Statement of Basis

Tier II Operating Permit No. T2-2013.0062
Project ID 61305

Micron Technology, Inc.
Boise, Idaho

Facility ID 001-00044

Final

May 13, 2015
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The purpose of this Statement of Basis is to satisfy the requirements of IDAPA 58.01.01.et seq, Rules for the Control of Air Pollution in Idaho, for issuing air permits.

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ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURE

AAC	acceptable ambient concentrations
AACC	acceptable ambient concentrations for carcinogens
acfm	actual cubic feet per minute
ASTM	American Society for Testing and Materials
CAA	Clean Air Act
CAM	Compliance Assurance Monitoring
CFR	Code of Federal Regulations
CI	compression ignition
CMS	continuous monitoring systems
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent emissions
COMS	continuous opacity monitoring systems
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EPA	U.S. Environmental Protection Agency
FEC	facility emissions cap
gal	gallons
GHG	greenhouse gases
gr	grain (1 lb = 7,000 grains)
HAP	hazardous air pollutants
HCl	hydrochloric acid
HF	hydrofluoric acid
HNO_3	nitric acid
hr	hour
hr/yr	hours per consecutive 12-calendar-month period
H_2SO_4	sulfuric acid
H_3PO_4	phosphoric acid
IC	internal combustion
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pounds per hour
MACT	Maximum Achievable Control Technology
MMBtu	million British thermal units
mmHg	millimeters of mercury
MRRR	Monitoring, Recordkeeping, and Reporting Requirements
MTI	Micron Technology, Inc.
NAAQS	National Ambient Air Quality Standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NSPS	New Source Performance Standards
Pb	lead
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
ppmv	parts per million by volume
PSD	Prevention of Significant Deterioration

PTC	permit to construct
PTE	potential to emit
Rules	*Rules for the Control of Air Pollution in Idaho*
SO_2	sulfur dioxide
TAP	toxic air pollutants
T/yr	tons per consecutive 12-calendar-month period
T1	Tier I operating permit
T2	Tier II operating permit
VOC	volatile organic compounds

FACILITY INFORMATION

Description

Micron Technology, Inc. (MTI) manufactures and conducts research and development activities associated with semiconductor and other devices on silicon-based wafers. The facility constantly adapts to changing product mix, architecture, and functionality. The nature and rapid pace of constant technological change affects the type, number, and configuration of equipment (also known as "tools" in the industry) required to fabricate devices. A detailed description of the semiconductor manufacturing process, including research and development activities, is contained in the following sections.

In addition to the historical focus on integrated circuit semiconductor manufacturing, facility operations may also include manufacturing consumer products associated with semiconductor devices, other electronic devices, as well as alternative energy manufacturing opportunities. These operations incorporate semiconductor systems or other silicon-based products. Manufacturing these products is similar to the facility's historical operations and emissions are determined using established mass balance procedures. Emissions from the manufacturing of these products are controlled using existing abatement systems. The facility continues to identify and implement options for re-purposing idled manufacturing areas.

Fabrication

The wafer fabrication process consists of several steps: cleaning, diffusion, photolithography, etch, doping, metallization, other wafer fabrication steps, wafer-level packaging, fabrication of masks, assembly, test, and other finishing steps.

Cleaning

Silicon wafers are cleaned to remove particles and contaminants such as dust. Aqueous acid and base mixtures are the most commonly used cleaning solutions. Use of acids is generally necessary because of the solubility characteristics of silicon, silicon oxide, and common contaminants. A variety of acids may be used depending on the nature of the material to be removed.

Deposition

The next step in the process depends on the type of semiconductor device being produced, but commonly involves the diffusion or growth of a layer or layers of silicon dioxide, silicon nitride, or polycrystalline silicon. For example, an initial layer of silicon dioxide with the subsequent deposition of a silicon nitride layer is commonly applied to metal oxide silicon devices. Deposition processes can be conducted at atmospheric pressure or in a vacuum chamber and are typically conducted at temperatures between 400 and 1200 °C. Chemicals and gases necessary to obtain the desired effect are flowed for a limited time into the chambers where a reaction takes place, depositing a layer of the element or compound on the surface of the wafer. Wafer residence times in the chambers can range from several minutes to several hours. Products containing VOC may be used in the deposition step depending on the desired composition of the layer. As gases react in the deposition process, a small amount of particulate matter may be produced and emitted.

Photolithography

The wafer then proceeds to the photo process. Vapor priming occurs first to remove any moisture present on the surface of the wafer to prepare it for optimum photoresist adhesion. The wafer continues on to coat tracks where it is coated with a photoresist, a photosensitive emulsion, followed by a rinse to remove excess photoresist from the edges and backside of the wafer. The wafer is next exposed to ultraviolet light using glass photomasks that allow the light to strike only selected areas and depolymerize the photoresist in these areas. After exposure to ultraviolet light, exposed resist is removed from the wafer on develop tracks and rinsed off with deionized (DI) water. Some wafers may be further baked to harden the photo mask layer. This hard bake process, designed to cross-link and harden the polymers in the photoresist, occurs after the volatile constituents have been driven off. Photo allows subsequent processes to affect only the exposed portions of the wafer. Wafer residence times during chemical application in the photo process can vary from several seconds to ten or fifteen minutes.

Etch

Etching of the wafer is then conducted to selectively remove deposited layers not protected by the photoresist material. Either dry or wet etch processes may be used depending on the type of layer being removed. Dry etch uses a high-energy plasma to remove the target layer. Process gases are ionized under vacuum pressure to form plasmas capable of etching specific layers. Wet etch may also be used to remove specific layers from the wafer. Some wet etch processes, however, also perform cleaning functions and prepare the wafer for subsequent processing. Wet etch is generally conducted at atmospheric pressure. Both etch processes may be conducted at ambient temperature or elevated temperatures (400 °C or higher). Chemicals and gases used in both etch processes may be used in varying quantities depending on the specific objective of the etching being conducted. Wafer etching can be conducted for anywhere from two minutes to more than two hours. Some of the VOC-containing material used in etch processes may be discharged to either the hazardous waste or industrial wastewater collection systems.

Doping (Diffusion and Implant)

Following etch, the wafer moves on to a process where dopants are added to the wafer or layers. Dopants are impurities such as boron, phosphorus, or arsenic. Adding small quantities of these impurities to the wafer substrate alters its electrical properties. Implant and diffusion are two methods currently used to add dopants. During implant, a chemical is ionized and accelerated in a beam to velocities approaching the speed of light. Scanning the beam across the wafer surface implants the energized ions into the wafer. A subsequent heating step, termed annealing, is necessary to make the implanted dopants electrically active. Diffusion is a vapor phase process in which the dopant, in the form of a gas, is injected into a furnace containing the wafers. The gaseous compound breaks down into its elemental constituents on the hot wafer surface. Continued heating of the wafer allows diffusion of the dopant into the surface at controlled depths to form the electrical pathways within the wafer. Solid forms of the dopant may also be used.

Metallization

Metallization is a process that can be used to add metal layers to a wafer. Sputtering and vacuum deposition are forms of metallization that may be used to deposit a layer of metal on the wafer surface. In the sputtering process, the source metal and the target wafer are electrically charged, as the cathode and anode, respectively, in a partially evacuated chamber. The electric field ionizes the gas in the chamber and these ions bombard the source metal cathode, ejecting metal that deposits on the wafer surface. In the vacuum deposition process, the source metal is heated in a high vacuum chamber by resistance or electron beam heating to the vaporization temperature. The vaporized metal condenses on the surface of the silicon wafer. VOC may be used in the diffusion process, but are generally not used in the implant or metallization processes.

Other Wafer Fabrication Steps

The wafer is then rinsed in an acid or solvent solution to remove the remainder of the hardened photoresist material. Another oxide layer is grown on the wafer and the process is repeated. This photolithographic-etching-implant-oxide process sequence may occur a number of times depending upon the application of the semiconductor. During these processes, the wafer may be cleaned many times in acid solutions followed by DI water rinses and solvent drying. This is necessary to maintain wafer cleanliness. The rinsing and drying steps may involve the use of a VOC-containing material.

The wafer fabrication phase ends with an electrical test (probe). Each device on the wafer is probed to determine whether it functions correctly. Defective devices are marked to indicate they should be discarded. A computer-controlled testing tool quickly tests each circuit.

Wafer-Level Packaging

Rather than being assembled into protective packages as described below in the Assembly Section, some semiconductor devices are processed further at the wafer level. Wafer level packaging consists of extending the wafer fabrication process to include device inter-connection and device protection processes.

Fabrication of Masks

As noted above, the photo process employs photomasks. Photomasks (or masks), are very flat pieces of quartz or glass with a layer of chrome on one side. Circuit designs are etched into the chrome. The manufacturing process to produce a mask is similar to, but much simpler than the process to make a silicon-based electrical device. Production of silicon-based devices includes many steps and can take up to several months to manufacture, whereas a mask requires relatively few steps and only about a week to manufacture. Masks are produced in the "Mask Shop" (Building 80), located in the northeast portion of the site.

The major steps involved in producing a mask are:

- Lithography
- Develop
- Etch
- Strip

These steps are very similar to those discussed above and utilize similar chemicals. The mask manufacturing process has lower emissions of VOC than the wafer manufacturing process.

Assembly

After the fabrication processes are completed, most semiconductor devices are assembled into protective packages. The wafers are first mounted on tape in a metal frame where the wafer is sectioned to separate the individual devices. Devices are picked off the tape and attached to the bonding pad of a leadframe. Die attach cure ovens heat treat the die/leadframe assembly for several hours. The die is then connected to the legs of the leadframe by fine bonding wire. A protective coating is applied to the die and hardened in die coat cure ovens. The entire die is then encapsulated with a protective molding compound. The leadframe strip is trimmed and individual leads formed on each device. The legs of individual device packages are then plated to provide reliable electrical contacts. Devices may then be sold individually or assembled into memory modules. Several VOC-containing materials are used in the assembly process.

Assembly-related research and development is also conducted at the facility. Alternative assembly processes are continually evaluated and implemented.

Test

After assembly or wafer-level packaging, the complete device is run through a series of tests for classification and final checking. There are several different tests run during this phase. Tests are conducted at varying temperatures to check for early failure and to verify the speed of each device. A final visual check of the device is conducted before they are packaged and shipped. No pollutants are currently emitted by the testing process.

Other

The facility also assembles printed circuit boards, assembles custom test equipment, and provides finished product packaging, as well as other support operations as part of its Systems Integration Group (SIG).

Support Operations

Numerous operations are conducted at the facility in support of the manufacturing process. These include, but are not limited to:

- Natural gas boilers used to supply steam for general heating and humidification;
- Cooling towers used to dissipate heat from non-contact cooling water;
- An industrial wastewater treatment plant used to treat manufacturing wastewater to levels suitable for discharge to a publicly owned treatment works;
- Temporary storage of solid and liquid hazardous waste and secondary materials generated at the facility pending shipment to a licensed off-site treatment, storage, and disposal facility or for lawful reuse or other recycling;

- Storage and dispensing of unleaded gasoline and diesel fuels;
- Use of paved and unpaved roads within the facility;
- Painting and welding in support of new construction and maintenance of existing equipment and facilities;
- Maintenance and landscaping; and the
- Testing and operation of emergency generators and fire water pumps.

Application Scope and Chronology

This permit is a renewal of an existing Facility Emission Cap (FEC) Tier II (T2) operating permit. The applicant has proposed to:

- Reduce the lead (Pb) FEC limitation to ensure compliance with NAAQS.
- Establish a fine particulate ($PM_{2.5}$) FEC limitation to ensure compliance with NAAQS.
- Update toxic air pollutant (TAP) FEC conditions to ensure compliance with TAP ambient air concentration (AAC) increments.
- Incorporate applicable requirements of National Emission Standards for Hazardous Air Pollutants (NESHAP), Subparts ZZZZ, CCCCCC, and WWWWWW.

Summary of Application Chronology

Date	Description
December 17, 2013	DEQ received a T2 renewal application (2013AAG2067).
January 13, 2014	DEQ determined that the T2 application was incomplete (2014AAG105). Additional information was requested to evaluate PSD regulatory applicability.
January 24, 2014	DEQ received information addressing PSD regulatory non-applicability (2015AAG20).
January 29, 2014	DEQ made available the draft T2 and statement of basis for peer and regional office review.
February 5, 2014	DEQ determined that the T2 application was complete (2014AAG106).
February 5, 2014	DEQ made available the draft T2 and statement of basis for applicant review (2014AAG77[v1], 2014AAG76[v1]).
April 7, 2014	DEQ met with Micron to discuss comments regarding the facility draft and to discuss permit processing timelines (2014AAG829).
April 28, 2014	DEQ sent a request for information concerning data used in the NO_x NAAQS modeling demonstrations (2014AAG845).
May 5, 2014	DEQ received information supporting data used in the NO_x NAAQS modeling demonstrations (2014AAG951).
July 14, 2014	DEQ received a supplemental information package (2014AAG1350-1353).
September 26, 2014	DEQ received a letter updating facility contact information (2014AAG1655).
December 1, 2014	DEQ made available an updated draft T2 and statement of basis for applicant review (2014AAG77[v2], 2014AAG76[v2]).
December 22 – January 21, 2015	DEQ provided a public comment period (2015AAG61, 2014AAG77[v3], 2014AAG76[v3]).
January 21 – February 5, 2015	DEQ extended a public comment period (2015AAG180).
February 5 – February 20, 2015	DEQ extended a public comment period (2015AAG338).
May 13, 2015	DEQ issued the final T2 permit and statement of basis (2014AAG77[v4], 2014AAG76 [v4]).

Permitting History

The following permit history was derived from a review of the permit files available to DEQ. Permit status is noted as active and in effect (A), superseded (S), terminated (T), or not applicable (n/a).

Summary of Permitting History

Issue Date	Permit Number	Project	Description	Status
February 12, 1981	001-00044	Initial PTC	Initial permit to construct (PTC) a semiconductor manufacturing plant.	A
April 9, 1993	001-00044	Initial PTC	Initial PTC implanter process units. Revised by permit 001-00044 issued May 16, 1994.	S
May 16, 1994	001-00044	Revised PTC	Revised PTC to revise process gas usage limits. Revised permit 001-00044 issued April 9, 1993. Revised by permit 001-00044 issued December 2, 1994.	S
December 2, 1994	001-00044	Revised PTC	Revised PTC to revise process gas usage limits. Revised permit 001-00044 issued May 16, 1994. Revoked April 7, 1995.	T
June 29, 1995	T2 001-00044	Initial T2	Initial T2 for three emergency generators. Revised by permit T2 001-00044 issued February 21, 1997.	S
February 21, 1997	T2 001-00044 (9503-034-2)	Revised T2	Revised T2 001-00044 (6/29/95) to modify emissions factors for the emergency generators.	S
December 24, 2002	T1 001-00044 (9504-046-1)	Initial T1	Initial Title V operating permit. Terminated by letter on 1/11/10.	T
February 26, 2008	T2-060033	Revised T2	Revised T2 to establish criteria and HAP FEC and incorporate limits from a consent order. Revised by permit T2-2009.0078.	S
December 23, 2009	T2-2009.0078	Revised T2	Revised T2 to reduce NO_x, CO and VOC FEC ("synthetic minor"), and to increase SO_2 and PM_{10} FEC. Revised permit T2-060033. Revised by permit T2-2009.0078 PROJ 60631.	S
January 11, 2010	n/a	n/a	Termination of Tier I after "synthetic minor" FEC limits were established under permit T2-2009.0078. Terminated permit T1 001-00044.	n/a
December 2, 2010	T2-2009.0078 PROJ 60631	Revised T2	Revised Tier II/PTC to increase VOC emission limits for coat tracks and IPA solvent tools, while maintaining established FEC limits. Revised permit T2-2009.0078. Revised by permit T2-2009.0078 PROJ 60920.	S
September 21, 2011	T2-2009.0078 PROJ 60920	Revised T2	Revised T2 to change facility contact information. Revised permit T2-2009.0078 PROJ 60631. Revised by permit T2-2013.0062 PROJ 61305.	S
May 13, 2015	T2-2013.0062 PROJ 61305	Revised T2	Revised T2 to reduce Pb FEC, establish $PM_{2.5}$ FEC, increase allowable short-term TAP concentrations and decrease allowable annual TAP concentrations. Revised permit T2-2009.0078 PROJ 60920.	A

TECHNICAL REVIEW

Emission Inventories

Emission inventories were provided in the application, including criteria, hazardous air pollutant (HAP), and GHG emissions. Refer to Appendix A – Emission Inventories for a summary of the emission estimates provided in the application.

Ambient Air Quality Impact Analyses

The applicant has demonstrated compliance to DEQ's satisfaction that emissions from this facility will not cause or significantly contribute to a violation of any ambient air quality standard. The applicant has also demonstrated preconstruction compliance to DEQ's satisfaction that facility-wide emissions will not exceed any acceptable ambient concentration (AAC) or acceptable ambient concentration for carcinogens (AACC) for toxic air pollutants (TAP).

An ambient air quality impact analyses memorandum has been crafted by DEQ based upon a review of the modeling analyses submitted in the application and has been included in Appendix E – Ambient Air Quality Impact Analyses.

REGULATORY REVIEW

Attainment Designation (40 CFR 81.313)

This facility is located in Ada County, which is designated as attainment or unclassifiable for $PM_{2.5}$, PM_{10}, SO_2, NO_2, CO, and ozone. Refer to 40 CFR 81.313 for additional information.

Title V Classification (IDAPA 58.01.01.300, 40 CFR Part 70)

MTI is not classified as a major facility, as defined by IDAPA 58.01.01.008.10.[1,2]

- The facility does not emit nor have the potential to emit ten (10) tons per year or more of any HAP.
- The facility does not emit nor have the potential to emit twenty-five (25) tpy or more of any combination of any HAP.
- The facility does not emit nor have the potential to emit one hundred (100) tons per year or more of a regulated air pollutant.

MTI has fossil fuel boilers (or combination thereof) of more than 250 MMBtu/hr heat input; therefore the facility was classified as a designated facility as defined in IDAPA 58.01.01.006.30, and fugitive emissions are required to be included when determining the major facility classification in accordance with IDAPA 58.01.01.008.10.c.i.

Refer to Appendix A for a summary of regulated air pollutant emissions.

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[1] Following the recent court decision in Utility Air Regulatory Group (UARG) v. Environmental Protection Agency (EPA), EPA has indicated that it will no longer apply or enforce federal regulatory provisions of the EPA-approved Title V programs that require a stationary source to obtain a PSD or Title V permit solely because the source emits or has the potential to emit greenhouse gas (GHG) emissions above the major source thresholds ("Step 2" sources). The State of Idaho incorporates the T1 program definition of "major facility" at IDAPA 58.01.01.008.10.d, in accordance with 40 CFR 70.2. In order to act consistent with our understanding of EPA's memorandum and the Supreme Court's decision, DEQ will no longer require PSD or T1 permits for "Step 2" sources, and will not continue processing applications for such permits. DEQ and EPA recognize that Idaho's SIP-approved regulations may require revision to effectuate the Supreme Court's decision.

[2] Next Steps and Preliminary Views on the Application of Clean Air Act Permitting Programs to Greenhouse Gases Following the Supreme Court's Decision in Utility Air Regulatory Group (UARG) v. Environmental Protection Agency (EPA), July 24, 2014.

PSD Classification (40 CFR 52.21)

MTI is not classified as an existing major stationary source as defined in 40 CFR 52.21(b)(1) and incorporated at IDAPA 58.01.01.107.[1,2]

MTI has fossil fuel boilers (or combination thereof) of more than 250 MMBtu/hr heat input; therefore the facility was classified as a designated facility as defined in IDAPA 58.01.01.006.30 and 40 CFR 52.21(b)(1)(i)(a), and fugitive emissions are required to be included when determining the major stationary source classification.

NSPS Applicability (40 CFR 60)

The facility is subject to the following New Source Performance Standards (NSPS):

- 40 CFR 60, Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units
- 40 CFR 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
- 40 CFR 60, Subpart A – General Provisions

These requirements have been incorporated by reference into the permit (Permit Conditions 3.17, 7.4, and 8.4). A list of emissions units subject to NSPS requirements will be maintained in accordance with monitoring requirements (Permit Condition 4.15).

NESHAP Applicability (40 CFR 61)

The facility is not subject to any National Emission Standards for Hazardous Air Pollutants (NESHAP) in 40 CFR 61.

MACT Applicability (40 CFR 63)

The facility is subject to the following area source Maximum Achievable Control Technology (MACT) requirements:

- 40 CFR 63, Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
- 40 CFR 63, Subpart CCCCCC – National Emission Standards for Hazardous Air Pollutants for Gasoline Dispensing Facilities
- 40 CFR 63, Subpart WWWWWW – National Emission Standards for Hazardous Air Pollutants: Area Source Standards for Plating and Polishing Operations
- 40 CFR 63, Subpart A – General Provisions

These requirements have been incorporated by reference into the permit (Permit Conditions 3.17, 5.23, 8.5, and 8.6). A list of emissions units subject to MACT requirements will be maintained in accordance with monitoring requirements (Permit Condition 4.15).

Permit Conditions Review

This section describes only those permit conditions that have been added and revised as a result of this permitting action.

Refer to Appendix A – Emission Inventories for a summary of the emission estimates provided in the application. Permit conditions which were re-ordered in addition to being re-numbered include Permit Conditions 3.10 – 3.16 and 3.17 – 3.19 (Permit Conditions 2.9 – 2.18 of T2-2009.0078 PROJ 60920).

Removed Permit Condition 2.18 of T2-2009.0078 PROJ 60920

Because performance testing requirements are addressed in General Provision 9.6, this permit condition was determined to be duplicative in nature and was removed.

Added Permit Condition 3.17

This permit condition incorporates federal regulations by reference in accordance with IDAPA 58.01.01.107.

With regard to permit conditions referenced in accordance with federal regulations, should there be a conflict between the language of the permit condition(s) and the language of the regulation(s), the language of the regulation(s) shall govern.

Revised Permit Conditions 4.1 – 4.7, 5.19, 7.2, and 8.1 (Permit Condition 3.2 - 3.3, 4.6.4, 6.3, and 7.2 of T2-2009.0078 PROJ 60920)

The PM_{10}, SO_2, NO_x, CO, VOC, Pb, and HAP emissions from this facility shall not exceed any corresponding facility emissions cap (FEC) limits listed in Table 3.2. Hazardous air pollutants are those listed in or pursuant to Section 112(b) of the Clean Air Act.

Table 3.2 FEC EMISSIONS LIMITS

Source Description	***PM_{10}***	***SO_2***	***NO_x***	***CO***	***VOC***	***Lead***	***Individual HAPs***	***Aggregate HAPs***
	T/yr[1]	***T/yr***[1]	***T/yr***[1]	***T/yr***[1]	***T/yr***[1]	***T/yr***[1]	***T/yr***[1]	***T/yr***[1]
Total Facility Emissions Cap	*62*	*17*	*92*	*75*	*96*	*0.060*	*<10*	*<25*

[1] Tons per rolling 12-month period.

Revised Permit Condition 4.1 establishes an additional $PM_{2.5}$ FEC and revises the existing lead (Pb) FEC to address new $PM_{2.5}$ and Pb NAAQS. The remaining permit conditions were updated to add $PM_{2.5}$ (in addition to PM_{10}) to existing monitoring, recordkeeping, reporting, and testing requirements to ensure compliance with the new $PM_{2.5}$ NAAQS, and to also allow the use of $PM_{2.5}$ emission factors documented in the application for this permit or as otherwise approved by DEQ.

Refer to Appendix E – Ambient Air Quality Impact Analyses for a summary of the $PM_{2.5}$ and Pb NAAQS compliance demonstration provided in the application.

Revised Permit Condition 4.10 (Permit Condition 3.5 of T2-2009.0078 PROJ 60920)

The due date for this permit condition has been updated to October 1st at the request of the applicant.

Complete chemical usage data is not typically available until 4 to 5 weeks after the end of each month, making it difficult to finalize both the monthly calculations for June and the annual report by the (superseded) September 1st deadline.

Revised Permit Condition 4.15 (Permit Condition 3.8.1 of T2-2009.0078 PROJ 60920)

A list of scrubbers, VOC abatement units, alternate VOC abatement technology units, emergency standby IC engines, boilers, and cooling towers installed at the facility shall be maintained by the permittee and provided to DEQ personnel upon request. The list shall include:

- *Identification if equipment was included in the permit application;*
- *Identification if in service at time of permit issuance;*
- *Equipment location;*
- *Installation date, if installed after permit issuance;*
- *De-installation date if removed after permit issuance; and*
- *Identification if equipment is subject to NSPS requirements (40 CFR Part 60).*

This permit condition requires recordkeeping of equipment applicable to federal requirements to ensure compliance with applicable NSPS and NESHAP (Permit Condition 3.17).

Revised Permit Condition 5.8 (Permit Condition 4.5 of T2-2009.0078 PROJ 60920)

For the purposes of this permit, certain terms are defined as follows:

- *"Coat track" means a manufacturing tool that performs a process called coat bake in a photolithography area of the facility.*
- *"Coat bake" means a batch process where liquids potentially containing volatile organic compounds (VOCs) are applied to the surface of silicon wafers and then cured.*
- *"IPA Solvent Tool" means a manufacturing tool that applies liquid isopropyl alcohol on silicon wafers in the manufacturing process.*
- *"Facility" means the manufacturing facility located at 8000 S. Federal Way, 7560 S. Federal Way, and 3851 E. Columbia Road, in Boise, Idaho.*
- *"VOC abatement unit" means a system that gathers, concentrates, and oxidizes volatile organic compounds (VOCs).*
- *"Alternate VOC abatement technology" means a VOC abatement system that will be determined and installed on a case-by-case basis as additional manufacturing equipment that is exempt from obtaining a PTC is installed at the facility.*

The "IPA Solvent Tool" definition was updated to better clarify and distinguish requirements intended for process equipment (designed for manufacturing and research and development) from other lab-scale activities.

Revised Permit Conditions 5.18 and 5.22 (Permit Condition 4.7.3 of T2-2009.0078 PROJ 60920)

The language in these permit conditions were updated for consistency with IDAPA 58.01.01.157 to reflect that a test protocol is highly encouraged, but not required, by regulation.

Added Permit Condition 5.23

This permit condition incorporates applicable federal NESHAP requirements in accordance with 40 CFR 63, Subpart WWWWWW and IDAPA 58.01.01.107.

Revised Permit Conditions 6.1 (Permit Condition 5.1.1 of T2-2009.0078 PROJ 60920)

This permit authorizes the permittee to install sources or make modifications to the facility which change emissions of pollutants listed in IDAPA 58.01.01.585 and 586. The permittee shall monitor material usage to calculate monthly average hourly process emissions of substances listed at IDAPA 8.01.01.585 and 586. If the increase in hourly emissions (E_i from Equation 5.1) exceeds 80% of the AAC or AACC for each respective pollutant (E_{ia}, from Equation 5.2 or Equation 5.3), the permittee shall conduct a refined exemption modeling analysis for the pollutant to demonstrate compliance with the respective AAC or AACC. The most recent five years of calculated emission rates and calculations shall be maintained on site and made available to DEQ representatives upon request.

E_i is calculated from the following equation;

$$E_i = \frac{E_m}{H_m} - M_u \qquad \textit{(Equation 5.1)}$$

For substances listed in IDAPA 58.01.01.585;

$$E_{ia} = \frac{\left(AAC \times 0.8 \times 1{,}000\ ^{\mu g}/_{mg}\right)}{CQ_{24\text{-}hour}} \qquad \textit{(Equation 5.2)}$$

For substances listed in IDAPA 58.01.01.586;

$$E_{ia} = \frac{\left(AACC \times 0.8\right)}{CQ_{annual}} \qquad \textit{(Equation 5.3)}$$

Where:

AAC	=	*Acceptable ambient concentration for non-carcinogens (mg/m^3)*
AACC	=	*Acceptable ambient concentration for carcinogens ($\mu g/m^3$)*
E_{ia}	=	*Increase in hourly emissions that triggers a refined modeling analysis (lb/hr)*
E_i	=	*Calculated increase in hourly emissions (lb/hr)*
E_m	=	*Calculated monthly emissions rate of each pollutant used (lb/month)*
H_m	=	*Hours in the month of the calculation (hours/month)*
M_u	=	*Baseline hourly emissions rate from Table 5.1 (lb/hr). If a baseline emissions rate for a specific pollutant does not exist in Table 5.1, then $M_u = 0$*
$CQ_{24\text{-}hr}$	=	*Chi/Q value for 24-hour averaging period = 10.35 $\mu g/m^3$ per lb/hr*
CQ_{annual}	=	*Chi/Q value for annual averaging period = 3.06 $\mu g/m^3$ per 1b/hr*

Table 5.1 BASELINE HOURLY EMISSIONS RATES

CAS #	*Material*	*Baseline Emissions (lb/yr)*	*M_u Baseline Emissions Rate (lb/hr)*
14808-60-7	*Silica –Quartz*	*16,300.0*	*1.86*
60676-86-0	*Silica Amorphous (fused)*	*2,143.6*	*0.24*

a) Baseline emissions rate is determined by dividing baseline emissions (lb/yr) by 8,760 (hr/yr).

This permit condition was updated to reflect Chi/Q values consistent with TAP modeling demonstrations, to allow stack-specific Chi/Q values to be used in refined modeling analyses, and to include an equation for calculating substances listed in IDAPA 58.01.01.586 on an annual basis.

Revised Permit Conditions 7.3 (Permit Condition 6.4 of T2-2009.0078 PROJ 60920) and 8.4, and Added Permit Conditions 8.5 and 8.6

These permit conditions incorporate applicable federal NESHAP and NSPS requirements in accordance with 40 CFR 63, Subpart ZZZZ, 40 CFR 63, Subpart CCCCCC, 40 CFR 60, Subpart Dc, 40 CFR 60, Subpart IIII, 40 CFR 60, Subpart A, and IDAPA 58.01.01.107.

At the request of the applicant, applicable minor and area source NESHAP and NSPS regulatory requirements were incorporated using high-level regulatory citations. For specific applicable requirements, the incorporated document should be consulted.

Revised Permit Condition 8.3 (Permit Condition 7.4 of T2-2009.0078 PROJ 60920)

Once per month, the permittee shall monitor and record the number of hours of operation of each emergency standby IC engine. The hours of operation shall be used to calculate rolling 12-month emissions.

As an alternative to recording the actual hours of operation each month, the permittee may monitor and record the actual hours of operation only once per year and assume that each emergency standby IC engine operates 200 hours per year. The permittee must use 200 hours per year in the rolling 12-month emissions calculations unless the actual hours of operation are greater than 200 hours per year, in which case the actual hours of operation shall be used to update the emissions calculation.

This permit condition was updated to include a default value of 100 hours per year for estimating emissions from each emergency generator engine, for consistency with the emission estimates and modeling compliance demonstrations in the application.

PUBLIC REVIEW

Public Comment Period

A public comment period was made available to the public pursuant to IDAPA 58.01.01.404.01. During this time, comments were submitted in response to DEQ's proposed action. Refer to the Application Scope and Chronology section for public comment period dates. A response to public comments document has been crafted by DEQ based on comments submitted during the public comment period. That document is part of the final permit package for this permitting action.

APPENDIX A – EMISSION INVENTORIES

FORM EI-1: POTENTIAL TO EMIT FOR NSR REGULATED POLLUTANTS (SCENARIO 1 - BUILDING 4 REDUCED OPERATING CAPCITY)

Emissions Unit Type	PM/PM_{10}	$PM_{2.5}$	SO_2	CO	NO_2	VOC	Lead	CO_2e [1]	GHG [1]
	T/yr	T/yr	T/yr	T/yr	T/yr	T/yr	T/yr	T/yr	T/yr
Point Sources									
Boiler	8.9	8.9	2.7	71.0	71.6	6.4	5.9E-04	138,340	138,208
Cooling Tower	13.0	0.12							
Emergency Engine	0.7	0.7	0.02	5.9	29.7	0.8		158	157
Scrubber	37.9	37.9	15.9		8.8				
Storage Silo	0.002	0.002							
VOC	0.8	0.8	0.3	9.4	11.1	17.0	5.6E-05	668	669
Fabrication						71.8	3.9E-02	80,085	119
Volume Sources									
WW Treatment	0.44	0.44							
PTE Totals [2]	**61.7**	**48.8**	**18.9**	**86.2**	**121.3**	**96.0**	**0.04**	**219,251**	**139,152**
Proposed FEC Limits	62	49	17	75	92	96	0.04	--	--

Notes: 1. CO_2e and GHG PTE from Appendix B-2 of Micron's June 2012 Tier I Operating Permit Application

2. Because MTI is requesting FEC limits and operational flexibility, PTE annual totals representing maximum individual equipment operations were modeled. Therefore, the PTE totals are higher than the proposed permit limits.

FORM EI-1: POTENTIAL TO EMIT FOR NSR REGULATED POLLUTANTS (SCENARIO 2 - LOW-NOx RETROFIT ON ALL BOILERS)

Emissions Unit Type	PM/PM_{10}	$PM_{2.5}$	SO_2	CO	NO_2	VOC	Lead	CO_2e [1]	GHG [1]
	T/yr	T/yr	T/yr	T/yr	T/yr	T/yr	T/yr	T/yr	T/yr
Point Sources									
Boiler	11.4	11.4	3.4	49.3	58.4	8.2	7.5E-04	138,340	138,208
Cooling Tower	13.0	0.12							
Emergency Engine	0.7	0.7	0.02	5.9	29.7	0.8		158	157
Scrubber	37.9	37.9	15.9		8.8				
Storage Silo	0.002	0.002							
VOC	0.8	0.8	0.3	9.4	11.1	17.0	5.6E-05	668	669
Fabrication						70.0	3.9E-02	80,085	119
Volume Sources									
WW Treatment	0.44	0.44							
PTE Totals [2]	**64.2**	**51.3**	**19.6**	**64.5**	**108.1**	**96.0**	**0.04**	**219,251**	**139,152**
Proposed FEC Limits	62	49	17	75	92	96	0.04	--	--

Notes: 1. CO_2e and GHG PTE from Appendix B-2 of Micron's June 2012 Tier I Operating Permit Application

2. Because MTI is requesting FEC limits and operational flexibility, PTE annual totals representing maximum individual equipment operations were modeled. Therefore, the PTE totals are higher than the proposed permit limits.

3 Facility Emissions Cap

3.1 Facility Emissions Cap

Application documents submitted to obtain Micron's current permit (T2-2009.0078) included emissions data to establish the FEC including: 1) baseline actual emissions; 2) an operational variability component; and 3) an optional growth component. The updated air dispersion modeling and ambient air impact analysis conducted for this permit renewal and Micron's consideration of future business needs do not result in any proposed changes to the existing FEC limits with the exception of the lead limit. As discussed in Sections 2.1 and 2.2, a lower lead FEC limit and a new $PM_{2.5}$ FEC limit consistent with the PM_{10} limit are proposed. All of the proposed FEC emission rates are shown in Table 3.1 below.

Table 3.1: FEC Emission Rate Summary (tpy)

	Emissions in tpy								
	PM_{10}	**$PM_{2.5}$**	**SO_2**	**NOx**	**CO**	**VOC**	**Lead**	**Individual HAPs**	**Aggregate HAPs**
Existing FEC	62	--	17	92	75	96	0.060	<10	<25
Adjustments		49					-0.020		
Proposed FEC	62	49	17	92	75	96	0.040	<10	<25

CO = carbon monoxide
HAPs = hazardous air pollutants
$PM_{2.5}$ = particulate matter smaller than 2.5 microns
PM_{10} = particulate matter smaller than 10 microns
NOx = nitrogen oxides
SO_2 = sulfur dioxide
tpy = tons per year based on a rolling 12-month period
VOC = volatile organic compounds

Micron proposes to maintain these FECs for criteria air pollutants and hazardous air pollutants. Micron continues to request permit flexibility to make changes to its current manufacturing operations, including manufacture of products other than semiconductors that would use similar manufacturing methods, similar equipment, similar abatement and similar compliance methodology. Manufacturing activities at the facility may include Micron operations, tenant operations, or other Micron business partner operations.

APPENDIX B – BOILER AND GENERATOR EQUIPMENT LIST

Table EU5.1

Boiler ID	Manufacturer	Model	Serial	Capacity (MMBtu/hr)	Modification/ Construction Date	Subject to NSPS Subpart Dc
04-BOI-01	Sellers	105E 300HP	98097-1	12.56	7/1/1984	N
04-BOI-02	Sellers	105E 300HP	98097-2	12.56	7/1/1984	N
04-BOI-03	Sellers	105E 600HP	98098	25.11	7/1/1984	N
04-BOI-04	Sellers	105E 600HP	99147	25.11	4/29/1988	N
04-BOI-05	Sellers	105E 700 HP	99260	29.3	11/10/1988	N
04-BOI-06	Sellers	105E 700 HP	99697	29.3	8/10/1990	Y
25-BOI-01	Sellers	105E 600HP	100655	25.11	8/1/1994	Y
25-BOI-02	Sellers	105E 600HP	100497-A	12.56	12/14/1993	Y
25-BOI-03	Sellers	105E 600HP	100497-B	12.56	12/14/1993	Y
25-BOI-04	Sellers	105E 600HP	100496	25.11	12/20/1993	Y
25-BOI-05	Sellers	105E 600HP	100752	25.11	1/26/1995	Y
25-BOI-06	Sellers	600 HP-SH-MODEL LN390	100953-A	25.11	11/1/1995	Y
25-BOI-07	Sellers	600 HP-SH-MODEL LN390	100953-B	25.11	11/1/1995	Y
25-BOI-08	Sellers	600 HP-SH-MODEL LN390	100968	25.11	4/21/1997	Y
25-BOI-09	Sellers	600 HP-SH-MODEL LN390	101321	25.11	4/21/1997	Y
32-BOI-01	Ajax	----------	----------	1.125	5/3/1994	N
80-BOI-01 [a]	Lochinvar	IBN 2000 (INTELLI FIN)	DO28887	2.0	11/8/2002	N
80-BOI-02 [a]	Lochinvar	IBN 2000 (INTELLI FIN)	DO28884	2.0	11/8/2002	N
80-BOI-03 [a]	Lochinvar	IBN 2000 (INTELLI FIN)	DD28886	2.0	11/8/2002	N
80-BOI-04 [a]	Lochinvar	IBN 2000 (INTELLI FIN)	DD28883	2.0	11/8/2002	N
80-BOI-05	Fulton	PHW-2000 (Pulse)	2773	2.0	11/3/2011	N
80-BOI-06	Fulton	PHW-2000 (Pulse)	2774	2.0	11/3/2011	N

a. Boilers are scheduled to be replaced.

Table EU1 - List of Individual Generators Covered under Form EU1

ID No.	Manufacturer	Model	Construction Date	Modification Date	Model Year	Maximum Rated Engine Power (BHP)	Engine Displacement (L/cyl)	Full-Load Fuel Consumption (gal/hr)	Serial No.
50-GEN-01	Cummins	QSK50-G4	11/8/2011	n/a	2011	2220	3.14	92.7	25367677
24-GEN-01	Cummins	KTA50-G3	7/30/1994	n/a	1994	1850	3.14	84	33126714
26-GEN-01	Cummins	KTA50-G3	6/1/1995	n/a	1994	1850	3.14	84	33127811
36-GEN-01	Cummins	KTA50-G3	9/10/2001	n/a	2000	1850	3.14	84	25267057
36-GEN-02	Cummins	KTA50-G3	9/10/2001	n/a	2000	1850	3.14	84	25267060
15-GEN-01	Caterpillar	3512	3/29/1989	n/a	1988	1482	4.32	74	24Z02402
01-GEN-01	Caterpillar	3512	7/28/1995	n/a	1994	1818	4.32	89.7	24Z06035
01X-GEN-01	Caterpillar	3512	7/28/1995	n/a	1995	1818	4.32	89.7	24Z06392
80-GEN-01	Caterpillar	3512	7/30/2002	n/a	2001	1818	4.32	89.7	24Z10021
4-GEN-01	Caterpillar	3512B	11/30/1996	n/a	1996	1817	4.32	94.3	6WN00091
6-GEN-01	Caterpillar	3512B	11/30/1996	n/a	1995	1817	4.32	94.3	6WN00084
17-GEN-01	Caterpillar	3512B	11/30/1996	n/a	1996	1817	4.32	94.3	6WN00090
17C-GEN-01	Caterpillar	3512B	1/5/1999	n/a	1995	1817	4.32	94.3	6WN00088
24D-GEN-02	Caterpillar	3512B	2/5/2002	n/a	1995	1817	4.32	94.3	6WN00085
24D-GEN-03	Caterpillar	3512B	2/5/2002	n/a	1994	1817	4.32	94.3	6WN00092
25-GEN-01	Caterpillar	3512B	11/30/1996	n/a	1995	1817	4.32	94.3	6WN00086
38-GEN-01	Caterpillar	3406	7/9/1997	n/a	1996	449	2.44	22.1	4RG02560
10A-GEN-01	Caterpillar	3306B	11/4/1990	n/a	1989	345	1.75	17.6	85Z05518
22C-FWP-02	Caterpillar	3408	8/1/1995	n/a	1994	481	2.25	24.7	67UI6930

Approximately 15 hr/yr of operation for each generator for testing, other emergency use as needed.

APPENDIX C – CONTROL EQUIPMENT PARAMETERS

Table SCE.1

MTI Scrubber Inventory & Parameters [a]							
CE ID No.	Stack ID No.	Manufacturer	Model No.	Type	Bed Dimensions (H x W x L) (ft)	Air Flow Rate (cfm) [b]	Liquid Flow Rate (gpm) [c]
01-FS-01	01FS01	Ceilcote	HRP-66-60	Horizontal	6 x 6 x 5	20,000	120
01-FS-02	01FS02	Ceilcote	HRP-66-60	Horizontal	6 x 6 x 5	20,000	120
01-FS-03	01FS03	Ceilcote	HRP-66-60	Horizontal	6 x 6 x 5	20,000	120
01X-FS-101	01FS101	Ceilcote	HRP-115-60	Horizontal	5 x 11 x 5	38,000	228
01X-FS-102	01FS102	Ceilcote	HRP-115-60	Horizontal	5 x 11 x 5	38,000	228
01X-FS-103	01FS103	Ceilcote	HRP-115-60	Horizontal	5 x 11 x 5	38,000	228
01X-FS-104	01FS104	Ceilcote	HRP-115-60	Horizontal	5 x 11 x 5	38,000	228
01X-AMS-105	01AMS105	Ceilcote	HRP-24-48	Horizontal	4 x 2 x 4	5,000	30
04-FS-01 [d]	04FS01	Air Chem	XF 78 (20000)	Horizontal	7 x 7 x 2	20,000	120
04-FS-02	04FS02	Wesco	H96-5S	Horizontal	9 x 6 x 5	24,000	144
05-FS-01	05FS01	Harrington	ECH 55-3 LBS	Horizontal	5 x 5 x 3	11,000	66
05-FS-02	05FS02	Harrington	ECH 55-3 LBS	Horizontal	5 x 5 x 3	11,000	66
05-FS-03	05FS03	Corrosion Controllers, Inc	-----	Horizontal	5 x 5 x 4	11,000	66
10B-FS-01 [d]	10BFS01	Wesco	H96-5S	Horizontal	9 x 6 x 5	30,000	180
15-FS-01 [f]	15FS01	Viron	VHF-108144	Horizontal	9 x 12 x 5	--	--
15-FS-02	15FS02	Viron	VHF-108144	Horizontal	9 x 12 x 5	60,000	360
15-FS-03	15FS03	Viron	VHF-108144	Horizontal	9 x 12 x 5	60,000	360
15-FS-04 [f]	15FS04	Ceilcote	SPT-132-48	Vertical	4 x 11(diameter)	--	--
15-AMS-05	15AMS05	Corrosion Controllers, Inc	-----	Horizontal	6 x 6 x 5	15,000	90
15-AMS-06	15AMS06	Corrosion Controllers, Inc	-----	Horizontal	6 x 6 x 5	15,000	90
16-FS-01	16FS01	Harrington	ECH 33-4 LB	Horizontal	3 x 3 x 4	3,000	18
16-FS-02	16FS02	Harrington	ECH 33-4 LB	Horizontal	3 x 3 x 4	3,000	18
22-FS-02	22FS02	HEE	ECV 44-5 QB	Vertical	5 x 4 x 4	5,000	128
24-FS-01	24FS01	Harrington	ECH 66-5 LBS	Horizontal	6 x 6 x 5	15,000	90
24-FS-02	24FS02	Harrington	ECH 66-5 LBS	Horizontal	6 x 6 x 5	15,000	90
24-FS-03	24FS03	Harrington	ECH 66-5 LBS	Horizontal	6 x 6 x 5	15,000	90
24-AMS-08	24AMS08	Ceilcote	HRP-46.5-60	Horizontal	6.5 x 4 x 5	15,000	90
24-AMS-14 [e]	24AMS14	TBD				15,000	90
24-FS-04	24FS04	Harrington	ECH 66-5 LBS	Horizontal	6 x 6 x 5	15,000	90
24-FS-05	24FS05	Harrington	ECH 66-5 LBS	Horizontal	6 x 6 x 5	15,000	90
24-FS-11	24FS11	Corrosion Controllers, Inc	-----	Horizontal	6 x 6 x 5	15,000	90
24-FS-06	24FS06	Harrington	ECH 99-5 TB	Horizontal	9 x 9 x 5	38,000	228
24-FS-07	24FS07	Harrington	ECH 99-5 TB	Horizontal	9 x 9 x 5	38,000	228

Table SCE.1

MTI Scrubber Inventory & Parameters [a]							
CE ID No.	Stack ID No.	Manufacturer	Model No.	Type	Bed Dimensions (H x W x L) (ft)	Air Flow Rate (cfm) [b]	Liquid Flow Rate (gpm) [c]
24-FS-09	24FS09	Ceilcote	HRP-116-60	Horizontal	6 x 11 x 5	38,000	228
24-FS-10	24FS10	Ceilcote	HRP-116-60	Horizontal	6 x 11 x 5	38,000	228
24-AMS-12	24AMS12	Corrosion Controllers, Inc	-----	Horizontal	6 x 6 x 5	15,000	90
24-AMS-13	24AMS13	Corrosion Controllers, Inc	-----	Horizontal	6 x 6 x 5	15,000	90
24D-AMS-01	24DAMS01	Corrosion Controllers, Inc	-----	Horizontal	7 x 8 x 5	35,000	210
24D-FS-01	24DFS01	Corrosion Controllers, Inc	-----	Horizontal	7 x 11 x 5	45,000	270
24D-FS-02	24DFS02	Corrosion Controllers, Inc	-----	Horizontal	7 x 11 x 5	45,000	270
24D-FS-03	24DFS03	Corrosion Controllers, Inc	-----	Horizontal	7 x 11 x 5	45,000	270
24D-FS-04	24DFS04	Corrosion Controllers, Inc	-----	Horizontal	7 x 11 x 5	45,000	270
24D-FS-05	24DFS05	HEE	ECH 711-5 QB	Horizontal	7 x 11 x 5	45,000	270
24D-MPS-01	24DMPS01	Corrosion Controllers, Inc	-----	Horizontal	7 x 8 x 5	25,000	150
26-FS-01	26FS01	Ceilcote	HRP-76-48	Horizontal	6 x 7 x 4	25,000	150
26-FS-02	26FS02	Ceilcote	HRP-76-48	Horizontal	6 x 7 x 4	25,000	150
50-AMS-01	50AMS01	HEE	ECH 55-5 QB	Horizontal	5 x 5 x 5	15,000	90
50-AMS-02	50AMS01	HEE	ECH 55-5 QB	Horizontal	5 x 5 x 5	15,000	90
50-AMS-03 [e]	50AMS01	TBD				15,000	90
50-FS-01	50FS01	HEE	ECV 1010-5 QB	Vertical	5 x 10 x 10	60,000	360
50-FS-02	50FS02	HEE	ECV 1010-5 QB	Vertical	5 x 10 x 10	60,000	360
50-FS-03	50FS03	HEE	ECV 1010-5 QB	Vertical	5 x 10 x 10	60,000	360
50-FS-04 [e]	50FS04	TBD				60,000	360
80-FS-01	80FS01	Ceilcote	HRP-67-48	Horizontal	7 x 6 x 4	25,000	150
80-FS-02	80FS02	Ceilcote	HRP-67-48	Horizontal	7 x 6 x 4	25,000	150

a. Wet scrubbers are packed bed scrubbers used throughout the facility to control emissions from acids, bases, and water soluble constituents. The recirculating contact liquid is water, maintained at a pH greater than 6 for scrubbers used to control acids. MTI typically monitors pressure drop as an indicator for maintenance, but this monitoring is not required by the T2-2009.0078 Operating Permit.

b. Exhaust flow rates represent the scrubber fan capacity, actual flow rates will vary.

c. Represents the minimum circulation rate of water needed to maintain operational effiency in wet scrubbers (6 gpm/1000 cfm), with the exception of the B22 scrubber which has a manufacturer design circulation rate of 128 gpm for abatement of a water treatment process.

d. Emergency or backup use only.

e. Future.

f. Decommissioned in 2013; Building 15 will no longer be used for manufacturing - occupancy code changed to B.

Table AO.1

MTI VOC Abatement Unit Inventory & Parameters [a]						
CE ID No.	Model	Oxidizer Rating (MMBtu/hr)	Minimum Process Air Flow (cfm)	Maximum Process Air Flow (cfm)	Minimum Oxidation Temp. (°F)	Minimum Desorption Temp. (°F)
1X-VOC-01	IZS-1500-TH	1.6	1,500	6,750	1,350	340
02-VOC-01	IZS-2400-TH	2.0	2,000	15,000	1,350	340
15-VOC-01	IZS-3546-TH	2.5	8,000	25,000	1,350	340
24A-VOC [b]	IZS-3546-TH	2.5	10,000	20,000	1,350	340
24C-VOC-03	IZS-2946-TH	1.4	7,500	15,000	1,350	340
24D-VOC-02	IZS-2946-TH	1.5	7,000	15,000	1,350	340
24E-VOC-01	IZS-1900-TH	0.8	2,200	8,500	1,350	340
50-VOC-01	IZS-3546-TH	4.1	8,000	30,000	1,350	340
80-VOC-01	IZS-1500-TH	0.9	2,000	5,000	1,350	340

a. Munter's VOC Abatement units gather, concentrate, and oxidize volatile organic compounds (VOCs) generated from manufacturing processes, Munter's process overview is attached.

b. 24A-VOC unit is scheduled for replacement with the 2.5 MMBtu/hr unit listed. Current unit is rated at 1.5 MMBtu/hr.

APPENDIX D – STACK-SPECIFIC CHI/Q VALUES

Table B.3: Chi/Q Values for Facility Stacks

Sorted by Equipment Type		
Stack ID	24-hr	Annual
	(ug/m3)/(lb/hr)	
1FS01	3.35	0.76
1FS02	3.25	0.74
1XFS101	2.39	0.51
1XFS102	2.42	0.52
1XFS103	2.44	0.52
1XAMS105	5.14	1.12
4FS02	4.89	1.03
5FS01	6.18	1.52
5FS02	6.66	1.67
5FS03	6.51	1.60
15FS01	2.95	0.75
15FS02	3.20	0.82
15FS03	3.46	0.90
15AMS05	6.39	1.60
16FS01	12.67	2.71
24FS01	3.01	0.68
24FS02	3.02	0.68
24FS03	2.80	0.64
24FS04	2.33	0.47
24FS05	2.34	0.48
24FS06	2.02	0.41
24FS07	2.03	0.43
24AMS08	2.95	0.66
24FS09	2.01	0.44
24FS11	2.28	0.48
24AMS13	2.22	0.43
24DAMS01	1.76	0.33
24DMPS01	1.91	0.38
24DFS01	1.57	0.35
24DFS02	1.62	0.34
24DFS03	1.64	0.34
26FS01	5.13	1.34
26FS02	5.27	1.40
80FS01	8.27	1.76
1FS03	3.44	0.79
1XFS104	2.45	0.53
4FS01	4.69	1.09
10BFS01	2.41	0.41
15FS04	4.08	1.04
15AMS06	6.14	1.32
16FS02	13.06	2.60
22FS02	4.74	0.69
24AMS14	2.90	0.65
24FS10	1.79	0.35
24AMS12	2.19	0.42
24DFS04	1.65	0.33
24DFS05	1.65	0.33
50AMS01	1.86	0.39
50FS01	1.49	0.33
50FS02	1.50	0.33
50FS03	1.51	0.33
50FS04	1.42	0.30
80FS02	8.20	1.85
22FUG1	28.18	3.17
22FUG2	20.78	2.30
32GE09	36.49	7.34
SILO1	7.57	1.08
SILO2	7.38	0.94

Sorted by 24-hr Impact, Hi-Lo		
Stack ID	24-hr	Annual
	(ug/m3)/(lb/hr)	
32GE09	36.49	7.34
22FUG1	28.18	3.17
22FUG2	20.78	2.30
16FS02	13.06	2.60
16FS01	12.67	2.71
80FS01	8.27	1.76
80FS02	8.20	1.85
SILO1	7.57	1.08
SILO2	7.38	0.94
5FS02	6.66	1.67
5FS03	6.51	1.60
15AMS05	6.39	1.60
5FS01	6.18	1.52
15AMS06	6.14	1.32
26FS02	5.27	1.40
1XAMS105	5.14	1.12
26FS01	5.13	1.34
4FS02	4.89	1.03
22FS02	4.74	0.69
4FS01	4.69	1.09
15FS04	4.08	1.04
15FS03	3.46	0.90
1FS03	3.44	0.79
1FS01	3.35	0.76
1FS02	3.25	0.74
15FS02	3.20	0.82
24FS02	3.02	0.68
24FS01	3.01	0.68
24AMS08	2.95	0.66
15FS01	2.95	0.75
24AMS14	2.90	0.65
24FS03	2.80	0.64
1XFS104	2.45	0.53
1XFS103	2.44	0.52
1XFS102	2.42	0.52
10BFS01	2.41	0.41
1XFS101	2.39	0.51
24FS05	2.34	0.48
24FS04	2.33	0.47
24FS11	2.28	0.48
24AMS13	2.22	0.43
24AMS12	2.19	0.42
24FS07	2.03	0.43
24FS06	2.02	0.41
24FS09	2.01	0.44
24DMPS01	1.91	0.38
50AMS01	1.86	0.39
24FS10	1.79	0.35
24DAMS01	1.76	0.33
24DFS04	1.65	0.33
24DFS05	1.65	0.33
24DFS03	1.64	0.34
24DFS02	1.62	0.34
24DFS01	1.57	0.35
50FS03	1.51	0.33
50FS02	1.50	0.33
50FS01	1.49	0.33
50FS04	1.42	0.30

Sorted by Annual Impact, Hi-Lo		
Stack ID	24-hr	Annual
	(ug/m3)/(lb/hr)	
32GE09	36.49	7.34
22FUG1	28.18	3.17
16FS01	12.67	2.71
16FS02	13.06	2.60
22FUG2	20.78	2.30
80FS02	8.20	1.85
80FS01	8.27	1.76
5FS02	6.66	1.67
15AMS05	6.39	1.60
5FS03	6.51	1.60
5FS01	6.18	1.52
26FS02	5.27	1.40
26FS01	5.13	1.34
15AMS06	6.14	1.32
1XAMS105	5.14	1.12
4FS01	4.69	1.09
SILO1	7.57	1.08
15FS04	4.08	1.04
4FS02	4.89	1.03
SILO2	7.38	0.94
15FS03	3.46	0.90
15FS02	3.20	0.82
1FS03	3.44	0.79
1FS01	3.35	0.76
15FS01	2.95	0.75
1FS02	3.25	0.74
22FS02	4.74	0.69
24FS02	3.02	0.68
24FS01	3.01	0.68
24AMS08	2.95	0.66
24AMS14	2.90	0.65
24FS03	2.80	0.64
1XFS104	2.45	0.53
1XFS103	2.44	0.52
1XFS102	2.42	0.52
1XFS101	2.39	0.51
24FS11	2.28	0.48
24FS05	2.34	0.48
24FS04	2.33	0.47
24FS09	2.01	0.44
24AMS13	2.22	0.43
24FS07	2.03	0.43
24AMS12	2.19	0.42
24FS06	2.02	0.41
10BFS01	2.41	0.41
50AMS01	1.86	0.39
24DMPS01	1.91	0.38
24FS10	1.79	0.35
24DFS01	1.57	0.35
24DFS02	1.62	0.34
24DFS03	1.64	0.34
24DFS04	1.65	0.33
50FS03	1.51	0.33
50FS02	1.50	0.33
24DAMS01	1.76	0.33
50FS01	1.49	0.33
24DFS05	1.65	0.33
50FS04	1.42	0.30

APPENDIX E – AMBIENT AIR QUALITY IMPACT ANALYSES

MEMORANDUM

DATE: May 13, 2014

TO: Morrie Lewis, Permit Writer, Air Program

FROM: Kevin Schilling, Stationary Source Modeling Coordinator, Air Program

PROJECT: T2-2013.0062 Proj 61305 Tier II FEC Renewal Application for the Micron Technology, Inc. Facility

SUBJECT: Demonstration of Compliance with IDAPA 58.01.01.203.02 (NAAQS) and 203.03 (TAPs) as it relates to air quality impact analyses.

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1.0 Summary

Micron Technology, Inc. (Micron) submitted a Tier II operating permit (Tier II OP) application, with a facility-wide emission cap (FEC), on December 17, 2013. Supplemental information and data, including revised air impact analyses, were submitted to DEQ on July 14, 2014. A minor correction was made to the air impact analyses in an April 14, 2015, submittal, following identification of an inconsistency in base elevations between sources and surrounding buildings. This memorandum provides a summary of the ambient air impact analyses submitted with the Tier II OP FEC application. It also describes DEQ's review of those analyses, additional clarifications, and conclusions.

Project-specific air quality analyses involving atmospheric dispersion modeling of estimated potential/allowable emissions associated with the facility were submitted to DEQ to demonstrate that the facility would not cause or significantly contribute to a violation of any ambient air quality standard (Idaho Air Rules Section 403.02 and 403.03).

CH2M Hill (CH2M), on behalf of Micron, performed the ambient air impact analyses for this project to demonstrate compliance with NAAQS and TAPs. The DEQ review summarized by this memorandum addressed only the rules, policies, methods, and data pertaining to the air impact analyses used to demonstrate that the estimated emissions associated with operation of the proposed facility would not cause or significantly contribute to a violation of any applicable air quality standard. This review did not evaluate compliance with other rules or analyses that do not pertain to the air impact analyses. Evaluation of emission estimates was the responsibility of the permit writer and is addressed in the main body of the Statement of Basis, and was not evaluated in this modeling review memorandum.

The submitted air quality impact analyses: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data (review of emission estimates was addressed by the DEQ permit writer); 3) adhered to established DEQ guidelines and policies for new source review dispersion modeling; 4) showed either a) that predicted pollutant concentrations from emissions associated with the project/facility as modeled were below Significant Impact Levels (SILs) or other applicable regulatory thresholds; or b) that predicted pollutant concentrations from emission associated with the project/facility as modeled, when appropriately combined with co-contributing sources and background concentrations, were below applicable National Ambient Air Quality Standards (NAAQS) at ambient air locations where and when the project/facility has a significant impact; 5) showed that Toxic Air Pollutant (TAP) emission increases associated with the project will not result in increased ambient air impacts exceeding allowable TAP increments.

Table 1 presents key assumptions and results to be considered in the development of the permit.

Air impact analyses are required by Idaho Air Rules to be conducted according to methods outlined in 40 CFR 51, Appendix W (*Guideline on Air Quality Models*). Appendix W requires that facilities be modeled using emissions and operations representative of design capacity or as limited by a federally enforceable permit condition. The submitted information and analyses demonstrated to the satisfaction of the Department that operation of the proposed facility would not cause or significantly contribute to a violation of any ambient air quality standard, provided the key conditions in Table 1 are representative of facility design capacity or operations as limited by a federally enforceable permit condition.

DEQ discovered an error in the air impact analyses while investigating a comment submitted during the December 2014 public comment period for this permitting action. Detailed review of dispersion modeling input files revealed an inconsistency between base elevations used for emissions sources and those used for buildings. This inconsistency can affect how plume downwash, caused by adjacent structures, is considered in the analyses. Micron corrected the inconsistency in all impact analyses. The correction did not substantially alter the modeled impacts and no permit conditions were changed as a result.

Table 1. KEY ASSUMPTIONS USED IN MODELING ANALYSES	
Criteria/Assumption/Result	**Explanation/Consideration**
General Emission Rates Emission rates used in the air impact analyses, as listed in this memorandum, represent maximum potential emissions as given by design capacity or as limited by the issued permit for the specific pollutant and averaging period.	Compliance has not been demonstrated for emission rates greater than those used in the modeling analyses.
Lead Emission Rates An hourly lead emission rate of 0.0091 lb/hr was used to demonstrate compliance with a 3-month rolling average standard. This equates to a 3-month emission rate of 20 lbs / 3 months.	Compliance has not been demonstrated for a 3-month averaged lead emission rate greater than 20 lbs / 3 months.
Use of TAPs X /Q Values Maximum 24-hour averaged emission rates of Idaho Air Rules Section 585 TAPs must be less than a pound/hour value equal to the following: $$AAC_i(in\ mg/m^3)\left(\frac{10^3\ \mu g/m^3}{mg/m^3}\right)\left(\frac{1}{X/Q}\right)$$ Where: *AACi* = acceptable ambient concentration for non-carcinogens of TAP "i" in Idaho Air Rules Section 585. *X/Q* = 585 TAP dispersion factor from air impact analyses = 13.1 ($\mu g/m^3$) / (lb/hr) Maximum annual averaged emission rates of Idaho Air Rules Section 586 TAPs must be less than a pound/hour value equal to the following: $$AACC_i(in\ \mu g/m^3)\left(\frac{1}{X/Q}\right)$$ Where: *AACCi* = acceptable ambient concentration for carcinogens of TAP "i" in Idaho Air Rules Section 586. *X/Q* = 586 TAP dispersion factor from air impact analyses = 2.60 ($\mu g/m^3$) / (lb/hr)	Demonstration of compliance with AACs for TAPs in Idaho Air Rules Section 585 is made on a 24-hour averaging period. Demonstration of compliance with AACCs for TAPs in Idaho Air Rules Section 586 is made on an annual averaging period.
Operation in Accordance with Modeled Operational Scenarios Scenario 1: Natural gas usage in boilers in Building 4 will not exceed 60 MMBtu/hr heat input. Micron indicated during the public comment period that Scenario 1 would no longer be an option for their facility because all boilers now use low-NOx burners (Scenario 2). Scenario 2: Utilization of all boilers at the facility following installation of low-NO_x burners on all Building 4 and Building 25 boilers. Emissions will not exceed values equal to 1.25 of those listed in Tables 3 and 4 (values in these tables are equal to 0.8 of NO_x emissions to account for the NO_2/NO_x ambient ratio). Stack locations and parameters will be as was used in the modeling input files.	NAAQS Compliance was not demonstrated for other operational scenarios.

2.0 Background Information

This section provides background information applicable to the project/facility and the area where the facility is located. It also provides a brief description of the applicable air impact analyses requirements for the permit.

2.1 Proposed Location and Area Classification

The Micron facility is located in east Boise, in Ada County, Idaho. This area is designated as an attainment or unclassifiable area for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), lead (Pb), ozone (O_3), particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}), and particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$). The area is not classified as non-attainment for any criteria pollutants.

Boise operates under a maintenance plan for CO and PM_{10}.

2.2 Air Impact Analyses Required for All Tier II Operating Permits

Idaho Air Rules Sections 403.02:

> *No Tier II operating permit shall be granted unless the applicant shows to the satisfaction of the Department that:*
>
> ***02. NAAQS.*** *The stationary source or modification would not cause or significantly contribute to a violation of any ambient air quality standard.*

Atmospheric dispersion modeling, using computerized simulations, is used to demonstrate compliance with both NAAQS and TAPs. Idaho Air Rules Section 402.03 states:

> ***03. Estimates of Ambient Concentrations.*** *All estimates of ambient concentrations shall be based on the applicable air quality models, databases, and other requirements specified in 40 CFR 51 Appendix W (Guideline on Air Quality Models).*

2.3 Significant Impact Level and Cumulative NAAQS Impact Analyses

Significant Impact Level (SIL) analyses for a facility involve modeling estimated criteria air pollutant emissions from the project/facility to determine the potential impacts to ambient air. Air impact analyses are required by Idaho Air Rules to be conducted according to methods outlined in 40 CFR 51, Appendix W (Guideline on Air Quality Models). Appendix W requires that facilities be modeled using emissions and operations representative of design capacity or as limited by a federally enforceable permit condition.

A project/facility is considered to have a significant impact on air quality if maximum modeled impacts to ambient air exceed the established SIL listed in Idaho Air Rules Section 006 (referred to as a significant contribution in Idaho Air Rules) or as incorporated by reference as per Idaho Air Rules Section 107.03.b. Table 2 lists the applicable SILs.

If modeled maximum pollutant impacts to ambient air from the emission sources associated with a project/facility exceed the SILs, a cumulative NAAQS impact analysis is necessary to demonstrate compliance with NAAQS and Idaho Air Rules Section 403.02.

Table 2. APPLICABLE REGULATORY LIMITS				
Pollutant	Averaging Period	Significant Impact Levels[a] ($\mu g/m^3$)[b]	Regulatory Limit[c] ($\mu g/m^3$)	Modeled Design Value Used[d]
PM_{10}[e]	24-hour	5.0	150[f]	Maximum 6th highest[g]
$PM_{2.5}$[h]	24-hour	1.2	35[i]	Mean of maximum 8th highest[j]
	Annual	0.3	12[k]	Mean of maximum 1st highest[l]
Carbon monoxide (CO)	1-hour	2,000	40,000[m]	Maximum 2nd highest[n]
	8-hour	500	10,000[m]	Maximum 2nd highest[n]
Sulfur Dioxide (SO_2)	1-hour	3 ppb[o] (7.8 $\mu g/m^3$)	75 ppb[p] (196 $\mu g/m^3$)	Mean of maximum 4th highest[q]
	3-hour	25	1,300[m]	Maximum 2nd highest[n]
	24-hour	5	365[m]	Maximum 2nd highest[n]
	Annual	1.0	80[r]	Maximum 1st highest[n]
Nitrogen Dioxide (NO_2)	1-hour	4 ppb (7.5 $\mu g/m^3$)	100 ppb[s] (188 $\mu g/m^3$)	Mean of maximum 8th highest[t]
	Annual	1.0	100[r]	Maximum 1st highest[n]
Lead (Pb)	3-month[u]	NA	0.15[r]	Maximum 1st highest[n]
	Quarterly	NA	1.5[r]	Maximum 1st highest[n]
Ozone (O_3)	8-hour	40 TPY VOC[v]	75 ppb[w]	Not typically modeled

a. Idaho Air Rules Section 006 (definition for significant contribution) or as incorporated by reference as per Idaho Air Rules Section 107.03.b.
b. Micrograms per cubic meter.
c. Incorporated into Idaho Air Rules by reference, as per Idaho Air Rules Section 107.
d. The maximum 1st highest modeled value is always used for the significant impact analysis unless indicated otherwise. Modeled design values are calculated for each ambient air receptor.
e. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
f. Not to be exceeded more than once per year on average over 3 years.
g. Concentration at any modeled receptor when using five years of meteorological data.
h. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
i. 3-year mean of the upper 98th percentile of the annual distribution of 24-hour concentrations.
j. 5-year mean of the 8th highest modeled 24-hour concentrations at the modeled receptor for each year of meteorological data modeled. For the SIL analysis, the 5-year mean of the 1st highest modeled 24-hour impacts at the modeled receptor for each year.
k. 3-year mean of annual concentration.
l. 5-year mean of annual averages at the modeled receptor.
m. Not to be exceeded more than once per year.
n. Concentration at any modeled receptor.
o. Interim SIL established by EPA policy memorandum.
p. 3-year mean of the upper 99th percentile of the annual distribution of maximum daily 1-hour concentrations.
q. 5-year mean of the 4th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of 1st highest modeled 1-hour impacts for each year is used.
r. Not to be exceeded in any calendar year.
s. 3-year mean of the upper 98th percentile of the annual distribution of maximum daily 1-hour concentrations.
t. 5-year mean of the 8th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of maximum modeled 1-hour impacts for each year is used.
u. 3-month rolling average.
v. An annual emission rate of 40 ton/year of volatile organic compounds (VOCs) is considered significant for O_3.
w. Annual 4th highest daily maximum 8-hour concentration averaged over three years.

A cumulative NAAQS impact analysis for attainment area pollutants involves assessing ambient impacts (typically the design values consistent with the form of the standard) from facility-wide emissions, and emissions from any nearby co-contributing sources, and then adding a DEQ-approved background concentration value to the modeled result that is appropriate for the criteria pollutant/averaging-period at the facility location and the area of significant impact. The resulting pollutant concentrations in ambient air are then compared to the NAAQS listed in Table 2. Table 2 also lists SILs and specifies the modeled design value that must be used for comparison to the NAAQS. NAAQS compliance is evaluated on a receptor-by-receptor basis for the modeling domain.

If the cumulative NAAQS impact analysis indicates a violation of the standard, the permit may not be issued if the proposed project/facility has a significant contribution (exceeding the SIL) to the modeled violation. This evaluation is made specific to both time and space. If impacts from the project/facility are below the SIL at specific receptors showing NAAQS violations during the time periods when a modeled violation occurred, then the project/facility does not have a significant contribution to a violation.

Compliance with Idaho Air Rules Section 403.02 is generally demonstrated if: a) all modeled impacts of the SIL analysis are below the applicable SIL or other level determined to be inconsequential to NAAQS compliance; or b) modeled design values of the cumulative NAAQS impact analysis (modeling all emissions from the facility and co-contributing sources, and adding a background concentration) are less than applicable NAAQS at receptors where impacts from the project/facility exceeded the SIL or other identified level of consequence; or c) if the cumulative NAAQS analysis showed NAAQS violations, the impact of project/facility to any modeled violation was inconsequential (typically assumed to be less than the established SIL) for that specific receptor and for the specific modeled time when the violation occurred.

The $PM_{2.5}$ annual standard was changed from 15 $\mu g/m^3$ to 12 $\mu g/m^3$ on December 14, 2012. The revised standard was not applicable for permitting purposes until it was incorporated *sine die* into Idaho Air Rules (Spring 2014). The December 13, 2013, submitted application used the 15 $\mu g/m^3$ NAAQS standard for the compliance demonstration. The July 14, 2014, revised analyses used the 12 $\mu g/m^3$ annual $PM_{2.5}$ NAAQS.

2.4 Toxic Air Pollutant Analyses

Emissions of toxic substances are generally addressed by Idaho Air Rules Section 161:

> *Any contaminant which is by its nature toxic to human or animal life or vegetation shall not be emitted in such quantities or concentrations as to alone, or in combination with other contaminants, injure or unreasonably affect human or animal life or vegetation.*

Permitting requirements for TAPs from new or modified sources are specifically addressed by Idaho Air Rules Section 203.03 and require the applicant to demonstrate to the satisfaction of DEQ the following:

> *Using the methods provided in Section 210, the emissions of toxic air pollutants from the stationary source or modification would not injure or unreasonably affect human or animal life or vegetation as required by Section 161. Compliance with all applicable toxic air pollutant carcinogenic increments and toxic air pollutant non-carcinogenic increments will also demonstrate preconstruction compliance with Section 161 with regards to the pollutants listed in Sections 585 and 586.*

Per Section 210, if the total project-wide emission increase of any TAP associated with a new source or modification exceeds screening emission levels (ELs) of Idaho Air Rules Section 585 or 586, then the ambient impact of the emission increase must be estimated. If ambient impacts are less than applicable acceptable ambient concentrations (AACs) for non-carcinogens of Idaho Air Rules Section 585 and acceptable ambient concentrations for carcinogens (AACCs) of Idaho Air Rules Section 586, then compliance with TAP requirements has been demonstrated.

Idaho Air Rules Section 210.20 states that if TAP emissions from a specific source are regulated by the Department or EPA under 40 CFR 60, 61, or 63, then a TAP impact analysis under Section 210 is not required for that TAP.

3.0 Analytical Methods and Data

This section describes the methods and data used in analyses to demonstrate compliance with applicable air quality impact requirements.

3.1 Emission Source Data

Emission rates of criteria pollutants and TAPs for the Micron facility were provided by CH2M for various applicable averaging periods. Review and approval of estimated emissions was the responsibility of the DEQ permit writer, and is not addressed in this modeling memorandum. DEQ modeling review included verification that the application's potential emission rates were properly used in the model. The rates listed must represent the maximum allowable rate as averaged over the specified period.

Emission rates used in the dispersion modeling analyses submitted by CH2M were reviewed by the DEQ permit writer against those in the emission inventories of the permit application. All modeled criteria air pollutant and TAP emission rates were equal to or greater than the facility's emissions calculated in the Tier II operating permit application or requested permit allowable emission rates.

3.1.1 Criteria Pollutant Emission Rates

Two operational scenarios were used in the revised analyses submitted on July 14, 2014, to demonstrate compliance with all NAAQS except for Pb. Scenario 1 involved limiting fuel use for boilers in Building 4 to a combined 60 MMBtu/hour heat input. Rather than evenly distribute emissions among all boilers in Building 4, CH2M conservatively assumed all emissions occurred from Boilers 4BOI05 and 4BOI06. Scenario 2 involved utilization of all boilers at the facility following installation of low-NO_x burners on all Building 4 and Building 25 boilers.

Micron indicated, during the public comment period for this permit, that Scenario 1 would no longer be considered as an option for this facility. Since all boilers are now equipped with low-NOx burners, Scenario 2 is the only operational condition.

Table 3 lists criteria pollutant modeled emission rates for the Micron facility that were used in the project-specific modeling analyses for short-term averaging periods for Scenario 2. Table 4 lists modeled emission rates for annual averaging periods.

Emissions rates for maximum 1-hour averaged oxides of nitrogen (NO_x) had a 0.8 adjustment factor applied to them to account for a 0.8 NO_2/NO_x maximum ambient ratio, as described in Section 3.3.11.

Modeling Applicability

Facility-wide potential emissions of PM_{10}, $PM_{2.5}$, NO_x, CO, SO_2, and Pb exceed modeling thresholds stated in the *State of Idaho Guideline for Performing Air Quality Impact Analyses*[1] (*Idaho Air Modeling Guideline*), thereby requiring a NAAQS impact analysis in accordance to Idaho Air Rules Section 403.02.

Table 3. SHORT-TERM ANALYSES (FORMERLY SCENARIO 2) MODELED CRITERIA POLLUTANT EMISSIONS						
Source ID	Description	Emission Rates (lb/hr[a])				
		NO_x[b]	PM_{10}[c]	$PM_{2.5}$[d]	CO[e]	SO_2[f]
Point Sources						
4BOI01	Boiler	0.360[g]	0.0935[g]	0.0935[g]	0.382[g]	0.028[g]
4BOI02	Boiler	0.360[g]	0.0935[g]	0.0935[g]	0.382[g]	0.028[g]
4BOI03	Boiler	0.720[g]	0.187[g]	0.187[g]	0.763[g]	0.057[g]
4BOI04	Boiler	0.720[g]	0.187[g]	0.187[g]	0.763[g]	0.057[g]
4BOI05	Boiler	0.840[g]	0.218[g]	0.218[g]	0.891[g]	0.066[g]
4BOI06	Boiler	0.840[g]	0.218[g]	0.218[g]	0.891[g]	0.066[g]
25BOI01	Boiler	0.720[g]	0.187[g]	0.187[g]	0.763[g]	0.057[g]
25BOI02	Boiler	0.360[g]	0.094[g]	0.094[g]	0.382[g]	0.028[g]
25BOI03	Boiler	0.360[g]	0.094[g]	0.094[g]	0.382[g]	0.028[g]
25BOI04	Boiler	0.720[g]	0.187[g]	0.187[g]	0.763[g]	0.057[g]
25BOI05	Boiler	0.720[g]	0.187[g]	0.187[g]	0.763[g]	0.057[g]
25BOI06	Boiler	0.720[g]	0.187[g]	0.187[g]	0.763[g]	0.057[g]
25BOI07	Boiler	0.720[g]	0.187[g]	0.187[g]	0.763[g]	0.057[g]
25BOI08	Boiler	0.720[g]	0.187[g]	0.187[g]	0.763[g]	0.057[g]
25BOI09	Boiler	0.720[g]	0.187[g]	0.187[g]	0.763[g]	0.057[g]
32BOI01	Boiler	0.090[g]	0.0084[g]	0.0084[g]	0.0919[g]	0.0025[g]
80BOI1	Boiler	0.930[g]	0.0894[g]	0.0894[g]	0.981[g]	0.027[g]
1GEN01	Emergency Generator	Not Modeled[h]	0.048	0.048	6.36	0.022
1XGEN01	Emergency Generator	Not Modeled[h]	0.048	0.048	6.36	0.022
4GEN01	Emergency Generator	Not Modeled[h]	0.032	0.032	10.65	0.022
6GEN01	Emergency Generator	Not Modeled[h]	0.032	0.032	10.65	0.022
10AGEN01	Emergency Generator	Not Modeled[h]	0.032	0.032	2.31	0.0037
15GEN01	Emergency Generator	Not Modeled[h]	0.037	0.037	4.90	0.017
17GEN01	Emergency Generator	Not Modeled[h]	0.032	0.032	10.65	0.022
17CGEN01	Emergency Generator	Not Modeled[h]	0.032	0.032	10.65	0.022
24GEN01	Emergency Generator	Not Modeled[h]	0.012	0.012	2.37	0.022
24DGEN02	Emergency Generator	Not Modeled[h]	0.032	0.032	10.65	0.022
24DGEN03	Emergency Generator	Not Modeled[h]	0.032	0.032	10.65	0.022
25GEN01	Emergency Generator	Not Modeled[h]	0.032	0.032	10.65	0.022
26GEN01	Emergency Generator	Not Modeled[h]	0.012	0.012	2.37	0.022
36GEN01	Emergency Generator	Not Modeled[h]	0.012	0.012	2.37	0.022
36GEN02	Emergency Generator	Not Modeled[h]	0.012	0.012	2.37	0.022
38GEN01	Emergency Generator	Not Modeled[h]	0.035	0.035	2.93	0.0047
50GEN01	Emergency Generator	Not Modeled[h]	0.005	0.005	1.79	0.022
80GEN01	Emergency Generator	Not Modeled[h]	0.048	0.048	6.36	0.022
FWP2	Fire Water Pump	Not Modeled[h]	0.022	0.022	2.14	0.0053
1XVOC	VOC abatement unit	0.180	0.018	0.018	0.194	0.0050
2VOC	VOC abatement unit	0.240	0.022	0.022	0.247	0.0070
15VOC	VOC abatement unit	0.290	0.028	0.028	0.305	0.0080
24AVOC	VOC abatement unit	0.290	0.028	0.028	0.305	0.0080
24CVOC	VOC abatement unit	0.170	0.016	0.016	0.178	0.0050
24DVOC	VOC abatement unit	0.180	0.017	0.017	0.190	0.0050
24EVOC	VOC abatement unit	0.0900	0.009	0.009	0.095	0.0030
50VOC01	VOC abatement unit	0.480	0.046	0.046	0.508	0.0140
80VOC	VOC abatement unit	0.110	0.010	0.010	0.114	0.0030
1FS01	Acid scrubber		0.145	0.145		
1FS02	Acid scrubber		0.145	0.145		
1XFS101	Acid scrubber	0.0600	0.275	0.275		

Table 3. SHORT-TERM ANALYSES (FORMERLY SCENARIO 2) MODELED CRITERIA POLLUTANT EMISSIONS						
Source ID	Description	Emission Rates (lb/hr[a])				
		NO_x[b]	PM_{10}[c]	$PM_{2.5}$[d]	CO[e]	SO_2[f]
1XFS102	Acid scrubber	0.0600	0.275	0.275		
1XFS103	Acid scrubber		0.275	0.275		
1XAMS105	Ammonia scrubber		0.084	0.084		
4FS02	Acid scrubber		0.130	0.130		
5FS01	Acid scrubber		0.060	0.060		
5FS02	Acid scrubber		0.060	0.060		
15FS01	Acid scrubber	0.0400				0.090
15FS02	Acid scrubber	0.0400	0.434	0.434		0.090
15FS03	Acid scrubber	0.0400				
15AMS05	Ammonia scrubber		0.167	0.167		
16FS01	Acid scrubber		0.022	0.022		
24FS01	Acid scrubber		0.109	0.109		
24FS02	Acid scrubber		0.109	0.109		
24FS03	Acid scrubber		0.109	0.109		
24FS04	Acid scrubber		0.109	0.109		
24FS05	Acid scrubber		0.109	0.109		
24FS06	Acid scrubber		0.275	0.275		
24FS07	Acid scrubber		0.275	0.275		
24AMS08	Ammonia scrubber	0.540	0.251	0.251		
24FS09	Acid scrubber		0.275	0.275		
24AMS13	Ammonia scrubber		0.251	0.251		
24DAMS01	Ammonia scrubber		0.585	0.585		
24DMPS01	Multi-purpose scrubber		0.136	0.136		
24DFS01	Acid scrubber	0.110	0.326	0.326		0.090
24DFS02	Acid scrubber	0.110	0.326	0.326		0.090
24DFS03	Acid scrubber	0.110	0.326	0.326		
26FS01	Acid scrubber		0.226	0.226		
80FS01	Acid scrubber		0.226	0.226		
SILO1	Silo 1		0.0023	0.0023		
22FS02	Acid scrubber		0.102	0.102		6.00
24DFS04	Acid scrubber	0.110	0.326	0.326		
50AMS01	Ammonia scrubber		0.501	0.501		
50FS01	Acid scrubber	0.220	0.543	0.543		0.090
50FS02	Acid scrubber	0.220	0.543	0.543		0.090
50FS04	Acid scrubber		0.543	0.543		0.090
4COOL01	Cooling Tower		0.056	0.00051		
4COOL02	Cooling Tower		0.056	0.00051		
4COOL03	Cooling Tower		0.056	0.00051		
4COOL04	Cooling Tower		0.056	0.00051		
4COOL05	Cooling Tower		0.056	0.00051		
4COOL08	Cooling Tower		0.150	0.0014		
4COOL09	Cooling Tower		0.150	0.0014		
38COOL01	Cooling Tower		0.173	0.0019		
38COOL02	Cooling Tower		0.173	0.0019		
6COOL01	Cooling Tower		0.065	0.00017		
25COOL01	Cooling Tower		0.150	0.0014		
25COOL02	Cooling Tower		0.150	0.0014		
25COOL03	Cooling Tower		0.150	0.0014		
25COOL04	Cooling Tower		0.150	0.0014		
25COOL05	Cooling Tower		0.345	0.0033		
25COOL06	Cooling Tower		0.345	0.0033		
25COOL07	Cooling Tower		0.345	0.0033		

Table 3. SHORT-TERM ANALYSES (FORMERLY SCENARIO 2) MODELED CRITERIA POLLUTANT EMISSIONS						
Source ID	Description	Emission Rates (lb/hr[a])				
		NO_x[b]	PM_{10}[c]	$PM_{2.5}$[d]	CO[e]	SO_2[f]
25COOL08	Cooling Tower		0.345	0.0033		
Volume Sources						
22FUG1	Building 22 Fugitives		0.05	0.05		
22FUG2	Building 22 Fugitives		0.05	0.05		

a. Pounds per hour.
b. Oxides of nitrogen, 1-hour averaging period. Assumes 0.8 NO_x to NO_2 default ambient ratio applied to source emission rate.
c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers, 24-hour averaging period.
d. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers, 24-hour averaging period.
e. Carbon monoxide, 1-hour and 8-hour averaging period.
f. Sulfur dioxide, 1-hour, 3-hour, and 24-hour averaging period.
g. Scenario 2 involves utilization of all boilers at the facility following installation of low-NO_x burners on all Building 4 and Building 25 boilers.
h. The source was not included in 1-hour NO_2 impact modeling analyses according to DEQ's guidance policy for intermittent emissions from emergency engines. See the sub-section on Intermittent Emission Source in this section.

Table 4. ANNUAL AVERAGE ANALYSES CRITERIA POLLUTANT EMISSIONS				
Source ID	Description	Emission Rates (lb/hr[a])		
		NO_x[b]	$PM_{2.5}$[c]	SO_2[d]
Point Sources				
4BOI01	Boiler	0.904	0.0936	0.0283
4BOI02	Boiler	0.904	0.0936	0.0283
4BOI03	Boiler	1.808	0.187	0.0566
4BOI04	Boiler	1.808	0.187	0.0566
4BOI05	Boiler	2.110	0.218	0.0660
4BOI06	Boiler	2.110	0.218	0.0660
25BOI01	Boiler	1.808	0.187	0.0566
25BOI02	Boiler	0.904	0.0936	0.0283
25BOI03	Boiler	0.904	0.0936	0.0283
25BOI04	Boiler	1.808	0.187	0.0566
25BOI05	Boiler	1.808	0.187	0.0566
25BOI06	Boiler	0.904	0.187	0.0566
25BOI07	Boiler	0.904	0.187	0.0566
25BOI08	Boiler	0.904	0.187	0.0566
25BOI09	Boiler	0.904	0.187	0.0566
32BOI01	Boiler	0.109	0.00845	0.0025
80BOI1	Boiler	1.167	0.0895	0.0272
1GEN01	Emergency Generator[e]	0.407	0.0132	0.00025
1XGEN01	Emergency Generator[e]	0.407	0.0132	0.00025
4GEN01	Emergency Generator[e]	0.332	0.00868	0.00025
6GEN01	Emergency Generator[e]	0.332	0.00868	0.00025
10AGEN01	Emergency Generator[e]	0.122	0.00868	4.34E-5
15GEN01	Emergency Generator[e]	0.313	0.0103	1.94E-4
17GEN01	Emergency Generator[e]	0.332	0.00868	0.00025
17CGEN01	Emergency Generator[e]	0.332	0.00868	0.00025
24GEN01	Emergency Generator[e]	0.587	0.00320	0.00025
24DGEN02	Emergency Generator[e]	0.332	0.00868	0.00025
24DGEN03	Emergency Generator[e]	0.332	0.00868	0.00025
25GEN01	Emergency Generator[e]	0.332	0.00868	0.00025

Table 4. ANNUAL AVERAGE ANALYSES CRITERIA POLLUTANT EMISSIONS				
Source ID	Description	Emission Rates (lb/hr[a])		
		NO_x[b]	$PM_{2.5}$[c]	SO_2[d]
26GEN01	Emergency Generator[e]	0.587	0.00320	0.00025
36GEN01	Emergency Generator[e]	0.587	0.00320	0.00025
36GEN02	Emergency Generator[e]	0.587	0.00320	0.00025
38GEN01	Emergency Generator[e]	0.105	0.00982	5.48E-5
50GEN01	Emergency Generator[e]	0.251	0.00137	0.00025
80GEN01	Emergency Generator[e]	0.407	0.0132	0.00025
FWP2	Fire Water Pump[e]	0.100	0.00594	5.94E-5
1XVOC	VOC abatement unit	0.231	0.0176	0.00525
2VOC	VOC abatement unit	0.294	0.0224	0.00662
15VOC	VOC abatement unit	0.363	0.0276	0.00822
24AVOC	VOC abatement unit	0.363	0.0276	0.00822
24CVOC	VOC abatement unit	0.212	0.0160	0.00479
24DVOC	VOC abatement unit	0.227	0.0171	0.00525
24EVOC	VOC abatement unit	0.113	0.00868	0.00251
50VOC01	VOC abatement unit	0.605	0.0459	0.0137
80VOC	VOC abatement unit	0.136	0.0103	0.00320
1FS01	Acid scrubber		0.145	
1FS02	Acid scrubber		0.145	
1XFS101	Acid scrubber	0.0692	0.275	
1XFS102	Acid scrubber	0.0692	0.275	
1XFS103	Acid scrubber		0.275	
1XAMS105	Ammonia scrubber		0.0836	
4FS02	Acid scrubber		0.130	
5FS01	Acid scrubber		0.0598	
5FS02	Acid scrubber		0.0598	
15FS01	Acid scrubber	0.0461	0.0434	0.0900
15FS02	Acid scrubber	0.0461	0.0598	0.0900
15FS03	Acid scrubber	0.0461		
15AMS05	Ammonia scrubber		0.1671	
16FS01	Acid scrubber		0.0217	
24FS01	Acid scrubber		0.1087	
24FS02	Acid scrubber		0.1087	
24FS03	Acid scrubber		0.1087	
24FS04	Acid scrubber		0.1087	
24FS05	Acid scrubber		0.1087	
24FS06	Acid scrubber		0.2751	
24FS07	Acid scrubber		0.2751	
24AMS08	Ammonia scrubber	0.680	0.2505	
24FS09	Acid scrubber		0.2751	
24AMS13	Ammonia scrubber		0.02505	
24DAMS01	Ammonia scrubber		0.5847	
24DMPS01	Multi-purpose scrubber		0.1356	
24DFS01	Acid scrubber	0.138	0.3258	0.0900
24DFS02	Acid scrubber	0.138	0.3258	0.0900
24DFS03	Acid scrubber	0.138	0.3258	
26FS01	Acid scrubber		0.2263	
80FS01	Acid scrubber		0.2263	
SILO1	Silo 1		3.88E-4	
22FS02	Acid scrubber		0.1023	3.00
24DFS04	Acid scrubber	0.138	0.3258	
50AMS01	Ammonia scrubber		0.5011	
50FS01	Acid scrubber	0.277	0.5429	0.0900

Table 4. ANNUAL AVERAGE ANALYSES CRITERIA POLLUTANT EMISSIONS				
Source ID	Description	Emission Rates (lb/hr[a])		
		NO_x[b]	$PM_{2.5}$[c]	SO_2[d]
50FS02	Acid scrubber	0.277	0.5429	0.0900
50FS04	Acid scrubber		0.5429	0.0900
4COOL01	Cooling Tower		0.0564	
4COOL02	Cooling Tower		0.0564	
4COOL03	Cooling Tower		0.0564	
4COOL04	Cooling Tower		0.0564	
4COOL05	Cooling Tower		0.0564	
4COOL08	Cooling Tower		0.1502	
4COOL09	Cooling Tower		0.1502	
38COOL01	Cooling Tower		0.1726	
38COOL02	Cooling Tower		0.1726	
6COOL01	Cooling Tower		0.0253	
25COOL01	Cooling Tower		0.1297	
25COOL02	Cooling Tower		0.1297	
25COOL03	Cooling Tower		0.1297	
25COOL04	Cooling Tower		0.1297	
25COOL05	Cooling Tower		0.3452	
25COOL06	Cooling Tower		0.3452	
25COOL07	Cooling Tower		0.3452	
25COOL08	Cooling Tower		0.3452	
Volume Sources				
22FUG1	Building 22 Fugitives		0.05	
22FUG2	Building 22 Fugitives		0.05	

a. Pounds per hour. Emission rates represent total annual emissions divided by 8,760 hour/year to give an annual average hourly rate.
b. Oxides of nitrogen.
c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
d. Sulfur dioxide.
e. Annual operating hours of 100 hours/year for the emergency generator engines and fire water pump engine, averaged over 8,760 hours/year.

Ozone (O_3) differs from other criteria pollutants in that it is not typically emitted directly into the atmosphere. O_3 is formed in the atmosphere through reactions of volatile organic compounds (VOCs), NO_x, and sunlight. Emissions of VOCs and NO_x from the Micron facility were evaluated for their potential to cause a violation of the 8-hour O_3 NAAQS.

Atmospheric dispersion models used in stationary source air permitting analyses (see Section 3.3.3) cannot be used to estimate O_3 impacts resulting from VOC and NO_x emissions from an industrial facility. O_3 concentrations resulting from area-wide emissions are predicted by using more complex airshed models such as the Community Multi-Scale Air Quality (CMAQ) modeling system. Use of the CMAQ model is very resource intensive and DEQ determined that performing a CMAQ analysis for a particular permit application is not typically a reasonable or necessary requirement for air quality permitting.

Addressing secondary formation of O_3 has been somewhat addressed in EPA regulation and policy. As stated in a letter from Gina McCarthy of EPA to Robert Ukeiley, acting on behalf of the Sierra Club (letter from Gina McCarthy, Assistant Administrator, United States Environmental Protection Agency (EPA), to Robert Ukeiley, January 4, 2012):

. . . footnote 1 to sections 51.166(I)(5)(I) of the EPA's regulations says the following: "No de minimis air quality level is provided for ozone. However, any net emission increase of 100 tons per year or more of volatile organic compounds or nitrogen oxides subject to PSD would be required to perform an ambient impact analysis, including the gathering of air quality data."

The EPA believes it unlikely a source emitting below these levels would contribute to such a violation of the 8-hour ozone NAAQS, but consultation with an EPA Regional Office should still be conducted in accordance with section 5.2.1.c. of Appendix W when reviewing an application for sources with emissions of these ozone precursors below 100 TPY."

Allowable emission estimates of VOCs and NO_x are below the 100 tons/year threshold, and DEQ determined it was not appropriate or necessary to require a quantitative source specific O_3 impact analysis.

Intermittent Emission Sources

Emissions from the testing of emergency generator engines (source IDs of the form XXGENXX in the model input files) are intermittent sources that only operate on an infrequent basis. The internal combustion (IC) engines are only used for emergency conditions and during periodic operational testing. As such, these sources are difficult to model in a way that accounts for impacts in a reasonably accurate but conservative manner.

For air quality standards that use the maximum observed concentration or second highest concentration as the compliance design value, regulatory assessment of pollutant impacts from intermittent sources can be appropriately modeled assuming continual operation. This assumption is appropriate because the source could be reasonably expected to operate during worst-case conditions, and the highest impact is the value used to evaluate compliance. For NAAQS having an averaging period longer than 1 hour (e.g., 8-hour, 24-hour, or annual NAAQS), short-term emissions can often be smeared or distributed over the longer averaging period, calculating an average emission rate for the period of interest.

The main challenge of accurately modeling intermittent sources to evaluate the potential for violating the 1-hour NO_2 NAAQS arises because of the probabilistic form of the standard. The probabilistic form of the NAAQS causes the operational frequency of an intermittent source to be a key consideration in the compliance evaluation. For example, if the only source at a facility is an intermittent source that operates once every quarter or four times per year, it is nearly impossible for the source to cause or contribute to a violation of the 1-hour NO_2 standard unless the background NO_2 concentration periodically exceeds the standard. For this example, the source does not operate frequently enough (four times each year) to impact the design concentration, which is the 3-year average of the 98^{th} percentile of the annual distribution of daily maximum 1-hour concentrations. The 1-hour NO_2 design value at any specific ambient air location is estimated through dispersion modeling by using the 5-year average of the eighth highest of the daily 1-hour maximum concentrations from each year. However, if the facility has additional NO_2 sources of substantial magnitude, the contribution of the NO_2 emissions from even a very infrequent NO_2 source could measurably affect compliance with the 1-hour NO_2 NAAQS at some downwind locations.

Demonstrating NAAQS compliance for permitting purposes typically involves modeling permit allowable emissions over all allowable operation times, which often is continual operation (8,760 hours per year). If a source is allowed to operate during any particular hour of the year, then modeling is performed by assessing the impacts for each hour of the year. Modeling an intermittent source by assuming continual operation would artificially skew the distribution, thereby over-representing the source's impact. However, specific hours during which an intermittent source will operate are usually unknown.

The EPA provided guidance on modeling intermittent NO_2 sources in a March 2011 memorandum from Tyler Fox, leader of the air quality modeling group, to regional air directors.[2] The memo identifies the problem with modeling intermittent sources as a continuous source:

> We are concerned that assuming continuous operations for intermittent emissions would effectively impose an additional level of stringency beyond that intended by the level of the standard itself. As a result, we feel that it would be inappropriate to implement the 1-hour NO_2 standard in such a manner and recommend that compliance demonstrations for the 1-hour NO_2 NAAQS be based on emission scenarios that can logically be assumed to be *relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations* [emphasis added]. EPA believes that existing modeling guidelines provide sufficient discretion for reviewing authorities to exclude certain types of intermittent emissions from compliance demonstrations for the 1-hour NO_2 standard under these circumstances.

DEQ developed a guidance policy in 2013 on modeling intermittent sources for compliance with the 1-hour NO_2 NAAQS. The following is stated from the policy:

> Upon a review of other states' application of the Tyler Fox memo, comments from the public and Idaho industry, an internal review of Idaho sources, NO_2 background levels, and various sample model runs, DEQ has determined that nitrogen oxides (NO_x) emissions from the intermittent operational testing of engines powering emergency generators or fire-suppression water pumps may be excluded from the project-specific significant impact level (SIL) analysis and the cumulative NAAQS analysis for 1-hour NO_2, providing the annual hours of operation from testing and maintenance are less than or equal to 100 hours.
>
> This determination is applicable to minor source air permitting projects and is not limited to any specific number of engines present at a facility. The Director may require deviation from this guidance if deemed appropriate to assure compliance with 1-hour NO_2 NAAQS and IDAPA 58.01.01.203 or 01.403. DEQ will determine how emergency engines are included in permits for major sources, specifically those applicable to the Prevention of Significant Deterioration (PSD) program, on a case-by-case basis.

Secondary Particulate Formation

The impact from secondary particulate formation resulting from emissions of NO_x, SO_2, and/or VOCs was assumed by DEQ to be negligible on the basis of the magnitude of emissions and the short distance from emission sources to modeled receptors where maximum PM_{10} and $PM_{2.5}$ impacts were predicted.

Lead Emissions

Lead emissions were assumed to occur from Building 32 and vented through Stack 32GE09. This stack is very close to the ambient air boundary and modeling results from this source are likely to be conservative for estimated impacts. A 1.0 gram/second emission rate (7.94 pound/hour) was used in the model for evaluating a monthly average impacts. A post processing spreadsheet was then used to calculate a 3-month rolling X/Q dispersion factor in units of micrograms per cubic meter per pound per hour ($\{\mu g/m^3\}$ / {lb/hr}) of emissions.

Micron requested an 80 pound/year emission cap and evaluated compliance by modeling an hourly rate of 0.0091 pounds/hour (equal to 80 pounds/year evenly distributed over 8,760 hour/year).

3.1.2 Toxic Air Pollutant Emission Rates

TAP emission regulations under Idaho Air Rules Section 220 are only applicable for new or modified sources constructed before July 1, 1995. Sources were modeled separately using a 1.0 pound per hour emission rate to identify the worst-case impacting source. The maximum modeled impact associated with each source was used to generate a dispersion factor, in units of micrograms per cubic meter per pound per hour ({$\mu g/m^3$} / {lb/hr}) of emissions. Combustion sources and cooling tower sources were not evaluated for future TAP compliance since these sources have been evaluated in the previous application.

3.1.3 Emission Release Parameters

Table 5 provides emission release parameters, including stack height, stack diameter, exhaust temperature, and exhaust velocity for point sources. Table 6 provides release parameters for the two volume sources. Micron provided a description of how release parameters were determined and verified for specific sources. DEQ determined that release parameters were within values generally expected for the sources modeled, and a detailed review of submitted documentation/verification was not performed. The submitted application did not address how release parameters may change with the installation of low-NO_x burners for modeling Scenario 2. In response to a comment received during the public comment period for this permitting action, Micron indicated that actual stack gas temperatures for their boilers utilizing low-NOx burners are higher than what was used in the air impact analyses. Higher stack gas temperatures results in greater plume rise, greater dispersion, and lower ground-level impacts in most instances.

Table 5. POINT SOURCE STACK PARAMETERS

Release Point	Description	UTM[a] Coordinates Easting-X (m)[b]	Northing-Y (m)	Stack Height (m)	Stack Gas Flow Temperature (K)[c]	Stack Gas Flow Velocity (m/sec)[d]	Modeled Stack Diameter (m)
4BOI01	Boiler	568845	4819961	13.8	521	10.01[e]	0.56
4BOI02	Boiler	568851	4819961	13.8	521	10.01[e]	0.56
4BOI03	Boiler	568857	4819961	13.8	521	10.83[e]	0.56
4BOI04	Boiler	568864	4819961	13.8	521	10.83[e]	0.76
4BOI05	Boiler	568870	4819961	13.8	521	13.53[e]	0.76
4BOI06	Boiler	568877	4819961	13.8	521	10.53[e]	0.87
25BOI01	Boiler	569044	4819824	12.5	521	7.55[e]	0.91
25BOI02	Boiler	569048	4819824	12.5	521	16.97[e]	0.61
25BOI03	Boiler	569053	4819824	12.5	521	16.97[e]	0.61
25BOI04	Boiler	569057	4819824	12.5	521	7.55[e]	0.91
25BOI05	Boiler	569064	4819824	12.5	521	7.55[e]	0.91
25BOI06	Boiler	569069	4819824	12.5	521	7.55[e]	0.91
25BOI07	Boiler	569073	4819824	12.5	521	7.55[e]	0.91
25BOI08	Boiler	569078	4819824	12.5	521	9.43[e]	0.82
25BOI09	Boiler	569083	4819824	12.5	521	9.48[e]	0.82
32BOI01	Boiler	568586	4820333	6.4	521	1.92[e]	0.36
80BOI1	Boiler	569874	4819992	15.2	450	9.0[e]	0.50
1GEN01	Emergency Generator	568882	4820056	4.6	700	50.0	0.30
1XGEN01	Emergency Generator	568882	4820060	4.6	700	50.0	0.30
4GEN01	Emergency Generator	568887	4819963	5.6	699	30.5	0.46
6GEN01	Emergency Generator	568951	4819943	5.7	699	30.5	0.46
10AGEN01	Emergency Generator	568945	4819990	2.8	700	50.0[f]	0.12

Table 5. POINT SOURCE STACK PARAMETERS							
Release Point	Description	UTM[a] Coordinates		Stack Height (m)	Stack Gas Flow Temperature (K)[c]	Stack Gas Flow Velocity (m/sec)[d]	Modeled Stack Diameter (m)
		Easting-X (m)[b]	Northing-Y (m)				
15GEN01	Emergency Generator	568882	4819780	3.9	700	50.0[f]	0.25
17GEN01	Emergency Generator	568672	4820114	7.9	699	24.9	0.51
17CGEN01	Emergency Generator	568772	4820110	4.3	699	24.9	0.51
24GEN01	Emergency Generator	569130	4819662	4.4	700	50.0	0.30
24DGEN02	Emergency Generator	569124	4819623	5.2	699	30.5	0.46
24DGEN03	Emergency Generator	569122	4819628	5.2	699	30.5	0.46
25GEN01	Emergency Generator	569113	4819863	5.2	699	30.5	0.46
26GEN01	Emergency Generator	568917	4819668	5.0	700	45.0	0.34
36GEN01	Emergency Generator	569156	4819468	4.7	700	25.5	0.46
36GEN02	Emergency Generator	569170	4819472	4.7	700	25.5	0.46
38GEN01	Emergency Generator	569370	4819374	3.6	700	50.0	0.20
50GEN01	Emergency Generator	569251	4819611	4.4	700	50.0	0.36
80GEN01	Emergency Generator	569882	4819980	15.2	700	50.0	0.30
FWP2	Fire Water Pump	569038	4819926	5.5	654	29.5	0.21
1XVOC	VOC abatement unit	568859	4820122	20.1	540	11.7	0.27
2VOC	VOC abatement unit	568800	4820044	13.8	569	22.6	0.30
15VOC	VOC abatement unit	568836	4819867	16.7	533	18.1	0.36
24AVOC	VOC abatement unit	568996	4819738	15.9	533	13.9	0.36
24CVOC	VOC abatement unit	569069	4819641	15.6	533	10.4	0.36
24DVOC	VOC abatement unit	569088	4819597	20.7	511	13.3	0.30
24EVOC	VOC abatement unit	569085	4819545	18.6	616	13.0	0.26
50VOC01	VOC abatement unit	569165	4819526	21.3	314	24.0	0.94
80VOC	VOC abatement unit	569819	4820021	14.0	644	12.3	0.26
1FS01	Acid scrubber	568807	4820095	21.3	289	26.73	0.67
1FS02	Acid scrubber	568812	4820096	21.3	289	26.73	0.67
1XFS101	Acid scrubber	568894	4820132	22.6	289	23.99	0.98
1XFS102	Acid scrubber	568894	4820127	22.6	289	23.99	0.98
1XFS103	Acid scrubber	568894	4820121	22.6	289	23.99	0.98
1XAMS105	Ammonia scrubber	568813	4820124	17.9	289	7.35	0.64
4FS02	Acid scrubber	568870	4819959	11.7	289	32.06	0.67
5FS01	Acid scrubber	568796	4819972	17.4	289	11.39	0.76
5FS02	Acid scrubber	568791	4819956	17.4	289	11.39	0.76
15FS01	Acid scrubber	568841	4819876	17.9	289	26.88	1.16
15FS02	Acid scrubber	568847	4819862	17.9	289	26.88	1.16
15FS03	Acid scrubber	568851	4819844	17.9	289	26.88	1.16
15AMS05	Ammonia scrubber	568857	4819789	17.6	289	20.06	0.67
16FS01	Acid scrubber	568795	4819822	15.6	289	19.42	0.30
16FS02	Acid scrubber	568792	4819832	15.6	289	19.42	0.30
24FS01	Acid scrubber	568992	4819772	14.1	289	15.53	0.76
24FS02	Acid scrubber	568989	4819771	14.1	289	15.53	0.76
24FS03	Acid scrubber	568986	4819771	14.1	289	24.26	0.61
24FS04	Acid scrubber	569069	4819667	16.2	289	24.26	0.61
24FS05	Acid scrubber	569067	4819674	16.2	289	24.26	0.61
24FS06	Acid scrubber	569069	4819658	15.9	289	20.07	1.07
24FS07	Acid scrubber	569072	4819650	15.9	289	20.07	1.07
24AMS08	Ammonia scrubber	569001	4819774	14.1	289	15.51	0.76
24FS09	Acid scrubber	569075	4819643	15.9	289	20.06	1.07
24AMS13	Ammonia scrubber	569082	4819660	19.6	289	19.17	0.69
24DAMS01	Ammonia scrubber	569083	4819612	20.7	289	20.42	1.02
24DMPS01	Multi-purpose scrubber	569091	4819605	20.7	289	20.18	0.86
24DFS01	Acid scrubber	569102	4819577	20.7	289	20.15	1.16

Table 5. POINT SOURCE STACK PARAMETERS							
Release Point	Description	UTM[a] Coordinates		Stack Height (m)	Stack Gas Flow Temperature (K)[c]	Stack Gas Flow Velocity (m/sec)[d]	Modeled Stack Diameter (m)
		Easting-X (m)[b]	Northing-Y (m)				
24DFS02	Acid scrubber	569099	4819584	20.7	289	20.15	1.16
24DFS03	Acid scrubber	569097	4819588	20.7	289	20.15	1.16
26FS01	Acid scrubber	568931	4819617	15.7	289	10.12	1.22
80FS01	Acid scrubber	569821	4820008	14.0	289	13.2	1.07
SILO1	Silo 1	569002	4819924	16.3	289	3.35[f]	0.45
22FS02	Acid scrubber	569025	4819898	11.7	289	17.74	0.41
24DFS04	Acid scrubber	569095	4819593	20.7	289	20.15	1.16
50AMS01	Ammonia scrubber	569175	4819536	21.0	289	20.42	0.94
50FS01	Acid scrubber	569170	4819552	21.3	289	30.23	1.09
50FS02	Acid scrubber	569171	4819546	21.3	289	30.23	1.09
50FS04	Acid scrubber	569254	4819563	21.3	289	30.23	1.09
32GE09	Building 32 Stack	568580	4820364	9.4	293	12.1	0.30
4COOL01	Cooling Tower	568848	4819996	10.8	289	8.04	3.96
4COOL02	Cooling Tower	568853	4819997	10.8	289	8.8	3.96
4COOL03	Cooling Tower	568857	4819997	10.8	289	8.8	3.96
4COOL04	Cooling Tower	568863	4819997	10.8	289	8.8	3.96
4COOL05	Cooling Tower	568868	4819997	10.8	289	8.8	3.96
4COOL08	Cooling Tower	568910	4819999	9.0	289	9.6	4.88
4COOL09	Cooling Tower	568910	4819992	9.0	289	9.6	4.88
38COOL01	Cooling Tower	569393	4819376	7.3	289	6.1	3.05
38COOL02	Cooling Tower	569394	4819370	7.3	289	6.1	3.05
6COOL01	Cooling Tower	568922	4819947	4.7	289	6.1	2.44
25COOL01	Cooling Tower	569053	4819866	11.6	289	6.81	5.79
25COOL02	Cooling Tower	569062	4819865	11.6	289	6.81	5.79
25COOL03	Cooling Tower	569071	4819866	11.6	289	6.81	5.79
25COOL04	Cooling Tower	569080	4819866	11.6	289	6.81	5.79
25COOL05	Cooling Tower	569086	4819895	13.4	289	7.1	8.53
25COOL06	Cooling Tower	569096	4819895	13.4	289	7.1	8.53
25COOL07	Cooling Tower	569108	4819895	13.4	289	7.1	8.53
25COOL08	Cooling Tower	569119	4819895	13.4	289	7.1	8.53

a. Universal Transverse Mercator.
b. Meters.
c. Kelvin.
d. Meters per second.
e. Rain-capped source. Modeled using the AERMOD Beta algorithm for rain-capped sources.
f. Horizontal release. Modeled using the AERMOD Beta algorithm for horizontal release sources.

Table 6. VOLUME SOURCE RELEASE PARAMETERS						
Source	Description	UTM[a] Coordinates		Release Height (m)	Horizontal Dimension (m)	Vertical Dimension (m)
		Easting - X (m)[b]	Northing - Y (m)			
22FUG1	Building 22 Fugitives	568990	4819875	3.05	2.27	2.84
22FUG2	Building 22 Fugitives	569052	4819907	3.05	2.27	2.84

a. Universal Transverse Mercator.
b. Meters.

3.2 *Background Concentrations*

Background concentrations to use in the cumulative NAAQS analyses were provided to CH2M in the March 15, 2013, Modeling Protocol Approval Notice. Table 7 lists those background concentrations used in the analyses. DEQ has developed new methods to evaluate background concentrations and more recent monitoring data has become available for the area since the issuance of the protocol approval. DEQ determined it was not appropriate to reevaluate background concentrations from what was approved in the Protocol Approval Notice.

Table 7. BACKGROUND CONCENTRATIONS

Pollutant and Averaging Period	Background Concentration (μg/m³)[a]	Description of Background Value	NAAQS[b] (μg/m³)
NO_2 1-hour	Hour by Hour[c]	St. Luke's Meridian, June 2009 – June 2010[d]	188
NO_2 annual	40	From monitoring data collected in Boise[e]	100
SO_2 1-hour	33.1	Based on values from Fargo, ND and Morehead, MN	196
CO 1-hour	12,200	From Monitoring data collected in Boise	40,000
CO 8-hour	6,800	From Monitoring data collected in Boise	10,000
PM_{10} 24-hour	73	At the Micron site – based on DEQ airshed modeling for Boise	150
$PM_{2.5}$ 24-hour	19.3	St. Luke's Meridian, 2008 – 2010[f]	35
$PM_{2.5}$ annual	6.3	St. Luke's Meridian, 2008 – 2010[g]	12

a. Micrograms per cubic meter.
b. National Ambient Air Quality Standards.
c. A specific background value was used for each hour of the day. The value was the 2nd highest of monitored values in the data for that hour of day.
d. See Table 9.
e. Collected in Boise for 1999. Maximum of 3-years of data.
f. Value is the 3-year mean of each year's 98th percentile 24-hour average concentration.
g. Value is the 3-year mean of each year's annual average.

A separate NO_2 background value was used for each hour of the day, using the 2nd highest value of monitoring data for each hour of the day. Hourly 1-hour NO_2 background concentrations are given in Table 8.

Table 8. BACKGROUND 1-HOUR NO_2 CONCENTRATIONS

Hour Ending	Concentration (μg/m³)[a]	Hour Ending	Concentration (μg/m³)[a]	Hour Ending	Concentration (μg/m³)[a]
1	50.0	9	54.9	17	49.8
2	48.1	10	48.1	18	61.8
3	45.7	11	39.5	19	70.4
4	56.2	12	32.6	20	85.9
5	56.7	13	34.3	21	79.0
6	54.9	14	34.3	22	75.5
7	56.7	15	37.8	23	63.5
8	60.1	16	46.4	24	49.8

a. Micrograms per cubic meter. Values are the 2nd highest for that hour.

O_3 Background Concentrations

Background O_3 concentrations are also needed for 1-hour NO_2 modeling if using Tier 3 methods to account for atmospheric conversion of NO to NO_2. Background O_3 data were provided to CH2M in the protocol approval notification. Tier 3 methods were used in the initial December 2013 application, but revisions submitted in July 2014 and April 2015 used Tier 2 methods, and O_3 background values are not used for these methods.

3.3 NAAQS Impact Modeling Methodology

This section describes the modeling methods used by the applicant to demonstrate compliance with applicable air quality standards.

3.3.1 *General Overview of NAAQS Analyses*

CH2M performed project-specific air impact analyses that were determined by DEQ to be reasonably representative of the project/facility as described in the application. Results of the submitted analyses demonstrate compliance with applicable air quality standards to DEQ's satisfaction, provided the facility is operated as described in the submitted application and in this memorandum.

Table 9 provides a brief description of parameters used in the modeling analyses.

Table 9. MODELING PARAMETERS

Parameter	Description/Values	Documentation/Addition Description
General Facility Location	Boise, ID	The area is an attainment or unclassified area for all criteria pollutants.
Model	AERMOD	AERMOD with the PRIME downwash algorithm, version 12345.
Meteorological Data	Boise surface and upper air data	See Section 3.3.4 of this memorandum for additional details of the meteorological data.
Terrain	Considered	3-dimensional receptor coordinates were obtained from USGS National Elevation Dataset (NED) files and were used to establish elevation of ground level receptors. AERMAP was used to determine each receptor elevation and hill height scale.
Building Downwash	Considered	Plume downwash was considered for the structures associated with the facility. BPIP-PRIME was used to evaluate building dimensions for consideration of downwash effects in AERMOD.
Receptor Grid	**Significant Impact Analyses**	
	Grid 1	25-meter spacing along the ambient air boundary
	Grid 2	50-meter spacing in a 4,800meter (easting) by 4,600 meter (northing) grid centered on the facility
	Grid 3	100-meter spacing in a 6.5 kilometers (easting) by 6.3 kilometers (northing) grid centered on Grid 2
	Grid 4	500-meter spacing in a 15.0 kilometer (easting) by 14.5 kilometer (northing) grid centered on Grid 3

3.3.2 *Modeling protocol and Methodology*

A modeling protocol was submitted to DEQ prior to the application, on February 25, 2013. The protocol was submitted by CH2M on behalf of Micron. Conditional protocol approval was provided to Micron on March 15, 2013. Project-specific modeling and other required impact analyses were generally conducted using data and methods described in the protocol and in the *Idaho Air Quality Modeling Guideline*[1].

3.3.3 *Model Selection*

Idaho Air Rules Section 402.03 requires that estimates of ambient concentrations be based on air quality models specified in 40 CFR 51, Appendix W (Guideline on Air Quality Models). The refined, steady state, multiple source, Gaussian dispersion model AERMOD was promulgated as the replacement model for ISCST3 in December 2005. AERMOD retains the single straight line trajectory of ISCST3, but includes more advanced algorithms to assess turbulent mixing processes in the planetary boundary layer for both convective and stable stratified layers.

AERMOD version 12345 was used for the modeling analyses to evaluate impacts of the facility. This version was the current version at the time the application was received by DEQ.

3.3.4 Meteorological Data

DEQ provided CH2M with model-ready meteorological data processed from the Boise National Weather Service (NWS) surface station data and Boise upper air data for 2008-2012. DEQ determined these data were reasonably representative for the Micron site.

3.3.5 Effects of Terrain on Modeled Impacts

Terrain data were extracted from United States Geological Survey (USGS) National Elevation Dataset (NED) files in the NAD83 datum. Receptors, the ambient air boundary, building, and stack locations were identified in the NAD27 datum.

The terrain preprocessor AERMAP Version 11103 was used to extract the elevations from the NED files and assign them to receptors, source bases, and building bases in the modeling domain in a format usable by AERMOD. AERMAP also determined the hill-height scale for each receptor. The hill-height scale is an elevation value based on the surrounding terrain which has the greatest effect on that individual receptor. AERMOD uses those heights to evaluate whether the emission plume has sufficient energy to travel up and over the terrain or if the plume will travel around the terrain.

DEQ performed spot checks of receptor elevations used in the model input files to those obtained from the GoogleEarth mapping program. The immediate area of the Micron facility is nearly flat with regard to pollutant dispersion. Therefore, precise resolution of terrain is not critical to modeled impacts since design value impacts are located along the ambient air boundary of the site.

3.3.6 Facility Layout

The Micron facility is an existing facility and no new structures are proposed in the application. DEQ verified proper identification of the facility boundary and buildings on the site by comparing a graphical representation of the modeling input file to aerial photographs available through the GoogleEarth mapping program. The modeling input file for source location and structures matched well with the GoogleEarth images.

3.3.7 Effects of Building Downwash on Modeled Impacts

Potential downwash effects on emission plumes were accounted for in the impact analyses by using building parameters (locations of building corners, base elevation, and building heights). Dimensions and orientation of proposed buildings were input to the Building Profile Input Program for the Plume Rise Model Enhancements downwash algorithm (BPIP-PRIME) to calculate direction-specific dimensions and Good Engineering Practice (GEP) stack height information for input to AERMOD.

An inconsistency between base elevations used for buildings and those used for emissions stacks was discovered by DEQ during the public comment period for this permitting action. While investigating modeling input files in response to a submitted public comment, DEQ found that in numerous instances the base elevations of stacks were several meters above the base elevations of buildings where those stacks were located. This discrepancy will affect the BPIP-PRIME output since it artificially increases the stack height above roof-height, thereby changing the plume downwash affects in the model. In response to this error, Micron provided CH2M with corrected elevation data and the air impact analyses were revised accordingly.

3.3.8 Ambient Air Boundary

Ambient air is defined in Section 006 of the Idaho Air Rules as "that portion of the atmosphere, external to buildings, to which the general public has access." The establishment of the ambient air boundary used in the analyses was described in previously submitted applications. The ambient air boundary for the Micron facility is established by a fence, assuring public access is precluded to areas inside the ambient air boundary.

3.3.9 Receptor Network

Table 9 describes the receptor grid used in the submitted analyses. The receptor grid met the minimum recommendations specified in the State of Idaho Air Quality Modeling Guideline. DEQ determined this grid assured maximum impacts were reasonably resolved by the model.

3.3.10 Good Engineering Practice Stack Height

An allowable good engineering practice (GEP) stack height may be established using the following equation in accordance with Idaho Air Rules Section 512.03.b:

$H = S + 1.5L$, where:

H = good engineering practice stack height measured from the ground-level elevation at the base of the stack.

S = height of the nearby structure(s) measured from the ground-level elevation at the base of the stack.

L = lesser dimension, height or projected width, of the nearby structure.

Submitted air impact analyses are not permitted to account for increased dispersion for that portion of a stack above GEP stack height. Stack heights of all Micron point sources were below GEP stack height.

3.3.11 NO_x Chemistry

CH2M indicated in their July 2014 submittal that the Tier 2 approach for handling NO_x chemistry was used in the 1-hour NO_2 impact analyses, in accordance with recent EPA guidance. The Tier 2 approach recommends using an Ambient Ratio Method (ARM), adjusting modeled impacts of NO_x emissions by a factor of 0.8 to account for the fraction of modeled NO_x that could be NO_2. DEQ review of the submitted modeling input files revealed that the Tier 2 adjustment was made to the total NO_x emissions rates rather than the modeled results, with background concentrations added within the AERMOD model processing.

4.0 NAAQS Impact Modeling Results

4.1 Results for Cumulative Impact Analyses

A cumulative NAAQS impact analysis was performed for all criteria pollutants. The cumulative NAAQS impact analyses consisted of modeling potential/allowable emissions from the Micron facility, except for NO_x emissions from emergency IC engines for 1-hour NO_2. No nearby co-contributing emission sources were identified that would not be reasonably accounted for in the background concentrations used. Background concentration values were then added to modeled design values, and results were compared to the NAAQS. Table 11 provides results from the cumulative NAAQS analyses.

Compliance with the Pb NAAQS was demonstrated through use of model results post-processing and development of dispersion factors. A unit emission rate was modeled for the stack 32GE09 for Building 32. Monthly averaged impacts were modeled for all receptors for the 5-year meteorological dataset. Post processing, using an EXCEL spreadsheet, was performed to convert monthly impacts to 3-month rolling averages. The maximum 3-month rolling average was then used to calculate a X/Q dispersion factor as follows:

$$X/Q = \frac{maximum\,3-month\,impact}{modeled\ emissions\,rate} = \frac{85.01\,\mu g/m^3}{7.936\,lb/hr} = 10.71\frac{\mu g/m^3}{lb/hr}$$

Maximum Pb impacts were then calculated by multiplying the allowable emission rate by the dispersion factor:

$$maximum\ 3-month\,rolling\,average = (emissions\ rate)(X/Q)$$

$$= (0.0091\,lb/hr)\left(10.71\frac{\mu g/m^3}{lb/hr}\right) = 0.10\ \mu g/m^3$$

Table 11. RESULTS FOR CUMULATIVE IMPACT ANALYSES						
Pollutant	**Averaging Period**	**Modeled Design Value Concentration ($\mu g/m^3$)[a] Scenario 2 [c]**	**Background Conc. ($\mu g/m^3$)**	**Total Ambient Impact ($\mu g/m^3$)**	**NAAQS[b] ($\mu g/m^3$)**	**Percent of NAAQS**
PM_{10}[d]	24-hour	20.3	73	93.3	150	61
$PM_{2.5}$[e]	24-hour	13.2	19.3	32.5	35	97.5
	Annual	5.0	6.3	11.3	12	94
CO[f]	1-hour	1,018	12,200	13,218	40,000	33
	8-hour	769	6,800	7,569	10,000	76
SO_2[g]	1-hour	153.4	33.1	186.5	196	95
	3-hour	116.3	42	168.8	1,300	13
	24-hour	28.1	26	54.1	365	15
	Annual	3.0	2.6	5.4	80	7
NO_2[h]	1-hour	169.2	In model[j]	169.5	188	90
	Annual	14.3	40	54.3	100	54
Pb[i]	3-month	0.10	0.04	0.14	0.15	92
	Quarterly	0.10	0.04	0.14	1.5	9.2

a. Micrograms per cubic meter.

b. National ambient air quality standards.

c. Scenario 1 involves limiting boilers in Building 4 (4BOI01 – 4BOI06) to a combined 60 MMBtu/hour, conservatively assuming all emissions occur from only 4BOI05 and 4BOI06. Scenario 2 involves utilization of all boilers at the facility following installation of low-NO_x burners on all Building 4 and Building 25 boilers.

d. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers. Micron conservatively used the maximum modeled 24-hour concentration from modeling 5 years of meteorological data.

e. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers. The modeled design value is the maximum 5-year mean of 8^{th} highest 24-hour values from each year of a 5-year meteorological dataset. Modeled design value for the annual period is the maximum 5-year mean of annual average values from each year of a 5-year meteorological dataset.

f. Carbon monoxide. Modeled design value is the maximum of highest 2^{nd} high modeled impacts for each of five years modeled.

g. Sulfur dioxide. Modeled design value for the 1-hour period is the maximum 5-year mean of the 4^{th} highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. Micron conservatively used modeled design values for the 3-hour and 24-hour as the maximum of highest 1^{st} high modeled impacts for each of five years modeled. Modeled design value for the annual period is the maximum annual average from five years modeled.

h. Nitrogen dioxide. Modeled design value for the 1-hour period is the maximum 5-year mean of 8^{th} highest daily 1-hour maximum impacts for each year of a 5-year meteorological dataset. Modeled design value for the annual period is the maximum annual average from five years modeled.

i. Lead. Modeled design value for the 3-month period is the maximum 3-month rolling average for the 5-year meteorological dataset. The maximum 3-month rolling average was also conservatively used to demonstrate compliance with the quarterly standard.

j. Background NO_2 concentrations are included with the modeled output value. The individual hour background NO_2 values listed in Table 9 of this memorandum for a 24-hour period were used for the NAAQS analysis.

4.2 Results for TAPs Impact Analyses

Submitted modeling was performed to identify the stack having the largest impact and to use modeled impacts of a unit emission rate to calculate X/Q dispersion factors. Dispersion factors are calculated by dividing the maximum modeled impact X by the emission rate modeled Q. Table 12 shows X/Q values to be used to evaluate TAP compliance for various TAP-emitting activities Micron may conduct. The Building 16 scrubbers (stack 16FS01 for the annual averaging period and stack 16FS02 for the 24-hour averaging period) were identified as the potential TAP sources with the highest X/Q values. Higher X/Q values were obtained for the Building 32 general exhaust stack (32GE09) and fugitives from wastewater pretreatment (22FUG1 and 22FUG2); however, Micron asserted that increases in TAP emissions would not occur from these emissions points.

For any project, TAP compliance is assured provided maximum allowable emissions of the specific TAP, when multiplied by the appropriate X/Q dispersion factor, results in an impact value that is less than the specific AAC or AACC. Maximum allowable emissions are the following: for Idaho Air Rules Section 585 TAPs, the maximum 24-hour emission rate divided by 24; for Idaho Air Rules Section 586 TAPs, the maximum annual emission rate divided by 8,760.

Table 12. RESULTS FOR TAP MODELING

TAP Pollutants	Averaging Period	X/Q[a] ($\mu g/m^3$) / (lb/hr)
585 TAPs	24-hour	13.1
586 TAPs	Annual	2.7[b]

a. Dispersion factor in units of micrograms/cubic meter impacts per pounds/hour of emissions.

b. The application originally stated a value of 2.6 for source 16FS02 as the controlling annual X/Q. This value was later found not to be the controlling X/Q, and the controlling annual X/Q value was 2.7, obtained for source 16FS02.

5.0 Conclusions

The ambient air impact analyses and other air quality analyses submitted with the application demonstrated to DEQ's satisfaction that emissions from the Micron facility will not cause or significantly contribute to a violation of any ambient air quality standard.

References:

1. *State of Idaho Guideline for Performing Air Quality Impact Analyses.* Idaho Department of Environmental Quality. September 2013. Available at http://www.deq.idaho.gov/media/1029/modeling-guideline.pdf. State of Idaho DEQ Air Doc. ID AQ-011.

2. *Additional Clarification Regarding Application of Appendix W Modeling Guidance for 1-hour NO_2 National Ambient Air Quality Standard*, Tyler Fox, Air Quality Modeling Group, C439-01, Environmental Protection Agency, March 1, 2011.