 sets a limit of 16.9 lbs/hr for CO. Ecology does not identify a PTE for Carbon Monoxide (CO). Please identify the expected PTE for CO under a new permit.

24. Condition 5.9 and 5.10 regarding VOCs and SO2 respectively, does not set an emission limit that is enforceable as a practical matter as defined under the FCAA. The Preliminary Determination only establishes an annual emission limit of 2860 lb/yr on a 36-month rolling average, when emission limits must be shorter term, i.e., hourly, daily. Please correct this in the permit and set emission limits that are enforceable as a practical matter.

25. Condition 5.11 increases visible emissions from a 5% opacity factor to a 10% opacity factor. Why?

26. Under Operation and Maintenance Manuals Ecology requires that the "O&M manual shall include the manufacturers' recommended protocols for extended low-load operation." If Ecology is concerned about operations at low-load and extended operations at low-load, it would seems more appropriate for Ecology to have this manual prior to approving this permit.

27. Condition 8.4 should reflect the current knowledge about the operation of large diesel engines and compliance with 1-hr NO2 NAAQS. Please amend this condition to require NOx emission calculations whenever the facility is without power for one hour or more, regardless of how many engines are running.

28. Condition 8.5 removed the word "tenant" and replaced it with "building quadrant". This is not acceptable. Only proprietary information is protected under the CAA. If an entity is registered with the State of Washington to do business, its name is not proprietary information. Providing the name of the tenant prevents a situation where another data center might lease out space to circumvent becoming a major facility under the Act.

[3] minus 16.5hrs at 0-50% load

Each independent tenant should report, including their name, consistent with the required NOC form.

29. Reporting requirements under Condition 9.5 must require fuel receipts.

30. Condition 10.4 regarding the 44 engines should state specifically which engines are allowed under the permit.

31. Condition 10.6 regarding enforcement should be implemented. Sabey was permitted to install certain engines under the 2011 Approval Order and did not. Did Ecology undertake an enforcement action against Sabey?

32. Ecology should include a provision that engine operational logs and records, as generated by the engines, shall be available to the public upon request. The citizenry cannot be assured that there will be compliance with the permits without access to this information.

32a The Statement above YOUR RIGHT TO APPEAL has been edited and now reads:
"The provisions of this authorization are severable and, if any provision of this authorization, or application of any provisions of their circumstances, and the remainder of this authorization, shall not be affected thereby."

Please retain the original language in the 2011 Approval Order.

Sabey has been encouraged by Ecology (see Dec. 5, 2014 incompleteness letter) to "average" its loads rather than take load-specific limits. In doing so, Sabey must model the "worst case" scenario for each of the individual pollutants based on the load at which they are emitted in highest concentration. Sabey assumes that worst case is 25% load for PM and 100% for CO, VOCs, NOx and TAPs.

33

33. Appendix E states that Sabey used 100% load to represent the maximum emissions for NOx, CO, VOCs and TAPs. Carbon monoxide, VOCs and TAPs are known to be emitted during periods of incomplete combustion and are highest at lower loads. Basing emissions of CO, VOCs and TAPs at 100% load would not be worst-case and suggests that condensable and cold start emissions were not considered. Please do not issue this permit based on this flawed assumption.

34. Appendix E limits the application of the "cold start" factor to the first 15 minutes of engine operation. Because the information[4] from which Sabey derives its "cold start" factor is based on emissions that take place in the first 30 seconds of the engine startup, the mass of the emissions should be added to each engine run and recorded as part of

[4] 2005 *AIR QUALITY IMPLICATIONS OF BACKUP GENERATORS IN CALIFORNIA,* VOLUME TWO: EMISSION MEASUREMENTS FROM CONTROLLED AND UNCONTROLLED BACKUP GENERATORS

the emission rate. This mass emission that takes place in the first 30 seconds should also be accounted for in modeling for compliance with NAAQS, WAAQS and TAPs.

35. Appendix E assumes that operating at 25% load for the 57.5 hours within a single year is worst-case scenario for annual DPM. Please model the real-world 16 cold starts per year on all 44 engines plus the remaining 57.5 hours to determine which is worst-case. See attached Sabey operational records.

36. For 24-hour PM10 and PM2.5 similar real-world operational scenarios should be run for purposes of compliance. In addition to the 16 cold starts per engine per year, Quincy has on average at least 2 outages each year in excess of 1-hr.

37. What was the total engine runtime at Sabey for power outages in 2013, 2014 and 2015? Please provide this information so the public can understand how closely this Preliminary Determination aligns with real-world operation.

37a Emission Assumptions

I take exception to the cold start factor used in the permit. Attached is an excerpt from the 2005 *AIR QUALITY IMPLICATIONS OF BACKUP GENERATORS IN CALIFORNIA,* VOLUME TWO: EMISSION MEASUREMENTS FROM CONTROLLED AND UNCONTROLLED BACKUP GENERATORS demonstrating that average emission factor in g/kW-hr for CO, THC, NOx and PM is 24.3, 22.5, 55.4 and 17.7 averaged over 30 minutes. Since most of Sabey's engine operations, with the exceptions of power outages and commissioning, are approximately 30 minutes long these cold start emission factors should be included in the emission modeling and compliance with NAAQS. (Please note that the narrative below the graph erroneously refers to Figure 20). These emissions occur within the first 30 seconds of every cold start, i.e., engine startup, and therefore should be added into every emission calculation used for PTE, NAAQS, WAAQS and TAP compliance. Failure to do so significantly underestimates risk to our community.

37b Additionally, the modeling should better reflect the actual engine operations. In reviewing engine operational logs from 2011, 2012 and the only one submitted for 2013, Sabey operated its engines between 14 and 16 times each year. With the exception of power outages, the engines are usually operated one at time.

37c This permit should not be issued until the actual operating scenario is modeled for compliance with NAAQS, WAAQS and for TAPs. Cold start factors are significant and should be modeled with the 44 engines operating at worse case real-world scenarios.

37d Sabey also relies upon the AP-42 for TAP emissions. The AP-42 was not designed for the purpose of NAAQS compliance.[5] Other regulatory models such as SPECIATE may have more accurate emission rates for both PM and TAPs.

[5] "Emissions factors were originally established only for use in estimating emissions for developing national emissions inventories." http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0174-0001

"SPECIATE[6] is the EPA repository of total organic compound (TOC) and particulate matter (PM) speciation profiles for emissions from stationary and mobile air pollution sources. The profiles are key inputs to air quality modeling and source-receptor modeling applications. SPECIATE essentially provides emissions factors and information for pollutants, from both controlled and uncontrolled processes, at a level of detail that is not adequately or traditionally presented in AP-42."

Please do not issue this permit without reviewing the SPECIATE database for updated emission factors for PM and TAPs. Please provide documentation of emission rates for the appropriate sized engines from the SPECIATE database.

37e Meteorology

The 5-year meteorological data used in Sabey's 2011 Approval Order was for the period 2004-2008, and now Sabey is using older data from 2001-2005. Why is this being allowed? Ecology is aware that 40 CFR 51 Appendix W requires the use of the most recent meteorological data. To use old data suggests manipulation to avoid failing the NAAQS.

38. Was condensable particulate considered in the permitting of Sabey in 2011? If yes, please provide proof.

39. Because condensable particulate was not included during permitting of Yahoo!, Intuit, Dell and Microsoft Columbia, please provide updated background information and modeling to demonstrate that the condensable particulate has been evaluated as part of the NAAQS, WAAQS and TAPs, as well as, the DPM cancer and chronic health review under Ecology's community-wide approach.

40. Cold start factors were not considered in the modeling of Intuit, Yahoo!'s original permit or Microsoft Columbia. Have emission estimates for these facilities been updated in the modeling to provide proof of Sabey's compliance with NAAQS, WAAQS and TAPs off-site and as part of the HIA community wide approach?

41. Please provide the following:
    a. the serial numbers of the engines and generators in currently in use at Sabey;
    b. the manufacturer; and
    c. the capacity of the engines in MWe.

42. What "average" operational load are the PTE's based on? Please include a PTE chart in the new permit similar to the one in the 2011 Approval Order. Citizens should not have to go digging to find these enforceable parameters.
43. Compliance with NAAQS PM2.5 and PM10 requires both condensable and filterable particulate matter be considered. Why is Ecology requiring that only the filterable

[6] http://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=164604

portion of particulate matter be tested under the GENERAL TESTING AND MAINTENANCE REQUIREMENTS 4.3.2

44. Each engine is a "source" for purposes of the CAA. Please cite to the authority allowing Ecology can allow "any engine" with a rated capacity of less than 2.0 to satisfy the permitting requirements for a NOC Order and New Source Review.

45. Why is Sabey being allowed to use performance data from 2008 and a 2006 Tier 2 certified engine?

46. Why does Sabey make the BACT determination when that is the responsibility of Ecology? Has Ecology or the State of Washington entered into an agreement, whether formal or not, that data centers locating in Quincy will not be required to use air pollution controls?

47. Sabey is using the same background numbers as Vantage, but Microsoft's Oxford has added 32 engines, Amway has natural gas boilers, and condensable and cold start emissions were not considered with many of the permits. Please revise the background concentrations to include Oxford, Amway, condensable and cold start emissions and then model for compliance with NAAQS, WAAQS, TAPs and the community wide cancer risk before issuing this permit. Please provide proof of these corrected emission factors and modeling.

47a For over 8 years Ecology impermissibly allowed data centers in Quincy to model emissions based on the NSPS limits which do not consider the condensable portion of the particulates emitted and does not consider the cold start "black puff", which is exempted during performance testing of the engines prior to entering the market place. 40 CFR 89.406 and .407. In their haste and enthusiasm to permit as many data centers as possible in Quincy, the agency charged with protecting our health has failed in its mission. The agency has acted as a broker of air, rather than a protector of it; and only time will tell what cost will be paid by the health of our community.

Please reject this permit and require that an honest attempt be made at modeling.

Thank you for considering my comments,

Patricia Anne Martin
Quincy, WA

Attachments:
Sabey Operational records 2011-2013;
Page 31-32, *AIR QUALITY IMPLICATIONS OF BACKUP GENERATORS IN CALIFORNIA,* VOLUME 2

Johnson, Kari D. (ECY)

From: Patty Martin <martin@nwi.net>
Sent: Monday, January 11, 2016 4:31 PM
To: Johnson, Kari D. (ECY)
Subject: Sabey Preliminary Determination comments
Attachments: Sabey 2016 comments.pdf

Kari,

48 Attached are my comments. One thing that I forgot to note in my comments was that the Caterpillar bids were based on only 6 DOCs, DPFs, etc, rather than on 34 units. My question for Sabey and Ecology is isn't there a discount on that many units?

Patty

Johnson, Kari D. (ECY)

From: Patty Martin <martin@nwi.net>
Sent: Monday, January 11, 2016 4:42 PM
To: Johnson, Kari D. (ECY)
Subject: comments
Attachments: Sabey comments without attachments.pdf

Kari,

49 My comments are a large file so I am sending them again in 2 emails, plus an additional one that includes Jim Wilder's cold start factor that is based on the same example I provide in my comments today. I am asking for Ecology to review the cold start factor excerpt information
against the information that Jim Wilder derived from the same example.
I would like to know if they comport.

Thank you.

Patty

Johnson, Kari D. (ECY)

From: Patty Martin <martin@nwi.net>
Sent: Monday, January 11, 2016 4:49 PM
To: Johnson, Kari D. (ECY)
Subject: cold start factors
Attachments: cold start factors.pdf

Kari,

50 Attached are the cold start factors that Jim Wilder used during the Dell permitting. If these are not the ones he has used here I would like to know how the latest ones were derived. I also want to know how these calculations comport with the graph he and I both used that show 24.3, 22.5, 55.4 and 17.7 g/kW-hr for CO, THC, NOx and PM respectively.

Thank you.

Patty

SABEY

OPERATIONAL RECORDS

2011-2013

SABEY Data Centers

INTERGATE.QUINCY

Generator: QC3-GEN-A					
Date	Start Time	End Time	Run Hours (xx.x)	Operator Initials	Reason for Run
Arrival			0.2	CAT	Hours on generator upon arrival
10/29/2011			0.8	PP	Caterpillar initial startup
11/5/2011			1.7	PP	Caterpillar initial startup
11/7/2011	8:39	13:09	4.5	PP	Caterpillar 4 hour burn in
11/8/2011	13:48	17:21	3.4	RWF	DOE 10% Load Emissions Test
11/9/2011	7:33	11:40	3.8	RWF	DOE 50% Load Emissions Test
11/9/2011	12:20	15:50	3.6	RWF	DOE 75% Load Emissions Test
11/9/2011	15:55	19:55	4.0	RWF	DOE 100% Load Emissions Test
11/10/2011	13:48	14:00	0.2	PP	EPMS Alarm review/Commissioning
11/11/2011	8:15	10:40	2.4	RWF	Integrated System Test
11/12/2011	9:30	10:12	0.7	RWF	HDP/PLC test
11/18/2011	9:15	9:27	0.2	RWF	HDP/PLC test
11/28/2011	13:45	13:57	0.2	RWF	Square D onsite for shutdown issue
11/30/2011	7:13	7:17	0.1	RWF	Fuel Flow meter install
12/14/2011	9:54	10:13	0.3	RWF	Monthly Generator run
Total Hours			26.1		
				PP	Pat Paul - NC Systems
				RWF	Roy Franklin - Sabey Data Center

SABEY Data Centers

INTERGATE.QUINCY

Generator: QC3-GEN-B

Date	Start Time	End Time	Run Hours (xx.x)	Operator Initials	Reason for Run
Arrival			0.2		Hours on generator upon arrival
11/6/2011			2.4	PP	Caterpillar initial startup
11/7/2012	13:19	17:37	4.3	PP	Caterpillar 4 hour burn in
11/10/2011	7:40	12:00	4.6	RWF	DOE 10% Load Emissions Test
11/10/2011	12:36	15:55	3.4	RWF	DOE 50% Load Emissions Test
11/10/2011	15:56	19:30	3.5	RWF	DOE 75% Load Emissions Test
11/11/2011	11:00	13:18	2.3	RWF	Integrated System Test
11/14/2011	8:50	13:38	4.8	RWF	DOE 100% Load Emissions Test
11/28/2011	13:56	14:09	0.2	RWF	HDP/PLC Test
11/30/2011	7:17	7:21	0.1	RWF	Fuel Flow meter Install
12/14/2011	9:31	9:49	0.3	RWF	Monthly Generator run
Total Hours			26.1		
				PP	Pat Paul - NC Systems
				RWF	Roy Franklin - Sabey Data Center

SABEY Data Centers

INTERGATE.QUINCY

Generator: QC3-GEN-C

Date	Start Time	End Time	Run Hours (xx.x)	Operator Initials	Reason for Run
Arrival			0.2	PP	Hours on generator upon arrival
11/7/2011			2.5	PP	Caterpillar initial startup
11/8/2011	9:32	12:02	4.5	PP	Caterpillar 4 hour burn in
11/11/2011	14:00	16:02	2.0	RWF	Integrated System Test
11/14/2011	14:45	18:18	3.6	RWF	DOE 10% Load Emissions Test
11/15/2011	7:05	10:20	3.5	RWF	DOE 50% Load Emissions Test
11/15/2011	10:20	14:20	3.6	RWF	DOE 75% Load Emissions Test
11/15/2011	14:20	17:57	3.7	RWF	DOE 100% Load Emissions Test
11/17/2011	14:10	15:16	1.1	RWF	Fuel Flow Meter calibration
11/17/2011	15:35	16:15	0.6	RWF	Fuel Flow Meter calibration
11/30/2011	13:17	13:25	0.2	RWF	Fuel Flow meter install
12/14/2011	9:05	9:23	0.3	RWF	Monthly Generator run
Total Hours			25.8		
				PP	Pat Paul - NC Systems
				RWF	Roy Franklin - Sabey Data Center

Generator: **QC3-GEN-A**

Date	Start Time	End Time	Run Hours (xx.x)	Operator Initials	Reason for Run
1/18/2012	8:43	9:20	0.6	RWF	Monthly Testing
2/15/2012	9:15	9:41	0.4	RB	Monthly Testing
3/21/2012	10:33	10:40	0.1	RWF/GG	Monthly Testing
3/21/2012	10:46	11:17	0.6	RWF/GG	Monthly Testing
4/18/2012	7:40	7:59	0.3	RWF	Monthly Testing
5/1/2012	10:53	13:10	2.2	SDC	Power Outage
5/23/2012	10:05	10:24	0.3	RWF	Monthly Testing
6/20/2012	11:20	11:35	0.3	RWF	Monthly Testing
6/20/2012	2:50	3:07	0.3	RWF/ED	Monthly Testing
7/19/2012	8:22	8:50	0.5	RWF	Monthly Testing
8/21/2012	8:54	9:25	0.5	RB	Monthly Testing
9/18/2012	10:57	11:09	0.2	RWF/FD	Annual Load Bank Testing
9/18/2012	13:10	15:02	1.9	RWF/FD	Annual Load Bank Testing
10/10/2012	12:51	15:28	2.6	RWF	GCPUD Power Change to Underground
11/20/2012	12:00	12:18	0.3	RWF	Monthly Testing
12/19/2012	9:37	10:12	0.6	RWF/FD	Monthly Testing
Total Hours			11.7		
				ED	Eric Dunkin - NC Systems
				SDC	Sabey Data Center Operations
				GG	Gale Graham - NC Systems

QC3 Generator Run Log - 2012

SABEY Data Centers

INTERGATE.QUINCY

Generator: QC3-GEN-B

Date	Start Time	End Time	Run Hours (xx.x)	Operator Initials	Reason for Run
1/18/2012	9:29	9:49	0.3	RWF	Monthly Testing
2/15/2012	10:01	10:26	0.5	RWF	Monthly Testing
3/21/2012	12:01	12:11	0.1	RWF/GG	Monthly Testing
3/21/2012	12:15	12:45	0.6	RWF/GG	Monthly Testing
4/18/2012	8:06	8:24	0.3	RWF	Monthly Testing
5/1/2012	10:53	12:42	1.8	SDC	Power Outage
5/23/2012	10:30	10:47	0.3	RWF	Monthly Testing
6/20/2012	1:05	1:18	0.2	RWF	Monthly Testing
6/20/2012	2:25	2:44	0.4	RWF/ED	Monthly Testing
7/19/2012	8:54	9:17	0.3	RWF	Monthly Testing
8/21/2012	9:32	9:57	0.4	RB	Monthly Testing
9/19/2012	7:51	8:01	0.2	RWF/FD	Annual Load Bank Testing
9/19/2012	9:01	10:55	2.0	RWF/FD	Annual Load Bank Testing
10/10/2012	12:50	15:27	2.6	RWF	GCPUD Power Change to Underground
11/20/2012	11:37	11:53	0.2	RWF	Monthly Testing
12/19/2012	10:18	10:48	0.6	RWF/FD	Monthly Testing
Total Hours			10.8		
				ED	Eric Dunkin - NC Systems
				SDC	Spokane Data Center Operations
				GG	Gale Graham - NC Systems

QC3 Generator Run Log - 2012

SABEY Data Centers

INTERGATE.QUINCY

Generator: QC3-GEN-C

Date	Start Time	End Time	Run Hours (xx.x)	Operator Initials	Reason for Run
1/18/2012	9:57	10:17	0.4	RWF	Monthly Testing
2/15/2012	10:45	11:11	0.4	RB	Monthly Testing
3/21/2012	2:00	2:08	0.1	RWF/GG	Monthly Testing
3/21/2012	2:09	2:42	0.6	RWF/GG	Monthly Testing
4/18/2012	8:32	8:50	0.3	RWF	Monthly Testing
5/1/2012	10:53	12:19	1.4	SDC	Power Outage
5/23/2012	10:54	11:12	0.3	RWF	Monthly Testing
6/20/2012	1:30	1:45	0.3	RWF	Monthly Testing
6/20/2012	1:50	2:16	0.4	RWF/ED	Monthly Testing
7/19/2012	9:21	9:43	0.4	RWF	Monthly Testing
8/21/2012	10:06	10:30	0.4	RB	Monthly Testing
9/18/2012	13:53	14:03	0.2	RWF/FD	Annual Load Bank Testing
9/18/2012	15:10	17:05	1.9	RWF/FD	Annual Load Bank Testing
10/10/2012	12:48	15:25	2.6	RWF	GCPUD Power Change to Underground
11/20/2012	10:31	10:47	0.3	RWF	HDP Lineup Testing
11/20/2012	11:07	11:23	0.3	RWF	Monthly Testing
11/21/2012	9:29	9:47	0.5	RWF	HDP Lineup Testing
12/19/2012	10:55	11:33	0.6	RWF/FD	Monthly Testing
Total Hours			11.4		
				ED	Eric Dunkin - NC Systems
				SDC	Sabey Data Center Operations

QC3 Generator Run Log - 2012

SABEY Data Centers

INTERGATE.QUINCY

Generator: **QC1-GEN-B**

Date	Start Time	End Time	Run Hours (xx.x)	Operator Initials	Reason for Run
12/18/2013	16:07	16:17	0.1	TP/RWF	Startup
12/19/2013	9:37	14:15	4.9	TP/RWF	Startup
Total Hours			5		
				RWF	Roy Franklin - Sabey
				TP	Troy Porter - NC Systems

SABEY Data Centers

INTERGATE.QUINCY

Generator: QC3-GEN-C

Date	Start Time	End Time	Run Hours (xx.x)	Operator Initials	Reason for Run
1/23/2013	9:30	9:51	0.3	RWF	Monthly Testing
2/22/2013	10:20	10:52	0.6	RWF	Monthly Testing
3/20/2013	8:40	9:40	1.0	RWF/GG	Quarterly Testing
4/16/2013	10:01	10:23	0.3	RWF/MS	Monthly Testing
5/22/2013	9:55	10:18	0.4	RWF	Monthly Testing
6/19/2013	12:25	12:55	0.6	RWF/FD	Quarterly Testing
7/17/2013	10:34	11:04	0.5	RMB/CP	Monthly Testing
8/21/2013	10:48	11:08	0.3	RWF/CP	Monthly Testing
9/18/2013	9:10	10:48	1.7	RWF/FD	Annual Load Bank
10/23/2013	11:58	12:27	0.5	RMB/CP	Monthly Testing
11/16/2013	17:49	19:28	1.6	RMB/CE	Power Outage
12/18/2013	13:20	13:49	0.5	RMB/CP	Monthly Testing
12/20/2013	9:52	10:29	0.6	CP	Quarterly Testing
Total Hours			8.9		
				RWF	Roy Franklin - Sabey Data Centers
				GG	Gale Graham - NC Systems
				MS	Mark Senner
				FD	Frank DeGregory - NC Systems
				RMB	Ryan Beebout - Sabey Data Centers
				CP	Cody Payne - Sabey Data Centers

Arnold Schwarzenegger
Governor

AIR QUALITY IMPLICATIONS OF BACKUP GENERATORS IN CALIFORNIA

VOLUME TWO: EMISSION MEASUREMENTS FROM CONTROLLED AND UNCONTROLLED BACKUP GENERATORS

PIER FINAL PROJECT REPORT

Prepared For:
California Energy Commission
Public Interest Energy Research Program

Prepared By:
University of California, Riverside
Bourns College of Engineering—Center for Environmental Research and Technology (CE-CERT)

July 2005
CEC-500-2005-049

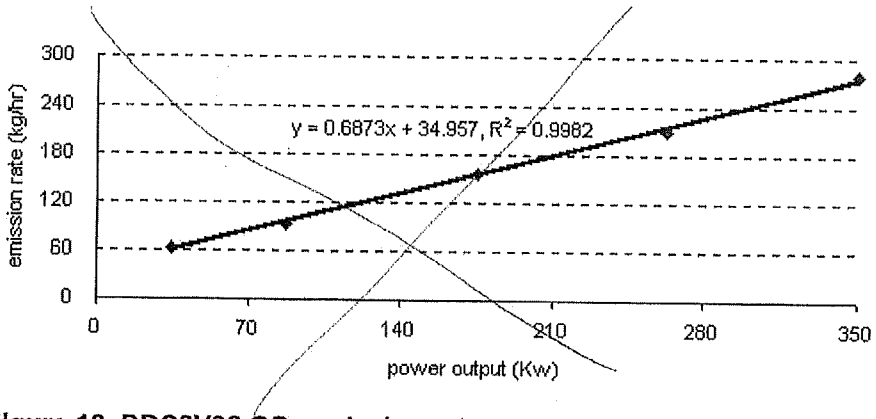


Figure 18. DDC8V92 CO_2 emission rate versus generator power output

3.4. Emission Factors for the Transient Cold Start

For each of the BUGs, the raw data were compiled during the testing, then adjustments were made to correct for ambient values and moisture. One of the data sets that was unique to this work was the measurement of transient emissions during the cold start. A representative example of the startup transient data is shown in Figure 19. The salient features are the high CO, total hydrocarbons, and the low NO_x initial values for about the first 30 seconds, and then a leveling out of the emissions.

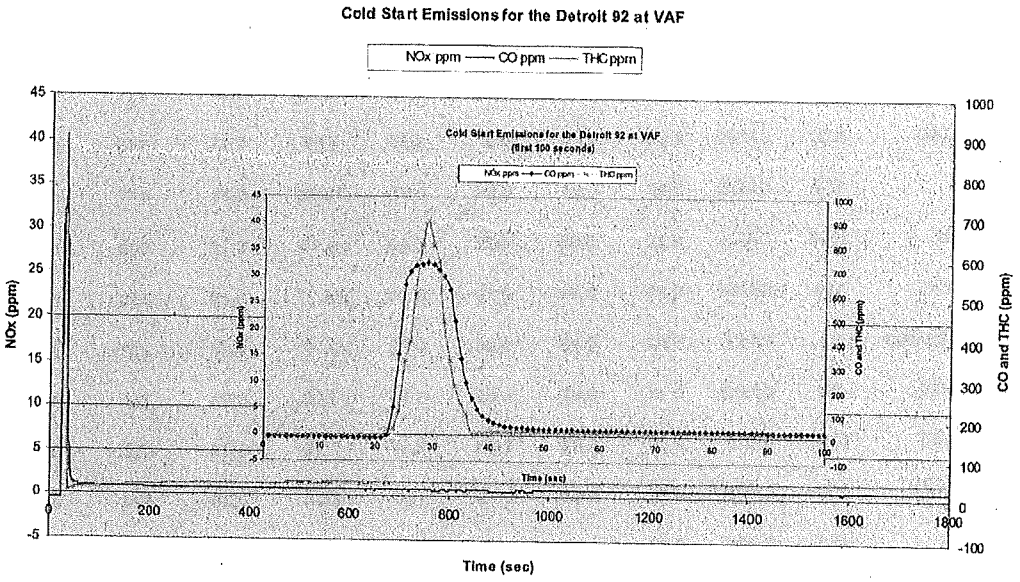


Figure 19. Cold-start emissions for CO and NO_X as a function of time

Although no electrical load is applied to the generator when the BUG was started, there are measurable emissions. For example, in the case shown in Figure 20, the emission factors in grams per kilowatt-hour were 24.3, 22.5, 55.4 and 17.7 for CO, THC, NO_x and

PM, respectively. The load on the engine was about 5 kW and emissions were averaged over the first 30 minutes.

3.5. Emission Factors for Regulated Species and Carbon Dioxide, CO_2

As mentioned in the introduction to this section, the emission factors were calculated from the raw data by following the methods prescribed in the CFR. For each BUG, the CE-CERT team developed emission rates in terms of the actual measured grams per hour at a specific power setting and then calculated the emission factor in terms of grams per measured kW-hour. The overall emission factor was figured using the formula and weighting factors shown in the CFR. Table 13 lists the weighted emission factors for the uncontrolled BUGs.

Table 13. Summary of weighted emission factors in g/kW-hr for uncontrolled BUGS

Mfg/Model/Yr	Eng Hr	Fuel	THC	CH4	NMHC	CO	NOx	NO2	CO2	PM Mass
CAT/3406B/'91	300	CARB	0.15	0.03	0.12	1.21	12.95		777	0.13
DDC/V92/'91	273	CARB	0.63	0.05	0.59	1.26	10.48		868	0.29
CAT/3406C/00	120	CARB	0.10	0.02	0.08	1.90	8.80	0.30	765	0.25
CAT/3412C/'98	2200	CARB	0.15	0.04	0.12	1.46	10.42		824	0.21
CAT/3412C/98	2542	CARB	0.14	0.04	0.11	1.53	10.35	0.44	821	0.26
CAT/3406C/00	3237	CARB	0.22	0.04	0.37	1.68	8.89	0.37	745	0.22
DDC/60/99	762	CARB	0.09	0.01	0.08	0.75	10.19	0.39	871	0.08
CUM/N14/99	1200	CARB	0.30	0.03	0.27	0.63	8.25	0.26	803	0.09
CAT/3406B/86	110	CARB	0.23	0.04	0.19	0.90	15.37	0.40	773	0.14
CUM/KTA19G2/90	64	CARB	0.52	0.05	0.48	0.93	9.37	0.37	733	0.32
CAT/3406C/00	664	CARB	0.11	0.02	0.09	1.96	9.08	0.33	755	0.25
CAT/3406C/00	1018	ECD	0.10	0.02	0.08	2.07	7.98	0.31	762	0.22
CAT/3406C/00	130	CARB	0.12	0.02	0.10	1.39	8.86	0.28	747	0.20
DDC/V92/85	863	CARB	0.88	0.07	0.82	2.11	14.46	0.76	957	0.28
CAT/3408B/90	3004	CARB	0.19	0.05	0.14	2.30	7.16	0.35	799	0.47
CAT/3512/00	808	CARB	0.42	0.03	0.39	0.77	6.93	0.42	798	0.18
CAT/3508/02	443	CARB	0.43	0.04	0.37	0.74	6.41	0.32	798	0.22
CAT/3516/00	1530	CARB	0.40	0.02	0.36	0.66	6.80	0.38	745	0.17

Table B-1. Emission Factor Adjustments for Cold Start

Runtime Following Cold Start	DPM	NOx
10-minutes	1.35	0.999
30-minutes	1.12	0.999
1-hour	1.058	0.999
8-hours	1.007	0.999

DIESEL GENERATOR COLD-START ADJUSTMENT FACTORS
ICF INTERNATIONAL, APRIL-2011

Short-term concentration trends for VOC, CO and NOx immediately following a cold start by a large diesel backup generator were measured by the California Energy Commission for their document :Air Quality Implications of Backup Generators in California" dated July 2005. They used continuous monitors to measure the following trends, which are shown in the attached figure:

During the first 14 seconds after cold-start, the VOC concentration spiked up to a maximum value of 900 ppm before dropping back to the steady state value of 30 ppm. The area under the concentration-vs-time curve represents a "VOC spike" of 6,300 ppm-sec..

It took 8 seconds for the NOx concentration to ramp up to its steady state value of 38 ppm. The area under the concentration-vs-time curve represents the "NOx deficit" of 160 ppm-sec.

The Cold Start Adjustment Factor for DPM was estimated by assuming the concentration trend for DPM should be similar to the trend for VOC. In that case, for any generator operating period after a cold start, the adjustment factor is the area under the VOC Spike divided by the area under the 30 ppm steady state concentration profile.

Example: DPM emissions for 1-hour Generator Runtime After Cold Start

The steady state VOC concentration is 30 ppm. For a 1-hour runtime the VOC emission is the area under the concentration-vs-time curve, or 30 pppm x 3600 seconds = 108,000 ppm-sec.

The "cold start factor" is the VOC spike area divided by the steady state area:

(6300 ppm-sec) / (108,000 ppm-sec) = 0.058.

So during the 1-hour period following a cold start the overall DPM emission factor is adjusted by the "cold start factor" of 1.058.

Example: NOx Emissions During 1-Hour Runtime Following Cold Start

NOx Deficit = 160 ppm-sec

Steady-state NOx profile = 38 ppm x 3600 sec = 137,000 ppm-sec

NOx Cold Start Factor = 1 - (160/137,000) = 0.999 x Steady State Emission Factor

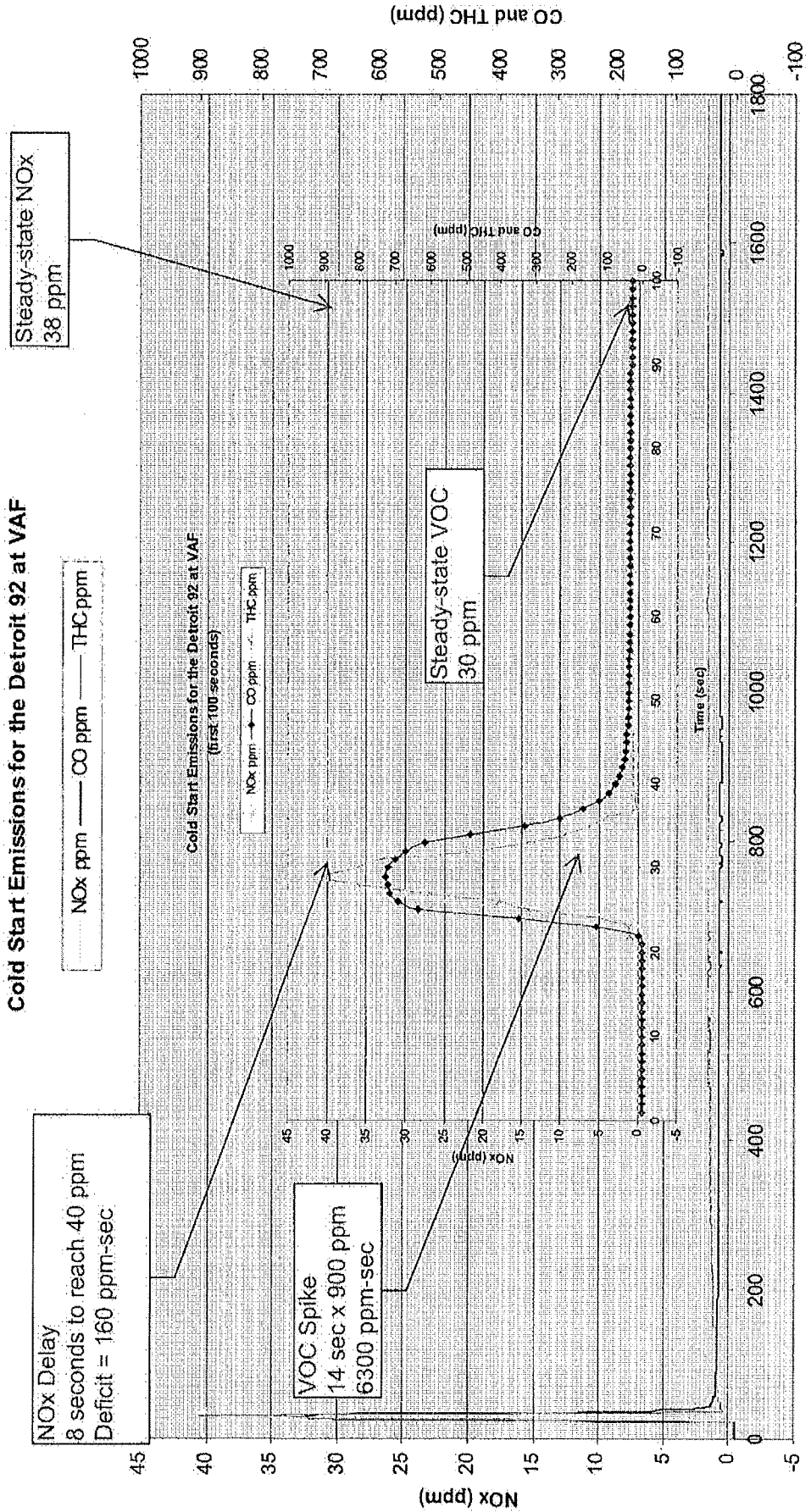
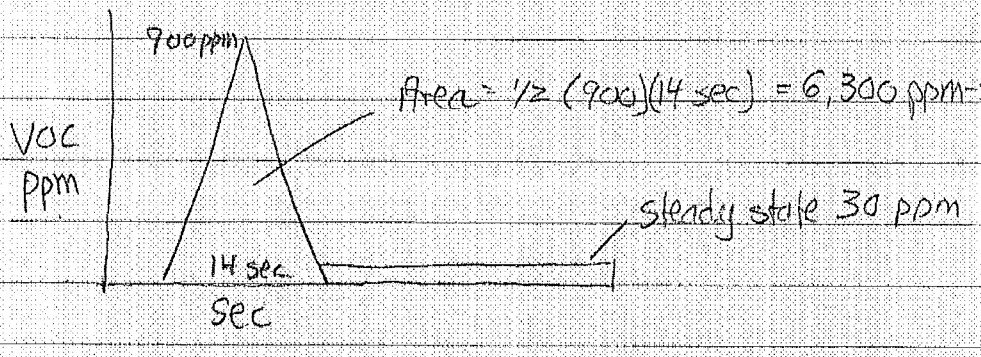


Figure 19. Cold-start emissions for CO and NO_X as a function of time

VOC Spike

VOC Spike Area = 1/2 (900 ppm)(14 sec) = 6,300 ppm-sec



Steady State VOC Areas @ 30 ppm

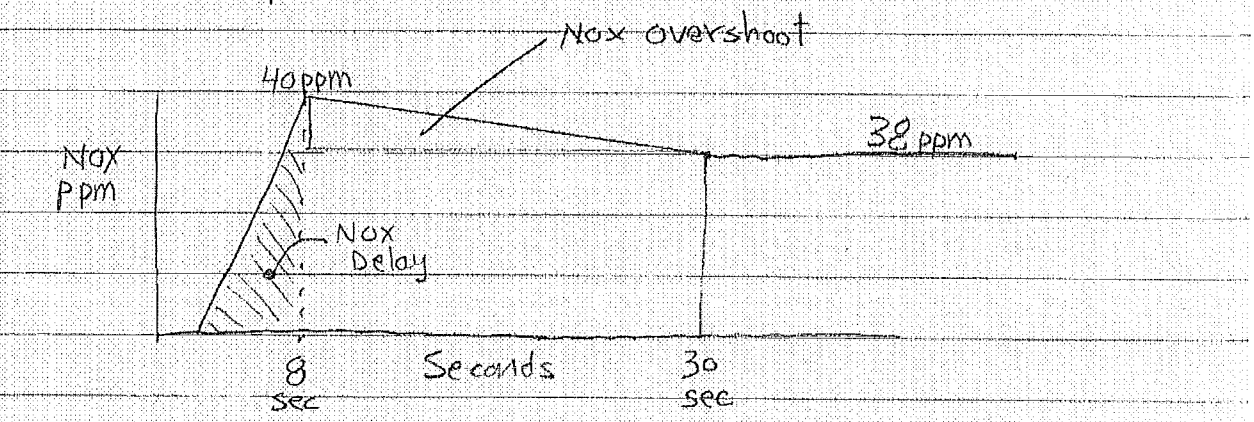
10-minutes Area = 30 ppm x 600 sec = 18,000 ppm-sec
Cold-Start Factor = 6,300/18,000 = 0.35
So DPM in 1st 10 minutes = 1.35 * steady state

30-min Area = 30 ppm x 30 min x 60 = 54,000 ppm-sec
Cold Start factor = 6300/54,000 = 0.12
So DPM in 1st 30 min = 1.12 * steady state

60- minutes = 30 ppm x 60 min x 60 sec/min = 108,000 ppm-sec
Cold start factor = 6300/108,000 = 0.058
So DPM in 1st 60 min = 1.058 * Steady state

8-hours: 30 ppm x 8 hrs x 3600 sec/hr = 864,000 ppm-sec
Cold Start factor = 6300/864,000 = 0.0073
So DPM in 8-hrs = 1.0073 * Steady state

NOx Delay



Nox Delay: 8 secs to reach 40 ppm

Area = ½ (8 sec)(40) = 160 ppm-sec

Nox Overshoot: 22 secs to drop to 38 ppm

Area = ½ (22 sec)(2 ppm) = 22 ppm-sec

Net Deficit = 22 ppm-sec − 160 ppm-sec = −138 ppm-sec

1-hour Nox Cold-Start Factor @ 38 ppm steady state

Steady state 1-hr = 3600 sec x 38 ppm = 137,000 ppm-sec

Cold start factor = −138 ppm-sec / 137,000 ppm-sec

So Cold start adjustment = 0.999 * Steady state

January 7, 2015

Kari Johnson, Education and Outreach Specialist
Department of Ecology
4601 N Monroe St
Spokane, Washington 99205

Dear Kari,

The following pages are my public comments for the revised Sabey Data Center 2015 Permit.

Donna DalPorto
Ephrata, WA

PUBLIC COMMENT DOCUMENTS
DANNA DAL PORTO

SABEY INTERGATE-QUINCY DATA CENTER, QUINCY WASHINGTON

JANUARY 7, 2016

51 1. My first comment is to express my concern for the timing of the public comment period. The public was presented the complex operational changes to the Sabey permit in the thirty-day period from December 10, 2015, to January 10, 2016. (Exhibit A) These 30 days bracket the Christmas and New Year celebration time. This is family time. This season of the year is when college students return home for vacations and family from far and wide come home for celebrations. I feel that choosing this time period was intended to limit public involvement and is a hindrance to the public comment process. This annoying and inconsiderate choice of timing for public comment has been done before. The public comment period for Vantage was December 11, 2012 to January 11, 2013. (Exhibit B)

The Sabey permit revision started with documents being submitted to Ecology in March 2015. The various documents were revised and a letter was sent to Karen Wood of Spokane Ecology on November 16, 2015, indicating that the public comment period could begin "when you are ready to do so." (Exhibit C) I read that statement and concluded that the public comment period could have been earlier in 2015 and not during the Holiday Season. I have contacted Ecology and requested specifics on who chose the December 10, 2015- January 10, 2016, dates for public comment.

52 2. The March 2015 Revised HIA/Sabey Risk Analysis has a chart of Exposure Frequencies for Each Receptor Type. The chart lists the exposure of School-Student as 7 (years) Elementary and 4 (years) for HS and College. (Exhibit D) I believe the data is incorrect. The Quincy school system is a K-12 system so Quincy children are exposed to the cancer causing agents for 13 years. I do not understand the category for college student, as there is no college in Quincy. I request the Sabey documents represent the facts.

53 3. Throughout the Sabey documents the emissions are listed as 70-year averages. (Exhibit E) (Exhibit F) The Quincy data center construction has been built for the long-term and the community has been lead to believe that 70+ years will be data center effective life. In the Sabey Technical Support Documents for Preliminary Determination, November 16, 2015, the evaluated cost effectiveness of installing and operating DOC's was discussed. Bullet number four of page 15 explains the "annualized" costs over 25 years are $182,094. (Exhibit G) In all of the BACT and tBACT data for emission controls, Ecology gives costs and expenses for the emission controls and most always states that controls are not cost effective and therefore are rejected as BACT and tBACT. The "annualized" costs over 25 years are very different than the "annualized" costs over

70 years. I want to see the calculations used by Ecology and data center developers to determine cost effectiveness for emission controls. If the "annualized" numbers are based on 25 years and not 70+ years, the effective life of these diesel engines, I believe the price for controls would be more affordable and the public should expect emission controls on all the data center diesel engines. The cost of the emission controls is surely a business expense and therefore a business deduction so Quincy residents do not understand why data center developers and Ecology do not insist on emission controls to protect the public. To repeat myself: I want to see the calculations used by Ecology and the data center developers to determine cost effectiveness for emission controls. If I do not understand the calculations, I want Clint Bowman of Ecology to explain the process to me.

54 4. "Black Puff" cold-start considerations are new to me in the Quincy data center permits. The chart on Landau Associates 2015 Response Letter\Revised Sabey-Quincy AO Revision Request, page 2 (Exhibit F) states that "Black Puff" is "accounted for in the annual-average and short-term emission rates and AMEROD modeling". My comment is the annual average for Sabey Quincy"Black Puff" is not possible to determine. The frequency of cold starts is an unknown. In reading the Sabey permit application, there are many unknowns because the Sabey facility will have up to eight different tenants in the building. The eight different tenants would be operating their own engines so each tenant could have very different operating behaviors therefore the number of "Black Puff" starts is impossible to know. The amount of material expended in a cold start is considerable so making an average of that amount will not be accurate. Explain how Sabey can average in the "Black Puff" cold start into their short-term emission rates without knowing the operational patterns of their tenants.

55 5. The Preliminary Determination for Sabey Intergate lists in EQUIPMENT a variety of engines and manufacturers that can be permitted in the facility. The 2011 and 20115 emission data for the permit was compiled from the original engines: Caterpillar 3512C-1.5 MWe, Caterpillar 3516C-2.0 MWe. (Exhibit H) The various engine manufacturers have their own emission data based on the operation of their engines. With the addition of as many as four new engines with two different manufacturers, I believe it will be necessary to compile all new data for the Sabey Intergate emissions based on these different engines. Because of these unknowns, as well as the unknown operational patterns of the Sabey tenants, the technical assumptions for this permit cannot be valid and therefore Sabey Revised 2015 Permit cannot be valid.

56 6. In the Preliminary Determination, November 16, 2015, Ecology is allowing Sabey to install new engines up to July 1, 2019. (Exhibit I) This date, so far in the future, does not satisfy my need and request for Ecology to monitor the development and build-out of this facility. Because of the complexity of the tenant control of the engines, I am concerned about the concurrent running of the engines and the number of cold-starts to emit toxins. I want to be able to see the operational logs as well as the records of the coordination communications with other data centers intended to minimize engine emission impacts (Exhibit J) and I want Ecology not to allow the build out to continue to 2019.

57 7. In the Preliminary Determination, November 16, 2015, Ecology is allowing five years (60 months) to pass from the initial testing of an engine (each size engine from each manufacturer) for the repeated testing of that type of engine. (Exhibit K) Five years is too long between testing to check out the emissions of engines. I want Ecology to explain why they are allowing 5 years between testing.

58 8. The operation of engines in the Preliminary Determination is very confusing. On Page 5, Table 3.2, the Annual Engine Operating Restrictions list the average Operating Electrical Loads (%) as Zero to 50% for Monthly Testing. Testing at 50% does not represent the worst-case scenario for some toxic emission. How can Monthly Testing not be done at a range of loads? (Exhibit L) On Page 7 of the same document, Section 4.2 and 4.3.2 list compliance with Tier 2 average emission limits and has specific electrical loads to determine emissions: 100%, 75%, 50%, 25% and 10%. (Exhibit K) The previous data center documents had these specific load percentages for emission testing. Page 8, 9 and 10 of the Preliminary Determination has those same Operating Electrical Load percentages. (Exhibit M) I want Ecology to explain the variations in the charts that would allow Monthly Testing to be done from Zero % to 50 % and not at the 100%, 75%, 50%, 25% and 10% levels.

59 9. Two references were made in Sabey documents to the data from the Microsoft Oxford Permit 2015. (Exhibit N) (Exhibit O) There are two incorrect assumptions from these documents. First, the "Black Puff" factors derived from the 15-minute cold start is not correct. The factors from cold start are to be determined from a 30-minute time frame. Second, the Microsoft Oxford Data Center 2015 Permit is experiencing yet another revision (third?) and has not been finalized. No information should be used from an incomplete document that has yet to be approved by Ecology.

60 10. I am referencing a November 16, 2015 letter from Chris Hanlon-Meyer, Science and Engineering Section Manager, Air Quality Program, Washington Department of Ecology to Ms. Karen Wood, Department of Ecology, Eastern Regional Office, Spokane, Washington. (Exhibit C) This letter talks about the March 2015, Sabey submittal to revise their permit to allow their generators to operate over a wider range of operating loads. This increases air pollution. This letter describes the previous Sabey estimate was seven (7) in one (1) million from cancer to a new estimate of 9.9 in one (1) million. Another document (Exhibit P) determines that concentrations exceeding 0.0333ug/m3 (10 in one million) occurred in portions of a residential parcel near Sabey. Ecology documents limit individual data centers from exceeding the 0.0333ug/m3 (10 in one million). I want to know how this permit can be allowed if the 10 in one million has been exceeded. Over ten in one million cancers is a violation of the per cancer rate, per single facility, to be allowed in Quincy.

61 11. Exhibit P has a footnote that Sabey has agreed to accept lower emissions limits that what was reported in the HIA. The footnote about the lower emissions possibly refers to an email exchange between Jim Wilder (Landau-Sabey) and two Ecology employees, Gary Huitsing and Gary Palcisko. (Exhibit Q) This dialogue in May 2015, discusses the inability of Sabey to be below 10 in one million facility wide cancer risk. The Sabey

engineer offers: "Sabey wishes to revise the Tables 5.2-5.5 of the Approval Order, so the revised per generator hourly emissions limits will match the revised, conservative lbs/hr emissions rates we used for our revised application". Hustsing responds that a "separate report is not necessary. We accept the email below as documentation of Sabey's concurrence to reduce the facility-wide DEEP emissions limit so that the calculated risk…is less than the 9.9-per-million." Following Hustings acceptance of an email (instead of a revised document that could be reviewed by Ecology and seen by the public) for Sabey intent to lower emissions, Palcisko reports the calculations need to be further adjusted to make the risk lower that the highest reported risk of 11 per million. The permitting requirements for air quality indicate that the modeling must be done based on the "worst case scenario" and not a toxicologist's suggestion to keep the emissions under a certain tonnage. At the end of the emails, Wilder states that Sabey will "have no difficulty complying with the 0.408 tpy limit". The 10 per million cancers is one of the benchmark requirements of the method Ecology is using to permit data centers in Quincy. As far back as May 2015, Sabey was having difficulty meeting that benchmark. I am astonished to see the casual way this issue was handled. Ecology is accepting an email for a permit instead of requiring a revision of the testing and a correction of the documents? I want to see how that statement is reflected in the permit. I want to be able to read this permit and know that Sabey is operating properly and safely. I suspect Sabey is tinkering with the operating loads to lower emissions. In the past, the public has not been allowed to see the operating records. Quincy residents do not know if these modifications are being followed to protect the public. I want to know how Sabey can be allowed to operate, without emission controls, and still be within the limits of Ecology standards. Explain to me how this permit was determined to be valid with these operational flaws.

62 11. Referencing the November 16, 2015, letter from Chris Hanlon-Meyer to Karen Wood, Ecology has determined that cumulative impacts of DEEP emissions in the area of Sabey have increased cancer risk up to approximately 58 in one million at a location about ¾ mile south of Sabey near State Route 28. (Exhibit C) A reason is given that most of the DEEP exposure is from trucks traveling on the highway. I have looked at the maps of the modeling for DEEP and the cumulative plume from Sabey, Intuit, Vantage and Yahoo all overlap with the highway emissions. (Exhibit R) The highway emissions would not be a 58 in one million cancer risk by themselves. The conclusion is that the location of these data centers and their emissions has greatly increased the risk of cancer for anyone living in that area. Studying the Ecology-developed map illustrating the DEEP concentrations the Microsoft Oxford facility, I looked at the emissions surrounding the train track and highway 28. The Oxford map shows no concentrations of DEEP along the train track and highway 28 just west of the Oxford facility. (Exhibit S) These are the same transportation routes that Chris Hanlon-Meyer determines to be the reason for the elevated cancer risks south of Sabey. I believe these maps clearly show the data centers to be the cause of the increases in DEEP south of Sabey. I want to know how Ecology can permit a data center with toxic emissions that overlap with background emissions and raise the cancer risk to 58 in one million. Sabey must put emission controls on the diesel generators to protect public safety.

63 12. The Technical Support Document, November 16, 2015, made a statement about the "community-wide basis": In light of the rapid development of other data centers in the Quincy area, and recognizing the potency of DEEP emissions Ecology decided to evaluate Sabey's proposal in a community-wide basis, even though it is not required to do so by state law. (Exhibit T) I have complained about the community-wide construct in other public comments and I will continue to do so. The community-wide basis is a fabrication. Ecology has never submitted this "formula-invention" to a peer review and it is not part of the Ecology rules or guidelines that have been part of established Ecology operational procedure. This guideline only applies in Quincy. There is no rule or law on record that community wide has been approved as an Ecology benchmark. When the gates were opened for multiple data centers to be built in close proximity in Quincy, Washington, Ecology invented the magic number of 100 per cancers in a million as an arbitrary standard for limits on construction. By doing this, as long as the cancers were below 10 in a million for each facility, the construction could continue with no apparent limits on dangerous emissions such as NO2 and the taps. The community wide is a shield for Ecology to allow data center construction to smother Quincy in toxic air. If community wide had any validity, the 58 cancers per million south of Sabey would trigger emission controls on Sabey as well as all of the data centers east of Quincy.

64 13. The Sabey Intergate-Quincy Data Center Technical Support Document, November 16, 2015, uses five years of sequential hourly meteorological data 2001-2005 from Moses Lake Airport. (Exhibit U) 40 CFR 51 Appendix W 8.3.1.2 Recommendations are that the years used for the air quality model should be from the most recent, readily available 5-year period. (Exhibit V) This 2001-2005 data is ten years old. In the 2011 application Sabey used 2004-2008 meteorological data. Explain to me why Sabey is allowed to use older (2001-2005) weather data for the new 2015 Permit? Weather is not constant and I believe that data centers developers should use recent data, as recommended by 40 CFR 51 Appendix W 8.3.1.2. I believe that Ecology should require use of current data. I have argued in the past that use of Moses Lake Airport data does not represent weather in Quincy. Ecology response to Comment 35 in the Microsoft Oxford Public Comment Document, July 9, 2015, *, appears to be the basis for Ecology choosing Moses Lake Airport as the standard for meteorology for Quincy. Ecology makes this statement: "In previous actions, the Pollution Control Hearings Board (PCHB) has agreed that Moses Lake meteorology is sufficiently representative of conditions in Quincy to provide a basis for air dispersion modeling in Quincy." (Exhibit W) I am requesting the document that verifies the statement that the PCHB agreed on Moses Lake for Quincy air. My question to Ecology is this: In what way does the Pollution Control Hearing Board have a scientific foundation to make the determination about the weather in Quincy? I think this determination has no basis in scientific fact and I do not accept this finding. The City of Quincy must have a monitor for air quality and weather. Ecology continues to deny Quincy residents an honest and true window into the air quality of our community. Ecology reports that personnel and funding are the basis for not having air monitors. I regret that I cannot accept those reasons and I will continue to argue for technical support, especially if Ecology continues to permit facilities in Quincy without actually knowing the air quality. I believe that Ecology is avoiding the instillation of an air monitor because the monitor would verify that Quincy air is toxic. The placement and

the timing of a monitor is critical. An air monitor must be placed to collect the most representative air samples and the monitor must be installed for 365 days (one entire year). The recent extended inversions need to be captured as well as the cycles of wind and weather from the Columbia River. Everything being done in Quincy is being done on modeling and technical calculations. I think it is well past time to find out how reliable these mathematical computations are. I am requesting air monitors for Quincy and a recent meteorological basis for modeling. * The Microsoft Oxford 2015 Permit is still not finalized and the public comments from the July 9, 2015, Microsoft Oxford Public Hearing have not been published.

65 14. The Revised HIA\Sabey Risk Analysis, March 3, 2015, reports that Landau used "The local background emissions estimates from the Vantage Data Center- used in this HIA-were previously derived in that project's HIA (ICF 2012)". (Exhibit X) Recent considerations in emission testing have taken into account the large amount of material involved in "Black Puff" cold start. Using the 2012 Vantage background data is not reliable or current and not acceptable for the veracity of this application. I want to know how Ecology would read this information and not request a proper background emission test. I am requesting a revised, updated and accurate background test for the permitting of Sabey engines.

66 15. The Sabey-Intergate facility has different operational issues than the standard commercial, company owned facility. Having as many as eight different tenants, each operating independently, has made for many unknown factors affecting this permit. (Exhibit Y) Are each of these tenants going to have their own diesel engine operator? How can the public know if these engines are operating under the guidelines of a permit? The March 2015 Revised AO Request describes some of the operational variations for this facility. Sabey has asked to use two different models of two different manufacturer's engine in the further build-out of the facility. I do not think this permit clearly defines the operational limits to engine loads and engine cold-start to understand the emission composition. Sabey has asked for more flexibility (operating from 0% to 100%) and if Ecology allows this range of flexibility, there is no way to know if the facility is in compliance with emission limits. Given the necessity for Sabey to lower emissions to be below the 10 per million limit for permit compliance (Exhibit P) (Exhibit Q), I believe that emission controls must be required for the safe operation of the Sabey facility. For public safety, I am requesting that Ecology require emission controls on the Sabey-Intergate Data Center.

67 16. I am requesting colored city-wide emission maps for DEEP, NO2, PM2.5, PM10, and Ozone that goes from Oxford east to include Sabey. On the maps I want the 5 public schools, the one private school, the hospital and the Senior Center identified. The other document I want is the regional background for Quincy for the years 2008 and 2015.

Thank you for considering my comments, Danna Dal Porto, Quincy, WA

Danna Dal Porto

EXHIBIT LIST FOR THE SABEY INTERGATE-QUINCY 2015

DANNA DAL PORTO PUBIC COMMENT

A. Email from Kari Johnson (ECY) to the QUINCY-DATA-CENTERS @ LISTSERVE.WA.GOV, December 10, 2015

B. Email from Beth Mort (ECY) to Interested Parties, December 11, 2012

C. Letter from Chris Hanlon-Meyer (ECY) to Karen Wood (ECY) Re: Second Tier Petition by Sabey Corporation Regarding TAP Emissions Increases Associated with Permit Revisions Requested for the Sabey Intergate-Quincy Data Center in Quincy, WA, November 16, 2015

D. March 3, 2015, Revised HIA\Sabey Risk Analysis, Landau Associates, page 4-12

E. March 4, 2015, Application materials, June 5, 2015 supplemental math\Errata 6-4-2015 Appendix E Landau Associates, Page 4

F. March 4, 2015, Response letter\Revised Sabey-Quincy AO Revision Request, Landau Associates, Page 2

G. Sabey Intergate-Quincy Data Center, Technical Support Document for Preliminary Determination, November 16, 2015, Page 15

H. Sabey Intergate Quincy LLC, Intergate-Quincy Data Center, Preliminary Determination, November 16, 2015, Page 1, 2

I. Sabey Intergate-Quincy Data Center, Preliminary Determination, November 16, 2015, Page 4

J. Sabey Intergate-Quincy Data Center, Preliminary Determination, November 16, 2015, Page 6

K. Sabey Intergate-Quincy Data Center, Preliminary Determination, November 16, 2015, Page 7

L. Sabey Intergate-Quincy Data Center, Preliminary Determination, November 16, 2015, Page 5

M. Sabey Intergate-Quincy Data Center, Preliminary Determination, November 16, 2015, Page 8, 9, 10

N. March 4, 2015, Revised Emission Calcs & Ambient Impact Assessments, Landau Associates, Page 4

O. APPENDIX E (March 2015), REVISED EMISSION CALCULATIONS & AMBIENT IMPACT ASSESSMENT AIR QUALITY APPROVAL ORDER REVISION APPLICATION, SABEY INTERGATE –QUINCY DATA CENTER, QUINCY, WASHINGTON, Landau Associates, Page 1

P. Second Tier Review Recommendation, Sabey Intergate-Quincy Data Center, November 16, 2015, Page 6

Q. Emails between Jim Wilder, Landau Associates, May 6, 2015 and May 22, 2015; Gary Huitsing, Ecology, May 6, 2016; Gary Palcisko, Ecology, May 22, 2015 regarding the Sabey Intergate-Quincy Data Center.

R. Cumulative Risk from DEEP at residential locations (estimated by Ecology) in the Sabey vicinity (colored map), Second Tier Review Recommendation, November 16, 2015, Page 16

S. Cumulative DEEP concentrations (estimated by Ecology) in the Oxford vicinity. Concentrations are reported as the number of times higher than the ASIL. (colored map), Second Tier Review Recommendation, Microsoft Oxford Data Center, August 12, 2014 (Updated), Page 23

T. Sabey Intergate-Quincy Data Center, Technical Support Document for Preliminary Determination, November 16, 2015, Page 25

U. Sabey Intergate-Quincy Data Center, Technical Support Document for Preliminary Determination, November 16, 2015, Page 18

V. 40 CFR 51, Appendix W, 8.3.1.2 Recommendations, a. b.

W. Microsoft Oxford Public Comment, July 9, 2015, Comment 35: Danna Dal Porto and the Ecology Response. This permit is not finalized as of January 5, 2015.

X. March 3, 2015, Sabey Intergate-Quincy Data Center, Revised HIA\Sabey Risk Analysis, Landau Associates, Page 4-4

Y. March 4, 2015, Sabey Intergate-Quincy Data Center, Response Letter\Revised Sabey-Quincy AO Revision Request, Landau Associates, Page 5

From: **Johnson, Kari D. (ECY)** KARI.JOHNSON@ECY.WA.GOV
Subject: Sabey Comment Period Open!
Date: December 10, 2015 at 12:08 PM
To: QUINCY-DATA-CENTERS@LISTSERV.WA.GOV

Hello Quincy Data Center Interested Parties,

The Sabey Public Comment Period has begun. Sabey Intergate applied for revisions to its air permit for Sabey Data Center. Sabey is proposing changes to the way it operates and tests backup generators at its data center in Quincy. These changes require modification of an existing air permit that was issued on August 26, 2011. The proposed permit includes flexibility for potential use of smaller generators and improvements on testing procedures. It also allows a longer term for phased growth and adds clarification to certain conditions. Additional conditions to protect public health from air pollution include limits on the amount of fuel and number of hours the engines can operate. Ecology is seeking public comment on the changes to Sabey's permit.

The public comment period will be open from December 10, 2015 through January 10, 2016.

The documents associated this project are available online here:
http://www.ecy.wa.gov/programs/air/quincydatacenter

Or at the following repositories:

Quincy City Hall
104 B Street SW
Quincy, WA 98848

Quincy Library
208 Central Ave. S
Quincy, WA 98848

Ecology's Spokane Office
4601 N Monroe St
Spokane, WA 99205

Submit comments to:
Kari Johnson, Education & Outreach Specialist
Department of Ecology
4601 N Monroe St
Spokane, WA 99205
kari.johnson@ecy.wa.gov

Feel free to contact me with any questions.

Have a wonderful day.

Kari

Kari Johnson (509) 329-3502 kari.johnson@ecy.wa.gov EXHIBIT A

From: "Mort, Beth (ECY)" <BMOR461@ECY.WA.GOV>
Subject: **Vantage Data Center - NEW Public Comment Period**
Date: December 11, 2012 2:04:16 PM PST

Dear Interested Parties,

The new public comment period on the draft air quality permit for Vantage Data Centers is now open! Comments will be accepted through midnight January 11, 2013.

This new comment period is needed because Vantage has made changes to the proposed project. Vantage requested higher emission limits for the generators at certain operating loads. This resulted in a slight increase in emissions. Because of this they had to recalculate their emission impacts. The results of this analysis showed that the project proposal still complies with all air quality rules designed to protect public health.

Documents about the permit and the health assessment are available for the public at:

- City of Quincy, City Hall, 104 B St. SW, Quincy, WA
- Department of Ecology, Eastern Regional Office, Air Quality Program, 4601 N. Monroe St., Spokane, WA
- Online at: http://www.ecy.wa.gov/programs/air/quincydatacenter/ scroll down to Vantage Data Centers and you will find the updated documents

You can email comments to me at beth.mort@ecy.wa.gov or mail them to me at:

Beth Mort
Department of Ecology
Eastern Regional Office
4601 N Monroe St.
Spokane, WA 99205-1295

Thank you!!

Beth Mort | Community Outreach & Environmental Education
Air Quality Program | Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov | 509 329 3502
Office Hours: M-Th 7am-4pm

EXHIBIT B

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

November 16, 2015

Ms. Karen Wood
Department of Ecology
Eastern Regional Office
4601 N. Monroe Street
Spokane, WA 99205-1295

Re: Second Tier Petition by Sabey Corporation Regarding TAP Emissions Increases Associated with Permit Revisions Requested for the Sabey Intergate-Quincy Data Center in Quincy, WA

Dear Ms. Wood:

The Washington State Department of Ecology's Air Quality Program (Ecology) has completed a review of health risks from diesel engine exhaust particulate (DEEP) emissions from the Sabey Corporation (Sabey) Intergate-Quincy Data Center in Quincy, WA. Sabey had previously obtained a permit to install and operate:

- Several cooling units
- Forty-four generators rated at up to 2,000 kilowatt (kW) electrical output

In March 2015, Sabey submitted an application to revise the permit to allow generators to operate over a wider range of operating loads. This wider range results in an increase in the amount of air pollution the facility could emit. Ecology required Sabey to revise the health impact assessment to evaluate the health risks from exposure to diesel engine exhaust particles.

The revised diesel particle emissions resulted in an increase lifetime cancer risk from the previous estimate of seven in one million to a new estimate of about 9.9 in one million. The maximum risk was estimated on a portion of a residential parcel located north of Sabey Intergate-Quincy Data Center. Ecology allows an increased risk of up to 10 in one million from new sources of air pollutants.

As part of the community-wide approach in Quincy, Ecology also considered the cumulative impacts of DEEP emissions in the area. Emissions from Sabey and other local sources of DEEP could result in lifetime increased cancer risk of up to approximately 58 in one million (58×10^{-6}) at a location about ¾ mile south of Sabey Intergate-Quincy Data Center and just south of State

Route 28. Most of the DEEP exposure at this residence is estimated to come from heavy duty trucks travelling on the highway. The cumulative non-cancer hazard quotient at this location is much lower than unity (one) meaning that non-cancer adverse health effects are unlikely.

Ecology recommends approval of the proposed project because project-related health risks are permissible under WAC 173-460-090 and the cumulative cancer risk from DEEP emissions in Quincy is less than the cumulative maximum risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100 x 10^{-6}).

This project has satisfied all requirements of a Second Tier analysis. Ecology recommends that you incorporate our findings as part of your ambient air impacts analysis and you may begin the public comment period when you are ready to do so.

If you would like to discuss this project further, please contact Gary Palcisko at (360) 407-7338 or gary.palcisko@ecy.wa.gov.

Sincerely,

Chris Hanlon-Meyer
Science and Engineering Section Manager
Air Quality Program

gp/te

Enclosure

cc: Jolaine Johnson, Ecology
Gary Palcisko, Ecology
Dale Spencer, Sabey
Jim Wilder, Landau Associates

$$\text{Risk} = \frac{C_{Air} \times URF \times EF1 \times EF2 \times ED}{AT}$$

Because URFs are based on a continuous exposure over a 70-year lifetime, exposure duration and exposure frequency are important to consider. Exposure frequencies will vary depending on the receptor type being evaluated in the HIA. For example, the duration and frequency of time spent by the occupants of a home over a 70-year life span is much greater than that for a commercial warehouse or office.

Exposure frequencies used in this HIA are based on Ecology's judgment from review of published risk evaluation guidelines. These values are shown below. Using these exposure frequency factors, Table 4-7 lists the corrected unit risk factors for each maximally impacted receptor evaluated in this HIA.

EXPOSURE FREQUENCIES FOR EACH RECEPTOR TYPE

Parameter	Description	Value Based on Receptor Type						Units
		Residential	Worker	School-Staff	School-Student	Hospital	Boundary	
C_{Air}	Concentration in air at the receptor	See Table 4-3						$\mu g/m^3$
URF	Unit Risk Factor	0.0003						$(\mu g/m^3)^{-1}$
EF1	Exposure Frequency	365	250	200	180	365	250	Days/Year
EF2	Exposure Frequency	24	8	8	8	24	2	Hours/Day
ED	Exposure Duration	70	40	40	7 (Elem) 4 (HS & College)	1	30	Years
AT	Averaging Time	613,200						Hours

Table 4-8 shows the estimated cancer risks associated with predicted project-related concentrations (Table 4-2) and the URFs (Table 4-7). Although the highest annual-average concentration was predicted to occur at the MICR, the highest cancer risk was estimated at the MIRR (the residential home to the northwest of the Intergate-Quincy Data Center). This is due to considerations of duration and frequency of potential exposure incorporated in the unit risk factors. The calculated 70-year average cancer risk at the MIRR is 9 increased cancer cases per million population (9.1×10^{-6}). This is less than 10×10^{-6}, which is the recommended permissible level under Chapter 176-460 WAC.

As part of the second-tier risk evaluation, Ecology will consider cumulative impacts of DEEP emissions in the project vicinity. Note that Chapter 173-460 WAC does not currently contain a numerical limit on allowable cumulative cancer risks. However, Ecology has indicated that new sources of DEEP

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.

EXHIBIT E

Item	Current Approval Order and 2011 Permit Application	This 2015 Permit Revision Request
Activity-specific allowable runtime	Condition 3.2 sets runtime limits for each individual activity, totaling 57.5 hours per year per generator.	Consolidate the runtime limits for three categories (unplanned outages, scheduled electrical bypass, and corrective testing) into a combined category with a runtime limit of 35 hours/year (the sum of the previous individual runtime limits). The currently-permitted runtimes for monthly testing (16.5 hours/year) and annual load bank testing (6 hours/year) should be retained.
Activity-specific allowable generator load	Condition 3.2 sets load limits for each individual activity.	For the combined category "unplanned outages, electrical bypass, and corrective testing," allow any random load from zero to 100% to provide operational flexibility to respond to variable server electrical demand.
Activity-specific and load-specific emission limits	Conditions 5.2-5.5 set allowable lbs/hour limits based on allowable load for each activity.	The current limits should be retained. Note that for this resubmittal the revised emissions for each pollutant are calculated by assuming every generator always runs at the worst-case load for each pollutant: 25% load for PM; 100% load for NO_x, CO and VOCs; 100% load for fuel and AP-42 (EPA 1995) toxic air pollutants.
Annual emissions from initial generator commissioning and periodic stack testing.	Not accounted for in annual emission calculations.	Accounted for in the 70-year average annual emission calculations.
"Black puff" cold-start adjustments	Not accounted for.	Accounted for in the annual-average and short-term emission rates and AERMOD modeling.
Maximum theoretical annual emission rates	70-year average emission rates	Maximum theoretical annual emission rates for consideration of compliance with NAAQS, ASIL, and assessment of chronic non-cancer risk were based on assumptions that the total emissions for a 3-year rolling period might occur in one single year.
70-year DEEP emissions for cancer risk modeling	0.31 tons/year	0.467 tons/year
Sabey-Only DEEP cancer risk at maximum house	7 per million	9 per million
Facility-wide NO_x limit during power outage for ASIL	NO_x limited to 991 lbs/hour, 1st-highest 1-hour limit.	The current limits should be retained. Therefore, a revised Second-Tier Risk Report for NO_2 is not necessary.

EXHIBIT F

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, DOCs have also been demonstrated to reduce diesel engine exhaust particulate emissions, and also hydrocarbon emissions.

Sabey has evaluated the cost effectiveness of installing and operating DOCs on each of the proposed diesel engines. The following DOC BACT cost details are provided as an example of the BACT and tBACT cost process that Sabey followed for engines within this application (including for SCR-only, DPF-only, and Tier 4 capable integrated control system technologies).

- Sabey obtained the following recent DOC equipment costs: $30,828 for a stand-alone catalyzed DOC per single 2.0 MWe generator. For thirty two (32) 2.0 MWe generators, this amounts to $986,496. According to the vendor, DOC control efficiencies for this unit are CO, HC, and PM are 80%, 70%, and 20% respectively.
- The subtotal becomes $1,287,442 after accounting for shipping ($49,325), WA sales tax ($64,122), and direct on-site installation ($187,499).
- After adding indirect installation costs, the total capital investment amounts to: $1,502,245. Indirect installation costs include but are not limited to: startup fees, contractor fees, and performance testing.
- Annualized over 25 years and included with direct annual costs based on EPA manual EPA/452/B-02-001, the total annual cost (capital recovery and direct annual costs) is estimated to be $182,094.
- At the control efficiencies provided from the vendor, the annual tons per year of emissions for CO (11.9 tpy), HC (1.43 tpy), and PM (0.42 tpy) become 9.51 tpy, 1.00 tpy, and 0.08 tpy removed respectively.
- The last step in estimating costs for a BACT analysis is to divide the total annual costs by the amount of pollutants removed ($182,094 divided by 9.51 tpy for CO, etc..).

The corresponding annual DOC cost effectiveness value for carbon monoxide destruction alone is approximately $19,100 per ton. If particulate matter and hydrocarbons are individually considered, the cost effectiveness values become $2.2 million and $182,000 per ton of pollutant removed annually, respectively. If the cost effectiveness of using DOC is evaluated using the total amount of carbon monoxide, particulate matter and hydrocarbons reduced, the cost estimate would be approximately $17,200 per ton of combined pollutants removed per year.

These annual estimated costs (for DOC use alone) provided by Sabey are conservatively low estimates that take into account installation, tax, shipping, and other capital costs as mentioned above, but assume no greater than mid-range CARB estimates for operational, labor and maintenance costs.

Ecology concludes that use of DOC is not economically feasible for this project. Therefore, Ecology agrees with the applicant that these control option can be rejected as BACT.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A NEW)
AIR CONTAMINANT SOURCE FOR)
SABEY INTERGATE QUINCY, LLC)
INTERGATE-QUINCY DATA CENTER)

Preliminary Determination

TO: Cris Engel,
Sabey Intergate-Quincy Data Center
2200 M Street NE,
Quincy, WA 98848

On October 7, 2014, the Washington State Department of Ecology (Ecology) received a Notice of Construction (NOC) application from the Sabey Intergate Quincy, LLC., Data Center (Sabey) located at 2200 M Street NE, Quincy, WA. Sabey requested approval for revisions to the August 26, 2011 Approval Order No. 11AQ-E424 (previous permit). The NOC application was determined to be incomplete and, on December 5, 2014, Ecology issued an incompleteness letter to Sabey. On March 5, 2015, Sabey provided a revised NOC application and a revised Second Tier Risk Analysis to Ecology. The application and Second Tier Risk Analysis were considered complete on June 23, 2015.

EQUIPMENT

The list of equipment for this approval order includes 44 diesel engines used to power emergency electrical generators at the Sabey Intergate-Quincy Data Center (Sabey). The forty-four 2.0 megawatt (MWe) generators will have a combined capacity of up to 88 MWe using a combination of Caterpillar, Cummins, and MTU engines. Provisions for the use of smaller engines supplied by these manufacturers are contained in Condition 2.7 of this Approval Order. Sabey's application provided Ecology with a combination of engine size ranges for the anticipated engines to be used, which will have ranges at or smaller than the following sizes: Caterpillar Model 3516C rated 2.0 MWe; Caterpillar Model 3512C rated 1.5 MWe; Cummins QSK60-G14 NR2 rated 2.0 MWe; Cummins Inc QSK50-G5 NR2 rated 1.5 MWe; MTU 16V4000G43 rated 2.0 MWe; and MTU 12V4000G43 rated 1.5 MWe.

The generators will be installed in three construction phases. The remaining 2 generators of the 12 Phase 1 generators (10 were installed under a previous Approval Order and are included as part of the 44 generators of this Approval Order), will each consist of up to 2.0 MWe generators that will be installed upon approval. Phase 2 and 3 will each consist of sixteen generators up to 2.0 MWe each, and will be installed at the facility as independent tenant companies contract for space at Sabey. Emergency engine information is provided in Table 1.1.

Table 1.1: Emergency Engine & Generator Serial Numbers

Phase	Unit ID	Manufacturer & Model No.	Capacity MWe	Engine SN	Generator SN	Build Date
Phase 3	A01					
"	A02					
"	A03					
"	A04					
"	A05					

EXHIBIT H

"	A06					
"	A07					
"	A08					
"	A09					
"	A10					
"	A11					
"	A12					
"	A13					
"	A14					
"	A15					
"	A16					
Phase 2	B01					
"	B02					
"	B03					
"	B04					
"	B05					
"	B06					
"	B07					
"	B08					
"	B09					
"	B10					
"	B11					
"	B12					
"	B13					
"	B14					
"	B15					
"	B16					
Phase 1	QC3-A	Caterpillar 3512C	1.5	EBG00972	G5Y00653	07/22/2011
Phase 1	QC3-B	Caterpillar 3512C	1.5	EBG00975	G5Y00652	07/22/2011
Phase 1	QC3-C	Caterpillar 3512C	1.5	EBG00973	G5Y00654	07/22/2011
Phase 1	QC1-A	Caterpillar 3516C	2.0	DD600363	G7F00178	11/24/2013
Phase 1	QC1-B	Caterpillar 3516C	2.0	DD600364	G7F00177	11/22/2013
Phase 1	QC4-A	Caterpillar 3512C	1.5	CT200132	G2N00529	03/05/2014
Phase 1	QC4-B	Caterpillar 3512C	1.5	CT200134	G2N00532	03/07/2014
Phase 1	QC4-C	Caterpillar 3512C	1.5	CT200133	G2N00531	03/05/2014
Phase 1	QC2-A	Caterpillar 3516C	2.0	DD600488	G7F00188	07/09/2014
Phase 1	QC2-B	Caterpillar 3516C	2.0	DD600490	G7F00187	07/09/2014
Phase 1						
Phase 1						
total	44					

This approval order also includes 176 Munters Model PV-W35-PVT (or equivalent) cooling units to dissipate heat from electronic equipment at the facility. Cooling unit information is provided in Table 1.2.

Table 1.2: Munters Model PV-W35-PVT Cooling Units

	# Fans per Cooling Unit	# Cooling Units per engine	Total # Cooling Units
Total	3	4	176

Conditions 2.4 and 2.7. Ecology will review the NOC application form to determine whether the proposed project conforms to the parameters contained in this approval order. If the proposed project conforms to the approval order, Ecology will issue an administrative approval order to the applicant without further review. If the proposed project does not conform to this approval order, Ecology will require new source review under Chapters 173-400 WAC and 173-460 WAC. The purpose of the administrative approval orders for each independent tenant is to establish responsibility for their individual operations, and to ensure conformity to this approval Order.

1.4 The administrative approval orders issued to each independent tenant will contain conditions that will require coordination of operations with other tenants to provide for compliance with this approval order with the intent to minimize community impacts.

1.5 Sabey shall make available information on diesel engine exhaust health risks and emergency generator operations to existing residents and commercial and industrial facilities within 0.25 miles of Sabey property boundaries. Information on diesel exhaust health risks and emergency generator operations shall be provided to the City of Quincy Building and Planning Department for distribution to new homeowners and businesses that locate on undeveloped parcels within 0.25 miles of the Sabey property boundary. The health risk information may be, or should be similar to, Ecology Focus on Diesel Exhaust Health Risks dated February 2011, Publication Number 11-02-005. A copy of the materials to be used to comply with this condition shall be provided to Ecology for review, and distributed prior to starting Phase 1 operations.

2. EQUIPMENT RESTRICTIONS

2.1 Any engine used to power the electrical generators shall be operated in accordance with applicable 40 CFR 60, Subpart IIII requirements including but not limited to: certification by the manufacturer to meet the 40 CFR 89 EPA Tier 2 emissions levels as required by 40 CFR 60.4202; and installed and operated as emergency engines, as defined in 40 CFR 60.4219. At the time of the effective date of this permit, Tier 4 interim and Tier 4 final certified engines (as specified in 40 CFR 1039.102 Table 7 and 40 CFR 1039.101 Table 1, respectively), are not required for 1.5 to 2.0 MWe electrical generators used for emergency purposes as defined in 40 CFR 60.4219 in attainment areas in Washington State. However, any engines installed at the Sabey Data Center after Tier 4 or other limits are implemented by EPA for emergency generators, shall meet the applicable specifications as required by EPA at the time the emergency engines are installed.

2.2 The only engines and electrical generating units approved for operation at Sabey are those listed by serial number in Table 1 above.

2.3 Replacement of failed engines with identical engines (same manufacturer and model) requires notification prior to installation but will not require new source review unless there is an increase in emission rates or community impacts.

2.4 The installation of any new engines after July 1, 2019 will require notification to Ecology that includes engine manufacturer's specification sheets. Ecology will decide whether new source review is required based on various factors including whether the new engines will have either an increased emission rate or result in an emission

Annual Load Bank Testing	6	100%	4
Combined Electrical Bypass and Power Outage	35	Any random load from zero to 100%	22 (electrical bypass); 44 (power outage); 1 (corrective testing)
Total	57.5		

3.3. A load bank will be used for electrical energy dissipation whenever prescheduled monthly maintenance testing, corrective testing or annual load bank testing occurs above zero electrical load.

3.4. The forty-four (44) engines at Sabey require periodic scheduled operation. To mitigate engine emission impacts, Sabey will perform all engine testing during daylight hours. Engine testing may take place outside of these time restrictions upon coordination by Sabey with other data centers in northeast Quincy to minimize engine emissions impacts to the community. Sabey shall maintain records of the coordination communications with other data centers, and those communications shall be available for review by Ecology upon request.

3.5. Initial start-up (commissioning) testing for the forty-four (44) engines at Sabey is restricted to an average of 30 hours per generator and 2309 gallons of fuel per generator, averaged over all generators installed during any consecutive 3 year period.

3.5.1 Except during site integration testing as specified below, only one engine shall be operated at any one time during start-up testing.
3.5.2 During a site integration test, no more than sixteen (16) generator engines may operate concurrently for up to four continuous hours.
3.5.3 All startup and commissioning testing shall be conducted during daylight hours.
3.5.4 Fuel use limits contained in Approval Conditions 3.1 and emission limits contained in Approval Conditions 5, remain in effect during initial start-up testing.

3.6. All of the cooling units shall comply with the following conditions:

3.6.1 Each individual cooling unit shall use a mist eliminator with a maximum drift rate of 0.001% of the circulating water flow rate. The drift rate shall be guaranteed by the unit manufacturer.
3.6.2 Chemicals containing hexavalent chromium cannot be used to pre-treat the cooling unit makeup water.

4. GENERAL TESTING AND MAINTENANCE REQUIREMENTS

4.1. Sabey will follow engine-manufacturer's recommended diagnostic testing and maintenance procedures to ensure that each engine will conform to Condition 5 emission limits and Tier 2 emission specifications as listed in 40 CFR 89 throughout the life of each engine.

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4.2 Sabey shall measure emissions of particulate matter (PM), non-methane hydrocarbons, nitric oxide (NO), nitrogen dioxide (NO_2), carbon monoxide (CO) from engine exhaust stacks in accordance with Approval Condition 4.3. This testing will serve to demonstrate compliance with the g/kW-hr EPA Tier 2 average emission limits contained in Section 5, and as an indicator of proper operation of the engines. The selection of the engines(s) to be tested shall be in accordance with Conditions 4.2.1 and 4.2.2 and shall be defined in a source test protocol submitted to Ecology no less than 30 days in advance of any compliance-related stack sampling conducted by Sabey. Additional testing as described in 40 CFR 60.8(g) may be required by Ecology at their discretion.

4.2.1 For new engines, at least one representative engine from each manufacturer and each size engine from each manufacturer shall be tested immediately after commissioning.

4.2.2 Every 60 months after the first testing performed in Condition 4.2.1, Sabey shall test at least one engine, including the engine with the most operating hours as long as it is a different engine from that which was tested during the previous 60 month interval testing.

4.3 The following procedure shall be used for each test for the engines as required by Approval Condition 4.2 unless an alternate method is proposed by Sabey and approved in writing by Ecology prior to the test.

4.3.1 Periodic emissions testing should be combined with other pre-scheduled maintenance testing and annual load bank engine testing. Additional operation of the engines for the purpose of emissions testing beyond the operating hours allowed in this Order must be approved by Ecology in writing. Additional operation of the engines for Ecology-required stack emission testing shall be limited to up 30 hours per generator per emission test, averaged over all generators tested in any year. These allowable runtime hours for emission testing cannot be transferred to other uses. If emission testing cannot be completed within the 30 hour allocated limit, then additional stack testing runtime beyond 30 hours must be included in the 57.5 hours per year per generator limit listed in Table 3.2.

4.3.2 PM (filterable fraction only), non-methane hydrocarbons, NO, NO_2, and CO emissions measurement shall be conducted at five individual generator electrical loads of 100%, 75%, 50%, 25%, and 10% using weighting factor averaging according to Table 2 of Appendix B to Subpart E of 40CFR89..

4.3.3 EPA Reference Methods and test procedures from 40 CFR 60, 40 CFR 51, and/or 40 CFR 89 as appropriate for each pollutant shall be used including Method 5 or 40 CFR 1065 for PM. A test plan will be submitted for Ecology approval at least 30 days before any testing is conducted and must include the criteria used to select the engine for testing, as well as any modifications to the standard test procedure contained in the above references.

4.3.4 The F-factor method, as described in EPA Method 19, may be used to calculate exhaust flow rate through the exhaust stack. The fuel meter data, as measured according to Approval Condition 4.5, shall be included in the test report, along with the emissions calculations.

concentration that may increase community impacts over those evaluated for this approval Order, or if an update to the current BACT analysis is necessary.

2.5 The forty-four (44) engine exhaust stack heights shall be greater than or equal to 48 feet above ground level and will be no more than 16 inches in diameter. All engines that may be used for this project shall be required to verify that exhaust stack parameters such as diameter, height, and exhaust rate and velocity do not result in community emissions impacts greater than what was evaluated for this project.

2.6 The manufacture and installation of the forty-four (44) engine/generator sets proposed for Building A, Building B and Building C of the project shall occur by January 1, 2019. If the manufacture and installation of the engines has not been completed within the above schedule, new source review may be required prior to installation, and community impacts will be re-evaluated if new source review is required. Sabey may request an extension of this time schedule, and Ecology may approve of an extension without revision to this Order.

2.7 This Order only applies to the forty-four (44) engines, each with a rated full standby capacity of up to 2.0 MWe, which are consistent with the engines that were evaluated in the Notice of Construction application and second tier review. New source review will not be required for engines with a rated full standby capacity of less than or equal to2.0 MWe that comply with the engine certification requirements contained in Approval Conditions 2.1 and 5 unless there is an increase in community emission impacts. On a case-by-case basis, Ecology may require additional ambient impacts analyses prior to installation of smaller engines.

2.8 In addition to meeting EPA Tier 2 certification requirements, the source must have written verification from the engine manufacturer that each engine of the same make, model, and rated capacity installed at the facility uses the same electronic Programmable System Parameters, i.e., configuration parameters, in the electronic engine control unit.

3. OPERATING LIMITATIONS

3.1 The fuel consumption at Sabey shall be limited to a total of 263,725 gallons per year of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.00150 weight percent sulfur). Total annual fuel consumption by the facility may be averaged over a three (3) year period using monthly rolling totals.

3.2 Except as provided in Approval Condition 3.5, the forty-four (44) Sabey engines are restricted to the annual limits in Table 3.2 averaged over three (3) year monthly rolling totals and averaged over all generators in service:

Table 3.2: Annual Engine Operating Restrictions

Operating Activity	Average hours/year per engine.	Average Operating Electrical Loads (%)	Number of Engines Operating Concurrently
Monthly Testing	16.5	Zero electrical load to 50%	4

4.3.5 In the event that any source test shows non-compliance with the emission limits in Condition 5, Sabey shall repair or replace the engine and repeat the test on the same engine plus two additional engines of the same make and model as the engine showing non-compliance. Test reports shall be submitted to Ecology as provided in Condition 9.5 of this Order.

4.4 Each engine shall be equipped with a properly installed and maintained non-resettable meter that records total operating hours.

4.5 Each engine shall be connected to a properly installed and maintained fuel flow monitoring system that records the amount of fuel consumed by that engine during operation.

5 EMISSION LIMITS

5.1 The forty-four (44) engines described in this Order shall meet the emission rate limitations contained in this section. Unless otherwise approved by Ecology in writing, compliance with emission limits for those pollutants that are required to be tested under Approval Conditions 4.2 and 4.3 shall be based on emissions test data as determined according to those approval conditions.

5.2 To demonstrate compliance with 40CFR89(112 & 113) g/kW-hr EPA Tier 2 weighted average emission limits through stack testing, Sabey shall conduct exhaust stack testing as described in Conditions 4.2 and 4.3 according to Table 2 of Appendix B to Subpart E of 40CFR89, or any other applicable EPA requirement in effect at the time the engines are installed.

5.3 Nitrogen oxides (NOx or NO + NO2) emissions from each of the forty-four (44) engines shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.3: Nitrogen oxides (NOx) and non-methane hydrocarbon (NMHC) emission rate limits

	Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.2.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	41.9 lb/hr[1] (NOx)
5.2.2	Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 6.4 g/kW-hr (NOx + NMHC)

1 Limit represents the higher value of either the Caterpillar "Not To Exceed" or EPA Tier-2 (6.12 g/kw-hr) Total engine NOx emissions shall comply with Tier 2 emissions limits in 40CFR89.

5.4 Nitrogen dioxide (NO_2) emissions from each of the forty-four (44) engines shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.4: Nitrogen dioxide (NO_2) emission rate limits			
	Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.3.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	4.19 lb/hr[1]
5.3.2	Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 0.62 g/kW-hr

1 10% of total NOx emission limits

5.5 Carbon monoxide emissions from each of the forty-four (44) engines shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.5: Carbon monoxide (CO) emission rate limits			
	Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.4.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	16.9 lb/hr[1]
5.4.2	Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 3.5 g/kW-hr

1 Limit represents the higher value of either the Caterpillar "Not To Exceed" or EPA Tier-2 (3.5 g/kw-hr). Total engine CO emissions shall comply with Tier 2 emissions limits in 40CFR89.

5.6 Diesel Engine Exhaust Particulate (DEEP) emissions from each of the forty-four (44) engines power shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.6: Diesel Engine Exhaust Particulate (DEEP) emission rate limits			
	Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.5.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	0.57 lb/hr[1]
5.5.2	Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 0.2 g/kW-hr

1 Limit represents the higher value of either the Caterpillar "Not-to-Exceed" data or EPA Tier-2 (0.2 g/kw-hr). Total engine PM emissions shall comply with Tier 2 emissions limits in 40CFR89.

5.7 Particulate matter emissions from all 44 engines combined shall not exceed 0.408 tons/yr (816 lbs/yr), on a 36-month rolling basis. For this condition, all PM emissions, including both the filterable "front-half" and the condensable "back-half" was conservatively considered to be diesel engine exhaust particulate (DEEP).

5.8 Nitrogen dioxide (NO_2) emissions from all 44 engines combined shall not exceed 99 lbs/hr and 2.39 tons/yr, on a 36-month rolling basis.

5.9 Volatile organic compound (VOC) emissions from all 44 engines combined shall not exceed 1.43 tons/yr (2860 lbs/yr), on a 36-month rolling basis.

5.10 Sulfur dioxide emissions from all 44 engines combined shall not exceed 0.028 tons/yr (56 lbs/yr).

5.11 Visual emissions from each diesel electric generator exhaust stack while operating at an electrical load greater than 20 percent or less than 5 percent shall be no more than 5 percent opacity, and visible emissions during operating loads between 5 to 20 percent shall be no more than 10 percent opacity, with the exception of a two (2) minute period after unit start-up. Visual emissions shall be measured by using the procedures contained in 40 CFR 60, Appendix A, Method 9.

6 OPERATION AND MAINTENANCE MANUALS

A site-specific O&M manual for Sabey equipment shall be developed and followed. Manufacturers' operating instructions and design specifications for the engines, generators, and associated equipment shall be included in the manual. The O&M manual shall include the manufacturers' recommended protocols for extended low-load operation. The O&M manual shall be updated to reflect any modifications of the equipment or its operating procedures. Emissions that result from failure to follow the operating procedures contained in the O&M manual or manufacturer's operating instructions may be considered proof that the equipment was not properly installed, operated, and/or maintained. The O&M manual for the diesel engines and associated equipment shall at a minimum include:

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.

EXHIBIT N

APPENDIX E (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.

EXHIBIT O

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

3.3. Affected Community/Receptors

While Sabey Intergate-Quincy Data Center is located in an industrially zoned area surrounded largely by agricultural land uses and other data centers, air dispersion modeling indicated that proposed DEEP emissions could result in concentrations in excess of the ASIL at two parcels with residential land use codes (Figure 1) [Ecology, 2013; Grant County, 2015]. U.S. Census data show that approximately 23 people live in the Census Blocks intersected by the area in which DEEP concentrations are estimated to exceed the ASIL (U.S. Census Bureau, 2010).

For the purposes of assessing increased cancer risk and non-cancer hazards, Landau identified receptor locations where the highest exposure to project-related air pollutants could occur: at the project boundary, nearby residences, and on-site tenant occupied commercial locations (Figure 2).

Ecology's review of the HIA found that Landau identified appropriate receptors to capture the highest Sabey attributable exposures for residential, commercial, and fence line receptors.

3.4. Increased Cancer Risk

3.4.1. Cancer Risk Attributable to Sabey's DEEP and Other TAP Emissions

Table 2, adapted from the HIA, shows the estimated Sabey-specific cancer risk per million for each of the receptors. The highest increase in risks attributable to Sabey's emissions is 9.9 per million[3] and occurs at the closest edge of a property that contains an existing house to the north of Sabey Intergate-Quincy Data Center.[4] A lower risk estimate of 7.9 per million occurs at the house location on the same parcel. Landau also calculated risks posed by other carcinogenic TAPs (i.e., acetaldehyde, benzene, formaldehyde, 1,3-butadiene, and carcinogenic polycyclic aromatic hydrocarbons). They estimated a negligible increased risk attributable to these other TAPs of about 0.05 per million at the maximally impacted residential receptor (MIRR).

For non-residential exposure scenarios, workers at on-site facilities may have increased risks of about 3.5 per million, and increased cancer risks to potential bystanders exposed near the point of maximum off-site impact (i.e., fence line receptor) may be about 0.4 per million.

EXHIBIT P

[3] Number per million represents an upper-bound theoretical estimate of the number of excess cancers that might result in an exposed population of one million people compared to an unexposed population of one million people. Alternatively, an individual's increase in risk of one in one million means a person's chance of getting cancer in their lifetime increases by one in one million or 0.0001 percent.

[4] Ecology's initial review of the HIA determined that concentrations exceeding 0.0333 ug/m3 (corresponding to a lifetime increased risk of 10 in one million) occurred on portions of a residential parcel. Sabey agreed to accept lower emission limits than what was reported in the HIA.

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.

EXHIBIT Q

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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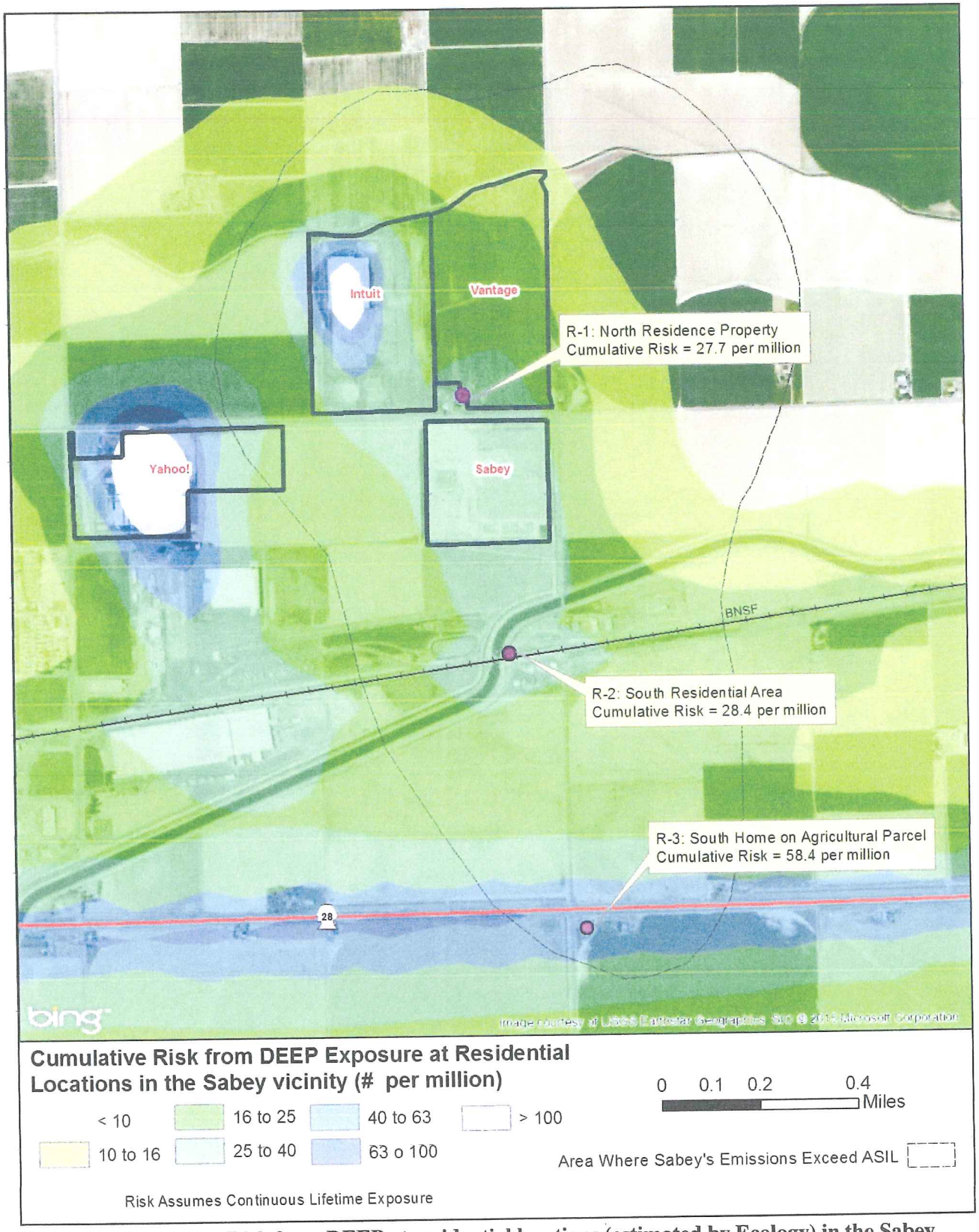

Figure 3. Cumulative Risk from DEEP at residential locations (estimated by Ecology) in the Sabey vicinity

EXHIBIT R

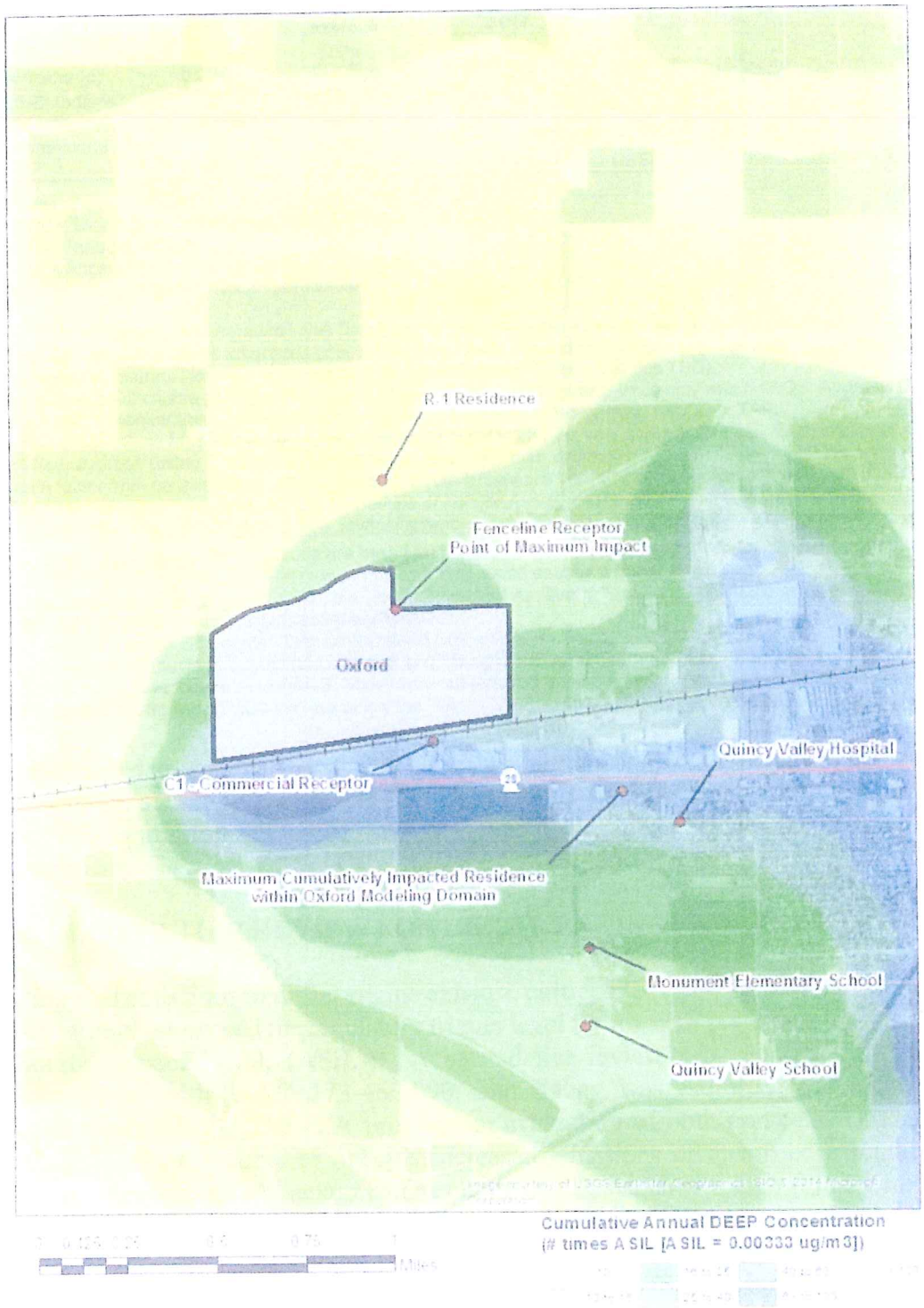

Figure 4. Cumulative DEEP concentrations (estimated by Ecology) in the Oxford vicinity. Concentrations are reported as the number of times higher than the ASIL.

EXHIBIT S

Chrysene	Compliance with the VOC BACT requirement
Benzo(b)fluoranthene	Compliance with the VOC BACT requirement
Benzo(k)fluoranthene	Compliance with the VOC BACT requirement
Dibenz(a,h)anthracene	Compliance with the VOC BACT requirement
Ideno(1,2,3-cd)pyrene	Compliance with the VOC BACT requirement
Napthalene	Compliance with the VOC BACT requirement
Propylene	Compliance with the VOC BACT requirement
PAH (no TEF)	Compliance with the VOC BACT requirement
PAH (apply TEF)	Compliance with the VOC BACT requirement
Cooling Tower Emissions (TAPs as PM)	Compliance with Cooling Tower BACT requirement

5. AMBIENT AIR MODELING

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.

5.1 AERMOD Assumptions:

- Five years of sequential hourly meteorological data (2001–2005) from Moses Lake Airport were used. Twice-daily upper air data from Spokane were used to define mixing heights. [Note: The Engine Operating Restrictions listed in Table 3.2 of the Approval Order were based on 2011 Monte Carlo modeling for the 98th-percentile 1-hr NO2 NAAQS. The 2011 modeling used 2004-2008 meteorological data (see Section 5.2 of this TSD)].
- The AMS/EPA Regulatory Model Terrain Pre-processor (AERMAP) was used to obtain height scale, receptor base elevation, and to develop receptor grids with terrain effects. For area topography required for AERMAP, Digital topographical data (in the form of Digital Elevation Model files) were obtained from www.webgis.com.
- Each generator was modeled with a stack height of 48- feet above local ground.
- The data center buildings, in addition to the individual generator enclosures were included to account for building downwash.
- The receptor grid for the AERMOD modeling was established using a 10-meter grid spacing along the facility boundary extending to a distance of 350 meters from each facility boundary. A grid spacing of 25 meters was used for distances of 350 meters to 800 meters from the boundary. A grid spacing of 50 meters was used for distances from 500 meters to 2000 meters from the boundary. A grid spacing of 100 meters was used for distances beyond 2000 meters from the boundary.
- 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 49 parts per billion (ppb) of background ozone, and an equilibrium NO_2 to NOx ambient ratio of 90%.
- 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

From: **Danna Dal Porto** ddalp44@gmail.com
Subject: Fwd: Appendix W
Date: January 5, 2016 at 10:07 PM
To: Danna Dal Porto ddalporto@smwireless.net

40 CFR 51 Appendix W

https://www.law.cornell.edu/cfr/text/40/part-51/appendix-W

8.3.1.2Recommendations

a. Five years of representative meteorological data should be used when estimating concentrations with an air quality model. Consecutive years from the most recent, readily available 5-year period are preferred. The meteorological data should be *adequately representative*, and may be site specific or from a nearby NWS station. Where professional judgment indicates NWS-collected ASOS (automated surface observing stations) data are inadequate {for cloud cover observations}, the most recent 5 years of NWS data that are observer-based may be considered for use.

b. The use of 5 years of NWS meteorological data or at least I year of site specific data is required.

EXHIBIT V

concentrations. Unlike a forensic investigation there is no requirement for the meteorology to be for a period when the emissions occurred which is impossible for future emissions.

Regarding Amway: The air quality analysis supporting Amway's permit application showed that Amway emissions do not have a significant impact at Microsoft.

COMMENT 34: DANNA DAL PORTO:
I am requesting two physical air monitors for Quincy. As was mentioned at the Hearing, Quincy is certainly getting more data centers. The 2015 Republican budget had a line item in the document that provides for tax relief for data center construction and the document mentions from 8 to 12 data companies that can build in Quincy. I do not know if that includes the expansions that are predicted for data centers already here. It is well known that Yahoo plans an expansion and perhaps others. Sabey is already expanding. The number of diesel generators in town will quickly exceed many more than 200 units and even the Spokane office of Ecology should recognize that is a huge number of huge generators in a small community. I think a real case can be made for installing air monitors in Quincy. I do not believe that telling residents that there is no money to install monitors will hold up under scrutiny. This is a matter of public health and it is time to know the accurate levels of toxic components in the air instead of guessing.

ECOLOGY RESPONSE:
Ecology is aware of Ms. Dal Porto's interest in monitoring and cause and effect studies for the Quincy area ambient air. At Ecology's March 2014 Monitoring Advisory Committee (MAC) this issue was discussed. It was determined during the March meeting that due to limited staffing and fiscal resources as well as the low impacts to the community, air quality monitoring studies cannot be conducted in the area at this time. However, Ecology is exploring other avenues to see if there is some way to find funding for monitoring in Quincy.

COMMENT 35: DANNA DAL PORTO:
I challenge any and all metrological assumptions about the weather in Quincy because Ecology uses weather data from Moses Lake. Quincy has distinct weather events because of the hills around the town as well as weather coming down the Columbia River from the north. Quincy needs accurate weather data to go along with the air monitors that must be installed in town. Ecology must do the right thing and not guess about air or weather.

ECOLOGY RESPONSE:
Analyses provided for previous data centers in Quincy indicate that, compared with data from Ephrata, the meteorological observations from Moses Lake tend to overestimate the impacts of pollution in Quincy because Moses Lake gets less wind (therefore less dispersion) than Ephrata. In previous actions, the Pollution Control Hearings Board has agreed that Moses Lake meteorology is sufficiently representative of conditions in Quincy to provide a basis for air dispersion modeling in Quincy.

Microsoft Oxford Public Comment July 9, 2015
Permit is still not finalized as of Jan 5, ~~2015~~ 2016

of the project site. Each of the proposed diesel generators were modeled as an individual emission source.

DEEP ambient air impacts from the Sabey project were modeled using the following air dispersion model inputs:

- AERMOD with the Plume Rise Model Enhancements algorithm for building downwash (Version 12345).
- Five years of sequential hourly meteorological data from Grant County International Airport (2001 to 2005).
- Twice-daily upper air data from Spokane, Washington (2001 to 2005) to define mixing heights.
- Grant County area digital topographical data in the form of Digital Elevation Model files (which describe local topography and terrain).
- Grant County area digital land classification files (which describe local topography).
- The emissions for each diesel engine were modeled with stack heights of 48 feet (ft) for the Intergate-Quincy Data Center, 20 to 30 ft (Yahoo! Data Center), 40 ft (Intuit Data Center), and 41 ft (Vantage Data Center) above ground level.
- The building dimensions for the surrounding buildings (at the project site, Yahoo! Data Center, Intuit Data Center, and Vantage Data Center) were included in order to account for building downwash dispersion effects.
- The receptor grid for the AERMOD modeling domain at or beyond the facility boundary was established using a variable Cartesian grid:
  - 10-meter (m) spacing from emission source to 350 m
  - 25-m spacing from 350 m to 800 m
  - 50-m spacing from 500 m to 2,000 m
  - 100-m spacing beyond 2,000 m.

For cumulative risk analysis, the local background emissions of DEEP from permitted diesel generators at neighboring data centers—as well as emission rates for the highways and the nearby railroad—were taken from previous estimates shown in Ecology's *Sabey Data Center Second-Tier Risk Report* (Ecology 2011). Since the time of publication, the Vantage Data Center has been permitted to install diesel emergency generators. The local background emission estimates from the Vantage Data Center—used in this HIA—were previously derived in that project's HIA (ICF 2012).

4.2.3 Identifying Reasonable Maximum Exposure Receptors

There are several different reasonable maximum exposure receptors within the general vicinity of the Intergate-Quincy Data Center. In order to capture worst-case exposure scenarios, Ecology typically considers ambient impact levels at maximally impacted (i) Boundary, (ii) Residential, and (iii) Business and Commercial areas as risk receptors. These are evaluated in addition to sensitive receptors such as

Under Sabey's revised maintenance procedure, any given generator would still be operated for 15 hours during the triennial period. However, Sabey requests that the transformer maintenance and switchgear maintenance procedures be consolidated into a single maintenance session lasting up to 15 hours in a single day. This revised maintenance procedure requires that up to 22 generators (all the generators in one building, plus some of the generators in the neighboring building) be operated simultaneously for 15 hours during the combined bypass event.

The resulting change in the daily emission rates, and confirmation that this change will not adversely affect the 24-hour ambient air quality impacts, are described in the section of this letter entitled "Emission and Ambient Air Quality Implications."

Request for Increased Flexibility: Consolidation of Allowable Runtimes, and Expanded Range of Allowable Generator Loads

In the original Request for Approval Order Revisions (October 2014), Sabey requested that Table 3.2 of the original Approval Order be revised to consolidate the annual runtime limit for "Electrical Bypass" (15 hours/year) and "Power Outage" (8 hours/year) to allow flexibility in the generator activities. In Ecology's Incompleteness Letter, the agency requested that Table 3.2 be revised further, to address public concern and provide a range of operating loads and maximum emission rates that could actually be expected during this consolidated runtime.

The current Table 3.2 allows the generators to operate only at 75 percent load during outages or electrical bypass. However, Sabey's electrical contractor (Keith Lane of Lane, Coburn & Associates) has indicated that actual generator loads are based on a range that depends partly on server electrical demand, and partly on the number of generators available to serve each tenant (Lane, K., 2014, personal communication). These generators are sized to run at upper bound loads from 56 percent to 75 percent, provided that all of the tenants' generators successfully activate during a power outage. In the event that a redundant generator malfunctions, then the remaining generators will compensate load and may operate at loads as high as 85 percent. However, under this scenario not as many emergency generators would be running because not all generators activated. Therefore, under this upper-bound worst-case operating condition, a few generators would run at 85 percent load, fewer generators would be operating than permitted, and most of the generators would operate between 56 percent and 75 percent load (as expected). Mr. Lane also indicated that the likelihood for any generators to ever run at loads exceeding 85 percent is small and that it is inconceivable for all generators to ever activate at 100 percent load.

The lower bound of the generator load during an outage is uncertain, and would depend entirely on the electrical demand required by the servers at that particular time. Under normal conditions, the generators are expected to run at loads of 56 percent to 75 percent. However, it is conceivable that under

Johnson, Kari D. (ECY)

From: William Riley <1724liberty@gmail.com>
Sent: Monday, January 04, 2016 4:16 PM
To: Johnson, Kari D. (ECY)
Subject: Letter of support for Sabey Integrate NOC

68 I am in full support of the requested changes by Sabey Integrate to enhance by modifying their original Air Quality permit.
A personal visit to the site reveals no toxic emissions and the Grant County PUD power outages are rare and of minimum duration. The rapid air movement of the land adjoining the Columbia River and the Quincy area shows minimum risk of stagnant polluted air.
William Riley-Chairman
Columbia Basin Environmental Council
POB 450
Soap Lake, WA 98851

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Appendix C:
Redline Documents

Redline documents display the edits made to the original drafts of the Preliminary Determination (now called the "Approval Order") and the Technical Support Document, which were provided for public review during the Public Comment Period.

- Redline of the Technical Support Document
- Redline of the Preliminary Determination (Approval Order)

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TECHNICAL SUPPORT DOCUMENT
FOR ~~PRELIMINARY DETERMINATION~~APPROVAL ORDER NO. 16AQ-E011
SABEY INTERGATE QUINCY, DATA CENTER
~~NOVEMBER 16~~APRIL XX, ~~2015~~2016

1. PROJECT DESCRIPTION

On October 7, 2014, the Washington State Department of Ecology (Ecology) received a Notice of Construction (NOC) application submittal from the Sabey Intergate Quincy, LLC., Intergate-Quincy Data Center (Sabey) located at 2200 M Street NE, Quincy, WA. Sabey is requesting approval for revisions to the August 26, 2011 Approval Order No. 11AQ-E424 (previous permit). The NOC application was determined to be incomplete and, on December 5, 2014, Ecology issued an incompleteness letter to Sabey. On March 5, 2015, Sabey provided a revised NOC application (Sabey's application) and a revised Second Tier Risk Analysis to Ecology. Sabey provided Ecology with supplemental information on March 12, April 1, April 2, May 6, May 22, and June 5, 2015. Sabey's application and Second Tier Risk Analysis were considered completed on June 23, 2015. Ecology has concluded that this project has satisfied all requirements of a second tier analysis.

The primary air contaminant sources at the facility consist of forty-four (44) electric generators powered by diesel engines to provide emergency backup power to the facility. Sabey data center space will be leased to independent tenants companies that require fully supported data storage and processing space. The project will be phased in over several years depending on customer demand. The phased project will include construction of 3 buildings, i.e., Phase 1, Phase 2, and Phase 3. Phase 1 construction of approximately 135,257 square feet (ft^2) Building C began under the previous permit, and houses ten of twelve planned electric generators with up to 2.0 Megawatts (MWe) capacity per engine. Phases 2 and 3 will include two additional buildings (Buildings A and B) each with approximately 186,660 ft^2 of space, and will each house sixteen electric generators of up to 2.0 Megawatts (MWe) per engine. Upon final build-out of all three Phases, Sabey will consists of forty-four (44) electric generators with a total capacity of up to approximately 88 MWe using a combination of Caterpillar, Cummins, and MTU engines with up to 2.0 MWe capacity per engine.

Sabey will also include 176 Munters Model PV-W35-PVT cooling units or equivalents to dissipate heat from electronic equipment at the facility. The cooling units are a source of particulate matter. Each of the units has a design recirculation rate of 80 gallons per minute (gpm) and an air flow rate of 21,000 cubic feet per minute (cfm).

Cooling system particulate matter emissions were calculated based on design and operating parameters for 176 Munters Model PV-W35-PVT. The cooling tower emissions contained in Table 1 has been overestimated by a factor of three times based on actual water usage calculations by the manufacturer.

1.1 Potential To Emit For Criteria Pollutants And Toxic Air Pollutants (TAPs)

Table 1 contains potential-to-emit (PTE) estimates for the diesel engines and cooling system pollutants at Sabey.

Table 1. Potential To Emit For Diesel Engine and Cooling Tower Emissions			
Pollutant	**Emission Factor**	**Facility Potential to Emit**	**References**
Criteria Pollutants	**Units = lbs/hr (except where noted)**	**(TPY)**	**(a)**
NOx Total	18.9	23.9	Average of loads
NOx 100% load	41.9	na	(b)
NOx 75% load	22.5	na	(b)
NOx 50% load	15.3	na	(b)
NOx 25% load	9.4	na	(b)
NOx 10% load	6.49	na	(b)
VOC Total	1.0	~~1.43~~1.32	Average of loads
VOC 100% load	0.91	na	(b)
VOC 75% load	1.11	na	(b)
VOC 50% load	1.13	na	(b)
VOC 25% load	0.95	na	(b)
VOC 10% load	1.0	na	(b)
CO Total	9.4	~~11.9~~13.0	Average of loads
CO 100% load	16.9	na	(b)
CO 75% load	12.7	na	(b)
CO 50% load	8.75	na	(b)
CO 25% load	4.8	na	(b)
CO 10% load	4.05	na	(b)
Total PM10/PM2.5	[See PM2.5 (Engines), DEEP and cooling tower emissions]		
Total PM2.5 (Engines: DEEP + VOC)	DEEP + VOC	1.73	Average of loads, (f)
SO_2	15 ppm	0.028	(c)
Lead	NA	Negligible	(d)
Ozone	NA	NA	(e)
Toxic Air Pollutants (TAPS)	**Units = Lbs/MMbtu (except where noted)**		(a)
Primary NO_2	10% total NOx	2.39	See NOx
Diesel Engine Exhaust Particulate (DEEP) Total	0.35 lb/hr	0.408	Average of loads
DEEP 100% load	0.23 lb/hr	na	(b)
DEEP 75% load	0.22 lb/hr	na	(b)
DEEP 50% load	0.27 lb/hr	na	(b)
DEEP 25% load	0.57 lb/hr	na	(b)
DEEP 10% load	0.45 lb/hr	na	(b)

CO	16.9 lb/hr	~~11.9~~13	See CO
SO_2	15 ppm	0.028	(c)
Propylene	2.79E-03	4.2E-02	(g)
Acrolein	7.88E-06	1.9E-04	(g)
Benzene	7.76E-04	1.9E-02	(g)
Toluene	2.81E-04	5.08E-03	(g)
Xylenes	1.93E-04	3.49E-03	(g)
Napthalene	1.30E-04	3.1E-03	(g)
1,3 Butadiene	1.96E-05	4.7E-04	(g)
Formaldehyde	7.89E-05	1.43E-03	(g)
Acetaldehyde	2.52E-05	4.55E-04	(g)
Benzo(a)Pyrene	2.57E-07	2.32E-06	(g)
Benzo(a)anthracene	6.22E-07	1.12E-05	(g)
Chrysene	1.53E-06	2.76E-05	(g)
Benzo(b)fluoranthene	1.11E-06	2.01E-05	(g)
Benzo(k)fluoranthene	2.18E-07	1.97E-06	(g)
Dibenz(a,h)anthracene	3.46E-07	3.13E-06	(g)
Ideno(1,2,3-cd)pyrene	4.14E-07	3.74E-06	(g)
Cooling Tower Emissions			
PM10/PM2.5	7,500 mg/liter water concentration	2.32	(h)

(a) The current list of EPA criteria pollutants (https://www.epa.gov/criteria-air-pollutants))~~http://www.epa.gov/airquality/urbanair/~~; last updated ~~December 22~~March 4, 2016~~, 2014~~) that have related National Ambient Air Quality Standards (NAAQS) (https://www.epa.gov/criteria-air-pollutants/naaqs); last updated ~~October 21, 2014~~February 29, 2016). VOC is not a criteria pollutant but is included here per note (e). Toxic Air Pollutants (TAPs) are defined as those in WAC 173-460. Greenhouse gas is not a criteria pollutant or a TAP and is exempt from New Source Review requirements for non Prevention of Significant Deterioration projects such as at ~~Oxford~~ Sabey Data Center per WAC 173-400-110(5)(b).

(b) Emission factors (EFs) based on Caterpillar not-to-exceed (NTE) data and Tier 2 EFs, whichever is higher. For example, the NOx and PM maximum limits are based on Caterpillar NTE data of 41.9 lb/hr (100% load) and 0.57 lb/hr (25% load) respectively. Whereas the CO maximum limit is based on Tier 2 emission factors because they are higher than Caterpillar NTE data for CO. For CO, outage and combined test loads are at 100% load of 2190kWm. The maximum limit of 16.9 lb/hr is calculated as follows: 2190 kWm x 3.5 g/kWm-hr x (1 lb/453.6 g).

(c) Applicants estimated emissions based on fuel sulfur mass balance assuming 0.00150 weight percent sulfur fuel.

(d) EPA's AP-42 document does not provide an emission factor for lead emissions from diesel-powered engines. Lead emissions are presumed to be negligible.

(e) Ozone is not emitted directly into the air, but is created when its two primary components, volatile organic compounds (VOC) and oxides of nitrogen (NOx), combine in the presence of sunlight. *Final Ozone NAAQS Regulatory Impact Analysis EPA-452/R-08-003*, March 2008, Chapter 2.1. http://www.epa.gov/ttnecas1/regdata/RIAs/452_R_08_003.pdf

(f) For this project, all ~~PM~~ VOC emissions~~, including both the filterable "front-half" and the~~ were assumed to be condensable ~~"back-half" was conservatively considered to be diesel engine exhaust~~ particulate (PM), and were added to filterable PM (DEEP), at the 25% load. This is load with the highest DEEP emission rate of 0.57 lb/hr, and the corresponding VOC emission rate at this load is 0.95 lb/hr, for a total PM emission rate of 1.52 lb/hr. This emission rate was used with modeling for comparison to short term NAAQS. For annual facility totals, the DEEP emission limit (0.408 tpy) was added to annual VOC emissions (1.32 tpy), which was based on the VOC annual average load emission rate of 1.0 lb/hr, for a total of 1.73 tpy as listed in Table 1 of this TSD.

(g) EPA AP-42 § 3.3 or 3.4 from: Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors http://www.epa.gov/ttn/chief/ap42/.

(h) Based on manufacturer (Munters) cooling unit maximum recirculation rate.

1.2 Maximum Operation Scenarios

Sabey's operation assumptions for their permit revision requests as presented in their application are listed table 2 below along with Ecology comments:

Table 2. Sabey Application Revision Requests	
Sabey Application Assumptions/Requests	**Ecology Comments**

Short-term Emissions: • 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. AERMOD modeling for the 24-hour PM10 NAAQS is based on the ~~2nd-highest 24-hour value~~following assumptions: The data center will experience two 8-hour power outages each year. During each 8-hour power outage the 44 primary generators and the 3 building safety generators will activate at the worst-case operating load of 25%. This scenario includes use of cold-start adjustments and conservative assumption that all hydrocarbons are condensable particulate.~~.~~ The modeling for the 98th-percentile 24-hour PM2.5 NAAQS was based on the following assumptions: ~~the 1st highest value in order to provide a conservatively high assessment.~~ The 4 highest days of emissions each year are anticipated to result from a full-building electrical bypass event, two days of unplanned outages, and one day of full-building generator commissioning. The operating event that would cause the 8th-highest emission rate is expected to be "corrective testing" of one generator at a time at 25% load, presumed to occur for up to 12 hours per day. This scenario includes use of cold-start adjustments and conservative assumption that all hydrocarbons are condensable particulate. • Short-term emission rate estimates for nitrogen oxides (NOx), 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 for NOx and CO ~~and 50% load for VOC~~, according to emission rates reported by Caterpillar.	(a), (e)
Annual Average Emissions: The annual-average emission rate estimates for PM, DEEP, NOx, 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. All permitted emissions allowed during a 3-year rolling average period were conservatively assumed to occur in a single 12-month period (as a "maximum theoretical annual emission" rate) 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.	(a)
Power Outages and AERMOD Dispersion Factors: • Short-term dispersion factors (for averaging periods of 24 hours, 8 hours, or 1 hour) were derived from AERMOD ~~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). The annual-average dispersion factor was derived for a runtime scenario of all generators operating under random, variable load (between 10 and 100 percent), over the course of the entire year. ➢ ~~AERMOD modeling for the 24-hour PM10 NAAQS is based on~~: (see short-term emission assumptions above). ~~the 2nd-highest 24-hour value. For this runtime scenario, 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).~~ ➢ The modeling for the 98th-percentile 24-hour PM2.5 NAAQS was based on: (see short-term emission assumptions above). ~~the 1st highest value in order to provide a conservatively high assessment. For this runtime scenario, it would be theoretically possible to have eight outages per year, each lasting 4.4 hours (35 hours / 8 outages = 4.4 hours/outage).~~ ➢ The 1st-highest 1-hour NO_2 concentrations during a full power outage were modeled to assess compliance with the ASIL. Because a power outage could occur at any time on any day, all 44 new generators were modeled at their assigned loads continuously, for 24 hours per day and 365 days per year for the five years of meteorology used in the analysis. The AERMOD/PVMRM was set to indicate the 1st-highest 1-hour value for each separate modeling year. See also NO2 Limits Remain Unchanged and NO2 Modeling and Ambient Impacts in this table.	(a)

➢ For purposes of the statistical "Monte Carlo" analysis used to demonstrate compliance with the 1-hour NO_2 NAAQS it was assumed there would be power outages lasting at least one hour on 4 days per year. See also NO2 Limits Remain Unchanged and NO2 Modeling and Ambient Impacts in this table.	
Cold Start Factors: 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.	(b)
NO2 Limits Remain Unchanged: Sabey will continue to comply with a 1-hour NO2 limit of 990 lbs/hour as was required in the previous permit. This limit was developed by assuming that there would be 44 generators, each 2,000 kWe, operating at 75 percent load. Sabey believes there is a negligible potential for the actual emission rate to approach that limit because they have already installed six generators in Building C that are smaller and lower-emitting (1,500 kWe) than the permitted 2,000-kWe generators. Sabey's electrical systems are designed so most of the generators will operate at loads less than 75 percent during an outage. As an additional margin of safety, Sabey's stack emission testing to date has shown the actual NOx emission rates at high load have been much lower than the allowable limit of 41.9 lbs/hour. Therefore, Sabey believes that after full build-out of the data center, the actual NOx emissions will be lower than the 990 lbs/hour limit. Sabey proposed to revise the Approval Order to require keeping records of the calculated actual NOx emission rate during each unplanned outage or scheduled electrical bypass event, to demonstrate compliance with the 990 lbs/hour limit and make it an enforceable limit.	(a), (c)
NO2 Modeling and Ambient Impacts: The 1-hour NO2 impacts during a power outage (for comparison to the ASIL), and the 98th-percentile 1-hour NO2 impacts (for comparison to the NAAQS) were not remodeled. • NO2, as a TAP exceeds the ASIL and is addressed in Sections 5.3 and 6 of this TSD. • Sabey's 2011 Monte Carlo modeling demonstrated compliance with the 98th-percentile NO2 NAAQS with a safety margin. Sabey proposes that by retaining the current operational limits (runtime and load limits) for the most frequent scheduled routine activities (monthly testing and annual load bank testing) that comprise the typical 8th-highest daily NOx emission events each year, will ensure continued compliance with the NAAQS (using the 990 lb/yr limit).	(d)

(a) Ecology accepts this approach ~~because it conservatively overestimates actual emissions~~. The most recent 3-year average annual hours of operation per engine for planned and unplanned outages (2013 = 1.6 hr/yr/engine; 2014 = 2.0 hr/yr/engine; 2015 = 4.6 hr/yr/engine) was significantly less than the 57.5 hours per year per engine of total runtime allowed by the permit.
(b) Ecology accepts the cold start black puff factors derived from the Microsoft Project Oxford Data Center.
(c) See footnote (b) of section 5.3 of this TSD.
(d) See background information about the 2011 Monte Carlo modeling in Section 5.2 of this TSD.
(e) Page 7 of the Sabey application states that VOC max hourly lb/hr emissions are at 100% load. However, table E-1 of application shows highest VOC hourly lb/hr emissions at 50% load. Sabey used the high emission load (50%) for short term emissions and the average emissions load for annual emission estimates. ~~Spreadsheets from applicant titled "Ecology-submittal_ Fully-Flex Average PM-NOx-CO 2-6-2015" tab "T3 Outage+Bypass Emis" (cells B33 and C33) show that the applicant did use the highest hourly VOC lb/hr emissions (50% load) in their emission estimates~~.

The summary effect of accepting the requests based on the scenarios above is that Sabey has conservatively estimated emissions by assuming the following worst case conditions:

- Instead of load-based emission estimates, Sabey conservatively over-estimated short-term emissions at the load that causes the highest emissions, when in reality, the facility will operate engines at a range of loads and not solely at the load with highest emissions.
- Sabey assumed a worst case scenario in which 351,670 gallons of fuel would be used per year, when in reality, the permit limits fuel usage to 263,725 gallons per year.
- The new permit emission estimates assume the worst-case scenario that the 3-year rolling average permitted emission limits are released entirely within a single year. In reality, this

is unlikely, because it would prohibit Sabey from operating those generators for two years within that 3-year timeframe.

2. APPLICABLE REQUIREMENTS

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

- Chapter 70.94 Revised Code of Washington (RCW), Washington Clean Air Act,
- Chapter 173-400 Washington Administrative Code (WAC), General Regulations for Air Pollution Sources,
- Chapter 173-460 WAC, Controls for New Sources of Toxic Air Pollutants
- 40 CFR Part 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ* (* See section ~~3.4~~2.2)

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.

2.1 Support for permit Approval Condition 2.1 regarding applicability of 40CFR Part 60 Subpart IIII:

As noted in the applicability section of 40CFR1039 (part 1039.1.c), that regulation applies to non-road compression ignition (diesel) engines and; *(c) The definition of nonroad engine in 40 CFR 1068.30 excludes certain engines used in stationary applications.* According to the definition in 40CFR1068.30(2)(ii): *An internal combustion engine is not a nonroad engine if it meets any of the following criteria: The engine is regulated under 40 CFR part 60, (or otherwise regulated by a federal New Source Performance Standard promulgated under section 111 of the Clean Air Act (42 U.S.C. 7411)).* Because the engines at Sabey are regulated under 40CFR60 subpart IIII (per 40CFR60.4200), they are not subject to 40CFR1039 requirements except as specifically required within 40CFR60.

Some emergency engines with lower power rating are required by 40CFR60 to meet 40CFR1039 Tier 4 emission levels, but not emergency engines with ratings that will be used at Sabey (approximately 1.5 MWe to 2.0 MW or less). Instead, 40CFR60 requires the engines at Sabey to meet the Tier 2 emission levels of 40CFR89.112. The applicable sections of 40CFR60 for engine owners are pasted below in italics with bold emphasis on the portions requiring Tier 2 emission factors for emergency generators such as those at Sabey:

> *§60.4205 What emission standards must I meet for emergency engines if I am an owner or operator of a stationary CI internal combustion engine?*
>
> > *(b) Owners and operators of 2007 model year and later emergency stationary CI ICE with a displacement of less than 30 liters per cylinder that are not fire pump engines must comply with the emission standards for new nonroad CI engines in*

§60.4202 (see below), *for all pollutants, for the same model year and maximum engine power for their 2007 model year and later emergency stationary CI ICE.*

Based on information provided by the applicant, Sabey will use engines that will use the following 2007 model year engines or later with 2.0 MWe (or smaller) sizes: Caterpillar Model 3516C rated 2.0 MWe; Caterpillar Model 3512C rated 1.5 MWe; Cummins QSK60-G14 NR2 rated 2.0 MWe; Cummins Inc QSK50-G5 NR2 rated 1.5 MWe; MTU 16V4000G43 rated 2.0 MWe; MTU 12V4000G43 rated 1.5 MWe.

Based on these specifications, each engine's displacement per cylinder ~~were~~ was calculated and compared to subpart (b) of §60.4205 as follows:

2.1.1 Caterpillar Engine Model 3516C rated 2.0 MWe

Displacement is not listed among the manufacturer specifications for this engine. However, displacement can be calculated by multiplying the volume of a cylinder by the number of cylinders as follows:

$$\text{Displacement} = (\text{cross-sectional area of cylinder} = \pi r^2) \times (\text{cylinder height}) \times (\#\ \text{cylinders})$$

The bore of an engine represents the cylinder diameter and the stroke represents the cylinder height. Substituting bore/2 for radius, and the stroke height, the equation for calculating the volume of an engine cylinder is:

$$[\text{Cylinder Volume} = \pi/4 \times (\text{bore})^2 \times (\text{stroke})]^1$$

Simplifying and using a metric units conversion factor, the equation for total displacement becomes:

$$\text{Displacement} = 0.7854 \times \text{bore(cm)}^2 \times \text{stroke(cm)} \times (\#\ \text{cylinders}) \times (1\ \text{Liter}/1000\ \text{cm}^3)$$

Using this equation, and plugging in the manufacturer specifications for bore (170mm), stroke (190mm), and 16 cylinders, this engine's total displacement and displacement per cylinder are calculated as follows:

$$\text{Total Displacement} = 0.7854 \times (170/10)^2 \times (190/10) \times 16\ \text{cylinders} \times (1/1000)$$

$$\text{Total Displacement} = 69.0\ \text{Liters.}$$

$$\text{Displacement per cylinder} = 0.7854 \times (170/10)^2 \times (190/10) \times (1/1000)$$

$$\text{Displacement per cylinder} = 4.31\ \text{liters/cylinder.}$$

[1] HPBooks Auto Math Handbook., Lawlor, John., The Berkeley Publishing Group, A division of Penguin Putnam Inc. (www.penguinputnam.com), 1992, p. 2.

2.1.2 Caterpillar Engine Model 3512C rated 1.5 MWe

The specification sheet for this engine lists displacement as 51.8 liters, with 12 cylinders total. The single cylinder displacement for this engine is therefore 4.32 liters/cylinder.

2.1.3 Cummins Engine QSK60 rated 2.0 MWe

The specification sheet for this engine lists displacement as 60.1 liters, with 16 cylinders total. The single cylinder displacement for this engine is therefore 3.76 liters/cylinder.

2.1.4 Cummins Engine QSK50 rated 1.5 MWe

The specification sheet for this engine lists displacement as 50.2 liters, with 16 cylinders total. The single cylinder displacement for this engine is therefore 3.14 liters/cylinder.

2.1.5 MTU Engine 16V4000G43 rated 2.0 MWe

The specification sheet for this engine lists displacement as 76.3 liters, with 16 cylinders total. The single cylinder displacement for this engine is listed as 4.77 liters/cylinder.

2.1.6 MTU Engine 12V4000G43 rated 2.0 MWe

The specification sheet for this engine lists displacement as 57.3 liters, with 12 cylinders total. The single cylinder displacement for this engine is listed as 4.77 liters/cylinder.

Thus, because Sabey will use engines with a displacement of less than the *§60.4205 (b)* limit of 30 liters per cylinder, and are for emergency purposes only, the engines are therefore required to meet *§60.4202* manufacturer requirements listed below.

> *§60.4202 What emission standards must I meet for emergency engines if I am a stationary CI internal combustion engine manufacturer?*
>
> > *(a) Stationary CI internal combustion engine manufacturers must certify their 2007 model year and later emergency stationary CI ICE with a maximum engine power* ***less than or equal to 2,237 KW*** *(3,000 HP) and a displacement of less than 10 liters per cylinder that are not fire pump engines to the emission standards specified in paragraphs (a)(1) through (2) of this section.*
> >
> > *(1) For engines with a maximum engine power less than 37 KW (50 HP):*
> >
> > *(i) The certification emission standards for new nonroad CI engines for the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants for model year 2007 engines, and*

(ii) The certification emission standards for new nonroad CI engines in 40 CFR 1039.104, 40 CFR 1039.105, 40 CFR 1039.107, 40 CFR 1039.115, and table 2 to this subpart, for 2008 model year and later engines.

(2) For engines with a maximum engine power greater than or equal to 37 KW (50 HP), the certification emission standards for new nonroad CI engines for the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants beginning in model year 2007.

Thus, based on the power ratings listed in *40 CFR 60.4202(a),* and because the engines to be used at Sabey will also have less than 10 liters per cylinder displacement, the engines are required to meet the applicable 40CFR89 Tier 2 emission standards.

2.2 Support for complying with 40 CFR 63 Subpart ZZZZ from Section 3 of TSD.

According to section 40 CFR 63 Subpart ZZZZ section 636590 part (c) and (c)(1), sources such as this facility, are required to meet the requirements of 40 CFR 60 IIII and "*no further requirements apply for such engines under this* (40 CFR 63 Subpart ZZZZ) *part."*

3. SOURCE TESTING

Source testing requirements are outlined in Sections 4 of the Approval Order. The five-mode stack testing in Condition 4 of the permit is required to demonstrate compliance with 40CFR89(112 & 113) g/kW-hr EPA Tier 2 average emission limits via the 5 individual operating loads (10%, 25%, 50%, 75% and 100%) according to Table 2 of Appendix B to Subpart E of 40CFR89, or according to any other applicable EPA requirement in effect at the time the engines are installed. For this permit, engine selection testing will be determined as follows:

3.1 NEW ENGINE STACK TESTING:

Because Sabey can utilize multiple engine manufacturer and make options, Conditions 4.2 and 4.3 require testing of at least one engine from each manufacturer and each size engine from each manufacturer, immediately after commissioning any new proposed engine. These conditions apply in addition to the testing Sabey has performed on a subset of the 10 engines already installed at the time of this permit.

3.2 PERIODIC STACK TESTING:

Every 60 months after the first testing performed starting with engines tested after the date of this permit, Sabey shall test at least one engine, including the engine with the most operating hours as long as it is a different engine from that which was tested during the previous 60 month interval testing.

3.3 AUDIT SAMPLING

According to Condition 4.2, audit sampling per 40 CFR 60.8(g), may be required by Ecology at their discretion. Ecology will not require audit samples for test methods specifically exempted in 40 CFR 60.8(g) such as Methods, 7E, 10, 18, 25A, and 320. For non-exempted test methods, according to 40 CFR 60.8(g):

"The compliance authority responsible for the compliance test may waive the requirement to include an audit sample if they believe that an audit sample is not necessary."

Although Ecology believes that audit sampling is not necessary for certified engines, Ecology may choose at any time to require audit sampling for any stack tests conducted. Audit sampling could include, but would not necessarily be limited to, the following test methods: Methods 5, 201A, or 202.

4. SUPPORT FOR BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

BACT is defined[2] 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. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.*

For this project, 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 (based upon the factors within the BACT definition), 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.[3] 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.

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

[3] 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 proposed diesel engines and/or cooling towers 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_{10} and $PM_{2.5}$), and sulfur dioxide. BACT for toxics (tBACT) is included in Section 4.5.

4.1 BACT ANALYSIS FOR NOx FROM DIESEL ENGINE EXHAUST

Sabey reviewed EPA's RACT/BACT/LAER Clearinghouse (RBLC) database to look for 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.

4.1.1 BACT Options for NOx

Sabey'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, and was therefore considered the top-case control technology and evaluated for technical feasibility and cost-effectiveness. 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 by Ecology through a literature review include: selective non-catalytic reduction (SNCR), non-selective catalytic reduction (NSCR), water injection, as well as emerging technologies. Ecology reviewed these options and addressed them below.

4.1.1.1 ***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. SCR can reduce NOx emissions by approximately 90 percent.

For SCR systems to function effectively, exhaust temperatures must be high enough (about 200 ^{o}C to 500^{o}C) to enable catalyst activation. For this reason, SCR control efficiencies are expected to be relatively low during the initial minutes after engine start up, especially during maintenance, testing and storm avoidance loads. Minimal amounts of the urea-nitrogen reducing agent injected into the catalyst does not react, and is emitted as ammonia. Optimal operating temperatures are needed to minimize excess ammonia (ammonia slip) and maximize NOx reduction. SCR systems are costly. Most SCR systems operate in the range of 290^{o}C to 400^{o}C. Platinum catalysts are needed for low temperature range applications (175^{o}C – 290^{o}C); zeolite can be used for high temperature applications (560^{o}C); and conventional SCRs (using vanadium pentoxide, tungsten, or titanium dioxide) are typically used for temperatures from 340^{o}C to 400^{o}C.

Sabey has evaluated the cost effectiveness of installing and operating SCR systems on each of the proposed diesel engines by taking into account direct costs (equipment, sales tax, shipping, installation, etc..) and indirect costs (startup, performance tests, etc..). Assuming a mid-range California Area Resource Board (CARB) annual operation and maintenance cost estimate to account for urea, fuel for pressure drop, increased inspections, and periodic

OEM visits, the use of SCR systems would cost approximately $37,100 per ton of NOx removed from the exhaust stream each year. If SCR is combined with a Tier 4 capable integrated control system, which includes SCR, as well as control technologies for other pollutants such PM, CO, and VOC (see section 4.3), the cost estimate would be approximately $43,600 for NOx alone or $~~29,200~~27,600 per ton of combined pollutants removed per year.

Ecology concludes that while SCR is a demonstrated emission control technology for diesel engines, and preferred over other NOx control alternatives described in subsection 4.1.1.3., it is not economically feasible for this project. Furthermore, although NOx is a criteria pollutant, the only NOx that currently have NAAQS is NO2. Cost per ton removal of NO2 is an order of magnitude more expensive than for NOx, and is addressed under tBACT in section 4.5.

Therefore, Ecology agrees with the applicant that this NOx control option can be excluded as BACT (both as SCR alone and as part of Tier 4 capable integrated control system, which includes a combination of SCR with other control technologies for other pollutants).

4.1.1.2. ***Combustion Controls, Tier 2 Compliance, and Programming Verification.***
Diesel engine manufacturers typically use proprietary combustion control methods to achieve the overall emission reductions needed to meet applicable EPA tier standards. Common general controls include fuel injection timing retard, turbocharger, a low-temperature aftercooler, use of EPA Tier-2 certified engines operated as emergency engines as defined in 40 CFR§60.4219, and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. Although it may lead to higher fuel consumption, injection timing retard reduces the peak flame temperature and resulting NOx emissions. While good combustion practices are a common BACT approach, for the Sabey engines however, a more specific approach, based on input from Ecology inspectors after inspecting similar data centers, is to obtain written verification from the engine manufacturer that each engine of the same make, model, and rated capacity installed at a facility use the same electronic Programmable System Parameters, i.e., configuration parameters, in the electronic engine control unit. These BACT options are considered further in section 4.1.2.

4.1.1.3. ***Other Control Options***. Other NOx control options listed in this subsection were considered but rejected for the reasons specified:

4.1.1.3.1. ***Selective Non-Catalytic Reduction (SNCR)****:* This technology is similar to that of an SCR but does not use a catalyst. Initial applications of Thermal DeNOx, an ammonia based SNCR, achieved 50 percent NOx reduction for some stationary sources. This application is limited to new stationary sources because the space required to completely mix ammonia with exhaust gas needs to be part of the source design. A different version of SNCR called NOxOUT, uses urea and has achieved 50-70 percent NOx reduction. Because the SNCR system does not use a catalyst, the reaction between ammonia and NOx occurs at a higher temperature than with an SCR, making SCR applicable to more combustion sources. Currently, the preferred technology for back-end NOx control of reciprocating internal

combustion engine (RICE) diesel applications, appears to be SCR with a system to convert urea to ammonia.

4.1.1.3.2. ***Non-Selective Catalytic Reduction (NSCR):*** This technology uses a catalyst without a reagent and requires zero excess air. The catalyst causes NOx to give up its oxygen to products of incomplete combustion (PICs), CO and hydrocarbons, causing the pollutants to destroy each other. However, if oxygen is present, the PICs will burn up without destroying the NOx. While NSCR is used on most gasoline automobiles, it is not immediately applicable to diesel engines because diesel exhaust oxygen levels vary widely depending on engine load. NSCR might be more applicable to boilers. Currently, the preferred technology for back-end NOx control of reciprocating internal combustion engine (RICE) diesel applications, appears to be SCR with a system to convert urea to ammonia. See also Section 4.2.1.3 (Three-Way Catalysts).

4.1.1.3.3. ***Water Injection:*** Water injection is considered a NOx formation control approach and not a back-end NOx control technology. It works by reducing the peak flame temperature and therefore reducing NOx formation. Water injection involves emulsifying the fuel with water and increasing the size of the injection system to handle the mixture. This technique has minimal effect on CO emissions but can increase hydrocarbon emissions. This technology is rejected because there is no indication that it is commercially available and/or effective for new large diesel engines.

4.1.1.3.4. ***Other Emerging Technologies****:* Emerging technologies include: NOx adsorbers, RAPER-NOx, ozone injection, and activated carbon absorption.

- ***NOx Adsorbers:*** NOx adsorbing technologies (some of which are known as SCONOx or EMx^{GT}) use a catalytic reactor method similar to SCR. SNONOx uses a regenerated catalytic bed with two materials, a precious metal oxidizing catalyst (such as platinum) and potassium carbonate. The platinum oxidizes the NO into NO2 which can be adsorbed onto the potassium carbonate. While this technology can achieve NOx reductions up to 90% (similar to an SCR), it is rejected because it has significantly higher capital and operating costs than an SCR. Additionally, it requires a catalyst wash every 90 days, and has issues with diesel fuel applications, (the GT on EMx^{GT} indicates gas turbine application). A literature search did not reveal any indication that this technology is commercially available for stationary backup diesel generators.
- ***Raper-NOx****:* This technology consists of passing exhaust gas through cyanic acid crystals, causing the crystals to form isocyanic acid which reacts with the NOx to form CO2, nitrogen and water. This technology is considered a form of SNCR, but questions about whether stainless steel tubing acted as a catalyst during development of this technology, could make this another form of SCR. To date, it appears this technology has never been offered commercially.
- ***Ozone Injection:*** Ozone injection technologies, some of which are known as LoTOx or BOC, use ozone to oxidize NO to NO2 and further to NO3. NO3 is soluble in water and can be scrubbed out of the exhaust. As noted in the literature, ozone injection is a unique approach because while NOx is in attainment in many areas of the United States (including Quincy, WA), the

primary reason to control NOx is because it is a precursor to ozone. Due to high additional costs associated with scrubbing, this technology is rejected.

- ***Activated Carbon Absorption with Microwave Regeneration.*** This technology consists of using alternating beds of activated carbon by conveying exhaust gas through one carbon bed, while regenerating the other carbon bed with microwaves. This technology appears to be successful in reducing NOx from diesel engine exhaust. However, it is not progressing to commercialization and is therefore rejected.

4.1.2. ***BACT determination for NOx***

Ecology determines that BACT for NOx is the use of EPA Tier-2 certified engines operated as emergency engines as defined in 40 CFR§60.4219, and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. In addition, Approval Condition 2.8 in the permit requires that the source must have written verification from the engine manufacturer that each engine of the same make, model, and rated capacity installed at the facility uses the same electronic Programmable System Parameters, i.e., configuration parameters, in the electronic engine control unit. "Installed at the facility" could mean at the manufacturer or at the data farm because the engine manufacturer service technician sometimes makes the operational parameter modification/correction to the electronic engine controller at the data farm. Sabey will install engines consistent with this BACT determination. Ecology believes this is a reasonable approach in that this BACT requirement replaces a more general, common but related BACT requirement of "good combustion practices."

Note: Because control options for PM, CO, and VOCs, are available as discussed in BACT section 4.2., which are less costly per ton than the Tier 4 capable integrated control system option for those pollutants, both the SCR-only option as well as the Tier 4 capable integrated control system option are not addressed further within BACT.

4.2 BACT ANALYSIS FOR PM, CO AND VOC FROM DIESEL ENGINE EXHAUST

Sabey reviewed the available published literature and the RBLC and identified the following demonstrated technologies for the control of particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC) emissions from the proposed diesel engines:

4.2.1. BACT Options for PM, CO, and VOC from Diesel Engine Exhaust

4.2.1.1 ***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.

Sabey 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 ~~$1.9 million~~450,300 per ton of engine exhaust particulate removed from the exhaust stream at Sabey each year. DPFs also remove CO and VOCs at costs of approximately ~~$69,500~~63,500 and ~~$661,100~~715,900 per ton per year respectively. If the cost effectiveness of DPF use is evaluated using the total amount of PM, CO, and VOCs reduced, the cost estimate would be approximately ~~$60,900~~51,600 per ton of pollutants removed per year.

Ecology concludes that use of DPF is not economically feasible for this project. Therefore, Ecology agrees with the applicant that this control option can be rejected as BACT.

4.2.1.2. ***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, DOCs have also been demonstrated to reduce diesel engine exhaust particulate emissions, and also hydrocarbon emissions.

Sabey has evaluated the cost effectiveness of installing and operating DOCs on each of the proposed diesel engines. The following DOC BACT cost details are provided as an example of the BACT and tBACT cost process that Sabey followed for engines within this application (including for SCR-only, DPF-only, and Tier 4 capable integrated control system technologies).

- Sabey obtained the following recent DOC equipment costs: $30,828 for a stand-alone catalyzed DOC per single 2.0 MWe generator. For thirty two (32) 2.0 MWe generators, this amounts to $986,496. According to the vendor, DOC control efficiencies for this unit are CO, HC, and PM are 80%, 70%, and 20% respectively.
- The subtotal becomes $1,287,442 after accounting for shipping ($49,325), WA sales tax ($64,122), and direct on-site installation ($187,499).
- After adding indirect installation costs, the total capital investment amounts to: $1,502,245. Indirect installation costs include but are not limited to: startup fees, contractor fees, and performance testing.
- Annualized over 25 years and included with direct annual costs based on EPA manual EPA/452/B-02-001, the total annual cost (capital recovery and direct annual costs) is estimated to be $182,094.
- At the control efficiencies provided from the vendor, the annual tons per year of emissions for CO (~~11.9~~13 tpy), HC (1.~~43~~ 32 tpy), and PM (~~0.42~~1.73 tpy) become ~~9.51~~10.46 tpy, ~~1.00~~0.92 tpy, and ~~0.08~~.346 tpy removed respectively.
- The last step in estimating costs for a BACT analysis is to divide the total annual costs by the amount of pollutants removed ($182,094 divided by ~~9.51~~10.46 tpy for CO, etc..).

The corresponding annual DOC cost effectiveness value for carbon monoxide destruction alone is approximately $~~19,100~~17,500 per ton. If particulate matter and hydrocarbons are individually considered, the cost effectiveness values become $~~2.2 million~~527,000 and $~~182,000~~197,000 per ton of pollutant removed annually, respectively. If the cost effectiveness of using DOC is evaluated using the total amount of carbon monoxide, particulate matter and hydrocarbons reduced, the cost estimate would be approximately $~~17,200~~15,600 per ton of combined pollutants removed per year.

These annual estimated costs (for DOC use alone) provided by Sabey are conservatively low estimates that take into account installation, tax, shipping, and other capital costs as mentioned above, but assume no greater than mid-range CARB estimates for operational, labor and maintenance costs.

Ecology concludes that use of DOC is not economically feasible for this project. Therefore, Ecology agrees with the applicant that these control option can be rejected as BACT.

4.2.1.3 Three-Way Catalysts.

Three way catalyst (TWC) technology can control CO, VOC and NOx in gasoline engines, but is only effective for CO and VOC control in diesel engines. According to DieselNet, an online information service covering technical and business information for diesel engines, published by Ecopoint Inc. of Ontario, Canada (https://www.dieselnet.com):

> *"The TWC catalyst, operating on the principle of non-selective catalytic reduction of NOx by CO and HC, requires that the engine is operated at a nearly stoichiometric air to- fuel (A/F) ratio… In the presence of oxygen, the three-way catalyst becomes ineffective in reducing NOx. For this reason, three-way catalysts cannot be employed for NOx control on diesel applications, which, being lean burn engines, contain high concentrations of oxygen in their exhaust gases at all operating conditions."*

As noted by the applicant, diesel engine stack tests at another data center in Washington State (Titan Data Center in Moses Lake, WA), showed that TWC control increased the emission rate for nitrogen dioxide (NO2). This technology is therefore rejected as a control option.

*4.2.2 **BACT Determination for PM, CO, and VOC***

Ecology determines BACT for particulate matter, carbon monoxide and volatile organic compounds is restricted operation of EPA Tier-2 certified engines operated as emergency engines as defined in 40 CFR§60.4219, and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. Sabey will install engines consistent with this BACT determination.

4.3 BACT ANALYSIS FOR SULFUR DIOXIDE FROM DIESEL ENGINE EXHAUST

*4.3.1. **BACT Options for SO2***

Sabey did not find any add-on control options commercially available and feasible for controlling sulfur dioxide emissions from diesel engines. Sabey's proposed BACT for sulfur dioxide is the use of ultra-low sulfur diesel fuel (15 ppm by weight of sulfur).

*4.3.2. **BACT Determination for SO2~~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 BACT ANALYSIS FOR PM FROM COOLING TOWERS

Because no changes are proposed for cooling tower operations or emission estimates, a BACT analysis was not performed. The following BACT determination from the previous Sabey permit is continued into this permit: "maintaining the water droplet drift rate from cooling systems and drift eliminators to a maximum drift rate of 0.001% of the circulating water flow rate."

4.5 BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS

Best Available Control Technology for Toxics (tBACT) means BACT, as applied to toxic air pollutants.[4] For TAPs that exceed small quantity emission rates (SQERs), the procedure for determining tBACT followed the same procedure used above for determining BACT. Of the technologies Sabey considered for BACT, the minimum estimated costs as applied to tBACT are as follows:

- The minimum estimated costs to control diesel engine exhaust particulate is estimated to be $1.9 million per ton removed.
- The minimum estimated costs to control NO2 is estimated to be $370,700 per ton removed.
- The minimum estimated costs to control CO is estimated to be $~~19,100~~17,500 per ton removed.
- For the other TAPS above SQERs, the minimum estimated costs per ton removed would be as follows: $14 million for benzene; $81 million for naphthalene; $552 million for 1,3-butadiene; and $1.4 billion for acrolein.

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. Based on the information presented in this TSD, Ecology has determined that Table 4 below represents tBACT for the proposed project.

Table 4 tBACT Determination

Toxic Air Pollutant	tBACT
Primary NO_2	Compliance with the NOx BACT requirement
Diesel Engine Exhaust Particulate	Compliance with the PM BACT requirement
Carbon monoxide	Compliance with the CO BACT requirement
Sulfur dioxide	Compliance with the SO_2 BACT requirement

[4] WAC 173-460-020

Benzene	Compliance with the VOC BACT requirement
Toluene	Compliance with the VOC BACT requirement
Xylenes	Compliance with the VOC BACT requirement
1,3 Butadiene	Compliance with the VOC BACT requirement
Formaldehyde	Compliance with the VOC BACT requirement
Acetaldehyde	Compliance with the VOC BACT requirement
Acrolein	Compliance with the VOC BACT requirement
Benzo(a)Pyrene	Compliance with the VOC BACT requirement
Benzo(a)anthracene	Compliance with the VOC BACT requirement
Chrysene	Compliance with the VOC BACT requirement
Benzo(b)fluoranthene	Compliance with the VOC BACT requirement
Benzo(k)fluoranthene	Compliance with the VOC BACT requirement
Dibenz(a,h)anthracene	Compliance with the VOC BACT requirement
Ideno(1,2,3-cd)pyrene	Compliance with the VOC BACT requirement
Napthalene	Compliance with the VOC BACT requirement
Propylene	Compliance with the VOC BACT requirement
PAH (no TEF)	Compliance with the VOC BACT requirement
PAH (apply TEF)	Compliance with the VOC BACT requirement
Cooling Tower Emissions (TAPs as PM)	Compliance with Cooling Tower BACT requirement

5. AMBIENT AIR MODELING

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.

5.1 AERMOD Assumptions:

- Five years of sequential hourly meteorological data (2001–2005) from Moses Lake Airport were used. Twice-daily upper air data from Spokane were used to define mixing heights. [Note: The Engine Operating Restrictions listed in Table 3.2 of the Approval Order were based on 2011 Monte Carlo modeling for the 98th-percentile 1-hr NO2 NAAQS. The 2011 modeling used 2004-2008 meteorological data (see Section 5.2 of this TSD)].
- The AMS/EPA Regulatory Model Terrain Pre-processor (AERMAP) was used to obtain height scale, receptor base elevation, and to develop receptor grids with terrain effects. For area topography required for AERMAP, Digital topographical data (in the form of Digital Elevation Model files) were obtained from www.webgis.com.
- Each generator was modeled with a stack height of 48- feet above local ground.
- The data center buildings, in addition to the individual generator enclosures were included to account for building downwash.
- The receptor grid for the AERMOD modeling was established using a 10-meter grid spacing along the facility boundary extending to a distance of 350 meters from each facility boundary. A grid spacing of 25 meters was used for distances of 350 meters to

800 meters from the boundary. A grid spacing of 50 meters was used for distances from 500 meters to 2000 meters from the boundary. A grid spacing of 100 meters was used for distances beyond 2000 meters from the boundary.

- 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 49 parts per billion (ppb) of background ozone, and an equilibrium NO_2 to NOx ambient ratio of 90%.
- 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.
- AERMOD Meteorological Pre-processor (AERMET) was used to estimate boundary layer parameters for use in AERMOD.
- AERSURFACE was used to determine the percentage of land use type around the facility based on albedo, Bowen ratio, and surface roughness parameters.

5.2 Background Information for 2011 Monte Carlo Modeling

As explained in the TSD for the previous permit, a Monte Carlo statistical analysis was used to determine operational limits to address NO2. Portions of the following information from that TSD are re-presented below and updated as applicable to the current Approval Order.

5.2.1 "Monte Carlo" Statistical Analysis For Demonstrating Compliance with the 1-Hour NO_2 NAAQS

The 1-hour NO_2 NAAQS is based on the 3-year rolling average of the 98th percentile of the daily maximum 1-hour NO_2 impacts. Data centers operate their generators on an intermittent basis under a wide range of engine loads, under a wide range of meteorological conditions. As such it is difficult to determine whether high-emitting generator runtime regimes coincide with meteorological conditions giving rise to poor dispersion, and trigger an exceedance of the 1-hour NO_2 NAAQS at any given location beyond the facility boundary. This issue has been recognized by EPA when they stated that "[m]odeling of intermittent emission units, such as emergency generators, and/or intermittent emission scenarios, such as startup/shutdown operations, has proven to be one of the main challenges for permit applicants undertaking a demonstration of compliance with the 1-hour NO_2 NAAQS".[5]

To address this problem, Ecology developed a statistical re-sampling technique, that we loosely call the "Monte Carlo analysis". This technique performs a statistical analysis of the AERMOD-derived ambient NO_2 impacts caused by individual generator operating regimes, each of which exhibits its own NOx emission rates at various locations throughout the facility. The randomizing function of the Monte Carlo analysis allows inspection of how the combination of sporadic generator operations, sporadic generator emissions at various locations, and variable meteorology affect the modeled 98th-percentile concentrations at modeling receptors placed within the facility and outside the facility boundary.

[5] http://www.epa.gov/ttn/scram/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf

The first step in the Monte Carlo NO_2 analysis was to use the AERMOD/PVMRM model for each representative generator runtime regime by each tenant at the Sabey facility. To do so, 14 different generator operating regimes proposed by Sabey were each modeled separately with AERMOD, using 5 years of meteorology (2004- 2008). For each of the 14 AERMOD runs, the number of calendar days per year of operation for that generator operating regime was established. To test the effect of initial startup and commissioning testing on ambient air quality, the NOx-emitting scenarios corresponding to the initial startup testing were included in the 2004 meteorological set. For all 5 years of modeling, it was assumed that all of the tenants conducted their scheduled maintenance each year. For each of the 5 modeling years, the existing emissions contributed by the existing Ask.com facility were included in the analysis. For each of the 5 modeling years, it was assumed there would be 4 random days on which power outages lasted at least 1 hour.

The Monte Carlo method then randomly selected the days on which the generators operated in each regime, combined the modeled concentrations on those days across all operating regimes and iterated the process 1000 times, so as to obtain a distribution of the possible concentrations at each receptor.

5.2.2 AERMOD Modeling of Individual Runtime Scenarios

In order to conduct the Monte Carlo analysis, the hierarchy of individual generator runtime events was clustered into 15 separate AERMOD runs, which are described in the Table 5. The NOx emissions from the offsite background sources are also listed in Table 5. For each of the 15 independent AERMOD scenarios, the number of calendar days of generator runtime was established. The two yellow-highlighted rows on the right side of Table 5 show the number of calendar days per year of generator runtime for each AERMOD scenario.

Table 5. AERMOD Runs Used for Monte Carlo Analysis

Tenant	No. of Installed Gens	Runtime Regime	Monte Carlo Days/yr	Day of Regime	% Load	kWm	No. Running Gens	Hrs/Day	kWmhrs/ day	E.F.	Nox lbs/hour	Monte Carlo AERMOD Run	Monte Carlo Days/yr
All	44	Full Power Outage, 75% Load	4	1	75%	1650	44	1	72600	6.2	991	1	4
Bldg B	16	Bldg B Main Switchgear	1		75%	1650	16	1	26400	6.2	361	2	1
B-1	8	Startup: Int. Sys Test Day 2	1		75%	1650	8	1	13200	6.2	180	3	1
C-3	6	Transf. Maint., 75%	2	1	75%	1650	2	1	3300	6.2	45.1	4	2
A-1	8	Transf. Maint., 75%	2	1	75%	1650	2	1	3300	6.2	45.1	5	2
A-2	8	Transf. Maint., 75%	2	1	75%	1650	2	1	3300	6.2	45.1	6	2
B-2	4	Transf. Maint., 75%	2	1	75%	1650	2	1	3300	6.2	45.1	7	2
C-1	3	Annual Test, 100% load		1	100%	2191		1	2191	8.68			
C-2	3	Annual Test, 100% load		1	100%	2191		1	0	8.68			
C-3	6	Annual Test, 100% load	12	1	100%	2191	1	1	0	8.68	41.9	8	12
A-1	8	Annual Test, 100% load		1	100%	2191		1	2191	8.68			
A-2	8	Annual Test, 100% load	16	1	100%	2191	1	1	0	8.68	41.9	9	16
B-1	8	Annual Test, 100% load		1	100%	2191		1	2191	8.68			
B-2	4	Annual Test, 100% load		1	100%	2191		1	0	8.68			
B-3	4	Annual Test, 100% load		1	100%	2191		1	0	8.68			
B-1	4	Startup: Mfr Testing Day 1			100%	2191		1	0	8.68			
B-1	4	Startup: Funct. Perf Test	24		100%	1135	1	1	0	8.68	41.9	10	24
C-1	3	Montly Test, 50% Load		1	50%	1135		1	1135	6.12			
C-1	3	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
C-2	3	Montly Test, 50% Load		1	50%	1135		1	0	6.12			
C-2	3	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
C-3	6	Montly Test, 50% Load		1	50%	1135		1	0	6.12			
C-3	6	Corrective Testing, 50% load	45	1	50%	1135	1	1	0	6.12	15.3	11	45
A-1	8	Montly Test, 50% Load		1	50%	1135		1	1135	6.12			
A-1	8	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
A-2	8	Montly Test, 50% Load		1	50%	1135		1	0	6.12			
A-2	8	Corrective Testing, 50% load	38	1	50%	1135	1	1	0	6.12	15.3	12	38
B-1	8	Montly Test, 50% Load		1	50%	1135		1	1135	6.12			
B-1	8	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
B-2	4	Montly Test, 50% Load		1	50%	1135		1	0	6.12			
B-2	4	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
B-3	4	Montly Test, 50% Load		1	50%	1135		1	0	6.12			
B-3	4	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
B-1	4	Startup: Int. Sys Test Day 1	53		50%	1135	1	1	0	6.12	15.3	13	53
CELITE	1	Continuous Operation	365		--		--				8.6	14	365
Intuit	9	Outage			90%		7				200		
Yahoo	23	Outage	8		90%		19				544	1	4
Intuit	9	Annual tests			100%		1				32.0		
Yahoo	23	Annual tests	15		100%		1				32.0	15	15

5.2.3 Monte Carlo NO_2 Results

The results of the Monte Carlo analysis are listed in Table 6. For each modeling year, the Monte Carlo analysis lists the 98th-percentile daily 1-hour NO_2 concentration at the maximally impacted receptor. Compliance is demonstrated by the median value of the five modeling years. As listed in Table 6, the maximum impact at or beyond the Sabey property line (or on the tenant building rooftops) is 111 µg/m^3. Figure 1 shows the location of that maximally impacted receptor, which is on the east property line in unpopulated industrially-zoned land roughly midway between the northeast and southeast property corners.

Table 6. Monte Carlo NO_2 Results

	98th-Percentile Daily 1-Hour NO_2, ug/m3					
Receptor Location	**2004**	**2005**	**2006**	**2007**	**2008**	**Median (2004-2008)**
Property Line and Beyond (Eastern property line)	114	111	108	108	111	111
Within Sabey Property (rooftop of Tenant A-2)	63	63	63	62	59	63

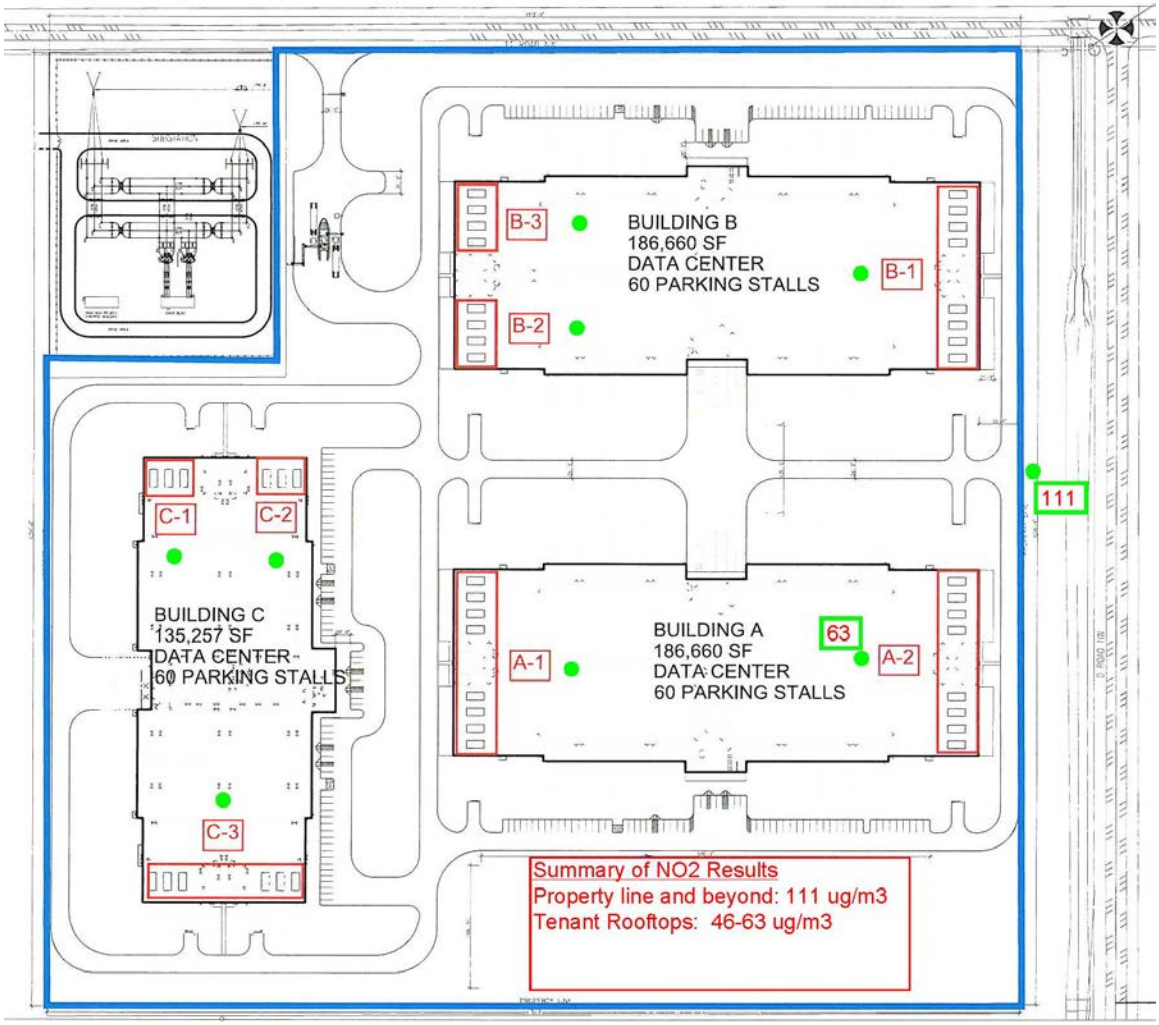

Figure 1. Locations of Maximum Modeled 98th-Percentile 1-Hour NO_2 Impacts.

5.2.4 Updates to 2011 Monte Carlo Results

Between 2011 and the time of this permit preparation, another data center (Vantage) has been constructed to the north of Sabey. In addition, available updated regional background emissions of 15.6 ug/m3were used.[6] Sabey also assumed that Vantage emissions would contribute up to an additional 10% of the total Monte Carlo maximum impact of 111 ug/m3 or 11 ug/m3. Based on 2012 Vantage AERMOD modeling performed by consultant ICF International, this is a conservatively high estimate. According to the 2012 modeling, local 1-hour NO2 background at the maximum Vantage receptor caused by combined data center emissions from nearby Sabey, Yahoo, and Intuit data centers was only 0.02 ug/m3. The combined emissions from Sabey and regional sources would be as follows:

Impact from Sabey and Offsite-Sources	122 $\mu g/m^3$ (111 $\mu g/m^3$ +11 $\mu g/m^3$ Vantage)
Regional Background:	15.6 $\mu g/m^3$
Total NO_2 Concentration	148.6 $\mu g/m^3$
Allowable NAAQS:	188 $\mu g/m^3$

Consistent with the 2011 Monte Carlo results, Sabey could emit up to approximately 160 ug/m3 (161.4 ug/m3) and still be in compliance with the 1-hr NO2 NAAQS of 188 ug/m3 (15.6ug/m3 + 11ug/m3 + 161.4 ug/m3 = 188 ug/m3 ≤ 188 ug/m3). Considering Sabey's conservative Vantage background emission estimate of 11 ug/m3, it is possible that Sabey emissions above 161.4 ug/m3 would still be in compliance with the NAAQS. However, Sabey has agreed to use the conservative Vantage background estimate as a safety buffer for compliance with the 1-hr NO2 NAAQS.

Based on this analysis, it is concluded the intermittent NOx emissions from the Intergate-Quincy Data Center, combined with the emissions from other local sources and regional background, would not cause ambient impacts exceeding the allowable NAAQS limit at any point at or beyond the fenced facility boundary or on the tenant building rooftops within the facility. As shown in Table 5, the lb/hr emission rate at which the 1-hr NO2 NAAQS is met, is at 991 lb/hr. For this reason, Approval Order Condition 8.4 places a limit on NOx at 990 lb/yr.

[6] Provided by Washington State University, Northwest International Air Quality Environmental Science and Technology Consortium, NW AIRQUEST, Lookup 2009-2011 design values of criteria pollutants. Lookup values from the NW AIRQUEST website on June 3, 2015: http://lar.wsu.edu/nw-airquest/lookup.html

5.3 Ambient Impact Results

Except for diesel engine exhaust particulate (DEEP) and NO2 which are predicted to exceed its ASIL, AERMOD model results show that no NAAQS or ASIL will be exceeded at or beyond the property boundary. The applicant's modeling results are provided below:

Criteria Pollutant	Standards in µg/m³ NAAQS(e) Primary	Standards in µg/m³ NAAQS(e) Secondary	Maximum Ambient Impact Concentration (µg/m³)	AERMOD Filename	Background Concentrations (µg/m³) (a)	Maximum Ambient Impact Concentration Added to Background (µg/m³) (If Available)
Particulate Matter (PM_{10})						
1st-Highest 24-hour average during power outage with cooling towers	150	150	~~45.1~~57	DEEP_011915	~~85.0~~90	~~130.2~~147 (c)
Particulate Matter ($PM_{2.5}$)						
Annual average (d)	12	15	~~0.327~~1.2 (c)	DEEP_011515	6.5	~~6.8~~7.7 (c)
1st-highest 24-hour average for cooling towers and electrical bypass	35	35	~~12.1~~10.4	DEEP_011915	~~22.2~~23.5	~~34.3~~33.9 (c)
Carbon Monoxide (CO)						
8-hour average	10,000 (9 ppm)		3,014	DEEP_011915	482	3,496
1-hour average	40,000 (35 ppm)		6,223	DEEP_011915	842	7,065
Nitrogen Oxides (NO_2)						
Annual average (d)	100 (53 ppb)	100	15.8	2011 Monte Carlo files	2.8	18.6
1-hour average	188 (100 ppb)	--	161 (max allowed) (b)	2011 Monte Carlo files	26.6 [15.6 regional + 11 local (Vantage)]	<188
Sulfur Dioxide (SO_2)						
3-hour average	--	1,300 (0.5 ppm)	See note (f)			
1-hour average	195 (75 ppb)	--	See note (f)			

Toxic Air Pollutant	ASIL (µg/m³)	Averaging Period	1st-Highest Ambient Concentration (µg/m³)	AERMOD Filename
DEEP (d)	0.00333	Annual average	0.307	DEEP_011515
NO_2	470	1-hour average	960	(b)
CO	23,000	1-hour average	7,065	DEEP_011915

S02	660	1-hour average	See note (f)	
Acrolein	0.06	24-hour average	0.017	DEEP_011915
Benzene (d)	0.0345	Annual Average	0.012	DEEP_011515
1,3-Butadiene (d)	0.00588	Annual Average	0.00031	DEEP_011515
Naphthalene (d)	0.0294	Annual Average	0.0021	DEEP_011515

Notes:
$\mu g/m^3$ = Micrograms per cubic meter.
ppm = Parts per million.
ASIL = Acceptable source impact level.
DEEP = Diesel engine exhaust, particulate

(a) Sum of "regional background" plus "local background" values. Regional background concentrations obtained from WSU NW Airquest website. Local background concentrations include emissions from: proposed generators, nearby data centers, and other background sources including highways and the Railroad (see Section 6 of this TSD).
(b) 1-hour NO2 criteria pollutant emissions to be kept below 990 lbs/year to comply with NAAQS. Approval Condition 8.4 includes language to monitor this emission limit requirement. See Section 6 regarding NO2 as a TAP.
(c) The PM values take into account the following very small and yet very conservative cooling tower estimated values of: 0.0996 ug/m3 for the 24-hour averages (using 0.4 scale factor from conservative 1-hour estimate), and 0.0199 ug/m3 for the annual average (using 0.08 scale factor from conservative 1-hour estimate). Scale factors are from California Air Resources Board (CARB) *Appendix H Recommendations for Estimating Concentrations of Longer Averaging Periods from the Maximum One-Hour Concentration for Screening Purposes* http://www.arb.ca.gov/toxics/harp/docs/userguide/appendixH.pdf
(d) Annually averaged concentrations are based on the theoretical maximum annual concentration, which assumes the worst-case scenario that the 3-year rolling average permit limit is released entirely within a single year.
(e) Ecology interprets compliance with the National Ambient Air Quality Standards (NAAQS) as demonstrating compliance with the Washington Ambient Air Quality Standards (WAAQS).
(f) Based on nearby data center (Microsoft Oxford) S02 annual emissions of 0.047 tpy, which are estimated through modeling to cause ambient impacts of 5.7 ug/m3 (1-hr avg) and 4.4 ug/m3 (3-hr avg), Sabey, with emissions of 0.028 tpy are expected have ambient impacts far below the NAAQS. Sabey was not required to model SO2 for comparison to the ASIL because estimated emissions of 0.006 lb/hr (0.028 tpy) are below the WAC 173-460-150 small quantity emission rate of 0.457 lb/hr (2.0 tpy).

Sabey has demonstrated compliance with the national ambient air quality standards (NAAQS) and acceptable source impact levels (ASILs) except for DEEP and NO2. As required by WAC 173-460-090, emissions of DEEP and NO2 are further evaluated in the following section of this document.

6. SECOND TIER REVIEW FOR DIESEL ENGINE EXHAUST PARTICULATE

Proposed emissions of diesel engine exhaust, particulate (DEEP) and NO2 from the forty-four (44) Sabey engines exceed the regulatory trigger level for toxic air pollutants (also called an Acceptable Source Impact Level, (ASIL)). A second tier review was required for DEEP and NO2 in accordance with WAC 173-460-090, and Sabey was required to prepare a health impact assessment (HIA). The HIA presents an evaluation of both non-cancer hazards and increased cancer risk attributable to Sabey's increased emissions of identified carcinogenic compounds. Large diesel-powered backup engines emit DEEP, which is a high priority toxic air pollutant in the state of Washington. In light of the rapid development of other data centers in the Quincy area, and recognizing the potency of DEEP emissions, Ecology decided to evaluate Sabey's proposal in a community-wide basis, even though it is not required to do so by state law. Sabey reported the cumulative risks associated with Sabey and prevailing sources in their HIA document based on a cumulative modeling approach. The Sabey cumulative risk study is based on proposed generators, nearby data centers, and other background sources including highways and railroads.

Because Sabey requests that the 1st-highest NOx emission rate be retained at the current limit of 990 lbs/hour (or 99 lb/hr of NO2 per Condition 5.7 of Approval Order), Ecology's 2011 Technical Support Document for Second Tier Review of NO2 does not need to be repeated but can be re-used to satisfy this permit revision. The Sabey DEEP HIA document along with a brief summary of Ecology's review will be available on Ecology's website.

7. CONCLUSION

Based on the above analysis, Ecology concludes that operation of the 44 generators and 176 cooling units will not have an adverse impact on air quality. Ecology finds that Sabey's Data Center has satisfied all requirements for NOC approval.

******END OF SABEY TSD** ****

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A NEW) APPROVAL ORDER No. 16AQ-E011
AIR CONTAMINANT SOURCE FOR)
SABEY INTERGATE QUINCY, LLC)
INTERGATE-QUINCY DATA CENTER)

TO: Cris Engel,
Sabey Intergate-Quincy Data Center
2200 M Street NE,
Quincy, WA 98848

On October 7, 2014, the Washington State Department of Ecology (Ecology) received a Notice of Construction (NOC) application from the Sabey Intergate Quincy, LLC., Data Center (Sabey) located at 2200 M Street NE, Quincy, WA. Sabey requested approval for revisions to the August 26, 2011 Approval Order No. 11AQ-E424 (previous permit). The NOC application was determined to be incomplete and, on December 5, 2014, Ecology issued an incompleteness letter to Sabey. On March 5, 2015, Sabey provided a revised NOC application and a revised Second Tier Risk Analysis to Ecology. The application and Second Tier Risk Analysis were considered complete on June 23, 2015.

EQUIPMENT

The list of equipment for this approval order includes 44 diesel engines used to power emergency electrical generators at the Sabey Intergate-Quincy Data Center (Sabey). The forty-four 2.0 megawatt (MWe) generators will have a combined capacity of up to 88 MWe using a combination of Caterpillar, Cummins, and MTU engines. Provisions for the use of smaller engines supplied by these manufacturers are contained in Condition 2.7 of this Approval Order. Sabey's application provided Ecology with a combination of engine size ranges for the anticipated engines to be used, which will have ranges at or smaller than the following sizes: Caterpillar Model 3516C rated 2.0 MWe; Caterpillar Model 3512C rated 1.5 MWe; Cummins QSK60-G14 NR2 rated 2.0 MWe; Cummins Inc QSK50-G5 NR2 rated 1.5 MWe; MTU 16V4000G43 rated 2.0 MWe; and MTU 12V4000G43 rated 1.5 MWe.

The generators will be installed in three construction phases. The remaining 2 generators of the 12 Phase 1 generators (10 were installed under a previous Approval Order and are included as part of the 44 generators of this Approval Order), will each consist of up to 2.0 MWe generators that will be installed upon approval. Phase 2 and 3 will each consist of sixteen generators up to 2.0 MWe each, and will be installed at the facility as independent tenant companies contract for space at Sabey. Emergency engine information is provided in Table 1.1.

Table 1.1: Emergency Engine & Generator Serial Numbers

Phase	Unit ID	Manufacturer & Model No.	Capacity MWe	Engine SN	Generator SN	Build Date
Phase 3	A01					
"	A02					
"	A03					
"	A04					
"	A05					

“	A06					
“	A07					
“	A08					
“	A09					
“	A10					
“	A11					
“	A12					
“	A13					
“	A14					
“	A15					
“	A16					
Phase 2	B01					
“	B02					
“	B03					
“	B04					
“	B05					
“	B06					
“	B07					
“	B08					
“	B09					
“	B10					
“	B11					
“	B12					
“	B13					
“	B14					
“	B15					
“	B16					
Phase 1	QC3-A	Caterpillar 3512C	1.5	EBG00972	G5Y00653	07/22/2011
Phase 1	QC3-B	Caterpillar 3512C	1.5	EBG00975	G5Y00652	07/22/2011
Phase 1	QC3-C	Caterpillar 3512C	1.5	EBG00973	G5Y00654	07/22/2011
Phase 1	QC1-A	Caterpillar 3516C	2.0	DD600363	G7F00178	11/24/2013
Phase 1	QC1-B	Caterpillar 3516C	2.0	DD600364	G7F00177	11/22/2013
Phase 1	QC4-A	Caterpillar 3512C	1.5	CT200132	G2N00529	03/05/2014
Phase 1	QC4-B	Caterpillar 3512C	1.5	CT200134	G2N00532	03/07/2014
Phase 1	QC4-C	Caterpillar 3512C	1.5	CT200133	G2N00531	03/05/2014
Phase 1	QC2-A	Caterpillar 3516C	2.0	DD600488	G7F00188	07/09/2014
Phase 1	QC2-B	Caterpillar 3516C	2.0	DD600490	G7F00187	07/09/2014
Phase 1						
Phase 1						
total	44					

This approval order also includes 176 Munters Model PV-W35-PVT (or equivalent) cooling units to dissipate heat from electronic equipment at the facility. Cooling unit information is provided in Table 1.2.

Table 1.2: Munters Model PV-W35-PVT Cooling Units

	# Fans per Cooling Unit	# Cooling Units per engine	Total # Cooling Units
Total	3	4	176

Combined facility potential to emit (PTE) estimated emissions are provided in Table 1.3

Table 1.3 Potential To Emit	
Pollutant	**Facility Potential to Emit**
Criteria Pollutants	**(TPY)**
NOx Total	23.9
VOC Total	~~1.43~~1.32
CO Total	~~11.9~~13
Total PM10/PM2.5 [See PM2.5 (Engines), DEEP and cooling tower emissions]	
PM2.5 (Engines): DEEP + VOC	1.73
SO_2	0.028
Toxic Air Pollutants (TAPS)	
Primary NO_2	2.39
Diesel Engine Exhaust Particulate (DEEP)	0.408
CO	~~11.9~~13
SO_2	0.028
Propylene	4.2E-02
Acrolein	1.9E-04
Benzene	1.9E-02
Toluene	5.08E-03
Xylenes	3.49E-03
Napthalene	3.1E-03
1,3 Butadiene	4.7E-04
Formaldehyde	1.43E-03
Acetaldehyde	4.55E-04
Benzo(a)Pyrene	2.32E-06
Benzo(a)anthracene	1.12E-05
Chrysene	2.76E-05
Benzo(b)fluoranthene	2.01E-05
Benzo(k)fluoranthene	1.97E-06
Dibenz(a,h)anthracene	3.13E-06
Ideno(1,2,3-cd)pyrene	3.74E-06
Cooling Tower Emissions	
PM10/PM2.5	2.32

DETERMINATIONS

In relation to this project, the State of Washington Department of Ecology (Ecology), pursuant to Revised Code of Washington (RCW) 70.94.152, Washington Administrative Code (WAC) 173-460-040, and WAC 173-400-110, makes the following determinations:

1. The project, if constructed and operated as herein required, will be in accordance with applicable rules and regulations, as set forth in Chapter 173-400 WAC, and Chapter 173-460

WAC, and the operation thereof, at the location proposed, will not emit pollutants in concentrations that will endanger public health.

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

3. The proposed project, if constructed and operated as herein required, will utilize best available control technology for toxic air pollutants (tBACT).

4. The modeled ambient concentrations of two toxic air pollutants – diesel engine exhaust particulate matter and nitrogen dioxide – exceed the Acceptable Source Impact Levels (ASILs) for those pollutants, as defined in Chapter 173-460 WAC. Ecology has evaluated the health risks associated with diesel engine exhaust particulate and nitrogen dioxide emissions from the proposed project, in accordance with WAC 173-460-090. Ecology has concluded that the health risks from the project are acceptable in accordance with WAC 173-460-090(7). The technical analysis supporting this determination is incorporated into the Technical Support Document associated with this Notice of Construction Approval Order.

THEREFORE, IT IS ORDERED that the project as described in the Notice of Construction application and more specifically detailed in plans, specifications, and other information submitted to Ecology is approved for construction and operation, provided the following are met:

APPROVAL CONDITIONS

1. ADMINISTRATIVE CONDITION

1.1 Notice of Construction Approval Order No. 11AQ-E424 is rescinded and replaced entirely with this Approval Order.

1.2 Sabey will provide Quincy School District administrators with the telephone number for Sabey and a 24 hour contact number for a Sabey manager. Sabey will notify the school whenever (Ecology) approved changes occur in the maintenance testing schedule. As decided by the school administrators and Sabey, an ongoing relationship shall be established to facilitate future communications.

1.3 Sabey submitted a NOC application to determine compliance with all applicable state and federal air quality regulations. At full build out of all three phases, Sabey is anticipated to be occupied by up to eight independent tenants. Each independent tenant will be issued an approval order based on the parameters established in this approval order. A NOC application (form only) and engine manufacturer's specification sheets will be required from each independent tenant prior to occupancy, subject to Approval Conditions 2.4 and 2.7. Ecology will review the NOC application form to determine whether the proposed project conforms to the parameters contained in this approval order. If the proposed project conforms to the approval order, Ecology will issue an administrative approval order to the applicant without further review. If the proposed project does not conform to this approval order, Ecology will require new source review under Chapters 173-400 WAC and 173-460 WAC. The purpose of the administrative approval orders for each independent tenant is to establish responsibility for their individual operations, and to ensure conformity to this approval Order.

1.4 The administrative approval orders issued to each independent tenant will contain conditions that will require coordination of operations with other tenants to provide for compliance with this approval order with the intent to minimize community impacts.

1.5 Sabey shall make available information on diesel engine exhaust health risks and emergency generator operations to existing residents and commercial and industrial facilities within 0.25 miles of Sabey property boundaries. Information on diesel exhaust health risks and emergency generator operations shall be provided to the City of Quincy Building and Planning Department for distribution to new homeowners and businesses that locate on undeveloped parcels within 0.25 miles of the Sabey property boundary. The health risk information may be, or should be similar to, Ecology Focus on Diesel Exhaust Health Risks dated February 2011, Publication Number 11-02-005. A copy of the materials to be used to comply with this condition shall be provided to Ecology for review, and distributed prior to starting Phase 1 operations.

2. EQUIPMENT RESTRICTIONS

2.1 Any engine used to power the electrical generators shall be operated in accordance with applicable 40 CFR 60, Subpart IIII requirements including but not limited to: certification by the manufacturer to meet the 40 CFR 89 EPA Tier 2 emissions levels as required by 40 CFR 60.4202; and installed and operated as emergency engines, as defined in 40 CFR 60.4219. At the time of the effective date of this permit, Tier 4 interim and Tier 4 final certified engines (as specified in 40 CFR 1039.102 Table 7 and 40 CFR 1039.101 Table 1, respectively), are not required for 1.5 to 2.0 MWe electrical generators used for emergency purposes as defined in 40 CFR 60.4219 in attainment areas in Washington State. However, any engines installed at the Sabey Data Center after Tier 4 or other limits are implemented by EPA for emergency generators, shall meet the applicable specifications as required by EPA at the time the emergency engines are installed.

2.2 The only engines and electrical generating units approved for operation at Sabey are those listed by serial number in Table 1.1 ~~above~~of this permit, which must have equal or less emissions than the engine/generator models specified in the equipment section of this permit.

2.3 Replacement of failed engines with identical engines (same manufacturer and model) requires notification prior to installation but will not require new source review unless there is an increase in emission rates or community impacts.

2.4 The installation of any new engines after July 1, 2019 will require notification to Ecology that includes engine manufacturer's specification sheets. Ecology will decide whether new source review is required based on various factors including whether the new engines will have either an increased emission rate or result in an emission concentration that may increase community impacts over those evaluated for this approval Order, or if an update to the current BACT analysis is necessary.

2.5 The forty-four (44) engine exhaust stack heights shall be greater than or equal to 48 feet above ground level and will be no more than 16 inches in diameter. All engines that may be used for this project shall be required to verify that exhaust stack parameters such as diameter, height, and exhaust rate and velocity do not result in community emissions impacts greater than what was evaluated for this project.

2.6 The manufacture and installation of the forty-four (44) engine/generator sets proposed for Building A, Building B and Building C of the project shall occur by January 1, 2019. If the manufacture and installation of the engines has not been completed within the above schedule, new source review may be required prior to installation, and community impacts will be re-evaluated if new source review is required. Sabey may request an extension of this time schedule, and Ecology may approve of an extension without revision to this Order.

2.7 This Order only applies to the forty-four (44) engines, each with a rated full standby capacity of up to 2.0 MWe, which are consistent with the engines that were evaluated in the Notice of Construction application and second tier review. New source review will not be required for engines with a rated full standby capacity of less than or equal to2.0 MWe that comply with the engine certification requirements contained in Approval Conditions 2.1 and 5 unless there is an increase in community emission impacts. On a case-by-case basis, Ecology may require additional ambient impacts analyses prior to installation of smaller engines.

2.8 In addition to meeting EPA Tier 2 certification requirements, the source must have written verification from the engine manufacturer that each engine of the same make, model, and rated capacity installed at the facility uses the same electronic Programmable System Parameters, i.e., configuration parameters, in the electronic engine control unit.

3. OPERATING LIMITATIONS

3.1 The fuel consumption at Sabey shall be limited to a total of 263,725 gallons per year of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.00150 weight percent sulfur). Total annual fuel consumption by the facility may be averaged over a three (3) year period using monthly rolling totals.

3.2 Except as provided in Approval Condition 3.5, the forty-four (44) Sabey engines are restricted to the annual limits in Table 3.2 averaged over three (3) year monthly rolling totals and averaged over all generators in service:

Table 3.2: Annual Engine Operating Restrictions

Operating Activity	Average hours/year per engine.	Average Operating Electrical Loads (%)	Number of Engines Operating Concurrently
Monthly Testing	16.5	Zero electrical load to 50%	4
Annual Load Bank Testing	6	100%	4
Combined Electrical Bypass and Power Outage	35	Any random load from zero to 100%	22 (electrical bypass); 44 (power outage); 1 (corrective testing)
Total	57.5		

3.3. A load bank will be used for electrical energy dissipation whenever prescheduled monthly maintenance testing, corrective testing or annual load bank testing occurs above zero electrical load.

3.4. The forty-four (44) engines at Sabey require periodic scheduled operation. To mitigate engine emission impacts, Sabey will perform all engine testing during daylight hours. Engine testing may take place outside of these time restrictions upon coordination by Sabey with other data centers in northeast Quincy to minimize engine emissions impacts to the community. Sabey shall maintain records of the coordination communications with other data centers, and those communications shall be available for review by Ecology upon request.

3.5. Initial start-up (commissioning) testing for the forty-four (44) engines at Sabey is restricted to an average of 30 hours per generator and 2309 gallons of fuel per generator, averaged over all generators installed during any consecutive 3 year period.

3.5.1 Except during site integration testing as specified below, only one engine shall be operated at any one time during start-up testing.
3.5.2 During a site integration test, no more than sixteen (16) generator engines may operate concurrently for up to four continuous hours.
3.5.3 All startup and commissioning testing shall be conducted during daylight hours.
3.5.4 Fuel use limits contained in Approval Conditions 3.1 and emission limits contained in Approval Conditions 5, remain in effect during initial start-up testing.

3.6. All of the cooling units shall comply with the following conditions:

3.6.1 Each individual cooling unit shall use a mist eliminator with a maximum drift rate of 0.001% of the circulating water flow rate. The drift rate shall be guaranteed by the unit manufacturer.
3.6.2 Chemicals containing hexavalent chromium cannot be used to pre-treat the cooling unit makeup water.

4. GENERAL TESTING AND MAINTENANCE REQUIREMENTS

4.1. Sabey will follow engine-manufacturer's recommended diagnostic testing and maintenance procedures to ensure that each engine will conform to Condition 5 emission limits and Tier 2 emission specifications as listed in 40 CFR 89 throughout the life of each engine.

4.2 Sabey shall measure emissions of particulate matter (PM), non-methane hydrocarbons, nitric oxide (NO), nitrogen dioxide (NO_2), carbon monoxide (CO) from engine exhaust stacks in accordance with Approval Condition 4.3. This testing will serve to demonstrate compliance with the g/kW-hr EPA Tier 2 average emission limits contained in Section 5, and as an indicator of proper operation of the engines. The selection of the engines(s) to be tested shall be in accordance with Conditions 4.2.1 and 4.2.2 and shall be defined in a source test protocol submitted to Ecology no less than 30 days in advance of any compliance-related stack sampling conducted by Sabey.

Additional testing as described in 40 CFR 60.8(g) may be required by Ecology at their discretion.

4.2.1 For new engines, at least one representative engine from each manufacturer and each size engine from each manufacturer shall be tested ~~immediately~~ as soon as possible after commissioning and before it becomes operational.

4.2.2 Every 60 months after the first testing performed in Condition 4.2.1, Sabey shall test at least one engine, including the engine with the most operating hours as long as it is a different engine from that which was tested during the previous 60 month interval testing.

4.3 The following procedure shall be used for each test for the engines as required by Approval Condition 4.2 unless an alternate method is proposed by Sabey and approved in writing by Ecology prior to the test.

4.3.1 Periodic emissions testing should be combined with other pre-scheduled maintenance testing and annual load bank engine testing. Additional operation of the engines for the purpose of emissions testing beyond the operating hours allowed in this Order must be approved by Ecology in writing. Additional operation of the engines for Ecology-required stack emission testing shall be limited to up 30 hours per generator per emission test, averaged over all generators tested in any year. These allowable runtime hours for emission testing cannot be transferred to other uses. If emission testing cannot be completed within the 30 hour allocated limit, then additional stack testing runtime beyond 30 hours must be included in the 57.5 hours per year per generator limit listed in Table 3.2.

4.3.2 PM (filterable fraction only), non-methane hydrocarbons, NO, NO_2, and CO emissions measurement shall be conducted at five individual generator electrical loads of 100%, 75%, 50%, 25%, and 10% using weighting factor averaging according to Table 2 of Appendix B to Subpart E of 40CFR89..

4.3.3 EPA Reference Methods and test procedures from 40 CFR 60, 40 CFR 51, and/or 40 CFR 89 as appropriate for each pollutant shall be used including Method 5 or 40 CFR 1065 for PM. A test plan will be submitted for Ecology approval at least 30 days before any testing is conducted and must include the criteria used to select the engine for testing, as well as any modifications to the standard test procedure contained in the above references.

4.3.4 The F-factor method, as described in EPA Method 19, may be used to calculate exhaust flow rate through the exhaust stack. The fuel meter data, as measured according to Approval Condition 4.5, shall be included in the test report, along with the emissions calculations.

4.3.5 In the event that any source test shows non-compliance with the emission limits in Condition 5, Sabey shall repair or replace the engine and repeat the test on the same engine plus two additional engines of the same make and model as the engine showing non-compliance. Test reports shall be submitted to Ecology as provided in Condition 9.5 of this Order.

4.4 Each engine shall be equipped with a properly installed and maintained non-resettable meter that records total operating hours.

4.5 Each engine shall be connected to a properly installed and maintained fuel flow monitoring system that records the amount of fuel consumed by that engine during operation.

5 EMISSION LIMITS

5.1 The forty-four (44) engines described in this Order shall meet the emission rate limitations contained in this section. Unless otherwise approved by Ecology in writing, compliance with emission limits for those pollutants that are required to be tested under Approval Conditions 4.2 and 4.3 shall be based on emissions test data as determined according to those approval conditions.

5.2 To demonstrate compliance with 40CFR89(112 & 113) g/kW-hr EPA Tier 2 weighted average emission limits through stack testing, Sabey shall conduct exhaust stack testing as described in Conditions 4.2 and 4.3 according to Table 2 of Appendix B to Subpart E of 40CFR89, or any other applicable EPA requirement in effect at the time the engines are installed.

5.3 Nitrogen oxides (NOx or NO + NO2) emissions from each of the forty-four (44) engines shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.3: Nitrogen oxides (NOx) and non-methane hydrocarbon (NMHC) emission rate limits

	Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.3~~2~~.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	41.9 lb/hr[1] (NOx)
5.~~2~~3.2	Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 6.4 g/kW-hr (NOx + NMHC)

1 Limit represents the higher value of either the Caterpillar "Not To Exceed" or EPA Tier-2 (6.12 g/kw-hr) Total engine NOx emissions shall comply with Tier 2 emissions limits in 40CFR89.

5.4 Nitrogen dioxide (NO_2) emissions from each of the forty-four (44) engines shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.4: Nitrogen dioxide (NO_2) emission rate limits			
	Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.~~3~~4.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	4.19 lb/hr[1]
5.~~3~~4.2	Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 0.62 g/kW-hr

1 10% of total NOx emission limits

5.5 Carbon monoxide emissions from each of the forty-four (44) engines shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.5: Carbon monoxide (CO) emission rate limits			
	Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.~~4~~5.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	16.9 lb/hr[1]
5.~~4~~5.2	Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 3.5 g/kW-hr

1 Limit represents the higher value of either the Caterpillar “Not To Exceed” or EPA Tier-2 (3.5 g/kw-hr). Total engine CO emissions shall comply with Tier 2 emissions limits in 40CFR89.

5.6 Diesel Engine Exhaust Particulate (DEEP) and total particulate matter (total PM) emissions from each of the forty-four (44) engines power shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.6: Diesel Engine Exhaust Particulate (DEEP) and total PM emission rate limits			
	Pollutant: Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.65.1	DEEP: Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	0.57 lb/hr[1]
5.6.2	Total PM: Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	1.52 lb/hr[2]
5.56.23	DEEP: Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 0.2 g/kW-hr

1 Limit represents the higher value of either the Caterpillar "Not-to-Exceed" data or EPA Tier-2 (0.2 g/kw-hr). Total DEEP emissions shall comply with Tier 2 emissions limits in 40CFR89.

2 Sum of DEEP emission factor plus hydrocarbon emission factor at 25% load.

5.7 Nitrogen dioxide (NO_2) emissions from all 44 engines combined shall not exceed 99 lbs/hr and 2.39 tons/yr (4780 lbs/yr), on a 36-month rolling basis.

5.8 Volatile organic compound (VOC) emissions from all 44 engines combined shall not exceed 1.431.32 tons/yr (2860 lbs/yr), on a 36-month rolling basis.

5.9 Sulfur dioxide emissions from all 44 engines combined shall not exceed 0.028 tons/yr (56 lbs/yr). 5.7 DEEP emissions from all 44 engines combined shall not exceed 0.408 tons/yr (816 lbs/yr), on a 36-month rolling basis. For this condition, all PM emissions, including both the filterable "front-half" and the condensable "back-half" was conservatively considered to be diesel engine exhaust particulate (DEEP).

5.10 Total PM emissions from all 44 engines combined shall not exceed 1.73 tons/yr (3456 lbs/yr), on a 36 month rolling basis.

5.11 Visual emissions from each diesel electric generator exhaust stack while operating at an electrical load greater than 20 percent or less than 5 percent shall be no more than 5 percent opacity, and visible emissions during operating loads between 5 to 20 percent shall be no more than 10 percent opacity, with the exception of a two (2) minute period after unit start-up. Visual emissions shall be measured by using the procedures contained in 40 CFR 60, Appendix A, Method 9. Visual emissions from each diesel electric generator exhaust stack shall be no more than 5 percent, with the exception of a two (2) minute period after unit start-up. Visual emissions shall be measured by using the procedures contained in 40 CFR 60, Appendix A, Method 9.

5.115.12 Carbon monoxide emissions from all 44 engines combined shall not exceed 13 tons/yr (26,000 lbs/yr), on a 36 month rolling basis.

6 OPERATION AND MAINTENANCE MANUALS

A site-specific O&M manual for Sabey equipment shall be developed and followed. Manufacturers' operating instructions and design specifications for the engines, generators, and associated equipment shall be included in the manual. The O&M manual shall include the manufacturers' recommended protocols for extended low-load operation. The O&M manual shall be updated to reflect any modifications of the equipment or its operating procedures. Emissions that result from failure to follow the operating procedures contained in the O&M manual or manufacturer's operating instructions may be considered proof that the equipment was not properly installed, operated, and/or maintained. The O&M manual for the diesel engines and associated equipment shall at a minimum include:

6.1 Manufacturer's testing and maintenance procedures that will ensure that each individual engine will conform to the EPA Tier Emission Standards appropriate for that engine throughout the life of the engine.

6.2 Normal operating parameters and design specifications.

6.3 Operating maintenance schedule.

7 SUBMITTALS

All notifications, reports, and other submittals shall be sent to:

Washington State Department of Ecology
Air Quality Program
4601 N. Monroe Street
Spokane, WA 99205-1295

8 RECORDKEEPING

All records, Operations and Maintenance Manual, and procedures developed under this Order shall be organized in a readily accessible manner and cover a minimum of the most recent 60-month period except as required for stack testing in Condition 8.2. Any records required to be kept under the provisions of this Order shall be provided within 30 days to Ecology upon request. The following records are required to be collected and maintained.

8.1 Fuel receipts with amount of diesel and sulfur content for each delivery to the facility.

8.2 Monthly and annual fuel usage.

8.3 Monthly and annual hours of operation for each diesel engine. The cumulative hours of operation for each engine shall be maintained for the life of the engine while at Sabey, and shall include which engines have been stack tested, and the report information from Condition 9.5.

8.4 Purpose, electrical load and duration of runtime for each diesel engine period of operation.

8.5 Comparison of the actual NOx emission rate to the allowable limit of 990 lbs/hour based on records of algebraic equations used to calculate load-specific NOx emissions, and facility-wide actual 1-hour average NOx emissions rates during each unplanned

power outage and scheduled electrical bypass event that activates more than 16 generators simultaneously.

8.6 Annual gross power generated by each independent building quadrant at the facility and total annual gross power for the facility.

8.7 Upset condition log for each engine and generator that includes date, time, duration of upset, cause, and corrective action.

8.8 Any recordkeeping required by 40 CFR Part 60 Subpart IIII.

8.9 Air quality complaints received from the public or other entity, and the affected emissions units.

9 REPORTING

9.1 Within 10 business days after entering into a binding agreement with an independent tenant, Sabey shall provide Ecology with the company and the name and contact information of the company representative. Information on the Phase 2 and 3 engine/generator sets for Equipment Table 1.1 above will be the responsibility of the independent tenants of Sabey. The serial number, manufacturer make and model, standby capacity, and date of manufacture will be submitted prior to installation for each Phase 1, 2, and 3 engine and generator.

9.2 The following information will be submitted to the AQP at the address in Condition 7 above by January 31 of each calendar year. This information may be submitted with annual emissions information requested by the AQP.

9.2.1 Monthly rolling annual and three-year rolling total summary of fuel usage compared to Conditions 3.1.

9.2.2 Monthly rolling annual ~~total~~ and three-year rolling total summary of the air contaminant emissions for pollutants above the WAC 173-400-110(5) and WAC 173-460-150 de minimis levels as listed in Table 1.3 of this permit~~of concern in Condition 5 (PM2.5, CO, NOx, VOC, SO2, DEEP, and NO2)~~,

9.2.3 Monthly rolling hours of operation with annual and three-year rolling total,

9.2.4 Monthly rolling gross power generation with annual total as specified in Approval Condition 8.4,

9.2.5 A listing of each start-up of each diesel engine that shows the purpose, fuel usage, and duration of each period of operation.

9.3 Any air quality complaints resulting from operation of the emissions units or activities shall be promptly assessed and addressed. A record shall be maintained by each tenant of the action taken to investigate the validity of the complaint and what, if any, corrective action was taken in response to the complaint. Ecology shall be notified within three (3) days of receipt of any such complaint.

9.4 Each tenant shall notify Ecology by e-mail or in writing within 24 hours of any engine operation of greater than 60 minutes if such engine operation occurs as the result of a power outage or other unscheduled operation. This notification does not alleviate the tenant from annual reporting of operations contained in any section of Approval Condition 9.

9.5 Stack test reports of any engine shall be submitted to Ecology within 45 days of completion of the test and shall include, at a minimum, the following information:

9.5.1 Location, unit ID, manufacturer and model number of the engine(s) tested, including the location of the sample ports.
9.5.2 A summary of test methods, results (reported in units and averaging periods consistent with the applicable emission standard or limit), field and analytical laboratory data, quality assurance/quality control procedures and documentation.
9.5.3 A summary of operating parameters for the diesel engines being tested.
9.5.4 Copies of field data and example calculations.
9.5.5 Chain of custody information.
9.5.6 Calibration documentation
9.5.7 Discussion of any abnormalities associated with the results.
9.5.8 A statement signed by the senior management official of the testing firm certifying the validity of the source test report.

10 GENERAL CONDITIONS

10.1 **Commencing/Discontinuing Construction and/or Operations:** This approval shall become void if construction of the facility is not begun within 18 months of permit issuance or if facility operation is discontinued for a period of eighteen (18) months or more. In accordance with WAC 173-400-111(7)(a) and (c), Ecology may extend the 18 month period and each phase must commence construction within 18 months of the projected and approved construction dates in this Order.

10.2 **Compliance Assurance Access:** Access to the source by representatives of Ecology or the EPA shall be permitted upon request. Failure to allow such access is grounds for enforcement action under the federal Clean Air Act or the Washington State Clean Air Act, and may result in revocation of this Approval Order.

10.3 **Availability of Order and O&M Manual:** Legible copies of this Order and the O&M manual shall be available to employees in direct operation of the diesel electric generation station, and be available for review upon request by Ecology.

10.4 **Equipment Operation:** Operation of the 44 diesel engines used to power emergency electrical generators and related equipment shall be conducted in compliance with all data and specifications submitted as part of the NOC application and in accordance with the O&M manual, unless otherwise approved in writing by Ecology.

10.5 **Modifications:** Any modification to the generators or engines and their related equipment's operating or maintenance procedures, contrary to information in the NOC application, shall be reported to Ecology at least 60 days before such modification. Such modification may require a new or amended NOC Approval Order.

10.6 **Quincy Community Assessment 2017:** On or before July 1, 2017, Sabey shall submit to Ecology a protocol for a health risk assessment that analyzes the public health risk to Quincy residents from DEEP emissions in the Quincy area, including emissions from data center engines, highways, locomotives and other source categories. Sabey shall submit the completed health risk assessment to Ecology within 90 days of Ecology's approval of the risk assessment protocol. Ecology may extend this deadline for good cause. The study shall model the locations in the community that experience the highest

exposure to DEEP emissions, estimate the health risks associated with that exposure, and apportion the health risks among contributing source categories. In preparing the study Sabey may collaborate with other owners of diesel engines in or near Quincy. Ecology shall review the assessment and take appropriate action based on the results.

10.7 **Activities Inconsistent with the NOC Application and this Approval Order:** Any activity undertaken by the permittee or others, in a manner that is inconsistent with the NOC application and this determination, shall be subject to Ecology enforcement under applicable regulations.

10.8 **Obligations under Other Laws or Regulations:** Nothing in this Approval Order shall be construed to relieve the permittee of its obligations under any local, state or federal laws or regulations.

All plans, specifications, and other information submitted to Ecology relative to this project and further documents and any authorizations or approvals or denials in relation thereto shall be kept at the Eastern Regional Office of the Department of Ecology in the "Air Quality Controlled Sources" files, and by such action shall be incorporated herein and made a part thereof.

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

1. Violation of any terms or conditions of this authorization;
2. Obtaining this authorization by misrepresentation or failure to disclose fully all relevant fact.

The provisions of this authorization are severable and, if any provision of this authorization, or application of any provisions of their circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this authorization, shall not be affected thereby.

YOUR RIGHT TO APPEAL

You have a right to appeal this Approval Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Approval Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do the following within 30 days of the date of receipt of this Approval Order:

- File your appeal and a copy of this Approval Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Approval Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel Road SW, Suite 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk P.O. Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** P.O. Box 40903 Olympia, WA 98504-0903

For additional information visit the Environmental Hearings Office
Website: http://www.eho.wa.gov

To find laws and agency rules visit the Washington State Legislature Website:
http://www1.leg.wa.gov/CodeReviser

DATED this xxth day of xxx ~~2015~~2016, at Spokane, Washington.

Reviewed By:

Approved By:

Gary J. Huitsing, P.E.
Science and Engineering Section
Air Quality Program
Department of Ecology
State of Washington

Karen K. Wood, Section Manager
Regional Air Quality Section
Eastern Regional Office
Department of Ecology
State of Washington

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Appendix D:
Final Approval Order

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4601 N Monroe Street • Spokane, Washington 99205-1295 • (509)329-3400

April 20, 2016

Cris Engel
Sabey Intergate-Quincy Data Center
2200 M Street NE
Quincy, WA 98848

Dear Mr. Engel:

Ecology has processed your air quality permit (Notice of Construction) application, for the installation of 44 diesel engines used to power emergency electric generators at the Sabey Intergate-Quincy Data Center in Quincy, Washington.

Please review the enclosed Approval Order (Order) carefully, as you are required to comply with all of its conditions. The enclosed Order may be appealed. The appeal procedures are described in the Order.

Ecology is committed to streamlining our permitting procedures and to maintaining a high level of staff responsiveness and assistance to permit applicants. We encourage you to provide Ecology with feedback. To help us provide better service to you and our other applicants, please complete the short survey online at: www.ecy.wa.gov/programs/air/permit_register/Permitting_Feedback.htm.

If you have any questions, please contact me at Karen.wood@ecy.wa.gov. or call (509) 329-3469.

Sincerely,

Karen K. Wood

Karen K. Wood
Air Quality Unit Manager
Eastern Region Office

KKW:lc

Enclosure: Approval Order No. 16AQ-E011, Technical Support Document

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A NEW AIR CONTAMINANT SOURCE FOR **SABEY INTERGATE QUINCY, LLC** **INTERGATE-QUINCY DATA CENTER**	APPROVAL ORDER No. 16AQ-E011

TO: Cris Engel
Sabey Intergate-Quincy Data Center
2200 M Street NE
Quincy, WA 98848

On October 7, 2014, the Washington State Department of Ecology (Ecology) received a Notice of Construction (NOC) application from the Sabey Intergate Quincy, LLC., Data Center (Sabey) located at 2200 M Street NE, Quincy, WA. Sabey requested approval for revisions to the August 26, 2011 Approval Order No. 11AQ-E424 (previous permit). The NOC application was determined to be incomplete and, on December 5, 2014, Ecology issued an incompleteness letter to Sabey. On March 5, 2015, Sabey provided a revised NOC application and a revised Second Tier Risk Analysis to Ecology. The application and Second Tier Risk Analysis were considered complete on June 23, 2015.

EQUIPMENT

The list of equipment for this approval order includes 44 diesel engines used to power emergency electrical generators at the Sabey Intergate-Quincy Data Center (Sabey). The forty-four 2.0 megawatt (MWe) generators will have a combined capacity of up to 88 MWe using a combination of Caterpillar, Cummins, and MTU engines. Provisions for the use of smaller engines supplied by these manufacturers are contained in Condition 2.7 of this Approval Order. Sabey's application provided Ecology with a combination of engine size ranges for the anticipated engines to be used, which will have ranges at or smaller than the following sizes: Caterpillar Model 3516C rated 2.0 MWe; Caterpillar Model 3512C rated 1.5 MWe; Cummins QSK60-G14 NR2 rated 2.0 MWe; Cummins Inc QSK50-G5 NR2 rated 1.5 MWe; MTU 16V4000G43 rated 2.0 MWe; and MTU 12V4000G43 rated 1.5 MWe.

The generators will be installed in three construction phases. The remaining 2 generators of the 12 Phase 1 generators (10 were installed under a previous Approval Order and are included as part of the 44 generators of this Approval Order), will each consist of up to 2.0 MWe generators that will be installed upon approval. Phase 2 and 3 will each consist of sixteen generators up to 2.0 MWe each, and will be installed at the facility as independent tenant companies contract for space at Sabey. Emergency engine information is provided in Table 1.1.

Table 1.1: Emergency Engine & Generator Serial Numbers						
Phase	Unit ID	Manufacturer & Model No.	Capacity MWe	Engine SN	Generator SN	Build Date
Phase 3	A01					
"	A02					
"	A03					
"	A04					
"	A05					
"	A06					
"	A07					
"	A08					
"	A09					
"	A10					
"	A11					
"	A12					
"	A13					
"	A14					
"	A15					
"	A16					
Phase 2	B01					
"	B02					
"	B03					
"	B04					
"	B05					
"	B06					
"	B07					
"	B08					
"	B09					
"	B10					
"	B11					
"	B12					
"	B13					
"	B14					
"	B15					
"	B16					
Phase 1	QC3-A	Caterpillar 3512C	1.5	EBG00972	G5Y00653	07/22/2011
Phase 1	QC3-B	Caterpillar 3512C	1.5	EBG00975	G5Y00652	07/22/2011
Phase 1	QC3-C	Caterpillar 3512C	1.5	EBG00973	G5Y00654	07/22/2011
Phase 1	QC1-A	Caterpillar 3516C	2.0	DD600363	G7F00178	11/24/2013
Phase 1	QC1-B	Caterpillar 3516C	2.0	DD600364	G7F00177	11/22/2013
Phase 1	QC4-A	Caterpillar 3512C	1.5	CT200132	G2N00529	03/05/2014
Phase 1	QC4-B	Caterpillar 3512C	1.5	CT200134	G2N00532	03/07/2014
Phase 1	QC4-C	Caterpillar 3512C	1.5	CT200133	G2N00531	03/05/2014
Phase 1	QC2-A	Caterpillar 3516C	2.0	DD600488	G7F00188	07/09/2014
Phase 1	QC2-B	Caterpillar 3516C	2.0	DD600490	G7F00187	07/09/2014
Phase 1						
Phase 1						
total	44					

This approval order also includes 176 Munters Model PV-W35-PVT (or equivalent) cooling units to dissipate heat from electronic equipment at the facility. Cooling unit information is provided in Table 1.2.

Table 1.2: Munters Model PV-W35-PVT Cooling Units			
	# Fans per Cooling Unit	# Cooling Units per engine	Total # Cooling Units
Total	3	4	176

Combined facility potential to emit (PTE) estimated emissions are provided in Table 1.3

Table 1.3 Potential To Emit	
Pollutant	**Facility Potential to Emit**
Criteria Pollutants	**(TPY)**
NOx Total	23.9
VOC Total	1.32
CO Total	13
Total PM10/PM2.5 [See PM2.5 (Engines), DEEP and cooling tower emissions]	
PM2.5 (Engines): DEEP + VOC	1.73
SO_2	0.028
Toxic Air Pollutants (TAPS)	
Primary NO_2	2.39
Diesel Engine Exhaust Particulate (DEEP)	0.408
CO	13
SO_2	0.028
Propylene	4.2E-02
Acrolein	1.9E-04
Benzene	1.9E-02
Toluene	5.08E-03
Xylenes	3.49E-03
Napthalene	3.1E-03
1,3 Butadiene	4.7E-04
Formaldehyde	1.43E-03
Acetaldehyde	4.55E-04
Benzo(a)Pyrene	2.32E-06
Benzo(a)anthracene	1.12E-05
Chrysene	2.76E-05
Benzo(b)fluoranthene	2.01E-05
Benzo(k)fluoranthene	1.97E-06
Dibenz(a,h)anthracene	3.13E-06
Ideno(1,2,3-cd)pyrene	3.74E-06
Cooling Tower Emissions	
PM10/PM2.5	2.32

DETERMINATIONS

In relation to this project, the State of Washington Department of Ecology (Ecology), pursuant to Revised Code of Washington (RCW) 70.94.152, Washington Administrative Code (WAC) 173-460-040, and WAC 173-400-110, makes the following determinations:

1. The project, if constructed and operated as herein required, will be in accordance with applicable rules and regulations, as set forth in Chapter 173-400 WAC, and Chapter 173-460 WAC, and the operation thereof, at the location proposed, will not emit pollutants in concentrations that will endanger public health.

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

3. The proposed project, if constructed and operated as herein required, will utilize best available control technology for toxic air pollutants (tBACT).

4. The modeled ambient concentrations of two toxic air pollutants – diesel engine exhaust particulate matter and nitrogen dioxide – exceed the Acceptable Source Impact Levels (ASILs) for those pollutants, as defined in Chapter 173-460 WAC. Ecology has evaluated the health risks associated with diesel engine exhaust particulate and nitrogen dioxide emissions from the proposed project, in accordance with WAC 173-460-090. Ecology has concluded that the health risks from the project are acceptable in accordance with WAC 173-460-090(7). The technical analysis supporting this determination is incorporated into the Technical Support Document associated with this Notice of Construction Approval Order.

THEREFORE, IT IS ORDERED that the project as described in the Notice of Construction application and more specifically detailed in plans, specifications, and other information submitted to Ecology is approved for construction and operation, provided the following are met:

APPROVAL CONDITIONS

1. ADMINISTRATIVE CONDITION

1.1 Notice of Construction Approval Order No. 11AQ-E424 is rescinded and replaced entirely with this Approval Order.

1.2 Sabey will provide Quincy School District administrators with the telephone number for Sabey and a 24 hour contact number for a Sabey manager. Sabey will notify the school whenever (Ecology) approved changes occur in the maintenance testing schedule. As decided by the school administrators and Sabey, an ongoing relationship shall be established to facilitate future communications.

1.3 Sabey submitted a NOC application to determine compliance with all applicable state and federal air quality regulations. At full build out of all three phases, Sabey is anticipated to be occupied by up to eight independent tenants. Each independent tenant will be issued an approval order based on the parameters established in this approval order. A NOC application (form only) and engine manufacturer's specification sheets will be required from each independent tenant prior to occupancy, subject to Approval Conditions 2.4 and 2.7. Ecology will review the NOC application form to determine whether the proposed project conforms to the parameters contained in this approval

order. If the proposed project conforms to the approval order, Ecology will issue an administrative approval order to the applicant without further review. If the proposed project does not conform to this approval order, Ecology will require new source review under Chapters 173-400 WAC and 173-460 WAC. The purpose of the administrative approval orders for each independent tenant is to establish responsibility for their individual operations, and to ensure conformity to this approval Order.

1.4 The administrative approval orders issued to each independent tenant will contain conditions that will require coordination of operations with other tenants to provide for compliance with this approval order with the intent to minimize community impacts.

1.5 Sabey shall make available information on diesel engine exhaust health risks and emergency generator operations to existing residents and commercial and industrial facilities within 0.25 miles of Sabey property boundaries. Information on diesel exhaust health risks and emergency generator operations shall be provided to the City of Quincy Building and Planning Department for distribution to new homeowners and businesses that locate on undeveloped parcels within 0.25 miles of the Sabey property boundary. The health risk information may be, or should be similar to, Ecology Focus on Diesel Exhaust Health Risks dated February 2011, Publication Number 11-02-005. A copy of the materials to be used to comply with this condition shall be provided to Ecology for review, and distributed prior to starting Phase 1 operations.

2. EQUIPMENT RESTRICTIONS

2.1 Any engine used to power the electrical generators shall be operated in accordance with applicable 40 CFR 60, Subpart IIII requirements including but not limited to: certification by the manufacturer to meet the 40 CFR 89 EPA Tier 2 emissions levels as required by 40 CFR 60.4202; and installed and operated as emergency engines, as defined in 40 CFR 60.4219. At the time of the effective date of this permit, Tier 4 interim and Tier 4 final certified engines (as specified in 40 CFR 1039.102 Table 7 and 40 CFR 1039.101 Table 1, respectively), are not required for 1.5 to 2.0 MWe electrical generators used for emergency purposes as defined in 40 CFR 60.4219 in attainment areas in Washington State. However, any engines installed at the Sabey Data Center after Tier 4 or other limits are implemented by EPA for emergency generators, shall meet the applicable specifications as required by EPA at the time the emergency engines are installed.

2.2 The only engines and electrical generating units approved for operation at Sabey are those listed by serial number in Table 1.1 of this permit, which must have equal or less emissions than the engine/generator models specified in the equipment section of this permit.

2.3 Replacement of failed engines with identical engines (same manufacturer and model) requires notification prior to installation but will not require new source review unless there is an increase in emission rates or community impacts.

2.4 The installation of any new engines after July 1, 2019 will require notification to Ecology that includes engine manufacturer's specification sheets. Ecology will decide whether new source review is required based on various factors including whether the new engines will have either an increased emission rate or result in an emission concentration that may increase community impacts over those evaluated for this approval Order, or if an update to the current BACT analysis is necessary.

2.5 The forty-four (44) engine exhaust stack heights shall be greater than or equal to 48 feet above ground level and will be no more than 16 inches in diameter. All engines that may be used for this project shall be required to verify that exhaust stack parameters such as diameter, height, and exhaust rate and velocity do not result in community emissions impacts greater than what was evaluated for this project.

2.6 The manufacture and installation of the forty-four (44) engine/generator sets proposed for Building A, Building B and Building C of the project shall occur by January 1, 2019. If the manufacture and installation of the engines has not been completed within the above schedule, new source review may be required prior to installation, and community impacts will be re-evaluated if new source review is required. Sabey may request an extension of this time schedule, and Ecology may approve of an extension without revision to this Order.

2.7 This Order only applies to the forty-four (44) engines, each with a rated full standby capacity of up to 2.0 MWe, which are consistent with the engines that were evaluated in the Notice of Construction application and second tier review. New source review will not be required for engines with a rated full standby capacity of less than or equal to2.0 MWe that comply with the engine certification requirements contained in Approval Conditions 2.1 and 5 unless there is an increase in community emission impacts. On a case-by-case basis, Ecology may require additional ambient impacts analyses prior to installation of smaller engines.

2.8 In addition to meeting EPA Tier 2 certification requirements, the source must have written verification from the engine manufacturer that each engine of the same make, model, and rated capacity installed at the facility uses the same electronic Programmable System Parameters, i.e., configuration parameters, in the electronic engine control unit.

3. OPERATING LIMITATIONS

3.1 The fuel consumption at Sabey shall be limited to a total of 263,725 gallons per year of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.00150 weight percent sulfur). Total annual fuel consumption by the facility may be averaged over a three (3) year period using monthly rolling totals.

3.2 Except as provided in Approval Condition 3.5, the forty-four (44) Sabey engines are restricted to the annual limits in Table 3.2 averaged over three (3) year monthly rolling totals and averaged over all generators in service:

Table 3.2: Annual Engine Operating Restrictions

Operating Activity	Average hours/year per engine.	Average Operating Electrical Loads (%)	Number of Engines Operating Concurrently
Monthly Testing	16.5	Zero electrical load to 50%	4
Annual Load Bank Testing	6	100%	4
Combined Electrical Bypass and Power Outage	35	Any random load from zero to 100%	22 (electrical bypass); 44 (power outage); 1 (corrective testing)
Total	57.5		

3.3. A load bank will be used for electrical energy dissipation whenever prescheduled monthly maintenance testing, corrective testing or annual load bank testing occurs above zero electrical load.

3.4. The forty-four (44) engines at Sabey require periodic scheduled operation. To mitigate engine emission impacts, Sabey will perform all engine testing during daylight hours. Engine testing may take place outside of these time restrictions upon coordination by Sabey with other data centers in northeast Quincy to minimize engine emissions impacts to the community. Sabey shall maintain records of the coordination communications with other data centers, and those communications shall be available for review by Ecology upon request.

3.5. Initial start-up (commissioning) testing for the forty-four (44) engines at Sabey is restricted to an average of 30 hours per generator and 2309 gallons of fuel per generator, averaged over all generators installed during any consecutive 3 year period.

3.5.1 Except during site integration testing as specified below, only one engine shall be operated at any one time during start-up testing.
3.5.2 During a site integration test, no more than sixteen (16) generator engines may operate concurrently for up to four continuous hours.
3.5.3 All startup and commissioning testing shall be conducted during daylight hours.
3.5.4 Fuel use limits contained in Approval Conditions 3.1 and emission limits contained in Approval Conditions 5, remain in effect during initial start-up testing.

3.6. All of the cooling units shall comply with the following conditions:

3.6.1 Each individual cooling unit shall use a mist eliminator with a maximum drift rate of 0.001% of the circulating water flow rate. The drift rate shall be guaranteed by the unit manufacturer.
3.6.2 Chemicals containing hexavalent chromium cannot be used to pre-treat the cooling unit makeup water.

4. GENERAL TESTING AND MAINTENANCE REQUIREMENTS

4.1. Sabey will follow engine-manufacturer's recommended diagnostic testing and maintenance procedures to ensure that each engine will conform to Condition 5 emission limits and Tier 2 emission specifications as listed in 40 CFR 89 throughout the life of each engine.

4.2 Sabey shall measure emissions of particulate matter (PM), non-methane hydrocarbons, nitric oxide (NO), nitrogen dioxide (NO_2), carbon monoxide (CO) from engine exhaust stacks in accordance with Approval Condition 4.3. This testing will serve to demonstrate compliance with the g/kW-hr EPA Tier 2 average emission limits contained in Section 5, and as an indicator of proper operation of the engines. The selection of the engines(s) to be tested shall be in accordance with Conditions 4.2.1 and 4.2.2 and shall be defined in a source test protocol submitted to Ecology no less than 30 days in advance of any compliance-related stack sampling conducted by Sabey. Additional testing as described in 40 CFR 60.8(g) may be required by Ecology at their discretion.

4.2.1 For new engines, at least one representative engine from each manufacturer and each size engine from each manufacturer shall be tested as soon as possible after commissioning and before it becomes operational.

4.2.2 Every 60 months after the first testing performed in Condition 4.2.1, Sabey shall test at least one engine, including the engine with the most operating hours as long as it is a different engine from that which was tested during the previous 60 month interval testing.

4.3 The following procedure shall be used for each test for the engines as required by Approval Condition 4.2 unless an alternate method is proposed by Sabey and approved in writing by Ecology prior to the test.

4.3.1 Periodic emissions testing should be combined with other pre-scheduled maintenance testing and annual load bank engine testing. Additional operation of the engines for the purpose of emissions testing beyond the operating hours allowed in this Order must be approved by Ecology in writing. Additional operation of the engines for Ecology-required stack emission testing shall be limited to up 30 hours per generator per emission test, averaged over all generators tested in any year. These allowable runtime hours for emission testing cannot be transferred to other uses. If emission testing cannot be completed within the 30 hour allocated limit, then additional stack testing runtime beyond 30 hours must be included in the 57.5 hours per year per generator limit listed in Table 3.2.

4.3.2 PM (filterable fraction only), non-methane hydrocarbons, NO, NO_2, and CO emissions measurement shall be conducted at five individual generator electrical loads of 100%, 75%, 50%, 25%, and 10% using weighting factor averaging according to Table 2 of Appendix B to Subpart E of 40CFR89.

4.3.3 EPA Reference Methods and test procedures from 40 CFR 60, 40 CFR 51, and/or 40 CFR 89 as appropriate for each pollutant shall be used including Method 5 or 40 CFR 1065 for PM. A test plan will be submitted for Ecology approval at least 30 days before any testing is conducted and must include the criteria used to select the engine for testing, as well as any modifications to the standard test procedure contained in the above references.

4.3.4 The F-factor method, as described in EPA Method 19, may be used to calculate exhaust flow rate through the exhaust stack. The fuel meter data, as measured according to Approval Condition 4.5, shall be included in the test report, along with the emissions calculations.

4.3.5 In the event that any source test shows non-compliance with the emission limits in Condition 5, Sabey shall repair or replace the engine and repeat the test on the same engine plus two additional engines of the same make and model as the engine showing non-compliance. Test reports shall be submitted to Ecology as provided in Condition 9.5 of this Order.

4.4 Each engine shall be equipped with a properly installed and maintained non-resettable meter that records total operating hours.

4.5 Each engine shall be connected to a properly installed and maintained fuel flow monitoring system that records the amount of fuel consumed by that engine during operation.

5 EMISSION LIMITS

5.1 The forty-four (44) engines described in this Order shall meet the emission rate limitations contained in this section. Unless otherwise approved by Ecology in writing, compliance with emission limits for those pollutants that are required to be tested under Approval Conditions 4.2 and 4.3 shall be based on emissions test data as determined according to those approval conditions.

5.2 To demonstrate compliance with 40CFR89(112 & 113) g/kW-hr EPA Tier 2 weighted average emission limits through stack testing, Sabey shall conduct exhaust stack testing as described in Conditions 4.2 and 4.3 according to Table 2 of Appendix B to Subpart E of 40CFR89, or any other applicable EPA requirement in effect at the time the engines are installed.

5.3 Nitrogen oxides (NOx or NO + NO2) emissions from each of the forty-four (44) engines shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.3: Nitrogen oxides (NOx) and non-methane hydrocarbon (NMHC) emission rate limits

	Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.3.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	41.9 lb/hr[1] (NOx)
5.3.2	Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 6.4 g/kW-hr (NOx + NMHC)

1 Limit represents the higher value of either the Caterpillar "Not To Exceed" or EPA Tier-2 (6.12 g/kw-hr) Total engine NOx emissions shall comply with Tier 2 emissions limits in 40CFR89.

5.4 Nitrogen dioxide (NO_2) emissions from each of the forty-four (44) engines shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.4: Nitrogen dioxide (NO_2) emission rate limits

	Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.4.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	4.19 lb/hr[1]
5.4.2	Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 0.62 g/kW-hr

1 10% of total NOx emission limits

5.5 Carbon monoxide emissions from each of the forty-four (44) engines shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.5: Carbon monoxide (CO) emission rate limits			
	Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.5.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	16.9 lb/hr[1]
5.5.2	Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 3.5 g/kW-hr

1 Limit represents the higher value of either the Caterpillar "Not To Exceed" or EPA Tier-2 (3.5 g/kw-hr). Total engine CO emissions shall comply with Tier 2 emissions limits in 40CFR89.

5.6 Diesel Engine Exhaust Particulate (DEEP) and total particulate matter (total PM) emissions from each of the forty-four (44) engines power shall not exceed the following emission rates at the stated loads, based on emission factors provided by the engine manufacturer:

Table 5.6: Diesel Engine Exhaust Particulate (DEEP) and total PM emission rate limits			
	Pollutant: Operating Scenario	Operating Electrical Load	Emissions Limit per engine
5.6.1	DEEP: Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	0.57 lb/hr[1]
5.6.2	Total PM: Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	1.52 lb/hr[2]
5.6.3	DEEP: Average Emission Rate Across All Loads	Weighted Average of Rates at 100%, 75%, 50%, 25%, and 10%	5-load weighted average of 0.2 g/kW-hr

1 Limit represents the higher value of either the Caterpillar "Not-to-Exceed" data or EPA Tier-2 (0.2 g/kw-hr). Total DEEP emissions shall comply with Tier 2 emissions limits in 40CFR89.

2 Sum of DEEP emission factor plus hydrocarbon emission factor at 25% load.

5.7 Nitrogen dioxide (NO_2) emissions from all 44 engines combined shall not exceed 99 lbs/hr and 2.39 tons/yr (4780 lbs/yr), on a 36-month rolling basis.

5.8 Volatile organic compound (VOC) emissions from all 44 engines combined shall not exceed 1.32 tons/yr (2860 lbs/yr), on a 36-month rolling basis.

5.9 DEEP emissions from all 44 engines combined shall not exceed 0.408 tons/yr (816 lbs/yr), on a 36-month rolling basis.

5.10 Total PM emissions from all 44 engines combined shall not exceed 1.73 tons/yr (3456 lbs/yr), on a 36 month rolling basis.

5.11 Visual emissions from each diesel electric generator exhaust stack shall be no more than 5 percent, with the exception of a two (2) minute period after unit start-up. Visual emissions shall be measured by using the procedures contained in 40 CFR 60, Appendix A, Method 9.

5.12 Carbon monoxide emissions from all 44 engines combined shall not exceed 13 tons/yr (26,000 lbs/yr), on a 36 month rolling basis.

6 OPERATION AND MAINTENANCE MANUALS

A site-specific O&M manual for Sabey equipment shall be developed and followed. Manufacturers' operating instructions and design specifications for the engines, generators, and associated equipment shall be included in the manual. The O&M manual shall include the manufacturers' recommended protocols for extended low-load operation. The O&M manual shall be updated to reflect any modifications of the equipment or its operating procedures. Emissions that result from failure to follow the operating procedures contained in the O&M manual or manufacturer's operating instructions may be considered proof that the equipment was not properly installed, operated, and/or maintained. The O&M manual for the diesel engines and associated equipment shall at a minimum include:

6.1 Manufacturer's testing and maintenance procedures that will ensure that each individual engine will conform to the EPA Tier Emission Standards appropriate for that engine throughout the life of the engine.

6.2 Normal operating parameters and design specifications.

6.3 Operating maintenance schedule.

7 SUBMITTALS

All notifications, reports, and other submittals shall be sent to:

Washington State Department of Ecology
Air Quality Program
4601 N. Monroe Street
Spokane, WA 99205-1295

8 RECORDKEEPING

All records, Operations and Maintenance Manual, and procedures developed under this Order shall be organized in a readily accessible manner and cover a minimum of the most recent 60-month period except as required for stack testing in Condition 8.2. Any records required to be kept under the provisions of this Order shall be provided within 30 days to Ecology upon request. The following records are required to be collected and maintained.

8.1 Fuel receipts with amount of diesel and sulfur content for each delivery to the facility.

8.2 Monthly and annual fuel usage.

8.3 Monthly and annual hours of operation for each diesel engine. The cumulative hours of operation for each engine shall be maintained for the life of the engine while at Sabey, and shall include which engines have been stack tested, and the report information from Condition 9.5.

8.4 Purpose, electrical load and duration of runtime for each diesel engine period of operation.

8.5 Comparison of the actual NOx emission rate to the allowable limit of 990 lbs/hour based on records of algebraic equations used to calculate load-specific NOx emissions, and facility-wide actual 1-hour average NOx emissions rates during each unplanned power outage and scheduled electrical bypass event that activates more than 16 generators simultaneously.

8.6 Annual gross power generated by each independent building quadrant at the facility and total annual gross power for the facility.

8.7 Upset condition log for each engine and generator that includes date, time, duration of upset, cause, and corrective action.

8.8 Any recordkeeping required by 40 CFR Part 60 Subpart IIII.

8.9 Air quality complaints received from the public or other entity, and the affected emissions units.

9 REPORTING

9.1 Within 10 business days after entering into a binding agreement with an independent tenant, Sabey shall provide Ecology with the company and the name and contact information of the company representative. Information on the Phase 2 and 3 engine/generator sets for Equipment Table 1.1 above will be the responsibility of the independent tenants of Sabey. The serial number, manufacturer make and model, standby capacity, and date of manufacture will be submitted prior to installation for each Phase 1, 2, and 3 engine and generator.

9.2 The following information will be submitted to the AQP at the address in Condition 7 above by January 31 of each calendar year. This information may be submitted with annual emissions information requested by the AQP.

- 9.2.1 Monthly rolling annual and three-year rolling total summary of fuel usage compared to Conditions 3.1.
- 9.2.2 Monthly rolling annual and three-year rolling total summary of the air contaminant emissions for pollutants above the WAC 173-400-110(5) and WAC 173-460-150 de minimis levels as listed in Table 1.3 of this permit,
- 9.2.3 Monthly rolling hours of operation with annual and three-year rolling total,
- 9.2.4 Monthly rolling gross power generation with annual total as specified in Approval Condition 8.4,
- 9.2.5 A listing of each start-up of each diesel engine that shows the purpose, fuel usage, and duration of each period of operation.

9.3 Any air quality complaints resulting from operation of the emissions units or activities shall be promptly assessed and addressed. A record shall be maintained by each tenant of the action taken to investigate the validity of the complaint and what, if any, corrective

action was taken in response to the complaint. Ecology shall be notified within three (3) days of receipt of any such complaint.

9.4 Each tenant shall notify Ecology by e-mail or in writing within 24 hours of any engine operation of greater than 60 minutes if such engine operation occurs as the result of a power outage or other unscheduled operation. This notification does not alleviate the tenant from annual reporting of operations contained in any section of Approval Condition 9.

9.5 Stack test reports of any engine shall be submitted to Ecology within 45 days of completion of the test and shall include, at a minimum, the following information:

9.5.1 Location, unit ID, manufacturer and model number of the engine(s) tested, including the location of the sample ports.
9.5.2 A summary of test methods, results (reported in units and averaging periods consistent with the applicable emission standard or limit), field and analytical laboratory data, quality assurance/quality control procedures and documentation.
9.5.3 A summary of operating parameters for the diesel engines being tested.
9.5.4 Copies of field data and example calculations.
9.5.5 Chain of custody information.
9.5.6 Calibration documentation
9.5.7 Discussion of any abnormalities associated with the results.
9.5.8 A statement signed by the senior management official of the testing firm certifying the validity of the source test report.

10 GENERAL CONDITIONS

10.1 **Commencing/Discontinuing Construction and/or Operations:** This approval shall become void if construction of the facility is not begun within 18 months of permit issuance or if facility operation is discontinued for a period of eighteen (18) months or more. In accordance with WAC 173-400-111(7)(a) and (c), Ecology may extend the 18 month period and each phase must commence construction within 18 months of the projected and approved construction dates in this Order.

10.2 **Compliance Assurance Access:** Access to the source by representatives of Ecology or the EPA shall be permitted upon request. Failure to allow such access is grounds for enforcement action under the federal Clean Air Act or the Washington State Clean Air Act, and may result in revocation of this Approval Order.

10.3 **Availability of Order and O&M Manual:** Legible copies of this Order and the O&M manual shall be available to employees in direct operation of the diesel electric generation station, and be available for review upon request by Ecology.

10.4 **Equipment Operation:** Operation of the 44 diesel engines used to power emergency electrical generators and related equipment shall be conducted in compliance with all data and specifications submitted as part of the NOC application and in accordance with the O&M manual, unless otherwise approved in writing by Ecology.

10.5 **Modifications:** Any modification to the generators or engines and their related equipment's operating or maintenance procedures, contrary to information in the NOC application, shall be reported to Ecology at least 60 days before such modification. Such modification may require a new or amended NOC Approval Order.

10.6 **Quincy Community Assessment 2017:** On or before July 1, 2017, Sabey shall submit to Ecology a protocol for a health risk assessment that analyzes the public health risk to Quincy residents from DEEP emissions in the Quincy area, including emissions from data center engines, highways, locomotives and other source categories. Sabey shall submit the completed health risk assessment to Ecology within 90 days of Ecology's approval of the risk assessment protocol. Ecology may extend this deadline for good cause. The study shall model the locations in the community that experience the highest exposure to DEEP emissions, estimate the health risks associated with that exposure, and apportion the health risks among contributing source categories. In preparing the study, Sabey may collaborate with other owners of diesel engines in or near Quincy. Ecology shall review the assessment and take appropriate action based on the results.

10.7 **Activities Inconsistent with the NOC Application and this Approval Order:** Any activity undertaken by the permittee or others, in a manner that is inconsistent with the NOC application and this determination, shall be subject to Ecology enforcement under applicable regulations.

10.8 **Obligations under Other Laws or Regulations:** Nothing in this Approval Order shall be construed to relieve the permittee of its obligations under any local, state or federal laws or regulations.

All plans, specifications, and other information submitted to Ecology relative to this project and further documents and any authorizations or approvals or denials in relation thereto shall be kept at the Eastern Regional Office of the Department of Ecology in the "Air Quality Controlled Sources" files, and by such action shall be incorporated herein and made a part thereof.

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

1. Violation of any terms or conditions of this authorization;
2. Obtaining this authorization by misrepresentation or failure to disclose fully all relevant fact.

The provisions of this authorization are severable and, if any provision of this authorization, or application of any provisions of their circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this authorization, shall not be affected thereby.

YOUR RIGHT TO APPEAL

You have a right to appeal this Approval Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Approval Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do the following within 30 days of the date of receipt of this Approval Order:

- File your appeal and a copy of this Approval Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Approval Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel Road SW, Suite 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk P.O. Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** P.O. Box 40903 Olympia, WA 98504-0903

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov

To find laws and agency rules visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser

DATED this 20th day of April 2016, at Spokane, Washington.

Reviewed By:

GARY J. HUITSING STATE OF WASHINGTON 42376 REGISTERED PROFESSIONAL ENGINEER

Gary J. Huitsing, P.E.
Science and Engineering Section
Air Quality Program
Department of Ecology
State of Washington

Approved By:

Karen K. Wood, Section Manager
Regional Air Quality Section
Eastern Regional Office
Department of Ecology
State of Washington

Appendix E:
Final Technical Support Document

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TECHNICAL SUPPORT DOCUMENT
FOR APPROVAL ORDER No. 16AQ-E011
SABEY INTERGATE QUINCY, DATA CENTER
APRIL 20, 2016

1. PROJECT DESCRIPTION

On October 7, 2014, the Washington State Department of Ecology (Ecology) received a Notice of Construction (NOC) application submittal from the Sabey Intergate Quincy, LLC., Intergate-Quincy Data Center (Sabey) located at 2200 M Street NE, Quincy, WA. Sabey is requesting approval for revisions to the August 26, 2011 Approval Order No. 11AQ-E424 (previous permit). The NOC application was determined to be incomplete and, on December 5, 2014, Ecology issued an incompleteness letter to Sabey. On March 5, 2015, Sabey provided a revised NOC application (Sabey's application) and a revised Second Tier Risk Analysis to Ecology. Sabey provided Ecology with supplemental information on March 12, April 1, April 2, May 6, May 22, and June 5, 2015. Sabey's application and Second Tier Risk Analysis were considered completed on June 23, 2015. Ecology has concluded that this project has satisfied all requirements of a second tier analysis.

The primary air contaminant sources at the facility consist of forty-four (44) electric generators powered by diesel engines to provide emergency backup power to the facility. Sabey data center space will be leased to independent tenants companies that require fully supported data storage and processing space. The project will be phased in over several years depending on customer demand. The phased project will include construction of 3 buildings, i.e., Phase 1, Phase 2, and Phase 3. Phase 1 construction of approximately 135,257 square feet (ft^2) Building C began under the previous permit, and houses ten of twelve planned electric generators with up to 2.0 Megawatts (MWe) capacity per engine. Phases 2 and 3 will include two additional buildings (Buildings A and B) each with approximately 186,660 ft^2 of space, and will each house sixteen electric generators of up to 2.0 Megawatts (MWe) per engine. Upon final build-out of all three Phases, Sabey will consists of forty-four (44) electric generators with a total capacity of up to approximately 88 MWe using a combination of Caterpillar, Cummins, and MTU engines with up to 2.0 MWe capacity per engine.

Sabey will also include 176 Munters Model PV-W35-PVT cooling units or equivalents to dissipate heat from electronic equipment at the facility. The cooling units are a source of particulate matter. Each of the units has a design recirculation rate of 80 gallons per minute (gpm) and an air flow rate of 21,000 cubic feet per minute (cfm).

Cooling system particulate matter emissions were calculated based on design and operating parameters for 176 Munters Model PV-W35-PVT. The cooling tower emissions contained in Table 1 has been overestimated by a factor of three times based on actual water usage calculations by the manufacturer.

1.1 Potential To Emit For Criteria Pollutants And Toxic Air Pollutants (TAPs)

Table 1 contains potential-to-emit (PTE) estimates for the diesel engines and cooling system pollutants at Sabey.

Table 1. Potential To Emit For Diesel Engine and Cooling Tower Emissions

Pollutant	Emission Factor	Facility Potential to Emit	References
Criteria Pollutants	**Units = lbs/hr (except where noted)**	**(TPY)**	**(a)**
NOx Total	18.9	23.9	Average of loads
NOx 100% load	41.9	na	(b)
NOx 75% load	22.5	na	(b)
NOx 50% load	15.3	na	(b)
NOx 25% load	9.4	na	(b)
NOx 10% load	6.49	na	(b)
VOC Total	1.0	1.32	Average of loads
VOC 100% load	0.91	na	(b)
VOC 75% load	1.11	na	(b)
VOC 50% load	1.13	na	(b)
VOC 25% load	0.95	na	(b)
VOC 10% load	1.0	na	(b)
CO Total	9.4	13.0	Average of loads
CO 100% load	16.9	na	(b)
CO 75% load	12.7	na	(b)
CO 50% load	8.75	na	(b)
CO 25% load	4.8	na	(b)
CO 10% load	4.05	na	(b)
Total PM10/PM2.5	[See PM2.5 (Engines), DEEP and cooling tower emissions]		
Total PM2.5 (Engines: DEEP + VOC)	DEEP + VOC	1.73	Average of loads, (f)
SO_2	15 ppm	0.028	(c)
Lead	NA	Negligible	(d)
Ozone	NA	NA	(e)
Toxic Air Pollutants (TAPS)	**Units = Lbs/MMbtu (except where noted)**		(a)
Primary NO_2	10% total NOx	2.39	See NOx
Diesel Engine Exhaust Particulate (DEEP) Total	0.35 lb/hr	0.408	Average of loads
DEEP 100% load	0.23 lb/hr	na	(b)
DEEP 75% load	0.22 lb/hr	na	(b)
DEEP 50% load	0.27 lb/hr	na	(b)
DEEP 25% load	0.57 lb/hr	na	(b)
DEEP 10% load	0.45 lb/hr	na	(b)

CO	16.9 lb/hr	13	See CO
SO_2	15 ppm	0.028	(c)
Propylene	2.79E-03	4.2E-02	(g)
Acrolein	7.88E-06	1.9E-04	(g)
Benzene	7.76E-04	1.9E-02	(g)
Toluene	2.81E-04	5.08E-03	(g)
Xylenes	1.93E-04	3.49E-03	(g)
Napthalene	1.30E-04	3.1E-03	(g)
1,3 Butadiene	1.96E-05	4.7E-04	(g)
Formaldehyde	7.89E-05	1.43E-03	(g)
Acetaldehyde	2.52E-05	4.55E-04	(g)
Benzo(a)Pyrene	2.57E-07	2.32E-06	(g)
Benzo(a)anthracene	6.22E-07	1.12E-05	(g)
Chrysene	1.53E-06	2.76E-05	(g)
Benzo(b)fluoranthene	1.11E-06	2.01E-05	(g)
Benzo(k)fluoranthene	2.18E-07	1.97E-06	(g)
Dibenz(a,h)anthracene	3.46E-07	3.13E-06	(g)
Ideno(1,2,3-cd)pyrene	4.14E-07	3.74E-06	(g)
Cooling Tower Emissions			
PM10/PM2.5	7,500 mg/liter water concentration	2.32	(h)

(a) The current list of EPA criteria pollutants (https://www.epa.gov/criteria-air-pollutants)); last updated March 4, 2016) that have related National Ambient Air Quality Standards (NAAQS) (https://www.epa.gov/criteria-air-pollutants/naaqs); last updated February 29, 2016). VOC is not a criteria pollutant but is included here per note (e). Toxic Air Pollutants (TAPs) are defined as those in WAC 173-460. Greenhouse gas is not a criteria pollutant or a TAP and is exempt from New Source Review requirements for non Prevention of Significant Deterioration projects such as at Sabey Data Center per WAC 173-400-110(5)(b).

(b) Emission factors (EFs) based on Caterpillar not-to-exceed (NTE) data and Tier 2 EFs, whichever is higher. For example, the NOx and PM maximum limits are based on Caterpillar NTE data of 41.9 lb/hr (100% load) and 0.57 lb/hr (25% load) respectively. Whereas the CO maximum limit is based on Tier 2 emission factors because they are higher than Caterpillar NTE data for CO. For CO, outage and combined test loads are at 100% load of 2190kWm. The maximum limit of 16.9 lb/hr is calculated as follows: 2190 kWm x 3.5 g/kWm-hr x (1 lb/453.6 g).

(c) Applicants estimated emissions based on fuel sulfur mass balance assuming 0.00150 weight percent sulfur fuel.

(d) EPA's AP-42 document does not provide an emission factor for lead emissions from diesel-powered engines. Lead emissions are presumed to be negligible.

(e) Ozone is not emitted directly into the air, but is created when its two primary components, volatile organic compounds (VOC) and oxides of nitrogen (NOx), combine in the presence of sunlight. *Final Ozone NAAQS Regulatory Impact Analysis EPA-452/R-08-003*, March 2008, Chapter 2.1. http://www.epa.gov/ttnecas1/regdata/RIAs/452_R_08_003.pdf

(f) For this project, all VOC emissions, including were assumed to be condensable particulate.

(g) EPA AP-42 § 3.3 or 3.4 from: Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors http://www.epa.gov/ttn/chief/ap42/.

(h) Based on manufacturer (Munters) cooling unit maximum recirculation rate.

1.2 Maximum Operation Scenarios

Sabey's operation assumptions for their permit revision requests as presented in their application are listed table 2 below along with Ecology comments:

Table 2. Sabey Application Revision Requests	
Sabey Application Assumptions/Requests	**Ecology Comments**
Short-term Emissions:	(a), (e)
• 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. AERMOD modeling for the 24-hour PM10	

NAAQS is based on the following assumptions: The data center will experience two 8-hour power outages each year. During each 8-hour power outage the 44 primary generators and the 3 building safety generators will activate at the worst-case operating load of 25%. This scenario includes use of cold-start adjustments and conservative assumption that all hydrocarbons are condensable particulate. The modeling for the 98th-percentile 24-hour PM2.5 NAAQS was based on the following assumptions: The 4 highest days of emissions each year are anticipated to result from a full-building electrical bypass event, two days of unplanned outages, and one day of full-building generator commissioning. The operating event that would cause the 8th-highest emission rate is expected to be "corrective testing" of one generator at a time at 25% load, presumed to occur for up to 12 hours per day. This scenario includes use of cold-start adjustments and conservative assumption that all hydrocarbons are condensable particulate. • Short-term emission rate estimates for nitrogen oxides (NOx), carbon monoxide (CO), and AP-42 (EPA 1995) gaseous toxic air pollutants (TAPs) are 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 for NOx and CO, according to emission rates reported by Caterpillar.	
Annual Average Emissions: The annual-average emission rate estimates for PM, DEEP, NOx, 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. All permitted emissions allowed during a 3-year rolling average period were conservatively assumed to occur in a single 12-month period (as a "maximum theoretical annual emission" rate) 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.	(a)
Power Outages and AERMOD Dispersion Factors: • Short-term dispersion factors (for averaging periods of 24 hours, 8 hours, or 1 hour) were derived from AERMOD, with all generators operating at only 25 percent load (the load at which the PM emission rate is highest). The annual-average dispersion factor was derived for a runtime scenario of all generators operating under random, variable load (between 10 and 100 percent), over the course of the entire year. ➢ AERMOD modeling for the 24-hour PM10 NAAQS is based on: (see short-term emission assumptions above).The modeling for the 98th-percentile 24-hour PM2.5 NAAQS was based on: (see short-term emission assumptions above). ➢ The 1st-highest 1-hour NO_2 concentrations during a full power outage were modeled to assess compliance with the ASIL. Because a power outage could occur at any time on any day, all 44 new generators were modeled at their assigned loads continuously, for 24 hours per day and 365 days per year for the five years of meteorology used in the analysis. The AERMOD/PVMRM was set to indicate the 1st-highest 1-hour value for each separate modeling year. See also NO2 Limits Remain Unchanged and NO2 Modeling and Ambient Impacts in this table. ➢ For purposes of the statistical "Monte Carlo" analysis used to demonstrate compliance with the 1-hour NO_2 NAAQS it was assumed there would be power outages lasting at least one hour on 4 days per year. See also NO2 Limits Remain Unchanged and NO2 Modeling and Ambient Impacts in this table.	(a)
Cold Start Factors: 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.	(b)
NO2 Limits Remain Unchanged: Sabey will continue to comply with a 1-hour NO2 limit of 990 lbs/hour as was required in the previous permit. This limit was developed by assuming that there would be 44 generators, each 2,000 kWe, operating at 75 percent load. Sabey believes there is a negligible potential for the actual	(a), (c)

emission rate to approach that limit because they have already installed six generators in Building C that are smaller and lower-emitting (1,500 kWe) than the permitted 2,000-kWe generators. Sabey's electrical systems are designed so most of the generators will operate at loads less than 75 percent during an outage. As an additional margin of safety, Sabey's stack emission testing to date has shown the actual NOx emission rates at high load have been much lower than the allowable limit of 41.9 lbs/hour. Therefore, Sabey believes that after full build-out of the data center, the actual NOx emissions will be lower than the 990 lbs/hour limit. Sabey proposed to revise the Approval Order to require keeping records of the calculated actual NOx emission rate during each unplanned outage or scheduled electrical bypass event, to demonstrate compliance with the 990 lbs/hour limit and make it an enforceable limit.	
NO2 Modeling and Ambient Impacts: The 1-hour NO2 impacts during a power outage (for comparison to the ASIL), and the 98th-percentile 1-hour NO2 impacts (for comparison to the NAAQS) were not remodeled. • NO2, as a TAP exceeds the ASIL and is addressed in Sections 5.3 and 6 of this TSD. • Sabey's 2011 Monte Carlo modeling demonstrated compliance with the 98th-percentile NO2 NAAQS with a safety margin. Sabey proposes that by retaining the current operational limits (runtime and load limits) for the most frequent scheduled routine activities (monthly testing and annual load bank testing) that comprise the typical 8th-highest daily NOx emission events each year, will ensure continued compliance with the NAAQS (using the 990 lb/yr limit).	(d)

(a) Ecology accepts this approach. The most recent 3-year average annual hours of operation per engine for planned and unplanned outages (2013 = 1.6 hr/yr/engine; 2014 = 2.0 hr/yr/engine; 2015 = 4.6 hr/yr/engine) was significantly less than the 57.5 hours per year per engine of total runtime allowed by the permit.
(b) Ecology accepts the cold start black puff factors derived from the Microsoft Project Oxford Data Center.
(c) See footnote (b) of section 5.3 of this TSD.
(d) See background information about the 2011 Monte Carlo modeling in Section 5.2 of this TSD.
(e) Page 7 of the Sabey application states that VOC max hourly lb/hr emissions are at 100% load. However, table E-1 of application shows highest VOC hourly lb/hr emissions at 50% load. Sabey used the high emission load (50%) for short term emissions and the average emissions load for annual emission estimates..

The summary effect of accepting the requests based on the scenarios above is that Sabey has conservatively estimated emissions by assuming the following worst case conditions:

- Instead of load-based emission estimates, Sabey conservatively over-estimated short-term emissions at the load that causes the highest emissions, when in reality, the facility will operate engines at a range of loads and not solely at the load with highest emissions.
- Sabey assumed a worst case scenario in which 351,670 gallons of fuel would be used per year, when in reality, the permit limits fuel usage to 263,725 gallons per year.
- The new permit emission estimates assume the worst-case scenario that the 3-year rolling average permitted emission limits are released entirely within a single year. In reality, this is unlikely, because it would prohibit Sabey from operating those generators for two years within that 3-year timeframe.

2. APPLICABLE REQUIREMENTS

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

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

- 40 CFR Part 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ* (* See section 2.2)

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.

2.1 Support for permit Approval Condition 2.1 regarding applicability of 40CFR Part 60 Subpart IIII:

As noted in the applicability section of 40CFR1039 (part 1039.1.c), that regulation applies to non-road compression ignition (diesel) engines and; *(c) The definition of nonroad engine in 40 CFR 1068.30 excludes certain engines used in stationary applications.* According to the definition in 40CFR1068.30(2)(ii): *An internal combustion engine is not a nonroad engine if it meets any of the following criteria: The engine is regulated under 40 CFR part 60, (or otherwise regulated by a federal New Source Performance Standard promulgated under section 111 of the Clean Air Act (42 U.S.C. 7411)).* Because the engines at Sabey are regulated under 40CFR60 subpart IIII (per 40CFR60.4200), they are not subject to 40CFR1039 requirements except as specifically required within 40CFR60.

Some emergency engines with lower power rating are required by 40CFR60 to meet 40CFR1039 Tier 4 emission levels, but not emergency engines with ratings that will be used at Sabey (approximately 1.5 MWe to 2.0 MW or less). Instead, 40CFR60 requires the engines at Sabey to meet the Tier 2 emission levels of 40CFR89.112. The applicable sections of 40CFR60 for engine owners are pasted below in italics with bold emphasis on the portions requiring Tier 2 emission factors for emergency generators such as those at Sabey:

> *§60.4205 What emission standards must I meet for emergency engines if I am an owner or operator of a stationary CI internal combustion engine?*
>
> > *(b) Owners and operators of 2007 model year and later emergency stationary CI ICE with a displacement of less than 30 liters per cylinder that are not fire pump engines must comply with the emission standards for new nonroad CI engines in §60.4202* (see below), *for all pollutants, for the same model year and maximum engine power for their 2007 model year and later emergency stationary CI ICE.*

Based on information provided by the applicant, Sabey will use engines that will use the following 2007 model year engines or later with 2.0 MWe (or smaller) sizes: Caterpillar Model 3516C rated 2.0 MWe; Caterpillar Model 3512C rated 1.5 MWe; Cummins QSK60-G14 NR2 rated 2.0 MWe; Cummins Inc QSK50-G5 NR2 rated 1.5 MWe; MTU 16V4000G43 rated 2.0 MWe; MTU 12V4000G43 rated 1.5 MWe.

Based on these specifications, each engine's displacement per cylinder was calculated and compared to subpart (b) of §60.4205 as follows:

2.1.1 Caterpillar Engine Model 3516C rated 2.0 MWe

Displacement is not listed among the manufacturer specifications for this engine. However, displacement can be calculated by multiplying the volume of a cylinder by the number of cylinders as follows:

$$\text{Displacement} = (\text{cross-sectional area of cylinder} = \pi r^2) \times (\text{cylinder height}) \times (\#\ \text{cylinders})$$

The bore of an engine represents the cylinder diameter and the stroke represents the cylinder height. Substituting bore/2 for radius, and the stroke height, the equation for calculating the volume of an engine cylinder is:

$$[\text{Cylinder Volume} = \pi/4 \times (\text{bore})^2 \times (\text{stroke})]^1$$

Simplifying and using a metric units conversion factor, the equation for total displacement becomes:

$$\text{Displacement} = 0.7854 \times \text{bore(cm)}^2 \times \text{stroke(cm)} \times (\#\ \text{cylinders}) \times (1\ \text{Liter}/1000\ \text{cm}^3)$$

Using this equation, and plugging in the manufacturer specifications for bore (170mm), stroke (190mm), and 16 cylinders, this engine's total displacement and displacement per cylinder are calculated as follows:

$$\text{Total Displacement} = 0.7854 \times (170/10)^2 \times (190/10) \times 16\ \text{cylinders} \times (1/1000)$$

$$\text{Total Displacement} = 69.0\ \text{Liters.}$$

$$\text{Displacement per cylinder} = 0.7854 \times (170/10)^2 \times (190/10) \times (1/1000)$$

$$\text{Displacement per cylinder} = 4.31\ \text{liters/cylinder.}$$

2.1.2 Caterpillar Engine Model 3512C rated 1.5 MWe

The specification sheet for this engine lists displacement as 51.8 liters, with 12 cylinders total. The single cylinder displacement for this engine is therefore 4.32 liters/cylinder.

2.1.3 Cummins Engine QSK60 rated 2.0 MWe

The specification sheet for this engine lists displacement as 60.1 liters, with 16 cylinders total. The single cylinder displacement for this engine is therefore 3.76 liters/cylinder.

2.1.4 Cummins Engine QSK50 rated 1.5 MWe

The specification sheet for this engine lists displacement as 50.2 liters, with 16 cylinders total. The single cylinder displacement for this engine is therefore 3.14 liters/cylinder.

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[1] HPBooks Auto Math Handbook., Lawlor, John., The Berkeley Publishing Group, A division of Penguin Putnam Inc. (www.penguinputnam.com), 1992, p. 2.

2.1.5 MTU Engine 16V4000G43 rated 2.0 MWe

The specification sheet for this engine lists displacement as 76.3 liters, with 16 cylinders total. The single cylinder displacement for this engine is listed as 4.77 liters/cylinder.

2.1.6 MTU Engine 12V4000G43 rated 2.0 MWe

The specification sheet for this engine lists displacement as 57.3 liters, with 12 cylinders total. The single cylinder displacement for this engine is listed as 4.77 liters/cylinder.

Thus, because Sabey will use engines with a displacement of less than the *§60.4205 (b)* limit of 30 liters per cylinder, and are for emergency purposes only, the engines are therefore required to meet *§60.4202* manufacturer requirements listed below.

> *§60.4202 What emission standards must I meet for emergency engines if I am a stationary CI internal combustion engine manufacturer?*
>
> > *(a) Stationary CI internal combustion engine manufacturers must certify their 2007 model year and later emergency stationary CI ICE with a maximum engine power* ***less than or equal to 2,237 KW*** *(3,000 HP) and a displacement of less than 10 liters per cylinder that are not fire pump engines to the emission standards specified in paragraphs (a)(1) through (2) of this section.*
> >
> > *(1) For engines with a maximum engine power less than 37 KW (50 HP):*
> >
> > *(i) The certification emission standards for new nonroad CI engines for the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants for model year 2007 engines, and*
> >
> > *(ii) The certification emission standards for new nonroad CI engines in 40 CFR 1039.104, 40 CFR 1039.105, 40 CFR 1039.107, 40 CFR 1039.115, and table 2 to this subpart, for 2008 model year and later engines.*
> >
> > ***(2) For engines with a maximum engine power greater than or equal to 37 KW (50 HP), the certification emission standards for new nonroad CI engines for the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants beginning in model year 2007.***
>
> Thus, based on the power ratings listed in *40 CFR 60.4202(a),* and because the engines to be used at Sabey will also have less than 10 liters per cylinder displacement, the engines are required to meet the applicable 40CFR89 Tier 2 emission standards.

2.2 Support for complying with 40 CFR 63 Subpart ZZZZ from Section 3 of TSD.

According to section 40 CFR 63 Subpart ZZZZ section 636590 part (c) and (c)(1), sources such as this facility, are required to meet the requirements of 40 CFR 60 IIII and *"no further requirements apply for such engines under this* (40 CFR 63 Subpart ZZZZ) *part."*

3. SOURCE TESTING

Source testing requirements are outlined in Sections 4 of the Approval Order. The five-mode stack testing in Condition 4 of the permit is required to demonstrate compliance with 40CFR89(112 & 113) g/kW-hr EPA Tier 2 average emission limits via the 5 individual operating loads (10%, 25%, 50%, 75% and 100%) according to Table 2 of Appendix B to Subpart E of 40CFR89, or according to any other applicable EPA requirement in effect at the time the engines are installed. For this permit, engine selection testing will be determined as follows:

3.1 NEW ENGINE STACK TESTING:

Because Sabey can utilize multiple engine manufacturer and make options, Conditions 4.2 and 4.3 require testing of at least one engine from each manufacturer and each size engine from each manufacturer, immediately after commissioning any new proposed engine. These conditions apply in addition to the testing Sabey has performed on a subset of the 10 engines already installed at the time of this permit.

3.2 PERIODIC STACK TESTING:

Every 60 months after the first testing performed starting with engines tested after the date of this permit, Sabey shall test at least one engine, including the engine with the most operating hours as long as it is a different engine from that which was tested during the previous 60 month interval testing.

3.3 AUDIT SAMPLING

According to Condition 4.2, audit sampling per 40 CFR 60.8(g), may be required by Ecology at their discretion. Ecology will not require audit samples for test methods specifically exempted in 40 CFR 60.8(g) such as Methods, 7E, 10, 18, 25A, and 320. For non-exempted test methods, according to 40 CFR 60.8(g):

"The compliance authority responsible for the compliance test may waive the requirement to include an audit sample if they believe that an audit sample is not necessary."

Although Ecology believes that audit sampling is not necessary for certified engines, Ecology may choose at any time to require audit sampling for any stack tests conducted. Audit sampling could include, but would not necessarily be limited to, the following test methods: Methods 5, 201A, or 202.

4. SUPPORT FOR BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

BACT is defined[2] 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. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.*

For this project, 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 (based upon the factors within the BACT definition), 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.[3] 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 and/or cooling towers 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_{10} and $PM_{2.5}$), and sulfur dioxide. BACT for toxics (tBACT) is included in Section 4.5.

4.1 BACT ANALYSIS FOR NOx FROM DIESEL ENGINE EXHAUST

Sabey reviewed EPA's RACT/BACT/LAER Clearinghouse (RBLC) database to look for 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.

4.1.1 BACT Options for NOx

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

[3] J. Craig Potter, EPA Assistant Administrator for Air and Radiation memorandum to EPA Regional Administrators, "Improving New Source Review (NSR) Implementation", December 1, 1987.

Sabey'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, and was therefore considered the top-case control technology and evaluated for technical feasibility and cost-effectiveness. 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 by Ecology through a literature review include: selective non-catalytic reduction (SNCR), non-selective catalytic reduction (NSCR), water injection, as well as emerging technologies. Ecology reviewed these options and addressed them below.

4.1.1.1 ***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. SCR can reduce NOx emissions by approximately 90 percent.

For SCR systems to function effectively, exhaust temperatures must be high enough (about 200 °C to 500°C) to enable catalyst activation. For this reason, SCR control efficiencies are expected to be relatively low during the initial minutes after engine start up, especially during maintenance, testing and storm avoidance loads. Minimal amounts of the urea-nitrogen reducing agent injected into the catalyst does not react, and is emitted as ammonia. Optimal operating temperatures are needed to minimize excess ammonia (ammonia slip) and maximize NOx reduction. SCR systems are costly. Most SCR systems operate in the range of 290°C to 400°C. Platinum catalysts are needed for low temperature range applications (175°C – 290°C); zeolite can be used for high temperature applications (560°C); and conventional SCRs (using vanadium pentoxide, tungsten, or titanium dioxide) are typically used for temperatures from 340°C to 400°C.

Sabey has evaluated the cost effectiveness of installing and operating SCR systems on each of the proposed diesel engines by taking into account direct costs (equipment, sales tax, shipping, installation, etc…) and indirect costs (startup, performance tests, etc...). Assuming a mid-range California Area Resource Board (CARB) annual operation and maintenance cost estimate to account for urea, fuel for pressure drop, increased inspections, and periodic OEM visits, the use of SCR systems would cost approximately $37,100 per ton of NOx removed from the exhaust stream each year. If SCR is combined with a Tier 4 capable integrated control system, which includes SCR, as well as control technologies for other pollutants such PM, CO, and VOC (see section 4.3), the cost estimate would be approximately $43,600 for NOx alone or $27,600 per ton of combined pollutants removed per year.

Ecology concludes that while SCR is a demonstrated emission control technology for diesel engines, and preferred over other NOx control alternatives described in subsection 4.1.1.3., it is not economically feasible for this project. Furthermore, although NOx is a criteria pollutant, the only NOx that currently have NAAQS is NO2. Cost per ton removal of NO2 is an order of magnitude more expensive than for NOx, and is addressed under tBACT in section 4.5.

Therefore, Ecology agrees with the applicant that this NOx control option can be excluded as BACT (both as SCR alone and as part of Tier 4 capable integrated control system, which includes a combination of SCR with other control technologies for other pollutants).

4.1.1.2. ***Combustion Controls, Tier 2 Compliance, and Programming Verification.***
Diesel engine manufacturers typically use proprietary combustion control methods to achieve the overall emission reductions needed to meet applicable EPA tier standards. Common general controls include fuel injection timing retard, turbocharger, a low-temperature aftercooler, use of EPA Tier-2 certified engines operated as emergency engines as defined in 40 CFR§60.4219, and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. Although it may lead to higher fuel consumption, injection timing retard reduces the peak flame temperature and resulting NOx emissions. While good combustion practices are a common BACT approach, for the Sabey engines however, a more specific approach, based on input from Ecology inspectors after inspecting similar data centers, is to obtain written verification from the engine manufacturer that each engine of the same make, model, and rated capacity installed at a facility use the same electronic Programmable System Parameters, i.e., configuration parameters, in the electronic engine control unit. These BACT options are considered further in section 4.1.2.

4.1.1.3. ***Other Control Options***. Other NOx control options listed in this subsection were considered but rejected for the reasons specified:

4.1.1.3.1. ***Selective Non-Catalytic Reduction (SNCR)****:* This technology is similar to that of an SCR but does not use a catalyst. Initial applications of Thermal DeNOx, an ammonia based SNCR, achieved 50 percent NOx reduction for some stationary sources. This application is limited to new stationary sources because the space required to completely mix ammonia with exhaust gas needs to be part of the source design. A different version of SNCR called NOxOUT, uses urea and has achieved 50-70 percent NOx reduction. Because the SNCR system does not use a catalyst, the reaction between ammonia and NOx occurs at a higher temperature than with an SCR, making SCR applicable to more combustion sources. Currently, the preferred technology for back-end NOx control of reciprocating internal combustion engine (RICE) diesel applications, appears to be SCR with a system to convert urea to ammonia.

4.1.1.3.2. ***Non-Selective Catalytic Reduction (NSCR):*** This technology uses a catalyst without a reagent and requires zero excess air. The catalyst causes NOx to give up its oxygen to products of incomplete combustion (PICs), CO and hydrocarbons, causing the pollutants to destroy each other. However, if oxygen is present, the PICs will burn up without destroying the NOx. While NSCR is used on most gasoline automobiles, it is not immediately applicable to diesel engines because diesel exhaust oxygen levels vary widely depending on engine load. NSCR might be more applicable to boilers. Currently, the preferred technology for back-end NOx control of reciprocating internal combustion engine (RICE) diesel applications, appears to be SCR with a system to convert urea to ammonia. See also Section 4.2.1.3 (Three-Way Catalysts).

4.1.1.3.3. ***Water Injection:*** Water injection is considered a NOx formation control approach and not a back-end NOx control technology. It works by reducing the peak flame temperature and therefore reducing NOx formation. Water injection involves emulsifying the fuel with water and increasing the size of the injection system to handle the mixture. This technique has minimal effect on CO emissions but can increase hydrocarbon emissions. This technology is rejected because there is no indication that it is commercially available and/or effective for new large diesel engines.

4.1.1.3.4. ***Other Emerging Technologies****:* Emerging technologies include: NOx adsorbers, RAPER-NOx, ozone injection, and activated carbon absorption.

- ***NOx Adsorbers:*** NOx adsorbing technologies (some of which are known as SCONOx or EMx^{GT}) use a catalytic reactor method similar to SCR. SCONOx uses a regenerated catalytic bed with two materials, a precious metal oxidizing catalyst (such as platinum) and potassium carbonate. The platinum oxidizes the NO into NO2 which can be adsorbed onto the potassium carbonate. While this technology can achieve NOx reductions up to 90% (similar to an SCR), it is rejected because it has significantly higher capital and operating costs than an SCR. Additionally, it requires a catalyst wash every 90 days, and has issues with diesel fuel applications, (the GT on EMx^{GT} indicates gas turbine application). A literature search did not reveal any indication that this technology is commercially available for stationary backup diesel generators.
- ***Raper-NOx****:* This technology consists of passing exhaust gas through cyanic acid crystals, causing the crystals to form isocyanic acid which reacts with the NOx to form CO2, nitrogen and water. This technology is considered a form of SNCR, but questions about whether stainless steel tubing acted as a catalyst during development of this technology, could make this another form of SCR. To date, it appears this technology has never been offered commercially.
- ***Ozone Injection:*** Ozone injection technologies, some of which are known as LoTOx or BOC, use ozone to oxidize NO to NO2 and further to NO3. NO3 is soluble in water and can be scrubbed out of the exhaust. As noted in the literature, ozone injection is a unique approach because while NOx is in attainment in many areas of the United States (including Quincy, WA), the primary reason to control NOx is because it is a precursor to ozone. Due to high additional costs associated with scrubbing, this technology is rejected.
- ***Activated Carbon Absorption with Microwave Regeneration.*** This technology consists of using alternating beds of activated carbon by conveying exhaust gas through one carbon bed, while regenerating the other carbon bed with microwaves. This technology appears to be successful in reducing NOx from diesel engine exhaust. However, it is not progressing to commercialization and is therefore rejected.

4.1.2. BACT determination for NOx

Ecology determines that BACT for NOx is the use of EPA Tier-2 certified engines operated as emergency engines as defined in 40 CFR§60.4219, and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. In addition, Approval Condition 2.8 in the permit requires that the source must have written verification from the engine manufacturer

that each engine of the same make, model, and rated capacity installed at the facility uses the same electronic Programmable System Parameters, i.e., configuration parameters, in the electronic engine control unit. "Installed at the facility" could mean at the manufacturer or at the data farm because the engine manufacturer service technician sometimes makes the operational parameter modification/correction to the electronic engine controller at the data farm. Sabey will install engines consistent with this BACT determination. Ecology believes this is a reasonable approach in that this BACT requirement replaces a more general, common but related BACT requirement of "good combustion practices."

Note: Because control options for PM, CO, and VOCs, are available as discussed in BACT section 4.2., which are less costly per ton than the Tier 4 capable integrated control system option for those pollutants, both the SCR-only option as well as the Tier 4 capable integrated control system option are not addressed further within BACT.

4.2 BACT ANALYSIS FOR PM, CO AND VOC FROM DIESEL ENGINE EXHAUST

Sabey reviewed the available published literature and the RBLC and identified the following demonstrated technologies for the control of particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC) emissions from the proposed diesel engines:

4.2.1. BACT Options for PM, CO, and VOC from Diesel Engine Exhaust

4.2.1.1 ***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.

Sabey 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 $450,300 per ton of engine exhaust particulate removed from the exhaust stream at Sabey each year. DPFs also remove CO and VOCs at costs of approximately $63,500 and $715,900 per ton per year respectively. If the cost effectiveness of DPF use is evaluated using the total amount of PM, CO, and VOCs reduced, the cost estimate would be approximately $51,600 per ton of pollutants removed per year.

Ecology concludes that use of DPF is not economically feasible for this project. Therefore, Ecology agrees with the applicant that this control option can be rejected as BACT.

4.2.1.2. ***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, DOCs have also been demonstrated to reduce diesel engine exhaust particulate emissions, and also hydrocarbon emissions.

Sabey has evaluated the cost effectiveness of installing and operating DOCs on each of the proposed diesel engines. The following DOC BACT cost details are provided as an example of the BACT and tBACT cost process that Sabey followed for engines within this application (including for SCR-only, DPF-only, and Tier 4 capable integrated control system technologies).

- Sabey obtained the following recent DOC equipment costs: $30,828 for a stand-alone catalyzed DOC per single 2.0 MWe generator. For thirty two (32) 2.0 MWe generators, this amounts to $986,496. According to the vendor, DOC control efficiencies for this unit are CO, HC, and PM are 80%, 70%, and 20% respectively.
- The subtotal becomes $1,287,442 after accounting for shipping ($49,325), WA sales tax ($64,122), and direct on-site installation ($187,499).
- After adding indirect installation costs, the total capital investment amounts to: $1,502,245. Indirect installation costs include but are not limited to: startup fees, contractor fees, and performance testing.
- Annualized over 25 years and included with direct annual costs based on EPA manual EPA/452/B-02-001, the total annual cost (capital recovery and direct annual costs) is estimated to be $182,094.
- At the control efficiencies provided from the vendor, the annual tons per year of emissions for CO (13 tpy), HC (1.32 tpy), and PM (1.73 tpy) become 10.46 tpy, 0.92 tpy, and .346 tpy removed respectively.
- The last step in estimating costs for a BACT analysis is to divide the total annual costs by the amount of pollutants removed ($182,094 divided by 10.46 tpy for CO, etc..).

The corresponding annual DOC cost effectiveness value for carbon monoxide destruction alone is approximately $17,500 per ton. If particulate matter and hydrocarbons are individually considered, the cost effectiveness values become $527,000 and $197,000 per ton of pollutant removed annually, respectively. If the cost effectiveness of using DOC is evaluated using the total amount of carbon monoxide, particulate matter and hydrocarbons reduced, the cost estimate would be approximately $15,600 per ton of combined pollutants removed per year.

These annual estimated costs (for DOC use alone) provided by Sabey are conservatively low estimates that take into account installation, tax, shipping, and other capital costs as mentioned above, but assume no greater than mid-range CARB estimates for operational, labor and maintenance costs.

Ecology concludes that use of DOC is not economically feasible for this project. Therefore, Ecology agrees with the applicant that these control option can be rejected as BACT.

4.2.1.3 Three-Way Catalysts.

Three way catalyst (TWC) technology can control CO, VOC and NOx in gasoline engines, but is only effective for CO and VOC control in diesel engines. According to DieselNet, an online information service covering technical and business information for diesel engines, published by Ecopoint Inc. of Ontario, Canada (https://www.dieselnet.com):

> *"The TWC catalyst, operating on the principle of non-selective catalytic reduction of NOx by CO and HC, requires that the engine is operated at a nearly stoichiometric air to- fuel (A/F) ratio... In the presence of oxygen, the three-way catalyst becomes ineffective in reducing NOx. For this reason, three-way catalysts cannot be employed for NOx control on diesel applications, which, being lean burn engines, contain high concentrations of oxygen in their exhaust gases at all operating conditions."*

As noted by the applicant, diesel engine stack tests at another data center in Washington State (Titan Data Center in Moses Lake, WA), showed that TWC control increased the emission rate for nitrogen dioxide (NO2). This technology is therefore rejected as a control option.

4.2.2 BACT Determination for PM, CO, and VOC

Ecology determines BACT for particulate matter, carbon monoxide and volatile organic compounds is restricted operation of EPA Tier-2 certified engines operated as emergency engines as defined in 40 CFR§60.4219, and compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. Sabey will install engines consistent with this BACT determination.

4.3 BACT ANALYSIS FOR SULFUR DIOXIDE FROM DIESEL ENGINE EXHAUST

4.3.1. BACT Options for SO2

Sabey did not find any add-on control options commercially available and feasible for controlling sulfur dioxide emissions from diesel engines. Sabey's proposed BACT for sulfur dioxide is the use of ultra-low sulfur diesel fuel (15 ppm by weight of sulfur).

4.3.2. BACT Determination for SO2

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 BACT ANALYSIS FOR PM FROM COOLING TOWERS

Because no changes are proposed for cooling tower operations or emission estimates, a BACT analysis was not performed. The following BACT determination from the previous Sabey permit is continued into this permit: "maintaining the water droplet drift rate from cooling systems and drift eliminators to a maximum drift rate of 0.001% of the circulating water flow rate."

4.5 BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS

Best Available Control Technology for Toxics (tBACT) means BACT, as applied to toxic air pollutants.[4] For TAPs that exceed small quantity emission rates (SQERs), the procedure for determining tBACT followed the same procedure used above for determining BACT. Of the technologies Sabey considered for BACT, the minimum estimated costs as applied to tBACT are as follows:

- The minimum estimated costs to control diesel engine exhaust particulate is estimated to be $1.9 million per ton removed.
- The minimum estimated costs to control NO2 is estimated to be $370,700 per ton removed.
- The minimum estimated costs to control CO is estimated to be $17,500 per ton removed.
- For the other TAPS above SQERs, the minimum estimated costs per ton removed would be as follows: $14 million for benzene; $81 million for naphthalene; $552 million for 1,3-butadiene; and $1.4 billion for acrolein.

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. Based on the information presented in this TSD, Ecology has determined that Table 4 below represents tBACT for the proposed project.

Table 4 tBACT Determination

Toxic Air Pollutant	tBACT
Primary NO_2	Compliance with the NOx BACT requirement
Diesel Engine Exhaust Particulate	Compliance with the PM BACT requirement
Carbon monoxide	Compliance with the CO BACT requirement
Sulfur dioxide	Compliance with the SO_2 BACT requirement
Benzene	Compliance with the VOC BACT requirement
Toluene	Compliance with the VOC BACT requirement
Xylenes	Compliance with the VOC BACT requirement
1,3 Butadiene	Compliance with the VOC BACT requirement
Formaldehyde	Compliance with the VOC BACT requirement
Acetaldehyde	Compliance with the VOC BACT requirement
Acrolein	Compliance with the VOC BACT requirement
Benzo(a)Pyrene	Compliance with the VOC BACT requirement
Benzo(a)anthracene	Compliance with the VOC BACT requirement

[4] WAC 173-460-020

Chrysene	Compliance with the VOC BACT requirement
Benzo(b)fluoranthene	Compliance with the VOC BACT requirement
Benzo(k)fluoranthene	Compliance with the VOC BACT requirement
Dibenz(a,h)anthracene	Compliance with the VOC BACT requirement
Ideno(1,2,3-cd)pyrene	Compliance with the VOC BACT requirement
Napthalene	Compliance with the VOC BACT requirement
Propylene	Compliance with the VOC BACT requirement
PAH (no TEF)	Compliance with the VOC BACT requirement
PAH (apply TEF)	Compliance with the VOC BACT requirement
Cooling Tower Emissions (TAPs as PM)	Compliance with Cooling Tower BACT requirement

5. AMBIENT AIR MODELING

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.

5.1 AERMOD Assumptions:

- Five years of sequential hourly meteorological data (2001–2005) from Moses Lake Airport were used. Twice-daily upper air data from Spokane were used to define mixing heights. [Note: The Engine Operating Restrictions listed in Table 3.2 of the Approval Order were based on 2011 Monte Carlo modeling for the 98th-percentile 1-hr NO2 NAAQS. The 2011 modeling used 2004-2008 meteorological data (see Section 5.2 of this TSD)].
- The AMS/EPA Regulatory Model Terrain Pre-processor (AERMAP) was used to obtain height scale, receptor base elevation, and to develop receptor grids with terrain effects. For area topography required for AERMAP, Digital topographical data (in the form of Digital Elevation Model files) were obtained from www.webgis.com.
- Each generator was modeled with a stack height of 48- feet above local ground.
- The data center buildings, in addition to the individual generator enclosures were included to account for building downwash.
- The receptor grid for the AERMOD modeling was established using a 10-meter grid spacing along the facility boundary extending to a distance of 350 meters from each facility boundary. A grid spacing of 25 meters was used for distances of 350 meters to 800 meters from the boundary. A grid spacing of 50 meters was used for distances from 500 meters to 2000 meters from the boundary. A grid spacing of 100 meters was used for distances beyond 2000 meters from the boundary.
- 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 49 parts per billion (ppb) of background ozone, and an equilibrium NO_2 to NOx ambient ratio of 90%.
- 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.
- AERMOD Meteorological Pre-processor (AERMET) was used to estimate boundary layer parameters for use in AERMOD.
- AERSURFACE was used to determine the percentage of land use type around the facility based on albedo, Bowen ratio, and surface roughness parameters.

5.2 Background Information for 2011 Monte Carlo Modeling

As explained in the TSD for the previous permit, a Monte Carlo statistical analysis was used to determine operational limits to address NO2. Portions of the following information from that TSD are re-presented below and updated as applicable to the current Approval Order.

5.2.1 "Monte Carlo" Statistical Analysis For Demonstrating Compliance with the 1-Hour NO_2 NAAQS

The 1-hour NO_2 NAAQS is based on the 3-year rolling average of the 98th percentile of the daily maximum 1-hour NO_2 impacts. Data centers operate their generators on an intermittent basis under a wide range of engine loads, under a wide range of meteorological conditions. As such it is difficult to determine whether high-emitting generator runtime regimes coincide with meteorological conditions giving rise to poor dispersion, and trigger an exceedance of the 1-hour NO_2 NAAQS at any given location beyond the facility boundary. This issue has been recognized by EPA when they stated that "[m]odeling of intermittent emission units, such as emergency generators, and/or intermittent emission scenarios, such as startup/shutdown operations, has proven to be one of the main challenges for permit applicants undertaking a demonstration of compliance with the 1-hour NO_2 NAAQS".[5]

To address this problem, Ecology developed a statistical re-sampling technique, that we loosely call the "Monte Carlo analysis". This technique performs a statistical analysis of the AERMOD-derived ambient NO_2 impacts caused by individual generator operating regimes, each of which exhibits its own NOx emission rates at various locations throughout the facility. The randomizing function of the Monte Carlo analysis allows inspection of how the combination of sporadic generator operations, sporadic generator emissions at various locations, and variable meteorology affect the modeled 98th-percentile concentrations at modeling receptors placed within the facility and outside the facility boundary.

The first step in the Monte Carlo NO_2 analysis was to use the AERMOD/PVMRM model for each representative generator runtime regime by each tenant at the Sabey facility. To do so, 14 different generator operating regimes proposed by Sabey were each modeled separately with AERMOD, using 5 years of meteorology (2004- 2008). For each of the 14 AERMOD runs, the number of calendar days per year of operation for that generator operating regime was established. To test the effect of initial startup and commissioning testing on ambient air quality, the NOx-emitting scenarios corresponding to the initial startup testing were included in the 2004 meteorological set. For all 5 years of modeling, it was assumed that all of the tenants conducted their scheduled

[5] http://www.epa.gov/ttn/scram/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf

maintenance each year. For each of the 5 modeling years, the existing emissions contributed by the existing Ask.com facility were included in the analysis. For each of the 5 modeling years, it was assumed there would be 4 random days on which power outages lasted at least 1 hour.

The Monte Carlo method then randomly selected the days on which the generators operated in each regime, combined the modeled concentrations on those days across all operating regimes and iterated the process 1000 times, so as to obtain a distribution of the possible concentrations at each receptor.

5.2.2 AERMOD Modeling of Individual Runtime Scenarios

In order to conduct the Monte Carlo analysis, the hierarchy of individual generator runtime events was clustered into 15 separate AERMOD runs, which are described in the Table 5. The NOx emissions from the offsite background sources are also listed in Table 5. For each of the 15 independent AERMOD scenarios, the number of calendar days of generator runtime was established. The two yellow-highlighted rows on the right side of Table 5 show the number of calendar days per year of generator runtime for each AERMOD scenario.

Table 5. AERMOD Runs Used for Monte Carlo Analysis

Tenant	No. of Installed Gens	Runtime Regime	Monte Carlo Days/yr	Day of Regime	% Load	kWm	No. Running Gens	Hrs/Day	kWmhrs/ day	E.F.	Nox lbs/hour	Monte Carlo AERMOD Run	Monte Carlo Days/yr
All	44	Full Power Outage, 75% Load	4	1	75%	1650	44	1	72600	6.2	991	1	4
Bldg B	16	Bldg B Main Switchgear	1		75%	1650	16	1	26400	6.2	361	2	1
B-1	8	Startup: Int. Sys Test Day 2	1		75%	1650	8	1	13200	6.2	180	3	1
C-3	6	Transf. Maint., 75%	2	1	75%	1650	2	1	3300	6.2	45.1	4	2
A-1	8	Transf. Maint., 75%	2	1	75%	1650	2	1	3300	6.2	45.1	5	2
A-2	8	Transf. Maint., 75%	2	1	75%	1650	2	1	3300	6.2	45.1	6	2
B-2	4	Transf. Maint., 75%	2	1	75%	1650	2	1	3300	6.2	45.1	7	2
C-1	3	Annual Test, 100% load		1	100%	2191		1	2191	8.68			
C-2	3	Annual Test, 100% load		1	100%	2191		1	0	8.68			
C-3	6	Annual Test, 100% load	12	1	100%	2191	1	1	0	8.68	41.9	8	12
A-1	8	Annual Test, 100% load		1	100%	2191		1	2191	8.68			
A-2	8	Annual Test, 100% load	16	1	100%	2191	1	1	0	8.68	41.9	9	16
B-1	8	Annual Test, 100% load		1	100%	2191		1	2191	8.68			
B-2	4	Annual Test, 100% load		1	100%	2191		1	0	8.68			
B-3	4	Annual Test, 100% load		1	100%	2191		1	0	8.68			
B-1	4	Startup: Mfr Testing Day 1			100%	2191		1	0	8.68			
B-1	4	Startup: Funct. Perf Test	24		100%	1135	1	1	0	8.68	41.9	10	24
C-1	3	Montly Test, 50% Load		1	50%	1135		1	1135	6.12			
C-1	3	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
C-2	3	Montly Test, 50% Load		1	50%	1135		1	0	6.12			
C-2	3	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
C-3	6	Montly Test, 50% Load		1	50%	1135		1	0	6.12			
C-3	6	Corrective Testing, 50% load	45	1	50%	1135	1	1	0	6.12	15.3	11	45
A-1	8	Montly Test, 50% Load		1	50%	1135		1	1135	6.12			
A-1	8	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
A-2	8	Montly Test, 50% Load		1	50%	1135		1	0	6.12			
A-2	8	Corrective Testing, 50% load	38	1	50%	1135	1	1	0	6.12	15.3	12	38
B-1	8	Montly Test, 50% Load		1	50%	1135		1	1135	6.12			
B-1	8	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
B-2	4	Montly Test, 50% Load		1	50%	1135		1	0	6.12			
B-2	4	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
B-3	4	Montly Test, 50% Load		1	50%	1135		1	0	6.12			
B-3	4	Corrective Testing, 50% load		1	50%	1135		1	0	6.12			
B-1	4	Startup: Int. Sys Test Day 1	53		50%	1135	1	1	0	6.12	15.3	13	53
CELITE	1	Continuous Operation	365		--		--				8.6	14	365
Intuit	9	Outage			90%		7				200		
Yahoo	23	Outage	8		90%		19				544	1	4
Intuit	9	Annual tests			100%		1				32.0		
Yahoo	23	Annual tests	15		100%		1				32.0	15	15

5.2.3 Monte Carlo NO_2 Results

The results of the Monte Carlo analysis are listed in Table 6. For each modeling year, the Monte Carlo analysis lists the 98th-percentile daily 1-hour NO_2 concentration at the maximally impacted receptor. Compliance is demonstrated by the median value of the five modeling years. As listed in Table 6, the maximum impact at or beyond the Sabey property line (or on the tenant building rooftops) is 111 $\mu g/m^3$. Figure 1 shows the location of that maximally impacted receptor, which is on the east property line in unpopulated industrially-zoned land roughly midway between the northeast and southeast property corners.

Table 6. Monte Carlo NO_2 Results

	98th-Percentile Daily 1-Hour NO_2, ug/m3					
Receptor Location	**2004**	**2005**	**2006**	**2007**	**2008**	**Median (2004-2008)**
Property Line and Beyond (Eastern property line)	114	111	108	108	111	111
Within Sabey Property (rooftop of Tenant A-2)	63	63	63	62	59	63

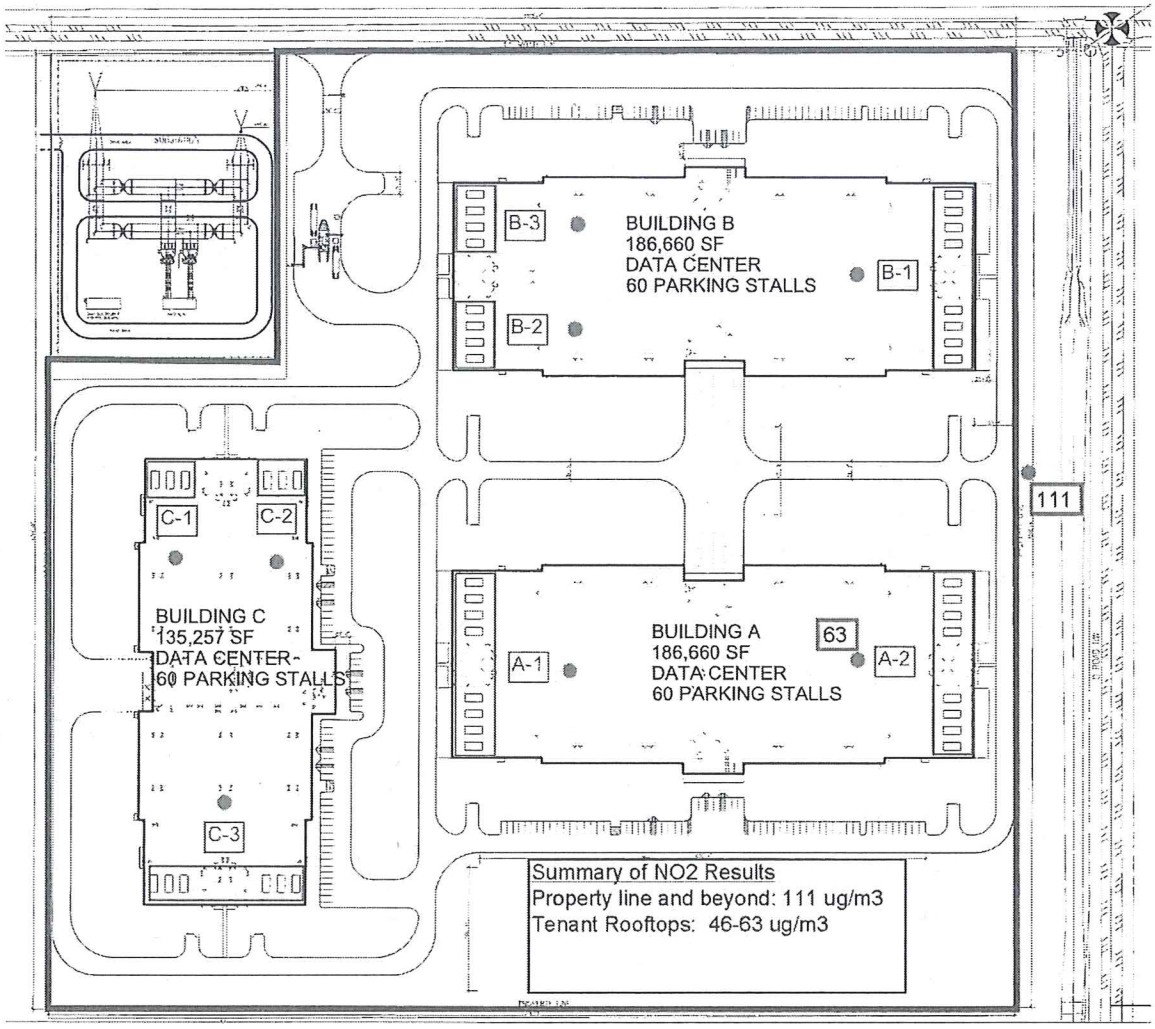

Figure 1. Locations of Maximum Modeled 98th-Percentile 1-Hour NO_2 Impacts.

5.2.4 Updates to 2011 Monte Carlo Results

Between 2011 and the time of this permit preparation, another data center (Vantage) has been constructed to the north of Sabey. In addition, available updated regional background emissions of 15.6 ug/m3were used.[6] Sabey also assumed that Vantage emissions would contribute up to an additional 10% of the total Monte Carlo maximum impact of 111 ug/m3 or 11 ug/m3. Based on 2012 Vantage AERMOD modeling performed by consultant ICF International, this is a conservatively high estimate. According to the 2012 modeling, local 1-hour NO2 background at the maximum Vantage receptor caused by combined data center emissions from nearby Sabey, Yahoo, and Intuit data centers was only 0.02 ug/m3. The combined emissions from Sabey and regional sources would be as follows:

Impact from Sabey and Offsite-Sources	122 $\mu g/m^3$ (111 $\mu g/m^3$ +11 $\mu g/m^3$ Vantage)
Regional Background:	15.6 $\mu g/m^3$
Total NO_2 Concentration	148.6 $\mu g/m^3$
Allowable NAAQS:	188 $\mu g/m^3$

Consistent with the 2011 Monte Carlo results, Sabey could emit up to approximately 160 ug/m3 (161.4 ug/m3) and still be in compliance with the 1-hr NO2 NAAQS of 188 ug/m3 (15.6ug/m3 + 11ug/m3 + 161.4 ug/m3 = 188 ug/m3 ≤ 188 ug/m3). Considering Sabey's conservative Vantage background emission estimate of 11 ug/m3, it is possible that Sabey emissions above 161.4 ug/m3 would still be in compliance with the NAAQS. However, Sabey has agreed to use the conservative Vantage background estimate as a safety buffer for compliance with the 1-hr NO2 NAAQS.

Based on this analysis, it is concluded the intermittent NOx emissions from the Intergate-Quincy Data Center, combined with the emissions from other local sources and regional background, would not cause ambient impacts exceeding the allowable NAAQS limit at any point at or beyond the fenced facility boundary or on the tenant building rooftops within the facility. As shown in Table 5, the lb/hr emission rate at which the 1-hr NO2 NAAQS is met, is at 991 lb/hr. For this reason, Approval Order Condition 8.4 places a limit on NOx at 990 lb/yr.

[6] Provided by Washington State University, Northwest International Air Quality Environmental Science and Technology Consortium, NW AIRQUEST, Lookup 2009-2011 design values of criteria pollutants. Lookup values from the NW AIRQUEST website on June 3, 2015: http://lar.wsu.edu/nw-airquest/lookup.html

5.3 Ambient Impact Results

Except for diesel engine exhaust particulate (DEEP) and NO2 which are predicted to exceed its ASIL, AERMOD model results show that no NAAQS or ASIL will be exceeded at or beyond the property boundary. The applicant's modeling results are provided below:

Criteria Pollutant	Standards in µg/m³ NAAQS(e) Primary	Standards in µg/m³ NAAQS(e) Secondary	Maximum Ambient Impact Concentration (µg/m³)	AERMOD Filename	Background Concentrations (µg/m³) (a)	Maximum Ambient Impact Concentration Added to Background (µg/m³) (If Available)
Particulate Matter (PM_{10})						
1st-Highest 24-hour average during power outage with cooling towers	150	150	57	DEEP_011915	90	147 (c)
Particulate Matter ($PM_{2.5}$)						
Annual average (d)	12	15	1.2 (c)	DEEP_011515	6.5	7.7 (c)
1st-highest 24-hour average for cooling towers and electrical bypass	35	35	10.4	DEEP_011915	23.5	33.9 (c)
Carbon Monoxide (CO)						
8-hour average	10,000 (9 ppm)		3,014	DEEP_011915	482	3,496
1-hour average	40,000 (35 ppm)		6,223	DEEP_011915	842	7,065
Nitrogen Oxides (NO_2)						
Annual average (d)	100 (53 ppb)	100	15.8	2011 Monte Carlo files	2.8	18.6
1-hour average	188 (100 ppb)	--	161 (max allowed) (b)	2011 Monte Carlo files	26.6 [15.6 regional + 11 local (Vantage)]	<188
Sulfur Dioxide (SO_2)						
3-hour average	--	1,300 (0.5 ppm)	See note (f)			
1-hour average	195 (75 ppb)	--	See note (f)			

Toxic Air Pollutant	ASIL (µg/m³)	Averaging Period	1st-Highest Ambient Concentration (µg/m³)	AERMOD Filename
DEEP (d)	0.00333	Annual average	0.307	DEEP_011515
NO_2	470	1-hour average	960	(b)
CO	23,000	1-hour average	7,065	DEEP_011915

S02	660	1-hour average	See note (f)	
Acrolein	0.06	24-hour average	0.017	DEEP_011915
Benzene (d)	0.0345	Annual Average	0.012	DEEP_011515
1,3-Butadiene (d)	0.00588	Annual Average	0.00031	DEEP_011515
Naphthalene (d)	0.0294	Annual Average	0.0021	DEEP_011515

Notes:
$\mu g/m^3$ = Micrograms per cubic meter.
ppm = Parts per million.
ASIL = Acceptable source impact level.
DEEP = Diesel engine exhaust, particulate

(a) Sum of "regional background" plus "local background" values. Regional background concentrations obtained from WSU NW Airquest website. Local background concentrations include emissions from: proposed generators, nearby data centers, and other background sources including highways and the Railroad (see Section 6 of this TSD).
(b) 1-hour NO2 criteria pollutant emissions to be kept below 990 lbs/year to comply with NAAQS. Approval Condition 8.4 includes language to monitor this emission limit requirement. See Section 6 regarding NO2 as a TAP.
(c) The PM values take into account the following very small and yet very conservative cooling tower estimated values of: 0.0996 ug/m3 for the 24-hour averages (using 0.4 scale factor from conservative 1-hour estimate), and 0.0199 ug/m3 for the annual average (using 0.08 scale factor from conservative 1-hour estimate). Scale factors are from California Air Resources Board (CARB) *Appendix H Recommendations for Estimating Concentrations of Longer Averaging Periods from the Maximum One-Hour Concentration for Screening Purposes* http://www.arb.ca.gov/toxics/harp/docs/userguide/appendixH.pdf
(d) Annually averaged concentrations are based on the theoretical maximum annual concentration, which assumes the worst-case scenario that the 3-year rolling average permit limit is released entirely within a single year.
(e) Ecology interprets compliance with the National Ambient Air Quality Standards (NAAQS) as demonstrating compliance with the Washington Ambient Air Quality Standards (WAAQS).
(f) Based on nearby data center (Microsoft Oxford) S02 annual emissions of 0.047 tpy, which are estimated through modeling to cause ambient impacts of 5.7 ug/m3 (1-hr avg) and 4.4 ug/m3 (3-hr avg), Sabey, with emissions of 0.028 tpy are expected have ambient impacts far below the NAAQS. Sabey was not required to model SO2 for comparison to the ASIL because estimated emissions of 0.006 lb/hr (0.028 tpy) are below the WAC 173-460-150 small quantity emission rate of 0.457 lb/hr (2.0 tpy).

Sabey has demonstrated compliance with the national ambient air quality standards (NAAQS) and acceptable source impact levels (ASILs) except for DEEP and NO2. As required by WAC 173-460-090, emissions of DEEP and NO2 are further evaluated in the following section of this document.

6. SECOND TIER REVIEW FOR DIESEL ENGINE EXHAUST PARTICULATE

Proposed emissions of diesel engine exhaust, particulate (DEEP) and NO2 from the forty-four (44) Sabey engines exceed the regulatory trigger level for toxic air pollutants (also called an Acceptable Source Impact Level, (ASIL)). A second tier review was required for DEEP and NO2 in accordance with WAC 173-460-090, and Sabey was required to prepare a health impact assessment (HIA). The HIA presents an evaluation of both non-cancer hazards and increased cancer risk attributable to Sabey's increased emissions of identified carcinogenic compounds. Large diesel-powered backup engines emit DEEP, which is a high priority toxic air pollutant in the state of Washington. In light of the rapid development of other data centers in the Quincy area, and recognizing the potency of DEEP emissions, Ecology decided to evaluate Sabey's proposal in a community-wide basis, even though it is not required to do so by state law. Sabey reported the cumulative risks associated with Sabey and prevailing sources in their HIA document based on a cumulative modeling approach. The Sabey cumulative risk study is based on proposed generators, nearby data centers, and other background sources including highways and railroads.

Because Sabey requests that the 1st-highest NOx emission rate be retained at the current limit of 990 lbs/hour (or 99 lb/hr of NO2 per Condition 5.7 of Approval Order), Ecology's 2011 Technical Support Document for Second Tier Review of NO2 does not need to be repeated but can be re-used to satisfy this permit revision. The Sabey DEEP HIA document along with a brief summary of Ecology's review will be available on Ecology's website.

7. CONCLUSION

Based on the above analysis, Ecology concludes that operation of the 44 generators and 176 cooling units will not have an adverse impact on air quality. Ecology finds that Sabey's Data Center has satisfied all requirements for NOC approval.

******END OF SABEY TSD ******

Appendix F:
Second Tier Review Recommendation

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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November 16, 2015

Ms. Karen Wood
Department of Ecology
Eastern Regional Office
4601 N. Monroe Street
Spokane, WA 99205-1295

Re: Second Tier Petition by Sabey Corporation Regarding TAP Emissions Increases Associated with Permit Revisions Requested for the Sabey Intergate-Quincy Data Center in Quincy, WA

Dear Ms. Wood:

The Washington State Department of Ecology's Air Quality Program (Ecology) has completed a review of health risks from diesel engine exhaust particulate (DEEP) emissions from the Sabey Corporation (Sabey) Intergate-Quincy Data Center in Quincy, WA. Sabey had previously obtained a permit to install and operate:

- Several cooling units
- Forty-four generators rated at up to 2,000 kilowatt (kW) electrical output

In March 2015, Sabey submitted an application to revise the permit to allow generators to operate over a wider range of operating loads. This wider range results in an increase in the amount of air pollution the facility could emit. Ecology required Sabey to revise the health impact assessment to evaluate the health risks from exposure to diesel engine exhaust particles.

The revised diesel particle emissions resulted in an increase lifetime cancer risk from the previous estimate of seven in one million to a new estimate of about 9.9 in one million. The maximum risk was estimated on a portion of a residential parcel located north of Sabey Intergate-Quincy Data Center. Ecology allows an increased risk of up to 10 in one million from new sources of air pollutants.

As part of the community-wide approach in Quincy, Ecology also considered the cumulative impacts of DEEP emissions in the area. Emissions from Sabey and other local sources of DEEP could result in lifetime increased cancer risk of up to approximately 58 in one million (58×10^{-6}) at a location about ¾ mile south of Sabey Intergate-Quincy Data Center and just south of State

Route 28. Most of the DEEP exposure at this residence is estimated to come from heavy duty trucks travelling on the highway. The cumulative non-cancer hazard quotient at this location is much lower than unity (one) meaning that non-cancer adverse health effects are unlikely.

Ecology recommends approval of the proposed project because project-related health risks are permissible under WAC 173-460-090 and the cumulative cancer risk from DEEP emissions in Quincy is less than the cumulative maximum risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100 x 10^{-6}).

This project has satisfied all requirements of a Second Tier analysis. Ecology recommends that you incorporate our findings as part of your ambient air impacts analysis and you may begin the public comment period when you are ready to do so.

If you would like to discuss this project further, please contact Gary Palcisko at (360) 407-7338 or gary.palcisko@ecy.wa.gov.

Sincerely,

Chris Hanlon-Meyer
Science and Engineering Section Manager
Air Quality Program

gp/te

Enclosure

cc: Jolaine Johnson, Ecology
Gary Palcisko, Ecology
Dale Spencer, Sabey
Jim Wilder, Landau Associates

DEPARTMENT OF
ECOLOGY
State of Washington

Revised Health Impact Assessment Recommendation Document for

Sabey Intergate-Quincy Data Center
Quincy, Washington

Prepared by

Department of Ecology
Air Quality Program
Olympia, Washington

November 16, 2015

1. Executive Summary

This health impact assessment evaluates and summarizes the health risks from air pollutants emitted by 44 diesel engines at the Sabey Intergate-Quincy Data Center. This document updates a previous version to reflect permit changes requested by Sabey Corporation (Sabey). In general, toxic air pollutant impacts in the area near Sabey Intergate-Quincy Data Center will not result in excessive risk or cause serious long- or short-term health effects. Ecology concluded that the health risk is acceptable and is recommending approval of the revisions to the permit.

In August 2011, Ecology issued an air permit which allowed Sabey to install and operate equipment that emits pollutants into the air at the Sabey Intergate-Quincy Data Center. The permit specified limits on the emissions and operation of:

- Several cooling units
- Forty-four generators rated at up to 2,000 kilowatt (kW) electrical output

In March 2015, Sabey submitted an application to revise the permit to allow generators to operate over a wider range of operating loads, but Sabey did not request to add new generators or increase the runtime of the currently permitted generators (Landau Associates, 2015). This wider range results in an increase in the amount of air pollution the facility could emit. Specifically, Sabey requested an increase in the amount of diesel particles they are allowed to emit from 0.31 tons per year to 0.408 tons per year. Sabey's actual emissions will likely be less than their permitted limits, but Ecology required Sabey to revise the health impact assessment evaluating the health risks from exposure to diesel engine exhaust particles.

Sabey hired Landau Associates (Landau) to revise the health impact assessment (Landau Associates, 2015a). In this assessment, Landau estimated lifetime increased cancer risks associated with Sabey's diesel particles and other toxic air pollutant emissions.

The revised diesel particle emissions resulted in an increase lifetime cancer risk from the previous estimate of seven in one million to a new estimate of up to 9.9 in one million. The maximum risk was estimated at a location on a property that contains a home north of Sabey Intergate-Quincy Data Center. A lower risk estimate of 7.9 per million occurs at the house location on the same parcel. In assessing these risks, Ecology assumes that a person is exposed to Sabey's emissions continuously during their entire lifetime. Ecology allows an increased risk of up to 10 in one million from new sources of air pollutants. This risk can also be expressed as the number of cancers that might occur in addition to those normally expected in a population of one million people. The cancer risk estimates reported here are for increases above a baseline lifetime risk of cancer of about 40 percent in the United States.

To evaluate the cumulative effect of numerous sources of diesel particles in the area, Ecology assessed the cumulative health risk by adding estimated concentrations associated with Sabey's emissions to an estimated background concentration. The maximum cumulative cancer risk to a person who lives near Sabey Intergate-Quincy Data Center is about **58 in one million**. Most of the exposure to diesel particles at this location comes from highway vehicles. Additionally, exposure to diesel particles in the area is not likely to result in long-term non-cancer health effects.

Because the increase in cancer risk associated with Sabey Intergate-Quincy Data Center alone is less than the maximum risk allowed by a health impact assessment (10 in one million), and the non-cancer hazard is low, the project can be approved under WAC 173-460-090. Furthermore, the cumulative risks to residents living near Sabey Intergate-Quincy Data Center are below the cumulative risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100 x 10^{-6}).

This summary document presents Ecology's review of the Sabey Intergate-Quincy Data Center revised health impact assessment and other requirements under WAC 173-460.

2. Second Tier Review Processing and Approval Criteria

2.1. Second Tier Review Processing Requirements

In order for Ecology to review the Second Tier petition, each of the following regulatory requirements under Chapter 173-460-090 must be satisfied:

(a) The permitting authority has determined that other conditions for processing the Notice of Construction (NOC) Order of Approval have been met, and has issued a preliminary approval order.

(b) Emission controls contained in the preliminary NOC approval order represent at least best available control technology for toxics (tBACT).

(c) The applicant has developed a health impact assessment (HIA) protocol that has been approved by Ecology.

(d) The ambient impact of the emissions increase of each toxic air pollutant (TAP) that exceed acceptable source impact levels (ASILs) has been quantified using refined air dispersion modeling techniques as approved in the HIA protocol.

(e) The Second Tier review petition contains an HIA conducted in accordance with the approved HIA protocol.

Acting as the "permitting authority" for this project, Ecology's project permit engineer satisfied item (a) and verified item (b) above on October 28, 2015.[1] Because Sabey was revising an earlier HIA, an HIA protocol (item (c)) was deemed to be unnecessary. Ecology's modeler confirmed that refined modeling (item (d)) was conducted appropriately.[2] The revised HIA (item (e)) was received by Ecology on March 4, 2015. After an initial review of the HIA, Ecology determined that the requested diesel engine exhaust particulate (DEEP) emission rate (0.467 tons per year) would result in unacceptable risk. Sabey agreed to an emission limit of 0.408 tpy. Ecology scaled the modeling results by a factor of 0.873662 to reflect the lower emission rate. The risks reported in this HIA review reflect an annual average DEEP emission rate of 0.408.

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[1] Gary Huitsing to Gary Palcisko, "RE: Memo with Recommendations from Sabey," e-mail message, October 28, 2015.
[2] Clint Bowman to Gary Palcisko, "PSD_Modeling_Review_Checklist_cb1_sabey-quincy-2015.doc," e-mail message, September 4, 2015.

All five processing requirements above are satisfied.

2.2. Second Tier Review Approval Criteria

As specified in WAC 173-460-090(7), Ecology may recommend approval of a project that is likely to cause an exceedance of ASILs for one or more TAPs only if it:

(a) Determines that the emission controls for the new and modified emission units represent tBACT.

(b) The applicant demonstrates that the increase in emissions of TAPs is not likely to result in an increased cancer risk of more than one in one hundred thousand.

(c) Ecology determines that the non-cancer hazard is acceptable.

2.2.1. tBACT Determination

Ecology's permit engineer determined that Sabey's proposed pollution control equipment satisfies the BACT and tBACT requirement for diesel engines powering backup generators at Sabey Intergate-Quincy Data Center (Ecology, 2015). BACT and tBACT for diesel particulate was determined to be met through the use of EPA Tier 2 certified engines if the engines are installed and operated as emergency engines, as defined at 40 CFR §60.4219; compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII; and use of ultra-low sulfur diesel fuel containing no more than 15 parts per million by weight of sulfur.

3. HIA Review

As described above, the applicant is responsible for preparing the HIA under WAC 173-460-090. Ecology's project team consisting of an engineer, a toxicologist, and a modeler review the HIA to determine if the methods and assumptions are appropriate for assessing and quantifying surrounding community's risk from a new project.

For the Sabey Intergate-Quincy project, the HIA focused on health risks attributable to DEEP exposure as this was the only TAP in which Sabey requested increased limits from the existing permit and the modeled concentration in ambient air exceeded an ASIL. Landau briefly described emissions and exposure to other TAPs (nitrogen dioxide (NO_2), carbon monoxide (CO), benzene, 1-3 butadiene, acrolein, and naphthalene) because these pollutants exceeded a small quantity emission rate (SQER), and Ecology requested that health hazards from exposure to these pollutants be quantified.

3.1. DEEP Health Effects Summary

Diesel engines emit very small fine (<2.5 micrometers [μm]) and ultrafine (<0.1 μm) particles. These particles can easily enter deep into the lung when inhaled. Mounting evidence indicates that inhaling fine particles can cause numerous adverse health effects.

Studies of humans and animals specifically exposed to DEEP show that diesel particles can cause both acute and chronic health effects including cancer. Ecology has summarized these health

effects in "Concerns about Adverse Health Effects of Diesel Engine Emissions" available at http://www.ecy.wa.gov/pubs/0802032.pdf.

The HIA prepared by Landau quantifies the non-cancer hazards and increased cancer risks attributable to the proposed Sabey Intergate-Quincy Data Center's DEEP emissions.

3.2. DEEP Toxicity Reference Values

To quantify non-cancer hazards and cancer risk from exposure to DEEP, quantitative toxicity values must be identified. Landau identified toxicity values for DEEP from two agencies: the U.S. Environmental Protection Agency (EPA) (EPA, 2002; EPA, 2003), and California EPA's Office of Environmental Health Hazard Assessment (OEHHA) (CalEPA, 1998). These toxicity values are derived from studies of animals that were exposed to a known amount (concentration) of DEEP, or from epidemiological studies of exposed humans. They are intended to represent a level at or below which adverse non-cancer health effects are not expected, and a metric by which to quantify increased risk from exposure to a carcinogen. Table 1 shows the appropriate DEEP non-cancer and cancer toxicity values identified by Landau.

EPA's reference concentration (RfC) and OEHHA's reference exposure level (REL) for diesel engine exhaust (measured as DEEP) was derived from dose-response data on inflammation and changes in the lung from rat inhalation studies. Each agency established a level of 5 $\mu g/m^3$ as the concentration of DEEP in air at which long-term exposure is not expected to cause adverse non-cancer health effects.

National Ambient Air Quality Standards (NAAQS) and other regulatory toxicological values for short- and intermediate-term exposure to particulate matter have been promulgated, but values specifically for DEEP exposure at these intervals do not currently exist.

OEHHA derived a unit risk factor (URF) for estimating cancer risk from exposure to DEEP. The URF is based on a meta-analysis of several epidemiological studies of humans occupationally exposed to DEEP. In these studies, DEEP exposure was estimated from measurements of elemental carbon and respirable particulate representing fresh diesel exhaust. The URF is expressed as the upper-bound probability of developing cancer, assuming continuous lifetime exposure to a substance at a concentration of one microgram per cubic meter (1 $\mu g/m^3$), and are expressed in units of inverse concentration [i.e., $(\mu g/m^3)^{-1}$]. OEHHA's URF for DEEP is 0.0003 per $\mu g/m^3$ meaning that a lifetime of exposure to 1 $\mu g/m^3$ of DEEP results in an increased individual cancer risk of 0.03 percent or a population cancer risk of 300 excess cancer cases per million people exposed.

Table 1. Toxicity Values Used to Assess and Quantify Non-Cancer Hazard and Cancer Risk

Pollutant	Agency	Non-cancer	Cancer
DEEP	EPA	RfC = 5 µg/m3	NA[1]
	California EPA–OEHHA	Chronic REL = 5 $\mu g/m^3$	URF = 0.0003 per $\mu g/m^3$

[1] EPA considers DEEP to be a probable human carcinogen, but has not established a cancer slope factor or unit risk factor.

3.3. Affected Community/Receptors

While Sabey Intergate-Quincy Data Center is located in an industrially zoned area surrounded largely by agricultural land uses and other data centers, air dispersion modeling indicated that proposed DEEP emissions could result in concentrations in excess of the ASIL at two parcels with residential land use codes (Figure 1) [Ecology, 2013; Grant County, 2015]. U.S. Census data show that approximately 23 people live in the Census Blocks intersected by the area in which DEEP concentrations are estimated to exceed the ASIL (U.S. Census Bureau, 2010).

For the purposes of assessing increased cancer risk and non-cancer hazards, Landau identified receptor locations where the highest exposure to project-related air pollutants could occur: at the project boundary, nearby residences, and on-site tenant occupied commercial locations (Figure 2).

Ecology's review of the HIA found that Landau identified appropriate receptors to capture the highest Sabey attributable exposures for residential, commercial, and fence line receptors.

3.4. Increased Cancer Risk

3.4.1. Cancer Risk Attributable to Sabey's DEEP and Other TAP Emissions

Table 2, adapted from the HIA, shows the estimated Sabey-specific cancer risk per million for each of the receptors. The highest increase in risks attributable to Sabey's emissions is 9.9 per million[3] and occurs at the closest edge of a property that contains an existing house to the north of Sabey Intergate-Quincy Data Center.[4] A lower risk estimate of 7.9 per million occurs at the house location on the same parcel. Landau also calculated risks posed by other carcinogenic TAPs (i.e., acetaldehyde, benzene, formaldehyde, 1,3-butadiene, and carcinogenic polycyclic aromatic hydrocarbons). They estimated a negligible increased risk attributable to these other TAPs of about 0.05 per million at the maximally impacted residential receptor (MIRR).

For non-residential exposure scenarios, workers at on-site facilities may have increased risks of about 3.5 per million, and increased cancer risks to potential bystanders exposed near the point of maximum off-site impact (i.e., fence line receptor) may be about 0.4 per million.

[3] Number per million represents an upper-bound theoretical estimate of the number of excess cancers that might result in an exposed population of one million people compared to an unexposed population of one million people. Alternatively, an individual's increase in risk of one in one million means a person's chance of getting cancer in their lifetime increases by one in one million or 0.0001 percent.

[4] Ecology's initial review of the HIA determined that concentrations exceeding 0.0333 ug/m3 (corresponding to a lifetime increased risk of 10 in one million) occurred on portions of a residential parcel. Sabey agreed to accept lower emission limits than what was reported in the HIA.

Table 2. Estimated Increased Cancer Risk for Residential, Commercial, and Boundary Receptors Attributable to Sabey's DEEP Emissions					
	Risk Per Million from DEEP Exposure at Various Receptor Locations				
Attributable to:	Fence Line Receptor[1]	R-1 North Residence (property) (MIRR)[2]	R-1 North Residence (home) [2]	R-2 South Residential Parcel[2]	C-1 Industrial Building (MICR)[3]
Sabey	0.4	9.9	7.9	6.2	3.5
[1] Fence line scenario assumes intermittent exposure 250 days per year, two hours per day for 30 years.					
[2] Residential scenarios assume continuous lifetime exposure.					
[3] Workplace scenarios assume exposure occurs 250 days per year, eight hours per day for 40 years.					
Note: Landau also calculated risks posed by other carcinogenic TAPs (i.e., acetaldehyde, benzene, formaldehyde, 1,3-butadiene, and carcinogenic polycyclic aromatic hydrocarbons). They estimated a negligible increased risk attributable to these TAPs of about 0.05 per million at the north residence (R-1).					

3.4.2. Cancer Risk Attributable to Cumulative DEEP Emissions

Ecology conducted an analysis of cumulative exposure to DEEP in Quincy in 2014 during the permitting process for the Oxford Data Center located three miles west of Sabey.[5] Ecology adjusted the results of this analysis to include updated emissions rates requested by Sabey, and the revised emission rates allowed in a draft permit for the Oxford Data Center (Ecology, 2015a). In total, the cumulative analysis includes allowable emissions estimates from:

- Microsoft Columbia Data Center
- Yahoo! Data Center
- Intuit Data Center
- Dell Data Center
- Vantage Data Center
- Microsoft Oxford Data Center (results adjusted to reflect contribution from increased emissions reflected in a revised permit out for public comment in 2015)
- Sabey Intergate-Quincy Data Center (results adjusted to account for emissions increase requested by Sabey)

Ecology also included 2011 estimates for vehicles on State Routes (SR) 28 and 281 and locomotives on the BNSF railroad.

[5] Landau reported cumulative risks associated with DEEP exposure in the area around Sabey based on earlier modeling results. Ecology recently updated these community-wide models during a recent permitting action. Ecology reported the updated modeling results in this HIA review document.

The cumulative cancer risk from all known sources of DEEP emissions in the vicinity[6] of Sabey Intergate-Quincy Data Center (Table 3) is highest for a residential location on an agricultural parcel south of SR 28. This parcel is about ¾ mile south of the Sabey Intergate-Quincy Data Center property boundary (Figure 3). The cumulative DEEP risk at this home is about 58 per million, and the majority (~86 percent) of exposure to DEEP is estimated to be attributable to emissions from vehicles travelling on SR 28.

Table 3. Estimated Cumulative Cancer Risk at Residential Locations near Sabey Data Center

	Risk Per Million from DEEP Exposure at Various Receptor Locations		
Attributable to:	R-1 North Residence (property) (MIRR)[1]	R-2 South Residence (parcel)[1]	R-3 South Home on Agricultural parcel
Sabey	9.2	6.0	1.2
Vantage	6.2	0.9	0.5
Intuit	4.7	3.2	1.4
Yahoo!	2.9	1.7	1.6
SR 28	2.1	4.4	49.7
Rail	1.4	11.0	2.5
Microsoft Columbia	0.5	0.4	0.3
SR 281	0.5	0.6	0.6
Microsoft Oxford	0.2	0.2	0.2
Dell	0.1	0.1	0.1
Cumulative	27.7	28.4	58.1

[1] Locations of R-1 and R-2 slightly different than those in Table 2.
R-3 was not evaluated in HIA prepared by Landau.
Residential scenarios assume continuous lifetime exposure.

3.5. Non-cancer Hazard

Landau evaluated chronic non-cancer hazards associated with long-term exposure to DEEP emitted from Sabey Intergate-Quincy Data Center and other local sources. Hazard quotients were much

[6] For the purposes of this analysis, the "vicinity" of Sabey encompasses the area in which Sabey's estimated impact exceeds the DEEP ASIL.

lower than unity (one) for all receptors' exposure to Sabey-related and cumulative DEEP.[7] This indicates that chronic non-cancer hazards are not likely to occur as a result of exposure to DEEP in the vicinity of Sabey.

Landau also evaluated short-term exposures to NO_2, CO, benzene, 1,3-butadiene, and acrolein emitted from Sabey's engines and determined that under outage scenarios, hazard indices could exceed unity at the maximally impacted boundary receptor. This hazard primarily results from NO_2 emissions. The frequency of this potential occurrence is further discussed in Section 4.2.

4. Other Considerations

4.1. Short-Term Exposures to DEEP

Exposure to DEEP can cause both acute and chronic health effects. However, as discussed previously, reference toxicity values specifically for DEEP exposure at short-term or intermediate intervals do not currently exist. Therefore, Landau did not quantify short-term risks from DEEP exposure. Generally, Ecology assumes that compliance with the 24-hour $PM_{2.5}$ NAAQS is an indicator of acceptable short-term health effects from DEEP exposure. Ecology's Technical Support Document (TSD) for the draft preliminary NOC approval concludes that Sabey's emissions are not expected to cause or contribute to an exceedance of any NAAQS (Ecology, 2015).

4.2. Cumulative Short-Term NO_2 Hazard

Sabey and Ecology previously evaluated short-term nitrogen oxides (NO_X) emissions as part of the previous Second Tier review process (Ecology, 2011). Because Sabey agreed to restrict its maximum-hourly NO_X and NO_2 emissions during a power outage to the currently-permitted values, Sabey's recent application will not affect its previously estimated contribution to cumulative regional NO_2 concentrations. Furthermore, Ecology recently conducted an analysis of a system-wide outage in Quincy during permitting of the Microsoft Oxford Data Center in 2014 (Ecology, 2014; Ecology, 2015b). This analysis incorporated potential NO_X emission rates from each of the engines at all of Quincy's data centers during a power outage. The analysis showed that while NO_2 levels could indeed rise to levels of concern[8] during a system-wide outage, the outage would have to occur at a time when the dispersion conditions were optimal for concentrating NO_2 at a given location. Ecology estimated the combined probability of a system-wide outage coinciding with unfavorable meteorology and found the likelihood of this occurrence to be relatively low throughout Quincy.

5. Uncertainty

Many factors of the HIA are prone to uncertainty. Uncertainty relates to the lack of exact knowledge regarding many of the assumptions used to estimate the human health impacts of Sabey's emissions. The assumptions used in the face of uncertainty may tend to over- or

[7] The highest chronic hazard quotient attributed to cumulative exposure to DEEP (0.065) occurred at the maximum impacted commercial on-site receptor location.

[8] The level of concern in this case is 462 $\mu g/m^3$. This represents California OEHHA's acute REL of 470 $\mu g/m^3$ minus an estimated regional background concentration of 8.3 $\mu g/m^3$.

underestimate the health risks estimated in the HIA. Key aspects of uncertainty in the HIA for project Sabey are exposure assumptions, emissions estimates, air dispersion modeling, and toxicity of DEEP.

5.1. Exposure

It is difficult to characterize the amount of time that people can be exposed to Sabey's DEEP emissions. For simplicity, Landau and Ecology assumed a residential receptor is at one location for 24 hours per day, 365 days per year for 70 years. These assumptions tend to overestimate exposure.

5.2. Emissions

The exact amount of DEEP emitted from Sabey's diesel-powered generators is uncertain. Landau estimated emissions assuming engines would operate at a load that produces the most DEEP. In reality, the engines will operate at a variety of loads in which emissions may be lower than assumed. Landau also attempted to account for higher emissions that would occur during initial start-up. The resulting values are considered to be an appropriate estimate of DEEP emissions. Periodic engine emission testing will be conducted to ensure that engines meet appropriate emission limits.

5.3. Air Modeling

The transport of pollutants through the air is a complex process. Regulatory air dispersion models are developed to estimate the transport and dispersion of pollutants as they travel through the air. The models are frequently updated as techniques that are more accurate become known, but are written to avoid underestimating the modeled impacts. Even if all of the numerous input parameters to an air dispersion model are known, random effects found in the real atmosphere will introduce uncertainty. Typical of the class of modern steady-state Gaussian dispersion models, the AERMOD model used for the Sabey analysis may slightly overestimate the short-term (1-hour average) impacts and somewhat underestimate the annual concentrations.

5.4. Toxicity

One of the largest sources of uncertainty in any risk evaluation is associated with the scientific community's limited understanding of the toxicity of most chemicals in humans following exposure to the low concentrations generally encountered in the environment. To account for uncertainty when developing toxicity values (e.g., RfCs), EPA and other agencies apply "uncertainty" factors to doses or concentrations that were observed to cause adverse non-cancer effects in animals or humans. Agencies apply these uncertainty factors so that they derive a toxicity value that is considered protective of humans including susceptible populations. In the case of DEEP exposure, the non-cancer reference values used in this assessment were generally derived from animal studies. These reference values are probably protective of the majority of the population including sensitive individuals, but in the case of EPA's DEEP RfC, EPA acknowledges (EPA, 2002):

> "…the actual spectrum of the population that may have a greater susceptibility to diesel exhaust (DE) is unknown and cannot be better characterized until more information is available regarding the adverse effects of diesel particulate matter (DPM) in humans."

Quantifying DEEP cancer risk is also uncertain. Although EPA classifies DEEP as probably carcinogenic to humans, they have not established a URF for quantifying cancer risk. In their health assessment document, EPA determined that "human exposure-response data are too uncertain to derive a confident quantitative estimate of cancer unit risk based on existing studies." However, EPA suggested that a URF based on existing DEEP toxicity studies would range from $1x10^{-5}$ to 1×10^{-3} per $\mu g/m^3$. OEHHA's DEEP URF (3×10^{-4} per $\mu g/m^3$) falls within this range. Regarding the range of URFs, EPA states in their health assessment document for diesel exhaust (EPA, 2002):

> "Lower risks are possible and one cannot rule out zero risk. The risks could be zero because (a) some individuals within the population may have a high tolerance to exposure from [diesel exhaust] and therefore not be susceptible to the cancer risk from environmental exposure, and (b) although evidence of this has not been seen, there could be a threshold of exposure below which there is no cancer risk."

Other sources of uncertainty cited in EPA's health assessment document for diesel exhaust are:

- Lack of knowledge about the underlying mechanisms of DEEP toxicity.
- The question of whether toxicity studies of DEEP based on older engines is relevant to current diesel engines.

Table 4 presents a summary of how the uncertainty affects the quantitative estimate of risks or hazards.

Table 4. Qualitative Summary of How the Uncertainty Affects the Quantitative Estimate of Risks or Hazards

Source of Uncertainty	How Does it Affect Estimated Risk from this Project?
Exposure assumptions	Likely overestimate of exposure
Emissions estimates	Possible overestimate of emissions concentrations
Air modeling methods	Possible underestimate of average long-term ambient concentrations and overestimate of short-term ambient concentration
Toxicity of DEEP at low concentrations	Possible overestimate of cancer risk, possible underestimate of non-cancer hazard for sensitive individuals

6. Conclusions and Recommendation

The project review team has reviewed the HIA and determined that:

a) The TAP emissions estimates presented by Landau represent a reasonable estimate of the project's future emissions.

b) Emission controls for the new and modified emission units meet or exceed the tBACT requirement.

c) The ambient impact of the emissions increase of each TAP that exceeds ASILs has been quantified using appropriate refined air dispersion modeling techniques.

d) The HIA submitted by Landau on behalf of Sabey adequately assesses project-related increased health risk attributable to TAP emissions.

In the HIA, Landau estimated lifetime increased cancer risks attributable to Sabey's DEEP and other TAP emissions. The revised DEEP emissions resulted in an increase from the previous risk estimate of about seven in one million to a new estimate of **9.9 in one million**. The maximum risk was estimated at an undeveloped portion of a parcel that contains a house to the north of the Sabey Intergate-Quincy Data Center property. A lower risk estimate of 7.9 per million occurs at the house location on the same parcel.

Landau also assessed chronic and acute non-cancer hazards attributable to the project's emissions and determined that Sabey's emissions by themselves are not likely to result in adverse non-cancer health effects.

Finally, Ecology assessed the cumulative health risk by adding estimated concentrations attributable to Sabey's emissions to an estimated background DEEP concentration. The maximum cumulative cancer risk from resident's exposure to DEEP in the vicinity of Sabey Intergate-Quincy Data Center is approximately **58 in one million**. Most of the exposure to diesel particulate at this location comes from vehicles travelling on State Route 28. Additionally, exposure to DEEP in the area is not likely to result in non-cancer health effects. These DEEP-related health risks in the vicinity of Sabey Intergate-Quincy Data Center are generally much lower than those estimated in urban areas of Washington.

Because the increase in cancer risk attributable to the new data center alone is less than the maximum risk allowed by a Second Tier review, which is 10 in one million, and the non-cancer hazard is acceptable, the project could be approvable under WAC 173-460-090. Furthermore, the cumulative risks to residents living near the Sabey Intergate-Quincy Data Center are below the cumulative risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100 x 10^{-6}).

The project review team concludes that the HIA represents an appropriate estimate of potential increased health risks posed by Sabey's TAP emissions. The risk manager may recommend approval of the revised permit because total project-related health risks are permissible under WAC 173-460-090 and the cumulative risk from DEEP emissions in Quincy is less than the cumulative additional cancer risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100 x 10^{-6}).

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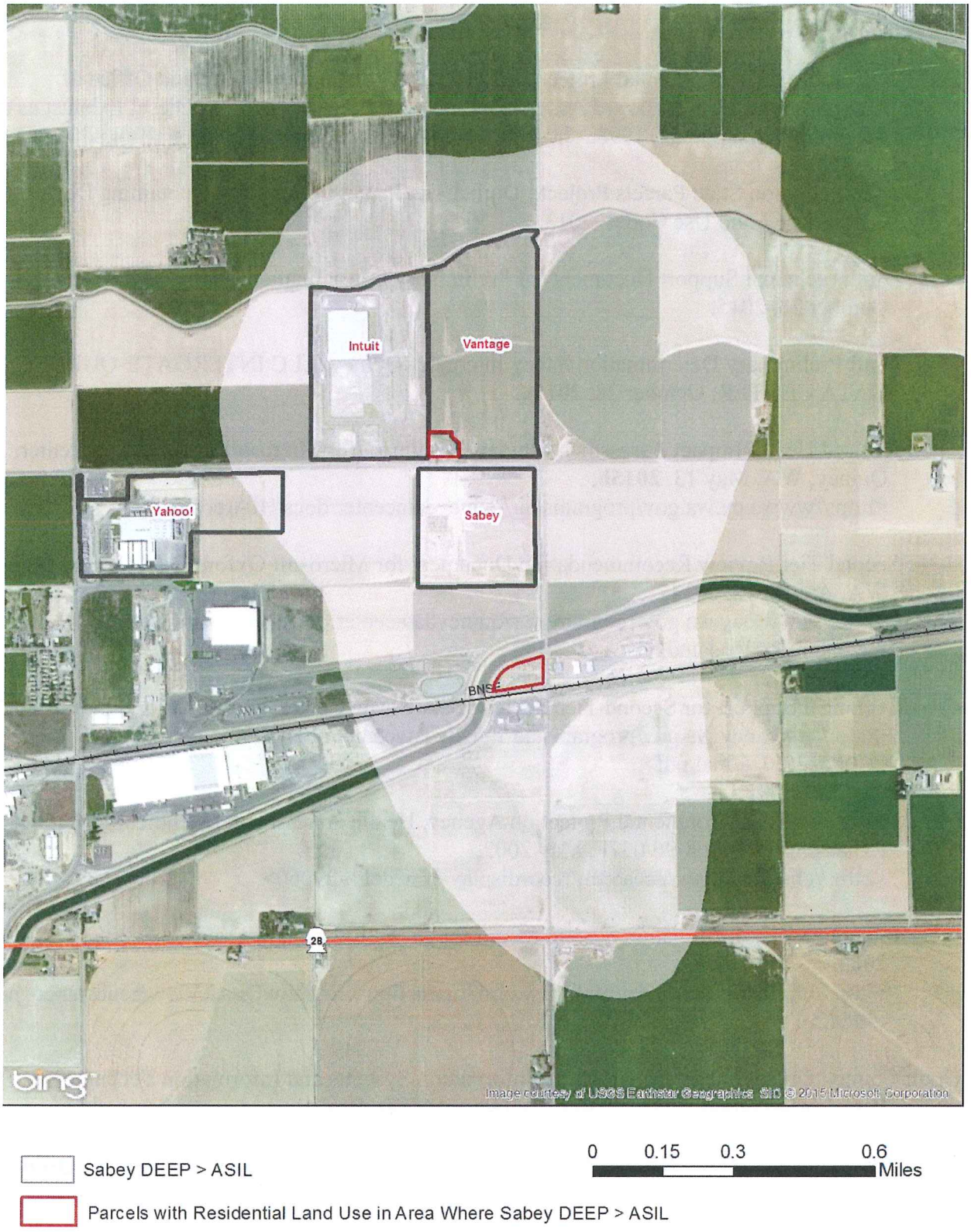

Figure 1. Residential parcels in the area where Sabey DEEP concentrations could exceed the ASIL

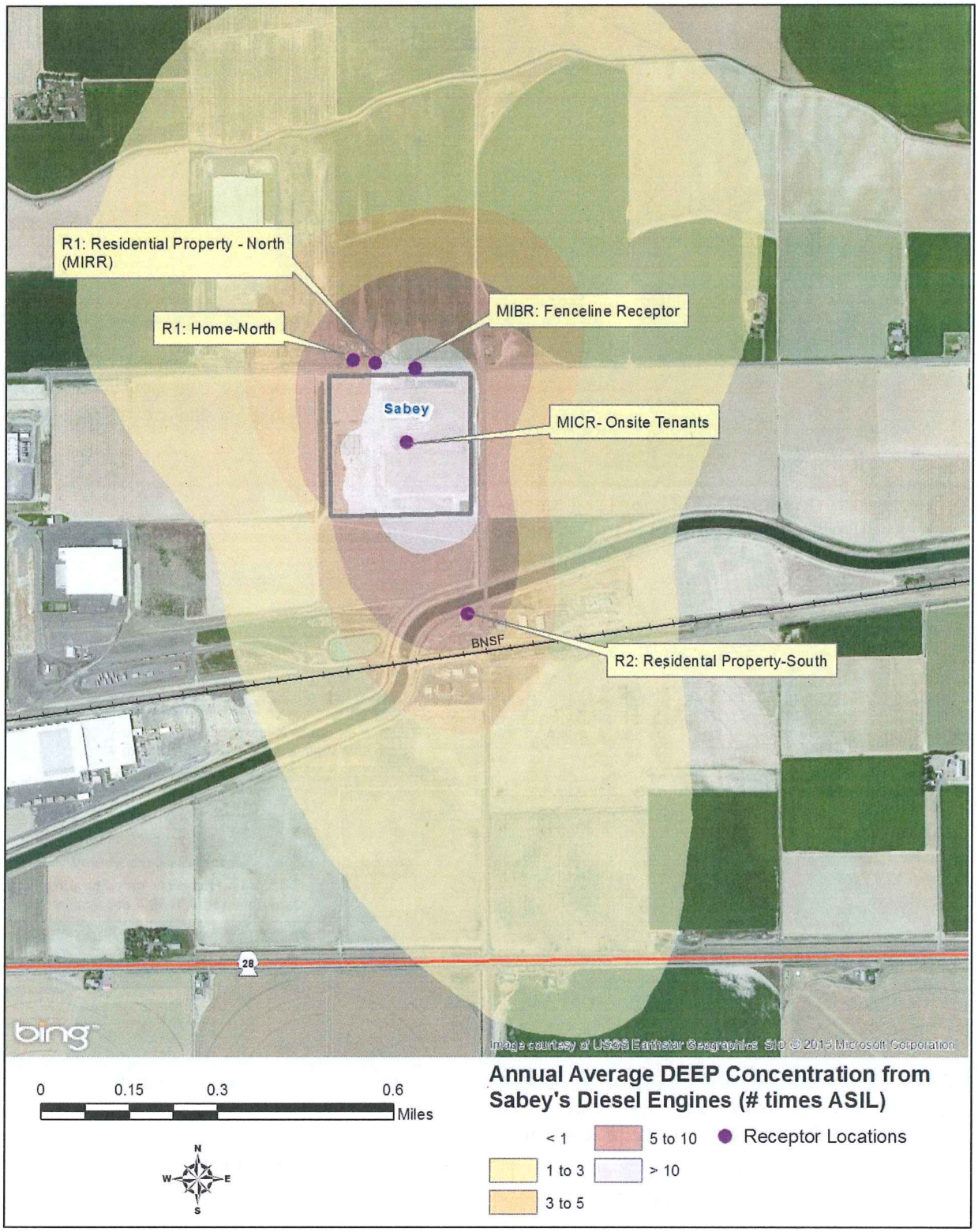

Figure 2. DEEP concentrations attributable to Sabey's Engines and receptor locations evaluated in the HIA. Concentrations reported as the number of times higher than the ASIL.

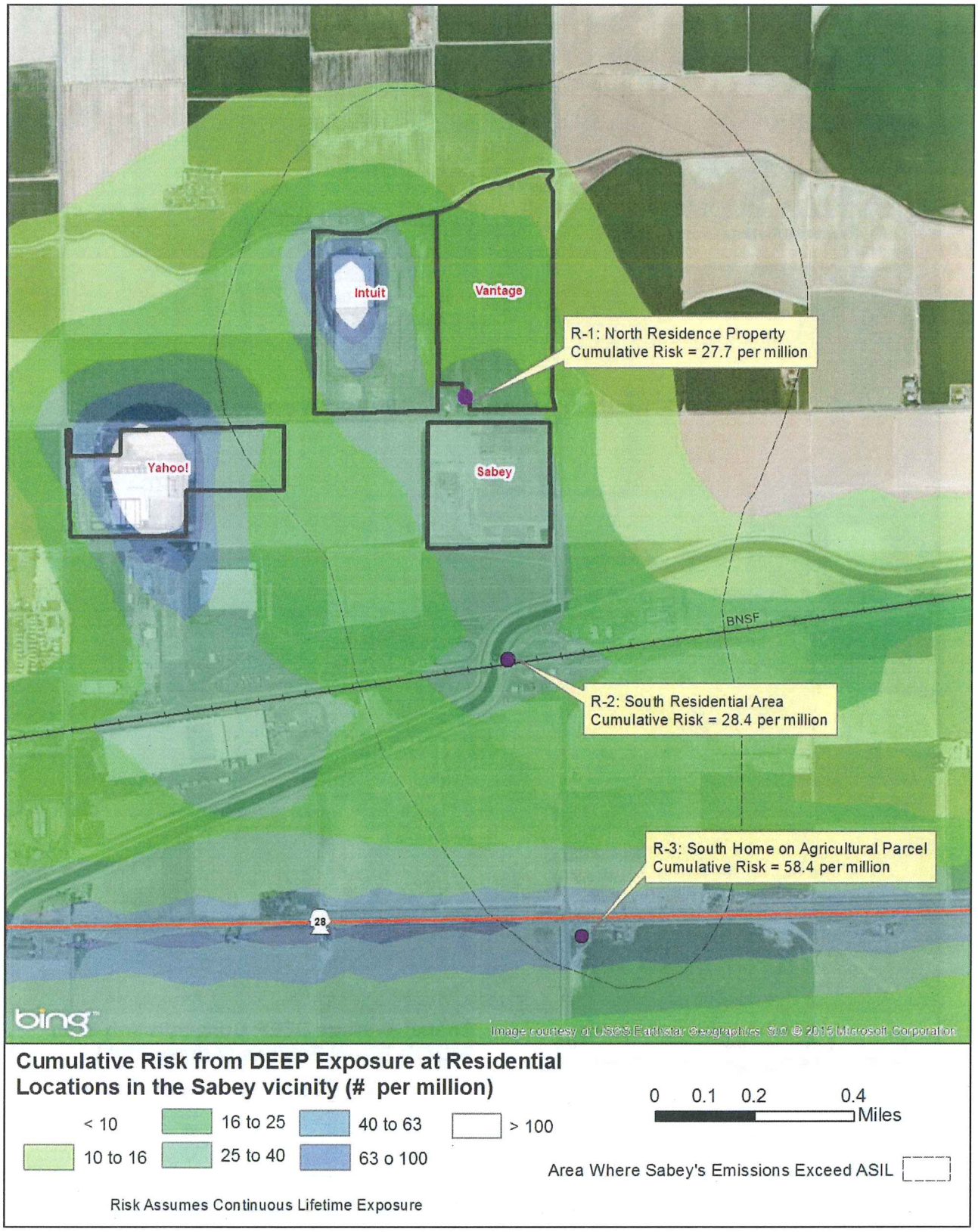

Figure 3. Cumulative Risk from DEEP at residential locations (estimated by Ecology) in the Sabey vicinity