OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY AIR CONTAMINANT DISCHARGE PERMIT - MAJOR NSR REVIEW REPORT

for: Intel Corporation

State of Oregon
Department of Environmental Quality

Northwest Region
700 NE Multnomah St Ste 600
Portland, OR 97232-4100

Source Information:

SIC	3674
NAICS	334413

Source Categories (Part and code)	B 85, C 3, C 4, C 5

Compliance and Emissions Monitoring Requirements:

Unassigned emissions	N
Emission credits	N
Compliance schedule	N
Source test [date(s)]	various

COMS	N
CEMS	N
PEMS	N
Ambient monitoring	Y

Reporting Requirements

Annual report (due date)	March 31
Emission fee report (due date)	March 31
SACC (due date)	n/a
Quarterly report (due dates)	n/a

Monthly report (due dates)	N
Excess emissions report	Y
Other reports (type)	n/a

Air Programs

NSPS (list subparts)	Dc, IIII
NESHAP (list subparts)	ZZZZ, WWWWWW
CAM	TBD in TV permit
Regional Haze (RH)	N
Synthetic Minor (SM)	N
Part 68 Risk Management	Y
CFC	N
RACT	N

TACT	N
Title V	Y
ACDP (SIP)	Y
Major HAP source	N
Federal Major source	Y
NSR	Y
PSD	Y
Acid Rain	N

TABLE OF CONTENTS

CHANGES TO THE REVIEW REPORT FOLLOWING PUBLIC NOTICE....4
INTRODUCTION....5
PERMITTEE IDENTIFICATION....5
FACILITY DESCRIPTION....7
FACILITY HISTORY....9
INSIGNIFICANT ACTIVITIES....13
EMISSION LIMITS AND STANDARDS, TESTING, MONITORING, AND RECORDKEEPING....16
PLANT SITE EMISSION LIMITS AND NETTING BASIS....18
PARTIAL SUMMARY OF PREVIOUS PLANT SITE EMISSION LIMITS AND NETTING BASIS....19
NETTING BASIS AND NETTING BASIS RESET....21
PROPOSED PSELS AND NETTING BASIS FOR THE PROPOSED PERMIT (APP. REC'D 7/07/2023)....23
NEW SOURCE REVIEW....24
(BACT) BEST AVAILABLE CONTROL TECHNOLOGY REVIEW....29
AIR QUALITY ANALYSIS (AIR QUALITY MODELING)....55
FLUORIDES AND HF....56
HAZARDOUS AIR POLLUTANTS....58
GENERAL BACKGROUND INFORMATION....59
COMPLIANCE HISTORY....60
ENFORCEMENT ACTION....60
PUBLIC NOTICE....61
APPENDIX 1 - NETTING BASIS RESET PROVISIONS....61
APPENDIX 2 – RICE BACT APPLICABILITY....63
APPENDIX 3 – EMERGENCY RICE OPERATION HOURS, 2016 - 2023....65
APPENDIX 4. AQ ANALYSIS - MODELING REVIEW OF INTEL EXPANSION PROJECT MEMO....66
CLARIFICATON OF AMBIENT AIR BOUNDARY AND USE OF ALLOWABLE EMISSIONS IN MODELING MEMO....78

LIST OF ABBREVIATIONS USED IN THIS REVIEW REPORT

ACDP	Air Contaminant Discharge Permit
Act	Federal Clean Air Act
Annual	Calendar Year
APCD	Air Pollution Control Device
ASTM	American Society of Testing and Materials
BACT	Best Available Control Technology
Btu	British thermal unit
CAM	Compliance Assurance Monitoring
CAO	Cleaner Air Oregon
CEMS	Continuous Emissions Monitoring System
CFC	Chlorofluorocarbon
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COMS	Continuous Opacity Monitoring System
CPMS	Continuous parameter monitoring system
CPP	Climate Protection Program
DEQ	Department of Environmental Quality
dscf	Dry standard cubic feet
EAL	Emission action level
EF	Emission factor
EPA	US Environmental Protection Agency
EU	Emissions Unit
FAB or Fab	Semiconductor fabrication and support facilities
FCAA	Federal Clean Air Act
Fluorides	Inorganic fluoride compounds (as measured by EPA Method 13A or 13B), excluding hydrogen fluoride
FGR	Flue gas recirculation
FSA	Fuel sampling and analysis
GHG	Greenhouse Gas
GWP	Global Warming Potential
gr/dscf	Grain per dry standard cubic feet (1 pound = 7000 grains)
HAP	Hazardous Air Pollutant as defined by OAR 340-244-0040
HCl	Hydrogen chloride
HF	Hydrogen fluoride
ID	Identification number or label
I&M	Inspection and maintenance
IPCC	Intergovernmental Panel on Climate Change
N/A or n/a	Not applicable
NAICS	North American Industry Classification System
NB	Netting Basis
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NO_x	Nitrogen oxides
NSPS	New Source Performance Standards
NSR	New Source Review
O_2	Oxygen
OAR	Oregon Administrative Rules
ODEQ	Oregon Department of Environmental Quality
ORS	Oregon Revised Statutes
O&M	Operation and maintenance
Pb	Lead
PCD	Pollution Control Device
PEMS	Predictive/Parameter Emissions Monitoring System
PM	Particulate matter
PM_{10}	Particulate matter less than 10 microns in size
$PM_{2.5}$	Particulate matter less than 2.5 microns in size
POU	Point of use device
ppm	Parts per million
PSD	Prevention of Significant Deterioration
PSEL	Plant Site Emission Limit
PTE	Potential to Emit
psia	pounds per square inch, actual
RACT	Reasonably Available Control Technology
RCTO (APCD)	Rotor concentrator thermal oxidizer
RICE	Reciprocating Internal Combustion Engine
SACC	Semiannual Compliance Certification
SER	Significant Emission Rate
SERP	Source emissions reduction plan
SIC	Standard Industrial Classification
SO_2	Sulfur dioxide
SSM	Startup, Shutdown and Malfunction
ST	Source test
TACT	Typically Achievable Control Technology
VE	Visible emissions
VMT	Vehicle miles traveled
VOC	Volatile organic compounds
WESP (APCD)	Wet electrostatic precipitator

CHANGES TO THE REVIEW REPORT FOLLOWING PUBLIC NOTICE

NOTE: 3/29/2024 There is significant additional discussion of BACT in the Review Report/Hearing Officer Report following public notice. No BACT determinations were changed.

NOTE: 3/29/2024 EPA questioned if Intel was a “nested” Federal Major source for the 2016 NSR permit. DEQ determined that it was not. See the Response to Comments/Hearing Officer Report for this permit.

NOTE: 3/29/2024 Several tables revised to correct PM10 and PM2.5 PSEL and NB following public notice.

NOTE: 3/29/2024 Several tables revised to add PM following public notice.

NOTE: 3/29/2024 The public notice section was revised to change future tense to past tense and to note an extended public comment period, and other minor changes were made in various locations.

INTRODUCTION

1. DEQ proposes to issue an Air Contaminant Discharge Permit (ACDP) to Intel Corporation. This permit combines two permit actions based on two separate permit applications received from Intel:

   1.a. Application 034907 is the primary application, received on July 7, 2023 and amended on September 9, 2023. This application was for two purposes:
      1.a.i. To apply for a Major New Source Review (NSR) permit that would authorize a major expansion of Intel's manufacturing operations. The proposed permit may also be referred to as an NSR permit, a Major NSR permit, a Type 4 permit, a PSD permit or a construction permit;
      1.a.ii. To apply for renewal of Intel's current ACDP issued on January 22, 2016

   1.b. Application 034188, received on August 3, 2022. This application was for a permit modification that would allow Intel to pilot test a low temperature NOx emission control system. There are no emissions increases associated with this proposed permit modification.

   1.c. Two permits were being drafted simultaneously for the applications described above. DEQ combined these applications in December, 2023.

2. Intel is also required to obtain a Title V permit. The Title V permit will be issued at some future date, and will replace the proposed permit discussed in this report.
   2.a. Historically, Intel became subject to Title V permitting on July 1, 2011, when greenhouse gases (GHGs) became a regulated air pollutant in Oregon. Intel submitted a Title V permit application by July 1, 2012. Subsequently, certain violations were identified. Correction of the violations required submittal of an application for a Major NSR permit, which was issued on January 22, 2016.
   2.b. Because of rule changes, Intel is no longer subject to Title V because of GHGs, but is now (as of the application date, 7/7/2023) subject to Title V because Intel is classified as a Major Source under OAR 340-200-0020(90)(b)(B), which defines a Major Source for Title V purposes as one that directly emits or has the potential to emit 100 tons per year or more of any regulated pollutant, except greenhouse gases. Intel has requested some Plant Site Emissions Limits for regulated pollutants that are over 100 tons per year.

3. In accordance with OAR 340-218-0120(1)(f), this review report is intended to provide the legal and factual basis for the draft permit conditions. In most cases, the legal basis for a permit condition is included in the permit by citing the applicable regulation. In addition, the factual basis for the requirement may be the same as the legal basis. However, when the regulation is not specific and only provides general requirements, this review report is used to provide a more thorough explanation of the factual basis for the draft permit conditions.

PERMITTEE IDENTIFICATION

4. The proposed permit (application received 7/7/2023) covers two Intel manufacturing facilities, both located in Washington County, Oregon:
   - Gordon Moore Park at Ronler Acres campus at 2501 NE Century Boulevard in Hillsboro, Oregon; and
   - Aloha campus at 3585 SW 198th Avenue in Aloha, Oregon.

   Both campuses are engaged in the production of semiconductor products such as computer microprocessors. These two facilities are considered one source for permitting purposes because their production activities are interrelated.

5. Intel operates other facilities in Washington County; two of the largest sites are known as the Jones Farm Campus and the Hawthorne Farm Campus. Both of these sites have been evaluated by both Intel and DEQ, and neither site is considered part of the regulated operations that take place at the sites addressed by this proposed permit (Gordon Moore Park at Ronler Acres and Aloha). These sites are separately subject to permitting requirements and are not addressed in this proposed permit (application received 7/7/2023).

6. Significant changes to the permit are briefly described in this paragraph.

6.a. Summary:

6.a.i. Increased Emissions
6.a.ii. Conduct ambient monitoring for NOx
6.a.iii. Best Available Control Technology (BACT) analysis
6.a.iv. Voluntary extra emissions controls
6.a.v. Test a new NOx emissions reduction system

6.b. Additional details:

6.b.i. The proposed permit will allow Intel to install new facilities and increase production capacity. Increased production will result in increased emissions, as summarized below:

Pollutant	Proposed PSEL (tons/yr)	Previous PSEL (tons/yr) Established in permit issued 1-22-2016	PSEL Increase (tons/yr)
PM	68	41	27
PM_{10}	62	35	27
$PM_{2.5}$	60	31	29
CO	598	229	369
NO_x	413	197	216
SO_2	35	39	-4
VOC	351	178	173
Fluorides	12.5	6.4	5.8
GHG (CO_2e)	1,725,560	819,000	906,560
Individual HAP	9	9	0
Combined HAP	24	24	0

6.b.ii. The proposed permit requires Intel to conduct ambient monitoring for NOx. The intent of the ambient monitoring is to confirm that Intel's emissions of NOx will not exceed the National Ambient Air Quality Standard (NAAQS) for NOx. See paragraph 93 for more information.

6.b.iii. Intel conducted a Best Available Control Technology (BACT) analysis to identify the best emissions controls that could be used taking cost into account. The analysis found in general that Intel was already using BACT-level emissions controls.

6.b.iv. Intel has voluntarily installed two kinds of emissions controls on some of its equipment. Under the BACT rules, DEQ cannot require Intel to install these systems. The systems are: Catalytic Diesel Particulate Filters, which are installed on some newer emergency generator engines and reduce emissions of particulate matter, CO and VOC; and Wet Electrostatic Precipitators which are installed on some wet scrubber exhausts and reduce emissions of particulate matter.

6.b.v. Intel is proposing to install and pilot test a new NOx emissions reduction system[1]. The system will be installed on the exhaust duct from the D1XM2 RCTOs (APCD), and will inject ozone into the RCTO (APCD) exhaust. The purpose of this system is for the ozone to react with NOx and convert it to nitric acid (HNO3) which will then go to a wet acid scrubber to be captured. The proposed system is a "first of kind" system and has not been pilot tested before. If the pilot test is successful, Intel may install it on additional exhausts at the facilities covered by the proposed permit. If unsuccessful, it will be abandoned.

[1] Intel applied for a permit modification to test a NOx emissions reduction system in 2022. Because of processing delays, that permit and the permit discussed in this Review Report (application received 7/7/2023) would be going on public notice at about the same time. DEQ has therefore combined the NOx emissions reduction permit modification (application received in 2022) with the proposed permit discussed in this report (application received 7/7/2023).

FACILITY DESCRIPTION

7. The semiconductor manufacturing process begins with thin disks of high-purity silicon called wafers, which then undergo a large number of individual processes to create a number of microprocessors on each wafer. Each individual microprocessor consists of microcircuits containing semiconductor devices such as diodes and transistors. After a group of microprocessors have been created on a wafer, they are cut out of the wafer to produce individual microprocessors.

8. The typical processes used to create the microcircuits and semiconductor devices are:

8.a. Etching, which removes material from the wafer's surface. The etching pattern is created by a photoresist mask on the wafer which covers and protects the areas that are not to be etched. The areas to be etched are not covered by the mask. Etching is done by placing a wafer in a chamber, removing the air from the chamber, introducing a fluorine-containing gas (a perfluorocarbon compound, PFC), and then creating a plasma in the chamber. When the plasma is created the gas molecules break apart and release free fluorine ions which strike the wafer surface and etch material from those areas where the surface is not covered by the photoresist mask.

8.b. Doping, which implants certain other chemical elements into the silicon to create semiconductors. A mask is used to create the pattern of areas to be doped, the wafer is placed in a chamber, the air is removed, and a dopant gas is introduced. Arsine (AsH_3) and phosphine (PH_3) are examples of dopant gases. After introduction of the dopant gas, a plasma is created which breaks the dopant gas molecules apart, releasing free arsenic ions (in the case of arsine) or phosphorus ions (in the case of phosphine). These free ions are electromagnetically accelerated, strike the surface where it is not covered by the mask and embed themselves in the silicon to create the desired type of semiconductor.

8.c. Deposition and film, grows or coats a material onto the wafer to create a thin film of material. The film can be locally etched using lithography and etching processes. The deposition process is either via a chemical reaction or a physical deposition to produce thin films. Chemical deposition includes Chemical Vapor Deposition (CVD), Electrodeposition, Epitaxy, and Thermal Oxidation. Physical deposition includes Physical Vapor Deposition (PVD) and Casting. Hydrofluorocarbons and precursors are used in the deposition process to create a film of materials on the wafers. Deposition process byproducts included gases, liquids or even other solids.

8.d. Photoresist masking, which puts a mask of photoresist material onto the surface of the wafer. A layer of photoresist material is first put on the entire surface of the wafer. The etching or doping pattern is then created by exposing and developing the photoresist mask in the areas that are not to be etched or doped. The developed areas are resistant to certain solvents, while the undeveloped areas are not. The wafer is then washed with solvent which dissolves the undeveloped photoresist, exposing the wafer surface in those areas for etching or doping. After the etching or doping process is completed, solvents which can dissolve the developed photoresist are used to wash the photoresist mask off the wafer.

8.e. Planarization, which involves the removal of material from the wafer surface. Chemical-mechanical planarization (CMP) uses a combination of chemicals and abrasive particles (slurries) along with polishing pads in order to remove varying types of materials. Material from the wafer is usually polished away through single or multiple steps and then the wafers are put through a series of cleaning steps. Byproducts include the slurry, material removed, as well as any cleaning chemicals used.

8.f. C4 (Controlled Collapse Chip Connection) is the process by which metal pads are placed on the wafer to connect the metal lines attached to transistors to the final package. This process uses many other standard semiconductor processes such as dry etch, litho and thin films.

8.g. Die Prep separates the die (individual chips) from the wafer in preparation for chip attachment. The wafer is mounted on tape and the chips are cut apart using lasers and diamond saws. The chips are removed from the wafer and placed on carrier tape which is stored in reels before being sent to test facilities.

9. The processes described above are carried out in process units called “tools”. Microprocessor production involves dozens of individual masking, etching, deposition, planarization, and doping steps which are carried out in a number of different tools. Particular tools may be used multiple times throughout the production process. The semiconductor production processes change and are updated rapidly, with significant changes to processes and tools occurring roughly every two years.

10. The microprocessor manufacturing process takes place in buildings known as “fabs”. Each fab contains the tools necessary to manufacture a particular type of microprocessor, or carries out other operations such as cutting the individual microprocessors from a wafer.

Process emissions

11. Many production steps create air emissions. Since production steps and tools are constantly changing, the emissions are tested to calculate total emission per technology or per fab. Recently, EPA has generated default GHG emission factors based on data collected from various different semiconductor companies. EPA default emission factors help standardize emission reporting. In order to calculate overall process emissions, Intel analyzes the emissions from each manufacturing process step at one or more facilities and develops emission factors for each process step. The tools and process steps are the same at all other Intel facilities so the emission factors can be applied at those other facilities. Emissions are calculated by using the emission factor for each particular process step, multiplied by the number of times that particular step is carried out, and then summing these emissions for all steps used. GHG emissions can be calculated by using the EPA default emission factors for each particular process step, multiplied by the number of times that particular step is carried out, and then summing those emissions for all steps used as well.

12. As described in paragraph 8, a plasma is created during the etching process that breaks down the molecules of the etching gas (typically a perfluorocarbon) to release free fluorine ions. Creation of the plasma results in partial destruction of the etching gas and the creation of various fragments of the original molecules. After the etching process is done and the plasma no longer exists the fragments of the original molecules as well as the free fluorine ions recombine to create other hydrofluorocarbon molecules, hydrogen fluoride (HF), and other molecules containing carbon, hydrogen, fluorine and silicon.

13. Etch tools are typically equipped with small emissions control devices called Point of Use (POU) controls. The POU controls are either small thermal oxidizers or plasma devices followed by wet scrubbing. The POU controls treat the perfluorocarbon compounds in the exhaust from the tools, creating carbon dioxide (CO_2), water (H_2O), HF and other fluoride compounds. Since many POU control devices include thermal oxidizers which burn natural gas, the POUs also emit pollutants created by combustion of natural gas, including CO, NOx, and small amounts of VOC, $PM/PM_{10}/PM_{2.5}$, combustion HAPs and SO_2.

14. Production process emissions are covered by emissions units EU-Scrubbers and EU-RCTOs (APCD) as listed in the proposed permit and in paragraph 22 of this report.

15. Intel uses isopropyl alcohol (IPA) bottles and wipes for production tool cleaning. Since this cleaning occurs in production spaces occupied by employees, the IPA is emitted to the atmosphere in the general building ventilation exhaust. These emissions are covered by EU-VOCunc as listed in the proposed permit and in paragraph 22 of this report.

16. Other emissions are from process support operations, including boilers and diesel RICE (Reciprocating Internal Combustion Engines, i.e., emergency generators and fire pumps).

FACILITY HISTORY

17. Intel Corporation purchased the Aloha Campus property and began construction in 1974 of a semiconductor wafer fabrication facility (Fab), office building and support areas that began operation in 1976. Primary operations involved Research and Development (R&D) and manufacturing. Three fabs were built at this location going by various names depending upon their business unit and purpose.

18. Most original operations at the Aloha Campus had ceased by 2003/2004 when the focus shifted to back-end operations (Die Prep, Controlled Collapse Chip Connection and Sort). There were several wafer size conversions (3" to 4" to 6" to 8" to 12” (300mm)).

19. Primary R&D and manufacturing operations moved to the Ronler Acres Campus when construction began on office, support and wafer fab D1B (Fab 20) in 1994 with operations beginning in 1996. Additional office, support and fabs were built to include RB1, D1C, RP1, D1D and D1X.

20. Current industrial processes at the facility include semiconductor manufacturing and process support systems. Semiconductor manufacturing begins with a silicon wafer substrate. It then involves growth or application of various layers, patterning using photoresist, thermal diffusion, etching, doping, metallization, acid or solvent treatments and ultrapure water rinse steps. There are multiple processes with unique "recipe" steps. Many of these steps are repeated multiple times in various sequences and with variations in each step.

EMISSIONS UNIT AND POLLUTION CONTROL DEVICE IDENTIFICATION

21. The emissions units regulated by the proposed permit are the following: [OAR 340-218-0040(3)]

(RA) indicates Gordon Moore Park at Ronler Acres
(A) indicates Aloha Campus

Emissions Unit ID	Device/ process	Emission point	Type of pollution control device
EU-Boilers	Boilers, natural gas-fired	Multiple boiler exhaust stacks, (RA) and (A)	Varies, low-NOx burners and FGR or Ultra Low NOx burners
EU-Heaters	Heaters, natural gas-fired	Multiple, (RA) and (A)	None
EU-TMXW	Ammonia wastewater treatment system	Multiple, (RA)	Thermal catalytic oxidation/reduction system
EU-RCTOs (APCD)	Manufacturing processes and storage tanks that emit VOCs, natural gas-fired	Multiple, (RA) and (A)	RCTOs (APCD) ***
EU-Wet Scrubbers*	Manufacturing processes and storage tanks controlled by wet scrubbers	Multiple, (RA) and (A)	Wet scrubbers ***
EU-VOCunc	VOC, uncontrolled	Multiple, (RA) and (A)	None
EU-RICE	Emergency generator and fire pump engines	Multiple, (RA) and (A)	Varies, DPFs
EU-Paved Roads**	Paved roads	(RA) and (A)	Periodic sweeping
EU-Cooling Towers**	Industrial cooling towers that do not use chromium based chemicals	Multiple, (RA) and (A)	Drift eliminators
EU-Other	Arsenic Specialty Filter (EXSP) and Lime Silos	Multiple, (RA)	Varies, HEPA filter and filters

* EU-Wet Scrubbers includes only wet acid gas scrubbers (EXSC (APCD)), wet ammonia gas scrubbers (EXAM (APCD)) and process specific support systems wet scrubbers (PSSS).
** Paved Roads and Cooling Towers are categorically insignificant activities.
*** A number of RCTOs (APCD) and wet scrubbers are equipped with wet electrostatic precipitators (WESPs (APCD)). The WESPs (APCD) are not a unique EU grouping, but rather are add-on equipment to existing pollution control devices.

22. Additional information on the emissions units is provided below:

22.a. EU-Boilers, consisting of natural gas-fired boilers.
- 22.a.i. Boilers burn fuel in an enclosed combustion chamber to heat water.
- 22.a.ii. There are a number of exclusively natural gas-fired boilers located on both campuses.
- 22.a.iii. Many of the boilers are subject to NSR requirements; see the New Source Review section of this report.

22.b. EU-Heaters, consisting of natural gas-fired heaters.
- 22.b.i. There are a number of exclusively natural gas-fired heaters located on both campuses. The heaters are all rated at less than or equal to 2.0 MMBtu/hr.
- 22.b.ii. Many of the heaters are subject to NSR requirements; see the New Source Review section of this report.

22.c. EU-TMXW, consisting of Tri-Mix Ammonia wastewater treatment system
- 22.c.i. This is a catalytic emission control system that controls ammonia emissions from the wastewater treatment system.
- 22.c.ii. This system is subject to NSR; see the New Source Review section of this report.

22.d. EU-RICE, consisting of emergency generator engines and fire pump engines.

22.d.i. There are a number of emergency generators and fire pumps powered by diesel Reciprocating Internal Combustion Engines (RICE); they located on both campuses.

22.d.ii. There are 86 emergency generators and 4 fire pumps, but they are only run for Maintenance and Readiness (M&R) testing and if part of the facility suffers a power outage or if a fire pump must be run.

22.d.iii. For this permit (application 034907, received 7/7/2023), M&R testing is limited to 25 hours per year for each emergency generator and 50 hours per year for each fire pump.

22.d.iv. Appendix 3 of this report shows the number of hours of emergency operation each year from 2016 to 2023; the highest number of hours of operation was in 2022 when 5 emergency generators ran for 22.16 hours.

22.d.v. The generator and fire pump engines (RICE) are subject to NSR requirements; see the New Source Review section of this report.

22.e. EU-Wet Scrubbers, consisting of wet scrubbers that are divided into 3 categories: EXSC (APCD), EXAM (APCD) and PSSS.

22.e.i. Emissions from the microprocessor production tools, also referred to as process emissions, fall into three categories: emissions

22.e.ii. Wet scrubbers are emission control devices consisting of a large chamber filled with loose packing material. The packing material is shaped to leave spaces that air or liquid can flow through.

22.e.ii.A. At the top of the packing, scrubbing liquid is sprayed and then trickles down through the packing. The exhaust stream to be treated enters the chamber at the bottom and flows upward through the packing material. In this way the scrubbing liquid and exhaust stream can contact each other and the pollutant(s) to be treated are removed from the exhaust stream and transferred into the scrubbing liquid, which may be further treated before being discharged to the sewer system.

22.e.ii.B. Scrubber drift refers to small droplets of scrubber solution that are carried out of the scrubber by the scrubbed exhaust stream. The scrubber solution evaporates, leaving a minor amount of particulate matter which is emitted to atmosphere.

22.e.iii. As described in paragraph 13, both process and POU combustion emissions are routed to the EXSC (APCD) and EXAM (APCD) wet scrubbers. In general, wet scrubbers are not considered to provide significant treatment of combustion emissions (CO, NOx, and small amounts of VOC, PM/PM10/PM2.5, combustion HAPs and SO_2); such pollutants simply pass through the scrubbers.

22.e.iv. Acidic and alkaline raw chemical and waste tanks are also fitted with conservation vents which exhaust to the facility's scrubbers to control acidic and alkaline gases including HAPs.

22.e.v. The 3 scrubber categories are described in the table below:

Category	**Purpose**	**Emissions regulated under this permit**	**Permit requirements**
EXSC (APCD), process acid gas wet scrubbers Some EXSC (APCD) wet scrubbers are equipped with WESPs (APCD)	Treat acid gas emissions from production tools	PM, PM_{10}, $PM_{2.5}$ from wet scrubber drift emissions and PM, PM_{10}, $PM_{2.5}$, NOx, CO, VOC, Fluorides, GHG and HAPs from process emissions	BACT, O&M, EAL and WESP (APCD) requirements, reporting for PSELs
EXAM (APCD), process ammonia wet scrubbers	Treat ammonia emissions from production tools	PM, PM_{10}, $PM_{2.5}$ only from wet scrubber drift emissions and PM, PM_{10}, $PM_{2.5}$, NOx, CO, VOC, Fluorides and HAPs from process emissions	BACT, Emissions reporting for PSELs only

Category	Purpose	Emissions regulated under this permit	Permit requirements
PSSS, process safety system wet scrubbers	Ventilate gas storage cabinets and similar areas to protect employees in the event of leaks.	PM, PM_{10}, $PM_{2.5}$ only from wet scrubber drift emissions	BACT, Emissions reporting for PSELs only

22.f. EU-RCTO (APCD), consisting of VOCs emitted from manufacturing processes
- 22.f.i. Solvent vapors (Volatile Organic Compounds, VOC) and air from process tools are routed to the RCTOs (APCD) for control. Each RCTO (APCD) is fed by a large volume of dilute VOC/air mixture.
- 22.f.ii. The VOCs are captured and removed from the large volume of air; this cleaned air is then exhausted to atmosphere.
- 22.f.iii. The captured VOCs are concentrated into a smaller volume of air in an oxidizer where it is burned to destroy the VOCs before being exhausted to atmosphere. The VOCs are flammable and themselves provide part of the fuel required to burn them; the remaining fuel requirement is met using natural gas.
- 22.f.iv. Each RCTO (APCD) has one inlet (dilute VOCs) and two outlets (a large volume of cleaned air and a smaller volume from the oxidizer).
- 22.f.v. Solvent waste tanks are equipped with conservation vents to maintain safe internal tank pressures and to reduce vapor losses. Some solvent waste tanks are vented to the RCTOs (APCD) to control VOCs.
- 22.f.vi. Some RCTOs (APCD) are also equipped with Wet Electrostatic Precipitators (WESPs (APCD)).

22.g. EU-VOCunc, consisting of uncontrolled VOC emissions
- 22.g.i. Uncontrolled VOC emissions means emissions of isopropyl alcohol (IPA) that is used to clean manufacturing process equipment and evaporates quickly.
- 22.g.ii. The process equipment is in clean rooms which are supplied with air through the general building air circulation system, so the IPA is exhausted with the general building air.

22.h. EU-Cooling Towers, consisting of cooling towers open to the atmosphere
- 22.h.i. The cooling towers are used to dissipate the heat loads generated by the Fab and to condition the incoming air to the correct temperature required by the Fab. Water treatment chemicals, including biocides and anti-scalants are added to the recirculating water system.
- 22.h.ii. The cooling towers are a source of particulate matter and a de minimis amount of HAPs.

22.i. EU-Other, consisting of Arsenic Specialty Filters (EXSP) and Lime Silos
- 22.i.i. Arsine gas is used in some processes (tools) and leaves arsenic particulate matter in the tools which is vacuumed out when the tools are cleaned. The vacuum exhaust is route to HEPA filters before being exhausted to atmosphere. The HEPA filters are replaced at required intervals and disposed of as Hazardous Waste.
- 22.i.ii. Lime Silos store lime; when the silos are filled lime dust is exhausted from the silos. The lime dust is captured by bag filters.

22.j. EU-Paved Roads, consisting of paved roadways.
- 22.j.i. Paved roads are a minor source of particulate matter emissions from dust stirred up by traffic.
- 22.j.ii. Speed limits and sweeping help reduce dust emissions from paved roads.

23. Greenhouse gases are emitted from manufacturing processes and fuel combustion, and will be reported with the appropriate emissions units listed above.

23.a. Fluorine-containing gases which are classified as GHGs (e.g. fluorocarbons and hydrofluorocarbons) are used in many of the manufacturing processes. These gases are partially broken down in the manufacturing process and in the associated Point of Use (POU) devices. The POU devices reduce emissions of GHGs.

23.b. GHG emissions are also created by the combustion of fuels in the boilers, heaters, RCTOs (APCD), other thermal emission control devices and the RICE (emergency engines).

Other Emissions Units

24. Intel's current permit (issued 1/22.2016) also listed an emissions unit named EU-RoadsUnpv, consisting of unpaved roads and parking lots, which were present while the expansion permitted in 2016 was being constructed. This emissions unit is no longer needed and will not be in the proposed permit.

INSIGNIFICANT ACTIVITIES

25. Insignificant activities are activities at a regulated facility that emit air pollutants in small amounts, and include such activities as food service, office activities, instrument calibration and maintenance activities. Insignificant activities include categorically insignificant activities and aggregate insignificant emissions, as defined in OAR 340-200-0020.

26. Categorically insignificant activities include the following:

- Constituents of a chemical mixture present at less than 1% by weight of any chemical or compound regulated under OAR Chapter 340, Divisions 200 through 268, excluding Divisions 248 and 262, or less than 0.1% by weight of any carcinogen listed in the U.S. Department of Health and Human Service's Annual Report on Carcinogens when usage of the chemical mixture is less than 100,000 pounds/year
- Evaporative and tail pipe emissions from on-site motor vehicle operation
- Office activities
- Food service activities
- Janitorial activities
- Groundskeeping activities including, but not limited to building painting and road and parking lot maintenance
- On-site recreation facilities
- Instrument calibration
- Maintenance and repair shop
- Air cooling or ventilating equipment not designed to remove air contaminants generated by or released from associated equipment
- Refrigeration systems with less than 50 pounds of charge of ozone depleting substances regulated under Title VI, including pressure tanks used in refrigeration systems but excluding any combustion equipment associated with such systems
- Bench scale laboratory equipment and laboratory equipment used exclusively for chemical and physical analysis, including associated vacuum producing devices but excluding research and development facilities
- Temporary construction activities
- Warehouse activities
- Accidental fires
- Air vents from air compressors
- Air purification systems
- Continuous emissions monitoring vent lines
- Demineralized water tanks
- Pre-treatment of municipal water, including use of deionized water purification systems
- Electrical charging stations
- Fire brigade training
- Instrument air dryers and distribution
- Process raw water filtration systems
- Fire suppression

- Routine maintenance, repair, and replacement such as anticipated activities most often associated with and performed during regularly scheduled equipment outages to maintain a plant and its equipment in good operating condition, including but not limited to steam cleaning, abrasive use, and woodworking
- Electric motors
- Natural gas, propane, and liquefied petroleum gas (LPG) storage tanks and transfer equipment
- Pressurized tanks containing gaseous compounds
- Emissions from wastewater discharges to publicly owned treatment works (POTW) provided the source is authorized to discharge to the POTW, not including on-site wastewater treatment and/or holding facilities
- Storm water settling basins
- Fire suppression and training
- ***Paved roads and paved parking lots within an urban growth boundary ****
- Health, safety, and emergency response activities
- Non-contact steam vents and leaks and safety and relief valves for boiler steam distribution systems
- Non-contact steam condensate flash tanks
- Non-contact steam vents on condensate receivers, deaerators and similar equipment
- Boiler blowdown tanks
- ***Industrial cooling towers that do not use chromium-based water treatment chemicals ****
- Oil/water separators in effluent treatment systems
- Combustion source flame safety purging on startup

  * Intel provided emissions data for this activity, but those emissions are not included in PSELs. See paragraph 61.

27. OAR 340-222-0035(6) states that PSELs must include aggregate insignificant emissions, if applicable. The aggregate insignificant emissions amounts applicable in the proposed permit are:

    27.a. One ton for each criteria pollutant (PM, PM10, PM2.5, NOx, CO and VOC in this case), except lead;
    27.b. 120 pounds for lead (0.06 ton);
    27.c. 600 pounds for Fluorides;
    27.d. An aggregate of 5,000 pounds for all hazardous air pollutants; and
    27.e. 2,756 tons CO2e for greenhouse gases.

28. Intel included aggregate insignificant activities in the requested PSELs for PM, PM10, PM2.5, NOx, CO, VOC and SO2, but did not include aggregate insignificant activities in the requested PSELs for CO2e (GHG), Fluorides, total HAPs and lead. DEQ has adjusted the PSELs to include aggregate insignificant activities, as shown below:

Intel Corporation - Oregon Potential to Emit Emission Inventory												
Ronler and Aloha Plant Site Emission Limit Summary	**NO_x** (tpy)	**CO** (tpy)	**VOC** (tpy)	**PM** (tpy)	**PM_{10}** (tpy)	**$PM_{2.5}$** (tpy)	**SO_2** (tpy)	**CO2e** (Short Tons /yr)	**Fluorides** (tpy)	**Total HAPs** (tpy)	**Largest Single HAP (HF)** (tpy)	**Lead** (tpy)
Boilers	19.69	58.64	8.55	3.89	3.89	3.89	4.04	187,037	-	0.14	-	7.78 E-04
EGENs	52.46	4.28	0.96	0.48	0.48	0.48	0.05	4,113	-	0.35	-	6.68 E-04
RCTOs (APCD)	80.73	106.28	150.01	19.05	19.05	19.05	2.10	97,076	0.002	0.13	0.03	4.04 E-04
EXSC (APCD) Scrubbers	192.68	327.92	36.92	28.11	27.17	25.65	26.77	1,307,668	12.13	17.47	8.79	-
EXAM (APCD) Scrubbers	43.45	81.51	86.51	13.55	8.54	8.27	0.77	-	0.04	0.04	0.04	-
PSSS Scrubbers	-	-	-	0.71	0.44	0.00	-	-	-	-	-	-
Fugitive VOCs[a]	-	-	65.82	-	-	-	-	-	-	-	-	-
Heaters	10.41	17.13	0.57	0.26	0.26	0.26	0.27	25,031	-	0.02	-	5.26 E-05
TMXW	12.23	1.10	0.20	0.09	0.09	0.09	0.09	101,880	-	0.004	-	1.80 E-05
Lime Silos	-	-	-	0.44	0.44	0.44	-	-	-	-	-	-
Cooling Towers[b]	-	-	-	***8.81***	***7.19***	***0.03***	-	-	-	-	-	-
Aggregate Insignificant Activities	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2,756	0.300	2.500	-	0.06
Paved Road Emissions[b]	-	-	-	***0.75***	***0.15***	***0.04***	-	-	-	-	-	-
Total	412.64	597.86	350.54	77.16	68.71	59.21	35.10	1,725,560	12.5	20.65	8.86	1.92 E-03
Current PSEL	197	229	178	41	35	31	39	819,000	6	24	9	See Note[c]
Requested PSEL[b]	413	598	351	68	61	59	39	1,725,560	12.5	24	9[d]	See Note[c]
Final PSEL	**413**	**598**	**351**	**68**	**61**	**59**	**35**[d]	**1,725,560**	**12.5**	**24**	**9**	**See Note**[c]
[a]Fugitive emissions are those associated with solvent use.												
[b]Fugitive emissions associated with vehicle travel on paved roads and cooling towers are Categorically Insignificant Activities as defined in OAR 340-200-0020(24); consistent with OAR 340-222-0035(5), PSELs do not include emissions from Categorically Insignificant Activities.												
[c]Emissions of lead are 0.062 ton/yr and are below de minimis emission level of 0.1 ton/yr and a PSEL is not required.												
[d]Intel is not requesting a revised PSEL for SO2, individual HAP or total HAP. However, DEQ no longer sets Generic PSELs, therefore the former generic PSEL of 39 tons per year for SO2 has been revised to 35 tons per year.												

NOTE: **3/29/2024** **This table was revised to correct PM10 and PM2.5 PSEL and NB following public notice**.

EMISSION LIMITS AND STANDARDS, TESTING, MONITORING, AND RECORDKEEPING

Oregon Administrative Rules (OAR)

29. The following OARs apply to this facility. This list is not exhaustive and does not include rules that are the basis for monitoring, recordkeeping and reporting requirements.

OAR	Summary of rule	Applies to
340-208-0110(3)(a)	opacity must not equal or exceed 20% average in a 6-minute block per OAR 340-208-0110(2)	Facility-wide
340-208-0210(2)	prevent PM from becoming airborne	Facility-wide
340-208-0300	do not cause a nuisance	Facility-wide
340-208-0450	do not deposit PM of 250 microns or larger on another property	Facility-wide
340-222-0041	PSELs	Facility-wide
340-222-0051(3)	Major/Type A State NSR Netting Basis reset requirement	Facility-wide
	Major NSR in a maintenance area	See the New Source Review section of this report.
340-224-0060	PSD in attainment/unclassified area	See the New Source Review section of this report.
340-226-0120	Operation and maintenance requirements	RCTOs (APCD) and EXSC (APCD) wet scrubbers
340-226-0210(1)(b)	PM limit, 0.14 gr/dscf for non-fuel burning equipment	Facility-wide
340-228-0210(1)	PM limit, 0.14 gr/dscf for fuel burning equipment	Facility-wide
340, Division 245	Cleaner Air Oregon program, see paragraph 30	Facility-wide
340, Division 271	Climate Protection Program, see paragraph 31	Facility-wide

Cleaner Air Oregon

30. Since issuance of the current permit (issued 1/22/2016), DEQ has adopted an industrial air toxics permitting program known as Cleaner Air Oregon (CAO). It is expected that the CAO program will begin evaluating Intel's air toxics emissions in late 2024. CAO does health-based risk assessments for facilities with air quality permits. When it started, Cleaner Air Oregon prioritized existing facilities, like Intel, into groups based on level of risk and all new facilities must go through a Cleaner Air Oregon assessment before they can get a permit.
    - 30.a. Based on DEQ's initial analysis under Cleaner Air Oregon, Intel is in the second group of existing facilities that will be "called in" for Cleaner Air Oregon analysis.
    - 30.b. DEQ will not further evaluate Intel's HF and Fluorides impacts at this time but will instead wait for the CAO evaluation.

Climate Protection Program

31. Greenhouse gas emissions (GHG) from the facility will be regulated through DEQ's newly adopted Climate Protection Program (CPP). Intel's facility is one of just over a dozen facilities across the state for which the "Best Available Emissions Reduction" component of the CPP applies. Much like the Cleaner Air Oregon process, DEQ will be working with Intel in the future to closely evaluate their facility's emissions (in this case GHG emissions, not toxics) and opportunities to reduce them.

Previous ACDP requirements, including source specific RACT and TACT determinations

32. Prior to the current permit (issued 1/22/2016), Intel's Air Contaminant Discharge Permit (ACDP) included conditions that established specific requirements for this facility.

32.a. The equipment that condition 2.2 pertained to no longer exists, so this condition was not carried over into the 1/22/2016 permit.

32.b. Condition 2.3 was carried over into the 1/22/2016 permit with little or no change; however, BACT now applies instead of TACT. TACT cannot apply if other requirements, such as BACT, apply. This condition will be replaced with a BACT requirement.

32.c. Condition 2.6 was carried over into the 1/22/2016 permit with little or no change, and will be carried over into the proposed permit.

32.d. Previous conditions 2.2, 2.3 and 2.6 are summarized below:

ACDP Condition	Summary of Condition	New Condition
2.2	Established RACT/TACT requirement for existing FAB at Aloha campus	Affected equipment is no longer in use, this condition is no longer needed.
2.3	Established TACT requirement for RCTOs (APCD) for new FABs; VOC destruction and removal efficiency requirement.	The former TACT requirement is now a BACT requirement.
2.6	Conditional Preapproval Allowing for Operational Flexibility	Carried forward to the proposed permit (application 034907 received 7/7/2023)

NSPS APPLICABILITY

33. 40 CFR Part 60, Subpart Dc – "Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units" is applicable to the source because the permittee operates boilers that are affected facilities under this federal standard. However, all affected boilers are fueled exclusively with natural gas and there are no limitations, monitoring or recordkeeping requirements in Subpart Dc that apply to these boilers other than keeping monthly records of fuel use.

34. 40 CFR Part 60 Subpart IIII - This facility has a number of emergency generators and fire pumps powered by Reciprocating Internal Combustion Engines (RICE). A subset of these engines are subject to the NSPS for RICE (40 CFR Part 60 Subpart IIII) and conditions pertaining to new and existing RICE have been added to the proposed permit (application 034907, received 7/7/2023).

NOTE: 3/29/2024 Detail Sheets revised to include lists of Boilers and RICE subject to NSPS following public notice.

NESHAPS/MACT APPLICABILITY

35. Intel is classified as minor source of Hazardous Air Pollutants (HAP) because the Potential to Emit (PTE) of any individual HAP is less than 10 tons per year and the PTE of all combined HAPs is less than 25 tons per year.

36. 40 CFR Part 63 Subpart ZZZZ - This facility has a number of emergency generators and fire pumps) powered by Reciprocating Internal Combustion Engines (RICE). These engines are subject to the RICE NESHAP (40 CFR Part 63 Subpart ZZZZ) and conditions pertaining to new and existing RICE were put in the current permit in 2016.

37. 40 CFR Part 63, Subpart WWWWWW - On December 20, 2021, Intel submitted a Moderate Technical Permit Modification request (AQ101) to incorporate the requirements of the National Emission Standards for Hazardous Air Pollutants (NESHAP): Area Source Standards for Plating and Polishing Operations, 40 CFR Part 63, Subpart WWWWWW, §63.11504 through§63.11513. A permit modification was issued to incorporate conditions that implement this NESHAP; these conditions will be incorporated into the proposed permit (application 034907 received 7/7/2023).

38. 40 CFR Part 63, Subpart JJJJJJ - Intel operates a number of boilers, but they are exclusively fired with natural gas and are therefore not subject to the NESHAP for Industrial, Commercial, and Institutional Boilers Area Sources, 40 CFR Part 63, Subpart JJJJJJ[2].

[2] **§ 63.11195 Are any boilers not subject to this subpart?**

ACCIDENTAL RELEASE PREVENTION (PART 68)

39. This facility is subject to Accidental Release Prevention, 40 CFR Part 68, and has submitted a Risk Management Plan to EPA as required.

RACT APPLICABILITY

40. The facility is located in the Portland AQMA, but it is not one of the listed source categories (categorical RACT rules) in OAR 340-232-0010. Pursuant to OAR 340-232-0040, a source specific Reasonably Available Control Technology (RACT) rule was adopted and approved into the State Implementation Plan, to regulate VOC emissions from Intel Aloha's FAB15 emission unit that was in existence before November 15, 1990. However, the FAB15 operations that were subject to this rule no longer exist and the source specific RACT requirements are no longer required.

TACT APPLICABILITY

41. TACT previously applied to this facility, but no longer does (see paragraph 32). There are no TACT requirements in the proposed permit.

PLANT SITE EMISSION LIMITS AND NETTING BASIS

42. Plant Site Emission Limits (PSELs) set limits on the maximum amount of pollutants that may be emitted by a regulated facility, typically over each continuous 12 month period. A facility (also referred to as a "source") may request increases to their PSELs, and if the requested increases are large enough the source may have to meet additional requirements before the increases can be granted. Two important factors that are used to determine if additional requirements must be met are:

    42.a. the amount by which each PSEL increases, i.e., the requested PSEL minus the previous PSEL; and
    42.b. the amount by which each requested PSEL exceeds the Netting Basis for each pollutant.

43. OAR 340-200-0020(116) states in part that "Plant Site Emission Limit" or "PSEL" means the total mass emissions per unit time of an individual regulated pollutant specified in a permit for a source. In the case of Intel, each PSEL is the sum of the emissions from many individual emitting processes. Similar pollutant emitting processes are grouped together as shown in paragraph 21.

44. "Netting basis" means an emission rate for each criteria pollutant that is a factor in determining if a source is subject to New Source Review.
    44.a. A source's netting basis is determined as specified in OAR 340-222-0046.
    44.b. Netting basis may increase or decrease over time. Netting basis decreases typically result from rule changes that impose new limits or emission control requirements, while netting basis increases often result from major New Source Review permitting actions, such as the proposed permitting action (application 034907 received 7/7/2023) discussed in this Review Report.
    44.c. A source's Baseline Emission Rate is the starting point for determining a source's netting basis.

The types of boilers listed in paragraphs (a) through (e) of this section *are not subject* to this subpart. (italics added)
…
(e) A gas-fired boiler as defined in this subpart.

§ 63.11237 What definitions apply to this subpart?
Gas-fired boiler includes any boiler that burns gaseous fuels not combined with any solid fuels, burns liquid fuel only during periods of gas curtailment, gas supply emergencies, or periodic testing on liquid fuel. Periodic testing of liquid fuel shall not exceed a combined total of 48 hours during any calendar year.
Gaseous fuels includes, but is not limited to, natural gas, process gas, landfill gas, coal derived gas, refinery gas, and biogas.

Baseline Emission Rate

45. A source's Baseline Emission Rate establishes the starting values for the source's Netting Basis. Under OAR 340-200-0020:
    45.a. (16) "Baseline emission rate" means the actual emission rate during a baseline period as determined under OAR chapter 340, division 222.
    45.b. (17) "Baseline period" means the period used to determine the baseline emission rate for each regulated pollutant under OAR chapter 340, division 222.

46. Under 340-222-0048:
    46.a. The baseline period used to calculate the baseline emission rate is either:
        46.a.i. For any regulated pollutant other than greenhouse gases and PM2.5, any consecutive 12 calendar month period during the calendar years 1977 or 1978. DEQ may allow the use of a prior time period upon a determination that it is more representative of normal source operation.
        46.a.ii. For greenhouse gases, any consecutive 12 calendar month period during the calendar years 2000 through 2010.
    46.b. A Baseline Emission Rate is not established for PM2.5 per OAR 340-222-0048(3).

47. As shown in the table below, the original baseline emission rates were identified in the permit issued in 2007. In the permit issued on 1/22/2016 the baseline emission rates were revised by rounding off, and the baseline emission rate for GHG was established. The baseline year for GHGs under OAR 340-222-0048(1)(b) is the period January 1, 2010 through December 31, 2010.

Pollutant	Original Baseline Emission Rate (tons/yr) From permit issued 12/31/2007	Revised Baseline Emission Rate (tons/yr) From permit issued 1/22/2016:
PM	0.4	0
PM_{10}	0.4	0
$PM_{2.5}$	*,**	**
CO	1	1
NO_x	4	4
SO_2	14.2	14
VOC	190.1	190
Fluorides	*	0
GHG (CO_2e)	*	227,000***

* $PM_{2.5}$ and GHG became regulated pollutants after the 2007 permit was issued. Fluorides were mistakenly omitted from previous permits.
** A Baseline Emission Rate is not established for PM2.5 per OAR 340-222-0048(3).
*** The baseline period for GHGs is Jan. 1, 2010 through Dec. 31, 2010.

PARTIAL SUMMARY OF PREVIOUS PLANT SITE EMISSION LIMITS AND NETTING BASIS

48. DEQ must sometimes review past permitting actions to verify compliance with the regulations in effect at the time, so it is necessary to track changes to PSELs and Netting Basis over time. The next section of this review report summarizes the proposed PSELs and Netting Basis for the proposed permit (application 034907 received on 7/07/2023), as well as the most recent preceding PSEL and Netting Basis changes.

Permit No. 34-2681-ST-01, issued December 31, 2007

49. The PSEL and netting basis information from the permit issued on December 31, 2007 are shown below. There were no PSELs for $PM_{2.5}$, Fluorides or GHG in that permit; PSELs for these pollutants were added in a later permit.

This information is from the permit issued on 12/31/2007.

Pollutant	Baseline Emission Rate (tons/yr)	Netting Basis		Plant Site Emission Limits (PSEL)		
		Prior to 12/31/07 (tons/yr)	**For ACDP issued 12/31/07 (tons/yr)**	Prior to 12/31/07 (tons/yr)	**For ACDP issued 12/31/07 (tons/yr)**	PSEL Increase in ACDP issued 12/31/07 (tons/yr)
PM/PM_{10}	0.4	0.4	**0**	8.0	**14**	6
$PM_{2.5}$	-	-	**-**	-	**-**	-
SO_2	14.2	14.2	**14**	14.2	**39**	24.8
NO_x	4	4	**4**	19.3	**43**	23.7
CO	1	1	**1**	39.1	**99**	59.9
VOC	190.1	160	**139**	97.7	**99**	1.3
Fluorides	-	-	**-**	-	**-**	-
GHG	-	-	**-**	-	**-**	-
Individual HAP	n/a	n/a	**n/a**	n/a	**9**	n/a
Combined HAP	n/a	n/a	**n/a**	n/a	**24**	n/a

50. Source classification after issuance of the permit issued on 12/31/2007:

Minor Source (No PSELs greater than 100 tons per year)	Yes
Major Source (PSELs greater than 100 tons per year)	No
Subject to Title V?	No
Federal Major Source (PSELs greater than 250 tons per year)	No

Permit No. 34-2681-ST-02, Issued January 22, 2016

51. The PSEL and netting basis information from the permit issued on January 22, 2016 are shown below.

51.a. PSELs and Netting Basis for the following pollutants were added to this permit: $PM_{2.5}$, GHG and Fluorides.

51.b. The permit issued on January 22, 2016, was a Major New Source Review permit. Major New Source Review applied to CO and NOx.

51.c. Plant Site Emission Limits (PSELs) for PM/PM_{10}, CO, NOx and VOC were increased. PSELs for SO_2, individual HAP and combined HAP were not changed. The Netting Basis for CO and NOx were increased pursuant to the Major NSR rules, which state that a facility's Netting Basis for a pollutant is increased when the facility goes through Major NSR for that pollutant.

This information is from the permit issued on 1/22/2016.

Pollutant	Baseline Emission Rate (tons/yr)	Netting Basis: Previous (ACDP issued 12/31/07) (tons/yr)	Netting Basis: **For ACDP issued 1-22-2016 (tons/yr)**	Plant Site Emission Limits (PSEL): Previous (ACDP issued 12/31/07) (tons/yr)	Plant Site Emission Limits (PSEL): **For ACDP issued 1/22/2016 (tons/yr)**	Plant Site Emission Limits (PSEL): PSEL Increase for ACDP issued 1/22/2016 (tons/yr)
PM	0	0	**0**	14	**41**	27
PM_{10}	0	0	**0**	14	**35**	21
$PM_{2.5}$	n/a	*	**0**	*	**31**	*
CO	1	1	**229**	99	**229**	130
NO_x	4	4	**197**	43	**197**	154
SO_2	14	14	**14**	39	**39**	0
VOC	190	139**	**139**	99	**178**	79
Fluorides	0	*	**0.5**	*	**6.4**	*
GHG (CO_2e)	227,000***	*	**227,000**	*	**819,000**	*
Individual HAP	n/a	n/a	**n/a**	9	**9**	0
Combined HAP	n/a	n/a	**n/a**	24	**24**	0

* The previous permit (issued 12/31/2007) did not include PSELs for this pollutant. $PM_{2.5}$ and GHG became regulated pollutants after the previous permit was issued. Fluorides were mistakenly omitted from previous permits.
** The netting basis for VOC was previously reduced from 190 to 139 tons per year, see paragraph 49 and the review report for the ACDP issued on Dec. 31, 2007 for details.
*** The baseline period for GHGs is Jan. 1, 2010 through Dec. 31, 2010.
n/a Not applicable. A baseline emission rate and netting basis are not established for HAPs.

52. Source classification after issuance of the current permit (issued 1/22/2016):

Minor Source (No PSELs greater than 100 tons per year)	No
Major Source (PSELs greater than 100 tons per year)	Yes
Subject to Title V?	Yes
Federal Major Source (PSELs greater than 250 tons per year)	No

NETTING BASIS AND NETTING BASIS RESET

53. In the current permit issued 1/22/2016, and per OAR 340-222-0046(2)(a), the initial netting basis was set equal to the baseline emission rate.

54. The netting basis for PM2.5 was established in the current permit issued 1/22/2016. Under OAR 340-222-0046(2)(b) the netting basis for PM2.5 is equal to the PM2.5 fraction of the PM10 netting basis. Since the PM10 netting basis was zero, the PM2.5 netting basis was also zero.

55. As shown in the table in paragraph 58, the netting basis for CO and NOx were increased. The netting basis for a pollutant can be increased when that pollutant is subject to a Major NSR or Type A State NSR permitting action, as provided in OAR 340-222-0046(3)(e)(A). CO and NOx were subject to Major NSR as described in the Review Report for the current permit issued on 1/22/2016.

56. OAR 340-222-0046(3)(d) states that “the netting basis will be reduced when actual emissions are reduced according to OAR 340-222-0051(3)”. OAR 340-222-0051(3) refers to OAR 340-222-0051(2). These rules comprise what is referred to as the “Netting Basis reset provisions” or just “reset provisions” for short. The reset provisions are intended to reduce a source’s Netting Basis and make it more likely to trigger Major NSR. A plain language explanation of the reset provisions is provided in Appendix 1 to this review report. The conclusion reached in Appendix 1 is copied below:

> “In this case, Intel has triggered Major NSR anyway because the requested emissions increases are large enough to trigger Major NSR without lowering the Netting Basis via the reset, and the reset provision does not affect the outcome and does not have to be calculated.”

57. The Netting Basis reset provisions have future applicability. The reset condition in the current permit (issued 1/22/2016), will be retained, renumbered and revised in the proposed permit as necessary.

58. The following table summarizes the Baseline Emission Rate and Netting Basis changes over time:

Pollutant →	PM	PM_{10}	$PM_{2.5}$	CO	NOx	SO_2	VOC	Fluorides	GHG (CO_2e)
Baseline Emission Rate and Changes to Netting Basis ↓	All values in (tons/yr) n/a=not applicable; tbd = to be determined								
Baseline Emission Rate	0	0	n/a	1	4	14	190	0	227,000
Initial Netting Basis from permit issued 1/22/2016	0	0	n/a	1	4	14	190	0	227,000
Netting Basis established in permit issued 1/22/2016	0	0	0	229 *	197 *	14	139	0.5	227,000
GHG Netting Basis Reset, effective as of 12/31/2020	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ND **
CO and NOx Netting Basis Reset, to take effect on 1/22/2026	n/a	n/a	n/a	ND **	ND **	n/a	n/a	n/a	n/a
Netting Basis established in the proposed permit (application 034907 received 7/7/2023)	0	61	59	598	413	14	351	12.5	1,725,560
Netting Basis Reset, to take effect 10 years after issuance of the proposed permit (application 034907 received 7/7/2023)	n/a	n/a	n/a	future, tbd ***	future, tbd ***	n/a	future, tbd ***	future, tbd ***	future, tbd ***

* In the permit issued on 1/22/2016, CO and NOx were subject to Major NSR. As provided in OAR 340-222-0046(3)(e)(A), the Netting Basis for these two pollutants were increased.

** Not Determined, see paragraph 56.

*** OAR 340-222-0051(3)(a) states that the potential to emit of the source or part of the source will be reset to actual emissions ten years from the date the proposed permit (application 034907 received 7/7/2023) was issued. Such reset will also revise the Netting Basis; see paragraph 56.

<u>**NOTE: 3/29/2024 This table revised to correct PM10 and PM2.5 PSEL and NB following public notice.**</u>

PROPOSED PSELS AND NETTING BASIS FOR THE PROPOSED PERMIT (APP. REC'D 7/07/2023)

59. Proposed PSELs and Netting Basis for the proposed permit (application 034907 received 7/07/2023) are shown in the table below:

Pollutant	Baseline Emission Rate (tons/yr)	Netting Basis (NB)		Plant Site Emission Limit (PSEL)			
		NB Established in permit issued 1-22-2016	Proposed NB (tons/yr)	Previous PSEL (tons/yr) Established in permit issued 1-22-2016	Proposed PSEL (tons/yr)	PSEL Increase (tons/yr)	PSEL Increase Above Netting Basis established in permit issued 1-22-2016 (tons/yr)
PM	0	0	0	41	68	27	68
PM_{10}	0	0	61	35	61	26	61
$PM_{2.5}$	n/a	0	59	31	59	28	59
CO	1	229	598	229	598	369	369
NO_x	4	197	413	197	413	216	216
SO_2	14	14	14	39	35	-4	21
VOC	190	139	351	178	351	173	212
Fluorides	0	0.5	12.5	6.4	12.5	5.8	11.7
GHG (CO_2e)	227,000*	227,000	1,725,560	819,000	1,725,560	906,560	1,498,560
Individual HAP	n/a **	n/a **	n/a **	9	9	0	n/a **
Combined HAP	n/a **	n/a **	n/a **	24	24	0	n/a **

* The baseline period for GHGs is Jan. 1, 2010 through Dec. 31, 2010.
** Not applicable. A baseline emission rate and netting basis are not established for HAPs.

NOTE: 3/29/2024 This table revised to correct PM10 and PM2.5 PSEL and NB following public notice.

60. Under OAR 340-222-0020(3)(c), as revised in 2023, PSELs are no longer required for HAPs.

60.a. Under OAR 340-222-0060(1), DEQ may establish PSELs for hazardous air pollutants (HAPs) if an owner or operator requests that DEQ create an enforceable PTE limit.

60.b. Intel has requested that DEQ retain the PSELs for HAPs, and DEQ agreed. The HAP PSELs have been retained without change.

61. OAR 340-222-0035(5) states that PSELs do not include emissions from categorically insignificant activities. Emissions from categorically insignificant activities must be considered when determining Major NSR or Type A State NSR applicability under OAR chapter 340, division 224.

61.a. As required by OAR 340-222-0035(5) emissions from categorically insignificant activities were considered when determining Major NSR or Type A State NSR applicability for the proposed permit (application received 7/7/2023), but will be excluded from Plant Site Emission Limits.

61.b. The table below identifies activities at Intel that are listed as categorically insignificant, or categorically insignificant with exceptions. Emissions from cooling towers and paved roads are not included in Plant Site Emission Limits. Subsections referenced in the table are from OAR 340-200-0020(24).

Listed as Categorically Insignificant, or Categorically Insignificant with Exceptions	Notes
RICE (emergency engines)	Listed as categorically insignificant under subsection (uu), but are not categorically insignificant because the aggregate horsepower rating of all stationary RICE (emergency generator and pump engines) is more than 3,000 horsepower.
Heaters	Listed as categorically insignificant under subsection (c), but are not categorically insignificant because the aggregate expected actual emissions exceed the de minimis level for one or more regulated pollutants.
Cooling Towers	Categorically insignificant under subsection (zz), Industrial cooling towers that do not use chromium-based water treatment chemicals.
Paved Roads	Categorically insignificant under subsection (rr), Paved roads and paved parking lots within an urban growth boundary.

NEW SOURCE REVIEW

62. New Source Review (NSR) is a construction permitting program. In Oregon, the NSR program consists of a Major NSR program and a State NSR program, as set forth in OAR 340-224-0010 through -0540. The Major NSR program is equally or more stringent than the State NSR program, and State NSR does not apply if Major NSR does apply.

62.a. Major and State NSR apply to all pollutants that meet the definition of "regulated air pollutant" or "regulated pollutant" in OAR 340-200-0020.

62.b. Under OAR 340-200-0020(133), PM, PM10, PM2.5, NOx, CO, VOC, SO2, GHG and Fluorides are all regulated air pollutants and can all be subject to Major or State NSR.

63. Major and State NSR applicability determinations are made on a pollutant by pollutant basis, based on the criteria specified in OAR 340-224-0010. In general, the criteria consider:

- how the area where the source is located is designated;
- whether or not the source meets or will meet the definition of "Federal Major source";
- whether emissions exceed or will exceed 100 tons per year in areas other than attainment/unclassified areas;
- whether emissions will exceed the netting basis by the SER as defined in OAR 340-200-0020(160) or more; and
- whether or not the source is making a major modification as defined in OAR 340-200-0020(88).

These factors are reviewed in the following paragraphs.

Area Designations

64. There are five area designations, with designations made on a pollutant-specific basis. Hillsboro, where the Intel facilities are located, is designated as follows:

Pollutant	Area designation	Notes
PM	Not applicable	There are no air quality standards for PM; see PM_{10} and $PM_{2.5}$
PM_{10}	Attainment/ unclassified	Means the area meets the air quality standards for this pollutant, or the status is unknown
$PM_{2.5}$	Attainment/ unclassified	Means the area meets the air quality standards for this pollutant, or the status is unknown

Pollutant	Area designation	Notes
CO	Maintenance	The greater Portland area was formerly a nonattainment area for CO. Rule requirements in a maintenance area are intended to help prevent the area from becoming a nonattainment area again.
NO_x (as NOx)	Attainment/ unclassified	Means the area meets the air quality standards for this pollutant, or the status is unknown
NO_x (as an ozone precursor)	Maintenance for ozone	The greater Portland area was formerly a nonattainment area for ozone (i.e., did not meet the air quality standards). Rule requirements in a maintenance area are intended to help prevent the area from becoming a nonattainment area again.
NO_x (as a $PM_{2.5}$ precursor)	Attainment/ unclassified	Means the area meets the air quality standards for this pollutant, or the status is unknown
SO_2	Attainment/ unclassified	Means the area meets the air quality standards for this pollutant, or the status is unknown
VOC (an ozone precursor)	Maintenance for ozone	The greater Portland area was formerly a nonattainment area for ozone (i.e., did not meet the air quality standards). Rule requirements in a maintenance area are intended to help prevent the area from becoming a nonattainment area again.
Fluorides	Not applicable	There are no ambient air quality standards for Fluorides.
GHG (CO_2e)	Not applicable	There are no ambient air quality standards for GHGs.

Major New Source Review Applicability

65. OAR 340-224-0010(1)(a)(C) and (b)(C) state that a source must comply with the applicable Major New Source Review (NSR) requirements if:

65.a. it makes a Major Modification, is located in an attainment or unclassified area and is an existing source that will become a Federal Major source because emissions of a regulated pollutant are increased to the Federal Major source level or more; or

65.b. it makes a Major Modification, is located in a maintenance area and is an existing source that will increase emissions of the maintenance pollutant to 100 tons per year or more.

65.c. OAR 340-224-0010(1)(c)(A) states that a source is subject to Prevention of Significant Deterioration (PSD) for GHGs if the owner or operator is first subject to Major NSR for a pollutant other than GHGs, and the source is an existing source which is undertaking a major modification for GHGs.

66. To determine if Major NSR is applicable, it is necessary to determine if the source is classified as a Federal Major Source, and then to determine if the source is making a Major Modification. These determinations are shown in the following paragraphs.

Federal Major Source

67. "Federal Major source" is defined in OAR 340-200-0020, and means a source that has potential to emit:

67.a. 100 tons per year or more of any individual regulated pollutant, excluding greenhouse gases and hazardous air pollutants listed in OAR 340 division 244 if in a source category listed in subsection (c) of the definition of Federal Major source, or

67.b. 250 tons per year or more of any individual regulated pollutant, excluding greenhouse gases and hazardous air pollutants listed in OAR 340 division 244, if not in a source category listed in subsection (c) of the definition of Federal Major source.

Federal Major source? **All amounts in tons per year (tpy)**

Pollutant	Requested Plant Site Emissions Limits (PSEL)	Criterion (see paragraph 67)	**Does source meet Federal Major source criterion?**
CO	598	≥250	**Yes**
NOx	413	≥250	**Yes**
NOx ozone precursor	413	≥250	**Yes**
VOC ozone precursor	351	≥250	**Yes**

67.c. Intel is not in a source category listed in subsection (c) of the definition of Federal Major source; however, Intel proposes Plant Site Emission Limits of 250 tons per year or more of NOx, CO and VOC. Therefore, the proposed changes will make Intel a Federal Major Source.

NOTE: 3/29/2024 EPA questioned if Intel was a "nested" Federal Major source for the 2016 NSR permit. DEQ determined that it was not. See the Response to Comments/Hearing Officer Report for this permit.

Major Modification

68. As shown in paragraph 67, Intel meets the criteria for Federal Major Source. Intel will be subject to Major NSR if it is proposing to make changes that will meet the definition of Major Modification. This is evaluated in the following paragraphs.

68.a. A source makes a Major Modification if it meets two criteria, which are listed in OAR 340-224-0025(2). In summary, the criteria are:

68.a.i. The requested Plant Site Emission Limit exceeds the Netting Basis by the Significant Emission Rate or more; and

68.a.ii. The accumulation of emissions increases due to all physical changes and changes in the method of operation is equal to or greater than the SER. To evaluate this, it is necessary to first determine the emissions rates for all pollutants before the proposed change is made; these will be referred to as the "pre-change" emissions rates.

69. The tables below summarize the evaluation of the criteria for Major Modification.

69.a. Does the requested Plant Site Emission Limit exceed the Netting Basis by the Significant Emission Rate or more (paragraph 68.a.i)? Results are shown in the last column.

All amounts in tons per year (tpy).

Table 69.a Pollutant	Requested Plant Site Emissions Limits (PSEL)	Netting Basis (NB)	PSEL minus NB	Significant Emission Rate (SER)	**Does PSEL exceed NB by SER or more?**
PM	68	0	68	25	**Yes**
PM_{10}	61	0	61	15	**Yes**
$PM_{2.5}$	59	0	59	10	**Yes**
CO	598	229	369	100	**Yes**
NOx	413	197	216	40	**Yes**
SO2	35	14	25	40	**No**

Table 69.a Pollutant	Requested Plant Site Emissions Limits (PSEL)	Netting Basis (NB)	PSEL minus NB	Significant Emission Rate (SER)	**Does PSEL exceed NB by SER or more?**
VOC	351	139	212	40	**Yes**
Fluorides	12.5	0.5	12.0	3	**Yes**
GHG	1,725,560	227,000	1,498,560	75,000	**Yes**

NOTE: 3/29/2024 This table revised to correct PM10 and PM2.5 PSEL following public notice.

69.b. Is the accumulation of emissions increases due to all physical changes and changes in the method of operation equal to or greater than the SER? In this case, this criteria will be met if the requested PSEL minus the pre-change emission rate is equal to or greater than the Significant Emission Rate (paragraph 68.a.ii).

"Pre-change emission rate" means the emission rate during the time periods specified in OAR 340-224-0025(1); pre-change emissions rates are determined in the table below, and the results are in the last column.

All amounts in tons per year (tpy).

Table 69.b-1 Pollutant	Requested Plant Site Emissions Limits (PSEL)	Baseline Period	Baseline Emission Rate	Most Recent Major NSR Action	PSEL approved in Most Recent Major NSR Action	**Pre-change emission rate**
PM	68	1977/78	0	n/a	n/a	**0**
PM_{10}	61	1977/78	0	n/a	n/a	**0**
$PM_{2.5}$	59	*	*	n/a	n/a	**0**
CO	598	1977/78	1	2016	229	**229**
NOx	413	1977/78	4	2016	197	**197**
SO2	35	1977/78	14	n/a	n/a	**14**
VOC	351	1977/78	190	n/a	n/a	**190**
Fluorides	12.5	1977/78	0	n/a	n/a	**0**
GHG	1,725,560	2010**	227,000	n/a	n/a	**227,000**

* A Baseline Emission Rate is not established for PM2.5 per OAR 340-222-0048(3).
** The baseline period for GHGs is Jan. 1, 2010 through Dec. 31, 2010.

NOTE: 3/29/2024 This table revised to correct PM10 and PM2.5 PSEL and NB following public notice.

PSELs minus Pre-change emissions rates are shown in the table below, with the results in the next-to-last column. The last column uses the results from the table above and the table below to show if the criteria for a Major Modification are met.

All amounts in tons per year (tpy).

Table 69.b-2 Pollutant	Requested Plant Site Emissions Limits (PSEL)	**Pre-change emission rate**	PSEL minus Pre-change emission rate	Significant Emission Rate (SER)	**Does PSEL minus Pre-change emission rate exceed SER?**	**Do the changes meet the criteria for a Major Modification?**
PM	68	**0**	68	25	**Yes**	**Yes**
PM_{10}	61	**0**	61	15	**Yes**	**Yes**
$PM_{2.5}$	59	**0**	59	10	**Yes**	**Yes**
CO	598	**229**	369	100	**Yes**	**Yes**

Table 69.b-2 Pollutant	Requested Plant Site Emissions Limits (PSEL)	**Pre-change emission rate**	PSEL minus Pre-change emission rate	Significant Emission Rate (SER)	**Does PSEL minus Pre-change emission rate exceed SER?**	**Do the changes meet the criteria for a Major Modification?**
NOx	413	**197**	216	40	**Yes**	**Yes**
SO2	35	**14**	25	40	**No**	**No**
VOC	351	**190**	161	40	**Yes**	**Yes**
Fluorides	12.5	**0**	12.5	3	**Yes**	**Yes**
GHG	1,725,560	**227,000**	1,498,560	75,000	**Yes**	**Yes**

NOTE: **3/29/2024** **This table revised to correct PM10 and PM2.5 PSEL and NB following public notice.**

Major NSR Applicability Summary

70. As shown below, Intel is subject to Major New Source Review for all pollutants listed except SO_2.

Pollutant	**Is the source a Federal Major Source?**	**Do the changes meet the criteria for a Major Modification?**	**Is Intel subject to Major NSR for the listed pollutant?**
PM	Yes	Yes	**Yes**
PM_{10}		Yes	**Yes**
$PM_{2.5}$		Yes	**Yes**
CO		Yes	**Yes**
NOx		Yes	**Yes**
SO2		No	**No**
VOC		Yes	**Yes**
Fluorides		Yes	**Yes**
GHG		Yes	**Yes**

New Source Review Requirements Summary Table

NSR Requirements Summary Table PM column added in response to EPA comment 1.

	PM	**PM_{10}**	**$PM_{2.5}$**	**CO**	**NOx as NOx**	**NOx as an ozone precursor**	**VOC as an ozone precursor**	**GHG**	**Fluorides**
BACT* analysis	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**
Air Quality Analysis (model air quality impacts)	**no**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**no****	**no*****
Obtain offsets or an allocation from growth allowance	**n/a**	**n/a**	**n/a**	**yes**	**no**	**yes**	**yes**	**n/a**	**n/a**

* **Best Available Control Technology**
** There are no ambient air quality standards for GHGs.
*** See paragraphs 90 through 92 for a discussion of Fluorides and HF.

NOTE: **3/29/2024** **This table revised to add PM following public notice**

(BACT) BEST AVAILABLE CONTROL TECHNOLOGY REVIEW

NOTE: 3/29/2024 There is significant additional discussion of BACT in the Review Report/Hearing Officer Report following public notice. No BACT determinations were changed.

71. The purpose of a Best Available Control Technology (BACT) analysis is to evaluate emission control options and to determine which, if any, must be used. This analysis is often referred to as a "top-down" analysis and consists of the following 5 step process:

    Step 1 – Identify all available control options.
    Step 2 – Eliminate technically infeasible options.
    Step 3 – Rank the remaining control options.
    Step 4 – Evaluate economic, energy, and environmental impacts.
    Step 5 – Select Best Available Control Technology.

72. It is possible the analysis will determine that an emission control system must be installed. It is also possible for the analysis to determine that no emission controls are feasible; this can occur at Step 2 or Step 4. The individual steps are described in more detail below.

    - In Step 1, all available control options must be identified. The control option has to exist and be commercially available.

    - In Step 2, the identified options are reviewed and any that are found to be technically infeasible are eliminated. Emission control options are technically feasible if they are in use by other facilities in the same industry or at facilities that have processes that are similar enough to conclude that the emission control will work for the process being considered in the review. If none of the options are technically feasible, the review is done and the determination is no control.

    - In Step 3, all control options that are considered technically feasible (if any) are ranked by effectiveness, with the most effective ranked first, the next most effective ranked second, and so on to the least effective.

    - In Step 4, the first-ranked option is reviewed for economic[3], energy, and environmental impacts. If any of these impacts are found to be unacceptable, that option is eliminated and the second-ranked option is reviewed. If the second-ranked option is eliminated, then the third-ranked option is reviewed. This "top-down" review continues until an option is found to have acceptable economic, energy, and environmental impacts. It is possible for all options to be eliminated.

    - In Step 5, the Best Available Control Technology is determined to be the highest-ranking option reviewed in Step 4 that is not eliminated because of economic, energy, or environmental impacts. If all options are eliminated, the determination is no control.

73. Intel performed BACT analyses as required for nine emissions categories, listed below in paragraph 75. The analyses are detailed in the permit application received on 7/7/2023, Appendix C. DEQ found in general that the proper procedure was followed for each BACT analysis, except as noted in paragraphs 74 and 78.f.ii.A.

---

[3] The generally accepted BACT Control Cost criterion is (approximately) $10,000 per ton of pollutant reduced, and control options can be eliminated if the cost is greater than this criterion. DEQ does not regard $10,000 as a hard line that cannot be crossed; control costs somewhat higher than $10,000 per ton could warrant closer examination and a more refined cost estimate.

74. Intel reviewed EPA's RACT/BACT/LAER Clearinghouse (RBLC) to determine if and what kind of emissions control devices were used at other facilities, as is typically done in a BACT analysis. In some cases, for example: section 6.1 CO BACT for RCTOs (APCD), Intel stated the following:

> 'A review of the U.S. EPA's RBLC database did not produce any findings of semiconductor facilities that utilize add-on control devices to abate CO emissions that are generated from RCTOs (APCD). In addition, the review did not produce other facilities that utilize add-on control devices to abate CO emissions that are generated from RCTOs (APCD). To determine if non-PSD permits contain relevant CO control measures, the air quality permits of 300-mm semiconductor fabrication facilities were reviewed to determine if any control technologies are currently being utilized to abate CO emissions from RCTOs (APCD). It should be noted that permits were reviewed for 300-mm semiconductor fabrication facilities only as the Intel Facility manufactures 300-mm wafers. Smaller capacity semiconductor fabrication facilities (i.e., 200-mm) were not reviewed as typically these fabrication facilities operate with much lower exhaust flowrates and have lower CO emissions' (underline added).

DEQ has concluded that smaller semiconductor manufacturers should have been reviewed as well, as they could potentially use emissions controls that would be of interest in a BACT analysis. However, DEQ notes that this does not invalidate any BACT analysis, because in each of these cases Intel did identify one or more potential emissions control measures and carried out the BACT analysis on those measures.

75. For calculating the cost effectiveness of possible emission reduction measures, Intel used EPA Air Pollution Control Cost Estimation Spreadsheets developed and provided by the US Environmental Protection Agency (https://www.epa.gov/sites/default/files/2020-07/documents/c_allchs.pdf). These methods are normally used in BACT analyses, and their results could be accepted without further review. However, DEQ did a more detailed control cost review of four of the BACT analyses for verification purposes. The four BACT analyses reviewed are for the four highest-emitting processes or equipment, indicated below:

Emissions Unit Categories	**General Review**	**More Detailed Review**
Boilers	Yes	Yes
Heaters	Yes	Yes
RCTOs (APCD)	Yes	Yes
TriMix Systems (TMXWs)	Yes	-
Acid and Ammonia Scrubbers (EXSC (APCD)s and EXAM (APCD)s)	Yes	Yes
Cooling Towers	Yes	-
RICE	Yes	-
Paved Roads	Yes	-
Isopropyl Alcohol (IPA) Usage, General Ventilation	Yes	-

75.a. To calculate cost effectiveness it is necessary to have information on equipment costs. DEQ asked Intel to provide information on how equipment costs were obtained. Intel replied that costs were obtained from the EPA Air Pollution Control Cost Estimation Spreadsheets discussed above. The specific cost information DEQ requested and Intel's replies are listed below:

75.a.i. SCR systems for boilers
- 75.a.i.A. o Cost of the equipment: $1,579,354 & $2,325,750
- 75.a.i.B. o Source: EPA's Air Pollution Control Cost Estimation Spreadsheet for SCR
- 75.a.i.C. o Annual fuel usage: calculations are based on 30 % utilization

75.a.ii. SNCR systems for boilers
- 75.a.ii.A. o Cost of the equipment: $339,546 & $466,365

75.a.ii.B. o Source: EPA's Air Pollution Control Cost Estimation Spreadsheet for SNCR
75.a.ii.C. o Annual fuel usage: calculations are based on 30 % utilization
75.a.iii. Electrically-fired boilers
75.a.iii.A. o Cost of the equipment: $4,756,199 (per 2 3.5 MW boiler)
75.a.iii.B. o Source: Intel provided cost estimate from supplier & EPA Cost Manual guidance and factors.
75.a.iii.C. o Annual fuel usage: calculations are based on 30 % utilization
75.a.iv. Diesel particulate filters for emergency engines
75.a.iv.A. o Cost of the equipment: $190,000
75.a.iv.B. o Source: Microsoft Data Center Expansion Project in WA & EPA Cost Manual guidance and factors.
75.a.iv.C. o Annual fuel usage: calculations are based on 25 hours per year
75.a.iv.D. o Cost is only for emissions control package and does not include the cost of the EGEN (EGEN = emergency generator)
75.a.v. Tier 2 and Tier 4 emergency generators with similar power outputs in the 3-3.5 MW range.
75.a.v.A. Tier 4 Integrated package
75.a.v.A.(1) Cost of the equipment: $280,000
75.a.v.A.(2) Source: Microsoft Data Center Expansion Project in WA & EPA Cost Manual guidance and factors.
75.a.v.A.(3) Annual fuel usage: calculations are based on 25 hours per year
75.a.v.A.(4) Cost is only for emissions control package and does not include the cost of the EGEN
75.a.v.B. Tier 2 Integrated package is considered BACT and a cost analysis was not conducted.

Note on GHGs

76. Intel's GHG emissions include CO2 from combustion equipment such as boilers, heaters, RCTOs (APCD), TMXW and engines, but the majority of the GHG emissions in terms of CO2 equivalents (CO2e) are in the form of fluorinated gases known as High Global Warming Potential gases that are used in the microchip production processes and are listed below:

Chemical	EPA Global Warming Potential
C_2F_6	12,200
C_4F_8	10,300
CF_4	7,390
CHF_3	14,800
CH_2F_2	675
N_2O	298
NF_3	17,200
SF_6	22,800
CH_3F	92

77. Currently there are no viable emission reduction options for these GHGs, other than to minimize the use of these chemicals. However, Intel has stated that they intend to achieve a "net-zero" GHG emission rate on a global basis by year 2040 (https://www.intel.com/content/www/us/en/newsroom/opinion/progress-toward-net-zero-greenhouse-gas-emissions). This is an Intel initiative and is not subject to regulation by DEQ and therefore is not included in the permit.

BOILERS

78. BACT review for Boilers[4]

78.a. Boilers are typically used to produce steam by heating (boiling) water. Intel's boilers do not actually boil water; rather, they are large hot water heaters and operate at lower combustion temperatures than typical boilers do. This results in lower exhaust gas temperatures. For certain types of emissions controls, higher exhaust gas temperatures are needed, and additional natural gas must be burned simply to preheat the exhaust gases to the temperature required by these emissions controls.

Intel concluded that BACT for NOx emissions from the natural gas-fired boilers shall consist of the use of an ultra-low NOx burner design or the combination of a low NOx burner design with FGR. Intel will rely on the current BACT floor of 0.011 lb/MMBtu for boilers with a rated heat input >2.0 MMBtu/hr as shown in Table 4-15. BACT for boilers ≤2.0 MMBtu/hr is good combustion practices and exclusive use of natural gas as fuel are shown in Table 4-16. DEQ agrees with these conclusions.

78.b. The BACT review for boilers is summarized below:

Pollutant	**Technically Feasible Control technology or method**	**Special requirements**	**Cost, $ per ton of pollutant reduced**	**Economically feasible?**
CO	Catalytic oxidizer, monolith or fluidized bed	Requires preheating	>$359,386	No
	Retrofit Catalytic oxidizer, monolith or fluidized bed	Requires preheating	>$179,204	No
	Good combustion practices		-	Yes
NOx	SCR	Requires preheating	$411,418	No
	Retrofit SCR	Requires preheating	$538,222	No
	Ultra-Low NOx burners or Low NOx burners with FGR, 9 ppm or 0.011 lb/MMBtu			Yes
	SNCR	Requires preheating	$306,498	No
	Retrofit SNCR	Requires preheating	$377,355	No
	Good combustion practices			Yes
PM, PM10, PM2.5	Good combustion practices	-	-	Yes
VOC	Catalytic Oxidizer	Requires preheating	$3,260,000 *	No
	Good combustion practices	-	-	Yes

<u>NOTE</u>: <u>3/29/2024</u> <u>This table revised to add PM following public notice.</u>

* The catalytic oxidizers used to reduce CO emissions also reduce VOC emissions. Therefore, DEQ estimated the VOC control cost as (control cost for catalytic oxidizer for CO) times ratio of CO reduction over VOC reduction, or

$359,386 x 1.27 tpy CO / 0.14 tpy VOC = $3,260,000 per ton, where:

- control cost for catalytic oxidizer for CO = $359,386, from table above
- CO reduction = 1.27 tons per year from Table 4-4 from the BACT analysis in the permit application received 7/07/2023
- VOC reduction = 0.14 tons per year, estimated as 95% of (average VOC emission rate from 58 boilers in permit application Appendix B emissions summary)

* Intel's BACT analysis is found in the permit application, Appendix C, BACT Analyses document, section 4.

78.c. CO, VOC, PM, PM10 and PM2.5 - Boilers
Intel's BACT analysis identified potential emissions control equipment to control CO and VOC emissions, but all costs per ton of pollutant reduced exceeded the BACT control cost criterion of $10,000 per ton of pollutant reduced. No emissions control devices were identified to reduce PM, PM10 and PM2.5.

For CO, PM/PM10/PM2.5 and VOC, BACT for boilers is good combustion practices.

78.d. GHG - Boilers
Intel's BACT analysis for GHG identified Design and Operational Efficiency as BACT for boilers.

DEQ notes that boilers are natural gas-fired combustion devices and are similar to RCTOs (APCD) in that respect. Intel's BACT analysis identified only two technically feasible methods to reduce GHG emissions from RCTOs (APCD):

- utilization of design and operational energy efficiency consistent with the manufacturers' specifications; and
- use of low-carbon fuel such as natural gas.

Both of these methods apply to boilers, are used by Intel and are considered BACT for GHGs.

78.e. Fluorides - Boilers
The Boilers are not a source of Fluorides emissions. Therefore, a Fluorides BACT analysis is not required.

78.f. NOx - Boilers

78.f.i. DEQ found the following information online:

Ultra-Low NOx Premixed Industrial Burner, Industrial Efficiency & Decarbonization Office, at **Ultra-Low NOx Premixed Industrial Burner | Department of Energy** states that Ultra-Low NOx burners achieve NOx emission levels of <10 ppm.

78.f.ii. As part of DEQ's review of NOx BACT for Boilers, DEQ further considered the NOx levels that Intel's boiler burners could achieve.

78.f.ii.A. DEQ asked Intel why retrofitting of existing boilers with ultra-low NOx burners was not considered. Intel provided information that all but two boilers rated over 2 MMBtu/hr are rated for 9 ppm regardless of the burner system employed (see paragraph 78.f.iii for the two exceptions). DEQ found the following information online:

78.f.ii.B. DEQ reviewed the RBLC entries for NOx provided in Intel's BACT analysis. None of the entries expressed BACT limits in ppm; units were lb/MMBtu, lb/MMscf or lb/hr. Intel's NOx emission factors are all in terms of lb/MMBtu, so to simplify the review DEQ considered only the RBLC entries that were in lb/MMBtu; there were 24 such entries. Intel's emissions factors are compared to the RBLC lb/MMBtu entries below:

	Intel	RBLC
maximum	0.0600	0.100
average	0.01246	0.03487
minimum	0.0108	0.01

78.f.ii.C. Intel has 45 boilers rated at more than 2.0 MMBtu/hr. Of these, 43 have a NOx emission factor of 0.0108 lb/MMBtu. The lowest RBLC entries are 0.01 and 0.011;

that is, they are rounded off to 2 or 3 decimal places. If Intel's emission factors are similarly rounded off, 0.0108 becomes 0.011 (3 decimal places) or 0.01 (2 decimal places). Thus, Intel's emission factors are effectively the same as the lowest RBLC entries in lb/MMBtu for 43 of 45 boilers.

78.f.iii. Since RBLC entries are not in terms of ppm, DEQ finds that NOx BACT for boilers rated over 2 MMBtu/hr is good combustion practices and use of burners or a combination of burners plus Flue Gas Recirculation (FGR) that can meet 9 ppm or 0.011 lb/MMBtu.

78.f.iii.A. This finding does not apply to the two boilers with higher NOx emission factors listed below.

Equipment Tag	Install Date	Burner Maximum Heat Input (MMBtu/hr)	EF (lbs/MMBtu)	Annual Emissions (tpy)
BLR-115-1-210	2001	8.17	0.0600	0.644
BLR-115-5-210	2009	14.29	0.0360	0.676

78.f.iii.B. The expected NOx emissions rates for these two boilers are the same as they were in the permit issued on Jan. 22, 2016, and do not contribute to the emissions increases proposed in the proposed permit (application 034907 received 7/7/2023); therefore, these two boilers are not subject to BACT at this time. DEQ also notes that both of these boilers are expected to emit less than 1 ton per year of NOx.

79. Intel informed DEQ that electric boilers have been considered, as these would have no direct emissions[5]. However, Intel found the cost of such units excessive. Further, in the event of a power outage affecting an electric boiler it would require the operation of several emergency generators to provide power for the electric boiler, resulting in high short-term emissions. Intel concluded that electric boilers are not feasible because of the cost and potential environmental impacts from operation of a significant number of emergency generators.

79.a. The control cost analysis for electric boilers gave costs of $2.3 million or more per ton of pollutant removed for all pollutants except GHG, which gave a cost of $715 to $1,200 per ton. At face value this cost per ton appears to meet the general $10,000 per ton BACT Control Cost criterion; however, $10,000 per ton does not apply to GHG because of the large disparity between emission rates of typical criteria pollutants like NOx and CO, and the emission rates of GHG.

79.b. To illustrate this for the case being considered here, the use of two electrically fired boilers would eliminate the following emissions of GHG, CO and NOx:

	GHG	CO	NOx
Amount eliminated, ton/yr	4,550	1.41	0.447
Ratio of CO or NOx to GHG	--	4,550:1.41 = 3,226:1	4,550:0.447 = 10,911:1

79.c. The ratios calculated above show that 3,226 tons of GHG are emitted for every 1 ton of CO, and 10,991 tons of GHG are emitted for every 1 ton of NOx from the particular boilers considered by Intel. While it is hypothetically possible to derive control cost criteria for GHG that are equivalent to $10,000 per ton of CO or per ton of NOx, the resulting values would be very small (less than five dollars per ton in this case) and will vary widely each time such a calculation is made because the ratio of GHG emitted to other pollutants varies widely depending on the equipment, the process involved, the fuel used, and the pollutant used for

[5] Direct emissions means emissions directly from the boilers. However, a significant portion of the electrical power in the Northwest is generated at natural gas-fired power plants, so there are indirect emissions from the power plants from generating the electricity used by the electrically-fired boilers.

the comparison. For this reason the $10,000 per ton control cost criterion cannot be used for GHG and other factors must be considered instead.

79.d. For the following reasons, DEQ agrees that electrically-fired boilers are eliminated from consideration as BACT:

79.d.i. The control costs for the criteria pollutants are excessively high, suggesting that the control costs for GHG are also likely to be high; and

79.d.ii. The amount of GHG eliminated per electric boiler is small compared to the overall facility-wide GHG emissions (for example, 4,550 tons per year eliminated compared to the GHG PSEL of 1,725,560 tons per year).

79.e. DEQ considered whether it was appropriate to require renewable natural gas credits as BACT for GHGs. These credits would work by paying for renewable natural gas to be used by another company, with Intel getting credit for the GHG reduction associated with the use of renewable natural gas. In other words, the actual emissions reductions would not be made by Intel, but by another company that may not even be located in Oregon. However, Intel provided information that the U.S. Supreme Court previously ruled that this type of emissions reduction credit is not allowed as BACT because the emissions reductions achieved by BACT must be made by the facility and equipment that is subject to BACT, not by some other company or location.

79.f. In addition to the BACT analysis for the boilers, DEQ asked Intel to propose a periodic boiler tuning schedule. Intel proposed periodic tuning every 6 years per the boiler manufacturers recommendation. DEQ agrees with this schedule and has added a permit condition requiring boiler tuning at least every 6 years.

80. **BACT review for RCTOs (APCD)**[6]

80.a. CO - RCTOs (APCD)
Intel's BACT analysis did not identify any facilities that use add-on control devices for RCTOs (APCD); however, the following was identified as a technically feasible control option:

- Catalytic oxidation

The control cost was evaluated using a USEPA Air Pollution Control Cost Estimation Spreadsheet, which returned the lowest estimate of $46,287 per ton of pollutant reduced. This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as BACT. Intel also stated that the exhaust stream would require filtration or other pretreatment to remove silicon dioxide particles, which would otherwise cause fouling of the catalyst system. Pretreatment would increase the control cost above the estimate shown here.

80.b. NOx - RCTOs (APCD)
Intel's BACT analysis did not identify any facilities that use add-on control devices for RCTOs (APCD); however, the following were identified as technically feasible control options:

- Low NOx burners;
- Ultra-low NOx burners;
- Selective Catalytic Reduction (SCR);
- Selective Non-catalytic Reduction (SNCR); and
- Good combustion practices

Intel eliminated SNCR as BACT based on energy considerations alone and did not perform a Control Cost analysis for this method. However, DEQ calculated the control costs based on energy cost alone (i.e., without equipment costs) and found that the annual energy cost estimate was $100,611 per ton. This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as BACT.

[6] Intel's BACT analysis is found in the permit application, Appendix C, BACT Analyses document, section 6.

For SCR, the control cost was evaluated using a USEPA Air Pollution Control Cost Estimation Spreadsheet, which returned the lowest estimate of $23,155 per ton of pollutant reduced. This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as BACT. Intel also stated that the exhaust stream would require filtration or other pretreatment to remove silicon dioxide particles, which would otherwise cause fouling of the SCR system. Pretreatment would increase the control cost above the estimate shown here.

All RCTOs (APCD) at Intel are equipped with low NOx burners, so a control cost analysis of this method was not necessary.

Intel concluded that use of ultra-low NOx burners with good combustion practices is BACT for new RCTOs (APCD).

Intel evaluated the control cost of retrofitting existing RCTOs (APCD) with ultra-low NOx burners and determined a control cost of $245,701 per ton. This exceeds the BACT Control Cost criterion of $10,000 per ton and retrofitting ultra-low NOx burners is therefore eliminated as retrofit BACT.

DEQ noted that all RCTO (APCD) emission factors for NOx are the same in the emissions calculation sheets in Appendix B of the permit application (received 7/7/2023). Intel explained that the natural gas burners in the RCTOs (APCD) are used mainly for startup, after which natural gas usage is reduced as combustion is partially maintained by the process VOCs that are being destroyed (burned)[7]. NOx generation is largely a function of the combustion of VOCs, not the gas burners, so gas burner design has limited effect on emissions. Further, because the VOC stream is variable, Intel stated that the RCTO (APCD) manufacturer will not guarantee a NOx emission rate. Intel will rely instead on existing emission factors from the current permit (issued 1/22/2016).

80.c. PM/PM10/PM2.5 - RCTOs (APCD)
Intel's BACT analysis did not identify any facilities that use add-on control devices for RCTOs (APCD); however, the following were identified as a technically feasible control option:

- Wet Electrostatic Precipitators (WESP (APCD)); and
- Good combustion practices.

The control cost was evaluated in a manner similar to the other control cost analyses considered here, but the capital cost was based on the equipment, shipping, structural support, installation, engineering, and construction costs from a recent Intel air permit application at their Ocotillo site in Arizona State (2021) for a WESP (APCD).

- The lowest cost estimate for a WESP (APCD) was $718,334 per ton of pollutant reduced.
- This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as BACT.
- Retrofit costs for WESPs (APCD) were estimated using the capital cost above, with lowest cost estimate for a retrofit WESP (APCD) of $2,920,670 per ton of pollutant reduced. This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as retrofit BACT.

Intel has voluntarily installed additional particulate matter controls on some RCTOs (APCD). The first systems installed added a WESP (APCD) to reduce particulate matter emissions from the exhaust of associated RCTOs (APCD) (Equipment ID D1XM1-VOC138-5-20, D1XM1-VOC138-6-20, D1XM1-VOC138-7-20). This system requires cooling the RCTO (APCD) exhaust to a temperature that is compatible with WESPs (APCD). Additional RCTOs (APCD) have been routed to scrubber WESPs (APCD) which involves cooling the RCTO (APCD) exhaust in a heat exchanger, which uses the exhaust heat to reduce natural gas heating in other parts of the facility. The cooled RCTO (APCD) exhaust is then

[7] See paragraph 22 for a short explanation of how RCTOs (APCD) operate.

routed to the scrubber system for routing through the scrubber WESPs (APCD) before being emitted to atmosphere. The cost of these voluntary emissions control systems exceeds the BACT Control Cost criterion, so cannot be considered BACT and DEQ cannot require Intel to install such systems on all RCTOs (APCD).

80.d. VOC - RCTOs (APCD)
Intel's BACT analysis did not identify any facilities that use add-on control devices for RCTOs (APCD); however, the following was identified as a technically feasible control option:

- Catalytic oxidation

The control cost was evaluated using a USEPA Air Pollution Control Cost Estimation Spreadsheet, which returned a lowest estimate of $143,347 per ton of pollutant reduced. This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as BACT.

These exceed the BACT Control Cost criterion of $10,000 per ton and are therefore eliminated as BACT. Intel also stated that the exhaust stream would require filtration or other pretreatment to remove silicon dioxide particles, which would otherwise cause fouling of the SCR system. Pretreatment would increase the control cost above the estimate shown here.

80.e. Fluorides - RCTOs (APCD)
Intel's BACT analysis did not identify any facilities that use add-on control devices for RCTOs (APCD); however, the following was identified as a technically feasible control option:

- Wet electrostatic precipitators (WESPs (APCD)).

This control option assumes that Fluorides are adhered onto particulate matter and can therefore be removed by a particulate matter control system. The control cost was evaluated using a USEPA Air Pollution Control Cost Estimation Spreadsheet, which returned a lowest estimate of over $9 billion per ton of pollutant reduced. This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as BACT.

80.f. GHGs - RCTOs (APCD)
Intel's BACT analysis identified only two technically feasible methods to reduce GHG emissions from RCTOs (APCD):

- utilization of design and operational energy efficiency consistent with the manufacturers' specifications; and
- use of low-carbon fuel such as natural gas.

Both of these methods are used by Intel and are considered BACT for GHGs.

81. BACT review for Wet Scrubbers (EXSC (APCD) and EXAM (APCD))[8]

81.a. CO – Wet Scrubbers
Intel's BACT analysis did not identify any facilities that use add-on control devices for scrubber exhausts; however, the following was identified as a technically feasible control option:

- Catalytic oxidation.

The control cost was evaluated using a USEPA Air Pollution Control Cost Estimation Spreadsheet, which returned a lowest estimate of $110,907 per ton of pollutant reduced. This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as BACT.

81.b. NOx – Wet Scrubbers

[8] Intel's BACT analysis is found in the permit application, Appendix C, BACT Analyses document, section 8.

Intel's BACT analysis did not identify any facilities that use add-on control devices for scrubber exhausts; however, the following were identified as technically feasible control option:

- Selective Catalytic Reduction (SCR);
- Selective Non-Catalytic Reduction (SNCR); and
- $NaClO_2$ Wet Scrubber.

Intel eliminated SCR and SNCR as BACT based on energy considerations alone and did not perform a Control Cost analysis for these methods. DEQ calculated the control costs based on energy cost alone (i.e., without equipment costs) and found that the annual energy cost was $1.1 million per ton or more. This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as BACT.

The control cost for a $NaClO_2$ scrubber was evaluated using a USEPA Air Pollution Control Cost Estimation Spreadsheet, which returned a lowest estimate of $50,174 per ton of pollutant reduced. This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as BACT.

81.c. PM/PM10/PM2.5 – Wet Scrubbers
Intel's BACT analysis did not identify any facilities that use add-on control devices for scrubber exhausts; however, the following was identified as a technically feasible control option:

- Wet Electrostatic Precipitators (WESP (APCD)); and
- Wet Scrubbers using water.

The control cost was evaluated using USEPA Air Pollution Control Cost Estimation Spreadsheets.

- The lowest cost estimate for a WESP (APCD) was $1,198,073 per ton of pollutant reduced, and
- The lowest cost estimate for a wet scrubber was $314,365 per ton of pollutant reduced.

These exceed the BACT Control Cost criterion of $10,000 per ton and are therefore eliminated as BACT.

81.d. VOC – Wet Scrubbers
Intel's BACT analysis identified the following as technically feasible control options:

- Catalytic Oxidation;
- Thermal Incinerators, Afterburners and RTOs; and
- NaClO packed-bed scrubbers.

The control cost was evaluated using USEPA Air Pollution Control Cost Estimation Spreadsheets.

- The lowest cost estimate for Catalytic Oxidation was $93,741 per ton of pollutant reduced; and
- The lowest cost estimate for NaClO packed-bed scrubbers was $59,335 per ton of pollutant reduced.

Intel's BACT analysis did not include a control cost estimate for Thermal Incinerators, Afterburners and RTOs; however, DEQ calculated the control costs based on energy cost alone (i.e., without equipment costs) and found that the annual energy cost was $464,091 per ton or more.

These exceed the BACT Control Cost criterion of $10,000 per ton and are therefore eliminated as BACT.

81.e. Fluorides – Wet Scrubbers
Intel's BACT analysis did not identify any facilities that use add-on control devices for scrubber exhausts; however, the following was identified as a technically feasible control option:

- Wet electrostatic precipitators (WESPs (APCD)).

This control option assumes that Fluorides are adhered onto particulate matter and can therefore be removed by a particulate matter control system. The control cost was evaluated using a USEPA Air Pollution Control Cost Estimation Spreadsheet, which returned a lowest estimate of over $9 billion per ton of pollutant reduced. This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as BACT.

The control cost was evaluated as described in Intel's permit application (received 7/7/2023) BACT Analyses, section 6.3.4.3:

> "Cost estimates for a WESP (APCD) as a new installation were determined by estimating annualized capital recovery costs, direct annualized costs and indirect annual costs. Indirect cost factors to derive a conservatively low total installation cost were obtained from the EPA Air Pollution Control Cost Manual (EPA 2002). The annual capital recovery costs were calculated assuming a 15-year system lifetime and a 5 percent annual discount rate. Conservatively low estimates of annual operation and maintenance costs for each control option were derived by assuming that there would be no operating cost for electricity or equipment maintenance. To provide a conservatively low estimate of the annual operating cost, the operational unit costs for each emission control option were set to zero. Using equipment, shipping, structural support, installation, engineering, and construction costs from a recent Intel air permit application at their Ocotillo site in Arizona State (2021) for a WESP (APCD), the capital cost of installing a WESP (APCD) on an RCTO (APCD) was calculated. Since the capital costs were estimated in 2021, the total capital was escalated based on the Chemical Engineering Plan Cost Index (CEPCI)."

The lowest cost estimate for WESPs (APCD) was $5,027,626 per ton of pollutant reduced. This exceeds the BACT Control Cost criterion of $10,000 per ton and is therefore eliminated as BACT.

81.f. GHGs – Wet Scrubbers

GHG emissions from Wet Scrubbers originate in the microchip production process, where GHGs are used as a source of fluorine. In the production processes, the GHG molecules are broken down, which creates free fluorine atoms which then perform processes such as etching or equipment cleaning. When the process is stopped, the free atoms and molecule fragments recombine in various ways, creating various compounds some of which are GHGs. The newly created GHGs plus any unreacted GHGs are then treated in a Point of Use abatement device, and then sent to wet scrubbers before being emitted to atmosphere. Production processes are described in more detail in the permit application.

Intel's BACT analysis identified only two technically feasible methods to reduce GHG emissions:

- Process Chemical Use Optimization; and
- Chemical substitution – NF3 Cleans

  Intel provided the following information regarding NF3 Cleans[9]:

  > "The semiconductor industry has developed remote plasma clean technologies using NF3 to replace in-situ chamber cleans using carbon-based GHGs. This has resulted in substantial reductions in the associated GHG emission on a CO2e basis. Plasma cleans technology dissociate NF3 into fluorine ions or atoms in plasma and then feed the fluorine ions/atoms into the process chamber to remove silicon-based and other residues. Plasma cleans convert NF3 at 70-98% utilization efficiency. While NF3 does not have a lower GWP than carbon-based GHGs, the increased efficiency with which it can be used results in a dramatic reduction in the CO2e emissions for this process operation."

Both of these methods are used by Intel and are considered BACT for GHGs.

82. BACT review for Emergency RICE[10] (emergency generator and fire pump engines)

[9] From Intel's permit application 034907 received 7/7/2023, Appendix C, Best Available Control Technology (BACT) Analysis, dated 07 July 2023, section 8.5.1.2.

[10] Intel's BACT analysis is found in the permit application received on 7/7/2023, Appendix C, BACT Analyses document, section 9.

82.a. BACT applicability to individual RICE varies by the installation date of the RICE, by pollutant and by whether the RICE was previously subject to BACT under the previous permit (issued 1/22/2016). Appendix 2-RICE shows the BACT applicability of each RICE.

82.b. Intel's BACT analysis for Tier 4 RICE (emergency generator engines and fire pump engines) considered only the price of a complete Tier 4 generator set. However, DEQ considers Tier 4 engines to be essentially Tier 2 engines with modifications and add-on emissions controls. Further, DEQ considers that Intel will, at the least, install Tier 2 RICE (emergency generator sets. Accordingly, DEQ considers that the appropriate equipment cost is only (the cost of the additional emissions controls on Tier 4 engines), which can be estimated as (cost of Tier 4 generator set) minus (cost of Tier 2 generator set). In this way, the BACT analysis would consider only the cost of the modifications and add-on emissions controls required to meet the Tier 4 standards.

82.c. DEQ conducted an on-line search for price estimates for diesel emergency generators ranging from about 2,500 kW (2.5 MW) to 3,500 kW (3.5 MW) generating capacity. This capacity range is approximately the range used and proposed by Intel.

82.d. Little information was available online, as most large diesel generator manufacturers listed "request a quote" for their equipment. However, USP&E Global, located in South Africa, did provide prices online for various diesel generators ranging from 2.5 MW to 3.6 MW. The generators and their prices are listed in the table below.

Generator Cost Table

MW Rating	Description	Price in US dollars
3.6	3.6 MW 1999 Used MAN 18v28 32h Diesel Power Plant	$403,000
3.5	3.5 MW 2016 Surplus New Rolls Royce B3345l6a Diesel Generator Set	$1,150,000
3.4	3.4 MW 2020 Refurbished Caterpillar 3516b HD Diesel Generator Set	$748,896
2.8	2.8 MW 2014 New Bergen B32 40l6acd Diesel Generator Sets	$920,000
2.7	2.7 MW 2017 New Man 12vp185tcm Diesel Generator Sets	$517,500
2.6	2.6 MW 2017 New MTU 20v4000g63l Diesel Generator Sets	$172,500
2.6	2.6 MW 2022 New Refurbished Caterpillar 3512b Diesel Lo Bsfc Gensets	$794,500
2.5	2.5 MW 2011 New MTU 20v4000g43 Diesel Generator Sets	$212,800
2.5	2.5 MW 2020 New Caterpillar 3516c Diesel Generator Sets Sound Attenuated Enclosure	$1,380,000
	Average Price	$699,911
	Least Expensive (2.6 MW)	$172,500

82.e. In Intel's BACT analysis for Tier 4 diesel generators (Application no. 034907, appendix C, BACT attachment A, page A-14), a cost for the generator set itself of $250,000 was used. Seven out of the nine prices listed above are over $250,000, with the lowest price being $172,500. DEQ considers the cost estimate used by Intel to be reasonable compared to the prices listed in the table above. Additional costs such as shipping, installation and operating costs were factored in to estimate an annualized cost of $307,426.79. Dividing the annualized cost by the tons per year of emission reductions this unit would achieve results in dollars per ton of emissions removed. The calculations gave the following results:

$/ton CO removed	$28,889,561.47
$/ton NOx removed	$335,133.58
$/ton VOC removed	$85,602,959.96
$/ton PM removed	$272,267,046.84

82.f. Reconsideration of Tier 4 Control Cost by DEQ

82.f.i. Intel's BACT analysis for Tier 4 RICE (emergency generators and fire pumps) considered only the price of a complete Tier 4 generator set. However, DEQ considers Tier 4 engines to be essentially Tier 2 engines with internal modifications and add-on emissions controls. Further, DEQ considers that Intel will, at the least, install Tier 2 RICE (emergency generator sets). Accordingly, DEQ considers that the appropriate equipment cost is only the cost of the modifications and add-on emissions controls needed to convert Tier 2 engines into Tier 4 engines, which can be estimated as:

(cost of Tier 4 generator set) minus **(cost of Tier 2 generator set)**.

82.f.ii. In this way, the BACT analysis would consider only the cost of the modifications to the engines and add-on emissions controls required to meet the Tier 4 standards.

82.f.iii. Since DEQ has no information on the difference in cost between Tier 2 and Tier 4 generator sets, DEQ conducted an extreme-case analysis by assuming zero cost for the engine/generator set. This results in an annualized equipment cost of zero dollars. However, other costs would still be factored in, such as the costs of reagent, maintenance, administration, property tax and insurance. Assuming zero cost for the engine/generator set reduces the annualized cost from $307,426.79 to $279,031.03, which is approximately 91% of the annualized cost used in Intel's analysis. This would reduce the control costs to 91% of the costs estimated by Intel, as shown below:

	Intel's analysis		DEQ's extreme case estimate
$/ton CO removed	$28,889,561.47	x 91% =	$26,289,500
$/ton NOx removed	$335,133.58	x 91% =	$304,972
$/ton VOC removed	$85,602,959.96	x 91% =	$77,898,694
$/ton PM removed	$272,267,046.84	x 91% =	$247,763,013

82.f.iv. The BACT cost effectiveness criterion is generally taken to be $10,000 or less per ton of pollutant removed. The costs calculated for a Tier 4 diesel generator per ton of pollutant removed far exceed the BACT cost effectiveness criterion, even when the cost of the equipment itself is ignored. DEQ notes that even significant differences in the cost estimate for a Tier 4 generator would not change this outcome.

82.f.v. Even if the tons per year of pollutant were doubled or tripled, the lowest control cost would still be over $100,000 per ton, still exceeding the BACT cost criterion and eliminating Tier 4 engines from consideration as BACT.

82.f.vi. Since adding SCR to the existing generator sets would involve the same costs, DEQ's extreme case analysis above also results in elimination of SCR as BACT.

82.f.vii. Finally, the least expensive add-on control costs are for catalytic diesel particulate filters (CPDF) and diesel oxidation catalysts (DOC), with the lowest cost $2,147,988.16 per ton of pollutant removed. Doubling or tripling the emissions removed still leaves a control cost figure of well over $500,000 per ton, eliminating these devices as BACT.

82.g. GHG – RICE

Intel's BACT analysis identified only one technically feasible method to reduce GHG emissions from RICE (emergency generators and fire pumps):

- utilization of design and operational energy efficiency consistent with the manufacturers' specifications.

This method is used by Intel and is considered BACT for GHGs.

In addition, GHG emissions from RICE (emergency generators and fire pumps) can be reduced by limiting the operation of the RICE (emergency generators and fire pumps) as much as possible consistent with the manufacturer's maintenance requirements.

82.h. FLUORIDES – RICE

The RICE (emergency generators and fire pumps) are not a source of Fluorides emissions. Therefore, a Fluorides BACT analysis is not required.

82.i. BACT conclusion - RICE

82.i.i. Although DEQ disagrees with Intel's cost analysis for Tier 4 generator sets, DEQ's revised analysis still results in eliminating Tier 4 as BACT. Further, DEQ agrees with Intel's conclusions that SCR, CDPFs and DOCs are also eliminated as BACT, and therefore has determined that Tier 2 engines are BACT.

Summary Of BACT

NOTE: 3/29/2024 There is significant additional discussion of BACT in the Review Report/Hearing Officer Report following public notice. No BACT determinations were changed.

83. The following tables summarize the BACT determinations that apply to each Emissions Unit category. BACT does not apply to all EUs in a category nor to all pollutants emitted by the EUs in a category. See the Detail Sheets for which EUs and pollutants are subject to BACT.

Tables are copied from the permit application submitted to DEQ on: 7/07/2023, Appendix C BACT Analysis Report

Table 4-15 Summary of Proposed BACT for Boilers (>2.0 MMBtu/hr)

EU Boiler Tag ID	Year Installed	NOx BACT	CO BACT	VOC BACT	PM/PM_{10} BACT	PM2.5 BACT	CO_2 (GHG) BACT
F20-BLR115-5-200	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RA4-BLR117-3-30	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RA4-BLR117-4-30	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
BLR-115-6-210	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RP1-BLR115-1-210	2016	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RP1-BLR115-4-210	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
CUB4-BLR115-7-10	New Addition	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RAC5-BLR115-1	2021	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RAC5-BLR115-2	2022	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RAC5-BLR115-3	2021	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RAC5-BLR115-4	2022	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RAC5-BLR115-5	2022	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RAC5-BLR115-6	2022	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RAC5-BLR115-7	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RAC5-BLR115-8	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
N2-BLR117-1A-30	2021	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
N2-BLR117-1B-30	2021	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
F20-BLR115-4-200	2013	-	-	GCP	GCP	GCP	DOEE
CUB2-BLR115-5-210	2012	-	-	GCP	GCP	GCP	DOEE
CUB2-BLR115-6-210	2015	-	-	GCP	GCP	GCP	DOEE
CUB4-BLR115-1-10	2013	-	-	GCP	GCP	GCP	DOEE
CUB4-BLR115-2-10	2013	-	-	GCP	GCP	GCP	DOEE

Table continued on next page…

GCP = Good Combustion Practices

DOEE = Design and Operational Energy Efficiency

Table continued from previous page…

EU Boiler Tag ID	Year Installed	NOx BACT	CO BACT	VOC BACT	PM/PM_{10} BACT	$PM_{2.5}$ BACT	CO_2 (GHG) BACT
CUB4-BLR115-3-10	2013	-	-	GCP	GCP	GCP	DOEE
CUB4-BLR115-4-10	2013	-	-	GCP	GCP	GCP	DOEE
CUB4-BLR115-5-10	2011	-	-	GCP	GCP	GCP	DOEE
CUB4-BLR115-6-10	2011	-	-	GCP	GCP	GCP	DOEE
F15-BLR28-1-2	2014	-	-	GCP	GCP	GCP	DOEE
F15-BLR28-1-3	2014	-	-	GCP	GCP	GCP	DOEE
F15-BLR28-1-1	2014	-	-	GCP	GCP	-	DOEE
BLR-115-4-210	2008	-	-	GCP	GCP	-	-
BLR-115-5-210	2009	-	-	GCP	GCP	-	-
RP1-BLR115-2-210	2003	-	-	GCP	GCP	-	-
RP1-BLR115-3-210	2003	-	-	GCP	GCP	-	-
RA2-BLR115-1-300	1998	-	-	GCP	GCP	-	-
RA2-BLR115-2-300	1998	-	-	GCP	GCP	-	-
F20-BLR115-1-200*	1995	0.011 lb/MMBtu	-	GCP	GCP	-	-
F20-BLR115-2-200*	1995	0.011 lb/MMBtu	-	GCP	GCP	-	-
F20-BLR115-3-200*	1995	0.011 lb/MMBtu	-	GCP	GCP	-	-
CUB2-BLR115-1-210*	1998	0.011 lb/MMBtu	-	GCP	GCP	-	-
CUB2-BLR115-2-210*	1998	0.011 lb/MMBtu	-	GCP	GCP	-	-
CUB2-BLR115-3-210*	1998	0.011 lb/MMBtu	-	GCP	GCP	-	-
CUB2-BLR115-4-210*	2000	0.011 lb/MMBtu	-	GCP	GCP	-	-
BLR-115-1-210*	2001	0.011 lb/MMBtu	-	GCP	GCP	-	-
BLR-115-2-210*	2001	0.011 lb/MMBtu	-	GCP	GCP	-	-
BLR-115-3-210*	2001	0.011 lb/MMBtu	-	GCP	GCP	-	-

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.
GCP = Good Combustion Practices
DOEE = Design and Operational Energy Efficiency
**Boilers that have pre-project BACT limits for NOx but are not subject to current BACT analysis.*
“ - “ Indicates selected boiler does not meet BACT applicability for the specific pollutant

Table 4-16 Summary of Proposed BACT for Boilers (≤2.0 MMBtu/hr)

EU Boiler Tag ID	Year Installed	NOx BACT	CO BACT	VOC BACT	PM/PM_{10} BACT	$PM_{2.5}$ BACT	CO_2 (GHG) BACT
RS4-BLR115-1	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RS4-BLR115-2	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RS4-BLR115-3	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RS6-BLR115-1	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RS6-BLR115-2	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RS6-BLR115-3	Planned	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RA4-BLR117-1-30	2021	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
F15-HW35-3	2016	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
F15-HW35-4	2016	0.011 lb/MMBtu	0.037 lb/MMBtu	GCP	GCP	GCP	DOEE
RA4-BLR152-2-30	2014	-	-	GCP	GCP	GCP	DOEE
RA4-BLR152-1-30	2014	-	-	GCP	GCP	GCP	DOEE
RA4-BLR117-2-30	2014	-	-	GCP	GCP	GCP	DOEE
RA1-MECH-B01	2010	-	-	GCP	GCP	-	DOEE
RA1-MECH-B02	1995	-	-	GCP	GCP	-	-

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.

GCP = Good Combustion Practices

DOEE = Design and Operational Energy Efficiency

- “ Indicates selected boiler does not meet BACT applicability for the specific pollutant

Table 5-4 Summary of Proposed BACT for Heaters

Heater Equipment Tag		
HER3_01	HELT4_06	HER3_02
HELT4_07	HER3_03	HELT4_08
HER3_04	HELT4_09	HER3_05
HELT4_10	HER3_06	HELT4_11
HER3_07	HELT4_12	HER3_08
HELT4_13	HERS4_01	HELT4_14
HERS2_15	HERS4_02	HELT4_15
HERS2_16	HERS4_03	HELT4_16
HERA1_01	HERS4_04	HELT4_17
HERA1_02	HERS4_05	HELT4_18
HEC4_01	HERS4_06	HELT4_19
HEPB1_01	HERS4_07	HELT4_20
HEC5_01	HERS4_08	HELT4_21
HERA5_01	HERS4_09	HELT4_22
HERA5_02	HERS4_10	HELT4_23
HERA5_03	HERS4_11	HELT4_24
HERA6_01	HERS4_12	HEAL_01
HERA6_02	HERS5_01	HEAL_02

Pollutant	Selected BACT
PM/PM10	Good Combustion Practices
$PM_{2.5}$	Good Combustion Practices
CO	Good Combustion Practices
VOC	Good Combustion Practices
NOx	Good Combustion Practices
CO_2 (GHG)	Design and Operational Energy Efficiency

HERA6_03 HEPB1_02 HEC5_02 HEMA_01 HEAL_07 HEAL_08 HELT4_01 HELT4_02 HELT4_03 HELT4_04 HELT4_05 HERS6_04 HERS2_09 HERS6_07 HERS2_12 HERS6_10 HERS5_02 HERS5_03 HERS5_04 HERS5_05 HERS5_06 HERS5_07 HERS5_08 HERS5_09 HERS6_01 HERS6_02 HERS6_03 HERS2_08 HERS6_06 HERS2_11 HERS6_09 HERS2_14 HEAL_03 HEAL_04 HEAL_05 HEAL_06 HERS2_01 HERS2_02 HERS2_03 HERS2_04 HERS2_05 HERS2_06 HERS2_07 HERS6_05 HERS2_10 HERS6_08 HERS2_13 HERS6_11		

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.

<u>NOTE</u>: <u>3/29/2024</u> <u>This table revised to add PM following public notice</u>.

Table 6-17 Summary of Proposed NOx and CO BACT for RCTOs (APCD)

RCTO (APCD) Group Set	Selected NOx BACT	Selected CO BACT
D1B-VOC-138-4-120 D1B-VOC-138-5-120	0.78 lb-NOx/hr	0.54 lb-CO/hr
F20-VOC138-1-100* F20-VOC138-2-100* F20-VOC138-3-100	0.2 lb-NOx/hr	0.14 lb-CO/hr
F15-VOC-138-3-10 F15-VOC-138-4-10 F15-VOC-138-5-10	0.2 lb-NOx/hr	0.14 lb-CO/hr
D1C-VOC-138-1-120* D1C-VOC-138-2-120* D1C-VOC-138-3-120*	0.2 lb-NOx/hr	1.51 lb-CO/hr
VOC-138-1-120* VOC-138-2-120* VOC-138-3-120* VOC-138-4-120*	0.2 lb-NOx/hr	1.12 lb-CO/hr
VOC-138-5-120 VOC-138-6-120	0.78 lb-NOx/hr	0.54 lb-CO/hr
F15-VOC-138-1-10* F15-VOC-138-2-10*	0.2 lb-NOx/hr	1.86 lb-CO/hr
D1XM1-VOC138-1-20 D1XM1-VOC138-2-20 D1XM1-VOC138-3-20 D1XM1-VOC138-4-20	0.34 lb-NOx/hr	0.24 lb-CO/hr

D1XM1-VOC138-5-20 D1XM1-VOC138-6-20 D1XM1-VOC138-7-20 D1XM1-VOC138-8-20 D1XM2-VOC138-1-20 D1XM2-VOC138-2-20 D1XM2-VOC138-3-20 D1XM2-VOC138-4-20 D1XM2-VOC138-5-20 D1XM3-VOC138-1-20 D1XM3-VOC138-2-20 D1XM3-VOC138-3-20 D1XM3-VOC138-4-20 D1XM3-VOC138-5-20	0.78 lb-NOx/hr	0.54 lb-CO/hr

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.

Notes: Each emissions limit is averaged over the set of RCTOs (APCD).

**RCTOs (APCD) that have pre-project BACT limits for NOx and CO but are not subject to current BACT analysis.*

Table 6-18 Summary of Proposed PM_{10}, $PM_{2.5}$, VOC, GHG and Fluorides BACT for RCTOs (APCD)

RCTO (APCD) Equipment Tag	Pollutant	Selected BACT
D1B-VOC-138-4-120 D1B-VOC-138-5-120 F20-VOC138-1-100 F20-VOC138-2-100 F20-VOC138-3-100 F20-VOC138-4-100 D1C-VOC-138-1-120 D1C-VOC-138-2-120 D1C-VOC-138-3-120 VOC-138-1-120 VOC-138-2-120 VOC-138-3-120 VOC-138-4-120 F15-VOC-138-1-10 F15-VOC-138-2-10 F15-VOC-138-3-10 F15-VOC-138-4-10 F15-VOC-138-5-10 D1XM1-VOC138-1-20 D1XM1-VOC138-2-20 D1XM1-VOC138-3-20 D1XM1-VOC138-4-20 D1XM2-VOC138-1-20 D1XM2-VOC138-2-20 D1XM2-VOC138-3-20 D1XM2-VOC138-4-20 D1XM2-VOC138-5-20 D1XM1-VOC138-5-20 D1XM1-VOC138-6-20	PM/PM_{10}	Good Combustion Practices
	$PM_{2.5}$	Good Combustion Practices
	Fluorides	Maintain good work practices in operation of the Fab Plants for BACT including maintaining the RCTO (APCD) per best management practices
	VOC	Each RCTO (APCD) group set controlling VOC emissions from Fab production operations must be operated in a manner such that it achieves a minimum VOC destruction/removal efficiency (DRE) of at least 95% by weight when its inlet VOC concentration (measured as propane) is 90 ppm or greater. If and when the inlet VOC concentration falls below 90 ppm, the outlet concentration must not exceed 10 ppm.

D1XM1-VOC138-7-20 D1XM1-VOC138-8-20 D1XM3-VOC138-1-20 D1XM3-VOC138-2-20 D1XM3-VOC138-3-20 D1XM3-VOC138-4-20 D1XM3-VOC138-5-20	GHG	Design and operational energy efficiency

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.

Notes: Each emissions limit is averaged over the set of RCTOs (APCD).

Table 7-9 Summary of Proposed BACT for TMXWs

TMXW Equipment Tag	Pollutant	Selected BACT
CUB3-OX293-0-70 PUB1A-OX293-0-70 PUB1B-OX293-0-70 PUB1C-OX293-0-70 PUB1D-OX293-0-70 PUB1E-OX293-0-70 PUB1F-OX293-0-70 CUB2-OX293-0-70	PM/PM_{10}	Good Combustion Practices
	$PM_{2.5}$	Good Combustion Practices
	CO	0.03 lb/MMBtu
	VOC	Good Combustion Practices
	NOx	0.34 lb/hr
	GHG	Design and Operational Energy Efficiency
CUB3-OX293B-0-70 *	NOx	0.34 lb/hr

** This unit does not utilize natural gas (electric burner); it is subject to NOx BACT but not PM, PM_{10}, $PM_{2.5}$, CO, VOC, or GHG BACT*

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.

Table 8-24 Summary of Proposed BACT for EXAM (APCD) Wet Scrubbers

EXAM (APCD) Wet Scrubber Equipment Tag	Pollutant	Selected BACT
D1C-SC142-3-100 D1XM3-SC142-4-00 D1C-SC142-4-100 D1XM4-SC142-1-00 D1C-SC142-5-100 D1XM4-SC142-2-00 RB1-SC-142-1-100 RB1-SC-142-2-100 RB1-SC-142-3-100 RP1-SC142-1-100 SC-142-1-100 SC-142-2-100 SC-142-3-100 SC-142-4-100 SC-142-5-100	CO	Maintain good work practices in operation of the Fab Plants for BACT including maintaining the wet scrubbers per best management practices
	NOx	
	Fluorides	
	$PM/PM_{2.5}$	
	PM_{10}	
	VOC	

SC142-21-100 SC142-22-100 SC142-23-100 SC142-24-100 SC142-25-100 D1X-SC142-1-11 D1X-SC142-2-11 D1X-SC142-3-11 D1X-SC142-4-11 D1X-SC142-5-00 D1XM2-SC142-1-00 D1XM2-SC142-2-00 D1XM2-SC142-3-00 D1XM2-SC142-4-00 D1XM3-SC142-1-00 D1XM3-SC142-2-00 D1XM3-SC142-3-00	GHG	Use of NF3 cleans and process chemical use optimization

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.

83.a. Summary of BACT for EXSC (APCD) Wet Scrubbers

Table 8-24 Summary of Proposed BACT for EXSC (APCD) Wet Scrubbers

EXSC (APCD) Wet Scrubber Equipment Tag		Pollutant	Selected BACT
D1X-SC133-1-00 F20-SC133-1-111 F20-SC133-2-111 F20-SC133-3-111 D1A-SC133-1-00 D1A-SC133-2-00 D1C-SC133-1-100 D1C-SC133-2-100 D1C-SC133-3-100 D1C-SC133-4-100 RB1-SC-133-1-100 RB1-SC-133-2-100 RB1-SC-133-8-100 RB1-SC-133-4-100 RB1-SC-133-6-100 RB1-SC-133-7-100 RA4-SC133-1 RA4-SC133-2 RP1-SC133-1-100 RP1-SC133-2-100 RP1-SC133-3-100 SC-133-1-100 SC-133-2-100 SC-133-3-100 SC-133-4-100 SC-133-5-100 SC-133-6-100	D1X-SC133-2-00 D1X-SC133-3-00 D1X-SC133-4-00 D1X-SC133-5-00 D1XM2-SC133-2-00 D1XM2-SC133-3-00 D1XM2-SC133-4-00 D1XM2-SC133-5-00 D1XM3-SC133-1-00 D1XM3-SC133-2-00 D1XM3-SC133-3-00 D1XM3-SC133-4-00 D1XM3-SC133-5-00 D1XM4-SC133-1-00 D1XM4-SC133-2-00 D1XM4-SC133-3-00 MSB-SC133-1 MSB-SC133-2 MSB-SC133-3 F15-SC7-1-1 F15-SC7-1-2 F15-SC7-1-3 F15-SC7-1-4 F15-SC7-1-5 F15-SC7-1-6	CO NOx Fluorides PM/PM_{10} $PM_{2.5}$ VOC	Maintain good work practices in operation of the Fab Plants for BACT including maintaining the wet scrubbers per best management practices
		GHG	Use of NF3 cleans and process chemical use optimization

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.

Table 8-24 Summary of Proposed BACT for PSSS Wet Scrubbers

PSSS Wet Scrubber ID Tag	PM_{10}	PM/ $PM_{2.5}$
F20-SC-134-1-100		--
D1C-SC134-1-100		--
D1C-SC134-2-100		--
SC-134-1-100		--
SC-134-2-100		--
SC-134-3-100		--
D1C-SC133-1-200		--
RP1-SC134-1-100		--
SC-133-1-200		--
D1X-SC134-1-00		
D1X-SC134-2-00		
D1X-SC134-3-00		
D1X-SC134-4-00	Maintain good work practices in operation of the Fab Plants for BACT including maintaining the wet scrubbers per best management practices	
D1XM2-SC134-1-00		
D1XM2-SC134-2-00		
D1XM2-SC134-3-00		Maintain good work practices in operation of the Fab Plants for BACT including maintaining the wet scrubbers per best management practices
D1XM2-SC134-4-00		
D1XM3-SC134-1-00		
D1XM3-SC134-2-00		
D1XM3-SC134-3-00		
D1XM3-SC134-4-00		
D1XM4-SC134-1-00		
D1XM4-SC134-2-00		
PUB1-SC133-1-00		
PUB1-SC133-2-00		
F15-SC7-1-12		--
F15-SC7-1-7		--
F15-SC7-2-7		"

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.
(--) Indicates selected boiler does not meet BACT applicability for the specific pollutant
(“) Indicates “ditto”

Table 9-9 Summary of Proposed BACT for Existing Diesel-Fired Emergency Generators[11] Installed Before 2010

RICE Equipment Tag	Pollutant	BACT
RA1-ELEC-CPS-GEN01 RA1-ELEC-CPS-GEN02 RA1-ELEC-CPS-GEN03 RA1-ELEC-CPS-GEN04 D1C-CPS-GEN01 D1C-CPS-GEN02 D1C-CPS-GEN03 D1C-EPS-GEN01 D1C-EPS-GEN02 RB1-EPS-GEN01 RP1-EPS-GEN01 EPS-GEN01 EPS-GEN02 EPS-GEN03 EPS-GEN04 EPS-GEN05 RS4-ELEC-EG-4-1 RS6-ELEC-EG-6 F15-EG01 F15-EG02 F15-EG03 EPS-GEN06 F15.5-GEN01 F15.5-GEN02	PM/PM10	Operation Per Manufacturer Specifications
	PM2.5	Operation Per Manufacturer Specifications
	CO	Operation Per Manufacturer Specifications
	VOC	Operation Per Manufacturer Specifications
	NOx	Operation Per Manufacturer Specifications
	CO2 (GHG)	Design and Operational Design Efficiency

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.

[11] Diesel-Fired Emergency Generators consist of diesel engines (RICE) that drive an electrical generator. The BACT review is for the RICE.

Table 9-10 Summary of Proposed BACT for Existing, Planned and New Additional Diesel-Fired Emergency Generators Installed In or After 2010

<table>
<tr><th colspan="2">RICE Equipment Tag</th><th>Pollutant</th><th>Selected BACT</th></tr>
<tr><td rowspan="6">RP1-GEN-2
D1D-GEN-7
RS6-GEN-2
D1X-GEN-1A
D1X-GEN-1B
D1X-GEN-1C
D1X-GEN-2A
D1X-GEN-2B
D1X-GEN-2C
D1X-GEN-3A
D1X-GEN-3B
D1X-GEN-3C
D1X-GEN-4A
D1X-GEN-4B
D1X-GEN-4C
D1X-GEN-5A
D1X-GEN-5B
D1X-GEN-5C
D1X-GEN-6A
D1X-GEN-6B
D1X-GEN-6C
D1X-GEN-7A
D1X-GEN-7B
D1X-GEN-7C</td><td rowspan="6">D1X2-GEN-6A
D1X2-GEN-6B
D1X2-GEN-6C
D1X2-GEN-7A
D1X2-GEN-7B
D1X2-GEN-7C
D1X2-GEN-1A
D1X2-GEN-1B
D1X2-GEN-1C
D1X2-GEN-2A
D1X2-GEN-2B
D1X2-GEN-2C
D1X2-GEN-3A
D1X2-GEN-3B
D1X2-GEN-3C
D1X2-GEN-4A
D1X2-GEN-4B
D1X2-GEN-4C
D1X2-GEN-5A
D1X2-GEN-5B
D1X2-GEN-5C
F20-EPS-1
F20-EPS-2
N2-GEN-1A
IWW-GEN-1
IWW-GEN-2
IWW-PS-1 H2-GEN-1
D1A-GEN-1
D1A-GEN-2
D1A-GEN-3
D1A-GEN-4
D1A-GEN-5
D1A-GEN-6
D1A-GEN-7
D1A-GEN-8</td><td>PM/PM_{10}</td><td>Operation Per Manufacturer Specifications</td></tr>
<tr><td>$PM_{2.5}$</td><td>Operation Per Manufacturer Specifications</td></tr>
<tr><td>CO</td><td>3.25 g/hp-hr</td></tr>
<tr><td>VOC</td><td>Operation Per Manufacturer Specifications</td></tr>
<tr><td>NOx</td><td>6.0 g/hp-hr</td></tr>
<tr><td>CO_2 (GHG)</td><td>Design and Operational Energy Efficiency</td></tr>
</table>

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.

Table 10-1 Summary of Proposed BACT for Fire Pump Engines

RICE Equipment Tag	Pollutant	Emissions Limits
PH #1 PH #2 PH #3 PH #4	PM/PM_{10}	Operation Per Manufacturer Specifications
	$PM_{2.5}$	Operation Per Manufacturer Specifications
	CO	3.25 g/hp-hr
	VOC	Operation Per Manufacturer Specifications
	NOx	6.0 g/hp-hr
	CO_2 (GHG)	Design and Operational Energy Efficiency

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.

Table 11-1 Summary of Proposed BACT for Cooling Towers

Equipment ID			Pollutant	Proposed BACT
AC4-CT114-1	CT-114-1-210	F20-CT114-1-210 F20-	PM/PM$_{10}$ and PM$_{2.5}$	Drift elimination with drift rate specification and TDS control per manufacturer specifications.
RAC4-CT114-2	CT-114-2-210	CT114-2-210 F20-		
RAC4-CT114-3	CT-114-3-210	CT114-3-210 F20-		
RAC4-CT114-4	CT-114-4-210	CT114-4-210 F20-		
RAC4-CT114-5	CT-114-5-210	CT114-5-210 F20-		
RAC4-CT114-6	CUB3-CT114-21-10	CT114-6-210 F20-		
RAC4-CT114-7	CUB3-CT114-22-10	CT114-7-210 F20-		
RAC4-CT114-8	CUB3-CT114-23-10	CT114-8-210 F20-		
RAC4-CT114-9	CUB3-CT114-24-10	CT114-9-210 F20-		
RAC4-CT114-10	CUB3-CT114-25-10	CT114-10-210 F20-		
RAC4-CT114-11	CUB3-CT114-26-10	CT114-11-210		
RAC4-CT114-12	RP1-CT114-1-200	N2-CT114-1		
RAC4-CT114-13	RP1-CT114-2-200	N2-CT114-2		
RAC4-CT114-14	RP1-CT114-3-00	N2-CT114-3		
RAC4-CT114-15	RA4-CT113-1-10	RACB3-CT-114-1-35		
RAC4-CT114-16	RA4-CT113-2-10	RACB3-CT-114-2-35		
RAC4-CT114-17	RA4-CT113-3-10	RACB3-CT-114-3-35		
RAC4-CT114-18	RA4-CT113-4-10	RAWTR1-CH918-1-11		
RAC4-CT114-19	RA4-CT113-5-10	RAWTR1-CH918-2-11		
RAC4-CT114-20	RA4-CT113-6-10	RAWTR1-CH918-3-11		
RAC5-CT115-1	RA5-CT114-1	RAWTR1-CH918-4-11		
RAC5-CT115-2	RA6-CT114-1	RAWTR1-CH918-5-11		
RAC5-CT115-3	CUB2-CT114-1-210	RAWTR1-CH918-6-11		
RAC5-CT115-4	CUB2-CT114-2-210	RAWTR1-CH918-7-11		
RAC5-CT115-5	CUB2-CT114-3-210	RAWTR1-CH918-8-11		
RAC5-CT115-6	CUB2-CT114-4-210	RAWTR1-CH918-9-11		
RAC5-CT115-7	CUB2-CT114-5-210	RAWTR1-CH918-10-11		
RAC5-CT115-8	CUB2-CT114-6-210	RAWTR1-CH918-11-11		
RAC5-CT115-9	CUB2-CT114-7-210	RAWTR1-CH918-12-11		
RAC5-CT115-10	CUB2-CT114-8-210	AL4-CHW-CT2		
RAC5-CT115-11	CUB2-CT114-9-210	AL4-CHW-CT3		
RAC5-CT115-12	CUB2-CT114-10-210	F15-CT29-1-1		
RAC5-CT115-13	CUB2-CT114-11-10	F15-CT29-1-2		
RAC5-CT115-14	CUB2-CT114-12-10	F15-CT29-1-3		
RAC5-CT115-15	CUB2-CT114-13-10	F15-CT29-1-4		
RAC5-CT115-16	CUB2-CT114-14-10	F15-CT29-1-5		
RAC5-CT115-17		F15-CT29-1-6-1		

Notes: Details about each piece of equipment are listed in the PSEL Detail Sheets and identified by the Equipment Tag.

Table 12-1 Summary of Proposed BACT for Paved Roads and Parking Lots

Unit	Pollutant	Selected BACT
Paved Roads and Parking Lots	PM/PM$_{10}$ and PM$_{2.5}$	Good housekeeping practices to include limiting vehicle speeds and sweeping as needed

Table 13-7 Summary of Proposed BACT for Isopropyl Alcohol Usage, General Ventilation

Unit	Pollutant	Selected BACT
VOC-from IPA usage	VOC	VOC emissions from the General Ventilation Systems stemming from IPA usage shall be controlled through good operating practices.

AIR QUALITY ANALYSIS (AIR QUALITY MODELING)

84. Under OAR 340-224-0070(3)(a), sources subject to Prevention of Significant Deterioration (PSD) requirements must perform an air quality analysis for all pollutants subject to PSD. Intel is subject to PSD for PM, PM10, PM2.5 and NOx. The air quality analysis is performed by computer modeling of the source's impacts. The modeling must comply with the requirements of OAR 340-225-0050 and -0060 and must be reviewed and approved by DEQ.

85. Under OAR 340-224-0060, sources subject to Major NSR and located in a Maintenance Area must perform an air quality analysis for all Maintenance Pollutants subject to Major NSR. Intel is subject to Major NSR for CO and NOx and VOC as ozone precursors. The air quality analysis is performed by computer modeling of the source's impacts. The modeling must comply with the requirements of OAR 340-225-0050 and -0060 and must be reviewed and approved by DEQ.

86. There are no National Ambient Air Quality Standards (NAAQS) or PSD increments for Fluorides, and modeling is not required under the rules when there are no standards.
    86.a. Therefore, for the Fluorides emission increase an air quality analysis is not required for this permit application (received 7/7/2023).
    86.b. However, Intel did perform air quality impact modeling for Fluorides and HF in or about 2016. Fluorides and HF are further discussed in paragraphs 90through 92.

87. Air quality impacts were modeled for PM_{10}, $PM_{2.5}$, NOx, SO_2 (as a $PM_{2.5}$ precursor) and ozone, and were submitted with application 034907 (received 7/7/2023). Modeling includes general background ambient air quality levels and specific nearby emissions sources such as data centers.

88. DEQ reviewed the modeling and found that it complied with the requirements of OAR 340-225-0050 and -0060. DEQ's review of the modeling is presented in the Modeling Review of Intel Expansion Project memo, which is attached to this report as Appendix 4.

88.a. Section 8 of the Modeling Review of Intel Expansion Project memorandum (Appendix 4) includes the following statements:

"The review of the air quality analysis of the Intel expansion project, using the emission rates, stack parameters, and unit locations provided in the analysis and as described above, shows that impacts from Intel are in compliance with the applicable air quality standards."

"The air quality analysis as submitted demonstrates that the facility will not have adverse impacts from the Criteria Pollutants and is approved."

88.b. The modeling results summaries from the **Modeling Review of Intel Expansion Project Memorandum** (**Appendix 4**) are presented below:

Intel Expansion Project **NAAQS Analysis** Modeling Results Total: Intel + Competing Source + Background							
Pollutant	Averaging Period	1-hr NO2 Modeling	Modeled Conc. ug/m3	Background ug/m3	Secondary PM2.5 ug/m3	Total ug/m3	NAAQS ug/m3
NO2	1-hr 5-yr Avg of 98th%	EPA Method	162.6	in model		162.6	188
	1-hr 5-yr Avg of 98th%	Monte Carlo	163	in model		163	188
	Annual Max		17.1	35.6		52.7	100
PM10	24-hour H6H		9.1	39		48.1	150
PM2.5	24-hr 5-yr Avg of 98th%		6.01	20.7	0.19	27.1	35
	5-yr Avg of Ann Conc's		2.49	6.6	0.01	9.1	12
SO2	1-hr 5-yr Avg of 99th%		40	7		47	196
	24-hr Avg		20.1	4.7		24.8	1,300
	Annual Max		4.9	1.1		6	80
	Averaging Period		MERPs Conc. ppb	Background ppb		Total ppb	NAAQS ppb
O3	3-yr avg H4H 24-hr Max 8-hr		1.9	61.3		63.2	70

Intel Expansion Project **PSD Class II Increment** Modeling Results Total: Intel + Competing Sources					
Pollutant	Avg. Period	Modeled Conc. ug/m3	Secondary PM2.5 ug/m3	Total ug/m3	Increment ug/m3
NO2	Annual	17.1		17.1	25
PM10	24-hr H2H	9.8		9.8	30
	Annual	3.4		3.4	17
PM2.5	24-hr H2H	8.4	0.19	8.6	9
	Annual	2.7	0.01	2.7	4

FLUORIDES AND HF

89. For the current permit application (application 034907 received 7/7/2023), Intel has potential to emit (PTE) 8.9 tons per year of HF and 12.5 tons per year of Fluorides.

90. Modeling for Fluorides is not required as part of the permit application; however, Intel performed modeling for Fluorides and HF for the permit that was issued on 1/22/2016. At that time, the PTE for HF was 8.8 tons per year and the PTE for Fluorides was 6.4 tons per year.

2016 Modeled HF and Fluorides Concentrations

Pollutant	Emission Rate (tons/yr)	Averaging Period	Maximum Modeled Concentration (µg/m3)	Benchmark or Other Reference Level (µg/m3)	Reference(s) Used in 2016
HF	8.8	Annual	0.50	14	Oregon Ambient Benchmark Concentration (ABC)
Fluorides	6.4	Annual	0.38	6 to 27	Oregon does not have an ABC for Fluorides. Reference levels were found for the following states, and cover the range given: California, New Hampshire, Massachusetts and Texas.

91. From the table above, the maximum modeled concentrations were well below the Benchmark or other Reference Levels, and even if the maximum concentrations were two or three times higher at this time, they would still be well below the Benchmark or other Reference Levels.

92. Since issuance of the 1/22/2016 permit, DEQ has adopted an industrial air toxics permitting program known as Cleaner Air Oregon (CAO). It is expected that the CAO program will begin evaluating Intel's air toxics emissions in late 2024. CAO does health-based risk assessments for facilities with air quality permits. When it started, Cleaner Air Oregon prioritized existing facilities, like Intel, into groups based on level of risk and all new facilities must go through a Cleaner Air Oregon assessment before they can get a permit.
    - 92.a. Based on DEQ's initial analysis under Cleaner Air Oregon, Intel is in the second group of existing facilities that will be "called in" for Cleaner Air Oregon analysis.
    - 92.b. HF and Fluorides will be included in the analysis that will be conducted for the Cleaner Air Oregon program.
    - 92.c. DEQ will not further evaluate Intel's HF and Fluorides impacts at this time but will instead wait for the CAO evaluation.

Ambient monitoring for NO2

93. Because the modeling results are close to the 1-hour National Ambient Air Quality Standard for NO2, DEQ has determined that Intel must perform ambient air quality monitoring for NOx. DEQ has the authority to require this under OAR 340-224-0070(1)(b).

    - 93.a. Monitoring must be for hourly NO2 concentrations at or near the fence line of the Ronler Acres campus, at a location representative of that which the modeling shows to be the location of greatest impact from the permittee's NO2 emissions.

    - 93.b. Monitoring must be done for a minimum of five years, beginning not later than April 1, 2026, and must be done in accordance with DEQ's requirements. Intel must submit a monitoring plan to DEQ for approval.

    - 93.c. Monitoring data must be made available to the public and updated on a reasonable frequency.

Net Air Quality Benefit

94. OAR 340-224-0060(2) requires that a source located within a designated maintenance area and is subject to Major NSR for the maintenance pollutant must satisfy the requirements for Net Air Quality Benefit. In an ozone or carbon monoxide maintenance area, these requirements can be met by obtaining an allocation from a Growth Allowance, if available.

Growth Allowances for CO, VOC and NOx

94.a. OAR 340-224-0060(2) requires that new or modified sources located within a CO Maintenance Area must obtain offsets for CO. Intel is located in a CO Maintenance Area and must obtain offsets for CO.

94.a.i. OAR 340-224-0520(5) states that in lieu of obtaining offsets, the owner or operator may obtain an allocation from a growth allowance, if available.
94.a.ii. The allocation must be obtained at the rate of 1:1 from a growth allowance; that is, one ton from a growth allowance offsets one ton of emissions.
94.a.iii. A Growth Allowance is available for CO and DEQ proposes to grant the requested allowance.

94.b. OAR 340-224-0520 and -0520(1) require that new or modified sources located within an ozone designated area obtain offsets for ozone precursors (VOC and NOx). Intel is located in an area designated as Maintenance for ozone, and therefore must obtain offsets for VOC and NOx.

94.b.i. OAR 340-224-0520(5) states that in lieu of obtaining offsets, the owner or operator may obtain an allocation from a growth allowance, if available.
94.b.ii. The allocation must be obtained at the rate of 1:1 from a growth allowance; that is, one ton from a growth allowance offsets one ton of emissions.
94.b.iii. Growth allowances are available for both VOC and NOx and DEQ proposes to grant the requested allowances.

Pollutant	Area Designation	Offset Ratio	Requested Emission Increase Over the previous PSEL	Required Offsets	Allocation from the Growth Allowance
CO	Maintenance for CO	1 to 1	369 tons per year	369 tons per year	369 tons per year
VOC as an ozone precursor	Maintenance for Ozone	1.0 to 1	173 tons per year	173 tons per year	173 tons per year
NOx as an ozone precursor	Maintenance for Ozone	1.0 to 1	216 tons per year	216 tons per year	216 tons per year

HAZARDOUS AIR POLLUTANTS

95. The potential to emit (PTE) Hazardous Air Pollutants (HAPs) from this facility are estimated to be 9 tons per year of any single HAP and 18 tons per year of all combined HAPs. The highest single HAP is hydrogen fluoride (HF) at 8.9 tons per year.

95.a. A source that has PTE less than 10 tons per year of any single HAP and 25 tons per year of all combined HAPs is classified as a minor source of HAPs.
95.b. As a minor HAP source, Intel is not subject to major source NESHAPs including the NESHAP for Semiconductor Manufacturing, 40 CFR Part 63, Subpart BBBBB.
95.c. As a minor HAP source, Intel is subject to the following area source NESHAPs:
95.c.i. 40 CFR Part 63 Subpart ZZZZ—-National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (which requires compliance with New Source Performance Standard 40 CFR Part 60 Subpart IIII for certain RICE; and
95.c.ii. 40 CFR Part 63 Subpart WWWWWW—National Emission Standards for Hazardous Air Pollutants: Area Source Standards for Plating and Polishing Operations.
95.d. Permit conditions that implement 40 CFR Part 63 Subpart ZZZZ were added to Intel’s existing permit issued 1/22/2016.

95.e. Intel's existing permit (issued 1/22/2016) was modified in 2022 to add conditions that implement 40 CFR Part 63 Subpart WWWWWW.

NOTE: 3/29/2024 There is significant discussion in the Response to Comments/Hearing Officer Report concerning HF emissions and Synthetic Minor for HAPs following public notice.

96. **The following table lists the HAPs that are expected to be emitted at the highest levels:**

Hazardous air pollutant	Potential to Emit, tpy
Hydrogen Fluoride	8.9
Hydrochloric Acid	7.7
Methanol	0.5
Acetonitrile	0.4
Phosphine	0.04
Carbonyl Sulfide	0.04
Chlorine	0.03

GENERAL BACKGROUND INFORMATION

97. Intel's sites currently operate under an ACDP issued on: January 22, 2016 (application no. 028014). The ACDP has an expiration date of: January 1, 2021, but has remained in effect pending issuance of a Title V permit.

97.a. The permit served two purposes:

97.a.i. The permit was a Major New Source Review (NSR) permit and authorized a major expansion of Intel's manufacturing operations. This permit may also be referred to as an NSR permit, a Major NSR permit, a Type 4 permit or a construction permit; and

97.a.ii. The permit renewed Intel's then-current ACDP issued on December 31, 2007.

Changes to Intel's permit since issuance of the current permit (issued 1/22/2016)

98. Since issuance of the current permit on Jan. 22, 2016, Intel has applied for three permit revisions, not counting the current permit application 034907 received on July 7, 2023. Intel has also submitted several Notices of Intent to Construct (NCs). The permit revisions and NCs are briefly described below, and the NCs are described in paragraph 99.

98.a. Application number 030867, received on 8/21/2019, requested that permit condition 45 in the 1/22/2016 permit be changed from limiting emergency generator testing hours from sunrise to sunset to 8am to 6pm. Condition 45 also set generator testing limit of 10 at any one time; Intel requested that this limit apply only to the Ronler Acres Campus. These changes were approved, and condition 45 in the 1/22/2016 permit has been renumbered; see EU-RICE in the permit table of contents.

98.b. Application number 033516, received on 3/7/2022, requested that conditions pertaining to NESHAP WWWWWW be added to the permit. In addition, DEQ incorporated Monitoring, Recordkeeping and Reporting requirements for existing Wet Electrostatic Precipitators (WESP (APCD)) at the Ronler Acres Campus that had been added under NC application numbers 030521, 030746 and 029045.

98.c. Application number 034188, received 8/3/2022, requested the changes described below. The requested permit modification has not been issued yet, and may be incorporated into the permit discussed in this review report (application 034907 received 7/7/2023).

98.c.i. Request to test a supplemental NOx abatement technology for up to seven RCTOs (APCD) on the Ronler Acres Campus.

98.c.ii. Request to remove restrictions on testing of emergency fire pumps on Air Advisory days. This change is required by the Hillsboro Fire Marshall's office.

99. In addition to the permit revisions described in paragraph 98, Intel submitted a number of Notices of Intent to Construct. A Notice of Intent to Construct is used to notify DEQ of changes to the facility that do not require changes to the permit, such as adding new emissions controls without requesting changes to permit limits. Other changes were approved as allowed under the permit. The changes are briefly summarized below:

99.a. Approval of NC 033155, issued June 23, 2021 and revised on Sept. 27, 2021, to install:
- 99.a.i. 2 new scrubbers;
- 99.a.ii. 1 new TMXW pilot unit for catalyst testing;
- 99.a.iii. replacement of 4 previously permitted Munters RCTOs (APCD) with 2 larger capacity Anguil RCTOs (APCD); and
- 99.a.iv. 9 new emergency generators (RICE).

100. On May 31, 2022, DEQ approved the use of Emergency Generator Variable Load Emission Factors. This approval has been carried forward into the proposed permit, application 034907. The Variable Load Emission Factors are shown in the Detail Sheets.

COMPLIANCE HISTORY

101. Intel was inspected in 2018; October 3, 2018 was a facility walk through site visit, and December 11, 2018 was a records review site visit. The inspection report is available in the permit file. Intel was found in compliance.

102. EPA National Enforcement Investigations Center (NEIC) conducted an unannounced on-site inspection in July 2023. NEIC had not released the inspection report as of the date this permit was placed on public notice.

103. Only one permit violation has occurred between issuance of the current permit (1/22/2016 and the date the public notice in paragraph 104 was issued (approximately mid-January, 2024). DEQ took enforcement action for this violation, as detailed below:

Violation

Loss of acid gas scrubber pH monitoring for 63 days; did not report promptly within 15 days of occurrence. Conditions 39, 40 and 72 were violated.

Enforcement Action

DEQ issued a Pre-Enforcement Notice number 2023-PEN-7978 on 1/17/2023.
DEQ issued a Notice of Civil Penalty Assessment and Order, Case No. AQ/ACDP-NWR-2023-039 on 7/11/2023 which included civil penalties of $30,816. Intel paid the penalty.

Resolution

In response to this event, Intel returned this scrubber to proper operation by placing the pH meter back in normal service and resuming caustic injection and have appropriately modified their Preventive Maintenance procedures to reduce the likelihood of future similar violations.

PUBLIC NOTICE

104. Pursuant to OAR 340-216-0066(4)(a)(C), issuance of major modifications subject to Major NSR to Standard Air Contaminant Discharge Permits require public notice in accordance with OAR 340-209-0030(3)(d), which requires DEQ to provide notice of the proposed permit action and a minimum of 40 days for interested persons to submit written comments. In addition, a public hearing must be scheduled to allow interested persons to submit oral or written comments. DEQ must provide a minimum of 30 days notice for the hearing.

Comment Period

This permit was on public notice from: January 10, 2024 until 5 p.m. on: Friday, March 1, 2024, but was extended for an additional week, so the notice period ended on: March 8, 2024 with over 38 pages of comments and letters received. Comments received were responded to in the final pages of this report. When the proposed permit's public notice period began in January of 2024, the notice included the following statement:

> "After the comment period closes, DEQ will consider all comments received. DEQ may modify provisions in the proposed permit based upon comments received if it is determined the proposed permit did not adequately address all applicable regulatory requirements. Ultimately, if the facility's permit meets all legal requirements, DEQ will issue the air quality permit".

Public Hearing

DEQ held a virtual (online) public hearing on February 15, 2024 to receive verbal comments. The hearing was from 6:00 to 8:30 p.m. A large number of comments were received, and responses to comments are available in the Response to Comments/Hearing Officer Report.

APPENDIX 1	**NETTING BASIS RESET PROVISIONS**	**Page 61**
APPENDIX 2	**RICE BACT APPLICABILITY**	**Page 63**
APPENDIX 3	**EMERGENCY RICE OPERATION HOURS, 2016 - 2023**	**Page 65**
APPENDIX 4	**AQ ANALYSIS RESULTS**	**Page 66**

EMISSIONS DETAIL SHEETS

See separate Emissions Details Spreadsheets (EDS).

APPENDIX 1 - NETTING BASIS RESET PROVISIONS

Regulated facilities (commonly called "sources") are allowed to increase emissions by a certain amount without having to go through a process called Major New Source Review (NSR), which, in general terms, involves performing BACT and air quality analysis. However, for increases at or above that certain amount, and if other conditions are met, the source must go through Major NSR and perform a BACT and air quality analysis. The "certain amount" referred to above is called the Significant Emission Rate (SER).

That much is relatively simple in concept, but a more complicated question is "what do we start counting from?" Under DEQ's rules, we start counting from the "Netting Basis". For new sources the Netting Basis is simple, it equals zero. For existing sources it's not so simple and takes into account a number of factors that include, for example: when did the facility begin operating and what were its emissions at that time; have new rules made the source reduce emissions; and has the source ever been through Major NSR?

This review report will not attempt to explain in detail how Netting Basis is calculated; for this discussion, it's only necessary to know the following:

- The Netting Basis is not the same as the PSEL and they are calculated differently. Although they are sometimes equal, one may also be higher than the other.
- When a source requests an emissions increase, DEQ counts the increase to the PSEL, but also counts the emissions increase from the Netting Basis. Since the PSEL and Netting Basis may be different, these two increases may also be different.
- An increase of an SER or more above the Netting Basis is one of the factors that determines if a source must go through Major NSR when it requests an emissions increase.

An example follows:

Assume a source has a NOx PSEL of 90 tons per year and wishes to increase that PSEL to 110 tons per year, a 20 ton per year increase to the *PSEL*.
The SER for NOx is 40 tons per year.
Assume that all other tests for triggering Major NSR have been met; the final test is to determine if the emissions increase is equal to or greater than the SER above the Netting Basis.

The table below shows 3 scenarios for different Netting Basis:

Scenario	Assume the Netting Basis is: (tons/yr)	Increase above the Netting Basis (equals the requested PSEL minus the Netting Basis) (tons/yr)	Is the increase above the Netting Basis equal to or greater than the SER (40 tpy)?	Does the source trigger Major New Source Review?
A	100	110 - 100 = 10	No	No
B	80	110 – 80 = 30	No	No
C	60	110 – 60 = 50	Yes	Yes

* All values in tons per year

In scenario C, a *20 ton per year* increase in the *PSEL* resulted in a *50 ton per year* increase over the *Netting Basis*, and Major New Source Review was triggered. This illustrates that the lower the Netting Basis is, the more likely a source is to trigger Major NSR when it increases its PSEL, even if the increase to the PSEL is less than the SER. From a regulatory viewpoint, for a source to trigger Major NSR is desirable because the source must then perform a BACT analysis and might have to install new or upgraded emissions controls. One way to increase the probability of a source triggering Major NSR is to have a rule that lowers a source's Netting Basis. That is the idea behind the "Netting Basis Reset" rules. It works like this:

A source that goes through Major NSR has both its PSEL and Netting Basis adjusted to the level approved by the Major NSR permit. Over the next ten years, the source's emissions are tracked. Assume, for that over that period the maximum emissions were only 85% of the PSEL. At the end of that ten-year period, the source's Netting Basis is reduced, or "reset" to 85% of the level approved by the Major NSR permit. This increases the probability that a future emissions increase will again trigger Major NSR.

If, however, the source goes through Major NSR a second time, then the Netting Basis is again adjusted up to the level approved by the second Major NSR permit, and the reset process is started over with a new reset to occur ten years after the second Major NSR permit was issued. In this case, calculating the first reset is unnecessary because:

- the Netting Basis adjustment from the second time through Major NSR overrides any decrease from the first reset; and
- the source triggered Major NSR anyway, which is what the reset rules are meant to increase the likelihood of.

In other words, if a source triggers Major NSR anyway because the emissions increase was large enough to trigger Major NSR without lowering the Netting Basis via the reset, then the reset provision does not affect the outcome and does not have to be calculated.

In this case, Intel has triggered Major NSR anyway because the requested emissions increases are large enough to trigger Major NSR without lowering the Netting Basis via the reset, and the reset provision does not affect the outcome and does not have to be calculated.

APPENDIX 2 – RICE BACT APPLICABILITY

The RICE BACT TABLE shows BACT applicability for RICE. The notes used in the table are explained below:

RB-16	This unit was identified as "pre-project" in the 1/22/2016 NSR/PSD permit and was subject to retroactive BACT in the 1/22/2016 NSR/PSD permit for NOx and CO. This unit was not subject to BACT for NOx and CO in the 7/7/2023 NSR/PSD permit because it was subject in the 1/22/2016 permit. Only NOx and CO were subject to BACT in the 1/22/2016 permit.
B-16	This unit was subject to BACT in the 1/22/2016 NSR/PSD permit for NOx and CO only. This unit was not subject to BACT for NOx and CO in the 7/7/2023 NSR/PSD permit because it was subject in the 1/22/2016 permit. Only NOx and CO were subject to BACT in the 1/22/2016 permit.
B-23	This unit was subject to BACT for the pollutants listed in this column in the 7/7/2023 NSR/PSD permit.
N-23	This unit was not subject to BACT for PM2.5 and GHG in the 7/7/2023 NSR/PSD permit because it was installed before PM2.5 and GHG became regulated pollutants.

RICE BACT TABLE (RICE are not a source of Fluorides so Fluorides BACT is not applicable.)

RICE Equipment Tag	Year Installed	NOx and CO BACT	VOC and PM/PM10 BACT	PM2.5 and GHG BACT
RA1-ELEC-CPS-GEN01	***1996***	RB-16	B-23	N-23
RA1-ELEC-CPS-GEN02	***1996***	RB-16	B-23	N-23
RA1-ELEC-CPS-GEN03	***1996***	RB-16	B-23	N-23
RA1-ELEC-CPS-GEN04	***1996***	RB-16	B-23	N-23
D1C-CPS-GEN01	***1998***	RB-16	B-23	N-23
D1C-CPS-GEN02	***1998***	RB-16	B-23	N-23
D1C-CPS-GEN03	***1998***	RB-16	B-23	N-23
D1C-EPS-GEN01	***1998***	RB-16	B-23	N-23
D1C-EPS-GEN02	***1998***	RB-16	B-23	N-23
RB1-EPS-GEN01	***1998***	RB-16	B-23	N-23
RP1-EPS-GEN01	***2000***	RB-16	B-23	N-23
RP1-GEN-2	Planned	B-23	B-23	B-23
EPS-GEN01	***2002***	RB-16	B-23	N-23
EPS-GEN02	***2002***	RB-16	B-23	N-23
EPS-GEN03	***2002***	RB-16	B-23	N-23
EPS-GEN04	***2002***	RB-16	B-23	N-23
EPS-GEN05	***2002***	RB-16	B-23	N-23
EPS-GEN06	***2002***	RB-16	B-23	N-23
D1D-GEN-7	Planned	B-23	B-23	B-23
RS4-ELEC-EG-4-1	***2005***	RB-16	B-23	N-23
RS6-ELEC-EG-6-1	***2005***	RB-16	B-23	N-23

RICE Equipment Tag	Year Installed	NOx and CO BACT	VOC and PM/PM10 BACT	PM2.5 and GHG BACT
RS6-GEN-2	Planned	B-23	B-23	B-23
D1X-GEN-1A	2012	B-16	B-23	B-23
D1X-GEN-1B	2013	B-16	B-23	B-23
D1X-GEN-1C	2012	B-16	B-23	B-23
D1X-GEN-2A	2012	B-16	B-23	B-23
D1X-GEN-2B	2012	B-16	B-23	B-23
D1X-GEN-2C	2012	B-16	B-23	B-23
D1X-GEN-3A	2013	B-16	B-23	B-23
D1X-GEN-3B	2012	B-16	B-23	B-23
D1X-GEN-3C	2013	B-16	B-23	B-23
D1X-GEN-4A	2013	B-16	B-23	B-23
D1X-GEN-4B	2013	B-16	B-23	B-23
D1X-GEN-4C	2017	B-23	B-23	B-23
D1X-GEN-5A	2017	B-23	B-23	B-23
D1X-GEN-5B	2017	B-23	B-23	B-23
D1X-GEN-5C	2013	B-16	B-23	B-23
D1X-GEN-6A	2018	B-23	B-23	B-23
D1X-GEN-6B	2018	B-23	B-23	B-23
D1X-GEN-6C	2018	B-23	B-23	B-23
D1X-GEN-7A	Planned	B-23	B-23	B-23
D1X-GEN-7B	Planned	B-23	B-23	B-23
D1X-GEN-7C	Planned	B-23	B-23	B-23
D1X2-GEN-6A	Planned	B-23	B-23	B-23
D1X2-GEN-6B	Planned	B-23	B-23	B-23
D1X2-GEN-6C	Planned	B-23	B-23	B-23
D1X2-GEN-7A	Planned	B-23	B-23	B-23
D1X2-GEN-7B	Planned	B-23	B-23	B-23
D1X2-GEN-7C	Planned	B-23	B-23	B-23
D1X2-GEN-1A	2021	B-23	B-23	B-23
D1X2-GEN-1B	2021	B-23	B-23	B-23
D1X2-GEN-1C	2021	B-23	B-23	B-23
D1X2-GEN-2A	2021	B-23	B-23	B-23
D1X2-GEN-2B	2021	B-23	B-23	B-23
D1X2-GEN-2C	2021	B-23	B-23	B-23
D1X2-GEN-3A	2021	B-23	B-23	B-23
D1X2-GEN-3B	2021	B-23	B-23	B-23
D1X2-GEN-3C	2021	B-23	B-23	B-23
D1X2-GEN-4A	2021	B-23	B-23	B-23
D1X2-GEN-4B	2021	B-23	B-23	B-23
D1X2-GEN-4C	2021	B-23	B-23	B-23
D1X2-GEN-5A	Planned	B-23	B-23	B-23
D1X2-GEN-5B	Planned	B-23	B-23	B-23
D1X2-GEN-5C	Planned	B-23	B-23	B-23
F20-EPS-1	2016	B-23	B-23	B-23
F20-EPS-2	2016	B-23	B-23	B-23
F20-CPS-1	Pre-2016	B-16	B-23	N-23
F15-EG01	***1994***	RB-16	B-23	N-23
F15-EG02	***1994***	RB-16	B-23	N-23
F15-EG03	***1994***	RB-16	B-23	N-23
F15.5-EG01	***2001***	RB-16	B-23	N-23

RICE Equipment Tag	Year Installed	NOx and CO BACT	VOC and PM/PM10 BACT	PM2.5 and GHG BACT
F15.5-EG02	***2001***	RB-16	B-23	N-23
PH-#1	Pre-2016	B-16	B-23	N-23
PH-#2	Pre-2016	B-16	B-23	N-23
PH-#3	Pre-2016	B-16	B-23	N-23
PH-#4	2021	B-23	B-23	B-23
N2-GEN-1A	2017	B-23	B-23	B-23
IWW-GEN-1	2018	B-23	B-23	B-23
IWW-GEN-2	Planned	B-23	B-23	B-23
IWW-PS-1	2018	B-23	B-23	B-23
MAX-EGEN	***2005***	RB-16	B-23	N-23
H2-GEN-1	New addition	B-23	B-23	B-23
D1A-GEN-1	New addition	B-23	B-23	B-23
D1A-GEN-2	New addition	B-23	B-23	B-23
D1A-GEN-3	New addition	B-23	B-23	B-23
D1A-GEN-4	New addition	B-23	B-23	B-23
D1A-GEN-5	New addition	B-23	B-23	B-23
D1A-GEN-6	New addition	B-23	B-23	B-23
D1A-GEN-7	New addition	B-23	B-23	B-23
D1A-GEN-8	New addition	B-23	B-23	B-23

APPENDIX 3 – EMERGENCY RICE OPERATION HOURS, 2016 - 2023

EGEN = Emergency Generator FP = Fire Pump

Date	Hours for each EGEN	Number of EGENs/FP	Which EGENs	Comment
8/12/2023	10.63	2 EGENs	F15.5-EG01, F15.5-EG01	Emergency
6/13/2023	0.23	1 FP	PH #1	Supporting Fire Systems
7/12/2022	0.83	3 EGEN	RS4-ELEC-EG-4-1, RS6-ELEC-EG-6-1, IWW-PS-1	Emergency
5/6/2022	22.16	5 EGENs	EPS-GEN01, EPS-GEN02, EPS-GEN04, EPS-GEN05, EPS-GEN06	Emergency
12/12/2022	0.5	1 FP	PH #2	Supporting Fire Systems
8/8/2021	0.37	1 FP	PH #1	Supporting Fire Systems
4/18/2021	8.25	5 EGENs	F15.5-EG01, F15.5-EG01, F15-EG01, F15-EG02, F15-EG03	Emergency
10/17/2021	0.25	1 EGEN	D1C-CPS-GEN02	Emergency
10/23/2021	0.5	1 EGEN	D1C-CPS-GEN02	Emergency
10/24/2021	0.75	1 EGEN	D1C-CPS-GEN02	Emergency
5/10/2019	2.08	1 EGEN	RS6-ELEC-EG-6-1	Emergency
6/21/2018	0.03	3 EGENs	D1C-CPS-GEN01, D1C-CPS-GEN02, D1C-CPS-GEN03	Emergency
6/21/2018	2.85	1 EGEN	RP1-EPS-GEN01	Emergency

3/2/2017	1	1 FP	PH #2	Supporting Fire Systems
5/5/2017	3.43	2 EGEN	RS4-ELEC-EG-4-1, RS6-ELEC-EG-6-1	Emergency
2/2/2016	0.47	1 EGEN	D1C-EPS-GEN01	Emergency
1/26/2016	6.12	1 EGEN	F15.5-EG01	Emergency

APPENDIX 4. AQ ANALYSIS - MODELING REVIEW OF INTEL EXPANSION PROJECT MEMO

Attached: See next page.

NOTE: 3/29/2024 There is significant additional discussion of the AQ Analysis (modeling) in the Review Report/Hearing Officer Report following public notice.

State of Oregon
DEQ Department of Environmental Quality

Memorandum

To: George Davis

From: Phil Allen and Kristen Martin

Date: January 2, 2024

Subject: Modeling Review of Intel Expansion Project

Results Snapshot

Facility Description**:** Intel operates manufacturing facilities at their Ronler Acres and Aloha campuses, which are engaged in the production of semiconductor products. Because of their interrelated production activities, both campuses are considered co-located under a single ACDP permit, 34-2681-ST-01 issued by DEQ in 2016 and modified in 2022.

Basis for permit application: Intel is proposing changes at both campuses The proposed changes trigger both Maintenance Area NSR and a PSD analysis, both of which require a modeling demonstration. The modeling report reviewed here was submitted as support for a Type 4 Maintenance Area NSR and PSD permit application. The following pollutants were modeled: NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$. Impacts to Ozone were also assessed using the MERPs analysis.

Summary of NAAQS modeling results: The air quality analysis of Intel's proposed changes show that impacts are below the NAAQS and PSD Increment, as shown in tables below. CO results are not shown because results were below Significant Impact Levels (SIL) and cumulative modeling was not required.

Intel Expansion Project							
			NAAQS Analysis				
		Modeling Results Total: Intel + Competing Source + Background					
Pollutant	Averaging Period	1-hr NO2 Modeling	Modeled Conc. ug/m3	Background ug/m3	Secondary PM2.5 ug/m3	Total ug/m3	NAAQS ug/m3
NO2	1-hr 5-yr Avg of 98th%	EPA Method	162.6	in model		162.6	188
	1-hr 5-yr Avg of 98th%	Monte Carlo	163	in model		163	188
	Annual Max		17.1	35.6		52.7	100
PM10	24-hour H6H		9.1	39		48.1	150
PM2.5	24-hr 5-yr Avg of 98th%		6.01	20.7	0.19	27.1	35
	5-yr Avg of Ann Conc's		2.49	6.6	0.01	9.1	12
SO2	1-hr 5-yr Avg of 99th%		40	7		47	196
	24-hr Avg		20.1	4.7		24.8	1,300
	Annual Max		4.9	1.1		6	80
	Averaging Period		MERPs Conc. ppb	Background ppb		Total ppb	NAAQS ppb
O3	3-yr avg H4H 24-hr Max 8-hr		1.9	61.3		63.2	70

Intel Expansion Project					
PSD Class II Increment					
Modeling Results Total: Intel + Competing Sources					
Pollutant	Avg. Period	Modeled Conc. ug/m3	Secondary PM2.5 ug/m3	Total ug/m3	Increment ug/m3
NO2	Annual	17.1		17.1	25
PM10	24-hr H2H	9.8		9.8	30
	Annual	3.4		3.4	17
PM2.5	24-hr H2H	8.4	0.19	8.6	9
	Annual	2.7	0.01	2.7	4

- The NAAQS impact analysis uses specific modeling inputs and assumptions, such as emission rates, stack parameters, unit locations, and operating scenarios and schedule for testing and maintenance of the emergency generator engines. The permit includes conditions to ensure that the permittee follows modeling assumptions to protect NAAQS.

- Based on the modeling inputs and conditions, the modeling is approved: the proposed project changes will be in compliance with applicable air quality standards.

Operating Assumptions

- M&R Testing of emergency generators is limited to 10 hrs/day (8am-6pm).
- EXSC (APCD), EXAM (APCD), PSSS, RCTO (APCD) and TMXW operate 24 hours per day and 8,760 hours per year.
- RCTOs (APCD) at an annual operating capacity at 100%
- Boiler operation is up to 24 hours per day with a 30% annual capacity factor.
- Emergency generator M&R testing occurs up to 60 minutes per day, 10 engine tests per day and 25 hours per year. Fire pump testing is up to 50 hours per year.
- Emergency generator emergency operations are assumed to operate less than 24 hours for 6 engines per year.
- Cooling towers operate 24-hours per day and 8,760 hours per year.
- Lime silos will only emit during loading operations which will occur no more than 1 hour per day with only one silo being loaded on any given hour or day. On an annual basis, there will be no more than 52 loading operations per year per silo.
- Fugitive dust emissions are assumed to occur 24 hours per day and 8,760 hours per year.

1. Background and applicability

Intel Corporation operates manufacturing facilities at their Ronler Acres and Aloha campuses. The Aloha campus has been operating since 1976 while the Gordon Moore Park at Ronler Acres campus began operation in 1994. Both campuses are engaged in the production of semiconductor products and are considered co-located for permitting purposes because their production activities are interrelated. Both campuses are regulated under a single Standard ACDP, 34-2681-ST-01, issued in 2016 and most recently modified in 2022.

The proposed changes at the Facility include additional fabrication (fab) cleanroom space and increased emissions at the existing fabs due to advances in manufacturing and additional support operations. These changes meet the definition of "major modification". This major modification triggers Maintenance Area NSR and PSD requirements, both of which require a demonstration the proposed changes will not cause or contribute to an exceedance of the NAAQS and PSD Increments.

Modeling Submittals

Modeling submitted: July 2023
Revised modeling submitted: November 2023
Facility location: The Ronler Acres plant is located in Hillsboro, OR at NAD 83 UTM 506601.5 East and 5043404.5 North, Zone 10; and the Aloha campus is in Aloha, OR at UTM 509003.2 East and 5037811.5 North.

2. Plant Configuration and Operation

Semiconductor manufacturing

Semiconductors are fabricated in batches of silicon wafers and can take anywhere from one to two months to manufacture. Semiconductor manufacturing begins with a silicon wafer substrate. The semiconductor is then built up as a series of layers, with material added or removed in each of the following steps:

- Oxidation: The generation of a silicon dioxide layer on the wafer surface to provide a base for the photolithography process.
- Lithography: After application of a photo sensitive layer onto the wafer, light is projected through a photomask to form patterns of exposed and unexposed photoresist. After exposure, the wafer is developed in a solution that dissolves the exposed photoresist, leaving those areas exposed for subsequent processing steps.
- Ion Implant: Doping the wafer with ions to make it conductive or insulating at selected locations.
- Etching: Wet or dry etching techniques are used to remove unwanted material on certain areas on the wafer. After etching, photoresist is removed using dry or liquid stripping compounds.
- Deposition: Applies additional layers of silicon, silicon dioxide, or other materials to the wafer
- Planar: A surface treatment process which prepares the wafer for subsequent processing steps. A mildly corrosive chemical slurry is used as a polishing compound.

During the fabrication process, many of these steps are repeated multiple times in various sequences with variations in each step. Once the manufacturing is completed, the wafers are tested and cut into individual chips. Manufacturing operations occur 24 hours a day and 365 days a year.

The emissions of individual pollutants released during the manufacturing process varies by step and technique. Intel controls these emissions through the use of control devices as part of their manufacturing support system.

Manufacturing support systems:

There are a number of utility support systems that support Fab manufacturing operations. Unless noted below, the sources operate 24 hours per day, 365 days per year. These include:

- Rotor concentrator thermal oxidizers (RCTOs (APCD)) (natural gas-fired) are used to control VOCs emissions from the Fabs.
    - Hourly emissions assume the RCTOs (APCD) are operating at maximum rated capacity
    - Annual emissions are based on an annual operating capacity of 100% of the maximum rated capacity.
    - All PM emissions are assumed to be PM_{10} and $PM_{2.5}$
- Packed-Bed Wet Chemical Scrubbers for controlling acid gases used or created in production processes.
    - EXAM (APCD) wet scrubbers for controlling ammonia used in production processes.
    - PSSS wet scrubbers ventilate gas storage cabinets and similar areas to protect employees in the event of leaks.

- Trimix Ammonia Treatment Systems are used to treat ammonia wastewater.
- Large natural gas-fired boilers (>2.0 million BTU per hour).
  - Hourly emissions assume the boilers are operating at maximum rated capacity
  - Annual emissions are based on an annual operating capacity of 30%.
- Small gas-fired Boilers and heating units (<2.0 million BTU per hour).
- Emergency generators (diesel-fired) and fire pumps.
  - No more than ten generators may be run in any single day between 8 am and 6 pm for Maintenance and Readiness (M&R) Testing.
  - Maximum M&R testing no more than 25 hrs/year per engine.
  - Emergency operation of engines assumes no more than 24 hours/year per engine. See full description below.
  - Hourly emissions assume the engines are operated at full load.
  - Annual emissions for the fire pumps are all based on 50 hours per year.
- Wet cell cooling towers.
- Lime silos
  - Lime silos will only emit during loading operations which will occur no more than 1 hour per day with only one silo being loaded on any given hour or day.
- Paved Road Sources
  - Fugitive dust emissions are assumed to occur 24-hours per day and 8,760 hours per year.

3. Modeled Production and Emissions Scenarios

Stack Parameters and modeled emissions

The stack parameters (flow rates, temperatures, stack heights, velocities) used in modeling were determined from source testing, manufacturing specification guarantees, or worst-case assumptions. These are listed in Appendix A. These emissions and associated stack parameters were used in modeling.

Based on the potential to emit emission summary, the following pollutants are subject to air quality assessments: NO_x, CO, SO_2, PM_{10}, $PM_{2.5}$, and VOCs. NO_x and SO_2 will also be treated as precursors to $PM_{2.5}$, while NOx and VOC will be treated as O_3 precursors.

Intel Expansion Project								
Potential to Emit Summary: Intel Ronler Acres and Aloha								
Emission Category	Number of Units	NOx tpy	CO tpy	VOC tpy	TSP as PM tpy	PM10 tpy	PM2.5 tpy	SO2 tpy
Boilers	59	19.69	58.64	8.55	3.89	3.89	3.89	4.04
EGENS/Fire Pumps	90	52.46	4.28	0.96	0.48	0.48	0.48	0.05
RCTOs	33	80.73	106.28	150.01	19.05	19.05	19.05	2.1
EXSC Scrubbers	53	192.68	327.92	36.92	28.11	27.17	25.65	26.77
EXAM Scrubbers	30	43.45	81.51	86.51	13.55	8.54	8.27	0.77
PSSS Scrubbers	16	0	0	0	0.71	0.44	0	0
Fugitive VOCs		0	0	65.82	0	0	0	0
Heaters	11	10.41	17.13	0.57	0.26	0.26	0.26	0.27
TMXW	8	12.23	1.1	0.2	0.09	0.09	0.09	0.09
Lime Silos	1	0	0	0	0.44	0.44	0.44	0
Cooling Towers	108	0	0	0	8.81	7.19	0.03	0
Aggregate insignificant activities		1	1	1	1	1	1	1
Paved Road Emissions	2	0	0	0	0.75	0.15	0.04	0
Total		412.64	597.86	350.54	77.16	68.71	59.21	35.1
Requested PSEL		413	598	351	68	62	60	39

4. Modeling Basis

Model Versions

AERMOD	v. 22112
AERMET	v. 21112
AERMINUTE	v. 15272
AERSURFACE	v. 20060
AERMAP	v. 18081
BPIP	v. 04274

Note: Newer versions of AERMOD (v. 23132) and AERMET (v. 23132) were released in October 2023. These changes are not anticipated to impact results, and DEQ did not require the facility to remodel.

NO2 conversion

The Ambient Ratio Method Version 2 (ARM2) was used in AERMOD for all modeling except for the modeling that provided files for intermittent 1-hr NO2 analysis using the Monte Carlo simulation (as described in the intermittent sources section below). For the Monte Carlo method the plume volume molar ratio method (PVMRM) was used with concurrent hourly ambient ozone data collected at the SE Lafayette monitoring site. NO_2/NO_x ratios were based on Cummins (the engine manufacturer) supplied data for the 3,000 horsepower engines (or larger) at 0.05. All other diesel equipment used a 0.10 NO_2/NO_x

Land use

Land use surrounding the facility is largely characterized by urban land use categories, and AERMOD was run with urban dispersion coefficients. Selection of the urban boundary layer option in AERMOD also requires an estimate of the population of the urban area, and a value of 263,180 was used based on the population of Hillsboro, Aloha, and Beaverton.

Meteorology

Surface: Hillsboro Airport ASOS data
Upper Air: Salem Airport radiosonde data
Time Period: 2016-2020

Modeling Receptors

Receptor grids were used to provide adequate spatial coverage surrounding the Project area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations. The location and resolution of receptors followed DEQ guidance.

Background Data

The nearest air quality monitoring sites to the proposed Project are listed in the following table.

Intel Expansion Project			
Ambient monitoring data for Background			
	SE Lafayette (SEL)	Tualatin at I-5 (TBC)	Hare Field (HHF)
Dist. From Roler -km	21	21	5
Dist. From Aloha - km	15	15	8
NO2	y	y	
SO2	y		
CO	y	y	
PM10	y		
PM2.5	y	y	y
O3	y	y	

The Hare Field and SE Lafayette monitoring stations were selected as being the most representative for determining the background concentrations to be used in the modeling analyses. For NO_2, Ozone, and PM_{10} background data, SE Lafayette was used, with $PM_{2.5}$ background based on Hare Field, which is also the closest $PM_{2.5}$ monitoring station to the Project sites. For background CO and SO_2, the SE Lafayette data was also used in the modeling analyses. A summary is shown in the following table.

Intel Expansion Project			
	Background Air Quality Data Summary	Monitor	Background
Pollutant	Averaging Time for NAAQS	Location	ug/m3
PM10	24-hour 3-year 2nd High	SE Lafayette	39
PM2.5	3-Year Average of Annual 24-hour 98th Percentiles	Hare Field	20.7
PM2.5	3-Year Average of Annual Values	Hare Field	6.6
CO	1-hour High	SE Lafayette	2,978
CO	8-hour High	SE Lafayette	1,947
NO2	3-Year Average of Annual 98th Percentile 1-hour Daily Maximum	SE Lafayette	seasonal-hourly
NO2	Annual Maximum	SE Lafayette	18.3
SO2	3-Year Average of Annual 99th Percentile 1-hour Daily Maximum	SE Lafayette	7
SO2	24-hour 2nd High	SE Lafayette	4.7
SO2	Annual Maximum NAAQS	SE Lafayette	1.1

For the 1-hour NO_2 modeling, seasonal hourly background for the 2019-2021 data period was used, in accordance with the EPA guidance in which the third highest value for each hour and season was used to calculate the three-year average of each time period. Because complete hourly data from 2022 was not available, the seasonal hourly background modeling was limited to 2019-2021.

5. Modeling Procedures

Continuous Emission Sources

Modeled concentrations from normal operations were based on continuous operation of all sources at the Project, except for the emergency diesel generators and fire pumps. For the continuous source operations, the 1-hr, 8-hr, and 24-hour average time modeling utilized the maximum hourly emission rates. Annual emissions were based on full time operation or utilized annual capacity factors.

In summary:

- EXSC (APCD), EXAM (APCD), PSSS, RCTO (APCD) and TMXW operate 24 hours per day and 8,760 hours per year.
- RCTOs (APCD) at an annual operating capacity at 100%
- Boiler operation is up to 24 hours per day with a 30% annual capacity factor.
- Cooling towers operate 24-hours per day and 8,760 hours per year.
- Lime silos will only emit during loading operations which will occur no more than 1 hour per day with only one silo being loaded on any given hour or day. On an annual basis, there will be no more than 52 loading operations per year per silo.
- Fugitive dust emissions are assumed to occur 24 hours per day and 8,760 hours per year.

All sources with discrete stacks were modeled as point sources, fugitive emissions were modeled as an area source, and the lime silos as a volume source.

Intermittent Emission Sources

The analysis of the proposed modification at the facility included modeling 90 emergency generators, used for backup power, and fire pumps. Because these engines are run intermittently for a limited number of hours in the year, they are challenging to show compliance with the National Ambient Air Quality Standard (NAAQS). The intermittent operations include Maintenance and Readiness (M&R) Testing and actual emergency operation in the event of a power outage. The M&R occurs up to 1 hour per engine per day, limited to 10 generators (10 generator-hours) between 0800 and 1800 hours, with a maximum limit of 25 hours per year per generator. Fire pump testing is up to 50 hours per year.

An emergency operations analysis was requested by EPA, in addition to M&R Testing. Based on records of emergency operations over the last 5 years, and in consideration of the redundancy of the backup electrical power supply at the plant, 24 hours of emergency hours per year on 6 engines was considered a reasonable estimate, and this was approved by EPA for use in the modeling.

Generator Modeling for PM (24-hr, annual, PSD Increment)

Based on a NAAQS screening analysis, described below, a worst-case generator (EGDC_01) was identified for the NAAQS modeling of intermittent emissions of PM from M&R Testing using maximum emission rates. Using a similar approach, a representative set of 10 generators from Groups 02 and 03 (see table below) was identified for the PSD Increment analysis. The Monte Carlo approach was not used for the PM analysis. In addition, modeling of PM emissions from emergency operation was not required because $PM_{2.5}$ emissions are relatively low, focus of intermittent emissions is the 1-hr averaging time for NO_2, emergency operations would not occur simultaneously with M&R Testing especially for the 24-hr averaging time, and maximum emissions rates are used and not an annualized average.

Generator Modeling for 1-hr NO_2

DEQ aimed to characterize the impact of the emergency generator activity in a reasonable way given the uncertainty surrounding their activity. To do this, the modeling was conducted using two separate methods, the annualized emissions approach, and the Monte Carlo simulation, described below. Both methods estimated 1-hour NO_2 concentrations from the M&R Testing, and actual emergency operations during plant power outages.

1. For the EPA annualized emissions method, based on EPA guidance, annualized emission rates were derived from the maximum hourly rate prorated by the ratio of operating hours to total hours.

   a. For M&R Testing with 10 engine tests per day between 0800 and 1800 (3650 hours/year), and a maximum of 25 hours/year per engine, the ratio is 25 hrs/3650 hrs = 0.00685. For the NAAQS analysis, all 90 engines were included in the modeling, along with continuous emissions sources, competing sources, and time varying background, and concentrations calculated as a total for all.

   b. Emergency operations are modeled for 8,760 hours per year, with a maximum of 24 hours per year, and the ratio is 24 hrs/8760 hrs = 0.00274. For the NAAQS modeling, the group of generators that experienced the highest historical use in emergency operations (EGDD_01 – EGDD_07) was used. This group had also been identified as the worst-case group based on screening modeling. The modeling procedures for the emergency generators are discussed below.

2. For the Monte Carlo method, based on DEQ requirements, Intel modeled actual hourly emission rates from the emergency generators (i.e., no ratio was applied). AERMOD generated hourly concentrations for each generator group used for M&R Testing. The output from this modeling was then put into a Monte Carlo analysis that randomly selects the appropriate number of hours per year from the modeled output and determines the impact when combined with the continuous sources at the facility. This exercise is then repeated 1,001 times to converge on the likely impact from these activities.

   a. For M&R Testing, the following operating assumptions were made in the Monte Carlo analysis:
      i. M&R testing was restricted to 8am-6pm.
      ii. 20 'testing' groups ranging from 2 to 7 engines each, running up to 24-hours a year. Testing groups are shown in the table below.
      iii. Only 1 testing group operating in any given hour.
      iv. Each generator group is tested once every 15 days.
      v. Some days had multiple groups tested on the same day (20 groups split over 15 days) with groups not tested in the same hour.

Intel Expansion Project									
M&R Generator Groups for Monte Carlo Analysis									
G01	G02	G03	G04	G05	G06	G07	G08	G09	G10
EGR1_01	EGDC_01	EGDD_01	EGDD_07	EGE1_01	EGE1_07	EGE1_14	EGE1_19	EGC5_17	EGC5_01
EGR1_02	EGDC_02	EGDD_02	EGRS4_01	EGE1_02	EGE1_08	EGE1_15	EGE1_20	EGC5_18	EGC5_02
EGR1_03	EGDC_03	EGDD_03	EGRS6_01	EGE1_03	EGE1_09	EGE1_16	EGE1_21	EGC5_19	EGC5_03
EGR1_04	EGDC_04	EGDD_04	EGRS6_02	EGE1_04	EGE1_10	EGE1_17	EGC5_16	EGC5_20	EGC5_21
EGRB1_01	EGDC_05	EGDD_05		EGE1_05	EGE1_11	EGE1_18			
	EGRP1_01	EGDD_06		EGE1_06	EGE1_12				
	EGRP1_02				EGE1_13				
G11	G12	G13	G14	G15	G16	G17	G18	G19	G20
EGC5_04	EGC5_08	EGC5_12	EGDB_01	EGDA_03	EGDA_06	EGF15_01	FIRS4_01	EGIW_01	EGN2_01
EGC5_05	EGC5_09	EGC5_13	EGDB_02	EGDA_04	EGDA_07	EGF15_02	FIPH2_01	EGIW_02	EGH2_01
EGC5_06	EGC5_10	EGC5_14	EGDB_03	EGDA_05	EGDA_08	EGF15_03	FIPH1_01		EGIW_03
EGC5_07	EGC5_11	EGC5_15	EGDA_01			EGF5_01	FIC5_01		EGRS8_01
			EGDA_02			EGF5_02			

b. For Emergency Operations, the following assumptions were made in the Monte Carlo analysis:
   i. Activities can occur any time of day.
   ii. Based on historical data, emergency operations are modeled for 24 hours a year using the 6 engines (EGDD_01 – EGDD_06), which also had highest impacts, as determined in the screening modeling described below.
   iii. The simulation selected two 1-hour events per month for a total of 24 hours a year.

To show compliance with the Monte Carlo method, Intel wrote a Monte Carlo script in Microsoft Excel after AERMOD was used to generate hourly output by generator group. Conducting a Monte Carlo analysis can be achieved several ways depending on the amount of processing power and data management capabilities. Intel wrote a method that increased file size and processing time in favor of more refined results. Other methods, such as using the maximum daily hourly concentration from AERMOD could have resulted in higher impacts.

Due to the various methods to show compliance with the 1-hour NO_2 NAAQS, there is higher uncertainty in the results compared to other, less complex, demonstrations. For this reason, DEQ recommends fence line ambient air monitoring of 1-hour NO_2 to determine if the modeled results adequately represent the variability of activity at the facility and ensure protection of the public near the facility.

3. Screening Modeling for generators

In order to reduce model run times, and to ensure that maximum modeled impacts from the intermittent emergency generator emissions were estimated in areas of highest concentrations from the continuous emissions sources, a screening analysis was performed to identify for each pollutant and averaging time the most significant generators or generator groups. These generators were then used in the subsequent modeling, as shown in Appendix A.

Competing Sources

A competing source list was provided by DEQ based on emissions and distance. The emissions from the competing sources were PTE. While the PSD Increment analysis uses actual emissions, the use of PTE is considered conservative. The list of competing sources and their emissions is Appendix B.

7. Class II Area Analysis Results:

SIL Analysis

A Significant Impact Level analysis was performed of emissions from Intel to help define a Significant Impact Areas (SIA) for each pollutant to assist in identifying potential competing sources. Although SO_2 emissions are less than the SER of 40 tpy and no SIL analysis or further dispersion modeling was required, SO_2 emissions were included in the secondary $PM_{2.5}$ MERPs analysis. For the 1 and 8-hr average CO, the SIL analysis showed modeled CO concentrations were less than the SILs and no further analyses of CO was required. All other criteria pollutants exceeded the Class II SILs, and full competing source modeling was required.

Secondary PM2.5 and O3

A MERPs analysis, following EPA guidance, was performed with Intel emission rates to calculate $PM_{2.5}$ and O_3 levels using Morrow as the hypothetical MERPs site The Morrow site in Umatilla County, Oregon has been the default MERPs site for secondary formation in Oregon because the Morrow MERP were low (very conservative) relative to other hypothetical sites in the western US, and because its distance to most modeled sites in Oregon is the shortest. As part of this review, the Klickitat site located in Washington to the northwest of the Morrow location, was also included in the analysis. A comparison of results is shown in the table below.

The MERP analysis used the following emissions data as input which is based on the project total PSEL:

- NO_x – 412.64 tpy
- VOC – 350.54 tpy
- $PM_{2.5}$ – 59.21 tpy
- SO_x - 39.0 tpy

Intel Expansion Project																	
								MERPs analysis of secondary impacts from Intel									
		Hypothetical Source						Intel					Totals and NAAQS				
		Precursor	Release					Emissions		Calculated Concentrations				Intel	O3	**Total**	
	Source	Emissions	Ht	NOx	Conc	VOC	Conc	NOx	VOC	NOx	VOC	Total O3		O3	Bkg	O3	NAAQS
Precursor	Location	tpy	m	MERP	ppb	MERP	ppb	tpy	tpy	ppb	ppb	ppb		ppb	ppb	ppb	ppb
O3 Daily Max 8-hr	Morrow	500	10	257.7	1.940	1087	0.4602	412.6	350.5	1.6007	0.3226	1.92		1.92	61.3	**63.2**	70
	Klickitat	500	10	199	2.517	11902	0.0420	412.6	350.5	2.0770	0.0295	2.11		2.11	61.3	**63.4**	70
													Direct	Total	PM2.5	**Total**	
				NOx		SO2		NOx	SO2	NOx	SO2	Total	PM-2.5	Intel	Bkg	PM 2.5	NAAQS
Precursor				MERP	ug/m3	MERP	ug/m3	tpy	tpy	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3
PM2.5 24-hr	Morrow	500	10	3003	0.200	2314	0.2590	412.6	39	0.1649	0.0202	**0.185**	6.20	6.385	20.7	**27.09**	35
	Klickitat	500	10	13848	0.043	1203	0.4987	412.6	39	0.0358	0.0389	0.075	6.20	6.275	20.7	26.97	35
PM2.5 Annual	Morrow	500	10	7942	0.013	11877	0.0084	412.6	39	0.0104	0.0007	**0.011**	2.51	2.524	6.6	**9.124**	12
	Morrow	500	10	40098	0.002	11276	0.0089	412.6	39	0.0021	0.0007	0.003	2.51	2.516	6.6	9.116	12

The results show that for O_3 the total modeled plus background concentrations are less than the NAAQS. The concentration of secondary $PM_{2.5}$ will be aggregated with the concentrations of direct $PM_{2.5}$ in the final results.

<u>NAAQS and PSD Increment</u>

The modeling results are shown in tables at the beginning of the review and indicate that impacts from all modeled Criteria Pollutants are below, and in compliance with, all applicable standards.

<u>Soils and Vegetation</u>

An assessment of the impact to soils and vegetation of significant commercial or recreational value as a result of the Project was conducted. An analysis of project emissions concluded that emissions did not have an adverse impact on soils and vegetation, and that with the exception of areas adjacent to the facility, concentrations of the Criteria Pollutants were below their SILs and not considered to have a significant effect. In regard to deposition, the levels of nitrogen deposition in the area around the Project are estimated at 5.89 kg/ha-year, far below levels necessary to cause adverse effects.

<u>Class I Impact Assessment</u>

The Class I analysis is subject to: guidance from the Federal Land Managers (FLMs) for Air Quality Related Values (AQRVs), and guidance from EPA for Class I NAAQS and PSD Increment.

In regard to the FLMs, a screening Q/d analysis showed that Mt Hood was the nearest Class I area at 80 km, with a calculated Q/d of 4.2, the highest of any Class I area. Typically, a Q/d less than 10 would exempt the facility from undertaking an AQRV analysis. In addition, the US Forest Service and the National Park service, FLMs of affected Class I areas, were notified by DEQ and both agencies said an AQRV analysis was not required. Therefore, an AQRV analysis was not performed.

For the EPA Class I area NAAQS and Increment, a SIL analysis was performed with all values below their respective SIL. In conclusion for all Class I areas analyzed, the project will be in compliance with the NAAQS and PSD increments, and AQRV analyses were not required.

8. Summary and Recommendation

The review of the air quality analysis of the Intel expansion project, using the emission rates, stack parameters, and unit locations provided in the analysis and as described above, shows that impacts from Intel are in compliance with the applicable air quality standards.

The air quality analysis as submitted demonstrates that the facility will not have adverse impacts from the Criteria Pollutants and is approved. Emission rates used in this analysis should be no less than those levels prescribed in the permit.

Appendix A. Modeled Stack Parameters

Appendix B. Competing Source Inventory

(Note Added: Appendices are Excel files and can be found in the permit Detail Sheets)

Memorandum

To: The Record
From: Phil Allen, Kristen Martin Date:
March 29, 2024

105. Subject: Clarification of the Ambient Air Boundary, and Use of Allowable Emissions in Modeling

1. Ambient Air Boundary

The Intel operation in the Hillsboro area takes place across two campuses, the Aloha property and the Gordon Moore Park at Ronler Acres, the latter of which is divided into two parcels by a public road. The campuses are encircled by commercial office parks and residential areas. Because of the size of the campuses and the lengths of property boundary perimeters, concern has been expressed about the ambient air boundary and location of modeling receptors, and limits to public access beyond the property boundary.

In concert with EPA Region 10, DEQ has worked with Intel to develop a description of physical barriers and other limits to public access. As a result, Intel has provided information that is consistent with EPA guidance, Revised Policy on Exclusions from Ambient Air (12/2/2019), and includes descriptions of physical barriers and other measures such as signage, surveillance cameras, security patrols, and other security measures.

The physical barriers that Intel has in place along a majority of the perimeter at both the Ronler Acres and Aloha campuses include:

- fencing
- wetlands and other water features
- raised and heavily vegetated berms with heights between 6 to 18 feet with various widths ranging from 50 to 140 ft.
- other obstructions (concrete barriers, gates, etc.)

In addition to the physical barriers is a range of security and related measures for precluding public access that include:

- clear signage, such as “Private Property,” “No Trespassing,” “Loitering Forbidden”
- video surveillance that is monitored 24/7 at Security Command Centers
- routine security patrols, both scheduled and random foot and vehicle patrols
- enhanced patrols on the west and north sides of the Aloha campus

Conclusion

This combination of physical and other security measures that preclude public access to the Intel property is consistent with the measures identified in EPA’s guidance and as a result the use of Intel’s property boundary is appropriate as the ambient air boundary for the air dispersion modeling analysis.

For security reasons, the information outlined here is at a general level. More detailed information is given in a document held at DEQ that is protected as Security Information (ORS 192.345(22) and (23)).

2. Use of Allowable Emissions in Modeling

In recent discussions with EPA Region 10, and as noted in their comment on the draft permit submitted on3/8/2024, EPA suggested clarification on the use of allowable emissions for the modeling of boilers in the air quality analysis. This clarification is in reference to Section 8.2.2(c) of Appendix W to Part 51 – Guideline on Air

Quality Models, which states in part, "*new or modifying stationary point source shall be modeled with "allowable" emissions in the regulatory dispersion modeling.*"

The modeling report states the boilers supply hot water (not steam) to the various buildings and manufacturing processes, are natural gas fired, and their emissions are those associated with natural gas combustion. The assumptions used in calculating boiler emissions include 1) Hourly emissions based on boilers operating at their maximum rated capacity, and 2) annual emissions based on an annual operating capacity of 30%.

Intel has stated that there are physical limits to operating the boilers at greater than 30% capacity, and the annual emissions shown in both the comprehensive table of stack parameters, and in the emission summary Table 2 of the modeling report are based on this 30% operating limit.

However, the dispersion modeling for the boilers, and all other emission units, used the maximum hourly allowable emission rates for all averaging periods, and the modeled concentrations in Table 23 of the modeling report and as revised are based on this modeling.