DEPARTMENT OF
ECOLOGY
State of Washington

Response to Comments

Yahoo! Data Center, Quincy, WA
Air Quality Permit Update
16AQ-E012

Public Comment Period:
February 25, 2016 – April 4, 2016

Public Hearing:
March 31, 2016

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Introduction

Any new air pollutant source must meet emissions standards set by the U.S. Environmental Protection Agency and meet the requirements of the Washington State Clean Air Act. The Washington State Department of Ecology (Ecology) 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, Revised Code of Washington (RCW) 70.94 and the corresponding Washington Administrative Code 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:	Updates to the Yahoo! Data Center Air Quality Permit 11AQ-E399 Quincy, Grant County, WA
Comment period:	February 25, 2016 – April 4, 2016
Public hearing:	March 31, 2016
Date final permit issued:	Approval Order 16AQ-E012 issued on May 25, 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

The Yahoo! Data Center is located at 1010 Yahoo Way and 1500 M Street in Quincy, Washington. The facility was originally built in 2007 after Ecology approved an air quality permit, called a Notice of Construction Approval Order, for 13 backup generators powered by diesel engines for use during power failures. In March 2011, Ecology issued a revised permit allowing Yahoo! to install 10 new backup generators to support the facility's data servers. In October 2015, Yahoo! applied to Ecology to update its permit to expand operations. With the updated permit, they can construct a new facility, and operate an additional 25 backup diesel generators and associated cooling equipment.

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.

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 Releases
02/25/2016 – "Updating Yahoo!'s air permit for a data center in Quincy"
02/25/2016 – "Revisando el permiso de emisiones al aire para el centro de datos Yahoo! en Quincy"

Legal Notices
02/25/2016 – *Quincy Valley Post Register*
02/25/2016 – *Columbia Basin Herald*
02/26/2016 – *Wenatchee World*

Display Advertisements
02/25/2016 – *El Mundo* (Spanish)
03/24/2016 – *Columbia Basin Herald*
03/24/2016 – *Wenatchee World*
03/24/2016 – *El Mundo* (Spanish)
03/24/2016 – *Quincy Valley Post Register*

Public Involvement Calendar
02/25/2016 – Notice of comment period on Ecology's website
03/31/2016 – Notice of public hearing on Ecology's website
https://fortress.wa.gov/ecy/publiccalendar/

Document Repositories
02/25/2016 – Quincy City Hall
02/25/2016 – Quincy Library
03/03/2016 – Ecology's website
http://www.ecy.wa.gov/programs/air/quincydatacenter/index.html

Quincy Listserv Emails
02/19/2016 – "Status updates & important upcoming dates"
02/25/2016 – "Yahoo! Public Comment Period begins"
03/03/2016 – "Available online! Docs for Yahoo! Public Comment"
03/28/2016 – "Yahoo! Public Hearing this Thursday"
05/26/2016 – "Update on Yahoo! air quality permit"

Twitter & Text Alerts
English and Spanish Twitter posts and text alerts were sent on February 25, March 1, March 18, March 29, and March 30, 2016.

Public Hearing for Yahoo! Data Center: March 31, 2016
A public hearing was held at the Quincy Community Center at 115 F Street SW in Quincy, Washington. In addition to the advertisements listed above, the hearing was displayed on the Quincy Valley Business & Conference Center's electronic reader board on Washington State Highway 28 (F Street) on March 30th and 31st, 2016.

From 5:00 to 5:30 p.m. on the day of the hearing, a meet-and-greet provided an opportunity for attendees to view posters of various aspects of the project and ask questions of Ecology and Yahoo! staff. From 5:30 to 6:30 p.m., Ecology and Yahoo! staff gave presentations followed by a question and answer session.

The formal hearing started at 6:30 p.m. Of the 19 people who attended this hearing, six people gave recorded testimony. See Appendix C for hearing records, including a transcript.

Response to Comments

Ecology accepted public comments on the draft updates to Yahoo! Data Center's air permit from February 25, 2016, through April 4, 2016. Ecology responded to a total of 78 comments. Comments were taken in written form and at the hearing. At the hearing, seven people submitted written comments, and six people gave testimony.

In this section, those comments are listed by commenter and followed by Ecology's response. Section 1 addresses comments received in written format either by email or mail. Section 2 addresses comments given at the public hearing. A complete transcript of the hearing from March 31, 2016, is available in Appendix C: Public Hearing.

To view the written comments as they were originally submitted to Ecology, including any supporting documentation referenced in the comment, please see Appendix B: Public Comments Received in Original Format.

Ecology thanks all commenters for their participation.

Table 1. List of Commenters

COMMENTER	FORMAT	DATE RECEIVED	COMMENT NO.	PAGE NO.
Danna Dal Porto	Written, Hand-delivered	03/31/2016	1-16	
Patricia Martin	Written, Mail	04/04/2016	17-39	
James Valentine	Written, Email	04/04/2016	40	
Brett Muhlestein	Written, Email	04/04/2016	41	
Beth & Charlie Miracle	Written, Email	04/04/2016	42-50	
Debbie Koehnen	Written, Email	04/04/2016	51-57	
William Riley	Written, Email	02/27/2016	58	
Mike Green	Hearing	03/31/2016	59	
Quinn Zorric	Hearing	03/31/2016	60	
Debbie Koehnen	Hearing	03/31/2016	61-66	
Danna Dal Porto	Hearing	03/31/2016	67-72	
Patricia Martin	Hearing	03/31/2016	73-77	
Alex Ybarra	Hearing	03/31/2016	78	

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Section 1: Comments received in written format

The questions responded to in this section are from written comments received either by mail, email, or hand-delivered. Many of the numbered comments are selections from a larger written comment received. 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.*

Comment Nos. 1-16: Danna Dal Porto, 03/31/2016

Comment #1

My first comment is to express my concern for the process Ecology is following with the Public Hearings in Quincy. On July 9, 2015, the Microsoft Oxford facility had a Public Hearing. (Exhibit 1) Quincy residents attended the meeting and made comments. Ecology as not yet issued a Response to Comments for that meeting. Sabey-Intergate -Quincy Data Center Public Hearing was January 7, 2016. (Exhibit 2) No Response to Comments has been issued for those public comments. These data centers have similar issues and, as an involved local resident, I spend many hours reading, studying and researching my comments. If I make a comment or ask a question, and receive no answer, I have no idea if I understand the permit or if my research has resulted in a reasonable contribution to the safe permitting of the data centers or not. Now Ecology is asking for a third Public Comment Period in eight months. I am being expected to do more research for the Yahoo! permit but Ecology has yet to respond to my two previous sets of comments. I am protesting the actions of Ecology in not providing a Response to Comments before having another Public Hearing.

Ecology Response to Comment #1

We recognize that it takes time and effort to do the research necessary to make informed comments on these data center projects, and we appreciate those efforts. Likewise, it takes Ecology time and effort to provide thoughtful responses. We generally provide our responses to comments at the time we issue the permits commented upon. The responses to the Microsoft Oxford comments have not been issued because the permit is still being processed. Ecology may have multiple permitting efforts in various stages of completeness at any one time as has recently been the case in Quincy.

We provided to this commenter, upon request, a copy of our draft response to comments for the incomplete Oxford project in December 2015 and again in January 2016. The Response to Comments for the Sabey Intergate revised permit was completed in April 2016, and was provided at that time.

Comment #2

In thinking about the delay in the Response to Comments for the last two data center projects, I have thought of a possible reason for that delay. On August 24, 2010, Microsoft Columbia was off-line to swap and install new feeders for their load expansion project. During that swap, the data center ran their generators for 99 hours. (Exhibit 3) Microsoft Columbia engines ran, without emission controls, for 99 hours. I do not believe those hours were factored into their original permit. I know that Microsoft Oxford has to do a utility swap and I am asking if the delay in their Oxford Response to Comments is to prevent the permit from becoming operational. The Oxford engines could operate for the swap and not, therefore, be out of compliance with their new permit. Or is Oxford operating currently under their old permit and, for them to operate for the electrical swap, will they be in violation of the old permit? I want Ecology to explain the reason for the eight-month delay in the Microsoft Oxford Response to Comments as well as the three-month delay in Sabey-Intergate Response to Comments.

Ecology Response to Comment #2

The delay in the Oxford permit process was requested by Microsoft as Ecology was preparing to issue the final revised permit. Microsoft stated that their request was driven by a need to submit additional information regarding additional changes that they wanted to propose. Ecology agreed to stop work on the project and the Response to Comments remains draft pending a second round of public comment. Both sets of comments and responses will be provided when the permit is issued.

The Oxford Data Center is currently authorized to operate under Approval Order #14AQ-E537 issued on August 15, 2014.

The delay in Sabey Response to Comments and permit issuance was due to lack of resources and staff, on Ecology's part.

Comment #3

I am requesting a Tier 3 review of the Yahoo! application for an air quality permit. The basis for my request is a Department of Ecology Air Quality Program Position Paper, August 2010. (Exhibit 4) The back history of data center construction covers several projects over many years. The Third Tier Review Recommendation, Microsoft Columbia, August 20, 2010, page 9, has information related to the concentration of data centers in Quincy:

> "Given the serious interest in building several more data centers clustered within the Quincy, WA UGA, and the potential for overlapping DEEP plumes, Ecology's Air Quality Program (AQP) recognized the need to consider the cumulative impacts of new and existing data centers on a community-wide basis. Therefore, a third tier decision will be used by Ecology to consider the approval of Microsoft and each subsequent company's proposal to construct data centers in the Quincy UGA." (Exhibit 5)

Ecology's pemitting of new sources of toxic air pollutants has three levels of review. Yahoo!s modeled emissions exceed the acceptable source impact levels (ASILs) and required a Tier 2 health impact assessment (HIA). Using the Ecology language of the proceeding document, I am requesting the third tier petition procedure specified in WAC 173-460-100 for the Yahoo!

permit. At another time I will request that data centers permit issued since this August 20, 2010, recommendation be reconsidered if they did not complete a Tier 3 review.

Ecology Response to Comment #3
Under Ecology regulations, third tier review is triggered when a project does not meet the health risk thresholds provided in the second tier review regulations. In 2010, Ecology intended to use a third tier review process as a tool to evaluate and manage the cumulative impacts of multiple new data center projects. After Microsoft and Yahoo! went through the third tier review process in 2010 and 2011, Ecology determined that the third tier review process would only apply to subsequent projects if it was required by rule (i.e., the project-specific cancer risks evaluated under 2nd Tier Review exceeded one in one hundred thousand, or the noncancer hazard was deemed to be unacceptable) . Ecology, however, continued to require that cumulative impacts be considered, and that if new sources significantly contribute to a cumulative cancer risk greater than 100 in one million, Ecology may require the use of additional controls (more than BACT).

Comment #4
Since 2010, Ecology has used the Community Wide model to limit the local cancer risk at 100 per million for Quincy. (Exhibit 6) The Yahoo! TSD, February 5, 2016, page 21, Item 6 states:

> "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 Yahoo!'s Project Genesis proposal in a community wide basis, even though it is not required to do so by state law." (Exhibit 7)

In a recent Yahoo! Ecology flier Publication # 16-02-006 the public is notified that community modeling is being used in Quincy and implies that this modeling "determines if the collective emissions would likely be harmful to human health." (Exhibit 8)) The Yahoo! TSD explains that "the proposed emission of DEEP and N02 exceeded the trigger level for toxic air pollutants (also called an Acceptable Source Impact Level (ASIL))." As required, Yahoo! completed a second tier review and a health impact assessment (HIA) but did nothing else to lower those emissions in excess of the ASIL. Putting the Yahoo! permit application under the "community wide" umbrella allowed for a level of 10 cancers from the Yahoo! facility and Ecology is recommending the permit be finalized.

I have been interested in "community wide" for several years. I am asking now, as I have in the past, for the documents and regulatory steps that created the "community wide" approach. Show me that "community wide" is a procedural step in air permitting and that it is legitimate as a regulatory step. To repeat myself, best I can tell, an Ecology employee, Gary Palcisko, developed this procedure in response to the large number of data centers being built and proposed for Quincy. It appears that the "community wide" numbers are arbitrary and without scientific basis. I have asked before if this analysis was peer reviewed. As before, I am asking if this analysis was proposed to the department management and has this been adopted as Ecology policy. How does this "community wide" fit together with Tier 2 and Tier 3 permitting? Where do Tier 4 controls fit into this scenario? By using this "community wide" approach, as long as cancers from DEEP are below 10 for each facility, the construction could continue with no apparent limits on dangerous emissions such as N02 and the TAPS. N02 is really dangerous and seriously effects many more people than DEEP but we are lured to focus on DEEP because cancer is a bigger deal. The "community wide" model is a shield for Ecology to allow data center construction to smother Quincy in toxic air. If "community wide" had any validity, the 62 cancers south of Yahoo! and the 58 cancers south of Sabey-Intergate would trigger emission controls on both these facilities as well as any further diesel permits in Quincy without Tier 4 controls. Prior to 2009, WAC 173-460 required that all sources of pollution use control technology to keep emissions of TAPS to below one cancer per million. Prior to the changes in the air quality rules of 2009, there were no permits issued that exceeded ten cancers per million. In 2009, the Washington State air quality protections that were in place were gutted to allow, among other things, this industrial concentration of diesel generators in Quincy. These facts should resonate with current Governor Jay Inslee as he has championed air quality as well as efforts in Washington State to slow climate change.

Prior to the implementation of this arbitrary "community wide" model, the Intuit Technical Support Document, December 24, 2007, lists the maximum risk allowed by a Second Tier Analysis as one in one hundred thousand. (Exhibit 9) The net effect of the difference in these numbers is that a large number of industrial facilities can be built before the limit (100) is reached to require steps such as emission controls be built to protect citizens in Quincy. The Yahoo! Second Tier Review Recommendation, February 17, 2016, page 22, is a map showing the Residential Receptors Near Genesis. The residence with the maximum cumulative risk is 62 cancers per million. (Exhibit 10) Ecology inserts a disclaimer that the DEEP risk indicated at that residence is exaggerated by the effects of Highway 28. On the same map is a residence, not near the highway, with a cumulative risk of 40 per million. This map is a Cumulative DEEP Concentration from Yahoo! and it references JUST project Genesis, not all 48 Yahoo! engines. I am asking for a map that shows the cumulative DEEP from ALL 48 of the Yahoo! engines. I would like a map showing the residences with the maximum risk be recalculated using emissions from all 48 Yahoo! engines.

Ecology Response to Comment #4

This comment contains multiple parts:

1) Requests the documents and regulatory steps that created the "community wide" approach, how it fits in with 2nd and 3rd Tier Toxics Review, and if this approach was approved by management at ECY.

Documents pertaining to the development of the community-wide approach have been provided to this commenter, upon request, in August 2014. Documents will continue to be made available through the public disclosure process.

Washington's air toxics rule allows an increased cancer risk of up to 10 cases of cancer per million people for each new source or project. The community-wide approach was conceived by the data center project team and approved by Air Quality Program management as a result of concerns about the possibility of rapid development of data centers in Quincy. Gary Palcisko was a part of the data center project team. 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.

The community-wide approach is authorized as part of Second Tier review, which authorizes Ecology to look at background concentrations of TAPs. WAC 173-460-090. In this case, Air Quality Program management used the community-wide approach to minimize the impact of individual and collective sources of pollution on any single person or on the community of Quincy. The goals of the community-wide approach consist of:

- Enhanced communication between the city, schools, data centers, local health department, and Ecology
- Establish a cumulative risk level that considers the impact of numerous sources of diesel particulate (not just the new source). Note that a cumulative risk level does not exist in current Washington State air regulations. There is no change to the risk level allowed by an individual new source subject to WAC 173-460 (Controls for new sources of toxic air pollutants). The cumulative risk level is based partly on a range of risks generally considered acceptable by several United States Environmental Protection Agency (EPA) programs.
- Evaluation of short-term impacts caused by emissions from all data centers' emergency engines during a system-wide power outage.
- Takes into account existing sources of diesel particulate to calculate cumulative risk.

Washington's air toxics rule still applies to projects subject to the community-wide approach. The community-wide approach is applied in addition to the other requirements of the air toxic rules. Ecology determined that even if a project resulted in an incremental cancer risk of less than 10 cases of cancer per million people, a cumulative cancer risk of more than 100 cases of cancer per million people would not be permitted in Quincy. This approach was intended to limit the total amount of new emissions that could affect Quincy residents. The community-wide approach is intended to apply to all new data center projects proposed in Quincy regardless of whether they are subject to 2nd tier or 3rd tier review. The cancer cap supports new source to take measures in addition to tBACT to minimize both air emissions and impacts to the community.

2) Requests a new map showing DEEP emissions from all 48 engines. Commenter infers that the map shows only impacts from project Genesis

Figure 5 in the Health Impact Assessment Recommendation Document includes the requested information. Figure 5 shows the cumulative concentrations of DEEP in the vicinity of project Genesis. In total, the cumulative analysis represented in this map includes estimates of allowable emissions from:

- Yahoo! Data Center (including emissions from the existing Yahoo! Data Center as well as from Project Genesis. The emissions from the existing Yahoo! data center differ from the limits in the current Yahoo! permit to reflect changes to that permit requested by Yahoo!)
- Intuit Data Center
- Vantage Data Center
- Sabey Intergate-Quincy Data Center

Additionally, the analysis considered emissions from SR28, SR281, and locomotives on the BNSF rail line based on 2011 estimates. Ecology also considered impacts from west side data center emissions estimates (Microsoft Columbia, Microsoft Oxford, and Dell) that were obtained from modeling conducted for a previous permitting project in Quincy.

<u>Comment #5</u>

I am asking for a map of that area of Quincy with those concentrated data centers that shows the cumulative DEEP emissions from the 48 Yahoo! engines, the 9 Intuit engines, the Sabey-Intergate 44 engines and the 17 Vantage engines. In less than a square mile, Ecology has permitted 118 diesel engines. The 17 Vantage engines have Tier 4 controls but the other 101 engines have no emission controls. Please note that the Intuit engines were permitted in to run for 400 hours (Exhibit 11) I want the maximum cumulative impacted residences identified with the cumulative DEEP emissions from all the 101 diesel engines in this concentrated area.

Ecology Response to Comment #5

Figure 5 in the Health Impact Assessment Recommendation document includes the requested information. Figure 5 shows the cumulative concentrations of DEEP in the vicinity of project Genesis. In total, the cumulative analysis represented in this map includes allowable emissions estimates from:

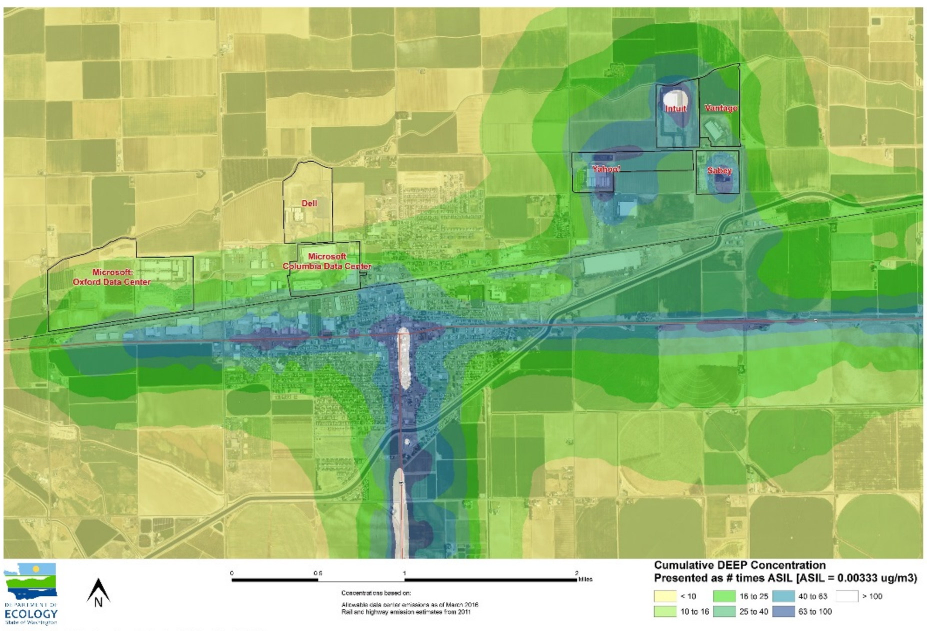
- Yahoo! Data Center (including emissions from the existing Yahoo! Data Center as well as from Project Genesis. The emissions from the existing Yahoo! data center differ from the limits in the current Yahoo! permit to reflect changes requested by Yahoo!)
- Intuit Data Center
- Vantage Data Center
- Sabey Intergate-Quincy Data Center

Additionally, the analysis considered emissions from SR28, SR281, and locomotives on the BNSF rail line based on 2011 estimates. Ecology also considered impacts from west side data center emissions estimates (Microsoft Columbia, Microsoft Oxford, and Dell) that were obtained from modeling conducted for a previous permitting project in Quincy.

<u>Comment #6</u>
I am asking for a Cumulative DEEP Concentration map covering the city of Quincy from Oxford to Sabey-Intergate as shown in the example included. (Exhibit 12) I want a second map to illustrate the Estimated short- term N02 concentrations.

Ecology Response to Comment #6

Ecology prepared the following map of Quincy-wide cumulative DEEP concentrations for the public meeting held on March 31, 2016.



A similar map showing maximum cumulative short-term nitrogen dioxide (NO_2) concentrations was not created by Ecology during the permitting process. Ecology determined that the method Landau Associates used to estimate cumulative short-term impacts was appropriate even though it overestimated the frequency with which meteorological conditions could produce NO_2 levels of concern, as well as the magnitude of maximum one hour impacts.

<u>Comment #7</u>
Reading through this Community Wide document, (Exhibit 6) some uncertainty existed in 2010 about the determination of the "background" risk to local health. In 2016, "background" is still an unresolved issue for Ecology permits. Real confusion exists if the "background" is a cumulative number from the single source data center or if the "background" is a total of all the other emission sources such as the nearby data centers, the railroad, the highway, trains or other industry. Some permits only reflect the emissions from the new engines being considered for the expansion, like Microsoft Columbia, and these permits pretend that the

engines right next to them do not exist. This compartmentalization of emissions, without regard to the diesel engines in the same facility, is an obvious construct to allow a permit to be issued without actually assessing the effects of all the diesel engines at a facility to operating at once. Appendix E of the Revised Yahoo! NOC, has a series of charts listing Capital Cost for DOC, DPF, SCR and Tier 4 technology. (Exhibits 13,14,15,16) The number of engines being considered for this estimate is 20 plus 5. The number of engines at Yahoo! is 48. These cost estimates for Tier 4 protections do not include the total number of engines at the Yahoo! data center. The omission of the total number of engines for these calculations makes the charts inaccurate and useless for public consideration. In addition to the error in number of engines, I want to use these Appendix E charts to point out that Yahoo! has received cost estimates for these controls from only one vendor, Cummins. I believe the company has the responsibility to have at least two estimates for consideration of emission controls.

The numbers on the following documents are not correct but we can look at them anyway. Revised NOC Genesis Revised, Appendix E-5 has DOC-Cost Effectiveness projections. (Exhibit 17) The cost considerations for DOCs , one of the emissions controls, is detailed on page 15 of the Yahoo! Intergate- Quincy Data Center *, February 5, 2016. {Exhibit 18) As usual, "Ecology concludes that the use of DOC is not economically feasible for this project.

Therefore, Ecology agrees with the applicant that these controls options can be rejected as BACT. I want to refer to the chart and state that the 25 year capitol recovery rate of 25 years does not reflect the number of years of life in these engines or the data center. These engines can work effectively for 75+ years so the Annualized rate of 25 years is inaccurate. These controls are a deduction for the company and the environmental and human health advantage for controls should be factored into the value of controls. Some members of Ecology, however, consider cost important in relation to benefit for the public. (Exhibit 19) Vantage data center was a champion for the Quincy community because Vantage data center came into the construction application insisting that Tier 4 controls be part of their permit. Yahoo! can be a Quincy champion as well by choosing to permit this large 48 engine facility under Tier 4 guidelines. * Please explain why the name of this facility is listed as Yahoo! Intergate-Quincy in this document.

Ecology Response to Comment #7

As noted in the TSD, local background values for PM2.5, PM10, and NO2 consisted of the ambient impacts, at Project Genesis' maximum impact location, caused by emissions from the nearby emergency generators and industrial emission sources at the existing Yahoo! Data Center, Sabey Data Center, Vantage Data Center, Intuit Data Center, and the Celite facility.

The BACT analysis is based on EPA manual EPA/452/B-02-001, which uses annualization periods from one to 25 years consistent and typical of BACT analyses. A BACT analysis was performed for all engines at the facility. Existing engines went through a BACT analysis prior to issuing previous permits. New engines which are part of Project Genesis went through a BACT analysis as part of this new permit. BACT vendor cost estimates are approximately consistent with other data center estimates. Yet, because data centers have been permitted at different times under differing circumstances, it is not expected that each applicant will obtain the exact same vendor cost estimates as other data centers.

This commenter states that the BACT cost analysis should include the existing Yahoo! engines as well as the new ones for Project Genesis. The comment suggests that the BACT cost analysis would produce different results if all the engines were included instead of only the engines from the new project. That is not the case, however, as the cost analysis is based on cost per ton of pollutant removed. Increasing the number of engines in the analysis also increases the costs of the engines as well as the number of tons of pollutants removed, resulting in a cost per ton of pollutant removed that is similar to that reached when only considering the engines for the new project.

The use of the term "Intergate-Quincy" was an error and the term will be removed from the final permit.

Comment #8

I understand that this Public Hearing is to grant a new permit to Yahoo!. Their original permit is being rescinded. Yahoo! is asking for a permit to operate all 48 engines without any of the previous restrictions on their operations. I want to see in the new permit a description of the proposed use of the original 13 engines, as well as the 10 other existing engines, integrated into the operation of the new facility. Ecology has requested the same information for PM. (Exhibit 20) I want to see in the permitting document how the first 13 + 10 engine operations are being changed. I want to see the modeling of those 13+10 engines as it applies to the total facility NAAQS. The Approval order lists the total facility emissions for all 48 engines but the Application only models the emissions from the new 25 engines. If the original 13+10 engine operations are being changed, but being run at the same time as the new engines, the emission charts must show all the 48 engines at once. I want to see operational charts that show the total emissions of 48 Yahoo! engines.

Ecology Response to Comment #8

The comment is incorrect about what Yahoo! is requesting. Not only do previous restrictions on existing engines still apply, but for some engines (engines R through 12), the new permit has increased restrictions.

A description of the use of all 23 existing engines is provided in section 3 and Table 3.2.1 of the permit. 13 of the original 23 engines will have decreased utilization as explained in Table 2 of the TSD. A decrease in utilization is not considered new or modified equipment, and does not trigger new source review. As noted in the TSD, local background values for PM2.5, PM10, and NO2 consisted of the ambient impacts, at Project Genesis' maximum impact location, caused by emissions from the nearby emergency generators and industrial emission sources at the existing Yahoo! Data Center, Sabey Data Center, Vantage Data Center, Intuit Data Center, and the Celite facility. Section 5.2 of the TSD shows compliance with the NAAQS.

Emissions of all 48 engines at the facility are listed in Table 1.3 of the permit. Hourly limits for existing engines are provided in Table 3.2.1 of the permit. Hourly limits for the new Project Genesis engines are provided in table 3.2.2 of the permit. Fuel limits for each set of existing engines R through 12 and engines 13 through R3 are provided, as well as for new Project Genesis engines are provided in Conditions 3.1, 3.1.1, 3.1.2, and 3.1.3, of the permit.

Comment #9

The emissions from old 13+10 engines must be represented in the calculations of BACT. Show me the charts that reflect the total emissions from Yahoo! with all engines in operation, such as the emissions in the "worst case scenario", a power outage. On page 9 of the Yahoo! Second Tier Review Recommendation, February 17, 2016, 3.4.2, Landau lists the cumulative exposure to DEEP in Quincy. (Exhibit 21) Listing the sources of emissions the documents says: "Yahoo! Data Center (including Project Genesis and requested permit changes to allowable emissions for the existing Yahoo! Data Center)." That statement implies that the DEEP calculations are based on all 48 Yahoo! engines. I want to see the chart that reflects that information.

Ecology Response to Comment #9

Total emissions of all 48 engines at the facility are listed in Table 1.3 of the permit. 13 of the original 23 engines will have decreased utilization and the utilization of the other 10 existing engines remains unchanged. Decreased utilization of equipment is not considered new or modified equipment, and does not trigger new source review (or BACT). However, BACT analyses were performed for all engines at the facility. Existing engines went through a BACT analysis prior to issuing previous permits. New engines which are part of Project Genesis went through a BACT analysis as part of this new permit.

Comment #10

I am complaining about the use of Moses Lake weather as a basis for Quincy data center projects. An August 6, 2015, email from Ranil Dhammapala, Ecology, to Chip Halbert and Mozan Totani, Yahoo! requests that the modeling for emissions be done using meteorological data from Moses Lake Airport acquired between 2001-2005. (Exhibit 22) I have complained before about using Moses Lake Airport to represent Quincy weather and Ecology's response is that "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 23) I have requested the document that verifies this statement. My question, again, is in what way does the PCHB have the scientific foundation to make a determination about weather in Quincy? Quincy is in a valley with a backdrop of the tallest point in Grant County, Monument. The Quincy data centers are constructed on the northern edge of town, at the base of these tall hills. We have weather influenced by these physical characteristics as well as weather generated by our proximity to the Columbia River. Our valley has experienced many days of inversions in recent years. The inversions have been spaced all throughout the year. The inversions are a result, in part, because of the valley formation. Moses Lake has no low spots and is not backed by large hills. Quincy weather is different enough, because of the inversions of toxic air, that it is not proper to use Moses Lake Airport weather to represent Quincy. In reference to the dates, 2001-2005, 40 CFR 51 Appendix W, 8.3.1.2 Recommendations, states: Consecutive years from the most recent, readily available 5-year period are preferred. (Exhibit 24) Yahoo! used Moses Lake weather as well as the old information from 2001-2005. (Exhibit 25) Those dates are over 10 years old and I am requesting current data be used for this air quality permit.

Ecology Response to Comment #10

It does not matter whether the modeling uses meteorological data from the 2001-2005 time period or the 2005-2009 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." This statement applies to general discussions of meteorology as well as to inversions.

Comment #11

Once more I am asking for air quality monitoring in Quincy. As the data center construction has increased in Quincy, so has the truck traffic, the train traffic and additional industry has been built. Quincy does NOT have any initial background air monitor data. All the construction has been designed and based on air modeling by various people, some from industry and some from Ecology. Air emissions and their patterns are science, requiring concrete data and specific hard information. We need to know and stop guessing about the reality of air quality in Quincy. Air monitoring equipment is necessary and, once again, I am requesting permanent air monitoring equipment be installed at Mountain View Elementary school (next door to Microsoft Columbia) and at Lazy Acres trailer park (across the road from Yahoo!) to provide 24/7, 365 days a year air quality records. I want the air monitoring records to be kept on file with Ecology, validated, reported to the EPA and available to the public in a format that can be viewed and easily understood.

Ecology has responded to my requests for air monitoring equipment by telling me that staffing and budgets are not available. I do not believe that would hold up under close scrutiny but I am very thankful that Ecology has started to involve the data center businesses in funding air monitors. (Exhibit 26) I encourage Ecology to consider adding requests for funding to every application for an air quality permit. I think it is very reasonable for developers to fund air monitoring technology as part of their permit to prove their facilities are operating in the public interest. I wish I could find a way to make that request retroactive.

Ecology Response to Comment #11

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 (see Response to Comment #16). If Ecology is able to monitor it will be done following strict criteria outlined in state and federal guidance.

With very few exceptions not applicable here, Ecology does not have the authority to require that sources of air pollution fund monitoring.

<u>Comment #12</u>

The Ecology handout "Focus on Yahoo! Data Center Expansion" (Exhibit 27) as well as the front page Columbia Basin Herald, Moses Lake newspaper (Exhibit 28) mentions the Yahoo! revision as including "conditions to protect the public from air pollution, including fuel limits and specified hours of operation for the generators". I read the Yahoo! documents and I did not see any specific language about fuel limits to protect human health. I want to know where to find that fuel limits protect human health in the Yahoo! documents. In fact, careful calculations show an additional 134,000 **additional** gallons of diesel will be permitted through this Yahoo! permit. Every one of the data center permits in Quincy already has specific hours of operation intended to prevent engine testing to occur at night or that testing be spaced apart to reduce the amount of emissions in the air. I do not see anything special in this Yahoo! permit to warrant the statement by Ecology that this permit protects human health.

Ecology Response to Comment #12

Section 3.of the Preliminary Determination establishes operating limits for the Yahoo! facility, including limits in fuel consumption at 3.1. Those fuel consumption limits have been established based upon Ecology's evaluation of the potential for community impacts from the proposed modifications at the Yahoo! facility through modelling to determine maximum concentrations of air contaminants. The predicted concentrations are below the health based air quality standards established for each of those air contaminants. Therefore, Ecology has determined that the engines are able to run within the limits without impact to public health.

Comment #13

I am asking for Ecology to create a format or provide some standardization for air quality permit application. This lack of consistency in applications is very difficult for public involvement. Each company creates their own application and locating and being able to compare numbers, emission rates or related data is unnecessarily difficult and time-consuming. Calculations in the various documents are reported in a bewildering number of modes: ppm (parts per million), bhp or hp- brake horse power and g/kWh. To compare documents, it might be necessary to convert from one f01mat to another. Permitting of air quality facilities is a complex and very detailed subject, however, the permit should not be so difficult that a committed and interested citizen cannot understand the basics of an application. If Ecology is dedicated to protecting public health, an effort should be made to facilitate public involvement. Making some consistency in permit applications would go a long way to improve the public's ability to be informed and educated on industry in their community.

Ecology Response to Comment #13

Ecology understands that the differences in applications may create difficulties for reviewers. Ecology has developed and requires completion of a standardized permit application form to provide basic facility information related to a project. It is not feasible to standardize the entire application because project proposals vary widely and are subject to varying applicable requirements. Ecology summarizes the emissions units and emissions in the draft Technical Support Document (TSD) that is provided to the public during the public comment period in a fairly consistent format. The Approval Order that is issued by Ecology does follow a consistent template which should simplify the comparison of approval conditions.

Comment #14

Cold-start emission information is part of an air quality permit application. As you can see from the photo, the "Black Puff'' (cold-start) generates huge amounts of visible emissions but, more importantly, many of the invisible toxic air pollutants. (Exhibit 29) Three Yahoo! Project Genesis documents identify the first minute (60 seconds) as the focus of Yahoo! concern for toxic emissions. (Exhibit 30,31,32) In Table 3 of the Yahoo! cold-start emission estimates, Yahoo! clearly used the first 60 seconds of emission as test data in their permit. In the Microsoft Oxford permit application, the cold-start emissions were estimated based on a 15 minute cold-start period for their facility. (Exhibit 33) The emission rates for chemicals vary depending on the length of the generator run. To test only 60 seconds of cold-start run does not capture the extent of the emissions given off in a black puff. I want Yahoo! to recalculate emissions of cold-start in their permit application to reflect a true capture of those black puff toxins.

Ecology Response to Comment #14

Yahoo based their cold start calculations on the California Energy Commission’s (CEC) 2005 report entitled “*Air Quality Implications of Backup Generators in California, Volume II (2005),*” which is the same information that the Microsoft Oxford (Oxford) cold start factors were based on. As shown in the document, cold start spikes occur within a 60 second timeframe.

The Yahoo! 60-second cold start estimates are higher than those used for Oxford. Oxford calculated lower cold start factors but implemented them over a longer period of time. If Yahoo! extrapolated its cold start estimates over the Oxford cold start timeframe, the cold start factors would be approximately the same as the ones used for the Oxford facility. Both approaches are acceptable.

Comment #15

Since I have not received a response to my previous comments from January 7, 2016, I am providing the first page of my Sabey-Intergate Comments because I am continuing to protest the timing of two Spokane Air Quality Program Public Comment Periods to bracket the Christmas Holiday Season. (Exhibit 34)

Ecology Response to Comment #15

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 – including getting public notices translated into Spanish, and placing ads and notices in relevant newspapers – which usually takes anywhere from two to four weeks to complete. All of this must occur after Ecology's technical staff have prepared their preliminary decisions on the projects and have their paperwork ready for public review. For the Sabey permit, it took Ecology staff from November 16 to December 10 to take the steps required to initiate the public comment period.

Comment #16

The Yahoo! Preliminary Determination, February 5, 2016, 10.6, page 14, is a requirement for Yahoo! to complete a health risk assessment specific to Quincy. (Exhibit 35) The due date is on or before July 1, 2017. Since Yahoo! has already completed the HIA for this permit, I want to know the reason for this request in the Preliminary Determination. The end of the paragraph is the statement:

> "In preparing the study Yahoo! may collaborate with the other owners of diesel engines in or near Quincy. Ecology shall review the assessment and take appropriate action based on the results."

I want to know what Ecology expects to achieve through this study and what "appropriate action" could be taken, after the permit is issued, to reduce any risk to the public from the Yahoo! data center.

Ecology Response to Comment #16

On September 24, 2012, the Pollution Control Hearings Board (PCHB) issued an Order to Yahoo! (PCHB No 11-067) stating:

> On or before July 1, 2017, Yahoo! 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. Yahoo! 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 Yahoo! 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.

Ecology's expectations for this study are detailed in the PCHB requirements presented above. Should the health risk assessment indicate that any one source or source category presents a public health risk to Quincy residents, Ecology may issue a regulatory order requiring that the source(s) be brought into compliance.

Comment Nos. 17-39: Patricia Martin, 04/04/2016

Comment #17

Cold Start Factors – The derivation of the cold start factors is flawed. The document from which they were derived, *Air Quality Implications of Backup Generators in California, Volume II (2005),* very clearly identifies elevated cold start emissions for CO, THC, NOx and PM (see Attachment A). Unlike the Revised NOC that attributes no "cold start" factor to NOx, the highest cold start emissions recorded in this study were for NOx (55.4 g/kWhr). Nowhere in the NOC application is a "cold start" factor for NOx applied, including but not limited to emission calculations, Potential to Emit (PTE), NAAQS compliance modeling, BACT analysis, etc. Instead, the NOC indicates that there is a NOx deficit and modeling is calculated around this erroneous claim (see Attachment A).

Please correct the NOx potential to emit to include the substantial "cold start" emissions as documented in the California Energy Commission's report *Air Quality Implications of Backup Generators in California, Volume II (2005).*

Additionally, the claim is made that "The California Energy Commission was unable to measure the time trend of DPM concentrations during the first several seconds after a cold start" as if to imply that PM was not included in the assessment of the cold start. This however was not the case. Particulate matter was found at 17.7 g/kW-hr averaged over a 30 minute period. Calculating "cold start" as a percent of runtime is not appropriate. For example, when runtimes are shorter the percent of "cold start" emissions will be greater than the percentage identified in the NOC. Please identify a more accurate way of determining an appropriate "cold start" factor.

Ecology Response to Comment #17

Based on the California Energy Commission's report titled: *Air Quality Implications of Backup Generators in California, Volume II (2005),* Yahoo! used a cold start factor of 0.999 (or 1.0) for

NOx. Ecology accepts this as appropriate. The amount of NOx emitted during cold starts is not higher than during normal running of the engines because NOx is formed during high temperature combustion. Less NOx is formed during cold start because the temperature is not so high. Ecology believes the way that Yahoo! calculated cold start factors as a percentage of runtime is appropriate for all pollutants considered. However, because the NOx cold start factor is approximately 1.0, the runtime is irrelevant for NOx cold start emission estimates.

See also the Response to Comment #14.

Comment #18

Condensable particulates -- The condensable particulates are underestimated. The same report used for the purposes of determining a cold start factor, *Air Quality Implications of Backup Generators in California, Volume II (2005),* also indicated that the condensable PM fraction is 3 to 5 times that of the Method 5 filterable results (See Attachment B). Please correct these estimates to reflect this factor.

Please also correct Condition 4 of the Preliminary Determination (PD) to include condensable particulate during stack testing. Presently, the PD only requires the filterable fraction of the particulate matter and VOCs to be tested. This is inappropriate since the NAAQS for PM is based on both the condensable (Method 202) and filterable (Method 5) particulate matter. Particulate matter is defined under the WA SIP to include both filterable and condensable particulate matter.

Additionally, the BACT analysis must include condensable particulate, which it does not.

Ecology Response to Comment #18

In determining whether the Yahoo! project would comply with the NAAQS, Ecology and Yahoo! added cold start factors and a 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 Yahoo!'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.. Also, the dilution tunnel system, which can be used for tier 2 testing, accounts for some of the condensable.

The final TSD provides revised BACT costs showing BACT conclusions using PTE values, which include condensables and cold start factors. These revisions do not change the final BACT determination.

Comment #19

The BACT analysis has been fraudulently conducted. Worksheets for DOCs, SCRs, DPFs and Tier 4 engines use numbers that are significantly less than the PTE for Project Genesis (see Attachments C,D, E and F), and egregiously deficient when the appropriate cold start factors and condensable particulate are properly represented. These deficiencies apply to NOx, VOCs, CO and PM. Please make the appropriate corrections before re-evaluating BACT, including but not limited to:

a. NOx PTE plus "cold start" factor (current calculations in Table C-1 ANNUAL OPERATION EMISSIONS indicate that NOx is lower during "cold start". This assumption is contrary to California Energy Commission's report, *Air Quality Implications of Backup Generators in California, Volume II (2005)* and to findings during performance test on Sabey engines in 2011. See Attachment A).
b. PM PTE plus appropriate condensable and "cold start" factor
c. VOCs PTE plus appropriate condensable and "cold start" factor
d. CO Pplus appropriate "cold start" factor

Engine run-times affect the "cold start" percentage applied. Conservative assumptions used in AERMOD should include more frequent "cold starts", and shorter runtimes.

Ecology Response to Comment #19

Except for PTE input values, the BACT methodology used by the applicant was appropriate, and takes into account cold start factors and consensables. Ecology agrees that the applicant should have used PTE values. The final TSD provides revised BACT costs showing BACT conclusions using PTE values. Using these revised values does not affect the final BACT determinations.

Yahoo! assumed 15 cold starts per year for each engine. Ecology believes that this was a sufficient number of cold starts.

Yahoo used a cold start factor of 0.999 (or 1.0) for NOx. Ecology accepts this as appropriate because the amount of NOx formed increases with the temperature of the engine. Emissions during cold starts, before the engine has had a chance to warm up, are therefore lower than when the engine is running at normal operating temperature. Ecology believes the way that Yahoo! calculated cold start factors for other pollutants was also acceptable.

See also the Response to Comment #14.

Comment #20

Stack diameter – Stack diameter stacked in the NOC application indicates an 18" diameter stack (Revised NOC page 5-2, 5.2.1). The AERMOD modeling was conducted assuming a 24" diameter stack (see Attachment G). This discrepancy affects dispersion and air quality concentrations. Please correct the modeling to reflect the 18" diameter stack and recalculate AERMOD to determine if NAAQS has been met.

Ecology Response to Comment #20

The emissions being modeled in Attachment G pertain to monthly maintenance tests, using a 2.75MW generator, which has a 24” diameter stack. This test was determined to produce the 4th highest emissions (out of which we took the 4th highest modeled value to determine the 8th highest concentration), which we needed to model to determine compliance with the NAAQS. 2MW, engines have 18” stacks., but they are not the ones being modeled in this scenario.

<u>Comment #21</u>

Operational loads for Engines R thru 12 have changed. What were the original emission factors used for calculating emissions from these engines? Table 3.2.1 indicates the operating restrictions for R through R3 engines, but identifies how only 10 of the R-12 engines will operate in a power outage. Please correct this error.

Ecology Response to Comment #21

Under the new permit, thirteen of the original 23 engines will have decreased utilization and the utilization of the other 10 existing engines will remain unchanged. Under the old permit, Engines R through 12 were authorized to run 200 hours per year. Under the new permit, they will be authorized to run only 100 hrs /year. In addition the loads at which Engines R through 12 have been changed. The old permit does not include any restrictions on operating loads for these engines. Under the new permit, these engines will be required to meet the more restrictive loads that are in place for engines 13 through R3. As a result, the new permit is more restrictive than previous permits for the existing engines. As shown in Table 3.2.1, the operating restrictions for R through R3 are now all the same including during a power outage. As noted in the title of the table, these restrictions are for “Engines R through 12 (13 engines) AND Engines 13 through R3 (10 engines).”

All existing engines, R through R3, must continue to meet the same tier 2 emission limits and tier 2 gram/kiloWatt-hour (g/kW-hr) emission factors as the tier 2 g/kW-hr emission factors for the new Project Genesis engines. Tier 2 emission factors are listed in both the permit and TSD.

<u>Comment #22</u>

Please recalculate the emissions for these engines using the appropriate NOx factor with "cold start".

Ecology Response to Comment #22

Based on the California Energy Commission's report titled: *Air Quality Implications of Backup Generators in California, Volume II (2005),* Yahoo! used a cold start factor of 0.999 (or 1.0) for NOx. Ecology accepts this as appropriate because the engines produce more NOx when operating at higher temperatures, so emissions of NOx during cold starts, before the engines reach normal running temperatures, are lower than emissions at normal engine temperatures.

Comment #23

Idle loads were used in past permits. What was the emission factor used for idle?

Ecology Response to Comment #23

As noted on page 6-1 of the application, "because manufacturers do not publish emission factors for idle operation, emissions factors for 10 percent load were used to estimate emissions for idle operation. Engines will not be operated at 10 percent load unless it is required for compliance stack testing." Because emissions at idle (zero percent load), are assumed to be less than at 10 percent load, Yahoo!'s emission estimates at idle are assumed to be overestimated.

Comment #24

Will Yahoo! continue to run as allowed under this exemption should a power outage exceed 100 hours?

Ecology Response to Comment #24

Ecology is not aware of which exemption is referred to in the comment. Yahoo! is required to follow the hourly restrictions of this permit. If Yahoo! operates more hours than allowed by the permit it will be considered a violation of the permit.

Comment #25

How many life/safety engines are associated with the original 23 engines as Yahoo!?

Ecology Response to Comment #25

Ecology does not know the answer to this question. 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.

Comment #26

Condition 1.2 Runtime Scenario is not permissible. Each engine is a source and if any source exceeds the 100 hr runtime it is required to add controls.

Ecology Response to Comment #26

Each engine is an emission unit, not a source. There is no Condition 1.2 runtime scenario in the permit. The TSD does not contain any approval conditions. All approval conditions that the facility must follow are listed in the permit and not in the TSD. Section 1.2 in the TSD refers to the approval conditions in the permit which limit all engines at Yahoo! to 100 hours or less per year per engine.

Comment #27

What does "full variable load" mean?

Ecology Response to Comment #27

"Full variable load" is a term used in Yahoo!'s application. It appears to refer to any random load less than or equal to 100%. In the previous permit, engines R through 12 were allowed to operate at any load up to 100%. Under the current permit, that is no longer allowed. However, the new engines will be authorized to run at any load. The modeling shows that emissions from the new engines will result in ambient air impacts that meet the NAAQS and the ASILs.

Comment #28

BACT calculations for reduction are only based on reductions at 100% load. This underestimates the efficiency of controls at lower loads (see Attachment H). Microsoft's stack tests conducted in September 2010 demonstrated that DOC's are capable of 65% reduction in PM, including both filterable and condensable (see Attachment I).

Ecology Response to Comment #28

BACT was based on expected typical engine load operation. Lower loads such as at 10 or 25 percent are expected to be used only during short-term testing. Depending on the length of time at a specific load, the DOC might not have warmed up sufficiently for maximum reduction effectiveness of other pollutants such as CO and VOCs. Long-term operation will involve higher loads. In addition, long-term operations produce higher emissions than the short-term testing scenarios. When the emissions are higher, the DOCs remove greater amounts of pollutants, so cost effectiveness increases. Yahoo! is not expected to use an emission reduction percentage different from what is provided from the manufacturer. However, even if 65 percent is used for the DOC reduction of PM, the costs would still be considered as unjustifiable (~$15,000 at 65% vs ~17,000 at reduction percentage provided by manufacturer). Also, when DOCs are operated in a manner that reduces PM by 65%, they increase NOx emissions.

Comment #29

Gary Palcisko directed Landau that they need not consider the "condensable" back half of PM because it was not considered by OEHHA in their toxicological profile for DEEP (See Attachment J). Please provide proof that OEHHA did not consider the condensable back half in its toxicological review.

Ecology Response to Comment #29

Ecology concurs with California Air Resources Board judgment that the measure of the filterable component of diesel exhaust best represents diesel engine exhaust, particulate because it is consistent with the methodologies used to estimate exposure concentrations used in deriving quantitative unit risk values. Appendix G of CARBs Staff Report: Initial Statement of Reasons for Proposed Rulemaking (available at URL http://www.arb.ca.gov/regact/statde/appg.pdf) includes a brief discussion of their rationale. In the final ATCM for compression ignition engines, CARB defines Diesel Particulate Matter (PM) as "the particles found in the exhaust of diesel-fueled CI engines as determined in accordance with the test methods in section 93115.14" Section 93115.14 specifies that PM is to be measured in one of three ways including ARB Method

5 using only measurements captured by the probe catch and filter catch (i.e., filterable) and shall not include PM captured in the impinge catch or solvent extract (i.e., condensable).

Comment #30

ERO Testing of engines by grouping and once every five years is inadequate. It will take 240 years to test them all and each engine is a source by itself.

Ecology Response to Comment #30

Ecology is not requiring that every engine be tested.

Conditions 4.2.1 and 4.2.2 of the permit require the following:

"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. Every 60 months after the first testing performed in Condition 4.2.1, Yahoo! 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."

Ecology believes that this testing scenario will provide a valid indication of emissions from groups of similar engines without requiring that all engines be tested, which would result in increased contaminant emissions.

In determining whether the Yahoo! project would comply with the NAAQS, Ecology and Yahoo! added cold start factors and a 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 Yahoo!'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. Also, the dilution tunnel system which can be used for tier 2 testing, accounts for some of the condensable.

Under the FCAA, each engine is an emission unit - not a source.

Comment #31

Please explain why Project Genesis is not being reviewed as a modification with increased emissions of pollutants.

Ecology Response to Comment #31

Project Genesis has new engines and is considered a new source, which is why Ecology has undertaken this New Source Review (NSR) in accordance with Washington Administrative Code (WAC) 173-400 "General Regulations for Air Pollution Sources. Although the operating requirements for some of the existing Yahoo! engines are changing, those changes are causing emissions from those engines to decrease, which exempts those changes from review.

Comment #32

Please explain how the maximum cumulative ambient impact from Project Genesis (plus background) can result in a 1-hr N02 level of 121 ug/m^3 in 2016 (see Attachment K, Table 10), when the modeling of the 10 engines in 2011-whose operation remains the same under the new permit – resulted in a 1-hr N02 level of 119 ug/m^3 from their operation alone (see Attachment L). Since those engines are still operating under the same scenario, their 1-hr N02 impact remains unchanged. Please explain then how the maximum cumulative ambient impact has decreased from 147 ug/m^3 to 121 ug/m^3. If the worst case scenario was modeled for the 10 engines and the worst case scenario was modeled for the 25 engines, how is the 25 engine impact is less?

Ecology Response to Comment #32

Because NO_2 is an hourly standard, plumes from different generators don't always overlap at their points of highest concentrations during the same hour. In the 2011 application, the source with the 8th highest emissions (one 2MW engine emitting at 3.3 g/s) was modeled. The stack was 9.1m above ground level. Maximum source-only impact was 119 µg/m^3.

In the 2016 application, the scenario with the 4th highest emission rate (one 2.75MW generator emitting at 9.3 g/s and two stacks at Celite emitting a total of about 1 g/s) was modeled. The 2.75MW generator stack was 12.8m above ground level. The 4th most impacted day (i.e. 8th highest concentration) was found to be 105 µg/m^3. The 119 and 105 impacts occur at locations about 600m apart. The higher stack would cause more atmospheric dispersion, resulting in lower concentrations compared to 2011.

In addition, the NW-AIRQUEST background concentration lookup tool was not available until 2013. As such ozone and NO_2 regional background concentrations used in the 2016 modeling were different but expected to be more realistic.

2011: ozone background of 40ppb and NO_2 background 28 µg/m^3.
2016: ozone background of 49ppb and NO_2 background 16 µg/m^3.

The higher ozone background used in Project Genesis modeling would cause more nitric oxide to be converted to NO_2. However the best estimate of the regional NO_2 background was lower.

Comment #33

Using the same attachments as in #16 please explain how the 1-hr N02 regional background level in 2011was 28 ug/m3 and now the regional background level is 16 ug/m3?

Ecology Response to Comment #33

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. This tool, which did not exist until 2013, provides the more accurate estimate of background concentration for NO2 of 16 ug/m3.

Comment #34

Why is Yahoo! allowed to use meteorological data from 2001-2005 when more recent information is available?

Ecology Response to Comment #34

It does not matter whether the modeling uses meteorological data from the 2001-2005 time period or the 2005-2009 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.

Comment #35

How much has Ecology allowed our air shed to degrade? What was the first estimated background for $N0_2$, PM_{10}, $PM_{2.5}$, TSP, CO, 0_3, VOCs?

Ecology Response to Comment #35

No monitoring data from Quincy is available for these pollutants, except for two summers of ozone monitoring in Quincy (summertime 4th highest value was 55ppb). A temporary PM monitor was placed in Quincy from January to April 2012, and recorded a maximum daily average of 11.8µg/m^3. Earliest estimates of these pollutants were simply based on the nearest available monitors, which may not have been representative of conditions in Quincy. More recently, Ecology has used a fusion of CMAQ modeling and monitoring data to establish “background” concentrations across the state.

Ecology has heard your concerns about airshed degradation and is in discussions with data centers and the City of Quincy to establish a permanent air quality monitor in the area.

Comment #36

What is our ground level ozone level and why isn't it being considered as part of the NAAQS?

Ecology Response to Comment #36
Quincy's average ozone level, based on monitoring conducted in the summer of 2010, was 30 ppb. The NW-AIRQUEST background lookup tool estimates the current design value to be 52ppb (and recommends a value of 49 ppb for use in AERMOD's PVMRM module). This is well below the Federal standard of 70 ppb.

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

<u>Comment #37</u>
Was Cummins the least expensive provider of control technology? Iwas unable to locate a bid document or estimate provided by Cummins. Please provide a copy of the bid documents or quotes from Cummins regarding the cost of a DPF, DOC, SCR and Tier 4 engine. Please compare the higher cost estimates used in this BACT analysis with the cost estimates provided by Landau during the permitting of Sabey in 2015. Please use these lower cost estimates and recalculate the affordability of controls at Yahoo!

Ecology Response to Comment #37
Ecology has no way of knowing if Cummins was the least expensive provider of control technology. The BACT vendor cost estimates provided by Yahoo! are approximately consistent with other data center estimates. However, because data centers have been permitted at different times under differing circumstances, it is not expected that each applicant will obtain the exact same vendor cost estimates as other data centers.

<u>Comment #38</u>
Finally, there were two statements made at the Public Hearing that deserve explanation. The first was a comment by Gary Huetsiger [sic] regarding a data center's credit rating and ability to borrow money as it applies to BACT. Please explain what was meant by this.

Ecology Response to Comment #38
Ecology did not make a statement about any data center's credit rating or its ability to borrow money as it applies to BACT. During the presentation period prior to the March 31, 2016 public hearing in Quincy, Ecology provided a definition of BACT pointing out that BACT is determined on a case by case basis taking into account *"energy, environmental, and economic impacts and other costs"* consistent with the definition of BACT WAC 173-400-030(12). The BACT analysis and decision making for Yahoo! Project Genesis is provided in the TSD for this permit.

<u>Comment #39</u>
The second statement was made by Yahoo!'s representative who claimed that Yahoo! has *"never"* had an unplanned outage while operating in Quincy. This is news to those of us who live here. Please provide proof of this statement.

Ecology Response to Comment #39

Yahoo's representative misstated that Yahoo! has never had an unplanned outage while operating in Quincy. All data centers are required to report to Ecology the hours and reasons for operating the engines. On several occasions, Yahoo! has reported operation of its engines during power outages. Yahoo has provided the following information for 2013 to date:

> Planned Outages (last 4 years): The following are total run hours for all generators for planned outages including maintenance and load bank testing.
> 2013 = 93.35
> 2014 = 434.34 (Higher run hours due to GCPUD 230 KV transmission upgrade)
> 2015 = 109.48
> 2016 = 32.4
>
> Unplanned Outages (Last 4 years): The following are total run hours for all generators due to unplanned outages when utility was unavailable or caused by a utility incident (voltage sag etc.) that caused us to go to generators for a predetermined time.
> 2013 = 77.48
> 2014 = 35.01
> 2015 = 6.5
> 2016 = 0

Comment No. 40: James Valentine of Energy & Environmental Partners, 04/04/2016

Comment #40

In the Draft Technical Support Document for Preliminary Determination of Approval Order XXXX for the Yahoo! Data Center, dated February 5,2016, the facility wide potential to emit NOx is listed at 95 TPY, while that for project Genesis is listed in parenthesis as 62.9 TPY (See Table 1.1). Yahoo evaluated the cost effectiveness of NOx reduction using SCR for the proposed 25 new engines in Project Genesis as approximately $19,500/ton and therefore Ecology agreed with applicant that SCR was not cost effective and can be excluded as BACT (pg 12/21; 4.1.1.1).

The BACT cost effectiveness calculation at $19,500/ton should be reviewed with these comments in mind:

1. The annual Potential to Emit (PTE) for Project Genesis is 62.9 tpy as further identified in Table 5, Project Emissions Summary, Project Genesis, described in the Revised Notice of Construction-Supporting Information Report, Project Genesis prepared by Landau Associates and dated December 23, 2015 (the "Landau report"). This PTE is based on using the Not To Exceed (NTE) emissions data supplied by the engine manufacturers. The NTE data reflects emissions that are likely to be measured in the field based on actual ambient conditions for humidity and temperature, fuel variation, engine-to-engine variation and measurement variation. The

Nominal emissions value for the engines are also presented by the engine manufacturers and are always lower than the NTE emission rate. The Nominal value reflects controlled/corrected laboratory conditions under which the engine is tested by the manufacturer.

Therefore the use of the higher NTE uncontrolled emission rates and the corresponding higher PTE value reflected in the permitted annual emissions for project Genesis appears a more appropriate choice in evaluating the cost effectiveness for SCR. However the BACT analysis presented in Appendix E-7 of the Landau report uses the Nominal uncontrolled emission rate of 48 TPY in calculating the cost effectiveness versus the allowable 62.9 TPY derived from the Not to Exceed emissions rates. Assuming a 90% reduction efficiency for SCR, the tons reduced per year would be 56.6 TPY versus 44 TPY used in the BACT analysis. The BACT analysis should be rerun using the permitted PTE value of 62.9 TPY for the uncontrolled NOx and a 90% reduction in the calculation of cost effectiveness. This will drive the cost effectiveness number down and potentially closer to the $10,000/ton hurdle rate used by Ecology in determining BACT for NOx.

Second, in the BACT analysis at Appendix E-3 of the Landau report (SCR Capital Cost) the cost for the SCR purchased equipment price is listed at $195,000 for the 2 MW unit and $240,000 for the 2.75 MW unit and referenced as supplied by Cummins. The detailed quotation for these cost numbers is not presented in the report. The one reference price at page 113/144 in the Landau report is from MTU (Pacific Power) for an integrated Tier 4 package, and the breakout price for the SCR equipment alone is $135,000 for a 2 MW engine and $ 141,250 for a 2.75 MW engine. Therefore it appears appropriate to use the $135,000 for the 2 MW SCR equipment price and the $ 141,250 for the 2.75 MW SCR in determining the cost effectiveness BACT calculation for SCR alone.

Support for a 2 MW SCR capital cost of $135,000 can also be found in a similar report from Landau to Ecology for the Sabey data center (March 4, 2015) which included a quotation from Caterpillar for a Tier 2, 2 MW engine SCR (including silencer) reported at $135,800. In that case the BACT analysis used the $135,800 equipment cost in the calculation of SCR cost effectiveness for a similar 2 MW engine.

Finally, it should be noted that the recent migration of commercial off-road, mobile and marine SCR systems into the stationary engine market is directed at further reducing the SCR equipment cost for large stationary engines. Quotes for this type of SCR equipment can be obtained from aftermarket SCR system suppliers who combined have supplied SCR systems for hundreds of stationary engines.

Ecology Response to Comment #40

Ecology agrees that the applicant should have used the higher PTE values. The final TSD provides revised BACT costs showing BACT conclusions using PTE values, which are unaffected by these revisions. BACT vendor cost estimates are approximately consistent with other data center estimates. Yet, because data centers have been permitted at different times under differing circumstances, it is not expected that each applicant will obtain the exact same vendor cost estimates as other data centers. Ecology believes the applicant obtained cost quotes from the appropriate vendor suppliers for the equipment to be used at Yahoo!.

Comment No. 41: Brett Muhlestein, 04/04/2016

Comment #41

I am pleased to see the expansion of business in Quincy. It bring[s] additional jobs and opportunities to our local community. It is also noteworthy to see the efforts Yahoo is making in keeping our community safe. They are reducing emissions by 17% year over year and are reducing the run time on several of their generators from 200 hours to 100 hours. It shows a level of commitment that respects the needs of the community while addressing growth. I for one am happy to support the permit and look forward to the long term sustainability Yahoo will have in Quincy.

Ecology Response to Comment #41

Thank you for your comment.

Comment Nos. 42-50: Beth & Charlie Miracle, Quincy Property Owners, 04/04/2016

Comment #42

Instead of allowing the Yahoo data center in Quincy to install additional diesel generators which will increase toxic air pollutants potentially more than doubling emissions by the Yahoo data center alone, why not have the data center(s) actually reduce its use of diesel generators by exploring alternative backup energy options, such as natural gas, solar, wind and other alternative or renewable energy?

Ecology Response to Comment #42

The Washington Clean Air Act requires that, prior to construction, Ecology must approve a project that includes a source of air contaminants. However, the Act does not authorize Ecology to require the use of particular types of emission control equipment. See RCW 70.94.152(6). Therefore, we cannot require the data centers to use alternative technology to supply their backup energy needs.

Comment #43

How can diesel generators which emit exhaust which carries toxic air pollutants be relied upon for backup power during the winter months when there are typically stagnant air advisories and burning bans in the surrounding area? This would seem to be another prudent reason to use other cleaner/alternative power sources for backup energy and/or generators. Also the data center(s) are not even using the lowest emission type of diesel generators. Why aren’t the data centers being required to use the lowest possible emission type of diesel generator?

Ecology Response to Comment #43
Air dispersion modeling, which takes into account the stagnant air advisories that generate burn bans, indicates that emissions from the engines meet state requirements. Thus, the data centers are being required to meet the requirements of state and local law.

Comment #44
Since natural gas is the cleanest of the fossil fuels in terms of greenhouse gases and, as a relatively low carbon, cost effective fuel that can help meet CO2-reducation gas, why not have the date center(s) diversify generator types relied upon for backup during power outages? Natural gas may offer a more affordable and definitely offers a cleaner solution.

Ecology Response to Comment #44
These are good arguments, and should be made directly to the data center owners. Ecology does not have the authority to require sources to use any particular technology, as per RCW 70.94.152(6).

Comment #45
Why not have the data center(s) instead install an alternative energy source(s), such as a solar array, which could be used as a source of power by the facility during power outages? The data center might also reap benefits produced by a solar array, Washington State Production incentive and federal tax credits. Excess power produced could be sold to Grant County PUD when not needed by the data center. The solar array could be installed on the roof top making the best use of valuable space/land. Why not incent the data centers to install the alternative energy sources now as a potential investment in and concern for the residents of the surrounding community?

Ecology Response to Comment #45
These are good arguments, and should be made directly to the data center owners. Ecology does not have the authority to require sources to use any particular technology, as per RCW 70.94.152(6).

Comment #46
In 2006, Washington State voters declared that 15% of the state's electricity must come from alternative sources, such as wind, solar, biomass and others by 2020. Wouldn't allowing large users of electricity such as the data center(s) to rely upon diesel generators for backup energy rather than alternative sources of power for backup negate this and actually increase the emission of greenhouse gases?

Ecology Response to Comment #46
These are good arguments, and should be made directly to the data center owners. Ecology does not have the authority to require sources to use any particular technology, as per RCW 70.94.152(6).

Comment #47

Nitrous oxide emissions are even deadlier than the particulates. Another imperative concern is that two existing schools and previously existing low income housing in Quincy, as well as land already zoned for additional low-income housing, are located in the most toxic zone. What will be done to ensure the safety of children attending these schools and the residents of the low-income housing who may not be able to afford proper legal representation?

Ecology Response to Comment #47

Note that the relevant pollutant is nitrogen oxides (NOx), not nitrous oxide (N_2O), which is not a toxic air pollutant. The purpose of the preconstruction permit process is to ensure the ambient impacts of air pollutants are evaluated prior to the establishment of a new air pollution source. As part of the process, Yahoo! had to demonstrate that their emissions would not result in a violation of National Ambient Air Quality Standards (NAAQS). Due to the infrequent use and limited simultaneous operation of the engines, Yahoo! was able to demonstrate that their emissions would not cause an exceedance of the nitrogen dioxide NAAQS at any location in Quincy, including those locations mentioned in the comment. Ecology acknowledges that if data centers must use their engines under emergency conditions during periods of unfavorable dispersion there is the potential for elevated levels of nitrogen dioxide in the community, but the probability of such an occurrence is very low.

Comment #48

Given the high number of diesel generators that have already been installed, why isn't a four-tier toxics review process being used? Why aren't the best test controls being used? If there was only one data center in the Quincy area, a second-tier toxics review process might seem reasonable, but there could be a total of 220 generators if the additional generators are approved. Doesn't the high number of diesel generators in a relatively small area warrant a four-tier toxics review process? Also, the health impacts assessment (HIA) issued by Landau Associates (hired by the Yahoo data center) contained errors which were not caught by Yahoo or the Department of Ecology and have not been corrected. How can this report on the health impacts be relied upon? Why isn't another report by an impartial party being done? Why hasn't the existing report been corrected or the results questioned?

Ecology Response to Comment #48

There is no four-tier toxics review. WAC 173-460 specifies that there are three tiers to reviewing a new source of toxic air pollutants. Because the proposed emissions from Yahoo! Genesis did not result in an increased cancer risk of more than one in one hundred thousand, and the non-cancer hazard was considered to be acceptable, a third tier review was not required. Ecology agrees that the large number of data centers in Quincy with their large numbers of backup diesel generator engines is a cause for potential concern. To address this concern, Ecology developed the community-wide approach to emissions of DEEP from the engines.

Without more specific information identifying the claimed errors in the HIA, Ecology cannot directly respond to the claims concerning errors in the HIA. . Generally, Ecology evaluated the HIA to determine if the health risks were adequately and appropriately described.

Comment #49

If the additional 25 diesel generators are approved, there could be 220 diesel generators at the data centers in Quincy. The generators are turned on and run for a period of time to be properly tested to ensure they are ready for use in a power outage. If only one generator is tested per day, this would be 220 days out of 365 days per year or 60% of the year. This does not now appear to be an insignificant number of diesel generators emitting an acceptable level of toxic air pollutants. Who will be responsible for the health of residents currently living in the immediate area when it's discovered that it wasn't an acceptable level? And what about our property values? What about the health risks for the farmers working the surrounding farm ground?

Ecology Response to Comment #49

As part of its analysis, Ecology considers the emissions from various uses of emergency engines at Yahoo! Genesis and other data centers in Quincy. Part of this analysis is used to determine if these uses would violate NAAQS at any location in Quincy (considering both project-related emissions and local and regional background levels). Emission limits are included in the permits to ensure that air pollution levels from these sources do not contribute to a violation of NAAQS which are intended to protect public health. On-going compliance inspections and engine tests are intended to verify that each facility is complying with all the conditions of its permit including emission limits.

Ecology's role regarding air permitting data centers in Quincy does not include considerations for a project's effect on property values.

In evaluating the health risks posed by new sources of air pollution, Ecology considers the most impacted receptors. Most often, residential receptors incur the highest long-term risk because they are likely to be present in the same location for longer durations than individuals who work intermittently at surrounding farms or commercial areas.

Comment #50

Yahoo (and the other data centers) has the ability to do better, but they are not. Wouldn't requiring the data center(s) to explore cleaner and alternative energy sources demonstrate more concern with toxic air pollutants and potential health problems to Quincy Valley residents? The data centers were attracted to the area because of the low cost of power, so they are making significantly more than if the facility was located elsewhere. The increased savings from low-cost power makes it far more feasible to install alternative backup power sources. Why not require the data centers to invest a little bit of the profit into alternative backup energy options? There are family residences within a half mile of the data center. My sister and her family live in the north residence. I do not want their family or neighbors to become a statistic. The health risk is ***not*** acceptable especially given that there are other potential alternatives. Why aren't those being explored? Why are we settling for the easy out?

Ecology Response to Comment #50

These are good arguments, and should be made directly to the data center owners. Ecology does not have the authority to require sources to use any particular technology, as per RCW 70.94.152(6).

Comment Nos. 51-57: Debbie Koehnen, 04/04/2016

Comment #51

When the local PUD informed Yahoo that there would be a planned outage, did Yahoo transfer the data storage to another plant during that time or did it use its back up generators to handle the outage? (We also received this power outage notice. I believe the outage was scheduled for at least an hour.) We were informed by DOE that running the generators was expensive and the data centers would not be running the generators more than 15-20 minutes before the storage was transferred to another center. So what did Yahoo do? Since they knew the outage was coming, if they really cared about the quality of our air, they would have made the arrangements ahead of time so no generators needed to be run.

Ecology Response to Comment #51

Ecology does not mandate whether a source is required to transfer data rather than run generators. Yahoo! will determine appropriate action on a case-by-case basis. Ecology has limited total generator operations to appropriate values.

Comment #52

Did the DOE know about the 2 new schools which will be built a 1/2 mile from Yahoo on Road 11 when they made their Health Impact Assessment? What is the impact on these new schools from the emissions created by Yahoo, and from the community wide assessments from all the data centers and other emissions contributors?

Ecology Response to Comment #52

Ecology was aware of the interest in building a new school, but did not know the location. In evaluating health risks as part of an HIA, Ecology relies on current land use zoning to appropriately characterize potential future health risks at undeveloped parcels. Local planning officials should consider adjacent land use - both in place and planned - when considering zoning changes. Furthermore, it is Ecology's understanding that, with regard to school siting, the local health officer must approve the proposed development site before a new school facility is constructed.

Comment #53

There are alternatives to back up generators. When are the data centers in our area going to start using these alternative controls to reduce emissions? When is the DOE going to start pushing for these alternative controls to protect our air? Our power was affordable, so the centers didn't see the need for alternatives, as in other areas in the country. However, using these alternatives would cut emissions. Now that all available power has been used up by the centers and we are unable to sell our excess power to other areas, our power prices are starting to rise. Of course the data centers rallied for the public to absorb the increases and not themselves. They won, and had the lowest rate increases for power. The people in the community lost and are bearing the cost with the highest rate increases. Now would be the time to strongly encourage the centers to use these alternatives due to limits of our hydro power and the possibility of increased rates.

Ecology Response to Comment #53
These are good arguments, and should be made directly to the data center owners and to the PUD. Ecology does not have the authority to require sources to use any particular technology, as per RCW 70.94.152(6). Nor does Ecology have any jurisdiction related to the provision of or the cost of power in Washington communities.

Comment #54
Why isn't Yahoo using Tier 4 filter controls on their generators? Is what Mike from Yahoo said correct about the filters or was he just making his own toxic emissions about the generators? If they aren't going to use the best filters available to control the emissions, or they don't feel the filters are effective, if they truly cared about the community, will they start using alternative controls to reduce emissions? Why aren't they looking into other ways to control emissions?

Ecology Response to Comment #54
As presented in the Technical Support Document for this proposed action, 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 Yahoo! (approximately 2.0 MWe to 2.75 MW). Instead, 40CFR60 requires the engines at Yahoo! to meet the Tier 2 emission levels of 40CFR89.112. The use of tier 4 emission engines can present problems in that the emission controls do not become effective until the engines have operated long enough to allow the controls to reach certain temperatures, which often takes longer than the engines need to run for routine testing and maintenance purposes.

See also the Response to Comment #42.

Comment #55
Flint, Michigan is going through a difficult situation due to a toxic situation. They are in the "I told you so" stage. When people get to the "I told you so" stage, it's too late, the damage has already been done. The children in their town have suffered the consequences. I have been speaking out about the data centers even before they were built. I went to the first zoning meeting, where the Port & City of Quincy had submitted a plan to have land rezoned from agriculture to industrial so Yahoo could be built. I suggested building the data centers out of the irrigation system, on non-productive land, which would have put the data centers out of town. They would not be near schools or people in our community. But the City of Quincy would not have received the money for it's coffers if the centers were built out of town. The county would have earned the money. The rezoning passed. The data center was built and others moved in. Now my house has been identified as Residential North because of the toxic levels of the plume.

I have children who have already been exposed to 10 years of emissions. I am disappointed the data centers have been allowed to continue their emissions with little or no regard to the quality of our air and the health of the community. Yahoo has it in their power to put in better emission controls, but are evading the issue because they don't seem to see it as a problem. When will they be held accountable for their actions? When will they use their money for emission controls instead of giving money for firework shows or school sports teams? When we arrive at the "I told you so stage" it will be too late, and the 'support' they are showing our town will seem superficial, more like bribes for us to ignore the real issue of poor air quality. Since my house is an 'identified' house, I am yelling, "I told you so!"

Ecology Response to Comment #55

Ecology is unable to address the community zoning decisions mentioned with this comment. Ecology has, however, evaluated the potential emissions associated with each and every data center that is operating in Quincy and determined that those sources, when operated as authorized by their air permits, will not exceed health based air quality standards. Additionally, Yahoo! and other data centers will be conducting a health risk assessment in 2017. See Response to Comment #16.

Comment #56

With 220 back up generators in our town, it's time to start adding a fee to each generator in town to help pay for air monitoring. Why don't you start right now by requiring a fee? $1,000 per generator would pay for the monitoring. If they can't afford it, maybe they will consider alternatives to diesel generators? Yahoo's permit, Microsoft's permit, Sabey's permit. Those generators are polluting our air, so it is only fair they help pay for the monitoring.

Ecology Response to Comment #56

Ecology does not have the authority to require new sources to pay for ambient monitoring.

See also the Response to Comment #11.

Comment #57

I was saddened by the errors in the reports for this permit. When simple errors are made, it calls into question the reliability of the reports and the ethics of the involved parties. Will the corrections be made to the reports and calculations checked before the permit is issued?

Ecology Response to Comment #57

In future comments, please identify specific errors that we can evaluate and correct. Ecology takes great care to issue preliminary determinations, approval orders and technical support documents without errors. Nevertheless, Ecology acknowledges that some minor errors may occur in development of any documents and appreciates that reviewers are able to bring those to our attention. Appropriate corrections will be made prior to issuance.

Comment No. 58: William Riley, Columbia Basin Environmental Council, 02/27/2016

Comment #58

I have visited the site at which Yahoo is applying for the Air Quality Permit. This is an area that is constantly subject to air mass movement from the Columbia River Basin. Stagnant air issues, ground fog, etc. are not of concern to this geographic area.

I endorse the permit application and the issuance of same.

Ecology Response to Comment #58:

Thank you for your comment.

Section 2: Comments received at the public hearing

The following comments are from the transcription of Yahoo!'s public hearing on March 31, 2016. Anywhere the transcription service misspelled names or acronyms, it was replaced with the correct spelling. To view the entire transcription, please see *Appendix C: Public Hearing*.

Comment No. 59: Mike Green, 03/31/2016

Comment #59

My thought on data centers are ... With any community, it's important to have growth, because as families grow they have children and it's ... A lot of communities see how their children grow up and they just go away. It's my personal thought is that this type of industry is a pretty clean industry compared to a lot of industries that are out there. This is probably a good thing for the community, and it offers non-farm type jobs ... Not that farming's bad ... But everybody's got their own likes and a lot of young children may not want to be farmers or they want to do something different. I think it offers a good opportunity for young folks to stay in their community.

Ecology Response to Comment #59

Thank you for attending the public hearing and for your comments.

Comment No. 60: Quinn Zorich, 03/31/2016

Comment #60

Just came here to get some knowledge. That's why I'm here.

Ecology Response to Comment #60

Thank you for attending the public hearing and for your comment.

Comment Nos. 61-66: Debbie Koehnen, 03/31/2016

Comment #61

I have some questions about the permit. When I refer to numbers that will be coming from the health impact assessment report on the department of ecology website, which was published February 17th, 2016. Under section 5 Uncertainty, in the report it says there's a lack of exact knowledge because of air dispersion modeling. My question is about air monitoring devices. We would be able to remove the uncertainty with actual data from air monitoring devices and then we could check to see if the computer modeling is accurate. One gentleman asked if we take into account the agricultural admissions as well. Air monitoring would take care of that. When are we going to get those air monitors in here so we can eliminate all this uncertainty?

Ecology Response to Comment #61

See the Response to Comment #11.

Comment #62

My next question refers to figure 1 on the report. It was a map that listed the residential permits ... Or the residential parcels in the area ... Where the Genesis DEEP concentration could exceed the ASIL. My house is the really close to Yahoo. We're neighbors. It's not identified in red. It's not circled in red. I'm like ... Is that going to be fixed? Can you ... It's funny, because I was identified as the north residential parcel, where the cancer risk is up to 6.3 now. There's one other residence that's up to 6.9, which is the one they said [inaudible 05:03] 7, but I'm up to 6.3 and table 2 under section 3.4 Cancer risk, specifically 3. ... 4.1. Are you going to consider me as a residence? We've been there for 112, 114 years. We do have some houses there.

Ecology Response to Comment #62

Ecology believes that the commenter is referring to Figure 1 of the HIA recommendation document in which Ecology identifies the parcels coded with residential land use codes from tax parcel information. Ecology recognizes that not every home or residential parcel is captured with this data source, however, Landau and Ecology made efforts to identify residential land uses that were potentially most exposed to emissions from Yahoo! Genesis. As alluded to in the comment, Figure 3 of the HIA identifies the north residence as a specific location in which Ecology considered long-term exposure to DEEP emitted by Yahoo! Genesis.

Comment #63

The next one is under section 5.2 Emissions. It said that the power outages are infrequent, but there's also testing times allotted, but the power centers don't wait until we have power outages. If they suspect we might have a power outage, they want to be prepared, so they start up the generators just in case. The logs are really important. Those electrical logs. Can we get access to the logs to make sure? We're sitting there in our house, watching the black smoke come out and it's a little disconcerting, especially when there's inversions and the black smoke is coming out. Those logs ... Can we get ahold of them? That would be great.

Ecology Response to Comment #63

Provision 9.2 of the proposed permit requires Yahoo! to record and report to Ecology, on an annual basis, reasons for operating engines. Those annual reports are available from Ecology through a request for public records.

Comment #64

Under 5.4 Sensitive Individuals, that would be my family. I am having problems breathing tonight. I haven't had to use inhalers for about 10 years. Now I'm on two inhalers, and I have a whole pharmaceutical bag full of medicine that I'm having to take. I lost a whole month in February where I was sick, above and beyond my insurance. I have $500 of medical bills. My daughter had pneumonia, my husband was unable to wear his contacts, because he had eye problems, which are all the symptoms of, you know ... These could create problems. I'm wondering how come my quality of life can be taken away in the name of progress. It seems we should be preserving what we have and keeping our beautiful clean air beautiful and clean. That's one of the perks of living here.

Ecology Response to Comment #64

Ecology has reviewed the proposal and established conditions that ensure that the Yahoo! facility will be operated in a manner that will not result in exceedances of the established air quality standards.

Comment #65

The other thing I have a concern about, there's two figure 3s on this document. If the first figure 3 talked about the nitrous oxide concentrations and where they're exceeding the ASIL limits, we have a high school and a junior high in that area right now and we're planning on building schools so that high school is going to be turned into a junior high, the junior high is going to be turned into an elementary school. For 8 years, those children will be in this area of noxious nitrous oxide concentrations. If they happen to live in one of the residential areas that are also in this area to be planned.

Ecology Response to Comment #65

Ecology is not certain which document contains two figures labeled as Figure 3. The Health Impact Assessment Recommendation document contains a Figure 2 which shows nitrogen dioxide levels that exceed the 1-hour ASIL. Ecology has acknowledged that there is the potential for nitrogen dioxide to rise to levels of potential concern if a system-wide outage affects multiple data centers simultaneously during periods of unfavorable dispersion. The likelihood of this occurrence is extremely low, but Ecology will continue to track outages and potential cumulative impacts in Quincy.

Comment #66

The other figure 3, my house, shows that it's 5 to 10 times higher the ASIL of nitrous oxide and the DEEP is 10 to 25 times. Again, my quality of life, the value of my home. Figure 4, nitrous oxide ... Didn't have a data center. I talked to somebody about that, they said they put it in there anyway. We're also building two new schools above road 11. And I love it, and I'm just ... It's above road 11, it's between Microsoft and Yahoo, and I ... These are going to be affected also by the over-the-limit concentrations. The last thing I have is Microsoft 2012 ,"We're eliminating back-up generators. We're using other things like solar power, wind power ..." Which are plentiful in our area. I'm hoping that the other data centers around us will start using some of these other technologies so we don't have the diesel emissions.

Ecology Response to Comment #66
Figure 3 shows the average levels of DEEP related to emissions from project Genesis. Figure 4 shows the maximum short-term levels of nitrogen dioxide that could occur if all 25 Genesis engines operate simultaneously during an outage. Figure 5 shows the cumulative impacts of DEEP from the data centers and other sources of DEEP in Quincy. According to Figure 4, nitrogen oxide emissions from the Genesis project do not cause an exceedance of the 1-hour NO_2 ASIL at this house. According to Figure 5, cumulative DEEP emissions in Quincy cause an exceedance of the DEEP ASIL by 16-25 times at this house. This exceedance translates to an increased excess lifetime cancer risk of 16-25 in 1 million, which is well below the 100-in-a-million excess cancer risk that triggers additional measures under the community-wide assessment.

See also the Response to Comment #42.

Comment Nos. 67-72: Danna Dal Porto, 03/31/2016

<u>Comment #67</u>
I'm going to grumble, for the record, in my written documents I showed up for the second Microsoft-Oxford hearing July 9th, prepared my documents ... I'm a citizen scientist. I am a retired art teacher. I don't do numbers, it's a real challenge for me, so making a public comment and making it make sense is hard work. I worked on that, and I turned my comments in. There has been no response to my comments from July 9th. Then the Sabey-Intergate was in January ... February? January. I did the same thing, got all my stuff, brought all that stuff, made all my comments, worked with all the stupid little numbers, turned in my comments. I have had no response to comments from my Sabey-Intergate. This is the third public hearing that I've prepared for in 8 months and I'm annoyed because these data centers are similar enough, if I get an answer, a good answer, from ecology about Oxford I won't ask it again, but if you don't answer me I don't have anything to learn from, so I'm complaining.

Ecology Response to Comment #67
See the Responses to Comments #1 and #15.

<u>Comment #68</u>
It confuses me that the gentleman from Yahoo! said that they only had to look at the Genesis [inaudible 11:23]. The information that come from ecology and in a brochure and the newspaper said that this was a revision of the permit. When you revise a permit, you're opening a permit. That means that you are looking at everything, not just the new stuff, but the new stuff plus the old stuff. I disagree with that statement that you don't have to combine those things.

Ecology Response to Comment #68
Consistent with the provisions of RCW 70.94.152, Washington Administrative Code (WAC) 173-400-100 New source review (NSR) paragraph (d) establishes that "New source review of a modification is limited to the emission unit or units proposed to be modified and the air contaminants whose emissions would increase as a result of the modification." This prohibits Ecology from opening everything up to consideration as suggested.

See also the Response to Comment #31.

<u>Comment #69</u>
One of the things I complained about specifically with Microsoft-Columbia, is that they brought in some expansion generators, but they pretended like there was nothing next to it. Right here is a whole 'nother set of generators, but we're not going to look at those, we're not going to model them together, they don't exist. They're invisible. We're just going to look at these. When you compartmentalize that stuff, it's offensive to me. Those generators are putting emissions into the air jointly. You cannot tell me they do not combine in the air. They do. I'm complaining about that, I believe this was a revision of the permit and it opens everything up to consideration.

Ecology Response to Comment #69
See the Response to Comment #68.

<u>Comment #70</u>
I said earlier, I don't care to be compared to Seattle, I know that there's all kinds of emissions from highways and trains and industry. Don't compare us to Seattle. We came here ... I came here in 1980 to raise my child in an agricultural community, and low-and-behold, what do I have? I have industry. I believe it's a responsibility of Ecology to protect me as if I did not have that industry next door to me, but that I had clean air based on my desire to live here and to breathe clean air.

Ecology Response to Comment #70
During the public meeting for Yahoo! Project Genesis on March 31, 2016, Ecology provided some comparisons of air quality and applicable air quality rules in Quincy to air quality and air quality rules in other parts of Washington State. Ecology believes these comparisons are valid and helpful to address questions from Quincy residents about the air quality rules and air quality risks in Quincy. They were prepared in response to claims made by the commenter in a May 13, 2015 letter addressed to "Dear Legislators." The commenter made the following claim on page 5 of the letter: "Quincy has more risk than any other community in Washington State." Ecology does not believe this claim to be true. Furthermore, because Seattle is a community in Washington State, Ecology believes the comparison between Quincy and other communities in the Seattle region presented at the March 31, 2016 public meeting was valid.

Comment #71

The other thing is I would like to understand ... I didn't have time to ask ... At one point in time during the answer-questions, you brought up the fact that credit ratings had something to do ... If I understood it properly ... With whether or not people put on controls. Someone needs to answer me that in response to comments. Was that said? It was said.

Ecology Response to Comment #71

During the presentation period prior to the March 31 public hearing in Quincy, Ecology provided a definition of BACT pointing out that BACT is determined on a case by case basis taking into account "*energy, environmental, and economic impacts and other costs*" consistent with the definition of BACT WAC 173-400-030(12). The BACT analysis and decision making for Yahoo! Project Genesis is provided in the TSD for this permit.

See also the Response to Comment #38.

Comment #72

The other thing I'd like to go on record for is to thank Yahoo! for the public presence. I believe they hired some nice local people who are committed to this community. Obviously your contributions to the senior center and to different activities in town and it matters. You are to be commended for that.

Ecology Response to Comment #72

Thank you for attending the public hearing and for your comments.

Comment Nos. 73-77: Patricia Martin, 03/31/2016

Comment #73

My issues with the permit has much to do with the estimations of emissions that are being used. First, I brought an example from the California Energy Commission's review of back-up generators and their implications on air quality in California. Yahoo! Landau has used this graph as well, but not included the emissions that are resulted from the cold start and as a result of this, they've implied that there's a deficit in the nox that's generated during a cold start, when in fact NOx cold start in the highest of the emission factors that happens during a cold start with an engine. We saw that, in fact, when ecology required the performance testing on a Sabey engine. The NOx was really high during cold start. That cold-start factor is missing from all the modeling and all the estimations for the potential to emit on the Yahoo! site. That would include, not only the new engines that would also include all the existing engines.

Ecology Response to Comment #73

Based on the California Energy Commission's report titled: *Air Quality Implications of Backup Generators in California, Volume II (2005),* Yahoo! used a cold start factor of 0.999 (or 1.0) for NOx. Ecology accepts this as appropriate. The amount of NOx emitted during cold starts is not higher than during normal running of the engines because NOx is formed during high temperature combustion. Less NOx is formed during cold start because the temperature is not so high. Ecology believes the way that Yahoo! calculated cold start factors as a percentage of runtime is appropriate for all pollutants considered. However, because the NOx cold start factor is approximately 1.0, the runtime is irrelevant for NOx cold start emission estimates.

See also the Response to Comment #14.

<u>Comment #74</u>
Also, for condensables, from that same study that was commissioned in 2005, condensables are ... Which are the back half of the particulate matter ... Are 2 to 3 times ... Excuse me, 3 to 5 times higher than the particulate. Keeping that in mind and the cold start factor I believe significantly changed the estimations.

Ecology Response to Comment #74
In determining whether the Yahoo! project would comply with the NAAQS, Ecology and Yahoo! added cold start factors and a 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 Yahoo!'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. Also, the dilution tunnel system, which can be used for tier 2 testing, accounts for some of the condensable.

See also the Response to Comment #73.

<u>Comment #75</u>
I mentioned about the BACT analysis, and this is from the revised NOC application dated 12 ... I hate to admit that, I should have brought the original sized when I printed it to fit the page and I can't read the bottom. It was from December of 2015. December 22nd I believe. The numbers that are inserted for NOx are less than 50 ton, for the 25 new engines it's 63.93 ton. The DOCs as I mentioned is over 1 ton and I believe it's 1.88 and up here the number used is .84. This repeats itself on the BACT analysis for all 4 of the alternatives, which is a DPF, a DOC, a tier engine, and a scrubber. When you put in the correct numbers, and again minus the cold start factor, the ... More than two of these ... And again, I don't have my narrative here ... Fall into being very close, if not meeting the BACT emission affordability.

Ecology Response to Comment #75
Ecology agrees that the applicant should have used the higher PTE values. The final TSD provides revised BACT costs showing BACT conclusions using PTE values. These revisions did not change the final BACT determination.

Comment #76

Again, from the air mod summary, which is table c2 from appendix c, the diameter used during the air modeling is a 24 inch diameter doc versus the 18 inch doc, which is actually employed on those engines, which changes the modeling assumptions. Again, the cold start factor, which is significant in the first hundred seconds of the engine's operation, and averaged out a 30 minute period, there are going to be more cold starts than have been admitted to in this application. The cold start looks like a very small number of a very long run, but if it's a shorter engine operation, then it's a much more significant component percentage wise of that emission. That needs to be reviewed, the cold start numbers and the air modelling assumptions I think are misguided, especially in light of the fact that the engines operate so infrequently for such short periods of times as we talked about. Each one of those is a cold start. Those emissions should be reflected as such.

Ecology Response to Comment #76

Based on the California Energy Commission's report titled: *Air Quality Implications of Backup Generators in California, Volume II (2005),* Ecology believes the way that Yahoo! calculated cold start factors as a percentage of runtime is appropriate for all pollutants considered. However, because the NOx cold start factor is approximately 1.0, the runtime is irrelevant for NOx cold start emission estimates.

See also the Responses to Comments #14 and #20.

Comment #77

Then, again, table c1 the annual operating emissions also demonstrates that it was modeled as though it had a deficit of NOx, so it was not modeled at even the level that is in the permit.

Ecology Response to Comment #77

Ecology believes the modeling performed in the application was acceptable.

See also the Responses to Comments #17 and #73.

Comment No. 78: Alex Ybarra, 03/31/2016

Comment #78

I have been working with the Yahoo! folks for since I moved back in town in 2003. They have not ... They supported Quincy kids, Quincy schools, Quincy soft ball, my daughter, her team, the high school team there right now ... With funds, financial support, everything that we've asked for, they supported. They've been a wonderful partner in making the kids of Quincy great kids.

We want those kids ... Who are most of them are minorities that have a hard time in school ... Getting them extra activities with their support ... These kids are going to be great. They're going to just graduate from Quincy high school, they're going to support it and the reason is because of people like Lisa who's worked for Yahoo! who's also a Quincy person ... She's been supporting.

She's always been there, Yahoo!'s been great to work with, their great for the community at Quincy. We should all know that.

Microsoft as well has done lots for Quincy. I can talk to you a little bit about some of the ecology that works, the pollution that happens because of progress ... Where I see this is progress, if you want progress, you could have had other things that pollute more than what is happening here. I do carbon analysis for Grant County PUD, so I know a little bit about what kind of carbon analysis we could be done just for ... At the utilities. I do have a lot of knowledge about what this information is telling us and I can tell you that most of the information that I'm seeing is fairly straight-forward, it's done properly from what I know. Again, it's not what DPA does from a scientific standpoint, but from a carbon standpoint I can see that the numbers seem to add up properly.

I don't think that there's going to be an issue with the pollution that happens because of the build-up of Yahoo! I think that my daughter and my friends who have children ... In all the schools in Quincy will not be affected by the minor amount of pollution that may happen because of those data forms. Those things are going to be on for just a minor amount of time. My analysis, DPB from other industries ... There's a lot more other industries that could be here, that could harm the kids at Quincy much more than what happens at Yahoo! on a monthly basis.

I think we need to have them here. I think they've not only done good for the town of Quincy, what they've done ... Just to let you guys know ... Is we just passed $108 million [inaudible 22:42] because of Yahoo! and Microsoft ... Because of their presence here in Quincy. We're going to have brand new schools. Those kids that need that help with brand new schools, with a brand new community, brand new roads ... Lots of it is done because of Yahoo! They brought that to Quincy. I just want to let you know that I'm talking as a parent, not from [inaudible 23:04], not from a PUD, but as a parent. My daughter's doing fine, she's going to be fine in the future, and so are the rest of the kids in Quincy in my opinion.

Ecology Response to Comment #78
Thank you for attending the public hearing and for your comments.

Appendix A:
Public Notices and Outreach Materials

- Press releases – English & Spanish
- Legal notices
- Display advertisements – English & Spanish
- Public Involvement Calendar entries
- QUINCY-DATA-CENTERS ListServ emails
- Public comment period focus sheet (Publication No. 16-02-006)
- Tweets – English & Spanish
- Public hearing electronic reader board ad

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

Department of Ecology News Release - February 25, 2016

Updating Yahoo!'s air permit for a data center in Quincy

Ecology is seeking comments on the changes

SPOKANE – Yahoo! is proposing to expand its operations at their data center in Quincy. In order to expand, their air quality permit needs to be updated to ensure that human health and the environment are protected.

Data centers house servers that store digital data, handle email, manage instant messages and run applications for computers. Yahoo! uses backup generators powered by diesel engines to keep servers functioning in case of power outages.

The Washington Department of Ecology is seeking comments on the updates to Yahoo!'s original permit that was issued in 2011. With the updated permit they can operate an additional 25 backup diesel generators.

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

The permit includes conditions to protect the public from air pollution including fuel limits and specified hours of operation for generators.

Public hearing

Ecology is hosting a public hearing on the air quality permit that begins at 5 p.m. on March 31 at the Quincy Community Center, 115 F St. S.W., Quincy, Wash. Formal testimony starts at 6:30 p.m.

Submit comments

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

Comments will be accepted from February 25 through April 4.

Review the revised permit

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

Contacts:

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

Department of Ecology News Release - February 25, 2016

Revisando el permiso de emisiones al aire para el centro de datos Yahoo! en Quincy

Ecología solicita comentarios sobre los cambios

SPOKANE – Yahoo! está proponiendo aumentar sus operaciones en su centro de datos en Quincy. Para aumentarse, su permiso de emisiones al aire necesita ser revisado para asegurar la protección de la salud humana y el medio ambiente.

Los equipos en los centros de datos almacenan información electrónica, procesan el correo electrónico, manejan mensajes instantáneos y ejecuten aplicaciones para computadoras. Yahoo! utiliza generadores de emergencia con motores de diésel para mantener los equipos funcionando durante una falla de la energía pública.

El Departamento de Ecología del Estado de Washington solicita comentarios sobre las revisiones al permiso original de Yahoo! que fue emitido en 2011. Según las revisiones, la empresa puede operar 25 generadores de emergencia adicionales con motores de diésel.

Las emisiones que salen de los tubos de escape de los motores de diésel contienen partículas finas que pueden causar problemas para la salud de las personas quienes están expuestas frecuentemente y a niveles altos de esas partículas.

El permiso incluye condiciones para proteger el público de la contaminación del aire incluyendo límites de la cantidad de diésel que se puede usar tanto como especificando las horas de operación para los generadores.

Audiencia pública

El 31 de marzo, Ecología patrocinará una audiencia pública sobre el permiso de emisiones al aire que comenzará a las 5 p.m. en el Centro Comunitario de Quincy, 115 F St. S.W., Quincy, Washington. Los testimonios formales comenzarán a las 6:30 p.m.

Entrega de los comentarios

Todos los comentarios y preguntas sobre el borrador del permiso deben ser enviados a Kari Johnson, Department of Ecology, Air Quality Program, 4601 N. Monroe, Spokane, WA 99205.

Se aceptarán los comentarios entre el 25 de febrero hasta el 4 de abril.

Revisa el permiso de emisiones en:

- La Oficina de Ecología de la Región Este, 4601 N. Monroe, Spokane
- La Municipalidad de Quincy, 104 B Street S.W.
- La Biblioteca de Quincy, 208 Central Ave S., Quincy.

Contactos:

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

LEGALS

Abraham Lincoln Elementary School – Addition and Modernization
Wenatchee School District #246

Lydig Construction, Inc. (the General Contractor/ Construction Manager) is requesting sealed proposals from interested Subcontractors by the following dates and times, for the referenced scope of work;

Wednesday, March 9, 2016
1:00 pm BP #31 – Landscaping and Irrigation

The Lincoln Elementary School Project will modernize the current 50,000 sf building, add an additional classroom wing, specialty classrooms for music and art, and a new gymnasium. The project will be completed in multiple phases while the school is in operation, completing in the Fall of 2016

Bids will be accepted prior to the dates and times listed above for each bid package. Bids to be submitted at the office of Forte Architects located at 240 North Wenatchee Avenue, Wenatchee, WA, 98801 by no later than the time noted above. Proposals received after this time will not be considered. Bids will then be publicly opened and read aloud. The GC/CM and Owner reserve the right to reject any or all bids and to waive any informalities or irregularities on the bids received.

PREBID MEETING:
A mandatory pre-bid meeting and walk thru will be held Wednesday March 2, 2016, 10:00AM at the Abraham Lincoln Elementary School, 1224 Methow Street, Wenatchee, WA 98801. Participants are to check in at Lydig Construction's jobsite trailer, located at the Southwest corner of the project site.

Electronic or Printed Documents can be obtained at:
Lydig Construction's Office; Spokane Valley, WA (contact: Andy Semprimoznik at asemprimoznik@lydig.com or AJ Prudente at APrudente@lydig.com or at Ph: 509-534-0451) to obtain documents.

Lydig Construction is an equal opportunity contractor and we encourage bids from disadvantaged, minority-owned, women-owned, and small businesses.

BEFORE THE CHELAN COUNTY WATER CONSERVANCY BOARD

TAKE NOTICE: That on February 18, 2016 Crown West Realty, L.L.C, with a principle place of business in Spokane County, filed application with the Chelan County Water Conservation Board which was accepted and assigned the Board's file number CHEL 16-03. You are encouraged to inquire further, but take notice of the following:

Ground Water Claim G4-1089CL, originally asserted by Spokane Industrial Park, Inc. under priority date of 12/1942, authorizes the withdrawal or diversion of 1050 gallons per minute, 1694 acre feet per year from a well located within the NWNW of Section 12, T25N, R44E continuously for industry and domestic uses located in the S1/2 of Section 1 and that portion of Section 12 lying northerly of the northerly right of way line of the Spokane International Railroad; All in T. 25N, R. 44 E.W.M., Spokane County, Washington; Less rights of way.

The application proposes to add 3 wells within the existing place of use for all quantities under the claim, to conform the authorized use to municipal and to further authorize the temporary donation of the right to the State Trust Water Rights Program for instream flows and for the mitigation of out of stream uses.

Any protests or objections to the approval of this application may be filed with the Department of Ecology and must include a detailed statement of the basis for objections; protests must be accompanied by a fifty dollar ($50) recording fee and filed with the Department of Ecology Cashiering Unit, P.O. Box 47611, Olympia, WA 98504-7611 within thirty (30) days from March 4, 2016

Any interested party may submit comments, objections, and other information to the Board regarding this application. The comments and information may be submitted in writing or verbally at any public meeting of the Board held to discuss or decide on the application. This application will be on the Boards agenda during its regular meeting to be held on the second Thursday of each month at 3:00 p.m. at 285 Technology Center Way; Wenatchee, WA until a decision on the application is made. Additionally, the Chelan County Water Conservancy Board may receive written comments or information provided within thirty days from March 4, 2016 at its office, 1205 Ormiston St.; Wenatchee, WA 98801

NOTICE OF HEARING: The Chelan County Water Conservancy Board will hold a public hearing for the purpose of affording an opportunity for interested persons to comment upon this application. The public hearing will be held on March 10, 2016 at 3:00 p.m. at 285 Technology Center Way; Wenatchee, WA.

BOARD OF COUNTY COMMISSIONERS DOUGLAS COUNTY, WASHINGTON

Resolution No. CE 16-08

CALL FOR BIDS CURRENT EXPENSE

Notice is hereby given by the Board of County Commissioners of Douglas County that sealed bids will be received by the Douglas County Sheriff at the Douglas County Courthouse, Commissioners Chambers, 203 Rainier, PO Box 747, Waterville, Washington until 10:00 AM on Monday, March 21, 2016 after which time they will be opened and read for the purchase of:

ONE (1) - NEW - WHEELED ALL TERRAIN VEHICLE

Specifications and bid proposals may be obtained by contacting the Douglas County Undersheriff at 110 N.E. 2nd St., Suite 200, E. Wenatchee, Washington 98802, or by calling (509) 884-0941, or going online to the following website:

http://www.douglascountywa.net/departments/commissioners/bids/

The Board reserves the right to reject any or all bids.

Dated this 22nd day of February, 2016 at the Douglas County Public Services Building, 140 NW 19th St, East Wenatchee, Washington.

BOARD OF COUNTY COMMISSIONERS
DOUGLAS COUNTY, WASHINGTON

Steven D. Jenkins, Chair

Dale Snyder, Vice Chair

Ken Stanton, Member
ATTEST:

Dayna Prewitt, Clerk of the Board

SUPERIOR COURT, STATE OF WASHINGTON, COUNTY OF SPOKANE
In the Matter of the Estate of
NO. 16400176-1
HENRY C. LEWIS
NOTICE TO CREDIT RCW 11.40.030 Deceased.

The Personal Representative named below has been appointed as Personal Representative of this Estate. Any person having a claim against the decedent must, before the time the claim would be barred by any otherwise applicable statute of limitations, present the claim in the manner as provided in RCW 11.40.070 by serving on or mailing to the Personal Representative or the Personal Representative's attorney at the address stated below a copy of the claim and filing the original of the claim with the Court in which the probate proceedings were commenced. The claim must be presented within the later of 1) thirty (30) days after the Personal Representative served or mailed the notice to the creditor as provided under RCW 11.40.020(1)(c); or 2) four (4) months after the date of first publication of the notice. If the claim is not presented within this time frame, the claim is forever barred, except as otherwise provided in RCW 11.40.051 and 11.40.060. This bar is effective as to claims against both the decedent's probate and nonprobate assets.

DATE OF FIRST PUBLICATION:February 26, 2016

NOTICE TO CREDITORS: 1
STAMPER RUBENS, P.S.
ALAN RUBENS
WSBA#12239
Attorney for the Estate
West 720 Boone, Suite 200
Spokane, WA 99201

NOTICE OF TRUSTEE'S SALE

Trustee Sale # 015577-WA Title # 02-14012917 PURSUANT TO THE REVISED CODE OF WASHINGTON CHAPTER 61.24 ET. SEQ. THIS NOTICE IS THE FINAL STEP BEFORE THE FORECLOSURE SALE OF YOUR HOME. You have only 20 DAYS from the recording date on this notice to pursue mediation. DO NOT DELAY. CONTACT A HOUSING COUNSELOR OR AN ATTORNEY LICENSED IN WASHINGTON NOW to assess your situation and refer you to mediation if you are eligible and it may help you save your home. See below for safe sources of help. SEEKING ASSISTANCE Housing counselors and legal assistance may be available at little or no cost to you. If you would like assistance in determining your rights and opportunities to keep your house, you may contact the following: The statewide foreclosure hotline for assistance and referral to housing counselors recommended by the Housing Finance Commission Telephone: 1-877-894-HOME (1-877-894-4663). Web site: http://www.dfi.wa.gov/consumers/homeownership/post_purchase_counselors_foreclosure.htm The United States Department of Housing and Urban Development Telephone: 1-800-569-4287 Web site: http://www.hud.gov/offices/hsg/sfh/hcc/fc/index.cfm?webListAction=search&searchstate=WA&filterSvc=dfc The statewide civil legal aid hotline for assistance and referrals to other housing counselors and attorneys Telephone: 1-800-606-4819 Web site: http://nwjustice.org/what-clear I. NOTICE IS HEREBY GIVEN that the undersigned, CLEAR RECON CORP, 9311 S.E. 36th Street, Suite 100, Mercer Island, WA 98040, Trustee will on 4/1/2016 at 10:00 AM at AT THE MAIN ENTRANCE TO THE OKANOGAN COUNTY COURTHOUSE, 149 3RD N, OKANOGAN, WA 98840 sell at public auction to the highest and best bidder, payable, in the form of cash, or cashier's check or certified checks from federally or State chartered banks, at the time of sale, the following described real property, situated in the County of Okanogan, State of Washington, to-wit: LOT 14, SUNCREST 3RD ADDITION, AS PER PLAT THEREOF RECORDED IN VOLUME H OF PLATS, SECTION 3, PAGE 107, UNDER AUDITOR'S FILE NO. 818154, OKANOGAN COUNTY, WASHINGTON. Commonly known as: 18 COUNTRY VUE RD OMAK, WA 98841 APN: 7540140000 which is subject to that certain Deed of Trust dated 12/6/2003, recorded 12/9/2003, as Auditor's File No. 3069587, records of Okanogan County, Washington, from REUBEN GONZALEZ AND MELODIE L. GONZALEZ, HUSBAND AND WIFE, as Grantor(s), to BAINES TITLE COMPANY, INC., as Trustee, to secure an obligation in favor of BENEFICIAL MORTGAGE CORPORATION, as Beneficiary, the beneficial interest in which was assigned by U.S. Bank Trust, N.A., as Trustee for LSF9 Master Participation Trust, under an Assignment recorded under Auditor's File No 3197070. II. No action commenced by the Beneficiary of the Deed of Trust or the Beneficiary's successor is now pending to seek satisfaction of the obligation in any Court by reason of the Borrower's or Grantor's default on the obligation secured by the Deed of Trust/Mortgage. III. The default(s) for which this foreclosure is made is/are as follows: PROMISSORY NOTE INFORMATION - Note Dated: 12/6/2003; Note Amount: $98,420.02; Interest Paid To: 6/11/2011; Next Due Date: 7/11/2011. PAYMENT INFORMATION - FROM / THRU / NO.PMT / AMOUNT / TOTAL - 7/11/2011 - 53 - $673.67 - $35,704.51. ADVANCES/LATE CHARGES - DESCRIPTION / TOTAL - Insurance Advance - $3,160.66; Tax Advance - $2,420.71; INSPECTIONS - $147.50. ESTIMATED FORECLOSURE FEES AND COSTS - DESCRIPTION / TOTAL - Trustee's Fee's $1,500.00; Record Appointment of Successor Trustee - $14.00; T.S.G. Fee - $560.04; Posting of Notice of Default - $100.00; Mailings - $62.60; TOTAL DUE AS OF 11/18/2015 - $43,670.02. IV. The sum owing on the obligation secured by the Deed of Trust is: The principal sum of $88,288.16, together with interest as provided in the Note from 7/11/2011, and such other costs and fees as are provided by statute. V. The above described real property will be sold to satisfy the expense of sale and the obligation secured by the Deed of Trust as provided by statute. Said sale will be made without warranty, expressed or implied, regarding title, possession or encumbrances on 4/1/2016. The defaults referred to in Paragraph III must be cured by 3/21/2016, (11 days before the sale date) to cause a discontinuance of the sale. The sale will be discontinued and terminated if at any time before 3/21/2016 (11 days before the sale) the default as set forth in Paragraph III is cured and the Trustee's fees and costs are paid. Payment must be in cash or with cashiers or certified checks from a State or federally chartered bank. The sale may be terminated any time after the 3/21/2016 (11 days before the sale date) and before the sale, by the Borrower or Grantor or the or the Grantor's successor interest or the holder of any recorded junior lien or encumbrance by paying the principal and interest secured by the Deed of Trust, plus costs, fees and advances, if any, made pursuant to the terms of the obligation and/or Deed of Trust and curing all other defaults. VI. A written Notice of Default was transmitted by the Beneficiary or Trustee to the Borrower and Grantor at the following address(es): SEE ATTACHED EXHIBIT "1" by both first class and certified mail on 8/6/2015, proof of which is in the possession of the Trustee; and the Borrower and Grantor were personally served, if applicable, with said written Notice of Default or the written Notice of Default was posted in a conspicuous place on the real property described in Paragraph I above, and the Trustee has possession of proof of such service or posting. VII. The Trustee whose name and address are set forth below will provide in writing to anyone requesting it, a statement of all costs and fees due at any time prior to the sale. VIII. The effect of the sale will be to deprive the Grantor and all those who hold by, through or under the Grantor of all their interest in the above-described property. IX. Anyone having any objections to this sale on any grounds whatsoever will be afforded an opportunity to be heard as to those objections if they bring a lawsuit to restrain the sale pursuant to RCW 61.24.130. Failure to bring such a lawsuit may result in a waiver of any proper grounds for invalidating the Trustee's sale. X. NOTICE TO OCCUPANTS OR TENANTS – The purchaser at the trustee's sale is entitled to possession of the property on the 20th day following the sale, as against the grantor under the Deed of Trust (the owner) and anyone having an interest junior to the Deed of Trust, including occupants who are not tenants. After the 20th day following the sale the purchaser has the right to evict occupants who are not tenants by summary proceedings under chapter 59.12 RCW. For tenant-occupied property, the purchaser shall provide a tenant with written notice in accordance with RCW 61.24.060. If you are a servicemember or a dependent of a servicemember, you may be entitled to certain protections under the federal Servicemembers Civil Relief Act and any comparable state laws regarding the risk of foreclosure. If you believe you may be entitled to these protections, please contact our office immediately. THIS IS AN ATTEMPT TO COLLECT A DEBT AND ANY INFORMATION OBTAINED WILL BE USED FOR THAT PURPOSE. Dated: 11/23/2015 CLEAR RECON CORP, as Successor Trustee For additional information or service you may contact: Clear Recon Corp. 9311 S.E. 36th Street, Suite 100 Mercer Island, WA 98040 Phone: (206) 707-9599. EXHIBIT "1" - NAME/ADDRESS - MELODIE GONZALEZ, 14 COUNTRYVUE RD, OMAK, WA 98841; MELODIE GONZALEZ, PMB 327, 17011 LINCOLN AVE, PARKER CO 80134; MELODIE L GONZALEZ, 14 COUNTRYVUE RD, PO BOX 3163, OMAK, WA 98841-3163; MELODIE L GONZALEZ, PO BOX 1548, CRAIG, CO 98841; MELODIE L GONZALEZ, PO BOX 1548, CRAIG, CO 98841-1548; REUBEN GONZALEZ, 14 COUNTRYVUE RD, PO BOX 3163, OMAK, WA 98841-3163; REUBEN GONZALEZ PMB 327, 17011 LINCOLN AVE, PARKER CO 80134; REUBEN L. GONZALEZ, PO BOX 1548, CRAIG, CO 98841; REUBEN L. GONZALEZ, PO BOX 1548, CRAIG, CO 98841-1548; REUBEN N. GONZALEZ, 14 COUNTRYVUE RD, OMAK, WA 98841

Quincy School District
Request for Qualifications
Architectural and Engineering Services

In accordance with Chapter 39.80 RCW, Quincy School District is seeking architectural and engineering services for design of school facilities included in its February, 2016 bond measure and other capital improvements.

Applicant architectural firms shall submit Statements of Qualifications consisting of a letter of interest (maximum 2 pages, single-sided), and examples of recent relevant school projects (maximum of 6 pages, single-sided). The School District will review submittal materials and reserves the right to conduct discussion(s)/interview(s) with an applicant firm (or firms) about providing architectural services and to select the firm it deems most highly qualified.

Provide six (6) copies of Statements of Qualifications by 4:00 PM, March 11, 2016, to:

Tom Harris, Facilities Manager
Quincy School District
119 "J" Street SW
Quincy, WA 98848

All questions regarding your submittal should be directed by email to tharris@qsd.wednet.edu

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LEGAL POLICY

Legal advertisements will be published as submitted and in accordance with The Wenatchee World legal advertising format. Legal advertisements may be submitted electronically to legals@wenworld.com, faxed to (509) 663-9110 or brought to 14 N. Mission St., Wenatchee. For questions or information, please call (509) 663-5161.

NOTICE OF TRUSTEE'S SALE

TS No WA08001602-15-1 APN 121788000 TO No 150218372-WA-MSI NOTICE OF TRUSTEE'S SALE PURSUANT TO THE REVISED CODE OF WASHINGTON CHAPTER 61.24 ET. SEQ. I. NOTICE IS HEREBY GIVEN that on March 25, 2016, 10:00 AM, at the Police Justice County Building, 401 Balsam Street NKA 411 South Balsam Street, Moses Lake, WA (the new civic center will be 401 South Balsam Street), MTC Financial Inc. dba Trustee Corps, the undersigned Trustee, will sell at public auction to the highest and best bidder, payable, in the form of cash, or cashier's check or certified checks from federally or State chartered banks, at the time of sale the following described real property, situated in the County of Grant, State of Washington, to-wit: LOTS 5 & 6, CHAMBER'S ACRES NUMBER 3-PLAT, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 12 OF PLATS, PAGE 48, RECORDS OF GRANT COUNTY, WA. APN: 121788000 More commonly known as 6587 RD 3 NE, MOSES LAKE, WA 98837 which is subject to that certain Deed of Trust dated as of April 24, 1998, executed by JESUS R. & ROSALINDA ALANIZ, HUSBAND & WIFE as Trustor(s), to secure obligations in favor of BENEFICIAL WASHINGTON INC. D/B/A BENEFICIAL MORTGAGE CO. OF WASHINGTON as original Beneficiary recorded April 29, 1998 as Instrument No. 1024999 and the beneficial interest was assigned to U.S. BANK TRUST, N.A., AS TRUSTEE FOR LSF9 MASTER PARTICIPATION TRUST, C/O CALIBER HOME LOANS, INC. and recorded December 17, 2014 as Instrument Number 1341495 of official records in the Office of the Recorder of Grant County, Washington. II. No action commenced by U.S. Bank Trust, N.A. as Trustee for LSF9 Master Participation Trust, the current Beneficiary of the Deed of Trust is now pending to seek satisfaction of the obligation in any Court by reason of the Borrowers' or Grantors' default on the obligation secured by the Deed of Trust/Mortgage. Current Beneficiary: U.S. Bank Trust, N.A. as Trustee for LSF9 Master Participation Trust Contact Phone No: 800-401-6587 Address: 13801 Wireless Way, Oklahoma City, OK 73134 III. The default(s) for which this foreclosure is made is/are as follows: FAILURE TO PAY WHEN DUE THE FOLLOWING AMOUNTS WHICH ARE NOW IN ARREARS: DELINQUENT PAYMENT INFORMATION From September 29, 2012 To November 20, 2015 Number of Payments 1 $771.34 38 $827.12 Total $32,201.90 PROMISSORY NOTE INFORMATION Note Dated: April 24, 1998 Note Amount: $77,000.00 Interest Paid To: August 29, 2012 Next Due Date: September 29, 2012 IV. The sum owing on the obligation secured by the Deed of Trust is: The principal sum of $42,495.47, together with interest as provided in the Note or other instrument secured, and such other costs and fees as are due under the Note or other instrument secured, and as are provided by statute. V. The above described real property will be sold to satisfy the expense of sale and the obligation secured by the Deed of Trust as provided by statute. Said sale will be made without warranty, expressed or implied, regarding title, possession or encumbrances on March 25, 2016. The defaults referred to in Paragraph III must be cured by March 14, 2016, (11 days before the sale date) to cause a discontinuance of the sale. The sale will be discontinued and terminated if at any time before March 14, 2016 (11 days before the sale) the default as set forth in Paragraph III is cured and the Trustees' fees and costs are paid. Payment must be in cash or with cashiers' or certified checks from a State or federally chartered bank. The sale may be terminated any time after the March 14, 2016 (11 days before the sale date) and before the sale, by the Borrower or Grantor or the holder of any recorded junior lien or encumbrance by paying the principal and interest, plus costs, fees and advances, if any, made pursuant to the terms of the obligation and/or Deed of Trust. VI. A written Notice of Default was transmitted by the current Beneficiary, U.S. Bank Trust, N.A. as Trustee for LSF9 Master Participation Trust or Trustee to the Borrower and Grantor at the following address(es): ADDRESS JESUS R. ALANIZ 6587 RD 3 NE, MOSES LAKE, WA 98837JESUS R. ALANIZ 6587 RD D. 3 NE, MOSES LAKE, WA 98837-9387JESUS R. ALANIZ 6587 RD D3 NE, MOSES LAKE, WA 98837JESUS R. ALANIZ 6588 ROAD D.3 NE, MOSES LAKE, WA 98837ROSALINDA ALANIZ 6587 RD 3 NE, MOSES LAKE, WA 98837ROSALINDA ALANIZ 6587 RD D. 3 NE, MOSES LAKE, WA 98837-9387ROSALINDA ALANIZ 6587 RD D3 NE, MOSES LAKE, WA 98837ROSALINDA ALANIZ 6588 ROAD D.3 NE, MOSES LAKE, WA 98837CURRENT OCCUPANT 6587 RD 3 NE, MOSES LAKE, WA 98837CURRENT OCCUPANT 6588 NE RD D. 3, MOSES LAKE, WA 98837 by both first class and certified mail on October 7, 2015, proof of which is in the possession of the Trustee; and the Borrower and Grantor were personally served, if applicable, with said written Notice of Default or the written Notice of Default was posted in a conspicuous place on the real property described in Paragraph I above, and the Trustee has possession of proof of such service or posting. VII. The Trustee whose name and address are set forth below will provide in writing to anyone requesting it, a statement of all costs and fees due at any time prior to the sale. VIII. The effect of the sale will be to deprive the Grantor and all those who hold by, through or under the Grantor of all their interest in the above described property. IX. Anyone having any objections to this sale on any grounds whatsoever will be afforded an opportunity to be heard as to those objections if they bring a lawsuit to restrain the sale pursuant to RCW 61.24.130. Failure to bring such a lawsuit may result in a waiver of any proper grounds for invalidating the Trustees' Sale. X. If the Borrower received a letter under RCW 61.24.031: THIS NOTICE IS THE FINAL STEP BEFORE THE FORECLOSURE SALE OF YOUR HOME. You have only 20 DAYS from the recording date on this notice to pursue mediation. DO NOT DELAY. CONTACT A HOUSING COUNSELOR OR AN ATTORNEY LICENSED IN WASHINGTON NOW to assess your situation and refer you to mediation if you might eligible and it may help you save your home. See below for safe sources of help. SEEKING ASSISTANCE Housing counselors and legal assistance may be available at little or no cost to you. If you would like assistance in determining your rights and opportunities to keep your house, you may contact the following: The statewide foreclosure hotline for assistance and referral to housing counselors recommended by the Housing Finance Commission: Telephone: (877) 894-4663 or (800) 606-4819 Website: www.wshfc.org The United States Department of Housing and Urban Development: Telephone: (800) 569-4287 Website: www.hud.gov The statewide civil legal aid hotline for assistance and referrals to other housing counselors and attorneys: Telephone: (800) 606-4819 Website: www.homeownership.wa.gov NOTICE TO OCCUPANTS OR TENANTS – The purchaser at the Trustee's Sale is entitled to possession of the property on the 20th day following the sale, as against the Grantor under the Deed of Trust (the owner) and anyone having an interest junior to the Deed of Trust, including occupants who are not tenants. After the 20th day following the sale the purchaser has the right to evict occupants who are not tenants by summary proceedings under the Unlawful Detainer Act, Chapter 59.12 RCW. For tenant-occupied property, the purchaser shall provide a tenant with written notice in accordance with RCW 61.24.060; Dated: November 20, 2015 MTC Financial Inc. dba Trustee Corps, as Duly Appointed Successor Trustee By: Jessica Cimarusti, Authorized Signatory MTC Financial Inc. dba Trustee Corps 1700 Seventh Avenue, Suite 2100 Seattle WA 98101 Phone: (800) 409-7530 TDD: (800) 833-6388 For Reinstatement/Pay Off Quotes, contact MTC Financial Inc. DBA Trustee Corps TRUSTEE'S SALE INFORMATION CAN BE OBTAINED ONLINE AT www.insourcelogic.com. Order No. WA15-001706-2.

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 Yahoo! Data Center submitted a NOC air quality permit application on October 19, 2015, to revise their existing NOC Approval Order 11AQ-E399 issued on March 28, 2011. The Yahoo! Data Center is located at 1010 Yahoo Way, and 1500 M Street NE, Quincy, Grant County, Washington. A new Yahoo! Data Center (Project Genesis) is included in the NOC application and is located adjacent to the existing Yahoo! Data Center facilities. The NOC application requests a new permit to cover existing Yahoo! Data Center facilities in addition to Project Genesis. After review of the completed NOC 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.
The Notice of Construction Preliminary Determination, the Second Tier Petition Recommendation, the Notice of Construction application, and other documents related to the project 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 February 25, 2016 through April 4, 2016. A public hearing will be held at 5:00 p.m. on March 31, 2016, at the Quincy Community Center, 115 F Street SW, Quincy, WA 98848. For additional information on the project and to submit comments, contact Kari Johnson at Ecology's Eastern Regional Office, 4601 N. Monroe, Spokane, WA 99205-1295, at kari.johnson@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

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TS No WA08000582-15-1 APN 122036000 TO No 150143448-WA-MSI NOTICE OF TRUSTEE'S SALE PURSUANT TO THE REVISED CODE OF WASHINGTON CHAPTER 61.24 ET. SEQ. I.

NOTICE IS HEREBY GIVEN that on March 4, 2016, 10:00 AM, at the Police Justice County Building, 401 Balsam Street NKA 411 South Balsam Street, Moses Lake, WA (the new civic center will be 401 South Balsam Street), MTC Financial Inc. dba Trustee Corps, the undersigned Trustee, will sell at public auction to the highest and best bidder, payable, in the form of cash, or cashier's check or certified checks from federally or State chartered banks, at the time of sale the following described real property, situated in the County of Grant, State of Washington, to-wit: LOT 6, WEST POINT ESTATES, DIVISION NO. 3, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 17 OF PLATS, PAGE 53, 54 AND 55, RECORDS OF GRANT COUNTY, WASHINGTON. APN: 122036000 More commonly known as 4948 RD E. 7 NE, MOSES LAKE, WA 98837 which is subject to that certain Deed of Trust dated as of May 27, 2005, executed by JAMES BOWEN AND JESSICA BOWEN, HUSBAND AND WIFE as Trustor(s), to secure obligations in favor of MORTGAGE ELECTRONIC REGISTRATION SYSTEMS, INC. ("MERS"), as designated nominee for BANNER BANK, Beneficiary of the security instrument, its successors and assigns, recorded May 31, 2005 as Instrument No. 1170293 and the beneficial interest was assigned to Wilmington Savings Fund Society, FSB DBA Christiana Trust, not in its individual capacity, but solely as Trustee for BCAT 2014-4TT By Rushmore Loan Management Services, LLC, Its Appointed Attorney In Fact and recorded August 3, 2015 as Instrument Number 1351011 of official records in the Office of the Recorder of Grant County, Washington. II. No action commenced by Wilmington Savings Fund Society, FSB DBA Christiana Trust, not in its individual capacity, but solely as Trustee for BCAT 2014-4TT By Rushmore Loan Management Services, LLC, Its Appointed Attorney In Fact, the current Beneficiary of the Deed of Trust is now pending to seek satisfaction of the obligation in any Court by reason of the Borrowers' or Grantors' default on the obligation secured by the Deed of Trust/Mortgage. Current Beneficiary: Wilmington Savings Fund Society, FSB DBA Christiana Trust, not in its individual capacity, but solely as Trustee for BCAT 2014-4TT By Rushmore Loan Management Services, LLC, Its Appointed Attorney In Fact Contact Phone No: 888-699-5600 Address: 15480 Laguna Canyon Road, Suite 100, Irvine, CA 92618 III. The default(s) for which this foreclosure is made is/are as follows: FAILURE TO PAY WHEN DUE THE FOLLOWING AMOUNTS WHICH ARE NOW IN ARREARS: DELINQUENT PAYMENT INFORMATION From January 1, 2011 To October 28, 2015 Number of Payments 58 $1,089.24 Total $63,175.92 LATE CHARGE INFORMATION January 1, 2011 October 28, 2015 $392.13 PROMISSORY NOTE INFORMATION Note Dated: May 27, 2005 Note Amount: $108,034.00 Interest Paid To: December 1, 2010 Next Due Date: January 1, 2011 IV. The sum owing on the obligation secured by the Deed of Trust is: The principal sum of $98,761.69, together with interest as provided in the Note or other instrument secured, and such other costs and fees as are due under the Note or other instrument secured, and as are provided by statute. V. The above described real property will be sold to satisfy the expense of sale and the obligation secured by the Deed of Trust as provided by statute. Said sale will be made without warranty, expressed or implied, regarding title, possession or encumbrances on March 4, 2016. The defaults referred to in Paragraph III must be cured by February 22, 2016, (11 days before the sale date) to cause a discontinuance of the sale. The sale will be discontinued and terminated if at any time before February 22, 2016 (11 days before the sale) the default as set forth in Paragraph III is cured and the Trustees' fees and costs are paid. Payment must be in cash or with cashiers' or certified checks from a State or federally chartered bank. The sale may be terminated any time after the February 22, 2016 (11 days before the sale date) and before the sale, by the Borrower or Grantor or the holder of any recorded junior lien or encumbrance by paying the principal and interest, plus costs, fees and advances, if any, made pursuant to the terms of the obligation and/or Deed of Trust. VI. A written Notice of Default was transmitted by the current Beneficiary, Wilmington Savings Fund Society, FSB DBA Christiana Trust, not in its individual capacity, but solely as Trustee for BCAT 2014-4TT By Rushmore Loan Management Services, LLC, Its Appointed Attorney In Fact or Trustee to the Borrower and Grantor at the following address(es): ADDRESS JAMES BOWEN 4948 RD E. 7 NE, MOSES LAKE, WA 98837 JAMES BOWEN C/O KIMBERLY R. ASHLEY, KIMBERLY RIES ASLHLEY P.P., ATTORNEY AT LAW, 206 SOUTH ALDER ST, MOSES LAKE, WA 98837 JAMES BOWEN C/O KIMBERLY R. ASHLEY, KIMBERLY RIES ASLHLEY P.P., ATTORNEY AT LAW, 206 SOUTH ALDER ST-P.O. BOX 1729, MOSES LAKE, WA 98837 JAMES BOWEN C/O KIMBERLY R. ASHLEY, KIMBERLY RIES ASLHLEY P.P., ATTORNEY AT LAW, P.O. BOX 1729, MOSES LAKE, WA 98837 JAMES BOWEN C/O NATHAN P ALBRIGHT, FIRM: COUTURE & ALBRIGHT, ATTYS AT LAW, PLLC, 406 W BROADWAY AVE STE D, MOSES LAKE, WA 99166 JESSICA BOWEN 4948 RD E. 7 NE, MOSES LAKE, WA 98837 JESSICA BOWEN 52 HERON LOOP, REPUBLIC, WA 99166 JESSICA BOWEN C/O BARBARA J. BLACK, PO BOX 1118, MOSES LAKE, WA 98837-0169 JESSICA BOWEN C/O KIMBERLY RIES ASHLEY ATTORNEY AT LAW, P. O. BOX 1729, MOSES LAKE, WA 98837 by both first class and certified mail on September 14, 2015, proof of which is in the possession of the Trustee; and the Borrower and Grantor were personally served, if applicable, with said written Notice of Default or the written Notice of Default was posted in a conspicuous place on the real property described in Paragraph I above, and the Trustee has possession of proof of such service or posting. VII. The Trustee whose name and address are set forth below will provide in writing to anyone requesting it, a statement of all costs and fees due at any time prior to the sale. VIII. The effect of the sale will be to deprive the Grantor and all those who hold by, through or under the Grantor of all their interest in the above described property. IX. Anyone having any objections to this sale on any grounds whatsoever will be afforded an opportunity to be heard as to those objections if they bring a lawsuit to restrain the sale pursuant to RCW 61.24.130. Failure to bring such a lawsuit may result in a waiver of any proper grounds for invalidating the Trustees' Sale. X. If the Borrower received a letter under RCW 61.24.031: THIS NOTICE IS THE FINAL STEP BEFORE THE FORECLOSURE SALE OF YOUR HOME. You have only 20 DAYS from the recording date on this notice to pursue mediation. DO NOT DELAY. CONTACT A HOUSING COUNSELOR OR AN ATTORNEY LICENSED IN WASHINGTON NOW to assess your situation and refer you to mediation if you might eligible and it may help you save your home. See below for safe sources of help. SEEKING ASSISTANCE Housing counselors and legal assistance may be available at little or no cost to you. If you would like assistance in determining your rights and opportunities to keep your house, you may contact the following: The statewide foreclosure hotline for assistance and referral to housing counselors recommended by the Housing Finance Commission: Telephone: (877) 894-4663 or (800) 606-4819 Website: www.wshfc.org The United States Department of Housing and Urban Development: Telephone: (800) 569-4287 Website: www.hud.gov The statewide civil legal aid hotline for assistance and referrals to other housing counselors and attorneys: Telephone: (800) 606-4819 Website: www.homeownership.wa.gov NOTICE TO OCCUPANTS OR TENANTS – The purchaser at the Trustee's Sale is entitled to possession of the property on the 20th day following the sale, as against the Grantor under the Deed of Trust (the owner) and anyone having an interest junior to the Deed of Trust, including occupants who are not tenants. After the 20th day following the sale the purchaser has the right to evict occupants who are not tenants by summary proceedings under the Unlawful Detainer Act, Chapter 59.12 RCW. For tenant-occupied property, the purchaser shall provide a tenant with written notice in accordance with RCW 61.24.060; Dated: October 28,2015 MTC Financial Inc. dba Trustee Corps, as Duly Appointed Successor Trustee By: Patrick Lynch, Authorized Signatory MTC Financial Inc. dba Trustee Corps 1700 Seventh Avenue, Suite 2100 Seattle WA 98101 Phone: (800) 409-7530 TDD: (800) 833-6388 For Reinstatement/Pay Off Quotes, contact MTC Financial Inc. DBA Trustee Corps TRUSTEE'S SALE INFORMATION CAN BE OBTAINED ONLINE AT www.insourcelogic.com. Order No. WA15-001449-2, Pub Dates 02/05/2016, 02/26/2016

ADVERTISEMENT FOR BIDS

Sealed proposals will be received for the following project:

PROJECT NO.: 2016-040 G (1-1)
TITLE: Miscellaneous Mechanical Repairs
ESTIMATED BASE BID COST RANGE: $275,000.00 to $325,000.00
AGENCY: Wenatchee Valley College
BID DATE/TIME: Prior to 11:00 A.M., Tuesday, March 22, 2016
WALK-THROUGH: 10:00 A.M., Wednesday, March 9, 2016
PROJECT MANAGER: David Lohrengel
BY: Department of Enterprise Services
Engineering & Architectural Services

Full advertisement available at https://fortress.wa.gov/ga/apps/EASBids/BidCalendar.aspx.

Please direct questions regarding this project to the office of the Consultant, Hultz/BHU Engineers, Inc., Attn.: Carly Kacalek, (253) 383-3257.

STATE OF WASHINGTON
DEPARTMENT OF ENTERPRISE SERVICES
ENGINEERING AND ARCHITECTURAL SERVICES

RECORDS

Arrests/Citations

Jan. 27
Luis Carlos Perez, 28, was arrested for possession of marijuana with intent to manufacture or deliver. A previous arrest report from the Grant County Sheriff's Office listed the charges incorrectly.
Feb. 15
Betsy Louise Peraza, 34, was arrested on two Grant County warrants and a Douglas County warrant.
Feb. 16
Jorge Tamayo, 25, was booked on a Grant County warrant.
Feb. 18
Homero Antonio, 24, was arrested on a Grant County warrant.
Hector I. Guerrero Hernandez, 27, was arrested on possession of meth, possession of drug paraphernalia, obstructing and second-degree criminal trespassing.
Feb. 19
Ryan Lee Bone, 39, was arrested on a DOC order.

Police Records
Feb. 15-21
Quincy Police Department

Trespassing: 5
Administrative: 4
Burglary alarms: 4
Domestic disturbances/violence: 4
Suspicious person/circumstances/vehicles: 4
Traffic stops/complaints/violations/hazards: 4
Stray animals/animal-related complaints: 3
Agency assists: 2
Burglaries/past burglaries: 2
Thefts/past thefts: 2
Threats: 2
Dangerous animals: 1
Found property: 1
Fraud: 1
Harrassment/threats: 1
Nuisance/disturbances: 1
Shots fired: 1
Suspected DUI: 1
Vehicle theft: 1
Weapons/firearms: 1

Legal Notice

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 Yahoo! Data Center submitted a NOC air quality permit application on October 19, 2015, to revise their existing NOC Approval Order 11AQ-E399 issued on March 28, 2011. The Yahoo! Data Center is located at 1010 Yahoo Way, and 1500 M Street NE, Quincy, Grant County, Washington. A new Yahoo! Data Center (Project Genesis) is included in the NOC application and is located adjacent to the existing Yahoo! Data Center facilities. The NOC application requests a new permit to cover existing Yahoo! Data Center facilities in addition to Project Genesis. After review of the completed NOC 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.

The Notice of Construction Preliminary Determination, the Second Tier Petition Recommendation, the Notice of Construction application, and other documents related to the project 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 February 25, 2016 through April 4, 2016. A public hearing will be held at 5:00 p.m. on March 31, 2016, at the Quincy Community Center, 115 F Street SW, Quincy, WA 98848. For additional information on the project and to submit comments, contact Kari Johnson at Ecology's Eastern Regional Office, 4601 N. Monroe, Spokane, WA 99205-1295, at kari.johnson@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 February 25, 2016

Medical

From Page A1

handing out hamburgers at McDonalds. Doing the wrong test or making a mistake can be dangerous. We spend a lot of time teaching accountability," she said.

Kaiser said students who enroll in the program are looking for secure careers that don't require advanced college degrees. Even though students are often learning medical procedures on dummies, at least at first, instructors work on getting them to show care and concern for real patients.

The ages of students vary from 19 to 65. Some have left other careers and are searching for something new. The program is popular among Hispanics and Eastern Europeans. There are usually a few men among the mostly female students.

The demand for responsible certified medical assistants is also strong. As clinics and hospitals cut costs, the need for lower-paid medical staff has increased, said Jenny Capelo, WVC dean of Allied Health and Nursing. The college recently doubled its staff to offer two sessions of its nine-month Medical Assistant Program. New sessions begin next fall and next winter.

World photo/Mike Bonnicksen

Medical Assistant Program students at Wenatchee Valley College sit at the first-aid table at Sterling Middle School earlier this month during a Winter Special Olympics basketball game. Students in the program have provided this community service for at least the last 14 years, said program Director Jan Kaiser.

"Confluence Health came to us and told we need more graduates," said Capelo, referring to the program's partnership with Confluence Health, which operates Wenatchee Valley Medical Center, Central Washington Hospital and several satellite clinics. The program had been turning out about 23 graduates a year. With the second session, that number has jumped to about 48. There are currently 20 local job openings for medical assistants and that number is expected to remain steady or grow in coming years.

"You're pretty much guaranteed a job when you graduate," Capelo said. A private school, Charter College, also recently began offering training toward a medical assistant career in East Wenatchee.

Medical assistants' work includes greeting patients, updating weight and height, checking their pulse and blood pressure and updating medical history charts. They do everything that's needed before a doctor, nurse practitioner, physician's assistant or registered nurse comes in. The training also includes immunizations and drawing blood.

"All the decisions have been made by the medical provider," said Kaiser. Medical assistants do learn critical thinking, but they aren't the ones who make critical decisions. They carry them out, she said.

Medical assistants are not nurses. Graduation requirements are far less than for a nurse. Pay is less, too. Medical assistant pay starts at about $13 an hour. Nurses earn about $23 an hour to start.

"It's a good, satisfying job with benefits," Capelo said.

The program's final quarter is devoted to a 160-hour practicum, essentially an internship working at a local clinic. In addition to Wenatchee Valley Clinic, students can be placed at clinics in Leavenworth, Cashmere, Chelan and other areas that may be closer to where they live.

The partnership with Confluence Health and other clinics offers real benefits for the program, the clinics and for students, Capelo said.

"Our program wouldn't exist without an excellent partnership with local clinics," she said.

Land

From Page A1

mation. Is this man made? An act of God? What do we do? I can't stay out of my house for very long," Nichols said.

Eric Peterson, Chelan County Public Works director, said the unstable area follows a crack that runs through an orchard above Whispering Ridge Road, curves down the road and then into what is now a wetland area between some residences. Holes were drilled in the ground last week to install sensors that can measure ground movement, but two of the six sensor pipes have broken off due to excessive movement. Data from previous measurements collected by Chelan County going back to 2010 show ground movement of about one foot at one site and three feet at another site, with movement 10 to 15 feet below the surface, he said.

A geotechnical company will begin reviewing information this week and will install more sensors next week to determine ground movement and acceleration of movement, Peterson said. Aerial laser technology can also be used to measure ground movement, but that technology may not be available for a couple weeks, he said. He said it will be some time before it's known if and how the ground can be stabilized.

Residents said they'd like to see information put online or in other ways directly accessible to them so they can make decisions about when to leave or when they might be able to return.

"I want some data. If it starts moving, I want to know when to get out," said Fitzpatrick, who has so far remained in the home he's owned below the slope for 15 years.

Elliott Nelson, president of the Whispering Ridge Homeowners' Association, also said he wants to see more data collection and access.

"We don't want to wait until it slides," he said.

Alysha Kaplan, a Washington State Emergency Management public assistance manager, said, "You are in a fortunate-unfortunate position in that you've had advance warning." But she added that because of the uncertain nature of the Whispering Ridge threat, insurance wasn't likely to offer much help, nor will there be much help from federal government.

"FEMA isn't going to come in on a white horse and save the day. They're an agency of last resort," she said.

Kaplan also noted that the Tuesday meeting was on the second anniversary of the 2014 Oso landslide in which 43 people died.

Whispering Ridge Road landslide threat facts:

- Whispering Ridge Road will remain closed and well patrolled to keep unauthorized vehicles out.
- No oversize vehicles or heavy equipment that could trigger a landslide will be allowed on the road.
- Temporary emergency power will be restored to most homes this week.
- Fire officials have a back up plan to use light brush trucks and pump water to the area in case of fire. Full-size fire vehicles are too heavy and could trigger a landslide.
- Ambulance service has a plan for using backroads or helicopters to provide medical help if the road is out.
- Emergency detours through Halverson Canyon can be used if Squilchuck Road is cut off by a landslide.
- Red Cross is offering meals and other help and will open a shelter if needed.
- Engineers will be collecting data on how much and fast the ground is moving, its cause and if it can be mitigated.
- Aerial lidar (light detection and ranging) scans of the hillside are planned to measure ground movement.

Bikes

From Page A1

B intersections, the analysis found.

RH2 projected there would be more traffic in 20 years, but the single northbound lane would be able to handle it.

"There's much, much more traffic, but what it's saying is that one lane with two signals can handle that traffic sufficiently," said Erik Howe, a project manager with RH2.

Councilman John Sterk took issue with this.

"That's where I have a problem. Because the way it reads implies that this is gonna be OK for the next 20 years," Sterk said. "I would say that there would be increased traffic in 20 days. Let alone 20 weeks. Let alone 20 months. Let alone 20 years."

Councilman Detering came to Howe's defense, saying that he puts more stock in a traffic study done by engineers than "somebody's personal projection."

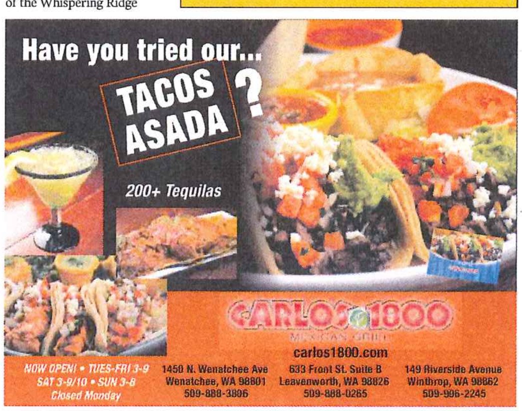
He added, "This wasn't just somebody sitting down going 'hey this is a great idea. Let's put bike lanes out there.' There is some science behind it."

After the original motion failed Councilman Chuck Johnson offered an alternative option: leave four lanes between Grant Road and Third Street, but add bike symbols to outer lanes for cyclists; and then use the three-lane option from Third Street to Grant Road.

"Whether this passes today or fails today, I hope that everyone of us will keep in mind bike lanes for the future because I think it's extremely important," Johnson said.

The motion failed. Johnson and Detering voted for and council members Harry Raab, Sandra McCourt and John Sterk voted against.

Contractors are currently working to repave Valley Mall Parkway. The road will be painted in early April, according to Public Works Director Greg Pezoldt.



FUNERAL NOTICE

Emma Corpus

Viewing will be held 2 to 6 p.m. on Monday, March 28, 2016, at Scharbach's Columbia Funeral Chapel in Quincy. Holy Rosary will be recited at 6 p.m.

Mass of the Christian Burial will be celebrated at 10 a.m. on Tuesday, March 29, 2016, at St. Pius X Catholic Church, Quincy.

Please leave a memory for the family or sign its online guestbook at www.scharbachs.com. Scharbach's Columbia Funeral Chapel is assisting the family with arrangements.

'The Lost Gold'

Submitted photo

A team of third-graders from Pioneer Elementary School traveled earlier this month to the Destination Imagination Regional Competition in Richland. The event is a creative problem-solving competition where teams of students work on their own to solve a challenge of their choosing. The Pioneer team chose the challenge "Get a Clue." The students then wrote a play, "The Lost Gold," about Christopher Columbus. The story was set on his ship, the Santa Maria. Students also designed the costumes and props. Habitat for Humanity donated the clothes for the costumes. It was the first year the students competed, and they were competing against students in the third through fifth grades, said teacher Camille Jones. "The kids told me they were very proud of themselves," Jones said. "They didn't think they'd be able to do it, but they did the whole thing by themselves and learned a lot about teamwork and friendship in the process." Pictured, from left to right, is the Quincy Engineering STEAM Team of Peter Hansen, Danielle MacPherson, Jones, Amy Buenrostro, Abigail Duran, Angel Cordova, Brooklynn Garcia and Lizbeth Ramirez.

Clasificados

Su mercado a la mano
1-800-797-4544

clasificados@elmundous.com

SERVICIOS

Posible solución

Alcohólicos Anónimos es una comunidad de hombres y mujeres que comparten su mutua experiencia, fortaleza, esperanza, resolver su problema común y ayudar a otros a recuperarse del alcoholismo. Para más información llame al 509-830-6723.

TRABAJOS

Se solicita

Bellevue Way Cleaners esta buscando planchador de camisas de Top, de camisas y persona para atender la oficina. Tiempo completo para tintoreria en el area de Bellevue. Solicite en persona para más información en 103 Bellevue Way NE #4 Bellevue, WA 98004 o llame al 425-454-8644.

Se solicita

Ayudante de cocina y lavaplatos para restaurante Koreano 9701 South Tacoma Way Lakewood, WA 98499 adentro de la Market Pal Do. Tiempo completo y parte del tiempo. Para más información llamar al 253-230-0668.

TRABAJOS

Se solicita

Cocinero de comida estilo Sushi y ayudante de cocina. En el área de Bremerton/ Silverdale. Para más información llamar al número 206-245-8511.

Se solicitan

Trabajadores para jardinería. Tiempo completo con experiencia en sistemas de irrigación y otros trabajos relacionados a jardinería. Para más información llamar al número 509-421-1330.

Se solicita

Planchador de camisas tiempo completo. En el área de Issaquah. Para más información llamar al número 206-919-8243.

TRABAJOS

Se solicita

Ayudante de cocina para comida estilo Teriyaki. En el área de Mill Creek. Para más información llamar al número 425-737-1885.

Se solicitan

Amas de casa para hotel localizado en el área de Wenatchee. Tiempo completo o parte del tiempo. Solicite en person en 232 N. Wenatchee Avenue Wenatchee, WA 98801.

TRABAJOS

TRABAJOS

Casas y casas movibles

Casas y casas movibles

Se renta

1 Cuarto en el área de Tacoma cerca del 5 y 512. Incluye todas las utilidades con cable y WiFi. Solamente $450 al mes. Para más información llamar al número 253-592-4292.

Articulos de Venta

Se vende

Tienda mexicana completa con panadería, carnicería, tortillería y licencia de alcohol. En el área de Edmonds. Llamar al 206-817-2065.

Articulos de Venta

Se vende

Negocio o equipo de cocina. Todo lo necesario para comenzar una taqueria. En el área de East Wenatchee. Para más información llamar al 509-449-3277 o al 509-470-1630.

PERIODO DE COMENTARIO PUBLICO

Acerca de la expansión y revisiones al permiso para emisiones al aire para el sitio

Centro de Datos Yahoo!

Desde el 3 de marzo hasta el 11 de abril, 2016

Documentos estarán disponibles para examinar en:

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

Someta sus comentarios a: kari.johnson@ecy.wa.gov

REUNION PUBLICO

El 7 de abril, 2016

Centro Comunitario de Quincy
115 Calle F, Quincy, WA
5:00pm Reunir y conversar
5:30pm Presentaciones y preguntas
6:30pm Audiencia formal

DEPARTMENT OF ECOLOGY
State of Washington

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

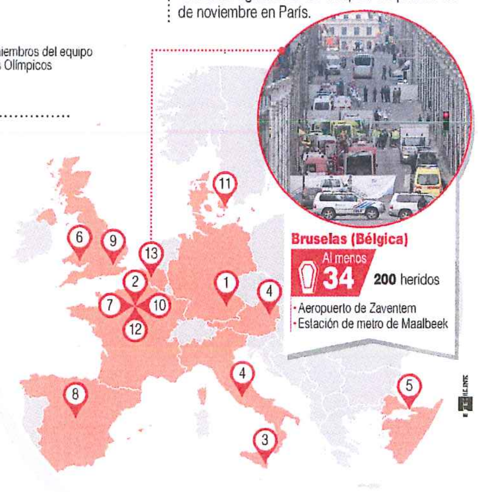
Para actualizaciones por correo electrónico Listserv.wa.gov "Quincy-data-centers"

El Mundo

www.elmundousa.com

Principales atentados terroristas en Europa

Los atentados de Bruselas (Bélgica), que han causado decenas de muertos y heridos, se producen cuatro días después de la detención del yihadista Salah Abdeslam, al que se atribuye la autoría logística de los ataques del pasado 13 de noviembre en París.



muertos

1 — 1972 Sept. 5-7
Munich (Alemania)
Un comando palestino secuestra a miembros del equipo olímpico de Israel durante los Juegos Olímpicos
18 — **11** rehenes **1** piloto, **5** terroristas **1** agente

2 — 1983 Jul. 15
París (Francia)
Atentado perpetrado por el grupo independentista armenio ASALA contra las líneas aéreas turcas, en el aeropuerto de Orly
8 — **56** heridos

3 — 1985 Nov. 23
La Valeta (Malta)
Un avión de Egypt Air es secuestrado por un comando árabe en el aeropuerto. Durante el rescate se produce una confrontación
66

4 — 1985 Dic. 27
Roma (Italia) / Viena (Austria)
Dos atentados simultáneos de la organización terrorista palestina de Abu Nidal contra la compañía israelí El Al, en los respectivos aeropuertos
20 — **16** en Roma, **4** en Viena

5 — 1986 Sept. 6
Estambul (Turquía)
Extremistas palestinos atacan con granadas y ametralladoras la sinagoga Neve Shalom
24

6 — 1988 Dic. 21
Lockerbie (Reino Unido)
Explota en pleno vuelo una bomba en el interior de un Boeing de la compañía Pan Am
270 — **11** de ellas se encontraban en tierra

7 — 1995 Jul. 25
París (Francia)
El Frente Islámico de Salvación (FIS) explotó un artefacto fabricado con una bombona de gas en la estación de Saint Michel
8

8 — 2004 Mar. 11
Madrid (España)
Se presentan 10 explosiones en cadena en 4 trenes, en una acción reivindicada por las Brigadas Abu Hafs al Masri, vinculadas a Al Qaeda
191 — **1.600** heridos

9 — 2005 Jul. 7
Londres (Reino Unido)
Se presentan 4 explosiones (3 en el metro, 1 en un autobús), ataques reivindicados por Al Qaeda
56 — **700** heridos (4 de ellos terroristas)

10 — 2015 Ene. 7-9
París (Francia)
Se presentan varias acciones terroristas contra la redacción del semanario satírico Charlie Hebdo
20

11 — 2015 Feb. 14-15
Copenhague (Dinamarca)
Un presunto yihadista dispara en un centro cultural y en una sinagoga
3 — **5** heridos
entre ellos, el presunto asesino

12 — 2015 Nov. 13
París (Francia)
Varios atentados casi simultáneos distintas partes de París, perpetrados por terroristas del Estado Islámico
130 — Más de **300** heridos
89 en la sala de fiestas de Bataclán

Diseñan biorreactor para producir biocombustibles a bajo costo


Foto Notimex

MÉXICO (Agencias)— Un grupo de estudiantes y maestros de la Universidad Autónoma de Coahuila (Uadec), en Saltillo, desarrollaron un biorreactor de columna de burbuja y gas-lift para producir biocombustible a bajo costo.

El biorreactor se construyó de acrílico en lugar de acero inoxidable, lo que representa un costo más económico, resaltó el investigador de la Facultad de Ciencias Químicas de la Uadec, Héctor Arturo Ruiz Leza.

"Es un reactor dos en uno, ya que puede operar como un reactor de columna de burbuja, o bien como gas-lift", dijo el académico en una entrevista con la Agencia Informativa del Consejo Nacional de Ciencia y Tecnología (Conacyt).

"Este reactor podemos utilizarlo bajo una condición, o bien, cambiamos una parte mecánica y funciona de otra manera, es de casi tres litros de volumen y se puede realizar con el la fermentación alcohólica", abundó.

A pesar de que el reactor trabaja de dos formas en un mismo aparato, permite hacer más eficiente la producción de bioetanol y a la vez se pueden estudiar diferentes condiciones de operación, puntualizó el investigador.

Astrónomos hallan galaxias de gran tamaño llamadas "súper espirales"

MÉXICO (Agencias)— Un grupo de astrónomos captó en el desierto cósmico galaxias enanas llamada "súper espirales" nunca antes vistas, informó la Administración Nacional de la Aeronáutica y del Espacio (NASA, por sus siglas en inglés).

Estas constelaciones compiten en tamaño y brillo con las galaxias más grandes del universo, explicó la NASA en su sitio de Internet.

Las galaxias descubiertas se ocultaron a la vista al imitar la apariencia de típicas galaxias espirales, pero un nuevo estudio de la NASA revela que estos objetos con apariencia cercana están muy lejanos entre sí y son versiones "monstruosas" de espirales cotidianas.

El astrofísico en el Centro de Procesamiento y Análisis Infrarrojo (IPAC) en el Instituto de Tecnología de California en Pasadena, Patrick Ogle, comentó que encontraron una clase antes no reconocida de galaxias espirales que son tan luminosas y masivas como las galaxias más grandes y más brillantes que se conocen.

SIGUE EN 8A


Foto Agencias

Científicos venezolanos crean rodilla mecánica

CARACAS (Agencias)— Un prototipo de rodilla mecánica para amputados capaz de reproducir el movimiento humano, fue creada por un grupo de científicos venezolanos, que buscan financiamiento para elaborar nuevos aparatos para personas amputadas.

La ingeniera Carmen Müller, investigadora y coordinadora de Biomecánica de la privada Universidad Simón Bolívar (USB), informó que "se trata de una prótesis externa para que la persona que la utilice se sienta más cómoda y pueda moverse con algo de naturalidad".


Foto Archivo

Müller, en diálogo con Notimex, explicó que el proyecto comenzó a realizarse hace cinco años, de manera conjunta con investigadores de la Universidad Nacional Experimental del Táchira (UNET) y "con el deseo de dar soluciones nacionales a los problemas de los venezolanos".

Müller señaló que actualmente tienen un prototipo en pleno funcionamiento, que fue colocado a muchos pacientes en calidad de prueba, con buenos resultados.

Pero resaltó que lamentablemente carecen de financiamiento para la producción comercial de estos útiles y novedosos aparatos.

Estudio revela que periodo Jurásico duró cinco millones de años más

MÉXICO (Agencias)— Un estudio realizado a diversas dataciones de nanoplancton, fósiles de amonitas y circones mostró que el periodo Jurásico duró cinco millones de años (Ma) más del tiempo registrado por los libros de historia, informó la Academia Mexicana de Ciencias (AMC).

La investigación la realizó el profesor emérito de la Universidad de Buenos Aires, el geólogo Víctor Alberto Ramos, en la zona llamada Vaca Muerta, Argentina, una zona abundante en sedimentos marinos y fósiles que se acumularon entre los periodos Jurásico y Cretácico.

El geólogo en ambos periodos descubrió una duración geocronológica de cinco millones de años más para el periodo Jurásico, la cual parte como base de la escala temporal geológica que se usa en la actualidad.


Foto Agencias

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.)

Mar 31 2016 5:00PM **Public Hearing - Quincy**
--------------- 8:30PM **Yahoo! Data Center Air Quality Permit**
Yahoo! proposes to expand its operations at their Quincy data center. In order to expand, their air quality permit needs to be updated to ensure that human health and the environment are protected.
More Information: More Information
Location: Quincy Community Center

115 F Street SW
Quincy , WA
Sponsor: Ecology
ECY ERO
Contact: Kari Johnson
(509) 329-3502 / kajo461@ecy.wa.gov
Public Comment Period - Feb 25 2016 - Apr 4 2016

Feb 25 2016 **Public Comment Period - Quincy**
Apr 04 2016 **Yahoo! Data Center Air Quality Permit**
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Quincy , WA
Sponsor: Ecology
ECY ERO
Contact: Kari Johnson
(509) 329-3502 / kajo461@ecy.wa.gov
Public Hearing - Mar 31 2016 5:00PM

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

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Johnson, Kari D. (ECY)

From:	Johnson, Kari D. (ECY) <KAJO461@ECY.WA.GOV>
Sent:	Friday, February 19, 2016 7:53 AM
To:	QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject:	Status updates & important upcoming dates

Hello, Quincy Interested Parties.

Here are status updates for Ecology's public involvement projects for three Data Centers, and some important upcoming dates.

Yahoo!: Yahoo! is proposing to expand operations at their facility in Quincy, which requires revisions to their air permits. Ecology will begin a 40-day Public Comment period on March 3rd and will hold a Public Hearing on April 7th at 5 PM at the Quincy Community Center. In March, I will send an email with more details, but I wanted to give folks a head's-up about the hearing date. **If April 7th conflicts with any major events in the community, please let me know by Monday, February 22.**

Sabey: The Public Comment period for Sabey's revised air permit ended January 11th. Comments are currently being reviewed and a formal Response To Comments Report is being drafted. We hope to have it finalized within the next few weeks. I will let you know when a copy of the report is available online and at the repositories.

Microsoft Oxford: Microsoft continues to send Ecology supplemental revisions to their air permit application. With each revision, Ecology must carefully review it within a 30-day Completeness Determination timeline. If Ecology determines that the revised application is incomplete, we will issue an incompleteness letter and wait for Microsoft's response. When Microsoft provides their final revision and Ecology determines it complete, we can begin processing the draft permit and send it out for Public Comment. I will keep you posted on any progress.

Upcoming Community Events?: I'd like to continue the outstanding work of Beth Mort in getting involved with the Quincy community. If there's any event that would be great for us to attend, or any areas where you'd appreciate some outreach, I'd love the opportunity to be educated! Plus, Beth tells me that *Tacos Jalisco* by the post office has the best food in Washington, so now I gotta try it!

Happy Friday!

Kari

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

DEPARTMENT OF ECOLOGY State of Washington

Visit us on the web or social media.

Johnson, Kari D. (ECY)

From:	Johnson, Kari D. (ECY) <KAJO461@ECY.WA.GOV>
Sent:	Thursday, February 25, 2016 11:51 AM
To:	QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject:	Yahoo! Public Comment Period begins
Attachments:	ECOLOGY NEWS_ Updating Yahoo!'s air permit for a data center in Quincy.pdf

Hello, Quincy Interested Parties.

Last week I sent an email with Data Center updates, including plans for an upcoming Public Comment Period & Hearing for **Yahoo!'s air permit update**. We received concerns that the scheduled hearing date was during Spring Break. Fortunately, we were able to move up the hearing, and subsequently, the comment period. Here's the info:

- **Public Comment Period: February 25, 2016 through April 4, 2016.**

Documents regarding the project may be viewed at the following locations:

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

Submit written comments to Kari Johnson at this email address (kari.johnson@ecy.wa.gov), or via mail at Ecology's Eastern Regional Office (address above).

- **Public Hearing: March 31, 2016 at 5:00 p.m. at the Quincy Community Center**, 115 F St. S.W., Quincy. Formal testimony starts at 6:30 p.m.

Attached to this email is Ecology's news release for more details about the Yahoo! project. I will be following up with you for additional resources and reminders.

Hope to see you at the Hearing! I look forward to meeting you and putting faces to names.

Enjoy this beautiful day!

Kari

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

DEPARTMENT OF ECOLOGY
State of Washington

Johnson, Kari D. (ECY)

From:	Partridge, Sandra (ECY) <shug461@ECY.WA.GOV>
Sent:	Thursday, February 25, 2016 9:54 AM
To:	ECOLOGY-NEWS@LISTSERV.WA.GOV
Subject:	ECOLOGY NEWS: Updating Yahoo!'s air permit for a data center in Quincy

Washington Department of Ecology – *NEWS*
Feb. 25, 2016

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

Updating Yahoo!'s air permit for a data center in Quincy

Ecology is seeking comments on the changes

SPOKANE – Yahoo! is proposing to expand its operations at their data center in Quincy. In order to expand, their air quality permit needs to be updated to ensure that human health and the environment are protected.

Data centers house servers that store digital data, handle email, manage instant messages and run applications for computers. Yahoo! uses backup generators powered by diesel engines to keep servers functioning in case of power outages.

The Washington Department of Ecology is seeking comments on the updates to Yahoo!'s original permit that was issued in 2011. With the updated permit they can operate an additional 25 backup diesel generators.

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

The permit includes conditions to protect the public from air pollution including fuel limits and specified hours of operation for generators.

Public hearing
Ecology is hosting a public hearing on the air quality permit that begins at 5 p.m. on March 31 at the Quincy Community Center, 115 F St. S.W., Quincy, Wash. Formal testimony starts at 6:30 p.m.

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

Comments will be accepted from February 25 through April 4.

Review the revised permit

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

Johnson, Kari D. (ECY)

From:	Johnson, Kari D. (ECY) <KAJO461@ECY.WA.GOV>
Sent:	Thursday, March 03, 2016 10:26 AM
To:	QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject:	Available online! Docs for Yahoo! Public Comment

Hello!

FYI, repository documents for the Yahoo! Public Comment Period are also available online here: http://www.ecy.wa.gov/programs/air/quincydatacenter/index.html (Scroll down to the bottom.)

Thank you for your interest in Quincy! I'll see you soon.

Kari

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

From: Johnson, Kari D. (ECY) [mailto:KAJO461@ECY.WA.GOV]
Sent: Thursday, February 25, 2016 11:51 AM
To: QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject: Yahoo! Public Comment Period begins

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Air Quality Program
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Johnson, Kari D. (ECY)

From:	Johnson, Kari D. (ECY) <KAJO461@ECY.WA.GOV>
Sent:	Monday, March 28, 2016 11:29 AM
To:	QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject:	Yahoo! Public Hearing this Thursday
Attachments:	Yahoo Genesis Focus Sheet.pdf

Good day, Quincy Interested Parties.

If you're like me, you're amazed that it's already the final days of March, and a week into Spring. (It snowed in Spokane this morning!)

This week is also the Public Hearing for Yahoo!'s air quality permit update. **It's March 31, 2016 at 5:00 p.m. at the Quincy Community Center**, 115 F St. S.W., Quincy. Formal testimony starts at 6:30 p.m.

Attached is a Focus Sheet that gives a summary of the revisions. Additional documents are online at: http://www.ecy.wa.gov/programs/air/quincydatacenter/index.html (Scroll down to the bottom.)

Comments on the project will be accepted through next Monday, April 4th; postmarked or emailed to me, Kari Johnson, by 11:59 pm (see address in my signature below).

Please let me know if you have any questions, concerns, or enthusiastic praise. ☺

Hope to see you Thursday!

Kari

Kari Johnson (509) 329-3502 kari.johnson@ecy.wa.gov
Environmental Education & Outreach Specialist
Air Quality Program
Department of Ecology, Eastern Regional Office
4601 N. Monroe St.
Spokane, WA 99205

From: Johnson, Kari D. (ECY) [mailto:KAJO461@ECY.WA.GOV]
Sent: Thursday, February 25, 2016 11:51 AM
To: QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject: Yahoo! Public Comment Period begins

Hello, Quincy Interested Parties.

Last week I sent an email with Data Center updates, including plans for an upcoming Public Comment Period & Hearing for **Yahoo!'s air permit update**. We received concerns that the scheduled hearing date was during Spring Break. Fortunately, we were able to move up the hearing, and subsequently, the comment period. Here's the info:

- **Public Comment Period: February 25, 2016 through April 4, 2016.**

Documents regarding the project may be viewed at the following locations:

- Ecology's Eastern Regional Office, 4601 N. Monroe, Spokane.
- Quincy City Hall, 104 B Street S.W., Quincy.
- Quincy Library, 208 Central Ave S., Quincy.
- Online at: http://www.ecy.wa.gov/programs/air/quincydatacenter/index.html (Scroll down to the bottom.)

Submit written comments to Kari Johnson at this email address (kari.johnson@ecy.wa.gov), or via mail at Ecology's Eastern Regional Office (address above).

- **Public Hearing: March 31, 2016 at 5:00 p.m. at the Quincy Community Center**, 115 F St. S.W., Quincy. Formal testimony starts at 6:30 p.m.

Attached to this email is Ecology's news release for more details about the Yahoo! project. I will be following up with you for additional resources and reminders.

Hope to see you at the Hearing! I look forward to meeting you and putting faces to names.

Enjoy this beautiful day!

Kari

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

DEPARTMENT OF ECOLOGY
State of Washington

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Yahoo! Data Center Permit Update

Yahoo! is proposing to expand its operations at their data center in Quincy, Wash. In order to do so, their air quality permit, called a "Notice of Construction Approval Order (NOC)", must be updated. A new Yahoo! data center, "Project Genesis," is included in the NOC application and will be located adjacent to the existing Yahoo! facilities.

The original permit, issued in 2011, allowed Yahoo! to install 23 diesel generators and associated cooling equipment, in order to provide emergency backup power to the facility. With the updated permit they can operate an additional 25 backup-diesel generators.

The proposed Project Genesis will include:

- Direct evaporative cooling units
- Air cleaning systems
- Boiler heating
- A 196,969 square foot building complex
- Twenty-five new diesel-powered engines. Twenty of the new engines will provide the main data center support and will be rated at 2.0 megawatt electrical capacity (MWe). The data center will also have four reserve engines rated at 2.75 MWe and one administrative support engine rated at 2.75 MWe.

The permit includes conditions to protect the public from air pollution including fuel limits and specified hours of operation for generators.

How Ecology evaluates diesel engine exhaust

When Ecology staff review a permit application for a data center, they carefully review the amount of air pollutants added to the area because of the project. Ecology cannot approve a permit that allows pollutants to be emitted often enough, or in high enough levels, to cause health problems.

Ecology's air quality experts rely on computer models to estimate where the wind will carry pollutants from diesel-powered backup generators' exhaust. They project the amount of toxic air pollutants that could be in the air.

Ecology toxicologists who specialize in understanding how pollution and chemicals affect people's health review the information. The look at the computer models and assess the possible health risks.

MORE INFORMATION

PUBLIC HEARING

March 31, 2016 at 5pm
Quincy Community Center
115 F Street SW
Quincy, Wa 98848

PUBLIC COMMENT PERIOD ENDS

APRIL 4, 2016

Submit comments to:
Kari Johnson
Department of Ecology
Air Quality Program
4601 N. Monroe St.
Spokane, WA 99205
(509) 329-3502
kari.johnson@ecy.wa.gov

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

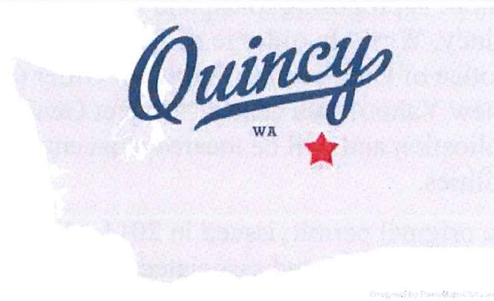
Quincy City Hall
104 B Street SW
Quincy, WA 98848

Quincy Library
208 Central Ave. S
Quincy, WA 98848

Department of Ecology
4601 N Monroe St
Spokane, WA 99205

Community Modeling

Community modeling has been used in Quincy because many companies built data centers there. Ecology evaluates the emissions from each individual data center and the combined emissions from all data centers and other sources of air pollution. This is done through a computer modeling process. The model adds any projected new data-center emissions to those from other sources of air pollution and determines if the collective emissions would likely be harmful to human health. We refer to this cumulative modeling process as "community modeling."



The Health Risks

Diesel-engine exhaust contains fine particles that can cause health problems for people who are exposed frequently and at high levels. The toxic air pollutants in diesel-engine exhaust include nitrogen dioxide, carbon monoxide, organic compounds, and tiny particles called diesel-engine-exhaust particulate.

Ecology evaluates the levels of all these pollutants during the permit review process. The ones most likely to be produced in high enough amounts to potentially affect health are diesel exhaust particles and nitrogen dioxide.

For detailed information on the health effects of these pollutants please read publication 11-02-005 "Focus on Diesel Exhaust Health Risks" on our website. It is available in English and Spanish. For more information please visit our Data Center webpage: http://www.ecy.wa.gov/programs/air/quincydatacenter.

STAY CURRENT
DATA CENTER AIR PERMITS

DEPARTMENT OF ECOLOGY State of Washington

Text "follow ecyQuincyAir" to 40404 for alerts

Follow @ecyQuincyAir

www.ecy.wa.gov search keyword Quincy

Email updates listserv.wa.gov "Quincy-data-centers"

If you need this publication in an alternative format, call the Department of Ecology at (509) 329-3400. Speech disabilities, call (877) 833- 6341. Hearing loss, call 711 for Washington Relay Service.

Special accommodations:
Para asistencia en español
Gregory Bohn
(509) 454-4174
preguntas@ecy.wa.gov

Ecology East - Brook
@ecyspokane

TWEETS	FOLLOWING	FOLLOWERS	LIKES	LISTS
1,286	667	684	842	8

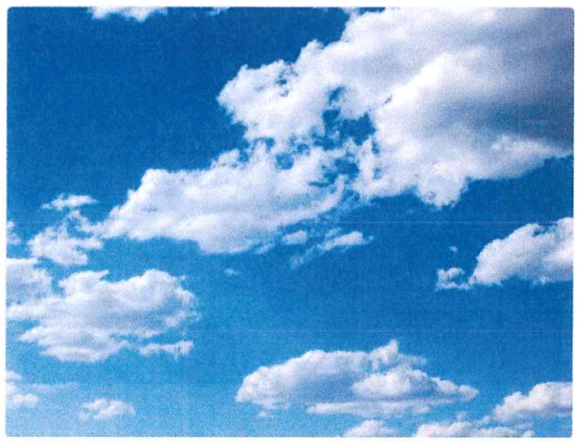
Ecology East - Brook @ecyspokane · Mar 29

Come. Listen. Learn. Comment. Yahoo! Data Center air permit public hearing March 31 at #QuincyWA Community Center, 5 pm.

3

Ecology East - Brook @ecyspokane · Mar 16

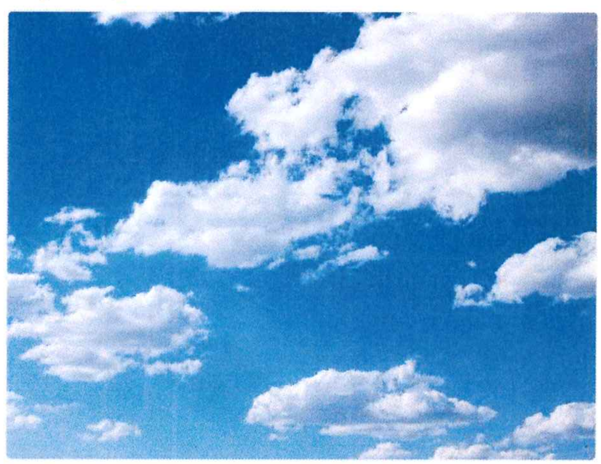
We want to hear from you! Taking comments on permits for @Yahoo data center. #QuincyWA ecy.wa.gov/news/2016/024....



1

Ecology East - Brook @ecyspokane · Feb 25

Take a look-see. @Yahoo data-center air permits in #QuincyWA out for review. ecy.wa.gov/news/2016/024....



1 1

Quincy Air
@ecyQuincyAir

TWEETS	FOLLOWING	FOLLOWERS	LIKES
54	29	24	1

Follow

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Info and updates about air permits for data centers in Quincy. Official Washington Department of Ecology account @EcologyWA. Información en inglés y español

Quincy, WA

ecy.wa.gov/programs/air/q...

Tweets   Tweets & replies

Quincy Air @ecyQuincyAir · Mar 30
Estamos aceptando ahora los comentarios sobre el permiso para emisiones al aire asociados con #QuincyWA ecy.wa.gov/programs/air/q...

Quincy Air @ecyQuincyAir · Mar 30
We want to hear from you! Accepting comments on air permits for #QuincyWA data center now. ecy.wa.gov/programs/air/q...

Quincy Air @ecyQuincyAir · Mar 13
Haga comentarios sobre el permiso de emisiones al aire del Centro de Datos Yahoo! en #QuincyWA, el 31 de marzo, Centro Comunitario, 5 pm.

Quincy Air @ecyQuincyAir · Mar 18
Come. Listen. Learn. Comment. Yahoo! Data Center air permit public hearing March 31 at #QuincyWA Community Center, 5 pm.

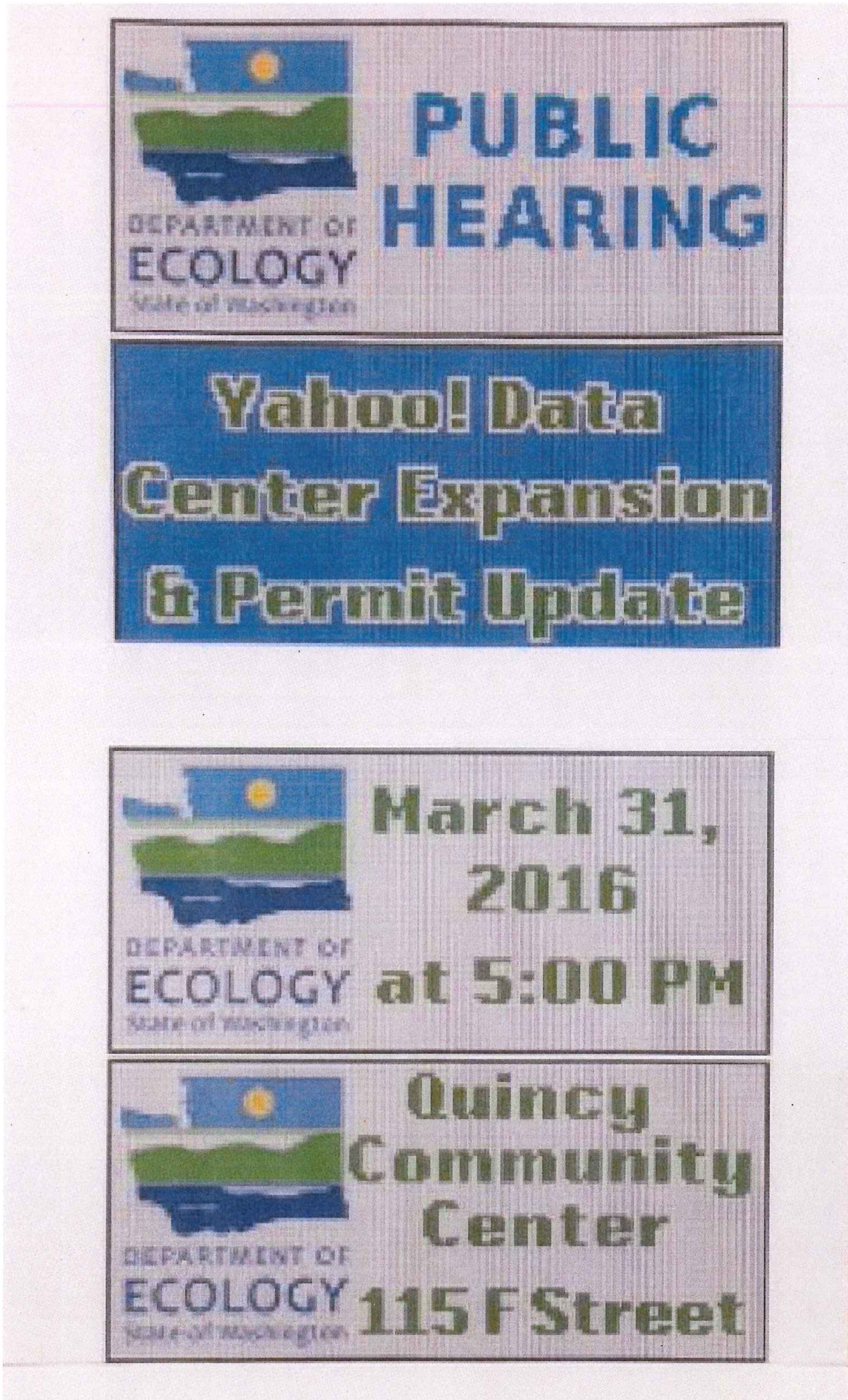
Quincy Air @ecyQuincyAir · Mar 1
El humo que sale de motores diésel contiene partículas dañosas. Aprende como estamos protegiendo su comunidad. 1.usa.gov/1pSYwEZ

Quincy Air @ecyQuincyAir · Mar 1
Diesel engine exhaust particles can be harmful for health. Learn how we are protecting your community. 1.usa.gov/1IZSqBo

Quincy Air @ecyQuincyAir · Feb 25
We want to hear from you! Accepting comments on air permits for @Yahoo #QuincyWA data centers now. ecy.wa.gov/news/2016/024....
...

Quincy Air @ecyQuincyAir · Feb 25
Estamos aceptando ahora los comentarios sobre los permisos para emisiones al aire asociados con #QuincyWA ecy.wa.gov/news/2016/024e... ...

Display on the Quincy Valley Business & Conference Center's
electronic reader board on Highway 28, March 30 & 31, 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.

- 03/31/2016 – Danna Dal Porto
- 04/04/2016 – Patricia Martin
- 04/04/2016 – James Valentine
- 04/04/2016 – Brett Muhlestein
- 04/04/2016 – Beth & Charlie Miracle
- 04/04/2016 – Debbie Koehnen
- 02/27/2016 – William Riley

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Rec'd by hand
3/31/16
at Yahoo
hearing.
-Kari
Johnson

Danna Dal Porto
16651 Road 3 NW
Quincy, WA 98848

Yahoo! Data Center Public Hearing

March 31, 2016

1. My first comment is to express my concern for the process Ecology is following with the Public Hearings in Quincy. On July 9, 2015, the Microsoft Oxford facility had a Public Hearing. (Exhibit 1) Quincy residents attended the meeting and made comments. Ecology as not yet issued a Response to Comments for that meeting. Sabey-Intergate –Quincy Data Center Public Hearing was January 7, 2016. (Exhibit 2) No Response to Comments has been issued for those public comments. These data centers have similar issues and, as an involved local resident, I spend many hours reading, studying and researching my comments. If I make a comment or ask a question, and receive no answer, I have no idea if I understand the permit or if my research has resulted in a reasonable contribution to the safe permitting of the data centers or not. Now Ecology is asking for a third Public Comment Period in eight months. I am being expected to do more research for the Yahoo! permit but Ecology has yet to respond to my two previous sets of comments. I am protesting the actions of Ecology in not providing a Response to Comments before having another Public Hearing.

2. In thinking about the delay in the Response to Comments for the last two data center projects, I have thought of a possible reason for that delay. On August 24, 2010, Microsoft Columbia was off-line to swap and install new feeders for their load expansion project. During that swap, the data center ran their generators for 99 hours. (Exhibit 3) Microsoft Columbia engines ran, without emission controls, for 99 hours. I do not believe those hours were factored into their original permit. I know that Microsoft Oxford has to do a utility swap and I am asking if the delay in their Oxford Response to Comments is to prevent the permit from becoming operational. The Oxford engines could operate for the swap and not, therefore, be out of compliance with their new permit. Or is Oxford operating currently under their old permit and, for them to operate for the electrical swap, will they be in violation of the old permit? I want Ecology to explain the reason for the eight-month delay in the Microsoft Oxford Response to Comments as well as the three-month delay in Sabey-Intergate Response to Comments.

3. I am requesting a Tier 3 review of the Yahoo! application for an air quality permit. The basis for my request is a Department of Ecology Air Quality Program Position Paper, August 2010. (Exhibit 4) The back history of data center construction covers several projects over many years. The Third Tier Review Recommendation, Microsoft Columbia, August 20, 2010, page 9, has information related to the concentration of data centers in Quincy.

"Given the serious interest in building several more data centers clustered within the Quincy, WA UGA, and the potential for overlapping DEEP plumes, Ecology's Air Quality Program (AQP) recognized the need to consider the cumulative impacts of new and existing data centers on a community-wide basis. Therefore, a third tier decision will be used by Ecology to consider the approval of Microsoft and each subsequent company's proposal to construct data centers in the Quincy UGA." (Exhibit 5)

Ecology's permitting of new sources of toxic air pollutants has three levels of review. Yahoo!s modeled emissions exceed the acceptable source impact levels (ASILs) and required a Tier 2 health impact assessment (HIA). Using the Ecology language of the proceeding document, I am requesting the third tier petition procedure specified in WAC 173-460-100 for the Yahoo! permit. At another time I will request that data centers permit issued since this August 20, 2010, recommendation be reconsidered if they did not complete a Tier 3 review.

4. Since 2010, Ecology has used the Community Wide model to limit the local cancer risk at 100 per million for Quincy. (Exhibit 6) The Yahoo! TSD, February 5, 2016, page 21, Item 6., States:

> "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 Yahoo!'s Project Genesis proposal in a community wide basis, even though it is not required to do so by state law." (Exhibit 7)

In a recent Yahoo! Ecology flier Publication # 16-02-006 the public is notified that community modeling is being used in Quincy and implies that this modeling "determines if the collective emissions would likely be harmful to human health." (Exhibit 8)) The Yahoo! TSD explains that "the proposed emission of DEEP and N02 exceeded the trigger level for toxic air pollutants (also called an Acceptable Source Impact Level (ASIL))." As required, Yahoo! completed a second tier review and a health impact assessment (HIA) but did nothing else to lower those emissions in excess of the ASIL. Putting the Yahoo! permit application under the "community wide" umbrella allowed for a level of 10 cancers from the Yahoo! facility and Ecology is recommending the permit be finalized.

I have been interested in "community wide" for several years. I am asking now, as I have in the past, for the documents and regulatory steps that created the "community wide" approach. Show me that "community wide" is a procedural step in air permitting and that it is legitimate as a regulatory step. To repeat myself, best I can tell, an Ecology employee, Gary Palcisko, developed this procedure in response to the large number of data centers being built and proposed for Quincy. It appears that the "community wide" numbers are arbitrary and without scientific basis. I have asked before if this analysis was peer reviewed. As before, I am asking if this analysis was proposed to the department management and has this been adopted as Ecology policy. How does this "community wide" fit together with Tier 2 and Tier 3 permitting? Where do Tier 4 controls fit into this scenario? By using this "community wide" approach, as long as cancers from DEEP are below 10 for each facility, the construction could continue with no apparent limits on dangerous emissions such as NO2 and the TAPS. N02 is really dangerous and seriously effects many more people than DEEP but we are lured to focus on DEEP because cancer is a bigger deal. The "community wide" model is a shield for Ecology to allow data center construction to smother Quincy in toxic air. If "community wide" had any validity, the 62 cancers south of Yahoo! and the 58 cancers south of Sabey-Intergate would trigger emission controls on both these facilities as well as any further diesel permits in Quincy without Tier 4 controls. Prior to 2009, WAC 173-460 required that all sources of pollution use control technology to keep emissions of TAPS to below one cancer per million. Prior to the changes in the air quality rules of 2009, there were no permits issued that exceeded ten cancers per million. In 2009, the Washington State air quality protections that were in place were gutted to allow, among other things, this industrial concentration of diesel generators in Quincy. These facts should resonate with current Governor Jay Inslee as he has championed air quality as well as efforts in Washington State to slow climate change.

Prior to the implementation of this arbitrary "community wide" model, the Intuit Technical Support Document, December 24, 2007, lists the maximum risk allowed by a Second Tier Analysis as one in one hundred thousand. (Exhibit 9) The net effect of the difference in these numbers is that a large number of industrial facilities can be built before the limit (100) is reached to require steps such as emission controls be built to protect citizens in Quincy. The Yahoo! Second Tier Review Recommendation, February 17, 2016, page 22, is a map showing the Residential Receptors Near Genesis. The residence with the maximum cumulative risk is 62 cancers per million. (Exhibit 10) Ecology inserts a disclaimer that the DEEP risk indicated at that residence is exaggerated by the effects of Highway 28. On the same map is a residence, not near the highway, with a cumulative risk of 40 per million. This map is a Cumulative DEEP Concentration from Yahoo! and it references JUST project Genesis, not all 48 Yahoo! engines. I am asking for a map that shows the cumulative DEEP from ALL 48 of the Yahoo! engines. I would like a map showing the residences with the maximum risk be recalculated using emissions from all 48 Yahoo! engines.

5. I am asking for a map of that area of Quincy with those concentrated data centers that shows the cumulative DEEP emissions from the 48 Yahoo! engines, the 9 Intuit engines, the Sabey-Intergate 44 engines and the 17 Vantage engines. In less than a square mile, Ecology has permitted 118 diesel engines. The 17 Vantage engines have Tier 4 controls but the other 101 engines have no emission controls. Please note that the Intuit engines were permitted in to run for 400 hours (Exhibit 11) I want the maximum cumulative impacted residences identified with the cumulative DEEP emissions from all the 101 diesel engines in this concentrated area.

6. I am asking for a Cumulative DEEP Concentration map covering the city of Quincy from Oxford to Sabey-Intergate as shown in the example included. (Exhibit 12) I want a second map to illustrate the Estimated short-term NO2 concentrations.

7. Reading through this Community Wide document, (Exhibit 6) some uncertainty existed in 2010 about the determination of the "background" risk to local health. In 2016, "background" is still an unresolved issue for Ecology permits. Real confusion exists if the "background" is a cumulative number from the single source data center or if the "background" is a total of all the other emission sources such as the nearby data centers, the railroad, the highway, trains or other industry. Some permits only reflect the

emissions from the new engines being considered for the expansion, like Microsoft Columbia, and these permits pretend that the engines right next to them do not exist. This compartmentalization of emissions, without regard to the diesel engines in the same facility, is an obvious construct to allow a permit to be issued without actually assessing the effects of all the diesel engines at a facility to operating at once. Appendix E of the Revised Yahoo! NOC, has a series of charts listing Capital Cost for DOC, DPF, SCR and Tier 4 technology. (Exhibits 13,14,15,16) The number of engines being considered for this estimate is 20 plus 5. The number of engines at Yahoo! is 48. These cost estimates for Tier 4 protections do not include the total number of engines at the Yahoo! data center. The omission of the total number of engines for these calculations makes the charts inaccurate and useless for public consideration. In addition to the error in number of engines, I want to use these Appendix E charts to point out that Yahoo! has received cost estimates for these controls from only one vendor, Cummins. I believe the company has the responsibility to have at least two estimates for consideration of emission controls.

The numbers on the following documents are not correct but we can look at them anyway. Revised NOC Genesis Revised, Appendix E-5 has DOC-Cost Effectiveness projections. (Exhibit 17) The cost considerations for DOCs , one of the emissions controls, is detailed on page 15 of the Yahoo! Intergate-Quincy Data Center *, February 5, 2016. (Exhibit 18) As usual, "Ecology concludes that the use of DOC is not economically feasible for this project. Therefore, Ecology agrees with the applicant that these controls options can be rejected as BACT. " I want to refer to the chart and state that the 25 year capitol recovery rate of 25 years does not reflect the number of years of life in these engines or the data center. These engines can work effectively for 75+ years so the Annualized rate of 25 years is inaccurate. These controls are a deduction for the company and the environmental and human health advantage for controls should be factored into the value of controls. Some members of Ecology, however, consider cost important in relation to benefit for the public. (Exhibit 19) Vantage data center was a champion for the Quincy community because Vantage data center came into the construction application insisting that Tier 4 controls be part of their permit. Yahoo! can be a Quincy champion as well by choosing to permit this large 48 engine facility under Tier 4 guidelines. * Please explain why the name of this facility is listed as Yahoo! Intergate-Quincy in this document.

8. I understand that this Public Hearing is to grant a new permit to Yahoo!. Their original permit is being rescinded. Yahoo! is asking for a permit to operate all 48 engines without any of the previous restrictions on their operations. I want to see in the new permit a description of the proposed use of the original 13 engines, as well as the 10 other existing engines, integrated into the operation of the new facility. Ecology has requested the same information for PM. (Exhibit 20) I want to see in the permitting document how the first 13 +10 engine operations are being changed. I want to see the modeling of those 13+10 engines as it applies to the total facility NAAQS. The Approval order lists the total facility emissions for all 48 engines but the Application only models the emissions from the new 25 engines. If the original 13+10 engine operations are being changed, but being run at the same time as the new engines, the emission charts must show all the 48 engines at once. I want to see operational charts that show the total emissions of 48 Yahoo! engines.

9. The emissions from old 13+10 engines must be represented in the calculations of BACT. Show me the charts that reflect the total emissions from Yahoo! with all engines in operation, such as the emissions in the "worst case scenario", a power outage. On page 9 of the Yahoo! Second Tier Review Recommendation, February 17, 2016, 3.4.2, Landau lists the cumulative exposure to DEEP in Quincy. (Exhibit 21) Listing the sources of emissions the documents says: "Yahoo! Data Center (including Project Genesis and requested permit changes to allowable emissions for the existing Yahoo! Data Center)." That statement implies that the DEEP calculations are based on all 48 Yahoo! engines. I want to see the chart that reflects that information.

10. I am complaining about the use of Moses Lake weather as a basis for Quincy data center projects. An August 6, 2015, email from Ranil Dhammapala, Ecology, to Chip Halbert and Mozan Totani, Yahoo! requests that the modeling for emissions be done using meteorological data from Moses Lake Airport acquired between 2001-2005. (Exhibit 22) I have complained before about using Moses Lake Airport to represent Quincy weather and Ecology's response is that "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 23) I have requested the document that verifies this statement. My question, again, is in what way does the PCHB have the scientific foundation to make a determination about

weather in Quincy? Quincy is in a valley with a backdrop of the tallest point in Grant County, Monument. The Quincy data centers are constructed on the northern edge of town, at the base of these tall hills. We have weather influenced by these physical characteristics as well as weather generated by our proximity to the Columbia River. Our valley has experienced many days of inversions in recent years. The inversions have been spaced all throughout the year. The inversions are a result, in part, because of the valley formation. Moses Lake has no low spots and is not backed by large hills. Quincy weather is different enough, because of the inversions of toxic air, that it is not proper to use Moses Lake Airport weather to represent Quincy. In reference to the dates, 2001-2005, 40 CFR 51 Appendix W, 8.3.1.2 Recommendations, states: Consecutive years from the most recent, readily available 5-year period are preferred. (Exhibit 24) Yahoo! used Moses Lake weather as well as the old information from 2001-2005. (Exhibit 25) Those dates are over 10 years old and I am requesting current data be used for this air quality permit.

11. Once more I am asking for air quality monitoring in Quincy. As the data center construction has increased in Quincy, so has the truck traffic, the train traffic and additional industry has been built. Quincy does NOT have any initial background air monitor data. All the construction has been designed and based on air modeling by various people, some from industry and some from Ecology. Air emissions and their patterns are science, requiring concrete data and specific hard information. We need to know and stop guessing about the reality of air quality in Quincy. Air monitoring equipment is necessary and, once again, I am requesting permanent air monitoring equipment be installed at Mountain View Elementary school (next door to Microsoft Columbia) and at Lazy Acres trailer park (across the road from Yahoo!) to provide 24/7, 365 days a year air quality records. I want the air monitoring records to be kept on file with Ecology, validated, reported to the EPA and available to the public in a format that can be viewed and easily understood.

Ecology has responded to my requests for air monitoring equipment by telling me that staffing and budgets are not available. I do not believe that would hold up under close scrutiny but I am very thankful that Ecology has started to involve the data center businesses in funding air monitors. (Exhibit 26) I encourage Ecology to consider adding requests for funding to every application for an air quality permit. I think it is very reasonable for developers to fund air monitoring technology as part of their permit to prove their facilities are operating in the public interest. I wish I could find a way to make that request retroactive

12. The Ecology handout "Focus on Yahoo! Data Center Expansion" (Exhibit 27) as well as the front page Columbia Basin Herald, Moses Lake newspaper (Exhibit 28) mentions the Yahoo! revision as including "conditions to protect the public from air pollution, including fuel limits and specified hours of operation for the generators". I read the Yahoo! documents and I did not see any specific language about fuel limits to protect human health. I want to know where to find that fuel limits protect human health in the Yahoo! documents. In fact, careful calculations show an additional 134,000 **additional** gallons of diesel will be permitted through this Yahoo! permit. Every one of the data center permits in Quincy already has specific hours of operation intended to prevent engine testing to occur at night or that testing be spaced apart to reduce the amount of emissions in the air. I do not see anything special in this Yahoo! permit to warrant the statement by Ecology that this permit protects human health.

13. I am asking for Ecology to create a format or provide some standardization for air quality permit application. This lack of consistency in applications is very difficult for public involvement. Each company creates their own application and locating and being able to compare numbers, emission rates or related data is unnecessarily difficult and time-consuming. Calculations in the various documents are reported in a bewildering number of modes: ppm (parts per million), bhp or hp- brake horse power and g/kWh. To compare documents, it might be necessary to convert from one format to another. Permitting of air quality facilities is a complex and very detailed subject, however, the permit should not be so difficult that a committed and interested citizen cannot understand the basics of an application. If Ecology is dedicated to protecting public health, an effort should be made to facilitate public involvement. Making some consistency in permit applications would go a long way to improve the public's ability to be informed and educated on industry in their community.

14. Cold-start emission information is part of an air quality permit application. As you can see from the photo, the "Black Puff" (cold-start) generates huge amounts of visible emissions but, more importantly, many of the invisible toxic air pollutants. (Exhibit 29) Three Yahoo! Project Genesis documents identify the first minute (60 seconds) as the focus of Yahoo! concern for toxic emissions. (Exhibit 30,31,32) In Table 3 of the Yahoo!

cold-start emission estimates, Yahoo! clearly used the first 60 seconds of emission as test data in their permit. In the Microsoft Oxford permit application, the cold-start emissions were estimated based on a 15 minute cold-start period for their facility. (Exhibit 33) The emission rates for chemicals vary depending on the length of the generator run. To test only 60 seconds of cold-start run does not capture the extent of the emissions given off in a black puff. I want Yahoo! to recalculate emissions of cold-start in their permit application to reflect a true capture of those black puff toxins.

15 ~~14~~. Since I have not received a response to my previous comments from January 7, 2016, I am providing the first page of my Sabey-Intergate Comments because I am continuing to protest the timing of two Spokane Air Quality Program Public Comment Periods to bracket the Christmas Holiday Season. (Exhibit 34)

16 ~~15~~. The Yahoo! Preliminary Determination, February 5, 2016, 10.6, page 14, is a requirement for Yahoo! to complete a health risk assessment specific to Quincy. (Exhibit 35) The due date is on or before July 1, 2017. Since Yahoo! has already completed the HIA for this permit, I want to know the reason for this request in the Preliminary Determination. The end of the paragraph is the statement:

> "In preparing the study Yahoo! may collaborate with the other owners of diesel engines in or near Quincy. Ecology shall review the assessment and take appropriate action based on the results."

I want to know what Ecology expects to achieve through this study and what "appropriate action" could be taken, after the permit is issued, to reduce any risk to the public from the Yahoo! data center.

cc: Jay Inslee, Governor, Washington State
Maia Bellon, Director, Washington State Department of Ecology
David Bray, Assistant Regional EPA Administrator: Air Waste and Toxics

Danna Dal Porto
3/31/2016

List of Exhibits Yahoo! Public Hearing
March 31, 2016

Danna Dal Porto Public Comment

1. Department of Ecology New Release, May 26, 2015, Revising air permit for data center in Quincy, Microsoft Oxford

2. Department of Ecology News Release, December 10, 2015, Quincy data center needs revised air permit, Sabey Intergate Quincy

3. Email correspondence, Jeff Shupe, Grant PUD to Angel Barahona-Sanchez, December 28, 2010, RE: West Quincy Substation Outage Dates

4. Microsoft Columbia Expansion, Third Tier Review, August 20, 2010, page 10, footnote-5

5. Microsoft Columbia Expansion, Third Tier Review, August, 20, 2010, page 9

6. Ecology Document from Gary Palcisko to Jeff Johnston, May 27, 2010, SUBJECT: BASIS FOR DETERMINING A TIER III CUMULATIVVE RISK SIGNIFICANCE LEVEL RELATED TO EXPOSURE TO DIESEL ENGINE EXHAUST PARTICULATE FROM "BACKGROUND" SOURCES AND NUMEROUS EXISTING AND PROPOSED DIESEL-POWERED GENERATORS CLUSTERED IN THE QUINCY,WA URBAN GROWTH AREA

7. Yahoo! Intergate-Quincy Data Center Technical Support Document for Preliminary Determination of Approval Order xxxx, February 5, 2016, page 21

8. Ecology Air Quality Program Document, Publication # 16-02-006, March 2016, page 2

9. Technical Support Document, Intuit Data Center, December 24, 2007, page 2

10. Second Tier Review Recommendation, Yahoo! Data Center, Project Genesis, Map of Residential Receptors Near Genesis, February 17, 2016, page 22

11. Technical Support Document, Intuit Data Center, December 24, 2007, page 4

12. Vantage Data Center Response to Comments, Ecology Response to Comment 43, Danna Dal Porto, Map 2012 Cumulative Diesel Particulate Concentration, page 32

13. Appendix E-1, DOC Capital Cost, Revised NOC Report, Project Genesis, 12/22/15

14. Appendix E-2, DPF-Capital Cost, Revised NOC Report, Project Genesis, 12/22/15

15. Appendix E-3, SCR Capital Cost, Revised NOC Report, Project Genesis, 12/22/15

16. Appendix E-4, Tier 4-Capital Cost, Revised NOC Report, Project Genesis, 12/22/15

17. Appendix E-5 DOC Cost Effectiveness, Revised NOC Report, project Genesis, 12/22/15

18. Yahoo! Intergate-Sabey Quincy Data Center, Technical Support Document for Preliminary Determination of Approval Order xxxx, February, 5, 2016, page 15-16

19. “Risk of backup generators concerns Quincy residents”, Chuck Allen, Wenatchee World, December 19, 2010, page A2

20. Letter from Ecology to Mozan Totani, Data Center Development Manager, Yahoo!, December 15, 2015, page 1-2

21. Second Tier Review Recommendation, Yahoo! Data Center, Project Genesis, February 17, 2016, page 9

22. Email chain from Ranil Dhammapala (ECY) to Mark Brunner (Landau), Gary Palcisko (ECY) and others, August 6, 2015, RE: Yahoo! Pre-Application Meeting

23. Microsoft Oxford Ecology Response to Comments, Ecology Response to Comment 25: Danna Dal Porto, July 9, 2015

24. 40 CFR 51 Appendix W, 8.3.1.2 Recommendations

25. Yahoo! Intergate-Quincy Data Center, Technical Support Document for Preliminary Determination of Approval Order xxxx, February 5, 2016, page 18

26. Letter from Ecology to Mozan Totani, Data Center Development Manager, Yahoo!, December 15, 2015, page 3

27. Department of Ecology Publication # 16-02-006, Focus on Yahoo! Data Center Expansion, March 2016, page 1

28. “Public hearing on Yahoo! data center air quality permit Thursday”, Ryan Minnerly, Columbia Basin Herald, Tuesday, March 29, 2016, page 1

29. Photo Display, “Data Center and Quincy, Washington…May 2015, Microsoft Columbia…Summer 2011

30. 6.0 PROPOSAL TO REDUCE POTENTIAL IMPACTS FROM EXISTING EMERGENCY GENERATORS, Revised NOC Report, Project Genesis, 12/22/15

31. 2.1 DERIVATION OF EMISSION FACTORS, FACILITY-WIDE EMISSION RATES, AND FUEL USAGE, Revised NOC Report, Project Genesis, 12/22/15, page 2-2

32. Appendix C, Table 3, Cold-Start Emission Estimates, Project Genesis, Revised NOC Report, Project Genesis, 12/22/15

33. Cold-Start "Black Puff" Conditions, Sabey 2014-2015 Permit Application Documents, Revised Emission Calcs & Ambient Impact Assessments, 6/4/15, page 4

34. Public Comment Documents, Danna Dal Porto, Sabey Intergate-Quincy Data Center, January 7, 2016, item 1-page 1

35. Yahoo! Quincy Data Center, Preliminary Determination, February 5, 2016, page 14, 10.6

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

Ecology home > News > News Release

artment of Ecology News Release - May 26, 2015

:vising air permit for data center in Quincy

eking comments on changes to Microsoft's Oxford facility permit through June 18

CORRECTION: New dates and information have been added to paragraphs 5 and 6 to reflect proposed permit revisions.

SPOKANE – Microsoft Corporation is proposing changes to the way it operates and tests backup generators at its Oxford data center in Quincy. These changes require modification of an existing air permit from the Washington Department of Ecology to ensure human health and the environment are protected.

Data centers house servers that store digital data, handle email, manage instant messages and run applications for computers. Microsoft uses backup generators powered by diesel engines to keep servers functioning in case of power outages.

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

Ecology approved an air permit for Oxford in August 2014 for construction and operation of the facility.

Microsoft applied to revise the permit before completing construction and beginning operation. Changes to the permit include altering the testing schedule of backup generators and increasing compliance monitoring over a longer time period.

The allowable operating range for the backup generators also was revised. Changes to the operating range allow increased air pollution. Potential increases are within state and federal limits that are set to protect people and the environment.

Microsoft still proposes to install advanced air pollution control equipment that is more than required. Additional conditions in the permit to protect the public from air pollution include limits on fuel and specified hours of operation for the generators.

No year date on notice

Public hearing

2015

Ecology is hosting a public hearing on the air permit at 5 p.m. on July 9 at the Quincy Community Center, 115 F St. SW, Quincy, Wash. 98848. The public meeting begins at 5 p.m. and the formal hearing starts at 6:30 p.m.

Submit comments

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

Comments will be accepted from May 28 through July 13.

Review the revised permit

Exhibit 1

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

artment of Ecology News Release - December 10, 2015

iincy data center needs revised air permit

NCY – 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.
2015 2016

No year dates on the notice.

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

Exhibit 2

Jeff Shupe

From: Angel Barahona-Sanchez
Sent: Tuesday, December 28, 2010 4:58 PM
To: Jeff Shupe
Subject: RE: West Quincy Substation Station Outage Dates

The hours are as follows:

Station was offline at approximately 08:00 on August 24, 2010 and back online at approximately 11:00 am on August 28, 2010.

This means the total station outage duration was approximately ninty-nine (99) hours.

Angel Barahona-Sanchez

From: Jeff Shupe
Sent: Tuesday, December 28, 2010 4:40 PM
To: Angel Barahona-Sanchez
Subject: RE: West Quincy Substation Station Outage Dates

Yes I need the total hours they were out and the start and stop times.
Thanks

Jeff Shupe
T&D Engineering Manager
Grant County PUD
Direct 509 793 1476; Cell 509 855 6554

From: Angel Barahona-Sanchez
Sent: Tuesday, December 28, 2010 4:06 PM
To: Jeff Shupe
Subject: West Quincy Substation Station Outage Dates

Jeff:

Per your request, West Quincy Substation was taken offline to swap and install new feeders for their load expansion project during the period of August 24-28, 2010.

At that time MSN's load was being serviced by their onsite generators.

Let me know if more information is needed.

Regards,
Angel

Exhibit 3

community-wide basis.[5] Therefore, a third tier decision will be used by Ecology to consider the approval of Microsoft and each subsequent company's proposal to construct data centers in the Quincy UGA.

Under the community-wide risk evaluation approach, Ecology estimated background DEEP concentrations by modeling contributions from:

- The existing data centers assuming each of the data centers was operating at their allowed maximum rate; and
- Other known sources of DEEP in the Quincy area.

Section 4 of this document summarizes Ecology's review of Microsoft's HIA, and presents results of our evaluation of background DEEP concentrations in Quincy.

3.5.1. Third Tier Review Processing Requirements

In order for Ecology to review the health impact assessment (HIA) for third tier decision and review, each of the following regulatory requirements under Chapter 173-460-090 and Chapter 173-460-100 must be satisfied:

(a) The local permitting authority, Ecology's ERO, has determined that other conditions for processing the Notice of Construction Order of Approval (NOC) have been met, and has issued a preliminary approval order.

(b) Emission controls contained in the preliminary NOC approval order represent at least tBACT.

(c) The applicant has developed a HIA protocol that has been approved by Ecology.

(d) The ambient impact of the emissions increase of each TAP that exceeds acceptable source impact levels has been quantified using refined air dispersion modeling techniques as approved in the HIA protocol.

(e) The third tier review petition contains a HIA conducted in accordance with the approved HIA protocol.

No!

ERO submitted items (a) and (b) above to Ecology on August 4, 2010. Ecology waived the requirement for developing a HIA protocol for this project (item (c)) because the applicant's consultant had recently developed HIAs for other similar data centers in Washington. Ecology

[5] Basis for estimating cumulative diesel engine exhaust particulate emissions health risk impacts in Quincy, WA, under the third tier petition procedure specified in WAC 173-460-100. Department of Ecology's Air Quality Program Position Paper, August 2010.

Table 4. Comparison of Modeled Off-Site TAP Concentrations to ASILs

Pollutant	CAS #	Averaging Time	Highest Modeled Off-Site Concentration (μg/m^3)	ASIL (μg/m^3)
DEEP	--	Annual (70-yr)	0.016	0.00333
Nitrogen Dioxide	10102-44-0	1-hr	359	470
Benzene	71-43-2	Annual	0.0013	0.0345
Acrolein	107-02-8	24-hr	0.007	0.06

3.5. The Third Tier Review and the Community-Wide Approach

Between 2006 and 2008, Ecology permitted the construction of three data centers in Quincy, WA. Each data center installed multiple large backup diesel-powered generators to be used during power failures. In total, the three existing data centers currently operate a total of 46 diesel-powered generators each rated at 2.0 MW electrical generating capacity or higher.

When Ecology permitted these facilities in 2006-2007, DEEP was not regulated as a toxic air pollutant under Chapter 173-460 WAC, Controls for Toxic Air Pollutants. In June 2009, Ecology revised Chapter 173-460 WAC, and began regulating DEEP as a toxic air pollutant along with a number of other new pollutants. The revised rule established an ambient trigger level or ASIL for DEEP of 0.00333 μg/m^3 above which predicted ambient concentrations of DEEP are subject to second tier review. Primarily because DEEP was not previously regulated, the existing data center permits allowed more hours of operation and fuel use than would likely be permitted under this revised rule.

On March 25, 2010, the governor signed into law a bill (ESSB 6789)[4] passed by the Washington legislature to promote the development of additional data centers in rural Washington. The final law gives anyone who starts constructing a data center between April 1, 2010 and July 1, 2011, an exemption from the sales tax for server equipment and power infrastructure. Among other requirements, eligible data centers have to be located in a rural county; cover at least 20,000 square feet dedicated to servers, and completed by April 1, 2018.

The passage of this *Computer Data Centers – Sales and Use Tax Exemption* Act of 2010 prompted much interest from companies wanting to build new data centers in Quincy and other parts of central and eastern Washington.

Given the serious interest in building several more data centers clustered within the Quincy, WA UGA, and the potential for overlapping DEEP plumes, Ecology's Air Quality Program (AQP) recognized the need to consider the cumulative impacts of new and existing data centers on a

[4] http://apps.leg.wa.gov/documents/WSLdocs/2009-10/Pdf/Bills/Session%20Law%202010/6789-S.SL.pdf

Basis for
Community wide

May 27, 2010

TO: Jeff Johnston
Section Manager
Science and Engineering
Air Quality Program
Washington State Department of Ecology

FROM: Gary Palcisko
Toxicologist
Science and Engineering
Air Quality Program
Washington State Department of Ecology

SUBJECT: BASIS FOR DETERMINING A TIER III CUMULATIVE RISK SIGNIFICANCE LEVEL RELATED TO EXPOSURE TO DIESEL ENGINE EXHAUST PARTICULATE FROM "BACKGROUND" SOURCES AND NUMEROUS EXISTING AND PROPOSED DIESEL-POWERED GENERATORS CLUSTERED IN THE QUINCY, WA URBAN GROWTH AREA.

Summary and purpose:

The purpose of this memo is to provide a basis for choosing a target cancer risk level of concern related to exposure to diesel engine exhaust particulate from numerous existing and additional proposed sources in Quincy, WA. As described in the body of this memo, the U.S. Environmental Protection Agency (EPA), a few states, and many local air districts in California have established a range of cancer risk values as benchmarks for implementing risk reductions or mitigations. I draw upon these examples and my professional judgment to derive the following recommendations.

Recommendations:

I recommend that AQP establish a target cancer risk of 100 per million as the risk level of concern for the maximally exposed individual near Quincy's data centers. Since AQP's aim is to minimize the impact of individual and collective sources of pollution on any single receptor or on the community as a whole, AQP should consider increased cancer risk attributable to all sources (stationary and mobile) with the goal of keeping the maximum increase total increased cancer risk at or below 100 per million.

1) Consider 100 per million as the risk level of concern
2) Consider cumulative impacts of each data center and "background"
3) Given the uncertainty surrounding EPA's National Air Toxics Assessment (NATA) pollutant concentration estimates, AQP should use more refined modeling and emissions inventories to define "background" risks from existing sources in and around Quincy.
4) As the risk level at the maximally exposed receptor approaches or exceeds 100 per million, new and existing sources should consider risk reduction measures to minimize their impact. Risk reduction measures can be achieved through:
    a. Technological controls
    b. Offsets
    c. Best management practices (i.e., reduced hours of operation)

Background:

Ecology permitted the construction of three data centers in Quincy, WA between 2006 and 2008. Each data center relies on stable electric power supplied by Grant County Public Utilities District. Data centers required an uninterrupted power supply, so each data center installed backup diesel-powered generators to be used during power failures. In total, the three existing data centers operate 46 diesel-powered generators in excess of 2.4 MW each.

When Ecology permitted these facilities, diesel engine exhaust particulate was not regulated as a toxic air pollutant under Chapter 173-460 WAC. As a result, the existing data center permits allow more hours of operation than would likely be permitted under the revised WAC in effect since June 2009.

On March, 25, 2010, the governor signed a bill (ESSB 6789)[1] passed by the WA legislature to promote the development of additional data centers in rural WA. The resulting law gives anyone who starts constructing a data center between April 1, 2010 and July 1, 2011 an exemption from the sales tax for server equipment and power infrastructure. The center has to be in a rural county, cover at least 20,000 square feet dedicated to servers, and completed by April 1, 2018.

Since the law has been in effect, interested proponents and state and local authorities initiated preliminary discussions regarding at least 5 possible new projects in Quincy. As of May 14, 2010, Microsoft has proposed the expansion of their existing data Columbia data center in Quincy which will include an additional thirteen diesel-powered generators.

Issue Statement:

The existing paradigm for permitting new sources of toxic air pollutants prohibits each new project from emitting toxic air pollutants at a level that results in a cancer risk in excess of 10 per million. The goal of this paradigm is to minimize the impact of toxic air pollutants on neighboring communities. Given the serious interest in building several more data centers clustered within the Quincy, WA urban growth area, and the potential for overlapping diesel exhaust plumes, Ecology's senior management team recognizes the need to consider the cumulative impacts of new and existing data centers on a community-wide basis. As part of this consideration, AQP needs to establish a target cumulative level of risk that provides an "ample margin of safety" to ensure the public's health is protected.

Federal State Cumulative Risk Level of Concern:

To determine what constitutes a cumulative risk level of concern, AQP first identified examples of cumulative risk "significance" levels from EPA, state, and local air districts. These examples are briefly described below. Generally, agencies define an increased cancer risk of **100 per million** as the upper-bound risk for *facility-wide* impacts on nearby receptors.

EPA

The 1970 Clean Air Act required EPA to establish emission standards for hazards air pollutants to protect public health with an "ample margin of safety". The act did not define what level of risk was acceptable. Some thought that "ample margin of safety" prohibited EPA from considering other factors such as cost, and that EPA would have to set the standard to "zero" risk for those pollutants where a no

[1] http://apps.leg.wa.gov/documents/WSLdocs/2009-10/Pdf/Bills/Session%20Law%202010/6789-S.SL.pdf

effect threshold could be defined (e.g., carcinogens). In 1987, the D.C. Circuit Court ruled that some amount of risk is acceptable, but EPA had to define that level. [2]

During rulemaking for the benzene NESHAP, EPA stated

> *"[I]n protecting public health with an ample margin of safety, we strive to provide maximum feasible protection against risks to health from hazardous air pollutants by (1) protecting the greatest number of persons possible to an individual lifetime risk level no higher than approximately 1-in-1 million; and (2) limiting to no higher than approximately 1-in-10 thousand [i.e., **100 in a million**] the estimated risk that a person living near a facility would have if he or she were exposed to the maximum pollutant concentrations for 70 years."*[3]

This language established a "presumptive" acceptable cancer risk level of 100 in a million cancer risk, but EPA maintains that this number does not represent a "rigid line" for making risk management decisions. EPA contends that other factors such as the number of people exposed, the weight of evidence of toxic effects, and the uncertainty of risk estimates should be considered as part of the decision. That said, EPA's Risk and Technology Review and National Air Toxics Assessment (NATA) both use 100 per million as the risk level of concern. These determinations are based on risks attributed to facility-wide emissions.

EPA's Risk and Technology Review assesses "residual risk" of sources after the implementation of technology based MACT standards. The goals of EPA Risk and Technology Review are similar to those stated in the benzene NESHAP:

- Limit cancer risk for person exposed to maximum HAP concentration(s) near a facility for 70 years to no higher than about 100 in a million
- Protect the greatest number of persons possible to approximately 1 in a million lifetime cancer risk or lower

EPA's DRAFT NATA 2005 defined a subset of facilities that are considered "high" risk facilities. These facilities posed an estimated increased cancer risk of more than 100 per million on adjacent receptors.

California

California's SB 1731 signed into law in 1992 requires certain *facilities* that present a "significant" risk to develop a plan to reduce risk. Each district established risk values at which facilities must conduct a risk reduction audit and plan.[4] Currently, the risk values established by California's air quality management districts range from 10 per million to 100 per million. [5]

Minnesota

Minnesota requires certain large sources to conduct a cumulative air emissions risk analysis. A cumulative air emissions risk analysis evaluates risks from multiple on-site and off-site sources. On-site

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[2] http://www.nap.edu/openbook.php?record_id=2125&page=36
[3] http://edocket.access.gpo.gov/2005/05-15825.htm
[4] http://www.arb.ca.gov/ab2588/overview.htm
[5] http://www.arb.ca.gov/ab2588/district_levels.htm

sources include point, area and mobile sources associated with the existing facility and the proposed project. Off-site sources include nearby point, area, mobile sources and regional background. [6]

Currently, Minnesota has not identified specific risk thresholds for cumulative risk decisions, but they identify EPA's cancer risk range of one in a million to one in ten thousand as a starting point. In situations where cumulative air emissions risk analysis results exceed thresholds, the Minnesota Pollution Control Agency (MPCA) considers options such as mitigation strategies, further model refinement, and/or off-set plans.

Background Risk:

Chapter 173-460-090 WAC states that "background concentrations of TAPs (toxic air pollutants) will be considered as part of a second tier review".[7] The word "background" is often used to describe exposures to chemicals that come from existing sources, or sources other than those being assessed.

The background concentrations of toxic air pollutants in Quincy are uncertain. Currently, the only estimate of ambient concentrations of air toxics in Quincy comes from EPA's NATA. NATA uses emissions and meteorological information to estimate ambient air toxics concentrations and health risks at each census tract in the U.S. Table 1 shows estimated cancer risks from NATA 2002 and the draft NATA 2005 (reportedly due in July, 2010) attributable to general source categories in the census tract encompassing Quincy. According to NATA 2002, the cancer risk in Quincy from all sources is 75 per million. Generally, on- and non-road sources make up roughly 70% of the total risk. Although NATA provides the only currently available estimate of "background" risks in Quincy, these estimates are uncertain. Furthermore, EPA warns users of NATA:[8]

> "NATA assessments should not be used for any of the following:
>
> - As a sole means for identifying localized hotspots*
> - As a definitive means to pinpoint specific risk values within a census tract
> - To characterize or compare risks at local levels such as between neighborhoods
> - As the sole basis for developing risk reduction plans or regulations
> - To control specific sources or pollutants
> - To quantify benefits of reduced air toxic emissions
>
> *For analysis of air toxics in these smaller areas, other tools such as monitoring and local-scale assessments should be used to evaluate potential hot spots using more refined and localized data."

Although not explicitly stated, EPA's caveats about the use of NATA seem to suggest that its estimates of risk are not sufficient as a basis for forming regulatory decisions. The bullet points and asterisk above seem to imply that EPA does not recommend relying on NATA to define a localized area impacted by air toxics. In this case, EPA recommends more thorough analyses to "evaluate potential hot spots using more refined and localized data."

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[6] http://www.pca.state.mn.us/publications/aq9-20.pdf
[7] http://apps.leg.wa.gov/WAC/default.aspx?cite=173-460-090
[8] http://www.epa.gov/ttn/atw/natamain/

Table 1. Existing risk (pre-data center emissions) in the Quincy, WA census tract according to NATA

Sources	NATA 2002		DRAFT NATA 2005	
	All chemical (risk per million)	Diesel PM risk (risk per million)	All chemicals (risk per million)	Diesel PM risk (risk per million)
On-road Risk	16	14	4	3
Non-road Risk	37	36	28	27
Major Source Risk	<1	0	<1	0
Area Source Risk	2	0	2	0
"background"	19	0	16	0
Total Risk	75	50	50	30

On-road mobile sources – Cars and trucks
Non-road mobile sources – Trains, planes, ships, construction equipment
Major sources -Large factories such as pulp mills and refineries
Area sources – Smaller businesses such as gas stations or dry cleaners, outdoor burning, woodstoves and fireplaces
Background estimate – Estimated level of air pollutants from natural and distant sources and pollutants that persist in the ambient air

Discussion:

EPA's Framework for Cumulative Risk Assessment provides guidance on how to conduct and evaluate cumulative exposures; unfortunately the document does not provide a threshold of risk for making risk management decisions[9]. As a result, AQP looks to the existing examples previously mentioned. Generally speaking, the goals of these processes aim to minimize the increased cancer risk of the maximally exposed individual to less than 100 per million. The key remaining question deals with whether to consider these risks on a facility-wide basis, or to include other "background" sources as part of the evaluation and decision framework.

As mentioned previously, Chapter 173-460-090 WAC states that "Background concentrations of TAPs will be considered as part of a second tier review". Unfortunately, the rule does not specify how background is considered with regard to making decisions about a project's overall health impact. Therefore, in the unique case of Quincy's data centers, it is up to AQP to determine how to make decisions while considering background.

Some options for considering background are:

1) AQP should consider the cumulative impact of existing and proposed data centers on receptors in Quincy.
2) AQP should consider the cumulative impact of existing and proposed data centers on receptors in Quincy and assume that a non-data center related "background" risk of 75 per million exists in Quincy per NATA 2002.
3) AQP should consider the cumulative impact of existing and proposed data centers on receptors in Quincy. Recognizing that the risks estimated in NATA 2002 are highly uncertain, AQP should attempt to estimate non-data center related "background" risk using emissions inventories and conducting more refined dispersion modeling.

[9] http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=54944

Once background is considered, then the question remains how much risk is acceptable from new sources on top of risk that already exists. If AQP sets an acceptable risk of 100 per million as a rigid line that can't be crossed, and background risk is already approaching 100 per million, it might be difficult to permit any new facilities with even modest emissions. Some of these issues could be resolved if our own efforts to determine background result in more reasonable or reliable estimates. The recommendations at the beginning of this memo reflect my current judgment with regard to acceptable risk levels and background considerations.

(d) Yahoo! was not required to model SO2 for comparison to the ASIL for Project Genesis, because estimated emissions of 0.9 lb/hr are below the WAC 173-460-150 small quantity emission rate of 1.45 lb/hr.

Yahoo! Project Genesis 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 were further evaluated as explained 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 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 Yahoo! Project Genesis 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 Yahoo!'s increased emissions of identified carcinogenic compounds. 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 Yahoo!'s Project Genesis proposal in a community-wide basis, even though it is not required to do so by state law. Yahoo! reported the cumulative risks associated with Yahoo! Project Genesis and prevailing sources in their HIA document based on a cumulative modeling approach.

As part of the community-wide approach, the Yahoo! Project Genesis second-tier health impact assessment (HIA) considered the cumulative impacts of DEEP and NO2 from the proposed generators, nearby existing permitted sources, and other background sources including State Route (SR) 28 and the adjacent railroad line. The Yahoo! Project Genesis DEEP and NO2 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 48 generators and 12 cooling cells will not have an adverse impact on air quality[pending]. Ecology finds that Yahoo!'s Data Center has satisfied all requirements for NOC approval.

******END OF YAHOO! TSD ******

Exhibit 7

Community Modeling

Community modeling has been used in Quincy because many companies built data centers there. Ecology evaluates the emissions from each individual data center and the combined emissions from all data centers and other sources of air pollution. This is done through a computer modeling process. The model adds any projected new data-center emissions to those from other sources of air pollution and determines if the collective emissions would likely be harmful to human health. We refer to this cumulative modeling process as "community modeling."

The Health Risks

Diesel-engine exhaust contains fine particles that can cause health problems for people who are exposed frequently and at high levels. The toxic air pollutants in diesel-engine exhaust include nitrogen dioxide, carbon monoxide, organic compounds, and tiny particles called diesel-engine-exhaust particulate.

Ecology evaluates the levels of all these pollutants during the permit review process. The ones most likely to be produced in high enough amounts to potentially affect health are diesel exhaust particles and nitrogen dioxide.

For detailed information on the health effects of these pollutants please read publication 11-02-005 "Focus on Diesel Exhaust Health Risks" on our website. It is available in English and Spanish. For more information please visit our Data Center webpage: http://www.ecy.wa.gov/programs/air/quincydatacenter.

STAY CURRENT
DATA CENTER AIR PERMITS

Department of Ecology, State of Washington

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Gregory Bohn
(509) 454-4174
preguntas@ecy.wa.gov

1. EXECUTIVE SUMMARY

Proposed nitric oxide (NO) emissions from the Intuit Data Center complex in Quincy, Washington exceed a regulatory trigger level called an Acceptable Source Impact Level (ASIL).

Based on the Second Tier Analysis described here and the modeled NO concentrations, the Washington State Department of Ecology (Ecology) has determined the health risks are within the range that Ecology may approve for proposed new sources of TAPs under Chapter 173-460 Washington Administrative Code (WAC).

Below is the technical analysis performed by Ecology.

2. THE PROCESS

2.1. The Regulatory Process

The requirements for performing a toxics screening are established in Chapter 173-460 WAC. These rules require a review of any increase in toxic emissions for all new or modified stationary sources in the state of Washington.

2.2 The Three Tiers of Toxic Air Pollutant Permitting

There are three levels of review when processing a new or modified emissions unit emitting Toxic Air Pollutants (TAPs): (1) Tier One (toxic screening), (2) Tier Two (health impacts assessment), and (3) Tier Three (risk management decision).

All projects are required to undergo a toxic screening (Tier One Analysis) as required by WAC 173-460-040. The objective of the toxic screening is to establish the systematic control of new sources emitting toxic air pollutants in order to prevent air pollution, reduce emissions to the extent reasonably possible, and maintain such levels of air quality to protect human health and safety. If modeled emissions exceed the trigger levels called ASIL's, a Second Tier Analysis is performed.

A Second Tier Analysis, promulgated in WAC 173-460-090, is a site-specific health impacts assessment. The objective of a Second Tier Analysis is to quantify the increase in lifetime cancer risk for persons exposed to the increased concentration of any Class A TAP and to quantify the increased health hazard from any Class B TAP in ambient air that would result from the proposed project. Once quantified, the cancer risk is compared to the maximum risk allowed by a Second Tier Analysis, which is one in one hundred thousand, and the concentration of any Class B TAP that would result from the proposed project is compared to its effect threshold concentration.

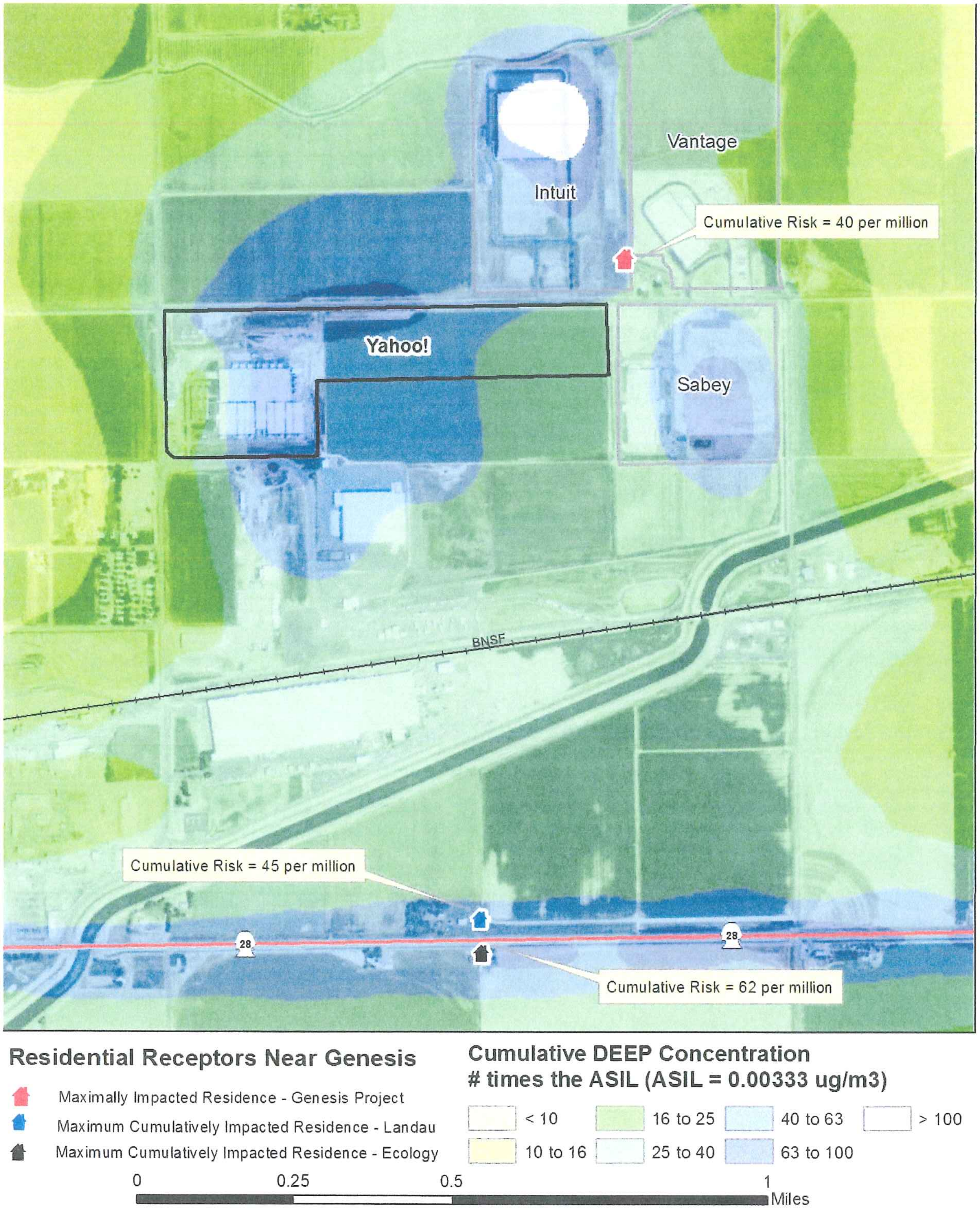


Figure 5. Cumulative risk from DEEP at residential locations (estimated by Landau and Ecology) in the vicinity of project Genesis

Exhibit 10

This is a new facility referred to as a "green field" facility. There has been no air permits previously issued to Intuit.

2.5.2 The Proposed Project

Inuit has proposed to construct and operate a data center complex in Quincy, Washington. This facility will include a 235,000 square foot building. The data center will house banks of servers to support business data delivery services. The site will contain stable electrical power delivery systems, air conditioning with a central water-cooled chiller plant and back-up diesel power generation capacity.

The back-up power will be generated by nine 2,500 kilowatt (KW) diesel powered electric generators and seven three-cell cooling towers. The first phase is expected to commence in August 2008 and will consist of six generators and four cooling towers will be installed. Phase two is expected to begin in August 2010 and will include the installation of one cooling tower. Phase three (the final phase) is expected to begin in August 2012. The final phase will include the installation of the final three generators and the last two cooling towers. Intuit has requested a limitation on the number of hours generator will operate. That limit was set at 400 hours per year for each generator.

2.5.3 Site Description

The proposed facility will be located in the Northeastern corner of the City of Quincy, Washington. The specific location is on Grant County Parcel # 40411025, northwest of the intersection of County Road 11 NW and County Road "O" NW. An aerial photo is shown below:

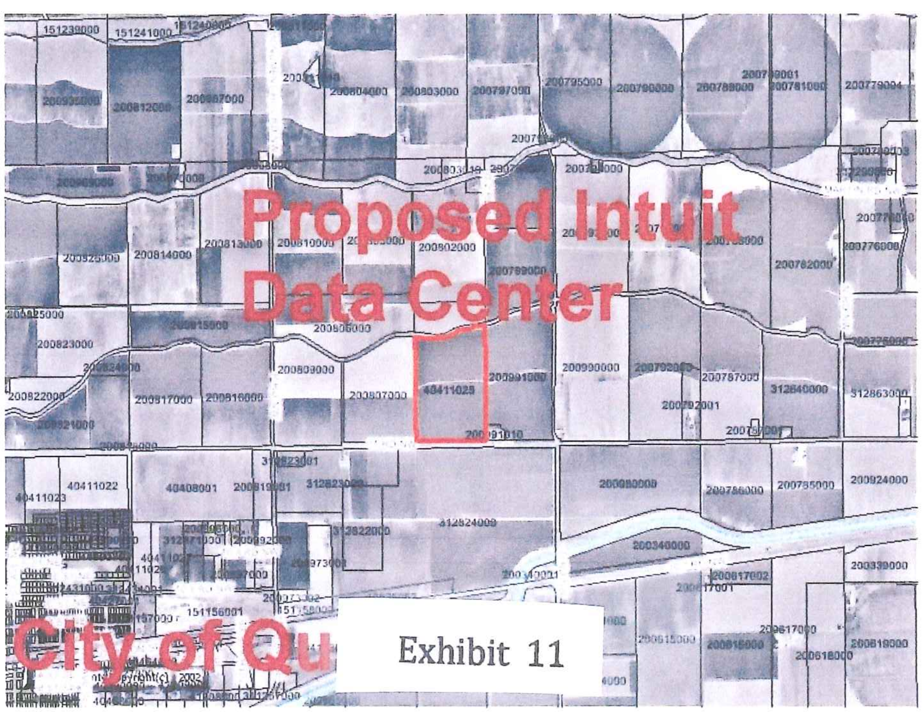


Exhibit 11

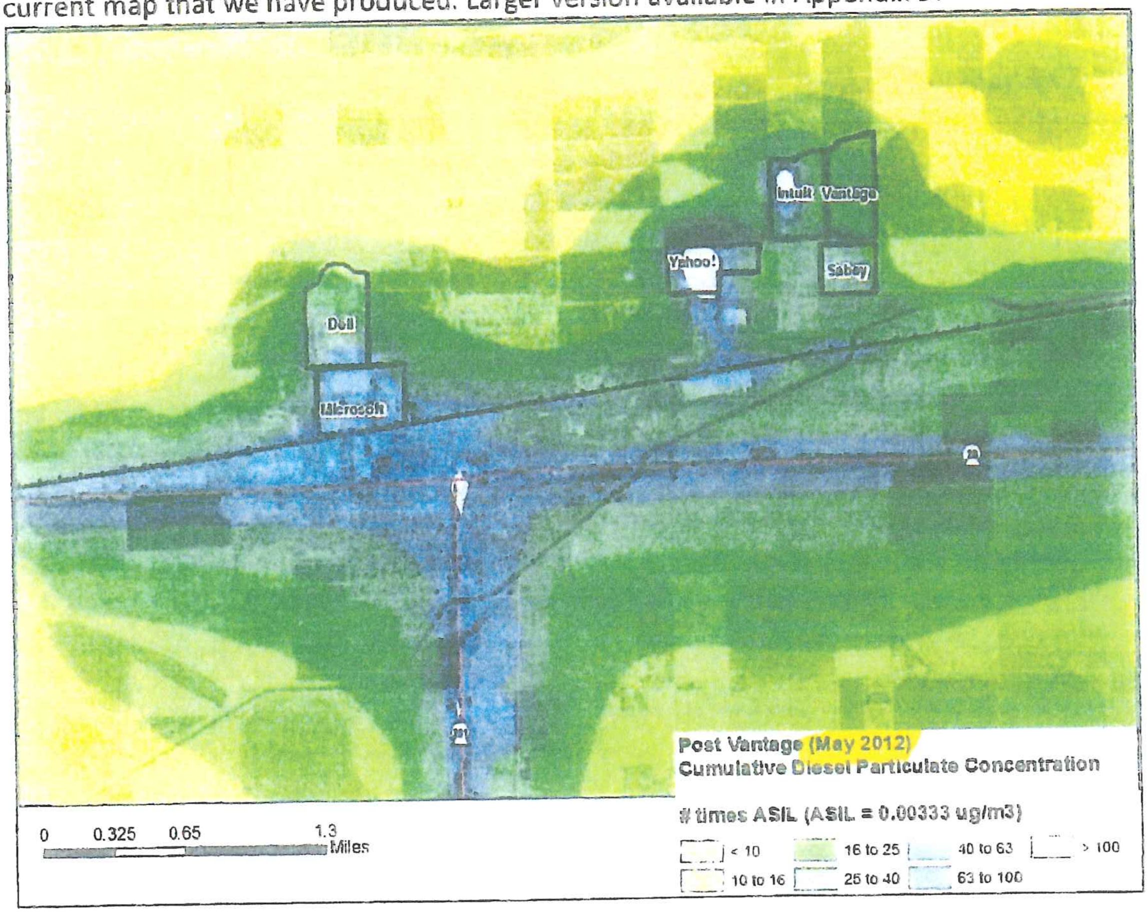
Comment 43, Danna Dal Porto:

Ecology has prepared visual aids (maps) in the past to represent the plumes of air emissions from facilities. (Exhibit 28, Exhibit 29, Exhibit 30)

I am requesting a current map (similar to the examples I provided in this document) to represent cumulative air quality from all sources over the Quincy City limits as well as the Quincy UGA.

Ecology Response:

This map shows the 2012 cumulative concentrations of DEEP. The estimated concentrations were derived from a model that used 2008 transportation data and allowable emissions from all data centers and proposed emissions from the Vantage Data Centers. This is the most current map that we have produced. Larger version available in Appendix D.



Comment 44, Danna Dal Porto:

Ecology has been working on air quality in Quincy since the construction of the Microsoft expansion in 2010. One constant factor in the permitting of facilities is the air quality, including background. Enough questions have been raised about ACTUAL air quality that Ecology must install at least two year-round air quality monitors in Quincy. One is to be located at Mountain View Elementary school and the other at the Lazy Acres low-income housing site on the east end of town. The residents of Quincy deserve actual information on air quality. This summer the Forest Service installed a temporary monitor on the roof of the medical clinic because of an inversion and the smoke from the forest fires. Air quality needs to be monitored daily, not just in an emergency. A five-month +/- air monitoring survey was done in early 2012. The December

APPENDIX E-1
DOC-CAPITAL COST
PROJECT GENESIS
QUINCY, WASHINGTON

Cost Category	Cost Factor	Source of Cost Factor	Quant.	Unit Cost	Subtotal Cost
Direct Costs					
Purchased Equipment Costs					
2750 kWe emission control package	Cost estimate by Cummins		5	$54,000	$270,000
2750 kWe miscellaneous parts	Cost estimate by Cummins			$3,667	$18,333
2000 kWe emission control package	Cost estimate by Cummins		20	$32,000	$640,000
2000 kWe miscellaneous parts	Cost estimate by Cummins			$3,667	$73,333
Combined systems FOB cost					$1,001,667
Instrumentation	Assumed no cost		0	$0	$0
Sales Tax	WA state tax	WA state tax	6.5%	--	$65,108
Shipping	0.05A	EPA Cost Manual	5.0%	--	$50,083
Subtotal Purchased Equipment Cost (PEC)					$1,116,858
Direct Installation Costs					
Enclosure structural supports	Assumed no cost		0	$0	$0
On-site Installation	Cost estimate by EKI Solutions Group (contractor)		25	$12,000	$300,000.00
Electrical	Assumed no cost		0	$0	$0
Piping	Assumed no cost		0	$0	$0
Insulation	Assumed no cost		0	$0	$0
Painting	Assumed no cost		0	$0	$0
Subtotal Direct Installation Costs (DIC)					$300,000
Site Preparation and Buildings (SP)	Assumed no cost		0	$0	$0
Total Direct Costs, (DC = PEC + DIC + SP)					$1,416,858
Indirect Costs (Installation)					
Engineering	0.025*PEC	1/4 of EPA Cost Manual	2.5%	--	$27,921
Construction and field expenses	0.025*PEC	1/2 of EPA Cost Manual	2.5%	--	$27,921
Contractor Fees	From DIS data center	From DIS data center	6.8%	--	$94,955
Startup	0.02*PEC	EPA Cost Manual	2.0%	--	$22,337
Performance Test (Tech support)	0.01*PEC	EPA Cost Manual	1.0%	--	$11,169
Contingencies	0.03*PEC	EPA Cost Manual	3.0%	--	$33,506
Subtotal Indirect Costs (IC)					$217,810
Total Capital Investment (TCI = DC+IC)					$1,634,668

Exhibit 13

APPENDIX E-2
DPF-CAPITAL COST
PROJECT GENESIS
QUINCY, WASHINGTON

Cost Category	Cost Factor	Source of Cost Factor	Quant.	Unit Cost	Subtotal Cost
Direct Costs					
Purchased Equipment Costs					
2750 kWe emission control package	Cost estimate by Cummins		5	$130,000	$650,000
2750 kWe miscellaneous parts	Cost estimate by Cummins			$3,667	$18,333
2000 kWe emission control package	Cost estimate by Cummins		20	$100,000	$2,000,000
2000 kWe miscellaneous parts	Cost estimate by Cummins			$3,667	$73,333
Combined systems FOB cost					$2,741,667
Instrumentation	Assumed no cost		0	$0	$0
Sales Tax	WA state tax	WA state tax	6.5%	--	$178,208
Shipping	0.05A	EPA Cost Manual	5.0%	--	$137,083
Subtotal Purchased Equipment Cost (PEC)					$3,056,958
Direct Installation Costs					
Enclosure structural supports	Assumed no cost		0	$0	$0
On-site Installation	Cost estimate by EKI Solutions Group (contractor)		25	$12,000	$300,000.00
Electrical	Assumed no cost		0	$0	$0
Piping	Assumed no cost		0	$0	$0
Insulation	Assumed no cost		0	$0	$0
Painting	Assumed no cost		0	$0	$0
Subtotal Direct Installation Costs (DIC)					$300,000
Site Preparation and Buildings (SP)	Assumed no cost		0	$0	$0
Total Direct Costs, (DC = PEC + DIC + SP)					$3,356,958
Indirect Costs (Installation)					
Engineering	0.025*PEC	1/4 of EPA Cost Manual	2.5%	--	$76,424
Construction and field expenses	0.025*PEC	1/2 of EPA Cost Manual	2.5%	--	$76,424
Contractor Fees	From DIS data center	From DIS data center	6.8%	--	$226,300
Startup	0.02*PEC	EPA Cost Manual	2.0%	--	$61,139
Performance Test (Tech support)	0.01*PEC	EPA Cost Manual	1.0%	--	$30,570
Contingencies	0.03*PEC	EPA Cost Manual	3.0%	--	$91,709
Subtotal Indirect Costs (IC)					$562,565
Total Capital Investment (TCI = DC+IC)					$3,919,524

Exhibit 14

APPENDIX E-3
SCR-CAPITAL COST
PROJECT GENESIS
QUINCY, WASHINGTON

Cost Category	Cost Factor	Source of Cost Factor	Quant.	Unit Cost	Subtotal Cost
Direct Costs					
Purchased Equipment Costs					
2750 kWe emission control package	Cost estimate by Cummins		5	$240,000	$1,200,000
2750 kWe miscellaneous parts	Cost estimate by Cummins			$3,667	$18,333
2000 kWe emission control package	Cost estimate by Cummins		20	$195,000	$3,900,000
2000 kWe miscellaneous parts	Cost estimate by Cummins			$3,667	$73,333
Combined systems FOB cost					$5,191,667
Instrumentation	Assumed no cost		0	$0	$0
Sales Tax	WA state tax	WA state tax	6.5%	--	$337,458
Shipping	0.05A	EPA Cost Manual	5.0%	--	$259,583
Subtotal Purchased Equipment Cost (PEC)					$5,788,708
Direct Installation Costs					
Enclosure structural supports	Assumed no cost		0	$0	$0
Onsite Installation	Cost estimate by EKI Solutions Group (contractor)		25	$14,000	$350,000.00
Electrical	Assumed no cost		0	$0	$0
Piping	Assumed no cost		0	$0	$0
Insulation	Assumed no cost		0	$0	$0
Painting	Assumed no cost		0	$0	$0
Subtotal Direct Installation Costs (DIC)					$350,000
Site Preparation and Buildings (SP)	Assumed no cost		0	$0	$0
Total Direct Costs, (DC = PEC + DIC + SP)					$6,138,708
Indirect Costs (Installation)					
Engineering	0.025*PEC	1/4 of EPA Cost Manual	2.5%	--	$144,718
Construction and field expenses	0.025*PEC	1/2 of EPA Cost Manual	2.5%	--	$144,718
Contractor Fees	From DIS data center	From DIS data center	6.8%	--	$411,240
Startup	0.02*PEC	EPA Cost Manual	2.0%	--	$115,774
Performance Test (Tech support)	0.01*PEC	EPA Cost Manual	1.0%	--	$57,887
Contingencies	0.03*PEC	EPA Cost Manual	3.0%	--	$173,661
Subtotal Indirect Costs (IC)					$1,047,997
Total Capital Investment (TCI = DC+IC)					$7,186,706

Exhibit 15

APPENDIX E-4
TIER 4-CAPITAL COST
PROJECT GENESIS
QUINCY, WASHINGTON

Cost Category	Cost Factor	Source of Cost Factor	Quant.	Unit Cost	Subtotal Cost
Direct Costs					
Purchased Equipment Costs					
2750 kWe emission control package	Cost estimate by Cummins		5	$424,000	$2,120,000
2750 kWe miscellaneous parts	Cost estimate by Cummins			$11,000	$55,000
2000 kWe emission control package	Cost estimate by Cummins		20	$327,000	$6,540,000
2000 kWe miscellaneous parts	Cost estimate by Cummins			$11,000	$220,000
Combined systems FOB cost					$8,935,000
Instrumentation	Assumed no cost		0	$0	$0
Sales Tax	WA state tax	WA state tax	6.5%	--	$580,775
Shipping	0.05A	EPA Cost Manual	5.0%	--	$446,750
Subtotal Purchased Equipment Cost (PEC)					$9,962,525
Direct Installation Costs					
Enclosure structural supports	Assumed no cost		0	$0	$0
Onsite Installation	Cost estimate by EKI Solutions Group (contractor)		25	$16,000	$400,000.00
Electrical	Assumed no cost		0	$0	$0
Piping	Assumed no cost		0	$0	$0
Insulation	Assumed no cost		0	$0	$0
Painting	Assumed no cost		0	$0	$0
Subtotal Direct Installation Costs (DIC)					$400,000
Site Preparation and Buildings (SP)	Assumed no cost		0	$0	$0
Total Direct Costs, (DC = PEC + DIC + SP)					$10,362,525
Indirect Costs (Installation)					
Engineering	0.025*PEC	1/4 of EPA Cost Manual	2.5%	--	$249,063
Construction and field expenses	0.025*PEC	1/2 of EPA Cost Manual	2.5%	--	$249,063
Contractor Fees	From DIS data center	From DIS data center	6.8%	--	$693,807
Startup	0.02*PEC	EPA Cost Manual	2.0%	--	$199,251
Performance Test (Tech support)	0.01*PEC	EPA Cost Manual	1.0%	--	$99,625
Contingencies	0.03*PEC	EPA Cost Manual	3.0%	--	$298,876
Subtotal Indirect Costs (IC)					$1,789,685
Total Capital Investment (TCI = DC+IC)					$12,152,210

Exhibit 16

Item	Quantity	Units	Unit Cost	Subtotal
Annualized Capital Recovery				
Total Capital Cost				$1,634,668
Capital Recovery Factor, 25 yrs, 4% discount rate				0.064
Subtotal Annualized 25-year Capital Recovery Cost				$104,638
Direct Annual Costs				
Annual Admin charges	2% of TCI (EPA Manual)		0.02	$32,693
Annual Property tax	1% of TCI (EPA Manual)		0.01	$16,347
Annual Insurance	1% of TCI (EPA Manual)		0.01	$16,347
Annual operation/labor/maintenance costs: Upper-bound estimate would assume CARB's value of $0.20/hp/year and would result in $28,000/year. Lower-bound estimate would assume zero annual O&M. Mid-range value would account for fuel for pressure drop, increased inspections, periodic OEM visits, and the costs for Ecology's increased emission testing requirements. **For this screening-level analysis we assumed the lower-bound annual O&M cost of zero.**				$0
Subtotal Direct Annual Costs				$65,387
Total Annual Cost (Capital Recovery + Direct Annual Costs)				**$170,025**
Uncontrolled Emissions (Combined Pollutants)				52.6
Annual Tons Removed (Combined Pollutants)				3.35
Cost Effectiveness ($ per tons combined pollutant destroyed)				**$50,761**

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO_x	$10,000	0.00	$0	per year
CO	$5,000	2.62	$13,121	per year
VOCs	$9,999	0.67	$6,682	per year
PM	$23,200	0.06	$1,323	per year
Other				
Total Reasonable Annual Control Cost for Combined Pollutants			**$21,126**	**per year**
Actual Annual Control Cost			**$170,025**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnage

Pollutant	
Tier-2 Uncontrolled Emissions TPY	
Controlled Emissions TPY	
TPY Removed	
Combined Uncontrolled TPY	
Combined TPY Removed	
Quoted Removal Effcy	2
Annualized Cost ($/yr)	$17
Indiv Poll $/Ton Removed	$2,9

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
DEEP (FH)	$23,200	0.057	$1,323	per year
CO	$5,000	2.62	$13,121	per year
Carcinogen VOCs	$9,999	2.26E-02	$226	per year
NO_2	$20,000	0.00	$0	per year
Non-carcinogen VOCs	$5,000	7.20E-02	$360	per year
Benzene	$20,000	1.71E-02	$342	per year
1,3-Butadiene	$20,000	8.61E-04	$17	per year
Acrolein	$20,000	1.73E-04	$3	per year
Naphthalene	$20,000	2.86E-03	$57	per year
Total Reasonable Annual Control Cost for Combined Pollutants			**$15,450**	**per year**
Actual Annual Control Cost			**$170,025**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

TAPs Removal Tonnages (Nominal-C

Pollutant	DE
Tier-2 Uncontrolled TPY	
Controlled TPY	
Tons Removed/Year	
Combined Uncontrolled Tons/yr	
Combined tons/yr Removed	
Overall Cold-Start Removal Effcy	
Annualized Cost ($/yr)	$1
Indiv Poll $/Ton Removed	$2,9
Combined TAPs $/Ton Removed	

FH = "front half" filterable particulate matter

Exhibit 17

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.

Yahoo! 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 $1.5 million per ton of engine exhaust particulate removed from the exhaust stream at Yahoo! each year. Catalyzed DPFs, which include a diesel oxidation catalyst, also remove CO and VOCs. However, for this project, DPFs and DOCs were evaluated separately (see Section 4.2.1.2 for DOC BACT).

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.

Yahoo! 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 Yahoo! followed for engines within this application (including for SCR-only, DPF-only, and Tier 4 capable integrated control system technologies).

- Yahoo! obtained the following recent DOC equipment costs: $32,000 and $54,000 for stand-alone catalyzed DOC per single 2.0 MWe and 2.75 MWe generators respectively (plus $3,667/generator for parts). For thirty two (5) 2.0 MWe, and 20 2.75 MWe generators, this amounts to $1,001,667. According to the applicant, DOC control efficiencies for this unit are CO, HC, and PM are 85%, 80%, and 20% respectively.
- The subtotal becomes $1,416,858 after accounting for shipping ($50,083), WA sales tax ($65,108), and direct on-site installation ($300,000).
- After adding indirect installation costs, the total capital investment amounts to: $1,634,668. 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 $170,025.
- At the control efficiencies provided, the annual tons per year of emissions for CO (3.09 tpy), HC (0.84 tpy), and PM (0.29 tpy) become 2.62 tpy, 0.67 tpy, and 0.06 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 ($170,025 divided by 2.62 tpy for CO, etc..).

The corresponding annual DOC cost effectiveness value for carbon monoxide destruction alone is approximately $64,800 per ton. If particulate matter and hydrocarbons are individually considered, the cost effectiveness values become $3.0 million and $254,400 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 $50,800 per ton of combined pollutants removed per year.

These annual estimated costs (for DOC use alone) provided by Yahoo! are conservatively low estimates that take into account installation, tax, shipping, and other capital costs as mentioned above, but assume low range CARB estimates for operational, labor and maintenance costs, which could be up to $28,000 per year.

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.

Parkway, East Wenatchee, 884-7191

◆ **Chelan-Douglas Health District Board:** 4 p.m., 200 Valley Mall Parkway, 886-6400

◆ **Pateros City Council:** 6 p.m., City Hall, 923-2571

◆ **Eastmont Metropolitan Park District:** 6:30 p.m., Eastmont Jr. High School library, 884-8015

◆ **Malaga Water District:** 7 p.m., 3957 Malaga Ave., 664-0142

◆ **Omak City Council:** 7 p.m., City Hall, 826-1170

◆ **Waterville City Council:** 7:30 p.m., City Hall, 745-8871

Schools

◆ **Cascade School Board:** 1 p.m., district office, 548-5885

◆ **Oroville School Board:** 5 p.m., district office, 476-2281

◆ **Brewster School Board:** 7 p.m., high school library, 689-3418 Ext. 0

◆ **Palisades School Board:** 7:30 p.m., Palisades School, ?84-8071

◆ **HAVE A QUESTION?**

If you have a comment or question about the paper, call managing editor Cal FitzSimmons at 665-1176 or e-mail him at fitzsimmons@wenatcheeworld.com.

If your question has to do with delivery of the paper, please contact our circulation department directly at 662-2904.

◆ **CORRECTIONS**

The Wenatchee World strives for accuracy, but when errors occur in print, we want to correct them as soon as possible. If you ' ...ve information printed ... e World is incorrect, please call 665-1161.

Risk of backup generators concerns Quincy residents

BY CHUCK ALLEN
Quincy Valley Post-Register

QUINCY — It wasn't a guarantee, but Greg Flibbert of the state Department of Ecology told a packed audience that the increased health risks by adding 13 diesel-powered backup generators to the Quincy Microsoft data center were acceptable based on a strict standard.

During the forum, which drew about 100 people to Grant County Fire District No. 3's fire station, Larry Williamson asked Flibbert if he would guarantee the health of children attending Mountain View Elementary School, which is near the Microsoft data center.

"I can't guarantee anything, only God can do that," Flibbert said.

Ecology used sophisticated modeling to determine the health risk, he said. The determination was that Microsoft's expanded project would create a risk of three to four cancers per million. Quincy's ambient air quality is about 30 cancers per million. By comparison, Olympia's ambient air quality is about 400 cancers per million, said Jeff Johnston, section manager in Ecology's Air Quality Program. With the Microsoft expansion, Quincy's risk of about 34 cancers per million would be far under the threshold of 100 cancers per million that was established by Ecology as an acceptable level for Quincy, Flibbert said. Individual data centers will only be allowed to increase the cancer risk by 10 to 1 million.

"Three cancers in a million people, is that in a lifetime?" Evan Landin asked.

The risk is based on a 70-year exposure, Johnston said. Quincy doesn't have a population of 1 million people, so assuming that Quincy's population grows to 10,000 people, that would be .03 cancers in 70 years, Landin said.

"So we could expect to see three real cancers every 7,000 years?" Landin asked. Johnston said yes.

Karen Wood, Ecology's manager for the Air Quality Program in Eastern Washington, said, "We have been very protective here in Quincy, more than any other place we know of in the state. It is the most restrictive modeling we've done."

The Quincy School District announced this week that it has purchased an air-quality monitor for Mountain View Elementary School.

"As a cautionary measure and to help assure that we have information on the quality of indoor air in our schools, we have obtained assistance from the Washington State Department of Health and Washington State University Extension ... to use indoor air-quality monitoring equipment that will allow us to gather data over extended periods of time," stated Quincy School District superintendent Burton Dickerson.

Tod Heikes asked why Ecology didn't require filters on the generators.

Flibbert said under the new permit, Microsoft reduced the allowable hours the 24 existing generators can operate to 120 hours, rather than 285 under the old permit, and 104 hours for the 13 new generators, so the filters were not required because the emissions were already significantly reduced. He added that filters would not create a significant reduction in cancers compared to their costs.

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Martin ar... claim Ecolo...

Exhibit 19

Wenatchee World
Dec. 19, 2010 pg A2

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

December 15, 2015

Mr. Mozan Totani
Data Center Development Manager
Yahoo! Data Center
701 First Avenue
Sunnyvale, CA 94089

Re: Yahoo! Project Genesis Notice of Construction (NOC) and Second Tier Review Applications Combined Completeness Letter

Dear Mr. Totani:

Ecology has reviewed NOC and Second Tier review applications submitted to Ecology's Eastern Regional Office and headquarters by your consultant, Landau Associates. The NOC application was received on October 19, 2015, and the Second Tier review application was received on October 21, 2015. Ecology received supplemental NOC application material by e-mail from Landau Associates on November 2, 2015, and November 13, 2015. Ecology issued an incompleteness letter to Yahoo! on November 19, 2015. Yahoo! provided Ecology with additional material on December 7, 2015, (dated December 3, 2015) in response to the incompleteness letter.

Completeness determinations for both the NOC and Second Tier review applications are combined into this single letter. Ecology has determined the NOC and Second Tier review applications to be complete pending the following actions by Yahoo!

- The December 3, 2015, submittal from Yahoo! provided the $PM_{2.5}$ potential-to-emit for 13 existing engines (engines R through 12) including condensable PM, but not for the 10 other existing engines (engines 13 through R3). Because the existing Yahoo! permit is being rescinded and replaced with a new permit taking into account the 23 existing engines and Project Genesis engines, a new permit limit for PM must take into account all facility PM including condensables. Calculate the total PM for engines 13 through R3 (including condensables) and include in a revised Table 16 for total facility emissions. Scaling for these 10 similar size/model engines based on the 13 engines R through 12 is acceptable.

Exhibit 20

- Ecology found the following two apparent discrepancies in the December 3, 2015, submittal for the existing engines (engines R through 12) with the possible result that some emissions may be overestimated and others underestimated.
    - Load testing information (number of events per year) are missing from row 6 of the tab titled "R-12 Annual TPY (criteria)" in spreadsheet "Att 1_Revised Yahoo! Existing Engines_12-03-15." The result is that load testing hours are not accounted for in cells C24 and D24, causing an underestimation of total emissions in cells O30-O34. Recalculate these values to include load testing hours.
    - Electrical bypass emissions appear to be overestimated for HC, CO, DEEP, and PM (FH +BH) but not for NO_X. The maximum bypass emissions in rows 30 and 32–34 are based on two engines running concurrently. The total emission estimates in cells O30–O34 include a multiplier of 13 to account for 13 engines. This incorrectly assumes twice as many engines (26) for these pollutants that have maximum emissions at the 40 percent load.

- Resubmit updated and complete NOC and Second Tier review applications. Because of multiple updates and supplemental material provided by Yahoo!, Ecology is requesting updated applications encompassing all revisions since the original application. We will need this information for the public record. Be sure to include all supplemental information updates and other corrections since the original NOC and Second Tier review such as listed below:
    - The complete list of engine serial numbers/manufacturers provided to Ecology on November 2, 2015.
    - Updated electronic spreadsheets showing Project Genesis and existing engine calculations (including recalculations required for existing engines per this letter).
    - Other updates provided in the December 3, 2015, supplemental that do not need recalculating (such as BACT, etc.).
    - Ecology is not requesting an additional set of AERMOD modeling runs. However, if Yahoo! chooses to rerun AERMOD, the following items should be addressed:
        - Restrict maintenance and testing to daytime hours only (NOC).
        - Include Highway 281 and BNSF railroad DPM emissions (HIA).

Ecology cannot complete a draft permit until permit limits based on the issues in this letter are resolved (total emissions recalculated). Once a corrected application is provided, Ecology will be able to incorporate permit limits, and provide Yahoo! with a draft preliminary determination for error review.

Ecology's next step is to complete Second Tier toxics review within 60 days of this completeness determination. If Second Tier review determines the project is approvable,

Table 2. Estimated Increased Cancer Risk for Residential, Commercial, and Boundary Receptors Attributable to Genesis' DEEP Emissions					
	Risk Per Million from DEEP Exposure at Various Receptor Locations				
Attributable to:	Fence Line Receptor (MIBR)[1]	Northeast Residence-Property (MIRR)[2]	Northeast Residence-Home[2]	North Residential Parcel[2]	C-1 Industrial Parcel (MICR)[3]
Genesis	1.5	7.2	6.0	6.3	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.

3.4.2. Cancer Risk Attributable to Cumulative DEEP Emissions

As part of the HIA, Landau Associates conducted an analysis of cumulative exposure to DEEP in Quincy.[6] In total, the cumulative analysis includes allowable emissions estimates from:

- Yahoo! Data Center (including Project Genesis and requested permit changes to allowable emissions for the existing Yahoo! Data Center)
- Intuit Data Center
- Vantage Data Center
- Sabey Intergate-Quincy Data Center
- State Route 28

Ecology appended this analysis with results from west side data center emissions estimates (Microsoft Columbia, Microsoft Oxford, and Dell), SR 281 emissions estimates, and 2011 emissions estimates from locomotives on the BNSF rail line. These results were obtained from modeling conducted for a previous permitting project in Quincy (Ecology, 2014).

The cumulative cancer risk from all known sources of DEEP emissions in the vicinity[7] of Genesis (Table 3) is highest for a residential location on parcel south of SR 28. This parcel is about three-fourths mile south of the Yahoo! Data Center property boundary (Figure 3). The cumulative DEEP risk at this home is about 62 per million, and the majority (~77 percent) of exposure to DEEP is estimated to be attributable to emissions from vehicles travelling on SR 28.

[6] Landau Associates reported the concentrations obtained from the model which used five years of meteorological data, and reported cumulative risks associated with DEEP exposure in the area around Genesis.
[7] For the purposes of this analysis, the "vicinity" of Genesis encompasses the area in which Genesis' estimated impact exceeds the DEEP ASIL.

From: Dhammapala, Ranil (ECY)
To: Mark Brunner; Palcisko, Gary (ECY); Johnson, Jolaine (ECY); Huitsing, Gary (ECY); Bowman, Clint (ECY)
Cc: Chip Halbert; Mozan Totani
Subject: RE: Yahoo! Pre-Application Meeting Summary
Date: Thursday, August 06, 2015 5:49:02 PM

Hi Mark, Chip and Mozan,

Thanks for taking the time to travel to Lacey for what was a very productive meeting. We look forward to working with you on this permit.

Mark's summary of the meeting pretty well captures what we discussed. The only addition I'd make is that the modeling will be conducted using the newest AERMOD version (v 15181) and will be driven by meteorological data from Moses Lake Airport acquired between 2001- 2005.

I did locate the Celite, railroads & highways AERMOD input files, and will send them to Mark in a separate email.

Regards

~*~
Ranil Dhammapala, PhD
Acting Manager, Science and Engineering Section
Air Quality Program, Washington Department of Ecology
P.O Box 47600, Olympia, WA 98504-7600
Tel: 360-407-6807   Fax: 360-407-7534
Email: ranil.dhammapala@ecy.wa.gov
~*~

From: Mark Brunner [mailto:mbrunner@landauinc.com]
Sent: Thursday, August 06, 2015 8:49 AM
To: Dhammapala, Ranil (ECY) <rdha461@ecy.wa.gov>; Palcisko, Gary (ECY) <gpal461@ECY.WA.GOV>; Johnson, Jolaine (ECY) <JOLA461@ECY.WA.GOV>; Huitsing, Gary (ECY) <ghui461@ECY.WA.GOV>; Bowman, Clint (ECY) <cbow461@ECY.WA.GOV>
Cc: Chip Halbert <CHalbert@landauinc.com>; Mozan Totani <mtotani@yahoo-inc.com>
Subject: Yahoo! Pre-Application Meeting Summary

Hi all,

Thanks for your participation in the Yahoo! Pre-Application Meeting. It was very helpful to touch base with everyone on key details and we sure appreciate the collaborative permitting approach we discussed for moving forward. The following is a summary of some of the key points from the meeting:

- Generator design details yet to be finalized, but likely to be about 24 generators, with a standby electrical production capacity of about 42 MW + 9 MW reserve.
- Yahoo! will be seeking as much permit flexibility as possible. The permit application will

Exhibit 22

contain impact analyses that reflect the operational flexibility requested. Permit flexibility examples include:
   - generator runtime hour limits not limited by activity type or load;
   - hour and fuel limits averaged over a 3-year period using monthly rolling totals;
   - hour limits summed across all generators in service.
- Emission calculation methodology to account for "Black puff factor" during the first 5-10 seconds of each cold-start and worst-case load for each pollutant for the power outage scenario.
- The BACT analysis will look at SCR, DPF, and DOC separately and combined as a Tier-4F package. At Ecology's request, an expanded BACT analysis will also consider the additional operating hours and up-sized generators that would be required to accommodate a Tier-4F generator package. Ecology is not asking for any supplemental air dispersion modeling of Tier 4 compliant generators.
- Yahoo! will submit a robust air modeling protocol to Ecology in advance of the NOC application to confirm Ecology's concurrence with the proposed modeling techniques and other factors that could affect the results of the air modeling.
- NO2 modeling will be conducted with the Ambient Ratio Method.
- For modeling background sources, Ecology will provide existing AERMOD input files for modeling Celite, railroads, and highways. If Celite input files are not available, Landau Associates will follow up with ERO to get permit.
- In the HIA, DEEP lifetime cancer risk will be modeled using emission factors for front-half filterable PM only. Modeling of short-term DEEP impacts and NAAQS compliance for PM will be modeled using emissions factors that account for front-half filterable and back-half condensable PM.
- The cumulative impacts evaluation in the HIA will look at all areas that are impacted by the project above the ASIL. MIRR and MICR will look at cumulative and project-only impacts. MIRR could be a residence or an undeveloped residentially-zoned receptor.
- The Yahoo! and Ecology teams have agreed to use the following approaches to expedite the permitting schedule to help meet construction deadlines:
   - application will be prepared on an expedited schedule;
   - Ecology-review fees will be paid prior to application submittal to allow pre-submittal meetings with Ecology to confirm evaluation methods meet Ecology's expectations;
   - NOC application and Tier 2 Health Impact Assessment will be prepared in tandem;
   - staff changes on the project will be as limited as possible.
- Permit application will include description of proposed cooling units.

Feel free to add anything noteworthy I have not captured above.

Thanks again,

Mark Brunner ¨ Senior Environmental Planner

Landau Associates, Inc.
601 Union Street, Suite 1606, Seattle, WA 98101
(206) 631-8695 ¨ fax (206) 631-8697 ¨ cell (206) 550-5808
mbrunner@landauinc.com ¨ www.landauinc.com

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

Exhibit 23

Danna Dal Porto
Fwd: Appendix W
January 5, 2016 at 10:07 PM
Danna Dal Porto

40 CFR 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 l year of site specific data is required.

Exhibit 24

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
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
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.
- 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.

Ecology will initiate the public notice and comment period per WAC 173-400-171. This process will likely be initiated in less than 60 days.

To date, Ecology has not used all of the initial $10,000 application fees for NOC (<70 percent used) and Second Tier review. Ecology staff will continue to track time working on the project. If needed, a final bill will be sent to Yahoo!, which will be based on a $95 per hour charge over the base fees as agreed to on the application submitted by Yahoo!. We will not be able to send the final permit to Yahoo! until after any potential final bill amounts (to be determined) have been paid.

At the pre-application meeting, Ecology requested Yahoo! to seriously consider sponsoring ambient air quality monitoring in the city of Quincy. Please keep us informed.

Ecology reserves the right to ask for additional information before issuing a final permit.

Sincerely,

Gary Palcisko
Science and Engineering Section
Air Quality Program

Gary Huitsing, P.E.
Science and Engineering Section
Air Quality Program

gh/te

cc: Mark Brunner, Landau Associates
Chip Halbert, Landau Associates
Jolaine Johnson, Ecology

Exhibit 26

DEPARTMENT OF ECOLOGY
State of Washington

Yahoo! Data Center Permit Update

Yahoo! is proposing to expand its operations at their data center in Quincy, Wash. In order to do so, their air quality permit, called a "Notice of Construction Approval Order (NOC)", must be updated. A new Yahoo! data center, "Project Genesis," is included in the NOC application and will be located adjacent to the existing Yahoo! facilities.

The original permit, issued in 2011, allowed Yahoo! to install 23 diesel generators and associated cooling equipment, in order to provide emergency backup power to the facility. With the updated permit they can operate an additional 25 backup-diesel generators.

The proposed Project Genesis will include:

- Direct evaporative cooling units
- Air cleaning systems
- Boiler heating
- A 196,969 square foot building complex
- Twenty-five new diesel-powered engines. Twenty of the new engines will provide the main data center support and will be rated at 2.0 megawatt electrical capacity (MWe). The data center will also have four reserve engines rated at 2.75 MWe and one administrative support engine rated at 2.75 MWe.

The permit includes conditions to protect the public from air pollution including fuel limits and specified hours of operation for generators.

How Ecology evaluates diesel engine exhaust

When Ecology staff review a permit application for a data center, they carefully review the amount of air pollutants added to the area because of the project. Ecology cannot approve a permit that allows pollutants to be emitted often enough, or in high enough levels, to cause health problems.

Ecology's air quality experts rely on computer models to estimate where the wind will carry pollutants from diesel-powered backup generators' exhaust. They project the amount of toxic air pollutants that could be in the air.

Ecology toxicologists who specialize in understanding how pollution and chemicals affect people's health review the information. The look at the computer models and assess the possible health risks.

MORE INFORMATION

PUBLIC HEARING

March 31, 2016 at 5pm
Quincy Community Center
115 F Street SW
Quincy, Wa 98848

PUBLIC COMMENT PERIOD ENDS

APRIL 4, 2016

Submit comments to:
Kari Johnson
Department of Ecology
Air Quality Program
4601 N. Monroe St.
Spokane, WA 99205
(509) 329-3502
kari.johnson@ecy.wa.gov

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 Ave. S
Quincy, WA 98848

Department of Ecology
4601 N Monroe St
Spokane, WA 99205

Public hearing on Yahoo! data center air quality permit Thursday

By RYAN MINNERLY
Staff Writer

QUINCY — A public hearing is being held Thursday for discussion and comment on the proposed air quality permit revision for the Yahoo! data center in Quincy.

Yahoo! has proposed an expansion of its Quincy operations, called Project Genesis, but it needs additional backup generators to expand. The hearing is scheduled to start at 5 p.m. at the Quincy Community Center, located at 115 F St. SW. It will be hosted by the state Department of Ecology. The itinerary includes a meet-and-greet at 5 p.m., presentations and question-and-answer at 5:30 p.m. and a formal hearing at 6:30 p.m.

According to a notice from Ecology, Yahoo! submitted an application in October 2015 for a revision to the air quality permit it was issued in 2011. The application included requests for permitting to cover the existing Yahoo! data center, as well as Yahoo!'s Project Genesis. In order to expand as planned, Yahoo! needs a revised air quality permit "to ensure that human health and the environment are protected," according to a release from the Department of Ecology.

Yahoo! uses backup generators powered by diesel engines to keep servers online in the event of a power outage. The original permit issued in 2011 allowed Yahoo! to install 23 diesel generators and the associated cooling equipment. The proposed permit revision would allow the data center to use an additional 25 backup diesel generators for Project Genesis. The revision also includes conditions to protect the public from air pollution, including fuel limits and specified hours of operation for the generators.

According to information provided by Ecology, Project Genesis will include the construction of a 196,969-square-foot building complex, complete with direct evaporative cooling units, air cleaning systems, boiler heating and the 25 new diesel-powered engines. Twenty of the new engines will provide support for the main data center, in addition to four reserve engines and one administrative support engine, according to Ecology.

According to Ecology, exhaust from diesel engines contains fine particles that can cause health problems for people who are frequently exposed at high enough levels.

Data centers house servers that store digital data and run applications for computers.

In addition to attending the March 31 public hearing, members of the public can also submit written comments and questions on the draft air quality permit to the Department of Ecology. Comments can be addressed to Kari Johnson, of the Department of Ecology's Air Quality Program, at 4601 N. Monroe in Spokane, 99205. Public input will be accepted until April 4.

The revised air quality permit can be reviewed at Quincy City Hall (104 B Street SW), the Quincy Library (208 Central Ave. S) and at the Department of Ecology's Eastern Regional Office in Spokane (4601 N. Monroe).

For more information, contact Johnson at 509-329-3502 or via email at kari.johnson@ecy.wa.gov.

Ryan Minnerly can be reached via email at countygvt@columbiabasinherald.com.

Exhibit 28

Data Centers and Quincy, Washington...May 2015

Quincy is home to 197 diesel engines.

Microsoft Columbia...Summer 2011.

This is what an engine looks like when it starts. The plume of black material is the dangerous particulate that comes from the operation of the diesel engine without emissions controls.

6.0 PROPOSAL TO REDUCE POTENTIAL IMPACTS FROM EXISTING EMERGENCY GENERATORS

Yahoo! currently operates a data center adjacent to the Project Genesis site. NOC Approval Order No. 11AQ-E399 was issued by Ecology in April 2011, and allows for the operation of 23 emergency generators at the adjacent data center. Yahoo! was originally permitted to operate generators R through 12 for up to 400 hours per year, as it was initially thought that there would be a need for that many hours. In 2011, Yahoo! agreed to a reduction from 400 hours to 200 hours/year due to increased confidence in electrical reliability. Yahoo! is now confident that 100 hours/year would meet the facility's needs for the R through 12 generators.

Yahoo! requests an administrative modification to reduce generator runtime limits (hours per year, fuel usage and load) on the existing emergency generators numbered R through 12. Yahoo! requests that the per hour and operating load limits that are currently in place for generators numbered 13 through 22 be applied to generators R through 12. The existing operating restrictions and proposed operating restrictions are summarized in Tables 14 and 15, respectively. Note, as shown in Table 15, proposed operations during maintenance testing and power outages will include operation at 0 percent load (idle). However, because manufacturers do not publish emission factors for idle operation, emissions factors for 10 percent load were used to estimate emissions for idle operation. Engines will not be operated at 10 percent load unless it is required for compliance stack testing.

As part of this administrative action, Landau Associates has calculated the new potential-to-emit (PTE) for each pollutant for the existing R through 12 generators. This requested change to operating limits would result in a PTE reduction for all pollutants from those emission units. Existing and new PTE estimates are presented in Table 16. The methods described in Section 2.0 were used to calculate the new PTE for R through 12and include the following assumptions:

- Calculations conservatively assume that all PM emitted from the engines is PM_{10} and $PM_{2.5}$.
- Emissions of $PM/PM_{10}/PM_{2.5}$, CO, NO_x, and total VOCs were scaled up using a "black puff" emissions factor to account for slightly higher emissions during the first minute of each engine cold-start.
- Estimates for $PM/PM_{10}/PM_{2.5}$ emissions account for "back-half" condensable PM.
- The DEEP emission estimate differs from the estimate of $PM/PM_{10}/PM_{2.5}$ in that it does not include an estimate of "back-half" condensable PM. Based on a discussion with Gary Palcisko, Ecology's toxicologist for this project, human health toxicological values for DEEP from the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) were developed based on exposure to measured levels of "front-half" filterable PM, not "back-half" condensable PM (Palcisko, G. 2015). Because OEHHA's toxicological profile for DEEP—which represents the most comprehensive human health toxicological profile available for DEEP—is used as the basis for evaluating project-related

Quality Standards (NAAQS). The filterable PM estimate is based on the manufacturer not-to-exceed emission factors and the condensable PM was derived as recommended by the manufacturer, by adding the not-to-exceed value for total hydrocarbons, which is considered equivalent to an estimate of EPA Method 202 condensable PM. All remaining pollutant emission rates will be calculated using emission factors from the EPA's AP-42, Volume I, Chapter 3.4, which provides emission factors for HAPs from large internal combustion diesel engines (EPA 1995).

Additionally, emissions of criteria pollutants (PM, CO, NO_x, and total VOCs) and volatile TAPs associated with cold-startup were scaled up using a "black puff" emission factor in order to account for slightly higher cold-start emissions during the first minute of each scheduled cold-start. These "black puff" factors are based on short-term concentration trends for VOC, CO, and NO_x emissions immediately following cold-start by a large diesel backup generator that were measured by the California Energy Commission in its document, *Air Quality Implications of Backup Generators in California* (CEC 2005). Derivation of cold-start emission factors is documented in Table 3 and in more detail in Appendix D.

As listed in the generator specification sheets provided in Appendix A, the hourly fuel consumption will vary depending on the generator load. If all 25 generators operated at the annual runtimes listed in Table 1, then the combined generators would use a total of 401,700 gallons of diesel fuel per year (see Table 4, Appendix C, and Appendix F for the derivation of this facility-wide fuel consumption).

Facility-wide emission rates are documented in Table 5.

Exhibit 31

TABLE 3
COLD-START EMISSION ESTIMATES
PROJECT GENESIS
QUINCY, WASHINGTON

"Black-Puff" Emissions Test Data (see Appendix D)

	Spike Duration (sec.)	Concentration (ppm) Cold-emission spike	Warm-state emissions	Cold-Start Emission Factor
PM+HC	14	900	30	4.3
NO_x	8	40	38	0.9
CO	20	750	30	9.0

Full-variable Load (≤100% Load) Emissions

	Worst-case (≤100% Load) Warm Emission Rate (lb/hr)		Cold-start Emission Rate (lb/hr) (a)	
Generator Size	2.0 MW	2.75 MW	2.0 MW	2.75 MW
HC	1.14	2.91	4.86	12.40
NO_x	44.34	74.40	41.54	69.70
CO	5.02	14.30	45.20	128.71
SO_2	0.03	0.04	N/A	N/A
DEEP	0.88	0.91	3.78	3.86
PM (FH+BH)	2.27	4.58	9.68	19.52

Notes:
(a) Cold-start emission factor applies to the first 60 seconds of emissions after engine startup.
FH ("front-half" filterable emissions)
BH ("back-half" condensable emissions)
DEEP (diesel engine exhaust particulate matter) is assumed equal to front-half NTE particulate emissions, as reported by the vendors.
NTE (not to exceed)
N/A (not applicable)

Exhibit 32

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 33

PUBLIC COMMENT DOCUMENTS
DANNA DAL PORTO

SABEY INTERGATE-QUINCY DATA CENTER, QUINCY WASHINGTON

JANUARY 7, 2016

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.

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.

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

Exhibit 34

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, Yahoo! 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. Yahoo! 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 Yahoo! 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).

Exhibit 35

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April 1, 2016

Kari Johnson
WA Department of Ecology
4601 N. Monroe St.
Spokane, WA 99205

RECEIVED

APR 04 2016

Department of Ecology
Eastern Washington Office

RE: Yahoo! Preliminary Determination

Dear Ms. Johnson,

I am writing with many concerns over the Yahoo! Preliminary Determination issued by Ecology, not the least is a questionably conducted BACT analysis. After attending last night's Public Hearing I was extremely disappointed that Landau's representative and/or Ecology had no technical documents for the public to review or, as in my case, question. With that said, let me list my observations and questions with a high expectation that Ecology will not only answer them, but will also correct the deficiencies associated with them.

17 1. Cold Start Factors – The derivation of the cold start factors is flawed. The document from which they were derived, *Air Quality Implications of Backup Generators in California, Volume II (2005),* very clearly identifies elevated cold start emissions for CO, THC, NOx and PM (see Attachment A). Unlike the Revised NOC that attributes no "cold start" factor to NOx, the highest cold start emissions recorded in this study were for NOx (55.4 g/kWhr). Nowhere in the NOC application is a "cold start" factor for NOx applied, including but not limited to emission calculations, Potential to Emit (PTE), NAAQS compliance modeling, BACT analysis, etc. Instead, the NOC indicates that there is a NOx deficit and modeling is calculated around this erroneous claim (see Attachment A).

   Please correct the NOx potential to emit to include the substantial "cold start" emissions as documented in the California Energy Commission's report *Air Quality Implications of Backup Generators in California, Volume II (2005).*

   Additionally, the claim is made that "The California Energy Commission was unable to measure the time trend of DPM concentrations during the first several seconds after a cold start" as if to imply that PM was not included in the assessment of the cold start. This however was not the case. Particulate matter was found at 17.7 g/kW-hr averaged over a 30 minute period. Calculating "cold start" as a percent of runtime is not appropriate. For example, when runtimes are shorter the percent of "cold start" emissions will be greater than the percentage identified in the NOC. Please identify a more accurate way of determining an appropriate "cold start" factor.

18 2. Condensable particulates -- The condensable particulates are underestimated. The same report used for the purposes of determining a cold start factor, *Air Quality Implications of Backup Generators in California, Volume II (2005),* also indicated that the condensable PM fraction is 3 to 5 times that of the Method 5 filterable results (See Attachment B). Please correct these estimates to reflect this factor.

Please also correct Condition 4 of the Preliminary Determination (PD) to include condensable particulate during stack testing. Presently, the PD only requires the filterable fraction of the particulate matter and VOCs to be tested. This is inappropriate since the NAAQS for PM is based on both the condensable (Method 202) and filterable (Method 5) particulate matter. Particulate matter is defined under the WA SIP to include both filterable and condensable particulate matter.

Additionally, the BACT analysis must include condensable particulate, which it does not.

19 3. The BACT analysis has been fraudulently conducted. Worksheets for DOCs, SCRs, DPFs and Tier 4 engines use numbers that are significantly less than the PTE for Project Genesis (see Attachments C,D, E and F), and egregiously deficient when the appropriate cold start factors and condensable particulate are properly represented. These deficiencies apply to NOx, VOCs, CO and PM. Please make the appropriate corrections before re-evaluating BACT, including but not limited to:

   a. NOx PTE plus "cold start" factor (current calculations in Table C-1 ANNUAL OPERATION EMISSIONS indicate that NOx is lower during "cold start". This assumption is contrary to California Energy Commission's report, *Air Quality Implications of Backup Generators in California, Volume II (2005)* and to findings during performance test on Sabey engines in 2011. See Attachment A).
   b. PM PTE plus appropriate condensable and "cold start" factor
   c. VOCs PTE plus appropriate condensable and "cold start" factor
   d. CO Pplus appropriate "cold start" factor

Engine run-times affect the "cold start" percentage applied. Conservative assumptions used in AERMOD should include more frequent "cold starts", and shorter runtimes.

20 4. Stack diameter – Stack diameter stacked in the NOC application indicates an 18" diameter stack (Revised NOC page 5-2, 5.2.1). The AERMOD modeling was conducted assuming a 24" diameter stack (see Attachment G). This discrepancy affects dispersion and air quality concentrations. Please correct the modeling to reflect the 18" diameter stack and recalculate AERMOD to determine if NAAQS has been met.

21 5. Operational loads for Engines R thru 12 have changed. What were the original emission factors used for calculating emissions from these engines? Table 3.2.1 indicates the operating restrictions for R through R3 engines, but identifies how only 10 of the R-12 engines will operate in a power outage. Please correct this error.

6. Please recalculate the emissions for these engines using the appropriate NOx factor with "cold start".
7. Idle loads were used in past permits. What was the emission factor used for idle?
8. Will Yahoo! continue to run as allowed under this exemption should a power outage exceed 100 hours?
9. How many life/safety engines are associated with the original 23 engines as Yahoo!?
10. Condition 1.2 Runtime Scenario is not permissible. Each engine is a source and if any source exceeds the 100 hr runtime it is required to add controls.
11. What does "full variable load" mean?
12. BACT calculations for reduction are only based on reductions at 100% load. This underestimates the efficiency of controls at lower loads (see Attachment H). Microsoft's stack tests conducted in September 2010 demonstrated that DOC's are capable of 65% reduction in PM, including both filterable and condensable (see Attachment I).
13. Gary Palcisko directed Landau that they need not consider the "condensable" back half of PM because it was not considered by OEHHA in their toxicological profile for DEEP (See Attachment J). Please provide proof that OEHHA did not consider the condensable back half in its toxicological review.
14. Testing of engines by grouping and once every five years is inadequate. It will take 240 years to test them all and each engine is a source by itself.
15. Please explain why Project Genesis is not being reviewed as a modification with increased emissions of pollutants.
16. Please explain how the maximum cumulative ambient impact from Project Genesis (plus background) can result in a 1-hr NO_2 level of 121 ug/m^3 in 2016 (see Attachment K, Table 10), when the modeling of the 10 engines in 2011 – whose operation remains the same under the new permit – resulted in a 1-hr NO_2 level of 119 ug/m^3 from their operation alone (see Attachment L). Since those engines are still operating under the same scenario, their 1-hr NO2 impact remains unchanged. Please explain then how the maximum cumulative ambient impact has decreased from 147 ug/m^3 to 121 ug/m^3. If the worst case scenario was modeled for the 10 engines and the worst case scenario was modeled for the 25 engines, how is the 25 engine impact is less?
17. Using the same attachments as in #16 please explain how the 1-hr NO_2 regional background level in 2011 was 28 ug/m_3 and now the regional background level is 16 ug/m_3?
18. Why is Yahoo! allowed to use meteorological data from 2001-2005 when more recent information is available?
19. How much has Ecology allowed our air shed to degrade? What was the first estimated background for NO_2, PM_{10}, $PM_{2.5}$, TSP, CO, O_3, VOCs?
20. What is our ground level ozone level and why isn't it being considered as part of the NAAQS?
21. Was Cummins the least expensive provider of control technology? I was unable to locate a bid document or estimate provided by Cummins. Please provide a copy of the bid documents or quotes from Cummins regarding the cost of a DPF, DOC, SCR and Tier 4 engine. Please compare the higher cost estimates used in this BACT analysis with the cost estimates provided by Landau

during the permitting of Sabey in 2015. Please use these lower cost estimates and recalculate the affordability of controls at Yahoo!

38 Finally, there were two statements made at the Public Hearing that deserve explanation. The first was a comment by Gary Huetsiger regarding a data center's credit rating and ability to borrow money as it applies to BACT. Please explain what was meant by this.

39 The second statement was made by Yahoo!'s representative who claimed that Yahoo! has "*never*" had an unplanned outage while operating in Quincy. This is news to those of us who live here. Please provide proof of this statement.

Thank you for reviewing my comments and answering my questions.

Respectfully submitted,

Patricia Martin

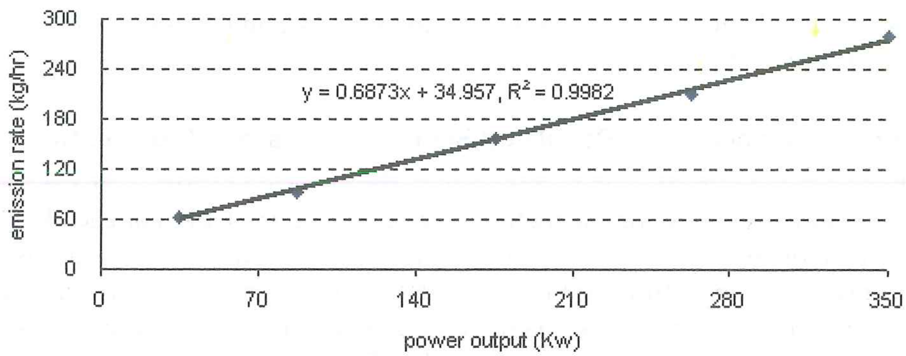

Figure 18. DDC8V92 CO_2 emission rate versus generator power output

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.

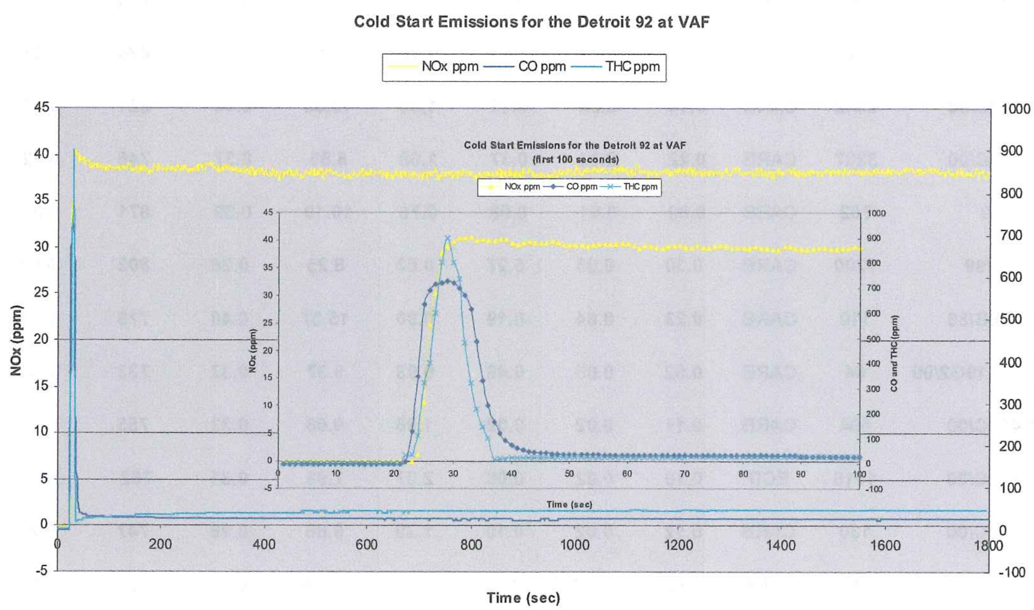

Figure 19. Cold-start emissions for CO and NO_X as a function of time

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 19, the emission factors in grams per kilowatt-hour were 24.3, 22.5, 55.4 and 17.7 for CO, THC, NO_x and

over →

A

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

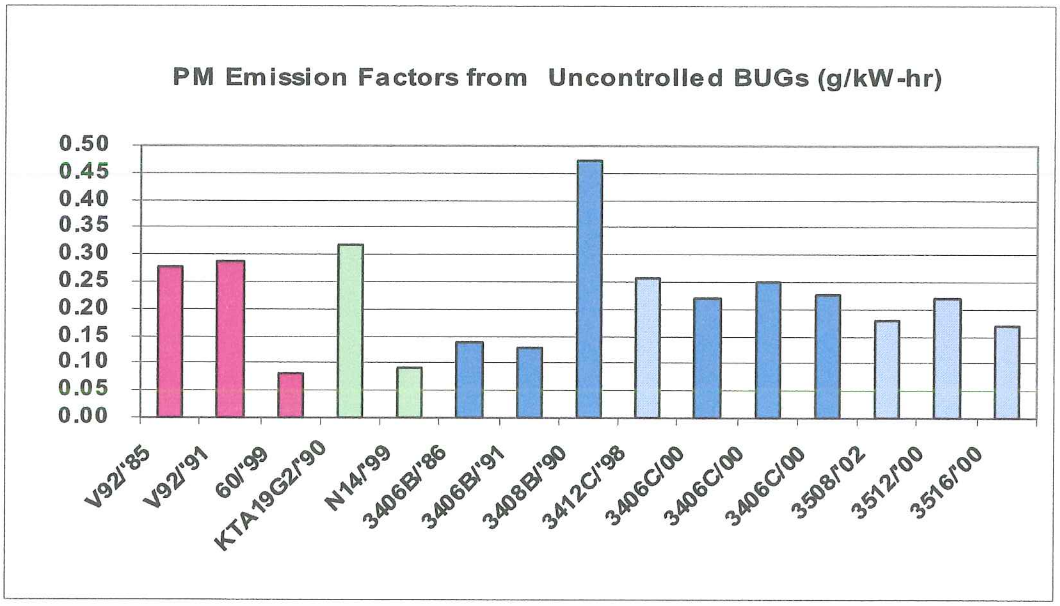

Figure 21. PM emission factors in g/kW-hr from uncontrolled BUGs

The large difference between the AP 42 value of 1.34-g/kW hr for small engines and the measured value became a source of further investigation. Several factors were obvious, including that the AP 42 value was derived using older engines with higher fuel sulfur content, and that a different method may have been used for measuring the emissions. CE-CERT's discussion with EPA uncovered that a contractor did the work a long time ago with older engines and their workers were retired. However, from some other work, CE-CERT researchers believe that the main difference is in the measurement method, as shown in Figure 22. Measurements made with a full dilution tunnel using the methods as specified in 40 CFR 89 are 3 to 5 times lower than measurements made with EPA's Field Method 5. The latter method uses impingers for the recovery of the condensable PM, and that is where significant mass is recovered. More work is needed to confirm this hypothesis.

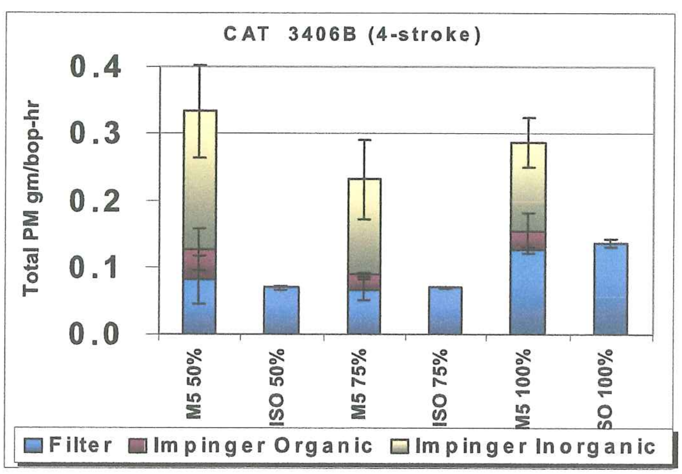

Figure 22. Mass emissions measured by 40 CFR 89 and CARB's Method 5

APPENDIX E-6
DPF-COST EFFECTIVENESS
PROJECT GENESIS
QUINCY, WASHINGTON

Item	Quantity	Units	Unit Cost	Subtotal
Annualized Capital Recovery				
Total Capital Cost				$3,919,524
Capital Recovery Factor, 25 yrs, 4% discount rate				0.064
Subtotal Annualized 25-year Capital Recovery Cost				$250,896
Direct Annual Costs				
Annual Admin charges	2% of TCI (EPA Manual)		0.02	$78,390
Annual Property tax	1% of TCI (EPA Manual)		0.01	$39,195
Annual Insurance	1% of TCI (EPA Manual)		0.01	$39,195
Annual operation/labor/maintenance costs: Upper-bound estimate would assume CARB's value of $0.20/hp/year and would result in $28,000/year. Lower-bound estimate would assume zero annual O&M. Mid-range value would account for fuel for pressure drop, increased inspections, periodic OEM visits, and the costs for Ecology's increased emission testing requirements. **For this screening-level analysis we assumed the lower-bound annual O&M cost of zero.**				$0
Subtotal Direct Annual Costs				$156,781
Total Annual Cost (Capital Recovery + Direct Annual Costs)				**$407,677**
Uncontrolled Emissions (Combined Pollutants)				52.6
Annual Tons Removed (Combined Pollutants)				0.27
Cost Effectiveness ($ per tons combined pollutant destroyed)				**$1,491,601**

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO_x	$10,000	-1.97	$0	per year
CO	$5,000	-0.13	$0	per year
VOCs	$9,999	-0.04	$0	per year
PM	$23,200	0.27	$6,341	per year
Other				
Total Reasonable Annual Control Cost for Combined Pollutants			**$6,341**	**per year**
Actual Annual Control Cost			**$407,677**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnages (Nominal-Controlled)

Pollutant	PM	CO	VOCs	NO_x
Tier-2 Uncontrolled Emissions TPY	0.29	3.09	0.84	48.41
Controlled Emissions TPY	0.01	3.22	0.87	50.38
TPY Removed	0.27	-0.13	-0.04	-1.97
Combined Uncontrolled TPY	52.62			
Combined TPY Removed	0.27			
Quoted Removal Effcy	96%	-4%	-5%	-4%
Annualized Cost ($/yr)	$407,677	$407,677	$407,677	$407,677
Indiv Poll $/Ton Removed	$1,491,601	-	-	-

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
DEEP (FH)	$23,200	0.273	$6,341	per year
CO	$5,000	-0.13	$0	per year
Carcinogen VOCs	$9,999	-1.30E-03	$0	per year
NO_2	$20,000	-0.20	$0	per year
Non-carcinogen VOCs	$5,000	-4.15E-03	$0	per year
Benzene	$20,000	-9.83E-04	$0	per year
1,3-Butadiene	$20,000	-4.95E-05	$0	per year
Acrolein	$20,000	-9.99E-06	$0	per year
Naphthalene	$20,000	-1.65E-04	$0	per year
Total Reasonable Annual Control Cost for Combined Pollutants			**$6,341**	**per year**
Actual Annual Control Cost			**$407,677**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH)	CO	Carcinogenic VOCs	NO_2 (10% of No_x)	Non-Carcinogenic VOCs	Benzene	1,3-Butadiene	Acrolein	Naphthalene
Tier-2 Uncontrolled TPY	0.29	3.09	2.83E-02	4.84	9.00E-02	2.14E-02	1.08E-03	2.17E-04	3.58E-03
Controlled TPY	0.01	3.22	2.96E-02	5.04	9.42E-02	2.23E-02	1.13E-03	2.27E-04	3.74E-03
Tons Removed/Year	0.27	-0.13	-1.30E-03	-0.20	-4.15E-03	-9.83E-04	-4.95E-05	-9.99E-06	-1.65E-04
Combined Uncontrolled Tons/yr	8.36								
Combined tons/yr Removed	0.27								
Overall Cold-Start Removal Effcy	96%	-4%	-5%		-5%	-5%	-5%	-5%	-5%
Annualized Cost ($/yr)	$407,677	$407,677	$407,677	$407,677	$407,677	$407,677	$407,677	$407,677	$407,677
Indiv Poll $/Ton Removed	$1,491,601	-	-	-	-	-	-	-	-
Combined TAPs $/Ton Removed	$1,491,601								

FH = "front half" filterable particulate matter

C

APPENDIX E-5
DOC-COST EFFECTIVENESS
PROJECT GENESIS
QUINCY, WASHINGTON

Item	Quantity	Units	Unit Cost	Subtotal
Annualized Capital Recovery				
Total Capital Cost				$1,634,668
Capital Recovery Factor, 25 yrs, 4% discount rate				0.064
Subtotal Annualized 25-year Capital Recovery Cost				$104,638
Direct Annual Costs				
Annual Admin charges	2% of TCI (EPA Manual)		0.02	$32,693
Annual Property tax	1% of TCI (EPA Manual)		0.01	$16,347
Annual Insurance	1% of TCI (EPA Manual)		0.01	$16,347
Annual operation/labor/maintenance costs: Upper-bound estimate would assume CARB's value of $0.20/hp/year and would result in $28,000/year. Lower-bound estimate would assume zero annual O&M. Mid-range value would account for fuel for pressure drop, increased inspections, periodic OEM visits, and the costs for Ecology's increased emission testing requirements. **For this screening-level analysis we assumed the lower-bound annual O&M cost of zero.**				$0
Subtotal Direct Annual Costs				$65,387
Total Annual Cost (Capital Recovery + Direct Annual Costs)				**$170,025**
Uncontrolled Emissions (Combined Pollutants)				52.6
Annual Tons Removed (Combined Pollutants)				3.35
Cost Effectiveness ($ per tons combined pollutant destroyed)				**$50,761**

D

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO_x	$10,000	0.00	$0	per year
CO	$5,000	2.62	$13,121	per year
VOCs	$9,999	0.67	$6,682	per year
PM	$23,200	0.06	$1,323	per year
Other				
Total Reasonable Annual Control Cost for Combined Pollutants			**$21,126**	**per year**
Actual Annual Control Cost			**$170,025**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnages (Nominal-Controlled)

Pollutant	PM	CO	VOCs	NO_x
Tier-2 Uncontrolled Emissions TPY	0.29	3.09	0.84	48.4
Controlled Emissions TPY	0.23	0.46	0.17	48.41
TPY Removed	0.06	2.62	0.67	0.0
Combined Uncontrolled TPY	52.62			
Combined TPY Removed	3.35			
Quoted Removal Effcy	20%	85%	80%	0%
Annualized Cost ($/yr)	$170,025	$170,025	$170,025	$170,025
Indiv Poll $/Ton Removed	$2,982,384	$64,790	$254,430	-

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
DEEP (FH)	$23,200	0.057	$1,323	per year
CO	$5,000	2.62	$13,121	per year
Carcinogen VOCs	$9,999	2.26E-02	$226	per year
NO_2	$20,000	0.00	$0	per year
Non-carcinogen VOCs	$5,000	7.20E-02	$360	per year
Benzene	$20,000	1.71E-02	$342	per year
1,3-Butadiene	$20,000	8.61E-04	$17	per year
Acrolein	$20,000	1.73E-04	$3	per year
Naphthalene	$20,000	2.86E-03	$57	per year
Total Reasonable Annual Control Cost for Combined Pollutants			**$15,450**	**per year**
Actual Annual Control Cost			**$170,025**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH)	CO	Carcinogenic VOCs	NO_2 (10% of No_x)	Non-Carcinogenic VOCs	Benzene	1,3-Butadiene	Acrolein	Naphthalene
Tier-2 Uncontrolled TPY	0.29	3.09	2.83E-02	4.84	9.00E-02	2.14E-02	1.08E-03	2.17E-04	3.58E-03
Controlled TPY	0.23	0.46	5.66E-03	4.84	1.80E-02	4.27E-03	2.15E-04	4.34E-05	7.15E-04
Tons Removed/Year	0.06	2.62	2.26E-02	0.00	7.20E-02	1.71E-02	8.61E-04	1.73E-04	2.86E-03
Combined Uncontrolled Tons/yr	8.36								
Combined tons/yr Removed	2.80								
Overall Cold-Start Removal Effcy	20%	85%	80%	0%	80%	80%	80%	80%	80%
Annualized Cost ($/yr)	$170,025	$170,025	$170,025	$170,025	$170,025	$170,025	$170,025	$170,025	$170,025
Indiv Poll $/Ton Removed	$2,982,384	$64,790	$7,509,784	-	$2,360,658	$9,953,338	$197,539,396	$980,176,444	$59,413,772
Combined TAPs $/Ton Removed	$60,790								

FH = "front half" filterable particulate matter

APPENDIX E-7
SCR-COST EFFECTIVENESS
PROJECT GENESIS
QUINCY, WASHINGTON

Item	Quantity	Units	Unit Cost	Units	Subtotal
Annualized Capital Recovery					
Total Capital Cost					$7,186,706
Capital Recovery Factor:	25	years	4%	discount	0.064
Subtotal Annualized 25-year Capital Recovery Cost					$460,035
Direct Annual Cost					
Maintenance (EPA Manual)	1.5%	of Total Capital Investment			$107,801
Increased Fuel Consumption	Insignificant				$0
Reagent Consumption (EPA Manual)					
25% aqueous Urea Flow Rate	22,260	lb/yr	$0.20	per lb	$4,452
Catalyst Replacement (EPA Manual)	Insignificant				$0
Subtotal Direct Annual Cost					$112,252
Indirect Annual Costs					
Annual Admin charges (EPA Manual)	2.0%	of Total Capital Investment			$143,734
Annual Property tax (EPA Manual)	1.0%	of Total Capital Investment			$71,867
Annual Insurance (EPA Manual)	1.0%	of Total Capital Investment			$71,867
Subtotal Indirect Annual Costs					$287,468
Total Annual Cost (Capital Recovery + Direct Annual Costs + Indirect Annual Costs)					$859,756
Uncontrolled Emissions (Combined Pollutants)					52.6
Annual Tons Removed (Combined Pollutants)					44.01
Cost Effectiveness ($ per tons combined pollutant destroyed)					$19,535

E

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO_x	$10,000	44.02	$440,161	per year
CO	$5,000	-0.81	$0	per year
VOCs	$9,999	0.72	$7,232	per year
PM	$23,200	0.08	$1,944	per year
Other				
Total Reasonable Annual Control Cost for Combined Pollutants			$449,336	per year
Actual Annual Control Cost			$859,756	per year
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnages (Nominal-Controlled)

Pollutant	PM	CO	VOCs	NO_x
Tier-2 Uncontrolled Emissions TPY	0.29	3.09	0.84	48.41
Controlled Emissions TPY	0.20	3.90	0.11	4.40
TPY Removed	0.08	-0.81	0.72	44.0
Combined Uncontrolled TPY	52.62			
Combined TPY Removed	44.01			
Quoted Removal Effcy	29%	-26%	87%	91%
Annualized Cost ($/yr)	$859,756	$859,756	$859,756	$859,756
Indiv Poll $/Ton Removed	$10,262,337	-	$1,188,736	$19,533

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
DEEP (FH)	$23,200	0.084	$1,944	per year
CO	$5,000	-0.81	$0	per year
Carcinogen VOCs	$9,999	2.45E-02	$245	per year
NO_2	$20,000	4.40	$88,032	per year
Non-carcinogen VOCs	$5,000	7.80E-02	$390	per year
Benzene	$20,000	1.85E-02	$370	per year
1,3-Butadiene	$20,000	9.32E-04	$19	per year
Acrolein	$20,000	1.88E-04	$4	per year
Naphthalene	$20,000	3.10E-03	$62	per year
Total Reasonable Annual Control Cost for Combined Pollutants			$91,065	per year
Actual Annual Control Cost			$859,756	per year
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH)	CO	Carcinogenic VOCs	NO_2 (10% of No_x)	Non-Carcinogenic VOCs	Benzene	1,3-Butadiene	Acrolein	Naphthalene
Tier-2 Uncontrolled TPY	0.29	3.09	2.83E-02	4.84	9.00E-02	2.14E-02	1.08E-03	2.17E-04	3.58E-03
Controlled TPY	0.20	3.90	3.80E-03	0.44	1.21E-02	2.86E-03	1.44E-04	2.91E-05	4.80E-04
Tons Removed/Year	0.08	-0.81	2.45E-02	4.40	7.80E-02	1.85E-02	9.32E-04	1.88E-04	3.10E-03
Combined Uncontrolled Tons/yr					8.36				
Combined tons/yr Removed					3.80				
Overall Cold-Start Removal Effcy	29%	-26%	87%	91%	87%	87%	87%	87%	87%
Annualized Cost ($/yr)	$859,756	$859,756	$859,756	$859,756	$859,756	$859,756	$859,756	$859,756	$859,756
Indiv Poll $/Ton Removed	$10,262,337	-	$35,086,832	$195,328	$11,029,348	$46,503,481	$922,933,545	$4,579,530,659	$277,590,012
Combined TAPs $/Ton Removed					$226,383				

FH = "front half" filterable particulate matter

APPENDIX E-8
TIER 4-COST EFFECTIVENESS
PROJECT GENESIS
QUINCY, WASHINGTON

Item	Quantity	Units	Unit cost	Units	Subtotal
Annualized Capital Recovery					
Total Capital Cost					$12,152,210
Capital Recovery Factor:	25	years	4%	discount	0.064
Subtotal Annualized 25-year Capital Recovery Cost					$777,887
Direct Annual Cost					
Maintenance (EPA Manual)	1.5%	of Total Capital Investment			$182,283
Increased Fuel Consumption	Insignificant				$0
Reagent Consumption (EPA Manual) 25% aqueous Urea Flow Rate	22,260	lb/yr	$0.20	per lb	$4,452
Catalyst Replacement (EPA Manual)	Insignificant				$0
Subtotal Direct Annual Cost					**$186,735**
Indirect Annual Costs					
Annual Admin charges (EPA Manual)	2.0%	of Total Capital Investment			$243,044
Annual Property tax (EPA Manual)	1.0%	of Total Capital Investment			$121,522
Annual Insurance (EPA Manual)	1.0%	of Total Capital Investment			$121,522
Subtotal Indirect Annual Costs					**$486,088**
Total Annual Cost (Capital Recovery + Direct Annual Costs + Indirect Annual Costs)					**$1,450,710**
Uncontrolled Emissions (Combined Pollutants)					52.6
Annual Tons Removed (Combined Pollutants)					46.44
Cost Effectiveness ($ per tons combined pollutant destroyed)					**$31,238**

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

Pollutant		Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO_x		$10,000	44.30	$443,043	per year
CO		$5,000	1.17	$5,840	per year
VOCs		$9,999	0.76	$7,586	per year
PM		$23,200	0.21	$4,878	per year
Other					
Total Reasonable Annual Control Cost for Combined Pollutants				**$461,347**	**per year**
Actual Annual Control Cost				**$1,450,710**	**per year**
Is The Control Device Reasonable?				**NO (Actual >> Acceptable)**	

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

Pollutant		Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
DEEP (FH)		$23,200	0.210	$4,878	per year
CO		$5,000	1.17	$5,840	per year
Carcinogen VOCs		$9,999	2.57E-02	$257	per year
NO_2		$20,000	4.43	$88,609	per year
Non-carcinogen VOCs		$5,000	8.18E-02	$409	per year
Benzene		$20,000	1.94E-02	$388	per year
1,3-Butadiene		$20,000	9.77E-04	$20	per year
Acrolein		$20,000	1.97E-04	$4	per year
Naphthalene		$20,000	3.25E-03	$65	per year
Total Reasonable Annual Control Cost for Combined Pollutants				**$100,468**	**per year**
Actual Annual Control Cost				**$1,450,710**	**per year**
Is The Control Device Reasonable?				**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnages (Nominal-Controlled)

Pollutant	PM	CO	VOCs	NO_x
Tier-2 Uncontrolled Emissions TPY	0.29	3.09	0.84	48.41
Controlled Emissions TPY	0.07	1.92	0.08	4.11
TPY Removed	0.21	1.17	0.76	44.3
Combined Uncontrolled TPY	52.62			
Combined TPY Removed	46.44			
Quoted Removal Effcy	74%	38%	91%	92%
Annualized Cost ($/yr)	$1,450,710	$1,450,710	$1,450,710	$1,450,710
Indiv Poll $/Ton Removed	$6,900,001	$1,242,113	$1,912,073	$32,744

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH)	CO	Carcinogenic VOCs	NO_2 (10% of No_x)	Non-Carcinogenic VOCs	Benzene	1,3-Butadiene	Acrolein	Naphthalene
Tier-2 Uncontrolled TPY	0.29	3.09	2.83E-02	4.84	9.00E-02	2.14E-02	1.08E-03	2.17E-04	3.58E-03
Controlled TPY	0.07	1.92	2.60E-03	0.41	8.26E-03	1.96E-03	9.87E-05	1.99E-05	3.28E-04
Tons Removed/Year	0.21	1.17	2.57E-02	4.43	8.18E-02	1.94E-02	9.77E-04	1.97E-04	3.25E-03
Combined Uncontrolled Tons/yr	8.36								
Combined tons/yr Removed	5.94								
Overall Cold-Start Removal Effcy	74%	38%	91%	92%	91%	91%	91%	91%	91%
Annualized Cost ($/yr)	$1,450,710	$1,450,710	$1,450,710	$1,450,710	$1,450,710	$1,450,710	$1,450,710	$1,450,710	$1,450,710
Indiv Poll $/Ton Removed	$6,900,001	$1,242,113	$56,436,911	$327,442	$17,740,624	$74,800,508	$1,484,531,815	$7,366,141,367	$446,501,492
Combined TAPs $/Ton Removed	$244,231								

FH = "front half" filterable particulate matter

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TABLE C-2
AERMOD SUMMARY
PROJECT GENESIS
QUINCY, WASHINGTON

AERMOD INPUT (1-hour Average)
Event: 1-hour Unplanned Power Outage

	Operating Assumptions (≤100%)			
Generator Size	2.0 MW		2.75 MW	
Operating Condition	Cold-start	Warm	Cold-start	Warm
Number of events	1	1	1	1
Duration of each event (hours)	0.02	0.98	0.02	0.98
Hours at each runtime mode	0.02	0.98	0.02	0.98
Number of engines operating concurrently	20		5	
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**			
NO_2 ASIL	44		74	
Load Specific Exhaust Temp. (°F)	897		879	
Load Specific Exhaust Flow (cfm)	15,515		20,134	
CO (1-hour) NAAQS / ASIL	5.7		16	
Load Specific Exhaust Temp. (°F)	829		866	
Load Specific Exhaust Flow (cfm)	7,212		20,121	
SO_2 (1-hour, 3-hour, 24-hour) NAAQS	2.9E-02		4.4E-02	
Load Specific Exhaust Temp. (°F)	897		892	
Load Specific Exhaust Flow (cfm)	15,515		25,620	

* Model was used to develop dispersion factors for estimating 1-hour impacts of benzene, 1,3-butadiene, acrolein, and napthalene.

AERMOD INPUT (8-hour Average)
Event: 8-hour Unplanned Power Outage

	Operating Assumptions (≤100%)			
Generator Size	2.0 MW		2.75 MW	
Operating Condition	Cold-start	Warm	Cold-start	Warm
Number of events	1	1	1	1
Duration of each event (hours)	0.02	7.98	0.02	7.98
Hours at each runtime mode	0.02	7.98	0.02	7.98
Number of engines operating concurrently	20		5	
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**			
CO (8-hour) NAAQS	5.1		15	
Load Specific Exhaust Temp. (°F)	829		866	
Load Specific Exhaust Flow (cfm)	7,212		20,121	

AERMOD INPUT (24-hour Average)
Event: 24-hour Unplanned Power Outage

	Operating Assumptions (≤100%)			
Generator Size	2.0 MW		2.75 MW	
Operating Condition	Cold-start	Warm	Cold-start	Warm
Number of events	1	1	1	1
Duration of each event (hours)	0.02	11.98	0.02	11.98
Hours at each runtime mode	0.02	11.98	0.02	11.98
Number of engines operating concurrently	20		5	
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**			
PM_{10} (24-hour) NAAQS	1.1		2.3	
Load Specific Exhaust Temp. (°F)	828		649	
Load Specific Exhaust Flow (cfm)	9,685		6,902	

	Operating Assumptions (≤100%)			
Generator Size	2.0 MW		2.75 MW	
Operating Condition	Cold-start	Warm	Cold-start	Warm
Number of events	1	1	1	1
Duration of each event (hours)	0.02	23.98	0.02	23.98
Hours at each runtime mode	0.02	23.98	0.02	23.98
Number of engines operating concurrently	20		5	
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**			
Acrolein ASIL	1.6E-04		2.3E-04	
Load Specific Exhaust Temp. (°F)	654		649	
Load Specific Exhaust Flow (cfm)	10,139		6,902	

Event: Monthly Maintenance Testing

Source	Genesis (1x 2.75 MW)
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**
NO2 (1-hour) NAAQS	74
Load Specific Exhaust Temp. (°F)	879.0
Load Specific Exhaust Flow (cfm)	20,134
Stack Diameter (ft)	2
Release Hieght (ft)	42

Event: Monthly Maintenance Testing

Source	Genesis (1x 2.75 MW)
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**
PM2.5 24-hour NAAQS	3.2 *
Load Specific Exhaust Temp. (°F)	649.3
Load Specific Exhaust Flow (cfm)	6,902
Stack Diameter (ft)	2
Release Hieght (ft)	42

* Based on 8 hours of operation in a day.

2000 kW / 2500 kVA — Horse power at 100% load = 2922 BHP

Model	DQKAB EPA T2	DQKAB DOC only	DQKAB DPF only	DQKAL SCR only	DQKAL T4 Compliant
HC	0.08	~(-80%) 0.016	0.08	0.00	0.00
NOx	5.30	5.30	5.30	0.45	0.48
CO	0.32	~(-85%) 0.048	0.32	0.20	0.23
PM	0.03	~(-20%) 0.024	0.00	0.01	0.00
	From data sheet @ 100% load	Approximate reduction @100%	Same as T2 with zero particulate matter	From data sheets @ 100% load	

All numbers are in Grams per BHP hour
These numbers will not match EPA D2 cycle testing

2750 kW / 3537 kVA — Horse power at 100% load = 4060 BHP

Model	DQLF EPA T2	DQLF DOC only	DQLF DPF only	DQLH SCR only	DQLH T4 Compliant
HC	0.14	~(-80%) 0.028	0.14	0.02	0.02
NOx	6.40	6.40	6.40	0.62	0.61
CO	0.43	~(-85%) 0.065	0.43	1.14	1.50
PM	0.04	~(-20%) 0.032	0.00	0.06	0.00
	From data sheet @ 100% load	Approximate reduction @100%	Same as T2 with zero particulate matter	From data sheets @ 100% load	

All numbers are in Grams per BHP hour
These numbers will not match EPA D2 cycle testing

Tom Tomlinson, Cummins Northwest, 8-14-15

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Table 13

Caterpillar 3516 Diesel Engine, DOC Inlet – 10% Load

EPA 5/202 PM Testing Results

Test Date: Sept 27, 2011	**Units**	**Run 1**	**Run 2**	**Run 3**	**Average**
Start Time		09:52	13:08	15:52	
End Time		11:49	14:32	17:32	
Sampling Time	min	84	60	84	76
Sampling Results					
EPA 5 Filterable PM	gr/dscf	0.015	0.013	0.015	0.015
Mass Rate (EPA 2)	lb/hr	0.39	0.34	0.40	0.38
Mass Rate (EPA 19)	lb/hr	0.39	0.34	0.38	0.37
Energy Basis (EPA 2)	g/kWm-hr	0.27	0.24	0.28	0.26
Energy Basis (EPA 19)	g/kWm-hr	0.27	0.24	0.27	0.26
EPA 202 Condensable PM	gr/dscf	0.019	0.021	0.020	0.020
Mass Rate (EPA 2)	lb/hr	0.49	0.53	0.52	0.51
Mass Rate (EPA 19)	lb/hr	0.49	0.53	0.50	0.51
Energy Basis (EPA 2)	g/kWm-hr	0.34	0.37	0.37	0.36
Energy Basis (EPA 19)	g/kWm-hr	0.34	0.37	0.35	0.36
Total PM	gr/dscf	0.034	0.034	0.035	0.034
Mass Rate (EPA 2)	lb/hr	0.88	0.87	0.92	0.89
Mass Rate (EPA 19)	lb/hr	0.88	0.87	0.88	0.87
Energy Basis (EPA 2)	g/kWm-hr	0.62	0.61	0.65	0.63
Energy Basis (EPA 19)	g/kWm-hr	0.62	0.61	0.62	0.62
Sample Volume	dscf	40.8	41.9	41.7	41.5
Sample Weight, Filterable	mg	40.0	36.5	40.8	39.1
Sample Weight, Condensable	mg	50.2	56.9	53.6	53.6
Sample Weight, Total PM	mg	90.2	93.4	94.4	92.7
Percent Isokinetic	%	99	98	99	98
Source Parameters					
O_2	%	15.5	15.3	15.3	15.4
CO_2	%	4.1	4.1	4.1	4.1
Flow Rate (Actual)	acf/min	5,870	5,790	6,050	5,910
EPA 2 Flow Rate (Standard)	dscf/min	3,000	2,960	3,070	3,010
EPA 19 Flow Rate (Standard)	dscf/min	3,020	2,930	2,930	2,960
Temperature	°F	548	549	553	550
Moisture	%	3.9	3.7	4.1	3.9

Table 14

Caterpillar 3516 Diesel Engine, DOC Outlet – 10% Load

EPA 5/202 PM Testing Results

Test Date: Sept 27, 2011	**Units**	**Run 1**	**Run 2**	**Run 3**	**Average**
Start Time		09:52	13:08	15:52	
End Time		11:49	14:32	17:32	
Sampling Time	min	84	60	84	76
Sampling Results					
EPA 5 Filterable PM	gr/dscf	0.0097	0.012	0.051	0.024
Mass Rate (EPA 2)	lb/hr	0.24	0.30	1.3	0.60
Mass Rate (EPA 19)	lb/hr	0.25	0.31	1.3	0.62
Energy Basis (EPA 2)	g/kWm-hr	0.17	0.21	0.90	0.43
Energy Basis (EPA 19)	g/kWm-hr	0.17	0.22	0.92	0.44
EPA 202 Condensable PM	gr/dscf	0.00089	0.0012	0.0010	0.0011
Mass Rate (EPA 2)	lb/hr	0.022	0.030	0.026	0.026
Mass Rate (EPA 19)	lb/hr	0.022	0.031	0.026	0.026
Energy Basis (EPA 2)	g/kWm-hr	0.016	0.021	0.018	0.018
Energy Basis (EPA 19)	g/kWm-hr	0.016	0.022	0.018	0.019
Total PM	gr/dscf	0.011	0.013	0.052	0.025
Mass Rate (EPA 2)	lb/hr	0.26	0.33	1.3	0.63
Mass Rate (EPA 19)	lb/hr	0.27	0.34	1.3	0.64
Energy Basis (EPA 2)	g/kWm-hr	0.19	0.23	0.92	0.44
Energy Basis (EPA 19)	g/kWm-hr	0.19	0.24	0.94	0.45
Sample Volume	dscf	38.8	42.4	38.4	39.9
Sample Weight, Filterable	mg	24.4	33.6	127.9	62.0
Sample Weight, Condensable	mg	2.2	3.4	2.6	2.7
Sample Weight, Total PM	mg	26.6	37.0	130.5	64.7
Percent Isokinetic	%	99	98	99	99
Source Parameters					
O_2	%	15.4	15.4	15.4	15.4
CO_2	%	4.3	4.3	4.3	4.3
Flow Rate (Actual)	acf/min	5,640	5,570	5,630	5,610
EPA 2 Flow Rate (Standard)	dscf/min	2,910	2,850	2,890	2,880
EPA 19 Flow Rate (Standard)	dscf/min	2,950	2,940	2,950	2,950
Temperature	°F	539	538	543	540
Moisture	%	3.6	4.3	3.4	3.8

Table 15

Caterpillar 3516 Diesel Engine, DOC Inlet – 40% Load

EPA 5/202 PM Testing Results

Test Dates: Sept 28-29, 2011	**Units**	**Run 1**	**Run 2**	**Run 3**	**Average**
Date		Sept 28	Sept 29	Sept 29	
Start Time		18:27	08:14	10:28	
End Time		19:47	09:26	12:56	
Sampling Time	min	60	60	60	60
Sampling Results					
EPA 5 Filterable PM	gr/dscf	0.0093	0.043	0.0067	0.020
Mass Rate (EPA 2)	lb/hr	0.46	1.9	0.28	0.89
Mass Rate (EPA 19)	lb/hr	0.35	1.6	0.25	0.74
Energy Basis (EPA 2)	g/kWm-hr	0.17	0.73	0.10	0.33
Energy Basis (EPA 19)	g/kWm-hr	0.13	0.60	0.093	0.28
EPA 202 Condensable PM	gr/dscf	0.0077	0.0075	0.0063	0.0072
Mass Rate (EPA 2)	lb/hr	0.38	0.34	0.26	0.33
Mass Rate (EPA 19)	lb/hr	0.29	0.28	0.24	0.27
Energy Basis (EPA 2)	g/kWm-hr	0.14	0.13	0.097	0.12
Energy Basis (EPA 19)	g/kWm-hr	0.11	0.11	0.087	0.10
Total PM	gr/dscf	0.017	0.050	0.013	0.027
Mass Rate (EPA 2)	lb/hr	0.84	2.3	0.54	1.2
Mass Rate (EPA 19)	lb/hr	0.64	1.9	0.49	1.0
Energy Basis (EPA 2)	g/kWm-hr	0.31	0.86	0.20	0.46
Energy Basis (EPA 19)	g/kWm-hr	0.24	0.71	0.18	0.38
Sample Volume	dscf	47.4	48.1	43.7	46.4
Sample Weight, Filterable	mg	28.6	133.2	19.0	60.3
Sample Weight, Condensable	mg	23.6	23.3	17.9	21.6
Sample Weight, Total PM	mg	52.2	156.5	36.9	81.9
Percent Isokinetic	%	101	100	100	100
Source Parameters					
O_2	%	13.0	13.1	12.9	13.0
CO_2	%	6.0	5.8	6.0	5.9
Flow Rate (Actual)	acf/min	13,500	12,100	11,400	12,400
EPA 2 Flow Rate (Standard)	dscf/min	5,790	5,300	4,810	5,300
EPA 19 Flow Rate (Standard)	dscf/min	4,410	4,390	4,340	4,380
Temperature	°F	744	713	754	737
Moisture	%	5.6	5.2	5.5	5.4

Table 16

Caterpillar 3516 Diesel Engine, DOC Outlet – 40% Load

EPA 5/202 PM Testing Results

Test Dates: Sept 28-29, 2011	**Units**	**Run 1**	**Run 2**	**Run 3**	**Average**
Date		Sept 28	Sept 29	Sept 29	
Start Time		18:27	08:14	10:22	
End Time		19:47	09:26	12:56	
Sampling Time	min	60	60	60	60
Sampling Results					
EPA 5 Filterable PM	gr/dscf	0.0057	0.0054	0.0067	0.0059
Mass Rate (EPA 2)	lb/hr	0.23	0.22	0.27	0.24
Mass Rate (EPA 19)	lb/hr	0.21	0.20	0.25	0.22
Energy Basis (EPA 2)	g/kWm-hr	0.086	0.081	0.099	0.089
Energy Basis (EPA 19)	g/kWm-hr	0.078	0.077	0.092	0.082
EPA 202 Condensable PM	gr/dscf	0.00011	0.00041	0.00018	0.00023
Mass Rate (EPA 2)	lb/hr	0.0047	0.016	0.0070	0.0094
Mass Rate (EPA 19)	lb/hr	0.0043	0.016	0.0065	0.0088
Energy Basis (EPA 2)	g/kWm-hr	0.0017	0.0062	0.0026	0.0035
Energy Basis (EPA 19)	g/kWm-hr	0.0016	0.0058	0.0024	0.0033
Total PM	gr/dscf	0.0058	0.0059	0.0069	0.0062
Mass Rate (EPA 2)	lb/hr	0.24	0.23	0.28	0.25
Mass Rate (EPA 19)	lb/hr	0.22	0.22	0.25	0.23
Energy Basis (EPA 2)	g/kWm-hr	0.088	0.087	0.10	0.092
Energy Basis (EPA 19)	g/kWm-hr	0.080	0.083	0.094	0.085
Sample Volume	dscf	43.3	45.1	42.3	43.6
Sample Weight, Filterable	mg	16.0	15.9	18.4	16.8
Sample Weight, Condensable	mg	0.32	1.2	0.48	0.67
Sample Weight, Total PM	mg	16.3	17.1	18.9	17.4
Percent Isokinetic	%	99	100	99	99
Source Parameters					
O_2	%	12.8	13.1	12.8	12.9
CO_2	%	6.1	5.9	6.1	6.0
Flow Rate (Actual)	acf/min	11,100	10,500	10,900	10,800
EPA 2 Flow Rate (Standard)	dscf/min	4,780	4,630	4,660	4,690
EPA 19 Flow Rate (Standard)	dscf/min	4,340	4,380	4,300	4,340
Temperature	°F	729	696	725	717
Moisture	%	5.4	5.0	5.5	5.3

Table 17

Caterpillar 3516 Diesel Engine, DOC Inlet – 85% Load

EPA 5/202 PM Testing Results

Test Date: Sept 28, 2011	**Units**	**Run 1**	**Run 2**	**Run 3**	**Average**
Start Time		08:40	10:47	15:50	
End Time		10:03	15:01	17:04	
Sampling Time	min	60	60	60	60
Sampling Results					
EPA 5 Filterable PM	gr/dscf	0.011	0.0034	0.0066	0.0071
Mass Rate (EPA 2)	lb/hr	0.86	0.25	0.47	0.53
Mass Rate (EPA 19)	lb/hr	0.64	0.19	0.37	0.40
Energy Basis (EPA 2)	g/kWm-hr	0.18	0.053	0.098	0.11
Energy Basis (EPA 19)	g/kWm-hr	0.13	0.040	0.077	0.084
EPA 202 Condensable PM	gr/dscf	0.0041	0.0033	0.0039	0.0038
Mass Rate (EPA 2)	lb/hr	0.32	0.24	0.28	0.28
Mass Rate (EPA 19)	lb/hr	0.24	0.18	0.22	0.21
Energy Basis (EPA 2)	g/kWm-hr	0.067	0.051	0.058	0.059
Energy Basis (EPA 19)	g/kWm-hr	0.049	0.039	0.046	0.045
Total PM	gr/dscf	0.015	0.0067	0.011	0.011
Mass Rate (EPA 2)	lb/hr	1.2	0.50	0.75	0.81
Mass Rate (EPA 19)	lb/hr	0.87	0.38	0.59	0.61
Energy Basis (EPA 2)	g/kWm-hr	0.25	0.10	0.16	0.17
Energy Basis (EPA 19)	g/kWm-hr	0.18	0.079	0.12	0.13
Sample Volume	dscf	57.6	46.7	40.7	48.3
Sample Weight, Filterable	mg	41.9	10.4	17.5	23.3
Sample Weight, Condensable	mg	15.4	10.0	10.3	11.9
Sample Weight, Total PM	mg	57.3	20.4	27.8	35.2
Percent Isokinetic	%	99	101	101	100
Source Parameters					
O_2	%	11.2	11.1	10.9	11.0
CO_2	%	7.3	7.4	7.5	7.4
Flow Rate (Actual)	acf/min	21,500	20,900	20,400	20,900
EPA 2 Flow Rate (Standard)	dscf/min	8,960	8,580	8,260	8,600
EPA 19 Flow Rate (Standard)	dscf/min	6,620	6,520	6,490	6,540
Temperature	°F	790	808	817	805
Moisture	%	6.2	6.3	6.8	6.4

Table 18

Caterpillar 3516 Diesel Engine, DOC Outlet – 85% Load

EPA 5/202 PM Testing Results

Test Date: Sept 28, 2011	**Units**	**Run 1**	**Run 2**	**Run 3**	**Average**
Start Time		08:40	10:47	15:50	
End Time		10:03	15:02	17:04	
Sampling Time	min	60	60	60	60
Sampling Results					
EPA 5 Filterable PM	gr/dscf	0.0036	0.0045	0.0046	0.0042
Mass Rate (EPA 2)	lb/hr	0.20	0.26	0.26	0.24
Mass Rate (EPA 19)	lb/hr	0.21	0.25	0.26	0.24
Energy Basis (EPA 2)	g/kWm-hr	0.043	0.055	0.055	0.051
Energy Basis (EPA 19)	g/kWm-hr	0.043	0.053	0.054	0.050
EPA 202 Condensable PM	gr/dscf	0.0015	0.00062	0.0018	0.0013
Mass Rate (EPA 2)	lb/hr	0.086	0.036	0.10	0.075
Mass Rate (EPA 19)	lb/hr	0.087	0.034	0.10	0.074
Energy Basis (EPA 2)	g/kWm-hr	0.018	0.0075	0.022	0.016
Energy Basis (EPA 19)	g/kWm-hr	0.018	0.0072	0.021	0.016
Total PM	gr/dscf	0.0052	0.0051	0.0064	0.0056
Mass Rate (EPA 2)	lb/hr	0.29	0.30	0.37	0.32
Mass Rate (EPA 19)	lb/hr	0.29	0.29	0.36	0.31
Energy Basis (EPA 2)	g/kWm-hr	0.061	0.062	0.077	0.067
Energy Basis (EPA 19)	g/kWm-hr	0.062	0.060	0.075	0.065
Sample Volume	dscf	47.9	56.3	46.0	50.1
Sample Weight, Filterable	mg	11.3	16.4	13.7	13.8
Sample Weight, Condensable	mg	4.8	2.3	5.4	4.2
Sample Weight, Total PM	mg	16.1	18.7	19.1	18.0
Percent Isokinetic	%	107	101	100	103
Source Parameters					
O_2	%	11.1	11.0	10.9	11.0
CO_2	%	7.3	7.4	7.5	7.4
Flow Rate (Actual)	acf/min	15,700	16,300	16,300	16,100
EPA 2 Flow Rate (Standard)	dscf/min	6,510	6,750	6,660	6,640
EPA 19 Flow Rate (Standard)	dscf/min	6,610	6,490	6,480	6,530
Temperature	°F	776	793	798	789
Moisture	%	6.5	5.4	6.2	6.0

6.0 PROPOSAL TO REDUCE POTENTIAL IMPACTS FROM EXISTING EMERGENCY GENERATORS

Yahoo! currently operates a data center adjacent to the Project Genesis site. NOC Approval Order No. 11AQ-E399 was issued by Ecology in April 2011, and allows for the operation of 23 emergency generators at the adjacent data center. Yahoo! was originally permitted to operate generators R through 12 for up to 400 hours per year, as it was initially thought that there would be a need for that many hours. In 2011, Yahoo! agreed to a reduction from 400 hours to 200 hours/year due to increased confidence in electrical reliability. Yahoo! is now confident that 100 hours/year would meet the facility's needs for the R through 12 generators.

Yahoo! requests an administrative modification to reduce generator runtime limits (hours per year, fuel usage and load) on the existing emergency generators numbered R through 12. Yahoo! requests that the per hour and operating load limits that are currently in place for generators numbered 13 through 22 be applied to generators R through 12. The existing operating restrictions and proposed operating restrictions are summarized in Tables 14 and 15, respectively. Note, as shown in Table 15, proposed operations during maintenance testing and power outages will include operation at 0 percent load (idle). However, because manufacturers do not publish emission factors for idle operation, emissions factors for 10 percent load were used to estimate emissions for idle operation. Engines will not be operated at 10 percent load unless it is required for compliance stack testing.

As part of this administrative action, Landau Associates has calculated the new potential-to-emit (PTE) for each pollutant for the existing R through 12 generators. This requested change to operating limits would result in a PTE reduction for all pollutants from those emission units. Existing and new PTE estimates are presented in Table 16. The methods described in Section 2.0 were used to calculate the new PTE for R through 12and include the following assumptions:

- Calculations conservatively assume that all PM emitted from the engines is PM_{10} and $PM_{2.5}$.
- Emissions of PM/PM_{10}/$PM_{2.5}$, CO, NO_x, and total VOCs were scaled up using a "black puff" emissions factor to account for slightly higher emissions during the first minute of each engine cold-start.
- Estimates for PM/PM_{10}/$PM_{2.5}$ emissions account for "back-half" condensable PM.
- The DEEP emission estimate differs from the estimate of PM/PM_{10}/$PM_{2.5}$ in that it does not include an estimate of "back-half" condensable PM. Based on a discussion with Gary Palcisko, Ecology's toxicologist for this project, human health toxicological values for DEEP from the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) were developed based on exposure to measured levels of "front-half" filterable PM, not "back-half" condensable PM (Palcisko, G. 2015). Because OEHHA's toxicological profile for DEEP—which represents the most comprehensive human health toxicological profile available for DEEP—is used as the basis for evaluating project-related

DEEP impacts, the condensable fraction is not calculated as part of the DEEP emission rate for the existing R through 12 generators.

- Cooling tower PTE is not provided in this application because there is no proposed change to existing cooling towers and no new cooling towers are proposed.

While no changes are proposed to the emissions or operating restrictions for the existing engines 13 through R3 (listed in Table 17), at Ecology's request, new PTE for $PM/PM_{10}/PM_{2.5}$is calculated and presented in Table 16 to account for condensable PM. Additionally, the cumulative NAAQS air modeling demonstration accounts for condensable PM from all existing and proposed emergency generators.

No additional new restrictions on the existing R through 12 and 13 through R3 generators are proposed.

TABLE 10
COMPARISON TO NAAQS
PROJECT GENESIS
QUINCY, WASHINGTON

Criteria Pollutant/ Hazardous Air Pollutant	National Standards Primary (μg/m³)	National Standards Secondary (μg/m³)	Washington State Standards (μg/m³)	Max. Project-Related Impact (μg/m³)	Filename	Local Background (μg/m³)	Regional Background (μg/m³)(a)	Max. Cumulative Ambient Impact (μg/m³)
Particulate Matter (PM_{10})								
Annual average	--	--	50	0.47	PM10_101115, PM10_101115b	1.1	--	1.6
24-hour average	150	150	150	56	PM10_101215, PM10_101315	18	62	136
Particulate Matter ($PM_{2.5}$)								
Annual average	15	15	12	0.47	PM10_101115, PM10_101115b	1.1	6.5	8
24-hour average	35	35	35	(b)	PM25_100515-COPY	12.6	21.0	34
Carbon Monoxide (CO)								
8-hour average	10,000	--	10,000	326	CO_100715b	--	3,308	3,634
1-hour average	40,000	--	40,000	637	CO_100715a	--	5,776	6,413
Nitrogen Oxides (NO_x)								
Annual average	100	100	100	7.71	NOx_101215, NOx_101215b	2.6	2.8	13
1-hour average	188	--	--	(b)	NOx_100715	105	16	121
Sulfur Dioxide (SO_2)								
Annual arithmetic mean	79	--	52	5.4E-03	SO2_100615a	--	0.26	0.27
24-hour average	370	--	260	0.9		--	1.0	2.0
3-hour average	--	1,310	1,310	1.6	SO2_100615b	--	2.1	3.7
1-hour average	200	--	200	2.3		--	2.6	4.9

Notes:
(a) Regional background level obtained from Ecology's Air Monitoring Network website (WSU website 2015).
(b) Modeled with local background; therefore, value in local background column accounts for project + local background.

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TABLE A3-6
CRITERIA AND TOXIC AIR POLLUTANT STANDARDS
PHASE 5 EMERGENCY GENERATORS - STANDARD SCENARIO
YAHOO! DATA CENTER - QUINCY, WASHINGTON

ıutant	National Standards Primary	National Standards Seconday	Washington State Standards	Maximum Ambient Impact Concentration (Yahoo! Phase 5)	Filename	Background Concentrations (a)	Maximum Ambient Impact C Added to Background (II
nded Particulates							
verage	--	--	60 µg/m^3	0.07 µg/m^3	Apm1109.isc	--	--
ıverage	--	--	150 µg/m^3	34 µg/m^3	Wpm1111.isc	--	--
Matter (PM$_{10}$)							
verage	--	--	50 µg/m^3	0.07 µg/m^3	Apm1109.isc	--	--
average	150 µg/m^3	150 µg/m^3	150 µg/m^3	34 µg/m^3	Wpm1111.isc	15 µg/m^3	49 µg/m^3
Matter (PM$_{2.5}$)							
verage	15 µg/m^3	15 µg/m^3	15 µg/m^3	0.07 µg/m^3	Apm1109.isc	7.5 µg/m^3	7.6 µg/m^3
average	35 µg/m^3	35 µg/m^3	--	0.71 µg/m^3	Wpm1109[b-f].isc (b)	20.5 µg/m^3	21.21 µg/m^3
noxide (CO)							
verage	9 ppm	--	9 ppm	872 µg/m^3 (0.76 ppm)	Wco1109.isc	--	--
verage	35 ppm	--	35 ppm	1403 µg/m^3 (1.2 ppm)	Wco1109.isc	--	--
kides (NO$_x$)							
average	0.053 ppm	0.053 ppm	0.05 ppm	2.1 µg/m^3 (0.001 ppm)	Ano1206.isc	--	--
verage	0.100 ppm	--	--	119 µg/m^3 (0.063 ppm)	Wno1203[b-f].isc (b)	28 µg/m^3 (0.015 ppm)	147 µg/m^3 (0.078
ide (SO$_x$)							
arithmetic mean	0.03 ppm	--	0.02 ppm	0.002 µg/m^3 (0.0000008 ppm)	Aso1109.isc	--	--
average	0.14 ppm	--	0.10 ppm	1.0 µg/m^3 (0.0004 ppm)	Wso1109.isc	--	--
average	--	0.50 ppm	--	1.8 µg/m^3 (0.0007 ppm)	Wso1109.isc	--	--
average	75 ppb	--	0.40 ppm	2.5 µg/m^3 (1 ppb; 0.001 ppm)	Wso1109.isc	--	--

Pollutant	ASIL	Averaging Period	Maximum Ambient Impact Concentration	Filename
	0.0345 µg/m^3	Annual average	0.001 µg/m^3	Abe1109.isc
	0.00333 µg/m^3	Annual average	0.07 µg/m^3	Apm1111.isc
	470 µg/m^3	1-hour average	755 µg/m^3	Wno1204.isc
	23000 µg/m^3	1-hour average	1403 µg/m^3	Wco1109.isc
	0.06 µg/m^3	24-hour average	0.005 µg/m^3	Wac1109.isc

ound concentrations provided by Ecology.
purposes of determining the 3-year average of the 98th percentile, five separate models were run (one for each year of meteorological data) to determine the 98 percentile (or 8th highest) concentration for each year
on the NAAQS.
licrograms per cubic meter.
rts per million.
ceptable source impact level.
esel particulate matter.

Capital Cost for Catalyzed-DPF

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

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M - DPF

Capital Cost for SCR (alone)

Cost Category	Cost Factor	Source of Cost Factor	Quant.	Unit Cost	Subtotal Cost
Direct Costs					
Purchased Equipment Costs					
2000 kWe emission control package	ROM cost estimate by Caterpillar		32	$135,803	$4,345,696
Combined systems FOB cost					$4,345,696
Instrumentation	Assume no cost	Assume no cost	0	0	0
Sales Tax	WA state tax	WA state tax	6.5%	--	$282,470
Shipping	0.05A	EPA Cost Manual	5.0%	--	$217,285
Subtotal Purchased Equipment Cost, PEC					$4,845,451
Direct Installation Costs					
Enclosure structural supports	Assume no cost	Assume no cost	0	$0	$0
Installation	1/2 of EPA Cost Manual	1/2 of EPA Cost Manual	2.5%	--	$121,136
Electrical	Assume no cost	Assume no cost	0	0	0
Piping	Assume no cost	Assume no cost	0	0	0
Insulation	Assume no cost	Assume no cost	0	0	0
Painting	Assume no cost	Assume no cost	0	0	0
Subtotal Direct Installation Costs					$121,136
Site Preparation and Buildings (SP)	Assume no cost	Assume no cost	0	0	0
Total Direct Costs, DC (PEC + Direct Installation + Site Prep)					$4,966,587
Indirect Costs (Installation)					
Engineering	0.025*PEC	1/4 of EPA Cost Manual	2.5%	--	$121,136
Construction and field expenses	0.025*PEC	1/2 of EPA Cost Manual	2.5%	--	$121,136
Contractor Fees	From DIS data center	From DIS data center	6.8%	--	$347,381
Startup	0.02*PEC	EPA Cost Manual	2.0%	--	$96,909
Performance Test (Tech support)	0.01*PEC	EPA Cost Manual	1.0%	--	$48,455
Contingencies	0.03*PEC	EPA Cost Manual	3.0%	--	$145,364
Subtotal Indirect Costs, IC					$880,381
Total Capital Investment (TCI = DC+IC)					$5,846,968
					TCI per gen
					$182,718

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M- SCR

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

Cost Category	Cost Factor	Source of Cost Factor	Quant.	Unit Cost	Subtotal Cost
Direct Costs					
Purchased Equipment Costs					
2000 kWe emission control package	ROM cost estimate by Caterpillar		32	$168,178	$5,381,696
Combined systems FOB cost					$5,381,696
Instrumentation	Assume no cost	Assume no cost	0	0	0
Sales Tax	WA state tax	WA state tax	6.5%	--	$349,810
Shipping	0.05A	EPA Cost Manual	5.0%	--	$269,085
Subtotal Purchased Equipment Cost, PEC					$6,000,591
Direct Installation Costs					
Enclosure structural supports	Assume no cost	Assume no cost	0	$0	$0
Installation	1/2 of EPA Cost Manual	1/2 of EPA Cost Manual	2.5%	--	$150,015
Electrical	Assume no cost	Assume no cost	0	0	0
Piping	Assume no cost	Assume no cost	0	0	0
Insulation	Assume no cost	Assume no cost	0	0	0
Painting	Assume no cost	Assume no cost	0	0	0
Subtotal Direct Installation Costs					$150,015
Site Preparation and Buildings (SP)	Assume no cost	Assume no cost	0	0	0
Total Direct Costs, DC (PEC + Direct Installation + Site Prep)					$6,150,606
Indirect Costs (Installation)					
Engineering	0.025*PEC	1/4 of EPA Cost Manual	2.5%	--	$150,015
Construction and field expenses	0.025*PEC	1/2 of EPA Cost Manual	2.5%	--	$150,015
Contractor Fees	From DIS data center	From DIS data center	6.8%	--	$425,584
Startup	0.02*PEC	EPA Cost Manual	2.0%	--	$120,012
Performance Test (Tech support)	0.01*PEC	EPA Cost Manual	1.0%	--	$60,006
Contingencies	0.03*PEC	EPA Cost Manual	3.0%	--	$180,018
Subtotal Indirect Costs, IC					$1,085,649
Total Capital Investment (TCI = DC+IC)					$7,236,255
					TCI per gen
					$226,133

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M - SCR-DOC-DPF Pkg.

TABLE 2
SUMMARY OF WORST-CASE EMISSIONS
PROJECT GENESIS
QUINCY, WASHINGTON

Generator Size		2.0 MW				2.75 MW			
Vendor		Caterpillar	Cummins	MTU	Worst-case (≤100% Load)	Caterpillar	Cummins	MTU	Worst-case (≤100% Load)
Fuel Consumption (gph)		138	141	147		214	187	186	
	Load	Vendor Reported NTE Emissions (lb/hr)				Vendor Reported NTE Emissions (lb/hr)			
Hydrocarbons	10%	0.98	0.87	0.42		2.91	1.34	0.73	2.91
	25%	0.91	0.88	0.89		2.28	1.98	1.31	
	50%	1.14	0.93	0.85	1.14	2.34	1.98	1.46	
	75%	1.12	0.74	0.87		1.33	2.05	1.79	
	100%	0.97	0.88	0.85		1.46	2.13	1.86	
Nitrogen Oxide (NO_x)	10%	6.45	4.18	4.07		7.75	7.44	5.57	
	25%	9.31	6.07	7.03		8.37	10.46	8.78	
	50%	12.80	13.81	13.81		20.71	19.76	17.90	
	75%	22.61	30.76	25.24		47.42	38.36	32.31	
	100%	42.31	44.34 44.41	42.69	44.34	70.92	74.40	62.32	74.40
Carbon Monoxide (CO)	10%	3.95	4.13	4.02		7.86	3.27	4.64	
	25%	3.92	3.06	4.52		12.10	2.55	7.29	
	50%	2.01	3.02	3.77		7.82	2.41	6.30	
	75%	1.85	2.41	3.77		14.30	3.22	6.46	14.30
	100%	3.49	4.12	5.02	5.02	12.76	7.69	5.97	
Sulfur Dioxide (SO_2)(a)	10%	0.01	-	0.01		0.01	-	0.00	
	25%	0.01	0.01	0.01		0.02	0.01	0.00	
	50%	0.02	0.02	0.01		0.03	0.02	0.00	
	75%	0.02	0.02	0.01		0.03	0.03	0.00	
	100%	0.03	0.03	0.01	0.03	0.04	0.04	0.00	0.04
Diesel Engine Exhaust Particulate Matter (DEEP)	10%	0.44	0.29	0.48		0.75	0.60	0.54	
	25%	0.57	0.85	0.60		0.91	0.61	0.66	0.91
	50%	0.27	0.88 .90	0.63	.90 0.88	0.46	0.56	0.83	
	75%	0.24	0.36	0.53 .55		0.52	0.84	0.55	
	100%	0.26	0.48	0.40 .53		0.49	0.89	0.53	
Particulate Matter (FH+BH)(b)	10%	1.78	1.46	1.12		4.58	2.43	1.58	4.58
	25%	1.85	2.15	1.87		3.98	3.24	2.46	
	50%	1.76	2.27	1.85	2.27	3.49	3.17	2.86	
	75%	1.71	1.38	1.74		2.32	3.61	2.92	
	100%	1.54	1.70	1.57		2.44	3.78	2.98	

3-5

Notes:

(a) SO_2 emissions for Caterpillar and Cummins were not provided as NTE. Instead, the emission factor for sulfur oxides from AP-42 Section 3.4 was used and assumed fuel sulfur content of 15 ppm.

(b) The estimated inter-site variability for calculating FH+BH emissions is 25%

FH ("front-half" filterable emissions)

BH ("back-half" condensable emissions)

PM (particulate matter) attributable to front-half and back-half emissions is assumed equal to the sum of vendor NTE values for PM and hydrocarbons.

NTE (not to exceed)

DEEP (diesel engine exhaust particulate matter) is assumed equal to front-half NTE particulate emissions, as reported by the vendors.

From Patty Martin Rec'd by hand 3/31/16 at Yahoo! hearing. -Kari Johnson

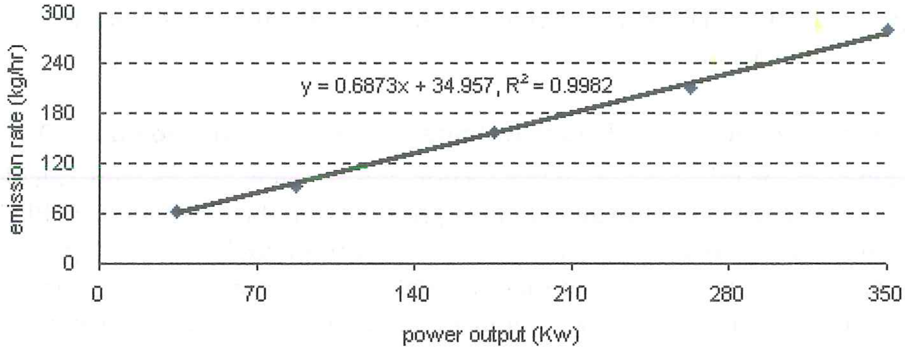

Figure 18. DDC8V92 CO_2 emission rate versus generator power output

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.

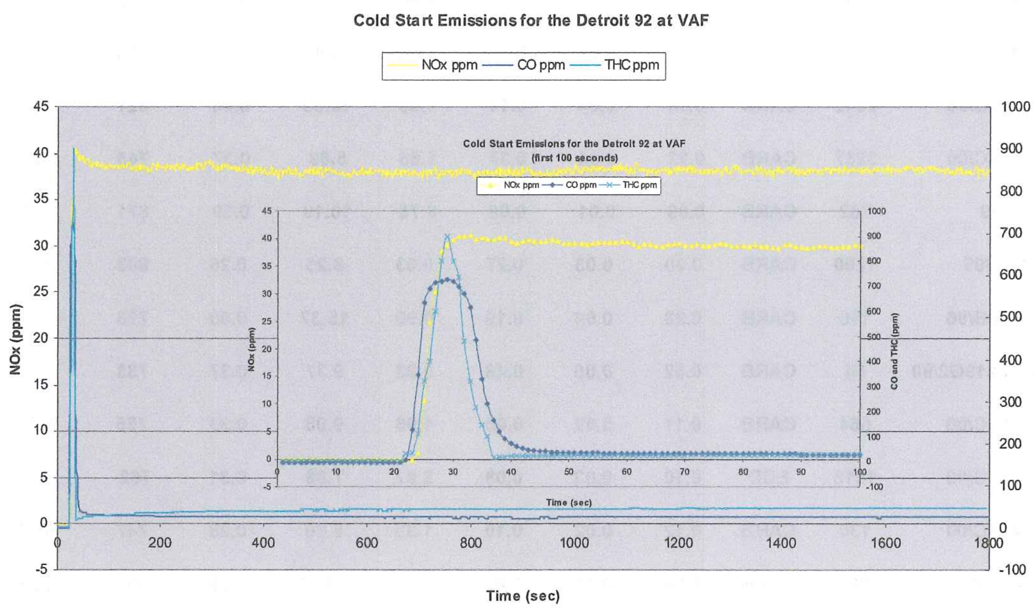

Figure 19. Cold-start emissions for CO and NO_X as a function of time

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~~ 19, the emission factors in grams per kilowatt-hour were 24.3, 22.5, 55.4 and 17.7 for CO, THC, NO_x and

over →

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

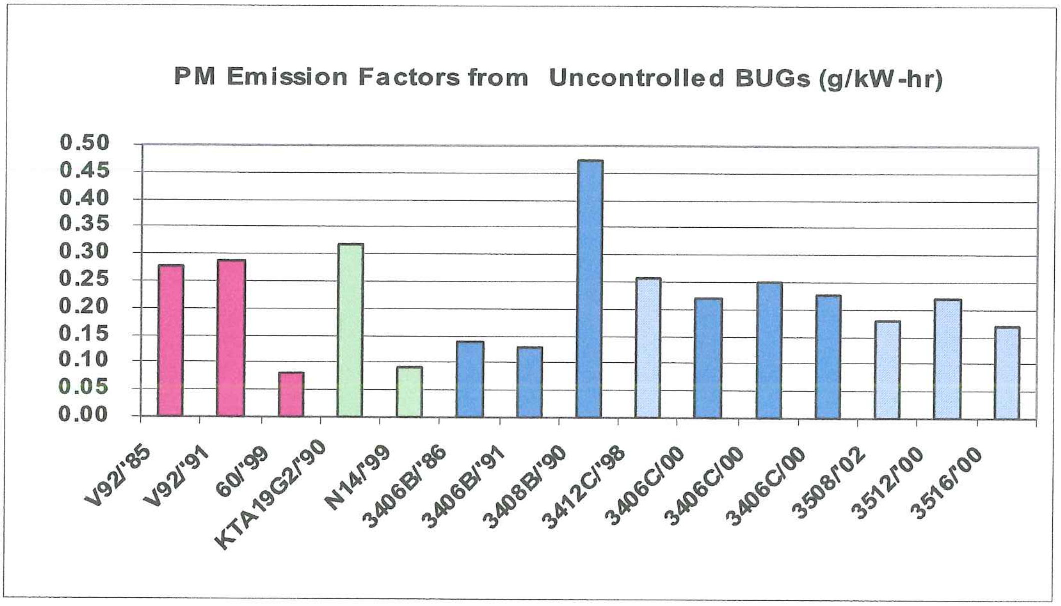

Figure 21. PM emission factors in g/kW-hr from uncontrolled BUGs

The large difference between the AP 42 value of 1.34-g/kW hr for small engines and the measured value became a source of further investigation. Several factors were obvious, including that the AP 42 value was derived using older engines with higher fuel sulfur content, and that a different method may have been used for measuring the emissions. CE-CERT's discussion with EPA uncovered that a contractor did the work a long time ago with older engines and their workers were retired. However, from some other work, CE-CERT researchers believe that the main difference is in the measurement method, as shown in Figure 22. Measurements made with a full dilution tunnel using the methods as specified in 40 CFR 89 are 3 to 5 times lower than measurements made with EPA's Field Method 5. The latter method uses impingers for the recovery of the condensable PM, and that is where significant mass is recovered. More work is needed to confirm this hypothesis.

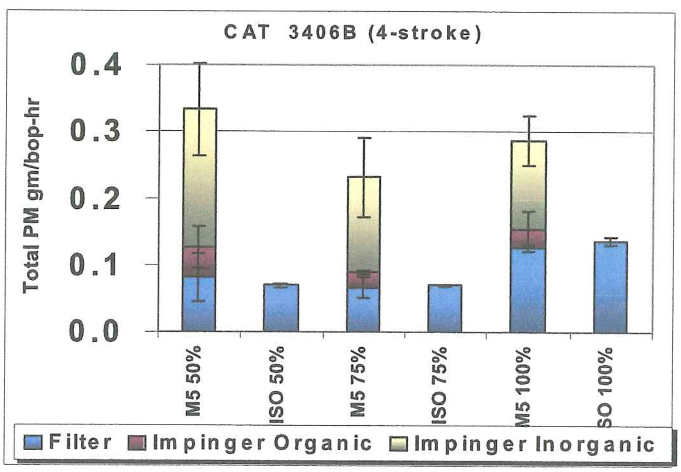

Figure 22. Mass emissions measured by 40 CFR 89 and CARB's Method 5

APPENDIX E-6
DPF-COST EFFECTIVENESS
PROJECT GENESIS
QUINCY, WASHINGTON

Item	Quantity	Units	Unit Cost	Subtotal
Annualized Capital Recovery				
Total Capital Cost				$3,919,524
Capital Recovery Factor, 25 yrs, 4% discount rate				0.064
Subtotal Annualized 25-year Capital Recovery Cost				$250,896
Direct Annual Costs				
Annual Admin charges	2% of TCI (EPA Manual)		0.02	$78,390
Annual Property tax	1% of TCI (EPA Manual)		0.01	$39,195
Annual Insurance	1% of TCI (EPA Manual)		0.01	$39,195
Annual operation/labor/maintenance costs: Upper-bound estimate would assume CARB's value of $0.20/hp/year and would result in $28,000/year. Lower-bound estimate would assume zero annual O&M. Mid-range value would account for fuel for pressure drop, increased inspections, periodic OEM visits, and the costs for Ecology's increased emission testing requirements. **For this screening-level analysis we assumed the lower-bound annual O&M cost of zero.**				$0
Subtotal Direct Annual Costs				$156,781
Total Annual Cost (Capital Recovery + Direct Annual Costs)				**$407,677**
Uncontrolled Emissions (Combined Pollutants)				52.6
Annual Tons Removed (Combined Pollutants)				0.27
Cost Effectiveness ($ per tons combined pollutant destroyed)				**$1,491,601**

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO_x	$10,000	-1.97	$0	per year
CO	$5,000	-0.13	$0	per year
VOCs	$9,999	-0.04	$0	per year
PM	$23,200	0.27	$6,341	per year
Other				
Total Reasonable Annual Control Cost for Combined Pollutants			**$6,341**	**per year**
Actual Annual Control Cost			**$407,677**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnages (Nominal-Controlled)

Pollutant	PM	CO	VOCs	NO_x
Tier-2 Uncontrolled Emissions TPY	0.29	3.09	0.84	48.41
Controlled Emissions TPY	0.01	3.22	0.87	50.38
TPY Removed	0.27	-0.13	-0.04	-1.97
Combined Uncontrolled TPY	52.62			
Combined TPY Removed	0.27			
Quoted Removal Effcy	96%	-4%	-5%	-4%
Annualized Cost ($/yr)	$407,677	$407,677	$407,677	$407,677
Indiv Poll $/Ton Removed	$1,491,601	-	-	-

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
DEEP (FH)	$23,200	0.273	$6,341	per year
CO	$5,000	-0.13	$0	per year
Carcinogen VOCs	$9,999	-1.30E-03	$0	per year
NO_2	$20,000	-0.20	$0	per year
Non-carcinogen VOCs	$5,000	-4.15E-03	$0	per year
Benzene	$20,000	-9.83E-04	$0	per year
1,3-Butadiene	$20,000	-4.95E-05	$0	per year
Acrolein	$20,000	-9.99E-06	$0	per year
Naphthalene	$20,000	-1.65E-04	$0	per year
Total Reasonable Annual Control Cost for Combined Pollutants			**$6,341**	**per year**
Actual Annual Control Cost			**$407,677**	**per year**
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH)	CO	Carcinogenic VOCs	NO_2 (10% of No_x)	Non-Carcinogenic VOCs	Benzene	1,3-Butadiene	Acrolein	Naphthalene
Tier-2 Uncontrolled TPY	0.29	3.09	2.83E-02	4.84	9.00E-02	2.14E-02	1.08E-03	2.17E-04	3.58E-03
Controlled TPY	0.01	3.22	2.96E-02	5.04	9.42E-02	2.23E-02	1.13E-03	2.27E-04	3.74E-03
Tons Removed/Year	0.27	-0.13	-1.30E-03	-0.20	-4.15E-03	-9.83E-04	-4.95E-05	-9.99E-06	-1.65E-04
Combined Uncontrolled Tons/yr	8.36								
Combined tons/yr Removed	0.27								
Overall Cold-Start Removal Effcy	96%	-4%	-5%		-5%	-5%	-5%	-5%	-5%
Annualized Cost ($/yr)	$407,677	$407,677	$407,677	$407,677	$407,677	$407,677	$407,677	$407,677	$407,677
Indiv Poll $/Ton Removed	$1,491,601	-	-	-	-	-	-	-	-
Combined TAPs $/Ton Removed	$1,491,601								

FH = "front half" filterable particulate matter

APPENDIX E-5
DOC-COST EFFECTIVENESS
PROJECT GENESIS
QUINCY, WASHINGTON

Item	Quantity	Units	Unit Cost	Subtotal
Annualized Capital Recovery				
Total Capital Cost				$1,634,668
Capital Recovery Factor, 25 yrs, 4% discount rate				0.064
Subtotal Annualized 25-year Capital Recovery Cost				$104,638
Direct Annual Costs				
Annual Admin charges		2% of TCI (EPA Manual)	0.02	$32,693
Annual Property tax		1% of TCI (EPA Manual)	0.01	$16,347
Annual Insurance		1% of TCI (EPA Manual)	0.01	$16,347
Annual operation/labor/maintenance costs: Upper-bound estimate would assume CARB's value of $0.20/hp/year and would result in $28,000/year. Lower-bound estimate would assume zero annual O&M. Mid-range value would account for fuel for pressure drop, increased inspections, periodic OEM visits, and the costs for Ecology's increased emission testing requirements. **For this screening-level analysis we assumed the lower-bound annual O&M cost of zero.**				$0
Subtotal Direct Annual Costs				$65,387
Total Annual Cost (Capital Recovery + Direct Annual Costs)				**$170,025**
Uncontrolled Emissions (Combined Pollutants)				52.6
Annual Tons Removed (Combined Pollutants)				3.35
Cost Effectiveness ($ per tons combined pollutant destroyed)				**$50,761**

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO_x	$10,000	0.00	$0	per year
CO	$5,000	2.62	$13,121	per year
VOCs	$9,999	0.67	$6,682	per year
PM	$23,200	0.06	$1,323	per year
Other				
Total Reasonable Annual Control Cost for Combined Pollutants			$21,126	per year
Actual Annual Control Cost			$170,025	per year
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnages (Nominal-Controlled)

Pollutant	PM	CO	VOCs	NO_x
Tier-2 Uncontrolled Emissions TPY	0.29	3.09	0.84	48.4
Controlled Emissions TPY	0.23	0.46	0.17	48.41
TPY Removed	0.06	2.62	0.67	0.0
Combined Uncontrolled TPY	52.62			
Combined TPY Removed	3.35			
Quoted Removal Effcy	20%	85%	80%	0%
Annualized Cost ($/yr)	$170,025	$170,025	$170,025	$170,025
Indiv Poll $/Ton Removed	$2,982,384	$64,790	$254,430	-

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
DEEP (FH)	$23,200	0.057	$1,323	per year
CO	$5,000	2.62	$13,121	per year
Carcinogen VOCs	$9,999	2.26E-02	$226	per year
NO_2	$20,000	0.00	$0	per year
Non-carcinogen VOCs	$5,000	7.20E-02	$360	per year
Benzene	$20,000	1.71E-02	$342	per year
1,3-Butadiene	$20,000	8.61E-04	$17	per year
Acrolein	$20,000	1.73E-04	$3	per year
Naphthalene	$20,000	2.86E-03	$57	per year
Total Reasonable Annual Control Cost for Combined Pollutants			$15,450	per year
Actual Annual Control Cost			$170,025	per year
Is The Control Device Reasonable?			**NO (Actual >> Acceptable)**	

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH)	CO	Carcinogenic VOCs	NO_2 (10% of No_x)	Non-Carcinogenic VOCs	Benzene	1,3-Butadiene	Acrolein	Naphthalene
Tier-2 Uncontrolled TPY	0.29	3.09	2.83E-02	4.84	9.00E-02	2.14E-02	1.08E-03	2.17E-04	3.58E-03
Controlled TPY	0.23	0.46	5.66E-03	4.84	1.80E-02	4.27E-03	2.15E-04	4.34E-05	7.15E-04
Tons Removed/Year	0.06	2.62	2.26E-02	0.00	7.20E-02	1.71E-02	8.61E-04	1.73E-04	2.86E-03
Combined Uncontrolled Tons/yr	8.36								
Combined tons/yr Removed	2.80								
Overall Cold-Start Removal Effcy	20%	85%	80%	0%	80%	80%	80%	80%	80%
Annualized Cost ($/yr)	$170,025	$170,025	$170,025	$170,025	$170,025	$170,025	$170,025	$170,025	$170,025
Indiv Poll $/Ton Removed	$2,982,384	$64,790	$7,509,784	-	$2,360,658	$9,953,338	$197,539,396	$980,176,444	$59,413,772
Combined TAPs $/Ton Removed	$60,790								

FH = "front half" filterable particulate matter

APPENDIX E-7
SCR-COST EFFECTIVENESS
PROJECT GENESIS
QUINCY, WASHINGTON

Item	Quantity	Units	Unit Cost	Units	Subtotal
Annualized Capital Recovery					
Total Capital Cost					$7,186,706
Capital Recovery Factor:	25	years	4%	discount	0.064
Subtotal Annualized 25-year Capital Recovery Cost					$460,035
Direct Annual Cost					
Maintenance (EPA Manual)	1.5%	of Total Capital Investment			$107,801
Increased Fuel Consumption	Insignificant				$0
Reagent Consumption (EPA Manual)					
25% aqueous Urea Flow Rate	22,260	lb/yr	$0.20	per lb	$4,452
Catalyst Replacement (EPA Manual)	Insignificant				$0
Subtotal Direct Annual Cost					$112,252
Indirect Annual Costs					
Annual Admin charges (EPA Manual)	2.0%	of Total Capital Investment			$143,734
Annual Property tax (EPA Manual)	1.0%	of Total Capital Investment			$71,867
Annual Insurance (EPA Manual)	1.0%	of Total Capital Investment			$71,867
Subtotal Indirect Annual Costs					$287,468
Total Annual Cost (Capital Recovery + Direct Annual Costs + Indirect Annual Costs)					$859,756
Uncontrolled Emissions (Combined Pollutants)					52.6
Annual Tons Removed (Combined Pollutants)					44.01
Cost Effectiveness ($ per tons combined pollutant destroyed)					$19,535

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO_x	$10,000	44.02	$440,161	per year
CO	$5,000	-0.81	$0	per year
VOCs	$9,999	0.72	$7,232	per year
PM	$23,200	0.08	$1,944	per year
Other				
Total Reasonable Annual Control Cost for Combined Pollutants			$449,336	per year
Actual Annual Control Cost			$859,756	per year
Is The Control Device Reasonable?			NO (Actual >> Acceptable)	

Criteria Pollutants Removal Tonnages (Nominal-Controlled)

Pollutant	PM	CO	VOCs	NO_x
Tier-2 Uncontrolled Emissions TPY	0.29	3.09	0.84	48.41
Controlled Emissions TPY	0.20	3.90	0.11	4.40
TPY Removed	0.08	-0.81	0.72	44.0
Combined Uncontrolled TPY	52.62			
Combined TPY Removed	44.01			
Quoted Removal Effcy	29%	-26%	87%	91%
Annualized Cost ($/yr)	$859,756	$859,756	$859,756	$859,756
Indiv Poll $/Ton Removed	$10,262,337	-	$1,188,736	$19,533

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

Pollutant	Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
DEEP (FH)	$23,200	0.084	$1,944	per year
CO	$5,000	-0.81	$0	per year
Carcinogen VOCs	$9,999	2.45E-02	$245	per year
NO_2	$20,000	4.40	$88,032	per year
Non-carcinogen VOCs	$5,000	7.80E-02	$390	per year
Benzene	$20,000	1.85E-02	$370	per year
1,3-Butadiene	$20,000	9.32E-04	$19	per year
Acrolein	$20,000	1.88E-04	$4	per year
Naphthalene	$20,000	3.10E-03	$62	per year
Total Reasonable Annual Control Cost for Combined Pollutants			$91,065	per year
Actual Annual Control Cost			$859,756	per year
Is The Control Device Reasonable?			NO (Actual >> Acceptable)	

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH)	CO	Carcinogenic VOCs	NO_2 (10% of No_x)	Non-Carcinogenic VOCs	Benzene	1,3-Butadiene	Acrolein	Naphthalene
Tier-2 Uncontrolled TPY	0.29	3.09	2.83E-02	4.84	9.00E-02	2.14E-02	1.08E-03	2.17E-04	3.58E-03
Controlled TPY	0.20	3.90	3.80E-03	0.44	1.21E-02	2.86E-03	1.44E-04	2.91E-05	4.80E-04
Tons Removed/Year	0.08	-0.81	2.45E-02	4.40	7.80E-02	1.85E-02	9.32E-04	1.88E-04	3.10E-03
Combined Uncontrolled Tons/yr	8.36								
Combined tons/yr Removed	3.80								
Overall Cold-Start Removal Effcy	29%	-26%	87%	91%	87%	87%	87%	87%	87%
Annualized Cost ($/yr)	$859,756	$859,756	$859,756	$859,756	$859,756	$859,756	$859,756	$859,756	$859,756
Indiv Poll $/Ton Removed	$10,262,337	-	$35,086,832	$195,328	$11,029,348	$46,503,481	$922,933,545	$4,579,530,659	$277,590,012
Combined TAPs $/Ton Removed	$226,383								

FH = "front half" filterable particulate matter

APPENDIX E-8
TIER 4-COST EFFECTIVENESS
PROJECT GENESIS
QUINCY, WASHINGTON

Item	Quantity	Units	Unit cost	Units	Subtotal
Annualized Capital Recovery					
Total Capital Cost					$12,152,210
Capital Recovery Factor:	25	years	4%	discount	0.064
Subtotal Annualized 25-year Capital Recovery Cost					$777,887
Direct Annual Cost					
Maintenance (EPA Manual)	1.5%	of Total Capital Investment			$182,283
Increased Fuel Consumption	Insignificant				$0
Reagent Consumption (EPA Manual)					
25% aqueous Urea Flow Rate	22,260	lb/yr	$0.20	per lb	$4,452
Catalyst Replacement (EPA Manual)	Insignificant				$0
Subtotal Direct Annual Cost					**$186,735**
Indirect Annual Costs					
Annual Admin charges (EPA Manual)	2.0%	of Total Capital Investment			$243,044
Annual Property tax (EPA Manual)	1.0%	of Total Capital Investment			$121,522
Annual Insurance (EPA Manual)	1.0%	of Total Capital Investment			$121,522
Subtotal Indirect Annual Costs					**$486,088**
Total Annual Cost (Capital Recovery + Direct Annual Costs + Indirect Annual Costs)					**$1,450,710**
Uncontrolled Emissions (Combined Pollutants)					52.6
Annual Tons Removed (Combined Pollutants)					46.44
Cost Effectiveness ($ per tons combined pollutant destroyed)					**$31,238**

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

Pollutant		Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
NO_x		$10,000	44.30	$443,043	per year
CO		$5,000	1.17	$5,840	per year
VOCs		$9,999	0.76	$7,586	per year
PM		$23,200	0.21	$4,878	per year
Other					
Total Reasonable Annual Control Cost for Combined Pollutants				**$461,347**	**per year**
Actual Annual Control Cost				**$1,450,710**	**per year**
Is The Control Device Reasonable?				**NO (Actual >> Acceptable)**	

Criteria Pollutants Removal Tonnages (Nominal-Controlled)

Pollutant	PM	CO	VOCs	NO_x
Tier-2 Uncontrolled Emissions TPY	0.29	3.09	0.84	48.41
Controlled Emissions TPY	0.07	1.92	0.08	4.11
TPY Removed	0.21	1.17	0.76	44.3
Combined Uncontrolled TPY	52.62			
Combined TPY Removed	46.44			
Quoted Removal Effcy	74%	38%	91%	92%
Annualized Cost ($/yr)	$1,450,710	$1,450,710	$1,450,710	$1,450,710
Indiv Poll $/Ton Removed	$6,900,001	$1,242,113	$1,912,073	$32,744

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

Pollutant		Ecology Acceptable Unit Cost ($/ton)	Forecast Removal (tons/yr)	Subtotal Reasonable Annual Cost ($/year)	
DEEP (FH)		$23,200	0.210	$4,878	per year
CO		$5,000	1.17	$5,840	per year
Carcinogen VOCs		$9,999	2.57E-02	$257	per year
NO_2		$20,000	4.43	$88,609	per year
Non-carcinogen VOCs		$5,000	8.18E-02	$409	per year
Benzene		$20,000	1.94E-02	$388	per year
1,3-Butadiene		$20,000	9.77E-04	$20	per year
Acrolein		$20,000	1.97E-04	$4	per year
Naphthalene		$20,000	3.25E-03	$65	per year
Total Reasonable Annual Control Cost for Combined Pollutants				**$100,468**	**per year**
Actual Annual Control Cost				**$1,450,710**	**per year**
Is The Control Device Reasonable?				**NO (Actual >> Acceptable)**	

TAPs Removal Tonnages (Nominal-Controlled)

Pollutant	DEEP (FH)	CO	Carcinogenic VOCs	NO_2 (10% of No_x)	Non-Carcinogenic VOCs	Benzene	1,3-Butadiene	Acrolein	Naphthalene
Tier-2 Uncontrolled TPY	0.29	3.09	2.83E-02	4.84	9.00E-02	2.14E-02	1.08E-03	2.17E-04	3.58E-03
Controlled TPY	0.07	1.92	2.60E-03	0.41	8.26E-03	1.96E-03	9.87E-05	1.99E-05	3.28E-04
Tons Removed/Year	0.21	1.17	2.57E-02	4.43	8.18E-02	1.94E-02	9.77E-04	1.97E-04	3.25E-03
Combined Uncontrolled Tons/yr					8.36				
Combined tons/yr Removed					5.94				
Overall Cold-Start Removal Effcy	74%	38%	91%	92%	91%	91%	91%	91%	91%
Annualized Cost ($/yr)	$1,450,710	$1,450,710	$1,450,710	$1,450,710	$1,450,710	$1,450,710	$1,450,710	$1,450,710	$1,450,710
Indiv Poll $/Ton Removed	$6,900,001	$1,242,113	$56,436,911	$327,442	$17,740,624	$74,800,508	$1,484,531,815	$7,366,141,367	$446,501,492
Combined TAPs $/Ton Removed					$244,231				

FH = "front half" filterable particulate matter

TABLE C-2
AERMOD SUMMARY
PROJECT GENESIS
QUINCY, WASHINGTON

AERMOD INPUT (1-hour Average)
Event: 1-hour Unplanned Power Outage

	Operating Assumptions (≤100%)			
Generator Size	2.0 MW		2.75 MW	
Operating Condition	Cold-start	Warm	Cold-start	Warm
Number of events	1	1	1	1
Duration of each event (hours)	0.02	0.98	0.02	0.98
Hours at each runtime mode	0.02	0.98	0.02	0.98
Number of engines operating concurrently	20		5	
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**			
NO_2 ASIL	44		74	
Load Specific Exhaust Temp. (°F)	897		879	
Load Specific Exhaust Flow (cfm)	15,515		20,134	
CO (1-hour) NAAQS / ASIL	5.7		16	
Load Specific Exhaust Temp. (°F)	829		866	
Load Specific Exhaust Flow (cfm)	7,212		20,121	
SO_2 (1-hour, 3-hour, 24-hour) NAAQS	2.9E-02		4.4E-02	
Load Specific Exhaust Temp. (°F)	897		892	
Load Specific Exhaust Flow (cfm)	15,515		25,620	

* Model was used to develop dispersion factors for estimating 1-hour impacts of benzene, 1,3-butadiene, acrolein, and napthalene.

AERMOD INPUT (8-hour Average)
Event: 8-hour Unplanned Power Outage

	Operating Assumptions (≤100%)			
Generator Size	2.0 MW		2.75 MW	
Operating Condition	Cold-start	Warm	Cold-start	Warm
Number of events	1	1	1	1
Duration of each event (hours)	0.02	7.98	0.02	7.98
Hours at each runtime mode	0.02	7.98	0.02	7.98
Number of engines operating concurrently	20		5	
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**			
CO (8-hour) NAAQS	5.1		15	
Load Specific Exhaust Temp. (°F)	829		866	
Load Specific Exhaust Flow (cfm)	7,212		20,121	

AERMOD INPUT (24-hour Average)
Event: 24-hour Unplanned Power Outage

	Operating Assumptions (≤100%)			
Generator Size	2.0 MW		2.75 MW	
Operating Condition	Cold-start	Warm	Cold-start	Warm
Number of events	1	1	1	1
Duration of each event (hours)	0.02	11.98	0.02	11.98
Hours at each runtime mode	0.02	11.98	0.02	11.98
Number of engines operating concurrently	20		5	
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**			
PM_{10} (24-hour) NAAQS	1.1		2.3	
Load Specific Exhaust Temp. (°F)	828		649	
Load Specific Exhaust Flow (cfm)	9,685		6,902	

	Operating Assumptions (≤100%)			
Generator Size	2.0 MW		2.75 MW	
Operating Condition	Cold-start	Warm	Cold-start	Warm
Number of events	1	1	1	1
Duration of each event (hours)	0.02	23.98	0.02	23.98
Hours at each runtime mode	0.02	23.98	0.02	23.98
Number of engines operating concurrently	20		5	
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**			
Acrolein ASIL	1.6E-04		2.3E-04	
Load Specific Exhaust Temp. (°F)	654		649	
Load Specific Exhaust Flow (cfm)	10,139		6,902	

Event: Monthly Maintenance Testing

Source	Genesis (1x 2.75 MW)
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**
NO2 (1-hour) NAAQS	74
Load Specific Exhaust Temp. (°F)	879.0
Load Specific Exhaust Flow (cfm)	20,134
Stack Diameter (ft)	2
Release Hieght (ft)	42

Event: Monthly Maintenance Testing

Source	Genesis (1x 2.75 MW)
Regulatory Demonstration	**AERMOD SETUP (lb/hr)**
PM2.5 24-hour NAAQS	3.2 *
Load Specific Exhaust Temp. (°F)	649.3
Load Specific Exhaust Flow (cfm)	6,902
Stack Diameter (ft)	2
Release Hieght (ft)	42

* Based on 8 hours of operation in a day.

TABLE C-1
ANNUAL OPERATION EMISSIONS
PROJECT GENESIS
QUINCY, WASHINGTON

		Operating Assumptions			
	Generator Size	2.0 MW		2.75 MW	
	Operating Conditon	Cold-start	Warm	Cold-start	Warm
Number of events per year	Monthly Maintenance Testing	12	12	12	12
	Annual Load Testing	1	1	1	1
	Emergency Power Outage	3.5	3.5	3.5	3.5
Duration of each event (hours)	Monthly Maintenance Testing	0.02	0.98	0.02	0.98
	Annual Load Testing	0.02	3.98	0.02	3.98
	Emergency Power Outage	0.02	23.98	0.02	23.98
Hours at each runtime mode	Monthly Maintenance Testing	0.20	11.80	0.20	11.80
	Annual Load Testing	0.02	3.98	0.02	3.98
	Emergency Power Outage	0.06	83.94	0.06	83.94
Operating Hours per Year (per Genset)		**0.3**	**99.7**	**0.3**	**99.7**
		Worst-case (≤100% Load) Emission Rate (lb/hr)			
Worst-case (≤100% Load) Emission Rate	HC	4.9	1.1	12.4	2.9
	NOx	42	44	70	74
	CO	45	5.0	129	14
	SO_2	2.9E-02		4.4E-02	
	DEEP	3.8	0.88	3.9	0.91
	PM (FH+BH)	9.7	2.3	20	4.6

		Facility Wide Emission (Tons / year)	
	Generator Size	2.0 MW	2.75 MW
	No. Generators (Total)	20	5
Project Annual Emissions	**total VOCs**	1.9	
	NOx	63	
	CO	8.8	
	SO2	1.1E-04	
	DEEP	1.1	
	PM (FH+BH)	3.4	

	Regulatory Demonstration	AERMOD INPUT (lb/hr) per Genset	
	Generator Size	2.0 MW	2.75 MW
INDIVIDUAL GENSET Annually Averaged Modeling Setup	**NOx (annual) NAAQS**	0.51	0.85
	SO2 (annual) NAAQS	3.3E-04	5.1E-04
	DEEP ASIL*	1.0E-02	1.0E-02
	PM10/PM2.5 (annual) NAAQS	2.6E-02	5.3E-02
	Acrolein (ASIL)	1.6E-02	2.3E-02
	Worst-case Exhaust Temp. (°F)	531	577
	Worst-case Exhaust Flow (cfm)	4,478	5,802

* Model was used to develop dispersion factors for estimating annual impacts of benzene, 1,3-butadiene, acrolein, and napthalene.

Kari Johnson
Department of Ecology
4601 N. Monroe St
Spokane, WA 99205

Via email: kari.johnson@ecy.wa.gov April 4, 2016

RE: **Comments from Energy & Environmental Partners, LLC Regarding the Permit for Yahoo! Data Center Expansion and Air Permit Update, Quincy Washington**

40. In the Draft Technical Support Document for Preliminary Determination of Approval Order XXXX for the Yahoo! Data Center, dated February 5,2016, the facility wide potential to emit NOx is listed at 95 TPY, while that for project Genesis is listed in parenthesis as 62.9 TPY (See Table 1.1). Yahoo evaluated the cost effectiveness of NOx reduction using SCR for the proposed 25 new engines in Project Genesis as approximately $19,500/ton and therefore Ecology agreed with applicant that SCR was not cost effective and can be excluded as BACT (pg 12/21; 4.1.1.1).

The BACT cost effectiveness calculation at $19,500/ton should be reviewed with these comments in mind:

1. The annual Potential to Emit (PTE) for Project Genesis is 62.9 tpy as further identified in Table 5, Project Emissions Summary, Project Genesis, described in the Revised Notice of Construction-Supporting Information Report, Project Genesis prepared by Landau Associates and dated December 23, 2015 (the "Landau report"). This PTE is based on using the Not To Exceed (NTE) emissions data supplied by the engine manufacturers. The NTE data reflects emissions that are likely to be measured in the field based on actual ambient conditions for humidity and temperature, fuel variation, engine-to-engine variation and measurement variation. The Nominal emissions value for the engines are also presented by the engine manufacturers and are always lower than the NTE emission rate. The Nominal value reflects controlled/corrected laboratory conditions under which the engine is tested by the manufacturer.

Therefore the use of the higher NTE uncontrolled emission rates and the corresponding higher PTE value reflected in the permitted annual emissions for project Genesis appears a more appropriate choice in evaluating the cost effectiveness for SCR. However the BACT analysis presented in Appendix E-7 of the Landau report uses the Nominal uncontrolled emission rate of 48 TPY in calculating the cost effectiveness versus the allowable 62.9 TPY derived from the Not to Exceed emissions rates. Assuming a 90% reduction efficiency for SCR, the tons reduced per year would be 56.6 TPY versus 44 TPY used in the BACT analysis. The BACT analysis should be rerun using the permitted PTE value of 62.9 TPY for the uncontrolled NOx and a 90% reduction in the calculation of cost effectiveness. This will drive the cost effectiveness number down and potentially closer to the $10,000/ton hurdle rate used by Ecology in determining BACT for NOx.

Second, in the BACT analysis at Appendix E-3 of the Landau report (SCR Capital Cost) the cost for the SCR purchased equipment price is listed at $195,000 for the 2 MW unit and $240,000 for the 2.75 MW unit and referenced as supplied by Cummins. The detailed quotation for these cost numbers is not presented in the report. The one reference price at page 113/144 in the Landau report is from MTU (Pacific Power) for an integrated Tier 4 package, and the breakout price for the SCR equipment alone is $135,000 for a 2 MW engine and $ 141,250 for a 2.75 MW engine. Therefore it appears appropriate to use the $135,000 for the 2 MW SCR equipment price and the $ 141,250 for the 2.75 MW SCR in determining the cost effectiveness BACT calculation for SCR alone.

Support for a 2 MW SCR capital cost of $135,000 can also be found in a similar report from Landau to Ecology for the Sabey data center (March 4, 2015) which included a quotation from Caterpillar for a Tier 2, 2 MW engine SCR (including silencer) reported at $135,800. In that case the BACT analysis used the $135,800 equipment cost in the calculation of SCR cost effectiveness for a similar 2 MW engine.

Finally, it should be noted that the recent migration of commercial off-road, mobile and marine SCR systems into the stationary engine market is directed at further reducing the SCR equipment cost for large stationary engines. Quotes for this type of SCR equipment can be obtained from after market SCR system suppliers who combined have supplied SCR systems for hundreds of stationary engines.

Sincerely,

James M. Valentine
President
Energy & Environmental Partners, LLC
Fairfield, CT
203-253-2039

James M Valentine is President of Energy & Environmental Partners, LLC (EEP) an independent Environmental Consulting and Marketing Company based in Connecticut. Mr. Valentine has over 35 years experience in bringing innovative NOx reduction technologies to market for boilers, turbines and engines. He is an inventor on 25 patents related to emission control and efficiency improvement. EEP is active in providing services to third parties who are or may be engaged in providing or using emission control technologies for boilers, engines and turbines, including SCR systems.

Johnson, Kari D. (ECY)

From: Brett Muhlestein <sbmuhles@hotmail.com>
Sent: Monday, April 04, 2016 3:05 PM
To: Johnson, Kari D. (ECY)
Subject: Public Comment for Yahoo Data Center Permit

Hi Kari,

I would like the following included as public comment about the proposed Yahoo Data Center Permit:

41 I am pleased to see the expansion of business in Quincy. It bring additional jobs and opportunities to our local community. It is also noteworthy to see the efforts Yahoo is making in keeping our community safe. They are reducing emissions by 17% year over year and are reducing the run time on several of their generators from 200 hours to 100 hours. It shows a level of commitment that respects the needs of the community while addressing growth. I for one am happy to support the permit and look forward to the long term sustainability Yahoo will have in Quincy.

Brett Muhlestein

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Johnson, Kari D. (ECY)

From: Beth Miracle <skippergirl59@gmail.com>
Sent: Monday, April 04, 2016 7:45 PM
To: Johnson, Kari D. (ECY)
Subject: Yahoo! Public Comment

Importance: High

42 Instead of allowing the Yahoo data center in Quincy to install additional diesel generators which will increase toxic air pollutants potentially more than doubling emissions by the Yahoo data center alone, why not have the data center(s) actually reduce its use of diesel generators by exploring alternative backup energy options, such as natural gas, solar, wind and other alternative or renewable energy?

43 How can diesel generators which emit exhaust which carries toxic air pollutants be relied upon for backup power during the winter months when there are typically stagnant air advisories and burning bans in the surrounding area? This would seem to be another prudent reason to use other cleaner/alternative power sources for backup energy and/or generators. Also the data center(s) are not even using the lowest emission type of diesel generators. Why aren't the data centers being required to use the lowest possible emission type of diesel generator?

44 Since natural gas is the cleanest of the fossil fuels in terms of greenhouse gases and, as a relatively low carbon, cost effective fuel that can help meet CO_2-reducation gas, why not have the date center(s) diversify generator types relied upon for backup during power outages? Natural gas may offer a more affordable and definitely offers a cleaner solution.

45 Why not have the data center(s) instead install an alternative energy source(s), such as a solar array, which could be used as a source of power by the facility during power outages? The data center might also reap benefits produced by a solar array, Washington State Production incentive and federal tax credits. Excess power produced could be sold to Grant County PUD when not needed by the data center. The solar array could be installed on the roof top making the best use of valuable space/land. Why not incent the data centers to install the alternative energy sources now as a potential investment in and concern for the residents of the surrounding community?

46 In 2006, Washington State voters declared that 15% of the state's electricity must come from alternative sources, such as wind, solar, biomass and others by 2020. Wouldn't allowing large users of electricity such as the data center(s) to rely upon diesel generators for backup energy rather than alternative sources of power for backup negate this and actually increase the emission of greenhouse gases?

47 Nitrous oxide emissions are even deadlier than the particulates. Another imperative concern is that two existing schools and previously existing low income housing in Quincy, as well as land already zoned for additional low-income housing, are located in the most toxic zone. What will be done to ensure the safety of children attending these schools and the residents of the low-income housing who may not be able to afford proper legal representation?

48 Given the high number of diesel generators that have already been installed, why isn't a four-tier toxics review process being used? Why aren't the best test controls being used? If there was only one data center in the Quincy area, a second-tier toxics review process might seem reasonable, but there could be a total of 220 generators if the additional generators are approved. Doesn't the high number of diesel generators in a relatively small area warrant a four-tier toxics review process? Also, the health impacts assessment (HIA) issued by Landau Associates (hired by the Yahoo data center) contained errors which were not caught by Yahoo or the Department of Ecology and have not been corrected.

How can this report on the health impacts be relied upon? Why isn't another report by an impartial party being done? Why hasn't the existing report been corrected or the results questioned?

If the additional 25 diesel generators are approved, there could be 220 diesel generators at the data centers in Quincy.
The generators are turned on and run for a period of time to be properly tested to ensure they are ready for use in a
49 power outage. If only one generator is tested per day, this would be 220 days out of 365 days per year or 60% of the
year. This does not now appear to be an insignificant number of diesel generators emitting an acceptable level of toxic
air pollutants. Who will be responsible for the health of residents currently living in the immediate area when it's
discovered that it wasn't an acceptable level? And what about our property values? What about the health risks for the
farmers working the surrounding farm ground?

50 Yahoo (and the other data centers) has the ability to do better, but they are not. Wouldn't requiring the data center(s) to explore cleaner and alternative energy sources demonstrate more concern with toxic air pollutants and potential health problems to Quincy Valley residents? The data centers were attracted to the area because of the low cost of power, so they are making significantly more than if the facility was located elsewhere. The increased savings from low-cost power makes it far more feasible to install alternative backup power sources. Why not require the data centers to invest a little bit of the profit into alternative backup energy options? There are family residences within a half mile of the data center. My sister and her family live in the north residence. I do not want their family or neighbors to become a statistic. The health risk is ***not*** acceptable especially given that there are other potential alternatives. Why aren't those being explored? Why are we settling for the easy out?

Sincerely,

Beth & Charlie Miracle

Quincy property owner

Johnson, Kari D. (ECY)

From:	Mark Koehnen <mdfek87@yahoo.com>
Sent:	Monday, April 04, 2016 11:47 PM
To:	Johnson, Kari D. (ECY)
Subject:	Yahoo permit comments

Dear Department of Ecology:
Although I attended the public meeting and recorded comments, I have a few additional comments to add.

5 1. When the local PUD informed Yahoo that there would be a planned outage, did Yahoo transfer the data storage to another plant during that time or did it use its back up generators to handle the outage? (We also received this power outage notice. I believe the outage was scheduled for at least an hour.) We were informed by DOE that running the generators was expensive and the data centers would not be running the generators more than 15-20 minutes before the storage was transferred to another center. So what did Yahoo do? Since they knew the outage was coming, if they really cared about the quality of our air, they would have made the arrangements ahead of time so no generators needed to be run.

5 2. Did the DOE know about the 2 new schools which will be built a 1/2 mile from Yahoo on Road 11 when they made their Health Impact Assessment? What is the impact on these new schools from the emissions created by Yahoo, and from the community wide assessments from all the data centers and other emissions contributors?

5 3. There are alternatives to back up generators. When are the data centers in our area going to start using

these alternative controls to reduce emissions? When is the DOE going to start pushing for these alternative controls to protect our air? Our power was affordable, so the centers didn't see the need for alternatives, as in other areas in the country. However, using these alternatives would cut emissions. Now that all available power has been used up by the centers and we are unable to sell our excess power to other areas, our power prices are starting to rise. Of course the data centers rallied for the public to absorb the increases and not themselves. They won, and had the lowest rate increases for power. The people in the community lost and are bearing the cost with the highest rate increases. Now would be the time to strongly encourage the centers to use these alternatives due to limits of our hydro power and the possibility of increased rates.

5 4. Why isn't Yahoo using Tier 4 filter controls on their generators? Is what Mike from Yahoo said correct about the filters or was he just making his own toxic emissions about the generators? If they aren't going to use the best filters available to control the emissions, or they don't feel the filters are effective, if they truly cared about the community, will they start using alternative controls to reduce emissions? Why aren't they looking into other ways to control emissions?

5 5. Flint, Michigan is going through a difficult situation due to a toxic situation. They are in the "I told you so" stage. When people get to the "I told you so" stage, it's too late, the damage has already been done. The children in their town have suffered the consequences. I have been speaking out about the data centers even

before they were built. I went to the first zoning meeting, where the Port & City of Quincy had submitted a plan to have land rezoned from agriculture to industrial so Yahoo could be built. I suggested building the data centers out of the irrigation system, on non-productive land, which would have put the data centers out of town. They would not be near schools or people in our community. But the City of Quincy would not have received the money for it's coffers if the centers were built out of town. The county would have earned the money. The rezoning passed. The data center was built and others moved in. Now my house has been identified as Residential North because of the toxic levels of the plume. I have children who have already been exposed to 10 years of emissions. I am disappointed the data centers have been allowed to continue their emissions with little or no regard to the quality of our air and the health of the community. Yahoo has it in their power to put in better emission controls, but are evading the issue because they don't seem to see it as a problem. When will they be held accountable for their actions? When will they use their money for emission controls instead of giving money for firework shows or school sports teams? When we arrive at the "I told you so stage" it will be too late, and the 'support' they are showing our town will seem superficial, more like bribes for us to ignore the real issue of poor air quality. Since my house is an 'identified' house, I am yelling, "I told you so!"

5 6. With 220 back up generators in our town, it's time to start adding a fee to each generator in town to help pay for air monitoring. Why don't you start right now

by requiring a fee? $1,000 per generator would pay for the monitoring. If they can't afford it, maybe they will consider alternatives to diesel generators? Yahoo's permit, Microsoft's permit, Sabey's permit. Those generators are polluting our air, so it is only fair they help pay for the monitoring.

5 7. I was saddened by the errors in the reports for this permit. When simple errors are made, it calls into question the reliability of the reports and the ethics of the involved parties. Will the corrections be made to the reports and calculations checked before the permit is issued?

Thank you for adding these comments to the official report.
Debbie Koehnen

Johnson, Kari D. (ECY)

From:	William Riley <1724liberty@gmail.com>
Sent:	Saturday, February 27, 2016 11:27 AM
To:	Johnson, Kari D. (ECY)
Subject:	My comment on Yahoo's Air permit application at Quincy, WA

58 I have visited the site at which Yahoo is applying for the Air Quality Permit. This is an area that is constantly subject to air mass movement from the Columbia River Basin. Stagnant air issues, ground fog, etc. are not of concern to this geographic area.

I endorse the permit application and the issuance of same.

William Riley
Columbia Basin Environmental Council
POB 450
Soap Lake, WA 98851

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Appendix C:
Public Hearing

- Hearing Agenda
- Sign-In Sheet
- Attendance Register of Testimonies
- Transcription of the Hearing
- Hearing Summary Memo

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March 31, 2016
Public Hearing Agenda
Yahoo! Data Center, Project Genesis
Air Quality Permit Revision

DEPARTMENT OF
ECOLOGY
State of Washington

Para asistencia en español: ***Greg Bohn***

5:00 – 5:30	*Meet and Greet* Informal opportunity to learn about project, meet Ecology and Yahoo! staff. *Introductions* Hearings Officer: **Erika Bronson**, Toxics Cleanup Program, Ecology Meeting Facilitator: **Kari Johnson**, Air Quality Outreach and Education, Ecology
5:30– 5:40	*Presentation: Project Genesis Data Center Revisions Overview* **Mike Coleman,** Sr. Director of Data Center Operations, Yahoo!
5:40 – 5:50	*Presentation: Ecology's Process* **Gary Huitsing**, Air Quality Engineer, Ecology
5:50 – 6:00	*Presentation: Air Quality and Human Health* **Gary Palcisko**, Toxicologist, Air Quality, Ecology
6:00 – 6:25	*Question and Answer Session* This is an open forum to ask general questions about this project. During the formal hearing, Ecology and Yahoo! will not be able to respond to comments made for the record. Panel members: **Karen Wood**, Air Quality Section Manager, Ecology **Gary Huitsing**, Air Quality Engineer, Ecology **Gary Palcisko**, Toxicologist, Air Quality, Ecology **Mike Coleman**, Sr. Director of Data Center Operations, Yahoo! **Mark Brunner**, Senior Environmental Planner, Landau Associates, Inc.
6:30pm	*Formal Hearing* During the formal hearing, we will be taking comments for the formal record. No response can be given tonight, but a written responsiveness summary will be available on Ecology's website.

STAY CURRENT
DATA CENTER AIR PERMITS
DEPARTMENT OF ECOLOGY State of Washington

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Ecology will be taking comments for this project through April 4, 2016. Please send all comments to Kari Johnson at 4601 N. Monroe, Spokane, WA 99205. Comments may also be emailed to Kari at kari.johnson@ecy.wa.gov.

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ECOLOGY PUBLIC HEARING
Sign-In Sheet

Name	Representing	Address	City, State	Zip	Telephone	Fax #	E-mail	Will you testify? Yes/No
Amy Anderson	Yahoo	701 First Ave	Sunnyvale, CA	94089	408-791-3828	n/a	amyand@yahoo-inc.com	
Mike [illegible]leman	Yahoo	701 First Ave	Sunnyvale, CA	94089	408-781-3828	n/a		
Brett Illers	Yahoo	701 First Ave	Sunnyvale Ca	94089	415-260-7607	N/A		
Curt Morris	Port of Quincy	840 F St. SW	Quincy, WA	[illegible]	509-797-3[illegible]	N/A		
Nik Bergman	Quincy Schools	227 S. St SE	Quincy, WA	98848	509-385-9530	N/A		
QUINN ZURICH	TURNER	830 4TH AVE. S	SEATTLE, WA	98134	206-255-4524	N/A		
Mike Green	Turner Const	9108 Quail Run Lane	Quincy, WA	98848	206-437-0703			
BOB LYTLE	Yahoo	701 FIRST AVE	SUNNYVALE, CA	94089	408 242-0985	N/A		
Rodney Harwood	CB Herald				(509) 770-1512	N/A		
Jack Eaton	Microsoft	PO Box 187 Quincy WA		98848	509 787 6352	509-787-1683	jeaton@microsoft.com	no
Mark Johnson	Vantage Data Centers	2101 M St. NE	Quincy WA	98848	509-470-2085	—	mjohnson@vantagedatacenters.com	NO
Sharon Hustrup	Ephrata Sr Ctr	124 C St NW	Ephrata	98823	5097542382	—		NO
Gigi E. Lowery	Microsoft	501 Port Ind.	Quincy	98848	5097876360	—	gigil@microsoft.com	No
Debbie Koehnen	concerned citizen	11443 Rd P NW Box 185	Quincy WA	98848	509-797-3925	—	dkoehnen@qsd.wednet.edu	yes
Dick Zimbelman		905 4th Ave SE	Quincy WA	98848	509 787 3282			
Brent Muhlestein	MICROSOFT	501 PORT IND	QUINCY	98848	425-765-5691		SBMUHLES@MICROSOFT.com	

Page 1 of 2

Hearing sign-in sheet.doc
10/6/10

ECOLOGY PUBLIC HEARING
Sign-In Sheet

Name	Representing	Address	City, State	Zip	Telephone	Fax #	E-mail	Will you testify? Yes/No
Danna DalPorto	MYTPN	16651 Rd 3 NW	Quincy	98848	509-989-7444			Yes
Patricia Martin	MYTAPN	617 H St SW	Quincy	98848	787-4275			yes
19 Scott Carr	City of Quincy							No

(3)

DATE 3/31/16

ATTENDANCE REGISTER

NAME Debbie Koehnen
Please Print

ADDRESS 11443 Rd P NW Box 185

CITY Quincy STATE/ZIP WA 98848

ORGANIZATION

If you would like to make public comment, please indicate. ☒

ECY 010-32 (4/92) email: mdfek87@yahoo.com

(1)

DATE 3/31/16

ATTENDANCE REGISTER

NAME Mike Green
Please Print

ADDRESS 9108 Quail Run Ln

CITY Quincy STATE/ZIP WA 98848

ORGANIZATION Turner Const.

If you would like to make public comment, please indicate. ☒

ECY 010-32 (4/92) email:

(4)

DATE 3/31/16

ATTENDANCE REGISTER

NAME DANNA DAL PORTO
Please Print

ADDRESS 16651 Rd 3 NW

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ORGANIZATION MYTAPN

If you would like to make public comment, please indicate. ☒

ECY 010-32 (4/92) email: dkdp@gmail.com

(2)

DATE 3/31/16

ATTENDANCE REGISTER

NAME QUINN ZORICH
Please Print

ADDRESS 830 4TH AVE S

CITY SEATTLE STATE/ZIP WA / 98134

ORGANIZATION TURNER

If you would like to make public comment, please indicate. ☐

ECY 010-32 (4/92) email:

(5)

WASHINGTON STATE DEPARTMENT OF ECOLOGY

DATE 3/31/16

ATTENDANCE REGISTER

NAME Patricia Martin
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ADDRESS 617 H St. SW

CITY Quincy STATE/ZIP WA 98848

ORGANIZATION

If you would like to make public comment, please indicate. ☑

ECY 010-32 (4/92) email:

(6)

WASHINGTON STATE DEPARTMENT OF ECOLOGY

DATE 3/31/16

ATTENDANCE REGISTER

NAME Alex Ybarra
Please Print

ADDRESS 921 K st SW

CITY Quincy STATE/ZIP WA 98848

ORGANIZATION Parent

If you would like to make public comment, please indicate. ☑

ECY 010-32 (4/92) email:

Transcript from March 31, 2016 Yahoo! Public Hearing

This is the original hearing transcript from the transcription service, CTS Language Link. Misspelled names or acronyms were left as received. The Response to Comments Section 2 includes the correct spellings of names or acronyms where needed.

Erica: And we've got double recording. I'm Erica Bronson [00:07], the hearing officer for the Yahoo Data Center's air quality permit revision and expansion in Quincy. Let the record show that it is 6:51PM on March 31st, 2016 and this hearing is being held at the Quincy Community Center at 115 F street SW in Quincy, Washington. Legal notice of this hearing was published in 3 area newspapers, including the Quincy Valley Post Register, which published it on February 25th. Display ad reminders were published in 4 area newspapers, including the Quincy Valley Post Register on March 24th. Spanish language display ads were placed in the El Mundo newspaper on February 25th and March 24th. A press release was published on February 25th. LISTSERV emails were sent to the Quincy interested parties on February 19th, February 25th, March 3rd, and March 28th. The social media platform Twitter was used with tweets posted in both English and Spanish.

[1:04] It is now the formal comment time for anyone who would like to comment. I'll be calling you to testify in the order that you signed in. When I call your name, please come up to the table here with me and state your name, and the company or organization you represent, if any. I apologize in advance if I mispronounce your name. Please correct it when you state your name for the record. Remember, please limit your comments to about 5 minutes and audience, please no extra noise. When you have 30 seconds left to complete your testimony, Kari [01:35] will hold up a card. When your time is up, I will call the next person to testify. We will begin with Mike Green [01:43] followed by Quinn Zorric [01:45].

Mike Green: [1:46] So, my thought-

Erica: Your name please.

Mike Green: [1:54] Oh, excuse me. My name is Mike Green. I live down at Crescent Bar. My thought on data centers are ... With any community, it's important to have growth, because as families grow they have children and it's ... A lot of communities see how their children grow up and they just go away. It's my personal thought is that this type of industry is a pretty clean industry compared to a lot of industries that are out there. This is probably a good thing for the community, and it offers non-farm type jobs ... Not that farming's bad ... But everybody's got their own likes and a lot of young children may not want to be farmers or they want to do something different. I think it offers a good opportunity for young folks to stay in their community.

Erica: [2:41] Thank you. Next is Quinn Zorric [02:47], and following that will be Debbie Canan [02:50].

Quinn Zorric: [2:54] Hi, my name's Quinn Zorric [02:57]. I live down at Crescent Bar as well. Mostly just here to learn and listen, not testify or anything, just kind of curious. Just came here to get some knowledge. That's why I'm here.

Erica: [3:08] Okay. Thank you. Debbie Canan [03:13] and she'll be followed by Danna del Porto [03:14].

Debbie Canan: [3:16] Hi, my name's Debbie Canan [03:18], I live at 11443, road P, Northwest. I have some questions about the permit. When I refer to numbers that will be coming from the health impact assessment report on the department of ecology website, which was published February 17th, 2016. Under section 5 Uncertainty, in the report it says there's a lack of exact knowledge because of air dispersion modeling. My question is about air monitoring devices. We would be able to remove the uncertainty with actual data from air monitoring devices and then we could check to see if the computer modeling is accurate. One gentleman asked if we take into account the agricultural admissions as well. Air monitoring would take care of that. When are we going to get those air monitors in here so we can eliminate all this uncertainty.

[4:17] My next question refers to figure 1 on the report. It was a map that listed the residential permits ... Or the residential parcels in the area ... Where the Genesis DEEP concentration could exceed the ASIL. My house is the really close to Yahoo. We're neighbors. It's not identified in red. It's not circled in red. I'm like ... Is that going to be fixed? Can you ... It's funny, because I was identified as the north residential parcel, where the cancer risk is up to 6.3 now. There's one other residence that's up to 6.9, which is the one they said [inaudible 05:03] 7, but I'm up to 6.3 and table 2 under section 3.4 Cancer risk, specifically 3. ... 4.1. Are you going to consider me as a residence? We've been there for 112, 114 years. We do have some houses there.

[5:19] The next one is under section 5.2 Emissions. It said that the power outages are infrequent, but there's also testing times allotted, but the power centers don't wait until we have power outages. If they suspect we might have a power outage, they want to be prepared, so they start up the generators just in case. The logs are really important. Those electrical logs. Can we get access to the logs to make sure? We're sitting there in our house, watching the black smoke come out and it's a little disconcerting, especially when there's inversions and the black smoke is coming out. Those logs ... Can we get ahold of them? That would be great.

[06:06] Under 5.4 Sensitive Individuals, that would be my family. I am having problems breathing tonight. I haven't had to use inhalers for about 10 years. Now I'm on 2 inhalers, and I have a whole pharmaceutical bag full of medicine that I'm having to take. I lost a whole month in February where I was sick, above and beyond my insurance. I have $500 of medical bills. My daughter had pneumonia, my husband was unable to wear his contacts, because he had eye problems, which are all the symptoms of, you know ... These could create problems. I'm wondering how come my quality of life can be taken away in the name of progress. It seems we should be preserving what we have and keeping our beautiful clean air beautiful and clean. That's one of the perks of living here.

[7:00] The other thing I have a concern about, there's 2 figure 3s on this document. If the first figure 3 talked about the nitrous oxide concentrations and where they're exceeding the ASIL limits, we have a high school and a junior high in that area right now and we're planning on building schools so that high school is going to be turned into a junior high, the junior high is going to be turned into an elementary school. For 8 years, those children will be in this area of noxious nitrous oxide concentrations. If they happen to live in one of the residential areas that are also in this area to be planned.

[7:50] Okay, now ... The other figure 3, my house, shows that it's 5 to 10 times higher the ASIL of nitrous oxide and the DEEP is 10 to 25 times. Again, my quality of life, the value of my home. Figure 4, nitrous oxide ... Didn't have a data center. I talked to somebody about that, they said they put it in there anyway. We're also building 2 new schools above road 11.

Kari Johnson: [8:18] Okay, I'm sorry. Your time is up.

Debbie Canan: Yes.

Kari Johnson: Can you summarize?

Debbie Canan: And I love it, and I'm just ... It's above road 11, it's between Microsoft and Yahoo, and I ... These are going to be affected also by the over-the-limit concentrations. The last thing I have is Microsoft 2012 We're Eliminating Back Up Generators, "We're eliminating back-up generators. We're using other things like solar power, wind power ..." Which are plentiful in our area. I'm hoping that the other data centers around us will start using some of these other technologies so we don't have the diesel emissions and that's what I have to say. Thank you.

Erica: [9:01] Thank you Debbie. Okay, can we get Danna del Porto [09:02] please? And following her will be Patricia Martin [09:05].

Danna del Porto: My name is Danna del Porto [09:19]. I represent MYTAPN, which is Microsoft-Yes; Toxic-Air Pollution-No. I'm not against data centers, I am against toxic air. My address is 16651 road 3 North West Quincy. I've lived here for ... Since 1980. Well, I appreciate the opportunity to have the question and answer tonight. That was really helpful. The last public hearing didn't have enough time at all.

[9:55] I'm going to grumble, for the record, in my written documents I showed up for the 2nd Microsoft-Oxford hearing July 9th, prepared my documents ... I'm a citizen scientist. I am a retired art teacher. I don't do numbers, it's a real challenge for me, so making a public comment and making it make sense is hard work. I worked on that, and I turned my comments in. There has been no response to my comments from July 9th. Then the Sabey-Intergate was in January ... February? January. I did the same thing, got all my stuff, brought all that stuff, made all my comments, worked with all the stupid little numbers, turned in my comments. I have had no response to comments from my Sabey-Intergate. This is the 3rd public hearing that I've prepared for in 8 months and I'm annoyed because these data centers are similar enough, if I get an answer, a good answer, from ecology about Oxford I won't ask it again, but if you don't answer me I don't have anything to learn from, so I'm complaining. Okay.

[11:11] It confuses me that the gentleman from Yahoo! said that they only had to look at the Genesis [inaudible 11:23]. The information that come from ecology and in a brochure and the newspaper said that this was a revision of the permit. When you revise a permit, you're opening a permit. That means that you are looking at everything, not just the new stuff, but the new stuff plus the old stuff. I disagree with that statement that you don't have to combine those things.

[11:52] One of the things I complained about specifically with Microsoft-Columbia, is that they brought in some expansion generators, but they pretended like there was nothing next to it. Right here is a whole 'nother set of generators, but we're not going to look at those, we're not going to mottle them together, they don't exist. They're invisible. We're just going to look at these. When you compartmentalize that stuff, it's offensive to me. Those generators are putting emissions into the air jointly. You cannot tell me they do not combine in the air. They do. I'm complaining about that, I believe this was a revision of the permit and it opens everything up to consideration.

[12:38] I said earlier, I don't care to be compared to Seattle, I know that there's all kinds of emissions from highways and trains and industry. Don't compare us to Seattle. We came here ... I came here in 1980 to raise my child in an agricultural community, and low-and-behold, what do I have? I have industry. I believe it's a responsibility of ecology to protect me as if I did not have that industry next door to me, but that I had clean air based on my desire to live here and to breathe clean air.

[13:19] The other thing is I would like to understand ... I didn't have time to ask ... At one point in time during the answer-questions, you brought up the fact that credit ratings had something to do ... If I understood it properly ... With whether or not people put on controls. Someone needs to answer me that in response to comments. Was that said? It was said. Okay.

[13:49] The other thing I'd like to go on record for is to thank Yahoo! for the public presence. I believe they hired some nice local people who are committed to this community. Obviously your contributions to the senior center and to different activities in town and it matters. You are to be commended for that.

Erica: Okay. Thank you, Danna.

Danna del Porto: Thank you.

Erica: [inaudible 14:17] Patricia Martin [14:19] please.

Female: Nailed it.

Patricia Martin: [14:28] Hello. Patricia Martin [14:30], 617 8 street, South West Quincy. Unfortunately, I have a glitch in my computer so I was not able to print off my comments, but I did bring my exhibits anyway. My issues with the permit has much to do with the estimations of emissions that are being used. First, I brought an example from the California Energy Commission's review of back-up generators and their implications on air quality in California. Yahoo! Landow has used this graph as well, but not included the emissions that are resulted from the cold start and as a result of this, they've implied that there's a deficit in the nox that's generated during a cold start, when in fact nox cold start in the highest of the emission factors that happens during a cold start with an engine. We saw that, in fact, when ecology required the performance testing on a Sabey engine. The nox was really high during cold start. That cold-start factor is missing from all the modeling and all the estimations for the potential to emit on the Yahoo! site. That would include, not only the new engines that would also include all the existing engines.

[16:12] Also, for condensables, from that same study that was commissioned in 2005, condensables are ... Which are the back half of the particulate matter ... Are 2 to 3 times ... Excuse me, 3 to 5 times higher than the particulate. Keeping that in mind and the cold start factor I believe significantly changed the estimations.

[16:45] I mentioned about the backed analysis, and this is from the revised NOC application dated 12 ... I hate to admit that, I should have brought the original sized when I printed it to fit the page and I can't read the bottom. It was from December of 2015. December 22nd I believe. The numbers that are inserted for nox are less than 50 ton, for the 25 new engines it's 63.93 ton. The DOCs as I mentioned is over 1 ton and I believe it's 1.88 and up here the number used is .84. This repeats itself on the backed analysis for all 4 of the alternatives, which is a DPF, a DOC, a tier engine, and a scrubber. When you put in the correct numbers, and again minus the cold start factor, the ... More than 2 of these ... And again, I don't have my narrative here ... Fall into being very close, if not meeting the backed up emission of affordability.

[18:05] Again, from the air mod summary, which is table c2 from appendix c, the diameter used during the air modeling is a 24 inch diameter doc versus the 18 inch doc, which is actually employed on those engines, which changes the modeling assumptions. Again, the cold start factor, which is significant in the first hundred seconds of the engine's operation, and averaged out a 30 minute period, there are going to be more cold starts than have been admitted to in this application. The cold start looks like a very small number of a very long run, but if it's a shorter engine operation, then it's a much more significant component percentage wise of that emission. That needs to be reviewed, the cold start numbers and the air modelling assumptions I think are misguided, especially in light of the fact that the engines operate so infrequently for such short periods of times as we talked about. Each one of those is a cold start. Those emissions should be reflected as such.

[19:25] Then, again, table c1 the annual operating emissions also demonstrates that it was modeled as though it had a deficit of nox, so it was not modeled at even the level that is in the permit.

Erica: Thank you, Patricia [19:43]. We do have one other person who signed up, Alex Abarra [19:47]. Hi, please just state your name before you begin.

Alex Abarra: [19:56] Okay. My name's Alex Abarra [19:59]. I'm a Quincy parent. I have a daughter in high school. I'm also the Quincy president ... The Quincy school board president. I have been working with the Yahoo! folks for since I moved back in town in 2003. They have not ... They supported Quincy kids, Quincy schools, Quincy soft ball, my daughter, her team, the high school team there right now ... With funds, financial support, everything that we've asked for, they supported. They've been a wonderful partner in making the kids of Quincy great kids.

[20:44]

We want those kids ... Who are most of them are minorities that have a hard time in school ... Getting them extra activities with their support ... These kids are going to be great. They're going to just graduate from Quincy high school, they're going to support it and the reason is because of people like Lisa who's worked for Yahoo! who's also a Quincy person ... She's been supporting. She's always been there, Yahoo!s been great to work with, their great for the community at Quincy. We should all know that.

[21:13] Microsoft as well has done lots for Quincy. I can talk to you a little bit about some of the ecology that works, the pollution that happens because of progress ... Where I see this is progress, if you want progress, you could have had other things that pollute more than what is happening here. I do carbon analysis for Grand Canyon PUD, so I know a little bit about what kind of carbon analysis we could be done just for ... At the utilities. I do have a lot of knowledge about what this information is telling us and I can tell you that most of the information that I'm seeing is fairly straight-forward, it's done properly from what I know. Again, it's not what DPA does from a scientific standpoint, but from a carbon standpoint I can see that the numbers seem to add up properly.

[21:58] I don't think that there's going to be an issue with the pollution that happens because of the build-up of Yahoo! I think that my daughter and my friends who have children ... In all the schools in Quincy will not be affected by the minor amount of pollution that may happen because of those data forms. Those things are going to be on for just a minor amount of time. My analysis, DPB from other industries ... There's a lot more other industries that could be here, that could harm the kids at Quincy much more than what happens at Yahoo! on a monthly basis.

[22:32] I think we need to have them here. I think they've not only done good for the town of Quincy, what they've done ... Just to let you guys know ... Is we just passed $108 million [inaudible 22:42] because of Yahoo! and Microsoft ... Because of their presence here in Quincy. We're going to have brand new schools. Those kids that need that help with brand new schools, with a brand new community, brand new roads ... Lots of it is done because of Yahoo! They brought that to Quincy. I just want to let you know that I'm talking as a parent, not from [inaudible 23:04], not from a PUD, but as a parent. My daughter's doing fine, she's going to be fine in the future, and so are the rest of the kids in Quincy in my opinion. That's all I have to say.

Erica: [23:12]

Thank you. Okay, is there anything else who would like to testify who has not yet? All right. Any testimony received at this hearing, along with any written comments received by the end of the comment period will be responded to on our response to comments document. If you would like to send ecology written comments, please mail them by midnight on April 4th, 2016 to Kari Jonson [23:37] Department of Ecology 4601 North Monroe street, Spokane Washington 99205. Written comments can also be emailed to Kari [23:47] at Kari.Johnson@ecy.wa.gov. Please see the agenda board and the focus sheet handout for this information as well. Ecology's response to comments will be posted on the web page noted on the agenda board and on the focus sheet handout. If you're signed up for the Quincy interested parties LISTSERV email, you will be notified when it's available. You can see Kari, if you'd like to sign up for that email list. On behalf of the department of ecology, thank you for coming tonight.

[24:21] Let the record show that this hearing was adjourned at 7:15PM.

DEPARMENT OF ECOLOGY

HEARING SUMMARY

MEMORANDUM

April 1, 2016

TO: Maia Bellon
Director

FROM: Erika Bronson
Hearings Officer

SUBJECT: Air Quality Permit Public Hearing Summary

Topic: Yahoo! Project Genesis Data Center Expansion

Program name: Air Quality, Eastern Regional Office

Names of Ecology employees at hearing: Erika Bronson, Gary Huitsing, Kari Johnson, Gary Palcisko, Karen Wood

Hearing location: Quincy Community Center, 115 F St. SW in Quincy, WA

Total number of people at hearing: 19

Total number of testimonies: 6

Summary of Comments:
The crowd generally seemed in favor of the data center expansion, aside from three very vocal people expressing opposition. A newspaper reporter was also present, taking photos throughout the evening and interviewing people working on the project as well as supporting and opposing community members.

The first two men to testify said they came to learn and seemed open to the expansion project. On the comment cards, they had identified themselves as working for a construction company but chose not to state that for the record. (One came to me before the hearing started wondering if it was inappropriate to testify given his interest in the project, but I assured him anyone could testify and that he did not have to reveal his company name if he was uncomfortable with that.)

The next three women who testified were adamantly against data centers in Quincy in general, citing respiratory system health issues, decreasing quality of rural life, and incorrect numbers used in the Best Available Control Technology analysis. Two also submitted lengthy written comments following their testimonies.

The last commenter, a father and school board member, strongly supported Yahoo's expansion due to their generous contributions and commitment to the community.

cc: Deputy Director
Program Manager
Permit Writer

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Appendix D:
Redline Documents

Redline documents display the edits made to the original drafts of the Technical Support Document and the Preliminary Determination (now the Approval Order), 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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DRAFT TECHNICAL SUPPORT DOCUMENT
FOR APPROVAL ORDER NO. 16AQ-E012

YAHOO! DATA CENTER
MAY XX, 2016

1. PROJECT DESCRIPTION

On October 19, 2015, the Washington State Department of Ecology (Ecology) received a Notice of Construction (NOC) application submittal from the Yahoo! Data Center, (Yahoo) located at 1010 Yahoo Way, and 1500 M Street NE Quincy, WA. Yahoo! Yahoo is requesting approval for revisions to the March 28, 2011 Approval Order No. 11AQ-E399 (previous permit) which covers existing Yahoo data center facilities. A new Yahoo! Data Center (Project Genesis) is included in the NOC application and is located adjacent to the existing Yahoo data center facilities. The NOC application requests a new permit to cover existing Yahoo data center facilities in addition to Project Genesis. The existing Yahoo data centers facilities and Project Genesis are referred hereafter as Yahoo. The NOC application was determined to be incomplete and, on November 19, 2015, Ecology issued an incompleteness letter to Yahoo. On December 7, 2015, Yahoo provided supplemental NOC and Second Tier Risk Analysis information to Ecology. Yahoo!'s NOC application and Second Tier Risk Analysis were considered complete on December 23, 2015. Ecology has concluded that this project has satisfied all requirements of a second tier analysis[pending].

The primary air contaminant sources at the facility consist of a total of 23 existing and 25 new electric generators powered by diesel engines to provide emergency backup power to the facility. The existing 23 generators/engines (engines) and related facilities (cooling towers, building etc…) were permitted under Approval Order 11AQ-E399 and are incorporated into this new Approval Order along with Project Genesis. Project Genesis consists of direct evaporative cooling units, air cleaning systems, boiler heating, a 196,969 square feet building complex, along with the 25 new engines. 20 of the new engines will provide the main data center support and will be rated at 2.0 megawatt electrical capacity (MWe). The data center will also have 4 reserve engines rated at 2.75 MWe and 1 administrative support engine rated at 2.75 MWe. Upon final build-out, Yahoo will consist of forty-eight (48) electric generators with a total capacity of up to approximately 99.75 MWe using a combination of Caterpillar, Cummins, and MTU engine options.

The existing engines R through 12 are supported by 6 Evapco Model USS 212-636 cooling units to dissipate heat from electronic equipment at the facility. Each unit has two cooling towers and two fans. Each tower has a design recirculation rate of 2,460 gallons per minute (gpm) and an air flow rate of 290,700 cubic feet per minute (cfm). Project Genesis will also include direct evaporative cooling units or equivalents. The cooling units for engines 13 through R3 and Project Genesis are not a source of air emissions.

To avoid Title V major thresholds of Nitrogen Oxides (NOx), and Nitrogen Dioxide (NO2), this facility requested that existing generators R through 12 reduce allowable annual hours from 200 to 100 hours. The facility is considered a synthetic minor source as described in footnote k of Table 1.1-.

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

Table 1.1 contains potential-to-emit (PTE) estimates in tons per year (TPY) by the applicant for Project Genesis and for entire Yahoo! facility (including Project Genesis).

Table 1 Total Facility and Project Genesis(j) Potential To Emit Estimates					
Pollutant	**Emission Factor (for the engine rating listed)**			**Total Facility PTE (Project Genesis PTE)**	**References**
Criteria Pollutants	**Units = lbs/hr; except where noted**			**TPY**	**(a)**
NOx	6.12 g/kW-hr	44.34 (2.0 MWe)	74.40 (2.75 MWe)	95 (62.9)	(b),(k)
VOC	0.28 g/kW-hr	1.14 (2.0 MWe)	2.91 (2.75 MWe)	2.8 (1.9)	(b)
CO	3.5 g/kW-hr	5.02 (2.0 MWe)	14.30 (2.75 MWe)	17.9 (8.8)	(b)
Total PM10/PM2.5 (filterable and condensable)	See DEEP and cooling tower emissions for specific contributions			7.6 (3.44)	(f),(i)
SO_2	15 ppm			0.025 (0.0001)	(c)
Lead	NA			Negligible (Negligible)	(d)
Ozone	NA			NA (NA)	(e)
Toxic Air Pollutants (TAPS)	**Units = Lbs/MMbtu (except where noted)**			**TPY**	(a)
Primary NO_2	10% of NOx			9.5 (6.3)	See NOx
DEEP	0.20 g/kW-hr	0.88 lbs/hr (2.0 MWe)	0.91 lbs/hr (2.75 MWe)	1.8 (1.12)	(b),(i)

CO	3.5 g/kW-hr	17.9 (8.8)	(b)
SO_2	15 ppm	0.025 (0.0001)	(c)
Propylene	2.79E-03	1.3E-01 (7.7E-02)	(g)
Acrolein	7.88E-06	3.5E-04 (2.2E-04)	(g)
Benzene	7.76E-04	3.5E-02 (2.2E-02)	(g)
Toluene	2.81E-04	1.3E-02 (7.8E-03)	(g)
Xylenes	1.93E-04	8.6E-03 (5.4E-03)	(g)
Napthalene	1.30E-04	2.2E-03 (3.6E-03)	(g)
1,3 Butadiene	1.96E-05	1.8E-03 (1.1E-03)	(g)
Formaldehyde	7.89E-05	3.5E-03 (2.2E-03)	(g)
Acetaldehyde	2.52E-05	1.1E-03 (7.0E-04)	(g)
Benzo(a)Pyrene	2.57E-07	1.2E-05 (7.1E-06)	(g)
Benzo(a)anthracene	6.22E-07	2.8E-03 (1.7E-05)	(g)
Chrysene	1.53E-06	6.9E-05 (4.2E-05)	(g)
Benzo(b)fluoranthene	1.11E-06	5.0E-05 (3.1E-05)	(g)
Benzo(k)fluoranthene	2.18E-07	9.8E-05 (6.1E-06)	(g)
Dibenz(a,h)anthracene	3.46E-07	1.6E-05 (9.6E-06)	(g)
Ideno(1,2,3-cd)pyrene	4.14E-07	1.9E-05 (1.1E-05)	(g)
Cooling Tower Emissions	**Units = mg/liter water concentration**		
PM10/PM2.5	7,500	2.11 tpy	(h),(j)
Arsenic	0.002	0.00263 lb/yr	(h),(j)
Barium	0.013	0.0171 lb/yr	(h),(j)
Cadmium	0.003	0.00395 lb/yr	(h),(j)
Chromium III	0.0047	0.00618 lb/yr	(h),(j)
Copper	0.0032	0.00421 lb/yr	(h),(j)
Iron	0.0665	0.0875 lb/yr	(h),(j)
Lead	0.0005	0.000658 lb/yr	(h),(j)
Manganese	0.002	0.00263 lb/yr	(h),(j)
Mercury	0.0003	0.000395 lb/yr	(h),(j)

(a) The current list of EPA criteria pollutants (http://www.epa.gov/airquality/urbanair/; last updated December 22, 2014) that have related National Ambient Air Quality Standards (NAAQS) (http://www.epa.gov/air/criteria.html; last updated October 21, 2014). 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 (PSD) projects such as at Yahoo! per WAC 173-400-110(5)(b).

(b) Project Genesis emission factors (EFs) based on manufacturer not-to-exceed (NTE) data and Tier 2 EFs from 40 CFR 89.112a. For NTE data, emission factors for Caterpillar, Cummins, and MTU were used, whichever is higher. For example, the VOC, PM, and CO NTE emission for the 2.75 MWe engines are based on Caterpillar NTE data of 2.91 lb/hr (10% load) and 0.91 lb/hr (25% load), and 14.3 lb/hr (75% load) respectively. Whereas for NOx, the Cummins NTE value of 74.4 lb/hr (100% load) is the highest NTE value. Tier 2 EFs are as follows: 6.4 g/kW-hr for NOx plus non-methane hydrocarbons (NMHC); 3.5 g/kW-hr for CO; and 0.20 g/kW-hr for PM. The total NOx, NMHC, CO, and PM emissions for all 48 certified engines meet the Tier 2 g/kW-hr emission factor limits listed.

(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) PM emissions are conservatively considered to be PM10 emissions, and PM10 emissions are conservatively considered to be PM2.5. Total facility PTE emissions of particulate (including filterable PLUS condensable) for all 48 engines and cooling towers would be approximately 7.6 tpy. As noted in the application, "the cumulative NAAQS air modeling demonstration does account for condensable PM from all existing and proposed emergency generators."

(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 (Evapco) cooling unit maximum recirculation rate as presented in TSD of Approval Order 11AQ-E399. Cooling tower emissions listed in previous TSD as 4,210 lbs/yr, which is approximately equivalent to 2.11 tpy.

(i) DEEP is defined in Washington Administrative Code (WAC) 173-460-150 as "Diesel Engine Exhaust, Particulate." DEEP includes only the filterable portion of PM2.5.

(j) Project Genesis emissions are only listed (in parenthesis) if they have estimated emissions for the listed pollutant or source.
(k) SM-80 Sources: Minor sources that have taken an enforceable limit to remain minor sources, called synthetic minor sources, that emit or have the potential to emit (PTE) at or above 80 percent of the Title V major source threshold (GUIDANCE ON FEDERALLY-REPORTABLE VIOLATIONS FOR CLEAN AIR ACT STATIONARY SOURCES September 2014; https://www.epa.gov/sites/production/files/2013-10/documents/caastationary-guidance.pdf).

1.2 Maximum Operation Scenarios

Yahoo's operation assumptions for their permit revision requests as presented in their application are listed table 2 below along with Ecology comments:

Table 2. Yahoo! Application Revision Requests

Yahoo! Application Assumptions/Requests	Ecology Comments
Existing Engines R through R3 and Local Background Emissions Sources: • ***Worst Case Emissions and Power Outages.*** For purposes of demonstrating compliance with the national ambient air quality standards (NAAQS) and acceptable source impact levels (ASILs), it was assumed that the Yahoo! Data Center [excluding Project Genesis] would experience 48 hours over 2 consecutive days of power outage, and would operate with the restrictions of Table 3.2 of the permit. • ***Decreased Engine Runtime for Engines R through 12:*** Yahoo! has requested to consolidate engines R through R3 by having them adhere to the same operation restrictions as engines 13 through R3. The implications of this request are as follows: ➢ Engines R through 12 will no longer be allowed to operate 200 hours per year but will operate 100 hours per year similar to engines 13 through R3. ➢ Engines R through 12 will no longer be allowed to operate at an average full load rate of 100%, but will operate at more restrictive loads similar to engines 13 through R3. • ***Local Background Emissions Sources:*** Local background values for PM2.5, PM10, and NO2 consisted of the ambient impacts, at Project Genesis' maximum impact location, caused by emissions from the nearby emergency generators and industrial emission sources at the existing Yahoo! Data Center, Sabey Data Center, Vantage Data Center, Intuit Data Center, and the Celite facility. Emissions from each of these facilities were assumed to be equal to their respective permit limits. The location and date of the maximum impact caused by Project Genesis' proposed new generators were determined, and AERMOD was used to model the "local background" ambient impacts at the same location and date caused by simultaneous activity at each of the adjacent data centers and industrial facility. The modeled "local background" sources were as follows: ➢ 24-Hour PM2.5. It was assumed that the existing cooling towers in the vicinity and the Celite facility would operate at their permitted limits. ➢ 1-Hour NO2. It was assumed that the Celite facility would operate at its permitted limit. ➢ 24-hour PM10 (Power Outage). It was assumed that each nearby data center would operate at its permitted rate during a power outage on the same day that the Project Genesis facility would operate during a power outage, while the Celite facility would emit at its permitted rate.	(a),(b),(c)

For Project Genesis Engines: During a power outage at the site, 20 2.0-MW emergency generators and one 2.75-MW generator will activate in order to supplement power to the server system and the administrative building. If there is a problem with one or more of the 2.0-MW generators, one or more of the "reserve" 2.75-MW generators will engage the load. • ASIL considerations with 1-hour and 24-hour averaging periods: Impacts were modeled for the worst-case screening scenario of a power outage lasting 24 hours per day for 365 days per year for 5 years, with AERMOD automatically selecting the highest 1-hour and 24-hour [TAP] impacts. The annual [TAP] impacts were modeled based on the maximum requested generator runtimes and generator loads. • Emissions considerations for modeling of pollutants (including TAPs with annual averaging periods): assumed (per engine) 84 hours (3.5 days) of power outages. Emission rates were calculated for criteria pollutants and TAPs based on peak hourly (worst-case maximum) and long-term (annual maximum) operating scenarios. • Worst-case 1-hour considerations for modeling to determine the worst-case ambient impacts for carbon monoxide (CO) and sulfur dioxide (SO2), each with a 1-hour averaging period. Twenty five generators were modeled as if operating 24 hours per day, 365 days per year, based on conservative consideration that an outage could occur at any time of day or night and any time of year. This scenario also took into account cold start emission factors. • Worst-case 3-hour, 8-hr, and 24-hr considerations for modeling to determine the worst-case ambient impacts for CO, SO2, and PM10. Twenty five generators were modeled as if operating 24 hours per day, 365 days per year and assumed a worst-case unplanned power outage scenario (3.5 days). This scenario also took into account cold start emission factors. • PM2.5 (see below) • NO2 (see below)	(b),(f)
PM2.5 24-Hour NAAQS Modeling Setup: The PM2.5 24-hour NAAQS is based on the 98th percentile of ambient impacts during a 3-year rolling average period. The worst-case modeling setup assumes testing 2.75-MW engines for 8 hours (one at a time) operating during daylight hours (7:00 a.m. to 7:00 p.m.). Eight cold start events are assumed to occur per day for this simulation event. The 8-hour emissions total for this event was divided by 12 hours to develop the hourly emission rate input into AERMOD.	(e)
NO2 1-hour NAAQS Modeling Setup: The NO2 1-hour NAAQS is based on the 98th percentile of the daily highest 1-hour ambient impacts during a 3-year rolling average period. The same screening-level approach, as described for evaluation of the PM2.5 24-hour NAAQS, was used to evaluate the NO2 1-hour NAAQS. Table 13 lists and ranks each of the 1-hour operating regimes for NO2 emissions from the Project Genesis site. The ranked 8th-highest hour would also be during an annual load bank or monthly maintenance testing event. Emissions from a single cold-start event were included in the input emission rate and the air dispersion model was set up as if operating during daylight hours (7:00 a.m. to 7:00 p.m.). ➢ The ambient NO2 concentrations were modeled using the Plume Volume Molar Ratio Method (PVMRM) option to demonstrate compliance with the 1-hour and annual NAAQS and ASIL for NO2. This AERMOD option calculated ambient NO2 concentrations surrounding the site by applying a default NO2/NOx equilibrium ratio of 0.90 and a NO2/NOx in-stack ratio of 0.1. ➢ The estimated ambient ozone concentration of 49 parts per billion was the AERMOD input level for all corresponding NO2 modeling setups. This value was taken from the NW AIRQUEST 2009-2011 design value of criteria pollutants website, provided by the Washington State University's Northwest International Air Quality Environmental Science and Technology Consortium, for the Quincy, Washington area (WSU website 2015).	(e)
Cold start/black puff factors: As noted in Yahoo!'s application: "emissions of criteria pollutants (PM, CO, NOx, and total VOCs) and volatile TAPs associated with cold-startup were scaled up using a 'black puff' emission factor in order to account for slightly higher cold-start emissions during the first minute of each scheduled cold-start. These 'black puff' factors are based on short-term concentration trends for VOC, CO, and NOx emissions immediately following cold-start by	(d)

a large diesel backup generator that were measured by the California Energy Commission in its document, *Air Quality Implications of Backup Generators in California* (CEC 2005)." The 60-second cold start/black puff factors used for this application are: PM+HC factor = 4.3; NOx factor = 0.94, CO factor = 9.0.	

(a) Ecology accepts the more restrictive operation limits for engines R through 12 requested by Yahoo!.
(b) Ecology accepts this approach because it is conservatively based on worst-case scenarios.
(c) Existing engine power outage information based on TSD of Approval Order 11AQ-E399.
(d) Ecology accepts the cold start black puff factors derived for this project.
(e) Emission impact estimates via modeling are based on the 98th percentile 3-yr average, which is consistent with the NAAQS standard.
(f) For the NO2 annual NAAQS, which are not based on 3-year averages, if all emissions occurred in 1-year, within a three-year period, the NAAQS standard would still be met because annual ambient NO^2 impacts (13 ug/m^3) are more than three times less than the NO2 annual NAAQS (100 ug/m^3).

2. APPLICABLE REQUIREMENTS

The proposal by Yahoo! 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 Yahoo! 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)

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 Yahoo! 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 Yahoo! (approximately 2.0 MWe to 2.75 MW). Instead, 40CFR60 requires the engines at Yahoo! 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 Yahoo!:

§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, Yahoo! is either using or will use the following engines discussed in Sections 2.1.1 through 2.1.7 with 2.0 MWe or 2.75 MWe sizes. Sections 2.1.1 through 2.1.6 cover 2007 and later model year engines and section 2.1.7 covers pre-2007 model year engines. Based on these specifications, each engine's displacement per cylinder were 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:

$$\text{Total Displacement} = 0.7854 \times (170/10)^2 \times (190/10) \times 16\ \text{cylinders} \times (1/1000)$$

$$\text{Total Displacement} = 69.0\ \text{Liters.}$$

$$\text{Displacement per cylinder} = 0.7854 \times (170/10)^2 \times (190/10) \times (1/1000)$$

[1] HPBooks Auto Math Handbook., Lawlor, John., The Berkeley Publishing Group, A division of Penguin Putnam Inc. (www.penguinputnam.com), 1992, p. 2.

Displacement per cylinder = 4.31 liters/cylinder.

2.1.2 Caterpillar Engine Model C175-16 rated 2.75 MWe

The specification sheet for this engine lists displacement as 84.67 liters, with 16 cylinders total. The single cylinder displacement for this engine is therefore 5.29 liters/cylinder.

2.1.3 Cummins Engine DQKAB rated 2.0 MWe

According to the specification sheet for this engine, it has 16 cylinders total. Using this equation above, and plugging in the manufacturer specifications for bore (159mm), stroke (190mm), and 16 cylinders, this engine's total displacement and displacement per cylinder are calculated as follows:

$$\text{Total Displacement} = 0.7854 \times (159/10)^2 \times (190/10) \times 16 \text{ cylinders} \times (1/1000)$$

Total Displacement = 60.4 Liters.

The single cylinder displacement for this engine is therefore 3.76 liters/cylinder.

2.1.4 Cummins Engine DQLF rated 2.75 MWe

According to the specification sheet for this engine, it has 18 cylinders total. Using this equation above, and plugging in the manufacturer specifications for bore (170 mm), stroke (190 mm), and 18 cylinders, this engine's total displacement and displacement per cylinder are calculated as follows:

$$\text{Total Displacement} = 0.7854 \times (170/10)^2 \times (190/10) \times 18 \text{ cylinders} \times (1/1000)$$

Total Displacement = 77.6 Liters.

The single cylinder displacement for this engine is therefore 4.31 liters/cylinder.

2.1.5 MTU Engine 16V4000 DS2000 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 20V4000 DS2800 rated 2.75 MWe

The specification sheet for this engine lists displacement as 95.4 liters, with 20 cylinders total. The single cylinder displacement for this engine is listed as 4.77 liters/cylinder.

Thus, because Yahoo! Project Genesis 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.

2.1.7 MTU Detroit Diesel 16V4000 G83 B3

The existing engines R through R3 use MTU Detroit Diesel 16V4000 G83 B3 engines. 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.

Some of these engines have manufacture dates as early as December 2006, which pre-dates the Tier 2 requirement date of January 1, 2007 mentioned in 40CFR60 above. However, the 1/1/2007 date was intended as a harmonization date for all stationary and non-road regulations. Table 1 of 40CFR89.112 shows the same tier 2 engine requirements for model year 2006 engines as engines manufactured after January 1, 2007. Footnote 1 on Table 1 of 40CFR89.112 states the following: *"The model years listed indicate the model years for which the specified tier of standards take effect."* Therefore, in accordance with table 1 of 40CFR89.112 which shows tier 2 requirements for model year 2006, Ecology is requiring the existing pre-2007 engine at Yahoo! to follow current Tier 2 requirements (6.4 g/kW-hr for NOx plus NMHC; 3.5 g/kW-hr for CO; and 0.20 g/kW-hr for PM).

2.1.8 Tier 2 Emission Requirements Summary

Thus, based on the power ratings listed in *40 CFR 60.4202(a),* the Tier 2 engine requirements in 40CFR89.112 for 2006 and later engines, and because the engines to be used at Yahoo! will also have less than 10 liters per cylinder displacement, the 48 engines at Yahoo! are required to meet the 40CFR89.112 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 Yahoo! 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 Yahoo! has performed on existing 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, Yahoo! 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

Yahoo! 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

[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.

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

Yahoo'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 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.

Yahoo! 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..). Annual operation and maintenance cost estimates to account for urea, fuel for pressure drop, increased inspections, and periodic OEM visits based on EPA manual EPA/452/B-02-001, would cost approximately $~~19,500~~14,400 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 $~~32,700~~25,200 for NOx alone or $~~31,200~~22,300 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 Yahoo! 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 affect 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 2.7 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. Yahoo! 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

Yahoo! 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.

Yahoo! 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 $~~1.5 million~~123,600 per ton of engine exhaust particulate removed from the exhaust stream at Yahoo! each year. Catalyzed DPFs, which include a diesel oxidation catalyst, also remove CO and VOCs. However, for this project, DPFs and DOCs were evaluated separately (see Section 4.2.1.2 for DOC BACT).

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.

Yahoo! 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 Yahoo! followed for engines within this application (including for SCR-only, DPF-only, and Tier 4 capable integrated control system technologies).

- Yahoo! obtained the following recent DOC equipment costs: \$32,000 and \$54,000 for stand-alone catalyzed DOC per single 2.0 MWe and 2.75 MWe generators respectively (plus \$3,667/generator for parts). For thirty two (5) 2.0 MWe, and 20 2.75 MWe generators, this amounts to \$1,001,667. According to the applicant, DOC control efficiencies for this unit are CO, HC, and PM are 85%, 80%, and 20% respectively.
- The subtotal becomes \$1,416,858 after accounting for shipping (\$50,083), WA sales tax (\$65,108), and direct on-site installation (\$300,000).
- After adding indirect installation costs, the total capital investment amounts to: \$1,634,668. 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 \$170,025.
- At the control efficiencies provided, the annual tons per year of emissions for CO (~~3.09~~8.79 tpy), HC (~~0.84~~1.88 tpy), and PM (~~0.29~~3.44 tpy) become ~~2.62~~7.47 tpy, ~~0.67~~1.5 tpy, and ~~0.06~~0.69 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 (\$170,025 divided by ~~2.62~~7.47 tpy for CO, etc..).

The corresponding annual DOC cost effectiveness value for carbon monoxide destruction alone is approximately \$~~64,800~~22,800 per ton. If particulate matter and hydrocarbons are individually considered, the cost effectiveness values become \$~~3.0 million~~113,000 and \$~~254,400~~247,100 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 \$~~50,800~~17,600 per ton of combined pollutants removed per year.

These annual estimated costs (for DOC use alone) provided by Yahoo! are conservatively low estimates that take into account installation, tax, shipping, and other capital costs as mentioned above, but assume low range CARB estimates for operational, labor and maintenance costs, which could be up to $28,000 per year.

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. Yahoo! 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***

Yahoo! did not find any add-on control options commercially available and feasible for controlling sulfur dioxide emissions from diesel engines. Yahoo! proposed BACT for sulfur dioxide is the use of ultra-low sulfur diesel fuel (15 ppm by weight of sulfur). Ecology agrees with the applicant's proposed BACT for SO2.

4.4 BACT ANALYSIS FOR PM FROM COOLING TOWERS

According to the applicant, "no known contaminants will be introduced into the surrounding atmosphere" for cooling units to be used for Project Genesis. Also, because no changes are proposed for existing cooling tower operations or emission estimates, a BACT analysis was not performed. The following BACT determination from the previous Yahoo! 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 Yahoo! considered for BACT, the minimum estimated costs as applied to tBACT are as follows:

- The minimum estimated cost to control diesel engine exhaust particulate is estimated to be $~~1~~0.~~5~~ 4 million per ton removed.
- The minimum estimated costs to control NO2 is estimated to be $~~195,300~~150,000 per ton removed.
- The minimum estimated cost to control CO is estimated to be $~~64~~22,800~~,800~~ per ton removed.
- For the other TAPS above SQERs, the minimum estimated cost per ton removed would be as follows: $10 million for benzene; $59 million for naphthalene; $198 million for 1,3-butadiene; and $980 million 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
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.
- 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 applicable stack height of above local ground (20 ft for engines R through 12; 30 ft for engines 13 through R3; 42 ft for the 25 Project Genesis engines).
- 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 12.5-meter grid spacing along the facility boundary extending to a distance of 150 meters from each facility boundary. A grid spacing of 25 meters was used for distances of 150 meters to 400 meters from the boundary. A grid spacing of 50 meters was used for distances from 400 meters to 900 meters from the boundary. A grid spacing of 100 meters was used for distances from 900 meters to 2000 meters from the boundary. A grid spacing of 300

meters was used for distances from 2000 meters to 4500 meters from the boundary. A grid spacing of 600 meters was used for distances from 4500 meters to 6000 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.
- As noted in the application, "the cumulative NAAQS air modeling demonstration does account for condensable PM from all existing and proposed emergency generators."

5.2 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(b) Primary	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	56	PM10_101115, PM10_101115b PM10_101215, PM10_101315	80	136
Particulate Matter ($PM_{2.5}$)						
Annual average	12	15	0.47	PM10_101115, PM10_101115b PM25_100515-COPY	7.6	8
1st-highest 24-hour average for cooling towers and electrical bypass	35	35	12.6 (includes local background)		21 (includes regional background only)	34
Carbon Monoxide (CO)						
8-hour average	10,000 (9 ppm)		326	CO_100715b CO_100715a	3,308	3,634
1-hour average	40,000 (35 ppm)		637		5,776	6,413
Nitrogen Oxides (NO_2)						

Annual average	100 (53 ppb)	100	7.71	NOx_101215, NOx_101215b NOx_100715	5.4	13
1-hour average	188 (100 ppb)	--	105 (includes local background)		16 (includes regional background only)	121
Sulfur Dioxide (SO_2)						
3-hour average	--	1,300 (0.5 ppm)	1.6	SO2_100615a	2.1	3.7
1-hour average	195 (75 ppb)	--	2.3	SO2_100615b	2.6	4.9

Toxic Air Pollutant	ASIL (µg/m³)	Averaging Period	1st-Highest Ambient Concentration (µg/m³)	AERMOD Filename
DEEP	0.00333	Annual average	0.15	DEEP_100615a
NO_2	470	1-hour average	859	NO2_100715
CO	23,000	1-hour average	637	CO_100715a
S02	660	1-hour average	4.9	(d)
Acrolein	0.06	24-hour average	0.0067	Acrolein_101415
Benzene	0.0345	Annual Average	0.0029	(c)
1,3-Butadiene	0.00588	Annual Average	0.00015	(c)
Naphthalene	0.0294	Annual Average	0.00048	(c)

Notes:
µg/m³ = 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 except where noted. Regional background concentrations obtained from WSU NW Airquest website http://lar.wsu.edu/nw-airquest/lookup.html. Local background values for PM2.5, PM10, and NO2 consisted of the ambient impacts, at Project Genesis' maximum impact location, caused by emissions from the nearby emergency generators and industrial emission sources at the existing Yahoo! Data Center, Sabey Data Center, Vantage Data Center, Intuit Data Center, and the Celite facility.
(b) Ecology interprets compliance with the National Ambient Air Quality Standards (NAAQS) as demonstrating compliance with the Washington Ambient Air Quality Standards (WAAQS).
(c) A dispersion factor was used to approximate the control emissions impact.
(d) Yahoo! was not required to model SO2 for comparison to the ASIL for Project Genesis, because estimated emissions of 0.9 lb/hr are below the WAC 173-460-150 small quantity emission rate of 1.45 lb/hr.

Yahoo! Project Genesis 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 were further evaluated as explained 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 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 Yahoo! Project Genesis 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 Yahoo!'s increased emissions of identified carcinogenic compounds. 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 Yahoo!'s Project Genesis proposal in a community-wide basis, even though it is not required to do so by state law. Yahoo! reported the cumulative risks associated with Yahoo! Project Genesis and prevailing sources in their HIA document based on a cumulative modeling approach.

As part of the community-wide approach, the Yahoo! Project Genesis second-tier health impact assessment (HIA) considered the cumulative impacts of DEEP and NO2 from the proposed generators, nearby existing permitted sources, and other background sources including State Route (SR) 28 and the adjacent railroad line. The Yahoo! Project Genesis DEEP and NO2 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 48 generators and 12 cooling cells will not have an adverse impact on air quality[pending]. Ecology finds that Yahoo!'s Data Center has satisfied all requirements for NOC approval.

******END OF YAHOO! TSD ******

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A NEW) AIR CONTAMINANT SOURCE FOR)

Synthetic Minor
APPROVAL ORDER No. 16AQ-E012

YAHOO! INC.)
YAHOO! DATA CENTER)

TO: Mozan Totani, Development Manager
Yahoo! Inc.
701 First Avenue
Sunnyvale, CA 94089

Brian Huck, Facilities Manager
Yahoo! Data Center
1010 Yahoo! Way
Quincy, WA 98848

EQUIPMENT

The following table contains a list of equipment that was evaluated for this order of approval for the Yahoo! Inc., Data Center (Yahoo!) located at 1010 Yahoo! Way and 1500 M Street NE, Quincy, WA. Engine sizes listed in the tables are in megawatt (MWe) units with the "e" indicating "electrical" based on generator power ratings listed on the engine specifications. Thirteen (13) existing 2.0 MWe MTU Detroit Diesel emergency generator unit identification numbers R through 12 were approved in Notice of Construction (NOC) approval Order No. 07AQ-E241 issued on November 13, 2007. Order No. 07AQ-E241 was rescinded and replaced by NOC approval Order No. 11AQ-E399 issued on March 28, 2011. Order No. 11AQ-E399 included the original 13 engines and also ten (10) 2.0 MWe MTU Detroit Diesel emergency generator units with identification numbers 13 through R3. Twenty five (25) new emergency generator units at the facility were proposed in Yahoo!'s Project Genesis final NOC application submitted to Ecology on December 23, 2015 and will have capacities of 2.0 MWe (20 units) and 2.75 MWe (5 units). Yahoo!'s application provided Ecology with a combination of the following anticipated engine manufacturers and models to be used for the 25 new engines: Caterpillar Models 3516C and 3512C; Cummins DQKAB and DQLF; MTU 16V4000 DS2000 and 20V4000 DS2800.

This approval Order covers all 48 engines (existing and proposed). The 48 engine/generators will have a combined capacity of up to 97 MWe. Specific engine information regarding existing engines is provided in Table 1.1.

Table 1.1: Emergency Engine & Generator Serial Numbers

Phase	Unit ID	Manufacturer & Model No.	Rated MWe	Engine SN	Generator SN	Build Date
Phase 1	R	MTU Detroit Diesel 16V4000 G83 B3	2.0	527103530	81 28288 A505	12/14/06
"	1	MTU Detroit Diesel 16V4000 G83 B3	2.0	527103852	81 28288 A205	2/16/07
"	2	MTU Detroit Diesel 16V4000 G83 B3	2.0	527103897	81 28288 A305	2/19/07
"	3	MTU Detroit Diesel 16V4000 G83 B3	2.0	527103898	81 28288 A105	2/19/07
"	4	MTU Detroit Diesel 16V4000 G83 B3	2.0	527104004	81 28288 A405	3/1/07
Phase 2	5	MTU Detroit Diesel 16V4000 G83 B3	2.0	527104645	81 28976 A404	9/12/07
"	6	MTU Detroit Diesel 16V4000 G83 B3	2.0	527104646	81 28597 A405	9/12/07
"	7	MTU Detroit Diesel 16V4000 G83 B3	2.0	527105840	81 28597 A101	8/8/08
"	8	MTU Detroit Diesel 16V4000 G83 B3	2.0	527104665	81 28597 A105	9/12/07

Phase 3	9	MTU Detroit Diesel 16V4000 G83 B3	2.0	527105203	81 28597 A505	2/1/08
"	10	MTU Detroit Diesel 16V4000 G83 B3	2.0	527105204	81 28976 A104	2/1/08
"	11	MTU Detroit Diesel 16V4000 G83 B3	2.0	527105205	81 28976 A204	2/1/08
"	12	MTU Detroit Diesel 16V4000 G83 B3	2.0	527105206	81 28976 A304	2/1/08
Phase 5	13	MTU Detroit Diesel 16V4000 G83 B3	2.0	527107949	WA-575124-1110	9/16/10
"	14	NA	NA	NA	NA	NA
"	15	MTU Detroit Diesel 16V4000 G83 B3	2.0	527107951	WA-575127-1110	9/16/10
	16	MTU Detroit Diesel 16V4000 G83 B3	2.0	527107950	WA-575140-1210	9/16/10
"	R2	MTU Detroit Diesel 16V4000 G83 B3	2.0	527107948	WA-575180-1210	2010
Phase 6	17	MTU Detroit Diesel 16V4000 G83 B3	2.0	5272011221	WA-575153-1210	Feb-13
"	18	MTU Detroit Diesel 16V4000 G83 B3	2.0	5272011219	WA-581655-0213	Feb-13
"	19	MTU Detroit Diesel 16V4000 G83 B3	2.0	5272011218	WA-581627-0213	Feb-13
"	20	MTU Detroit Diesel 16V4000 G83 B3	2.0	5272011220	WA-581653-0213	Feb-13
"	R3	MTU Detroit Diesel 16V4000 G83 B3	2.0	5272011251	WA-581631-0313	Mar-13
total	48					

The words "engine" or "generator" are used synonymously through the remainder of this permit to refer to the overall unit. This approval order also includes 6 Evapco Model AT 212-636 cooling towers installed under NOC 07AQ-E241 for the first 13 existing engines (engines R through 12). Cooling units dissipate heat from electronic equipment at the facility. Cooling unit information is provided in Table 1.2.

Table 1.2: Existing Cooling Towers installed under NOC 07AQ-E241			
Total Units	Total Number of Fans per Cooling Unit	Total Number of Cooling Tower Cells per Unit	Total Number of Cooling Cells
6	2	2	12

Engines 13 through R3 at Yahoo! do not use evaporative cooling systems. According to the application, the evaporative cooling units to be used for the new Project Genesis engines do not introduce contaminants into the atmosphere.

Combined facility potential to emit (PTE) estimated emissions from all engines and cooling towers are provided in Table 1.3.

Table 1.3 Total Facility Potential To Emit (PTE) Emissions	
Criteria Pollutants (Engines)	**TPY**
NOx	95
VOC	2.8
CO	17.9
Total PM10/PM2.5 (filterable and condensable)	5.5
SO_2	0.025
Toxic Air Pollutants (Engines)	**TPY**
Primary NO_2	9.5
DEEP	1.8
CO	17.9
SO_2	0.025
Propylene	1.3E-01
Acrolein	3.5E-04
Benzene	3.5E-02
Xylenes	8.6E-03
Napthalene	2.2E-03
1,3 Butadiene	1.8E-03
Formaldehyde	3.5E-03
Benzo(a)Pyrene	1.2E-05
Benzo(b)fluoranthene	5.0E-05
Dibenz(a,h)anthracene	1.6E-05
Cooling Tower Emissions	**TPY (or lbs/yr where listed)**
PM10/PM2.5	2.11
Cadmium	(0.00395 lb/yr)

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) ~~(pending)~~. 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-E399 is rescinded and replaced entirely with this Approval Order. [Order No. 07AQ-E241 for engines R through 12 was rescinded under 11AQ-E399, and remains rescinded under this Order].

1.2 Yahoo! will provide Quincy School District administrators with the telephone number for Yahoo! and a 24 hour contact number for a Yahoo! manager. Yahoo! will notify the school whenever (Ecology) approved changes occur in the maintenance testing schedule. As decided by the school administrators and Yahoo!, an ongoing relationship shall be established to facilitate future communications.

1.3 Yahoo! 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 Yahoo! 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 Yahoo! 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 Project Genesis 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 2.0 to 2.75 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 Yahoo! 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 Yahoo! are those listed by serial number in Table 1.1 of this Order.

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 of the engines permitted herein 18 months after the issuance date of this permit 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-eight (48) engine-generators exhaust stack heights shall conform to the limitations in Conditions 2.5.1, 2.5.2, and 2.5.3:

2.5.1 The 13 existing engine stack heights (Unit ID: R through 12) shall be greater than or equal to 20 feet above ground level

2.5.2 The 10 existing stack heights (Unit ID: 13 through R3) shall be greater than or equal to 30 feet above ground level.

2.5.3 The 25 Project Genesis stack heights shall be greater than or equal to 42 feet above ground level.

2.6 This Order only applies to the forty-eight (48) engines, each with a rated full standby capacity as listed in Table 1.1, which are consistent with the engines that were evaluated in Notice of Construction applications and second tier review. New source review will not be required for engines with a rated full standby capacity of less than or equal to the ratings in Table 1.1 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.

2.7 In addition to meeting EPA Tier 2 certification requirements, the source must have written verification from the engine manufacturer that each of the 48 engines 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 Yahoo! shall be limited to a total of approximately 648,900 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 and shall conform to Conditions 3.1.1 and 3.1.2:

3.1.1 The 13 existing engines (Unit ID: R through 12) shall be limited to 143,648 gallons per year of diesel fuel averaged over a three (3) year period using monthly rolling totals.

3.1.2 The 10 existing engines (Unit ID: 13 through R3) shall be limited to 103,551 gallons per year of diesel fuel averaged over a three (3) year period using monthly rolling totals.

3.1.3 The 25 Project Genesis engines shall be limited to a maximum of 401,700 gallons per year of diesel fuel averaged over a three (3) year period using monthly rolling totals.

3.2 Except as provided in Approval Condition 3.5, the forty-eight (48) Yahoo! engines are restricted to the annual limits in Tables 3.2.1 and 3.2.2.

Table 3.2.1 Existing Engine Operating Restrictions for Engines R through 12 (13 engines) and Engines 13 through R3 (10 engines)

Operating Activity	Hours/year per generator	Operating Electrical Loads (%)	Number of Engines Operating Concurrently (Engines R - 12)	Number of Engines Operating Concurrently (Engines 13 - R3)
Maintenance Testing	12	0	1	1
Load Testing	4	100	1	1
Electrical Bypass	36	2 at 40, or 1 at 80	2	2
Power Outage	48	8 at 90, 2 at idle*	13	10
Total	100			

*As noted in the application, potential to emit values are conservatively estimated based on 10% load because manufacturers do not publish emissions data for the idle operating condition. However, engines shall not be continuously operated at low loads (<30%) except during idle (zero load) and when it is required during stack testing (10% & 25%).

Table 3.2.2 Proposed Engine Operating Restrictions for Project Genesis Engines (25 engines)

Operating Activity	Hours/year per generator	Operating Electrical Loads (%)	Number of Engines Operating Concurrently
Maintenance Testing	12	Any random load* from zero to 100%	1
Load Testing	4	Any random load* from zero to 100%	1

Power Outage	84	Any random load* from zero to 100%	25
Total	100		

* Engines shall not be continuously operated at low loads (<30%) except during idle (zero load) and when it is required during stack testing (10% & 25%).

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-eight (48) engines at Yahoo! require periodic scheduled operation. To mitigate engine emission impacts, Yahoo! will perform all engine testing during daylight hours. Engine testing may take place outside of these time restrictions upon coordination by Yahoo! with other data centers in northeast Quincy to minimize engine emissions impacts to the community. Yahoo! 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 twenty-five (25) Project Genesis engines shall be performed in at least two phases, where each engine shall be restricted to an average of 16 hours per generator averaged over all generators installed and shall comply with the following Conditions:

3.5.1 Only six (6) 2.0-MW engines and two (2) 2.75-MW engines shall be commissioned during phase 1, and the remaining fourteen (14) 2.0-MW and three (3) 2.75-MW engines shall be commissioned at least 1 year after the first commissioning event.

3.5.2 Except during site integration testing as specified below, only one engine shall be operated at any one time during start-up testing.

3.5.3 During a site integration test, no more than twenty five (25) engines may operate concurrently for up to four continuous hours.

3.5.4 All startup and commissioning testing shall be conducted during daylight hours.

3.5.5 Fuel use limits and emissions limits contained in Approval Conditions 3.1 and 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. Yahoo! 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 Yahoo! 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 Yahoo!. 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, Yahoo! 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 Yahoo! 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.

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, Yahoo! 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-eight (48) 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, Yahoo! 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-eight (48) 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%	44.3 lb/hr[1] (NOx) for 2.0 MWe engines
			74.4 lb/hr[1] (NOx) for 2.75 MWe engines
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-eight (48) 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%	4.43 lb/hr[1] (NO_2) for 2.0 MWe engines
			7.44 lb/hr[1] (NO_2) for 2.75 MWe engines
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-eight (48) 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%	5.02 lb/hr[1] (CO) for 2.0 MWe engines
			14.3 lb/hr[1] (CO) for 2.75 MWe engines
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) emissions from each of the forty-eight (48) 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
5.6.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	0.88 lb/hr[1] (DEEP) for 2.0 MWe engines
			0.91 lb/hr[1] (DEEP) for 2.75 MWe engines
5.6.2	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 (filterable plus condensable) from all 48 engines combined shall not exceed 5.5 tons/yr on a 36-month rolling basis.

5.8 DEEP emissions from all 48 engines combined shall not exceed 1.8 tons/yr on a 36-month rolling basis.

5.9 Total NOx emissions from all 48 engines combined shall not exceed 95 tons/yr, on a 36-month rolling basis.

5.10 Total NO_2 emissions from all 48 engines combined shall not exceed 9.5 tons/yr, on a 36-month rolling basis.

5.11 Volatile organic compound (VOC) emissions from all 48 engines combined shall not exceed 2.8 tons/yr, on a 36-month rolling basis.

5.12 CO emissions from all 48 engines combined shall not exceed 17.9 tons/yr, on a 36-month rolling basis.

5.13 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 Yahoo! 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 Yahoo!, 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 Annual gross power generated by each independent building quadrant at the facility and total annual gross power for the facility.

8.6 Upset condition log for each engine and generator that includes date, time, duration of upset, cause, and corrective action.

8.7 Any recordkeeping required by 40 CFR Part 60 Subpart IIII.

8.8 Air quality complaints received from the public or other entity, the affected emissions units and any actions taken by Yahoo! in response to those complaints.

9 REPORTING

9.1 Within 10 business days after entering into a binding agreement to purchase the engine/generator sets identified in Equipment Table 1.1 above, Yahoo! shall notify Ecology in writing. The serial number, manufacturer make and model, standby capacity, and date of manufacture will be submitted prior to installation of each engine.

9.2 The following information will be submitted to the AQP at the address in Condition 7 above by January 31 of each calendar year. 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, 3.1.1, 3.1.2, and 3.1.3.

9.2.2 Monthly rolling annual and three year rolling total summary of all 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 of Yahoo!'s action to investigate the validity of the complaint and what, if any, corrective action was taken in response to the complaint. Ecology shall be notified within three (3) days of receipt of any such complaint.

9.4 Yahoo! shall notify Ecology by e-mail or in writing within 24 hours of any engine operation of greater than 60 minutes if such engine operation occurs as the result of a power outage 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 Project Genesis facility is not begun within 18 months of permit issuance or if overall facility operation is discontinued for a period of eighteen (18) months, unless prior written notification is received by Ecology at the address in Condition 7 above.

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 48 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, Yahoo! 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. Yahoo! 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 Yahoo! 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	**Department of Ecology** Attn: Appeals Processing Desk P.O. Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel Road SW, Suite 301 Tumwater, WA 98501	**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 2016, at Spokane, Washington.

Reviewed By:

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:
Approval Order

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4601 N Monroe Street • Spokane, Washington 99205-1295 • (509)329-3400

May 25, 2016

Mozan Totani, Development Manager
Yahoo! Inc.
701 First Avenue
Sunnyvale, CA 94089

And

Brian Huck, Facilities Manager
Yahoo! Data Center
1010 Yahoo! Way
Quincy, WA 98848

Dear Messrs. Totani and Huck:

Ecology has processed your air quality permit (Notice of Construction) application, for the installation of twenty five (25) new electric generators powered by diesel engines to provide emergency backup power for the Yahoo! 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 (509) 329-3469.

Sincerely,

Karen K. Wood

Karen K. Wood
Air Quality Unit Manager
Eastern Region Office

KKW:lc

Enclosure: Approval Order No. 16AQ-E012, Technical Support Document

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A NEW)
AIR CONTAMINANT SOURCE FOR)
YAHOO! INC.)
YAHOO! DATA CENTER)

Synthetic Minor
APPROVAL ORDER No. 16AQ-E012

TO: Mozan Totani, Development Manager
Yahoo! Inc.
701 First Avenue
Sunnyvale, CA 94089

Brian Huck, Facilities Manager
Yahoo! Data Center
1010 Yahoo! Way
Quincy, WA 98848

EQUIPMENT

The following table contains a list of equipment that was evaluated for this order of approval for the Yahoo! Inc., Data Center (Yahoo!) located at 1010 Yahoo! Way and 1500 M Street NE, Quincy, WA. Engine sizes listed in the tables are in megawatt (MWe) units with the "e" indicating "electrical" based on generator power ratings listed on the engine specifications. Thirteen (13) existing 2.0 MWe MTU Detroit Diesel emergency generator unit identification numbers R through 12 were approved in Notice of Construction (NOC) approval Order No. 07AQ-E241, issued on November 13, 2007. Order No. 07AQ-E241 was rescinded and replaced by NOC approval Order No. 11AQ-E399 issued on March 28, 2011. Order No. 11AQ-E399 included the original 13 engines and also ten (10) 2.0 MWe MTU Detroit Diesel emergency generator units with identification numbers 13 through R3. Twenty five (25) new emergency generator units at the facility were proposed in Yahoo!'s Project Genesis final NOC application submitted to Ecology on December 23, 2015 and will have capacities of 2.0 MWe (20 units) and 2.75 MWe (5 units). Yahoo!'s application provided Ecology with a combination of the following anticipated engine manufacturers and models to be used for the 25 new engines: Caterpillar Models 3516C and 3512C; Cummins DQKAB and DQLF; MTU 16V4000 DS2000 and 20V4000 DS2800.

This approval Order covers all 48 engines (existing and proposed). The 48 engine/generators will have a combined capacity of up to 97 MWe. Specific engine information regarding existing engines is provided in Table 1.1.

Table 1.1: Emergency Engine & Generator Serial Numbers

Phase	Unit ID	Manufacturer & Model No.	Rated MWe	Engine SN	Generator SN	Build Date
Phase 1	R	MTU Detroit Diesel 16V4000 G83 B3	2.0	527103530	81 28288 A505	12/14/06
"	1	MTU Detroit Diesel 16V4000 G83 B3	2.0	527103852	81 28288 A205	2/16/07
"	2	MTU Detroit Diesel 16V4000 G83 B3	2.0	527103897	81 28288 A305	2/19/07
"	3	MTU Detroit Diesel 16V4000 G83 B3	2.0	527103898	81 28288 A105	2/19/07
"	4	MTU Detroit Diesel 16V4000 G83 B3	2.0	527104004	81 28288 A405	3/1/07
Phase 2	5	MTU Detroit Diesel 16V4000 G83 B3	2.0	527104645	81 28976 A404	9/12/07
"	6	MTU Detroit Diesel 16V4000 G83 B3	2.0	527104646	81 28597 A405	9/12/07
"	7	MTU Detroit Diesel 16V4000 G83 B3	2.0	527105840	81 28597 A101	8/8/08
"	8	MTU Detroit Diesel 16V4000 G83 B3	2.0	527104665	81 28597 A105	9/12/07
Phase 3	9	MTU Detroit Diesel 16V4000 G83 B3	2.0	527105203	81 28597 A505	2/1/08
"	10	MTU Detroit Diesel 16V4000 G83 B3	2.0	527105204	81 28976 A104	2/1/08
"	11	MTU Detroit Diesel 16V4000 G83 B3	2.0	527105205	81 28976 A204	2/1/08
"	12	MTU Detroit Diesel 16V4000 G83 B3	2.0	527105206	81 28976 A304	2/1/08

Phase 5	13	MTU Detroit Diesel 16V4000 G83 B3	2.0	527107949	WA-575124-1110	9/16/10
"	14	NA	NA	NA	NA	NA
"	15	MTU Detroit Diesel 16V4000 G83 B3	2.0	527107951	WA-575127-1110	9/16/10
	16	MTU Detroit Diesel 16V4000 G83 B3	2.0	527107950	WA-575140-1210	9/16/10
"	R2	MTU Detroit Diesel 16V4000 G83 B3	2.0	527107948	WA-575180-1210	2010
Phase 6	17	MTU Detroit Diesel 16V4000 G83 B3	2.0	5272011221	WA-575153-1210	Feb-13
"	18	MTU Detroit Diesel 16V4000 G83 B3	2.0	5272011219	WA-581655-0213	Feb-13
"	19	MTU Detroit Diesel 16V4000 G83 B3	2.0	5272011218	WA-581627-0213	Feb-13
"	20	MTU Detroit Diesel 16V4000 G83 B3	2.0	5272011220	WA-581653-0213	Feb-13
"	R3	MTU Detroit Diesel 16V4000 G83 B3	2.0	5272011251	WA-581631-0313	Mar-13
total	48					

The words "engine" or "generator" are used synonymously through the remainder of this permit to refer to the overall unit. This approval order also includes 6 Evapco Model AT 212-636 cooling towers installed under NOC 07AQ-E241 for the first 13 existing engines (engines R through 12). Cooling units dissipate heat from electronic equipment at the facility. Cooling unit information is provided in Table 1.2.

Table 1.2: Existing Cooling Towers installed under NOC 07AQ-E241			
Total Units	Total Number of Fans per Cooling Unit	Total Number of Cooling Tower Cells per Unit	Total Number of Cooling Cells
6	2	2	12

Engines 13 through R3 at Yahoo! do not use evaporative cooling systems. According to the application, the evaporative cooling units to be used for the new Project Genesis engines do not introduce contaminants into the atmosphere.

Combined facility potential to emit (PTE) estimated emissions from all engines and cooling towers are provided in Table 1.3.

Table 1.3 Total Facility Potential To Emit (PTE) Emissions	
Criteria Pollutants (Engines)	**TPY**
NOx	95
VOC	2.8
CO	17.9
Total PM10/PM2.5 (filterable and condensable)	5.5
SO_2	0.025
Toxic Air Pollutants (Engines)	**TPY**
Primary NO_2	9.5
DEEP	1.8
CO	17.9
SO_2	0.025
Propylene	1.3E-01
Acrolein	3.5E-04
Benzene	3.5E-02
Xylenes	8.6E-03
Napthalene	2.2E-03
1,3 Butadiene	1.8E-03
Formaldehyde	3.5E-03
Benzo(a)Pyrene	1.2E-05
Benzo(b)fluoranthene	5.0E-05
Dibenz(a,h)anthracene	1.6E-05
Cooling Tower Emissions	**TPY (or lbs/yr where listed)**
PM10/PM2.5	2.11
Cadmium	(0.00395 lb/yr)

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-E399 is rescinded and replaced entirely with this Approval Order. [Order No. 07AQ-E241 for engines R through 12 was rescinded under 11AQ-E399, and remains rescinded under this Order].

1.2 Yahoo! will provide Quincy School District administrators with the telephone number for Yahoo! and a 24 hour contact number for a Yahoo! manager. Yahoo! will notify the school whenever (Ecology) approved changes occur in the maintenance testing schedule. As decided by the school administrators and Yahoo!, an ongoing relationship shall be established to facilitate future communications.

1.3 Yahoo! 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 Yahoo! 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 Yahoo! 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 Project Genesis 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 2.0 to 2.75 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 Yahoo! 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 Yahoo! are those listed by serial number in Table 1.1 of this Order.

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 of the engines permitted herein 18 months after the issuance date of this permit 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-eight (48) engine-generators exhaust stack heights shall conform to the limitations in Conditions 2.5.1, 2.5.2, and 2.5.3:

2.5.1 The 13 existing engine stack heights (Unit ID: R through 12) shall be greater than or equal to 20 feet above ground level

2.5.2 The 10 existing stack heights (Unit ID: 13 through R3) shall be greater than or equal to 30 feet above ground level.

2.5.3 The 25 Project Genesis stack heights shall be greater than or equal to 42 feet above ground level.

2.6 This Order only applies to the forty-eight (48) engines, each with a rated full standby capacity as listed in Table 1.1, which are consistent with the engines that were evaluated in Notice of Construction applications and second tier review. New source review will not be required for engines with a rated full standby capacity of less than or equal to the ratings in Table 1.1 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.

2.7 In addition to meeting EPA Tier 2 certification requirements, the source must have written verification from the engine manufacturer that each of the 48 engines 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 Yahoo! shall be limited to a total of approximately 648,900 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 and shall conform to Conditions 3.1.1 and 3.1.2:

3.1.1 The 13 existing engines (Unit ID: R through 12) shall be limited to 143,648 gallons per year of diesel fuel averaged over a three (3) year period using monthly rolling totals.

3.1.2 The 10 existing engines (Unit ID: 13 through R3) shall be limited to 103,551 gallons per year of diesel fuel averaged over a three (3) year period using monthly rolling totals.

3.1.3 The 25 Project Genesis engines shall be limited to a maximum of 401,700 gallons per year of diesel fuel averaged over a three (3) year period using monthly rolling totals.

3.2 Except as provided in Approval Condition 3.5, the forty-eight (48) Yahoo! engines are restricted to the annual limits in Tables 3.2.1 and 3.2.2.

Table 3.2.1 Existing Engine Operating Restrictions for Engines R through 12 (13 engines) and Engines 13 through R3 (10 engines)

Operating Activity	Hours/year per generator	Operating Electrical Loads (%)	Number of Engines Operating Concurrently (Engines R - 12)	Number of Engines Operating Concurrently (Engines 13 - R3)
Maintenance Testing	12	0	1	1
Load Testing	4	100	1	1
Electrical Bypass	36	2 at 40, or 1 at 80	2	2
Power Outage	48	8 at 90, 2 at idle*	13	10
Total	100			

*As noted in the application, potential to emit values are conservatively estimated based on 10% load because manufacturers do not publish emissions data for the idle operating condition. However, engines shall not be continuously operated at low loads (<30%) except during idle (zero load) and when it is required during stack testing (10% & 25%).

Table 3.2.2 Proposed Engine Operating Restrictions for Project Genesis Engines (25 engines)

Operating Activity	Hours/year per generator	Operating Electrical Loads (%)	Number of Engines Operating Concurrently
Maintenance Testing	12	Any random load* from zero to 100%	1
Load Testing	4	Any random load* from zero to 100%	1
Power Outage	84	Any random load* from zero to 100%	25
Total	100		

* Engines shall not be continuously operated at low loads (<30%) except during idle (zero load) and when it is required during stack testing (10% & 25%).

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-eight (48) engines at Yahoo! require periodic scheduled operation. To mitigate engine emission impacts, Yahoo! will perform all engine testing during daylight hours. Engine testing may take place outside of these time restrictions upon coordination by Yahoo! with other data centers in northeast Quincy to minimize engine emissions impacts to the community. Yahoo! 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 twenty-five (25) Project Genesis engines shall be performed in at least two phases, where each engine shall be restricted to an average of 16 hours per generator averaged over all generators installed and shall comply with the following Conditions:

3.5.1 Only six (6) 2.0-MW engines and two (2) 2.75-MW engines shall be commissioned during phase 1, and the remaining fourteen (14) 2.0-MW and three (3) 2.75-MW engines shall be commissioned at least 1 year after the first commissioning event.
3.5.2 Except during site integration testing as specified below, only one engine shall be operated at any one time during start-up testing.
3.5.3 During a site integration test, no more than twenty five (25) engines may operate concurrently for up to four continuous hours.
3.5.4 All startup and commissioning testing shall be conducted during daylight hours.
3.5.5 Fuel use limits and emissions limits contained in Approval Conditions 3.1 and 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. Yahoo! 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 Yahoo! 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 Yahoo!. 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, Yahoo! 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 Yahoo! 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.

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, Yahoo! 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-eight (48) 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, Yahoo! 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-eight (48) 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%	44.3 lb/hr[1] (NOx) for 2.0 MWe engines
			74.4 lb/hr[1] (NOx) for 2.75 MWe engines
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-eight (48) 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%	4.43 lb/hr[1] (NO_2) for 2.0 MWe engines
			7.44 lb/hr[1] (NO_2) for 2.75 MWe engines
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-eight (48) 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%	5.02 lb/hr[1] (CO) for 2.0 MWe engines
			14.3 lb/hr[1] (CO) for 2.75 MWe engines
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) emissions from each of the forty-eight (48) 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
5.6.1	Maximum Emission Rate Per Load	Maximum Rate at 100%, 75%, 50%, 25%, or 10%	0.88 lb/hr[1] (DEEP) for 2.0 MWe engines
			0.91 lb/hr[1] (DEEP) for 2.75 MWe engines
5.6.2	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 (filterable plus condensable) from all 48 engines combined shall not exceed 5.5 tons/yr on a 36-month rolling basis.

5.8 DEEP emissions from all 48 engines combined shall not exceed 1.8 tons/yr on a 36-month rolling basis.

5.9 Total NOx emissions from all 48 engines combined shall not exceed 95 tons/yr, on a 36-month rolling basis.

5.10 Total NO_2 emissions from all 48 engines combined shall not exceed 9.5 tons/yr, on a 36-month rolling basis.

5.11 Volatile organic compound (VOC) emissions from all 48 engines combined shall not exceed 2.8 tons/yr, on a 36-month rolling basis.

5.12 CO emissions from all 48 engines combined shall not exceed 17.9 tons/yr, on a 36-month rolling basis.

5.13 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 Yahoo! 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 Yahoo!, 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 Annual gross power generated by each independent building quadrant at the facility and total annual gross power for the facility.

8.6 Upset condition log for each engine and generator that includes date, time, duration of upset, cause, and corrective action.

8.7 Any recordkeeping required by 40 CFR Part 60 Subpart IIII.

8.8 Air quality complaints received from the public or other entity, the affected emissions units and any actions taken by Yahoo! in response to those complaints.

9 REPORTING

9.1 Within 10 business days after entering into a binding agreement to purchase the engine/generator sets identified in Equipment Table 1.1 above, Yahoo! shall notify Ecology in writing. The serial number, manufacturer make and model, standby capacity, and date of manufacture will be submitted prior to installation of each engine.

9.2 The following information will be submitted to the AQP at the address in Condition 7 above by January 31 of each calendar year. 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, 3.1.1, 3.1.2, and 3.1.3.

9.2.2 Monthly rolling annual and three year rolling total summary of all 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 of Yahoo!'s action to investigate the validity of the complaint and what, if any, corrective action was taken in response to the complaint. Ecology shall be notified within three (3) days of receipt of any such complaint.

9.4 Yahoo! shall notify Ecology by e-mail or in writing within 24 hours of any engine operation of greater than 60 minutes if such engine operation occurs as the result of a power outage 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 Project Genesis facility is not begun within 18 months of permit issuance or if overall facility operation is discontinued for a period of eighteen (18) months, unless prior written notification is received by Ecology at the address in Condition 7 above.

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 48 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, Yahoo! 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. Yahoo! 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 Yahoo! 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	**Department of Ecology** Attn: Appeals Processing Desk P.O. Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel Road SW, Suite 301 Tumwater, WA 98501	**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 24th day of May 2016, at Spokane, Washington.

GARY J. HUITSING
STATE OF WASHINGTON
42376
REGISTERED
PROFESSIONAL ENGINEER

Reviewed By:

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 F:
Final Technical Support Document

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TECHNICAL SUPPORT DOCUMENT
FOR APPROVAL ORDER NO. 16AQ-E012

YAHOO! DATA CENTER
MAY 24, 2016

1. PROJECT DESCRIPTION

On October 19, 2015, the Washington State Department of Ecology (Ecology) received a Notice of Construction (NOC) application submittal from the Yahoo! Data Center, (Yahoo) located at 1010 Yahoo Way, and 1500 M Street NE Quincy, WA. Yahoo! Yahoo is requesting approval for revisions to the March 28, 2011 Approval Order No. 11AQ-E399 (previous permit) which covers existing Yahoo data center facilities. A new Yahoo! Data Center (Project Genesis) is included in the NOC application and is located adjacent to the existing Yahoo data center facilities. The NOC application requests a new permit to cover existing Yahoo data center facilities in addition to Project Genesis. The existing Yahoo data centers facilities and Project Genesis are referred hereafter as Yahoo. The NOC application was determined to be incomplete and, on November 19, 2015, Ecology issued an incompleteness letter to Yahoo. On December 7, 2015, Yahoo provided supplemental NOC and Second Tier Risk Analysis information to Ecology. Yahoo!'s NOC application and Second Tier Risk Analysis were considered complete on December 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 a total of 23 existing and 25 new electric generators powered by diesel engines to provide emergency backup power to the facility. The existing 23 generators/engines (engines) and related facilities (cooling towers, building etc...) were permitted under Approval Order 11AQ-E399 and are incorporated into this new Approval Order along with Project Genesis. Project Genesis consists of direct evaporative cooling units, air cleaning systems, boiler heating, a 196,969 square feet building complex, along with the 25 new engines. 20 of the new engines will provide the main data center support and will be rated at 2.0 megawatt electrical capacity (MWe). The data center will also have 4 reserve engines rated at 2.75 MWe and 1 administrative support engine rated at 2.75 MWe. Upon final build-out, Yahoo will consist of forty-eight (48) electric generators with a total capacity of up to approximately 99.75 MWe using a combination of Caterpillar, Cummins, and MTU engine options.

The existing engines R through 12 are supported by 6 Evapco Model USS 212-636 cooling units to dissipate heat from electronic equipment at the facility. Each unit has two cooling towers and two fans. Each tower has a design recirculation rate of 2,460 gallons per minute (gpm) and an air flow rate of 290,700 cubic feet per minute (cfm). Project Genesis will also include direct evaporative cooling units or equivalents. The cooling units for engines 13 through R3 and Project Genesis are not a source of air emissions.

To avoid Title V major thresholds of Nitrogen Oxides (NOx), and Nitrogen Dioxide (NO2), this facility requested that existing generators R through 12 reduce allowable annual hours from 200 to 100 hours. The facility is considered a synthetic minor source as described in footnote k of Table 1.1.

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

Table 1.1 contains potential-to-emit (PTE) estimates in tons per year (TPY) by the applicant for Project Genesis and for entire Yahoo! facility (including Project Genesis).

Table 1 Total Facility and Project Genesis(j) Potential To Emit Estimates					
Pollutant	**Emission Factor (for the engine rating listed)**			**Total Facility PTE (Project Genesis PTE)**	**References**
Criteria Pollutants	**Units = lbs/hr; except where noted**			**TPY**	**(a)**
NOx	6.12 g/kW-hr	44.34 (2.0 MWe)	74.40 (2.75 MWe)	95 (62.9)	(b),(k)
VOC	0.28 g/kW-hr	1.14 (2.0 MWe)	2.91 (2.75 MWe)	2.8 (1.9)	(b)
CO	3.5 g/kW-hr	5.02 (2.0 MWe)	14.30 (2.75 MWe)	17.9 (8.8)	(b)
Total PM10/PM2.5 (filterable and condensable)	See DEEP and cooling tower emissions for specific contributions			7.6 (3.44)	(f),(i)
SO_2	15 ppm			0.025 (0.0001)	(c)
Lead	NA			Negligible (Negligible)	(d)
Ozone	NA			NA (NA)	(e)
Toxic Air Pollutants (TAPS)	**Units = Lbs/MMbtu (except where noted)**			**TPY**	(a)
Primary NO_2	10% of NOx			9.5 (6.3)	See NOx
DEEP	0.20 g/kW-hr	0.88 lbs/hr (2.0 MWe)	0.91 lbs/hr (2.75 MWe)	1.8 (1.12)	(b),(i)
CO	3.5 g/kW-hr			17.9 (8.8)	(b)
SO_2	15 ppm			0.025 (0.0001)	(c)
Propylene	2.79E-03			1.3E-01 (7.7E-02)	(g)
Acrolein	7.88E-06			3.5E-04 (2.2E-04)	(g)
Benzene	7.76E-04			3.5E-02 (2.2E-02)	(g)
Toluene	2.81E-04			1.3E-02 (7.8E-03)	(g)
Xylenes	1.93E-04			8.6E-03 (5.4E-03)	(g)
Napthalene	1.30E-04			2.2E-03 (3.6E-03)	(g)
1,3 Butadiene	1.96E-05			1.8E-03 (1.1E-03)	(g)
Formaldehyde	7.89E-05			3.5E-03 (2.2E-03)	(g)
Acetaldehyde	2.52E-05			1.1E-03 (7.0E-04)	(g)
Benzo(a)Pyrene	2.57E-07			1.2E-05 (7.1E-06)	(g)
Benzo(a)anthracene	6.22E-07			2.8E-03 (1.7E-05)	(g)
Chrysene	1.53E-06			6.9E-05 (4.2E-05)	(g)
Benzo(b)fluoranthene	1.11E-06			5.0E-05 (3.1E-05)	(g)
Benzo(k)fluoranthene	2.18E-07			9.8E-05 (6.1E-06)	(g)
Dibenz(a,h)anthracene	3.46E-07			1.6E-05 (9.6E-06)	(g)
Ideno(1,2,3-cd)pyrene	4.14E-07			1.9E-05 (1.1E-05)	(g)
Cooling Tower Emissions	**Units = mg/liter water concentration**				
PM10/PM2.5	7,500			2.11 tpy	(h),(j)
Arsenic	0.002			0.00263 lb/yr	(h),(j)
Barium	0.013			0.0171 lb/yr	(h),(j)
Cadmium	0.003			0.00395 lb/yr	(h),(j)
Chromium III	0.0047			0.00618 lb/yr	(h),(j)

Copper	0.0032	0.00421 lb/yr	(h),(j)
Iron	0.0665	0.0875 lb/yr	(h),(j)
Lead	0.0005	0.000658 lb/yr	(h),(j)
Manganese	0.002	0.00263 lb/yr	(h),(j)
Mercury	0.0003	0.000395 lb/yr	(h),(j)

(a) The current list of EPA criteria pollutants (http://www.epa.gov/airquality/urbanair/; last updated December 22, 2014) that have related National Ambient Air Quality Standards (NAAQS) (http://www.epa.gov/air/criteria.html; last updated October 21, 2014). 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 (PSD) projects such as at Yahoo! per WAC 173-400-110(5)(b).

(b) Project Genesis emission factors (EFs) based on manufacturer not-to-exceed (NTE) data and Tier 2 EFs from 40 CFR 89.112a. For NTE data, emission factors for Caterpillar, Cummins, and MTU were used, whichever is higher. For example, the VOC, PM, and CO NTE emission for the 2.75 MWe engines are based on Caterpillar NTE data of 2.91 lb/hr (10% load) and 0.91 lb/hr (25% load), and 14.3 lb/hr (75% load) respectively. Whereas for NOx, the Cummins NTE value of 74.4 lb/hr (100% load) is the highest NTE value. Tier 2 EFs are as follows: 6.4 g/kW-hr for NOx plus non-methane hydrocarbons (NMHC); 3.5 g/kW-hr for CO; and 0.20 g/kW-hr for PM. The total NOx, NMHC, CO, and PM emissions for all 48 certified engines meet the Tier 2 g/kW-hr emission factor limits listed.

(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) PM emissions are conservatively considered to be PM10 emissions, and PM10 emissions are conservatively considered to be PM2.5. Total facility PTE emissions of particulate (including filterable PLUS condensable) for all 48 engines and cooling towers would be approximately 7.6 tpy. As noted in the application, "the cumulative NAAQS air modeling demonstration does account for condensable PM from all existing and proposed emergency generators."

(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 (Evapco) cooling unit maximum recirculation rate as presented in TSD of Approval Order 11AQ-E399. Cooling tower emissions listed in previous TSD as 4,210 lbs/yr, which is approximately equivalent to 2.11 tpy.

(i) DEEP is defined in Washington Administrative Code (WAC) 173-460-150 as "Diesel Engine Exhaust, Particulate." DEEP includes only the filterable portion of PM2.5.

(j) Project Genesis emissions are only listed (in parenthesis) if they have estimated emissions for the listed pollutant or source.

(k) SM-80 Sources: Minor sources that have taken an enforceable limit to remain minor sources, called synthetic minor sources, that emit or have the potential to emit (PTE) at or above 80 percent of the Title V major source threshold (GUIDANCE ON FEDERALLY-REPORTABLE VIOLATIONS FOR CLEAN AIR ACT STATIONARY SOURCES September 2014; https://www.epa.gov/sites/production/files/2013-10/documents/caastationary-guidance.pdf).

1.2 Maximum Operation Scenarios

Yahoo's operation assumptions for their permit revision requests as presented in their application are listed table 2 below along with Ecology comments:

Table 2. Yahoo! Application Revision Requests	
Yahoo! Application Assumptions/Requests	**Ecology Comments**
Existing Engines R through R3 and Local Background Emissions Sources: • ***Worst Case Emissions and Power Outages.*** For purposes of demonstrating compliance with the national ambient air quality standards (NAAQS) and acceptable source impact levels (ASILs), it was assumed that the Yahoo! Data Center [excluding Project Genesis] would experience 48 hours over 2 consecutive days of power outage, and would operate with the restrictions of Table 3.2 of the permit. • ***Decreased Engine Runtime for Engines R through 12:*** Yahoo! has requested to consolidate engines R through R3 by having them adhere to the same operation restrictions as engines 13 through R3. The implications of this request are as follows: ➢ Engines R through 12 will no longer be allowed to operate 200 hours per year but will operate 100 hours per year similar to engines 13 through R3. ➢ Engines R through 12 will no longer be allowed to operate at an average full load rate of 100%, but will operate at more restrictive loads similar to engines 13 through R3.	(a),(b),(c)

• ***Local Background Emissions Sources:*** Local background values for PM2.5, PM10, and NO2 consisted of the ambient impacts, at Project Genesis' maximum impact location, caused by emissions from the nearby emergency generators and industrial emission sources at the existing Yahoo! Data Center, Sabey Data Center, Vantage Data Center, Intuit Data Center, and the Celite facility. Emissions from each of these facilities were assumed to be equal to their respective permit limits. The location and date of the maximum impact caused by Project Genesis' proposed new generators were determined, and AERMOD was used to model the "local background" ambient impacts at the same location and date caused by simultaneous activity at each of the adjacent data centers and industrial facility. The modeled "local background" sources were as follows: ➢ 24-Hour PM2.5. It was assumed that the existing cooling towers in the vicinity and the Celite facility would operate at their permitted limits. ➢ 1-Hour NO2. It was assumed that the Celite facility would operate at its permitted limit. ➢ 24-hour PM10 (Power Outage). It was assumed that each nearby data center would operate at its permitted rate during a power outage on the same day that the Project Genesis facility would operate during a power outage, while the Celite facility would emit at its permitted rate.	
For Project Genesis Engines: During a power outage at the site, 20 2.0-MW emergency generators and one 2.75-MW generator will activate in order to supplement power to the server system and the administrative building. If there is a problem with one or more of the 2.0-MW generators, one or more of the "reserve" 2.75-MW generators will engage the load. • ASIL considerations with 1-hour and 24-hour averaging periods: Impacts were modeled for the worst-case screening scenario of a power outage lasting 24 hours per day for 365 days per year for 5 years, with AERMOD automatically selecting the highest 1-hour and 24-hour [TAP] impacts. The annual [TAP] impacts were modeled based on the maximum requested generator runtimes and generator loads. • Emissions considerations for modeling of pollutants (including TAPs with annual averaging periods): assumed (per engine) 84 hours (3.5 days) of power outages. Emission rates were calculated for criteria pollutants and TAPs based on peak hourly (worst-case maximum) and long-term (annual maximum) operating scenarios. • Worst-case 1-hour considerations for modeling to determine the worst-case ambient impacts for carbon monoxide (CO) and sulfur dioxide (SO2), each with a 1-hour averaging period. Twenty five generators were modeled as if operating 24 hours per day, 365 days per year, based on conservative consideration that an outage could occur at any time of day or night and any time of year. This scenario also took into account cold start emission factors. • Worst-case 3-hour, 8-hr, and 24-hr considerations for modeling to determine the worst-case ambient impacts for CO, SO2, and PM10. Twenty five generators were modeled as if operating 24 hours per day, 365 days per year and assumed a worst-case unplanned power outage scenario (3.5 days). This scenario also took into account cold start emission factors. • PM2.5 (see below) • NO2 (see below)	(b),(f)
PM2.5 24-Hour NAAQS Modeling Setup: The PM2.5 24-hour NAAQS is based on the 98th percentile of ambient impacts during a 3-year rolling average period. The worst-case modeling setup assumes testing 2.75-MW engines for 8 hours (one at a time) operating during daylight hours (7:00 a.m. to 7:00 p.m.). Eight cold start events are assumed to occur per day for this simulation event. The 8-hour emissions total for this event was divided by 12 hours to develop the hourly emission rate input into AERMOD.	(e)
NO2 1-hour NAAQS Modeling Setup: The NO2 1-hour NAAQS is based on the 98th percentile of the daily highest 1-hour ambient impacts during a 3-year rolling average period. The same screening-level approach, as described for evaluation of the PM2.5 24-hour NAAQS, was used to evaluate the NO2 1-hour NAAQS. Table 13 lists and ranks each of the 1-hour operating regimes for NO2 emissions from the Project Genesis site. The ranked 8th-highest hour would also be during an annual load bank or monthly maintenance testing event. Emissions from a single cold-start event were included in the input emission rate and the air dispersion model was set up as if operating during daylight hours (7:00 a.m. to 7:00 p.m.).	(e)

➢ The ambient NO2 concentrations were modeled using the Plume Volume Molar Ratio Method (PVMRM) option to demonstrate compliance with the 1-hour and annual NAAQS and ASIL for NO2. This AERMOD option calculated ambient NO2 concentrations surrounding the site by applying a default NO2/NOx equilibrium ratio of 0.90 and a NO2/NOx in-stack ratio of 0.1. ➢ The estimated ambient ozone concentration of 49 parts per billion was the AERMOD input level for all corresponding NO2 modeling setups. This value was taken from the NW AIRQUEST 2009-2011 design value of criteria pollutants website, provided by the Washington State University's Northwest International Air Quality Environmental Science and Technology Consortium, for the Quincy, Washington area (WSU website 2015).	
Cold start/black puff factors: As noted in Yahoo!'s application: "emissions of criteria pollutants (PM, CO, NOx, and total VOCs) and volatile TAPs associated with cold-startup were scaled up using a 'black puff' emission factor in order to account for slightly higher cold-start emissions during the first minute of each scheduled cold-start. These 'black puff' factors are based on short-term concentration trends for VOC, CO, and NOx emissions immediately following cold-start by a large diesel backup generator that were measured by the California Energy Commission in its document, *Air Quality Implications of Backup Generators in California* (CEC 2005)." The 60-second cold start/black puff factors used for this application are: PM+HC factor = 4.3; NOx factor = 0.94, CO factor = 9.0.	(d)

(a) Ecology accepts the more restrictive operation limits for engines R through 12 requested by Yahoo!.
(b) Ecology accepts this approach because it is conservatively based on worst-case scenarios.
(c) Existing engine power outage information based on TSD of Approval Order 11AQ-E399.
(d) Ecology accepts the cold start black puff factors derived for this project.
(e) Emission impact estimates via modeling are based on the 98th percentile 3-yr average, which is consistent with the NAAQS standard.
(f) For the NO2 annual NAAQS, which are not based on 3-year averages, if all emissions occurred in 1-year, within a three-year period, the NAAQS standard would still be met because annual ambient NO^2 impacts (13 ug/m^3) are more than three times less than the NO2 annual NAAQS (100 ug/m^3).

2. APPLICABLE REQUIREMENTS

The proposal by Yahoo! 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 Yahoo! 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)

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 Yahoo! 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 Yahoo! (approximately 2.0 MWe to 2.75 MW). Instead, 40CFR60 requires the engines at Yahoo! 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 Yahoo!:

> *§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, Yahoo! is either using or will use the following engines discussed in Sections 2.1.1 through 2.1.7 with 2.0 MWe or 2.75 MWe sizes. Sections 2.1.1 through 2.1.6 cover 2007 and later model year engines and section 2.1.7 covers pre-2007 model year engines. Based on these specifications, each engine's displacement per cylinder were 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: [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:

$$\text{Displacement} = 0.7854 \times \text{bore(cm)}^2 \times \text{stroke(cm)} \times (\#\ \text{cylinders}) \times (1\ \text{Liter}/1000\ \text{cm}^3)$$

[1] HPBooks Auto Math Handbook., Lawlor, John., The Berkeley Publishing Group, A division of Penguin Putnam Inc. (www.penguinputnam.com), 1992, p. 2.

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 C175-16 rated 2.75 MWe

The specification sheet for this engine lists displacement as 84.67 liters, with 16 cylinders total. The single cylinder displacement for this engine is therefore 5.29 liters/cylinder.

2.1.3 Cummins Engine DQKAB rated 2.0 MWe

According to the specification sheet for this engine, it has 16 cylinders total. Using this equation above, and plugging in the manufacturer specifications for bore (159mm), stroke (190mm), and 16 cylinders, this engine's total displacement and displacement per cylinder are calculated as follows:

$$\text{Total Displacement} = 0.7854 \times (159/10)^2 \times (190/10) \times 16 \text{ cylinders} \times (1/1000)$$

$$\text{Total Displacement} = 60.4 \text{ Liters.}$$

The single cylinder displacement for this engine is therefore 3.76 liters/cylinder.

2.1.4 Cummins Engine DQLF rated 2.75 MWe

According to the specification sheet for this engine, it has 18 cylinders total. Using this equation above, and plugging in the manufacturer specifications for bore (170 mm), stroke (190 mm), and 18 cylinders, this engine's total displacement and displacement per cylinder are calculated as follows:

$$\text{Total Displacement} = 0.7854 \times (170/10)^2 \times (190/10) \times 18 \text{ cylinders} \times (1/1000)$$

$$\text{Total Displacement} = 77.6 \text{ Liters.}$$

The single cylinder displacement for this engine is therefore 4.31 liters/cylinder.

2.1.5 MTU Engine 16V4000 DS2000 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 20V4000 DS2800 rated 2.75 MWe

The specification sheet for this engine lists displacement as 95.4 liters, with 20 cylinders total. The single cylinder displacement for this engine is listed as 4.77 liters/cylinder.

Thus, because Yahoo! Project Genesis 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.***

2.1.7 MTU Detroit Diesel 16V4000 G83 B3

The existing engines R through R3 use MTU Detroit Diesel 16V4000 G83 B3 engines. 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.

Some of these engines have manufacture dates as early as December 2006, which pre-dates the Tier 2 requirement date of January 1, 2007 mentioned in 40CFR60 above. However, the 1/1/2007 date was intended as a harmonization date for all stationary and non-road regulations. Table 1 of 40CFR89.112 shows the same tier 2 engine requirements for model year 2006 engines as engines manufactured after January 1, 2007. Footnote 1 on Table 1 of 40CFR89.112 states the following: *"The model years listed indicate the model years for which the specified tier of standards take effect."* Therefore, in accordance with table 1 of 40CFR89.112 which shows tier 2 requirements for model year 2006, Ecology is requiring the existing pre-2007 engine at Yahoo! to follow current Tier 2 requirements (6.4 g/kW-hr for NOx plus NMHC; 3.5 g/kW-hr for CO; and 0.20 g/kW-hr for PM).

2.1.8 Tier 2 Emission Requirements Summary

Thus, based on the power ratings listed in *40 CFR 60.4202(a),* the Tier 2 engine requirements in 40CFR89.112 for 2006 and later engines, and because the engines to be used at Yahoo! will also have less than 10 liters per cylinder displacement, the 48 engines at Yahoo! are required to meet the 40CFR89.112 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 Yahoo! 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 Yahoo! has performed on existing 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, Yahoo! 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.

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[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.

4.1 BACT ANALYSIS FOR NOx FROM DIESEL ENGINE EXHAUST

Yahoo! 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

Yahoo'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 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.

Yahoo! 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..). Annual operation and maintenance cost estimates to account for urea, fuel for pressure drop, increased inspections, and periodic OEM visits based on EPA manual EPA/452/B-02-001, would cost approximately $14,400 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 $25,200 for NOx alone or $22,300 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 Yahoo! 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 affect 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 2.7 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. Yahoo! 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

Yahoo! 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.

Yahoo! 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 $123,600 per ton of engine exhaust particulate removed from the exhaust stream at Yahoo! each year. Catalyzed DPFs, which include a diesel oxidation catalyst, also remove CO and VOCs. However, for this project, DPFs and DOCs were evaluated separately (see Section 4.2.1.2 for DOC BACT).

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.

Yahoo! 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 Yahoo! followed for engines within this application (including for SCR-only, DPF-only, and Tier 4 capable integrated control system technologies).

- Yahoo! obtained the following recent DOC equipment costs: $32,000 and $54,000 for stand-alone catalyzed DOC per single 2.0 MWe and 2.75 MWe generators respectively (plus $3,667/generator for parts). For thirty two (5) 2.0 MWe, and 20 2.75 MWe generators, this amounts to $1,001,667. According to the applicant, DOC control efficiencies for this unit are CO, HC, and PM are 85%, 80%, and 20% respectively.
- The subtotal becomes $1,416,858 after accounting for shipping ($50,083), WA sales tax ($65,108), and direct on-site installation ($300,000).
- After adding indirect installation costs, the total capital investment amounts to: $1,634,668. 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 $170,025.
- At the control efficiencies provided, the annual tons per year of emissions for CO (8.79 tpy), HC (1.88 tpy), and PM (3.44 tpy) become 7.47 tpy, 1.5 tpy, and 0.69 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 ($170,025 divided by 7.47 tpy for CO, etc..).

The corresponding annual DOC cost effectiveness value for carbon monoxide destruction alone is approximately $22,800 per ton. If particulate matter and hydrocarbons are individually considered, the cost effectiveness values become $113,000 and $247,100 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 $17,600 per ton of combined pollutants removed per year.

These annual estimated costs (for DOC use alone) provided by Yahoo! are conservatively low estimates that take into account installation, tax, shipping, and other capital costs as mentioned above, but assume low range CARB estimates for operational, labor and maintenance costs, which could be up to $28,000 per year.

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. Yahoo! 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***

Yahoo! did not find any add-on control options commercially available and feasible for controlling sulfur dioxide emissions from diesel engines. Yahoo! proposed BACT for sulfur dioxide is the use of ultra-low sulfur diesel fuel (15 ppm by weight of sulfur). Ecology agrees with the applicant's proposed BACT for SO2.

4.4 BACT ANALYSIS FOR PM FROM COOLING TOWERS

According to the applicant, "no known contaminants will be introduced into the surrounding atmosphere" for cooling units to be used for Project Genesis. Also, because no changes are proposed for existing cooling tower operations or emission estimates, a BACT analysis was not performed. The following BACT determination from the previous Yahoo! 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 Yahoo! considered for BACT, the minimum estimated costs as applied to tBACT are as follows:

- The minimum estimated cost to control diesel engine exhaust particulate is estimated to be $0.4 million per ton removed.
- The minimum estimated costs to control NO2 is estimated to be $150,000 per ton removed.
- The minimum estimated cost to control CO is estimated to be $22,800 per ton removed.
- For the other TAPS above SQERs, the minimum estimated cost per ton removed would be as follows: $10 million for benzene; $59 million for naphthalene; $198 million for 1,3-butadiene; and $980 million 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
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
Cooling Tower Emissions (TAPs as PM)	Compliance with Cooling Tower BACT requirement

[4] WAC 173-460-020

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.
- 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 applicable stack height of above local ground (20 ft for engines R through 12; 30 ft for engines 13 through R3; 42 ft for the 25 Project Genesis engines).
- 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 12.5-meter grid spacing along the facility boundary extending to a distance of 150 meters from each facility boundary. A grid spacing of 25 meters was used for distances of 150 meters to 400 meters from the boundary. A grid spacing of 50 meters was used for distances from 400 meters to 900 meters from the boundary. A grid spacing of 100 meters was used for distances from 900 meters to 2000 meters from the boundary. A grid spacing of 300 meters was used for distances from 2000 meters to 4500 meters from the boundary. A grid spacing of 600 meters was used for distances from 4500 meters to 6000 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.
- As noted in the application, "the cumulative NAAQS air modeling demonstration does account for condensable PM from all existing and proposed emergency generators."

5.2 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:

	Standards in μg/m³		Maximum Ambient Impact Concentration (μg/m³)	AERMOD	Background Concentrations (μg/m³) (a)	Maximum Ambient Impact Concentration Added to Background (μg/m³) (If Available)
	NAAQS(b)					
Criteria Pollutant	Primary	Secondary		Filename		
Particulate Matter (PM_{10})						
1st-Highest 24-hour average during power outage with cooling towers	150	150	56	PM10_101115, PM10_101115b PM10_101215, PM10_101315	80	136
Particulate Matter ($PM_{2.5}$)						
Annual average	12	15	0.47	PM10_101115, PM10_101115b PM25_100515-COPY	7.6	8
1st-highest 24-hour average for cooling towers and electrical bypass	35	35	12.6 (includes local background)		21 (includes regional background only)	34
Carbon Monoxide (CO)						
8-hour average	10,000 (9 ppm)		326	CO_100715b CO_100715a	3,308	3,634
1-hour average	40,000 (35 ppm)		637		5,776	6,413
Nitrogen Oxides (NO_2)						
Annual average	100 (53 ppb)	100	7.71	NOx_101215, NOx_101215b NOx_100715	5.4	13
1-hour average	188 (100 ppb)	--	105 (includes local background)		16 (includes regional background only)	121
Sulfur Dioxide (SO_2)						
3-hour average	--	1,300 (0.5 ppm)	1.6	SO2_100615a SO2_100615b	2.1	3.7
1-hour average	195 (75 ppb)	--	2.3		2.6	4.9
Toxic Air Pollutant	ASIL (μg/m³)	Averaging Period	1st-Highest Ambient Concentration (μg/m³)	AERMOD Filename		
DEEP	0.00333	Annual average	0.15	DEEP_100615a		
NO_2	470	1-hour average	859	NO2_100715		
CO	23,000	1-hour average	637	CO_100715a		
S02	660	1-hour average	4.9	(d)		
Acrolein	0.06	24-hour average	0.0067	Acrolein_101415		
Benzene	0.0345	Annual Average	0.0029	(c)		
1,3-Butadiene	0.00588	Annual Average	0.00015	(c)		
Naphthalene	0.0294	Annual Average	0.00048	(c)		

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 except where noted. Regional background concentrations obtained from WSU NW Airquest website http://lar.wsu.edu/nw-airquest/lookup.html. Local background values for PM2.5, PM10, and NO2 consisted of the ambient impacts, at Project Genesis' maximum impact location, caused by emissions from the nearby emergency generators and industrial emission sources at the existing Yahoo! Data Center, Sabey Data Center, Vantage Data Center, Intuit Data Center, and the Celite facility.
(b) Ecology interprets compliance with the National Ambient Air Quality Standards (NAAQS) as demonstrating compliance with the Washington Ambient Air Quality Standards (WAAQS).
(c) A dispersion factor was used to approximate the control emissions impact.
(d) Yahoo! was not required to model SO2 for comparison to the ASIL for Project Genesis, because estimated emissions of 0.9 lb/hr are below the WAC 173-460-150 small quantity emission rate of 1.45 lb/hr.

Yahoo! Project Genesis 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 were further evaluated as explained 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 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 Yahoo! Project Genesis 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 Yahoo!'s increased emissions of identified carcinogenic compounds. 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 Yahoo!'s Project Genesis proposal in a community-wide basis, even though it is not required to do so by state law. Yahoo! reported the cumulative risks associated with Yahoo! Project Genesis and prevailing sources in their HIA document based on a cumulative modeling approach.

As part of the community-wide approach, the Yahoo! Project Genesis second-tier health impact assessment (HIA) considered the cumulative impacts of DEEP and NO2 from the proposed generators, nearby existing permitted sources, and other background sources including State Route (SR) 28 and the adjacent railroad line. The Yahoo! Project Genesis DEEP and NO2 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 48 generators and 12 cooling cells will not have an adverse impact on air quality. Ecology finds that Yahoo!'s Data Center has satisfied all requirements for NOC approval.

******END OF YAHOO! TSD ******

Appendix G:
Second Tier Review Recommendation

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
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February 17, 2016

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

Re: Second Tier Petition by Yahoo! Corporation Regarding TAP Emissions Increases from Project Genesis Data Center in Quincy, WA

Dear Mrs. Wood:

The Washington State Department of Ecology's Air Quality Program (Ecology) has completed a review of health risks from diesel particulate and nitrogen dioxide emissions from the Yahoo! Corporation (Yahoo!) Project Genesis Data Center in Quincy, WA. Ecology concluded that the health risk is acceptable and is recommending approval of the project.

Yahoo! proposes to build a new data center project, referred to as Project Genesis, near their existing data center in Quincy, WA. To ensure uninterrupted electrical power supply, project Genesis will use:

- Twenty 2.0 megawatt diesel powered emergency generators.
- Four 2.75 megawatt diesel powered emergency generators used as reserves.
- One 2.75 megawatt diesel powered emergency generator to support the administration building during power outages.

Although the proposed engines will only operate over a limited time (up to 100 hours per year per engine), two toxic air pollutants, diesel engine exhaust particulate matter and nitrogen dioxide, may be emitted at rates that exceed screening thresholds. As a result, Yahoo! is required to submit a health impact assessment describing the increased health risks from their potential emissions.

Diesel particle emissions resulted in an increase lifetime cancer risk of about seven in one million. The maximum risk was estimated at a residential location northeast of Genesis. As part of the community-wide approach in Quincy, Ecology also considered the cumulative impacts of diesel particle emissions in the area. Emissions from Genesis and other local sources of diesel particles could result in lifetime increased cancer risk of up to approximately 62 in one million (62×10^{-6}) at a location to the south of Genesis and just south of State Route 28.

Ecology's review of non-cancer hazards indicates that Genesis and other Quincy data center emissions under outage scenarios may cause nitrogen dioxide levels to be of concern for people with existing respiratory conditions. Because the meteorological conditions that would cause these higher levels are infrequent, and because power outages affecting data centers are not expected to occur frequently, the concentrations responsible for these hazards are not expected to occur often or be sustained for long periods of time.

Ecology recommends approval of the proposed project because 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 maximum risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100×10^{-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. Ecology also recommends that outages at Quincy data centers be tracked and re-evaluated yearly to determine if the assumptions used in characterizing hazards during outage scenarios remain plausible.

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: Mark Bruner, Landau Associates
Jolaine Johnson, Ecology
Gary Palcisko, Ecology
Mozan Totani, Yahoo!

DEPARTMENT OF
ECOLOGY
State of Washington

Health Impact Assessment Recommendation Document for

Yahoo! Data Center - Project Genesis
Quincy, Washington

Prepared by

Department of Ecology
Air Quality Program
Olympia, Washington

February 17, 2016

1. Executive Summary

This health impact assessment evaluates and summarizes the health risks from air pollutants emitted by twenty-five (25) new diesel engines at Yahoo! Data Center in Quincy. In general, toxic air pollutant impacts in the area near Yahoo! will not result in excessive risk or cause serious short- or long- term health effects. Ecology concluded that the health risk is acceptable and is recommending approval of the project.

Yahoo! proposes to build a new data center project, called Project Genesis, near their existing data center in Quincy. To ensure uninterrupted electrical power, Project Genesis will use:

- Twenty 2.0 megawatt diesel-powered emergency generators.
- Four 2.75 megawatt diesel-powered emergency generators used if primary engines fail.
- One 2.75 megawatt diesel-powered emergency generator to support the administration building during power outages.

While the proposed engines will only operate over intermittently (up to 100 hours per year per engine), the engines may emit two toxic air pollutants—diesel engine exhaust particulates and nitrogen dioxide—at rates above what is allowed without a health impact assessment. Because of these increased emissions, Yahoo! is required to submit a health impact assessment describing the increased health risks from their potential emissions.

Yahoo! hired Landau Associates to prepare a health impact assessment. Landau Associates estimated increased health risks associated with Project Genesis' diesel particles and other toxic air pollutant emissions. Because several data centers with many large diesel engines are located in Quincy, Landau Associates and Ecology also evaluated emissions from other nearby sources to determine the short-term and long-term health risks associated with cumulative exposure to diesel engine emissions.

Conclusions:

- Short-term: Nitrogen dioxide emitted during a power outage could rise to levels of short-term concern for sensitive people. Because power outages impacting several data centers at the same time are not expected to occur frequently, the concentrations responsible for these hazards are not expected to occur frequently or be sustained for long periods of time.
- Long-term:
  - o Project Genesis diesel particle emissions result in an increased lifetime cancer risk of up to 7.2 in one million. The maximum risk was estimated near a home northeast of Project Genesis. In assessing this risk, Ecology assumes that a person is exposed to Project Genesis' emissions continuously during their entire lifetime. 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 cancer risk of about 40 percent in the United States.

- The maximum cumulative cancer risk to a person who lives near Project Genesis is about 62 in one million. Most of the exposure to diesel particles at this location comes from vehicles. Additionally, exposure to diesel particles in the area is not likely to result in long-term non-cancer health effects.

Ecology's Recommendations:

Ecology recommends:

- Approval of the project because:
  - the cancer risk from Project Genesis' toxic air pollutant emissions is less than the maximum risk (10 in one million) allowed by a second tier review, and
  - the non-cancer hazard is acceptable.
  - the cumulative risks to residents living near Project Genesis are below the cumulative risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100×10^{-6}).
- Yearly review of the frequency of power outages impacting Quincy data centers. This will help determine if assumptions used to characterize nitrogen dioxide hazards continue to be appropriate.

2. Second Tier Review Processing and Approval Criteria

The health impacts assessment (HIA) for Project Genesis submitted by Landau Associates on behalf of Yahoo! is part of the second tier toxics review process under WAC 173-460 (Landau Associates, 2015). Ecology is responsible for processing and approving second tier review petitions statewide.

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 NOC Order of Approval (NOC) 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 an 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] Ecology approved an HIA protocol (item (c)), and the final HIA (item (e)) was received by Ecology on December 23, 2015. Ecology's modeler confirmed that refined modeling (item (d)) was conducted appropriately.[2]

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 Yahoo!'s proposed pollution control equipment satisfies the BACT and tBACT requirement for diesel engines powering backup generators at Project Genesis (Ecology, 2016a). BACT and tBACT was determined to be met through the restricted 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. The permit will also require 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).

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[1] Gary Huitsing to Gary Palcisko, "RE: Memo with Recommendations for Yahoo! Project Genesis," e-mail message, January 7, 2016.
[2] Ranil Dhammapala, "HIA_and_NOC_modeling_review_checklist_Project_Genesis_Yahoo_2015.docx," e-mail message, November 12, 2015.

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 risks to the surrounding community from a new project.

For the Genesis Project, the HIA focused on health risks attributable to diesel engine exhaust particulate (DEEP) and nitrogen dioxide (NO_2) exposure because these were the TAPs in which modeled concentration in ambient air exceeded an ASIL. Landau briefly described emissions and exposure to other TAPs (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. Health Effects Summary

The HIA prepared by Landau Associates quantifies the non-cancer hazards and increased cancer risks attributable to Project Genesis TAP emissions. The HIA focused on potential exposure to diesel particles and NO_2 as these were the two TAPs with emissions causing an exceedance of an ASIL.

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 or contribute to 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.

NO_2

NO_2 is a red-brown gas that is present in diesel exhaust. It forms when nitrogen, present in diesel fuel and as a major component of air, combines with oxygen to produce oxides of nitrogen.

NO_2 and other oxides of nitrogen are of concern for ambient air quality because they are part of a complex chain of reactions responsible for the formation of ground-level ozone. Additionally, exposure to NO_2 can cause both long-term (chronic) and short-term (acute) health effects.

Long-term exposure to NO_2 can lead to chronic respiratory illness such as bronchitis and increase the frequency of respiratory illness due to respiratory infections.

Short-term exposure to extremely high concentrations (> 180,000 $\mu g/m^3$) of NO_2 may result in serious effects including death (National Research Council, 2012). Moderate levels (~30,000 $\mu g/m^3$) may severely irritate the eyes, nose, throat, and respiratory tract, and cause shortness of breath and extreme discomfort. Lower level NO_2 exposure (< 1,000 $\mu g/m^3$), such as that experienced near major roadways, or perhaps downwind from stationary sources of NO_2, may cause increased bronchial reactivity in some asthmatics, decreased lung function in patients with chronic obstructive pulmonary disease, and increased risk of respiratory infections, especially in young children (CalEPA, 2008). For this project, the maximum short-term ambient NO_2 concentration has been estimated to be 859 $\mu g/m^3$, 1-hour average.

Power outage emissions present the greatest potential for producing high enough short-term concentrations of NO_2 to be of concern for susceptible individuals, such as people with asthma. Landau and Ecology calculated numerical estimates of exposure and hazard reported later in this document.

3.2. Toxicity Reference Values

Agencies develop toxicity reference values for use in evaluating and characterizing exposures to chemicals in the environment. As part of the HIA, Landau Associates identified appropriate toxicity values for DEEP and NO_2.

3.2.1. DEEP

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. Therefore, DEEP is defined as the filterable fraction of particulate emitted by diesel engines.[3] 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.

3.2.2. NO_2

OEHHA developed an acute reference exposure level for NO_2 based on inhalation studies of asthmatics exposed to NO_2. These studies found that some asthmatics exposed to about 0.25 ppm (i.e., 470 $\mu g/m^3$) experienced increased airway reactivity following inhalation exposure to NO_2 (CalEPA, 2008). Not all asthmatic subjects experienced an effect.

The acute REL derived for NO_2 does not contain any uncertainty factor adjustment, and therefore does not provide any additional buffer between the derived value and the exposure concentration at which effects have been observed in sensitive populations. This implies that exposure to NO_2 at levels equivalent to the acute REL (which is also the same as Ecology's ASIL) could result in increased airway reactivity in a subset of asthmatics. People without asthma or other respiratory disease are not likely to experience effects at NO_2 levels at or below the REL. OEHHA intended for acute RELs to be "for infrequent 1 hour exposures that occur no more than once every two weeks in a given year" (CalEPA, 2015).

EPA developed an annual and 1-hour NAAQS for NO_2. Compliance with these NAAQS was demonstrated as part of the NOC application process (Ecology, 2016b).

Table 1. Toxicity Values Used to Assess and Quantify Non-cancer Hazard and Cancer Risk

Pollutant	Agency	Non-cancer	Cancer
DEEP	U.S. Environmental Protection Agency	RfC = 5 µg/m3	N/A[1]
DEEP	California EPA–Office of Environmental Health Hazard Assessment	Chronic REL = 5 $\mu g/m^3$	URF = 0.0003 per $\mu g/m^3$
NO_2	California EPA–Office of Environmental Health Hazard Assessment	Acute REL = 470 $\mu g/m^3$	N/A

[1] EPA considers DEEP to be a probable human carcinogen, but has not established a cancer slope factor or URF.

[3] Condensable particulate is not considered to represent DEEP for the purposes assessing health risks from DEEP exposure, however, both the filterable and condensable fractions of PM are considered when determining compliance with NAAQS

3.3. Affected Community/Receptors

While Yahoo! Genesis is proposed to be built 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 57 parcels with residential land use codes (Figure 1) [Ecology, 2014; Grant County, 2015]. U.S. Census data show that approximately 669 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 nearby commercial locations (Figure 2). Landau also evaluated exposures that occur at Quincy High School.

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

3.4. Increased Cancer Risk

Landau Associates assessed the increased risk of cancer from lifetime exposure to DEEP emitted from Project Genesis' engines. Cumulative risks posed by other sources of DEEP in the area were also evaluated.

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

Table 2, adapted from the HIA, shows the estimated Genesis-specific cancer risk per million for residential, commercial, and fenceline receptors. Figure 3 shows the location of these receptors relative to Genesis. The highest increase in risks attributable to Genesis' emissions is 7.2 per million[4] and occurs near the closest edge of a property that contains an existing house to the northeast of Genesis Data Center.[5] A lower risk estimate of 6.0 per million occurs at the house location on the residential 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 0.02 per million at the maximally impacted residential receptor (MIRR).

For non-residential exposure scenarios, workers at nearby 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 1.5 per million.

[4] 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.

[5] Landau Associates selected a location to represent the MIRR that occurs near a residential parcel. The location actually falls on Intuit Data Center property.

Table 2. Estimated Increased Cancer Risk for Residential, Commercial, and Boundary Receptors Attributable to Genesis' DEEP Emissions					
Attributable to:	Risk Per Million from DEEP Exposure at Various Receptor Locations				
	Fence Line Receptor (MIBR)[1]	Northeast Residence-Property (MIRR)[2]	Northeast Residence-Home[2]	North Residential Parcel[2]	C-1 Industrial Parcel (MICR)[3]
Genesis	1.5	7.2	6.0	6.3	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.

3.4.2. Cancer Risk Attributable to Cumulative DEEP Emissions

As part of the HIA, Landau Associates conducted an analysis of cumulative exposure to DEEP in Quincy.[6] In total, the cumulative analysis includes allowable emissions estimates from:

- Yahoo! Data Center (including Project Genesis and requested permit changes to allowable emissions for the existing Yahoo! Data Center)
- Intuit Data Center
- Vantage Data Center
- Sabey Intergate-Quincy Data Center
- State Route 28

Ecology appended this analysis with results from west side data center emissions estimates (Microsoft Columbia, Microsoft Oxford, and Dell), SR 281 emissions estimates, and 2011 emissions estimates from locomotives on the BNSF rail line. These results were obtained from modeling conducted for a previous permitting project in Quincy (Ecology, 2014).

The cumulative cancer risk from all known sources of DEEP emissions in the vicinity[7] of Genesis (Table 3) is highest for a residential location on parcel south of SR 28. This parcel is about three-fourths mile south of the Yahoo! Data Center property boundary (Figure 3). The cumulative DEEP risk at this home is about 62 per million, and the majority (~77 percent) of exposure to DEEP is estimated to be attributable to emissions from vehicles travelling on SR 28.

[6] Landau Associates reported the concentrations obtained from the model which used five years of meteorological data, and reported cumulative risks associated with DEEP exposure in the area around Genesis.
[7] For the purposes of this analysis, the "vicinity" of Genesis encompasses the area in which Genesis' estimated impact exceeds the DEEP ASIL.

At the MIRR to the northeast of Yahoo!, potential emissions from Intuit Data Center contribute the most to cumulative DEEP risk (~40 percent) followed by Yahoo! (~18 percent) and Vantage Data Center (~17 percent).

Table 3. Estimated Cumulative Cancer Risk at Residential Locations near Yahoo! Data Center – Project Genesis

Attributable to:	Risk Per Million from DEEP Exposure at Various Residential Receptor Locations[1]		
	Residence Maximally Impacted by Genesis (MIRR)	South Residence (identified by Landau Assoc. in the HIA)	Maximum Cumulatively Exposed (identified by Ecology during the review of the HIA)
Genesis[2]	7.2	3.9	3.6
Sabey[2]	6.9	0.8	0.5
Vantage[2]	1.1	0.2	0.2
Intuit[2]	16	1.1	0.7
Yahoo! – Exisiting[2]	3.6	4.5	4.2
SR 28[3]	2.9	30	48
Rail[3]	1.4	3.2	2.9
Microsoft Columbia[2]	0.5	0.5	0.5
SR 281[3]	0.5	0.9	0.9
Microsoft Oxford[2]	0.2	0.2	0.2
Dell[2]	0.1	0.1	0.1
Cumulative	40	45	62

[1] Residential scenarios assume continuous lifetime exposure.

[2] Based on allowable emissions or requested emission limits. Actual emissions likely to be lower.

[3] Based on 2011 emissions estimates.

3.5. Non-cancer Hazard

Landau Associates evaluated chronic non-cancer hazards associated with long-term exposure to DEEP emitted from Genesis and other local sources. Table 4 shows that hazard quotients (HQs) associated with all receptors' exposure to Genesis-related and cumulative DEEP are much lower than unity (one). This indicates that chronic non-cancer hazards are not likely to occur as a result of exposure to DEEP in the vicinity of Genesis.

Landau also evaluated short-term exposures to NO_2 emitted from Genesis and nearby data center engines and determined that under outage scenarios, hazard indices could exceed unity at several locations. These hazards primarily result from NO_2 exposure.[8] The frequency of these potential occurrences is further discussed in Section 4.2.

Table 4. Estimated Short-term NO2 and Long-term DEEP Non-cancer Hazards Attributable to Genesis and (Cumulative) Emissions at Locations near Yahoo! Data Center

	Acute (short-term)			Chronic (long-term)		
Receptors	Max. 1-hr NO_2 (µg/m³)	NO_2 Acute REL (µg/m³)	HQ	Annual Avg. DEEP (µg/m³)	DEEP Chronic REL (µg/m³)	HQ
MIBR	859 [1015]	470	1.8 [2.2]	N/A	5	N/A
MICR	604 [675]		1.3 [1.5]	0.09 [0.23]		0.02 [0.05]
MIRR	564 [842]		1.2 [1.8]	0.02 [0.13]		<0.01 [0.03]
School	604 [1029]		1.3 [2.2]	0.04 [0.15]		0.02 [0.03]

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 Genesis' emissions are not expected to cause or contribute to an exceedance of any NAAQS (Ecology, 2016b).

4.2. Cumulative Short-Term NO_2 Hazard

Landau Associates evaluated short-term cumulative NO_X emissions as part of the second tier review. This analysis incorporated potential NO_X emission rates from each of the engines at all of Quincy's east side data centers during a power outage.[9] The analysis showed that while NO_2 levels could indeed rise to levels of concern[10] during a system-wide outage, the outage would

[8] Landau Associates also estimated acute hazards associated with CO, benzene, 1,3-butadiene, and acrolein. The combined hazard index of these pollutants (not including NO_2) was 0.2 or less for each of the evaluated receptors.
[9] Note that outage emissions from Sabey may have been overestimated by nearly a factor of two. Landau Associates assumed all of Sabey's engines would operate at 100 percent load (resulting in emissions of more than 1,800 lb NO_X/hr), but they will likely operate at a lower load and are only permitted to emit a maximum of 990 lb NO_X/hr.
[10] The level of concern in this case is 454 µg/m³. This represents California OEHHA's acute REL of 470 µg/m³ minus an estimated regional background concentration of 16 µg/m³.

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. The most frequent occurrence of NO_2 reaching a level of concern would occur near the boundaries of the data centers. Assuming eight hours of simultaneous outage per year, NO_2 levels of concern might occur once every two to three years at some locations near data center boundaries (Figure 6). Generally, recurrence becomes much less frequent with distance from the data centers.

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 Genesis' emissions. The assumptions used in the face of uncertainty may tend to over- or underestimate the health risks estimated in the HIA. Key aspects of uncertainty in the HIA for Project Genesis 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 Genesis' 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 Genesis' diesel-powered generators is uncertain. Landau Associates 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 Associates 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.

Forecasting the amount of time Genesis and other Quincy data center engines are used under emergency conditions is also uncertain. Furthermore, forecasting events that might affect each of the data centers simultaneously is difficult. While future outages cannot be predicted, past outages affecting data centers in Quincy appear to be infrequent (Ecology, 2014), and Grant County PUD previously reported that the average total outage time for customers that experience an outage throughout PUD's service area is about 143 minutes per year (Coe, 2010). Additionally, Quincy's east and west side are handled by separate feeder lines reducing the likelihood of an outage affecting all of Quincy at the same time.

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 Project Genesis 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.

6. Conclusions and Recommendation

The project review team has reviewed the HIA and determined that:

a) The TAP emissions estimates presented by Landau Associates represent a reasonable estimate of the project's future emissions.

b) Emission controls for the new and modified emission units meet 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 Associates on behalf of Yahoo! adequately assesses project-related increased health risk attributable to TAP emissions.

In the HIA, Landau Associates estimated lifetime increased cancer risks attributable to Genesis DEEP and other TAP emissions. DEEP emissions resulted in an increase cancer risk of about seven in one million at the MIRR. The maximum risk was estimated near an undeveloped portion of a residential parcel that contains a house to the northeast of the Genesis. A lower risk estimate of about six per million occurs at the house location on the residential parcel.

Landau Associates also assessed chronic and acute non-cancer hazards attributable to the project's emissions and determined that Genesis emissions by themselves are not likely to result in long-term adverse non-cancer health effects. Acute respiratory hazards are possible during power outage scenarios that occur during periods of unfavorable pollutant dispersion. If they do occur, these impacts would occur briefly at some locations near Genesis and may affect sensitive individuals with existing respiratory conditions such as asthma.

Landau Associates and Ecology assessed the combined impacts of a power outage affecting all data centers on the east side of Quincy and determined that NO_2 emitted during a power outage could rise to levels of short-term concern for sensitive people. Because power outages affecting several data centers at the same time are not expected to occur frequently, the concentrations responsible for these hazards are not expected to occur frequently or be sustained for long periods of time.

Finally, Landau Associates and Ecology assessed the cumulative health risk by adding estimated concentrations attributable to Genesis emissions to an estimated background DEEP concentration. The maximum cumulative cancer risk from resident's exposure to DEEP in the vicinity of Yahoo! Data Center – Project Genesis is approximately **62 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 Yahoo! Data Center – Project Genesis 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 Yahoo! Data Center Project Genesis are below the cumulative risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100×10^{-6}).

The project review team concludes that the HIA represents an appropriate estimate of potential increased health risks posed by Genesis' TAP emissions. The risk manager may recommend approval of the 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 100×10^{-6}). Ecology recommends periodically re-evaluating the frequency of power outages that affect Quincy data centers to determine if assumptions used to characterize NO_2 hazards continue to be appropriate.

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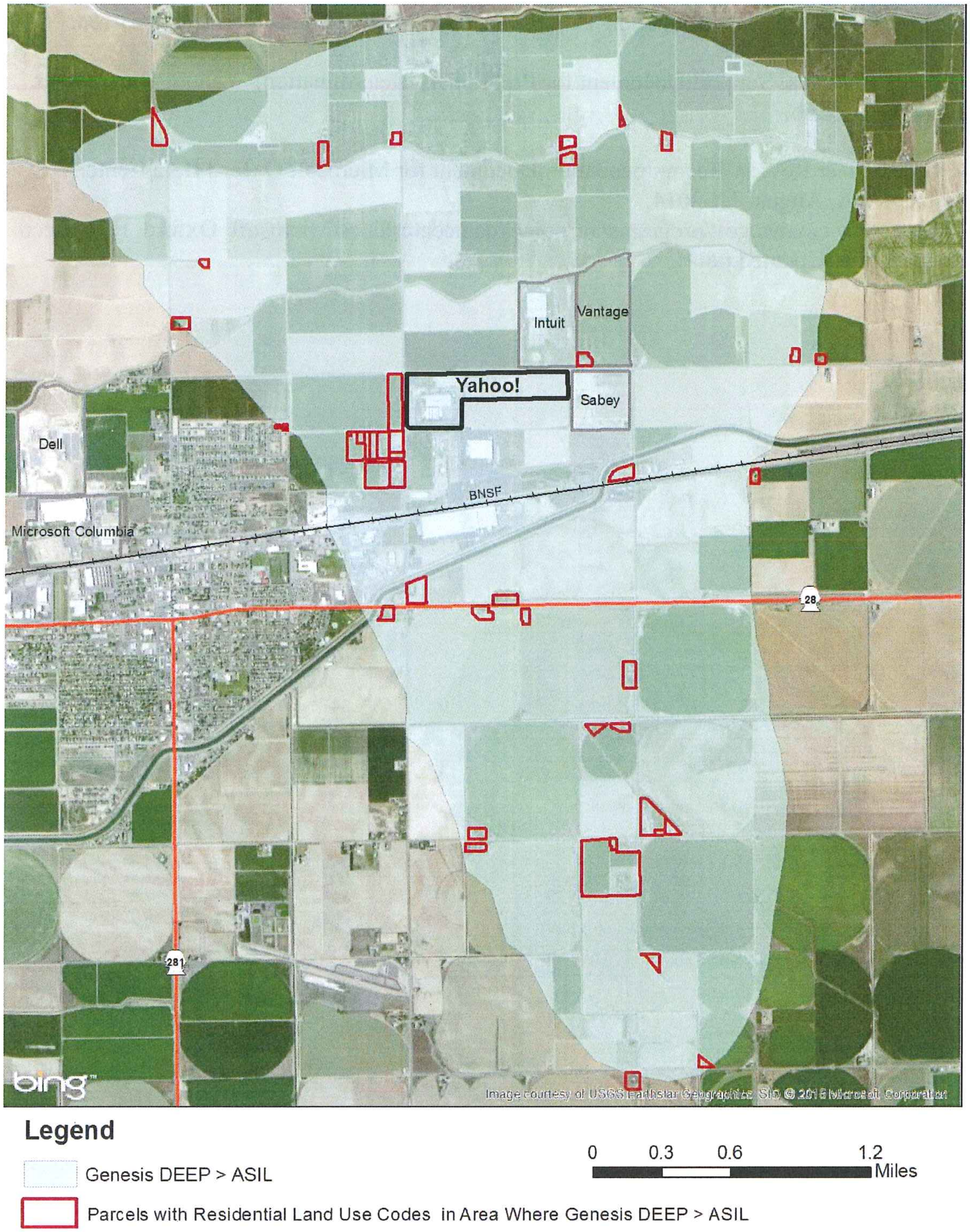


Figure 1. Residential parcels in the area where Genesis DEEP concentrations could exceed the ASIL

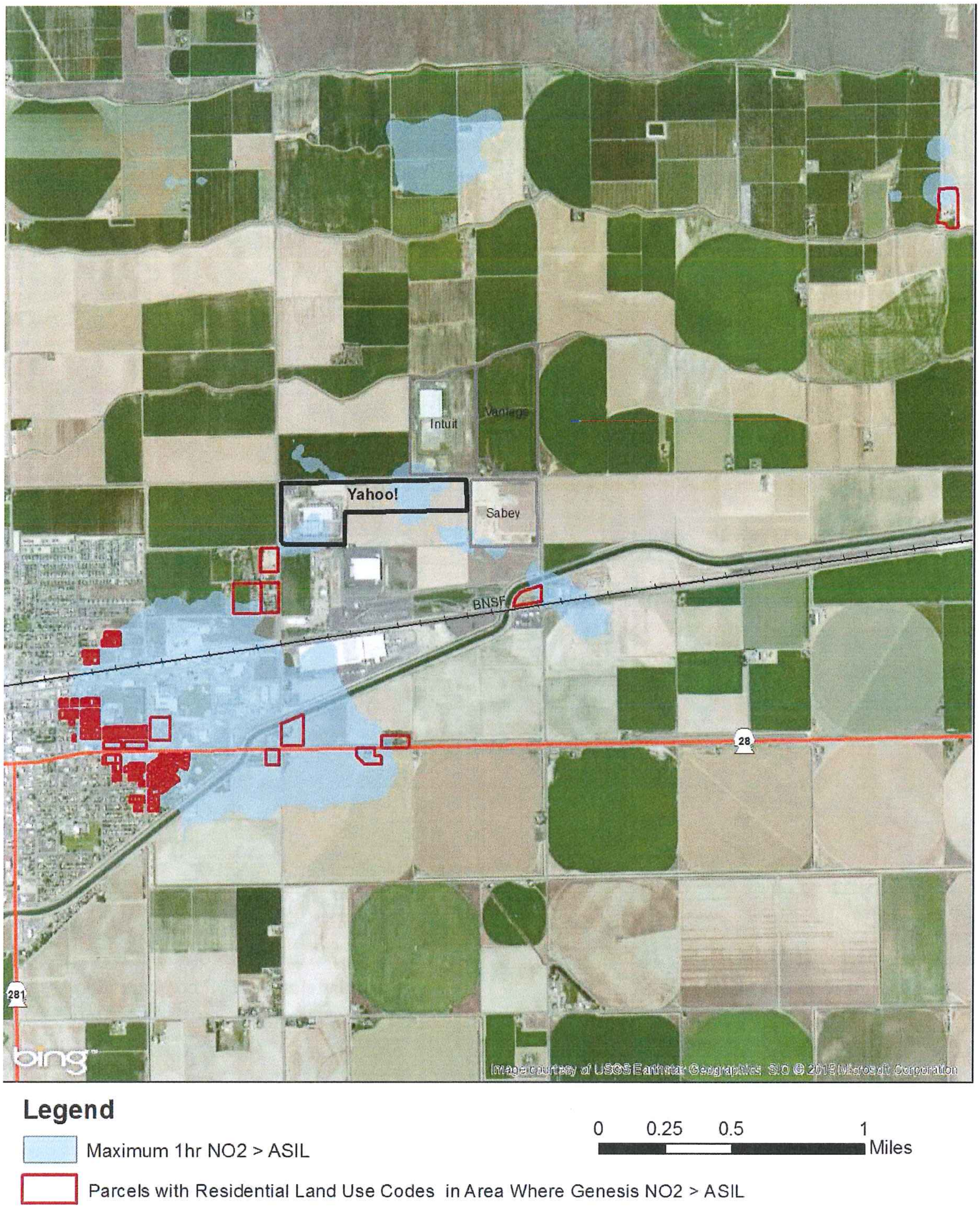
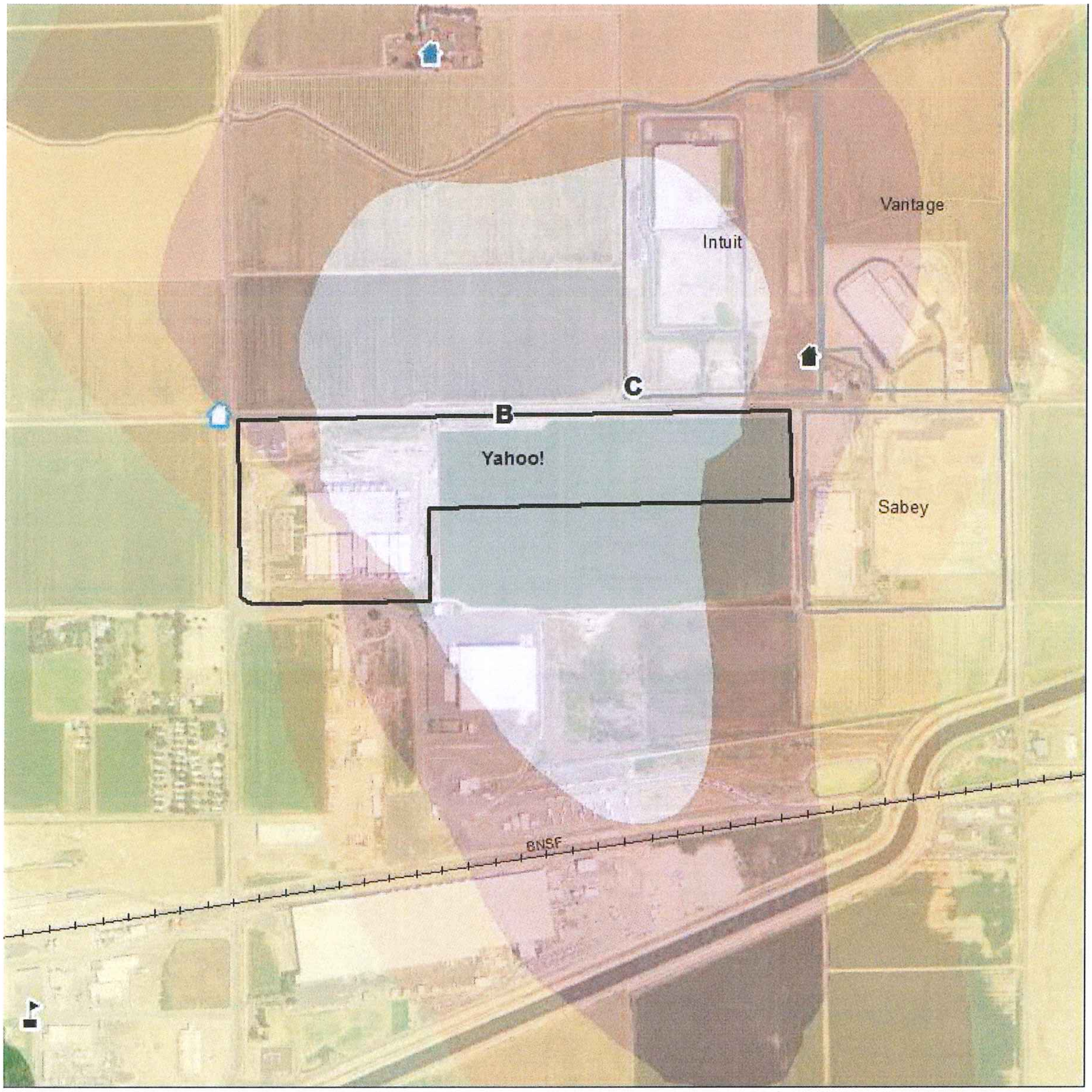


Figure 2. Residential parcels in the area where Genesis NO_2 concentrations could exceed the ASIL during a power outage



Receptor Locations Evaluated in HIA

B Maximally Impacted Boundary Receptor
Maximally Impacted Residential Receptor
C Maximaly Impacted Commercial Receptor
North Residence
School
West Undeveloped Residential Parcel

Genesis-related DEEP concentration
 # times ASIL (ASIL = 0.00333 ug/m3)

1 to 3
3 to 5
5 to 10
> 10

0 0.125 0.25 0.5 Miles

Figure 3. DEEP concentrations attributable to Genesis' engines and receptor locations evaluated in the HIA. Concentrations reported as the number of times higher than the ASIL.

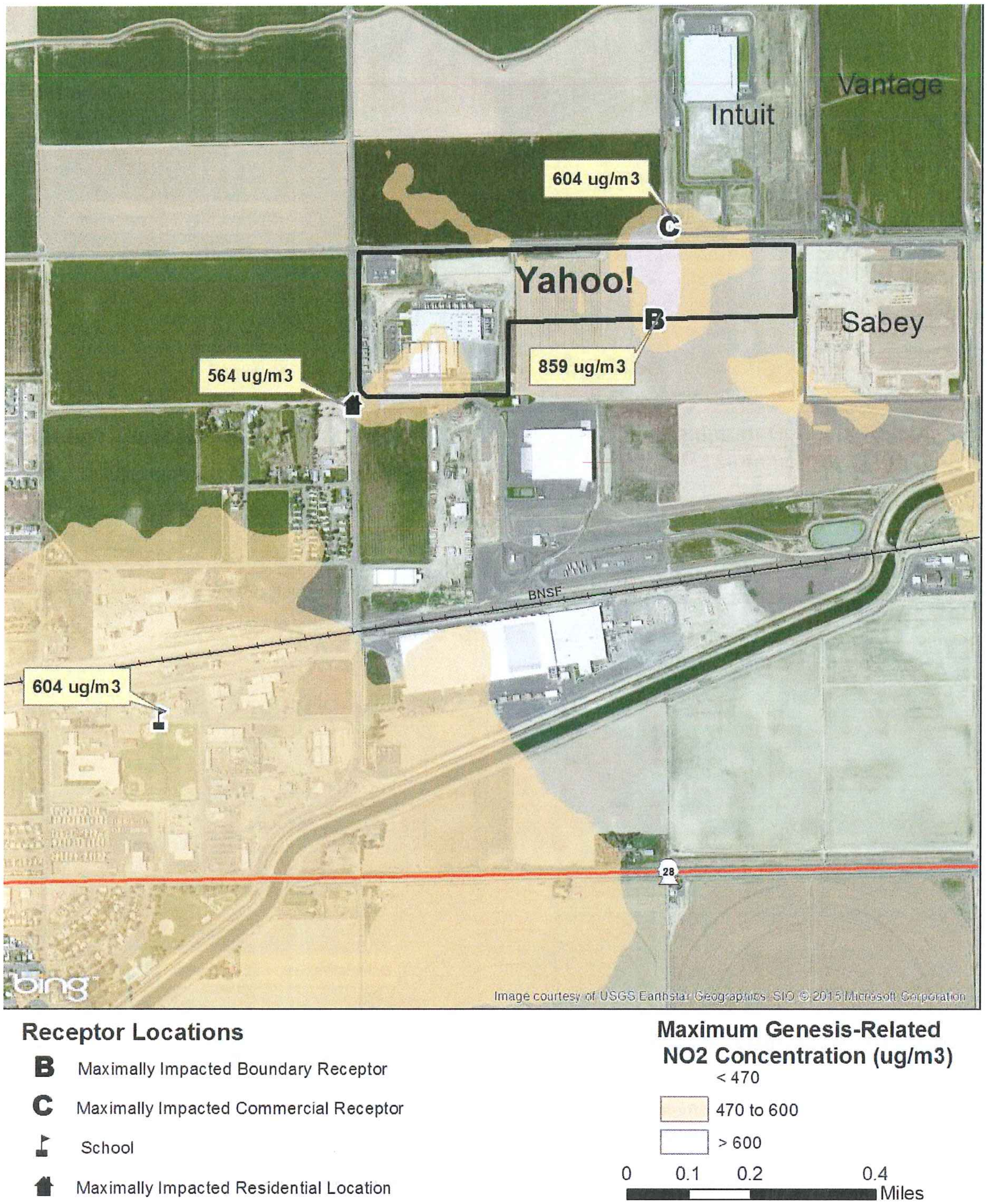


Figure 4. Maximum NO_2 concentrations attributable to Genesis' engines and receptor locations evaluated in the HIA

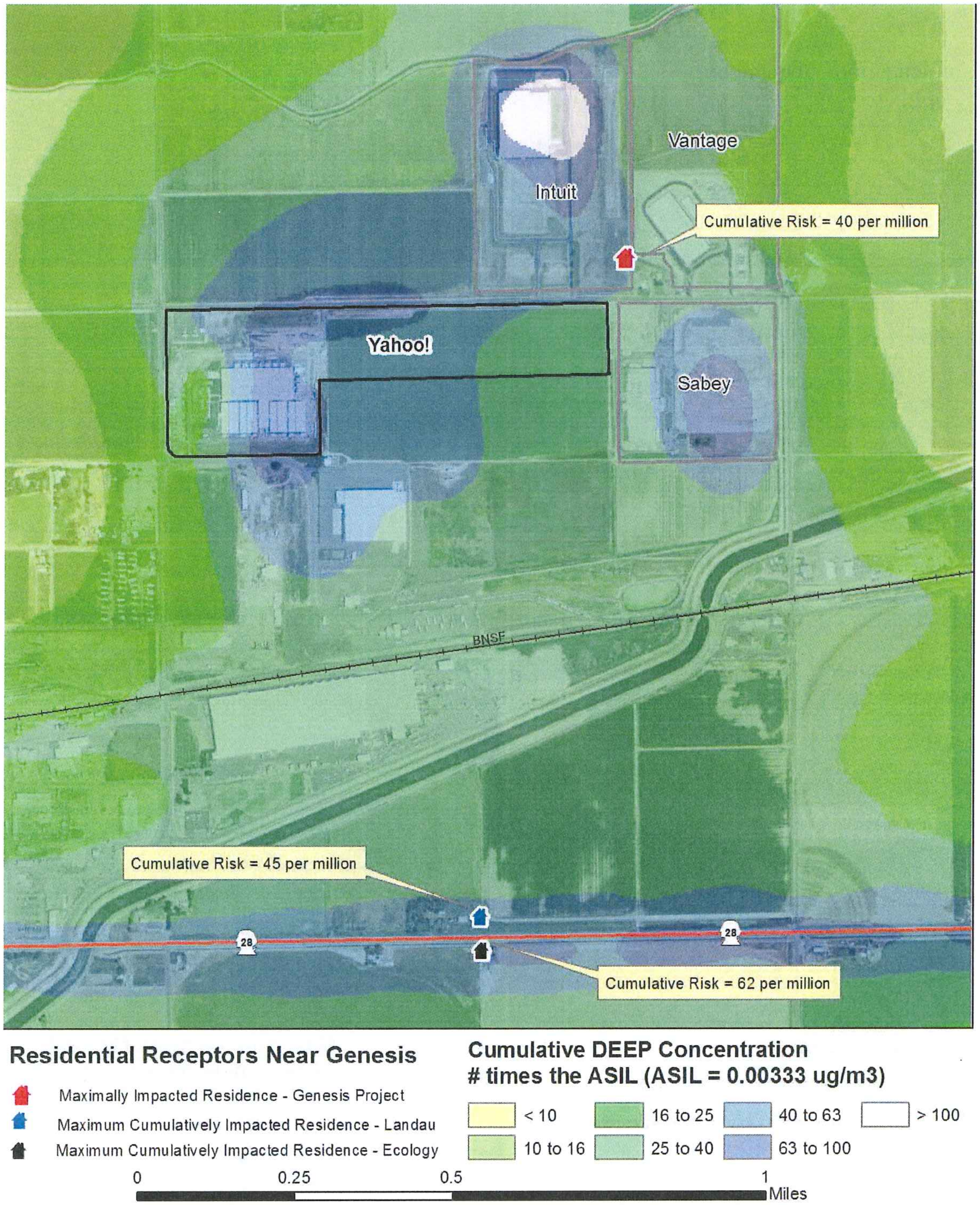


Figure 5. Cumulative risk from DEEP at residential locations (estimated by Landau and Ecology) in the vicinity of project Genesis

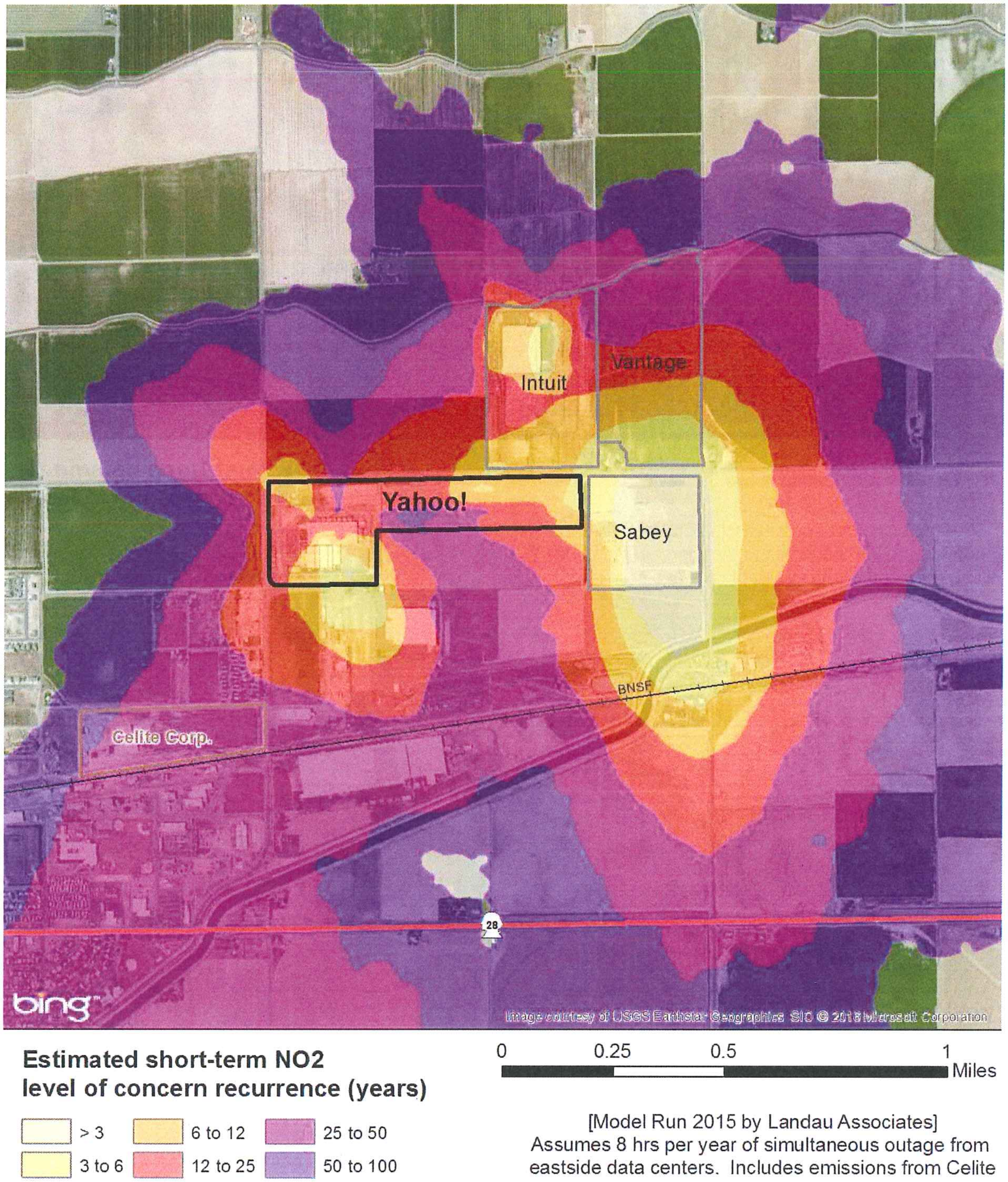


Figure 6. Estimated time interval between occurrences of 1-hr NO_2 concentrations greater than 454 μg/m^3 assuming eight hours of simultaneous eastside Quincy Data Center emergency engine outage emissions per year

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