Appendix A:
Copies of public notices & outreach materials

- Press releases – English & Spanish
- Public Involvement Calendar Entry
- Legal notices – English & Spanish
- Display advertisements – English & Spanish
- Information sheet and project location map handed out at 05/17/14 Women's Day Quincy event
- Oxford Data Center Draft Air Permit Fact Sheet (publication 14-02-014)
- Spanish version of Fact Sheet "Borrador del Permiso para Emisiones al Aire del Centro de Datos "Oxford" de Microsoft" (publication 14-02-014ES)
- Spanish and English versions of Ecology's publication "Focus on Exhaust Health Risks" & "Generadores de Reserva con Motor Diesel para los Centros de Datos en el Condado Grant" (publication number: 11-02-005; 11-02-005-ES)
- Emails to interested parties and QUINCY-DATA-CENTERS Listserv emails

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Department of Ecology News Release - June 13, 2014

This news release was updated to reflect comments for both draft permits will be accepted through July 29.

Air permits for data centers in Quincy under review

Microsoft plans new data center and upgrades for existing center

SPOKANE – Microsoft Corporation is proposing a new data center and upgrades to the operation of an existing facility in Quincy. The work requires air permits from the Washington Department of Ecology to ensure human health and the environment are protected.

The data centers house servers that store digital data, provide email, manage instant messages, and run applications for computers. They require cooling towers to keep equipment from overheating, as well as backup generators in case of power outages.

Particle pollution, at high enough levels, can cause health problems. One source of pollution is the fine particles from diesel engine exhaust. Cooling towers also release particles into the air.

Maintenance and testing of diesel generators at the Quincy-area data centers will be coordinated so the generators are not all running at the same time, reducing exposure to air pollution.

Oxford Data Center
At the new facility 37 diesel generators, 32 cooling towers and air pollution control equipment to reduce particles released into the air would be installed. The new generators would be in addition to the 158 generators already permitted at six other Quincy-area facilities.

Microsoft is proposing to install advanced equipment to reduce air pollutants beyond federal clean air requirements.

The draft permit for this facility includes several additional conditions that protect the public from air pollution including limits on fuel and specified hours of operation for the generators.

For more details and information about the permit, a public meeting and hearing will be held on July 24 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.

Columbia Data Center
The Columbia Data Center currently has an Ecology air permit to operate 37 diesel generators and 12 cooling towers. Microsoft is proposing to change cooling tower operations to decrease water use. The change will increase particles released into the air while still meeting clean air requirements. Diesel generator operations approved under the current permit will not be altered.

Submit comments
Comments and questions for both draft air permits should be addressed to Beth Mort, Department of Ecology, Air Quality Program, 4601 N. Monroe, Spokane, Wash. 99205.

Comments on both draft permits will be accepted through July 29.

Review permits

- Ecology's website
- Ecology's Eastern Regional Office, 4601 N. Monroe, Spokane, WA 99205

- Quincy City Hall, 104 B Street SW, Quincy, WA 98848
- Quincy Library, 208 Central Ave S, Quincy, WA 98848

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Contact:

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

Departamento de Ecología – NOTICIA - 13 de junio, 2014

Estas noticias fueron actualizadas para reflejar que se aceptará comentarios para ambos permiso hasta el 29 de julio.

Los permisos para emisiones al aire para los centros de datos en Quincy están siendo examinados

Microsoft planea construir un nuevo centro de datos y también mejorar el centro existente

SPOKANE – La Corporación Microsoft está proponiendo construir un nuevo centro de datos y también mejorar las operaciones del centro existente en Quincy. Los trabajos requieren permisos para emisiones al aire otorgados por el Departamento de Ecología (Ecología) para asegurar la protección del medio ambiente y de la salud humana.

Los centros de datos consisten de servidores electrónicos que almacenen datos digitales, proveen correo electrónico, manejan mensajes instantáneos, y corren las aplicaciones para computadores. Los centros requieren torres de enfriamiento para prevenir que los equipos sobrecalientan. También se requieren generadores de electricidad de emergencia en caso que haya una falta de energía.

La contaminación por medio de partículas finas, en niveles altos, puede causar problemas de la salud. Una fuente de tal contaminación es el humo que sale de los escapes de motores de diesel. Las torres de enfriamiento también emiten partículas al aire.

El mantenimiento y chequeo de los generadores de diesel en los centros de datos alrededor de Quincy se coordinará para que no todos los generadores estén operando al mismo momento. Haciendo esto reducirá la exposición del público a la contaminación del aire.

Centro de Datos "Oxford"
El nuevo centro de datos tendrá 37 generadores de diesel y 32 torres de enfriamiento. También se instalarán equipos para reducir las partículas emitidas al aire. Los generadores nuevos están en adición a los 158 generadores que ya existen en los otros seis centros de datos alrededor de Quincy.

Microsoft está proponiendo instalar equipo avanzado para reducir la contaminación de aire a niveles más bajos que las normas federales requeridas para aire limpio.

El permiso preliminar para este nuevo centro de datos incluye varias condiciones adicionales para proteger el público de la contaminación del aire. Estas condiciones incluyen límites de combustible y establecen horas específicas de operación para los generadores.

Para obtener más detalles y información sobre al permiso, el 24 de julio hará una reunión pública a las 5 p.m. en el Centro Comunitario de Quincy, ubicado en 115 F St. SW, Quincy, WA. 98848.

Para más detalles y información sobre el permiso, hará una reunión publica y audiencia formal el 24 de julio en el Centro Comunitario de Quincy (Quincy Community Center) , 115 F St. SW, Quincy, Wash. 98848. La reunión pública empieza a las 5 p.m. y la audiencia formal empieza a las 6:30 p.m.

Centro de Datos "Columbia"
El Centro de Datos "Columbia", en estos momentos, tiene un permiso para emisiones al aire otorgado por Ecología. El centro tiene permiso para operar 37 generadores de diesel y 12 torres de enfriamiento. Microsoft está proponiendo cambiar operación de las torres para reducir el uso de agua. El cambio aumentará la cantidad de partículas emitidas al aire aunque todavía cumpliendo con los requisitos de aire limpia. La operación de los generadores de diesel aprobada por el presente permiso no cambiará.

Como entregar comentarios
Se deben mandar los comentarios y preguntas para ambos permisos para emisiones al aire preliminares a Beth Mort, Department of Ecology, Air Quality Program, 4601 N. Monroe, Spokane, WA. 99205.

Se aceptará comentarios para ambos permisos hasta el 29 de julio.

Donde se puede revisar los permisos

- El sitio Web de Ecología (website)
- La Oficina Regional Este de Ecología, 4601 N. Monroe, Spokane, WA 99205
- La Municipalidad de Quincy, 104 B Street SW, Quincy, WA 98848
- La Biblioteca de Quincy, 208 Central Ave S, Quincy, WA 98848

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Contact:

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

Public Involvement Calendar

CALENDAR

Public Hearings, Meetings, Workshops, Open Houses

Public Comment Periods

More Ecology Events

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.

If you have special accommodation needs or require documents in alternative format, please contact Ecology at:
360-407-6000 (voice)
711 (relay service)
800-833-6388 (TTY)

Public Hearings, Meetings, Workshops, Open Houses

Jul 24 **5 PM**

Open House Followed by Public Hearing: Quincy Microsoft Oxford Data Center - Draft Air Permit
Microsoft applied for an air permit proposing to construct and operate the Oxford Data Center in Quincy. The data center would install 37 emergency backup diesel engine generators and construct 32 cooling towers. Find out more on July 24, 2014 at 5 pm: meet/greet; 5:30 pm: presentations/Q&A; 6:30 pm: public hearing. more info

Location: Quincy Community Center
115 F Street SW
Quincy, WA Map
Sponsor: Dept of Ecology
AIR QUALITY PM
Contact: Beth Mort
(509) 329-3502 / bmor461@ecy.wa.gov
Associated Public Comment Period: Jun 19 - Jul 29

Public Comment Periods

Jun 19 - Jul 29

Public Comment Period: Quincy Microsoft Oxford Data Center - Draft Air Permit
Microsoft applied for an air permit proposing to construct and operate the Oxford Data Center in Quincy. The data center would install 37 emergency backup diesel engine generators and construct 32 cooling towers. Documents associated with this project are available online, at Quincy City Hall, and Quincy Library. more info

Location: Quincy, WA
Sponsor: Dept of Ecology
AIR QUALITY PM
Contact: Beth Mort
(509) 329-3502 / bmor461@ecy.wa.gov
Associated Open House Followed by Public Hearing: Jul 24

Jun 19 - Jul 29

Public Comment Period: Quincy Microsoft Columbia Data Center - Draft Air Permit
Microsoft applied for an air permit proposing changes to Columbia Data Center, to change the water supply that serves the current mechanical draft cooling towers, and to change how the cooling towers are operated. Documents associated with this project are available online, at Quincy City Hall, and Quincy Library.
Columbia Data Center

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
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Biosolids
Climate Change
Coastal Zone Management (CZM)
Contamination
Dam safety
Emissions
Fee
Emissions

Enter search text:

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Public Notices

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY
NOTICE OF APPLICATION TO CONSTRUCT A NEW AIR POLLUTION SOURCE
COMMENT PERIOD JUNE 19 THROUGH JULY 29, 2014

The State of Washington Department of Ecology (Ecology) has received an application to construct a new air pollution source. The Microsoft Corporation (MSN) located at One Microsoft Way in Redmond, WA 98052 submitted a Notice of Construction (NOC) air quality permit application on January 27, 2014 to build a new data center. The new MSN Oxford Data Center will be located north of State Route 28 and south of Road 11 NW between Road S NW and Road R NW in Quincy, Grant County.

The primary air contaminant emission units at the Oxford Data Center Air will be 37 emergency electrical generators powered by diesel engines and 32 cooling towers. Air contaminant emissions from the diesel engines and the cooling towers include criteria and toxic air pollutants below major source thresholds. The primary emissions from the diesel engines of concern are nitrogen oxides and particulate matter, including diesel engine exhaust particulate (DEEP). DEEP emissions were reviewed under a Second Tier Health Impact Assessment to evaluate health risks posed by the project. After review of the completed Notice of Construction application and other information on file with the agency, Ecology has decided that this project proposal will conform to all requirements as specified in Chapter 173-400 WAC. After review of the Second Tier Health Impact Assessment, Ecology concluded that DEEP impacts to the community due to the Oxford Data Centers will meet the protective requirements contained in Chapter 173-460 WAC.

Copies of the Notice of Construction Preliminary Determination, the Second Tier Petition Recommendation, the Notice of Construction application, and other relevant documents are available for public review at Department of Ecology, Eastern Regional Office, 4601 N. Monroe, Spokane, WA 99205-1295, Quincy City Hall, 104 B Street SW, Quincy, WA 98848, and Quincy Library, 208 Central Ave. S. Quincy, WA, 98848. The public is invited to attend a public hearing that has been scheduled to start at 5:00 PM on July 24, 2014 at the Quincy Community Center located at 115 F Street SW in Quincy. The public hearing will include, meet and greet starting at 5:00 PM, followed by presentations and a question and answer session starting at 5:30 PM. Public comment will be taken starting promptly at 6:30 PM. In addition to public comments taken at the public hearing, the public is invited to comment on this project proposal prior to the public hearing. Written comments will be accepted on this proposal from June 19 through July 29, 2014. For additional information on the project and to submit comments, contact Beth Mort at Ecology's Spokane Office, 4601 N. Monroe, Spokane, WA 99205-1295, or at beth.mort@ecy.wa.gov, or at 509 329-3502. **Para asistencia en Espanol: Gregory Bohn 509-454-4174 or Richelle Perez 360-407-6084.**

Published in the Quincy Valley Post-Register on June 19, 2014.

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY
NOTICE OF APPLICATION TO CONSTRUCT AN AIR POLLUTION SOURCE
COMMENT PERIOD JUNE 19 THROUGH JULY 29, 2014

The State of Washington Department of Ecology (Ecology) has received an application from Microsoft Corporation for Columbia Data Center to change the water supply serving the existing mechanical draft cooling towers, and to change how the cooling towers are operated. The proposed changes will decrease water discharged to the City of Quincy industrial sewer system, and increase the particulate emissions caused by cooling tower drift. The facility location is 501 Port Industrial Parkway, Quincy, WA 98848.

After review of the completed Notice of Construction application and other information on file with the agency, Ecology has made a preliminary determination that this proposal will conform to all requirements as specified in Chapter 173-400 WAC. Criteria pollutant emission increases for this project include 9.45 tons per year PM_{10}, and 2.45 tons per year $PM_{2.5}$. Toxic Air Pollutants are estimated to be below levels triggering a review under Chapter 173-460 WAC.

Copies of the Preliminary Determination and other pertinent information are available for public review at Department of Ecology, Eastern Regional Office, 4601 N. Monroe, Spokane, WA 99205-1295, Quincy City Hall, 104 B Street SW, Quincy, WA 98848, and Quincy Library, 208 Central Ave. S. Quincy, WA, 98848.

The public may request a public hearing on this project, and is invited to comment on the project during the 40 day public comment period, by submitting written comments by close of business, July 29, 2014, to Beth Mort at the following address:
Beth Mort
Washington Department of Ecology
4601 N. Monroe Street
Spokane, Washington 99205
beth.mort@ecy.wa.gov
Para asistencia en Espanol: Gregory Bohn 509-454-4174 or Richelle Perez 360-407-6084.

Published in the Quincy Valley Post-Register on June 19, 2014.

CITY OF QUINCY
QUINCY, WASHINGTON
SUMMARY OF ORDINANCE NO. 14-331

Ordinance Number 14-331, **AN ORDINANCE AMENDING CHAPTER 20.06 OF THE QUINCY MUNICIPAL CODE PROHIBITING RETAIL STORES AND SALES OF MARIJUANA IN ALL USE DISTRICTS OF THE CITY.**

A copy of said ordinance is available for inspection at the Quincy City Hall, 104 B Street SW, Quincy, WA 98848, on Monday through Friday, between the hours of 9:00 a.m. to 5:00 p.m.

This Notice is published pursuant to Chapter 35A 12.160 of the Revised Code of Washington.

DATED THIS 13th day of June, 2014

CITY OF QUINCY
By: Sue Miller
City Clerk of the City of Quincy

Published in the Quincy Valley Post-Register on June 19, 2014.

DEPARTAMENTO DE ECOLOGÍA DEL ESTADO DE WASHINGTON
AVISO DE APPLICACIÓN PARA CONSTRUIR UNA NUEVA FUENTE DE CONTAMINACIÓN AL AIRE
PERIODO DE COMENTARIO DE 19 DE JUNIO HASTA 29 DE JULIO DE 2014

El Departamento de Ecologia del Estado de Washington (Ecología) recibió una aplicación para construir una fuente nueva de contaminación al aire. La Corporación Microsoft (MSN), ubicada en One Microsoft Way en Redmond, WA 98052, entregó una aplicación para un permiso para emisiones al aire, llamado Aviso de Construcción (NOC, por sus siglas en inglés), el 27 de enero de 2014 para construir un nuevo centro de datos. El nuevo centro de datos "Oxford" de MSN estará ubicado al norte de Ruta Estatal 28 y al sur de Calle 11 NW (noroeste) entre Calle S NW (noroeste) y Calle R NW (noroeste) en Quincy, Condado de Grant.

Las principales unidades de emisiones de contaminantes del airé en el centro de datos "Oxford" serán 37 generadores eléctricos de emergencia equipados con motores de diesel y 32 torres de enfriamiento. Las emisiones de contaminantes del aire producidas por los motores de diesel y las torres de enfriamiento incluyen contaminantes del aire de criterio y contaminantes tóxicos del aire abajo del nivel que requiere regulación como una fuente mayor. Las emisiones principales de preocupación de los motores de diesel son los óxidos de nitrógeno y las partículas, incluyendo partículas del escape del motor de diesel (DEEP, por sus siglas en inglés). Las emisiones DEEP fueron revisadas según una evaluación de efectos a la salud del segundo nivel para evaluar los riesgos de salud de este proyecto. Después de una revisión completada del Aviso de Construcción y la otra información de los archivos de Ecología, Ecología determinó que la propuesta de este proyecto cumple con los requisitos especificados en Capitulo 173-400 del Código Administrativo de Washington (WAC, por sus siglas en inglés). Después de una revisión de la evaluación de efectos a la salud del segundo nivel, Ecología concluyó que los efectos de DEEP a la comunidad producidos por el centro de datos "Oxford" cumplirán con los requisitos protectores contenidos en Capítulo 173-460 WAC.

Copias de la Determinación Preliminar para el Aviso de Construcción, la Recomendación para la Petición del Segundo Nivel, la aplicación para un Aviso de Construcción, y los otros documentos relevantes están disponibles para examinación pública en la Oficina Regional Este del Departamento de Ecología 4601 N. Monroe, Spokane, WA 99205-1295, la Municipalidad de Quincy, 104 B Street SW, Quincy, WA 98848, y la Biblioteca de Quincy, 208 Central Ave. S. Quincy, WA, 98848. El público está invitado a asistir un reunión y audiencia pública que empezará a las 5:00 PM el 24 de julio de 2014 en el centro comunitario de Quincy (Quincy Community Center) ubicado en 115 F Street SW en Quincy. La reunión pública incluye, introducciones empezando a las 5:00 PM, seguidos por presentaciones y una sesión de preguntas empezando a las 5:30 PM. El comentario público empezará puntualmente a las 6:30 PM. En adición a los comentarios públicos recibidos durante la audiencia pública, el público está invitado a comentar sobre el proyecto propuesto antes de la audiencia pública. Se acepta comentarios escritos para esta propuesta desde el 19 de junio hasta el 29 de julio de 2014. Para información adicional sobre el proyecto o para entregar comentarios, por favor contacte a Beth Mort en las Oficinas de Ecología en Spokane, 4601 N. Monroe, Spokane, WA 99205-1295, o a beth.mort@ecy.wa.gov, o a 509 329-3502. **Para asistencia en español: Gregory Bohn 509-454-4174 o Richelle Perez 360-407-6084 o preguntas@ecy.wa.gov.**

Published in the Quincy Valley Post-Register on June 19, 2014.

PUBLIC NOTICES CONTINUED ON NEXT PAGE.

For Sale

HANK'S AG SUPPLIES GROUND COVER/weed control fabric. Cut to size 12¢ per sq. ft. by 300 ft. roll 11¢ per sq. ft. Woven, 14 mil. Light weight tarps available. 509-398-1657.

4/3rts

Vendors Wanted

QUINCY DOWNTOWN MARKET ON SATURDAY, JULY 26! Vendors wanted for produce, handcrafts, antiques, fundraising groups, yard sale items & more! Email thegrainerycafe@gmail.com for information & application or call Barb at 787-1913. Yard sale vendors must get permit from the City of Quincy. Hosted by the Quincy Business Association.

6/5-6/19

Statewides

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DRIVERS – APPLY TODAY! Floyd Blinsky Trucking hiring professional truck drivers. Midwest (95%) / east coast (5%). 12,000-15,000 miles / month. Up to .34 cpm start. Call Angie 800-537-9599 (m-f) / 509-969-0084 (evenings/ weekends).
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DIVORCE $155. $175 with children. No court appearances. Complete preparation. Includes custody, support, property division and bills. BBB member. (503) 772-5295. www.paralegalalternatives.com legalalt@msn.com

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JRC GLOVE COMPANY – Made in the USA Deerskin and Elkskin Work Gloves, 10% off all work and other Gloves. Coupon Code: deerskin www.jrcglove.com

Traps set around state to protect grapes from moths

Staff report

Grape-eating moths beware.

The Washington State Department of Agriculture and U.S. Department of Agriculture are teaming up to set up traps in wine-grape growing regions throughout the state to search for four species of destructive moths.

The moths are the European Grapevine Moth, European Grape Berry Moth, Grape Tortrix and Grapevine Tortrix.

Up to 1,000 traps are being placed this month for each of the four moth species around the state, between late May and July, said Mike Klaus, WSDA entomologist and survey coordinator for Eastern Washington.

Traps will be placed in most of the 13 major wine grape growing regions. Trappers will focus on vineyards and also will target backyard grape vines near potential pathways of pest introduction.

Klaus said the traps will be checked every two-to-four weeks during the summer and then taken down in September. Similar WSDA surveys conducted the past two years yielded no detection of the pests.

"Our trappers will have state identification and welcome any questions landowners may have," Klaus said. "We'll be trapping from the San Juan Islands to the Columbia Gorge to Okanogan, but our emphasis will be in Yakima, Benton, Franklin and Walla Walla counties."

The European grapevine moth was found for the first time in the United States in 2009 in Napa Valley, a serious threat to California's wine industry. After its initial detection in Napa Valley, the pest has been found in several other counties. Some California growing regions are under quarantine.

In 2013, the USDA's Animal and Plant Health Inspection Service released $16.9 million in emergency funding to prevent the spread of European grapevine moth in the Golden State.

If any of the four species of targeted moths are found in Washington this summer, state agriculture officials may place more traps in the area in an attempt to find the center of the infestation.

Klaus emphasized that none of the moth species have been detected in Washington.

"The goal of the survey is to protect Washington's grape industry by preventing the establishment of these invasive moths," he said. "We want to detect them as early as possible if any do arrive. If any of these grape pests were to become established here, they could pose a serious threat to our grape and wine industries."

WSDA will also resume a limited survey for grape phylloxera, an aphid-like pest that attacks grape roots. Washington State University and WSDA have detected grape phylloxera at a few locations in Eastern Washington vineyards and backyard grape plantings back in as recently as 2002.

Grape phylloxera is considered to be the most serious grape pest worldwide, especially on vinifera grapes. California growers have experienced significant losses, sometimes requiring the removal and replanting of entire vineyards.

WSDA has cooperated with WSU several times over the last 25 years in survey for grape phylloxera. However, in Washington, official surveys for the pest have not been conducted since 2002. The control of grape phylloxera is costly and is only achieved after many pesticide applications over several years.

Planting resistant rootstocks has been the primary control measure. However, new biotypes in California are known to attack previously resistant rootstocks. Washington vineyards may be vulnerable since they are planted on their own nonresistant roots.

In the mid-1990s, a new pest of grapes, the vine mealybug, was found in California. WSU entomologist, Dr. Doug Walsh, has been conducting limited survey for vine mealybug along with research on another established mealybug species, the grape mealybug. To date, vine mealybug has not been detected in Washington.

WSDA has a quarantine in effect for both grape phylloxera and vine mealybug to prevent these threats, to the Washington state grape and wine industry, from spreading.

Fútbol Mexicano

Próximamente se completará plantel Cruz Azul


Agustín Manzo Foto Notimex

MÉXICO (Agencias)— Cruz Azul sigue en busca de redondear su plantel de cara al semestre intenso que vivirá en la segunda parte de 2014, y el director deportivo del club, Agustín Manzo, adelantó que la próximamente se conocerá al último refuerzo, un mediocampista extranjero. Una vez que el camerunés Achille Emana no cumplió con las expectativas y concluyó su contrato, la directiva busca un quinto jugador extranjero para redondear al grupo, expuso Manzo en rueda de prensa al final de la práctica de la Máquina en el Centro de Alto Rendimiento (CAR) de la Federación Mexicana de Futbol.

Cruzeiro será un buen parámetro para Tigres


Anselmo Junior Vendrechovski Foto Notimex

MONTERREY (Agencias)— El defensa Anselmo Junior Vendrechovski "Juninho" señaló que el partido amistoso que sostendrá Tigres de la UANL en julio contra el conjunto brasileño Cruzeiro, será un buen parámetro con miras al arranque del Torneo Apertura 2014. "Me da gusto que vamos a tener la oportunidad de jugar contra el Cruzeiro, va a ser un parámetro muy bueno para nosotros porque es el actual campeón brasileño", manifestó.
El jugador de Tigres consideró que, sin duda, ese conjunto será complicado porque también es el actual súper líder del balompié amazónico, por lo cual esperan un encuentro interesante.
Los Tigres se enfrentarán al Cruzeiro el 3 de julio en Estados Unidos, como parte de su preparación para el arranque del Torneo Apertura 2014 del futbol mexicano, en ese mismo mes. El defensa brasileño recordó que ese equipo lo conoce, además de que tiene amigos y enfrentó a varios de sus integrantes, por lo cual sabe que será un partido de utilidad para los felinos.

David Toledo quiere ganar su sexto título con Chivas


David Toledo Foto Notimex

MÉXICO (Agencias)— El centrocampista David Toledo sueña con ser campeón con Chivas de Guadalajara y sumar el sexto título en su prolija carrera futbolística, al contar tres coronas con Pumas de la UNAM, una con Atlante y otra con Tigres de la UANL.
"Me ha tocado esa fortuna de salir cinco veces campeón, es una satisfacción muy padre y ojalá en este reto con Chivas las cosas empiecen a caminar bien, sería importantísimo para la institución, para la afición y para nosotros conseguir un título", declaró.
En un video difundido por la página web del conjunto rojiblanco, el nacido en Juchitán, Oaxaca, hace 32 años, declaró que "es una gran satisfacción llegar a un equipo como Chivas, (que es) una gran institución, un club de mucha historia y de mucha afición, y es una gran responsabilidad y un nuevo reto para mí".

Reportan segundo grupo de jugadores de Tuzos de Pachuca


Foto Notimex

MÉXICO (Agencias)— Encabezados por Jurgen Damm y Rodolfo Pizarro, reportó el segundo grupo de jugadores del equipo Pachuca, para formar una plantilla de 25 futbolistas de cara al Torneo Apertura 2014.
Además de los mencionados también iniciaron los trabajos de pretemporada Daniel Arreola, Hugo Rodriguez, Hirving Lozano y Erick Gutiérrez, así como los procedentes del equipo campeón sub 20: Steven Almeida, Guillermo Martínez, Iván Ochoa, Osvaldo Rodríguez, José Villegas y Mauro Lainez.
Faltan por reportar los ecuatorianos Walter Ayoví y Enner Valencia, quienes participan con su selección en la Copa del Mundo Brasil 2014. Así como el colombiano naturalizado mexicano Aquivaldo Mosquera, quien regresa a la institución hidalguense proveniente del América y un refuerzo extranjero que está por contratar la directiva.

Anibal Zurdo deja al español Sabadell para militar en el Cruz Azul


Anibal Zurdo Foto Notimex

MÉXICO (Agencias)— El Sabadell no contará para la siguiente temporada con su máximo goleador, el tabasqueño Anibal Zurdo, quien se encuentra en México y está cerca de anunciar su contratación con el Cruz Azul.
Zurdo, que culminó la temporada 2013-14 con 18 goles, está a un paso de dejar la segunda división de España, ya que se encuentra realizando los exámenes médicos con La Máquina, tras lo cual se prevé se haga oficial su llegada, confirmó el jefe de prensa cruzazulino, Manuel Velázquez.
A falta del comunicado oficial por parte de la entidad "cementera", Zurdo se convierte así en el tercer refuerzo del equipo para la siguiente campaña luego de contratar al defensa Francisco "Maza" Rodríguez y al delantero argentino Pablo Gabriel Torres.

See how they run: The 2016 presidential checklist

Calvin Woodward
Associated Press

WASHINGTON (AP) — Here's a look at the who, what, when and where of the 2016 presidential contest at the cusp of summer. Why? Because more is going on than you might think two years from the event.

To those who might run, 2016 is the day after tomorrow and there's no time to waste.

For almost a year, The Associated Press has been tracking movements and machinations of more than a dozen prospective presidential candidates.

They are, for the Democrats, Vice President Joe Biden, former Secretary of State Hillary Rodham Clinton, Maryland Gov. Martin O'Malley and New York Gov. Andrew Cuomo; for the Republicans, former Florida Gov. Jeb Bush, New Jersey Gov. Chris Christie; Texas Sen. Ted Cruz, Louisiana Gov. Bobby Jindal, Kentucky Sen. Rand Paul, Texas Gov. Rick Perry, Florida Sen. Marco Rubio, Wisconsin Rep. Paul Ryan, former Pennsylvania Sen. Rick Santorum and Wisconsin Gov. Scott Walker.

Latest twists and turns:

NONDENIAL DENIAL: Cagey words that cloak presidential ambitions, none too convincingly.

Democrats

Biden: "If I decide to run, believe me, this would be the first guy I talk to. But that decision hasn't been made, for real. And there's plenty of time to make that."— April, CBS, in joint interview with President Barack Obama.

Clinton: "I just want to get through this year, travel around the country, sign books, help in the midterm elections in the fall and then take a deep breath and kind of go through my pluses and minuses." — June, ABC. Said Republican criticism of her handling of the Benghazi episode gives her "more of a reason to run."

Cuomo: "I'm sorry, I'm losing you. We have a technical difficulty. I'm running for governor of the state of New York." — Seeming not to hear a question about his presidential intentions. February, Fox Business Network.

O'Malley: "No one ever goes down this road, I would hope, without giving it a lot of consideration and a lot of preparation and a lot of thought work, and so that's what I'm doing." — February, speaking to reporters in Baltimore.

Republicans

Bush: "I can honestly tell you that I don't know what I'm going to do." — His standard disclaimer. Says he'll decide by year's end whether to run. One factor in his decision: Whether he can run an optimistic campaign and avoid the "mud fight" of politics.

Christie: "I'm certainly thinking about it, but I won't make any decision until 2015, and I've got a job to do." — End of May, to reporters in Tennessee. Also: "It's a lifetime away until 2016."

Cruz: "My focus is entirely on working for Texans in the U.S. Senate." — February. He said that not in Texas or in the Senate but in the important presidential primary state of South Carolina.

Jindal: "It's something that we're certainly thinking about and we're praying about. My wife and I, we won't make any decisions until after the November elections." — May, after addressing Republican Leadership Conference in New Orleans.

Paul: "We're definitely talking about it, my family is talking about it. I truly won't make my mind up until after the 2014 elections. But I haven't been shy in saying we're thinking about it." — March 9, Fox News.

Perry: "I'd be fibbing to you if I told you I knew what I'm going to be doing."— May, in Iowa. Says he'll decide in January.

Rubio: "It's something I'll consider at the end of this year." — May, on ABC. Does he feel ready to be president? "I do, but I think we have other people as well."

Ryan: "Janna and I are going to sit down in 2015 and give it the serious ... conversation, consideration that are required for keeping our options open. But right now I have responsibilities in the majority in the House of Representatives that I feel I ought to attend to, and then I'll worry about those things."— March, CBS.

Santorum: "I don't know if I can do this. It's just tough." — April, AP interview. Timing of decision? "A year at least, probably."

Walker: "I'm really focused on 2014, not getting ahead of the game. ... You guys can predict all you want." — January, CNN.

WRITING A BOOK: The perfect stage-setter for a campaign season, just ask Barack Obama ("The Audacity of Hope," 2006; "Dreams from My Father," 2004)

Democrats

Biden: No, not since before 2008 election.

Clinton: Yes. Splashy tour for "Hard Choices," released in June, puts her front and center.

Cuomo: Yes, coming in 2014.

O'Malley: No. "I'm not sure where I'd find the time for that." It's probably only a matter of time before he finds time.

Republicans

Bush: Yes, on immigration.

Christie: No.

Cruz: Yes, book deal disclosed by his agent in April.

Jindal: Not since before 2012 election.

Paul: No, not since just before the 2012 election.

Perry: Not since before 2012 election.

Rubio: Yes, coming in late 2014 from the publisher of his 2012 memoir.

Ryan: Yes, coming in 2014.

Santorum: Yes, "Blue Collar Conservatives" released in late April, says: "Do Republicans really care less about the person at the bottom of the ladder than Democrats do? To be painfully honest, I would have to say in some ways 'yes.'"

Walker: Yes, out in fall 2013.

GO TO IOWA: Its caucuses are the opening act of the nomination contest.

Democrats

Biden: Yes, spoke at Sen. Tom Harkin's fall 2013 steak-fry fundraiser, a must-stop for many Democrats seeking to compete in the leadoff caucuses. Then in May, attended party for Iowans who came to Washington for annual lobbying trip. Raised money for Iowa congressional candidate Jim Mowrer. Schmoozed with Iowa power brokers during 2013 inauguration week in Washington.

Clinton: No, avoiding big primary/caucus states. But Ready for Hillary is mobilizing for her in the state.

Cuomo: No.

O'Malley: Yes, mid-June events. Headlined Harkin's 2012 fundraiser.

Republicans

Bush: Has been holding off on splashy visits to early voting states but hosted spring fundraiser May 22 in Florida for Iowa Gov. Terry Branstad. Attended 2012 economic development meeting in Iowa.

Christie: Summer visit expected. Can test his theory that "they love me in Iowa, too." Hosted New Jersey fundraiser for Branstad in May. More travel driven by politics in the cards now that he's chairman of Republican Governors Association for 2014 election year. Campaigned in Iowa in 2012.

Cruz: Oh yes, four visits in eight months, and on tap to join several other prospects at August Christian conservative event.

Jindal: Yes, state GOP conference in June. Also, summer 2013 visit, then flew with Iowa governor to governors association meeting in Milwaukee. In Iowa seven times in 2012.

Paul: Yes, state GOP conference in June, after three visits in 2013. In March, snagged the state GOP chairman, who announced he was quitting to join Paul as an adviser.

Perry: Yes, three times in six months, more ahead in July and August. Campaigned for Senate hopeful Matt Whitaker in late May and promised to return often for Branstad's campaign. Visited Des Moines suburbs and Davenport in February, meeting GOP activists and attending an event sponsored by Koch brothers' Americans for Prosperity. Met Branstad and addressed Des Moines crowd of 400 in November.

Rubio: Yes, just days after 2012 election, but has been largely holding off on a new wave of trips to early voting states. That's changing.

Ryan: Yes, was keynote speaker for Iowa GOP's big fundraising dinner in Cedar Rapids in April. Main speaker at governor's annual birthday fundraiser in November 2013, in first visit since 2012 campaign.

Santorum: Yes, state GOP conference in June, earlier visit with strategists and media. Also August 2013 speech to conservative Christians in state where he won the 2012 caucuses. Screened his new Christmas movie in Iowa in November.

Walker: Yes, fundraiser last year.

GO TO NEW HAMPSHIRE: Nation's first primary comes after Iowa and is just as important.

Democrats

Biden: Yes, raised money for three Democrats in March visit for job-training event. Quipped: "I'm here about jobs — not mine."

Clinton: No. But Ready for Hillary has sent people there this year.

Cuomo: No.

O'Malley: Yes, spoke at Democratic Party dinner in November, returned in June. Also spoke at 2012 convention of New Hampshire Democrats.

Republicans

Bush: No.

Christie: It's been awhile. June visit scheduled. Visited three times in 2012.

Cruz: Yes, three times since August.

Jindal: Yes, keynote speech to local Republican organization in March, headlined state GOP fundraiser in 2013, visited twice in 2012.

Paul: Yes, addressed Freedom Summit in April. Won straw poll at March meeting of Northeast Republican Leadership Conference in Nashua. Several visits last year.

Perry: No, but had group of 13 conservative leaders from the state to Texas for private meeting in May.

Rubio: Yes, splashy debut in May, first visit of the 2016 season, headlining fundraisers, meeting local officials, giving interviews. Multiple visits before 2012 election

Ryan: Yes, headlined Manchester fundraiser in February for former House colleague. Canceled October 2013 visit because of government shutdown.

Santorum: Yes, March speech to Northeast Republican Leadership Conference marked his return to a state where he performed weakly in 2012 campaign.

Walker: Yes, headlined a GOP state convention in October 2013, keynote at state party convention in September 2012.

DON'T FORGET SOUTH CAROLINA: First Southern

See **RUN**, Page **A7**

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	6				7			5
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Level: Intermediate

Here's How It Works:
Sudoku puzzles are formatted as a 9x9 grid, broken down into nine 3x3 boxes. To solve a sudoku, the numbers 1 through 9 must fill each row, column and box. Each number can appear only once in each row, column and box. You can figure out the order in which the numbers will appear by using the numeric clues already provided in the boxes. The more numbers you name, the easier it gets to solve the puzzle!

5	7	9	4	6	3	8	2	1
4	8	3	9	2	1	6	5	7
1	6	2	8	7	5	4	9	3
8	2	7	5	1	4	3	6	9
3	1	6	7	9	8	2	4	5
9	4	5	2	3	6	1	7	8
6	5	8	3	4	9	7	1	2
2	9	1	6	8	7	5	3	4
7	3	4	1	5	2	9	8	6

State gathering comment on data center air pollution

◆ Microsoft's diesel generators can emit enough particles to cause health problems, ecology officials say

By Mike Irwin
World staff writer

QUINCY — The state Department of Ecology will gather public comment next month on draft permits protecting air quality from diesel generators and cooling towers at two Microsoft data centers here.

Questions and comments will be accepted until July 29 on Microsoft's proposed Oxford Data Center (37 generators, 32 cooling towers) and upgrades to the existing Columbia Data Center (37 generators, 12 cooling towers).

A public hearing on the Oxford center will also be held on July 24 at the Quincy Community Center, 115 F St. SW. Doors open at 5 p.m. with the formal comment period starting at 6:30 p.m.

Backup generators for power and cooling towers to limit overheating can release particles at high enough pollution levels to cause health problems, said an Ecology news release.

Microsoft has proposed installing advanced equipment and improvements to reduce air pollutants beyond federal clean air requirements, the Ecology press release said.

Comments and questions on both projects should be sent to Beth Mort at beth.mort@ecy.wa.gov. Draft permits can be reviewed online at ecy.wa.gov/programs/air/quincydatacenter/ or in person at the Quincy City Hall, 104 B St. SW, or Quincy Library, 208 Central Ave. S.

Briefly

News from around North Central Washington and the Northwest

Quincy

Town Hall meeting set tonight at Quincy High School

The Grant County Sheriff's Office will hold a town hall meeting 7 p.m. today at the Quincy High School Performing Arts Center.

Administrative staff will attend.

For more information, call 754-2011, Ext. 468, or email dshay@co.grant.wa.us.

— Dee Riggs, World staff

Wenatchee

PUD expects big insurance hike following turbine repairs

Defects and costly repairs to four of Rocky Reach Dam's 11 turbine units are expected to increase the Chelan County PUD's insurance premium by as much as 57 percent next year.

The premium for coverages — including property, general liability, mechanical breakdown and business interruption — cost $1.9 million for mid-2013 to mid-2014, PUD insurance-and-claims manager, Ron Gibbs, told commissioners Monday.

The combined premium for similar coverage could increase to as much as $3 million annually next year, Gibbs said, although he said he expected it be slightly less.

Temporary repairs to units C8 through C11 at Rocky Reach Dam have cost the utility $4.3 million so far.

That cost will be covered in part by insurance, the PUD and the contracted, long-term purchasers of power generated at Rocky Reach, officials have said.

Permanent repairs — one unit per year — will begin next year.

The four units were sidelined last year for cracks or suspected cracks in the stainless steel rod that delivers oil under pressure to regulate the angle of the units' turbine blades.

— Christine Pratt, World staff

Wenatchee

Drug dealer sentenced after deportation leniency

A man who avoided deportation by promising to turn over information on drug traffickers pleaded guilty Monday to making drug sales of his own.

Brigido Avila-Dera, 33, was sentenced in Chelan County Superior Court to six years and three months in prison after pleading guilty to cocaine possession, two counts of unlawful firearm possession and four counts of methamphetamine sale. He admitted selling meth to undercover informants four times in spring 2013 — months after local Immigration and Customs Enforcement agents offered to let him remain in the United States, despite entering illegally, if he fed them information on other drug dealers.

Avila-Dera, also known as Antonio Castayala, made the deal with Wenatchee-based ICE agents after a November 2012 arrest on a misdemeanor warrant. He then dropped out of contact with his ICE handler, and even avoided a Wenatchee police traffic stop in March 2013, abandoning his rented car and leaving behind a backpack holding 16 grams of cocaine and a stolen handgun.

From late March through mid-April he sold 49 grams of meth to police informants in four controlled buys in Wenatchee, and is accused of selling meth a fifth time in East Wenatchee. He has yet to stand trial on that charge.

ICE adopted a policy in 2012 not to deport unauthorized immigrants arrested for minor offenses. Avila-Dera had only two misdemeanor charges on his record in November 2012.

— Jefferson Robbins, World staff

Cheney

Colville chairman Michael Finley named EWU trustee

Michael Finley, chairman of the Confederated Tribes of the Colville Reservation, was appointed by Gov. Jay Inslee to the Eastern Washington University board of trustees.

Finley was selected to complete the term of Mark Mays, who died this spring. The term begins July 1 and continues through Sept. 30, 2015.

Finley, 35, of Inchelium, earned his Bachelor of Arts in American Indian studies and his master's degree in history from Eastern. He was awarded the history department's Cecil Dryden Alumni Award in 2011, and co-authored the book, "Finding Chief Kamiakin, the Life and Legacy of a Northwest Patriot." He is also first vice president of the National Congress of American Indians.

Finley has served as chairman or vice chairman of the Colville Business Council since 2009, and lost his bid for re-election in the tribes' primary election in May.

— K.C. Mehaffey, World staff

Brewster

Bridgeport woman still in intensive care after crash

A Bridgeport woman seriously injured Saturday in a two-vehicle crash on Highway 173 near Brewster remains in the intensive care unit at Harborview Medical Center.

Washington State Patrol troopers arrested Mario T. Bernabe, 30, of Mexico, on charges of vehicle assault and felony hit and run driving.

Ana K. Moreno-Rocha, 26, Bridgeport, the driver of the second vehicle, was seriously injured in the 11 p.m. Saturday crash.

Troopers said Bernabe's southbound Ford Explorer crossed the centerline, colliding with Moreno-Rocha's northbound 1999 Toyota Corolla.

A passenger in Bernabe's vehicle, Cruz Gillardo-Cadena, 55, Mexico, was injured and transported by ambulance to Three Rivers Hospital in Brewster.

— Rick Steigmeyer, World staff

OBITUARY

Marjorie Thomason

Marjorie Viola Thomason, 90, a longtime Quincy resident, passed away on Thursday, July 10, 2014. She was born July 14, 1923, the second daughter to her parents, Barbarite Baca and John Longwell in Cloudcroft, N.M.

Marjorie, along with her sister Dorothy, was raised in the mountain logging camps where her father ran a general store based in a train car that traded with the Native American tribes in the area.

As the Great Depression hit, her family moved closer to relatives in Alamogordo, where she graduated from high school around 1941. She would always feel a strong pride in the heritage of her mother's large Catholic family, whose ancestors emigrated from Spain to become some of the first settlers in New Mexico.

Incredibly, in the last few years, Marjorie relearned the Spanish she spoke as a girl and could instantly launch into speaking fluent Spanish with caretakers at The Cambridge or at restaurants in the community.

Marjorie was a bright young woman who completed her nursing degree from the Hotel Dieu School of Nursing in El Paso, Texas. During her time working as a nurse, she met and fell in love with Texan Farrell Thomason. They were married in May 1944 and enjoyed 53 years of marriage together before he passed in 1997. They homesteaded in the Coachella Valley in Southern California and also resided in Phoenix.

In 1959, Marjorie and Farrell drove up to George from Phoenix with their children, following the award of two parcels of land in a U.S. Veteran's land drawing of the Columbia Basin Reclamation Project. Prior to her passing, Marjorie was one of the few pioneers left from the George/Beverly settlement.

During her time in the Quincy Valley, she continued her profession as a nurse, working for Dr. Trantow and Dr. Stansfield at the Quincy Hospital, where she was very dedicated and highly respected.

Marjorie and Farrell were blessed with five children: Paula Thomason (who preceded her in death in 2011), Dorothy Redmann (husband Klaus Redmann) of Richland, Allan Thomason (wife Tracy Thomason) of Sumner, Gary Thomason (who preceded her in death in 1993) and John Thomason of George. She is also survived by her grandchildren, Kalle Fletcher, Greta Mahalko, Ingrid Varholdt, Dr. Veronika Brooks, Luke Redmann, Troy Redmann, Alex Thomason, Bailey Thomason and Twyla Petersen, and great-granddaughters Emma and Elliot Fletcher.

Marjorie was active in her church, St. Pius X Catholic Church, and was known for her deep, unwavering belief of God's hand in her life and her support of the Hispanic community. Her sense of humor and positivity will be missed.

A funeral Mass was celebrated at St. Pius X Catholic Church on July 16, 2014.

Donations in honor of Marge can be sent to The Cambridge, 301 H St. S.W., Quincy, WA, 98848, or St. Pius X Catholic Church, P. O. Box 308, Quincy, WA, 98848.

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

From the front page

PUD:

enforcement agencies to provide security along the river, Allen said, as well as contracting with private firms. The closure affected about 90 miles of shoreline, PUD security member Dick Robert said at a July 8 commission meeting.

The money pays for the law enforcement officers and private security, Allen said, along with the equipment needed for patrol. That includes boats and personal watercraft, air patrol and vehicles patrolling the shore, he said. Robert said that as of July 8, the extra security costs were between $450,000 and $600,000 per month.

"The goal when it comes to patrolling the shoreline is for the officers to inform and educate the public about the closure," Allen wrote. "The officers have been giving people an opportunity to comply with their requests to leave the no-trespassing area. The vast majority of people have complied."

Citations have been issued to people riding ATVs near an archeological site, and people who ignored a request to leave a "well-signed and protected area," Allen said.

Robert said at the July 8 meeting that the shoreline is closed because the riverbank — even though it looks dry — might be unstable, and that the current is moving fast at the surface. In addition, the PUD is required to protect archeological sites, he said, about 100 of which have been exposed by the drawdown.

The water level behind the dam was dropped following the Feb. 27 discovery of a crack in one of the pillars supporting the spillway. The low water decreased pressure on the dam which helped close the crack, Hydro Director Dawn Woodward said.

Portions of the riverbank all the way to Rock Island Dam were exposed, and the shoreline was closed to public access. It's been closed since.

The investigation into what caused the crack revealed an error in the original design calculations, Woodward said, which meant the flaw could exist in all the spillway pillars. As a result, the repair plans include modifications to all the pillars.

That will require the Wanapum pool to remain at low levels until the repairs are completed, which is expected sometime between October and the end of the year.

FIRE:

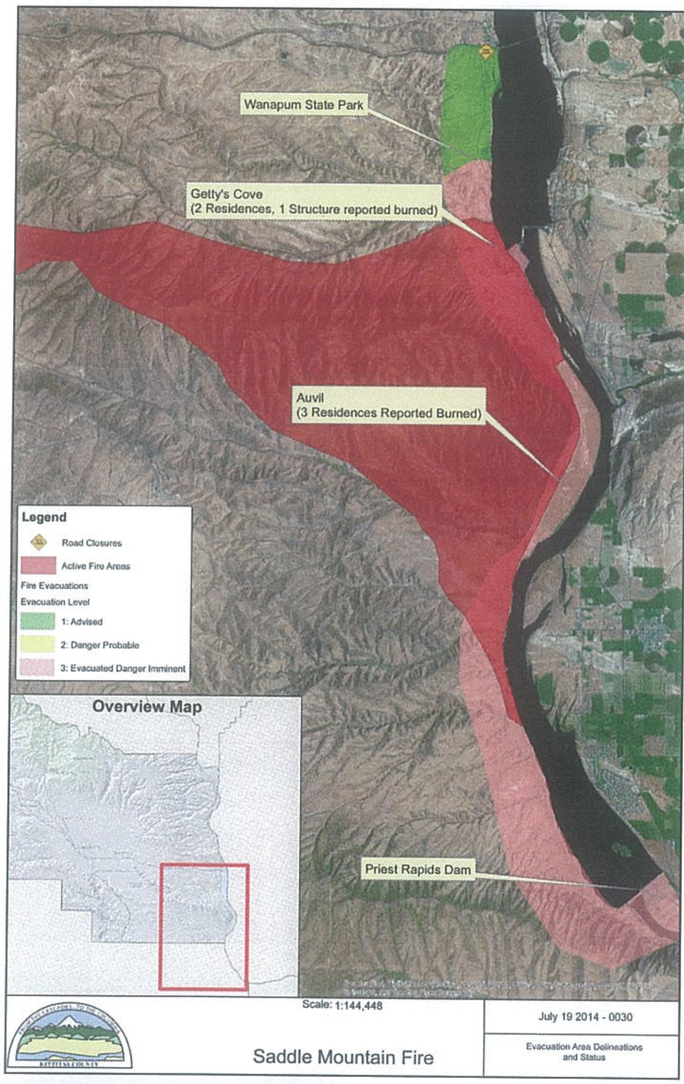
moved to Kittitas school on Sunday, and the response will be downgraded Monday when the Yakima Training Center will take over, he said.

The fire started at the Yakima Training Center at about 4:30 p.m. Friday, and the cause remains under investigation, Strange said.

The fire destroyed two homes and some outbuildings. A Red Cross shelter was set up in Kittitas.

Access to Huntzinger Road near Vantage remains restricted to support firefighting efforts, according to the sheriff's office, and the road will require some repair. A safety inspection of the road and embankment will take place today.

Puget Sound Energy transmission lines are still compromised and the wind farm is off-line, according to the sheriff's office.



THINKING REAL ESTATE? THINK JASON HALL.

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9			7		5			3

Level: Beginner

Here's How It Works:
Sudoku puzzles are formatted as a 9x9 grid, broken down into nine 3x3 boxes. To solve a sudoku, the numbers 1 through 9 must fill each row, column and box. Each number can appear only once in each row, column and box. You can figure out the order in which the numbers will appear by using the numeric clues already provided in the boxes. The more numbers you name, the easier it gets to solve the puzzle!

1	5	6	3	2	4	7	8	9
2	9	4	8	7	1	6	3	5
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6	1	5	4	3	9	8	2	7
3	7	9	6	8	2	4	5	1
7	6	8	9	1	3	5	4	2
5	2	3	7	4	8	1	9	6
9	4	1	2	6	5	3	7	8

Microsoft's Draft Air Permit for the Oxford Data Center

On January 27, 2014, the Department of Ecology's Air Quality Program received a Notice of Construction application (NOC or air permit application) from the Microsoft Corporation proposing to construct and operate the Oxford Data Center in Quincy, WA.

Microsoft has applied for an air permit because the proposed data center would install thirty-two 2.5-megawatt (MW), four 2-MW emergency back-up diesel engine generators, one 0.75-MW emergency back-up diesel engine generator, and construct thirty-two cooling towers. The Oxford Data Center is located approximately ¾ mile west of Microsoft's existing Columbia Data Center.

Stay Informed

Find out more information at our website:
http://www.ecy.wa.gov/programs/air/quincydatacenter/index.html
Sign up for Ecology's Data Center Listserv at:
http://listserv.wa.gov/cgi-bin/wa?A0=QUINCY-DATA-CENTERS
QUESTIONS?
Beth Mort, Outreach & Education Air Quality Program, 509-329-3502

Public Comment Invited

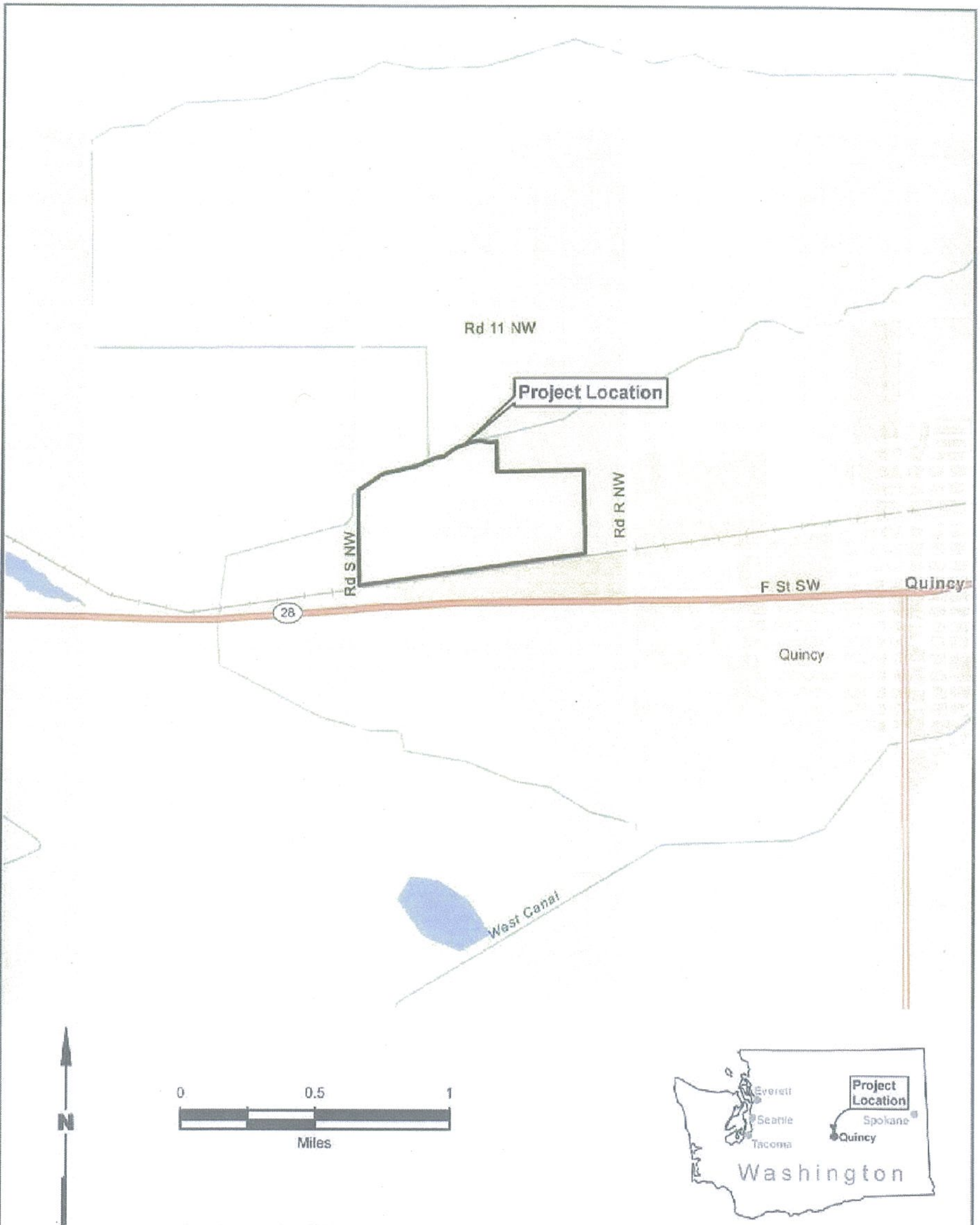
Ecology will be asking for your comments on the Oxford Data Center Draft Air Permit **as soon as the draft air permit is complete**. You will be invited to review the documents associated with this permit at Quincy City Hall or the Quincy Library. Documents will also be available at Ecology's Spokane office.

Information about the comment period including open and close dates, and how/where to submit your comments will be publicized in the **Quincy Valley Post Register**.

For more information contact :
Beth Mort, Outreach & Education Air Quality Program, 509-329-3502

Para asistencia en Espanol:
Gregory Bohn 509-454-4174
Richelle Perez 360-407-6084

DEPARTMENT OF
ECOLOGY
State of Washington



Data Source: Esri 2012.

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LANDAU ASSOCIATES

Project Oxford Data Center Quincy, Washington	Vicinity Map	Figure 1

DEPARTMENT OF ECOLOGY
State of Washington

Air Quality Program **June 2014**

Oxford Data Center Draft Air Permit

Este boletín incluye información sobre el Centro de Datos "Oxford" en Quincy. También está disponible en español. Si usted necesita más información en español, contáctenos al (360) 407-6084 o preguntas@ecy.wa.gov.

Microsoft proposes to build and operate the Microsoft Oxford Data Center in Quincy. The public can comment on this proposal during the public comment period as well as at the public hearing on July 24, 2014.

Data centers house the servers that provide email, manage instant messages, and run applications for our computers. The Oxford Data Center is about ¾ mile west of the existing Microsoft Columbia Data Center.

The Permit

An air permit (notice of construction approval order or NOC) is required for this project because the proposed data center includes backup generators. Backup generators emit air pollution when they burn diesel fuel.

Microsoft proposes to install 37 diesel generators, capable of producing 88.75 megawatts of emergency backup electrical power. Microsoft proposes to install air pollution control equipment that reduces emissions more than is required by federal standards. To protect the public from air pollution, the proposed NOC includes the following conditions:

- limit the amount of fuel that can be burned;
- limit the total hours per year the diesel engines can operate;
- test generator engines to make sure air pollution control equipment works;
- coordinate engine maintenance and testing schedules with the closest data centers (Dell and Microsoft Columbia Data Centers).

How Ecology Evaluates Diesel Exhaust

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

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

The Health Risks of Diesel Exhaust

The toxic air pollutants in diesel exhaust include nitrogen dioxide, carbon monoxide, organic compounds, and tiny particles called diesel exhaust particulates. Ecology evaluated the levels of all these pollutants during the

DATES AND LOCATIONS

Public Comment Period

June 19, 2014–July 29, 2014

Documents available at:

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

Quincy City Hall
104 "B" Street SW
Quincy, WA 98848

Quincy Library
208 Central Avenue South
Quincy, WA 98848

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

Submit comments to
Beth Mort
Washington Dept. of Ecology
4601 North Monroe Street
Spokane, WA 99205
(509) 329-3502
beth.mort@ecy.wa.gov

Public Hearing
Thursday, July 24, 2014

Quincy Community Center
115 "F" Street SW
Quincy, WA 98848

Agenda
5 p.m. Meet and Greet
5:30 p.m. Presentations/Q&A
6:30 p.m. Formal Hearing

Contact information
Greg Flibbert, Permit Manager
(509) 329-3452
greg.flibbert@ecy.wa.gov

permit review process. Diesel exhaust particles and nitrogen dioxide are the pollutants most likely to be produced in high enough amounts to potentially affect health. For more information about the health effects of these pollutants, read Ecology's publication *"Focus on Diesel Exhaust Health Risks."* This is available in English and Spanish.

Community Modeling

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

Ecology Wants Your Comments!

You may review and comment on the proposed draft air permit through **July 29, 2014**. The public comment period presents an opportunity to have your ideas and comments heard by Ecology. The box on page one provides details about where the documents can be found and how to submit comments.

A public hearing is also being held at the Quincy Community Center (115 "F" Street SW) on **July 24, 2014**. This will be an opportunity to learn about the project, and to voice your comments or concerns. The box on page one provides details about the public hearing.

For ADA accommodations or documents in alternate format, call (509) 329-3502, 711 (relay service), or 877-833-6341 (TTY).

STAY CURRENT
DATA CENTER AIR PERMITS

DEPARTMENT OF ECOLOGY State of Washington

Text ecyQuincyAir to 40404 for alerts

Follow @ecyQuincyAir

www.ecy.wa.gov search keyword Quincy

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

DEPARTMENT OF ECOLOGY
State of Washington

Borrador del Permiso para Emisiones al Aire del Centro de Datos "Oxford" de Microsoft

Microsoft propone construir y operar el Centro de Datos "Oxford" de Microsoft en Quincy. El público puede comentar sobre este propuesto durante el periodo de comentario público y también durante la reunión pública el 24 de julio de 2014.

Los centros de datos contienen servedores que entregan correo electrónico, manejan mensajes instantaneas y ejecutan aplicaciones para nuestras computadoras. El Centro de Datos "Oxford" está ubicado ¾ mila al oeste del existente Centro de Datos "Columbia" de Microsoft.

El Permiso

Un permiso para emisiones al aire (orden de aprobación del aviso de construcción o NOC, por sus siglas en inglés) es un requisito para este proyecto porque el propuesto del centro de datos incluye generadores de reserva. Generadores de reserva emiten contaminación al aire cuando queman el combustible de diesel.

Microsoft propone instalar 37 generadores de diesel, con la capacidad de producir 88.75 megavatios de energía eléctrica de reserva durante emergencias. Microsoft propone instalar equipo para controlar la contaminación al aire que reducirá las emisiones más que lo requerido por las normas federales. Para proteger el público de la contaminación al aire, el propuesto NOC incluye las siguentes condiciones:

- Un límite a la cantidad de combustible que se puede quemar;
- Un límite a las horas totales por año que los generadores de diesel pueden operar;
- Pruebas para los motores de los genaradores para asegurar que el equipo para controlar la contaminación al aire está funcionando;
- Coordinación de los horarios de mantenimiento y pruebas con los otros centros de datos cercanos (Centros de Datos de Dell y "Columbia" de Microsoft).

Como Ecología Evalua el Escape de Diesel

Durante la examinación de la aplicación para un permiso, Ecología evalua la cantidad de contaminación al aire el proyecto contribuiría. Ecología no puede aprobar un permiso que permite emisiones de contaminación al aire en niveles que pueden causar problemas de salud.

Ecología usa modelos computadorizados para estimar a donde el viento llevará la contaminación de aire tanto como la cantidad de contaminación al aire. Ecología evalua los resultados de los modelos computadorizados para determiner los posibles riesgos a la salud.

FECHAS Y LOCACIONES

Periodo de Comentario Público

19 de junio de 2014 a
29 de julio de 2014

Documentos disponible en las siguentes locaciones:

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

La Municipalidad de Quincy
104 "B" Street SW
Quincy, WA 98848

La Biblioteca de Quincy
208 Central Avenue South
Quincy, WA 98848

El Departamento de Ecología de Estado de Washington
Oficina Regional Este
4601 North Monroe Street
Spokane, WA 99205

Manda comentarios a:
Beth Mort
Washington Dept. of Ecology
4601 North Monroe Street
Spokane, WA 99205
(509) 329-3502
beth.mort@ecy.wa.gov

Reunion Pública
Jueves 24 de Julio de 2014

El Centro Comunitario de Quincy
115 "F" Street SW
Quincy, WA 98848

Agenda
5 p.m. Introducciones
5:30 p.m. Presentaciones / Preguntas
6:30 p.m. Audencia Formal

Información de Contacto
Richelle Perez
(360) 407-6084 o
Greg Bohn (509) 454-4174
preguntas@ecy.wa.gov

Los Riesgos a la Salud del Escape de Motores de Diesel

Los contaminantes al aire tóxicos que salen del escape de motores de diesel incluyen dióxido de nitrógeno, monóxido de carbono, compuestos orgánicos y partículas pequeñas que se llaman partículas del escape de motores de diesel. Ecología evaluó los niveles de todos estes contaminantes durante el proceso de examinar el permiso. Las partículas del escape de motores de diesel y dióxido de nitrógeno son los contaminantes con mayor posibilidad de estar producidos en cantidades suficientemente altas para tener la potencial de afectar la salud. Para más información sobre los efectos a la salud de estas contaminantes, lea la publicación de Ecología *"Enfoque en los Riesgos de Salud Desde los Escapes de Diesel."* Esto está disponible en inglés y español.

Modelos Comunitarios

Ecología evalua las emisiones de cada centro de datos individual tanto como las emisiones combinadas de todos los centros de datos y de las otras fuentes de contaminación al aire en el área. Para hacer eso, un modelo computerizado agrega las emisiones de un centro de datos nuevo a los de otras fuentes de contaminación del aire y determina si el total de las emisiones es capaz de ser dañoso a la salud humana. Este proceso de usar un modelo computerizado se llama "modelo comunitario". Un modelo comunitario fue usado porque hay muchos centros de datos ubicados en Quincy.

Ecología Quiere sus Comentarios!

Usted puede examinar y comentar sobre el propuesto del borrador del permiso para emisiones al aire hasta el 29 de julio de 2014. El periodo del comentario público le da una oportunidad para que Ecología escucha sus ideas y comentarios. El cuadro en la primera pagina tiene los detalles de donde se puede encontrar los documentos y como puede mandar los comentarios.

También hay una reunión pública el en Centro Comunitario de Quincy (115 "F" Street SW) el **24 de julio de 2014.** La reunión será una oportunidad para aprender sobre el proyecto y dar sus comentarios y preocupaciónes. El cuadro en la primera página tiene los detalles sobre la reunión pública.

Para acomodaciónes o documentos en un formato alternativo, llame (509) 329-3502, 711 (servicio relay), o 877-833-6341 (TTY).

www.ecy.wa.gov Busca keyword Quincy

Siga @ecyQuincyAir

Manda Follow ecyQuincyAir a 40404
Para avisos por mensajes de texto

Actualizaciones por correo electronic
listserv.wa.gov "Quincy-data-centers"

Diesel-powered Backup Generators for Data Centers in Grant County

Data centers house the servers that provide e-mail, manage instant messages, and run applications for our computers. In 2006, data center companies started to become interested in Grant County as a good place to build. Grant County has a low-cost, dependable power supply. Also, in 2010, the Washington State Legislature approved a temporary sales tax exemption for data centers building in Grant County and other rural areas. To qualify for the tax exemption, the data center must have at least 20,000 square feet dedicated to servers and start construction before July 1, 2011.

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

Health effects of diesel engine exhaust

The toxic air pollutants in diesel engine exhaust include nitrogen dioxide, carbon monoxide, organic compounds and tiny particles called diesel engine exhaust particles. 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 (NO_2). The possible health issues caused by these pollutants are discussed in this document.

When Ecology staff review the permit application for a data center, they look very carefully at how much the project will add to the air pollutants in the area. Ecology cannot approve a permit that allows pollutants to be emitted often enough or in high enough levels to cause health problems.

Diesel exhaust particles

The tiny particles in diesel exhaust are too small for our noses and upper respiratory systems to filter from the air we breathe. The particles go deep into our lungs, where they can cause damage and chemical changes. Studies show that certain levels of these particles can cause immediate health problems, including inflamed and irritated lungs and breathing passages, which may lead to coughing, chest tightness, wheezing, and difficulty breathing in some people.

WHY IT MATTERS

Data centers need an Ecology permit to install diesel-powered generators that emit diesel exhaust.

Diesel engine exhaust is a toxic air pollutant that, at high enough levels, can cause health problems.

As part of the permit process, Ecology reviews emissions of diesel engine exhaust and other air pollutants to see if they are a health concern.

This focus sheet gives information about the health effects of diesel exhaust, and how Ecology assesses health risk.

Contact information:

Greg Flibbert
509-329-3452
gregory.flibbert@ecy.wa.gov

Special accommodations:

If you need this publication in an alternate format, call the Air Quality Program at 360-407-6800. Persons with hearing loss, call 711 for Washington Relay Service. Persons with a speech disability, call 877-833-6341.

The particles increase the chance of a person getting a lung infection, such as pneumonia or bronchitis, and they can cause more frequent and more severe asthma attacks in people who already have asthma. Among people who have allergies, the particles can cause allergic reactions to be worse than usual, and they can cause heart disease and stroke in people who already have heart disease. Other conditions that might occur because of the particles are male infertility, birth defects, and reduced lung growth in children. Even small amounts of particles, breathed over a long period of time, can cause lung cancer and other forms of cancer.

Nitrogen dioxide (NO_2)

Short exposures – 30 minutes to 24 hours – to NO_2 above a safe level can cause breathing problems for some people. In addition, NO_2 may make breathing harder for people who already have trouble with their lungs, such as people with asthma.

When NO_2 combines with other gases and sunlight, ground-level ozone forms. Health effects of ground-level ozone are similar to those for diesel exhaust particles. They include inflamed and irritated lungs and breathing passages, which may lead to coughing, chest tightness, wheezing, and difficulty breathing. This reduced lung function may limit a person's ability to exercise. Ozone can also cause allergic reactions to be worse than usual. If a person is exposed to ground-level ozone day after day for a long time, the lungs can be permanently damaged.

NO_2 also hurts the environment. It contributes to acid rain and to smog.

How Ecology evaluates diesel engine exhaust

How the evaluation is done

1. Ecology's air quality experts rely on computer models to estimate where the wind will carry the pollutants in the exhaust from diesel-powered backup generators. They predict the amount of toxic air pollutants that could be in the air.
2. Ecology toxicologists review the information from the computer models. (Toxicologists specialize in understanding how pollution and chemicals affect people's health.)
3. The toxicologists then use risk assessment (see the heading "Risk assessment" below) to estimate possible health problems. They base these estimates on the predicted amounts of toxic air pollutants in the areas studied.

Risk assessment

Ecology toxicologists use risk assessment as a tool to estimate increased risk to human health. The purpose is to identify any potential health effects so we can prevent illness. Risk assessment is best used as a ruler to help us decide how we can best protect peoples' health. Risk assessment can't predict exact rates of a certain disease in an exposed community. However, it is a good tool for estimating potential risk and is based on current medical knowledge.

How the results are evaluated

The risk assessment divides health risk into two broad categories: cancer risk and non-cancer health risk. These two categories are evaluated differently. When Ecology staff assess diesel engine exhaust, they look at cancer risk from exposure to the particles in diesel exhaust.

They also look at non-cancer health risk caused by breathing these particles over a long time and by breathing the nitrogen dioxide in diesel exhaust over shorter times.

Cancer risk

When assessing cancer risk, Ecology assumes that any exposure to a cancer-causing chemical results in some degree of risk. The highest acceptable risk that Washington State regulations allow from any one project is a rate of 10 additional cancers in one million people. The highest risk usually allowed by the U.S. Environmental Protection Agency (EPA) for cancer-causing chemicals is 100 additional cancers in one million people exposed.

Non-cancer health risk

For non-cancer health risks, toxicologists calculate a "hazard quotient." This is a mathematical way to estimate how harmful a chemical might be to human health over a given period of time. The hazard quotient is the comparison of the estimated concentration of a chemical to what toxicologists term a "reference concentration." The reference concentration of a chemical is the amount below which health problems are not likely to occur. A hazard quotient of more than 1 means that a chemical has the potential to cause health problems. It does not mean that the chemical will definitely cause health problems, but the higher the hazard quotient, the more likely there will be health effects.

For NO_2, the hazard quotient is based on the amount of NO_2 that would cause some – but not all – people with asthma to have trouble breathing. The risk assessment takes into account the size of the hazard quotient, the severity and likelihood of a health effect, and the likelihood of exposure to NO_2.

What does health risk really mean?

Health problems like cancer and asthma may be due to many factors in addition to pollution, such as lifestyle, age, and exposure to viruses. But this does not mean there is no risk at all, even if pollution levels are within acceptable limits. Because there are many uncertainties involved in risk assessments, Ecology's estimate of increased health risk is not exact. To account for uncertainty, we design our risk assessments to use cautious assumptions – we are careful not to under predict human health risk. Actual health risks from diesel exhaust produced by any data center may be lower than our estimates, but we want to make sure we don't underestimate the risk when we make decisions based on health risk.

For more information, see Ecology's report, "Concerns about Adverse Health Effects of Diesel Engine Emissions" available online at http://www.ecy.wa.gov/pubs/0802032.pdf. Information about Washington data centers and air quality is available online at http://www.ecy.wa.gov/programs/air/quincydatacenter/.

Enfoque en los Riesgos de Salud Desde los Escapes de Diesel

Generadores de Reserva con Motor Diesel para los Centros de Datos en el Condado Grant

Los centros de datos tienen servidores que nos dan correo electrónico, manejan mensajes instantes, y ejecutan "software" para nuestras computadoras. En 2006, las compañías de los centros de datos se interesaron a tener interés en construir sus instalaciones en el Condado Grant. El condado Grant tiene una fuente de electricidad seguro y de bajo costo. También, en 2010, la legislatura del estado de Washington aprobó una exención temporaria de impuestos sobre la venta para los centros de datos que construyeran en el condado de Grant y otras áreas rurales. Para calificar para la exención de impuestos sobre la venta el centro de datos tenía que dedicar por lo menos 20,000 pies cuadrados de espacio a servidores y empezar construcción antes del 1 de julio de 2011.

Para construir o expandirse, la compañía de un centro de datos tiene que aplicar para un permiso de aire ambiente antes de empezar la construcción. El departamento de Ecología del Estado de Washington (Ecología) administra los permisos de aire ambiente. El permiso se llama "una orden de aprobación del aviso de construcción" (NOC, por sus siglas en inglés). El objetivo del NOC es proteger la calidad de aire. Los centros de datos necesitan un NOC para sus generadores de reserva con motor diesel grandes para proveer electricidad a los servidores cuando hay un corte de electricidad. Los escapes de diesel tienen contaminantes tóxicos del aire. Como parte del proceso de revisar la aplicación para el permiso, Ecología evalúa si los escapes de diesel desde los generadores de reserva pueden causar problemas de salud.

Los efectos a la salud desde los escapes de un motor de diesel

Los contaminantes tóxicos al aire en los escapes de un motor de diesel incluyen dióxido de nitrógeno, monóxido de carbono, compuestos orgánicos y pequeñas partículas llamadas "partículas de los escapes de un motor de diesel". Ecología evalúa los niveles de todos los contaminantes de aire durante el proceso de revisar la aplicación para el permiso de aire ambiente. Los contaminantes que los centros de datos tienen la mayor probabilidad de emitir en cantidades suficiente altas para afectar la salud son las partículas de los escapes de diesel y el dióxido de nitrógeno (NO_2). Este documento explicas los posibles efectos a la salud de estos contaminantes.

¿Por qué es Importante?

Los centros de datos necesitan un permiso del aire ambiente desde Ecología para instalar sus generadores de reserva que emita escapes de diesel.

A niveles altas, los escapes de motores de diesel son un contaminante toxico de aire que puede causar problema de salud

Como parte del proceso de evaluar una aplicación para un permiso de aire ambiente, Ecología revisa si las emisiones de los escapes de motores de diesel causan problemas de salud.

Este documento tiene información sobre los efectos a la salud de los escapes de diesel y como Ecología evalúa el riesgo de salud.

Contacto:
Richelle Pérez
(360) 407-6084
preguntas@ecy.wa.gov

Acomodaciones Especiales:

Si usted necesita este documento en un formato alternativo, favor de llamar a Richelle Pérez a 360-407-7528. Para los que son sordos llaman a 711, para los que tengan impedimentos del hablado, llama, 877-833-6341 (servicios sol en ingles).

Cuando Ecología revisa la aplicación para un permiso de aire ambiente para un centro de datos, examina cuidadosamente la cantidad de contaminantes de aire el proyecto va a acumular en el área. Ecología no puede aprobar un proyecto que subiría la cantidad o frecuencia de emisiones de contaminantes a nivel suficiente alta para causar problemas de salud.

Las partículas de los escapes de diesel

Las partículas de los escapes de diesel son tan pequeñas que nuestras narices y sistemas respiratorios superiores no pueden filtrarlos del aire que respiramos. Las partículas viajan profundamente a dentro de nuestros pulmones, donde pueden hacer daño y cambios químicos. Estudios muestran que algunos niveles de estas partículas pueden causar problemas inmediatos de salud, incluso inflamar e irritar los pulmones y vías respiratorias. Esto puede causar tos, opresión en el pecho, sibilancias, y dificultad para respirar en algunas personas.

Las partículas suben la posibilidad que una persona se infecte en los pulmones, como neumonía o bronquitis. También las partículas causan ataques de asma más frecuentes y más serias en personas que ya tienen asma. En personas con alergias, las partículas pueden causar reacciones alérgicas que son peores de lo normal y pueden causar enfermedad del corazón. En personas que tienen enfermedad del corazón pueden causar ataques fulminantes. Las partículas pueden causar otras condiciones como infertilidad en hombres, defectos de nacimiento, y crecimiento reducido en niños. Cantidades pequeñas de partículas respiradas sobre un tiempo largo, pueden causar cáncer de los pulmones y otros tipos de cáncer.

Dióxido de nitrógeno (NO_2)

Exposiciones cortas (entre 30 minutos y 24 horas) de NO_2 sobre un nivel seguro pueden causar problemas de respiración para algunas personas. Adicionalmente, NO_2 puede crear dificultad de a personas que tienen problemas de pulmones, como aquellos que tienen asma.

Cuando NO_2 se combina con otros gases y la luz del sol, se forma ozono a nivel del suelo. Los efectos a la salud de ozono a nivel del suelo son similares a los de las partículas de los escapes de diesel. Los efectos incluyen inflamar e irritar los pulmones y las vías respiratorias. Esto puede causar tos, opresión en el pecho, sibilancias, y dificultad de respirar. La reducción del funcionamiento de los pulmones puede limitar la capacidad en que una persona puede hacer ejercicio. Ozono también puede causar reacciones alérgicas que pueden ser peores de lo normal. Si una persona está expuesta a ozono a nivel del suelo todos los días por un tiempo largo, el ozono puede dañar a los pulmones permanentemente. NO_2 hace daño al medio ambiente porque contribuye a la lluvia acida y el "smog".

El proceso usado por Ecología para evaluar los escapes de un motor diesel

La manera de la evaluación

1. Los expertos de calidad de aire de Ecología dependen de modelos de computador para estimar donde el viento va a traer los escapes de un generador de reserva con motor de diesel. Ellos predican la cantidad de contaminantes tóxicos que puede estar en el aire.
2. Los toxicólogos de Ecología revisan la información de los modelos de la computadora. (Los toxicólogos se especializan en entender como los contaminantes y los productos químicos afectan la salud de una persona.)

3. Los toxicólogos usan una evaluación de riesgo (Vea el parágrafo titulado "La evaluación del riesgo" abajo) para estimar los posibles problemas de salud. Ellos hacen sus estimaciones en las cantidades de contaminantes tóxicas del aire predicados para las áreas estudiadas.

La evaluación de riesgo

Los toxicólogos usan la evaluación de riesgo como una herramienta para estimar el riesgo elevado a la salud humana. El objetivo es identificar cualquier efecto a la salud para poder prevenir enfermedades. La mejor forma de usar la evaluación de riesgo es como medida para ayudarnos a decidir la mejor forma de proteger la salud humana. La evaluación de riesgo no puede predicar cantidades exactas de enfermedades en una comunidad. Es una herramienta buena para estimar el riesgo potencial según el conocimiento medico contemporánea.

La evaluación de los resultados

La evaluación de riesgo se divide el riesgo de salud en dos categorías grandes: riesgo de cáncer y riesgo que no es cáncer. Evaluamos las dos categorías de una forma diferente. Cuando evaluamos los escapes de un motor de diesel, miramos el riesgo de cáncer por la exposición de partículas de escapes de diesel. También miramos a los riesgos de salud que no son cáncer que están causados por la respiración de partículas por un tiempo largo y la respiración del dióxido de nitrógeno sobre tiempos más cortos.

Riesgo de cáncer

Cuando evaluamos riesgo de cáncer, asumimos que cualquier exposición a un producto químico que causa cáncer resulta en algún grado de riesgo. El nivel de riesgo más alto aceptado en las reglas del estado de Washington permite un riesgo de 10 canceres adicionales en un millón de persones por un proyecto. El nivel de riesgo más alto aceptado por la Agencia de Protección Ambiental de Estados Unidos (EPA, por sus siglas en inglés) por productos químicos que causan cáncer es el riesgo de 100 canceres en un millón de personas expuestas.

Riesgo a la salud que no sea de cáncer

Para los riesgos a la salud que no son cáncer, los toxicológicos calculan un "cociente de riesgos." Esto es una manera matemática de estimar el daño potencial de un producto químico a la salud humana en un cierto periodo de tiempo. El cociente de riesgos es la comparación de la concentración estimada con algo que los toxicológicos nombran "concentración de referencia." La concentración de referencia es la cantidad de un producto químico donde los problemas de salud no tienen mucha posibilidad de ocurrir. Un cociente de riesgos mayor de uno significa que el producto químico tiene la posibilidad de causar problemas de salud. No significa que definitivamente causará problema de salud. Lo más alto el cociente de riesgo, lo más probable que causará los efectos a salud.

Para NO_2, la base del cociente de riesgo es la cantidad de NO_2 que puede causar problemas respiratorios para algunas (pero no todas) personas con asma. La evaluación de riesgo toma en cuenta el tamaño del cociente de riesgo, severidad, y posibilidad de un efecto a la salud más la posibilidad de exposición a NO2.

¿Qué significa riesgo a la salud?

Varios factores aparte de contaminación afectan los problemas de salud, como estilo de vida, edad, y exposición a los virus. Eso no significa que cuando los niveles de contaminación están a niveles aceptables que no hay riesgo a la salud. Hay varias incertidumbres involucradas con la ciencia evaluaciones de riesgo y la estimación del riesgo a la salud que hace Ecología, que no son exactas. Para tomar en cuenta los incertidumbres designamos nuestras evaluaciones del riesgo con supuestos prudentes – tenemos cuidado de no predicar un riesgo menos del riesgo actual a la salud humana. Los riesgos a la salud actuales desde los escapes de diesel de cualquier centro de datos pueden ser más bajos de nuestras estimaciones, pero queremos asegurar que no subestimamos el riesgo cuando hacemos decisiones en base del riesgo a la salud.

Para más información (en inglés), favor revise el reportaje de Ecología "Concerns about Adverse Health Effects of Diesel Engine Emissions" disponible en internet a http://www.ecy.wa.gov/pubs/0802032.pdf. Información (en inglés) sobre la calidad del aire y los centros de datos de Washington está disponible en http://www.ecy.wa.gov/programs/air/quincydatacenter/.

Mort, Beth (ECY)

From: Mort, Beth (ECY)
Sent: Thursday, February 06, 2014 10:57 AM
Subject: Oxford Data Center Notice of Construction Application
Attachments: project location.pdf

Hello Interested Parties,

On January 27, 2014, the Department of Ecology's Air Quality Program (Ecology) received a Notice of Construction application (air permit application) from the Microsoft Corporation proposing to construct and operate the Oxford Data Center in Quincy, WA. Microsoft has applied for an air permit because the proposed data center would install of 36 2.5-megawatt (MW) emergency back-up diesel engine generators, one 0.75-MW emergency back-up diesel engine generator, and construct 32 cooling towers. The Oxford Data Center would be located approximately ¾ mile west of Microsoft's existing Columbia Data Center (please see attached pdf of project location).

Ecology's technical staff are currently reviewing the application to determine if the proposal meets Federal and State air standards and requirements. Ecology will also evaluate diesel engine emission impacts from the proposed facility on the community. Additionally, other diesel engine emissions in Quincy, such as data centers, truck traffic, and trains will be evaluated along with the diesel emissions from the proposed data center.

We will provide updates during the review process and keep you informed on any outreach events. We will also notify you as we approach a public comment period on this project. Public comment will open once a draft permit is completed. Please contact me if you have questions.

OUTREACH UPDATE

I am currently conducting community interviews in the Quincy area asking general questions about:

- what people know about data centers and air sources in the area
- what they would like to know and
- how they get their news

If you would like to do an online version of this interview please choose one of these links:
English version https://www.surveymonkey.com/s/quincy-interview
Spanish version: https://www.surveymonkey.com/s/quincy-espanol

I will also be attending the Mt. View School Wellness Fair this evening, Feb. 6, from 4:30-6:30 to conduct interviews if you would like to do one in person.

****

You are on this email list because of past interest in data center projects in the Quincy area. If you do not wish to be on this list any longer, please respond with Unsubscribe in the subject line and I will remove your email.
If you know anyone else who you think would like to be on this list please have them contact me at beth.mort@ecy.wa.gov.
Please forward this email onto others you think would be interested. Contact me if you have questions.

For information on data centers in Quincy please visit our website:
http://www.ecy.wa.gov/programs/air/quincydatacenter/index.html.

Beth Mort | Community Outreach & Environmental Education
Air Quality Program | Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov | 509.329.3502
Office Hours: M-Th 7am-4pm

This communication is public record and may be subject to disclosure as per the Washington State Public Records Act, RCW 42.56.

Mort, Beth (ECY)

From: Mort, Beth (ECY)
Sent: Wednesday, April 23, 2014 1:28 PM
Subject: Interested Parties Emails now on QUINCY-DATA-CENTERS ListServ

Dear Interested Parties,

We now have a "listserv" for sending out email updates on data centers in the Quincy area. Now anyone can subscribe to the Quincy Data Centers listserv at any time or also unsubscribe. I will send out updates and information the same way except that it will be coming from the listserv not directly from my email address.
I will be entering in the email addresses I currently have into this listserv and you will receive a notification that you have been added. This notification will also give you links where you can unsubscribe or send emails if you have questions.

You can find this listserv and others at http://listserv.wa.gov. The listserv title is QUINCY-DATA-CENTERS. Please let me know if you have any questions. Please forward this on to anyone you think would be interested.

Beth Mort | Community Outreach & Environmental Education
Air Quality Program | Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov | 509.329.3502
Office Hours: M-Th 7am-4pm

Mort, Beth (ECY)

From: Mort, Beth (ECY) [BMOR461@ECY.WA.GOV]
Sent: Wednesday, April 23, 2014 4:08 PM
To: QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject: Testing ListServ

I am testing the new listserv to make sure that everything is running properly.

Thank you!

Beth Mort | Community Outreach & Environmental Education
Air Quality Program | Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov | 509.329.3502
Office Hours: M-Th 7am-4pm

Mort, Beth (ECY)

From: Mort, Beth (ECY)
Sent: Friday, May 16, 2014 1:37 PM
To: QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject: Women's Day Event in Quincy

I will be participating in Women's Day in Quincy this Saturday. Although the draft air quality permit is not completed for the Oxford Data Center, I will still have flyers to hand out reminding people that a comment period will be coming. I will also have other information about our program.

Thank you,

Beth Mort
Outreach & Education
Air Quality Program
509-329-3502

Mort, Beth (ECY)

From: Mort, Beth (ECY)
Sent: Thursday, June 12, 2014 4:20 PM
To: 'QUINCY-DATA-CENTERS@LISTSERV.WA.GOV'
Subject: Comment periods just around the corner

Hello Quincy Data Center Interested Parties,

Stay informed
We wanted to update you on a few ways to stay connected as we get close to a comment period for Oxford Data Center. Besides email updates through this listserv, we now have a way that you can receive text alerts about data center projects on your phone. This text alert is hosted through Twitter but you don't have to have a twitter account to sign up. Just text "**Follow ecyQuincyAir**" to 40404 and you will be signed up. Your standard text rates apply. If you do have a Twitter account, follow us @ecyQuincyAir. We are working diligently on getting all emails and other communications translated so that each are available in English and Spanish.

Columbia proposes changes to its cooling towers
Another comment period is coinciding with Oxford. Microsoft is proposing to change cooling tower operations at Columbia Data Center to decrease water use. The change will increase particles released into the air while still meeting clean air requirements. This comment period will coincide with Oxford's. We will be keeping you posted as soon as the comment periods open. We anticipate that they will open on June 19th.

Community Interviews in Quincy
We conducted community interviews at the beginning of this year and want to thank everyone that participated. We have incorporated many suggestions into this outreach effort based on the information provided by interviews (in person, online, or mailed). Be prepared to see advertisements run in the Quincy Valley Post Register, El Mundo, Wenatchee World, and the Columbia Basin Herald.

Website
Our website has recently been under construction but we are getting updates on the Quincy Data Center webpage as soon as we are able. We hope to have electronic versions of all relevant documents available on the webpage by the comment period opening.

Documents available in two locations
The Quincy Library and Quincy City Hall have graciously agreed to each hold copies of relevant documents for the comment periods so you will have two review locations. Focus sheets on Diesel Engine Exhaust and on the Oxford Data Center Project will be posted at several locations in Quincy including the Library, City Hall, Quincy Community Health Center, the Chamber of Commerce, Serve Quincy, and other places around town.

Help spread the word
Please help us spread the word about these comment periods! Forward this information on to your neighbors, friends, family and anyone you think is interested. Forward text alerts to people, post it on your Facebook page, talk with others, and if you have a chance – take a look at the information that is available to learn more about these projects. You can always contact Ecology if you have questions. Contact Beth Mort 509-329-3502 or beth.mort@ecy.wa.gov. Para asistencia en Espanol: Gregory Bohn 509-454-4174 or Richelle Perez 360-407-6084 preguntas@ecy.wa.gov.

Text "Follow ecyQuincyAir" to 40404 for text message alerts

Visit our Quincy Data Centers webpage for more information.
Find out what is happening in your city on our Public Involvement Calendar by searching your city.
Tips on Effective Public Commenting.
Sign up for the Quincy Data Centers Listserv.

Beth Mort | Community Outreach & Environmental Education
Air Quality Program | Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov | 509.329.3502
Office Hours: M-Th 7am-4pm

From: Mort, Beth (ECY)
Sent: Thursday, June 19, 2014 8:02 AM
To: 'QUINCY-DATA-CENTERS@LISTSERV.WA.GOV'
Subject: Comment Periods are OPEN!

Hello Quincy Data Center Interested Parties,

Comment periods are open for Oxford and Columbia Data Centers
The comment period for both the proposed new Oxford Data Center and changes to the existing Columbia Data Center are open as of June 19th. Both comment periods close on July 29th.

There will be a public hearing for the Oxford Data Center on July 24th at the Quincy Community Center. There will be a meet and greet at 5pm, at 5:30pm presentations followed by Q&A, and the formal hearing will begin at 6:30pm.

Documents associated with these projects are available at Quincy City Hall and the Quincy Library. Please submit comments by mail to Beth Mort, Department of Ecology, 4601 N Monroe St., Spokane, WA 99205, or by email to beth.mort@ecy.wa.gov, by close of business day on July 29. Contact Beth Mort at (509) 329-3502 if you have questions.

Please read the press release for more information. Also available en Español.
Para asistencia en Español: Gregory Bohn 509-454-4174 or Richelle Perez 360-407-6084 preguntas@ecy.wa.gov.

Website
Our website has recently been under construction but we are getting updates on the Quincy Data Center webpage as soon as we are able. Electronic versions of relevant documents for the comment periods will be available on the webpage very soon.

Stay informed
There are several ways to stay up to date!

- Sign up for this listserv for email updates!
- Receive text alerts! Just text "**Follow ecyQuincyAir**" to 40404 and you will be signed up. Your standard text rates apply.
- Follow us on Twitter @ecyQuincyAir.
- Visit Ecology's Quincy Data Centers webpage for more information.
- Find out what is happening in your city on our Public Involvement Calendar by searching your city.

We are working diligently to have all communications translated in English and Spanish.

Help spread the word
Please help us spread the word about these comment periods! Forward this information on to your neighbors, friends, family and anyone you think is interested. Forward text alerts to people, post it on your Facebook page, talk with others, and if you have a chance – take a look at the information that is available to learn more about these projects. You can always contact Ecology if you have questions. Contact Beth Mort 509-329-3502 or beth.mort@ecy.wa.gov. Para asistencia en Espanol: Gregory Bohn 509-454-4174 or Richelle Perez 360-407-6084 preguntas@ecy.wa.gov.

Text "Follow ecyQuincyAir" to 40404 for text message alerts

Visit our Quincy Data Centers webpage for more information.

Find out what is happening in your city on our Public Involvement Calendar by searching your city.
Tips on Effective Public Commenting.
Sign up for the Quincy Data Centers Listserv.

Beth Mort **/** Community Outreach & Environmental Education
Air Quality Program **/** Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov **/** 509.329.3502
Office Hours: M-Th 7am-4pm

Mort, Beth (ECY)

From: Mort, Beth (ECY) [BMOR461@ECY.WA.GOV]
Sent: Wednesday, June 25, 2014 2:52 PM
To: QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject: Documents are up on web!

Hello Interested Parties!

The documents for both the Oxford and Columbia comment periods are now available on the Quincy Data Centers webpage. Please let me know if you have any troubles viewing them.
Below is the translated version of the message that was sent out on 6/19.

Beth Mort | Community Outreach & Environmental Education
Air Quality Program | Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov | 509.329.3502
Office Hours: M-Th 7am-4pm

16 de junio 2014

Estimados señores interesados en los Centros de Datos de Quincy,

Están aceptando comentarios sobre los Centros de Datos "Oxford" y "Columbia"
Están aceptando comentarios desde el 19 de junio acerca de dos proyectos: el propuesto nuevo Centro de Datos "Oxford" y los cambios al existente Centro de Datos "Columbia". Aceptan comentarios para ambos proyectos hasta el 29 de julio.

Tendrá una reunión pública para el Centro de Datos "Oxford" el 24 de julio en el Centro Comunitario de Quincy (Quincy Community Center). Empezará a juntar para conocer y saludar a las 5:00 p.m., a las 5:30 p.m. habrá presentaciones y la audiencia pública formal empezará a las 6:30 p.m.

Los documentos asociados con estos proyectos están ubicados en la Municipalidad de Quincy (City Hall) y en la Biblioteca de Quincy. También están en el sitio web del Departmento de Ecología (Ecología) Quincy Data Centers webpage. Favor de someter comentarios por correo a Beth Mort, Department of Ecology, 4601 N Monroe St., Spokane, WA 99205, o por correo electrónico a beth.mort@ecy.wa.gov, antes el cierre del día hábil del 29 de julio. Contactar a Beth Mort a (509) 329-3502 si tiene preguntas. Para asistencia en español: Gregory Bohn a 509-454-4174 o Richelle Perez a 360-407-6084 o preguntas@ecy.wa.gov.

Favor de leer el comunicado de prensa al fin de este email para más información.

Manténgase informado
¡Hay muchas maneras para mantenerse informado!

- ¡Inscríbase para este listserv para recibir boletines por email!
- ¡Reciba alertas de texto! Solo mande por texto "**Follow ecyQuincyAir**" a 40404 y estará inscrito. Las aportaciones estándares se aplican.
- Síganos por Twitter @ecyQuincyAir.
- Visite a la página web de Ecología Quincy Data Centers webpage para más información.
- Manténgase al día con lo que pasa en su ciudad en nuestro calendario Public Involvement Calendar, buscando a su ciudad.

Estamos trabajando diligentemente para traducir todas las comunicaciones en inglés y español.

Entrevistas con la comunidad en Quincy
Conducimos entrevistas con la comunidad al principio de este año y queremos dar las gracias a todas las personas quienes participaron. Hemos incorporado muchas sugerencias en este esfuerzo de educación por lo que aprendimos en las entrevistas (en persona, en línea o por correo). Prepárese para ver advertencias en los periódicos Quincy Valley Post Register, El Mundo, Wenatchee World y Columbia Basin Herald.

Sitio web
Nuestro sitio web ha recientemente estado bajo construcción pero estamos publicando información en el Quincy Data Center webpage lo antes posible. Esperamos tener las versiones electrónicas de todos los documentos pertinentes disponibles en el sitio web antes del comienzo del periodo de comentarios.

Ayuda a diseminar las noticias
¡Háganos el favor de ayudar a diseminar las noticias sobre estos periodos de comentarios! Reenvíe esta información a sus vecinos, amigos, familia y quienes piensen que puede estar interesado. Reenvíe los alertas de texto, pónselos en su página Facebook, hable con otros y si tiene la oportunidad – revise la información que está disponible para aprender más sobre estos proyectos. Puede contactarse con Ecología si tiene preguntas. Contactar a Beth Mort a 509-329-3502 o beth.mort@ecy.wa.gov. Para asistencia en español: Gregory Bohn a 509-454-4174 o Richelle Perez a 360-407-6084 o preguntas@ecy.wa.gov.

Mande por texto "Follow ecyQuincyAir" a 40404 para alertas de texto

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

Beth Mort / Community Outreach & Environmental Education
Air Quality Program / Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov / 509.329.3502
Horario de Oficina: lunes a jueves desde las 7:00 hasta las 4:00

Mort, Beth (ECY)

From:	Mort, Beth (ECY)
Sent:	Monday, July 14, 2014 11:13 AM
To:	'QUINCY-DATA-CENTERS@LISTSERV.WA.GOV'
Subject:	Reminder! Public Hearing on 7/24!!! Recuerda! Reunión Pública el 27 de julio!!!

Hello Interested Parties,

Don't forget to come to the Public Hearing on the Oxford Data Center on July 24th at the Quincy Community Center! This is an opportunity to learn about the project, ask questions to Ecology staff and Microsoft staff, and give formal public comment.

Quincy Community Center
115 F Street SW, Quincy, WA
5:00 pm - Meet and Greet
5:30 pm - Presentations and Q&A
6:30 pm - Formal Hearing

We have a fact sheet about the Oxford Data Center that is available at Quincy City Hall, Quincy Library and several other locations around town. You can also access HERE at our website.

Estimados señores interesados,

No se olvidan venir a la Reunión Pública para el Centro de Datos "Oxford" el 24 de julio en el Centro Comunitario de Quincy! Esto es una oportunidad para aprender sobre el proyecto, hacer sus preguntas a los representantes de Ecología y Microsoft, y dar sus comentarios públicos formales.

Centro Comunitario de Quincy
115 Calle F SW, Quincy, WA
5:00 pm - Introducciones
5:30 pm - Presentaciones y preguntas
6:30 pm - Audiencia Formal

Tenemos un boletín sobre el Centro de Datos "Oxford" que está disponible en la Municipalidad de Quincy, la Biblioteca de Quincy, y varias otras locaciones en la ciudad. Usted también puede leerlo AQUÍ en nuestro sitio web.

Beth Mort | Community Outreach & Environmental Education
Air Quality Program | Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov | 509.329.3502
Office Hours: M-Th 7am-4pm

Visit our Quincy Data Centers webpage for more information.
Tips on Effective Public Commenting.
Find out what is happening in your city on our Public Involvement Calendar.
Sign up for the Quincy Data Centers Listserv.

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

This communication is public record and may be subject to disclosure as per the Washington State Public Records Act, RCW 42.56.
Este mensaje es registro público y puede estar sujeto a descubrimiento por la Ley de Registros Públicos de Washington (Washington State Public Records Act, RCW 42.56).

Mort, Beth (ECY)

From: Mort, Beth (ECY) [BMOR461@ECY.WA.GOV]
Sent: Wednesday, July 23, 2014 9:52 AM
To: QUINCY-DATA-CENTERS@LISTSERV.WA.GOV
Subject: Reminder! Public Hearing on 7/24!!! Recuerda! Reunión Pública el 27 de julio!!!

Hello Interested Parties,

Don't forget to come to the Public Hearing on the Oxford Data Center on July 24th at the Quincy Community Center! This is an opportunity to learn about the project, ask questions to Ecology staff and Microsoft staff, and give formal public comment.

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Estimados señores interesados,

No se olvidan venir a la Reunión Pública para el Centro de Datos "Oxford" el 24 de julio en el Centro Comunitario de Quincy! Esto es una oportunidad para aprender sobre el proyecto, hacer sus preguntas a los representantes de Ecología y Microsoft, y dar sus comentarios públicos formales.

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Tenemos un boletín sobre el Centro de Datos "Oxford" que está disponible en la Municipalidad de Quincy, la Biblioteca de Quincy, y varias otras locaciones en la ciudad. Usted también puede leerlo AQUÍ en nuestro sitio web.

Beth Mort | Community Outreach & Environmental Education
Air Quality Program | Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov | 509.329.3502
Office Hours: M-Th 7am-4pm

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

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Este mensaje es registro público y puede estar sujeto a descubrimiento por la Ley de Registros Públicos de Washington (Washington State Public Records Act, RCW 42.56).

To unsubscribe from the QUINCY-DATA-CENTERS list, click the following link:
http://listserv.wa.gov/cgi-bin/wa?SUBED1=QUINCY-DATA-CENTERS&A=1

Appendix B:
Copies of all written comments

- 06/23/14 – William Riley, Columbia Basin Environmental Council
- 07/15/14 – Patty Martin, MYTAPN
- 07/16/14 – Danna Dal Porto, MYTAPN
- 07/22/14 – Danna Dal Porto, MYTAPN
- 07/18/14 – Patty Martin, MYTAPN
- 07/25/14 – Danna Dal Porto, MYTAPN
- 07/29/14 – William Collier, Citizen
- 07/29/14 – John Raddick, Microsoft
- 07/29/14 – Patty Martin, MYTAPN
- 07/29/14 – Debbie and Mark Koehnen

This page is purposely left blank.

Mort, Beth (ECY)

From: William Riley [1724liberty@gmail.com]
Sent: Monday, June 23, 2014 2:30 PM
To: Mort, Beth (ECY)
Subject: Fwd: Support of Microsoft Expansion in Quincy

Categories: Quincy

I am President of the Columbia Basin Environmental Council. Founded in 1996 and continually registered with WA Sect of State as a Non-profit UBI# 601703876. We comment on events impacting the environment. CBEC will comment favorably on the expansion of the Microsoft facility in Quincy, WA.
1. The history of the existing facility.
2.The past history of diesel use being only 20% of the permitted use.
3. Electrical service having extremely(less than 143 minutes/year) little downtime resulting in low diesel backup use
4. Current low sulfur diesel fuel available reducing emissions
5. Favorable winds from the Columbia River Gorge causing rapid air replacement
6.Number of jobs created vs extremely low environmental impact

If you can provide me with a mailing address I will provide you with a copy of the CBEC statement of support.
We as environmentalists support bringing jobs to Grant County.

Sincerely,
Wm Riley CBEC President
POB 1285
Soap Lake, WA 98851
1724liberty@gmail.com
PH 509-246-0946

Mort, Beth (ECY)

From: Patty Martin [martin@nwi.net]
Sent: Tuesday, July 15, 2014 4:03 PM
To: Mort, Beth (ECY)
Cc: Flibbert, Gregory S. (ECY)
Subject: Re: Microsoft's latest lie

That's a none answer. I will interpret that to mean they are not putting on controls.

Patty

On 7/15/2014 3:25 PM, Mort, Beth (ECY) wrote:

> Hello Patty,
>
> Thank you for the comment regarding the requirements for SCR and DPF on each engine. We agree that the requirement for SCR and DPF should be clearly stated in the permit conditions. We will include this in the Response to Comments document.
>
> Thank you,
>
> *Beth*
> *509.329.3502*
>
> ---
>
> **From:** Patty Martin [mailto:martin@nwi.net]
> **Sent:** Tuesday, July 15, 2014 11:39 AM
> **To:** Mort, Beth (ECY); Hibbard, Richard (ECY); Kadlec, Matthew (ECY)
> **Subject:** Re: Microsoft's latest lie
>
> Beth,
>
> You are right that I sent the wrong draft permit. Here is the Oxford draft:
>
> http://www.ecy.wa.gov/programs/air/quincydatacenter/docs/MSN_Project_Oxford_PD_June_16_2014.pdf
>
> Please cite to the section of this draft permit where there is any requirement for controls. I do not see that they are required nor being voluntarily installed as eluded to in the TSD section 3.4.1.
>
> Thank you.
>
> Patty
>
> On 7/15/2014 10:21 AM, Mort, Beth (ECY) wrote:
>
>> Hello Patty,
>>
>> Rich Hibbard forwarded us your email below. The link that you provided was for Microsoft's existing Columbia Data Center. The comment period for Columbia Data Center is for modifications to cooling tower operations.

Microsoft's new facility is the Oxford Data Center. The link for that preliminary determination is: http://www.ecy.wa.gov/programs/air/quincydatacenter/docs/MSN_Project_Oxford_PD_June_16_2014.pdf. The link for the Technical Support Document is: http://www.ecy.wa.gov/programs/air/quincydatacenter/docs/MSN_Project_Oxford_TSD_June_16_2014.pdf. Both are on the website under Microsoft Oxford Data Center heading along with other relevant documents. The engines for Oxford will be Tier IV equivalents with SCR and PDF. Microsoft can't meet the emission conditions in the permit unless they use these controls for each engine. Please see sections in the TSD, 3.4.1 on page 7, and the Catalyst Delay Cold Start Adjustments Table on page 5.

The comment periods for both Columbia and Oxford run through July 29th. The public hearing on July 24th at the Quincy Community Center is just for the Oxford Data Center – which is the new facility.
Thank you,

Beth
509.329.3502

-----Original Message-----
From: Hibbard, Richard (ECY)
Sent: Tuesday, July 15, 2014 9:25 AM
To: Flibbert, Gregory S. (ECY); Mort, Beth (ECY)
Cc: Kadlec, Matthew (ECY)
Subject: FW: Microsoft's latest lie

Forwarded Email from Ms Martin.

-----Original Message-----
From: Patty Martin [mailto:martin@nwi.net]
Sent: Tuesday, July 15, 2014 9:16 AM
To: Hibbard, Richard (ECY); Kadlec, Matthew (ECY)
Subject: Microsoft's latest lie

Richard and Matt,

Just to let you know that Microsoft courted Danna and me about the new facility and assured us that they were using SCRs and DPFs. Now I see the permit doesn't include either control. In fact, Microsoft is buying engines that were manufactured in 2006 and 2010 to avoid using Tier IV engines.

http://www.ecy.wa.gov/programs/air/quincydatacenter/docs/MSN_Preliminary_Determination_14AQ-E553.pdf

I have been told that Microsoft is creating a more concentrated emission from their existing plant by recirculating the water through the cooling towers by 100x.

Patty

--
Patricia Martin
Safe Food and Fertilizer
617 H St. SW
Quincy, WA 98848

A project of Earth Island Institute.

--
Patricia Martin
Safe Food and Fertilizer
617 H St. SW
Quincy, WA 98848

A project of Earth Island Institute.

--
Patricia Martin
Safe Food and Fertilizer
617 H St. SW
Quincy, WA 98848

A project of Earth Island Institute.

Mort, Beth (ECY)

From: Flibbert, Gregory S. (ECY)
Sent: Wednesday, July 16, 2014 10:43 AM
To: Mort, Beth (ECY)
Subject: FW: Oxford data center questions

Categories: Quincy

Please read and advise, I'm wrapped in a project right now.

-----Original Message-----
From: Danna Dal Porto [mailto:ddalporto@smwireless.net]
Sent: Wednesday, July 16, 2014 10:08 AM
To: Flibbert, Gregory S. (ECY)
Subject: Oxford data center questions

July 16, 2014

Greg,

Some questions on the Oxford permit and public hearing.

The SEPA documents on file with the City of Quincy have statements I want to use in my public comments. Do I have to include the entire document or can I just pull the pages I need for support? Or should I have the page with information along with the cover sheet and signature page? Thanks for clarifying that.

I am sort of confused. The SEPA I refer to states that Oxford will have emission controls. Those controls are clearly listed by name and type. In the permitting documents on file, there is nothing about controls. The BACT is listed as Tier 2 engines. Can you sort out this difference in information? I really did think that this huge data center would have controls. I had a meeting in February with Kevin Williams and was presented a slide show and told that controls would be place on the engines. This month when I looked at the permit document I felt really sandbagged. I was really sad to think that I had been totally misled and deceived. I need you to tell me what is the truth and, if controls are to be installed, that information needs to be part of the written permit. Without the actual listing of controls in the permit, the public has no way to know what is happening. The public has only the permit as the standard that will be in place for operation of the facility.

I appreciate all the efforts Beth has taken to advertise this hearing. I appreciate the listing of the public notice in the Quincy paper, I appreciate the 40 day comment period and I really appreciate having the documents at the library. In the past when we needed to read the paperwork, Stephanie in the City office had to find us a table (move it into the small office) or give up her desk and we had to read the stuff during City Hall hours. The library is much better.
I am afraid that not many people will show up but having the Community Center as a meeting space will be better. Especially if it stays as hot as it is today.

Thanks for sorting this out for me.

Danna Dal Porto
Quincy, WA

Mort, Beth (ECY)

From: Danna Dal Porto [ddalporto@smwireless.net]
Sent: Tuesday, July 22, 2014 9:52 AM
To: Mort, Beth (ECY)
Subject: Confusion over closing dates on published information

Categories: Quincy

Beth,

The Quincy paper public notice of June 19, 2014, lists the closing of the comment period for the Columbia water discharge proposal as July 29, 2014.

An Ecology News Release of June 13, 2014, lists the comments closing on Columbia on July 19, 2014.

Please clarify. I do understand that the Columbia posting is asking for comments as well as a request for a public hearing. Comments on
Columbia are not to be heard at the July 24, 2014 Oxford hearing.
Correct?

Danna

Mort, Beth (ECY)

From:	Mort, Beth (ECY)
Sent:	Tuesday, July 22, 2014 10:27 AM
To:	'Patty Martin'
Cc:	Flibbert, Gregory S. (ECY); Johnson, Kari D. (ECY); Wood, Karen K. (ECY); 'Danna Dal Porto'; Smith, Stephanie (ECY); Hibbard, Richard (ECY)
Subject:	RE: Subject: updated web info

Tracking:

Recipient	Read
'Patty Martin'	
Flibbert, Gregory S. (ECY)	
Johnson, Kari D. (ECY)	
Wood, Karen K. (ECY)	Read: 7/22/2014 10:31 AM
'Danna Dal Porto'	
Smith, Stephanie (ECY)	Read: 7/22/2014 10:31 AM
Hibbard, Richard (ECY)	Read: 7/28/2014 6:32 AM
Beeler, Brook (ECY)	Read: 7/22/2014 11:16 AM

Hello Patty,

Below is the email you sent on Friday with responses and information you asked for. Attachments are included.

Thank you,

Beth Mort | Community Outreach & Environmental Education
Air Quality Program | Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov | 509.329.3502
Office Hours: M-Th 7am-4pm

This communication is public record and may be subject to disclosure as per the Washington State Public Records Act, RCW 42.56.

-----Original Message-----
From: Patty Martin [mailto:martin@nwi.net]
Sent: Friday, July 18, 2014 1:12 PM
To: Smith, Stephanie (ECY); Johnson, Kari D. (ECY); Hibbard, Richard (ECY); Danna Dal Porto
Subject: updated web info

I am writing to request information on the date of edit to Ecology's website regarding comments being sought on two separate Microsoft permits. The edited website can be found here:
http://www.ecy.wa.gov/news/2014/088.html

I am also requesting a screen shot of the original publication.

The original press release went out on Friday, June 13. That press release listed the comment period for Columbia as June 19-July 19. On Monday June 16, Ecology decided to extend the comment period to 40-days to match Oxford's so that both would run from June 19-July 29. The press release was updated to reflect this

Mort, Beth (ECY)

From: Danna Dal Porto [ddalporto@smwireless.net]
Sent: Friday, July 25, 2014 5:30 PM
To: Mort, Beth (ECY)
Subject: Exhibit index Danna Dal Porto comments, Oxford
Attachments: Oxford Exhibits.docx; OXFORD DATA CENTER PUBLIC COMMENTS…….docx

Categories: Quincy

Beth,

Thank you for all the effort you put into the Oxford public hearing. Although the group was still small, there were some new faces and that is progress.

I am sending the exhibit list as well as the document. I thought it might be useful to have the comments in electronic form.

Best wishes until next time,

Danna

This
is my
statement.
put into
record.

This document
does not have
page numbers.
Also I forgot
to provide an
index of Exhibits.
I will provide
Corrected copies
via email to Beth

1/4

MICROSOFT OXFORD DATA CENTER PUBLIC COMMENTS.......DANNA DAL PORTO

July 24, 2014

This document is from Danna Dal Porto, Quincy resident, to be submitted for the public comment period for the Microsoft Oxford Data Center.

The focus of my concern is the lack of clarity in the permitting documents regarding the construction of the diesel engines with emission controls. I had to make numerous phone calls and send several emails to clarify the actual facts regarding the use of emission controls on the engines. I will not be satisfied with the permitting of this project without clarity as to the restrictions in the permit that require Microsoft to protect the health of my community.

I was very pleased to read in the Determination of Nonsignificance (DNS) completed for the Oxford Project in the City of Quincy, 12/27/2013, that all 69 emergency diesel generators (Phases I-IV) would have emission controls (Exhibit 1). Air quality in Quincy has concerned me for several years and having emissions controls on these huge diesel engines was welcome news.

A Washington State Department of Ecology News Release of June 13, 2014, discussed the Oxford Data Center (Oxford) and this document states that Microsoft is "proposing to install advanced equipment to reduce air pollutants beyond federal clean air requirements" (Exhibit 2). In addition to the news release, Ecology presented a fact sheet (Exhibit 3) that restated emission controls would be on the engines. I regarded these news releases as further proof that emission controls would be installed on the diesel engines.

On June 16, 2014, the Preliminary Determination for Approval Order No. 14AQ-E537 (TSD) was available. I looked at Table 2a.1 BACT Determinations to see the requirements for emission controls (Exhibit 4). When I read this table I did not see that Oxford was installing emission controls. This was not what I thought I understood. This was a terrible disappointment. Reading further into the TSD, I saw language that I have seen before in data center documents. The phrase reads: "Ecology concludes that the use of DOC is not economically feasible for this project" (Exhibit 5), (Exhibit 6). Another phrase that is used is: "Therefore, Ecology agrees with the applicant that this NOx control option can be excluded as BACT...(Exhibit 7). All of those phrases, as well as others, almost always indicated that controls would not be installed.

On July 16, 2014, I sent an email to Gregory Flibbert, Ecology air Spokane, and he had Beth Mort, Ecology Spokane, answer my questions as to why the permit did not clearly state the situation at Oxford regarding controls (Exhibit 8). All the things I had read indicated controls yet the permit language did not clearly indicate controls. Without the <u>actual listing of controls in the permit</u>, the public has no way of knowing the restrictions on the operation of that data center. The public has only the operational permit as the standard that will be in place for the legal operation of the facility. I use this analogy to explain what I think should be the essence of the Ecology Air Operational Permit. When I go to the Washington State Drivers License Bureau for an operational license to drive my car, that bureau issues me a license with specific limits. I can drive my car but I must use my glasses to operate legally. That is an important, necessary limit placed on my legal operation of my car. The Ecology Air Permit is issued to Oxford to operate their facility, but to run legally, Oxford must have written stipulations to install specific emission controls to be in compliance.

This July 16, 2014, email from Beth Mort had additional information. She stated in the email "Microsoft can't meet the emission conditions in the permit unless they use these controls for each engine" (Exhibit 8). If that is true, why was that not listed on the permit? Beth referenced me to two specific places to find the emission controls in the TSD: Section 3.4.1 on page 7 (Exhibit 9) and the Catalyst Delay Cold Start Adjustments Table on page 5 (Exhibit 10). I read those pages and I could not determine from either of those references that Oxford was using emission controls. Figuring out what is happening should not be this hard. The public should expect clarity and brevity from Ecology regarding the specific requirements and limits imposed on a developer to protect human health and the environment. It should not be this hard find clear language in the document or this hard to understand.

Feeling frustrated, I contacted John Radick, Senior Program Manager at Microsoft. On February 11, 2014, I met with Mr. Radick (and others) and viewed an Oxford presentation. That presentation discussed controls and Mr. Radick responded with an email that confirmed the use of control devices (Exhibit 11). He referred me to the approval order Table 4 (Exhibit 12) to see the limits. Unfortunately Table 4 does not help me see that controls will be used. Despite the amount of time I have spent reading these documents, I need information spelled out very clearly because I cannot decipher the science or the numbers. <u>I want the Ecology Approval Order (Permit) to say clearly that Oxford is required to use specific emission controls on the diesel engines to comply with the legal operation of the data center. I want the emission controls to be listed and clearly named and identified. Anyone looking at the permit should see the restrictions placed on the operation of the facility.</u>

On another point, the TSD has a comment on page 21 (Exhibit 13) regarding the application of the "community-wide" evaluation of emission releases. The Oxford "community-wide" conversation only concerns DEEP. The "community-wide" approach has been interesting to me 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. As best I can tell, an Ecology employee, Gary Palcisko, developed this analysis 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. Was this Palcisko analysis peer reviewed? Was this analysis method proposed to the department management and was it adopted as policy? How does this analysis method fit together with Tier 2 and Tier 3 permitting? In reading a document by Ecology employee Richard B. Hibbard, Quincy Data Center Issues, May 20, 2010, (Exhibit 14), the higher number of "community-wide" affected residents applies to the maximum risk for a Third Tier analysis of 100 per million. In other words, does the "community-wide" analysis only apply to Tier 3? If so, Oxford is not Tier 3 and "community-wide" does not apply.

This is a specific question. Oxford had a Second Tier Review. Why didn't it have a Third Tier Review? The original DNS (SEPA) lists the build out to be 69 engines. Did Ecology/Microsoft model all 69 engines or only 37 (or 36 depending on the document you read)? Is Microsoft engineering a different permitting outcome by developing this facility in phases? The net effect is that in final build out this data center will have 69 engines. Shouldn't the emissions be calculated based on the total number of generators when the facility is complete?

Another specific question: With one exception I believe that all the modeling for Quincy data centers has been done by one person, Jim Wilder. Is he the only person in Washington State that is qualified to provide modeling of emissions? Ecology has excellent personnel and I think I would like to see modeling done by other people rather than just one person.

On a totally different track, I present an article from the Seattle Times, October 5, 2013, (Exhibit 15) about the potential hazard to Honeybees from two components of diesel exhaust, nitric oxide and nitrogen dioxide. Research concluded that honeybees rely on their sense of smell and, you guessed it, diesel exhaust can alter odors. Obviously this is an agricultural community and all effects of industry in Quincy must be considered when siting diesel engines. This study is far from conclusive but the thought still remains that what happens in the environment can have unexpected consequences.

Ecology has prepared emission maps from other data centers. This is a specific request from the public hearing: I would like an over-view map showing the emissions from Oxford in combination with all the other emissions from town. In response to Vantage public comments, Ecology sent out a close up map showing cumulative diesel particulate and it focused on the core of town. (Exhibit 16) Other maps from Ecology included in this document show much larger impacted areas. (Exhibits 17,18). Please provide me a current map showing the effects of emissions on the larger Quincy community.

I repeat myself in requesting air quality monitoring in Quincy. Our community is adding many industrial facilities, many more trains on the Intermodal, many more trucks and traffic that all raise the background emissions, especially DEEP. Modeling can only go so far in assessing accurate particulates in the air. We need to know and stop guessing about the reality of air quality. Air monitoring is necessary and once again I am requesting permanent air monitoring equipment be installed at

Mountain View School and at Lazy Acres, east of town, to provide accurate information on 24/7 air quality levels. I want the emission records to be kept on file with Ecology, validated, reported to the EPA and available to the public in a format that can be reviewed and easily understood.

Thank you for consideration of these comments,

Sincerely,

Danna Dal Porto
16651 Road 3 NW
Quincy, WA 98848
Home: (509) 785-2380
Cell: (509) 989-7444

EXHIBIT INDEX...PUBLIC COMMENTS DANNA DAL PORTO

OXFORD DATA PROJECT..........JULY 24, 2014

1. WAC 197-11-970 Determination of Nonsignificance (DNS) Prepared for the Project Oxford Data Center, City of Quincy, Tim Snead, City Administrator, December 27, 2013

2. Ecology News Release: Air permits for data centers in Quincy under review, Danzer, Erin, Washington Department of Ecology, June 13, 2014

3. Microsoft Oxford Data Center Draft Air Permit (news letter), June 2014, Publication Number 14-02-014

4. Preliminary Determination for Approval Order No. 14AQ-E537, Microsoft Oxford Data Center, June 16, 2014, Page 5-7 of 16

5. Technical Support Document, Microsoft Oxford Data Center, June 16, 2014, page 15.

6. Technical Support Document, Microsoft Oxford Data Center, June 16, 2014, page 14.

7. Technical Support Document, Microsoft Oxford Data Center, June 16, 2014, page 11.

8. Email: Mort, Beth, (ECY), reply to Danna Dal Porto's message: Oxford data center questions, July 16, 2014.

9. Technical Support Document, Microsoft Oxford Data Center, June 16, 2014, page 5.

10. Technical Support Document, Microsoft Oxford Data Center, June 16, 2014, page 7.

11. Email: John Radick, Senior Program Manager, reply to Danna Dal Porto's message: Oxford diesel emission controls, July 19, 2014.

12. Preliminary Determination for Approval Order No. 14AQ-E537, Microsoft Oxford Data Center, June 16, 2014, page 10 of 16.

13. Technical Support Document, Microsoft Oxford Data Center, June 16, 2014, page 21.

14. Quincy Data Center Issues, by Richard B. Hibbard, May 20, 2010.

WAC 197-11-970 Determination of **nonsignificance (DNS).**

DETERMINATION OF NONSIGNIFICANCE

Description of proposal: The proposed project includes the construction of approximately 1,400,000 SF of new industrial data center space in multiple construction phases on an approximately 212-acre site. Associated backup power center generation facilities, parking, fuel storage, landscaping and infrastructure improvements are also proposed; well-source water is a backup alternative for supply. The site will be designed to accommodate the phase construction of the proposed buildings.

Proponent: Project Oxford Data Center
Pacland
11400 S.E. 8th., Suite 345
Bellevue, WA 98004

Location of proposal: Parcels 2 through 5, Tract A, and Farm Units 216 and 217, Irrigation Block 73, Columbia Basin Project. The site is located west for Road R NW and east of Road S NW, Quincy WA.

Lead agency: City of Quincy

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030 (2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

☐ There is no comment period for this DNS.

☐ This DNS is issued after using the optional DNS process in WAC 197-11-355. There is no further comment period on the DNS.

X This DNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal for 14 days from the date below. Comments must be submitted by January 13, 2014

Responsible official: Tim Snead

Position/title: City Administrator Phone. 509-787-3523

Address P.O. Box 338 / 104 B St. SW Quincy, WA. 98848

Date. December 27, 2013 Signature ______

X You may appeal this determination to Tim Snead
at 104 B St. SW. Quincy WA. 98848
no later than January 28, 2014 in writing.

You should be prepared to make specific factual objections.
Contact Tim Snead to read or ask about the procedures for SEPA appeals.

☐ There is no agency appeal.

Exhibit 1

See above Item f.

2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, and industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Emissions during construction would include dust and vehicle emissions, and emissions after construction would include from employees, security, and the delivery/maintenance vehicles accessing the facility.

The eventual full buildout of the facility as described by the Preliminary Master Plan PC-1.00 includes multiple phases of facility construction. Only Phases I and II are reasonably certain to be completed within the next 3 years. Therefore, Ecology directed the applicant to submit the first air quality permit application to cover only Phases I and II of facility construction, with the understanding that long-term future construction of Phases III and IV will require additional air quality permitting.

The facilities will include a standby diesel engine generator system to provide power to the computer systems and occupied buildings in the event of utility power failure. The combined Phases I and II will include approximately 37 emergency diesel generators, ranging in size from 1,500 kW to 2,500 kW. The full buildout of the facility (Phases I-IV) will require approximately 69 emergency diesel generators, ranging in size from 1,500 kW to 2,500 kW. All generators will be equipped with emission control devices including Selective Catalytic Reduction (SCR) for control of nitrogen oxides (NOx), and diesel particulate filters (DPFs) for control of diesel engine exhaust particulate (DEEP).

All generators will operate periodically for routine testing and maintenance, and continuously during a power outage event. Grant County PUD forecasts less than 2 hours per year of power outage, but to be conservative, the facility will account for an average of 24 hours per year of power outage as part of the air quality permit.

The facility will use mechanical cooling towers that emit cooling tower drift.

b. Are there any off-site sources of emissions or odor that may effect your proposals? If so, generally describe.

The required air quality analysis will consider regional background emission sources including local railroads, local highways, and regional emissions from residential space heating and industrial/commercial sources.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Site will be sprinkled with water during construction as necessary to control dust. All diesel emergency generators will be equipped with emission control devices (SCR for NOx control, and DPFs for diesel particulate emissions). Diesel generator systems will be fitted with vertical exhaust stacks extending above the generator building rooftops to promote optimal dispersion. Diesel generator systems will meet or exceed current WA State Dept. of Ecology standards for air emissions. In addition, extensive air quality modeling will be conducted to demonstrate that ground-level air emissions do not pose a significant risk to the public. Construction of the diesel generators will not be allowed to begin until the WA State Dept. of Ecology has approved the documentation in the permit applications and has issued its final air quality permit. This combination of required steps will ensure that emissions during construction and operation of the data center facility will not cause any significant air quality impacts.

INITIALS ____

Gmail

Ecology News Release: Air permits for data centers in Quincy under review

Danzer, Erin (ECY) <edre461@ecy.wa.gov>
Reply-To: "Danzer, Erin (ECY)" <edre461@ecy.wa.gov>
To: ECOLOGY-NEWS@listserv.wa.gov

Fri, Jun 13, 2014 at 11:10 AM

Washington Department of Ecology – *NEWS*
June 13, 2014

Contacts:
Brook Beeler, Washington Department of Ecology, 509-329-3478, and @ecyspokane

Air permits for data centers in Quincy under review
Microsoft plans new data center and upgrades for existing center

SPOKANE – Microsoft Corporation is proposing a new data center and upgrades to the operation of an existing facility in Quincy. The work requires air permits from the Washington Department of Ecology to ensure human health and the environment are protected.

The data centers house servers that store digital data, provide email, manage instant messages, and run applications for computers. They require cooling towers to keep equipment from overheating, as well as backup generators in case of power outages.

Particle pollution, at high enough levels, can cause health problems. One source of pollution is the fine particles from diesel engine exhaust. Cooling towers also release particles into the air.

Maintenance and testing of diesel generators at the Quincy-area data centers will be coordinated so the generators are not all running at the same time, reducing exposure to air pollution.

Oxford Data Center
At the new facility 37 diesel generators, 32 cooling towers and air pollution control equipment to reduce particles released into the air would be installed. The new generators would be in addition to the 158 generators already permitted at six other Quincy-area facilities.

Microsoft is proposing to install advanced equipment to reduce air pollutants beyond federal clean air requirements.

The draft permit for this facility includes several additional conditions that protect the public from air pollution including limits on fuel and specified hours of operation for the generators.

For more details and information about the permit, a public hearing will be held at 5 p.m. on July 24 at the Quincy Community Center, 115 F St. SW, Quincy, Wash. 98848.

Comments on the draft air permit for Oxford Data Center will be accepted through July 29.

Columbia Data Center

The Columbia Data Center currently has an Ecology air permit to operate 37 diesel generators and 12 cooling towers. Microsoft is proposing to change cooling tower operations to decrease water use. The change will increase particles released into the air while still meeting clean air requirements. Diesel generator operations approved under the current permit will not be altered.

Comments on the draft air permit for Columbia Data Center will be accepted through July 19.

Submit comments

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

Review permits

- Ecology's website
- Ecology's Eastern Regional Office, 4601 N. Monroe, Spokane, WA 99205
- Quincy City Hall, 104 B Street SW, Quincy, WA 98848
- Quincy Library, 208 Central Ave S, Quincy, WA 98848

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Microsoft Oxford Data Center Draft Air Permit

Este boletín incluye información sobre el Centro de Datos "Oxford" en Quincy. También está disponible en español. Si usted necesita más información en español, contáctenos al (360) 407-6084 o preguntas@ecy.wa.gov.

Microsoft proposes to build and operate the Microsoft Oxford Data Center in Quincy. The public can comment on this proposal during the public comment period as well as at the public hearing on **July 24, 2014**.

Data centers house the servers that provide email, manage instant messages, and run applications for our computers. The Oxford Data Center is about ¾ mile west of the existing Microsoft Columbia Data Center.

The Permit

An air permit (notice of construction approval order or NOC) is required for this project because the proposed data center includes backup generators. Backup generators emit air pollution when they burn diesel fuel.

Microsoft proposes to install 37 diesel generators, capable of producing 88.75 megawatts of emergency backup electrical power. Microsoft proposes to install air pollution control equipment that reduces emissions more than is required by federal standards. To protect the public from air pollution, the proposed NOC includes the following conditions:

- limit the amount of fuel that can be burned;
- limit the total hours per year the diesel engines can operate;
- test generator engines to make sure air pollution control equipment works;
- coordinate engine maintenance and testing schedules with the closest data centers (Dell and Microsoft Columbia Data Centers).

How Ecology Evaluates Diesel Exhaust

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

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

The Health Risks of Diesel Exhaust

The toxic air pollutants in diesel exhaust include nitrogen dioxide, carbon monoxide, organic compounds, and tiny particles called diesel exhaust particulates. Ecology evaluated the levels of all these pollutants during the

DATES AND LOCATIONS

Public Comment Period

June 19, 2014–July 29, 2014

Documents available at:

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

Quincy City Hall
104 "B" Street SW
Quincy, WA 98848

Quincy Library
208 Central Avenue South
Quincy, WA 98848

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

Submit comments to
Beth Mort
Washington Dept. of Ecology
4601 North Monroe Street
Spokane, WA 99205
(509) 329-3502
beth.mort@ecy.wa.gov

Public Hearing
Thursday, July 24, 2014

Quincy Community Center
115 "F" Street SW
Quincy, WA 98848

Agenda
5 p.m. Meet and Greet
5:30 p.m. Presentations/Q&A
6:30 p.m. Formal Hearing

Contact information
Greg Flibbert, Permit Manager
(509) 329-3452
greg.flibbert@ecy.wa.gov

Exhibit 3

permit review process. Diesel exhaust particles and nitrogen dioxide are the pollutants most likely to be produced in high enough amounts to potentially affect health. For more information about the health effects of these pollutants, read Ecology's publication "*Focus on Diesel Exhaust Health Risks.*" This is available in English and Spanish.

Community Modeling

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

Ecology Wants Your Comments!

You may review and comment on the proposed draft air permit through **July 29, 2014**. The public comment period presents an opportunity to have your ideas and comments heard by Ecology. The box on page one provides details about where the documents can be found and how to submit comments.

A public hearing is also being held at the Quincy Community Center (115 "F" Street SW) on **July 24, 2014**. This will be an opportunity to learn about the project, and to voice your comments or concerns. The box on page one provides details about the public hearing.

For ADA accommodations or documents in alternate format, call (509) 329-3502, 711 (relay service), or 877-833-6341 (TTY).

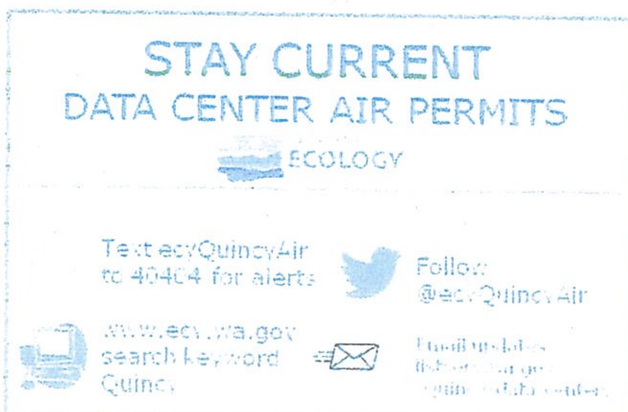


Table 2.2. Toxic Air Pollutants Potential To Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
Fluoride	0	4.8E-03	4.8E-03
Manganese	0	4.6E-04	4.6E-04
Copper	0	1.6E-04	1.6E-04
Chloroform	0	2.6E-04	2.6E-04
Bromodichloromethane	0	2.6E-04	2.6E-04
Bromoform	0	6.9E-03	6.9E-03

(a) DEEP is measured by EPA Method 5 (or 201a), which measures filterable (front-half) particulate emissions.
(b) NO_2 is assumed to be equal to 10 percent of the total NO_X emitted.

DETERMINATIONS

In relation to this project, the Washington State 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) as defined below:

Table 2a.1 BACT Determinations	
Pollutant(s)	BACT Determination
PM, CO, and VOCs	a. Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219. b. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. c. Use of high-efficiency drift eliminators which achieve a liquid droplet drift rate of no more than 0.0005 percent of the recirculation flow rate within each cooling tower.
NO_X	a. Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219, and satisfy the written verification requirements of Approval Condition 2.5. b. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.
SO_2	Use of ultra-low sulfur diesel fuel containing no more

Table 2a.1 BACT Determinations	
Pollutant(s)	**BACT Determination**
	than 15 parts per million by weight of sulfur.

3. The proposed project, if constructed and operated as herein required, will utilize Best Available Control Technology for toxic air pollutants (TAPs) (tBACT) as defined below:

Table 3.1 tBACT Determinations	
TAPs	**tBACT Determination**
Acetaldehyde, CO, acrolein, benzene, benzo(a)pyrene, 1,3-butadiene, DEEP, formaldehyde, toluene, total PAHs, xylenes, chrysene, benzo(a)anthracene, napthalene, benzo(b)fluoranthene, propylene, dibenz(a,h)anthracene, Ideno(1,2,3-cd)pyrene, fluoride, manganese, copper, chloroform, bromodichloromethane, bromoform,	Compliance with the VOC and PM BACT requirement.
Ammonia	No more than 15 parts per million volume-dry (ppmvd) at 15 percent oxygen per engine.
NO_2	Compliance with the NO_X BACT requirement.
SO_2	Compliance with the SO_2 BACT requirement.

4. In accordance with WAC 173-460-090, a second tier health risk analysis has been submitted by the applicant for DEEP emissions. Ecology has concluded that this project has satisfied all requirements of a second tier analysis.

THEREFORE, IT IS ORDERED that the project as described in the NOC application and more specifically detailed in plans, specifications, and other information submitted to Ecology is approved for construction and operation, provided the following conditions are met:

APPROVAL CONDITIONS

1. ADMINISTRATIVE CONDITION

 1.1. The emergency engine generators approved for operation by this Order are to be used solely for those purposes authorized for emergency generators under 40 CFR 60, Subpart IIII.

 1.2. The Oxford Data Center shall coordinate engine maintenance and testing schedules with Dell and the Microsoft Columbia Data Center in Quincy to minimize overlap between data center scheduled testing. Microsoft shall maintain records of the coordination communications with the other data centers, and those communications shall be available for review by Ecology.

2. EQUIPMENT RESTRICTIONS

2.1. The thirty-two 2.5 MWe engine, four 2.0 MWe engines, and the single 0.750 MWe engine 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 0.750 MWe, 2.0 MWe, and 2.5 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 Oxford 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 0.750 MWe, 2.0 MWe, and 2.5 MWe engines and electrical generating units approved for operation at the Oxford Data Center are those listed in Tables 1.1–1.3 above.

2.3. Replacement of failed engines with identical engines (same manufacturer and model) requires notification prior to installation, but will not require NOC unless there is an emission rate increase from the replacement engines.

2.4. The thirty-two 2.5 MWe engine-generator exhaust stack dimensions shall be greater than or equal to 46 feet above ground level, no more than 18 inches in diameter, and approximately 16 feet above roof height. The four 2.0 MWe engine-generator exhaust stack heights shall be greater than or equal to 46 feet above ground level, no more than 16 inches in diameter, and approximately 16 feet above roof height. The one 0.750 MWe engine-generator exhaust stack height shall be greater than or equal to 46 feet above ground level, no more than 14 inches in diameter, and approximately 16 feet above roof height.

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

3. OPERATING LIMITATIONS

3.1. Fuel consumption at the Oxford Data Center facility shall be limited to a total of 431,000 gallons per year and 119,300 gallons per day of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.00150 weight percent sulfur). Total facility annual fuel consumption may be averaged over a three (3) year period using monthly rolling totals.

3.2. Except as provided in Approval Condition 3.3, the thirty-seven (37) Project Oxford Data Center engines shall not operate more than the following load specific limits:

The corresponding annual DOC cost effectiveness value for carbon monoxide destruction alone is approximately $30,019 per ton. If particulate matter and hydrocarbons are individually considered, the cost effectiveness values become $959,386 and $154,771 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 $24,500 per ton of pollutants removed per year.

These annual estimated costs (for DOC use alone) provided by Microsoft are conservative estimates that take into account installation, tax, shipping, and other capital costs as mentioned above, but assume a lower bound estimate for operational, labor and maintenance costs of $0, whereas an upper bound CARB estimate could potentially amount to an additional $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.

4.2.3 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. Microsoft 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

Microsoft did not find any add-on control options commercially available and feasible for controlling sulfur dioxide emissions from diesel engines. Microsoft's proposed BACT for sulfur dioxide is the use of ultra-low sulfur diesel fuel (15 ppm by weight of sulfur).

4.3.2. BACT Determination for Sulfur Dioxide

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

4.4 BACT ANALYSIS FOR PM FROM COOLING TOWERS

The direct contact between the cooling water and air results in entrainment of some of the liquid water into the air. The resulting drift droplets contain total dissolved solids (TDS) in the cooling tower water, which can evaporate into air as particulate matter. For the Oxford facility, the recirculation water in the cooling towers will be pre-softened using the proprietary Water Conservation Technology International (WCTI) "pre-treatment system" to replace scale-forming mineral compounds (e.g., calcium and magnesium) with other non-toxic, non-scaling mineral compounds (e.g., sodium), which will allow the cooling towers to be operated with very high

These annual estimated costs (for DPF use alone) provided by Microsoft are conservative estimates that take into account installation, tax, and shipping capital costs but assume a lower bound estimate for operational, labor and maintenance costs of $0, whereas an upper bound CARB estimate could potentially amount to an additional $282,000/year.

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

4.2.1.2. ***Diesel Oxidation Catalysts***. This method utilizes metal catalysts to oxidize carbon monoxide, particulate matter, and hydrocarbons in the diesel exhaust. Diesel oxidation catalysts (DOCs) are commercially available and reliable for controlling particulate matter, carbon monoxide and hydrocarbon emissions from diesel engines. While the primary pollutant controlled by DOCs is carbon monoxide, DOCs have also been demonstrated to reduce diesel engine exhaust particulate emissions, and also hydrocarbon emissions.

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

- Microsoft obtained the following recent DOC equipment costs from a vendor on November 11, 2013: ($52,100 for a stand-alone catalyzed DOC per single 2.5MWe generator; add a scaled amount of $25,299 for a single 0.750 MWe generator, and conservatively exclude the cost of four 2.0 MWe generators). For thirty two (32) 2.5MWe generators and one (1) 0.750 MWe generators, this amounts to $1,692,500. According to the vendor, DOC control efficiencies for this unit are CO, HC, and PM are 90%, 80%, and 20% respectively.
- The subtotal becomes $1,934,315 after accounting for shipping ($84,625), WA sales tax ($110,012), and direct on-site installation ($47,178).
- After adding indirect installation costs, the total capital investment amounts to: $2,289,003. 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 $238,079.
- At the control efficiencies provided from the vendor, the annual tons per year of emissions for CO (8.81 tpy), HC (1.92 tpy), and PM (1.24 tpy) become 7.93 tpy, 1.54 tpy, and 0.25 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 ($238,079 divided by 7.93 tpy for CO, etc..).

Exhibit 6

whereas an upper bound CARB estimate could potentially amount to an additional $423,000 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 Oxford Data Center 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,

Exhibit 7

From: "Mort, Beth (ECY)" <BMOR461@ECY.WA.GOV>
Subject: **Oxford data center questions**
Date: July 16, 2014 1:57:44 PM PDT
To: "ddalporto@smwireless.net" <ddalporto@smwireless.net>
Cc: "Flibbert, Gregory S. (ECY)" <GFLI461@ECY.WA.GOV>

Hello Danna,

Greg asked me to respond to your questions. I have included your original email below.
Regarding your first question, you can simply reference the SEPA and indicate which statements came from that document in your public comments and do not need to submit the SEPA document in its entirety.

Regarding your second question, Microsoft is putting controls on its Oxford engines. The engines will be Tier IV equivalents with SCR and oxidizing DPF. Microsoft can't meet the emission conditions in the permit unless they use these controls for each engine. References to the controls are currently located in the TSD in section 3.4.1 on page 7, and the Catalyst Delay Cold Start Adjustments Table on page 5. Patty Martin also sent us an email and brought to our attention that this is not clearly spelled out in the PD. We agree that the requirement for SCR and DPF should be clearly stated in the permit conditions not just the TSD. This comment as well as Patty's will be included in the Response to Comments document where we can address this addition to the PD.

It sounds like the library has been a good place for you to review the documents but just in case, here is the link for the Oxford preliminary determination:
http://www.ecy.wa.gov/programs/air/quincydatacenter/docs/MSN_Project_Oxford_PD_June_16_2014.pdf and the link for the Technical Support Document:
http://www.ecy.wa.gov/programs/air/quincydatacenter/docs/MSN_Project_Oxford_TSD_June_16_2014.pdf. Both are on the website under Microsoft Oxford Data Center heading along with other relevant documents.

Thank you for your questions,

Beth Mort | Community Outreach & Environmental Education
Air Quality Program | Dept of Ecology Eastern Office
beth.mort@ecy.wa.gov | 509.329.3502
Office Hours: M-Th 7am-4pm

-----Original Message-----
From: Danna Dal Porto [mailto:ddalporto@smwireless.net]
Sent: Wednesday, July 16, 2014 10:08 AM
To: Flibbert, Gregory S. (ECY)
Subject: Oxford data center questions

July 16, 2014

Greg,

Some questions on the Oxford permit and public hearing.

The SEPA documents on file with the City of Quincy have statements I want to use in my public comments. Do I have to include the entire document or can I just pull the pages I need for support? Or should I have the page with information along with the cover sheet and signature page? Thanks for clarifying that.

I am sort of confused. The SEPA I refer to states that Oxford will have emission controls. Those controls are clearly listed by name and type. In the permitting documents on file, there is nothing about controls. The BACT is listed as Tier 2 engines. Can you sort out this difference in information? I really did think that this huge data center would have controls. I had a meeting in February with Kevin Williams and was presented a slide show and told that controls would be place on the engines. This month when I looked at the permit document I felt really sandbagged. I was really sad to think that I had been totally misled and deceived. I need you to tell me what is the truth and, if controls are to be installed, that information needs to be part of the written permit. Without the actual listing of controls in the permit, the public has no way to know what is happening. The public has only the permit as the standard that will be in place for operation of the facility.

I appreciate all the efforts Beth has taken to advertise this hearing. I appreciate the listing of the public notice in the Quincy paper, I appreciate the 40 day comment period and I really appreciate having the documents at the library. In the past when we needed to read the paperwork, Stephanie in the City office had to find us a table (move it into the small office) or give up her desk and we had to read the stuff during City Hall hours. The library is much better. I am afraid that not many people will show up but having the Community Center as a meeting space will be better. Especially if it stays as hot as it is today.

Thanks for sorting this out for me.

Danna Dal Porto
Quincy, WA

12-Month Total Emissions	404,047	0.46	8.77	16.00	0.81
Adjustment Factor Compared to 70-Year Average	0.91	0.86	1.023	1.01	1.02

(Note: these estimates are based on using thirty-six (36) 2.5 MWe engines and one (1) 0.750 MWe engine; Microsoft plans to use only thirty-two (32) 2.5 MWe engines, four (4) 2.0 MWe engines, and one (1) 0.750 MWe engine. As are result, NOx emissions are expected to be 8.6 tpy. In addition, VOC emissions are expected to be 0.8 tpy.):

Cold start adjustment factors are used to approximate the additional emissions from cold engines burning off the accumulated fuel and crankcase oil on cold cylinders. The PM and VOC cold start factor adjustments for these calculations are provided below:

VOC/PM Black Puff Cold-Start Adjustment Factors

Load	Spike Area (ppm-sec)	Steady-State Area (ppm-sec)	Total Area (ppm-sec)	Black Puff Factor
10%	6300	27000	33300	1.189
80%	6300	18000	24300	1.259
100%	6300	18000	24300	1.259

The CO cold start factor adjustments for these calculations are provided below:

CO Black Puff Cold-Start Adjustment Factors

Load	Spike Area (ppm-sec)	Steady-State Area (ppm-sec)	Total Area (ppm-sec)	Black Puff Factor
10%	15000	18000	33000	1.455
80%	15000	12000	27000	1.556
100%	15000	12000	27000	1.556

A NOx cold start factor of 1.0 was assumed because California Energy Commission tests (see *Air Quality Implications of Backup Generators in California"* CEC-500-2005-049; July 2005); do not show short term NOx spikes during cold starts.

Due to the way black-puff cold-start factors were calculated, annual facility-wide PTE emissions for CO and VOC were slightly underestimated by approximately 0.006 tpy and 0.004 tpy respectively. Ecology determines these differences to be negligible. Because Microsoft will be using diesel particulate filters, the applicant believes that use of a black-puff cold-start factor for DEEP conservatively overestimates facility emissions, but they have included them anyway.

Other cold-start related adjustments were also included in the application to account for heat-up times for catalysts in the selective catalyst reductions (SCR) and diesel particulate filter (DPF) as listed below:

Catalyst Delay Cold Start Adjustment

Control Device	Applicability	Adjustment
SCR catalyst and DPF oxidation catalyst	• Cold start under idle load (less than or equal to 10%) for VOC, CO, and NOx	15 minutes at emission levels equivalent of generator equipped with Tier 2 level emission controls followed by final Tier 4 compliant emissions
	• Cold start under high load for VOC, CO, and NOx	10 minutes at emission levels equivalent of generator equipped with Tier 2 level emission controls followed

		by final Tier 4 compliant emissions.

2.2 Source Testing

Source testing requirements outlined in Table 4 of the Approval Order, provide two testing approaches. A five-load approach for PM, NOx, CO, and VOC, where PM is considered to be DEEP at size PM2.5 or smaller, which tests only for the filterable particulate matter to be consistent with California Code of Regulations § 93115.14 *ATCM for Stationary CI Engines – Test Methods* (measuring front half particulate only). However, a single-load test at approximately 80 percent load (78%-82%) is also required for these pollutants (and ammonia), which takes into account both the filterable and condensable PM emissions. Engines are anticipated to be operating for more hours at 80 percent load than at other loads.

According to Approval Order 4.2, any emission testing performed to verify conditions of the permit or for submittal to Ecology in support of this facility's operations, requires that Microsoft comply with all requirements in 40 CFR 60.8 except subsection (g) which addresses audit samples. However, Approval Order 4.2 specifically states that "40 CFR 60.8(g) may be required by Ecology at their discretion." 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."*

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, Ecology believes that the two-test sampling approach required in Table 4 of the Order is a valid reason to waive audit sampling, because it provides two types of filterable particulate tests and also provides additional information (condensable particulate emissions) for one of the tests. However, Ecology may choose, at their discretion, to require audit sampling for stack tests conducted using any or all of the following particulate matter test methods: Methods 5, 201A, or 202.

3. APPLICABLE REQUIREMENTS

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

3.1 Chapter 70.94 Revised Code of Washington (RCW), Washington Clean Air Act,
3.2 Chapter 173-400 Washington Administrative Code (WAC), General Regulations for Air Pollution Sources,
3.3 Chapter 173-460 WAC, Controls for New Sources of Toxic Air Pollutants, and
3.4 40 CFR Part 60 Subpart IIII

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

3.4.1 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 Oxford are regulated under 40CFR60 subpart IIII (per 40CFR60.4200), they are not subject to 40CFR1039 requirements except as specifically required within 40CFR60.

According to 40CFR60, some emergency engines with lower power rating are required to meet 40CFR1039 Tier 4 emission levels, but not emergency engines with ratings that will be used at Oxford (0.750 MWe, 2.0 MWe, and 2.5 MWe). Instead, the engines at Oxford are required to meet the Tier 2 emission levels of 40CFR89.112 (even though they will in reality meet the more stringent limits listed in the permit with voluntary add-on controls). 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 Oxford:

§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.*

(Note: Based on information provided by the applicant, Oxford will use the following engines specifications: August, 2013 Caterpillar Model C27ATAAC rated 0.75 MWe; February, 2013 Caterpillar Model 3516C-TA rated 2.0 MWe; November 2012, Caterpillar Model 3516C-HD-TA rated 2.5 MWe. Based on these specifications, the 0.750 MWe engine has 27.03 liters displacement over 12 cylinders, or 2.25 liters per cylinder; the 2.0 MWe engines have 69.00 liters displacement over 16 cylinders, or 4.31 liters per cylinder; and the 2.5 MWe engines have 78.08 liters displacement over 16 cylinders, or 4.88 liters per cylinder. Thus, because the specified engines at Oxford will all have a displacement of less than 30 liters per cylinder, and are for emergency purposes only, they are 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.

(Note: Thus, as outlined in previous note, and based on the power ratings listed in *40 CFR 60.4202(a)*, the 0.75 MWe and 2.0 MWe engines at Oxford are required to meet the applicable 40CFR89 Tier 2 emission standards.)

(b) Stationary CI internal combustion engine manufacturers must certify their 2007 model year and later emergency stationary CI ICE with a maximum engine power ***greater than 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 (b)(1) through (2) of this section.*

(1) For 2007 through 2010 model years, the emission standards in table 1 to this subpart, for all pollutants, for the same maximum engine power.

(2) For 2011 model year and later, the certification emission standards for new nonroad CI engines for engines of the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants.

(Note: Thus, as outlined previously, and based on the power ratings listed in *40 CFR 60.4202(b)*, the 2.5 MWe engines at Oxford are required to meet the applicable 40CFR89 Tier 2 emission standards.)

3.4.2. Support for excluding 40 CFR 63 Subpart ZZZZ from Section 3 of TSD.

From: John Radick <John.Radick@microsoft.com>
Subject: **RE: Oxford diesel emission controls**
Date: July 19, 2014 5:09:24 PM PDT
To: Danna Dal Porto <ddalporto@smwireless.net>
1 Attachment, 1.7 KB

Ms. Dal Porto,

Thank you for your inquiry. All of the Project Oxford diesel generators will be equipped with emission control devices, including selective catalytic reduction (SCR) for NOx, and catalyzed diesel particulate filters (Catalyzed DPFs) to control particulate matter, volatile organic compounds, and carbon monoxide. Please see table 4 of the approval order for limits.

I hope this information helps answer your question.

Sincerely,

John Radick

John Radick -- RCDD / PMP
Senior Program Manager
Data Center Services
John.radick@microsoft.com
Cell (206) 898-1689

Microsoft

-----Original Message-----
From: Danna Dal Porto [mailto:ddalporto@smwireless.net]
Sent: Thursday, July 17, 2014 2:50 PM
To: John Radick
Subject: Oxford diesel emission controls

July 17, 2014

Dear Mr. Radick,

I attended a meeting with you, Kevin Williams and a young lady at the Quincy, WA Port District office on February 11, 2014. I hope you remember that during that meeting you made a media presentation about the Oxford Microsoft data facility. In that presentation you presented slides that described the diesel operations as well as a description of the emission controls to be installed for the safe operation of those engines.

I am writing because the permit presented to the public for comment on July 24, 2014, by Washington State Ecology does not list those emission controls. I am confused by that omission and I would like a comment from you about Microsoft's intention to use emission
controls. Could you please clarify the situation for me. Will the
Oxford data center be built using emission controls on the diesel engines?

Thank you for your reply to this letter,

Danna Dal Porto
16651 Road 3 NW
Quincy, WA 98848

2.1, Microsoft shall repair or replace the engine and repeat the test on the same engine plus two additional engines from the same phase of the Oxford Data Center. Test reports shall be submitted to Ecology as provided in Condition 9.5 of this Order.

Table 4. Testing Requirements

Pollutant	Load Test	Test Method	Emission Limits	Compliance Test Frequency
PM	Five-load weighted avg.	EPA Method 5 or 201a	0.03 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 5 or 201a, and EPA Method 202	0.1 lb/hr (0.75 MWe)	
			0.21 lb/hr (2.0 MWe)	
			0.288 lb/hr (2.5 MWe)	
NO_X	Five-load weighted avg.	EPA Method 7E	0.67 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 7E	1.8 lb/hr (0.75 MWe)	
			2.6 lb/hr (2.0 MWe)	
			3.37 lb/hr (2.5 MWe)	
CO	Five-load weighted avg.	EPA Method 10	3.5 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 10	0.75 lb/hr (0.75 MWe)	
			10.1 lb/hr (2.0 MWe)	
			15.04 lb/hr (2.5 MWe)	
NMHC/ VOC	Five-load weighted avg.	EPA Method 25A and EPA Method 18	0.19 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 25A and Method 18	0.1 lb/hr (0.75 MWe)	
			0.8 lb/hr (2.0 MWe)	
			0.8 lb/hr (2.5 MWe)	
Ammonia	Single-load (78%-82%)	BAAQMD Method ST-1B or EPA Method 320	0.19 lb/hr (0.75 MWe)	Test two different engines within 12 months of engine startup. Test two different untested engines every 3 years.
			0.51 lb/hr (2.0 MWe)	
			0.64 lb/hr (2.0 MWe)	

4.4.1. For the five load tests, testing shall be performed at each of the five engine torque load levels described in Table 2 of Appendix B to Subpart E of 40 CFR Part 89, and data shall be reduced to a single-weighted average value using the weighting factors specified in Table 2. Each test run shall be done within 2 percent of the target load value (e.g., the test runs for the nominal 10 percent load condition shall be done at loads from 8 to 12 percent). Microsoft may replace the dynamometer requirement in Subpart E of 40 CFR Part 89 with corresponding measurement of gen-set electrical output to derive horsepower output.

4.4.2. The F-factor described in Method 19 shall be used to calculate exhaust flow rate through the exhaust stack, except that EPA Method 2 shall be used to calculate

As required by WAC 173-460-090, emissions of diesel engine exhaust particulate are further evaluated in the following section of this document.

6. SECOND TIER REVIEW FOR DIESEL ENGINE EXHAUST PARTICULATE

Proposed emissions of diesel engine exhaust particulate (DEEP) from the thirty seven (37) Oxford engines exceed the regulatory trigger level for toxic air pollutants (also called an Acceptable Source Impact Level, (ASIL)). A second tier review was required for DEEP in accordance with WAC 173-460-090, and Oxford 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 Oxford's increased emissions of DEEP. Oxford also reported the cumulative risks associated with Oxford and prevailing sources in their HIA document based on a cumulative modeling approach. The Oxford cumulative risk study is based on proposed generators, nearby existing permitted data center sources, and other background sources including highways and railroads.

Large diesel-powered backup engines emit DEEP, which is a high priority toxic air pollutant in the state of Washington. In light of the rapid development of other data centers in the Quincy area, and recognizing the potency of DEEP emissions, Ecology decided to evaluate Oxford's proposal in a separate community-wide basis modeling effort, even though it is not required to do so by state law. The Ecology community-wide evaluation approach considers the cumulative impacts of DEEP emissions resulting from Oxford's project, prevailing background emissions from existing permitted data centers, and other DEEP sources in Quincy, beyond what was considered in the Oxford cumulative modeling effort.

The Oxford 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 37 generators and 32 cooling towers will not have an adverse impact on air quality. Ecology finds that Microsoft's Oxford Data Center has satisfied all requirements for NOC approval.

****END OF MICROSOFT OXFORD TSD ****

Quincy Data Center Issues
By Richard B. Hibbard
May 20, 2010

Introduction:

The purpose of this paper is to identify issues associated with citing Data Centers in the town of Quincy Washington. It has not been pier reviewed and may contain punctuation, spelling, and technical errors. The author determined that it was sufficient to get the issues out on the street for consideration. Should any of these issues have sufficient merit to be retained for further work then refinement of the text is warranted.

The issues are:

- Community Wide Approach
- DEEP and NO_2 background
- Offsets
- BUG Hours of Operation
- BACT Selection Process
- HIA Issues
- NO_2 NAAQS
- NO_2 Emission Factors
- Precedent Setting of Actions Taken In Quincy
- Need for sight specific or at least Quincy Specific Met
- Other

Each of these issues is discussed below:

What is the Community Wide Approach?

I have spent a considerable amount of time thinking about this. It seems to me that the State of Washington has accepted the responsibility to manage the larger issues associated with citing a large number of data centers in Quincy, Washington. Elements of the Community Wide approach include but are not limited to:

- How to apply the toxics rule
- Identification of the maximum allowable risk
- Procedure for determining risk
- Involvement of other agencies
- Mitigation plan
- Other options

Exhibit 14

How should the toxics rule be applied?

Chapter 173-460 WAC sets forth four options for addressing sources emitting Toxic Air Pollutants (TAPs). Briefly, those options are de minimis (a level that no review of the TAP is required), First Tier analysis (emissions of TAPs below the ASIL), Second Tier analysis (emissions of TAPs above the ASIL but below the 1 in 100,000 maximum risk for carcinogens), and Third Tier analysis (risk management decision for risks greater than 1 in 100,000 for carcinogens). To date, we have processed approximately 15 projects that triggered a Second Tier analysis and no project has ever triggered a Third Tier analysis.

In the town of Quincy I think that a source should develop and submit the same information when applying for a Second or Third Tier analysis. Specifically, they should develop a NOC application and HIA for the emissions increase associated with their project. They will estimate risks associate with their project only. Background is something I am proposing Ecology estimates.

What is the maximum risk that can be permitted under a Third Tier analysis?

Staff are proposing a maximum risk for a Third Tier analysis of 100 per million. Please see the analysis developed by Gary Palcisko for more information.

Procedure for determining risk:

Each of the Second Tier reviews so far has required a source to quantify the risks associated with the project in addition to the risks associated with the projects emissions plus background concentrations. Ecology has never made a decision based upon the project plus background. Under a Third Tier review I think it is Ecology's responsibility to make decisions based upon the projects emissions plus background concentrations. Due to the complexity of the risks associated with citing data centers in Quincy I recommend we trigger a Third Tier analysis even if a source can show that their emissions are below ASILs. As stated above, this risk should be determined by Ecology. The source is only responsible for identifying the emissions and risk from their project.

Involvement of other agencies:

I propose we involve the Grant County and/or City of Quincy zoning department and see if it is possible to reset the zoning in the affected area. That new zoning should preclude the construction and occupation of residences in the areas with the highest impacts.

Mitigation plan:

During a catastrophic power failure a multi agency plan should be developed that would notify the residence within the impact zone. This plan could discuss possible measures to mitigate exposure to the residential population.

Other options:

I think there may be other elements of a Community Wide approach that may fit our needs in the area. I defer to others for the identification of those options.

DEEP and NO_2 Background

Historically Ecology has required a source to quantify background emissions of the pollutant that triggered the Second Tier analysis. We have not required the background to be added to the project risk for decision making purposes. This concept is taken from the text within the rule. WAC 173-460-090(7) states" *Approval criteria for second tier review. Ecology may recommend approval of a project that is likely to cause an exceedance of acceptable source impact levels for one or more TAPs only if it determines that the emission controls for the new and modified emission units represent tBACT and 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 and ecology determines that the noncancer hazard is found to be acceptable."*

The rule gives Ecology direction as to how to evaluate background emissions. Three options were identified in WAC 173-460-090(5). They are: 1) National Toxics Assessments Data (NATA data), 2) ambient monitoring, and 3) modeling of all sources within 1.5 kilometers of the facility.

It is assumed that due to the number of data centers located within the Quincy Urban Growth Area there will be emissions of DEEP in excess of the 1 in 100,000 maximum risk identified above. Even if the increase of DEEP emissions from each source should be below the 1 in 100,000 threshold Ecology has agreed to invoke a Community Wide Approach to permitting data centers in Quincy or Third Tier analysis. When processing a Third Tier analysis the rule, WAC 173-460-090 (4) states *"Additional methods to reduce toxic air pollutants. In addition to the requirements in subsection (3) of this section, the applicant may propose and ecology may consider measures that would reduce community exposure, especially exposure of that portion of the community subject to the greatest additional risk, to comparable toxic air pollutants provided that such measures are not already required. "*

In order to deal with background I recommend we take the NATA data and scrutinize it because NATA data has a reputation of not actually representing ambient conditions. This analysis may include a reevaluation of things such as on-road traffic, non-road sources, and trains to develop a real Quincy background that Ecology can defend. This analysis would be performed by Ecology staff.

It is my opinion that background isn't just the on and off-road emissions it also consists of allowable emissions from existing data centers. I will refer to this as Net background. For each new or modified data center I propose we add not only the "allowable" emissions increase associated with the proposed expansion but also include the Net background for the purpose of evaluating risk.

Any decision made regarding the construction or modification of a data center in the Quincy Urban Growth Area would be made as a Third Tier analysis including project emissions and Net background regardless if the projects emission exceed the ASIL.

Offsets

Existing sources that have diesel fuelled backup emergency generators (BUGs) should be strongly encouraged to reduce the operating hours on their existing engines. The evaluation from their existing BUGs should be limited to estimating the new allowable emissions. Please note that a source now has the opportunity to "offset" new emissions by reducing actual emissions within their own property or other nearby sources. It is unlikely but possible that one data center could enter into an agreement with a different data center to reduce their actual emissions such that the impact (modeled ambient concentrations against the receptor or unmodled total emissions in pounds per year) would result in a projects emissions not triggering a Third Tier or even Second Tier review. The opportunity for a source to reduce emissions from its own existing BUGs is real and should be explored further.

There are two ways to generate offsets. Real reductions (based upon actual emissions) can be generated by reducing the hours of operation. It seems to me that the sources should be willing to reduce their permitted allowable emissions on existing BUGs as part of their expansion. The other way to achieve real reductions is to remove the existing engines and replace them with Tier 4 engines that have SCR and particulate filters built in as part of the design. I suppose add on equipment could also be considered but this is most likely more expensive than replacing the existing engines.

If a source wants to reduce their or another companies emissions they would need to receive some sort of benefit from Ecology. I propose an expedited permit that could be issued in 2 months as this benefit.

This is a win/win situation for the applicant, Ecology, and the environment and should be considered further.

BUG hours of operation

How many hours per year do new and existing BUG's need to operate in order to fulfill their mission?

The existing generators were permitted using NO as the pollutant of concern. They were approved to operate from between 359 and 400 hours per engine per year. Permits issued today will no longer evaluate emissions of NO. The pollutants of most concern today include DEEP, NO_2 and $PM_{2.5}$.

There are four operational scenarios considered when a facility estimates the annual hours of operation needed. They are:

- Maintenance and testing to support operation of the generators
- Emergency operation
- Storm Avoidance
- Electrical bypass uninterruptible power supply scheduled maintenance

Maintenance and testing

Maintenance and testing are the hours identified by the manufacturer. They are designed to ensure the generator turns on when it is needed. Additionally, when more than one generator operates the power they produce must be in phase and testing is performed to ensure the BUGs operate in phase. During these tests the BUGs operate at about 10% load. There is a range of hours per needed to fulfill this type of testing but it is estimated to be 16 hours per year per engine.

Emergency operation

The purpose of the BUGs is to provide emergency power should line power be unavailable. Grant county PUD officials have stated that transmission power is estimated to be available 99.99% of the time. They are also installing another line that should improve that reliability to the transmission lines but not the trunks going to facilities. A conservative estimate of emergency power needed is 8-hours per year. Companies are uncomfortable with this and usually ask for 48 hours of emergency operation per year. The engines would be operating at between 75 and 80% load during a power outage.

Storm Avoidance

In other parts of the country such as the Midwest storms can be catastrophic. Imagine the damage a tornado could impose on a power distribution network. Data centers turn on the BUGs before it gets really bad in anticipation of possible power outages thus the name storm avoidance. It is my understanding that while data centers in Quincy estimate storm avoidance hours, all of the companies may not actually turn them on like they would in a Midwest location. Nevertheless, I have some thoughts to deal with storm avoidance hours should they be proposed. Consider for a moment some of the situations when a BUG could be turned on to mitigate the possible power disruption caused by a storm. I envision lighting, wind and rain. It is pretty windy in Quincy even if there isn't a storm. In a storm, I envision that the wind would dilute and disperse the pollutants so quickly and completely that there would be no impact to the receptors. The preconstruction modeling that we do shows that the greatest impacts occur in stagnant air conditions. I think that we could set some minim wind speed say 25 miles per hour. If a bug is turned on for the purposes of storm avoidance and they prove that the wind was consistently above our minimum wind speed Ecology should consider not counting those hours towards the exposure to the receptors. I estimate that a bird and data logger can be installed for about two thousand bucks. When a company is reporting their hours of operation any period of operation that met Ecology's requirements would not be counted towards their annual hours kinda like an excess emissions report. These hours would most likely be at about 10% load.

Electrical bypass

It is my understanding that data centers sometimes lump BUG operating hours associated with maintenance on their uninterruptible power supplies (UPS) with storm avoidance. At least one data center estimates that this UPS maintenance will need 60 hours of BUG operation per year at 75 to 80% load. The way it works is that they actually run the data center or a portion of the data center off the BUGs and that line power is interrupted during this scheduled work. There are at least two ways of avoiding BUGs operation during this scheduled maintenance. One would be to run a jumper wire (it is actually more like big fat cable) from a different part of the plant to the units that are offline. The other is to design the new units to incorporate this dual power or switchable power so that the BUGs do not need to be operated during this maintenance. Regardless of how the maintenance is performed it should Ecology's position to discourage the use of the BUGs to operate during this maintenance. I think we have the ability to require the data centers to make a wiring design change.

In summary, a typical data center is requesting 16 hours for maintenance and testing, 48-hours for emergency operation, and 60 hours for UPS maintenance for each BUG. These 124 hours per generator each year is really close to what a facility will request. If the discussion I presented above results in the elimination of the 60 hours of UPS BUG operation a facility would then only needs to be permitted for 64 hours per engine per year. Comparing 64 hours per generator per year to the existing 400 hours per generator per year, leads me to conclude that we can reduce the existing generator hours to the same 64 hours per year requested in the modification. This is a net savings of approximately 396 hours per generator per year. This represents a big success to the environment.

Can we convince a data center to reduce the number of hours an existing generator can operate? You bet, but we must identify a reason for them to do so. The reason that I see is that they will get a permit for their expansion and the time necessary for them to receive that permit will be much shorter say 2-months vs. 7-months.

BACT

There MAY a difference in the NSPS that applies to these generators depending upon how they are operated. The reason I say MAY is that if a project is proposing to use the BUGs for UPS maintenance this could be considered a load use and not an emergency use. I am told that the Tier 4 standards have a phase in period for models built between 2011 and 2014. This information does not show up in 40 CFR 60 Subpart IIII. I found it in 69 FR, 29 June 2004 PP 38957 – 39273. There may also be some information contained in 40 CFR 1069 and 40 CFR 1039. I have not had a chance to understand this 400 pages of information. A brief look shows that Table II.A-4 for engines greater than 750 BHP requires NO_X emissions of 2.6 g/bhp-h and pm emissions of 0.075 g/bhp-hr in 2011. Current engines require have higher numbers. I must reiterate that I have not fully read and understood this FR. More research is needed in this area before this is fully understood.

Assuming the permit is issued prior to January 1, 2011 under the Tier 2 standards requiring add on controls such as SCR to reduce NO_X and filters to control pm it is my opinion that these controls would be cost prohibitive. I have not performed a t-BACT analysis but preliminary tBACT numbers for pm are in the range of 1 to 1.5 million dollars per ton of pm removed. I don't think SCR is that high but it is still going to be in the high hundreds of thousands of dollars to remove a ton of NO_X. BACT is a case-by-case determination but we had better have a good reason for requiring a different BACT for data centers located a mile apart and receiving a permit with 6-months of each other. If a new federal regulation comes into effect during that period that will not affect our BACT determination the manufacturers are required to build engines with the lower emission rates and we should not allow an older engine built the year before to be installed should our permit be issued after January 1st 2011.

HIA Issues

- Can a source in Quincy submit the HIA at the same time the NOC application is submitted?

Yes, there are two reasons. The first is that Ecology will be processing both the permit and HIA. Undergoing a parallel review has caused timing delays in the past mainly due to communication. For Quincy the project engineer is the same person for the permit as the HIA. This should be a lesser issue.

The other reason is that Ecology has invoked the Community Wide Approach for this area. It seems to me that this approach only works if Ecology process these approvals fast enough for the sources to take advantage of the tax incentives offered by the governor and decisions are not made on a case-by-case basis. Rather, a comprehensive plan is followed that minimizes surprises to the applicants.

- Should we require a source to consider the emissions from other generators on their property? Should we require the facility to consider generators from other facilities?

No and no. WAC 173-400-110(3) discusses limiting the review of a modification to the equipment that is being modified and the air contaminants who's emissions would increase as a result of the modification. Ecology will however be evaluating the total risk, project emission plus Net background, for this area.

NO_2 NAAQS

I think we have to require a 1-hrour NAAQS analysis be performed for each project. There is a separate document evaluating multiple options to model this standard. The current thought is that only AERMOD can be used to perform this analysis mainly due to atmospheric conversion of NO_X to NO_2. The development of a NO_2 background is necessary in order to complete this analysis. Multiple sources of background exist but it is my opinion that Ecology should not use 2002 NATA Data or 2005 NATA Data. Rather we should familiarize ourselves with that information and develop our own NO_2 background number. The NAAQS which is a monitored area violation may show a modeled exceedense if a conservative set of factors are used in the AREMOD run. Should this happen there are only three possible paths. The first is for Ecology to deny the permit. The second option is require that the monitoring be employed to verify a possible NAAQS violation. Lastly add-on control equipment may be proposed by the applicant such as SCR to reduce NO_X emissions. It is my opinion that and SCR unit most likely will not be cost effective as BACT for controlling NO_X emissions. Should the NAAQS be exceeded, the only path forward is for the source to voluntarily propose to install and operate this add-on control to reduce NO_X emissions.

NO_2 emission factors

I don't know how to develop these emission factors. Each size of engine has different NO_X emissions. To make this even more complicated the NO_X emissions appear to be inversely proportional to the engine load. AERMOD will perform this analysis for us. This area needs more work.

The need for sight specific or at least Quincy Met data

Staff has identified a need for meteorological data from the town of Quincy. The problem is that this data does not come cheaply. I estimate the cost to site and operate a met station to be in the tens of thousands of dollars each year. Who would pay this money? Would it be the first applicant? Would Ecology pay for it and try to get a portion of the fees from each data center? I don't think we really need the data that badly. If we do this issue will need to be researched further in order to figure out how to implement it.

Precedence setting of actions taken in Quincy

We have a proposed data center in Moses Lake and another in Wenatchee. Those locations most likely will not involve the use of the Community Wide Approach and most likely not require a Third Tier analysis. All or most of the other issues will apply. I recommend we keep this in mind as we proceed.

The Seattle Times
Winner of Nine Pulitzer Prizes

Nation & World

Originally published October 5, 2013 at 3:51 PM | Page modified October 5, 2013 at 8:14 PM

Study: Honeybees can't smell flowers well amid pollution

English scientists concluded that two components of diesel exhaust — nitric oxide and nitrogen dioxide — could alter the odor of the many chemicals that combine to give a flower its signature odor.

By Monte Morin

Los Angeles Times

When it comes to zeroing in on nectar-rich flowers, worker honeybees rely heavily on their expert sense of smell. But new research suggests pollution from diesel exhaust may fool the honeybee's "nose," making the search all the more difficult.

In a paper published recently in Scientific Reports, English scientists concluded that two components of diesel exhaust — nitric oxide and nitrogen dioxide — could alter the odor of the many chemicals that combine to give a flower its signature odor.

This phenomenon, researchers said, could either hinder or prevent honeybees from reaching their target flowers, and, in the process, inhibit the pollination of the world's principal food crops.

The research comes at a time of great concern over the fate of pollinator insects. Globally, their numbers have been on the decline, and the potential consequences for humans are great.

The economic value of pollination worldwide has been estimated at more than $200 billion a year, and 70 percent of the world's food crops rely on the process, according to lead study author Robbie Girling, a chemical ecologist at the University of Southampton.

"Honeybees have a sensitive sense of smell and an exceptional ability to learn and memorize new odors, enabling them to use floral odors to help locate, identify and recognize the flowers from which they forage," Girling and his colleagues wrote.

To test their hypothesis, researchers synthetically reproduced the odor of bright yellow oilseed rape flowers. The scent of the flower is the result of eight different chemicals mingling, and researchers used these same chemicals to reproduce the odor in the lab.

Next, they took worker honeybees that were raised at the university and "taught" them to associate the synthetic odor with nectar. They did this by restraining the bees, exposing them to the smell, and then swabbing their antennae with a sweet, nectarlike sucrose solution.

In the wild, worker honeybees will detect sweet nectar with their antennae. The bees then reflexively extend their proboscises — a long hollow tongue — and begin sucking up the liquid.

By repeatedly swabbing the captive bee's antennae with the sucrose solution and exposing them to the plant odor, they hoped to induce a Pavlovian response, whereby the bee would eventually extend its proboscis whenever it caught a whiff of the lab-made perfume.

Finally, study authors exposed the trained honeybees to the pure flower smell, as well as versions that were altered to mimic the effects of exposure to nitric oxide and nitrogen dioxide.

What were the results? Researchers said flower odors that mimicked the effects of pollution were roughly half as likely to make the bees stick their tongues out than the unadulterated smell. Researchers deemed this a "significant reduction in recognition."

While study authors acknowledged that their conclusion was the result of manipulating synthetic odors, not field observations, they said the disruption of natural odors by man-made pollution could have far-reaching effects.

"In nature honeybees use a combination of visual stimuli and floral odors to locate a flower for the first time," authors wrote.

"Degradation of an odor source by pollution is likely to be more pronounced at distance from the flower, where concentrations of the odors are lower," they wrote.

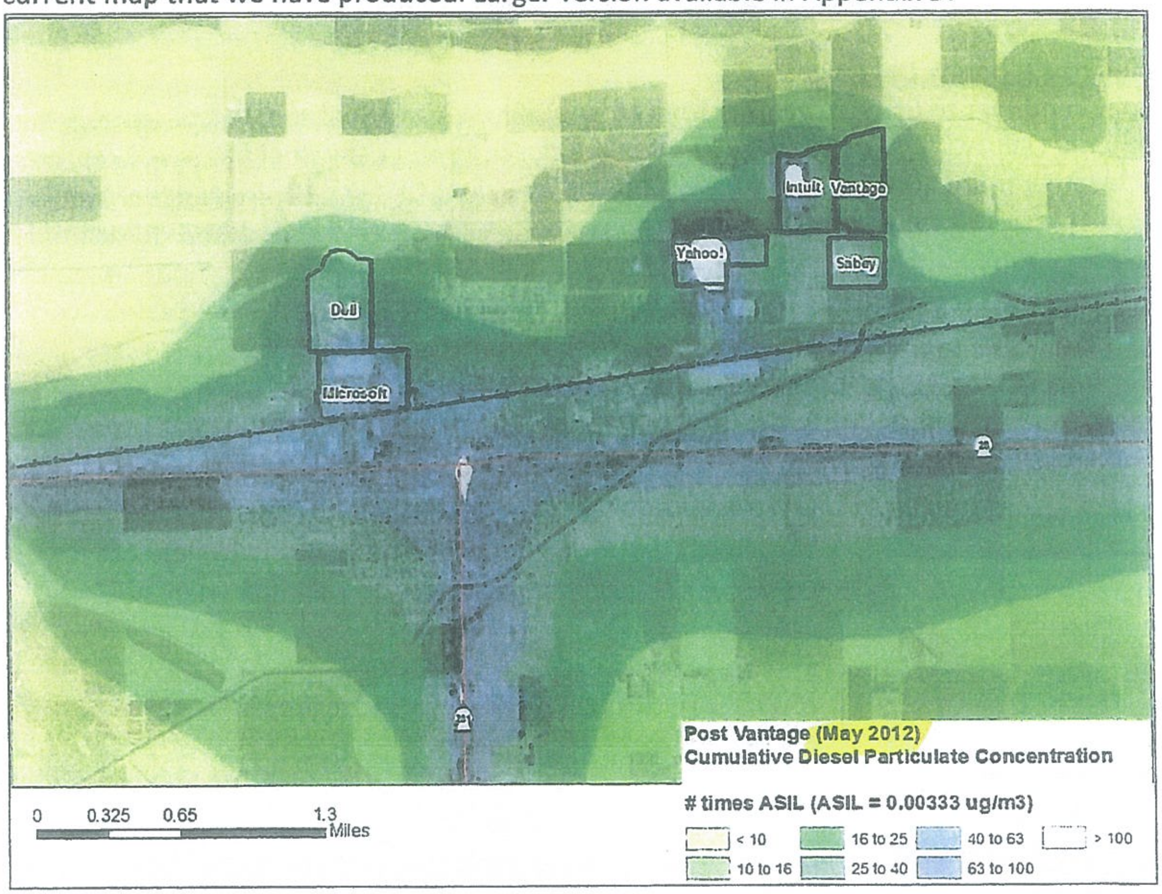
Comment 43, Danna Dal Porto:

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

ICF

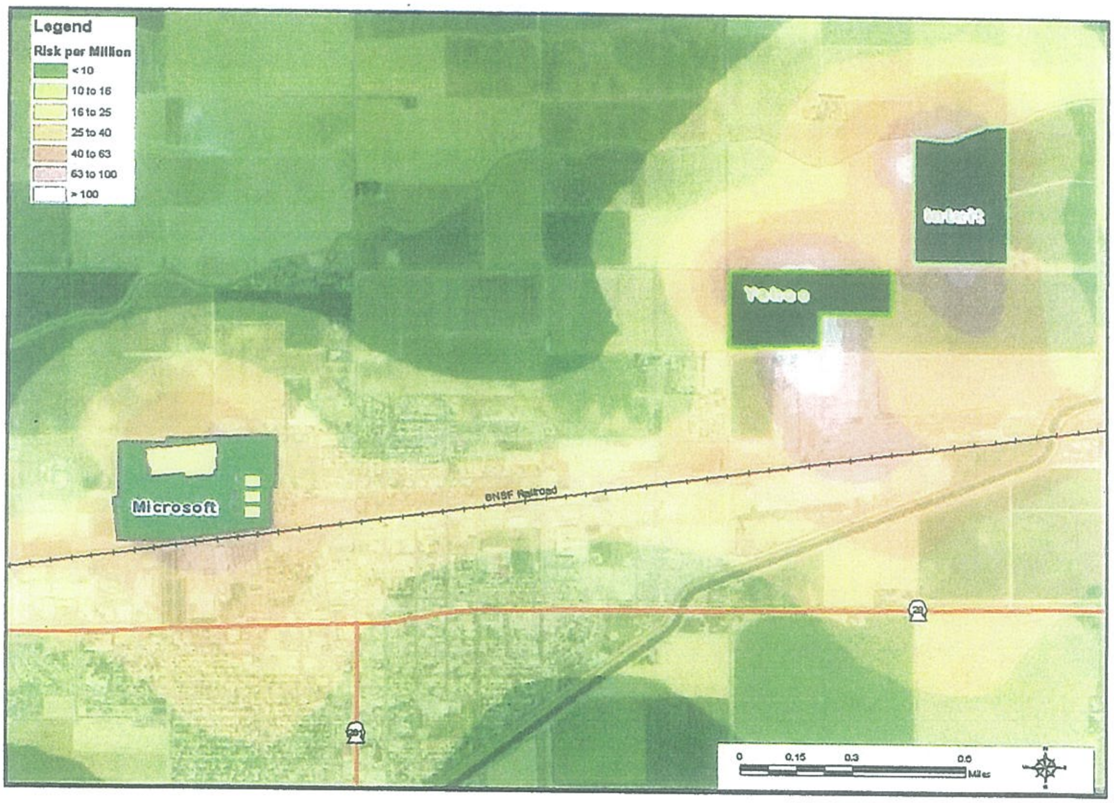
Figure 7-3
DPM Cancer Risk for Expansion Generators at Permit Limits, Plus Existing

Exhibit 17

Ecology Response:

As the map of cumulative impacts in Figure 1 demonstrates, the main portion of the diesel engine exhaust from Microsoft's Columbia Data Center does not intersect with the diesel engine exhaust from other data centers. Because the diesel engine exhaust particulate is evaluated as an annual average, its plume is composed of many individual plumes (more than 8000--one for each hour of the year) produced by the annual distribution of wind directions and wind speeds. This temporal averaging spreads the pattern out as shown.

Figure 1.



The concentration pattern for one-hour average NO_2 will consist of relatively narrow plumes that move around from hour to hour according to the wind direction. Although the plumes will be widened by the affects of air flowing over and around the buildings, the range of directions that are required for Microsoft emissions to interact with plumes from the other data centers is limited. The relevant metrics are the 98th percentile of the daily maximum (for the NAAQS) and the maximum 1-hour concentration in each year (toxics). As such, each hour's concentration field is evaluated independently and the concentrations of the preceding and following hours have little influence on the evaluation at a specific location.

Exhibit 18

Mort, Beth (ECY)

From: William Collier [isi.wc@me.com]
Sent: Tuesday, July 29, 2014 1:47 PM
To: Mort, Beth (ECY)
Subject: Microsoft Columbia Data Center

Follow Up Flag: Follow up
Flag Status: Completed

Categories: Quincy

> Dear Ms. Mort,
>
> In the last 24 hours I was made aware of today's deadline for comments on this project, and unfortunately that's simply not enough time to provide a thorough review and analysis. That's no fault of yours, but the state of my situation. However, I did a cursory review of the document "Final Notice of Construction Supporting Information Report Microsoft Project Oxford Data Center Quincy, Washington."
>
> They're proposing to build a data center using older concepts of construction, that being diesel generators and chilled water cooling systems. Both have have significant downsides for the environment. After all if there weren't hazards, and risks associated with both products why would they have needed to prepare a costly 182 page report to defend them. Furthermore, all the data provided in the reports seems to be based on optimum conditions and assumes that Microsoft will be adhering to a very strict and costly on-going maintenance program. Who's going to monitor those programs and at what cost?
>
> Here's my take, Quincy has had on-going problems with Microsoft's generators, both off-gassing and noise. You only have so many natural resources that you'd presumably like to protect, therefore why should either of these environmentally unfriendly products even be taken under consideration.
>
> Here's an alternative recommendation:
>
> 1.) Generators, instead of using diesel as a primary fuel source, why not use dual burner generators, which are readily available, using Natural Gas as the primary fuel source, and diesel ONLY used in the rare instance where Ngas fails. This provides them a redundant fuel source, which will make for a more reliable data center.. This dramatically reduce the emissions associated with diesel only equipment. I believe these are available from the same vendor.
>
> 2.) Cooling towers, As you may or may not be aware chilled water systems such as this, that depend on the use of cooling towers evaporate an enormous amount of water. By their own admission (p. 132 of the report) shows a Make Up water requirement of 300 gals/min., you realize that's 157,680,000 gallons of water annually, or 238 olympic swimming pools. Seems to me that's a lot of water to unnecessarily be evaporating, along with tons of associated pollutants. There are other means of well proven and equally efficient cooling methods available that should not cost them a premium. Air cooled direct expansion system, which have been successfully cooling data centers for decades. Leading data center manufacturers are, Liebert/Emerson, Stuls, DataAire, other manufactures providing a similar but more costly and less energy efficient means of the same thing are Multistack, and Motiveair. These can be had for similar if not a lower cost than chilled water systems, and don't use cooling towers to evaporate water, they are a closed loop system.
>

> Just as a matter of record, I'm not a part of, or represent any of the organizations mentioned, but have worked in and around the data center for a long time. My interest here is in helping all of us to protect the planet one day and project at a time--using a bit of common sense.
>
> Regards,
>
> W
>
>

Mort, Beth (ECY)

From:	John Radick [John.Radick@microsoft.com]
Sent:	Tuesday, July 29, 2014 4:05 PM
To:	Mort, Beth (ECY)
Cc:	Sue Cheung (LCA); Cohen, Matthew; Kevin Williams (DCS); Cox, Rachel H. (RHCOX@STOEL.COM); Jim Wilder (jwilder@landauinc.com); David Fierbaugh
Subject:	Microsoft Oxford Data Center, Approval Order No. 14AQ-E537
Attachments:	Microsoft comments Ecology Second Tier TSD 7-29-2014.pdf; Microsoft redline of Draft Oxford Approval Order 7_29.docx; Microsoft Comments to Ecology TSD 7_29.docx; Ltr to Beth Mort, Washington DOE.PDF
Categories:	Quincy

Ms. Mort,

Attached you will find Microsoft's response to Ecology pertaining to the Oxford Data Center air quality permit. Please feel free to contact myself is any questions arise. We look forward to Ecology's response.

Sincerely,

John Radick

John Radick -- RCDD / PMP
Senior Program Manager
Data Center Services
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Microsoft

July 29, 2014

Beth Mort
Eastern Regional Office
Washington Department of Ecology
4601 North Monroe Street
Spokane, WA 99205

Re: Oxford Data Center, Approval Order No. 14AQ-E537

Dear Ms. Mort:

Microsoft appreciates this opportunity to comment on Ecology's proposed Approval Order No. 14AQ-E537 ("the Proposed Order") issued June 16, 2014 for the Oxford Data Center in Quincy, Washington. Microsoft is submitting with these comments a redline of the Proposed Order with suggested revisions. This letter explains the rationale for the revisions Microsoft is requesting. Microsoft is also submitting proposed edits to the draft Technical Support Document ("TSD") and draft Second Tier Risk Analysis. The bases for these edits are explained in comments in the margin of these documents.

1. Determinations, Paragraph 2

The Proposed Order includes information about the number and size of the diesel engines that Ecology is permitting, and Table 2a.1 on page 5 describes those engines as "EPA Tier 2 certified engines." These statements create the misleading impression that the engines installed at the Oxford Data Center will feature no emission controls beyond those required by EPA for Tier 2 engines. Microsoft recently received a letter from a Quincy resident who noted that the Proposed Order does not mention emission controls. She wanted to know whether Microsoft plans to equip the engines with controls. *See* attached email, Attachment A to these comments.

The Oxford engines will be equipped with SCR for NOx and with catalyzed diesel particulate filters to control particulate matter, VOCs and CO. Further, the emission limits that Ecology has included in Table 4 are EPA Tier 4 limits. In Table 4 of the Proposed Order Ecology will require Microsoft to source test the engines to demonstrate compliance with EPA Tier 4 limits.

The Proposed Order should include findings that Microsoft voluntarily proposed to equip all of the diesel engines at the Oxford Data Center with control devices that can achieve EPA's Tier 4 standards, and that those engines will exceed the Best Availability Control Technology ("BACT") determinations in Table 2a.1. Microsoft believes it is important that the permit contain findings on these key details of the project. Our proposed edits to Paragraph 2 on page 5 incorporate a short version of these findings into the permit.

Microsoft's comments on the TSD for the Proposed Order provide more detail on the controls specified for the engines, and the basis for the conclusion that they exceed BACT requirements. *See* attached redline of the draft TSD at 2, 8, 10, etc.

2. Load ranges, Condition 3.2

Microsoft recommends that the approval order allocate engine hours to load ranges (e.g. 0 to 10 percent electrical load), rather than to specific load levels. The main reason for this recommendation is that certain operations, e.g. load bank testing, require operation at load levels other than 0, 80 and 100 percent. In addition, it is useful to specify that "load" means electrical load (as opposed to mechanical load). We included in the proposed brackets an allowance for the fact that engines may operate within 2 percent of the targeted 80 percent load level.

3. Engine hour limits for load levels, Conditions 3.2.2.1 and 3.2.3

These two conditions limit the engine runtime hours for specific loads: no more than 40 hours per year at 80% load (or 11% to 82% load per Comment 2 above) and 17.5 hours per year at 100% load (or in excess of 82% load per Comment 2). In the aggregate, the Proposed Order authorizes each engine to operate a total of 57.5 hours per year at these two load ranges.

Microsoft recommends modifying Condition 3.2.2.1 to authorize up to 57.5 hours per year at 80% load (or 11%-82% load). Condition 3.2.3 will still limit the runtime at 100% load (or in excess of 82% load) to 17.5 hours per year, but the engine hours operated at this load level will count towards the 57.5 hours per year authorized in Condition 3.2.2.1. Monthly, semi-annual and corrective testing required in the Proposed Order will be done at a wide range of loads (0%-100%). This proposed change provides Microsoft with the flexibility to operate at either the 80% load (11%-82%) or 100% load (greater than 82%) level, while still limiting the overall engine runtime hours to 57.5 hours per year and maintaining the 17.5 hour per year limit at the highest load level.

4. Daily Energy Generation, Condition 3.2.2.2

This condition sets a daily cap on electric power generated in a day. It includes an exception for emergency power outages. The condition should be clarified to state that the exception applies during up to four days *per year* of emergency power outage, and that the limit applies to each calendar day. The latter edit minimizes what could otherwise be a major recordkeeping burden.

5. Power outage exception for high load range limit, Condition 3.2.3

This condition limits the number of engines that can simultaneously operate at 100% load. In Comment 2 above, Microsoft proposed to change the specific load of 100% to a load range of 82% to 100%. During an emergency power outage, it is possible that an engine could operate at a load level slightly higher than 82% (e.g. 83% or 84%). Accordingly, Microsoft proposes to include "emergency power outages" in the description of operational scenarios for this load range. If an emergency power outage occurs, more than three engines may need to be run at a load range of between 82%-100% to power the data center. Microsoft recommends adding language to Condition 3.2.3 to clarify that more than three engines may run simultaneously during an emergency power outage.

6. Engine hours for source testing, Condition 3.3.2

Table 4 and Condition 4.4 of the Proposed Order demand that Microsoft source test engines at periodic intervals using a protocol that mandates source testing at six different engine loads, with a minimum of three one hour test runs at each load, and two different test methods for particulate matter. Condition 4.4 defines all of this testing on one engine as a "single testing event." Condition 3.3.2 of the Proposed Order proposes to allow only 30 hours of engine run time per testing event.

Microsoft requests that Ecology revise Condition 3.3.2 to allow 45 hours per testing event. Source testing experience at other data centers demonstrates that Ecology's requested six-load test will require more than 30 hours per generator. A six-load test requires 18 test runs, three runs per load. Each test run is required to be an hour long, which equates to an actual sampling duration of 18 hours per testing event. The 60 minute duration of each run is necessary to ensure that the particulate test captures enough material to accurately represent the emission rate from the engine.

In addition to the actual sampling time, generators require additional runtime during testing for pre-test velocity traversing to create cyclonic flow (2-3 hours), start-up and warm-up of the generator to reach the necessary temperature and stabilization between loads, changing out the Method 5 sampling train between each run, stabilization of the NOx, VOC and CO monitors, recalibration of the monitors when switching loads and cool-down of the generator at the end of the day. If small glitches occur during testing, which is always a possibility, additional unplanned runtime may be needed to adjust and calibrate the gaseous monitors, to fine tune the generator to achieve the load required for each test or to adjust the load bank, among other potential problems.

Actual source test experience documents the truth of these observations. The T-Mobile data center conducted a five-load test in October 2013 which required 35 hours of actual generator runtime.[1] Landau Associates estimates that a six-load test at T-Mobile would have required 42 runtime hours per generator. The Columbia Data Center conducted a five-load source test on one of its generators in May 2013 which lasted 5 days and required 44.2 hours of run time. Some of these hours may be attributable to learning curve delays, but a six-load test requires more hours than a five-load test. Given that the Proposed Order mandates source testing and prescribes a detailed protocol for the performance of these tests it must allow enough engine operating time per testing event to perform the operations required by the permit.

The NOC application for the Oxford Data Center modeled ambient DEEP impacts from engine source testing on the conservative assumption that Microsoft would run each of the 36 2.5 MW generators for 1.25 hours each year for source testing. *See* Microsoft's NOC Supporting Information Report for Project Oxford at Table 1 (Mar. 13, 2014). This equates to 68 hours per engine per triennial testing event.[2] Over the 70 year interval studied in the Health Impact Assessment Microsoft modeled roughly 500 more hours of source testing than the proposed 45 hour per test event limit would allow.

To model compliance with the annual NAAQS for NOx and PM2.5 Appendix C of Microsoft's NOC Supporting Information Report calculated the "worst-case 12 month emissions" by assuming that the maximum annual source testing event would consist of testing two generators in any given year with an allocated fuel consumption of 14,299 gallons/year for stack testing; that fuel usage corresponds to 74 hours per testing event for each of the two generators. *See* Microsoft's NOC Supporting Information Report for Project Oxford at App. C, Table 7 (Mar. 13, 2014). The requested source testing allowance of 45 hours per testing event is considerably less than the conservatively high runtime Microsoft's consultant modeled.

Microsoft also requests that Ecology delete from Condition 3.3.2 the phrase "no more than two generators shall be tested per year, every three years . . ." This phrase duplicates the source test frequency provisions from Table 4, and it conflicts with Condition 4.4, which requires testing of three generators in the event that a source test shows non-compliance with any emission limit.

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[1] *See* Horizon Engineering Test Report for T-Mobile Data Center submitted to Ecology's Central Regional Office in December 2013.

[2] This value is derived using the following calculation: 1.25 hours per generator per year for testing x 36 generators = 45 hours per year for testing. The Oxford Data Center engines will be tested every three years: 45 x 3 = 135 hours of testing per three years. Two engines will be tested every three years, which equates to: 135/2 = 67.5 hours per engine per testing event.

7. Purpose of Source Testing, Condition 4.3

Condition 4.3 is confusing, because it suggests that the emission limits in Table 4 are Tier 2 limits. In fact the limits in Table 4 are EPA Tier 4 limits, and the main purpose of the testing is to show that the engines meet the stringent limits in Table 4, not the more lenient Tier 2 limits. The condition would be simpler and provide more valuable information if Ecology deletes the reference to "applicable emission standards for the Tier 2 certified engines" in the first sentence of Condition 4.3. Microsoft requests that Ecology revise the Proposed Order as indicated in the attached redline to clarify the purpose of the testing.

8. General Testing and Maintenance Requirements, Condition 4.4

Microsoft requests that Ecology clarify that any re-testing required in the event that a source test shows non-compliance with an emission standard is a *separate* testing event for that engine. Comment 6 above documents that the test runs specified for a single testing event require more than 30 hours of engine run time to perform. Designating the re-test as a second testing event would enable Microsoft to run two tests on the same engine, as required by Condition 4.4, without violating the operating hour limit in Condition 3.3.2.

9. Source Test Intensity, Condition 4.4 and Table 4

Microsoft requests that Ecology reduce the intensity of the source testing requirements in Condition 4.4. Ecology's proposed Condition 4.4 requires Microsoft to test each of the Oxford Data Center engines using two different load methods, a single-load method and a five-load weighted average method to demonstrate compliance with the emission limits in Table 4 of the Proposed Order. These tests are to be performed on two engines within 12 months of startup and then two engines every three years thereafter. Microsoft requests that Ecology reduce the intensity of the testing requirements to test one engine within 12 months of startup and then one engine every three years thereafter.

First, the testing proposed by Ecology is expensive and time-consuming. Six-load testing requires 18 test runs per generator. As indicated in Comment 6 above, the Columbia Data Center underwent five days of testing on one generator in 2013. That was for a five load test, using test methods that do not require recovery of back half particulate emissions. The May 2013 test cost $84,800.[3] A six load test that requires capture of back half particulate will be more costly. Testing two engines at a time obviously would increase the total cost, although there would be savings from shared mobilization costs.

Second, all of the engines of a given capacity are identical. There is no reason to expect that emission rates will vary between two identical off the shelf Caterpillar engines. That is why

[3] This sum includes roughly $52,000 in contractor fees, $21,000 in fuel cost, $3400 for scaffolding and $8400 in data center staff time.

EPA does not require owners of Subpart IIII engines to test them at all. The Proposed Order, however, requires Microsoft to test *two* engines in year one and every three years thereafter.

The number of EPA five load tests demanded by the Proposed Order is unprecedented. Microsoft has data centers in seven states and the territory of Puerto Rico. None other than Washington require owners of NSPS Subpart IIII engines to source test their engines to show compliance with Subpart IIII emission standards. Ecology has only intermittently required such testing for Washington data centers. Table 1 summarizes the generator testing requirements in other Washington data center permits. Only two other Washington data centers, T-Mobile and Microsoft's Columbia Data Center, are required to perform any five-load weighted average testing. The T-Mobile data center approval order requires two five-load EPA source tests in the first ten years of operation. The Columbia Data Center approval order demands four five load EPA tests in the first ten years of operation. The Proposed Order demands *eight* EPA five load source tests in the first ten years of operation.

Third, the five-load weighted average testing is not necessary to monitor compliance with BACT. Ecology determined BACT for the Oxford Data Center engines to be installation of Tier 2 certified engines. (*See* Proposed Order No. 14AQ-E537 at Table 2a.1). Because Microsoft voluntarily equipped the engines with Tier 4 controls, there is an enormous compliance margin between BACT and the control efficiency of the engines.

Microsoft is not requesting that Ecology delete all five-load weighted average testing from the Oxford Data Center approval order. We do ask that Ecology reconsider the intensity of the proposed testing based on the factors noted above. The redline of the Proposed Order attached to these comments requests no reduction in the frequency of source testing, but that Ecology specify one (rather than two) engines to be tested during each source test event. One test per event, coupled with the requirement in Condition 4.4 to source test three engines in the event of a source test failure, will give Ecology ample assurance that the Oxford engines meet the applicable emission limits.

10. Recordkeeping and Reporting, Conditions 8 and 9

At the public hearing on July 24, 2014 citizens requested that the permit include recordkeeping and reporting requirements for the operating limits in Section 3. Microsoft supports this request. We propose to add subsections to Conditions 8 and 9 to require Microsoft to document compliance with the operating hour and maximum electrical generation limits in Section 3.

11. NSPS Recordkeeping Requirements, Condition 8.6

Condition 8.6 lists "Applicable recordkeeping for emergency engines required by 40 CFR Part 60, Subpart IIII." This language poses compliance challenges for data center managers who must interpret and comply with it. Like other EPA regulations Subpart IIII is dense and full of cross references. It imposes recordkeeping requirements that vary with the age, size and function of the engines. The requirements of the Proposed Order will remain in effect for decades, potentially outlasting the consultants and regulators who worked on the language of the Proposed Order.

Microsoft requests that Ecology provide more transparent guidance to current and future data center managers by specifying in the approval order the applicable Subpart IIII recordkeeping requirements with which the data center must comply. Fortunately the list is not long. Subpart IIII recordkeeping and reporting requirements appear in 40 CFR 60.4214. Because the Oxford engines are all emergency engines, Subsection (a) does not apply. Subsection (b) potentially applies, and Subsection (c) applies because the engines are equipped with diesel particulate filters. Subsection (d) imposes a reporting requirement that Ecology has already incorporated into Condition 9.6. Microsoft requests that Ecology reference 40 CFR 60.4214(b) and (c) in Condition 8.6 as the applicable Subpart IIII recordkeeping requirements. This addition, presented in the attached redline of the Proposed Order, will guide facility managers in designing recordkeeping systems for the data center.

Thank you for carefully considering Microsoft's comments on the Oxford Data Center Proposed Order. Please call John Radick at (425) 703-7963 if we can provide any additional information in support of these comments.

Very truly yours,

John Radick
Senior Program Manager
Microsoft

Cc: Jim Wilder
Matthew Cohen

Attachment A

From: Danna Dal Porto [mailto:ddalporto@smwireless.net]
Sent: Thursday, July 17, 2014 2:50 PM
To: John Radick
Subject: Oxford diesel emission controls

July 17, 2014

Dear Mr. Radick,

I attended a meeting with you, Kevin Williams and a young lady at the Quincy, WA Port District office on February 11, 2014. I hope you remember that during that meeting you made a media presentation about the Oxford Microsoft data facility. In that presentation you presented slides that described the diesel operations as well as a description of the emission controls to be installed for the safe operation of those engines.

I am writing because the permit presented to the public for comment on July 24, 2014, by Washington State Ecology does not list those emission controls. I am confused by that omission and I would like a comment from you about Microsoft's intention to use emission controls. Could you please clarify the situation for me. Will the
Oxford data center be built using emission controls on the diesel engines?

Thank you for your reply to this letter,

Danna Dal Porto
16651 Road 3 NW
Quincy, WA 98848

Table 1: Five-Load & BACT Testing Requirements for Engines at Washington Data Centers

Data Center	BACT Testing Required In First 10 Years of Operation	Five-Load Testing Required in First 10 Years of Operation
Microsoft Oxford Data Center	**8 engines in 10 years at one load** *(2 engines within 12 months, then 2 engines every 3 years)*	**8 Five-load tests** *(2 engines within 12 months then 2 engines every 3 years)*
T-Mobile Data Center ***Order No. 08AQ-CO75 1R*** ***November 20, 2013***	**None**	**2 Five-load tests** (*1 engine in year one, 1 engine in year 6*)
Titan Data Center ***Order No. 13AQ-E491*** ***May 21, 2013***	**4 engines in 10 years at three loads** *(2 engines within 12 months, then 2 engines every five years)*	**None.** *Ecology may request testing at its discretion.*
VMware Data Center ***Order No. 08AQ-CO78 2R*** ***May 14, 2013 (proposed order)***	**None**	**None.** *Ecology may request testing at its discretion.*
Microsoft Columbia Data Center ***Order No. 13AQ-E497*** ***April 20, 2013***	**None**	**4 Five-load tests** *(1 engine in 2013, 3 every five years thereafter)*
Vantage Data Centers ***Order No. 12AQ-E450*** ***March 18, 2013***	**8 engines in 10 years at one load** *(2 engines within 12 months, then every three years)*	**None.** *Ecology may request testing at its discretion.*
Sabey-Intergate Data Center ***Order No. 11AQ-E424*** ***August 26, 2011***	**44 engines in 10 years at four loads, but no PM testing** *(each engine within 12 months of installation, no periodic testing thereafter)*	**None.** *Ecology may request testing at its discretion.*
Dell Data Center ***Order No. 11AQ-E421*** ***August 5, 2011***	**28 engines in ten years at three loads, but no PM testing** *(each engine within 12 months of installation, no periodic testing thereafter)*	**None.** *Ecology may request testing at its discretion.*
Yahoo! Data Center ***Order No. 11AQ-E399*** ***March 28, 2011***	**10 engines in 10 years at three loads, but no PM testing** *(each engine within 12 months of installation, no periodic testing thereafter)*	**None.** *Ecology may request testing at its discretion.*

COPY

DEPARTMENT OF
ECOLOGY
State of Washington

(Microsoft Comments)

Second Tier Review Recommendation Document for

Microsoft Oxford Data Center
Quincy, Washington

June 13, 2014
(Microsoft Comments 7-21-2014)

1. Summary and Purpose

Microsoft Corporation (Microsoft) proposes to construct a new data center called Oxford Data Center (Oxford) in Quincy, WA. Microsoft plans to install and operate 32 diesel-powered generators, each rated at 2,500 kilowatt (kW) electrical output, to provide backup power to Oxford's servers, and four additional 2,000 kW and one 750 kW diesel-powered engines for backing up other equipment and their administrative building. The proposed engines emit diesel engine exhaust particulate (DEEP) at an estimated rate that cause ambient impacts in excess of a regulatory trigger level called an acceptable source impact level (ASIL). Microsoft was therefore required to submit a second tier petition under WAC 173-460-090. A second tier petition requires Microsoft to prepare a health impact assessment (HIA) quantifying the health risks posed by their emissions of DEEP.

of combined carcinogenic compounds

Microsoft hired Landau Associates (Landau) to prepare an HIA (Landau Associates, 2014). In this assessment, Landau estimated lifetime increased cancer risks attributable to Microsoft's ~~DEEP~~ emissions and found them to be about **four in one million.** The maximum risk was estimated at a residential location to the north of Oxford Data Center's property. This risk was quantified assuming that both filterable and condensable particulate emitted from Oxford's engines constitutes DEEP. It is important to note that California's airborne toxics control measure for stationary compression engines only requires the filterable fraction to be quantified. This is because the health studies that form the basis for quantifying the health risk from diesel exposure used measurements of respirable particulate from "fresh" diesel exhaust and elemental carbon as a surrogate for diesel exhaust emissions. Therefore, the increased risk estimated by Landau represents a conservatively high estimate. A lower risk of about **one in one million** was estimated at the same location based on filterable emissions only.

X

Landau also assessed chronic and acute noncancer hazards attributable to the project's emissions and found them to be lower than unity (one). This indicates that Oxford's emissions by themselves are not likely to result in adverse noncancer health effects.

Finally, Ecology assessed the cumulative health risk by adding estimated concentrations attributable to Microsoft's emissions to an estimated background DEEP concentration. The maximum cumulative cancer risk from resident's exposure to DEEP in the vicinity of Oxford is approximately **45 in one million.** Chronic noncancer hazard quotients are much lower than one indicating that long-term exposure to DEEP in the area is not likely to result in noncancer health effects. These DEEP related health risks in the vicinity of Oxford Data Center are generally much lower than those estimated in urban areas of Washington.

Ecology also updated its cumulative dispersion model in Quincy to evaluate short-term impacts of nitrogen (NO_2) emitted simultaneously by all Quincy data center emergency engines during a system-wide power outage. This evaluation indicated that elevated NO_2 levels could occur, but the combined probability of an outage coinciding with unfavorable meteorology is very low.

3.4. Increased Cancer Risk

X **3.4.1. Cancer Risk Attributable to Oxford's DEEP Emissions** and other Carcinogens X

Table 2, adapted from the HIA, shows the estimated Oxford Data Center-specific and cumulative cancer risk per million at each of the receptors evaluated. The highest increase in risks attributable to Oxford Data Center's emissions of ~~DEEP~~ is 4.1 per million[5] and occurs at residential property to the north of Oxford. Landau assumed that both filterable and condensable particulate matter make up DEEP resulting in an estimated risk that errs on the side of overestimating risk.[6] Additionally, Landau chose a receptor location to represent a residence that was approximately 400 ft south of the actual house (closer to Oxford's emission sources) and therefore, the risk reported for a residential receptor at this location represents a conservatively high estimate of risk.

The highest estimated increased risk for a residential receptor near Oxford assuming only filterable particulate represents DEEP is approximately 1.0 per million. For non-residential exposure scenarios, workers at nearby commercial facilities may have increased risks of about 1.1 per million (or 0.3 per million assuming only filterable). Increased cancer risks to potential bystanders exposed near the point of maximum impact (i.e., fence line receptor) may be about 0.1 to 0.6 per million.

combined carcinogenic compounds (including DEEP, naphthalene, benzene, 1-3 butadiene, formaldehyde, acetaldehyde, benzo(a) pyrene, benzo(a)anthracene, chrysene, benzo(b) fluoranthene, benzo (k) fluoranthene, dibenzo(a,h)anthracene, and ideno(1,2,3-cd) pyrene)

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[5] # 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.

[6] California Air Resources Board considers the front half (filterable) PM emissions to be consistent the techniques used to establish diesel PM as a toxic air contaminant."

- Use of different railway emission rate. Ecology adjusted the results of railway emissions to reflect an emission rate calculated from the 2011 Grant County locomotive inventory and active track miles in Grant County. The estimated particulate emission rate from railways in Quincy was approximately 128 pounds per mile per year.

For the purpose of incorporating the cumulative modeling results into the review of proposed emissions from Oxford Data Center, Ecology chose to report results from both analyses.

The cumulative risk of all known sources of DEEP emissions in the vicinity of Oxford Data Center (Table 3) is highest for a nearby residence south of State Route 28, and southeast of the proposed project. The cumulative DEEP risk at this home is about 45 per million.[7]

Table 3. Estimated Increased Cancer Risk for Residential, Occupations, and Student Scenarios Attributable to All Known Sources of DEEP in Quincy

	Risk Per Million from DEEP Exposure at Various Receptor Locations						
				Monument Elementary School			
Modeled by:	Fence Line Receptor[1]	R-1 North Residence (MIRR)[2]	C-1 Industrial Building (MICR)[3]	Students[4]	Teachers[5]	Patients at Quincy Valley Medical Center[6]	Maximally Cumulatively Impacted Residence in Modeling Domain[2]
Landau	0.8	10.3	4.3	0.3	0.9	0.4	32.6
Ecology	0.6	8.5	6.0	0.3	1.6	0.6	45.0

[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.
[4] Student scenario assumes exposure occurs 180 days per year, eight hours per day for seven years.
[5] Teacher scenario assumes exposure occurs 200 days per year, eight hours per day for 40 years.
[6] Patient scenario assumes a patient is present at the hospital 365 days per year, 24 hours per day for one year.

X

3.5. Noncancer Hazard

carbon monoxide, nitrogen dioxide and acrolein

Landau evaluated chronic noncancer hazards associated with long-term exposure to DEEP, emitted from Oxford Data Center and other local sources. Hazard quotients and indices were much lower than unity (one) for all receptors' exposure to Oxford Data Center-related and

[7] Note that residential receptors tend to be the most exposed (e.g., longest exposure duration and exposure frequency). Therefore, their risks tend to be higher than other types of receptors. For regulatory decision making purposes, Ecology assumes that a resident is continuously exposed at their residence for their entire lifetime.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A NEW) AIR CONTAMINANT SOURCE FOR) **MICROSOFT CORPORATION**) **THE OXFORD DATA CENTER**)	PRELIMINARY DETERMINATION for APPROVAL ORDER No. 14AQ-E537

TO: John Radick, Senior Program Manager
US-Data Center Services
Microsoft Corporation
5600 148th Avenue NE
Redmond, WA 98052

On January 27, 2014, Ecology received a Notice of Construction (NOC) application submittal from the Microsoft Corporation (MSN), requesting approval for Phases 1 and 2 of a new facility named the Oxford Data Center located at Industrial Park #5, west of Road R NW at the end of Port Industrial Parkway in Quincy, WA. The NOC application was determined to be incomplete, and an incompleteness letter was issued on February 26, 2014. A revised NOC application was received on March 17, 2014. The application was considered complete on June 3, 2014.

EQUIPMENT

A list of equipment for this project is provided in Tables 1.1–1.4 below. Engine sizes listed in Tables 1.1–1.3 are in megawatt (MWe) units with the "e" indicating "electrical" based on generator power ratings listed on the engine specifications provided with the application. MWe is the assumed engine power rating unit for all Approval Conditions related to this Order.

Table 1.1. 2.5 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Phase/Building	Unit ID	Engine SN	Generator SN	Build Date
Ph 1/AZ-4A				
"				
"				
"				
Ph 1/AZ-4B				
"				
"				
"				
Ph 1/AZ-4C				
"				
"				
"				
Ph 1/AZ-4D				
"				
"				

Table 1.1. 2.5 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Phase/Building	**Unit ID**	**Engine SN**	**Generator SN**	**Build Date**
"				
Ph 2/AZ-3A				
"				
"				
"				
Ph 2/AZ-3B				
"				
"				
"				
Ph 2/AZ-3C				
"				
"				
"				
Ph 2/AZ-3D				
"				
"				
"				

Table 1.2. 2.0 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Building	**Unit ID**	**Engine SN**	**Generator SN**	**Build Date**
CNR-A	CNR-A			
CNR-B	CNR-B			
CNR-C	CNR-C			
CNR-D	CNR-D			

Table 1.3. 0.750 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Building	**Unit ID**	**Engine SN**	**Generator SN**	**Build Date**
Admin				

Table 1.4. Cooling Towers for Phases 1 & 2			
Phase/Building	**# Cooling Towers**	**# Cells per Tower**	**Total # Cooling Tower Cells**
Ph 1/AZ-4A	4	4	16
Ph 1/AZ-4B	4	4	16
Ph 1/AZ-4C	4	4	16

Table 1.4. Cooling Towers for Phases 1 & 2			
Phase/Building	# Cooling Towers	# Cells per Tower	Total # Cooling Tower Cells
Ph 1/AZ-4D	4	4	16
Ph 2/AZ-3A	4	4	16
Ph 2/AZ-3B	4	4	16
Ph 2/AZ-3C	4	4	16
Ph 2/AZ-3D	4	4	16
Total	32	4	128

PROJECT SUMMARY

1. The Oxford Data Center will contain four Phase 1 activity zone (AZ) buildings designated AZ-4A, AZ-4B, AZ-4C, AZ-4D; four core network room (CNR) buildings; an administrative building; and four phase 2 AZ buildings designated AZ-3A, AZ-3B, AZ-3C, AZ-3D. Building construction for the Phase 1 generators and cooling towers is expected to begin before the end of October 2014 with commissioning of generators spread over an approximately 9-month period. Construction of Phase 2 is expected to begin within 18 months after the start of generator commissioning for Phase 1. Project Oxford Phases 1 and 2 will have thirty-two (32) Caterpillar Model 3516C-HD-TA diesel powered electric emergency generators in the activity zone buildings with a power rating of 2.5 MWe per generator, four (4) Caterpillar Model 3516C-TA diesel powered electric emergency generators in the CNR buildings with a power rating of 2.0 MWe per generator, and one (1) Caterpillar Model C27ATAAC diesel powered electric emergency generator in the administrative building with a power rating of 0.75 MWe.

2. Project Oxford will use SPX-Marley Model MD5008PAF2 cooling towers to dissipate heat from the AZ buildings. Each cooling tower has four cells and four fans. Each of the eight AZ buildings will have four cooling towers for a total of thirty-two (32) cooling towers. Each of the thirty-two individual cooling towers has a design recirculation rate of 950 gallons per minute (gpm) and 143,600 cubic feet per minute (cfm).

   Combined Phase 1 and 2 emissions for Project Oxford are contained in Tables 2.1 and 2.2.

Table 2.1. Criteria Pollutants Potential to Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
Total particulate matter (PM)	All $PM_{2.5}$	23	23.5
PM smaller than 10 microns in diameter (PM_{10})	All $PM_{2.5}$	12.8	13.3
PM smaller than 2.5 microns in diameter ($PM_{2.5}$)[(a)]	0.536	2.99	3.53

Table 2.1. Criteria Pollutants Potential to Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
Carbon monoxide (CO)	15.6	0	15.6
Nitrogen oxides (NO_X)	8.6	0	8.6
Volatile organic compound (VOC)	8.0E-01	Negligible	0.8
Sulfur dioxide (SO_2)	4.7E-02	0	4.7E-02
Lead	Negligible	0	Negligible

[a] All PM emissions from the generator engines are $PM_{2.5}$, and all $PM_{2.5}$ from the generator engines is considered Diesel Engine Exhaust Particulate (DEEP).

Table 2.2. Toxic Air Pollutants Potential To Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
CO	15.6	0	15.6
Ammonia	0.71	0	0.71
DEEP[a]	5.36E-01	0	5.36E-01
SO_2	4.7E-02	0	4.7E-02
Primary nitrogen dioxide (NO_2)[b]	8.6E-01	0	8.7E-01
Benzene	2.4E-03	0	2.4E-03
Toluene	8.6E-04	0	8.6E-04
Xylenes	5.9E-04	0	5.9E-04
1,3 Butadiene	1.2E-04	0	1.2E-04
Formaldehyde	2.4E-04	0	2.4E-04
Acetaldehyde	7.7E-05	0	7.7E-05
Acrolein	2.4E-05	0	2.4E-05
Benzo(a)pyrene	7.9E-07	0	7.9E-07
Benzo(a)anthracene	1.9E-06	0	1.9E-06
Chrysene	4.7E-06	0	4.7E-06
Benzo(b)fluoranthene	3.4E-06	0	3.4E-06
Benzo(k)fluoranthene	6.7E-07	0	6.7E-07
Dibenz(a,h)anthracene	1.1E-06	0	1.1E-06
Ideno(1,2,3-cd)pyrene	1.3E-06	0	1.3E-06
Napthalene	4.0E-04	0	4.0E-04
Propylene	8.5E-03	0	8.5E-03

Table 2.2. Toxic Air Pollutants Potential To Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
Fluoride	0	4.8E-03	4.8E-03
Manganese	0	4.6E-04	4.6E-04
Copper	0	1.6E-04	1.6E-04
Chloroform	0	2.6E-04	2.6E-04
Bromodichloromethane	0	2.6E-04	2.6E-04
Bromoform	0	6.9E-03	6.9E-03

(a) DEEP is measured by EPA Method 5 (or 201a), which measures filterable (front-half) particulate emissions.
(b) NO_2 is assumed to be equal to 10 percent of the total NO_X emitted.

DETERMINATIONS

In relation to this project, the Washington State 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. Microsoft has voluntarily agreed to equip all of the diesel powered electric generators at the Oxford Data Center with emission control devices that can achieve EPA's Tier 4 emission standards. The proposed project, if constructed and operated as herein required, will ~~utilize~~exceed Best Available Control Technology (BACT) requirements as defined below:

Table 2a.1 BACT Determinations	
Pollutant(s)	BACT Determination
PM, CO, and VOCs	a. Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219. b. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. c. Use of high-efficiency drift eliminators which achieve a liquid droplet drift rate of no more than 0.0005 percent of the recirculation flow rate within each cooling tower.
NO_X	a. Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219, and satisfy the written verification requirements of Approval Condition 2.5. b. Compliance with the operation and maintenance

Table 2a.1 BACT Determinations	
Pollutant(s)	**BACT Determination**
	restrictions of 40 CFR Part 60, Subpart IIII.
SO_2	Use of ultra-low sulfur diesel fuel containing no more than 15 parts per million by weight of sulfur.

3. The proposed project, if constructed and operated as herein required, will utilize Best Available Control Technology for toxic air pollutants (TAPs) (tBACT) as defined below:

Table 3.1 tBACT Determinations	
TAPs	**tBACT Determination**
Acetaldehyde, CO, acrolein, benzene, benzo(a)pyrene, 1,3-butadiene, DEEP, formaldehyde, toluene, total PAHs, xylenes, chrysene, benzo(a)anthracene, napthalene, benzo(b)fluoranthene, propylene, dibenz(a,h)anthracene, Ideno(1,2,3-cd)pyrene, fluoride, manganese, copper, chloroform, bromodichloromethane, bromoform,	Compliance with the VOC and PM BACT requirement.
Ammonia	No more than 15 parts per million volume-dry (ppmvd) at 15 percent oxygen per engine.
NO_2	Compliance with the NO_X BACT requirement.
SO_2	Compliance with the SO_2 BACT requirement.

4. In accordance with WAC 173-460-090, a second tier health risk analysis has been submitted by the applicant for DEEP emissions. Ecology has concluded that this project has satisfied all requirements of a second tier analysis.

THEREFORE, IT IS ORDERED that the project as described in the NOC application and more specifically detailed in plans, specifications, and other information submitted to Ecology is approved for construction and operation, provided the following conditions are met:

APPROVAL CONDITIONS

1. ADMINISTRATIVE CONDITION

1.1. The emergency engine generators approved for operation by this Order are to be used solely for those purposes authorized for emergency generators under 40 CFR 60, Subpart IIII.

1.2. The Oxford Data Center shall coordinate engine maintenance and testing schedules with Dell and the Microsoft Columbia Data Center in Quincy to minimize overlap between data center scheduled testing. Microsoft shall maintain records of the coordination communications with the other data centers, and those communications shall be available for review by Ecology.

2. EQUIPMENT RESTRICTIONS

2.1. The thirty-two 2.5 MWe engine, four 2.0 MWe engines, and the single 0.750 MWe engine 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 0.750 MWe, 2.0 MWe, and 2.5 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 Oxford 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 0.750 MWe, 2.0 MWe, and 2.5 MWe engines and electrical generating units approved for operation at the Oxford Data Center are those listed in Tables 1.1–1.3 above.

2.3. Replacement of failed engines with identical engines (same manufacturer and model) requires notification prior to installation, but will not require NOC unless there is an emission rate increase from the replacement engines.

2.4. The thirty-two 2.5 MWe engine-generator exhaust stack dimensions shall be greater than or equal to 46 feet above ground level, no more than 18 inches in diameter, and approximately 16 feet above roof height. The four 2.0 MWe engine-generator exhaust stack heights shall be greater than or equal to 46 feet above ground level, no more than 16 inches in diameter, and approximately 16 feet above roof height. The one 0.750 MWe engine-generator exhaust stack height shall be greater than or equal to 46 feet above ground level, no more than 14 inches in diameter, and approximately 16 feet above roof height.

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

3. OPERATING LIMITATIONS

3.1. Fuel consumption at the Oxford Data Center facility shall be limited to a total of 431,000 gallons per year and 119,300 gallons per day of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.00150 weight percent sulfur). Total facility annual fuel consumption may be averaged over a three (3) year period using monthly rolling totals.

3.2. Except as provided in Approval Condition 3.3, the thirty-seven (37) Project Oxford Data Center engines shall not operate more than the following load specific limits:

3.2.1. 0 to 10 percent electrical load~~Operational rpm with no load (referred to as idle)~~: for weekly testing, corrective engine maintenance, and generator cool-down, each generator shall not exceed 29 hours per year of operation averaged across all generators in service over a rolling monthly 3-year average.

3.2.2. 11 to 82 percent electrical load~~Approximately eighty percent load~~: for emergency power outages, load bank testing, corrective engine testing, electrical bypass for switchgear, transformer, or substation operations, and non-emergency situations authorized by 40 CFR 60.4211(f), the following conditions apply:

3.2.2.1 Each generator shall not exceed ~~40~~ 57.5 hours per year of operation averaged across all generators in service over a rolling monthly 3-year average.

3.2.2.2 Daily generator usage shall not exceed a maximum limit of 192 MWe hours per calendar day, except during up to four days per year of emergency power outage.

3.2.2.3 Maximum hourly generator usage shall be limited to no more than four 2.5 MWe generators operating simultaneously during any given hour except during emergency power outages.

3.2.3. Electrical load exceeding 82 percent~~One hundred percent load~~: for emergency power outages, monthly load bank testing, semiannual load bank testing, and as needed generator corrective maintenance, each generator shall not exceed 17.5 hours per year of operation averaged across all generators in service over a rolling monthly 3-year average~~, ~~. Engine runtime hours at this load level will be subtracted from the 57.5 hours per year authorized in Condition 3.2.2.1. Except for during a power outage, ~~with~~ no more than three 2.5 MWe generators shall ~~operating~~ operate simultaneously during any given hour.

3.3. The Oxford Data Center engines shall not exceed the following operating limits during commissioning and stack testing:

3.3.1. For commissioning events, each generator shall not exceed a one-time total of 50 hours of operation over a full range of loads, averaged over all facility generators commissioned in that year.

3.3.2. For stack testing, ~~no more than two generators shall be tested per year, every three years, with~~ each generator shall operat~~eing~~ no more than ~~30~~45 hours per testing event averaged over all testing events~~generators tested~~ in that year, and each testing event shall be conducted according to the testing requirements in Approval Condition 4. ~~If more than 30 hours per year of stack testing are~~Hours needed for re-testing at 80 % load to satisfy Approval Condition 4.4~~, those hours~~ should be combined with any of the pre-approved hours in Approval Condition 3.2. Additional operation of the engines for the purpose of emissions testing beyond the operating hour and fuel consumptions limits authorized by this Order will be considered by Ecology upon request in writing.

3.4. All of the 32 Phase 1 and 2 cooling towers shall comply with the following conditions:

3.4.1. Each individual cooling tower unit shall use a mist eliminator that meets the BACT determination for PM of Section 2(c) of this Order.

3.4.2. Chemicals containing hexavalent chromium cannot be used to pre-treat the cooling tower makeup water.

4. GENERAL TESTING AND MAINTENANCE REQUIREMENTS

4.1. The Oxford Data Center will follow engine-manufacturer's recommended diagnostic testing and maintenance procedures to ensure that each of the thirty-two (32) 2.5 MWe engines, four (4) 2.0 MWe engines, and one (1) 0.750 MWe engines will conform to applicable engine specifications in Approval Condition 2.1 and applicable emission specifications in Approval Condition 5 throughout the life of each engine.

4.2. Any emission testing performed to verify conditions of this Approval Order or for submittal to Ecology in support of this facility's operations, requires that Microsoft comply with all requirements in 40 CFR 60.8 except subsection (g). 40 CFR 60.8(g) may be required by Ecology at their discretion. A test plan will be submitted to Ecology at least 30 days prior to testing that will include a testing protocol for Ecology approval that includes the following information:

4.2.1. The location and Unit ID of the equipment proposed to be tested.

4.2.2. The operating parameters to be monitored during the test.

4.2.3. A description of the source including manufacturer, model number, design capacity of the equipment and the location of the sample ports or test locations.

4.2.4. Time and date of the test and identification and qualifications of the personnel involved.

4.2.5. A description of the test methods or procedures to be used.

4.3. ~~To show continuing compliance with the applicable emission standards for the Tier 2 certified engines specified in Approval Condition 2.1, t~~The Oxford Data Center shall source test engines as described in Approval Order 4.4 to show compliance with emission limits in Table 4.

4.4. The following testing requirements are for ammonia, PM, NO_X, CO, and non-methane hydro-carbons (NMHC). The test methods in Table 4 shall be used for each test event unless an alternate method is proposed by Microsoft and approved in writing by Ecology prior to the test. Except for ammonia testing, which requires only a single-load test, each pollutant in Table 4 shall be tested at two load testing approaches (five-load weighted and single load). A single testing event is defined as completion of all tests in Table 4 per engine, and each test shall be performed on different engines from those tested previously, until each engine at the data center has been tested except as provided in subsection 4.4.4. In the event that any source test shows non-compliance with any applicable Table 4 emission standards for the engines specified in Approval Condition 2.1, Microsoft shall repair or replace the engine and repeat the test on the same engine (a second testing event for that engine) plus two additional engines from the same phase of the Oxford Data Center. Test reports shall be submitted to Ecology as provided in Condition 9.5 of this Order.

Table 4. Testing Requirements

Pollutant	Load Test	Test Method	Emission Limits	Compliance Test Frequency
PM	Five-load weighted avg.	EPA Method 5 or 201a	0.03 g/kW-hr	Test ~~two different~~one engine~~s at both load tests~~ within 12 months of engine startup. Test ~~two~~one different untested engine~~s~~ every 3 years.
	Single-load (78%-82%)	EPA Method 5 or 201a, and EPA Method 202	0.1 lb/hr (0.75 MWe)	
			0.21 lb/hr (2.0 MWe)	
			0.288 lb/hr (2.5 MWe)	
NO_X	Five-load weighted avg.	EPA Method 7E	0.67 g/kW-hr	Test ~~two different~~one engine~~s at both load tests~~ within 12 months of engine startup. Test ~~two~~one different untested engine~~s~~ every 3 years.
	Single-load (78%-82%)	EPA Method 7E	1.8 lb/hr (0.75 MWe)	
			2.6 lb/hr (2.0 MWe)	
			3.37 lb/hr (2.5 MWe)	
CO	Five-load weighted avg.	EPA Method 10	3.5 g/kW-hr	Test ~~two different~~one engine~~s at both load tests~~ within 12 months of engine startup. Test ~~two~~one different untested engine~~s~~ every 3 years.
	Single-load (78%-82%)	EPA Method 10	0.75 lb/hr (0.75 MWe)	
			10.1 lb/hr (2.0 MWe)	
			15.04 lb/hr (2.5 MWe)	
NMHC/ VOC	Five-load weighted avg.	EPA Method 25A and EPA Method 18	0.19 g/kW-hr	Test ~~two different~~one engine~~s at both load tests~~ within 12 months of engine startup. Test ~~two~~one different untested engine~~s~~ every 3 years.
	Single-load (78%-82%)	EPA Method 25A and Method 18	0.1 lb/hr (0.75 MWe)	
			0.8 lb/hr (2.0 MWe)	
			0.8 lb/hr (2.5 MWe)	
Ammonia	Single-load (78%-82%)	BAAQMD Method ST-1B or EPA Method 320	0.19 lb/hr (0.75 MWe)	Test ~~two different~~one engine~~s~~ within 12 months of engine startup. Test ~~two~~ one different untested engine~~s~~ every 3 years.
			0.51 lb/hr (2.0 MWe)	
			0.64 lb/hr (2.5~~0~~ MWe)	

4.4.1. For the five load tests, testing shall be performed at each of the five engine torque load levels described in Table 2 of Appendix B to Subpart E of 40 CFR Part 89, and data shall be reduced to a single-weighted average value using the weighting factors specified in Table 2. Each test run shall be done within 2 percent of the target load value (e.g., the test runs for the nominal 10 percent load condition shall be done at loads from 8 to 12 percent). Microsoft may replace the dynamometer requirement in Subpart E of 40 CFR Part 89 with corresponding measurement of gen-set electrical output to derive horsepower output.

4.4.2. The F-factor described in Method 19 shall be used to calculate exhaust flow rate through the exhaust stack, except that EPA Method 2 shall be used to calculate the flow rate for purposes of particulate testing. The fuel meter data, as measured according to Approval Condition 4.5, shall be included in the test report, along with the emissions calculations.

4.4.3. Three test runs shall be conducted for each engine. Each run must last at least 60 minutes. Analyzer data shall be recorded at least once every minute during the test. Engine run time and horsepower output and fuel usage shall be recorded during each test run for each load and shall be included in the test report. In lieu of these requirements, Microsoft may propose a test protocol to Ecology in writing for approval.

4.4.4. The one (1) 0.750 MWe engine shall be stack tested according to Table 4. If the first two (2) 2.0 MWe engines tested are found to have consistent test results and are in compliance with all applicable Table 4 emission load tests, Microsoft may request approval from Ecology to discontinue compliance testing for the other two (2) 2.0 MWe engines. If the first five (5) 2.5 MWe engines tested are found to have consistent test results and are in compliance with all applicable Table 4 emission load tests, Microsoft may request approval from Ecology to discontinue compliance testing for the other twenty-seven (27) 2.5 MWe engines.

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

4.6. Each engine shall be connected to a properly installed and maintained fuel flow monitoring system (either physical or generator manufacturer provided software) that records the amount of fuel consumed by the engine during each operation.

5. EMISSION LIMITS

The thirty-two (32) 2.5 MWe engine-generators, the four (4) 2.0 MWe engine-generators, and the one (1) 0.750 MWe engine-generator shall meet the follow emission rate limitations:

5.1. Each emergency engine shall not exceed the applicable emission limits in Table 4.

5.2. Total annual facility-wide emissions shall not exceed the following: 13.3 tons per year (tpy) of PM10; 3.53 tpy of PM2.5; 15.6 tpy of CO; 8.6 tpy of NOx; 0.8 tpy of VOC; 0.047 tpy of SO2; 0.536 tpy of DEEP; 0.86 tpy of NO2; and 0.71 tpy of ammonia.

5.3. Visual emissions from each diesel electric generator exhaust stack shall be no more than five percent, with the exception of a ten (10) minute period after unit start-up. Visual emissions shall be measured by using the procedures contained in 40 CFR 60, Appendix A, Method 9.

5.4. Ammonia concentrations shall comply with the emission limits in Table 4.

6. OPERATION AND MAINTENANCE MANUALS

A site-specific O&M manual for the Oxford Data Center facility equipment shall be developed and followed. Manufacturer's operating instructions and design specifications for the engines, generators, cooling towers, and associated equipment shall be included in the manual. 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, cooling towers, 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 Tiered Emission Standards appropriate for that engine throughout the life of the engine.

6.2. Normal engine operating parameters and design specifications.

6.3. Operating maintenance schedule for engines and cooling towers.

6.4. Specification sheet for cooling towers verifying 0.0005 percent drift rating, water flow, air flow, makeup water rate, and a list of chemicals used to pre-treat cooling tower makeup water.

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, O&M 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. 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. Annual hours of operation for each diesel engine.

8.3. Annual number of start-ups for each diesel engine.

8.4. Annual gross power generated by facility-wide operation of the emergency backup electrical generators.

8.5. Number of generators in service each month, and the monthly facility-wide average generator hours of operation within each of the following electrical load brackets: 0 to 10 percent, 11 to 82 percent and above 82 percent;

8.6. Log showing each calendar day when facility-wide electric energy generation exceeded 192 MWe-hours, and the reason for the generator activity on that day;

~~8.4.~~8.7. Log showing each hour when more than four 2.5 MWe generators operated simultaneously, and the reason for the generator activity during that hour;

~~8.5.~~8.8. Upset condition log for each facility permitted emission unit (the 37 engines and 32 cooling towers) and their respective control units that include date, time, duration of upset, cause, and corrective action.

~~8.6.~~8.9. Applicable recordkeeping for emergency engines required by 40 CFR Part 60, Subpart IIII, Sections 60.4214(b) and (c).

~~8.7.~~8.10. Air quality complaints received from the public or other entity, and the affected emissions units.

9. REPORTING

9.1. The serial number of the engine and the generator, and the engine build date 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.

9.2.1. Monthly rolling annual total summary of air contaminant emissions~~,~~;

9.2.2. ~~m~~Monthly rolling facility wide average generator hours of operation within each of the electrical load brackets specified in Condition 8.6;

~~9.2.1.~~9.2.3. ~~rolling hours of operation with annual total, and m~~Monthly rolling gross power generation with annual total.

~~9.2.2.~~9.2.4. Monthly ~~Rolling~~ rolling annual total summary of fuel usage (in gallons).

9.3. Written notification that the O&M manual described in Approval Condition 6 has been developed and updated within 60 days after the issuance of this Order. A copy of the most current O&M manual will be provided to Ecology if requested.

9.4. 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 Microsoft Corporation'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.

9.5. Results of any stack testing performed 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. The information from Conditions 4.2.3, 4.2.4, and 4.2.5 including field and analytical laboratory data, quality assurance/quality control procedures and documentation.

9.5.2. A summary of results, reported in units and averaging periods consistent with the applicable emission standard or limit.

9.5.3. A summary of control system or equipment operating conditions.

9.5.4. A summary of operating parameters for the diesel engines being tested.

9.5.5. Copies of field data and example calculations.

9.5.6. Chain of custody information.

9.5.7. Calibration documentation

9.5.8. Discussion of any abnormalities associated with the results.

9.5.9. A statement signed by the senior management official of the testing firm certifying the validity of the source test report.

9.6. If Microsoft operates or contracts to operate any emergency diesel engine at the data center in non-emergency situations authorized by 40 CFR 60.4211(f), Microsoft shall submit the annual report required by 40 CFR 60.4214(d)

10. GENERAL CONDITIONS

10.1. **Commencing/Discontinuing Construction and/or Operations:** This Approval Order shall become void if construction of Phase 1 is not commenced within eighteen (18) months following the date of this Approval Order, or if Phase 2 is not commenced within eighteen (18) months following completion of commissioning of the final engine in Phase 1. No additional engines shall be installed, if construction of both phases is discontinued for a period of eighteen (18) months, or if operation of backup emergency diesel electric generator is discontinued at the facility 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 emergency diesel electric generators, and cooling towers, and be available for review upon request by Ecology.

10.4. **Equipment Operation:** Operation of the generator units, cooling towers, 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, engines, or cooling towers 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. **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.

10.7. **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, and the remainder of this authorization, shall not be affected thereby.

YOUR RIGHT TO APPEAL

You have a right to appeal this Approval Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Approval Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do the following within 30 days of the date of receipt of this Approval Order:

- File your appeal and a copy of this Approval Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Approval Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel Road SW, Suite 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk P.O. Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** P.O. Box 40903 Olympia, WA 98504-0903

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov

To find laws and agency rules visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser

DATED this __th day of ____ 2014, at Spokane, Washington.

Reviewed By:	Approved By:
Gary J. Huitsing, P.E. Science and Engineering Section Air Quality Program Department of Ecology State of Washington	Karen K. Wood, Section Manager Regional Air Quality Section Eastern Regional Office Department of Ecology State of Washington

76817596.1 0054026-00004

MICROSOFT COMMENTS 7/29/2014

TECHNICAL SUPPORT DOCUMENT
FOR PRELIMINARY DETERMINATION OF APPROVAL ORDER NO. 14AQ-E537
MICROSOFT OXFORD DATA CENTER
JUNE 16, 2014

1. EXECUTIVE SUMMARY

On January 27, 2014, Ecology received a Notice of Construction (NOC) application submittal from the Microsoft Corporation (Microsoft) **the permittee,** requesting approval for a permit application for phases 1 and 2 of a new facility named the Oxford Data Center (Oxford) located at Industrial Park #5, west of Road R NW at the end of Port Industrial Parkway in Quincy, WA. The following information comprises the legal description of the facility provided by the applicant:

LOTS 2, 3, 4, 5, AND TRACT A, AMENDED PORT DISTRICT INDUSTRIAL PARK NO. 6 BINDING SITE PLAN, ACCORDING TO THE BINDING SITE PLAN THEREOF FILED IN VOLUME 2 OF BINDING SITE PLANS, PAGES 64 AND 65, RECORDS OF GRANT COUNTY, WASHINGTON. FARM UNITS 216 AND 217, IRRIGATION BLOCK 73, OXFORD BASIN PROJECT, ACCORDING TO THE PLAT THEROF FILED NOVEMBER 29, 1951, RECORDS OF GRANT COUNTY, WASHINGTON. STARTING AT THE NORTHWEST CORNER OF SAID FARM UNIT 216, IRRIGATION BLOCK 73, THE TRUE POINT OF BEGINNING, THENCE 173 (feet) EAST ALONG THE NORTH LINE OF SAID FARM UNIT; THENCE 242 FEET SOUTH OF A LINE PERPENDICULAR TO THE NORTH LINE OF SAID FARM UNIT; THENCE WEST 173 FEET; THENCE NORTH 242 FEET TO THE TRUE POINT OF BEGINNING.

Ecology received supplemental application information on January 14, 17, 28, and February 7, including an electronic WORD version of a revised NOC application on February 7, 2014. Ecology received supplemental application information on February 13, 2014. The NOC application was determined to be incomplete, and an incompleteness letter was issued on February 26, 2014. A revised NOC application was received on March 17, 2014, with additional supporting material provided on March 19, 20, 25, 27, April 24, 28, May 21, and June 3, 2014. The application was considered complete on June 3, 2014. The Preliminary Determination (i.e., Proposed Decision) was completed on June 3, 2014, allowing a Tier II review to be initiated. In accordance with WAC 173-460-090, a second tier health risk analysis was ~~been~~ submitted by the applicant for DEEP emissions. Ecology has concluded that this project has satisfied all requirements of a second tier analysis.

2. PROJECT DESCRIPTION

2.1 Oxford will contain four phase 1 activity zone (AZ) buildings designated AZ-4A, AZ-4B, AZ-4C, AZ-4D, four core network room (CNR) buildings, an administrative building, and four phase 2 activity zone buildings designated AZ-3A, AZ-3B, AZ-3C, AZ-3D. Building construction for the Phase 1 generators and cooling towers is expected to begin before the end of October, 2014 with commissioning of generators spread over an approximately 9-month period. Construction of Phase 2 is expected to begin within 18 months after the ~~start~~ completion of ~~generator~~ commissioning of the final generator for Phase 1. Project Oxford phases 1 & 2 will have thirty-two (32) Caterpillar Model 3516C-HD-TA diesel powered electric emergency generators in the activity zone buildings with a power rating of 2.5 MWe per generator, four (4) Caterpillar Model 3516C-TA diesel powered electric emergency generators in the CNR buildings with a power rating of 2.0 MWe per generator, and one (1) Caterpillar Model C27ATAAC diesel powered electric emergency generator in the administrative building with a power rating of 0.75 MWe. ~~Each cooling tower has four cells and four fans.~~ Microsoft will voluntarily equip each generator with emission control devices including catalyzed diesel particulate filters (DPF) to control emissions of particulate matter, carbon monoxide, and volatile organic compounds, and urea-based selective catalytic reduction (SCR) to control emissions of nitrogen oxides.

Comment [jw1]: The requested revision is designed to make the described construction schedule consistent with Condition 10.1 of the PD Approval Order.

Comment [jw2]: This requested revision, along with multiple similar revisions herein, is designed to clarify that Microsoft will voluntarily install emission control devices on the Oxford Data Center engines. The rationale for these revisions is explained in Microsoft's attached comment letter.

Each of the eight activity zone building will have four cooling towers for a total of thirty two (32) SPX-Marley model MD5008PAF2 cooling towers. Each of the thirty two individual cooling towers has a design recirculation rate of 950 gallons per minute (gpm) and an air flow rate of 143,600 cubic feet per minute (cfm). Each cooling tower will be equipped with drift eliminators with a guaranteed performance of 0.0005 percent. Each cooling tower has four cells and four fans.

2.2.1 Potential to Emit for Criteria Pollutants and Toxic Air Pollutants (TAPS)

Table 2. Potential To Emit For Phases 1 & 2 (TPY)

Pollutant	Emission Factor	Facility Potential to Emit	References
Criteria Pollutants	Units = g/kW-hr (except where noted)	(TPY)	(a)
NO_x	Warmed up: (0.67); Cold: (Tier 2 load specific emission factors and use of cold-start (CS) adjustment factors)	8.6	(b),(g),(h)
VOC	Warmed up: (0.19); Cold: (use of CS Factors)	0.8	(a),(b),(e)
CO	Warmed up: (3.5); Cold: (use of CS Factors)	15.6	(b)
$PM_{2.5}$	Warmed up: (0.03 and back-half (BH) adjustment factors); Cold: (use of CS Factor) (See note j for cooling towers)	3.53	(b),(j)
PM_{10}	NA (See note j for cooling towers)	13.3	(f),(j)
SO_2	15 ppm fuel sulfur limit	0.047	(c)
Lead	NA	Negligible	(d)
Ozone	NA	NA	(e)
Toxic Air Pollutants (TAPS)	Units = lbs/MMBTU (except where noted)		(a)
Primary NO_2	Warmed up: (0.67); Cold: (Tier 2 load specific emission factors and use of CS factors)	0.86	(b),(h)
Ammonia	0.32 (lbs/hr NH3)/(MWe)	0.71	(g)
Diesel Engine Exhaust Particulate (DEEP)	Warmed up: (0.03 and BH factors); Cold: (use of CS Factor)	0.536	(b)
Carbon monoxide	Warmed up: (3.5); Cold: (use of CS Factors)	15.6	(b)
Sulfur dioxide	15 ppm fuel sulfur limit	0.047	(c)

Benzene	7.76E-04	2.4E-03	(i)
Toluene	2.81E-04	8.6E-04	(i)
Xylenes	1.93E-04	5.9E-04	(i)
1,3 Butadiene	3.91E-05	1.2E-04	(i)
Formaldehyde	7.89E-05	2.4E-04	(i)
Acetaldehyde	2.52E-05	7.7E-05	(i)
Acrolein	7.88E-06	2.4E-05	(i)
Benzo(a)Pyrene	2.57E-07	7.9E-07	(i)
Benzo(a)anthracene	6.22E-07	1.9E-06	(i)
Chrysene	1.53E-06	4.7E-06	(i)
Benzo(b)fluoranthene	1.11E-06	3.4E-06	(i)
Benzo(k)fluoranthene	2.18E-07	6.7E-07	(i)
Dibenz(a,h)anthracene	3.46E-07	1.1E-06	(i)
Ideno(1,2,3-cd)pyrene	4.14E-07	1.3E-06	(i)
Napthalene	1.30E-04	4.0E-04	(i)
Propylene	2.79E-03	8.5E-03	(i)
Fluoride	0.31 mg/L	4.8E-03	(j)
Manganese	0.03 mg/L	4.6E-04	(j)
Copper	0.01 mg/L	1.6E-04	(j)
Chloroform	0.0004 mg/L	2.6E-04	(k)
Bromodichloromethane	0.0004 mg/L	2.6E-04	(k)
Bromoform	0.0105 mg/L	6.9E-03	(k)

(a) The current list of EPA criteria pollutants (http://www.epa.gov/airquality/urbanair/, last updated April 20, 2012) that have related National Ambient Air Quality Standards (NAAQS) (http://www.epa.gov/air/criteria.html; last updated December 14, 2012). VOC is not a criteria pollutant but is included here per note (e). Toxic Air Pollutants (TAPs) are defined as those in WAC 173-460. Greenhouse gas is not a criteria pollutant or a TAP and is exempt from New Source Review requirements for non Prevention of Significant Deterioration projects such as at Oxford Data Center per WAC 173-400-110(5)(b).

(b) Potential to Emit (PTE) estimates are based on manufacturer 5-load final Tier 4 compliant engine test data and applicable cold start (CS) factors for catalyst warm-up periods and black puff factors from California Energy Commission's *Air Quality Implications of Backup Generators in California"* CEC-500-2005-049, July 2005. The NOx CS factor from the July 2005 report is 1.0, but NOx PTE is conservatively based on the highest provided tier-2 manufacturer test data from Cummins, MTU, and Caterpillar (CAT). The applicant believes that use of DPF eliminates the need for a black-puff CS factor adjustment, but has included it anyway to provide a conservative PTE estimate

(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) All PM emissions from the generator engines is $PM_{2.5}$, and all $PM_{2.5}$ from the generator engines is considered DEEP.

(g) Ammonia emission factor from Vantage Data Center in Quincy, WA.

(h) NO2 is assumed to be 10% of total NOx emitted.

(i) 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/

(j) Trace metals in city industrial wastewater as provided in application for cooling tower emissions. Total particulate matter from cooling towers based on the following study *Calculating Realistic PM10 Emissions from Cooling Towers", Reisman and Frisbie, Environmental Progress, July 2002.*

(k) Concentration in cooling tower makeup water as provided in application for cooling tower emissions

2.1.2 Maximum Operation Scenarios Based on Final Tier 4 Compliant Engines and Cold Start Factors and Activation Delay Periods

The DEEP and CO potential to emit values in Table 2 and facility maximum annual fuel usage values in Approval Condition 3.1 of the permit are based on the following worst-case operating scenario which use Final Tier 4 compliant engine factors and cold start factor adjustments):

Scenario: Full Operation of Combined Phases 1+2, Plus Stack Testing of 3 Generators					
		Facility-Wide Emissions, tons/year			
Activity	Fuel, gal/year	DEEP	NOx	CO	VOC
12 months Routine Operation of Phase 1	245,166	0.298	5.7	8.7	0.44
12 months Routine Operation of Phase 2	187,194	0.224	2.75	6.73	0.33
Stack Testing of 3 Generators	14,299	0.013	0.16	0.68	0.03
12-Month Total Emissions	**446,659**	**0.535**	8.61	**16.1**	0.8
Adjustment Factor Compared to 70-Year Average	1.009	1.008	1.005	1.013	1.013

(Note: These estimates are based on preliminary plans to use thirty-six (36) 2.5 MWe engines and one (1) 0.750 MWe engine. However, Microsoft's final plans are to use only thirty-two (32) 2.5 MWe engines, four (4) 2.0 MWe engines, and one (1) 0.750 MWe engine. As a result, CO emissions are expected to be 15.6 tpy, and maximum fuel usage is expected to be 431,000 gallons per year. In addition, DEEP emissions are expected to be less than the listed value, but Microsoft has conservatively chosen a potential to emit of 0.536 tpy for DEEP.

The NOx and VOC potential to emit values in Table 2 above are based on the following worst-case operating scenario which use Final Tier 4 compliant engine factors and cold start factor adjustments:

Scenario: Commissioning of Phase 2, Followed By Operation of Combined Phases 1 +2					
		Facility-Wide Emissions, tons/year			
Activity	Fuel, gal/year	DEEP	NOx	CO	VOC
12 months Routine Operation of Phase 1	245,166	0.298	5.7	8.7	0.44
Commissioning of 16 Phase 1 Generators	101,683	0.094	2.28	5.08	0.26
5 Months of Operation of 4 Phase 2 Generators	19,499	0.023	0.286	0.701	0.034
2 months Operation of 12 Phase 2 Generators	23,399	0.028	0.344	0.841	0.041
Emission Testing of 3 Phase 1 Generators	14,299	0.013	0.16	0.68	0.03
12-Month Total Emissions	404,047	0.46	**8.77**	16.00	**0.81**
Adjustment Factor Compared to 70-Year Average	0.91	0.86	1.023	1.01	1.02

(Note: these estimates are based on using thirty-six (36) 2.5 MWe engines and one (1) 0.750 MWe engine; Microsoft plans to use only thirty-two (32) 2.5 MWe engines, four (4) 2.0 MWe engines, and one (1) 0.750 MWe engine. As are result, NOx emissions are expected to be 8.6 tpy. In addition, VOC emissions are expected to be 0.8 tpy.):

"Black Puff" ~~C~~cold start adjustment factors are used to approximate the additional emissions that will occur during the first 10-30 seconds from cold engines burning off the

Comment [jw3]: The inserts in this section clarify the distinction between the "black puff" vs. "catalyst delay" cold start factors.

accumulated fuel and crankcase oil on cold cylinders. The PM and VOC cold start factor adjustments for these calculations are provided below:

VOC/PM Black Puff Cold-Start Adjustment Factors				
Load	Spike Area (ppm-sec)	Steady-State Area (ppm-sec)	Total Area (ppm-sec)	Black Puff Factor
10%	6300	27000	33300	1.189
80%	6300	18000	24300	1.259
100%	6300	18000	24300	1.259

The CO cold start factor adjustments for these calculations are provided below:

CO Black Puff Cold-Start Adjustment Factors				
Load	Spike Area (ppm-sec)	Steady-State Area (ppm-sec)	Total Area (ppm-sec)	Black Puff Factor
10%	15000	18000	33000	1.455
80%	15000	12000	27000	1.556
100%	15000	12000	27000	1.556

A NOx cold start factor of 1.0 was assumed because California Energy Commission tests (see *Air Quality Implications of Backup Generators in California"* CEC-500-2005-049; July 2005); do not show short term NOx spikes during cold starts.

Due to the way black-puff cold-start factors were calculated, annual facility-wide PTE emissions for CO and VOC were slightly underestimated by approximately 0.006 tpy and 0.004 tpy respectively. Ecology determines these differences to be negligible. Because Microsoft will be using diesel particulate filters, the applicant believes that use of a black-puff cold-start factor for DEEP conservatively overestimates facility emissions, but they have included them anyway in order to provide a conservatively high estimate of particulate emissions.

Other "catalyst delay" cold-start related adjustments were also included in the application to account for the anticipated 10-15 minute heat-up times for catalysts in the selective catalyst reductions (SCR) and diesel particulate filter (DPF) as listed below:

Catalyst Delay Cold Start Adjustment		
Control Device	Applicability	Adjustment
SCR catalyst and DPF oxidation catalyst	• Cold start under idle load (less than or equal to 10%) for VOC, CO, and NOx	15 minutes at emission levels equivalent of generator equipped with Tier 2 level emission controls followed by final Tier 4 compliant emissions
	• Cold start under high load for VOC, CO, and NOx	10 minutes at emission levels equivalent of generator equipped with Tier 2 level emission controls followed by final Tier 4 compliant emissions

2.2 Source Testing

Source testing requirements outlined in Table 4 of the Approval Order, provide two testing approaches. A five-load approach for PM, NOx, CO, and VOC, where PM is considered to be DEEP at size PM2.5 or smaller, which tests only for the filterable particulate matter to be consistent with California Code of Regulations § 93115.14 *ATCM for Stationary CI Engines – Test Methods* (measuring front half particulate only). However, a single-load test at approximately 80 percent load (78%-82%) is also required for these pollutants (and ammonia), which takes into account both the filterable and condensable PM emissions. Engines are anticipated to be operating for more hours at 80 percent load than at other loads.

According to Approval Order 4.2, any emission testing performed to verify conditions of the permit or for submittal to Ecology in support of this facility's operations, requires that Microsoft comply with all requirements in 40 CFR 60.8 except subsection (g) which addresses audit samples. However, Approval Order 4.2 specifically states that "40 CFR 60.8(g) may be required by Ecology at their discretion." 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."*

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, Ecology believes that the two-test sampling approach required in Table 4 of the Order is a valid reason to waive audit sampling, because it provides two types of filterable particulate tests and also provides additional information (condensable particulate emissions) for one of the tests. However, Ecology may choose, at their discretion, to require audit sampling for stack tests conducted using any or all of the following particulate matter test methods: Methods 5, 201A, or 202.

3. APPLICABLE REQUIREMENTS

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

3.1 Chapter 70.94 Revised Code of Washington (RCW), Washington Clean Air Act,
3.2 Chapter 173-400 Washington Administrative Code (WAC), General Regulations for Air Pollution Sources,
3.3 Chapter 173-460 WAC, Controls for New Sources of Toxic Air Pollutants, and
3.4 40 CFR Part 60 Subpart IIII
~~3.4~~3.5 40 CFR Part 63 Subpart ZZZZ

Comment [jw4]: This insert clarifies that the Oxford Data Center engines are subject to NESHAP Subpart ZZZZ, and that the facility will comply.

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.

~~3.4.1~~3.5.1 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 Oxford are regulated under 40CFR60 subpart IIII (per 40CFR60.4200), they are not subject to 40CFR1039 requirements except as specifically required within 40CFR60.

According to 40CFR60 Subpart IIII, some emergency engines with lower power rating are required to meet 40CFR1039 Tier 4 emission levels, but not emergency engines with ratings that will be used at Oxford (0.750 MWe, 2.0 MWe, and 2.5 MWe). Instead, NSPS Subpart IIII requires the engines at Oxford ~~are required~~ to meet only the Tier 2 emission levels of 40CFR89.112 (even though the Oxford generators will be voluntarily equipped with DPF and SCR emission controls, and they will in reality be required to meet the more stringent voluntary limits listed in Table 4 of the permit with voluntary add-on controls). 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 Oxford:

Comment [jw5]: This insert clarifies why Microsoft will voluntarily comply with emission limits more stringent than required under Tier-2.

§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.*

(Note: Based on information provided by the applicant, Oxford will use the following engines specifications: August, 2013 Caterpillar Model C27ATAAC rated 0.75 MWe; February, 2013 Caterpillar Model 3516C-TA rated 2.0 MWe; November 2012, Caterpillar Model 3516C-HD-TA rated 2.5 MWe. Based on these specifications, the 0.750 MWe engine has 27.03 liters displacement over 12 cylinders, or 2.25 liters per cylinder; the 2.0 MWe engines have 69.00 liters displacement over 16 cylinders, or 4.31 liters per cylinder; and the 2.5 MWe engines have 78.08 liters displacement over 16 cylinders, or 4.88 liters per cylinder. Thus, because the specified engines at Oxford will all have a displacement of less than 30 liters per cylinder, and are for emergency purposes only, they are 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.***

(Note: Thus, as outlined in previous note, and based on the power ratings listed in *40 CFR 60.4202(a),* the 0.75 MWe and 2.0 MWe engines at Oxford are required to meet the applicable 40CFR89 Tier 2 emission standards.)

> *(b) Stationary CI internal combustion engine manufacturers must certify their 2007 model year and later emergency stationary CI ICE with a maximum engine power **greater than 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 (b)(1) through (2) of this section.*
>
> *(1) For 2007 through 2010 model years, the emission standards in table 1 to this subpart, for all pollutants, for the same maximum engine power.*
>
> ***(2) For 2011 model year and later, the certification emission standards for new nonroad CI engines for engines of the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants.***

(Note: Thus, as outlined previously, and based on the power ratings listed in *40 CFR 60.4202(b),* the 2.5 MWe engines at Oxford are required to meet the applicable 40CFR89 Tier 2 emission standards.)

3.4.2. Support for ~~excluding~~ 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.*"

4. BEST AVAILABLE CONTROL TECHNOLOGY

Comment [jw6]: The inserts in multiple sections of Section 4 are designed to clarify that Microsoft is voluntarily installing SCR and DPF, even though Ecology has determined that BACT requires Tier-2 emission controls.

Microsoft will voluntarily install emission control devices (including catalyzed diesel particulate filters [DPF] and selective catalytic reduction [SCR]) on every generator. This section evaluates and concludes that Microsoft's voluntary emission controls exceed the requirements for Best Available Control Technology (BACT). BACT is defined[1] as "*an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation under chapter 70.94 RCW emitted from or which results from any new or modified stationary source, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant. In no event shall application of the "best available control technology" result in emissions of any pollutants which will exceed the emissions allowed by any applicable standard under 40 CFR Part 60 and Part 61. 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.[2] The "top-down" approach shifts the burden of proof to the applicant to justify why the proposed source is unable to apply the best technology available. The BACT analysis must be conducted for each pollutant that is subject to new source review.

The proposed diesel engines 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.

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

4.1 BACT ANALYSIS FOR NOx FROM DIESEL ENGINE EXHAUST

Microsoft will voluntarily install selective catalytic reduction (SCR) on every generator, which will reduce NOx emissions. This section evaluates whether those SCR control devices will satisfy or surpass the requirements for BACT.

Microsoft 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

Microsoft's review of the RBLC found that urea -based selective catalytic reduction (SCR) was the most stringent add-on control option demonstrated on diesel engines. The application of the SCR technology for NOx control was therefore considered the top-case control technology and evaluated for technical feasibility and cost-effectiveness. 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 address them below.

4.1.1.1 ***Selective Catalytic Reduction.*** The SCR system, which is the control device that Microsoft will voluntarily install on every generator, 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. 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.

Microsoft has evaluated the cost effectiveness of installing and operating SCR systems on each of the proposed diesel engines. The analysis indicates that the use of SCR systems would cost approximately $18,700 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 $29,700 for NOx alone or $24,900 per ton of combined pollutants removed per year.

The annual estimated cost of $18,700 (for SCR use alone) provided by Microsoft is a conservative estimate that takes into account installation, tax, and shipping capital costs but assumes a lower bound estimate for operational, labor and maintenance costs of $0, whereas an upper bound CARB estimate could potentially amount to an additional $423,000 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 Oxford Data Center 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.

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, would 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**

Microsoft will voluntarily install SCR to reduce emissions of NOx, and Ecology determines that SCR surpasses the requirement for BACT. 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, 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. Microsoft 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

Microsoft 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

Microsoft will voluntarily install catalyzed diesel particulate filters (catalyzed DPFs) which will reduce emissions of particulate matter, CO, and VOC. This section evaluates whether those control devices will meet or surpass the requirements for BACT.

4.2.1.1 ***Diesel Particulate Filters (DPFs).*** These add-on devices, which will be voluntarily installed on each generator by Microsoft, include passive and active DPFs, depending on the method used to clean the filters (i.e., regeneration). Passive filters rely on a catalyst while active filters typically use continuous heating with a fuel burner to clean the filters.

The use of DPFs to control diesel engine exhaust particulate emissions has been demonstrated in multiple engine installations worldwide. Particulate matter reductions of up to 85% or more have been reported. Therefore, this technology was identified as the top case control option for diesel engine exhaust particulate emissions from the proposed engines.

Microsoft has evaluated the cost effectiveness of installing and operating DPFs on each of the proposed diesel engines. The analysis indicates that the use of DPFs would cost approximately $526,000 per ton of engine exhaust particulate removed from the exhaust stream at Oxford each year. DPFs also remove CO and VOCs at costs of approximately $74,000 and $382,000 per ton per year respectively. If the cost effectiveness of DPF use is evaluated using the total amount of PM, CO, and VOCs reduced, the cost estimate would be approximately $55,000 per ton of pollutants removed per year.

These annual estimated costs (for DPF use alone) provided by Microsoft are conservatively low estimates that take into account installation, tax, and shipping capital costs but assume a lower bound estimate for operational, labor and maintenance costs of $0, whereas an upper bound CARB estimate could potentially amount to an additional $282,000/year.

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

4.2.1.2. ***Diesel Oxidation Catalysts.*** This method utilizes metal catalysts to oxidize carbon monoxide, particulate matter, and hydrocarbons in the diesel exhaust. Diesel oxidation catalysts (DOCs) are commercially available and reliable for controlling particulate matter, carbon monoxide and hydrocarbon emissions from diesel engines. While the primary pollutant controlled by DOCs is carbon monoxide, DOCs have also been demonstrated to reduce diesel engine exhaust particulate emissions, and also hydrocarbon emissions.

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

- Microsoft obtained the following recent DOC equipment costs from a vendor on November 11, 2013: ($52,100 for a stand-alone catalyzed DOC per single 2.5MWe generator; add a scaled amount of $25,299 for a single 0.750 MWe generator, and conservatively exclude the cost of four 2.0 MWe generators). For thirty two (32) 2.5MWe generators and one (1) 0.750 MWe generators, this amounts to $1,692,500. According to the vendor, DOC control efficiencies for this unit are CO, HC, and PM are 90%, 80%, and 20% respectively.

- The subtotal becomes $1,934,315 after accounting for shipping ($84,625), WA sales tax ($110,012), and direct on-site installation ($47,178).
- After adding indirect installation costs, the total capital investment amounts to: $2,289,003. 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 $238,079.
- At the control efficiencies provided from the vendor, the annual tons per year of emissions for CO (8.81 tpy), HC (1.92 tpy), and PM (1.24 tpy) become 7.93 tpy, 1.54 tpy, and 0.25 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 ($238,079 divided by 7.93 tpy for CO, etc..).

The corresponding annual DOC cost effectiveness value for carbon monoxide destruction alone is approximately $30,019 per ton. If particulate matter and hydrocarbons are individually considered, the cost effectiveness values become $959,386 and $154,771 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 $24,500 per ton of pollutants removed per year.

These annual estimated costs (for DOC use alone) provided by Microsoft are conservatively low estimates that take into account installation, tax, shipping, and other capital costs as mentioned above, but assume a lower bound estimate for operational, labor and maintenance costs of $0, whereas an upper bound CARB estimate could potentially amount to an additional $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.

4.2.3 BACT Determination for PM, CO, and VOC

Microsoft will voluntarily install catalyzed DPFs, and Ecology determines those emission controls surpass the BACT requirements. 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. Microsoft 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

Microsoft did not find any add-on control options commercially available and feasible for controlling sulfur dioxide emissions from diesel engines. Microsoft's proposed BACT for sulfur dioxide is the use of ultra-low sulfur diesel fuel (15 ppm by weight of sulfur).

4.3.2. **BACT Determination for Sulfur Dioxide**

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

4.4 BACT ANALYSIS FOR PM FROM COOLING TOWERS

The direct contact between the cooling water and air results in entrainment of some of the liquid water into the air. The resulting drift droplets contain total dissolved solids (TDS) in the cooling tower water, which can evaporate into air as particulate matter. For the Oxford facility, the recirculation water in the cooling towers will be pre-softened using the proprietary Water Conservation Technology International (WCTI) "pre-treatment system" to replace scale-forming mineral compounds (e.g., calcium and magnesium) with other non-toxic, non-scaling mineral compounds (e.g., sodium), which will allow the cooling towers to be operated with very high "cycles of concentration." Microsoft analyzed the industrial wastewater used in the cooling towers, which includes trace metals and chlorine disinfection byproducts, and estimates that cooling tower TAP emissions from all cooling towers combined (after implementing their proposed BACT in section 4.4.1.1) will not exceed the respective small quantity emission rates (SQERs) for any TAP.

4.4.1. BACT Options for PM from Cooling Towers

Microsoft reviewed the available published literature and the RBLC and identified drift eliminators as demonstrated technologies for the control of particulate matter (PM), from the proposed cooling towers. Drift eliminators can reduce the amount of drift, and therefore the amount of particulate matter released into the air.

4.4.1.1. ***Cooling Towers with 0.0005 Percent Drift Efficiency***

Microsoft proposes to use high-efficiency drift eliminators that will achieve a liquid droplet drift rate of no more than 0.0005 percent of the recirculation flow rate within each cooling tower. Microsoft estimates that by using a 0.0005 percent drift rate and a total dissolved solids (TDS) concentration of 69,000 mg/L, only 13 percent of the solid evaporated drift particles will be smaller than 2.5 microns in diameter (PM2.5), and 56 percent will be smaller than PM10 (based on sizing approach presenting in: *"Calculating Realistic PM10 Emissions from Cooling Towers", Reisman and Frisbie, Environmental Progress, July 2002).* Microsoft's original application dated January 17, 2014 stated that a cooling tower with 0.0005 percent drift efficiency is the most efficient drift eliminator that is commercially available.

4.4.1.2. ***Cooling Towers with 0.0003 Percent Drift Efficiency***

In Ecology's 2/26/2014 incompleteness letter, Ecology noted that a cooling tower with 0.0003 percent drift rate was in use at the Harquahala power plant in Arizona, which is regulated by the Maricopa County Air Pollution Control District (APCD). Because of this, Ecology asked Microsoft to defend or revise the claim in the original application stating that a cooling tower with 0.0005 percent drift efficiency is the most efficient drift eliminator that is commercially available. Upon review, Microsoft's consultant (Landau Associates) learned that the 0.0003 percent drift cooling tower at Harquahala is custom built for that large utility electric power plant. It has a water recirculation rate of 15,000 gpm, and is not comparable to what is needed at Oxford, which has a water recirculation rate of only 950 gpm. When Microsoft requested price quotes for cooling towers with 0.0003 percent drift efficiency for the cooling towers to be used at the Oxford Data Center, venders responded that a cooling tower with 0.0003 percent drift efficiency is not a commercially available product because it is below field measurement capabilities, and could not be proven. According to EPA's BACT/LAER Clearinghouse database, Microsoft found BACT levels for cooling towers from 0.005 percent and 0.0005 percent. Of 30 cooling towers identified between 2003-2013, twenty-four had BACT determinations of 0.0005%, and six had BACT determinations from between 0.005 percent to 0.0005 percent.

Thus, Ecology considers this information to be a reasonable justification to accept high efficiency drift eliminators rated at 0.0005 percent drift to be the most efficient drift eliminators that are commercially available for the induced-draft mechanical cooling towers to be used at Oxford. Therefore, no other control options are considered.

4.4.2. BACT Determination for PM from Cooling Towers

Ecology accepts as BACT for particulate matter, cooling tower drift eliminators that can achieve a 0.0005 percent rate. These are the most efficient drift eliminators that are commercially available for the induced-draft mechanical cooling towers to be used at Oxford. As noted in this Technical Support Document (section 4), federal regulations require that BACT decisions are made on a *case-by-case* basis. This specific BACT decision is based on the information provided in section (4.4), including consideration of the high TDS content resulting from the anti-scaling WCTI approach used by Oxford.

4.5 BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS

Microsoft is voluntarily installing SCR and catalyzed DPF control devices on every generator, and these devices will reduce the emission rates for many toxic air pollutants. Ecology evaluated whether Microsoft's emission controls will satisfy or surpass the requirements for Best Available Control Technology for Toxics (tBACT). TBACT means BACT, as applied to toxic air pollutants.[3] The procedure for determining tBACT follows the same procedure used above for determining BACT. Of the technologies Microsoft considered for BACT, the minimum estimated costs as applied to tBACT for the pollutants that exceed small quantity emission rates (SQERs) are as follows:

- The minimum estimated costs to control diesel engine exhaust particulate is estimated to be $557,000 per ton removed.
- The minimum estimated costs to control NO2 is estimated to be $187,000 per ton removed.
- The minimum estimated costs to control CO is estimated to be $30,000 per ton removed.

[3] WAC 173-460-020

- The minimum estimated costs to control acrolein, which could be treated with the VOC treatment listed under BACT, is estimated to be greater than $1 billion per ton.

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 4.5 below represents tBACT for the proposed project.

Table 4.5. 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
Ammonia	Ammonia emissions shall not exceed 15 per million volume-dry (ppmvd) at 15% Oxygen (O2) per engine.
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
Fluoride	Compliance with PM Cooling Tower BACT requirement
Manganese	Compliance with PM Cooling Tower BACT requirement
Copper	Compliance with PM Cooling Tower BACT requirement
Chloroform	Compliance with PM Cooling Tower BACT requirement
Bromodichloromethane	Compliance with PM Cooling Tower BACT requirement
Bromoform	Compliance with PM 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. Microsoft has demonstrated compliance with the national ambient air quality standards (NAAQS) and acceptable source impact levels (ASILs) other than DEEP. As described in Section 6, the applicant completed a Second Tier review for DEEP.

The AERMOD model used the following data and assumptions:

5.1 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.

5.2 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.

5.3 Each generator was modeled with a stack height of 46- feet above local ground.

5.4 The data center buildings, in addition to the individual generator enclosures were included to account for building downwash.

5.5 The receptor grid for the AERMOD modeling was established using a 10-meter grid spacing along the facility boundary extending to a distance of 350 meters from each facility boundary. A grid spacing of 25 meters was used for distances of 350 meters to 800 meters from the boundary. A grid spacing of 50 meters was used for distances from 500 meters to 2000 meters from the boundary. A grid spacing of 100 meters was used for distances beyond 2000 meters from the boundary.

5.6 1-hour NO_2 concentrations at and beyond the facility boundary were modeled using the Plume Volume Molar Ratio Method (PVMRM) module, with default concentrations of 49 parts per billion (ppb) of background ozone, and an equilibrium NO_2 to NOx ambient ratio of 90%.

5.7 Dispersion modeling is sensitive to the assumed stack parameters (i.e., flowrate and exhaust temperature). The stack temperature and stack exhaust velocity at each generator stack were set to values corresponding to the engine loads for each type of testing and power outage.

5.8 AERMOD Meteorological Pre-processor (AERMET) was used to estimate boundary layer parameters for use in AERMOD.

5.9 AERSURFACE was used to determine the percentage of land use type around the facility based on albedo, Bowen ratio, and surface roughness parameters.

5.10 Because regional background data is not available for all pollutants, annual average regional background concentrations for total PM and PM10 listed in the table below are based on available PM2.5 annual average regional background data from the source noted in footnote (a) of the table. Similarly, the 1st highest 24-hour average regional background concentrations for total PM is based on available PM10 24-hour average regional background data from the same source of footnote (a). Similarly, the applicant considered "local background" caused by localized emissions from nearby industrial sources including Con Agra Foods, Columbia Data Center, and Dell Data Center.

Comment [jw7]: This insert clarifies that Microsoft also considered "local background" in addition to "regional background".

Except for diesel engine exhaust particulate which is predicted to exceed its ASIL, AERMOD model results show that no NAAQS or ASIL will be exceeded at or beyond the property boundary. The modeling results as listed in the application are provided below:

Criteria Pollutant	Standards in µg/m³ – National Standards – Primary	Standards in µg/m³ – National Standards – Secondary	Standards in µg/m³ – Washington State Standards	Maximum Ambient Impact Concentration (µg/m³)	AERMOD Filename	Background Concentrations (µg/m³) (a)	Maximum Ambient Impact Concentration Added to Background (µg/m³) (If Available)
Total Suspended Particulates							
Annual average	--	--	60	1.16	PM10-121313a	6.5 (Regional)	7.65
1st-Highest 24-hour average during power outage with cooling towers	--	--	150	27.0	PM10-121313b	81 (Regional)	108
Particulate Matter (PM_{10})							
Annual average	--	--	50	1.16	PM10-121313a	6.5 (Regional)	7.7
1st-Highest 24-hour average during power outage with cooling towers	150	150	150	20	PM10-121313b	81(Regional)	101
Particulate Matter ($PM_{2.5}$)							
Annual average	12	15	--	0.33	PM10-121313a	6.5 (Regional)	6.8
4th-highest 24-hour average for cooling towers and electrical bypass	35	35	--	3.1	PM25-120613a-e, f	21 (Regional) + 0.021 (Local)	24.4
Carbon Monoxide (CO)							
8-hour average	10,000	--	10,000	873	CO-112713a	482	1,355
1-hour average	40,000	--	40,000	1507	CO-112713a	842	2,349
Nitrogen Oxides (NO_2)							
Annual average (b)	100	100	100	1.1	NOx-120413a	2.8	3.9
1-hour average	188	--	--	160	NOx-112413b thru f	15.6 (Regional), 0.28 (local)	176
Sulfur Dioxide (SO_2)							
Annual arithmetic mean	--	--	80	0.0066	(c)	0.26	0.27
24-hour average	--	--	365	1.2	SO2-120413a	1.0	2.2
3-hour average	--	1,300	--	2.3	SO2-120413a	2.1	4.4
1-hour average	60	--	319	3.1	SO2-120413a	2.6	5.7

Toxic Air Pollutant	ASIL (µg/m³)	Averaging Period	1st-Highest Ambient Concentration (µg/m³)	AERMOD Filename
DEEP	0.00333	Annual average	0.80	DEEP-121613a
NO_2	470	1-hour average	388	NOx-112413a
CO	23,000	1-hour average	1599	CO-112713a
Ammonia	70.8	24-hour average	21.8	(d)
Acrolein	0.06	24-hour average	0.0006	(d)

Notes:

µg/m³ = Micrograms per cubic meter.

ppm = Parts per million.

ASIL = Acceptable source impact level.

DEEP = Diesel engine exhaust particulate matter

(a) Sum of "regional background" plus "local background" values. Regional background concentrations obtained from WSU NW Airquest website. Local background concentrations derived from AERMOD modeling.

(b) For the purpose of determining the 3-year average, five separate models were run (one for each year of meteorological data) to determine the 98th percentile concentration for each year based on the NAAQS.

(c) A dispersion factor was used to calculate the annual average concentration of SO_2 in ambient air based on the annual average DEEP model.

(d) A dispersion factor was used to calculate the 24-hour average concentration of ammonia and acrolein in ambient air based on the 1st highest PM 24-hour average model.

As required by WAC 173-460-090, emissions of diesel engine exhaust particulate are further evaluated in the following section of this document.

6. SECOND TIER REVIEW FOR DIESEL ENGINE EXHAUST PARTICULATE

Proposed emissions of diesel engine exhaust particulate (DEEP) from the thirty seven (37) Oxford engines exceed the regulatory trigger level for toxic air pollutants (also called an Acceptable Source Impact Level, (ASIL)). A second tier review was required for DEEP in accordance with WAC 173-460-090, and Oxford 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 Oxford's ~~increased~~ emissions of all identified carcinogenic compounds (including DEEP and numerous other constituents), nitrogen dioxide, ammonia, carbon monoxide, and acrolein. Oxford also reported the cumulative risks associated with Oxford and prevailing sources in their HIA document based on a cumulative modeling approach. The Oxford cumulative risk study is based on proposed generators, nearby existing permitted data center sources, and other background sources including highways and railroads.

Large diesel-powered backup engines emit DEEP, which is a high priority toxic air pollutant in the state of Washington. In light of the rapid development of other data centers in the Quincy area, and recognizing the potency of DEEP emissions, Ecology decided to evaluate Oxford's proposal in a separate community-wide basis modeling effort, even though it is not required to do so by state law. The Ecology community-wide evaluation approach considers the cumulative impacts of DEEP emissions resulting from Oxford's project, prevailing background emissions from existing permitted data centers, and other DEEP sources in Quincy, beyond what was considered in the Oxford cumulative modeling effort.

The Oxford 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 37 generators and 32 cooling towers will not have an adverse impact on air quality. Ecology finds that Microsoft's Oxford Data Center has satisfied all requirements for NOC approval.

******END OF MICROSOFT OXFORD TSD ******

Mort, Beth (ECY)

From:	Patty Martin [martin@nwi.net]
Sent:	Tuesday, July 29, 2014 4:11 PM
To:	Mort, Beth (ECY)
Subject:	Comments
Attachments:	Oxford comments.pdf; Columbia comments.pdf
Categories:	Quincy

Beth,

Please accept my comments for consideration of the Oxford and Columbia air quality permits.

Thank you.

Patty

Patricia Martin
Microsoft-Yes; Toxic Air Pollution-No

July 29, 2014

Beth Mort
Department of Ecology
4601 North Monroe Street
Spokane, WA 99205

RE: Microsoft Oxford Permit

Dear Ms. Mort,

Please accept my comments regarding the Oxford data center air quality permit. As mentioned during the public hearing I believe that the Oxford and Columbia data centers are under common control of Microsoft and that the Oxford facility represents an increase in emissions subjecting both facilities – and all its sources of pollutants -- to New Source Review (NSR). This will in effect open both permits to appeal.

Additionally, the combined emissions from both facilities exceeds 100 ton per year of NSR pollutants as defined under 40 CFR 51.165 making them/it a major source[1] of pollution under the FCAA, and subject to the Prevention of Significant Deterioration (PSD) permitting and Title V requirements.

As a facility subject to PSD, the combined emissions from Oxford and Columbia must be reviewed for compliance with the increments established under the FCAA and those adopted into Washington State's Implementation Plan (SIP). Washington's increment levels are more stringent than the federal levels, i.e., 5.0 ug/m3 24-hr average for PM10 vs. 10 ug/m3. Microsoft's Columbia data center exceeds this standard in Table 5 of *Notice of Construction Columbia Data Center Cooling Tower Feed Water Modification*. Modeling of Oxford's cooling towers combined with a 24 hours outage also exceeds this standard.

There has been no mention of PSD or Title V permitting during the Public Comment period or at the Public Hearing. The public has been denied an opportunity to question and/or comment on

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[1] *Major stationary source* means: (*1*) Any stationary source of air pollutants that emits, or has the potential to emit, 100 tons per year or more of any regulated NSR pollutant. (*Regulated NSR pollutant*, for purposes of this section, means the following:(A) Nitrogen oxides or any volatile organic compounds; (B) Any pollutant for which a national ambient air quality standard has been promulgated;)

these facilities regulated as PSD and Title V. Both permits should be consolidated into one and a the public provided an opportunity to comment on the combined permit.

In situations like this, a citizen must ask whose interest Ecology represents. Citizens should not need to be experts in air quality law, and should be able to trust -- and expect -- that those charged with protecting their health and the environment will do their job. Those who intentionally misrepresent information should be investigated for moral turpitude.

There have been other misrepresentations in the Oxford permitting process, including, but not limited to the following:

1. That the Oxford facility is using the same controls as Vantage, or that Tier 4 emissions are satisfied by the use of SCRs and DPFs alone. See email from Greg Flibbert submitted at the Public Hearing stating that (Vantage's) Tier 4 engines use DOCs, DPFs and SCRs.
2. That Columbia and Oxford are not subject to common control as stated by Greg Flibbert at the Public Hearing.
3. Reviewing NAAQS and TAPs/HAPs at the fence line. Ambient air is defined as the surrounding outside air, which means that compliance should also be measured inside the fence line. Microsoft should not be able to buy a large parcel of land as a means of satisfying NAAQS.
4. That the GACT requirement under 40 CFR 63 ZZZZ satisfies the statutory requirement that BACT be applied to all pollutants. RCW 70.94.152(10) GACT is not as stringent as BACT.
5. That there is a CEMS on the engines or retrofits, as stated by Jim Wilder. There is no mention of CEMS in Oxford's permit.

I did not see any information on ground level ozone or modeling for it in either of the NOCs, nor did I see any information on other sources of PM10, PM2.5, NOx, CO, O3 or other air contaminants in the modeling data. Ecology has impermissibly limited its review, when the agency is aware of a variety of sources that contribute to ambient air quality:

Washington State Base Year 2005 County Inventories (June 8, 2007)
Washington State Base Year 2011 County Inventories

How many of the sources listed in the County Inventory did Microsoft include in NAAQS compliance modeling? Under what authority did Ecology limit its review of PM2.5 to diesel particulate matter only, when there are other sources of PM2.5 in the area?

Ecology is required to send a copy of the public notice for both of these permits to the EPA Regional Administrator. I am requesting evidence that the regional office sent a copy of the public notice regarding Columbia's and Oxford's permit to the Regional EPA Administrator as required under 40 CFR 51.161(d).

The community is being led to believe that achieving the NAAQS is protective of human health. Please explain the level of protectiveness provided by the various NAAQS. Are the standards protective of all people, including sensitive individuals, elderly and people with heart, respiratory disease or diabetes?

Microsoft's Oxford data center is already under construction. Is starting construction in advance of an air quality permit allowed under the FCAA and State CAA?

Microsoft modeled the manganese emissions from the cooling towers at Columbia, but not at Oxford. These emissions must be combined and the total manganese emitted modeled for compliance with the ASIL under WAC 173-460-150.

The city's water supply contains nitrates, but Microsoft provides no PTE for nitrates from the cooling towers in either permit, nor considers its presence when modeling compliance for NOx. Please correct this omission and provide the updated PTE.

As citizens of Washington State participating in a public process that is intended to give us a voice in the air permitting process, I was appalled at the Public Hearing when Deborah Koehnen and her two daughters were rudely directed to sit down at the start of Deborah's testimony. When public servants become the master, and rules take precedent over respect, then it is time for a lesson in Civics. The power emanates from the people, and "The people of this state do not yield their sovereignty to the agencies that serve them." RCW 42.56.030 I am again asking for a written apology from the Public Hearings officer – Karin Baldwin – to Deborah Koehnen and her daughters Ellie and Fiona.

The citizens of Quincy need access to the operational logs of both the Oxford and Columbia data centers to assure compliance with the terms of the permit. The requirement that this information be available upon request must be a specific term of the permit. Additionally, because of the lack of transparency and the excessive use of the generators at Columbia in 2010 (154 hrs each), we request that Tier 4 engines – not retrofits – be installed at Oxford. This ensures that a CEMS is an integral part of the engine, not an add-on.

Please combine my comments from the Public Hearing, Oxford permit and Columbia permit. Because these facilities are under common control, subject to PSD and Title V, the permits should be combined and the public process begun anew.

Thank you for considering my comments.

Respectfully submitted,

Patricia Anne Martin
Microsoft-Yes; Toxic Air Pollution-No
617 H St. SW
Quincy, WA 98848

Table 1.4. Cooling Towers for Phases 1 & 2			
Phase/Building	# Cooling Towers	# Cells per Tower	Total # Cooling Tower Cells
Ph 1/AZ-4D	4	4	16
Ph 2/AZ-3A	4	4	16
Ph 2/AZ-3B	4	4	16
Ph 2/AZ-3C	4	4	16
Ph 2/AZ-3D	4	4	16
Total	32	4	128

PROJECT SUMMARY

1. The Oxford Data Center will contain four Phase 1 activity zone (AZ) buildings designated AZ-4A, AZ-4B, AZ-4C, AZ-4D; four core network room (CNR) buildings; an administrative building; and four phase 2 AZ buildings designated AZ-3A, AZ-3B, AZ-3C, AZ-3D. Building construction for the Phase 1 generators and cooling towers is expected to begin before the end of October 2014 with commissioning of generators spread over an approximately 9-month period. Construction of Phase 2 is expected to begin within 18 months after the start of generator commissioning for Phase 1. Project Oxford Phases 1 and 2 will have thirty-two (32) Caterpillar Model 3516C-HD-TA diesel powered electric emergency generators in the activity zone buildings with a power rating of 2.5 MWe per generator, four (4) Caterpillar Model 3516C-TA diesel powered electric emergency generators in the CNR buildings with a power rating of 2.0 MWe per generator, and one (1) Caterpillar Model C27ATAAC diesel powered electric emergency generator in the administrative building with a power rating of 0.75 MWe.

2. Project Oxford will use SPX-Marley Model MD5008PAF2 cooling towers to dissipate heat from the AZ buildings. Each cooling tower has four cells and four fans. Each of the eight AZ buildings will have four cooling towers for a total of thirty-two (32) cooling towers. Each of the thirty-two individual cooling towers has a design recirculation rate of 950 gallons per minute (gpm) and 143,600 cubic feet per minute (cfm).

   Combined Phase 1 and 2 emissions for Project Oxford are contained in Tables 2.1 and 2.2.

Table 2.1. Criteria Pollutants Potential to Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
Total particulate matter (PM)	All $PM_{2.5}$	23	23.5
PM smaller than 10 microns in diameter (PM_{10})	All $PM_{2.5}$	12.8	13.3
PM smaller than 2.5 microns in diameter ($PM_{2.5}$)[(a)]	0.536	2.99	3.53

cropland; 3) late autumn after frost and harvest, or winter with no continuous snow; and 4) transitional spring with partial green coverage or short annuals.

5.1.4 AERMOD AIR DISPERSION MODELING

The AERMOD interface provided by Lakes Environmental was used for all Columbia Data Center facility air dispersion modeling. This version of the Lakes Environmental software incorporates the most recent version of AERMOD (version 13350). AERMOD incorporates the data from the pre-processors described above with emission estimates and physical emission point characteristics to model ambient impacts at and beyond the property boundary.

The AERMOD model was used to estimate the short-term ambient impacts (i.e., 24-hour average or less) of PM_{10}, $PM_{2.5}$, and manganese emissions, and long-term impacts (i.e., annual average) of PM_{10} and $PM_{2.5}$ emissions.

The previous Notice of Construction Supporting Information Report dated April 18, 2014 included the AERMOD model runs listed in Table 5, which modeled higher cooling tower emission rates. For this revised analysis using lower emission rates, the AERMOD results from the earlier analysis were scaled downward linearly according to the ratio of the emission rates. For example, the previously modeled $PM_{2.5}$ emission rate was 40 lbs/day and the modeled AERMOD ambient impact was 4.4 micrograms per cubic meter ($\mu g/m^3$), but for this analysis the $PM_{2.5}$ emission rate was revised downward to 25.4 lbs/day. Therefore, the ambient $PM_{2.5}$ impact caused solely by Microsoft's cooling towers was scaled downward to 2.8 $\mu g/m^3$ ($4.4 \times (25.4/40) = 2.8$).

5.2 ASSUMED BACKGROUND CONCENTRATIONS

This evaluation included "regional background" values contributed by existing regional emission sources in the project vicinity (e.g., permitted sources, highway vehicles, area sources) and "local background" values contributed by the other data centers in the vicinity. Project coordinate-specific regional background values were obtained from the Washington State University NW Airquest website (WSU website 2013). The reported regional background values were:

- PM_{10} (24-hour average) 81 $\mu g/m^3$
- $PM_{2.5}$ (annual average) 6.5 $\mu g/m^3$
- $PM_{2.5}$ (24-hour average) 21 $\mu g/m^3$.

"Local background" values for PM_{10} and $PM_{2.5}$ consist of the ambient impacts, at any point along the Columbia Data Center boundary, caused by emissions from the nearby emergency generators, cooling towers, and industrial emission sources at the Dell Data Center, Project Oxford Data Center, and ConAgra Foods facility. Emissions from each of those facilities were assumed to be equal to their respective

Sent: Thursday, January 03, 2013 3:54 PM
Subject: RE: Vantage

Hello Patty,

Greg forwarded me your email and asked that I send his response as well as let you know that your question and this response will be included in the Vantage Response to Comments document. Below is Greg's answer to your questions.

Patty:

There are two separate questions. BACT has been determined to be Tier 2 engines, AND Vantage will be installing Diesel Particulate Filter (DPF), Diesel Oxidation Catalyst (DOC), and Selective Catalytic Reduction (SCR) on the their engines.

Vantage decided to install Tier 4 engines, which are equipped with DPF, DOC, and SCR to reduce emissions beyond BACT. In the Preliminary Determination Section 5, Vantage is required to limit air contaminant emissions to the Tier 4 engine manufacturer's specified not-to-exceed emissions rates. The final approval order will contain the same requirement. Vantage can only achieve the required emission rates if the engines are equipped with DPF, DOC, and SCR. The BACT determination is contained in the revised TSD Sections 5.1.6 and 5.2.4. The revised NOC application dated 11/28/12, that becomes a condition of the NOC Approval Order, states that DPF, DOC, and SCR will be installed on all engines. In the Preliminary Determination Section 4, Vantage is required to conduct testing to verify the emission limits contained in Section 5

Greg

Thank you,

Beth Mort | Community Outreach & Environmental Education

Air Quality Program | Dept of Ecology Eastern Office

beth.mort@ecy.wa.gov | 509.329.3502

Office Hours: M-Th 7am-4pm

Patty,

I'm not knowledgeable enough to comment on the cooling tower mist PM issue - Sorry.

I don't recall writing 'WA's PM2.5 standard is 20 ug/m3'. It's important to know the Federal limit (a legal standard set in 2006) is 35 ug/m3 for the 3-year average of the 98th percentile of 24-hour time-weighted average concentrations. This federal standard has been adopted as the legal standard for PM2.5 in Washington. The 20 ug/m3 (24-hr TWA) concentration you refer to isn't a legal standard, it's a "goal" AQP created a few years ago. We were trying to cope with the Federal standard, which is at the highest end of the EPA CASAC's recommended range. We wanted to provide more protective information to the public than EPA's AQI provides (AQI is partly based on the Federal standard). The then available epidemiological research showed that PM2.5 concentrations higher than 20-ug/m3 (24-hr TWA) were unhealthy for sensitive groups. In order to not downplay health risks, AQP started communicating PM2.5 risk using the WAQA index, which we based in part on the 20 ug/m3 goal. Compared to the AQI, WAQA provides more protective, near real-time, information on health precautions for the public.

Well before PM2.5 concentrations are likely to rise to 35 ug/m3, AQP makes careful effort to make (or recommend) wood smoke curtailment calls, given the authority of RCW 70.94.473. We don't have authority to apply our 20 ug/m3 goal in administering RCW 70.94.473, though.

Hope this helps,

Matt

Mort, Beth (ECY)

From: Mark Koehnen [mdfek87@yahoo.com]
Sent: Tuesday, July 29, 2014 9:11 PM
To: Mort, Beth (ECY)
Subject: Oxford & Columbia Comments

Categories: Quincy

I am concerned about the Microsoft permits. I understood that we had a community approach with a maximum pollution number, as well as a maximum level for each company. I do not understand why Microsoft is being allowed to add Oxford to their expansion without having it included in their previous numbers. It seems like a loophole is being provided for Microsoft to keep the particulate numbers lower than they actually are. Microsoft is the parent company. They should retrofit the older Tier 2 generators to reduce emissions if their entire number is too high. This fact wasn't apparent until the end of the question period, so we weren't able to question this point further.

The change to the cooling tower emissions was never discussed. Why are we having to go backwards with emissions? Water in a desert is always a problem. Microsoft should have known that when they chose to build here. Poor planning on their part shouldn't mean we should have to accept worse air quality. I commend them for trying to find water solutions but please don't accept less for air solutions. Again, how about adding filters?

We don't deserve to have our air quality compromised even more than it already is. We are still suffering from smoke in the valley due to the fires. Was this considered in the community air quality reports?

I did ask about our community data numbers & do not feel I was given an answer to my question. I double checked with other people who were at the meeting and the 'community' number of 0.15 for particulates was given as 'the area around the Oxford center with the highway numbers added in'. When I questioned this, I was told it was for the entire community. It can't be both. Which is it? I was surprised when much of the meeting discussed East & West data instead of the whole community approach. It makes me suspicious that our community numbers are getting too high to present them possibly?

I thank Microsoft for using Tier 4 generators. Again, I wish they would retrofit the others to reduce emissions. The people in Quincy are worth the

expense, especially our children and our farm workers, who are outside most of the day, who aren't represented at the community meetings, and who help feed our nation & our world through their hard work.
Sincerely,
Debbie, Mark, Fiona & Ellie Koehnen
Sisters & land owners: Beth Miracle & Brooke Thomsen Halvorsen

Appendix C:
Transcripts from July 24, 2014 Public Hearing

- Transcript of the public hearing
- English and Spanish versions of the public hearing agenda

Quincy, WA – July 24, 2014
Ecology held a public hearing at the Quincy Community Center on July 24, 2014. Thirty-three members of the public attended the hearing. Four attendees testified.

July 24, 2014 Oxford Data Center Draft Air Quality Permit Hearing in Quincy, Washington
Department of Ecology
4601 N Monroe Street
Spokane, WA 99205-1295
Karin Baldwin, Ecology Hearings Officer
Transcription provided by CTS Language Link | 911 Main Street, Suite 302 | Vancouver, WA 98660

Washington Department of Ecology – Public Hearing transcription for Oxford Data Center Draft Air Permit
July 24, 2014

Karen Baldwin: Now, I might have to flip over the tape, so if I stop you, please don't be angry. I'm Karen Baldwin, and I'm the hearings officer for tonight's hearing on Microsoft's Oxford Data Center. Let the record show it is 6:34 p.m. on July 29th, 2014. And this hearing is being held at the Quincy Community Center located at 115 F Street SW in Quincy, Washington.

Ecology issued a news release on June 13th, 2014, and updated it on June 16th. Notice of this hearing was published on June 19th and July 17th in the Quincy Valley Post-Register in English and in Spanish, June 19th in El Mundo, a Spanish paper, June 19th and July 21st in English in the Columbia Basin Herald, and June 19th and July 22nd in The Wenatchee World in English. Legal notice of the hearing was published in the Quincy Valley Post-Register in English and Spanish on June 19th, 2014. The hearing was also advertised on the community center reader board in English and Spanish from July 18 through the 24th. In addition, information about the hearing was placed on the current Ecology's online public calendar and distributed at several locations in Quincy, including the library, city hall, Akins market, Tacos Jalisco, and the Quincy Community Health Center. Ecology sent updates and reminders via email to the Quincy Data Center listserv made up of 111 people as well as Twitter and text alerts.

It is now the formal comment period for anyone who would like to comment. I'll be calling you up to testify in the order in which you signed in. When I call your name, please come up to the microphone, state your name, the company or organization you represent, if any, your address. And I apologize in advance if I mispronounce your name, but feel free to correct me. Remember, limit comments to 10 minutes. And, audience, no extra noise. When you have 30 seconds left to complete your testimony, I will hold up a card. When your time is up, I will call the next person up to testify. We will begin with John Radick, followed by Danna Dal Porto.

JOHN RADICK: I won't be testifying.

Karen Baldwin: Oh, you're not going to testify? Okay. [Indistinct] sign-up sheet? Did I say July 14th? Oh, that was the… oh, sorry.

WOMAN: That's okay.

Karen Baldwin: Let the record show it is 6:37 p.m. on July 24th. I had the wrong date on my script. 2014. Okay. So, Danna Dal Porto followed by Debbie Koehnen.

Danna Dal Porto: My name is Danna Dal Porto. I live at 16651 Road 3 NW, Quincy, Washington, and I represent myself as well as the group MYTAPN, which has been involved in the data center construction here since, I believe, 2009. The focus of my concern is the lack of clarity in the permitting documents regarding the construction of the diesel engines with emission controls. I had to make numerous phone calls and send several emails to clarify the actual facts regarding the use of emission controls on the engines. I will not be satisfied with the permitting of this project without clarity as to the restrictions in the permit that require Microsoft to protect the health of my community.

I was very pleased to read the Determination of Nonsignificance in December of this past year that all 69 emergency diesel engines, phases 1-4, would have emission controls. And I would say that that 69 number is in the DNS, the SEPA document, which might be the focus of some of the confusion. Air quality in Quincy has concerned me for several years, and having emission controls on these huge diesel engines was welcome news. I saw the news releases, and it says right on there, "installing advanced equipment to reduce air pollutants." I was really, really happy. So when I got the approval order on June 16th, I looked at the table for BACT, which is the best available control technology, and guess what? There wasn't anything there. To say I felt sandbagged is kind of an understatement. And so I went through there and I looked at the technical support document, and I saw language I had seen before, such as Ecology concludes that the use of DOCs is not economically feasible for this project. Other phrases like "Ecology agrees with the applicant that this NOX control option can be excluded" is backed. And every time I saw that in other documents, that meant there was no control. So on July 16th, I emailed Greg Fulbert, and I said, "What's going on?" And she told me to go look at the document on a specific page, which I did. And I looked on the TSD section 3.4.1 page 7, and I couldn't understand it.

So here's my point. Without the actual listing of these controls on the permit itself, not in the technical support document or not in language that I cannot understand, I don't know what they're doing. Now, when I go to the Washington State Driver's License Bureau for an operational license to drive my car, that bureau issues me a license with specific limits. I can drive my car, but I must use my glasses. That's an important but necessary limit placed on my legal operation of my car. The Ecology air permit is issued to Oxford to operate their facility, but to run it legally, Oxford must have written stipulations to install specific emission controls. So then I was frustrated, and I'd had a meeting with John Radick from Microsoft, and Mr. Radick answered my email and said, "Look at Table 4." So I did. I looked at Table 4. And despite that time that I have spent reading these documents, I didn't understand Table 4 either. So, I want the Ecology approval order, the permit, to say clearly that Oxford is required to use specific emission controls on their diesel engines to comply with a legal operation of their data center. I want these emission controls to be listed, clearly named and identified. Anybody who looks at the permit should see the restrictions placed on the operation of that facility.

My written comments that I will turn in also include some grumbling about the community-wide evaluation of emissions. I think this has been an arbitrary number that was developed by the toxicologist Gary Palcisco and refuses to really -- it hasn't been adopted by Ecology, it's not gone through peer review. And so when they talk about community-wide, I have an issue with it. I'm also kind of confused about why this was a second tier review and not a third tier review. I also have some other questions about -- I would like to have a better map that shows the whole valley and where the extension of these emission plumes go, and how much of our community is covered by emissions from the different diesel generators. We're actually adding a lot of stuff here. And we're adding trains through the intermodal, we're having more traffic, we're adding more industrial development. And I really think we need to be very, very, very careful about where we place these facilities and how we monitor them, because these data centers are going to be here for a really long time, and I want them to be as safe as possible. Thank you for considering my comments.

Karen Baldwin: Debbie Koehnen, followed by Patricia Martin.

Debbie Koehnen: I'm Debbie Koehnen, and I --

Karen Baldwin: Excuse me. You have to place your hands against the microphone, and your children need to sit down.

Debbie Koehnen: They're here for an important reason, and thank you.

Karen Baldwin: I understand, but you're testifying to me, not to the audience.

Debbie Koehnen: All right. I will be doing that in just a minute. I'm Debbie Koehnen. I'm representing myself and my family. My family is here standing in front of you. Two lovely daughters. I have more family, but they haven't come tonight. They had other obligations. My address is 11443 Road P NW in Quincy. We live on our family farm that has been here for 113 years. So we are on our second 70 years, pretty close to almost 7-- you know, two lifetimes of 70 years here in Quincy. And I just wanted people to see the face of the next future generation. So if I have my lovely daughters turn around and wave at the audience. Fiona and Ellie, they're our future in Quincy. That's the younger generation is going to be here, hopefully. So they can sit down, and I'll finish my testimony.

As I said in my address, I don't know if you realize, but I'm a quarter of a mile from Intuit. Vantage is just a little farther down the road. I am a half a mile from Yahoo. Sabey's just a little farther down the road. I'm a second grade teacher at Mountain View Elementary. Microsoft and Dell are just down the road. So I am a 24-hour-a-day emissions person. I'm getting it all. I am under a little bit of respiratory distress tonight. I have been for the entire year. My doctor has doubled my medication at times when it's really bad. This is one of the bad times I should be doubling my medication. She doesn't want me to double my medication for the entire year, because that would be de-- more detrimental to my health. I already have immune system problems on top of that. So I'm going into this knowing that two lifetimes my family's been here, I'm already the respiratory person, the immune person. Like I said, I'm probably going to die [voice breaks] from the diesel particulates.

The reason I am up here testifying is because I want a future for my family and Quincy. If we're doing a good job in Quincy, our children will want to be here and come back. We'll be providing them enough opportunities for employment that they will want to come back. We'll be offering them a safe environment so they will want to come back. We will have been giving them enough enjoyable activities so they will want to return to our community. That's the best thing we can do for our community is raise our children so they will want to stay here and improve our community. I'm a little worried, like Danna, about the community-wide assessment. We don't want to be like King County. And I'm afraid our numbers, the community-wide limits, are similar to King County. We're an agricultural community. We shouldn't have the same air quality as King County. So I wish those community-wide numbers were being a little more actively sought after and lowered.

The other problem I see is the catastrophic predicament. In 2007, there was a catastrophic event. The west side was out of power, the east side was out of power. A catastrophic event. When you look at that map up there, my home is in the purple plume by Intuit. That's the worst. And it happened already. It's going to happen again. We had fires. We've had horrible air the last two or three weeks because of the fire. That's added into this problem with the community-wide air quality. That needs to be fixed, reduced so that we don't have people in respiratory self like myself -- respiratory distress.

I'm trying to decide whether to let my children come back and live on the family farm or whether I put it in my will when I die, burn it down, and don't let anybody live there again. Why would I want somebody in the purple plume in my family? And that's a really unfair thing to do to my family because we need data centers somewhere. So that's why I'm here.

The other request I would have, I loved hearing that the new 37 generators are going to have the tier 4 filters on them. I would ask Microsoft, now that they've been here for a long time, and technology's getting better and we can now do the tier 4 under the BACT, to start updating those old generators that they have and put the filters on them, and the scrubbers and whatever they need, so that our air quality is better.

We don't need to take a step backwards here. We need to keep going. I think I've said everything I would like to say. And please remember, Ecology, all the data centers, we have families living here, and we'd like our families to stay here in return. Because that is a strong community. Once our children leave, the community dies, and we have nothing left. Thank you.

Karen Baldwin: Patricia Martin followed by Alex Ibarra.

Patricia Martin: Patricia Martin, 617 H Street SW, here in Quincy. And I'm a member of Microsoft-Yes; Toxic-Air Pollution-No. I haven't written any formal comments, but I have a number of comments just based on a cursory review of information that was on the internet. First, I bring with me an email from Matt Kadlec, who is a toxicologist with the State of Washington, because I remember once reading that the state air quality program uses a standard of 20 µg/m3 for a health viewpoint for particulate, PM2.5. And I noticed in the technical support document for the Oxford Data Center that the background value for the region is 21 µg /m3. That means that for sensitive individuals such as Deborah Koehnen or myself, who is very sensitive sinus-wise for sinusitis and other issues, that these numbers are elevated over the air quality program's recommendation of 20 µg /m3. So our baseline in Quincy already exceeds a level of safety for sensitive populations.

I also would like to add that, again, in my reading, and I did not bring the citation, but somewhere in my reading there was assurance that Microsoft's Oxford Center was using the same controls as the Vantage Data Center. I've brought an email here from Beth Mort, from Greg Flibbert, talking about the controls that were put on the Vantage Data Center, which included diesel particulate filter, diesel oxidation catalysts, and a SCR to reduce emissions beyond BACT. I believe that despite the assurances from Ecology, that Microsoft's two facilities are under common control, and because they are under common control and on adjacent properties, that Ecology and Microsoft had an obligation to model the increased emissions, and all emissions from both facilities should have been modeled. In keeping -- Are you flipping that over?

Karen Baldwin: No, just, it's not working. It's been working intermittently, so stick with individual reporting. Go ahead.

Patricia Martin: Okay. The 2010 permit of Microsoft, again, as I recall, requires that any engines that are installed past January 1, 2011, must be tier 4 engines, not tier 2 retrofitted to tier 4 emissions. And I believe that there are differences between a tier 2 engine retrofitted and a tier 4 engine that has those controls that are intimately a part of that engine.

I want to reiterate that we citizens who have a right to this information to assure that the data centers, all data centers in Quincy, are in compliance with their permits, have been denied on repeated occasions access to the… to the reports that are made by the engines themselves and recorded. Handwritten logs of engine operations does not suffice in this digital age where engines themselves make their own recordings.

I'd also like to add that I don't believe the Washington State statutes provides an exemption from BACT for the hazardous and toxic air pollutants that's allowed under the 100 hour emergency engine rule found at 40 CFR 63 quadruple Z, ZZZZ. That uses a standard called the general achievable -- it's GACT, general achievable control technology, versus the best available control technology, which is required under Washington statute for all sources of air pollution. And that citation is RCW 70.94.152(10).

I have a concern that all of the ambient air measurements are done at the fence line. These are large pieces of property. The fence line is very removed. The definition of ambient air is outside, the surrounding outside air. And I am concerned about the safety of workers on all of these data sites for hazardous and toxic air pollutants as well as the ambient air quality criteria pollutants.

Something that was not talked about is the increased concentration of emission from the cooling towers. I have not had an opportunity to look -- not your fault, my fault -- to look at the existing permit, but since there is an increased emissions from the Columbia Data Center's cooling towers at 9.5 tons per year, with increased emissions of manganese and fluoride and other toxic air pollutants, I imagine that the Oxford center also has concentrated and higher levels of particulate matter being emitted from their cooling towers. These are not only sources of PM2.5 but sources of PM2 -- or PM10, excuse me.

My final comment is that there was no public hearing on the increased emissions from the Columbia Data Center's cooling towers. That's something that just kind of has flown under the radar. These two permits came out simultaneously. That's a lot of material for any people, any person to review. Even Danna and I, who have been involved in this since 2010, this is a lot of material to absorb and take in, especially during the summer months, when people are trying to vacation, and others of us are planning weddings for our daughters. So I want to formally object to the fact that there was no public hearing on those increased emissions from the Columbia Data Center. And people should be concerned about that, because this is 9.5 tons of, as I recall, PM10 and an additional 2.5 tons of PM2.5 in the vicinity of our Mountain View Elementary School.

Finally, I don't know how much goes into the public record, if it's just our testimony, but I am a firm believer in the power emanates from the people, and that the agencies and the employees of the state, to whom we have given power but not our -- we've not surrendered our sovereignty to, right? And I want to note it on the record, I was taken aback by the absolute rudeness of the person who is conducting this public hearing, Karen Baldwin, and I want it on the record that I believe there should be a formal apology sent to Deborah Koehnen and her daughters. Thank you.

Karen Baldwin: Thank you. Next, Alex Ybarra.

Alex Ybarra: Hi, my name's Alex Ybarra. My address is 921 K Street SW, Quincy. I'm just a citizen of Quincy. I've been here all my life. I've done carbon analysis for a utility for Grant County PUD, know what kind of analysis that gets done when it comes to energy systems, and pretty satisfied with the type of analysis that they've asked us for and the type of information they've asked for. I think they do a pretty thorough job of that when it comes to utilities. I'm glad that we have concerned citizens here that are looking for the best interest of Quincy, because I've got a daughter that lives in Quincy. But also, I think that there's, with growth, which Quincy -- what's happening in Quincy, we're getting growth. What happens with that is some of these side things that happen, like carbon emissions, crowding, a second stoplight, things like that. Those are things that we have to live with. I think that the benefits that the data farms, Microsoft, Yahoo bring in far outweighs what the emission issues may be. Some people may have it a lot more difficult than others, but I think the overall, I think that bringing the data farms was a very good thing to happen in Quincy. And again, just as a concerned citizen, I do hope that Microsoft and Ecology and everybody else listens to some of the concerned citizens and tries to answer the questions so we get good answers for a lot of the questions we have and we all live safe.

Just to let you know, back in the '60s, '70s, silica plant -- we'd always get pollution from them. I'd get ash on me every day playing outside in the yard. So it's a lot better than it used to be, except for maybe Lamb-Weston, which, got a lot of pollution there. Everybody gets the french fry smell all the time. So, I mean, if we're going to talk about something, we need to talk about not just these data farms, we need to talk about, you know, the traffic coming through town, the trains coming through town. So we've talked about that, and it's just part of the deal. It comes with civilization. We just have to be careful with what we do out there in society to make sure everybody's safe. But again, I'm glad that Microsoft is doing what they're doing, and Yahoo and the rest of them. It's just a matter of just making sure that we are all safe at the end. Thank you.

Karen Baldwin: Thank you. Is there anybody else who would like to testify? Okay.

If you would like to send written comments, they must be postmarked by July 29, 2014. Mail comments to Beth Mort, Department of Ecology Air Quality Program, 4601 N. Monroe Road, Spokane, Washington, 99205. Comments can also be faxed to 509-329-3529 or emailed to Beth at beth.mort@ecy.wa.gov. These addresses are also available on handout at the sign-in sheet. All testimony received at this hearing, emails received on July 29, 2014, and hard copy comments postmarked by July 29, 2014 will be part of the official record of the draft permit. After the comment period, Ecology staff will review and incorporate the comments where appropriate and prepare a response. A written response to comments will be available online at Ecology's web site, http://www.ecy.wa.gov/programs/air/quincydatacenter/index.html. People offering testimony will receive a copy of the response to comments that Ecology prepares.

The next step is to consider the comments and make a determination whether to issue the permit. Ecology's air quality program will look at the public comments, the response to comments, and other appropriate documentation and staff recommendations and will make a decision about issuing a permit. At this time, Ecology perceives issuing the air quality permit for the Oxford Data Center before the end of August. If you submit a written comment or give public testimony at this hearing, you will receive a notice [indistinct] when Ecology issues the final permit. Ecology will also send a notice to the Quincy Data Center listserv. If you are not on this listserv, please speak with Ecology staff so they can add you or send you a separate email. If we can be of further help, please don't hesitate to ask. You can contact Beth Mort.

On behalf of the Department of Ecology, thank you for coming tonight. For those that have questions that did not get answered during the question and answer period, we will have staff here available for a while. Let the record show the hearing was adjourned at 7:04 p.m. Thank you.

[end of recorded material]

Appendix D:
Redline Documents

- Redline of Second Tier Review Recommendation
- Redline of Technical Support Document
- Redline of Preliminary Determination

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DEPARTMENT OF ECOLOGY
State of Washington

Second Tier Review Recommendation Document for

Microsoft Oxford Data Center
Quincy, Washington

~~June 13~~August 12, 2014 (Updated)

1. Summary and Purpose

Microsoft Corporation (Microsoft) proposes to construct a new data center called Oxford Data Center (Oxford) in Quincy, WA. Microsoft plans to install and operate 32 diesel-powered generators, each rated at 2,500 kilowatt (kW) electrical output, to provide backup power to Oxford's servers, and four additional 2,000 kW and one 750 kW diesel-powered engines for backing up other equipment and their administrative building. The proposed engines emit diesel engine exhaust particulate (DEEP) at an estimated rate that cause ambient impacts in excess of a regulatory trigger level called an acceptable source impact level (ASIL). Microsoft was therefore required to submit a second tier petition under WAC 173-460-090. A second tier petition requires Microsoft to prepare a health impact assessment (HIA) quantifying the health risks posed by their emissions of DEEP.

Microsoft hired Landau Associates (Landau) to prepare an HIA (Landau Associates, 2014). In this assessment, Landau estimated lifetime increased cancer risks attributable to Microsoft's DEEP and other toxic air pollutant emissions and found them to be about **four in one million.** The maximum risk was estimated at a residential location to the north of Oxford Data Center's property. This risk was quantified assuming that both filterable and condensable particulate emitted from Oxford's engines constitutes DEEP. It is important to note that California's airborne toxics control measure for stationary compression engines only requires the filterable fraction to be quantified. This is because the health studies that form the basis for quantifying the health risk from diesel exposure used measurements of respirable particulate from "fresh" diesel exhaust and elemental carbon as a surrogate for diesel exhaust emissions. Therefore, the increased risk estimated by Landau represents a conservatively high estimate. A lower risk of about **one in one million** was estimated at the same location based on filterable emissions only.

Landau also assessed chronic and acute noncancer hazards attributable to the project's emissions and found them to be lower than unity (one). This indicates that Oxford's emissions by themselves are not likely to result in adverse noncancer health effects.

Finally, Ecology assessed the cumulative health risk by adding estimated concentrations attributable to Microsoft's emissions to an estimated background DEEP concentration. The maximum cumulative cancer risk from resident's exposure to DEEP in the vicinity of Oxford is approximately **45 in one million.** Chronic noncancer hazard quotients are much lower than one indicating that long-term exposure to DEEP in the area is not likely to result in noncancer health effects. These DEEP related health risks in the vicinity of Oxford Data Center are generally much lower than those estimated in urban areas of Washington.

Ecology also updated its cumulative dispersion model in Quincy to evaluate short-term impacts of nitrogen (NO_2) emitted simultaneously by all Quincy data center emergency engines during a system-wide power outage. This evaluation indicated that elevated NO_2 levels could occur, but the combined probability of an outage coinciding with unfavorable meteorology is very low.

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 noncancer hazard is acceptable, the project could be approvable under WAC 173-460-090. Furthermore, the cumulative risks to residents living near the proposed Oxford Data Center are below the cumulative risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100×10^{-6}).

This summary document presents Ecology's review of the proposed Microsoft Oxford Data Center HIA and other requirements under WAC 173-460.

2. Second Tier Review Processing and Approval Criteria

2.1. Second Tier Review Processing Requirements

In order for Ecology to review the second tier petition, each of the following regulatory requirements under Chapter 173-460-090 must be satisfied:

(a) The permitting authority has determined that other conditions for processing the 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 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.

Landau submitted an HIA protocol (item (c)) on December 20, 2013, and draft and final HIAs (item (e)) received by Ecology on January 27, 2014, March 17, 2014, and June 12, 2014.

Acting as the "permitting authority" for this project, Ecology's project permit engineer satisfied items (a) and (b) above on June 3, 2014.[1] Therefore, all five processing requirements above are satisfied.

[1] Gary Huitsing, "Microsoft Oxford: Combined Completeness Letter & Draft PD" e-mail message with attachments, addressed to Jim Wilder, Gary Palcisko, and Gregory Flibbert, June 3, 2014.

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 noncancer hazard is acceptable.

2.2.1. tBACT Determination

Ecology's permit engineer determined that Microsoft's proposed pollution control equipment (i.e., Tier 2 engines equipped with diesel particulate filters, diesel oxidation catalysts, and selective catalytic reduction) more than satisfies the BACT and tBACT requirement for diesel engines powering backup generators at Oxford Data Center.[2]

3. HIA Review

As described above, the applicant is responsible for preparing the HIA under WAC 173-460-090. Ecology's project team consisting of an engineer, a toxicologist, and a modeler review the HIA to determine if the methods and assumptions are appropriate for assessing and quantifying surrounding community's risk from a new project.

For the Oxford project, the HIA focused mainly on health risks attributable to DEEP exposure as this was the only TAP with a modeled concentration in ambient air that exceeded an ASIL. Landau briefly described emissions and exposure to other TAPs (NO_2, carbon monoxide (CO), ammonia,[3] and acrolein) because these pollutants exceeded a small quantity emission rate (SQER), and Ecology requested that health hazards from exposure to these pollutants be quantified.

3.1. DEEP Health Effects Summary

Diesel engines emit very small fine (<2.5 micrometers [μm]) and ultrafine (<0.1 μm) particles. These particles can easily enter deep into the lung when inhaled. Mounting evidence indicates that inhaling fine particles can cause numerous adverse health effects.

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[2] BACT was determined to be met through the use of EPA Tier 2 certified engines if the engines are installed and operated as emergency engines, as defined at 40 CFR§60.4219; compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII; and use of ultra-low sulfur diesel fuel containing no more than 15 parts per million by weight of sulfur.

[3] Some ammonia is released from the selective catalytic reduction equipment designed to reduce NO_X emissions.

Studies of humans and animals specifically exposed to DEEP show that diesel particles can cause both acute and chronic health effects including cancer. Ecology has summarized these health effects in "Concerns about Adverse Health Effects of Diesel Engine Emissions" available at http://www.ecy.wa.gov/pubs/0802032.pdf.

The HIA prepared by Landau quantifies the noncancer hazards and increased cancer risks attributable to the proposed Oxford Data Center's DEEP emissions.

3.2. DEEP Toxicity Reference Values

To quantify noncancer hazards and cancer risk from exposure to DEEP, quantitative toxicity values must be identified. Landau identified toxicity values for DEEP from two agencies: the U.S. Environmental Protection Agency (EPA) (EPA, 2002; EPA, 2003), and California EPA's Office of Environmental Health Hazard Assessment (OEHHA) (CalEPA, 1998). These toxicity values are derived from studies of animals that were exposed to a known amount (concentration) of DEEP, or from epidemiological studies of exposed humans, and are intended to represent a level at or below which adverse noncancer 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 noncancer 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 noncancer health effects.

National Ambient Air Quality Standards (NAAQS) and other regulatory toxicological values for short- and intermediate-term exposure to particulate matter have been promulgated, but values specifically for DEEP exposure at these intervals do not currently exist.

OEHHA derived a unit risk factor (URF) for estimating cancer risk from exposure to DEEP. The URF is based on a meta-analysis of several epidemiological studies of humans occupationally exposed to DEEP. In these studies, DEEP exposure was estimated from measurements of elemental carbon and respirable particulate representing fresh diesel exhaust. The URF is expressed as the upper-bound probability of developing cancer, assuming continuous lifetime exposure to a substance at a concentration of one microgram per cubic meter (1 $\mu g/m^3$), and are expressed in units of inverse concentration [i.e., $(\mu g/m^3)^{-1}$]. OEHHA's URF for DEEP is 0.0003 $(\mu g/m^3)^{-1}$ meaning that a lifetime of exposure to 1 $\mu g/m^3$ of DEEP results in an increased individual cancer risk of 0.03 percent or a population cancer risk of 300 excess cancer cases per million people exposed.

Table 1. Toxicity Values Used to Assess and Quantify Noncancer Hazard and Cancer Risk			
Pollutant	**Agency**	**Noncancer**	**Cancer**
DEEP	U.S. Environmental Protection Agency	RfC = 5 µg/m3	NA[1]
	California EPA–Office of Environmental Health Hazard Assessment	Chronic REL = 5 µg/m^3	URF = 0.0003 per µg/m^3
[1] EPA considers DEEP to be a probable human carcinogen, but has not established a cancer slope factor or unit risk factor.			

3.3. Affected Community/Receptors

While Oxford Data Center is located in an industrially zoned area and surrounded largely by agricultural land uses, air dispersion modeling indicated that proposed DEEP emissions, assuming DEEP is represented by both condensable and filterable particulate, could result in concentrations in excess of the ASIL at roughly 85 parcels with residential land use codes (Figure 1~~Figure 1~~) [Ecology 2013, Grant County 2013]. U.S. Census data show that approximately 250 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). When assuming that only filterable particulate is DEEP, as is specified in California's airborne toxics control measure for stationary compression engines, no residential land uses are impacted, but approximately seven people could live in the area impacted at levels in excess of the ASIL.

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For the purposes of assessing increased cancer risk and noncancer hazards, Landau identified receptor locations where the highest exposure to project-related air pollutants could occur: at the project boundary, a nearby residence, and off-site commercial areas. They also identified and evaluated exposures at other areas with sensitive populations such as schools and a hospital. Landau calculated both noncancer hazards and cancer risks for each of these receptors, and they also estimated long-term cumulative risks attributable to and other known sources of DEEP.[4] Landau also evaluated the combined cancer risk caused by numerous other carcinogens known to be emitted from diesel engines, and their analysis concluded that the vast majority of the cancer risk was caused by DEEP.

Ecology's review of the HIA found that Landau identified appropriate receptors to capture the highest exposures for residential, commercial, and fence line receptors. Landau also identified other potential sensitive receptor areas such as students at Monument Elementary and Quincy Valley Schools, and patients at Quincy Valley Hospital (Figures Figure 2~~2~~ and Figure 3~~3~~).

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[4] Landau and Ecology modeled cumulative emissions from existing data centers, railway, and highways. Results were incorporated into the review of proposed emissions from Oxford Data Center.

3.4. Increased Cancer Risk

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

Table 2, adapted from the HIA, shows the estimated Oxford Data Center-specific and cumulative cancer risk per million at each of the receptors evaluated. The highest increase in risks attributable to Oxford Data Center's emissions of DEEP is 4.1 per million[5] and occurs at residential property to the north of Oxford. 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 0.003 per million. When estimating exposure to DEEP, Landau assumed that both filterable and condensable particulate matter make up DEEP resulting in an estimated risk that errs on the side of overestimating risk.[6] Additionally, Landau chose a receptor location to represent a residence that was approximately 400 ft south of the actual house (closer to Oxford's emission sources) and therefore, the risk reported for a residential receptor at this location represents a conservatively high estimate of risk.

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The highest estimated increased risk for a residential receptor near Oxford assuming only filterable particulate represents DEEP is approximately 1.0 per million. For non-residential exposure scenarios, workers at nearby commercial facilities may have increased risks of about 1.1 per million (or 0.3 per million assuming only filterable). Increased cancer risks to potential bystanders exposed near the point of maximum impact (i.e., fence line receptor) may be about 0.1 to 0.6 per million.

[5] # 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.

[6] California Air Resources Board considers the front half (filterable) PM emissions to be consistent the techniques used to establish diesel PM as a toxic air contaminant."

Table 2. Estimated Increased Cancer Risk for Residential, Occupations, and Student Scenarios Attributable to Oxford's DEEP Emissions

Attributable to:	Risk Per Million from DEEP Exposure at Various Receptor Locations						
	Fence Line Receptor[1]	R-1 North Residence (MIRR)[2]	C-1 Industrial Building (MICR)[3]	Monument Elementary School		Patients at Quincy Valley Medical Center[6]	Maximally Cumulatively Impacted Residence in Modeling Domain[2]
				Students[4]	Teachers[5]		
Oxford (assumes filterable and condensable particulate are DEEP)	0.6	4.1	1.1	<0.1	0.2	<0.1	1.3
Oxford (assumes filterable only is DEEP)	0.1	1.0	0.3	<0.1	<0.1	<0.1	0.3

[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.
[4] Student scenario assumes exposure occurs 180 days per year, eight hours per day for seven years.
[5] Teacher scenario assumes exposure occurs 200 days per year, eight hours per day for 40 years.
[6] Patient scenario assumes a patient is present at the hospital 365 days per year, 24 hours per day for one year.
Note: Landau also calculated risks posed by other carcinogenic TAPs (i.e., acetaldehyde, benzene, formaldehyde, 1,3-butadiene, and carcinogenic polycyclic aromatic hydrocarbons). They estimated a negligible increased risk attributable to these TAPs of about 0.003 per million at the north residence (R-1).

3.4.2. Cancer Risk Attributable to Cumulative DEEP Emissions

Ecology and Landau conducted separate analyses of cumulative exposure to DEEP in Quincy. These analyses differed in scope and methodology and, therefore, the results also differed. While each analysis used similar emission rates for various sources, with the exception of railway emissions, Ecology's model tended to yield higher concentrations at locations near roadways. The key methodological difference stem from:

- Use of different sets of meteorological data to perform modeling. Ecology used 2005 meteorology which tends to produce higher concentrations in some areas compared to other meteorological years. Landau used the average of five years of meteorology spanning from 2000 to 2005. Ecology's use of 2005 meteorology likely resulted in higher concentration estimates at some locations.
- Use of different modeling techniques involving line sources (i.e., roads and railways).

- Use of different railway emission rate. Ecology adjusted the results of railway emissions to reflect an emission rate calculated from the 2011 Grant County locomotive inventory and active track miles in Grant County. The estimated particulate emission rate from railways in Quincy was approximately 128 pounds per mile per year.

For the purpose of incorporating the cumulative modeling results into the review of proposed emissions from Oxford Data Center, Ecology chose to report results from both analyses.

The cumulative risk of all known sources of DEEP emissions in the vicinity of Oxford Data Center (Table 3) is highest for a nearby residence south of State Route 28, and southeast of the proposed project. The cumulative DEEP risk at this home is about 45 per million.[7]

Table 3. Estimated Increased Cancer Risk for Residential, Occupations, and Student Scenarios Attributable to All Known Sources of DEEP in Quincy

Modeled by:	Risk Per Million from DEEP Exposure at Various Receptor Locations						
	Fence Line Receptor[1]	R-1 North Residence (MIRR)[2]	C-1 Industrial Building (MICR)[3]	Monument Elementary School: Students[4]	Monument Elementary School: Teachers[5]	Patients at Quincy Valley Medical Center[6]	Maximally Cumulatively Impacted Residence in Modeling Domain[2]
Landau	0.8	10.3	4.3	0.3	0.9	0.4	32.6
Ecology	0.6	8.5	6.0	0.3	1.6	0.6	45.0

[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.
[4] Student scenario assumes exposure occurs 180 days per year, eight hours per day for seven years.
[5] Teacher scenario assumes exposure occurs 200 days per year, eight hours per day for 40 years.
[6] Patient scenario assumes a patient is present at the hospital 365 days per year, 24 hours per day for one year.

3.5. Noncancer Hazard

Landau evaluated chronic noncancer hazards associated with long-term exposure to DEEP emitted from Oxford Data Center and other local sources. Hazard quotients ~~and indices~~ were much lower than unity (one) for all receptors' exposure to Oxford Data Center-related and

[7] Note that residential receptors tend to be the most exposed (e.g., longest exposure duration and exposure frequency). Therefore, their risks tend to be higher than other types of receptors. For regulatory decision making purposes, Ecology assumes that a resident is continuously exposed at their residence for their entire lifetime.

cumulative DEEP.[8] This indicates that chronic noncancer hazards are not likely to occur as a result of exposure to DEEP in the vicinity of Oxford Data Center. In addition, Landau evaluated combined long-term exposure to DEEP and ammonia emitted from Oxford and determined the hazard indices were much lower than unity for all receptors exposure to Oxford Data Center-related pollutants. This indicates that chronic noncancer hazards are not likely to occur as a result of exposure to DEEP and other project-related TAPs in the vicinity of Oxford Data Center.

Landau also evaluated acute hazards associated with short-term exposure to NO_2, CO, ammonia, and acrolein. Landau evaluated scenarios where Oxford Data Center was operating under full power outage mode because this is the time period when short-term emissions would be greatest. Hazard quotients and hazard indices for all receptors' exposures were below one indicating that acute adverse health effects are not likely to be caused solely by Oxford Data Center's emissions during a power outage.[9]

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 Oxford's emissions are not expected to cause or contribute to an exceedance of any NAAQS (Ecology, 2014).

4.2. Cumulative Short-Term NO_2 Hazard

While Oxford Data Center's NO_2 emissions by themselves are not likely to result in adverse noncancer health effects, Ecology recognizes that it is possible that cumulative impacts of multiple data center's emissions during a system-wide outage could potentially cause NO_2 levels to be a health concern. Ecology evaluated the short-term NO_2 impacts that could result from emergency engine operation during a system-wide power outage. While NO_2 levels could indeed rise to levels of concern[10] at various locations across town, the outage would have to occur at a time when the dispersion conditions were optimal for concentrating NO_2 at a given location.

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[8] The highest chronic hazard quotient attributed to cumulative exposure to DEEP (0.02) occurred at several locations near project Oxford (i.e., maximum impacted boundary receptor, maximally impact commercial receptor, and maximally impacted cumulatively impacted residential receptor in modeling domain).

[9] The highest acute hazard index of 0.8 occurred at the fence line receptor location (i.e., maximum impacted boundary receptor).

[10] The level of concern in this case is 462 $\mu g/m^3$. This represents California OEHHA's acute reference exposure level of 470 $\mu g/m^3$ minus an estimated regional background concentration of 8.3 $\mu g/m^3$.

Ecology estimated the combined probability of a system-wide outage coinciding with unfavorable meteorology. Ecology found the likelihood of this occurrence to be relatively low throughout Quincy.

To conduct this analysis, Ecology modeled emissions of:

- Simultaneous outage emissions of NO_X for all permitted and proposed data center engines, during all meteorological conditions experienced throughout 2005.
- Each engine operates at loads specified in permits (for existing data centers) or permit applications (for Oxford Data Center).
- Potential emissions from other NO_X sources in Quincy like the Celite Corporation and mobile source emissions.

Figure 5~~Figure 5~~ shows the maximum 1-hour NO_2 concentrations that could occur in Quincy if all data centers operated simultaneously under emergency conditions. Although the acute reference exposure level for NO_2 is 470 $\mu g/m^3$ (CalEPA, 2008), the figure shows only those concentrations that exceed 462 $\mu g/m^3$ because Ecology assumes that a NO_2 background concentration of 8.3 $\mu g/m^3$ exists in Quincy at any given time (NW AIRQUEST, 2014). It is important to note that the maximum 1-hour concentrations shown in Figure 5 do not all occur at the same time. The figure displays the worst-case concentration at each location in Quincy. Generally, this figure shows that concentrations of NO_2 could exceed a level of health concern in some areas of Quincy.

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Ecology also analyzed the frequency (# of hours per year) meteorological conditions could result in a NO_2 concentration greater than 462 $\mu g/m^3$ at each receptor point within the Quincy modeling domain. Figure 6~~Figure 6~~ shows the number of hours per year that a cumulative NO_2 concentration could exceed 462 $\mu g/m^3$ assuming data center engines operate during all combinations of meteorological conditions experienced throughout the year. If engines were run continuously during the course of a year, some areas near data centers could achieve concentrations of health concern for up to about 300 hours per year. In reality, these data centers were not permitted to continuously operate their engines; instead, they are only permitted to operate between eight and 400 hours per year under emergency outage conditions. Grant County Public Utilities District (PUD) reported that from 2003 to 2009, the average total outage time for customers that experience an outage throughout PUD's service area is about 143 minutes per year (Coe, 2010).

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To account for infrequent intermittent emergency outages, Ecology estimated the joint probability of a system-wide power outage coinciding with unfavorable meteorological conditions. The joint probability was estimated as:

$$P(X \cap Y) = P(X) \cdot P(Y)$$

Where:

P(X) = The number of unfavorable atmospheric condition hours[11] that occurred in a one year period[12] divided by the total number of hours in the same period, i.e., 8760 hours

P(Y) = The number of hours during which unplanned outage generator operation takes place divided by the total number of hours considered. Ecology estimated P(Y) by examining the lowest duration that Quincy data centers are permitted to operate engines under outage conditions, i.e., eight hours per year.

$P(X \cap Y)$ = The hourly probability that the concentration at a given receptor will exceed 462 $\mu g/m^3$.

Based on this joint probability, the estimated number of hours per year that an ambient NO_2 concentration of 462 $\mu g/m^3$ would probably occur given full use of the allowance for up to eight hours of emergency outage operation is:

$$\text{Frequency (hours per year)} = P(X \cap Y) \cdot 8760 \text{ hr/year}$$

The long-term recurrence intervals between hours that an ambient NO_2 concentration of 462 $\mu g/m^3$ would probably occur given full use of the allowance for up to eight hours of emergency outage operation is:

$$\text{Recurrence (years)} = 1/\text{Frequency (hr/yr)}$$

This analysis determined that the combined probability of an outage coinciding with unfavorable weather conditions results in recurrence intervals of every 100 years or more at most of the locations within the modeling domain. Some areas near and within the property boundaries of Yahoo!, Intuit, Sabey, and Microsoft Columbia Data Center could experience NO_2 levels > 462 $\mu g/m^3$ once every few decades to few years.

Ecology's analysis concluded that coincidental worst-case meteorological and system-wide power outage conditions are extremely unlikely to occur. Although extremely improbable, we cannot completely rule out the possibility of having such a scenario. If such an event were to occur, people with asthma who might be cumulatively exposed to NO_2 and DEEP emitted from emergency engines and other sources may experience respiratory symptoms such as wheezing, shortness of breath, and reduced pulmonary function with airway constriction.

4.3. Outages Reported by Quincy Data Centers

Ecology obtained reports of unplanned generator usage at the Microsoft, Yahoo!, Dell, Intuit, and Sabey data centers in Quincy to determine if the assumed eight hours of simultaneous outage per year represents a reasonable assumption. Table 4 shows the dates of data center power outages reported to Ecology. The information received about power outages from the data centers varies in the level of detail. For example, some reports do not specify the number of

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[11] The number of times the NO_2 concentration exceeded 462-$\mu g/m^3$ in the AERMOD simulation.

[12] Meteorology was based on 2005 year meteorology from Moses Lake.

engines or the duration of lost power, while others provide this information. None of the reports specify the load at which the engines operated during the outage.

The outage reports indicate that two or more data centers lost power at the same time on at least two occasions: May 29, 2013, affecting Dell and Microsoft Columbia Data Center on the west side of Quincy for a duration of about 1.3 hours; and November 16, 2013, affecting Sabey and Yahoo! on the east side of Quincy for about 1.5 hours. While these data are not comprehensive, there have been no reported instances of system-wide outages affecting the entire electrical grid in Quincy since the first data centers were permitted in 2006. According to Grant County PUD, the east and west sides of Quincy are connected to transmission lines via two different feeder lines thus reducing the likelihood of a simultaneous outage affecting all Quincy data centers (Coe, 2010).

Table 4. Summary of Power Outage Reports from Quincy-Area Data Centers (2008 to 2014)

	Microsoft Columbia Data Center		Yahoo!		Intuit		Dell		Sabey	
# Permitted Engines	37		23		9		28		44	
Date of Reported Outage	# Engines	Duration	# Engines	Duration	# Engines	Duration	# Engines	Duration	# Engines	Duration
08/09/2008	---	---	Not specified	0.5 hr	---	---	---	---	---	---
10/25/2008	---	---	Not specified	2 hr	---	---	---	---	---	---
06/05/2009	---	---	Not specified	0.5 hr	---	---	---	---	---	---
12/2009	Not specified	Not specified	---	---	---	---	---	---	---	---
01/2010	Not specified	Not specified	---	---	---	---	---	---	---	---
01/22/2010	Not specified	Not specified	---	---	---	---	---	---	---	---
12/ 20/2011	2	0.6 hrs	---	---	---	---	---	---	---	---
03/2012	---	---	13	0.5 hr	---	---	---	---	---	---
07/06/2012	---	---	---	---	---	---	5	0.2 to 0.4 hr (avg. 0.3 hr/engine)	---	---
05/29/2013	33	0.1 to 1.3 hr (avg. 0.8 hr)	---	---	---	---	5	0.4 to 1 hr (avg. 0.8 hr)	---	---
08/2013	---	---	16	1 to 5 hours (avg. 2 hr/ engine)	---	---	---	---	---	---
11/16/2013	---	---	---	--	--	---	---	---	Not Specified	1.5 hr
11/2013	---	---	20	1 to 26 hr (avg. 3.9 hr/engine)	---	---	---	---	---	---
02/2014	---	---	9	1 hr	---	---	---	---	---	---

Table 4. Summary of Power Outage Reports from Quincy-Area Data Centers (2008 to 2014)

	Microsoft Columbia Data Center		Yahoo!		Intuit		Dell		Sabey	
# Permitted Engines	37		23		9		28		44	
Date of Reported Outage	# Engines	Duration	# Engines	Duration	# Engines	Duration	# Engines	Duration	# Engines	Duration
04/21/2014	---	---	---	---	6	0.75 hr	---	---	---	---
04/24/2014	---	---	---	---	6	0.5 hr	---	---	---	---
04/2014	---	---	22	8 to 12 hr (avg. 9.4 hr/engine)	---	---	---	---	---	---
05/2014	---	---	12	1 hr	---	---	---	---	---	---

Note: Shaded cells represent times when more than one data center reports an outage at the same time interval.

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 Oxford's 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 related to the HIA for project Oxford are:

5.1. Exposure

It is difficult to characterize the amount of time that people can be exposed to Oxford's DEEP emissions. For simplicity, Landau and Ecology assumed a residential receptor is at one location for 24 hours per day, 365 days per year for 70 years. These assumptions tend to overestimate exposure.

The duration and frequency of power outages is also uncertain. Oxford estimates that they will use the generators during emergency outages for no more than 40 hours per year. From 2003 to 2009, the average outage for all Grant County PUD power customers was about 2.5 hours per year. While this small amount of power outage provides some comfort that power service is relatively stable, Oxford cannot predict future outages with any degree of certainty. Oxford accepted a limit of emergency operation totaling 40 hours per year for emergency outage (all engines operate) and electrical bypass during switchgear and transformer maintenance (four engines operate) and estimated that this limit should be more than sufficient to meet their emergency demands.

5.2. Emissions

The exact amount of DEEP emitted from Oxford's diesel-powered generators is uncertain. Landau estimated emissions using load-specific emission data provided by engine manufacturers. Landau attempted to account for higher emissions that would occur during initial start-up and before control equipment was fully warmed up. Finally, the emission estimates for DEEP include adjustment factors to account for condensable particulate in addition to filterable particles. The resulting values are considered to be a conservatively high estimate of DEEP emissions.

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 Oxford 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 noncancer 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 noncancer 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 μg/m^3. OEHHA's DEEP URF (3×10^{-4} per μg/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.

Regarding the second bullet above, California EPA's Office of Environmental Health Hazard Assessment recently evaluated experimental data from several new technology diesel engine emissions reflecting emission controls similar to those proposed for Oxford's engines (CalEPA, 2012).

> *"These studies indicate that the reductions of some air toxics such as polycyclic aromatic hydrocarbons, benzene and 1,3- butadiene in new technology engine exhaust (often 80 – 90%) are not as great as the corresponding reductions in DEP* [diesel engine particulate] *(often 95 – 99%). The resulting air toxics/DEP ratios for NTE* [new technology engine] *exhaust may be greater than or equal to similar ratios found in exhaust from older diesel engines. As an example, an analysis of data from one published review indicated that the average 3-ring PAH, 1,3-butadiene and benzene/DEP ratios increased in NTE exhaust compared to older DEE* [diesel engine emissions] *by 2-, 10- and 4-fold, respectively. These data suggest that while the absolute amount of DEP (and thus estimated cancer risk) and air toxics is much reduced in NTE exhaust, the exhaust composition has not necessarily become less hazardous. Thus, the available data do not indicate that NTE exhaust should be considered to be fundamentally different in kind compared to older DEE for risk assessment purposes and suggests the TAC cancer unit risk value for DEP can continue to be applied to NTE exhaust risk assessments."*

Table 5 presents a summary of how the uncertainty affects the quantitative estimate of risks or hazards.

Table 5. Qualitative Summary of How the Uncertainty Affects the Quantitative Estimate of Risks or Hazards	
Source of Uncertainty	**How Does it Affect Estimated Risk from this Project?**
Exposure assumptions	Likely overestimate of exposure
Emissions estimates	Possible overestimate of emissions concentrations
Air modeling methods	Possible underestimate of average long-term ambient concentrations and

	overestimate of short-term ambient concentration
Toxicity of DEEP at low concentrations	Possible overestimate of cancer risk, possible underestimate of noncancer hazard for sensitive individuals

6. Conclusions and Recommendation

The project review team has reviewed the HIA and determined that:

a) The TAP emissions estimates presented by Landau represent a reasonable estimate of the project's future emissions.

b) Emission controls for the new and modified emission units meet or exceed the tBACT requirement.

c) The ambient impact of the emissions increase of each TAP that exceeds ASILs has been quantified using refined air dispersion modeling techniques as approved in the HIA protocol.

d) The HIA submitted by Landau on behalf of Microsoft adequately assesses project-related increased health risk attributable to TAP emissions.

The project review team concludes that the HIA represents an appropriate estimate of potential increased health risks posed by Oxford Data Center's TAP emissions. The risk manager may recommend 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 additional cancer risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100×10^{-6}).

Additionally, Ecology's analysis of short-term impacts from simultaneous outage emissions determined a very low likelihood of a system-wide power outage coinciding with unfavorable pollutant dispersion. While existing power outage reports from each of the data centers do not indicate power outages have simultaneously affected all Quincy data centers, Ecology should track outage reports from the data centers to ensure that assumptions used in the analysis remain plausible.

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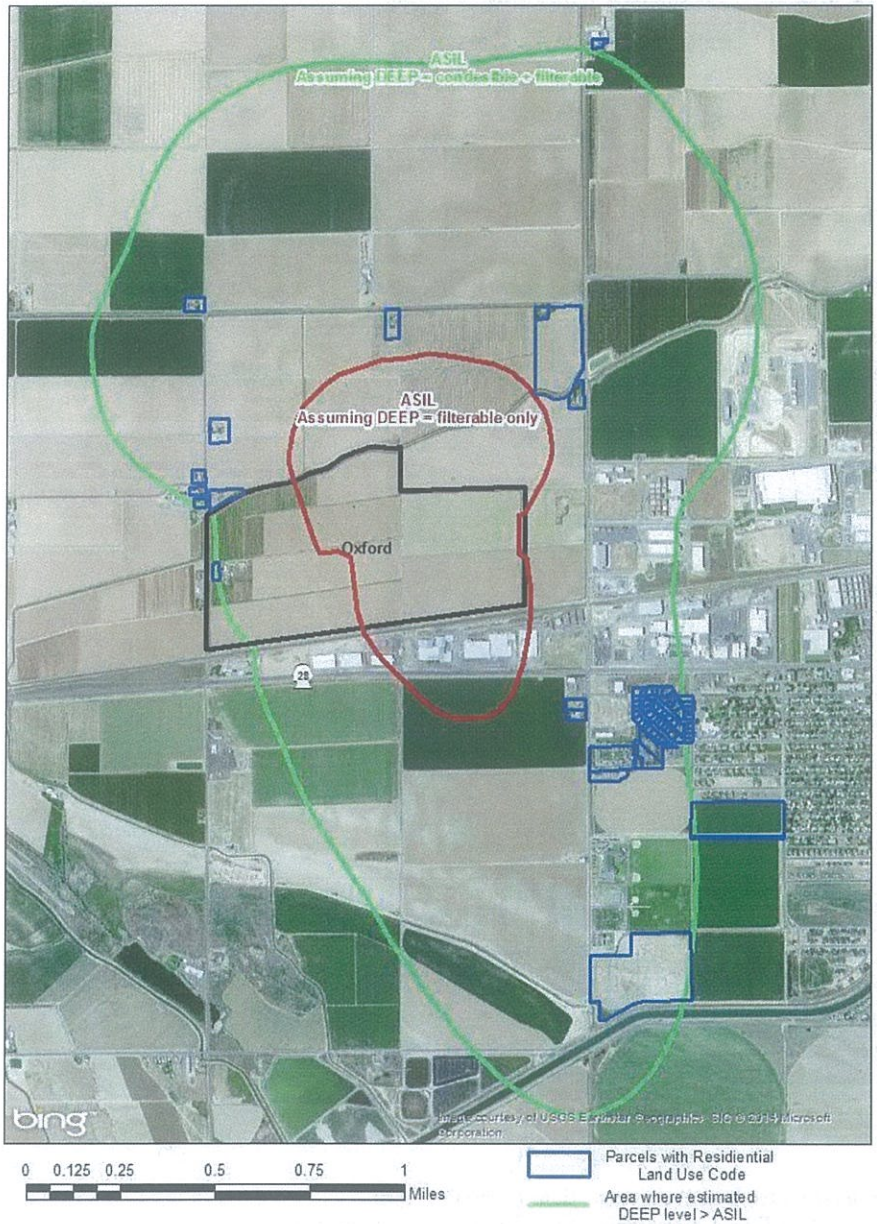

Figure 1. Residential parcels in the area where DEEP concentrations could exceed the ASIL.

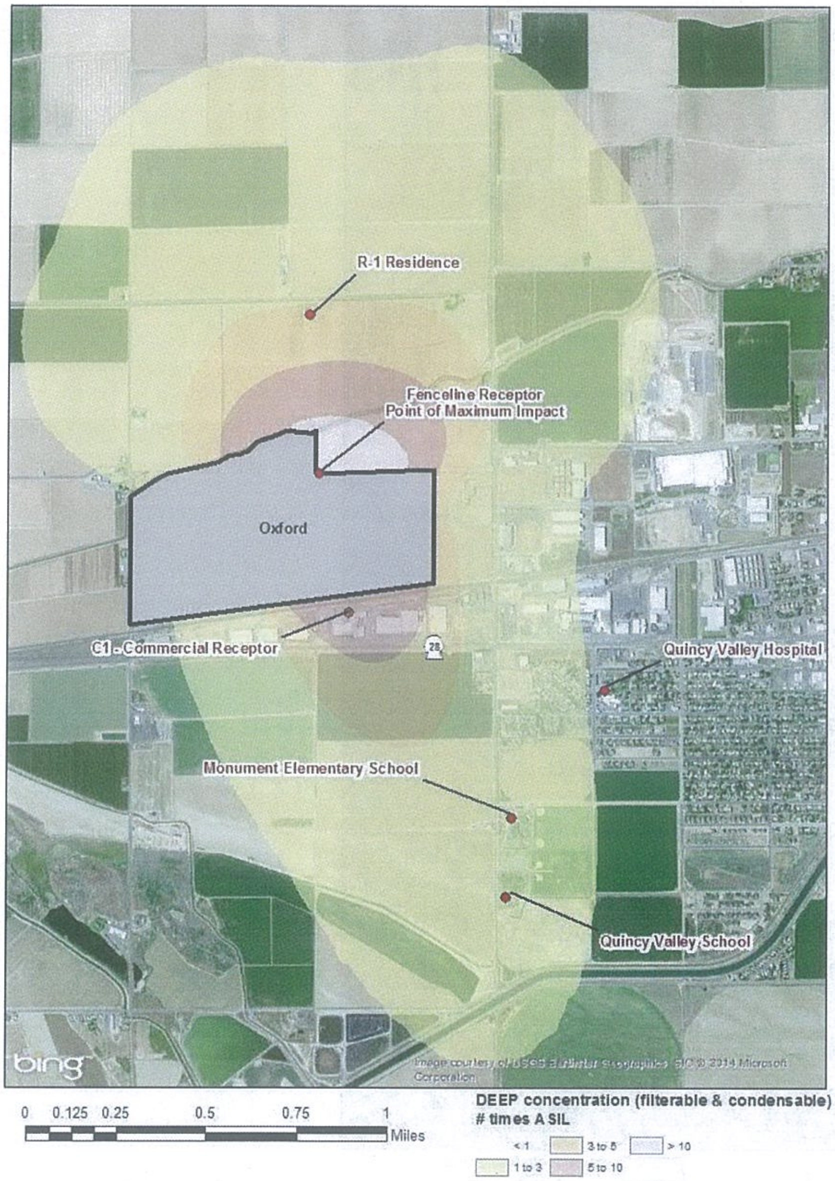

Figure 2. Receptor locations in relation to estimated DEEP concentrations (assuming both filterable and condensable fractions represent DEEP). Concentrations are reported as the number of times higher than the ASIL.

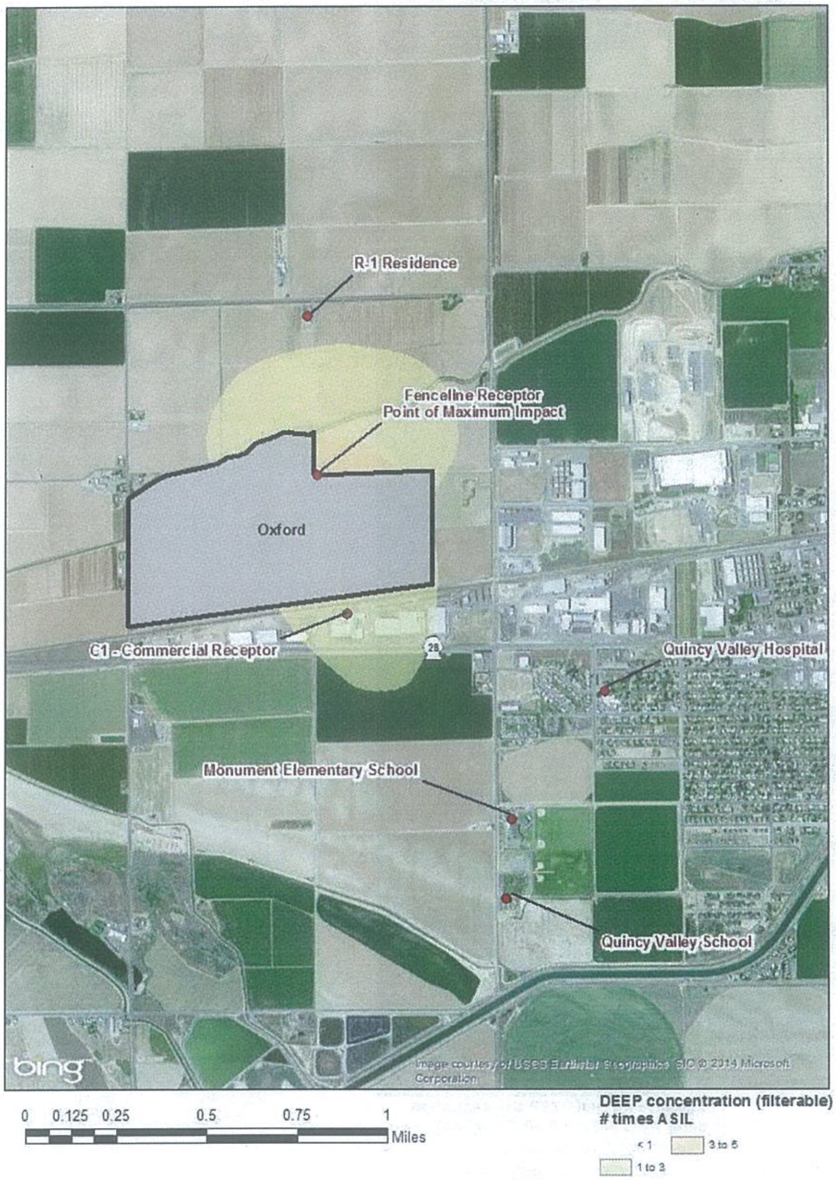

Figure 3. Receptor locations in relation to estimated DEEP concentrations (assuming only filterable fraction represents DEEP). Concentrations are reported as the number of times higher than the ASIL.

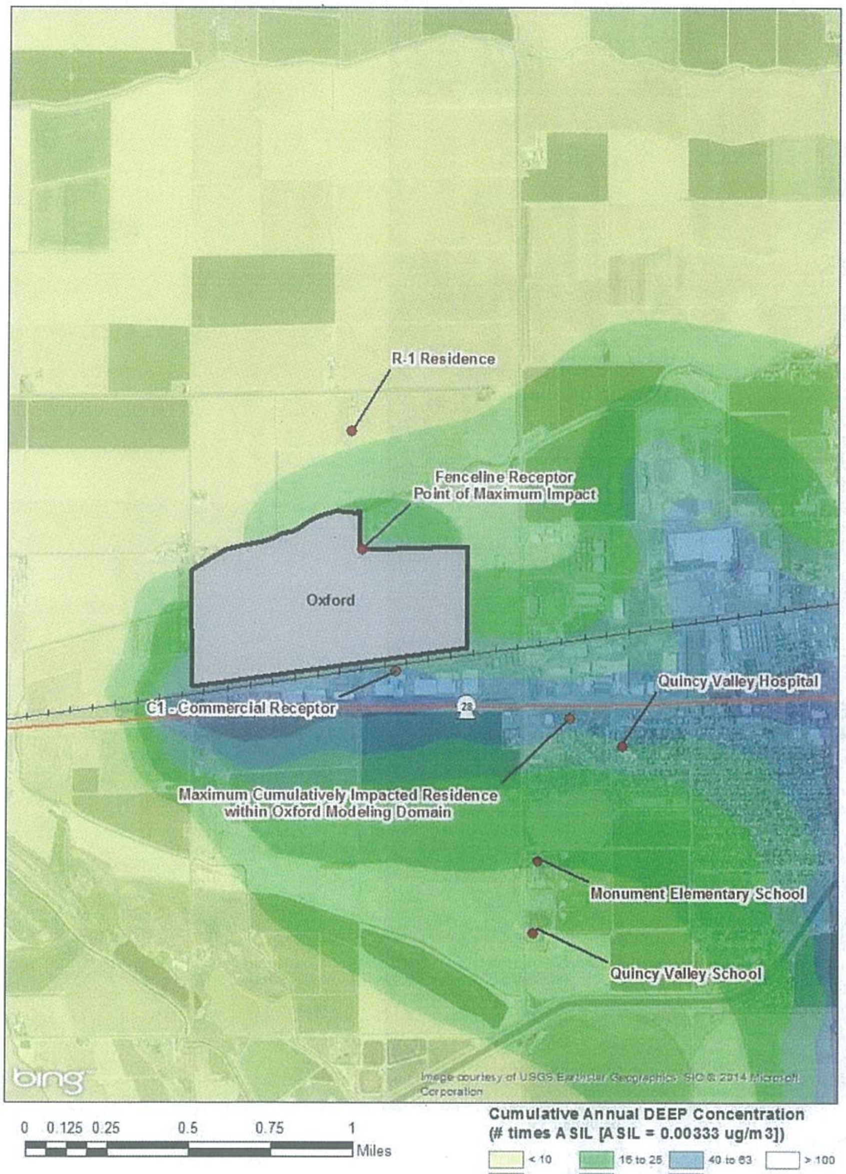

Figure 4. Cumulative DEEP concentrations (estimated by Ecology) in the Oxford vicinity. Concentrations are reported as the number of times higher than the ASIL.

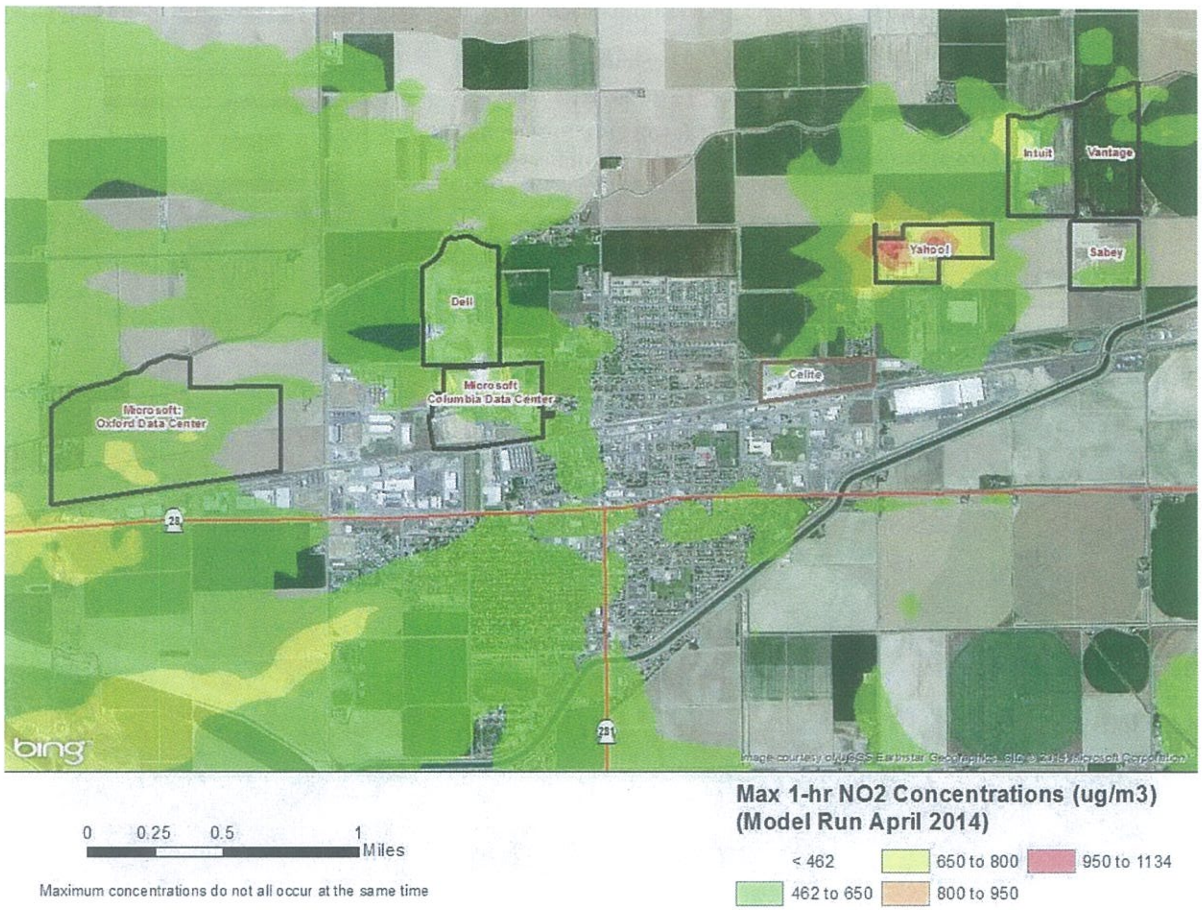

Figure 5. Estimated maximum 1-hr NO_2 concentrations resulting from cumulative NO_X emissions of all permitted and proposed data center engines during a simultaneous outage in Quincy. These maximum concentrations do not all occur at the same time.

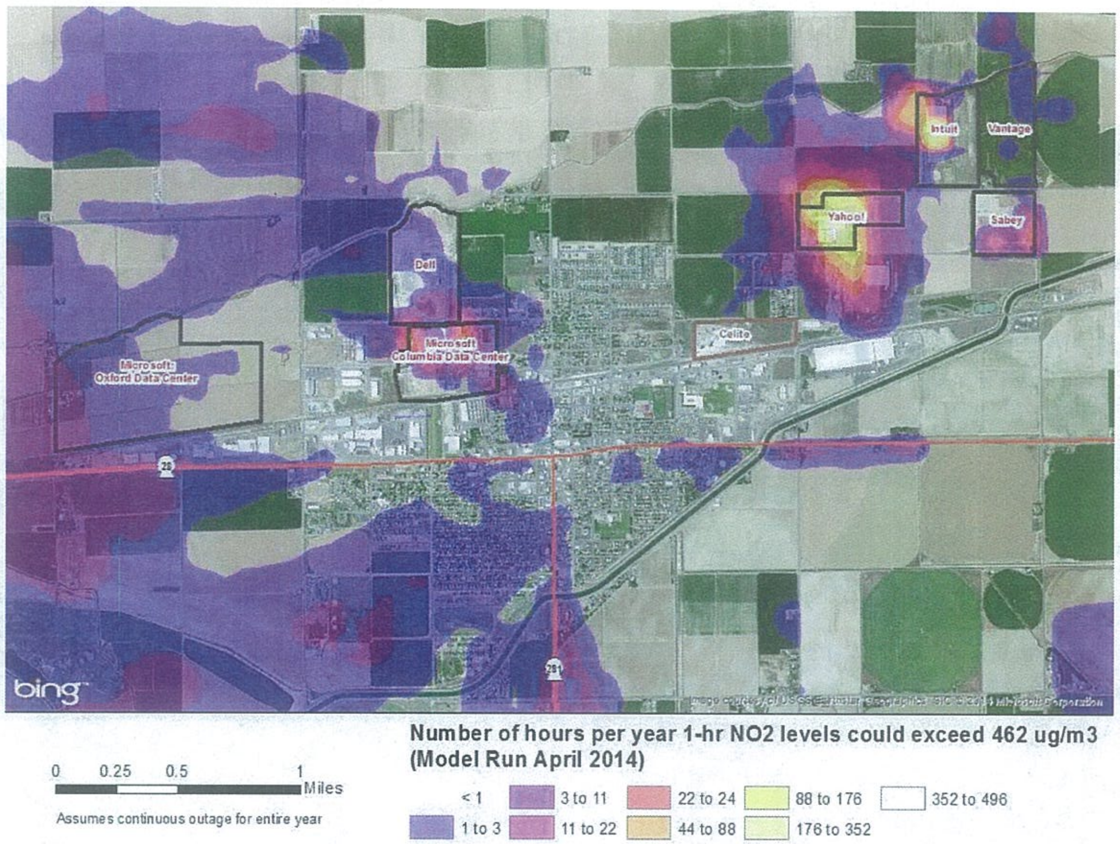

Figure 6. Estimated number of times per year that 1-hr NO_2 concentrations could exceed 462 ug/m^3 assuming continuous outage emissions for an entire year.

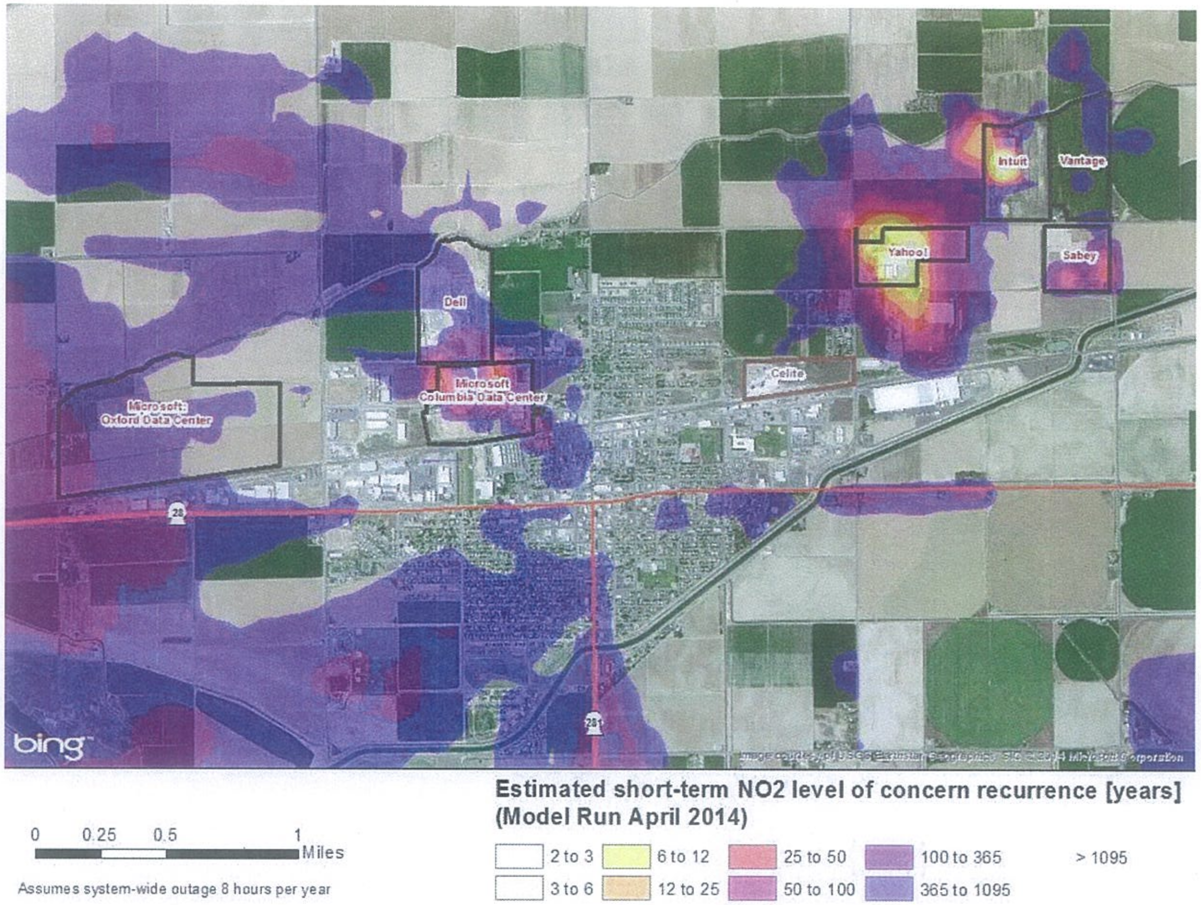

Figure 7. Estimated interval between occurrences of 1-hr NO_2 concentrations greater than 462 ug/m^3 assuming eight hours of simultaneous Quincy data center emergency engine outage emissions per year.

TECHNICAL SUPPORT DOCUMENT
FOR PRELIMINARY DETERMINATION OF APPROVAL ORDER NO. 14AQ-E537
MICROSOFT OXFORD DATA CENTER
~~JUNE 16~~AUGUST 15, 2014

1. EXECUTIVE SUMMARY

On January 27, 2014, Ecology received a Notice of Construction (NOC) application submittal from the Microsoft Corporation (Microsoft**) the permittee,** requesting approval for a permit application for phases 1 and 2 of a new facility named the Oxford Data Center (Oxford) located at Industrial Park #5, west of Road R NW at the end of Port Industrial Parkway in Quincy, WA. The following information comprises the legal description of the facility provided by the applicant:

LOTS 2, 3, 4, 5, AND TRACT A, AMENDED PORT DISTRICT INDUSTRIAL PARK NO. 6 BINDING SITE PLAN, ACCORDING TO THE BINDING SITE PLAN THEREOF FILED IN VOLUME 2 OF BINDING SITE PLANS, PAGES 64 AND 65, RECORDS OF GRANT COUNTY, WASHINGTON. FARM UNITS 216 AND 217, IRRIGATION BLOCK 73, OXFORD BASIN PROJECT, ACCORDING TO THE PLAT THEROF FILED NOVEMBER 29, 1951, RECORDS OF GRANT COUNTY, WASHINGTON. STARTING AT THE NORTHWEST CORNER OF SAID FARM UNIT 216, IRRIGATION BLOCK 73, THE TRUE POINT OF BEGINNING, THENCE 173 (feet) EAST ALONG THE NORTH LINE OF SAID FARM UNIT; THENCE 242 FEET SOUTH OF A LINE PERPENDICULAR TO THE NORTH LINE OF SAID FARM UNIT; THENCE WEST 173 FEET; THENCE NORTH 242 FEET TO THE TRUE POINT OF BEGINNING.

Ecology received supplemental application information on January 14, 17, 28, and February 7, including an electronic WORD version of a revised NOC application on February 7, 2014. Ecology received supplemental application information on February 13, 2014. The NOC application was determined to be incomplete, and an incompleteness letter was issued on February 26, 2014. A revised NOC application was received on March 17, 2014, with additional supporting material provided on March 19, 20, 25, 27, April 24, 28, May 21, and June 3, 2014. The application was considered complete on June 3, 2014. The Preliminary Determination (i.e., Proposed Decision) was completed on June 3, 2014, allowing a Tier II review to be initiated. In accordance with WAC 173-460-090, a second tier health risk analysis was ~~been~~ submitted by the applicant for DEEP emissions. Ecology has concluded that this project has satisfied all requirements of a second tier analysis.

2. PROJECT DESCRIPTION

2.1 Oxford will contain four phase 1 activity zone (AZ) buildings designated AZ-4A, AZ-4B, AZ-4C, AZ-4D, four core network room (CNR) buildings, an administrative building, and four phase 2 activity zone buildings designated AZ-3A, AZ-3B, AZ-3C, AZ-3D. Building construction for the Phase 1 generators and cooling towers is expected to begin before the end of October, 2014 with commissioning of generators spread over an approximately 9-month period. Construction of Phase 2 is expected to begin within 18 months after the ~~start~~ completion of ~~generator~~ commissioning of the final generator for Phase 1. Project Oxford phases 1 & 2 will have thirty-two (32) Caterpillar Model 3516C-HD-TA diesel powered electric emergency generators in the activity zone buildings with a power rating of 2.5 MWe per generator, four (4) Caterpillar Model 3516C-TA diesel powered electric emergency generators in the CNR buildings with a power rating of 2.0 MWe per generator, and one (1) Caterpillar Model C27ATAAC diesel powered electric emergency generator in the administrative building with a power rating of 0.75 MWe. Each cooling tower has four cells and four fans. Each of the eight activity zone building will have four cooling towers for a total of thirty two (32) SPX-Marley model MD5008PAF2 cooling towers. Each of the thirty two individual cooling towers has a design recirculation rate of 950 gallons per minute (gpm) and an air flow rate of 143,600 cubic feet per minute (cfm).

2.2.1 **Potential to Emit for Criteria Pollutants and Toxic Air Pollutants (TAPS)**

Table 2. Potential To Emit For Phases 1 & 2 (TPY)

Pollutant	Emission Factor	Facility Potential to Emit	References
Criteria Pollutants	Units = g/kW-hr (except where noted)	(TPY)	(a)
NO_x	Warmed up: (0.67); Cold: (Tier 2 load specific emission factors and use of CS factors)	8.6	(b),(g),(h)
VOC	Warmed up: (0.19); Cold: (use of CS Factors)	0.8	(a),(b),(e)
CO	Warmed up: (3.5); Cold: (use of CS Factors)	15.6	(b)
$PM_{2.5}$	Warmed up: (0.03 and BH factors); Cold: (use of CS Factor) (See note j for cooling towers)	3.53	(b),(j)
PM_{10}	NA (See note j for cooling towers)	13.3	(f),(j)
SO_2	15 ppm	0.047	(c)
Lead	NA	Negligible	(d)
Ozone	NA	NA	(e)
Toxic Air Pollutants (TAPS)	Units = lbs/MMBTU (except where noted)		(a)
Primary NO_2	Warmed up: (0.67); Cold: (Tier 2 load specific	0.86	(b),(h)

	emission factors and use of CS factors)		
Ammonia	0.32 (lbs/hr NH3)/(MWe)	0.71	(g)
Diesel Engine Exhaust Particulate (DEEP)	Warmed up: (0.03 and BH factors); Cold: (use of CS Factor)	0.536	(b)
Carbon monoxide	Warmed up: (3.5); Cold: (use of CS Factors)	15.6	(b)
Sulfur dioxide	15 ppm	0.047	(c)
Benzene	7.76E-04	2.4E-03	(i)
Toluene	2.81E-04	8.6E-04	(i)
Xylenes	1.93E-04	5.9E-04	(i)
1,3 Butadiene	3.91E-05	1.2E-04	(i)
Formaldehyde	7.89E-05	2.4E-04	(i)
Acetaldehyde	2.52E-05	7.7E-05	(i)
Acrolein	7.88E-06	2.4E-05	(i)
Benzo(a)Pyrene	2.57E-07	7.9E-07	(i)
Benzo(a)anthracene	6.22E-07	1.9E-06	(i)
Chrysene	1.53E-06	4.7E-06	(i)
Benzo(b)fluoranthene	1.11E-06	3.4E-06	(i)
Benzo(k)fluoranthene	2.18E-07	6.7E-07	(i)
Dibenz(a,h)anthracene	3.46E-07	1.1E-06	(i)
Ideno(1,2,3-cd)pyrene	4.14E-07	1.3E-06	(i)
Napthalene	1.30E-04	4.0E-04	(i)
Propylene	2.79E-03	8.5E-03	(i)
Fluoride	0.31 mg/L	4.8E-03	(j)
Manganese	0.03 mg/L	4.6E-04	(j)
Copper	0.01 mg/L	1.6E-04	(j)
Chloroform	0.0004 mg/L	2.6E-04	(k)
Bromodichloromethane	0.0004 mg/L	2.6E-04	(k)
Bromoform	0.0105 mg/L	6.9E-03	(k)

(a) The current list of EPA criteria pollutants (http://www.epa.gov/airquality/urbanair/; last updated April 20, 2012) that have related National Ambient Air Quality Standards (NAAQS) (http://www.epa.gov/air/criteria.html; last updated December 14, 2012). VOC is not a criteria pollutant but is included here per note (e). Toxic Air Pollutants (TAPs) are defined as those in WAC 173-460. Greenhouse gas is not a criteria pollutant or a TAP and is exempt from New Source Review requirements for non Prevention of Significant Deterioration projects such as at Oxford Data Center per WAC 173-400-110(5)(b).

(b) Potential to Emit (PTE) estimates are based on manufacturer 5-load final Tier 4 compliant engine test data and applicable cold start (CS) factors for catalyst warm-up periods and black puff factors from California Energy Commission's *Air Quality Implications of Backup Generators in California"* CEC-500-2005-049; July 2005. The NOx CS factor from the July 2005 report is 1.0, but NOx PTE is conservatively based on the highest provided tier-2 manufacturer test data from Cummins, MTU, and Caterpillar (CAT). The applicant believes that use of DPF eliminates the need for a black-puff CS factor adjustment, but has included it anyway to provide a conservative PTE estimate. The back-half (BH) factor accounts for condensable particulate (see section 2.2 for testing requirements).

(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) All PM emissions from the generator engines is $PM_{2.5}$, and all $PM_{2.5}$ from the generator engines is considered DEEP.
(g) Ammonia emission factor from Vantage Data Center in Quincy, WA.
(h) NO2 is assumed to be 10% of total NOx emitted.
(i) 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/.
(j) Trace metals in city industrial wastewater as provided in application for cooling tower emissions. Total particulate matter from cooling towers based on the following study: *Calculating Realistic PM10 Emissions from Cooling Towers", Reisman and Frisbie, Environmental Progress, July 2002.*
(k) Concentration in cooling tower makeup water as provided in application for cooling tower emissions.

2.1.2 Maximum Operation Scenarios Based on Final Tier 4 Compliant Engines and Cold Start Factors and Activation Delay Periods

The DEEP and CO potential to emit values in Table 2 and facility maximum annual fuel usage values in Approval Condition 3.1 of the permit are based on the following worst-case operating scenario which use Final Tier 4 compliant engine factors and cold start factor adjustments):

Scenario: Full Operation of Combined Phases 1+2, Plus Stack Testing of 3 Generators					
		Facility-Wide Emissions, tons/year			
Activity	Fuel, gal/year	DEEP	NOx	CO	VOC
12 months Routine Operation of Phase 1	245,166	0.298	5.7	8.7	0.44
12 months Routine Operation of Phase 2	187,194	0.224	2.75	6.73	0.33
Stack Testing of 3 Generators	14,299	0.013	0.16	0.68	0.03
12-Month Total Emissions	**446,659**	**0.535**	8.61	**16.1**	0.8
Adjustment Factor Compared to 70-Year Average	1.009	1.008	1.005	1.013	1.013

(Note: These estimates are based on preliminary plans to use thirty-six (36) 2.5 MWe engines and one (1) 0.750 MWe engine. However, Microsoft's final plans are to use only thirty-two (32) 2.5 MWe engines, four (4) 2.0 MWe engines, and one (1) 0.750 MWe engine. As a result, CO emissions are expected to be 15.6 tpy, and maximum fuel usage is expected to be 431,000 gallons per year. In addition, DEEP emissions are expected to be less than the listed value, but Microsoft has conservatively chosen a potential to emit of 0.536 tpy for DEEP.

The NOx and VOC potential to emit values in Table 2 above are based on the following worst-case operating scenario which use Final Tier 4 compliant engine factors and cold start factor adjustments:

Scenario: Commissioning of Phase 2, Followed By Operation of Combined Phases 1 +2					
		Facility-Wide Emissions, tons/year			
Activity	Fuel, gal/year	DEEP	NOx	CO	VOC
12 months Routine Operation of Phase 1	245,166	0.298	5.7	8.7	0.44
Commissioning of 16 Phase 1 Generators	101,683	0.094	2.28	5.08	0.26
5 Months of Operation of 4 Phase 2 Generators	19,499	0.023	0.286	0.701	0.034
2 months Operation of 12 Phase 2 Generators	23,399	0.028	0.344	0.841	0.041
Emission Testing of 3 Phase 1 Generators	14,299	0.013	0.16	0.68	0.03

12-Month Total Emissions	404,047	0.46	**8.77**	16.00	**0.81**
Adjustment Factor Compared to 70-Year Average	0.91	0.86	1.023	1.01	1.02

(Note: these estimates are based on using thirty-six (36) 2.5 MWe engines and one (1) 0.750 MWe engine; Microsoft plans to use only thirty-two (32) 2.5 MWe engines, four (4) 2.0 MWe engines, and one (1) 0.750 MWe engine. As are result, NOx emissions are expected to be 8.6 tpy. In addition, VOC emissions are expected to be 0.8 tpy.):

Cold start adjustment factors are used to approximate the additional emissions from cold engines burning off the accumulated fuel and crankcase oil on cold cylinders. The PM and VOC cold start factor adjustments for these calculations are provided below:

VOC/PM Black Puff Cold-Start Adjustment Factors				
Load	Spike Area (ppm-sec)	Steady-State Area (ppm-sec)	Total Area (ppm-sec)	Black Puff Factor
10%	6300	27000	33300	1.189
80%	6300	18000	24300	1.259
100%	6300	18000	24300	1.259

The CO cold start factor adjustments for these calculations are provided below:

CO Black Puff Cold-Start Adjustment Factors				
Load	Spike Area (ppm-sec)	Steady-State Area (ppm-sec)	Total Area (ppm-sec)	Black Puff Factor
10%	15000	18000	33000	1.455
80%	15000	12000	27000	1.556
100%	15000	12000	27000	1.556

A NOx cold start factor of 1.0 was assumed because California Energy Commission tests (see *Air Quality Implications of Backup Generators in California"* CEC-500-2005-049; July 2005); do not show short term NOx spikes during cold starts.

Due to the way black-puff cold-start factors were calculated, annual facility-wide PTE emissions for CO and VOC were slightly underestimated by approximately 0.006 tpy and 0.004 tpy respectively. Ecology determines these differences to be negligible. Because Microsoft will be using diesel particulate filters, the applicant believes that use of a black-puff cold-start factor for DEEP conservatively overestimates facility emissions, but they have included them anyway.

Other cold-start related adjustments were also included in the application to account for heat-up times for catalysts in the add-on controls (see section 4 regarding add-on controls) ~~catalysts in the selective catalyst reductions (SCR) and diesel particulate filter (DPF) as~~ listed below:

Catalyst Delay Cold Start Adjustment		
Control Device	Applicability	Adjustment
SCR catalyst and DPF oxidation catalyst	• Cold start under idle load (less than or equal to 10%) for VOC, CO, and NOx	15 minutes at emission levels equivalent of generator equipped with Tier 2 level emission controls followed by final Tier 4 compliant emissions
	• Cold start under high load for VOC, CO, and NOx	10 minutes at emission levels equivalent of generator equipped with Tier 2 level emission controls followed

		by final Tier 4 compliant emissions

2.2 Source Testing

Source testing requirements outlined in Table 4 of the Approval Order, provide two testing approaches. A five-load approach for PM, NOx, CO, and VOC, where PM is considered to be DEEP at size PM2.5 or smaller, which tests only for the filterable particulate matter to be consistent with California Code of Regulations § 93115.14 *ATCM for Stationary CI Engines – Test Methods* (measuring front half particulate only). However, a single-load test at approximately 80 percent load (78%-82%) is also required for these pollutants (and ammonia), which takes into account both the filterable and condensable PM emissions. Engines are anticipated to be operating for more hours at 80 percent load than at other loads.

According to Approval Order 4.2, any emission testing performed to verify conditions of the permit or for submittal to Ecology in support of this facility's operations, requires that Microsoft comply with all requirements in 40 CFR 60.8 except subsection (g) which addresses audit samples. However, Approval Order 4.2 specifically states that "40 CFR 60.8(g) may be required by Ecology at their discretion." 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."*

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, Ecology believes that the two-test sampling approach required in Table 4 of the Order is a valid reason to waive audit sampling, because it provides two types of filterable particulate tests and also provides additional information (condensable particulate emissions) for one of the tests. However, Ecology may choose, at their discretion, to require audit sampling for stack tests conducted using any or all of the following particulate matter test methods: Methods 5, 201A, or 202.

3. APPLICABLE REQUIREMENTS

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

3.1 Chapter 70.94 Revised Code of Washington (RCW), Washington Clean Air Act,
3.2 Chapter 173-400 Washington Administrative Code (WAC), General Regulations for Air Pollution Sources,
3.3 Chapter 173-460 WAC, Controls for New Sources of Toxic Air Pollutants, and
3.4 40 CFR Part 60 Subpart IIII 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.

3.4.1 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 Oxford are regulated under 40CFR60 subpart IIII (per 40CFR60.4200), they are not subject to 40CFR1039 requirements except as specifically required within 40CFR60.

~~According to 40CFR60, s~~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 Oxford (0.750 MWe, 2.0 MWe, and 2.5 MWe). Instead, 40CFR60 requires the engines at Oxford ~~are required~~ to meet the Tier 2 emission levels of 40CFR89.112 (see section 4 with respect to add-on controls). ~~(even though they will in reality meet the more stringent limits listed in the permit with voluntary add-on controls)~~. 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 Oxford:

§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.*

(Note: Based on information provided by the applicant, Oxford will use the following engines specifications: August, 2013 Caterpillar Model C27ATAAC rated 0.75 MWe; February, 2013 Caterpillar Model 3516C-TA rated 2.0 MWe; November 2012, Caterpillar Model 3516C-HD-TA rated 2.5 MWe. Based on these specifications, the 0.750 MWe engine has 27.03 liters displacement over 12 cylinders, or 2.25 liters per cylinder; the 2.0 MWe engines have 69.00 liters displacement over 16 cylinders, or 4.31 liters per cylinder; and the 2.5 MWe engines have 78.08 liters displacement over 16 cylinders, or 4.88 liters per cylinder. Thus, because the specified engines at Oxford will all have a displacement of less than 30 liters per cylinder, and are for emergency purposes only, they are 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.

(Note: Thus, as outlined in previous note, and based on the power ratings listed in *40 CFR 60.4202(a),* the 0.75 MWe and 2.0 MWe engines at Oxford are required to meet the applicable 40CFR89 Tier 2 emission standards.)

(b) Stationary CI internal combustion engine manufacturers must certify their 2007 model year and later emergency stationary CI ICE with a maximum engine power ***greater than 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 (b)(1) through (2) of this section.*

(1) For 2007 through 2010 model years, the emission standards in table 1 to this subpart, for all pollutants, for the same maximum engine power.

(2) For 2011 model year and later, the certification emission standards for new nonroad CI engines for engines of the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants.

(Note: Thus, as outlined previously, and based on the power ratings listed in *40 CFR 60.4202(b),* the 2.5 MWe engines at Oxford are required to meet the applicable 40CFR89 Tier 2 emission standards.)

3.4.2. Support for ~~excluding~~ 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.*"

4. SUPPORT FOR BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

As noted in Condition 2.2 of the Approval Order, each engine must be equipped with selective catalytic reduction (SCR) and catalyzed diesel particulate filter (DPF) controls to meet the emission requirements of EPA Tier 4 engines. Ecology does not consider this control equipment to be Best Available Control Technology (BACT) at Oxford because of the reasons outlined in this section.

BACT is defined[1] as "*an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation under chapter 70.94 RCW emitted from or which results from any new or modified stationary source, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant. In no event shall application of the "best available control technology" result in emissions of any pollutants which will exceed the emissions allowed by any applicable standard under 40 CFR Part 60 and Part 61. 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.[2] The "top-down" approach shifts the burden of proof to the applicant to justify why the proposed source is unable to apply the best technology available. The BACT analysis must be conducted for each pollutant that is subject to new source review.

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

[2] J. Craig Potter, EPA Assistant Administrator for Air and Radiation memorandum to EPA Regional Administrators, "Improving New Source Review (NSR) Implementation", December 1, 1987.

The 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

Microsoft 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

Microsoft's review of the RBLC found that urea -based selective catalytic reduction (SCR) was the most stringent add-on control option demonstrated on diesel engines. The application of the SCR technology for NOx control was therefore considered the top-case control technology and evaluated for technical feasibility and cost-effectiveness. 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 address 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. 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.

Microsoft has evaluated the cost effectiveness of installing and operating SCR systems on each of the proposed diesel engines. The analysis indicates that the use of SCR systems would cost approximately $18,700 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 $29,700 for NOx alone or $24,900 per ton of combined pollutants removed per year.

The annual estimated cost of $18,700 (for SCR use alone) provided by Microsoft is a conservative estimate that takes into account installation, tax, and shipping capital costs but assumes a lower bound estimate for operational, labor and maintenance costs of $0, whereas an upper bound CARB estimate could potentially amount to an additional $423,000 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 Oxford Data Center 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.

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, would 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, 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. Microsoft 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

Microsoft 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.

Microsoft has evaluated the cost effectiveness of installing and operating DPFs on each of the proposed diesel engines. The analysis indicates that the use of DPFs would cost approximately $526,000 per ton of engine exhaust particulate removed from the exhaust stream at Oxford each year. DPFs also remove CO and VOCs at costs of approximately $74,000 and $382,000 per ton per year respectively. If the cost effectiveness of DPF use is evaluated using the total amount of PM, CO, and VOCs reduced, the cost estimate would be approximately $55,000 per ton of pollutants removed per year.

These annual estimated costs (for DPF use alone) provided by Microsoft are conservatively low estimates that take into account installation, tax, and shipping capital costs but assume a lower bound estimate for operational, labor and maintenance costs of $0, whereas an upper bound CARB estimate could potentially amount to an additional $282,000/year.

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

4.2.1.2. ***Diesel Oxidation Catalysts.*** This method utilizes metal catalysts to oxidize carbon monoxide, particulate matter, and hydrocarbons in the diesel exhaust. Diesel oxidation catalysts (DOCs) are commercially available and reliable for controlling particulate matter, carbon monoxide and hydrocarbon emissions from diesel engines. While the primary pollutant controlled by DOCs is carbon monoxide, DOCs have also been demonstrated to reduce diesel engine exhaust particulate emissions, and also hydrocarbon emissions.

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

- Microsoft obtained the following recent DOC equipment costs from a vendor on November 11, 2013: ($52,100 for a stand-alone catalyzed DOC per single 2.5MWe generator; add a scaled amount of $25,299 for a single 0.750 MWe generator, and conservatively exclude the cost of four 2.0 MWe generators). For thirty two (32) 2.5MWe generators and one (1) 0.750 MWe generators, this amounts to $1,692,500. According to the vendor, DOC control efficiencies for this unit are CO, HC, and PM are 90%, 80%, and 20% respectively.
- The subtotal becomes $1,934,315 after accounting for shipping ($84,625), WA sales tax ($110,012), and direct on-site installation ($47,178).
- After adding indirect installation costs, the total capital investment amounts to: $2,289,003. 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 $238,079.
- At the control efficiencies provided from the vendor, the annual tons per year of emissions for CO (8.81 tpy), HC (1.92 tpy), and PM (1.24 tpy) become 7.93 tpy, 1.54 tpy, and 0.25 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 ($238,079 divided by 7.93 tpy for CO, etc..).

The corresponding annual DOC cost effectiveness value for carbon monoxide destruction alone is approximately $30,019 per ton. If particulate matter and hydrocarbons are individually considered, the cost effectiveness values become $959,386 and $154,771 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 $24,500 per ton of pollutants removed per year.

These annual estimated costs (for DOC use alone) provided by Microsoft are conservatively low estimates that take into account installation, tax, shipping, and other capital costs as mentioned above, but assume a lower bound estimate for operational, labor and maintenance costs of $0, whereas an upper bound CARB estimate could potentially amount to an additional $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.

4.2.3 <u>BACT Determination for PM, CO, and VOC</u>

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. Microsoft 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

Microsoft did not find any add-on control options commercially available and feasible for controlling sulfur dioxide emissions from diesel engines. Microsoft's proposed BACT for sulfur dioxide is the use of ultra-low sulfur diesel fuel (15 ppm by weight of sulfur).

4.3.2. <u>BACT Determination for Sulfur Dioxide</u>

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

4.4 BACT ANALYSIS FOR PM FROM COOLING TOWERS

The direct contact between the cooling water and air results in entrainment of some of the liquid water into the air. The resulting drift droplets contain total dissolved solids (TDS) in the cooling tower water, which can evaporate into air as particulate matter. For the Oxford facility, the recirculation water in the cooling towers will be pre-softened using the proprietary Water Conservation Technology International (WCTI) "pre-treatment system" to replace scale-forming mineral compounds (e.g., calcium and magnesium) with other non-toxic, non-scaling mineral compounds (e.g., sodium), which will allow the cooling towers to be operated with very high "cycles of concentration." Microsoft analyzed the industrial wastewater used in the cooling towers, which includes trace metals and chlorine disinfection byproducts, and estimates that cooling tower TAP emissions from all cooling towers combined (after implementing their proposed BACT in section 4.4.1.1) will not exceed the respective small quantity emission rates (SQERs) for any TAP.

4.4.1. BACT Options for PM from Cooling Towers

Microsoft reviewed the available published literature and the RBLC and identified drift eliminators as demonstrated technologies for the control of particulate matter (PM), from the proposed cooling towers. Drift eliminators can reduce the amount of drift, and therefore the amount of particulate matter released into the air.

4.4.1.1. *Cooling Towers with 0.0005 Percent Drift Efficiency*

Microsoft proposes to use high-efficiency drift eliminators that will achieve a liquid droplet drift rate of no more than 0.0005 percent of the recirculation flow rate within each cooling tower. Microsoft estimates that by using a 0.0005 percent drift rate and a total dissolved solids (TDS) concentration of 69,000 mg/L, only 13 percent of the solid evaporated drift particles will be smaller than 2.5 microns in diameter (PM2.5), and 56 percent will be smaller than PM10 (based on sizing approach presenting in: *"Calculating Realistic PM10 Emissions from Cooling Towers", Reisman and Frisbie, Environmental Progress, July 2002).* Microsoft's original application dated January 17, 2014 stated that a cooling tower with 0.0005 percent drift efficiency is the most efficient drift eliminator that is commercially available.

4.4.1.2. *Cooling Towers with 0.0003 Percent Drift Efficiency*

In Ecology's 2/26/2014 incompleteness letter, Ecology noted that a cooling tower with 0.0003 percent drift rate was in use at the Harquahala power plant in Arizona, which is regulated by the Maricopa County Air Pollution Control District (APCD). Because of this, Ecology asked Microsoft to defend or revise the claim in the original application stating that a cooling tower with 0.0005 percent drift efficiency is the most efficient drift eliminator that is commercially available. Upon review, Microsoft's consultant (Landau Associates) learned that the 0.0003 percent drift cooling tower at Harquahala is custom built for that large utility electric power plant. It has a water recirculation rate of 15,000 gpm, and is not comparable to what is needed at Oxford, which has a water recirculation rate of only 950 gpm. When Microsoft requested price quotes for cooling towers with 0.0003 percent drift efficiency for the cooling towers to be used at the Oxford Data

Center, venders responded that a cooling tower with 0.0003 percent drift efficiency is not a commercially available product because it is below field measurement capabilities, and could not be proven. According to EPA's BACT/LAER Clearinghouse database, Microsoft found BACT levels for cooling towers from 0.005 percent and 0.0005 percent. Of 30 cooling towers identified between 2003-2013, twenty-four had BACT determinations of 0.0005%, and six had BACT determinations from between 0.005 percent to 0.0005 percent.

Thus, Ecology considers this information to be a reasonable justification to accept high efficiency drift eliminators rated at 0.0005 percent drift to be the most efficient drift eliminators that are commercially available for the induced-draft mechanical cooling towers to be used at Oxford. Therefore, no other control options are considered.

4.4.2. BACT Determination for PM from Cooling Towers

Ecology accepts as BACT for particulate matter, cooling tower drift eliminators that can achieve a 0.0005 percent rate. These are the most efficient drift eliminators that are commercially available for the induced-draft mechanical cooling towers to be used at Oxford. As noted in this Technical Support Document (section 4), federal regulations require that BACT decisions are made on a *case-by-case* basis. This specific BACT decision is based on the information provided in section (4.4), including consideration of the high TDS content resulting from the anti-scaling WCTI approach used by Oxford.

4.5 BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS

Best Available Control Technology for Toxics (tBACT) means BACT, as applied to toxic air pollutants.[3] The procedure for determining tBACT follows the same procedure used above for determining BACT. Of the technologies Microsoft considered for BACT, the minimum estimated costs as applied to tBACT for the pollutants that exceed small quantity emission rates (SQERs) are as follows:

- The minimum estimated costs to control diesel engine exhaust particulate is estimated to be $557,000 per ton removed.
- The minimum estimated costs to control NO2 is estimated to be $187,000 per ton removed.
- The minimum estimated costs to control CO is estimated to be $30,000 per ton removed.
- The minimum estimated costs to control acrolein, which could be treated with the VOC treatment listed under BACT, is estimated to be greater than $1 billion per ton.

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 4.5 below represents tBACT for the proposed project.

Table 4.5. tBACT Determination

Toxic Air Pollutant	tBACT

[3] WAC 173-460-020

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
Ammonia	Ammonia emissions shall not exceed 15 per million volume-dry (ppmvd) at 15% Oxygen (O2) per engine.
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
Fluoride	Compliance with PM Cooling Tower BACT requirement
Manganese	Compliance with PM Cooling Tower BACT requirement
Copper	Compliance with PM Cooling Tower BACT requirement
Chloroform	Compliance with PM Cooling Tower BACT requirement
Bromodichloromethane	Compliance with PM Cooling Tower BACT requirement
Bromoform	Compliance with PM 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. Microsoft has demonstrated compliance with the national ambient air quality standards (NAAQS) and acceptable source impact levels (ASILs)**. (** See Section 6 of this TSD).

The AERMOD model used the following data and assumptions:

5.1 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.

5.2 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.

5.3 Each generator was modeled with a stack height of 46- feet above local ground.

5.4 The data center buildings, in addition to the individual generator enclosures were included to account for building downwash.

5.5 The receptor grid for the AERMOD modeling was established using a 10-meter grid spacing along the facility boundary extending to a distance of 350 meters from each facility boundary. A grid spacing of 25 meters was used for distances of 350 meters to 800 meters from the boundary. A grid spacing of 50 meters was used for distances from 500 meters to 2000 meters from the boundary. A grid spacing of 100 meters was used for distances beyond 2000 meters from the boundary.

5.6 1-hour NO_2 concentrations at and beyond the facility boundary were modeled using the Plume Volume Molar Ratio Method (PVMRM) module, with default concentrations of 49 parts per billion (ppb) of background ozone, and an equilibrium NO_2 to NOx ambient ratio of 90%.

5.7 Dispersion modeling is sensitive to the assumed stack parameters (i.e., flowrate and exhaust temperature). The stack temperature and stack exhaust velocity at each generator stack were set to values corresponding to the engine loads for each type of testing and power outage.

5.8 AERMOD Meteorological Pre-processor (AERMET) was used to estimate boundary layer parameters for use in AERMOD.

5.9 AERSURFACE was used to determine the percentage of land use type around the facility based on albedo, Bowen ratio, and surface roughness parameters.

5.10 Because regional background data is not available for all pollutants, annual average regional background concentrations for total PM and PM10 listed in the table below are based on available PM2.5 annual average regional background data from the source noted in footnote (a) of the table. Similarly, the 1st highest 24-hour average regional background concentrations for total PM is based on available PM10 24-hour average regional background data from the same source of footnote (a).

Except for diesel engine exhaust particulate which is predicted to exceed its ASIL, AERMOD model results show that no NAAQS or ASIL will be exceeded at or beyond the property boundary. The modeling results as listed in the application are provided below:

Criteria Pollutant	Standards in µg/m³ National Standards Primary	Standards in µg/m³ National Standards Secondary	Washington State Standards	Maximum Ambient Impact Concentration (µg/m³)	AERMOD Filename	Background Concentrations (µg/m³) (a)	Maximum Ambient Impact Concentration Added to Background (µg/m³) (If Available)
Total Suspended Particulates							
Annual average	--	--	60	1.16	PM10-121313a	6.5 (Regional)	7.65
1st-Highest 24-hour average during power outage with cooling towers	--	--	150	27.0	PM10-121313b	81 (Regional)	108
Particulate Matter (PM_{10})							
Annual average	--	--	50	1.16	PM10-121313a	6.5 (Regional)	7.7

1st-Highest 24-hour average during power outage with cooling towers	150	150	150	20	PM10-121313b	81(Regional)	101
Particulate Matter ($PM_{2.5}$)							
Annual average	12	15	--	0.33	PM10-121313a	6.5 (Regional)	6.8
4th-highest 24-hour average for cooling towers and electrical bypass	35	35	--	3.1	PM25-120613a-e, f	21 (Regional) + 0.021 (Local)	24.4
Carbon Monoxide (CO)							
8-hour average	10,000	--	10,000	873	CO-112713a	482	1,355
1-hour average	40,000	--	40,000	1507	CO-112713a	842	2,349
Nitrogen Oxides (NO_2)							
Annual average (b)	100	100	100	1.1	NOx-120413a	2.8	3.9
1-hour average	188	--	--	160	NOx-112413b thru f	15.6 (Regional), 0.28 (local)	176
Sulfur Dioxide (SO_2)							
Annual arithmetic mean	--	--	80	0.0066	(c)	0.26	0.27
24-hour average	--	--	365	1.2	SO2-120413a	1.0	2.2
3-hour average	--	1,300	--	2.3	SO2-120413a	2.1	4.4
1-hour average	60	--	319	3.1	SO2-120413a	2.6	5.7

Toxic Air Pollutant	ASIL (µg/m³)	Averaging Period	1st-Highest Ambient Concentration (µg/m³)	AERMOD Filename
DEEP	0.00333	Annual average	0.80	DEEP-121613a
NO_2	470	1-hour average	388	NOx-112413a
CO	23,000	1-hour average	1599	CO-112713a
Ammonia	70.8	24-hour average	21.8	(d)
Acrolein	0.06	24-hour average	0.0006	(d)

Notes:

µg/m³ = Micrograms per cubic meter.

ppm = Parts per million.

ASIL = Acceptable source impact level.

DEEP = Diesel engine exhaust particulate matter

(a) Sum of "regional background" plus "local background" values. Regional background concentrations obtained from WSU NW Airquest website. Local background concentrations derived from AERMOD modeling and include emissions from: Con Agra Foods, Microsoft Columbia Data Center, and the Dell Data Center (see Section 6 of this TSD).

(b) For the purpose of determining the 3-year average, five separate models were run (one for each year of meteorological data) to determine the 98th percentile concentration for each year based on the NAAQS.
(c) A dispersion factor was used to calculate the annual average concentration of SO_2 in ambient air based on the annual average DEEP model.
(d) A dispersion factor was used to calculate the 24-hour average concentration of ammonia and acrolein in ambient air based on the 1st highest PM 24-hour average model.

As required by WAC 173-460-090, emissions of diesel engine exhaust particulate are further evaluated in the following section of this document.

6. SECOND TIER REVIEW FOR DIESEL ENGINE EXHAUST PARTICULATE

Proposed emissions of diesel engine exhaust particulate (DEEP) from the thirty seven (37) Oxford engines exceed the regulatory trigger level for toxic air pollutants (also called an Acceptable Source Impact Level, (ASIL)). A second tier review was required for DEEP in accordance with WAC 173-460-090, and Oxford 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 Oxford's increased emissions of all identified carcinogenic compounds (including DEEP and numerous other constituents), nitrogen dioxide, ammonia, carbon monoxide, and acrolein. Oxford also reported the cumulative risks associated with Oxford and prevailing sources in their HIA document based on a cumulative modeling approach. The Oxford cumulative risk study is based on proposed generators, nearby existing permitted data center sources, and other background sources including highways and railroads.

Large diesel-powered backup engines emit DEEP, which is a high priority toxic air pollutant in the state of Washington. In light of the rapid development of other data centers in the Quincy area, and recognizing the potency of DEEP emissions, Ecology decided to evaluate Oxford's proposal in a separate community-wide basis modeling effort, even though it is not required to do so by state law. The Ecology community-wide evaluation approach considers the cumulative impacts of DEEP emissions resulting from Oxford's project, prevailing background emissions from existing permitted data centers, and other DEEP sources in Quincy, beyond what was considered in the Oxford cumulative modeling effort.

The Oxford 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 37 generators and 32 cooling towers will not have an adverse impact on air quality. Ecology finds that Microsoft's Oxford Data Center has satisfied all requirements for NOC approval.

****END OF MICROSOFT OXFORD TSD ****

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A NEW) AIR CONTAMINANT SOURCE FOR) **MICROSOFT CORPORATION**) **THE OXFORD DATA CENTER**)

APPROVAL ORDER No. 14AQ-E537

TO: John Radick, Senior Program Manager
US-Data Center Services
Microsoft Corporation
5600 148th Avenue NE
Redmond, WA 98052

On January 27, 2014, Ecology received a Notice of Construction (NOC) application submittal from the Microsoft Corporation (MSN), requesting approval for Phases 1 and 2 of a new facility named the Oxford Data Center located at Industrial Park #5, west of Road R NW at the end of Port Industrial Parkway in Quincy, WA. The NOC application was determined to be incomplete, and an incompleteness letter was issued on February 26, 2014. A revised NOC application was received on March 17, 2014. The application was considered complete on June 3, 2014.

EQUIPMENT

A list of equipment for this project is provided in Tables 1.1–1.4 below. Engine sizes listed in Tables 1.1–1.3 are in megawatt (MWe) units with the "e" indicating "electrical" based on generator power ratings listed on the engine specifications provided with the application. MWe is the assumed engine power rating unit for all Approval Conditions related to this Order.

Table 1.1. 2.5 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Phase/Building	Unit ID	Engine SN	Generator SN	Build Date
Ph 1/AZ-4A				
"				
"				
"				
Ph 1/AZ-4B				
"				
"				
"				
Ph 1/AZ-4C				
"				
"				
"				
Ph 1/AZ-4D				
"				
"				

Table 1.1. 2.5 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Phase/Building	Unit ID	Engine SN	Generator SN	Build Date
"				
Ph 2/AZ-3A				
"				
"				
"				
Ph 2/AZ-3B				
"				
"				
"				
Ph 2/AZ-3C				
"				
"				
"				
Ph 2/AZ-3D				
"				
"				
"				

Table 1.2. 2.0 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Building	Unit ID	Engine SN	Generator SN	Build Date
CNR-A	CNR-A			
CNR-B	CNR-B			
CNR-C	CNR-C			
CNR-D	CNR-D			

Table 1.3. 0.750 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Building	Unit ID	Engine SN	Generator SN	Build Date
Admin				

Table 1.4. Cooling Towers for Phases 1 & 2			
Phase/Building	# Cooling Towers	# Cells per Tower	Total # Cooling Tower Cells
Ph 1/AZ-4A	4	4	16
Ph 1/AZ-4B	4	4	16
Ph 1/AZ-4C	4	4	16

Table 1.4. Cooling Towers for Phases 1 & 2			
Phase/Building	# Cooling Towers	# Cells per Tower	Total # Cooling Tower Cells
Ph 1/AZ-4D	4	4	16
Ph 2/AZ-3A	4	4	16
Ph 2/AZ-3B	4	4	16
Ph 2/AZ-3C	4	4	16
Ph 2/AZ-3D	4	4	16
Total	32	4	128

PROJECT SUMMARY

1. The Oxford Data Center will contain four Phase 1 activity zone (AZ) buildings designated AZ-4A, AZ-4B, AZ-4C, AZ-4D; four core network room (CNR) buildings; an administrative building; and four phase 2 AZ buildings designated AZ-3A, AZ-3B, AZ-3C, AZ-3D. Building construction for the Phase 1 generators and cooling towers is expected to begin before the end of October 2014 with commissioning of generators spread over an approximately 9-month period. Construction of Phase 2 is expected to begin within 18 months after the start of generator commissioning for Phase 1. Project Oxford Phases 1 and 2 will have thirty-two (32) Caterpillar Model 3516C-HD-TA diesel powered electric emergency generators in the activity zone buildings with a power rating of 2.5 MWe per generator, four (4) Caterpillar Model 3516C-TA diesel powered electric emergency generators in the CNR buildings with a power rating of 2.0 MWe per generator, and one (1) Caterpillar Model C27ATAAC diesel powered electric emergency generator in the administrative building with a power rating of 0.75 MWe.

2. Project Oxford will use SPX-Marley Model MD5008PAF2 cooling towers to dissipate heat from the AZ buildings. Each cooling tower has four cells and four fans. Each of the eight AZ buildings will have four cooling towers for a total of thirty-two (32) cooling towers. Each of the thirty-two individual cooling towers has a design recirculation rate of 950 gallons per minute (gpm) and 143,600 cubic feet per minute (cfm).

   Combined Phase 1 and 2 emissions for Project Oxford are contained in Tables 2.1 and 2.2.

Table 2.1. Criteria Pollutants Potential to Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
Total particulate matter (PM)	All $PM_{2.5}$	23	23.5
PM smaller than 10 microns in diameter (PM_{10})	All $PM_{2.5}$	12.8	13.3
PM smaller than 2.5 microns in diameter ($PM_{2.5}$)[(a)]	0.536	2.99	3.53

Table 2.1. Criteria Pollutants Potential to Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
Carbon monoxide (CO)	15.6	0	15.6
Nitrogen oxides (NO_X)	8.6	0	8.6
Volatile organic compound (VOC)	8.0E-01	Negligible	0.8
Sulfur dioxide (SO_2)	4.7E-02	0	4.7E-02
Lead	Negligible	0	Negligible

[a] All PM emissions from the generator engines are $PM_{2.5}$, and all $PM_{2.5}$ from the generator engines is considered Diesel Engine Exhaust Particulate (DEEP).

Table 2.2. Toxic Air Pollutants Potential To Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
CO	15.6	0	15.6
Ammonia	0.71	0	0.71
DEEP[a]	5.36E-01	0	5.36E-01
SO_2	4.7E-02	0	4.7E-02
Primary nitrogen dioxide (NO_2)[b]	8.6E-01	0	8.7E-01
Benzene	2.4E-03	0	2.4E-03
Toluene	8.6E-04	0	8.6E-04
Xylenes	5.9E-04	0	5.9E-04
1,3 Butadiene	1.2E-04	0	1.2E-04
Formaldehyde	2.4E-04	0	2.4E-04
Acetaldehyde	7.7E-05	0	7.7E-05
Acrolein	2.4E-05	0	2.4E-05
Benzo(a)pyrene	7.9E-07	0	7.9E-07
Benzo(a)anthracene	1.9E-06	0	1.9E-06
Chrysene	4.7E-06	0	4.7E-06
Benzo(b)fluoranthene	3.4E-06	0	3.4E-06
Benzo(k)fluoranthene	6.7E-07	0	6.7E-07
Dibenz(a,h)anthracene	1.1E-06	0	1.1E-06
Ideno(1,2,3-cd)pyrene	1.3E-06	0	1.3E-06
Napthalene	4.0E-04	0	4.0E-04
Propylene	8.5E-03	0	8.5E-03

Table 2.2. Toxic Air Pollutants Potential To Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
Fluoride	0	4.8E-03	4.8E-03
Manganese	0	4.6E-04	4.6E-04
Copper	0	1.6E-04	1.6E-04
Chloroform	0	2.6E-04	2.6E-04
Bromodichloromethane	0	2.6E-04	2.6E-04
Bromoform	0	6.9E-03	6.9E-03

(a) DEEP is measured by EPA Method 5 (or 201a), which measures filterable (front-half) particulate emissions.
(b) NO_2 is assumed to be equal to 10 percent of the total NO_X emitted.

DETERMINATIONS

In relation to this project, the Washington State 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) as defined below~~meet applicable air quality requirements as defined below:

Table 2a.1 BACT Determinations	
Pollutant(s)	BACT Determination
PM, CO, and VOCs	a. Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219. b. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. c. Use of high-efficiency drift eliminators which achieve a liquid droplet drift rate of no more than 0.0005 percent of the recirculation flow rate within each cooling tower.
NO_X	a. Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219, and satisfy the written verification requirements of Approval Condition 2.5. b. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.

Table 2a.1 BACT Determinations	
Pollutant(s)	**BACT Determination**
SO_2	Use of ultra-low sulfur diesel fuel containing no more than 15 parts per million by weight of sulfur.

3. The proposed project, if constructed and operated as herein required, will utilize Best Available Control Technology for toxic air pollutants (TAPs) (tBACT) as defined below:

Table 3.1 tBACT Determinations	
TAPs	**tBACT Determination**
Acetaldehyde, CO, acrolein, benzene, benzo(a)pyrene, 1,3-butadiene, DEEP, formaldehyde, toluene, total PAHs, xylenes, chrysene, benzo(a)anthracene, napthalene, benzo(b)fluoranthene, propylene, dibenz(a,h)anthracene, Ideno(1,2,3-cd)pyrene, fluoride, manganese, copper, chloroform, bromodichloromethane, bromoform,	Compliance with the VOC and PM BACT requirement.
Ammonia	No more than 15 parts per million volume-dry (ppmvd) at 15 percent oxygen per engine.
NO_2	Compliance with the NO_X BACT requirement.
SO_2	Compliance with the SO_2 BACT requirement.

4. In accordance with WAC 173-460-090, a second tier health risk analysis has been submitted by the applicant for DEEP emissions. Ecology has concluded that this project has satisfied all requirements of a second tier analysis.

THEREFORE, IT IS ORDERED that the project as described in the NOC application and more specifically detailed in plans, specifications, and other information submitted to Ecology is approved for construction and operation, provided the following conditions are met:

APPROVAL CONDITIONS

1. ADMINISTRATIVE CONDITION

1.1. The emergency engine generators approved for operation by this Order are to be used solely for those purposes authorized for emergency generators under 40 CFR 60, Subpart IIII.

1.2. The Oxford Data Center shall coordinate engine maintenance and testing schedules with Dell and the Microsoft Columbia Data Center in Quincy to minimize overlap between data center scheduled testing. Microsoft shall maintain records of the coordination communications with the other data centers, and those communications shall be available for review by Ecology.

2. EQUIPMENT RESTRICTIONS

2.1. The thirty-two 2.5 MWe engine, four 2.0 MWe engines, and the single 0.750 MWe engine 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 0.750 MWe, 2.0 MWe, and 2.5 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 Oxford 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. Each engine must be equipped with selective catalytic reduction (SCR) and catalyzed diesel particulate filter (DPF) controls to meet the emission requirements of EPA Tier 4 engines. The only 0.750 MWe, 2.0 MWe, and 2.5 MWe engines and electrical generating units approved for operation at the Oxford Data Center are those listed in Tables 1.1–1.3 above.

2.3. Replacement of failed engines with identical engines (same manufacturer and model) requires notification prior to installation, but will not require NOC unless there is an emission rate increase from the replacement engines.

2.4. The thirty-two 2.5 MWe engine-generator exhaust stack dimensions shall be greater than or equal to 46 feet above ground level, no more than 18 inches in diameter, and approximately 16 feet above roof height. The four 2.0 MWe engine-generator exhaust stack heights shall be greater than or equal to 46 feet above ground level, no more than 16 inches in diameter, and approximately 16 feet above roof height. The one 0.750 MWe engine-generator exhaust stack height shall be greater than or equal to 46 feet above ground level, no more than 14 inches in diameter, and approximately 16 feet above roof height.

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

3. OPERATING LIMITATIONS

3.1. Fuel consumption at the Oxford Data Center facility shall be limited to a total of 431,000 gallons per year and 119,300 gallons per day of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.00150 weight percent sulfur). Total facility annual fuel consumption may be averaged over a three (3) year period using monthly rolling totals.

3.2. Except as provided in Approval Condition 3.3, the thirty-seven (37) Project Oxford Data Center engines shall not operate more than the following load specific limits:

3.2.1. Operational rpm with no load (referred to as idle): for weekly testing, corrective engine maintenance, and generator cool-down, each generator shall not exceed 29 hours per year of operation averaged across all generators in service over a rolling monthly 3-year average.

3.2.2. Approximately eighty percent load: for emergency power outages, load bank testing, corrective engine testing, electrical bypass for switchgear, transformer, or substation operations, and non-emergency situations authorized by 40 CFR 60.4211(f), the following conditions apply:

3.2.2.1 Each generator shall not exceed 40 hours per year of operation averaged across all generators in service over a rolling monthly 3-year average.

3.2.2.2 Daily generator usage shall not exceed a maximum limit of 192 MWe hours per calendar day, except during up to four days per year of emergency power outage.

3.2.2.3 Maximum hourly generator usage shall be limited to no more than four 2.5 MWe generators operating simultaneously during any given hour except during emergency power outages.

3.2.3. One hundred percent load: for monthly load bank testing, semiannual load bank testing, and as needed generator corrective maintenance, each generator shall not exceed 17.5 hours per year of operation averaged across all generators in service over a rolling monthly 3-year average, with no more than three 2.5 MWe generators operating simultaneously during any given hour.

3.3. The Oxford Data Center engines shall not exceed the following operating limits during commissioning and stack testing:

3.3.1. For commissioning events, each generator shall not exceed a one-time total of 50 hours of operation over a full range of loads, averaged over all facility generators commissioned in that year.

3.3.2. For stack testing, no more than two generators shall be tested per year, every three years, with each generator operating no more than 30 hours per testing event averaged over all generators tested in that year, and each testing event shall be conducted according to the testing requirements in Approval Condition 4. If more than 30 hours per year of stack testing are needed for re-testing to satisfy Approval Condition 4.4, those hours should be combined with any of the pre-approved hours in Approval Condition 3.2. Additional operation of the engines for the purpose of emissions testing beyond the operating hour and fuel consumptions limits authorized by this Order will be considered by Ecology upon request in writing.

3.4. All of the 32 Phase 1 and 2 cooling towers shall comply with the following conditions:

3.4.1. Each individual cooling tower unit shall use a mist eliminator that meets the BACT determination for PM of Section 2(c) of this Order.

3.4.2. Chemicals containing hexavalent chromium cannot be used to pre-treat the cooling tower makeup water.

4. GENERAL TESTING AND MAINTENANCE REQUIREMENTS

4.1. The Oxford Data Center will follow engine-manufacturer's recommended diagnostic testing and maintenance procedures to ensure that each of the thirty-two (32) 2.5 MWe engines, four (4) 2.0 MWe engines, and one (1) 0.750 MWe engines will conform to applicable engine specifications in Approval Condition 2.1 and applicable emission specifications in Approval Condition 5 throughout the life of each engine.

4.2. Any emission testing performed to verify conditions of this Approval Order or for submittal to Ecology in support of this facility's operations, requires that Microsoft comply with all requirements in 40 CFR 60.8 except subsection (g). 40 CFR 60.8(g) may be required by Ecology at their discretion. A test plan will be submitted to Ecology at least 30 days prior to testing that will include a testing protocol for Ecology approval that includes the following information:

4.2.1. The location and Unit ID of the equipment proposed to be tested.

4.2.2. The operating parameters to be monitored during the test.

4.2.3. A description of the source including manufacturer, model number, design capacity of the equipment and the location of the sample ports or test locations.

4.2.4. Time and date of the test and identification and qualifications of the personnel involved.

4.2.5. A description of the test methods or procedures to be used.

4.3. ~~To show continuing compliance with the applicable emission standards for the Tier 2 certified engines specified in Approval Condition 2.1, t~~The Oxford Data Center shall source test engines as described in Approval Order 4.4 to show compliance with emission limits in Table 4.

4.4. The following testing requirements are for ammonia, PM, NO_X, CO, and non-methane hydro-carbons (NMHC). The test methods in Table 4 shall be used for each test event unless an alternate method is proposed by Microsoft and approved in writing by Ecology prior to the test. Except for ammonia testing, which requires only a single-load test, each pollutant in Table 4 shall be tested at two load testing approaches (five-load weighted and single load). A single testing event is defined as completion of all tests in

Table 4 per engine, and each test shall be performed on different engines from those tested previously, until each engine at the data center has been tested except as provided in subsection 4.4.4. In the event that any source test shows non-compliance with any applicable Table 4 emission standards for the engines specified in Approval Condition 2.1, Microsoft shall repair or replace the engine and repeat the test on the same engine plus two additional engines from the same phase of the Oxford Data Center. Test reports shall be submitted to Ecology as provided in Condition 9.5 of this Order.

Table 4. Testing Requirements

Pollutant	Load Test	Test Method	Emission Limits	Compliance Test Frequency
PM	Five-load weighted avg.	EPA Method 5 or 201a	0.03 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 5 or 201a, and EPA Method 202	0.1 lb/hr (0.75 MWe)	
			0.21 lb/hr (2.0 MWe)	
			0.288 lb/hr (2.5 MWe)	
NO_X	Five-load weighted avg.	EPA Method 7E	0.67 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 7E	1.8 lb/hr (0.75 MWe)	
			2.6 lb/hr (2.0 MWe)	
			3.37 lb/hr (2.5 MWe)	
CO	Five-load weighted avg.	EPA Method 10	3.5 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 10	0.75 lb/hr (0.75 MWe)	
			10.1 lb/hr (2.0 MWe)	
			15.04 lb/hr (2.5 MWe)	
NMHC/ VOC	Five-load weighted avg.	EPA Method 25A and EPA Method 18	0.19 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 25A and Method 18	0.1 lb/hr (0.75 MWe)	
			0.8 lb/hr (2.0 MWe)	
			0.8 lb/hr (2.5 MWe)	
Ammonia	Single-load (78%-82%)	BAAQMD Method ST-1B or EPA Method 320	0.19 lb/hr (0.75 MWe)	Test two different engines within 12 months of engine startup. Test two different untested engines every 3 years.
			0.51 lb/hr (2.0 MWe)	
			0.64 lb/hr (2.0 MWe)	

4.4.1. For the five load tests, testing shall be performed at each of the five engine torque load levels described in Table 2 of Appendix B to Subpart E of 40 CFR Part 89, and data shall be reduced to a single-weighted average value using the weighting factors specified in Table 2. Each test run shall be done within 2 percent of the target load value (e.g., the test runs for the nominal 10 percent load condition shall be done at loads from 8 to 12 percent). Microsoft may replace the dynamometer requirement in Subpart E of 40 CFR Part 89 with corresponding measurement of gen-set electrical output to derive horsepower output.

4.4.2. The F-factor described in Method 19 shall be used to calculate exhaust flow rate through the exhaust stack, except that EPA Method 2 shall be used to calculate the flow rate for purposes of particulate testing. The fuel meter data, as measured according to Approval Condition 4.5, shall be included in the test report, along with the emissions calculations.

4.4.3. Three test runs shall be conducted for each engine. Each run must last at least 60 minutes. Analyzer data shall be recorded at least once every minute during the test. Engine run time and horsepower output and fuel usage shall be recorded during each test run for each load and shall be included in the test report. In lieu of these requirements, Microsoft may propose a test protocol to Ecology in writing for approval.

4.4.4. The one (1) 0.750 MWe engine shall be stack tested according to Table 4. If the first two (2) 2.0 MWe engines tested are found to have consistent test results and are in compliance with all applicable Table 4 emission load tests, Microsoft may request approval from Ecology to discontinue compliance testing for the other two (2) 2.0 MWe engines. If the first five (5) 2.5 MWe engines tested are found to have consistent test results and are in compliance with all applicable Table 4 emission load tests, Microsoft may request approval from Ecology to discontinue compliance testing for the other twenty-seven (27) 2.5 MWe engines.

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

4.6. Each engine shall be connected to a properly installed and maintained fuel flow monitoring system (either physical or generator manufacturer provided software) that records the amount of fuel consumed by the engine during each operation.

5. EMISSION LIMITS

The thirty-two (32) 2.5 MWe engine-generators, the four (4) 2.0 MWe engine-generators, and the one (1) 0.750 MWe engine-generator shall meet the follow emission rate limitations:

5.1. Each emergency engine shall not exceed the applicable emission limits in Table 4.

5.2. Total annual facility-wide emissions shall not exceed the following: 13.3 tons per year (tpy) of PM10; 3.53 tpy of PM2.5; 15.6 tpy of CO; 8.6 tpy of NOx; 0.8 tpy of VOC; 0.047 tpy of SO2; 0.536 tpy of DEEP; 0.86 tpy of NO2; and 0.71 tpy of ammonia.

5.3. Visual emissions from each diesel electric generator exhaust stack shall be no more than five percent, with the exception of a ten (10) minute period after unit start-up. Visual emissions shall be measured by using the procedures contained in 40 CFR 60, Appendix A, Method 9.

5.4. Ammonia concentrations shall comply with the emission limits in Table 4.

6. OPERATION AND MAINTENANCE MANUALS

A site-specific O&M manual for the Oxford Data Center facility equipment shall be developed and followed. Manufacturer's operating instructions and design specifications for the engines, generators, cooling towers, and associated equipment shall be included in the manual. 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, cooling towers, 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 Tiered Emission Standards appropriate for that engine throughout the life of the engine.

6.2. Normal engine operating parameters and design specifications.

6.3. Operating maintenance schedule for engines and cooling towers.

6.4. Specification sheet for cooling towers verifying 0.0005 percent drift rating, water flow, air flow, makeup water rate, and a list of chemicals used to pre-treat cooling tower makeup water.

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, O&M 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. 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. Annual hours of operation for each diesel engine.

8.3. Annual number of start-ups for each diesel engine.

8.4. Annual gross power generated by facility-wide operation of the emergency backup electrical generators.

8.5. Record of each operational period for each engine with the following information:

8.5.1 Date of engine operation,
8.5.2 engine unit ID,
8.5.3 reason for operating,
8.5.4 duration of operation, and
8.5.5 the percent of generator electrical load.

8.58.6 Upset condition log for each facility permitted emission unit (the 37 engines and 32 cooling towers) and their respective control units that include date, time, duration of upset, cause, and corrective action.

8.68.7 Applicable recordkeeping for emergency engines required by 40 CFR Part 60, Subpart IIII Section 60.4214 (b),(c), and (d).

8.78.8 Air quality complaints received from the public or other entity, and the affected emissions units.

9 REPORTING

9.1 The serial number of the engine and the generator, and the engine build date 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.

9.2.1 Monthly rolling annual total summary of air contaminant emissions., m
9.2.2 Monthly rolling hours of operation with annual total. , and m
9.2.19.2.3 Monthly rolling gross power generation with annual total.

9.2.29.2.4 Monthly Rrolling annual total summary of fuel usage (in gallons).

9.2.5 Calendar year annual total runtime hours for each range of generator electrical load.

9.3 Written notification that the O&M manual described in Approval Condition 6 has been developed and updated within 60 days after the issuance of this Order. A copy of the most current O&M manual will be provided to Ecology if requested.

9.4 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 Microsoft Corporation'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.

9.5 Results of any stack testing performed 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 The information from Conditions 4.2.3, 4.2.4, and 4.2.5 including field and analytical laboratory data, quality assurance/quality control procedures and documentation.

9.5.2 A summary of results, reported in units and averaging periods consistent with the applicable emission standard or limit.

9.5.3 A summary of control system or equipment operating conditions.

9.5.4 A summary of operating parameters for the diesel engines being tested.

9.5.5 Copies of field data and example calculations.

9.5.6 Chain of custody information.

9.5.7 Calibration documentation

9.5.8 Discussion of any abnormalities associated with the results.

9.5.9 A statement signed by the senior management official of the testing firm certifying the validity of the source test report.

9.6 If Microsoft operates or contracts to operate any emergency diesel engine at the data center in non-emergency situations authorized by 40 CFR 60.4211(f), Microsoft shall submit the annual report required by 40 CFR 60.4214(d)

10 GENERAL CONDITIONS

10.1 **Commencing/Discontinuing Construction and/or Operations:** This Approval Order shall become void if construction of Phase 1 is not commenced within eighteen (18) months following the date of this Approval Order, or if Phase 2 is not commenced within eighteen (18) months following completion of commissioning of the final engine in Phase 1. No additional engines shall be installed, if construction of both phases is discontinued for a period of eighteen (18) months, or if operation of backup emergency diesel electric generator is discontinued at the facility 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 emergency diesel electric generators, and cooling towers, and be available for review upon request by Ecology.

10.4 **Equipment Operation:** Operation of the generator units, cooling towers, 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, engines, or cooling towers 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 **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 determinationOrder, shall be subject to Ecology enforcement under applicable regulations.

10.7 **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, 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 15th day of August 2014, 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

IN THE MATTER OF APPROVING A NEW)
AIR CONTAMINANT SOURCE FOR)
MICROSOFT CORPORATION)
THE OXFORD DATA CENTER)

APPROVAL ORDER No. 14AQ-E537

TO: John Radick, Senior Program Manager
US-Data Center Services
Microsoft Corporation
5600 148th Avenue NE
Redmond, WA 98052

On January 27, 2014, Ecology received a Notice of Construction (NOC) application submittal from the Microsoft Corporation (MSN), requesting approval for Phases 1 and 2 of a new facility named the Oxford Data Center located at Industrial Park #5, west of Road R NW at the end of Port Industrial Parkway in Quincy, WA. The NOC application was determined to be incomplete, and an incompleteness letter was issued on February 26, 2014. A revised NOC application was received on March 17, 2014. The application was considered complete on June 3, 2014.

EQUIPMENT

A list of equipment for this project is provided in Tables 1.1–1.4 below. Engine sizes listed in Tables 1.1–1.3 are in megawatt (MWe) units with the "e" indicating "electrical" based on generator power ratings listed on the engine specifications provided with the application. MWe is the assumed engine power rating unit for all Approval Conditions related to this Order.

Table 1.1. 2.5 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Phase/Building	Unit ID	Engine SN	Generator SN	Build Date
Ph 1/AZ-4A				
"				
"				
"				
Ph 1/AZ-4B				
"				
"				
"				
Ph 1/AZ-4C				
"				
"				
"				
Ph 1/AZ-4D				
"				
"				

Table 1.1. 2.5 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Phase/Building	**Unit ID**	**Engine SN**	**Generator SN**	**Build Date**
"				
Ph 2/AZ-3A				
"				
"				
"				
Ph 2/AZ-3B				
"				
"				
"				
Ph 2/AZ-3C				
"				
"				
"				
Ph 2/AZ-3D				
"				
"				
"				

Table 1.2. 2.0 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Building	**Unit ID**	**Engine SN**	**Generator SN**	**Build Date**
CNR-A	CNR-A			
CNR-B	CNR-B			
CNR-C	CNR-C			
CNR-D	CNR-D			

Table 1.3. 0.750 MWe Engine & Generator Serial Numbers for Phases 1 & 2				
Building	**Unit ID**	**Engine SN**	**Generator SN**	**Build Date**
Admin				

Table 1.4. Cooling Towers for Phases 1 & 2			
Phase/Building	**# Cooling Towers**	**# Cells per Tower**	**Total # Cooling Tower Cells**
Ph 1/AZ-4A	4	4	16
Ph 1/AZ-4B	4	4	16
Ph 1/AZ-4C	4	4	16

Table 1.4. Cooling Towers for Phases 1 & 2			
Phase/Building	# Cooling Towers	# Cells per Tower	Total # Cooling Tower Cells
Ph 1/AZ-4D	4	4	16
Ph 2/AZ-3A	4	4	16
Ph 2/AZ-3B	4	4	16
Ph 2/AZ-3C	4	4	16
Ph 2/AZ-3D	4	4	16
Total	32	4	128

PROJECT SUMMARY

1. The Oxford Data Center will contain four Phase 1 activity zone (AZ) buildings designated AZ-4A, AZ-4B, AZ-4C, AZ-4D; four core network room (CNR) buildings; an administrative building; and four phase 2 AZ buildings designated AZ-3A, AZ-3B, AZ-3C, AZ-3D. Building construction for the Phase 1 generators and cooling towers is expected to begin before the end of October 2014 with commissioning of generators spread over an approximately 9-month period. Construction of Phase 2 is expected to begin within 18 months after the start of generator commissioning for Phase 1. Project Oxford Phases 1 and 2 will have thirty-two (32) Caterpillar Model 3516C-HD-TA diesel powered electric emergency generators in the activity zone buildings with a power rating of 2.5 MWe per generator, four (4) Caterpillar Model 3516C-TA diesel powered electric emergency generators in the CNR buildings with a power rating of 2.0 MWe per generator, and one (1) Caterpillar Model C27ATAAC diesel powered electric emergency generator in the administrative building with a power rating of 0.75 MWe.

2. Project Oxford will use SPX-Marley Model MD5008PAF2 cooling towers to dissipate heat from the AZ buildings. Each cooling tower has four cells and four fans. Each of the eight AZ buildings will have four cooling towers for a total of thirty-two (32) cooling towers. Each of the thirty-two individual cooling towers has a design recirculation rate of 950 gallons per minute (gpm) and 143,600 cubic feet per minute (cfm).

   Combined Phase 1 and 2 emissions for Project Oxford are contained in Tables 2.1 and 2.2.

Table 2.1. Criteria Pollutants Potential to Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
Total particulate matter (PM)	All $PM_{2.5}$	23	23.5
PM smaller than 10 microns in diameter (PM_{10})	All $PM_{2.5}$	12.8	13.3
PM smaller than 2.5 microns in diameter ($PM_{2.5}$)[(a)]	0.536	2.99	3.53

Table 2.1. Criteria Pollutants Potential to Emit for Phases 1 & 2 (TPY)

Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
Carbon monoxide (CO)	15.6	0	15.6
Nitrogen oxides (NO_X)	8.6	0	8.6
Volatile organic compound (VOC)	8.0E-01	Negligible	0.8
Sulfur dioxide (SO_2)	4.7E-02	0	4.7E-02
Lead	Negligible	0	Negligible

(a) All PM emissions from the generator engines are $PM_{2.5}$, and all $PM_{2.5}$ from the generator engines is considered Diesel Engine Exhaust Particulate (DEEP).

Table 2.2. Toxic Air Pollutants Potential To Emit for Phases 1 & 2 (TPY)

Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
CO	15.6	0	15.6
Ammonia	0.71	0	0.71
DEEP[(a)]	5.36E-01	0	5.36E-01
SO_2	4.7E-02	0	4.7E-02
Primary nitrogen dioxide (NO_2)[(b)]	8.6E-01	0	8.7E-01
Benzene	2.4E-03	0	2.4E-03
Toluene	8.6E-04	0	8.6E-04
Xylenes	5.9E-04	0	5.9E-04
1,3 Butadiene	1.2E-04	0	1.2E-04
Formaldehyde	2.4E-04	0	2.4E-04
Acetaldehyde	7.7E-05	0	7.7E-05
Acrolein	2.4E-05	0	2.4E-05
Benzo(a)pyrene	7.9E-07	0	7.9E-07
Benzo(a)anthracene	1.9E-06	0	1.9E-06
Chrysene	4.7E-06	0	4.7E-06
Benzo(b)fluoranthene	3.4E-06	0	3.4E-06
Benzo(k)fluoranthene	6.7E-07	0	6.7E-07
Dibenz(a,h)anthracene	1.1E-06	0	1.1E-06
Ideno(1,2,3-cd)pyrene	1.3E-06	0	1.3E-06
Napthalene	4.0E-04	0	4.0E-04
Propylene	8.5E-03	0	8.5E-03

Table 2.2. Toxic Air Pollutants Potential To Emit for Phases 1 & 2 (TPY)			
Pollutant	Main Generator Engines	Cooling Tower	Total Facility Emissions
Fluoride	0	4.8E-03	4.8E-03
Manganese	0	4.6E-04	4.6E-04
Copper	0	1.6E-04	1.6E-04
Chloroform	0	2.6E-04	2.6E-04
Bromodichloromethane	0	2.6E-04	2.6E-04
Bromoform	0	6.9E-03	6.9E-03

(a) DEEP is measured by EPA Method 5 (or 201a), which measures filterable (front-half) particulate emissions.
(b) NO_2 is assumed to be equal to 10 percent of the total NO_X emitted.

DETERMINATIONS

In relation to this project, the Washington State 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 meet applicable air quality requirements as defined below:

Table 2a.1 BACT Determinations	
Pollutant(s)	BACT Determination
PM, CO, and VOCs	a. Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219. b. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII. c. Use of high-efficiency drift eliminators which achieve a liquid droplet drift rate of no more than 0.0005 percent of the recirculation flow rate within each cooling tower.
NO_X	a. Use of EPA Tier 2 certified engines installed and operated as emergency engines, as defined in 40 CFR Section 60.4219, and satisfy the written verification requirements of Approval Condition 2.5. b. Compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII.
SO_2	Use of ultra-low sulfur diesel fuel containing no more

Table 2a.1 BACT Determinations	
Pollutant(s)	BACT Determination
	than 15 parts per million by weight of sulfur.

3. The proposed project, if constructed and operated as herein required, will utilize Best Available Control Technology for toxic air pollutants (TAPs) (tBACT) as defined below:

Table 3.1 tBACT Determinations	
TAPs	tBACT Determination
Acetaldehyde, CO, acrolein, benzene, benzo(a)pyrene, 1,3-butadiene, DEEP, formaldehyde, toluene, total PAHs, xylenes, chrysene, benzo(a)anthracene, napthalene, benzo(b)fluoranthene, propylene, dibenz(a,h)anthracene, Ideno(1,2,3-cd)pyrene, fluoride, manganese, copper, chloroform, bromodichloromethane, bromoform,	Compliance with the VOC and PM BACT requirement.
Ammonia	No more than 15 parts per million volume-dry (ppmvd) at 15 percent oxygen per engine.
NO_2	Compliance with the NO_X BACT requirement.
SO_2	Compliance with the SO_2 BACT requirement.

4. In accordance with WAC 173-460-090, a second tier health risk analysis has been submitted by the applicant for DEEP emissions. Ecology has concluded that this project has satisfied all requirements of a second tier analysis.

THEREFORE, IT IS ORDERED that the project as described in the NOC application and more specifically detailed in plans, specifications, and other information submitted to Ecology is approved for construction and operation, provided the following conditions are met:

APPROVAL CONDITIONS

1. ADMINISTRATIVE CONDITION

   1.1. The emergency engine generators approved for operation by this Order are to be used solely for those purposes authorized for emergency generators under 40 CFR 60, Subpart IIII.

   1.2. The Oxford Data Center shall coordinate engine maintenance and testing schedules with Dell and the Microsoft Columbia Data Center in Quincy to minimize overlap between data center scheduled testing. Microsoft shall maintain records of the coordination communications with the other data centers, and those communications shall be available for review by Ecology.

2. EQUIPMENT RESTRICTIONS

2.1. The thirty-two 2.5 MWe engine, four 2.0 MWe engines, and the single 0.750 MWe engine 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 0.750 MWe, 2.0 MWe, and 2.5 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 Oxford 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. Each engine must be equipped with selective catalytic reduction (SCR) and catalyzed diesel particulate filter (DPF) controls to meet the emission requirements of EPA Tier 4 engines. The only 0.750 MWe, 2.0 MWe, and 2.5 MWe engines and electrical generating units approved for operation at the Oxford Data Center are those listed in Tables 1.1–1.3 above.

2.3. Replacement of failed engines with identical engines (same manufacturer and model) requires notification prior to installation, but will not require NOC unless there is an emission rate increase from the replacement engines.

2.4. The thirty-two 2.5 MWe engine-generator exhaust stack dimensions shall be greater than or equal to 46 feet above ground level, no more than 18 inches in diameter, and approximately 16 feet above roof height. The four 2.0 MWe engine-generator exhaust stack heights shall be greater than or equal to 46 feet above ground level, no more than 16 inches in diameter, and approximately 16 feet above roof height. The one 0.750 MWe engine-generator exhaust stack height shall be greater than or equal to 46 feet above ground level, no more than 14 inches in diameter, and approximately 16 feet above roof height.

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

3. OPERATING LIMITATIONS

3.1. Fuel consumption at the Oxford Data Center facility shall be limited to a total of 431,000 gallons per year and 119,300 gallons per day of diesel fuel equivalent to on-road specification No. 2 distillate fuel oil (less than 0.00150 weight percent sulfur). Total facility annual fuel consumption may be averaged over a three (3) year period using monthly rolling totals.

3.2. Except as provided in Approval Condition 3.3, the thirty-seven (37) Project Oxford Data Center engines shall not operate more than the following load specific limits:

3.2.1. Operational rpm with no load (referred to as idle): for weekly testing, corrective engine maintenance, and generator cool-down, each generator shall not exceed 29 hours per year of operation averaged across all generators in service over a rolling monthly 3-year average.

3.2.2. Approximately eighty percent load: for emergency power outages, load bank testing, corrective engine testing, electrical bypass for switchgear, transformer, or substation operations, and non-emergency situations authorized by 40 CFR 60.4211(f), the following conditions apply:

3.2.2.1 Each generator shall not exceed 40 hours per year of operation averaged across all generators in service over a rolling monthly 3-year average.

3.2.2.2 Daily generator usage shall not exceed a maximum limit of 192 MWe hours per calendar day, except during up to four days per year of emergency power outage.

3.2.2.3 Maximum hourly generator usage shall be limited to no more than four 2.5 MWe generators operating simultaneously during any given hour except during emergency power outages.

3.2.3. One hundred percent load: for monthly load bank testing, semiannual load bank testing, and as needed generator corrective maintenance, each generator shall not exceed 17.5 hours per year of operation averaged across all generators in service over a rolling monthly 3-year average, with no more than three 2.5 MWe generators operating simultaneously during any given hour.

3.3. The Oxford Data Center engines shall not exceed the following operating limits during commissioning and stack testing:

3.3.1. For commissioning events, each generator shall not exceed a one-time total of 50 hours of operation over a full range of loads, averaged over all facility generators commissioned in that year.

3.3.2. For stack testing, no more than two generators shall be tested per year, every three years, with each generator operating no more than 30 hours per testing event averaged over all generators tested in that year, and each testing event shall be conducted according to the testing requirements in Approval Condition 4. If more than 30 hours per year of stack testing are needed for re-testing to satisfy Approval Condition 4.4, those hours should be combined with any of the pre-approved hours in Approval Condition 3.2. Additional operation of the engines for the purpose of emissions testing beyond the operating hour and fuel consumptions limits authorized by this Order will be considered by Ecology upon request in writing.

3.4. All of the 32 Phase 1 and 2 cooling towers shall comply with the following conditions:

3.4.1. Each individual cooling tower unit shall use a mist eliminator that meets the BACT determination for PM of Section 2(c) of this Order.

3.4.2. Chemicals containing hexavalent chromium cannot be used to pre-treat the cooling tower makeup water.

4. GENERAL TESTING AND MAINTENANCE REQUIREMENTS

4.1. The Oxford Data Center will follow engine-manufacturer's recommended diagnostic testing and maintenance procedures to ensure that each of the thirty-two (32) 2.5 MWe engines, four (4) 2.0 MWe engines, and one (1) 0.750 MWe engines will conform to applicable engine specifications in Approval Condition 2.1 and applicable emission specifications in Approval Condition 5 throughout the life of each engine.

4.2. Any emission testing performed to verify conditions of this Approval Order or for submittal to Ecology in support of this facility's operations, requires that Microsoft comply with all requirements in 40 CFR 60.8 except subsection (g). 40 CFR 60.8(g) may be required by Ecology at their discretion. A test plan will be submitted to Ecology at least 30 days prior to testing that will include a testing protocol for Ecology approval that includes the following information:

4.2.1. The location and Unit ID of the equipment proposed to be tested.

4.2.2. The operating parameters to be monitored during the test.

4.2.3. A description of the source including manufacturer, model number, design capacity of the equipment and the location of the sample ports or test locations.

4.2.4. Time and date of the test and identification and qualifications of the personnel involved.

4.2.5. A description of the test methods or procedures to be used.

4.3. The Oxford Data Center shall source test engines as described in Approval Order 4.4 to show compliance with emission limits in Table 4.

4.4. The following testing requirements are for ammonia, PM, NO_X, CO, and non-methane hydro-carbons (NMHC). The test methods in Table 4 shall be used for each test event unless an alternate method is proposed by Microsoft and approved in writing by Ecology prior to the test. Except for ammonia testing, which requires only a single-load test, each pollutant in Table 4 shall be tested at two load testing approaches (five-load weighted and single load). A single testing event is defined as completion of all tests in Table 4 per engine, and each test shall be performed on different engines from those tested previously, until each engine at the data center has been tested except as provided in subsection 4.4.4. In the event that any source test shows non-compliance with any applicable Table 4 emission standards for the engines specified in Approval Condition 2.1, Microsoft shall repair or replace the engine and repeat the test on the same engine plus two additional engines from the same phase of the Oxford Data Center. Test reports shall be submitted to Ecology as provided in Condition 9.5 of this Order.

Table 4. Testing Requirements

Pollutant	Load Test	Test Method	Emission Limits	Compliance Test Frequency
PM	Five-load weighted avg.	EPA Method 5 or 201a	0.03 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 5 or 201a, and EPA Method 202	0.1 lb/hr (0.75 MWe)	
			0.21 lb/hr (2.0 MWe)	
			0.288 lb/hr (2.5 MWe)	
NO_X	Five-load weighted avg.	EPA Method 7E	0.67 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 7E	1.8 lb/hr (0.75 MWe)	
			2.6 lb/hr (2.0 MWe)	
			3.37 lb/hr (2.5 MWe)	
CO	Five-load weighted avg.	EPA Method 10	3.5 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 10	0.75 lb/hr (0.75 MWe)	
			10.1 lb/hr (2.0 MWe)	
			15.04 lb/hr (2.5 MWe)	
NMHC/ VOC	Five-load weighted avg.	EPA Method 25A and EPA Method 18	0.19 g/kW-hr	Test two different engines at both load tests within 12 months of engine startup. Test two different untested engines every 3 years.
	Single-load (78%-82%)	EPA Method 25A and Method 18	0.1 lb/hr (0.75 MWe)	
			0.8 lb/hr (2.0 MWe)	
			0.8 lb/hr (2.5 MWe)	
Ammonia	Single-load (78%-82%)	BAAQMD Method ST-1B or EPA Method 320	0.19 lb/hr (0.75 MWe)	Test two different engines within 12 months of engine startup. Test two different untested engines every 3 years.
			0.51 lb/hr (2.0 MWe)	
			0.64 lb/hr (2.0 MWe)	

4.4.1. For the five load tests, testing shall be performed at each of the five engine torque load levels described in Table 2 of Appendix B to Subpart E of 40 CFR Part 89, and data shall be reduced to a single-weighted average value using the weighting factors specified in Table 2. Each test run shall be done within 2 percent of the target load value (e.g., the test runs for the nominal 10 percent load condition shall be done at loads from 8 to 12 percent). Microsoft may replace the dynamometer requirement in Subpart E of 40 CFR Part 89 with corresponding measurement of gen-set electrical output to derive horsepower output.

4.4.2. The F-factor described in Method 19 shall be used to calculate exhaust flow rate through the exhaust stack, except that EPA Method 2 shall be used to calculate the flow rate for purposes of particulate testing. The fuel meter data, as measured according to Approval Condition 4.5, shall be included in the test report, along with the emissions calculations.

4.4.3. Three test runs shall be conducted for each engine. Each run must last at least 60 minutes. Analyzer data shall be recorded at least once every minute during the test. Engine run time and horsepower output and fuel usage shall be recorded during each test run for each load and shall be included in the test report. In lieu of these requirements, Microsoft may propose a test protocol to Ecology in writing for approval.

4.4.4. The one (1) 0.750 MWe engine shall be stack tested according to Table 4. If the first two (2) 2.0 MWe engines tested are found to have consistent test results and are in compliance with all applicable Table 4 emission load tests, Microsoft may request approval from Ecology to discontinue compliance testing for the other two (2) 2.0 MWe engines. If the first five (5) 2.5 MWe engines tested are found to have consistent test results and are in compliance with all applicable Table 4 emission load tests, Microsoft may request approval from Ecology to discontinue compliance testing for the other twenty-seven (27) 2.5 MWe engines.

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

4.6. Each engine shall be connected to a properly installed and maintained fuel flow monitoring system (either physical or generator manufacturer provided software) that records the amount of fuel consumed by the engine during each operation.

5. EMISSION LIMITS

The thirty-two (32) 2.5 MWe engine-generators, the four (4) 2.0 MWe engine-generators, and the one (1) 0.750 MWe engine-generator shall meet the follow emission rate limitations:

5.1. Each emergency engine shall not exceed the applicable emission limits in Table 4.

5.2. Total annual facility-wide emissions shall not exceed the following: 13.3 tons per year (tpy) of PM10; 3.53 tpy of PM2.5; 15.6 tpy of CO; 8.6 tpy of NOx; 0.8 tpy of VOC; 0.047 tpy of SO2; 0.536 tpy of DEEP; 0.86 tpy of NO2; and 0.71 tpy of ammonia.

5.3. Visual emissions from each diesel electric generator exhaust stack shall be no more than five percent, with the exception of a ten (10) minute period after unit start-up. Visual emissions shall be measured by using the procedures contained in 40 CFR 60, Appendix A, Method 9.

5.4. Ammonia concentrations shall comply with the emission limits in Table 4.

6. OPERATION AND MAINTENANCE MANUALS

A site-specific O&M manual for the Oxford Data Center facility equipment shall be developed and followed. Manufacturer's operating instructions and design specifications for the engines, generators, cooling towers, and associated equipment shall be included in the manual. 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, cooling towers, 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 Tiered Emission Standards appropriate for that engine throughout the life of the engine.

6.2. Normal engine operating parameters and design specifications.

6.3. Operating maintenance schedule for engines and cooling towers.

6.4. Specification sheet for cooling towers verifying 0.0005 percent drift rating, water flow, air flow, makeup water rate, and a list of chemicals used to pre-treat cooling tower makeup water.

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, O&M 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. 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. Annual hours of operation for each diesel engine.

8.3. Annual number of start-ups for each diesel engine.

8.4. Annual gross power generated by facility-wide operation of the emergency backup electrical generators.

8.5. Record of each operational period for each engine with the following information:

8.5.1 Date of engine operation,
8.5.2 engine unit ID,

8.5.3 reason for operating,
8.5.4 duration of operation, and
8.5.5 the percent of generator electrical load.

8.6 Upset condition log for each facility permitted emission unit (the 37 engines and 32 cooling towers) and their respective control units that include date, time, duration of upset, cause, and corrective action.

8.7 Applicable recordkeeping for emergency engines required by 40 CFR Part 60, Subpart IIII Section 60.4214 (b),(c), and (d).

8.8 Air quality complaints received from the public or other entity, and the affected emissions units.

9 REPORTING

9.1 The serial number of the engine and the generator, and the engine build date 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.

9.2.1 Monthly rolling annual total summary of air contaminant emissions,
9.2.2 Monthly rolling facility-wide generator hours of operation with annual total.
9.2.3 Monthly rolling gross power generation with annual total.
9.2.4 Monthly rolling annual total summary of fuel usage (in gallons).
9.2.5 Calendar year annual total runtime hours for each range of generator electrical load.

9.3 Written notification that the O&M manual described in Approval Condition 6 has been developed and updated within 60 days after the issuance of this Order. A copy of the most current O&M manual will be provided to Ecology if requested.

9.4 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 Microsoft Corporation'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.

9.5 Results of any stack testing performed 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 The information from Conditions 4.2.3, 4.2.4, and 4.2.5 including field and analytical laboratory data, quality assurance/quality control procedures and documentation.

9.5.2 A summary of results, reported in units and averaging periods consistent with the applicable emission standard or limit.
9.5.3 A summary of control system or equipment operating conditions.
9.5.4 A summary of operating parameters for the diesel engines being tested.
9.5.5 Copies of field data and example calculations.
9.5.6 Chain of custody information.
9.5.7 Calibration documentation
9.5.8 Discussion of any abnormalities associated with the results.
9.5.9 A statement signed by the senior management official of the testing firm certifying the validity of the source test report.

9.6 If Microsoft operates or contracts to operate any emergency diesel engine at the data center in non-emergency situations authorized by 40 CFR 60.4211(f), Microsoft shall submit the annual report required by 40 CFR 60.4214(d)

10 GENERAL CONDITIONS

10.1 **Commencing/Discontinuing Construction and/or Operations:** This Approval Order shall become void if construction of Phase 1 is not commenced within eighteen (18) months following the date of this Approval Order, or if Phase 2 is not commenced within eighteen (18) months following completion of commissioning of the final engine in Phase 1. No additional engines shall be installed, if construction of both phases is discontinued for a period of eighteen (18) months, or if operation of backup emergency diesel electric generator is discontinued at the facility 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 emergency diesel electric generators, and cooling towers, and be available for review upon request by Ecology.

10.4 **Equipment Operation:** Operation of the generator units, cooling towers, 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, engines, or cooling towers 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 **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 Order, shall be subject to Ecology enforcement under applicable regulations.

10.7 **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, and the remainder of this authorization, shall not be affected thereby.

YOUR RIGHT TO APPEAL

You have a right to appeal this Approval Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Approval Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do the following within 30 days of the date of receipt of this Approval Order:

- File your appeal and a copy of this Approval Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Approval Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel Road SW, Suite 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk P.O. Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** P.O. Box 40903 Olympia, WA 98504-0903

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov

To find laws and agency rules visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser

DATED this 15th day of August 2014, 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 F:
Technical Support Document

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TECHNICAL SUPPORT DOCUMENT
FOR PRELIMINARY DETERMINATION OF APPROVAL ORDER NO. 14AQ-E537
MICROSOFT OXFORD DATA CENTER
AUGUST 15, 2014

1. EXECUTIVE SUMMARY

On January 27, 2014, Ecology received a Notice of Construction (NOC) application submittal from the Microsoft Corporation (Microsoft) **the permittee,** requesting approval for a permit application for phases 1 and 2 of a new facility named the Oxford Data Center (Oxford) located at Industrial Park #5, west of Road R NW at the end of Port Industrial Parkway in Quincy, WA. The following information comprises the legal description of the facility provided by the applicant:

LOTS 2, 3, 4, 5, AND TRACT A, AMENDED PORT DISTRICT INDUSTRIAL PARK NO. 6 BINDING SITE PLAN, ACCORDING TO THE BINDING SITE PLAN THEREOF FILED IN VOLUME 2 OF BINDING SITE PLANS, PAGES 64 AND 65, RECORDS OF GRANT COUNTY, WASHINGTON. FARM UNITS 216 AND 217, IRRIGATION BLOCK 73, OXFORD BASIN PROJECT, ACCORDING TO THE PLAT THEROF FILED NOVEMBER 29, 1951, RECORDS OF GRANT COUNTY, WASHINGTON. STARTING AT THE NORTHWEST CORNER OF SAID FARM UNIT 216, IRRIGATION BLOCK 73, THE TRUE POINT OF BEGINNING, THENCE 173 (feet) EAST ALONG THE NORTH LINE OF SAID FARM UNIT; THENCE 242 FEET SOUTH OF A LINE PERPENDICULAR TO THE NORTH LINE OF SAID FARM UNIT; THENCE WEST 173 FEET; THENCE NORTH 242 FEET TO THE TRUE POINT OF BEGINNING.

Ecology received supplemental application information on January 14, 17, 28, and February 7, including an electronic WORD version of a revised NOC application on February 7, 2014. Ecology received supplemental application information on February 13, 2014. The NOC application was determined to be incomplete, and an incompleteness letter was issued on February 26, 2014. A revised NOC application was received on March 17, 2014, with additional supporting material provided on March 19, 20, 25, 27, April 24, 28, May 21, and June 3, 2014. The application was considered complete on June 3, 2014. The Preliminary Determination (i.e., Proposed Decision) was completed on June 3, 2014, allowing a Tier II review to be initiated. In accordance with WAC 173-460-090, a second tier health risk analysis was submitted by the applicant for DEEP emissions. Ecology has concluded that this project has satisfied all requirements of a second tier analysis.

2. PROJECT DESCRIPTION

2.1 Oxford will contain four phase 1 activity zone (AZ) buildings designated AZ-4A, AZ-4B, AZ-4C, AZ-4D, four core network room (CNR) buildings, an administrative building, and four phase 2 activity zone buildings designated AZ-3A, AZ-3B, AZ-3C, AZ-3D. Building construction for the Phase 1 generators and cooling towers is expected to begin before the end of October, 2014 with commissioning of generators spread over an approximately 9-month period. Construction of Phase 2 is expected to begin within 18 months after the completion of commissioning of the final generator for Phase 1. Project Oxford phases 1 & 2 will have thirty-two (32) Caterpillar Model 3516C-HD-TA diesel powered electric emergency generators in the activity zone buildings with a power rating of 2.5 MWe per generator, four (4) Caterpillar Model 3516C-TA diesel powered electric emergency generators in the CNR buildings with a power rating of 2.0 MWe per generator, and one (1) Caterpillar Model C27ATAAC diesel powered electric emergency generator in the administrative building with a power rating of 0.75 MWe. Each cooling tower has four cells and four fans. Each of the eight activity zone building will have four cooling towers for a total of thirty two (32) SPX-Marley model MD5008PAF2 cooling towers. Each of the thirty two individual cooling towers has a design recirculation rate of 950 gallons per minute (gpm) and an air flow rate of 143,600 cubic feet per minute (cfm).

2.2.1 **Potential to Emit for Criteria Pollutants and Toxic Air Pollutants (TAPS)**

Table 2. Potential To Emit For Phases 1 & 2 (TPY)

Pollutant	Emission Factor	Facility Potential to Emit	References
Criteria Pollutants	Units = g/kW-hr (except where noted)	(TPY)	(a)
NO_x	Warmed up: (0.67); Cold: (Tier 2 load specific emission factors and use of CS factors)	8.6	(b),(g),(h)
VOC	Warmed up: (0.19); Cold: (use of CS Factors)	0.8	(a),(b),(e)
CO	Warmed up: (3.5); Cold: (use of CS Factors)	15.6	(b)
$PM_{2.5}$	Warmed up: (0.03 and BH factors); Cold: (use of CS Factor) (See note j for cooling towers)	3.53	(b),(j)
PM_{10}	NA (See note j for cooling towers)	13.3	(f),(j)
SO_2	15 ppm	0.047	(c)
Lead	NA	Negligible	(d)
Ozone	NA	NA	(e)
Toxic Air Pollutants (TAPS)	Units = lbs/MMBTU (except where noted)		(a)
Primary NO_2	Warmed up: (0.67); Cold: (Tier 2 load specific	0.86	(b),(h)

	emission factors and use of CS factors)		
Ammonia	0.32 (lbs/hr NH3)/(MWe)	0.71	(g)
Diesel Engine Exhaust Particulate (DEEP)	Warmed up: (0.03 and BH factors); Cold: (use of CS Factor)	0.536	(b)
Carbon monoxide	Warmed up: (3.5); Cold: (use of CS Factors)	15.6	(b)
Sulfur dioxide	15 ppm	0.047	(c)
Benzene	7.76E-04	2.4E-03	(i)
Toluene	2.81E-04	8.6E-04	(i)
Xylenes	1.93E-04	5.9E-04	(i)
1,3 Butadiene	3.91E-05	1.2E-04	(i)
Formaldehyde	7.89E-05	2.4E-04	(i)
Acetaldehyde	2.52E-05	7.7E-05	(i)
Acrolein	7.88E-06	2.4E-05	(i)
Benzo(a)Pyrene	2.57E-07	7.9E-07	(i)
Benzo(a)anthracene	6.22E-07	1.9E-06	(i)
Chrysene	1.53E-06	4.7E-06	(i)
Benzo(b)fluoranthene	1.11E-06	3.4E-06	(i)
Benzo(k)fluoranthene	2.18E-07	6.7E-07	(i)
Dibenz(a,h)anthracene	3.46E-07	1.1E-06	(i)
Ideno(1,2,3-cd)pyrene	4.14E-07	1.3E-06	(i)
Napthalene	1.30E-04	4.0E-04	(i)
Propylene	2.79E-03	8.5E-03	(i)
Fluoride	0.31 mg/L	4.8E-03	(j)
Manganese	0.03 mg/L	4.6E-04	(j)
Copper	0.01 mg/L	1.6E-04	(j)
Chloroform	0.0004 mg/L	2.6E-04	(k)
Bromodichloromethane	0.0004 mg/L	2.6E-04	(k)
Bromoform	0.0105 mg/L	6.9E-03	(k)

(a) The current list of EPA criteria pollutants (http://www.epa.gov/airquality/urbanair/; last updated April 20, 2012) that have related National Ambient Air Quality Standards (NAAQS) (http://www.epa.gov/air/criteria.html; last updated December 14, 2012). VOC is not a criteria pollutant but is included here per note (e). Toxic Air Pollutants (TAPs) are defined as those in WAC 173-460. Greenhouse gas is not a criteria pollutant or a TAP and is exempt from New Source Review requirements for non Prevention of Significant Deterioration projects such as at Oxford Data Center per WAC 173-400-110(5)(b).

(b) Potential to Emit (PTE) estimates are based on manufacturer 5-load final Tier 4 compliant engine test data and applicable cold start (CS) factors for catalyst warm-up periods and black puff factors from California Energy Commission's *Air Quality Implications of Backup Generators in California*" CEC-500-2005-049; July 2005. The NOx CS factor from the July 2005 report is 1.0, but NOx PTE is conservatively based on the highest provided tier-2 manufacturer test data from Cummins, MTU, and Caterpillar (CAT). The applicant believes that use of DPF eliminates the need for a black-puff CS factor adjustment, but has included it anyway to provide a conservative PTE estimate. The back-half (BH) factor accounts for condensable particulate (see section 2.2 for testing requirements).

(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) All PM emissions from the generator engines is $PM_{2.5}$, and all $PM_{2.5}$ from the generator engines is considered DEEP.
(g) Ammonia emission factor from Vantage Data Center in Quincy, WA.
(h) NO2 is assumed to be 10% of total NOx emitted.
(i) 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/.
(j) Trace metals in city industrial wastewater as provided in application for cooling tower emissions. Total particulate matter from cooling towers based on the following study: *Calculating Realistic PM10 Emissions from Cooling Towers", Reisman and Frisbie, Environmental Progress, July 2002.*
(k) Concentration in cooling tower makeup water as provided in application for cooling tower emissions.

2.1.2 Maximum Operation Scenarios Based on Final Tier 4 Compliant Engines and Cold Start Factors and Activation Delay Periods

The DEEP and CO potential to emit values in Table 2 and facility maximum annual fuel usage values in Approval Condition 3.1 of the permit are based on the following worst-case operating scenario which use Final Tier 4 compliant engine factors and cold start factor adjustments):

Scenario: Full Operation of Combined Phases 1+2, Plus Stack Testing of 3 Generators					
		Facility-Wide Emissions, tons/year			
Activity	Fuel, gal/year	DEEP	NOx	CO	VOC
12 months Routine Operation of Phase 1	245,166	0.298	5.7	8.7	0.44
12 months Routine Operation of Phase 2	187,194	0.224	2.75	6.73	0.33
Stack Testing of 3 Generators	14,299	0.013	0.16	0.68	0.03
12-Month Total Emissions	**446,659**	**0.535**	8.61	**16.1**	0.8
Adjustment Factor Compared to 70-Year Average	1.009	1.008	1.005	1.013	1.013

(Note: These estimates are based on preliminary plans to use thirty-six (36) 2.5 MWe engines and one (1) 0.750 MWe engine. However, Microsoft's final plans are to use only thirty-two (32) 2.5 MWe engines, four (4) 2.0 MWe engines, and one (1) 0.750 MWe engine. As a result, CO emissions are expected to be 15.6 tpy, and maximum fuel usage is expected to be 431,000 gallons per year. In addition, DEEP emissions are expected to be less than the listed value, but Microsoft has conservatively chosen a potential to emit of 0.536 tpy for DEEP.

The NOx and VOC potential to emit values in Table 2 above are based on the following worst-case operating scenario which use Final Tier 4 compliant engine factors and cold start factor adjustments:

Scenario: Commissioning of Phase 2, Followed By Operation of Combined Phases 1 +2					
		Facility-Wide Emissions, tons/year			
Activity	Fuel, gal/year	DEEP	NOx	CO	VOC
12 months Routine Operation of Phase 1	245,166	0.298	5.7	8.7	0.44
Commissioning of 16 Phase 1 Generators	101,683	0.094	2.28	5.08	0.26
5 Months of Operation of 4 Phase 2 Generators	19,499	0.023	0.286	0.701	0.034
2 months Operation of 12 Phase 2 Generators	23,399	0.028	0.344	0.841	0.041
Emission Testing of 3 Phase 1 Generators	14,299	0.013	0.16	0.68	0.03

12-Month Total Emissions	404,047	0.46	**8.77**	16.00	**0.81**
Adjustment Factor Compared to 70-Year Average	0.91	0.86	1.023	1.01	1.02

(Note: these estimates are based on using thirty-six (36) 2.5 MWe engines and one (1) 0.750 MWe engine; Microsoft plans to use only thirty-two (32) 2.5 MWe engines, four (4) 2.0 MWe engines, and one (1) 0.750 MWe engine. As are result, NOx emissions are expected to be 8.6 tpy. In addition, VOC emissions are expected to be 0.8 tpy.):

Cold start adjustment factors are used to approximate the additional emissions from cold engines burning off the accumulated fuel and crankcase oil on cold cylinders. The PM and VOC cold start factor adjustments for these calculations are provided below:

VOC/PM Black Puff Cold-Start Adjustment Factors				
Load	Spike Area (ppm-sec)	Steady-State Area (ppm-sec)	Total Area (ppm-sec)	Black Puff Factor
10%	6300	27000	33300	1.189
80%	6300	18000	24300	1.259
100%	6300	18000	24300	1.259

The CO cold start factor adjustments for these calculations are provided below:

CO Black Puff Cold-Start Adjustment Factors				
Load	Spike Area (ppm-sec)	Steady-State Area (ppm-sec)	Total Area (ppm-sec)	Black Puff Factor
10%	15000	18000	33000	1.455
80%	15000	12000	27000	1.556
100%	15000	12000	27000	1.556

A NOx cold start factor of 1.0 was assumed because California Energy Commission tests (see *Air Quality Implications of Backup Generators in California"* CEC-500-2005-049; July 2005); do not show short term NOx spikes during cold starts.

Due to the way black-puff cold-start factors were calculated, annual facility-wide PTE emissions for CO and VOC were slightly underestimated by approximately 0.006 tpy and 0.004 tpy respectively. Ecology determines these differences to be negligible. Because Microsoft will be using diesel particulate filters, the applicant believes that use of a black-puff cold-start factor for DEEP conservatively overestimates facility emissions, but they have included them anyway.

Other cold-start related adjustments were also included in the application to account for heat-up times for catalysts in the add-on controls (see section 4 regarding add-on controls) listed below:

Catalyst Delay Cold Start Adjustment		
Control Device	Applicability	Adjustment
SCR catalyst and DPF oxidation catalyst	• Cold start under idle load (less than or equal to 10%) for VOC, CO, and NOx	15 minutes at emission levels equivalent of generator equipped with Tier 2 level emission controls followed by final Tier 4 compliant emissions
	• Cold start under high load for VOC, CO, and NOx	10 minutes at emission levels equivalent of generator equipped with Tier 2 level emission controls followed by final Tier 4 compliant emissions

2.2 Source Testing

Source testing requirements outlined in Table 4 of the Approval Order, provide two testing approaches. A five-load approach for PM, NOx, CO, and VOC, where PM is considered to be DEEP at size PM2.5 or smaller, which tests only for the filterable particulate matter to be consistent with California Code of Regulations § 93115.14 *ATCM for Stationary CI Engines – Test Methods* (measuring front half particulate only). However, a single-load test at approximately 80 percent load (78%-82%) is also required for these pollutants (and ammonia), which takes into account both the filterable and condensable PM emissions. Engines are anticipated to be operating for more hours at 80 percent load than at other loads.

According to Approval Order 4.2, any emission testing performed to verify conditions of the permit or for submittal to Ecology in support of this facility's operations, requires that Microsoft comply with all requirements in 40 CFR 60.8 except subsection (g) which addresses audit samples. However, Approval Order 4.2 specifically states that "40 CFR 60.8(g) may be required by Ecology at their discretion." 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."*

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, Ecology believes that the two-test sampling approach required in Table 4 of the Order is a valid reason to waive audit sampling, because it provides two types of filterable particulate tests and also provides additional information (condensable particulate emissions) for one of the tests. However, Ecology may choose, at their discretion, to require audit sampling for stack tests conducted using any or all of the following particulate matter test methods: Methods 5, 201A, or 202.

3. APPLICABLE REQUIREMENTS

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

3.1 Chapter 70.94 Revised Code of Washington (RCW), Washington Clean Air Act,
3.2 Chapter 173-400 Washington Administrative Code (WAC), General Regulations for Air Pollution Sources,
3.3 Chapter 173-460 WAC, Controls for New Sources of Toxic Air Pollutants, and
3.4 40 CFR Part 60 Subpart IIII 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.

3.4.1 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 Oxford 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 Oxford (0.750 MWe, 2.0 MWe, and 2.5 MWe). Instead, 40CFR60 requires the engines at Oxford to meet the Tier 2 emission levels of 40CFR89.112 (see section 4 with respect to add-on controls). 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 Oxford:

§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.*

(Note: Based on information provided by the applicant, Oxford will use the following engines specifications: August, 2013 Caterpillar Model C27ATAAC rated 0.75 MWe; February, 2013 Caterpillar Model 3516C-TA rated 2.0 MWe; November 2012, Caterpillar Model 3516C-HD-TA rated 2.5 MWe. Based on these specifications, the 0.750 MWe engine has 27.03 liters displacement over 12 cylinders, or 2.25 liters per cylinder; the 2.0 MWe engines have 69.00 liters displacement over 16 cylinders, or 4.31 liters per cylinder; and the 2.5 MWe engines have 78.08 liters displacement over 16 cylinders, or 4.88 liters per cylinder. Thus, because the specified engines at Oxford will all have a displacement of less than 30 liters per cylinder, and are for emergency purposes only, they are 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.

(Note: Thus, as outlined in previous note, and based on the power ratings listed in *40 CFR 60.4202(a)*, the 0.75 MWe and 2.0 MWe engines at Oxford are required to meet the applicable 40CFR89 Tier 2 emission standards.)

*(b) Stationary CI internal combustion engine manufacturers must certify their 2007 model year and later emergency stationary CI ICE with a maximum engine power **greater than 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 (b)(1) through (2) of this section.*

(1) For 2007 through 2010 model years, the emission standards in table 1 to this subpart, for all pollutants, for the same maximum engine power.

(2) For 2011 model year and later, the certification emission standards for new nonroad CI engines for engines of the same model year and maximum engine power in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants.

(Note: Thus, as outlined previously, and based on the power ratings listed in *40 CFR 60.4202(b)*, the 2.5 MWe engines at Oxford are required to meet the applicable 40CFR89 Tier 2 emission standards.)

3.4.2. 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.*"

4. SUPPORT FOR BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

As noted in Condition 2.2 of the Approval Order, each engine must be equipped with selective catalytic reduction (SCR) and catalyzed diesel particulate filter (DPF) controls to meet the emission requirements of EPA Tier 4 engines. Ecology does not consider these add-on controls to be Best Available Control Technology (BACT) at Oxford because of the reasons outlined in this section.

BACT is defined[1] as "*an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation under chapter 70.94 RCW emitted from or which results from any new or modified stationary source, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant. In no event shall application of the "best available control technology" result in emissions of any pollutants which will exceed the emissions allowed by any applicable standard under 40 CFR Part 60 and Part 61. 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.[2] The "top-down" approach shifts the burden of proof to the applicant to justify why the proposed source is unable to apply the best technology available. The BACT analysis must be conducted for each pollutant that is subject to new source review.

The proposed diesel engines 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.

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

4.1 BACT ANALYSIS FOR NOx FROM DIESEL ENGINE EXHAUST

Microsoft 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

Microsoft's review of the RBLC found that urea -based selective catalytic reduction (SCR) was the most stringent add-on control option demonstrated on diesel engines. The application of the SCR technology for NOx control was therefore considered the top-case control technology and evaluated for technical feasibility and cost-effectiveness. 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. 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.

Microsoft has evaluated the cost effectiveness of installing and operating SCR systems on each of the proposed diesel engines. The analysis indicates that the use of SCR systems would cost approximately $18,700 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 $29,700 for NOx alone or $24,900 per ton of combined pollutants removed per year.

The annual estimated cost of $18,700 (for SCR use alone) provided by Microsoft is a conservative estimate that takes into account installation, tax, and shipping capital costs but assumes a lower bound estimate for operational, labor and maintenance costs of $0, whereas an upper bound CARB estimate could potentially amount to an additional $423,000 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 Oxford Data Center 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.

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, would 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, 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. Microsoft 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

Microsoft 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.

Microsoft has evaluated the cost effectiveness of installing and operating DPFs on each of the proposed diesel engines. The analysis indicates that the use of DPFs would cost approximately $526,000 per ton of engine exhaust particulate removed from the exhaust stream at Oxford each year. DPFs also remove CO and VOCs at costs of approximately $74,000 and $382,000 per ton per year respectively. If the cost effectiveness of DPF use is evaluated using the total amount of PM, CO, and VOCs reduced, the cost estimate would be approximately $55,000 per ton of pollutants removed per year.

These annual estimated costs (for DPF use alone) provided by Microsoft are conservatively low estimates that take into account installation, tax, and shipping capital costs but assume a lower bound estimate for operational, labor and maintenance costs of $0, whereas an upper bound CARB estimate could potentially amount to an additional $282,000/year.

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

4.2.1.2. ***Diesel Oxidation Catalysts.*** This method utilizes metal catalysts to oxidize carbon monoxide, particulate matter, and hydrocarbons in the diesel exhaust. Diesel oxidation catalysts (DOCs) are commercially available and reliable for controlling particulate matter, carbon monoxide and hydrocarbon emissions from diesel engines. While the primary pollutant controlled by DOCs is carbon monoxide, DOCs have also been demonstrated to reduce diesel engine exhaust particulate emissions, and also hydrocarbon emissions.

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

- Microsoft obtained the following recent DOC equipment costs from a vendor on November 11, 2013: ($52,100 for a stand-alone catalyzed DOC per single 2.5MWe generator; add a scaled amount of $25,299 for a single 0.750 MWe generator, and conservatively exclude the cost of four 2.0 MWe generators). For thirty two (32) 2.5MWe generators and one (1) 0.750 MWe generators, this amounts to $1,692,500. According to the vendor, DOC control efficiencies for this unit for CO, HC, and PM are 90%, 80%, and 20% respectively.
- The subtotal becomes $1,934,315 after accounting for shipping ($84,625), WA sales tax ($110,012), and direct on-site installation ($47,178).
- After adding indirect installation costs, the total capital investment amounts to: $2,289,003. 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 $238,079.
- At the control efficiencies provided from the vendor, the annual tons per year of emissions for CO (8.81 tpy), HC (1.92 tpy), and PM (1.24 tpy) become 7.93 tpy, 1.54 tpy, and 0.25 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 ($238,079 divided by 7.93 tpy for CO, etc..).

The corresponding annual DOC cost effectiveness value for carbon monoxide destruction alone is approximately $30,019 per ton. If particulate matter and hydrocarbons are individually considered, the cost effectiveness values become $959,386 and $154,771 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 $24,500 per ton of pollutants removed per year.

These annual estimated costs (for DOC use alone) provided by Microsoft are conservatively low estimates that take into account installation, tax, shipping, and other capital costs as mentioned above, but assume a lower bound estimate for operational, labor and maintenance costs of $0, whereas an upper bound CARB estimate could potentially amount to an additional $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.

4.2.3 **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. Microsoft 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

Microsoft did not find any add-on control options commercially available and feasible for controlling sulfur dioxide emissions from diesel engines. Microsoft's proposed BACT for sulfur dioxide is the use of ultra-low sulfur diesel fuel (15 ppm by weight of sulfur).

4.3.2. **BACT Determination for Sulfur Dioxide**

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

4.4 BACT ANALYSIS FOR PM FROM COOLING TOWERS

The direct contact between the cooling water and air results in entrainment of some of the liquid water into the air. The resulting drift droplets contain total dissolved solids (TDS) in the cooling tower water, which can evaporate into air as particulate matter. For the Oxford facility, the recirculation water in the cooling towers will be pre-softened using the proprietary Water Conservation Technology International (WCTI) "pre-treatment system" to replace scale-forming mineral compounds (e.g., calcium and magnesium) with other non-toxic, non-scaling mineral compounds (e.g., sodium), which will allow the cooling towers to be operated with very high "cycles of concentration." Microsoft analyzed the industrial wastewater used in the cooling towers, which includes trace metals and chlorine disinfection byproducts, and estimates that cooling tower TAP emissions from all cooling towers combined (after implementing their proposed BACT in section 4.4.1.1) will not exceed the respective small quantity emission rates (SQERs) for any TAP.

4.4.1. BACT Options for PM from Cooling Towers

Microsoft reviewed the available published literature and the RBLC and identified drift eliminators as demonstrated technologies for the control of particulate matter (PM), from the proposed cooling towers. Drift eliminators can reduce the amount of drift, and therefore the amount of particulate matter released into the air.

4.4.1.1. *Cooling Towers with 0.0005 Percent Drift Efficiency*

Microsoft proposes to use high-efficiency drift eliminators that will achieve a liquid droplet drift rate of no more than 0.0005 percent of the recirculation flow rate within each cooling tower. Microsoft estimates that by using a 0.0005 percent drift rate and a total dissolved solids (TDS) concentration of 69,000 mg/L, only 13 percent of the solid evaporated drift particles will be smaller than 2.5 microns in diameter (PM2.5), and 56 percent will be smaller than PM10 (based on sizing approach presenting in: *"Calculating Realistic PM10 Emissions from Cooling Towers", Reisman and Frisbie, Environmental Progress, July 2002).* Microsoft's original application dated January 17, 2014 stated that a cooling tower with 0.0005 percent drift efficiency is the most efficient drift eliminator that is commercially available.

4.4.1.2. *Cooling Towers with 0.0003 Percent Drift Efficiency*

In Ecology's 2/26/2014 incompleteness letter, Ecology noted that a cooling tower with 0.0003 percent drift rate was in use at the Harquahala power plant in Arizona, which is regulated by the Maricopa County Air Pollution Control District (APCD). Because of this, Ecology asked Microsoft to defend or revise the claim in the original application stating that a cooling tower with 0.0005 percent drift efficiency is the most efficient drift eliminator that is commercially available. Upon review, Microsoft's consultant (Landau Associates) learned that the 0.0003 percent drift cooling tower at Harquahala is custom built for that large utility electric power plant. It has a water recirculation rate of 15,000 gpm, and is not comparable to what is needed at Oxford, which has a water recirculation rate of only 950 gpm. When Microsoft requested price quotes for cooling towers with 0.0003 percent drift efficiency for the cooling towers to be used at the Oxford Data Center, venders responded that a cooling tower with 0.0003 percent drift efficiency is not a commercially available product because it is below field measurement capabilities, and could not be proven. According to EPA's BACT/LAER Clearinghouse database, Microsoft found BACT levels for cooling towers from 0.005 percent and 0.0005 percent. Of 30 cooling towers identified between 2003-2013, twenty-four had BACT determinations of 0.0005%, and six had BACT determinations from between 0.005 percent to 0.0005 percent.

Thus, Ecology considers this information to be a reasonable justification to accept high efficiency drift eliminators rated at 0.0005 percent drift to be the most efficient drift eliminators that are commercially available for the induced-draft mechanical cooling towers to be used at Oxford. Therefore, no other control options are considered.

4.4.2. **<u>BACT Determination for PM from Cooling Towers</u>**

Ecology accepts as BACT for particulate matter, cooling tower drift eliminators that can achieve a 0.0005 percent rate. These are the most efficient drift eliminators that are commercially available for the induced-draft mechanical cooling towers to be used at Oxford. As noted in this Technical Support Document (section 4), federal regulations require that BACT decisions are made on a *case-by-case* basis. This specific BACT decision is based on the information provided in section (4.4), including consideration of the high TDS content resulting from the anti-scaling WCTI approach used by Oxford.

4.5 BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS

Best Available Control Technology for Toxics (tBACT) means BACT, as applied to toxic air pollutants.[3] The procedure for determining tBACT follows the same procedure used above for determining BACT. Of the technologies Microsoft considered for BACT, the minimum estimated costs as applied to tBACT for the pollutants that exceed small quantity emission rates (SQERs) are as follows:

- The minimum estimated costs to control diesel engine exhaust particulate is estimated to be $557,000 per ton removed.
- The minimum estimated costs to control NO2 is estimated to be $187,000 per ton removed.
- The minimum estimated costs to control CO is estimated to be $30,000 per ton removed.
- The minimum estimated costs to control acrolein, which could be treated with the VOC treatment listed under BACT, is estimated to be greater than $1 billion per ton.

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 4.5 below represents tBACT for the proposed project.

Table 4.5. 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
Ammonia	Ammonia emissions shall not exceed 15 per million volume-dry (ppmvd) at 15% Oxygen (O2) per engine.

[3] 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
Fluoride	Compliance with PM Cooling Tower BACT requirement
Manganese	Compliance with PM Cooling Tower BACT requirement
Copper	Compliance with PM Cooling Tower BACT requirement
Chloroform	Compliance with PM Cooling Tower BACT requirement
Bromodichloromethane	Compliance with PM Cooling Tower BACT requirement
Bromoform	Compliance with PM 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. Microsoft has demonstrated compliance with the national ambient air quality standards (NAAQS) and acceptable source impact levels (ASILs).** (** See Section 6 of this TSD).

The AERMOD model used the following data and assumptions:

5.1 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.
5.2 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.
5.3 Each generator was modeled with a stack height of 46- feet above local ground.
5.4 The data center buildings, in addition to the individual generator enclosures were included to account for building downwash.

5.5 The receptor grid for the AERMOD modeling was established using a 10-meter grid spacing along the facility boundary extending to a distance of 350 meters from each facility boundary. A grid spacing of 25 meters was used for distances of 350 meters to 800 meters from the boundary. A grid spacing of 50 meters was used for distances from 500 meters to 2000 meters from the boundary. A grid spacing of 100 meters was used for distances beyond 2000 meters from the boundary.

5.6 1-hour NO_2 concentrations at and beyond the facility boundary were modeled using the Plume Volume Molar Ratio Method (PVMRM) module, with default concentrations of 49 parts per billion (ppb) of background ozone, and an equilibrium NO_2 to NOx ambient ratio of 90%.

5.7 Dispersion modeling is sensitive to the assumed stack parameters (i.e., flowrate and exhaust temperature). The stack temperature and stack exhaust velocity at each generator stack were set to values corresponding to the engine loads for each type of testing and power outage.

5.8 AERMOD Meteorological Pre-processor (AERMET) was used to estimate boundary layer parameters for use in AERMOD.

5.9 AERSURFACE was used to determine the percentage of land use type around the facility based on albedo, Bowen ratio, and surface roughness parameters.

5.10 Because regional background data is not available for all pollutants, annual average regional background concentrations for total PM and PM10 listed in the table below are based on available PM2.5 annual average regional background data from the source noted in footnote (a) of the table. Similarly, the 1st highest 24-hour average regional background concentrations for total PM is based on available PM10 24-hour average regional background data from the same source of footnote (a).

Except for diesel engine exhaust particulate which is predicted to exceed its ASIL, AERMOD model results show that no NAAQS or ASIL will be exceeded at or beyond the property boundary. The modeling results as listed in the application are provided below:

Criteria Pollutant	Standards in µg/m³ – National Standards – Primary	Standards in µg/m³ – National Standards – Secondary	Standards in µg/m³ – Washington State Standards	Maximum Ambient Impact Concentration (µg/m³)	AERMOD Filename	Background Concentrations (µg/m³) (a)	Maximum Ambient Impact Concentration Added to Background (µg/m³) (If Available)
Total Suspended Particulates							
Annual average	--	--	60	1.16	PM10-121313a	6.5 (Regional)	7.65
1st-Highest 24-hour average during power outage with cooling towers	--	--	150	27.0	PM10-121313b	81 (Regional)	108
Particulate Matter (PM_{10})							
Annual average	--	--	50	1.16	PM10-121313a	6.5 (Regional)	7.7
1st-Highest 24-hour average during power outage with cooling towers	150	150	150	20	PM10-121313b	81(Regional)	101
Particulate Matter ($PM_{2.5}$)							

Annual average	12	15	--	0.33	PM10-121313a	6.5 (Regional)	6.8
4th-highest 24-hour average for cooling towers and electrical bypass	35	35	--	3.1	PM25-120613a-e, f	21 (Regional) + 0.021 (Local)	24.4
Carbon Monoxide (CO)							
8-hour average	10,000	--	10,000	873	CO-112713a	482	1,355
1-hour average	40,000	--	40,000	1507	CO-112713a	842	2,349
Nitrogen Oxides (NO_2)							
Annual average (b)	100	100	100	1.1	NOx-120413a	2.8	3.9
1-hour average	188	--	--	160	NOx-112413b thru f	15.6 (Regional), 0.28 (local)	176
Sulfur Dioxide (SO_2)							
Annual arithmetic mean	--	--	80	0.0066	(c)	0.26	0.27
24-hour average	--	--	365	1.2	SO2-120413a	1.0	2.2
3-hour average	--	1,300	--	2.3	SO2-120413a	2.1	4.4
1-hour average	60	--	319	3.1	SO2-120413a	2.6	5.7

Toxic Air Pollutant	ASIL (μg/m^3)	Averaging Period	1st-Highest Ambient Concentration (μg/m^3)	AERMOD Filename
DEEP	0.00333	Annual average	0.80	DEEP-121613a
NO_2	470	1-hour average	388	NOx-112413a
CO	23,000	1-hour average	1599	CO-112713a
Ammonia	70.8	24-hour average	21.8	(d)
Acrolein	0.06	24-hour average	0.0006	(d)

Notes:

μg/m^3 = Micrograms per cubic meter.

ppm = Parts per million.

ASIL = Acceptable source impact level.

DEEP = Diesel engine exhaust particulate matter

(a) Sum of "regional background" plus "local background" values. Regional background concentrations obtained from WSU NW Airquest website. Local background concentrations derived from AERMOD modeling and include emissions from: Con Agra Foods, Microsoft Columbia Data Center, and the Dell Data Center (see Section 6 of this TSD).

(b) For the purpose of determining the 3-year average, five separate models were run (one for each year of meteorological data) to determine the 98th percentile concentration for each year based on the NAAQS.

(c) A dispersion factor was used to calculate the annual average concentration of SO_2 in ambient air based on the annual average DEEP model.

(d) A dispersion factor was used to calculate the 24-hour average concentration of ammonia and acrolein in ambient air based on the 1st highest PM 24-hour average model.

As required by WAC 173-460-090, emissions of diesel engine exhaust particulate are further evaluated in the following section of this document.

6. SECOND TIER REVIEW FOR DIESEL ENGINE EXHAUST PARTICULATE

Proposed emissions of diesel engine exhaust particulate (DEEP) from the thirty seven (37) Oxford engines exceed the regulatory trigger level for toxic air pollutants (also called an Acceptable Source Impact Level, (ASIL)). A second tier review was required for DEEP in accordance with WAC 173-460-090, and Oxford 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 Oxford's increased emissions of all identified carcinogenic compounds (including DEEP and numerous other constituents), nitrogen dioxide, ammonia, carbon monoxide, and acrolein. Oxford also reported the cumulative risks associated with Oxford and prevailing sources in their HIA document based on a cumulative modeling approach. The Oxford cumulative risk study is based on proposed generators, nearby existing permitted data center sources, and other background sources including highways and railroads.

Large diesel-powered backup engines emit DEEP, which is a high priority toxic air pollutant in the state of Washington. In light of the rapid development of other data centers in the Quincy area, and recognizing the potency of DEEP emissions, Ecology decided to evaluate Oxford's proposal in a separate community-wide basis modeling effort, even though it is not required to do so by state law. The Ecology community-wide evaluation approach considers the cumulative impacts of DEEP emissions resulting from Oxford's project, prevailing background emissions from existing permitted data centers, and other DEEP sources in Quincy, beyond what was considered in the Oxford cumulative modeling effort.

The Oxford 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 37 generators and 32 cooling towers will not have an adverse impact on air quality. Ecology finds that Microsoft's Oxford Data Center has satisfied all requirements for NOC approval.

******END OF MICROSOFT OXFORD TSD ******

Appendix G:
Second Tier Review Recommendation

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DEPARTMENT OF
ECOLOGY
State of Washington

Second Tier Review Recommendation Document for

Microsoft Oxford Data Center
Quincy, Washington

August 12, 2014 (Updated)

1. Summary and Purpose

Microsoft Corporation (Microsoft) proposes to construct a new data center called Oxford Data Center (Oxford) in Quincy, WA. Microsoft plans to install and operate 32 diesel-powered generators, each rated at 2,500 kilowatt (kW) electrical output, to provide backup power to Oxford's servers, and four additional 2,000 kW and one 750 kW diesel-powered engines for backing up other equipment and their administrative building. The proposed engines emit diesel engine exhaust particulate (DEEP) at an estimated rate that cause ambient impacts in excess of a regulatory trigger level called an acceptable source impact level (ASIL). Microsoft was therefore required to submit a second tier petition under WAC 173-460-090. A second tier petition requires Microsoft to prepare a health impact assessment (HIA) quantifying the health risks posed by their emissions of DEEP.

Microsoft hired Landau Associates (Landau) to prepare an HIA (Landau Associates, 2014). In this assessment, Landau estimated lifetime increased cancer risks attributable to Microsoft's DEEP and other toxic air pollutant emissions and found them to be about **four in one million.** The maximum risk was estimated at a residential location to the north of Oxford Data Center's property. This risk was quantified assuming that both filterable and condensable particulate emitted from Oxford's engines constitutes DEEP. It is important to note that California's airborne toxics control measure for stationary compression engines only requires the filterable fraction to be quantified. This is because the health studies that form the basis for quantifying the health risk from diesel exposure used measurements of respirable particulate from "fresh" diesel exhaust and elemental carbon as a surrogate for diesel exhaust emissions. Therefore, the increased risk estimated by Landau represents a conservatively high estimate. A lower risk of about **one in one million** was estimated at the same location based on filterable emissions only.

Landau also assessed chronic and acute noncancer hazards attributable to the project's emissions and found them to be lower than unity (one). This indicates that Oxford's emissions by themselves are not likely to result in adverse noncancer health effects.

Finally, Ecology assessed the cumulative health risk by adding estimated concentrations attributable to Microsoft's emissions to an estimated background DEEP concentration. The maximum cumulative cancer risk from resident's exposure to DEEP in the vicinity of Oxford is approximately **45 in one million.** Chronic noncancer hazard quotients are much lower than one indicating that long-term exposure to DEEP in the area is not likely to result in noncancer health effects. These DEEP related health risks in the vicinity of Oxford Data Center are generally much lower than those estimated in urban areas of Washington.

Ecology also updated its cumulative dispersion model in Quincy to evaluate short-term impacts of nitrogen (NO_2) emitted simultaneously by all Quincy data center emergency engines during a system-wide power outage. This evaluation indicated that elevated NO_2 levels could occur, but the combined probability of an outage coinciding with unfavorable meteorology is very low.

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 noncancer hazard is acceptable, the project could be approvable under WAC 173-460-090. Furthermore, the cumulative risks to residents living near the proposed Oxford Data Center are below the cumulative risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100×10^{-6}).

This summary document presents Ecology's review of the proposed Microsoft Oxford Data Center HIA and other requirements under WAC 173-460.

2. Second Tier Review Processing and Approval Criteria

2.1. Second Tier Review Processing Requirements

In order for Ecology to review the second tier petition, each of the following regulatory requirements under Chapter 173-460-090 must be satisfied:

(a) The permitting authority has determined that other conditions for processing the 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 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.

Landau submitted an HIA protocol (item (c)) on December 20, 2013, and draft and final HIAs (item (e)) received by Ecology on January 27, 2014, March 17, 2014, and June 12, 2014.

Acting as the "permitting authority" for this project, Ecology's project permit engineer satisfied items (a) and (b) above on June 3, 2014.[1] Therefore, all five processing requirements above are satisfied.

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[1] Gary Huitsing, "Microsoft Oxford: Combined Completeness Letter & Draft PD" e-mail message with attachments, addressed to Jim Wilder, Gary Palcisko, and Gregory Flibbert, June 3, 2014.

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 noncancer hazard is acceptable.

2.2.1. tBACT Determination

Ecology's permit engineer determined that Microsoft's proposed pollution control equipment (i.e., Tier 2 engines equipped with diesel particulate filters, diesel oxidation catalysts, and selective catalytic reduction) more than satisfies the BACT and tBACT requirement for diesel engines powering backup generators at Oxford Data Center.[2]

3. HIA Review

As described above, the applicant is responsible for preparing the HIA under WAC 173-460-090. Ecology's project team consisting of an engineer, a toxicologist, and a modeler review the HIA to determine if the methods and assumptions are appropriate for assessing and quantifying surrounding community's risk from a new project.

For the Oxford project, the HIA focused mainly on health risks attributable to DEEP exposure as this was the only TAP with a modeled concentration in ambient air that exceeded an ASIL. Landau briefly described emissions and exposure to other TAPs (NO_2, carbon monoxide (CO), ammonia,[3] and acrolein) because these pollutants exceeded a small quantity emission rate (SQER), and Ecology requested that health hazards from exposure to these pollutants be quantified.

3.1. DEEP Health Effects Summary

Diesel engines emit very small fine (<2.5 micrometers [μm]) and ultrafine (<0.1 μm) particles. These particles can easily enter deep into the lung when inhaled. Mounting evidence indicates that inhaling fine particles can cause numerous adverse health effects.

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[2] BACT was determined to be met through the use of EPA Tier 2 certified engines if the engines are installed and operated as emergency engines, as defined at 40 CFR§60.4219; compliance with the operation and maintenance restrictions of 40 CFR Part 60, Subpart IIII; and use of ultra-low sulfur diesel fuel containing no more than 15 parts per million by weight of sulfur.

[3] Some ammonia is released from the selective catalytic reduction equipment designed to reduce NO_X emissions.

Studies of humans and animals specifically exposed to DEEP show that diesel particles can cause both acute and chronic health effects including cancer. Ecology has summarized these health effects in "Concerns about Adverse Health Effects of Diesel Engine Emissions" available at http://www.ecy.wa.gov/pubs/0802032.pdf.

The HIA prepared by Landau quantifies the noncancer hazards and increased cancer risks attributable to the proposed Oxford Data Center's DEEP emissions.

3.2. DEEP Toxicity Reference Values

To quantify noncancer hazards and cancer risk from exposure to DEEP, quantitative toxicity values must be identified. Landau identified toxicity values for DEEP from two agencies: the U.S. Environmental Protection Agency (EPA) (EPA, 2002; EPA, 2003), and California EPA's Office of Environmental Health Hazard Assessment (OEHHA) (CalEPA, 1998). These toxicity values are derived from studies of animals that were exposed to a known amount (concentration) of DEEP, or from epidemiological studies of exposed humans, and are intended to represent a level at or below which adverse noncancer 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 noncancer 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 noncancer health effects.

National Ambient Air Quality Standards (NAAQS) and other regulatory toxicological values for short- and intermediate-term exposure to particulate matter have been promulgated, but values specifically for DEEP exposure at these intervals do not currently exist.

OEHHA derived a unit risk factor (URF) for estimating cancer risk from exposure to DEEP. The URF is based on a meta-analysis of several epidemiological studies of humans occupationally exposed to DEEP. In these studies, DEEP exposure was estimated from measurements of elemental carbon and respirable particulate representing fresh diesel exhaust. The URF is expressed as the upper-bound probability of developing cancer, assuming continuous lifetime exposure to a substance at a concentration of one microgram per cubic meter (1 $\mu g/m^3$), and are expressed in units of inverse concentration [i.e., $(\mu g/m^3)^{-1}$]. OEHHA's URF for DEEP is 0.0003 $(\mu g/m^3)^{-1}$ meaning that a lifetime of exposure to 1 $\mu g/m^3$ of DEEP results in an increased individual cancer risk of 0.03 percent or a population cancer risk of 300 excess cancer cases per million people exposed.

Table 1. Toxicity Values Used to Assess and Quantify Noncancer Hazard and Cancer Risk			
Pollutant	Agency	Noncancer	Cancer
DEEP	U.S. Environmental Protection Agency	RfC = 5 µg/m3	NA[1]
	California EPA–Office of Environmental Health Hazard Assessment	Chronic REL = 5 $\mu g/m^3$	URF = 0.0003 per $\mu g/m^3$
[1] EPA considers DEEP to be a probable human carcinogen, but has not established a cancer slope factor or unit risk factor.			

3.3. Affected Community/Receptors

While Oxford Data Center is located in an industrially zoned area and surrounded largely by agricultural land uses, air dispersion modeling indicated that proposed DEEP emissions, assuming DEEP is represented by both condensable and filterable particulate, could result in concentrations in excess of the ASIL at roughly 85 parcels with residential land use codes (Figure 1) [Ecology 2013, Grant County 2013]. U.S. Census data show that approximately 250 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). When assuming that only filterable particulate is DEEP, as is specified in California's airborne toxics control measure for stationary compression engines, no residential land uses are impacted, but approximately seven people could live in the area impacted at levels in excess of the ASIL.

For the purposes of assessing increased cancer risk and noncancer hazards, Landau identified receptor locations where the highest exposure to project-related air pollutants could occur: at the project boundary, a nearby residence, and off-site commercial areas. They also identified and evaluated exposures at other areas with sensitive populations such as schools and a hospital. Landau calculated both noncancer hazards and cancer risks for each of these receptors, and they also estimated long-term cumulative risks attributable to and other known sources of DEEP.[4] Landau also evaluated the combined cancer risk caused by numerous other carcinogens known to be emitted from diesel engines, and their analysis concluded that the vast majority of the cancer risk was caused by DEEP.

Ecology's review of the HIA found that Landau identified appropriate receptors to capture the highest exposures for residential, commercial, and fence line receptors. Landau also identified other potential sensitive receptor areas such as students at Monument Elementary and Quincy Valley Schools, and patients at Quincy Valley Hospital (Figures Figure 2 and Figure 3).

[4] Landau and Ecology modeled cumulative emissions from existing data centers, railway, and highways. Results were incorporated into the review of proposed emissions from Oxford Data Center.

3.4. Increased Cancer Risk

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

Table 2, adapted from the HIA, shows the estimated Oxford Data Center-specific and cumulative cancer risk per million at each of the receptors evaluated. The highest increase in risks attributable to Oxford Data Center's emissions is 4.1 per million[5] and occurs at residential property to the north of Oxford. 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 0.003 per million. When estimating exposure to DEEP, Landau assumed that both filterable and condensable particulate matter make up DEEP resulting in an estimated risk that errs on the side of overestimating risk.[6] Additionally, Landau chose a receptor location to represent a residence that was approximately 400 ft south of the actual house (closer to Oxford's emission sources) and therefore, the risk reported for a residential receptor at this location represents a conservatively high estimate of risk.

The highest estimated increased risk for a residential receptor near Oxford assuming only filterable particulate represents DEEP is approximately 1.0 per million. For non-residential exposure scenarios, workers at nearby commercial facilities may have increased risks of about 1.1 per million (or 0.3 per million assuming only filterable). Increased cancer risks to potential bystanders exposed near the point of maximum impact (i.e., fence line receptor) may be about 0.1 to 0.6 per million.

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[5] # 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.

[6] California Air Resources Board considers the front half (filterable) PM emissions to be consistent the techniques used to establish diesel PM as a toxic air contaminant."

Table 2. Estimated Increased Cancer Risk for Residential, Occupations, and Student Scenarios Attributable to Oxford's DEEP Emissions

Attributable to:	Risk Per Million from DEEP Exposure at Various Receptor Locations						
	Fence Line Receptor[1]	R-1 North Residence (MIRR)[2]	C-1 Industrial Building (MICR)[3]	Monument Elementary School: Students[4]	Monument Elementary School: Teachers[5]	Patients at Quincy Valley Medical Center[6]	Maximally Cumulatively Impacted Residence in Modeling Domain[2]
Oxford (assumes filterable and condensable particulate are DEEP)	0.6	4.1	1.1	<0.1	0.2	<0.1	1.3
Oxford (assumes filterable only is DEEP)	0.1	1.0	0.3	<0.1	<0.1	<0.1	0.3

[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.
[4] Student scenario assumes exposure occurs 180 days per year, eight hours per day for seven years.
[5] Teacher scenario assumes exposure occurs 200 days per year, eight hours per day for 40 years.
[6] Patient scenario assumes a patient is present at the hospital 365 days per year, 24 hours per day for one year.
Note: Landau also calculated risks posed by other carcinogenic TAPs (i.e., acetaldehyde, benzene, formaldehyde, 1,3-butadiene, and carcinogenic polycyclic aromatic hydrocarbons). They estimated a negligible increased risk attributable to these TAPs of about 0.003 per million at the north residence (R-1).

3.4.2. Cancer Risk Attributable to Cumulative DEEP Emissions

Ecology and Landau conducted separate analyses of cumulative exposure to DEEP in Quincy. These analyses differed in scope and methodology and, therefore, the results also differed. While each analysis used similar emission rates for various sources, with the exception of railway emissions, Ecology's model tended to yield higher concentrations at locations near roadways. The key methodological difference stem from:

- Use of different sets of meteorological data to perform modeling. Ecology used 2005 meteorology which tends to produce higher concentrations in some areas compared to other meteorological years. Landau used the average of five years of meteorology spanning from 2000 to 2005. Ecology's use of 2005 meteorology likely resulted in higher concentration estimates at some locations.
- Use of different modeling techniques involving line sources (i.e., roads and railways).

- Use of different railway emission rate. Ecology adjusted the results of railway emissions to reflect an emission rate calculated from the 2011 Grant County locomotive inventory and active track miles in Grant County. The estimated particulate emission rate from railways in Quincy was approximately 128 pounds per mile per year.

For the purpose of incorporating the cumulative modeling results into the review of proposed emissions from Oxford Data Center, Ecology chose to report results from both analyses.

The cumulative risk of all known sources of DEEP emissions in the vicinity of Oxford Data Center (Table 3) is highest for a nearby residence south of State Route 28, and southeast of the proposed project. The cumulative DEEP risk at this home is about 45 per million.[7]

Table 3. Estimated Increased Cancer Risk for Residential, Occupations, and Student Scenarios Attributable to All Known Sources of DEEP in Quincy

	Risk Per Million from DEEP Exposure at Various Receptor Locations						
				Monument Elementary School			
Modeled by:	Fence Line Receptor[1]	R-1 North Residence (MIRR)[2]	C-1 Industrial Building (MICR)[3]	Students[4]	Teachers[5]	Patients at Quincy Valley Medical Center[6]	Maximally Cumulatively Impacted Residence in Modeling Domain[2]
Landau	0.8	10.3	4.3	0.3	0.9	0.4	32.6
Ecology	0.6	8.5	6.0	0.3	1.6	0.6	45.0

[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.
[4] Student scenario assumes exposure occurs 180 days per year, eight hours per day for seven years.
[5] Teacher scenario assumes exposure occurs 200 days per year, eight hours per day for 40 years.
[6] Patient scenario assumes a patient is present at the hospital 365 days per year, 24 hours per day for one year.

3.5. Noncancer Hazard

Landau evaluated chronic noncancer hazards associated with long-term exposure to DEEP emitted from Oxford Data Center and other local sources. Hazard quotients were much lower than unity (one) for all receptors' exposure to Oxford Data Center-related and cumulative

[7] Note that residential receptors tend to be the most exposed (e.g., longest exposure duration and exposure frequency). Therefore, their risks tend to be higher than other types of receptors. For regulatory decision making purposes, Ecology assumes that a resident is continuously exposed at their residence for their entire lifetime.

DEEP.[8] In addition, Landau evaluated combined long-term exposure to DEEP and ammonia emitted from Oxford and determined the hazard indices were much lower than unity for all receptors' exposure to Oxford Data Center-related pollutants. This indicates that chronic noncancer hazards are not likely to occur as a result of exposure to DEEP and other project-related TAPs in the vicinity of Oxford Data Center.

Landau also evaluated acute hazards associated with short-term exposure to NO_2, CO, ammonia, and acrolein. Landau evaluated scenarios where Oxford Data Center was operating under full power outage mode because this is the time period when short-term emissions would be greatest. Hazard quotients and hazard indices for all receptors' exposures were below one indicating that acute adverse health effects are not likely to be caused solely by Oxford Data Center's emissions during a power outage.[9]

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 Oxford's emissions are not expected to cause or contribute to an exceedance of any NAAQS (Ecology, 2014).

4.2. Cumulative Short-Term NO_2 Hazard

While Oxford Data Center's NO_2 emissions by themselves are not likely to result in adverse noncancer health effects, Ecology recognizes that it is possible that cumulative impacts of multiple data center's emissions during a system-wide outage could potentially cause NO_2 levels to be a health concern. Ecology evaluated the short-term NO_2 impacts that could result from emergency engine operation during a system-wide power outage. While NO_2 levels could indeed rise to levels of concern[10] at various locations across town, the outage would have to occur at a time when the dispersion conditions were optimal for concentrating NO_2 at a given location.

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[8] The highest chronic hazard quotient attributed to cumulative exposure to DEEP (0.02) occurred at several locations near project Oxford (i.e., maximum impacted boundary receptor, maximally impact commercial receptor, and maximally impacted cumulatively impacted residential receptor in modeling domain).

[9] The highest acute hazard index of 0.8 occurred at the fence line receptor location (i.e., maximum impacted boundary receptor).

[10] The level of concern in this case is 462 $\mu g/m^3$. This represents California OEHHA's acute reference exposure level of 470 $\mu g/m^3$ minus an estimated regional background concentration of 8.3 $\mu g/m^3$.

Ecology estimated the combined probability of a system-wide outage coinciding with unfavorable meteorology. Ecology found the likelihood of this occurrence to be relatively low throughout Quincy.

To conduct this analysis, Ecology modeled emissions of:

- Simultaneous outage emissions of NO_X for all permitted and proposed data center engines, during all meteorological conditions experienced throughout 2005.
- Each engine operates at loads specified in permits (for existing data centers) or permit applications (for Oxford Data Center).
- Potential emissions from other NO_X sources in Quincy like the Celite Corporation and mobile source emissions.

Figure 5 shows the maximum 1-hour NO_2 concentrations that could occur in Quincy if all data centers operated simultaneously under emergency conditions. Although the acute reference exposure level for NO_2 is 470 $\mu g/m^3$ (CalEPA, 2008), the figure shows only those concentrations that exceed 462 $\mu g/m^3$ because Ecology assumes that a NO_2 background concentration of 8.3 $\mu g/m^3$ exists in Quincy at any given time (NW AIRQUEST, 2014). It is important to note that the maximum 1-hour concentrations shown in Figure 5 do not all occur at the same time. The figure displays the worst-case concentration at each location in Quincy. Generally, this figure shows that concentrations of NO_2 could exceed a level of health concern in some areas of Quincy.

Ecology also analyzed the frequency (# of hours per year) meteorological conditions could result in a NO_2 concentration greater than 462 $\mu g/m^3$ at each receptor point within the Quincy modeling domain. Figure 6 shows the number of hours per year that a cumulative NO_2 concentration could exceed 462 $\mu g/m^3$ assuming data center engines operate during all combinations of meteorological conditions experienced throughout the year. If engines were run continuously during the course of a year, some areas near data centers could achieve concentrations of health concern for up to about 300 hours per year. In reality, these data centers were not permitted to continuously operate their engines; instead, they are only permitted to operate between eight and 400 hours per year under emergency outage conditions. Grant County Public Utilities District (PUD) reported that from 2003 to 2009, the average total outage time for customers that experience an outage throughout PUD's service area is about 143 minutes per year (Coe, 2010).

To account for infrequent intermittent emergency outages, Ecology estimated the joint probability of a system-wide power outage coinciding with unfavorable meteorological conditions. The joint probability was estimated as:

$$P(X \cap Y) = P(X) \cdot P(Y)$$

Where:

P(X) = The number of unfavorable atmospheric condition hours[11] that occurred in a one year period[12] divided by the total number of hours in the same period, i.e., 8760 hours

P(Y) = The number of hours during which unplanned outage generator operation takes place divided by the total number of hours considered. Ecology estimated P(Y) by examining the lowest duration that Quincy data centers are permitted to operate engines under outage conditions, i.e., eight hours per year.

$P(X \cap Y)$ = The hourly probability that the concentration at a given receptor will exceed 462 $\mu g/m^3$.

Based on this joint probability, the estimated number of hours per year that an ambient NO_2 concentration of 462 $\mu g/m^3$ would probably occur given full use of the allowance for up to eight hours of emergency outage operation is:

$$\text{Frequency (hours per year)} = P(X \cap Y) \cdot 8760 \text{ hr/year}$$

The long-term recurrence intervals between hours that an ambient NO_2 concentration of 462 $\mu g/m^3$ would probably occur given full use of the allowance for up to eight hours of emergency outage operation is:

$$\text{Recurrence (years)} = 1/\text{Frequency (hr/yr)}$$

This analysis determined that the combined probability of an outage coinciding with unfavorable weather conditions results in recurrence intervals of every 100 years or more at most of the locations within the modeling domain. Some areas near and within the property boundaries of Yahoo!, Intuit, Sabey, and Microsoft Columbia Data Center could experience NO_2 levels > 462 $\mu g/m^3$ once every few decades to few years.

Ecology's analysis concluded that coincidental worst-case meteorological and system-wide power outage conditions are extremely unlikely to occur. Although extremely improbable, we cannot completely rule out the possibility of having such a scenario. If such an event were to occur, people with asthma who might be cumulatively exposed to NO_2 and DEEP emitted from emergency engines and other sources may experience respiratory symptoms such as wheezing, shortness of breath, and reduced pulmonary function with airway constriction.

4.3. Outages Reported by Quincy Data Centers

Ecology obtained reports of unplanned generator usage at the Microsoft, Yahoo!, Dell, Intuit, and Sabey data centers in Quincy to determine if the assumed eight hours of simultaneous outage

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[11] The number of times the NO_2 concentration exceeded 462-$\mu g/m^3$ in the AERMOD simulation.

[12] Meteorology was based on 2005 year meteorology from Moses Lake.

per year represents a reasonable assumption. Table 4 shows the dates of data center power outages reported to Ecology. The information received about power outages from the data centers varies in the level of detail. For example, some reports do not specify the number of engines or the duration of lost power, while others provide this information. None of the reports specify the load at which the engines operated during the outage.

The outage reports indicate that two or more data centers lost power at the same time on at least two occasions: May 29, 2013, affecting Dell and Microsoft Columbia Data Center on the west side of Quincy for a duration of about 1.3 hours; and November 16, 2013, affecting Sabey and Yahoo! on the east side of Quincy for about 1.5 hours. While these data are not comprehensive, there have been no reported instances of system-wide outages affecting the entire electrical grid in Quincy since the first data centers were permitted in 2006. According to Grant County PUD, the east and west sides of Quincy are connected to transmission lines via two different feeder lines thus reducing the likelihood of a simultaneous outage affecting all Quincy data centers (Coe, 2010).

Table 4. Summary of Power Outage Reports from Quincy-Area Data Centers (2008 to 2014)

	Microsoft Columbia Data Center		Yahoo!		Intuit		Dell		Sabey	
# Permitted Engines	37		23		9		28		44	
Date of Reported Outage	**# Engines**	**Duration**	**# Engines**	**Duration**	**# Engines**	**Duration**	**# Engines**	**Duration**	**# Engines**	**Duration**
08/09/2008	---	---	Not specified	0.5 hr	---	---	---	---	---	---
10/25/2008	---	---	Not specified	2 hr	---	---	---	---	---	---
06/05/2009	---	---	Not specified	0.5 hr	---	---	---	---	---	---
12/2009	Not specified	Not specified	---	---	---	---	---	---	---	---
01/2010	Not specified	Not specified	---	---	---	---	---	---	---	---
01/22/2010	Not specified	Not specified	---	---	---	---	---	---	---	---
12/ 20/2011	2	0.6 hrs	---	---	---	---	---	---	---	---
03/2012	---	---	13	0.5 hr	---	---	---	---	---	---
07/06/2012	---	---	---	---	---	---	5	0.2 to 0.4 hr (avg. 0.3 hr/engine)	---	---
05/29/2013	33	0.1 to 1.3 hr (avg. 0.8 hr)	---	---	---	---	5	0.4 to 1 hr (avg. 0.8 hr)	---	---
08/2013	---	---	16	1 to 5 hours (avg. 2 hr/ engine)	---	---	---	---	---	---
11/16/2013	---	---	---	--	--	---	---	---	Not Specified	1.5 hr

Table 4. Summary of Power Outage Reports from Quincy-Area Data Centers (2008 to 2014)										
	Microsoft Columbia Data Center		Yahoo!		Intuit		Dell		Sabey	
# Permitted Engines	37		23		9		28		44	
Date of Reported Outage	# Engines	Duration	# Engines	Duration	# Engines	Duration	# Engines	Duration	# Engines	Duration
11/2013	---	---	20	1 to 26 hr (avg. 3.9 hr/engine)	---	---	---	---	---	---
02/2014	---	---	9	1 hr	---	---	---	---	---	---
04/21/2014	---	---	---	---	6	0.75 hr	---	---	---	---
04/24/2014	---	---	---	---	6	0.5 hr	---	---	---	---
04/2014	---	---	22	8 to 12 hr (avg. 9.4 hr/engine)	---	---	---	---	---	---
05/2014	---	---	12	1 hr	---	---	---	---	---	---
Note: Shaded cells represent times when more than one data center reports an outage at the same time interval.										

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 Oxford's 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 related to the HIA for project Oxford are:

5.1. Exposure

It is difficult to characterize the amount of time that people can be exposed to Oxford's DEEP emissions. For simplicity, Landau and Ecology assumed a residential receptor is at one location for 24 hours per day, 365 days per year for 70 years. These assumptions tend to overestimate exposure.

The duration and frequency of power outages is also uncertain. Oxford estimates that they will use the generators during emergency outages for no more than 40 hours per year. From 2003 to 2009, the average outage for all Grant County PUD power customers was about 2.5 hours per year. While this small amount of power outage provides some comfort that power service is relatively stable, Oxford cannot predict future outages with any degree of certainty. Oxford accepted a limit of emergency operation totaling 40 hours per year for emergency outage (all engines operate) and electrical bypass during switchgear and transformer maintenance (four engines operate) and estimated that this limit should be more than sufficient to meet their emergency demands.

5.2. Emissions

The exact amount of DEEP emitted from Oxford's diesel-powered generators is uncertain. Landau estimated emissions using load-specific emission data provided by engine manufacturers. Landau attempted to account for higher emissions that would occur during initial start-up and before control equipment was fully warmed up. Finally, the emission estimates for DEEP include adjustment factors to account for condensable particulate in addition to filterable particles. The resulting values are considered to be a conservatively high estimate of DEEP emissions.

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 Oxford 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 noncancer 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 noncancer 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 1×10^{-5} to 1×10^{-3} per µg/m^3. OEHHA's DEEP URF (3×10^{-4} per µg/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.

Regarding the second bullet above, California EPA's Office of Environmental Health Hazard Assessment recently evaluated experimental data from several new technology diesel engine emissions reflecting emission controls similar to those proposed for Oxford's engines (CalEPA, 2012).

> *"These studies indicate that the reductions of some air toxics such as polycyclic aromatic hydrocarbons, benzene and 1,3- butadiene in new technology engine exhaust (often 80 – 90%) are not as great as the corresponding reductions in DEP* [diesel engine particulate] *(often 95 – 99%). The resulting air toxics/DEP ratios for NTE* [new technology engine] *exhaust may be greater than or equal to similar ratios found in exhaust from older diesel engines. As an example, an analysis of data from one published review indicated that the average 3-ring PAH, 1,3-butadiene and benzene/DEP ratios increased in NTE exhaust compared to older DEE* [diesel engine emissions] *by 2-, 10- and 4-fold, respectively. These data suggest that while the absolute amount of DEP (and thus estimated cancer risk) and air toxics is much reduced in NTE exhaust, the exhaust composition has not necessarily become less hazardous. Thus, the available data do not indicate that NTE exhaust should be considered to be fundamentally different in kind compared to older DEE for risk assessment purposes and suggests the TAC cancer unit risk value for DEP can continue to be applied to NTE exhaust risk assessments."*

Table 5 presents a summary of how the uncertainty affects the quantitative estimate of risks or hazards.

Table 5. Qualitative Summary of How the Uncertainty Affects the Quantitative Estimate of Risks or Hazards	
Source of Uncertainty	**How Does it Affect Estimated Risk from this Project?**
Exposure assumptions	Likely overestimate of exposure
Emissions estimates	Possible overestimate of emissions concentrations
Air modeling methods	Possible underestimate of average long-term ambient concentrations and overestimate of short-term ambient concentration
Toxicity of DEEP at low concentrations	Possible overestimate of cancer risk, possible underestimate of noncancer hazard for sensitive individuals

6. Conclusions and Recommendation

The project review team has reviewed the HIA and determined that:.

a) The TAP emissions estimates presented by Landau represent a reasonable estimate of the project's future emissions.

b) Emission controls for the new and modified emission units meet or exceed the tBACT requirement.

c) The ambient impact of the emissions increase of each TAP that exceeds ASILs has been quantified using refined air dispersion modeling techniques as approved in the HIA protocol.

d) The HIA submitted by Landau on behalf of Microsoft adequately assesses project-related increased health risk attributable to TAP emissions.

The project review team concludes that the HIA represents an appropriate estimate of potential increased health risks posed by Oxford Data Center's TAP emissions. The risk manager may recommend 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 additional cancer risk threshold established by Ecology for permitting data centers in Quincy (100 per million or 100×10^{-6}).

Additionally, Ecology's analysis of short-term impacts from simultaneous outage emissions determined a very low likelihood of a system-wide power outage coinciding with unfavorable pollutant dispersion. While existing power outage reports from each of the data centers do not indicate power outages have simultaneously affected all Quincy data centers, Ecology should track outage reports from the data centers to ensure that assumptions used in the analysis remain plausible.

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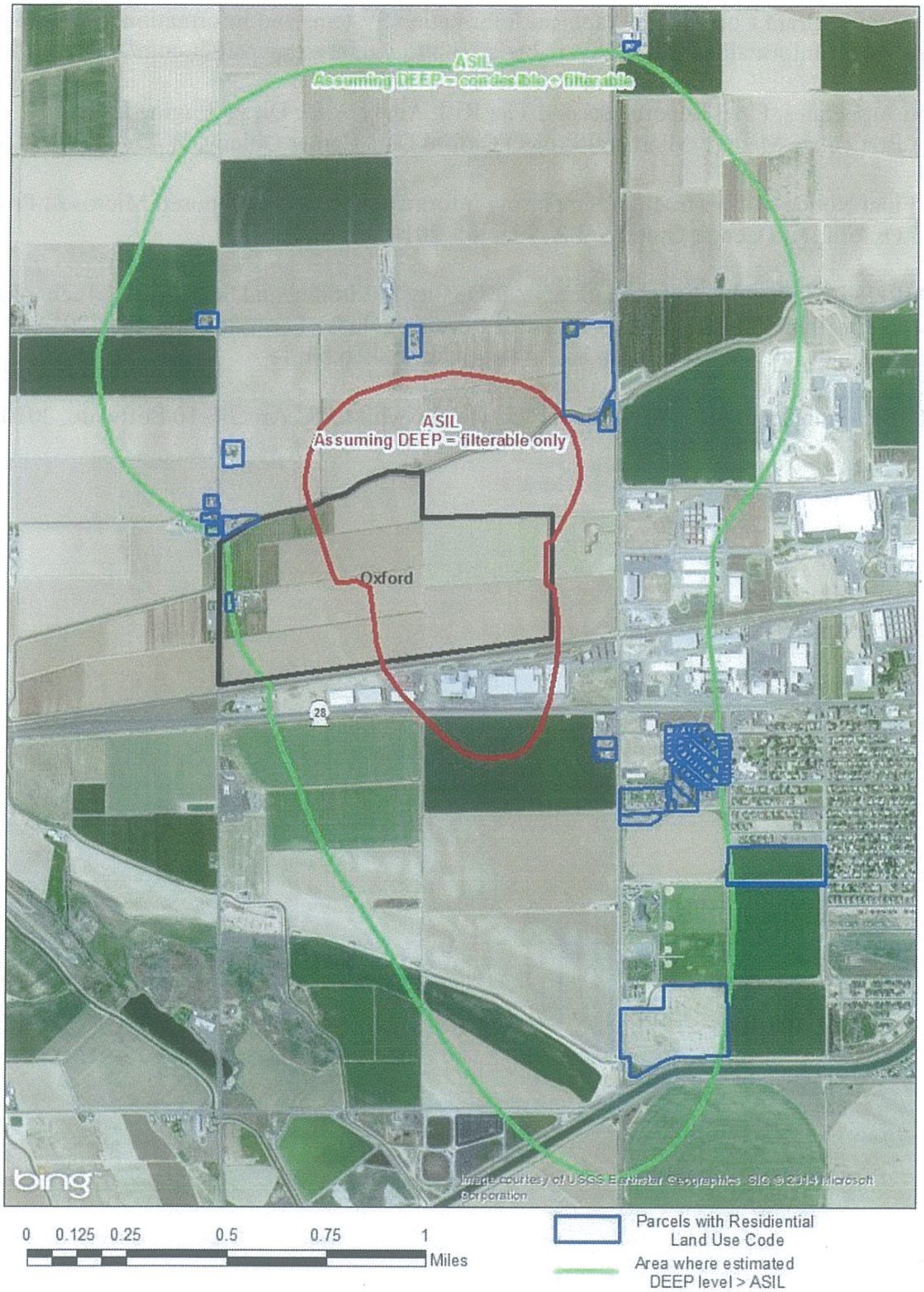

Figure 1. Residential parcels in the area where DEEP concentrations could exceed the ASIL.

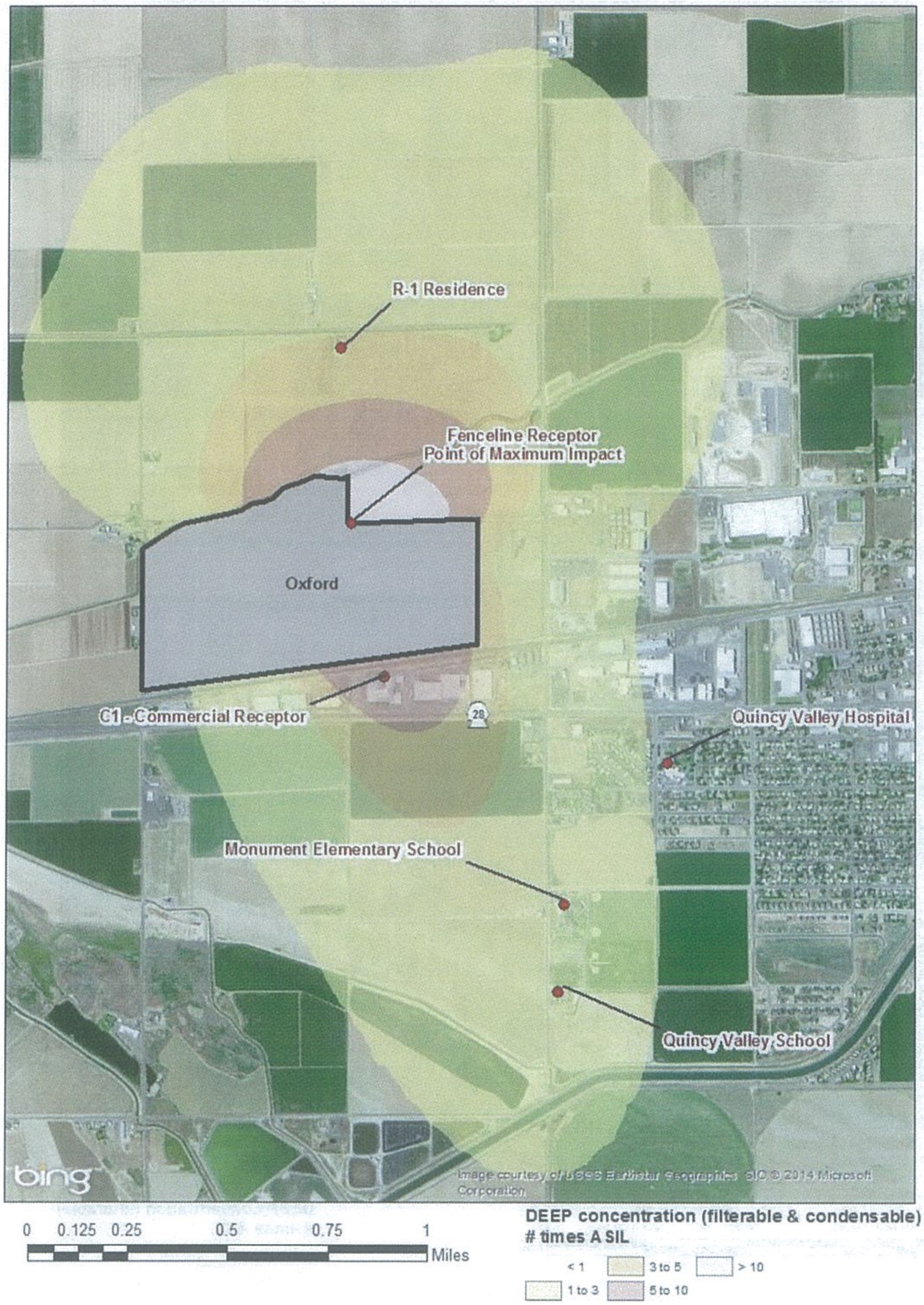

Figure 2. Receptor locations in relation to estimated DEEP concentrations (assuming both filterable and condensable fractions represent DEEP). Concentrations are reported as the number of times higher than the ASIL.

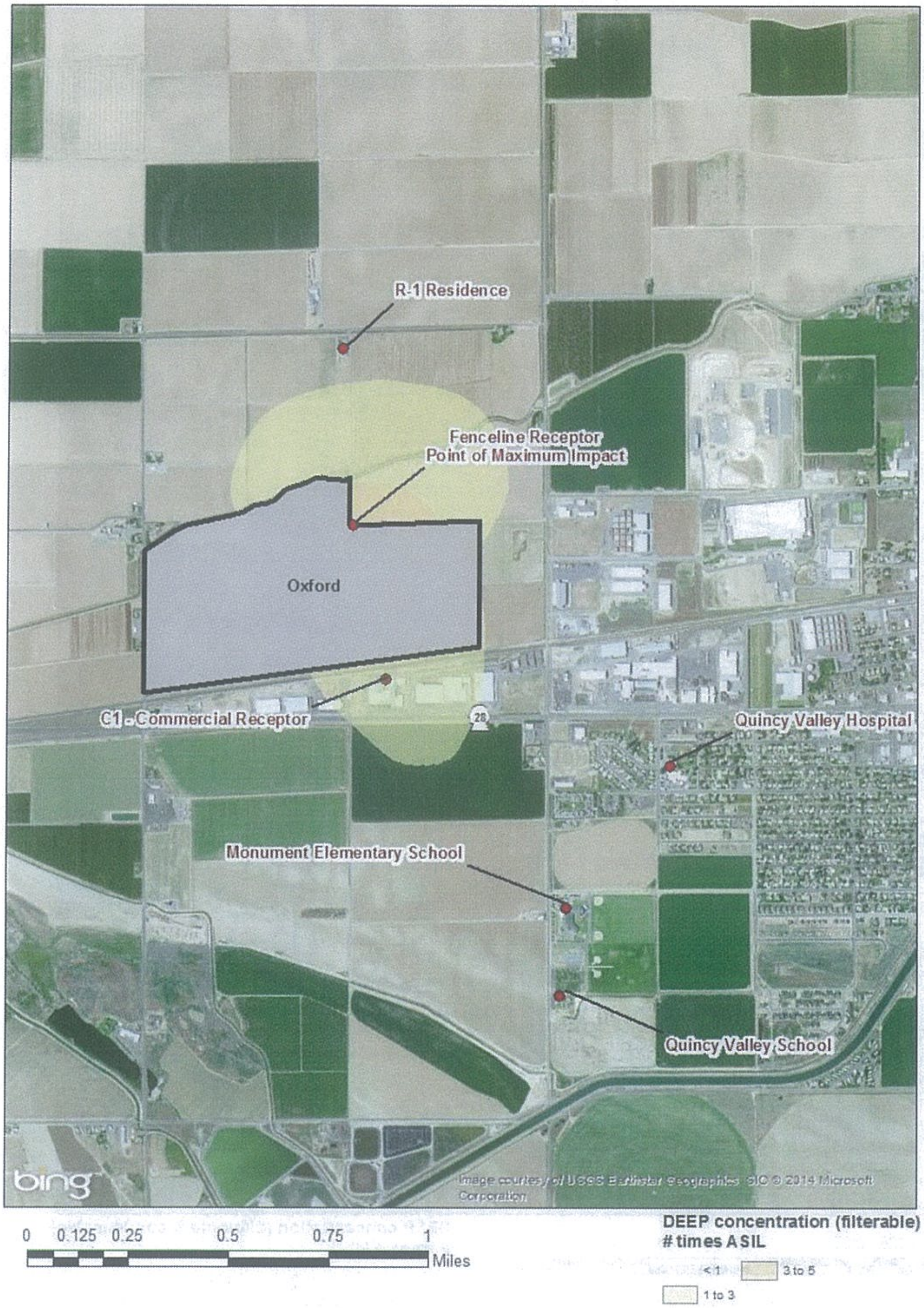

Figure 3. Receptor locations in relation to estimated DEEP concentrations (assuming only filterable fraction represents DEEP). Concentrations are reported as the number of times higher than the ASIL.

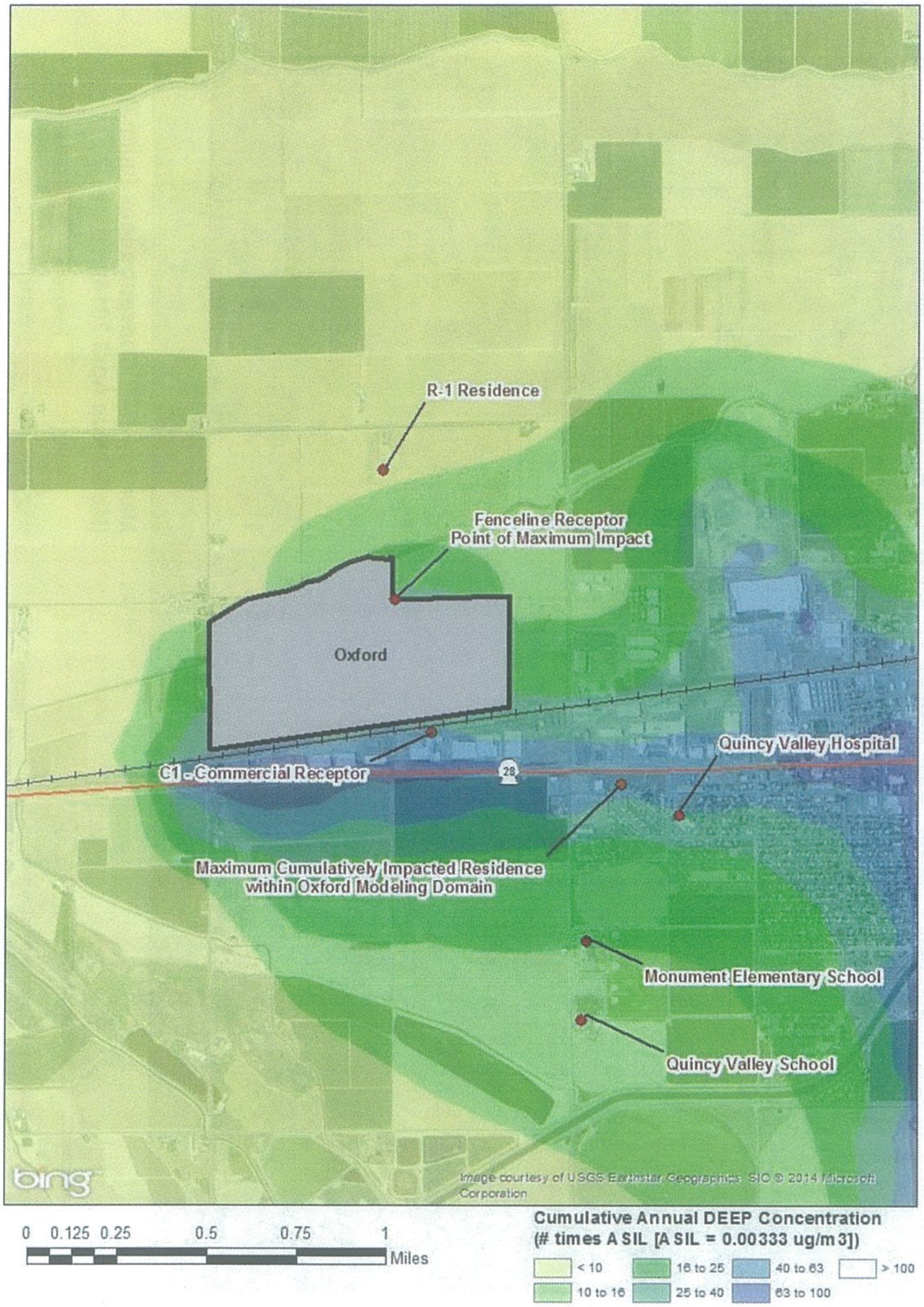

Figure 4. Cumulative DEEP concentrations (estimated by Ecology) in the Oxford vicinity. Concentrations are reported as the number of times higher than the ASIL.

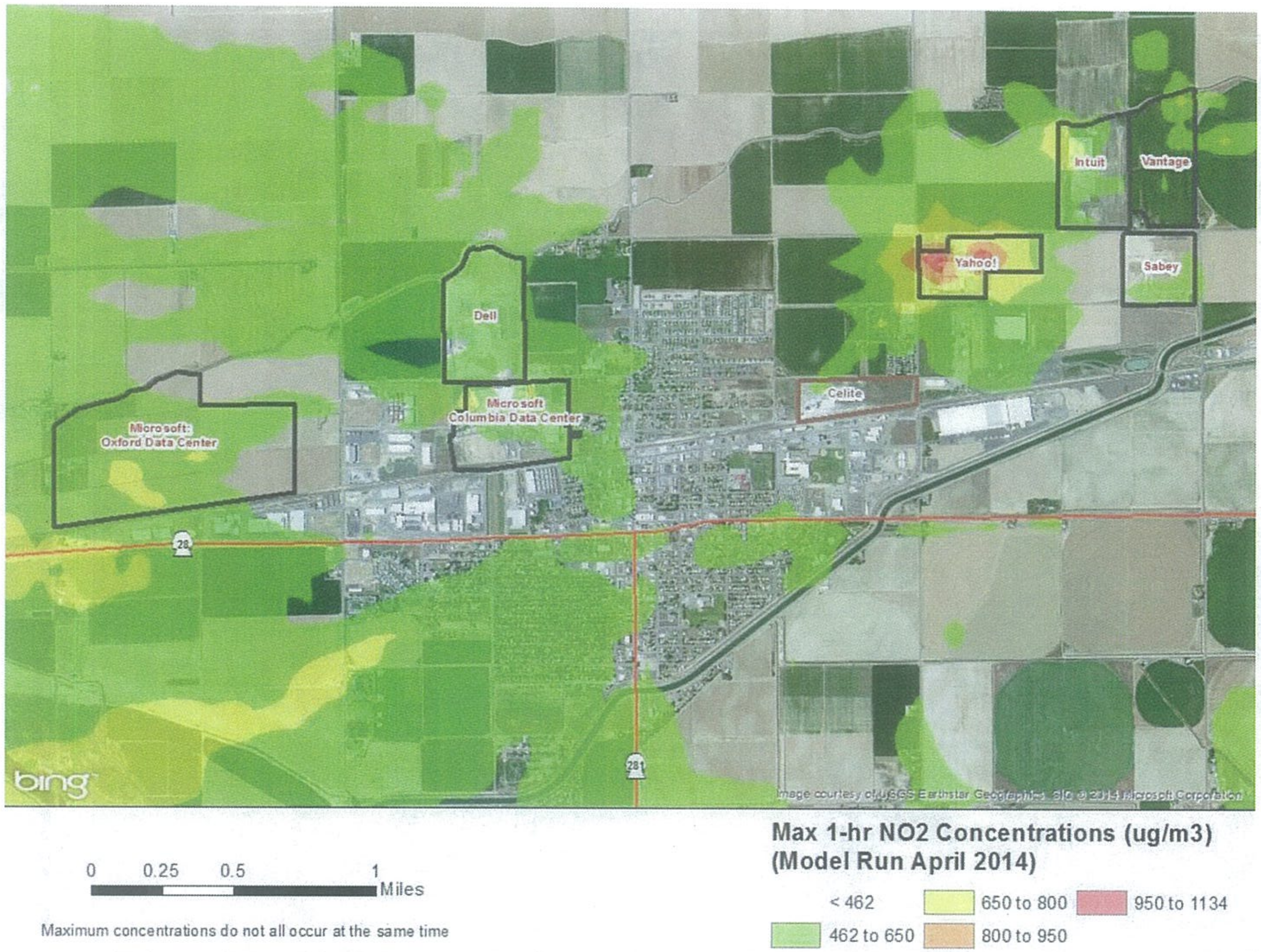

Figure 5. Estimated maximum 1-hr NO_2 concentrations resulting from cumulative NO_X emissions of all permitted and proposed data center engines during a simultaneous outage in Quincy. These maximum concentrations do not all occur at the same time.

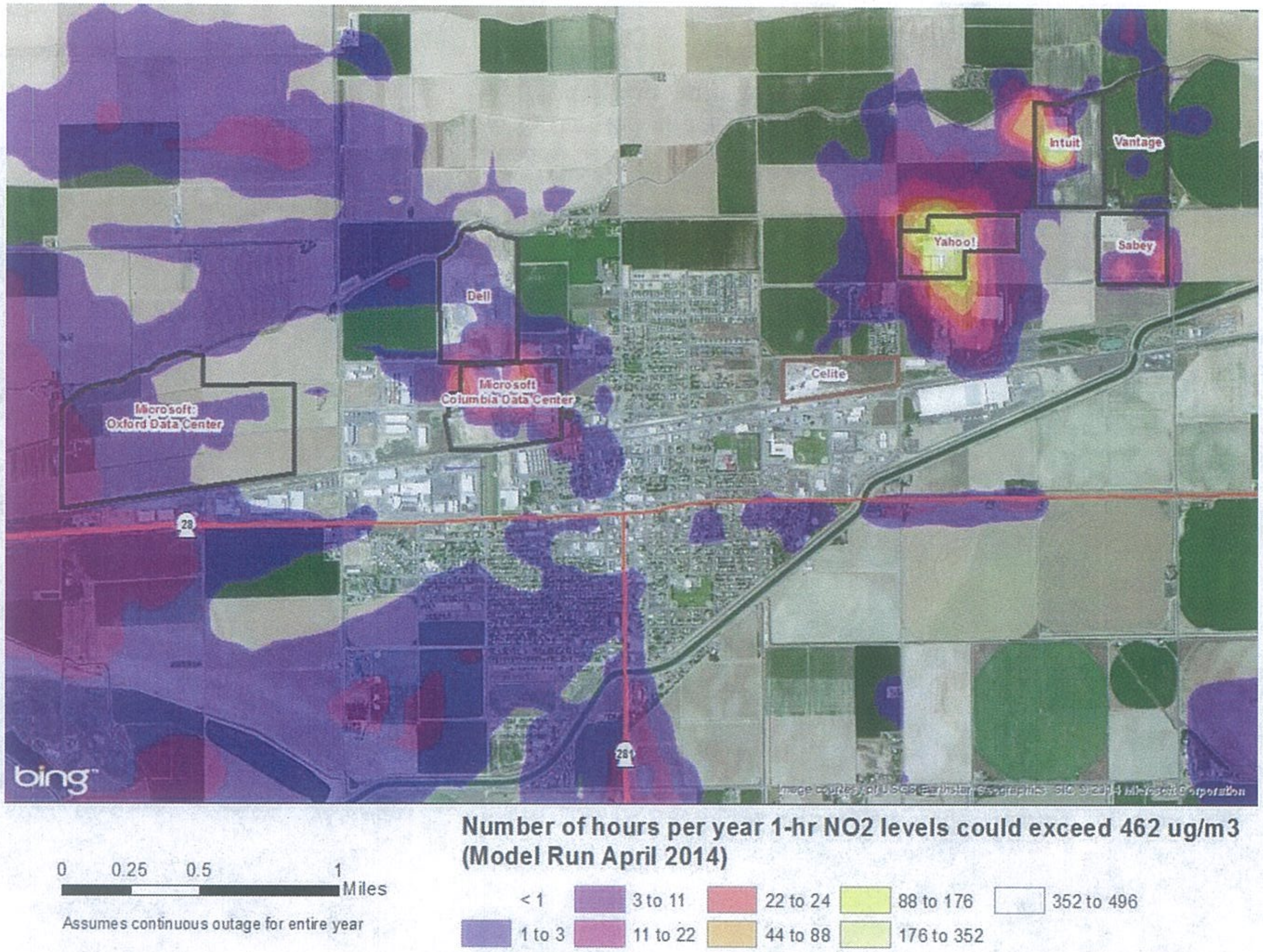

Figure 6. Estimated number of times per year that 1-hr NO_2 concentrations could exceed 462 ug/m^3 assuming continuous outage emissions for an entire year.

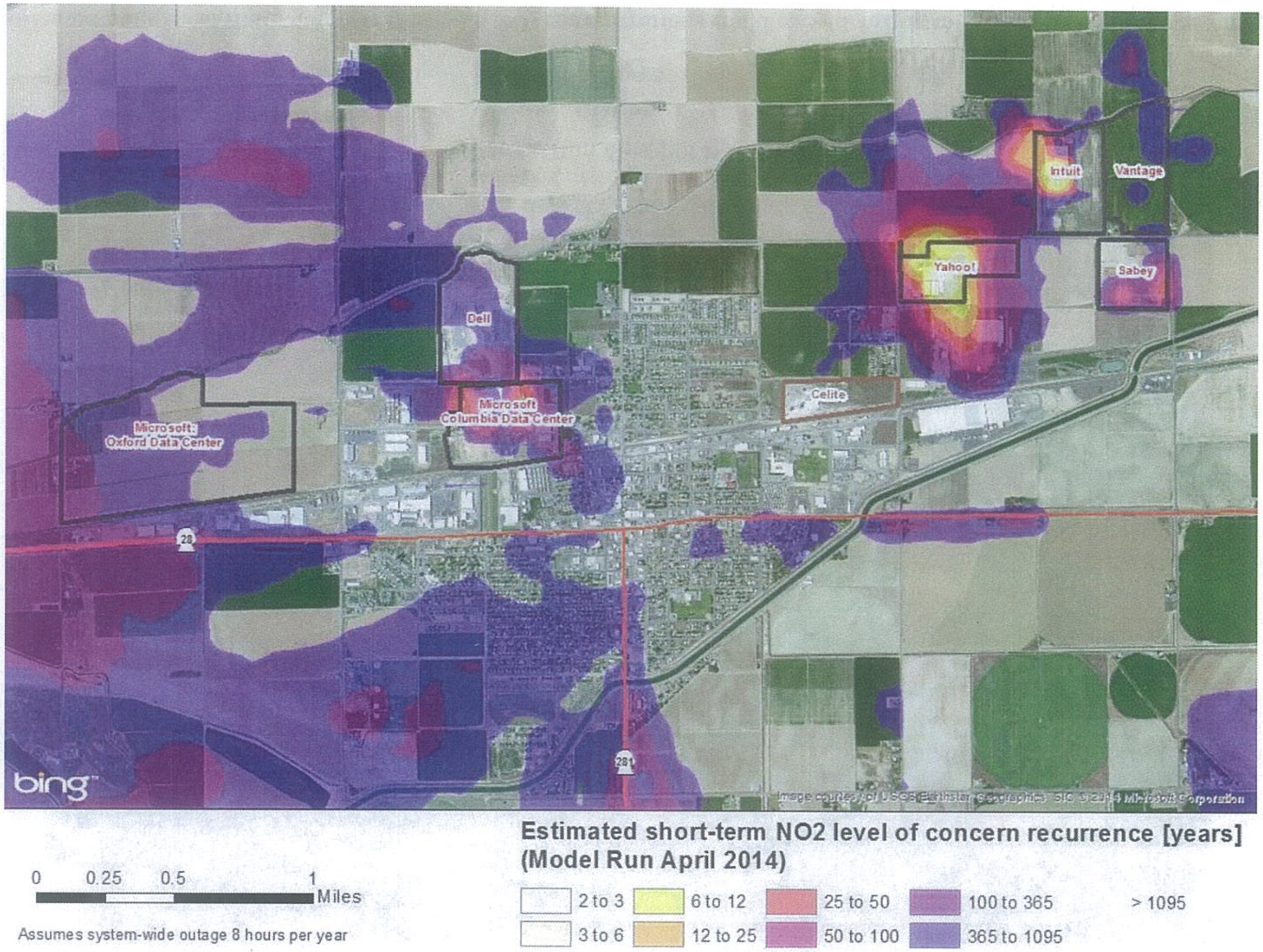

Figure 7. Estimated interval between occurrences of 1-hr NO_2 concentrations greater than 462 ug/m^3 assuming eight hours of simultaneous Quincy data center emergency engine outage emissions per year.

Appendix H:
Additional Information

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Flibbert, Gregory S. (ECY)

From:	Flibbert, Gregory S. (ECY)
Sent:	Tuesday, August 12, 2014 10:36 AM
To:	'Laurie Kral'
Cc:	Patty Martin; Wood, Karen K. (ECY); Flibbert, Gregory S. (ECY); Mort, Beth (ECY); Johnson, Kari D. (ECY)
Subject:	Microsoft Oxford and Columbia Data Centers public notice
Attachments:	MSN Columbia public notice.pdf; MSN Oxford public notice.pdf

Laurie:

Attached are copies of the public notices for both the Oxford and Columbia Data Centers for your files. Please contact me if you have any questions.

Gregory S. Flibbert, Manager
Commercial/Industrial Unit
Air Quality Program
(509) 329-3452
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