

AIR DISPERSION MODELING REPORT

**Micron New York Semiconductor, LLC
Clay, NY**



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1. INTRODUCTION

On behalf of Micron New York Semiconductor, LLC (Micron), Trinity Consultants, Inc. (Trinity) is submitting this modeling report to the New York State Department of Environmental Conservation (NYSDEC) for the Prevention of Significant Deterioration (PSD)/Non-attainment New Source Review (NNSR) and Title V air permit application submitted to the NYSDEC on March 7, 2025 for the Micron Proposed Air Permit Project in Clay, New York (Proposed Air Permit Project). A modeling protocol for this project was submitted to NYSDEC by Trinity on March 21, 2025. The modeling related aspects of the protocol were conditionally approved by NYSDEC on July 8, 2025. This modeling report includes the results of the completed air dispersion modeling, incorporating comments and questions received from NYSDEC on September 15, 2025 and October 10, 2025.

1.1 Project Description

Micron operates multiple semiconductor fabrication facilities globally and is proposing to construct a semiconductor manufacturing campus (the "Micron Campus") in the Town of Clay, New York, at the White Pine Commerce Park (WPCP), an approximately 1,400-acre industrial park. The Proposed Air Permit Project will consist of two fabrication facilities, intended to be 600,000 square feet each, along with supporting operations, including wastewater treatment plants, gas yards, electrical substations, and an office and administration building. Emissions generating equipment at the Proposed Air Permit Project will consist of semiconductor manufacturing operations and support equipment (e.g., generators, cooling towers, and boilers) and control devices will include acid scrubbers, ammonia scrubbers, and regenerative catalytic thermal oxidizers.

The Proposed Air Permit Project is subject to prevention of significant deterioration (PSD) permitting for nitrogen oxides (NO_x), particulate matter with a diameter equal to or smaller than 2.5 microns (PM_{2.5}), particulate matter with a diameter equal to or smaller than 10 microns (PM₁₀), and carbon monoxide (CO). The project is also subject to Nonattainment New Source Review (NNSR) permitting for oxides of nitrogen (NO_x) and volatile organic compounds (VOC) as ozone precursors; however, no modeling demonstration for ozone was required as part of this permitting action. In addition, Micron will be evaluating compliance with Title 6 of the New York Codes, Rules and Regulations (6 NYCRR) Part 212. The air dispersion modeling was completed in a manner that conforms to the applicable rules, guidance, and requirements in the following guidance documents:

- ▶ U.S. Environmental Protection Agency's (U.S. EPA's) Guideline on Air Quality Models, 40 CFR Part 51 - Appendix W (latest rule update, effective March 2025);
- ▶ U.S. EPA's AERMOD Implementation Guide (Updated November 2024);
- ▶ U.S. EPA: User's Guide for the AMS/EPA Regulatory Model – AERMOD (November 2024);
- ▶ NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis (DAR-10) (September 2020); and
- ▶ NYSDEC Guidelines for the Evaluation and Control of Ambient Air Contaminants under 6 NYCRR Part 212 (DAR-1) (February 2021).

The remainder of this modeling report is organized as follows:

- ▶ Section 2 discusses modeling requirements;
- ▶ Section 3 provides a description of the Proposed Air Permit Project;
- ▶ Section 4 describes the air dispersion modeling methodology;

- ▶ Section 5 discusses the representation of emission sources; and
- ▶ Section 6 includes the results of the air dispersion modeling.

2. MODELING REQUIREMENTS

Trinity has prepared this modeling report to describe the modeling methodologies and data resources that were used to evaluate whether the Proposed Air Permit Project could cause or significantly contribute to modeled exceedances of the National Ambient Air Quality Standards (NAAQS) and PSD Increments for NO₂, PM₁₀, PM_{2.5}, and CO and whether any other modeled adverse impacts at Class I or II areas could be attributable to the Proposed Air Permit Project.

In addition, this report discusses the air dispersion modeling required per 6 NYCRR Part 212. An analysis of the applicability of Part 212 and the resulting modeling requirements is provided in Appendix C. Those contaminants which were found to be subject to modeling per this analysis are discussed further in Section 2.7.

2.1 PSD Significance Analysis

The PSD significance analysis was conducted to determine whether the emissions changes associated with the Proposed Air Permit Project could cause a “significant” impact upon the area surrounding the Micron Campus. “Significant” impacts are defined by ambient concentration thresholds commonly referred to as the Significant Impact Levels (SILs). Table 2-1 lists the SIL, NAAQS, and PSD Increments for all PSD regulated pollutants subject to modeling for the Proposed Air Permit Project.

This modeling analysis was used to demonstrate compliance with the standards included in Table 2-1. Not included in Table 2-1 is ozone, which triggers major NSR, as the potential-to-emit (PTE) emissions of NO_x and VOC exceed 40 tons per year. However, as New York is within the Ozone Transport Region (OTR), all of New York is considered to be in moderate nonattainment. Based on the provisions of 6 NYCRR 231-5, new major facilities located in areas designated by EPA as nonattainment or within the OTR, must demonstrate, as part of the permit application, that several special conditions are met including the need to apply Lowest Achievable Emission Rate (LAER) and obtaining emission offsets. A modeling analysis using the Modeled Emission Rates for Precursors (MERPs) methodology is not needed for ozone because concentrations in the project area are assumed to exceed the NAAQS. LAER and emission offsets are discussed in the Micron Clay Air Permit Application.

Table 2-1. SILs, NAAQS, and Class II PSD Increments for Relevant PSD Regulated Pollutants

Pollutant	Averaging Period	PSD SIL ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)	Class II PSD Increment ($\mu\text{g}/\text{m}^3$)
NO ₂	1-hour	7.5 ^a	188 (100 ppb) ^b	--
	Annual	1	100 (0.053 ppm) ^c	25
PM ₁₀	24-hour	5	150 ^d	30
	Annual	1	-- ^e	17
PM _{2.5}	24-hour	1.2	35 ^f	9
	Annual	0.13	9 ^g	4
CO	1-hour	2,000	40,000 (35 ppm)	--
	8-hour	500	10,000 (9 ppm)	--

- The proposed 1-hr NO₂ SIL is based on the interim 1-hr NO₂ SIL in U.S. EPA's 1-hr NO₂ NAAQS implementation guidance memo (U.S. EPA Office of Air Quality Planning and Standards Memorandum from Anna Marie Wood, Acting Director Air Quality Policy Division to U.S. EPA Regional Air Division Directors entitled "General Guidance for Implementing the 1-hr NO₂ National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hr NO₂ Significant Impact Level", June 28, 2010).
- The 3-year average of the 98th percentile of the daily maximum 1-hr average.
- Annual arithmetic average.
- Not to be exceeded more than once per year on average over 3 years.
- EPA revoked the PM₁₀ annual standard effective December 18, 2006. See 71 FR 61144 for additional details.
- 98th percentile of concentrations in a given year, averaged over 3 years.
- Annual arithmetic mean from single or multiple monitors, averaged over 3 years.
- Not to be exceeded more than once per calendar year.

2.2 PSD NAAQS Analysis

The primary NAAQS are the maximum concentration ceilings, measured in terms of total concentration of a pollutant in the atmosphere, which define the "levels of air quality that the U.S. EPA judges are necessary, with an adequate margin of safety, to protect the public health." Secondary NAAQS define the levels that "protect the public welfare from any known or anticipated adverse effects of a pollutant." The NAAQS permissible limits are shown in Table 2-1 for NO₂, PM₁₀, PM_{2.5}, and CO.

The objective of the NAAQS Analysis was to demonstrate through air quality modeling that emissions associated with the Proposed Air Permit Project would not cause or significantly contribute to a modeled exceedance of the NAAQS at any ambient location. As the Significant Impact Analysis indicated that the maximum pollutant impacts of NO₂, CO, PM_{2.5}, and PM₁₀ exceeded the corresponding SIL at an off-property receptor, a NAAQS analysis was conducted for these pollutants.

The NAAQS Analysis included emissions from all sources at the Proposed Air Permit Project and the emissions of nearby sources included in the regional source inventory. The modeled impacts for directly emitted pollutants, added to appropriate background concentrations, were assessed against the applicable NAAQS as listed in Table 2-1 to demonstrate compliance.

2.2.1 Background Concentrations

2.2.1.1 Nitrogen Dioxide

The Rochester Near-Road monitor (AQS Site ID 36-055-0015) is located approximately 114 kilometers west of the Micron Campus, as shown in Figure 2-1, and was utilized for the NO₂ NAAQS analysis. Seasonal, hour

of day 1-hour NO₂ background data for this monitor was derived from EPA's AirData website for the period of 2021 to 2023. Annual NO₂ background data for this monitor was also obtained from EPA's AirData website and confirmed against the 2023 NYSDEC Air Quality Report.

The Rochester Near-Road monitor is located in an urban environment, directly north of the junction between Interstates 490 and 590, which is different than the Micron Campus in a manner to provide conservatively high background concentrations in comparison to the rural nature of the area around the Micron Campus.

As shown in Figure 2-2, prevailing winds in the vicinity of the Rochester Near-Road monitor are predominantly from the southwest and west. Based on information available on the DECinfo Locator website, which is shown in Figure 2-3, the majority of Title V and Air State Facilities are located upwind to the southwest and west of the Rochester monitor.¹ The concentration of sources near the monitor, the regional wind direction, and the location of the monitor near busy roadways suggest that the monitoring data would overestimate existing NO₂ concentrations at the Micron Campus and provide conservatively high background concentrations.

2.2.1.2 Carbon Monoxide

The Rochester Near-Road monitor was also used in the CO NAAQS analysis. As stated above, the location of the Rochester monitor provides conservatively high background concentrations in comparison to the rural nature of the area around the Micron Campus.

2.2.1.3 Particulate Matter (≤2.5 microns)

The Syracuse monitor (AQS Site ID 36-067-1015) was used in the PM_{2.5} NAAQS analysis. The site is located approximately 17 km southeast of the Micron Campus in an urban area, at the junction between Interstates 690 and 481. As shown in Figure 2-4, the prevailing winds in the Syracuse area are predominantly from the west. Figure 2-5 shows the location of the Syracuse monitor and the Micron Campus relative to the Title V and Air State Facilities in the area based on information available on the DECinfo Locator website.² Given the rural uses around the Micron Campus, the Syracuse monitor provides conservatively high data for use as background concentration for the Proposed Air Permit Project. Background data for this monitor from 2021 to 2023 was obtained from EPA's AirData website. Trinity conducted an analysis of the data and identified that there are days in the timeframe that were eligible for removal for purposes of establishing background concentration. Further explanation of the analysis to update the 24-hour and annual PM_{2.5} background concentration data is in Appendix E.

2.2.1.4 Particulate Matter (≤10 microns)

The Rochester monitor (AQS Site ID 36-055-1007) used in the PM₁₀ NAAQS analysis is located approximately 114 kilometers west of the Micron Campus and is 0.5 miles from the Rochester Near-Road monitor, as shown in Figure 2-1. For the same reasons discussed regarding the Rochester Near-Road monitor, data from this monitor provide conservatively high background concentrations in comparison to the rural nature of the area around the Proposed Air Permit Project. Background data for this monitor from 2021 to 2023 was obtained from EPA's AirData website and confirmed against the 2023 NYSDEC Air Quality Report.

¹ NYSDEC's DECinfo Locator, Accessed February 2024, <https://giservices.dec.ny.gov/gis/dil/>

² Ibid.

Figure 2-1. Rochester Monitors and Micron Campus

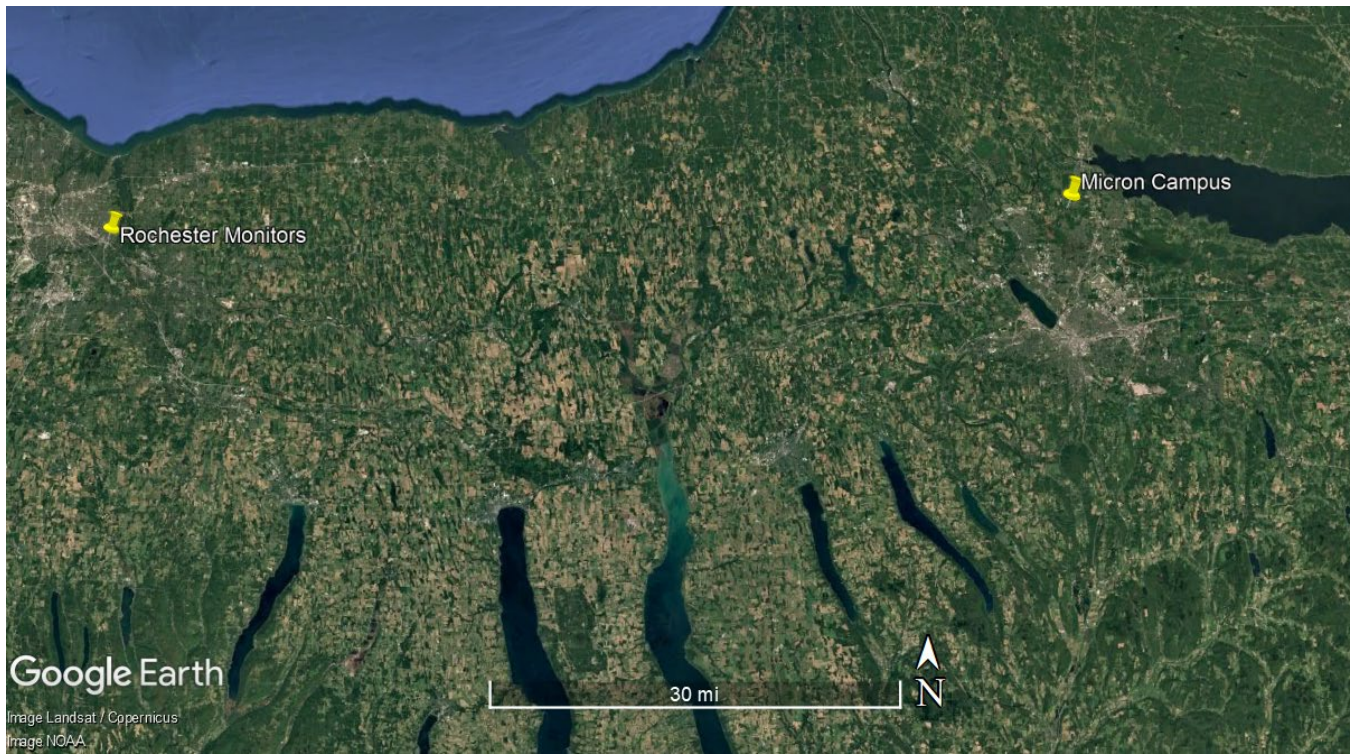


Figure 2-2. Rochester (KROC) Wind Rose



Windrose Plot for [ROC] ROCHESTER/MONROE CO
Obs Between: 01 Jan 2019 01:54 AM - 01 Jan 2024 12:54 AM America/New_York

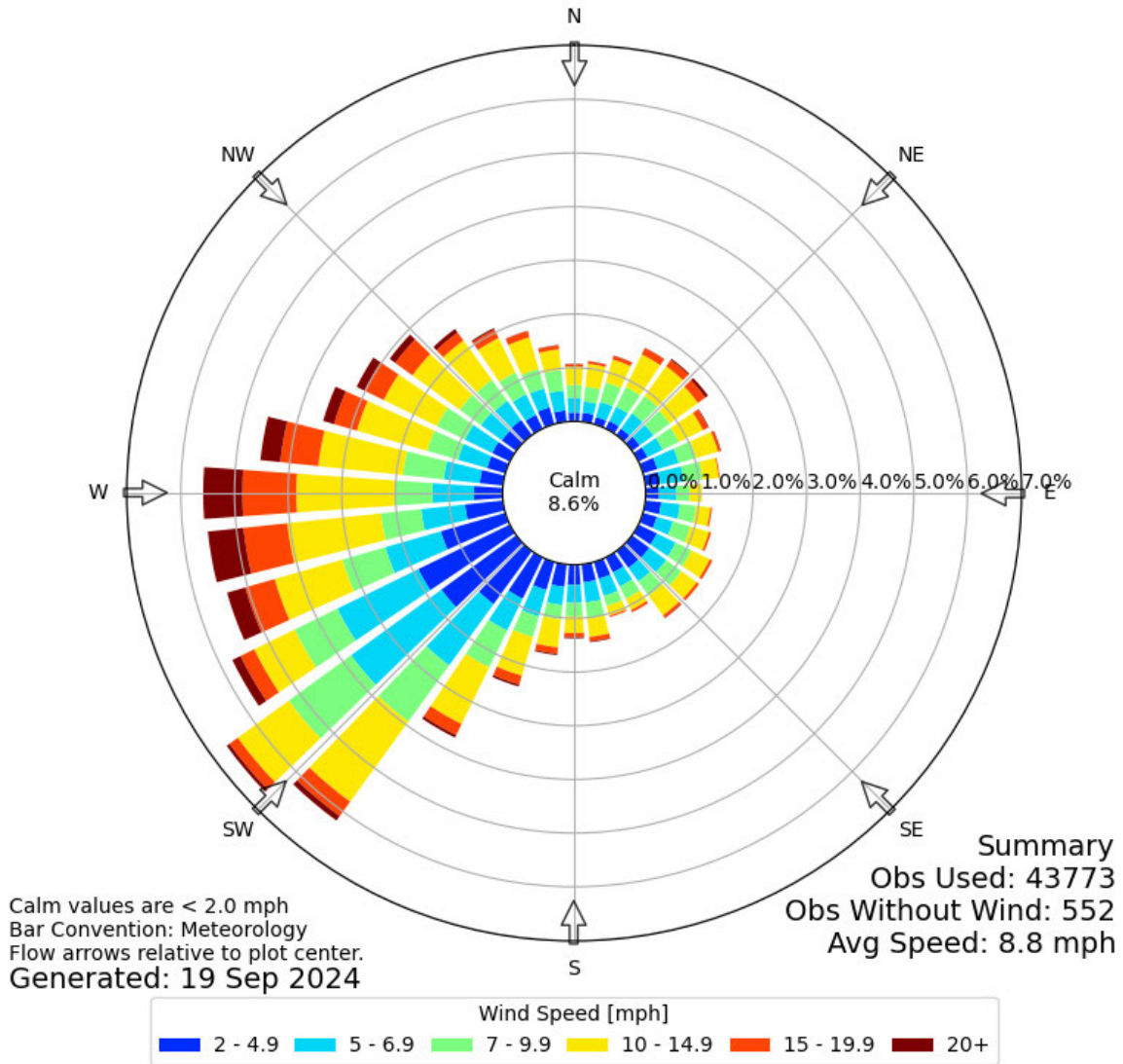


Figure 2-3. Location of Rochester Monitors and Title V and State Facilities

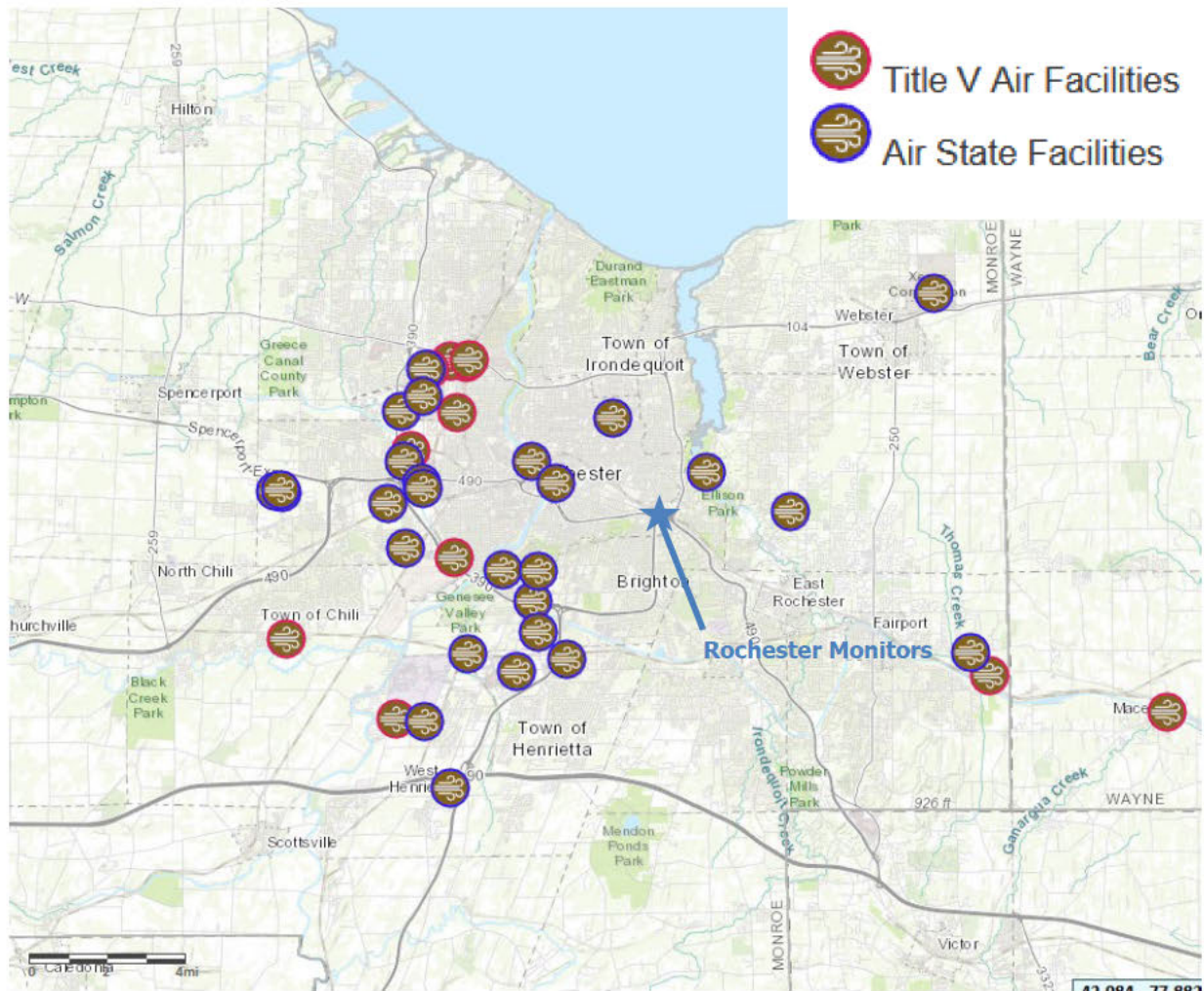


Figure 2-4. Syracuse (KSYR) Wind Rose



Windrose Plot for [SYR] SYRACUSE/HANCOCK

Obs Between: 01 Jan 2019 01:54 AM - 01 Jan 2024 12:54 AM America/New_York

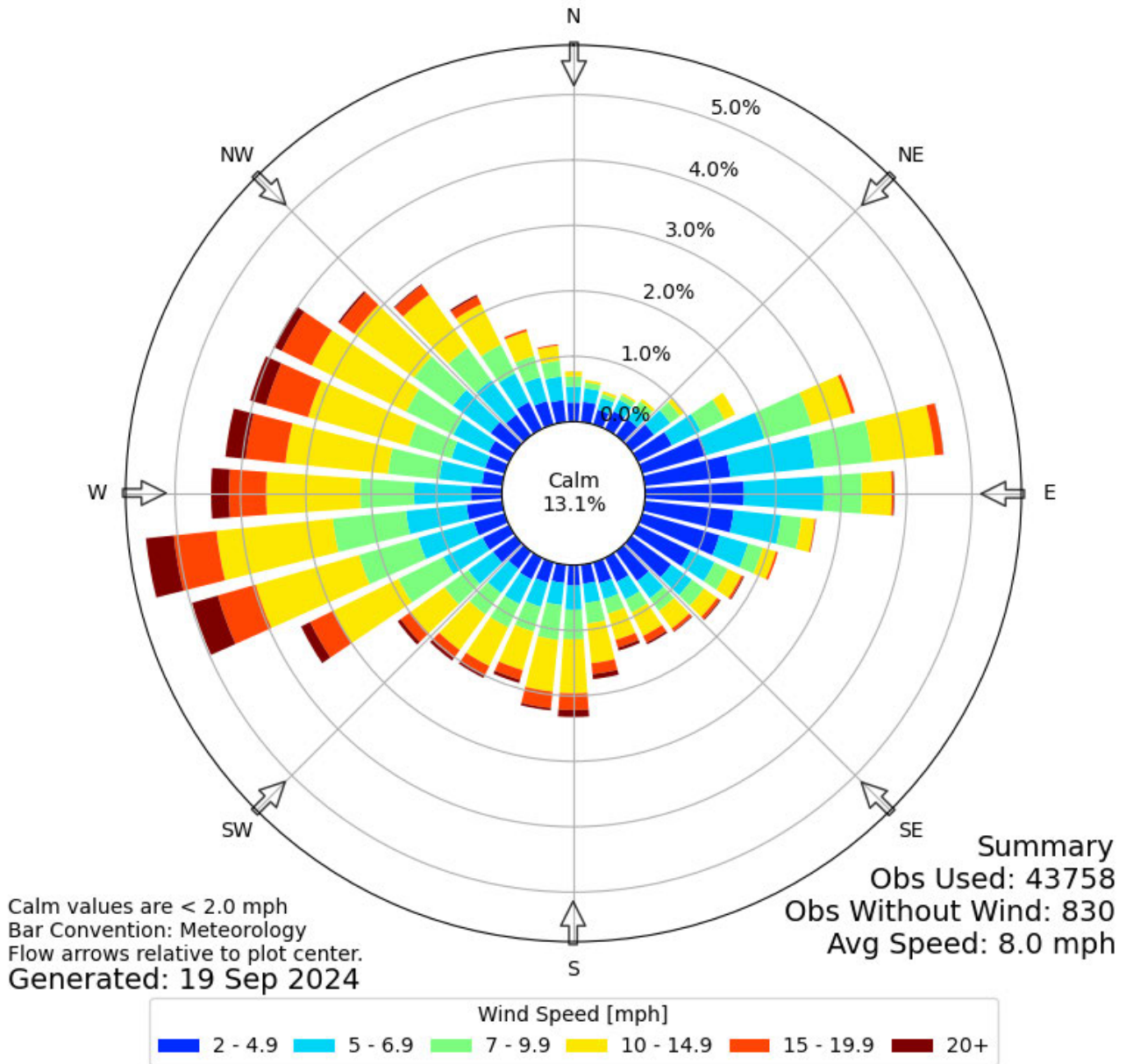
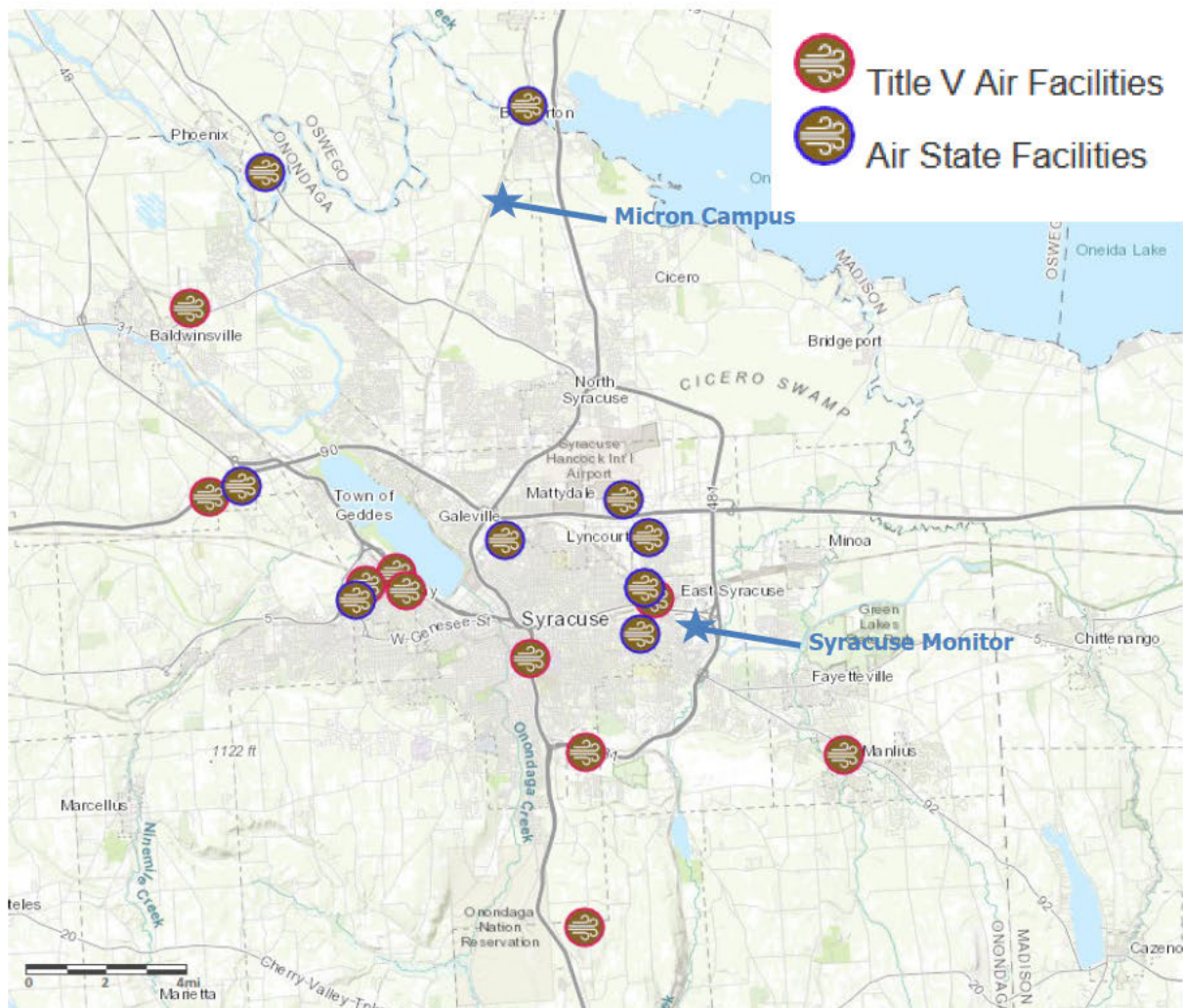


Figure 2-5. Location of Syracuse Monitor and Title V and State Facilities



2.2.2 Significant Impact Area and Regional Modeling Inventory

The significance analysis indicated modeled exceedances of the SILs for NO_2 , CO, PM_{10} , and $\text{PM}_{2.5}$; therefore, a cumulative modeling analysis, accounting for other emission sources in the Micron Campus area (e.g., existing sources and nearby regional sources that have the potential to cause a significant concentration gradient in the vicinity of Clay Proposed Air Permit Project) and monitored background concentrations was performed to demonstrate compliance with the NAAQS.

The Significant Impact Areas (SIA) were determined by measuring the distance between the center of the facility and the furthest receptor in the SIL file that exceeded the Sil threshold for each respective pollutant and averaging period. The center of the facility was represented at UTM Zone 18, 406,800 m Easting, 4,782,500 m Northing. The SIA for each pollutant are approximately as follows:

- 1-hour NO_2 : 50 km

- ▶ Annual NO₂: 8 km
- ▶ 1-hour CO: 6 km
- ▶ 8-hour CO: 9 km
- ▶ 24-hour PM_{2.5}: 11 km
- ▶ Annual PM_{2.5}: 7 km
- ▶ 24-hour PM₁₀: 6 km
- ▶ Annual PM₁₀: 3 km

The background concentrations, as discussed earlier in this report, were used to represent concentrations due to other emission sources, not explicitly modeled, that could impact receptors in the vicinity of the Micron Campus. Further discussion of regional sources is included in Section 5.1.2.

2.3 PSD Increment Analysis

The PSD regulations were enacted primarily to “prevent deterioration” of air quality in areas of the country where the air quality is better than the NAAQS. Class II areas are those areas external to the Micron Campus within which ambient air quality standards and PSD Class II increments apply. PSD Increments for relevant air pollutants are shown in Table 2-1. Note, at the time of this submittal, no PSD Increments for CO or for 1-hour NO₂ have been established.

The sum of the PSD Increment concentration and a baseline concentration defines a “reduced” ambient standard, either lower than or equal to the NAAQS that must be met in a designated attainment area. Significant deterioration is said to have occurred if the change in emissions occurring since a baseline date results in an off-property impact greater than the PSD Increment (i.e., the increased emissions “consume” more than the available PSD Increment).

If a source that was included in the PSD Increment baseline has shut down or has made operational modifications that are permanent and reduce PSD Increment consuming emissions in an area, the source is said to “expand” increment, that is, more increment will be available for other future sources to consume. The determination of whether an emissions change at a given source consumes or expands increment is based on the source definition and the time the change occurs in relation to baseline dates. The major source baseline dates are February 8, 1988 for NO₂, October 20, 2010 for PM_{2.5}, and August 7, 1977 for PM₁₀ per 6 NYCRR Part 231.

Actual emissions changes at major sources due to a physical change or a change in the method of operation (i.e., modification or construction) that occur after the major source baseline date affect increment. After the minor source baseline date, actual emission changes at any source, major or minor, affect increment. To demonstrate compliance with the Class II Increments for NO₂, PM_{2.5}, and PM₁₀, “increment-affecting emissions” from the Proposed Air Permit Project and the nearby regional inventory sources modeled in the NAAQS demonstrations were modeled and assessed cumulatively against the PSD Increments.

2.4 Modeled Emission Rates for Precursors (MERPs)

Modeled Emission Rates for Precursors (MERPs) to estimate single source PM_{2.5} impact from NO_x and SO₂ emissions were included in the modeling analysis. Based on EPA’s “MERPs View Qlik”, the closest

representative hypothetical source to the Micron Campus is in Livingston County, NY.³ The result was added to the modeled direct PM_{2.5} concentrations and compared against the applicable SILs, NAAQS, and PSD Increments as discussed in Section 6.2.

As stated in Section 2.1, a modeling analysis using the MERPs methodology is not needed for ozone and was not included in this modeling analysis.

2.5 Class I Areas

Class I areas are federally protected areas for which more stringent air quality standards apply to protect unique natural, cultural, recreational, and/or historic values. Two principal air quality impacts are considered for Class I areas: PSD Increments and air quality related values (AQRVs).

Class I PSD increments must be analyzed for sources within 100 km of the Class I areas. The nearest Class I area to the Micron Campus is the Lye Brook Wilderness in Vermont, approximately 256 kilometers to the east. As such, impacts on Class I PSD increments are expected to be small and are not proposed to be analyzed in this modeling analysis.

The Federal Land Managers (FLM) for Class I areas have the authority to protect AQRVs and to consider in consultation with the permitting authority whether a proposed major emitting facility will have an adverse impact on such values. AQRV for which PSD modeling is typically conducted to include visibility and deposition of sulfur and nitrogen. The Micron Campus is located within 300 km of one federally protected Class I area (Lye Brook Wilderness in Vermont). An analysis comparing the ratio of visibility impacting emissions (Q in tpy) to the distance from the Micron Campus to the Class I area (d in km) and a Request for Determination of Need for a Class I AQRV Modeling Analysis was submitted to Ralph Perron at the U.S. Forest Service – East Region, who services as the FLM for this Class I area, on January 30, 2025. On February 10, 2025, the FLM responded that the U.S. Forest Service was not requesting AQRV analyses for the Proposed Air Permit Project, attached in Appendix F.

2.6 Additional Impacts Analysis

Major facilities subject to 6 NYCRR Part 231 must include additional impact analyses for each PSD-triggering pollutant. These analyses, which must assess growth, the impacts of air, ground, and water pollution on soils, vegetation, and visibility caused by any increase in emissions are included in Section 6.3 of this report.

2.7 6 NYCRR Part 212 – Process Operations

Part 212 of 6 NYCRR applies to process emission sources and emission points associated with process operations. It requires that the off-site impacts from process operations be evaluated for emissions of air contaminants. Part 212 applies to several process emissions sources proposed as part of the Proposed Air Permit Project. An analysis of Part 212 applicability to the facility was addressed in the March 7, 2025 submittal of Permit Application 2. A copy of that Part 212 analysis is included as Appendix C to this air dispersion modeling report. The analysis has been reformatted into Appendix C of this report; however, the content has not changed.

³EPA's "MERPs View Qlik" website, Accessed December 2024, <https://www.epa.gov/scram/merps-view-qlik>

Part 212 and DAR-1⁴ provide a guideline to determine which sources and which compounds require air dispersion modeling to demonstrate that off-site impacts of air contaminants meet the requirements of Part 212. The compounds that were determined to be subject to air dispersion modeling are found in Appendix C. The relevant annual guideline concentrations (AGC) and short-term guideline concentration (SGC) derivations are also discussed in Appendix C. Table 2-2 below summarizes the air contaminants that were analyzed for the Part 212 modeling demonstration.

⁴ NYSDEC DAR-1 Guidelines for the Evaluation and Control of Ambient Air Contaminants Under Part 212, February 2021

Table 2-2. Modeled Part 212 Air Contaminants

CAS #	Chemical Name
288-88-0	1,2,4-Triazole
95-63-6	TMB (1,2,4-TMB and 1,3,5-TMB)
872-50-4	1-Methyl-2-pyrrolidone
108-11-2	4-Methylpentan-2-ol
1344-28-1	Aluminum oxide
1303-86-2	Boron trioxide
7726-95-6	Bromine
77-92-9	Citric acid
108-94-1	Cyclohexanone
142-96-1	Dibutyl ether
109-89-7	Diethylamine
64-17-5	Ethanol
97-64-3	Ethyl lactate
7782-41-4	Fluorine
999-97-3	Hexamethyldisilazane
10035-10-6	Hydrogen bromide
7722-84-1	Hydrogen peroxide
67-63-0	Isopropanol
79-41-4	Methacrylic Acid
67-56-1	Methanol
91-20-3	Naphthalene
123-86-4	n-Butyl acetate
7697-37-2	Nitric acid
7783-54-2	Nitrogen trifluoride
10024-97-2	Nitrous oxide
7664-38-2	Phosphoric acid
1314-56-3	Phosphorus pentoxide
7631-86-9	Silicon dioxide
64742-94-5	Solvent naphtha (petroleum), heavy arom.
7446-09-5	Sulfur dioxide
75-73-0	Tetrafluoromethane
75-59-2	Tetramethylammonium hydroxide
13463-67-7	Titanium dioxide
1314-35-8	Tungsten trioxide
1314-23-4	Zirconium oxide
7783-06-4	Hydrogen sulfide
1-Methoxy-2-propanol Group	
107-98-2	1-Methoxy-2-propanol
108-65-6	2-Methoxy-1-methylethyl acetate

52125-53-8	Propanol, 1(or 2)-ethoxy-
Acetic Acid Group	
64-19-7	Acetic Acid
Ammonia Group	
7664-41-7	Ammonia
74-86-2	Acetylene
687-47-8	Ethyl (S)-2-Hydroxypropionate
2110-78-3	Methyl 2-Hydroxy-2-Methylpropionate
Difluoromethane Group	
75-10-5	Difluoromethane
593-53-3	Fluoromethane
75-46-7	Trifluoromethane
Hexafluoroethane Group	
76-16-4	Hexafluoroethane
115-25-3	Octafluorocyclobutane
Sulfuric Acid Group	
7664-93-9	Sulfuric acid
3144-16-9	2-Oxobornane-10-Sulphonic Acid
Silane Group	
7803-62-5	Silane
1590-87-0	Disilane
Triethylamine Group	
121-44-8	Triethylamine
107-21-1	Ethanediol
Trimethylbenzene Group	
95-63-6	1,2,4-Trimethylbenzene
108-67-8	1,3,5-Trimethylbenzene

Process-based sulfur dioxide (SO₂) emissions are also included in the Part 212 analysis. These emissions are generated by certain chemical reactions that take place within process equipment, through oxidation of sulfur-bearing compounds in combustion-based control devices and from the oxidation of sulfur in fuel. As SO₂ is not assigned an Environmental Rating (ER), it is assumed to be giving a B rating. Sulfur dioxide

emissions attributable to sulfur in fuel are excluded from Part 212 per 6 NYCRR 212-1.4(i) and are not considered in this analysis.

As discussed in Appendix C and Table 1-3 of Appendix B, the hourly emission rate potential (ERP) of SO₂ from sources subject to Part 212 evaluation is 1.37 lb/hr. Per 6 NYCRR 212-2.1(b) and 212-2.3(a) Table 3, air dispersion modeling must be used to demonstrate compliance with the NAAQS and with Part 212. Air dispersion modeling was conducted for SO₂ in accordance with Part 212 requirements to demonstrate compliance with the SO₂ NAAQS. Background SO₂ concentrations for the Rochester monitor (AQ5 Site ID 36-055-1007) were obtained from EPA's AirData website and confirmed against the 2023 NYSDEC Air Quality Report.

2.8 Subpart 257-4 Air Quality Standards - Fluorides

DAR-1 Appendix A, Part V, Section D addresses the DAR-1 "equivalent" concentrations for certain compounds which have been assigned state or federal ambient air quality standards. Specifically, 1-hour and annual fluoride SGC/AGC were established as DAR-1 "equivalent" concentrations derived from the listed New York Ambient Air Quality Standards (NYAAQS) in Subpart 257-4. Such "equivalent" values are not true air quality standards and are intended to align federal and state air quality standards with a 1-hour and annual "equivalent" concentration that is equal to or more stringent than the original standard's averaging period. Where assigned, the DAR-1 "equivalent" concentrations are included in the SGC/AGC tables if they are more conservative than a preliminary SGC or AGC value. In the case of fluorides, Subpart 257-4 has not established a 1-hour or annual standard, however, DAR-1 includes "equivalent" standards for fluoride for these averaging periods, as shown in Table 2-3.

Per DAR-1, if the "equivalent" standards (i.e., the AGC/SGC) are met, it is an indication that the relevant ambient air quality standard would be met. If the "equivalent" standards are not met, compliance with the regulatory standard, NYAAQS for fluoride in Subpart 257-4 in this case, must be met. The regulatory standards are listed in Table 2-4.

Table 2-3. Equivalent NYAAQS for Part 257-4 Compounds

CAS #	Chemical	Equivalent 1-hr Concentration^a (µg/m³)	Equivalent Annual Concentration^a (µg/m³)
16984-48-8	Fluoride	5.3	0.067

a. DAR-1 AGC/SGC Table, dated February 12, 2021

Table 2-4. NYAAQS for Part 257-4 Compounds

CAS #	Chemical	12-hour Concentration^a (µg/m³)	24-hour Concentration^a (µg/m³)	1-week Concentration^a (µg/m³)	1-month Concentration^a (µg/m³)
16984-48-8	Fluoride	3.7	2.85	1.65	0.8

2.9 Subpart 257-5 Air Quality Standards – Hydrogen sulfide

Per 6 NYCRR Subpart 257-5.3, in any one-hour period, the average concentration of hydrogen sulfide (H₂S) shall not exceed 0.010 ppm (14 µg/m³). Air dispersion modeling was conducted to demonstrate compliance with this air quality standard.

3. SITE DESCRIPTION

The Micron Campus is located in Clay, Onondaga County, New York. Figure 3-1 presents an aerial map of where the Proposed Air Permit Project will be located. A proposed plot plan is provided in Appendix A.

The Proposed Air Permit Project is located at the following address:

5171 NY-31
Clay, New York 13041

Figure 3-1. Aerial Map of the Proposed Location of the Micron Campus at Clay



4. AIR DISPERSION MODELING METHODOLOGY

This section of the modeling report presents the procedures utilized in the air dispersion modeling analysis. The techniques in this air dispersion modeling analysis are consistent with the current U.S. EPA and NYSDEC guidance.

4.1 Dispersion Model Selection and Building Downwash Analysis

Dispersion models predict ambient pollutant concentrations by simulating the evolution of the pollutant plume over time and space given data inputs including the quantity of emissions, stack exhaust parameters (e.g., velocity, flow rate, and temperature) and meteorological data. Building structures that obstruct wind flow near emission points may cause stack discharges to become caught in the turbulent wakes of these structures leading to downwash of the plumes. Wind blowing around a building creates zones of turbulence that are greater than if the building were absent. These effects generally cause higher ground-level pollutant concentrations since building downwash inhibits dispersion from elevated stack discharges. For this reason, building downwash algorithms are considered an integral component of the selected air dispersion model.

The latest version of the AERMOD model, v24142, was used to estimate maximum ground-level concentrations in the air pollutant analysis conducted. AERMOD is a refined, steady-state, multiple source dispersion model that was promulgated in December 2005 as the EPA-preferred model to use for industrial sources in this type of air dispersion modeling analysis. The AERMOD modeling was performed using regulatory default options except as otherwise noted in this protocol. The AERMOD model has the Plume Rise Modeling Enhancements (PRIME) incorporated in the regulatory version, so the direction-specific building downwash dimensions used as input were determined by the Building Profile Input Program, PRIME version (BPIP PRIME), version 04274. BPIP PRIME is designed to incorporate the concepts and procedures expressed in the Good Engineering Practice (GEP) Technical Support document, the Building Downwash Guidance document, and other related documents, while incorporating the PRIME enhancements to improve prediction of ambient impacts in building cavities and wake regions.

4.2 Meteorological Data

Site-specific dispersion models require a sequential hourly record of dispersion meteorology representative of the region within which the source is located. In the absence of site-specific measurements, readily available data from the closest and most representative National Weather Service (NWS) station are commonly used. Regulatory air dispersion modeling using AERMOD requires five years of quality-assured meteorological data that includes hourly records of the following parameters:

- ▶ Wind speed;
- ▶ Wind direction;
- ▶ Air temperature;
- ▶ Micrometeorological parameters (e.g., friction velocity, Monin-Obukhov length);
- ▶ Mechanical mixing height; and
- ▶ Convective mixing height.

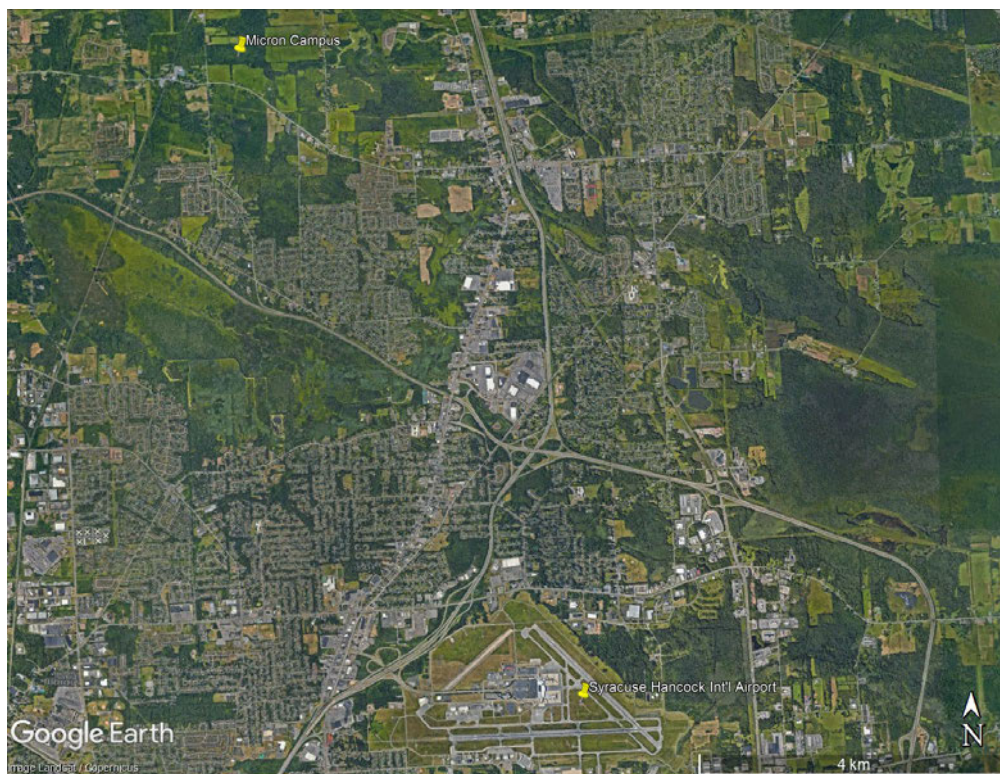
The first three of these parameters, wind speed, wind direction and air temperature, are directly measured by monitoring equipment located at typical surface observation stations. The friction velocity, Monin-Obukhov length, and mixing heights are derived from characteristic micrometeorological parameters and

from observed and correlated values of cloud cover, solar insolation, time of day and year, and latitude of the surface observation station. Surface observation stations form a relatively dense network, are almost always found at airports, and are typically operated by the NWS. Upper air stations are fewer in number than surface observing points since the upper atmosphere is less vulnerable to local effects caused by terrain or other land influences and is, therefore, less variable. The NWS operates virtually all available upper air measurement stations in the United States.

4.2.1 Site Location and Surface Characteristics

Micron utilized 2019 to 2023 meteorological data from the meteorological tower at the Syracuse Hancock International Airport (KSYR), located roughly 10 km southeast of the Micron Campus.⁵ The rural option was utilized in the modeling analysis, as NYSDEC guidance in DAR-10 only expects facilities located in the New York City metro area to have a sufficiently high population density and urban heat island effects to justify the use of urban dispersion coefficients. Figure 4-1 shows the relative location of KSYR to the Micron Campus.

Figure 4-1. Location of Syracuse Hancock International Airport Meteorological Tower



The meteorological tower at KSYR airport is the closest tower to the Micron Campus that has quality data for all necessary parameters. Given its proximity to the station, the KSYR station is ideally situated for use in this analysis.

AERMOD ready data available from NYSDEC was used for this modeling analysis. The dataset consisted of five years (2019-2023) of pre-processed meteorological data representing the winds, temperature, and

⁵ On August 8, 2025, Micron was advised by the NYSDEC to utilize the 2019-2023 MET dataset.

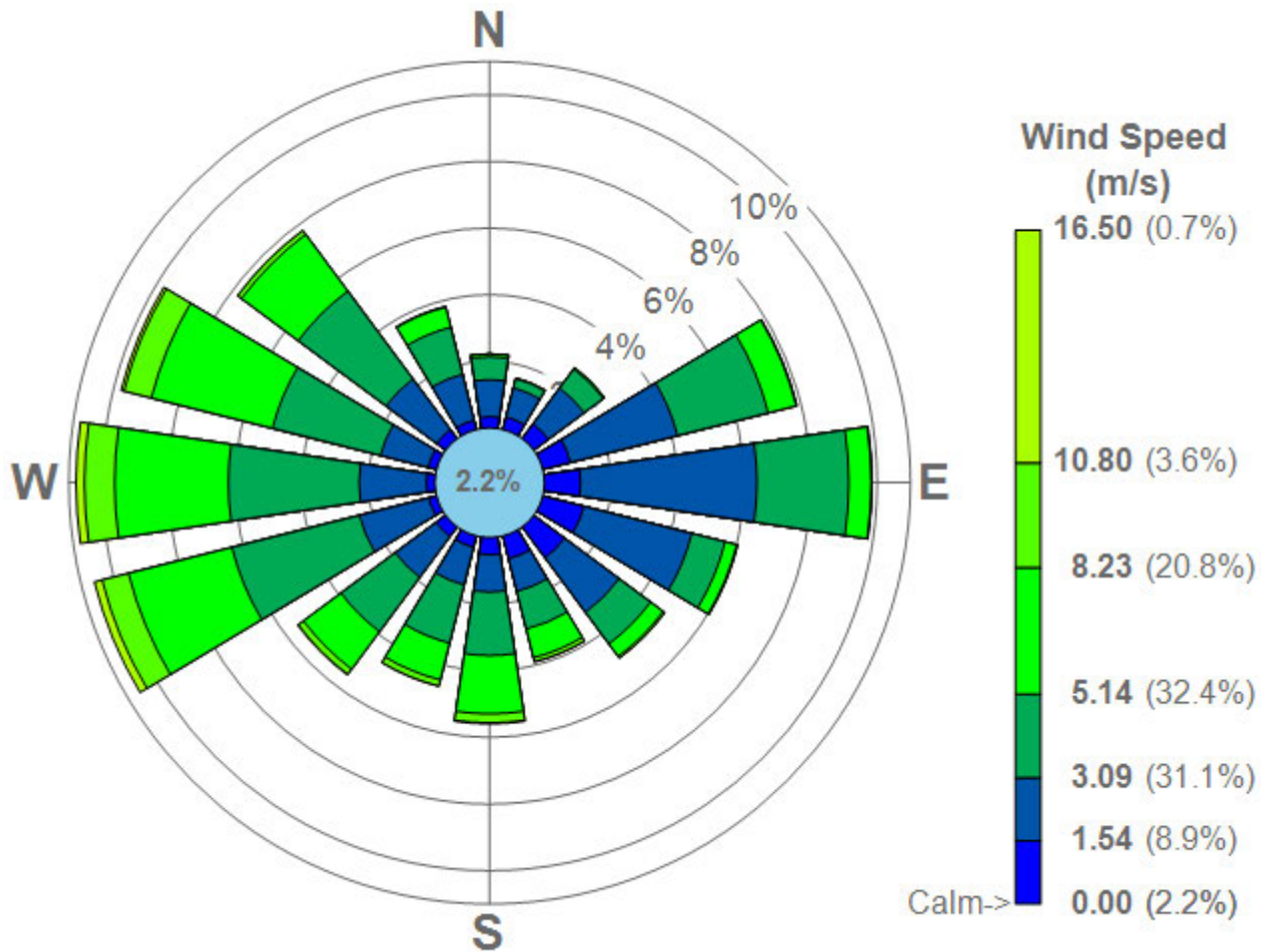
atmospheric turbulence around the KSYR airport (WBAN No. 14771) Automated Surface Observing System (ASOS) monitoring station located in Syracuse, New York. Upper air data is collected from the NWS station in Buffalo, NY (WBAN No. 14733). The raw hourly surface data format is Integrated Surface Hourly Data (ISHD), and the upper air data format is the Forecast Systems Laboratory (FSL) that are used and processed by AERMET v24142. Hourly surface wind data was supplemented with 1-minute wind data (or 5-minute data for time periods with missing 1-minute data) collected at the KSYR airport using U.S. EPA's AERMINUTE pre-processor program.⁶ NYSDEC incorporated Adjust U* as a regulatory option in the AERMOD processed ready meteorological data for all the ASOS sites in New York. A base elevation of 125 meters was used for the meteorological tower in the modeling analysis. The meteorological data files are included in the submittal of electronic files included with this modeling report submittal.

4.2.2 Topographic Setting

The complexity of the terrain is another consideration in determining data representativeness. There are minute differences in elevation between the Micron Campus (base elevation approximately 120 meters) and the Syracuse, NY Airport (Base Elevation 125 meters), so prevailing winds measured at the airport are representative of those experienced at the Micron Campus. Figure 4-2 provides a wind rose for KSYR airport for the data period of 2019 to 2023.

⁶ No 1-minute or 5-minute data is available for 7/4/2022 to 12/31/2022.

Figure 4-2. Syracuse (KSYR) Wind Rose



4.3 Treatment of Terrain

Through the use of the AERMOD terrain preprocessor (AERMAP), AERMOD incorporates not only the receptor heights, but also an effective height (hill height scale) that will represent the significant terrain features surrounding a given receptor that could lead to plume lift and other terrain interaction.

Receptor terrain elevations input to the model were interpolated from 1/3 arc-second National Elevation Dataset (NED) data obtained from the U.S. Geological Survey (USGS) using AERMAP v24142.

4.4 Coordinate System

In all modeling analysis data files, the location of emission sources, structures, and receptors were represented in the UTM coordinate system. The UTM grid divides the northern hemisphere into coordinates that are measured in north meters (measured from the equator) and east meters (measured from the central meridian of a particular zone, which is set at 500 km). The datum for this modeling analysis was based on North American Datum 1983 (NAD 83). UTM coordinates for this analysis all reside within UTM Zone 18.

4.5 Receptor Grids

For this air dispersion modeling analysis, ground-level concentrations were calculated along the Micron Campus boundary and also within a receptor grid outside the ambient air boundary. Since the receptor grid extended to 50 km, a nested Cartesian receptor grid was based on NYSDEC guidance in DAR-10.

The boundary receptors were spaced 25 meters apart. The grid consists of the following receptor spacing:

- ▶ 70 meter-spaced receptors from the boundary out to 1.0 kilometer from the Micron Campus fence-line;
- ▶ 100 meter-spaced receptors from 1.0 to 2.5 kilometers;
- ▶ 250 meter-spaced receptors from 2.5 to 5 kilometers;
- ▶ 500 meter-spaced receptors from 5 to 10 kilometers; and
- ▶ 1000 meter-spaced receptors from 10 to 50 kilometers.

Receptor elevations required by AERMOD were determined using the AERMAP terrain preprocessor (version 24142). Figure 4-4 shows the variable density of the receptor grid and Figures 4-5, 4-6, and 4-7 show the Proposed Air Permit Project ambient air boundary.

In the December 2019 memo from the EPA titled "Revised Policy on Exclusions from 'Ambient Air'", the ambient air policy is "...the atmosphere over land owned or controlled by the stationary source may be excluded from ambient air where the source employs measures, which may include physical barriers, that are effective in precluding access to the land by the general public".

The Micron Campus is planned for a greenfield site that currently primarily consists of residential and agricultural land. The property that constitutes the Micron Campus will be made up of several parcels of land. All of the properties on the Micron Campus have been acquired by the Onondaga County Industrial Development Agency (OCIDA) and the majority of the structures, including residences, were removed in late 2023. Micron anticipates that all of the Micron Campus will be owned and controlled by Micron by the time of the operation of the Proposed Air Permit Project. Figure 4-4 represents the future anticipated boundary of the Micron Campus.

4.5.1 Sensitive Receptors

The following locations, in Figure 4-3 were identified by the NYSDEC as sensitive receptors in the modeling demonstration.⁷

- ▶ The Cottages at Garden Grove
- ▶ Midstate Athletic Community Center
- ▶ Northern Onondaga Public Library
- ▶ Spring Village Apartments
- ▶ Cicero Elementary School

The Proposed Air Permit Project will be located in the Town of Clay, New York, at the White Pine Commerce Park, which is not designated as a disadvantaged community (DAC). The closest DAC to the proposed project is five (5) miles south (North Syracuse area). Therefore, the Proposed Air Permit Project is not likely to disproportionately burden or otherwise impact the DAC.

⁷ Micron ATV-Notice of Incomplete Application from Kevin Balduzzi, NYSDEC, to Scott Gatzemeir, Micron. April 30, 2025. Comment #124

Figure 4-3. Sensitive Receptor Locations

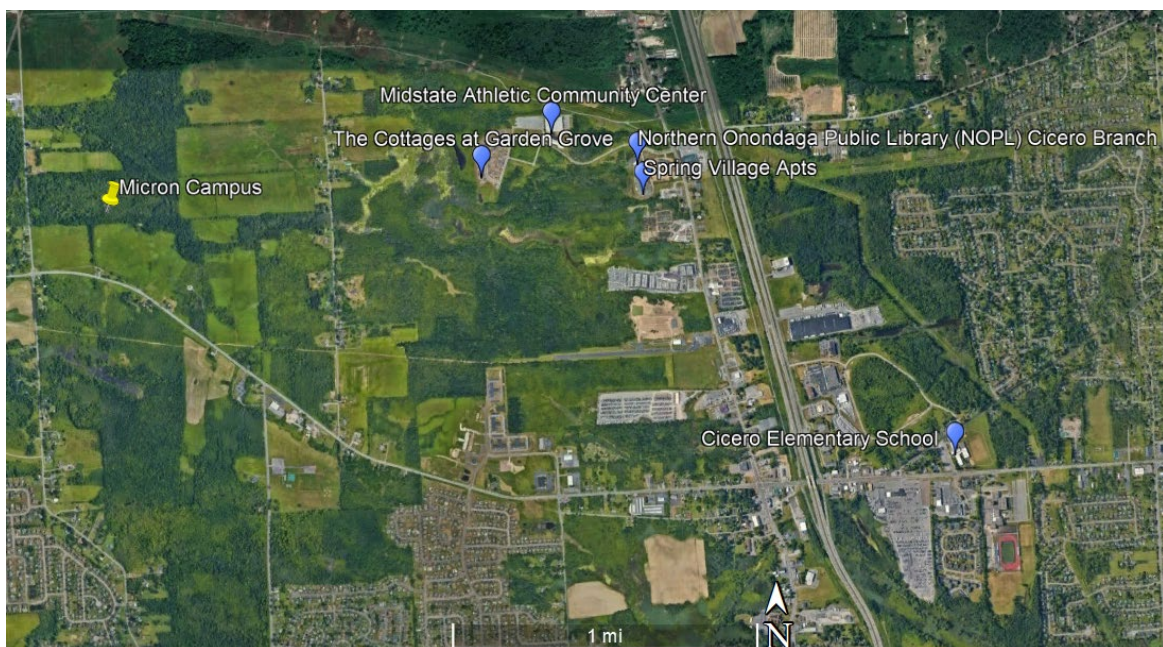


Figure 4-4. Receptor Grid (Zoomed Out)

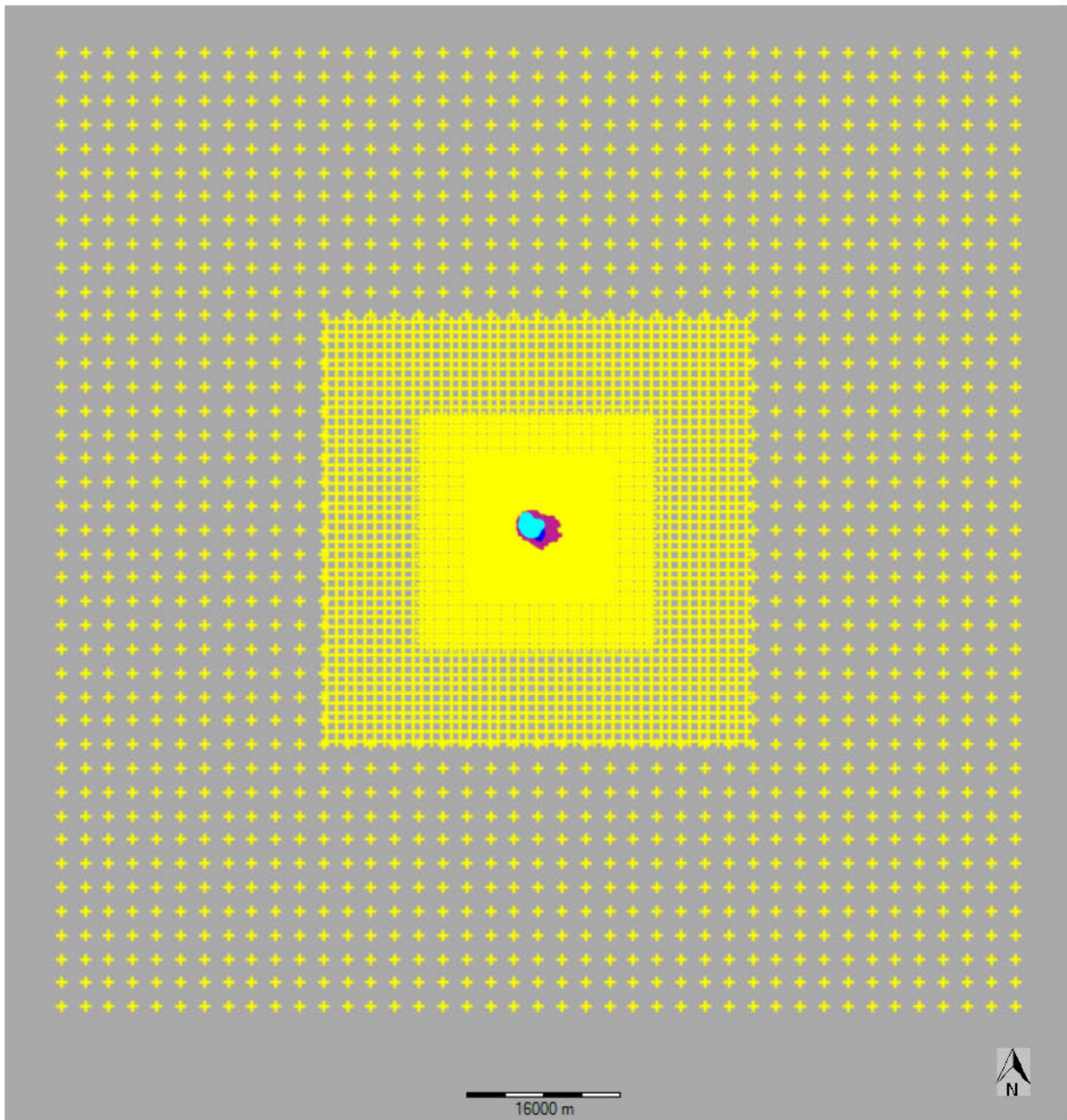


Figure 4-5. Boundary Receptor Grid (Zoomed In)



Figure 4-6. Boundary Receptor Grid – Map Overlay

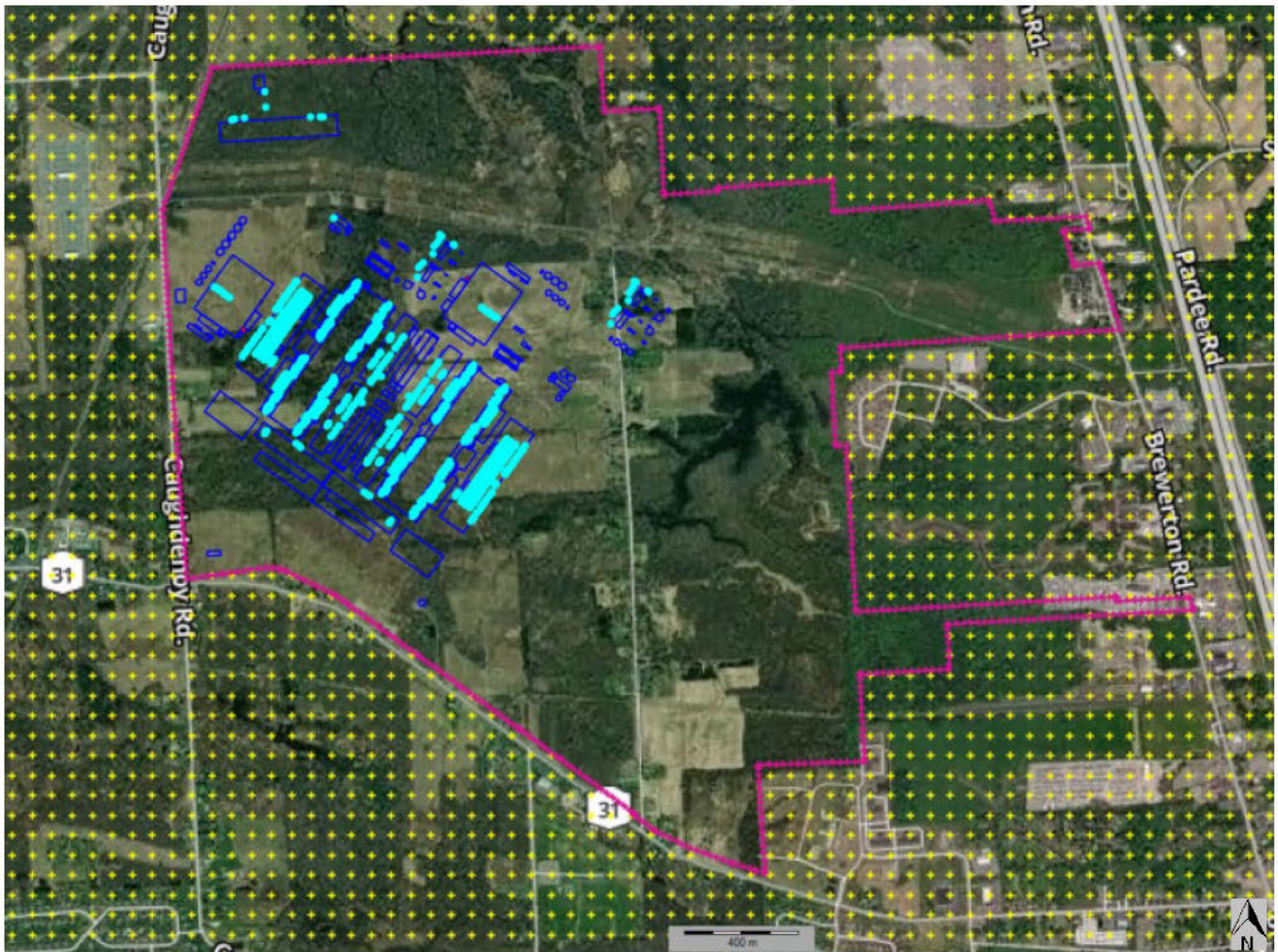
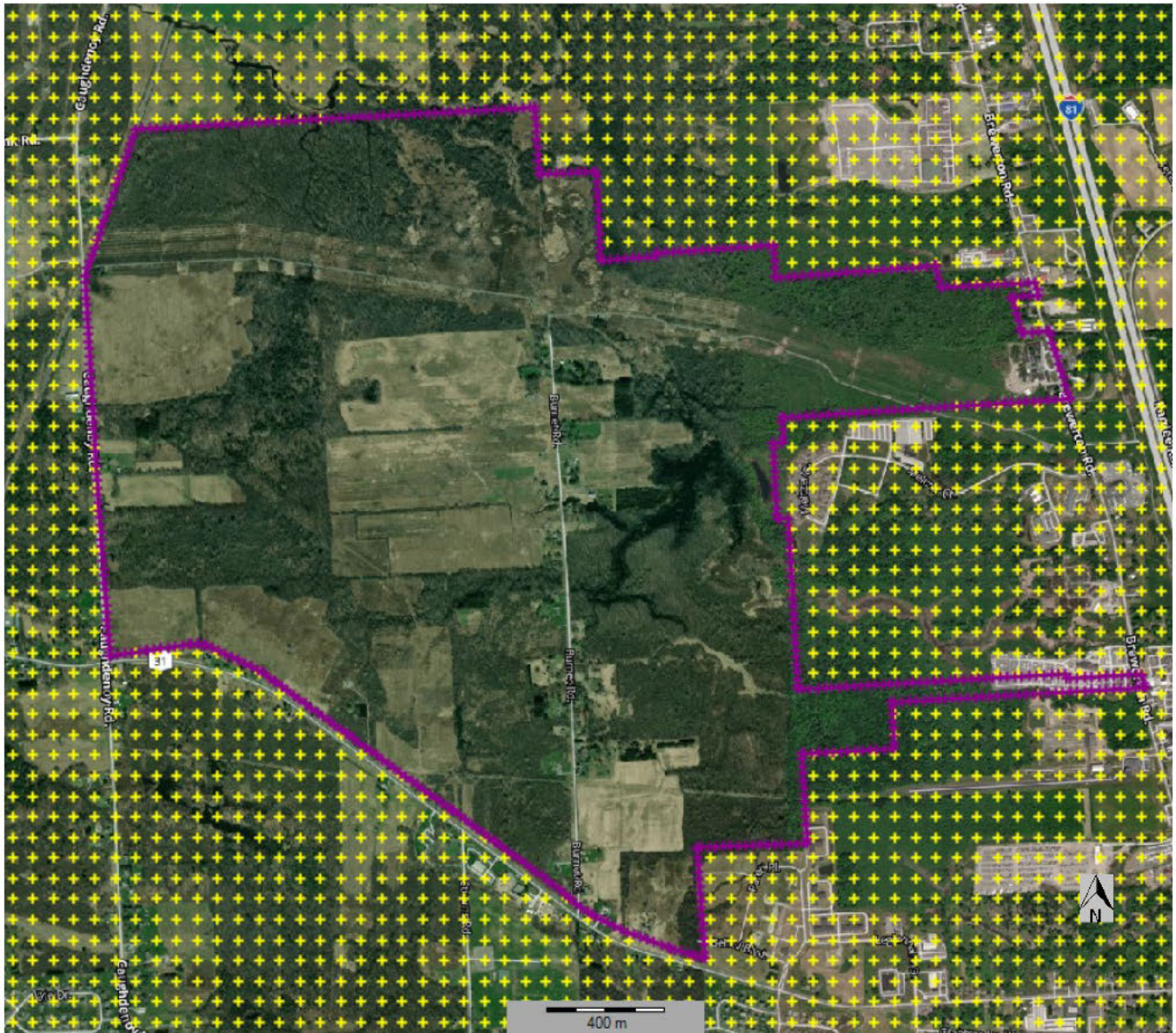


Figure 4-7. Property Boundary – Map Overlay



4.6 GEP Stack Height Analysis

Stack height regulations restrict the use of stack heights in excess of Good Engineering Practice (GEP) stack height in air dispersion modeling analyses. Under these regulations, that portion of a stack in excess of the GEP height is generally not creditable when modeling to determine source impacts. This essentially prevents the use of excessively tall stacks to reduce ground-level pollutant concentrations. The minimum stack height not subject to the effects of downwash, called the GEP stack height, is defined by the following formula:

$H_{GEP} = H + 1.5L$, where:

H_{GEP} = minimum GEP stack height,

- H = structure height, and
L = lesser dimension of the structure (height or projected width).

The wind direction-specific downwash dimensions and the dominant downwash structures used in this analysis were determined using BPIP PRIME. In general, the lowest GEP stack height for any source is 65 meters by default. A source may construct a stack that exceeds GEP, but is limited to the GEP stack height in the air quality analysis demonstration. All modeled source stacks part of Proposed Air Permit Project were less than 65 meters tall and therefore met the requirements of GEP and credit for the entire actual height of each stack was taken in this modeling analysis.

4.7 Regulatory NO₂ Model Selection

For NO₂ modeling, the U.S. EPA approved Tier 2 Ambient Ratio Method 2 (ARM2) was utilized. 40 CFR 51, Appendix W and subsequent guidance recommends a three-tier NO₂ modeling approach for the conversion of nitric oxide (NO) to NO₂. These tiers are regulatory options provided in AERMOD and each consider increasingly complex considerations of NO to NO₂ conversion chemistry.

- ▶ Tier 1 assumes total conversion of NO to NO₂;
- ▶ Tier 2 utilizes the revised ARM2 approach; and,
- ▶ Tier 3 incorporates the OLM and Plume Volume Molar Ratio Method (PVMRM) as regulatory options in AERMOD.

For NO₂ modeling using ARM2, default minimum and maximum ambient equilibrium ratios were used.

5. EMISSION SOURCES AND EMISSION RATES

This section presents the source types and stack parameters utilized in the models.

5.1 Sources and Stack Parameters

The AERMOD dispersion model allows for emission units to be represented as point, area, or volume sources, along with other less commonly used source types.

5.1.1 Proposed Air Permit Project Sources

In this air dispersion modeling analysis, the Proposed Air Permit Project utilized point sources (including capped or horizontal point sources as appropriate) for most modeled emission sources. There are also two volume sources.

Table 5-1 lists the proposed point sources of NO_x, PM_{2.5}, PM₁₀, and CO that were included in the air dispersion modeling for the Proposed Air Permit Project, organized by emission type. Each table indicates if the point source will be a vertical/unobstructed release, oriented horizontally, or capped. Model inputs for all point source types use stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity) based on facility design and each stack within a stack group shares the same stack parameters. Appendix D provides more detailed stack parameter information, and a spreadsheet is also included with this submittal to provide the full list of individual stack parameters.

Table 5-2 lists the proposed volume sources of PM_{2.5} and PM₁₀ that were included in the model, organized by emission type. Model inputs for all volume source types are based on facility design.

As discussed in the permit application, exhaust from the Proposed Air Permit Project will be routed to the compound-specific common vent header for one of five exhaust types: acid exhaust, CVD exhaust, ammonia exhaust, solvent exhaust, and general exhaust. The exhaust from several process tools in each subsection of the fab will be routed to a common exhaust header appropriate for the type of exhaust and then will be distributed to multiple similar control devices along the length of the header, each of which is equipped with stacks to the atmosphere. For each of these exhausts, with the exception of general exhaust, a unique type of control device will be used, which is discussed in further detail in the permit application. Process flow diagrams illustrating this layout are provided in Appendix H.

5.1.1.1 Emergency Generators

There are a number of emergency generators at the facility. The generators are only designed to be used in the event of a loss of electricity from the grid to safely shutdown the facility and would only be operated outside of those situations for readiness testing and maintenance. For the 1-hour NO₂ standard, Micron modeled emissions from readiness testing and maintenance, as discussed with the NYSDEC.⁸ Since maintenance and testing would be the only operation occurring at the same time as process operations, the NYSDEC considered this to be the most representative of realistic operating scenarios. Fifteen (15) generators will be tested for a duration of no more than 30 minutes, therefore Micron modeled emissions from 30 generators at half of the maximum hourly emission rate. Micron selected the 30 generators that were closest to the western fenceline of the facility, as that is where the worst-case impacts were occurring

⁸ Call with NYSDEC, Micron, and Trinity Consultants on June 2, 2025.

in the modeling demonstration. Additional modeling files are provided in this modeling report to demonstrate that the generators modeled in the cumulative modeling demonstration were the worst-case subset of all the generators at the facility.

Separately, for 24-hr PM₁₀ and PM_{2.5}, modeled emissions for the emergency generators were based on 24-hr operating limits that Micron is proposing in the permit application. These limits capped the number of hours that a certain number of generators would be operating at a given time. The proposed 24-hr operating limits were:

- ▶ 46 engines can operate for up to 24 hours
- ▶ 80 engines, inclusive of the 46 generators that can operate for up to 24 hours, can operate for up to 8 hours
- ▶ All remaining engines can operate for up to 4 hours

In order to maintain flexibility, Micron is not limiting operation of specific generators, but rather the generators at the facility as a whole. To model the most conservative scenario, Micron chose to model the 46 closest generators to the receptor with the highest modeled impact in preliminary modeling as operating for 24 hours, the next closest 34 engines as operating for up to 8 hours, and the remainder of generators as operating for up to 4 hours.

For the remainder of pollutants and averaging periods, modeled emission rates were based on the 100 hour per year operating limitation proposed in the permit application.

5.1.1.2 Merged Stacks

Generator and CVD stacks were modeled as merged stacks (i.e., assuming that the plumes combine for the purposes of plume rise) because the stacks were within 1 stack diameter of each other. To model these stacks, an equivalent diameter was calculated for each merged stack by determining the total cross-sectional area across the group of merged stacks, as shown in the equation below. Generators were modeled as either groups of 2 or 3, while CVD stacks were modeled in groups of 2.

For each group of merged plumes, the heights and exhaust temperatures of each individual stack in the group were identical, and therefore, the representative merged plume had the same height and exhaust temperature. The equivalent stack diameter was calculated using the following formula:

$$D_{equiv} = 2 \times \sqrt{\frac{\sum Stack Area}{\pi}}$$

For each group of merged plumes, the exit velocities of each individual stack in the group were identical. The exit velocity of the merged plume was determined by dividing the combined airflow from the individual stacks by the cross-sectional area using the equivalent stack diameter. Although the merged plume had a higher airflow compared to each individual stack, since each stack has the same airflow and the exit velocity is calculated using the cross-sectional area of the merged plume based on the equivalent diameter, the exit velocity of the merged plume matched the exit velocity of the individual stacks.

In the model, the total combined emissions from each group of stacks were modeled out of one stack. Stack height, temperature, and exit velocity reflected the shared parameters for each group of stacks. These stack parameters are reflected in Table 5-1.

5.1.1.3 Redundant Stacks

The Micron Campus is designed such that there are redundant units and associated stacks for each group of unique control devices. Only a certain number of units will be operating at a time, with other units either on standby or undergoing maintenance, and thus only a certain number of stacks will be emitting at a time. Instead of dividing total facility emissions across all the stacks at the site, Micron divided total facility emissions across operational stacks, resulting in a higher emission rate per stack, and modeled the redundant stacks with no emission rate.

Redundant stacks were selected to provide the most conservative modeled impact based on proximity to the western fenceline, as that is where the dispersion modeling indicates that the maximum off-site concentrations will be located. As discussed in the permit application, all stacks, regardless of whether they are considered “redundant” or not, exhaust from multiple similar control devices along the length of header, and emissions out of each stack along the header would be same. By selecting the stack in each header that was furthest from the maximum-off-site concentrations as the redundant stack, Micron is modeling the worst-case operations scenario.

Table 5-1. Modeled Source Stack Parameters

Building^a	Stack Type^b	Description	Quantity^c	Stack Height (m)	Stack Temp.^f (K)	Stack Diameter (m)	Stack Velocity (m/s)	Orientation
Fab	AE	Acid Exhaust Fan Stack	80	46.94	295.37	1.27	29.80	Vertical
Fab	AME	Ammonia Exhaust Fan Stack	32	46.94	295.37	0.91	28.75	Vertical
Fab	CVD	CVD Exhaust Fan Stack ^d	32	51.94	295.37	0.93	36.51	Vertical
Fab	GE	General Exhaust Fan Stack	80	46.94	295.37	1.07	29.04	Vertical
Fab	SEA	RCTO Oxidizer Exhaust Stack	72	46.94	588.71	0.25	23.29	Vertical
Fab	SE	Solvent Exhaust Fan Stack	72	46.94	295.37	1.02	29.11	Vertical
CUB	AE	Acid Exhaust Fan Stack	8	24.69	297.04	0.51	27.94	Vertical
CUB	BEX	Boiler Exhaust Stack	6	21.64	477.59	0.61	36.39	Capped
CUB	CT	Cooling Tower Discharge	210	30.75	Ambient	5.84	10.31	Vertical
CUB	GEN2	Engine Exhaust Stack - Group of 2 ^e	9	21.03	796.09	0.72	45.78	Vertical
CUB	GEN3	Engine Exhaust Stack - Group of 3 ^e	26	21.03	796.09	0.88	45.78	Vertical
HPM	AE	Acid Exhaust Fan Stack	16	30.88	295.37	1.07	19.27	Vertical
HPM	AME	Ammonia Exhaust Fan Stack	16	30.88	295.37	0.76	18.63	Vertical
HPM	GEN	Engine Exhaust Stack	8	8.38	796.09	0.51	45.78	Vertical
HPM	GE1	General Exhaust Fan Stack	20	30.88	295.37	0.71	23.76	Vertical
HPM	GE2	General Exhaust Fan Stack	16	30.88	295.37	1.27	17.40	Vertical
HPM	GBE1	General Exhaust Fan Stack	12	30.88	295.37	0.46	17.25	Vertical
HPM	GBE2	General Exhaust Fan Stack	12	30.88	295.37	1.17	16.73	Vertical
HPM	SEA	RCTO Oxidizer Exhaust Stack	16	30.88	588.71	0.15	29.75	Vertical
HPM	SE	Solvent Exhaust Fan Stack	16	30.88	295.37	0.86	18.53	Vertical
HPM	FRE	Flammable Exhaust Stack	12	30.88	295.37	1.02	16.01	Vertical
WWT	AE	Acid Exhaust Fan Stack	8	43.89	294.26	0.66	20.67	Vertical
WWT	AME	Ammonia Exhaust Fan Stack	6	43.89	294.26	0.25	23.29	Vertical
WWT	SE	Solvent Exhaust Fan Stack	6	43.89	294.26	0.15	51.74	Vertical
GY	GEN	Engine Exhaust Stack	4	3.45	740.37	0.20	101.14	Vertical
GY	WBV	Vaporizer Exhaust Stack	8	5.18	672.04	0.97	14.52	Capped
GY	CT	Venturi Style Cooling Tower Stack	12	12.80	Ambient	7.32	8.42	Vertical
PROBE	GEN	Engine Exhaust Stack	6	37.80	796.09	0.61	13.04	Vertical
PROBE	SE	Solvent Exhaust Fan Stack	4	34.75	294.26	0.30	25.87	Vertical
PROBE	AE	Acid Exhaust Fan Stack	4	34.75	294.26	0.51	23.29	Vertical
BIO	GEN	Engine Exhaust Stack	3	8.38	742.59	0.51	45.78	Vertical
BIO	GE	General and Odor Scrubber Exhaust	4	21.52	299.82	1.32	22.81	Vertical
IWW	GEN	Engine Exhaust Stack	1	8.38	796.09	0.51	45.78	Vertical
MPH	FWP	Emergency Fire Pump	1	7.92	735.93	0.20	17.26	Vertical

- a. CUB = central utilities building, HPM = hazardous process material building, WWT = wastewater treatment operations, GY = gas yard, PROBE = Admin/Probe building, BIO = Bio building, IWW = industrial wastewater treatment operations, and MPH = mech pump house
- b. The individual source locations, elevation data, emission rates, and parameters are listed in Appendix D.
- c. Each cooling tower stack represents emissions from two cooling tower units.
- d. Fab CVD stack parameters represent the modeled merged stack parameters.
- e. CUB GEN engines are merged as groups of two or three stacks. Stack parameters represent the modeled merged stack parameters for these groups of stacks.
- f. Stacks exhausting at ambient temperatures are modeled to exhaust at 0 K in AERMOD.

Table 5-2. Modeled Volume Source Parameters

AERMOD ID	Description	X Coord. (m)	Y Coord. (m)	Elev. (m)	Release Height (m)	Init. Lat. Dim. (m)	Init. Vert. Dim. (m)
SILO1	Transfer of material from lime silo to truck.	405437.9	4782946.0	121.92	3.505	5.349	6.521
SILO2	Transfer of material from lime silo to truck.	406225.1	4783125.4	121.92	3.505	5.349	6.521

5.1.2 Nearby and Other Sources

As discussed in Section V.5 of DAR-10, a NAAQS analysis must consider ambient concentrations resulting from emissions from the Proposed Air Permit Project as well as other facilities. In Section V.2.1 of DAR-10, these facilities are subcategorized into “nearby” and “other” sources. Generally, nearby sources should be considered for explicit modeling in AERMOD whereas other sources are best represented by air quality monitoring data. DAR-10 refers to 2011 NO₂ modeling guidance from EPA⁹ for additional details on determining emission source inventories for NAAQS modeling analyses. This guidance suggests that the emphasis on determining which nearby sources to include in the modeling analysis should focus on the area within 10 kilometers of the project location in most cases. This distance is based on a general principle that maximum concentrations typically occur a distance downwind that is approximately 10 times the source release height in relatively flat terrain and accounts for extra distance due to possible terrain influences.

Separately, the EPA has published a final rule that revises Appendix W¹⁰ on November 20, 2024. As part of these revisions, the EPA has also released a separate document, “Guidance on Developing Background Concentrations for Use in Modeling Demonstrations”,¹¹ published November 2024. The guidance recommends an initial qualitative analysis to determine how representative background data is of the source mix in the modeled demonstration area, as background monitors are not often co-located with the project source area. Understanding wind patterns, terrain features, and land use are also important in determining whether background data is representative and if nearby sources should be included in the cumulative modeling demonstration.

On October 3, 2023, NYSDEC provided a list of Title V sources with NO_x, CO, PM_{2.5}, and PM₁₀ emissions within 50 km of the Micron Campus, state permit sources with NO_x, CO, PM_{2.5}, and PM₁₀ emissions within 25 km of the Micron Campus, and registration permit sources with NO_x, CO, PM_{2.5}, and PM₁₀ emissions within 5 km of the Micron Campus, with supplemental information provided on December 22, 2023.¹² This list consisted of a total of 45 facilities, and all Title V sources were greater than 10 km from the Micron Campus.

To evaluate which sources should be included in the cumulative modeling, Micron first completed a qualitative analysis of the background monitoring data to determine how representative it is of the source mix in Micron Campus area. This analysis is discussed in the following sections.

5.1.2.1 Nitrogen Oxides, Carbon Monoxide, and Particulate Matter (≤10 microns) Regional Sources

The Rochester monitors used to represent background concentrations of NO₂, CO, and PM₁₀ provided a conservatively high estimate of background concentration for the area surrounding the Micron Campus. As discussed in Section 2.2.1, the monitors are located near I-490 in Rochester and will therefore be impacted strongly by NO_x emissions from vehicles traveling on the interstate highway and PM₁₀ fugitive emissions from road traffic. There is no equivalent roadway in the vicinity of the Micron Campus and therefore the

⁹ Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard, Memorandum from Mr. Tyler Fox to Regional Air Division Directors, March 1, 2011.

¹⁰ Federal Register / Vol. 89, No. 230 / Friday, November 29, 2024 / Rules and Regulations

¹¹ <https://www.epa.gov/system/files/documents/2024-11/guidance-on-developing-background-concentrations-for-use-in-modeling-demonstrations.pdf>

¹² Emails from Ms. Julia Stuart of NYSDEC to Mr. Tony Schroeder of Trinity Consultants on October 3, 2023 and email from Mr. Mark Nowak of NYSDEC to Mr. Brian Noel of Trinity Consultants on December 22, 2023.

mobile source and fugitive contribution to the background monitor more than adequately represent concentrations near the Micron Campus.

Additionally, there are considerably more industrial facilities located near the Rochester monitor than are in the vicinity of the Micron Campus. Based on information available on the DECinfo Locator website, which is shown in Figure 2-3, there are seven Title V sources located within 10 km and two additional Title V sources located within 20 km of the Rochester monitor as well as numerous other state permit sources located in this area. As shown in Figure 2-5, the density of Title V and state permit sources surrounding the Micron campus is significantly lower. There are zero Title V and one air state facility permit source that emit NO_x, CO, or PM₁₀ located within 10 km of the Micron Campus and seven Title V sources that emit NO_x or PM₁₀ located between 10 to 20 km of the Micron Campus.

Wind roses provided in Figures 2-2 and 2-4 for the Rochester and Syracuse areas show prevailing wind patterns. In the Rochester area, the prevailing winds are predominantly from the southwest and west. In the Syracuse area, the prevailing winds are predominantly from the west. As discussed in Section 2.2.1.1, the combination of the high density of industrial facilities that are upwind of the Rochester monitors and roadway traffic, along with the relatively low density of industrial facilities that are upwind of the Micron Campus make for a very conservatively high representation of concentration from background and “other” sources of NO_x, CO, and PM₁₀ near the Micron Campus.

5.1.2.2 Particulate Matter (≤ 2.5 microns) Regional Sources

The Syracuse monitor was used to represent background concentrations for PM_{2.5} as it provided a conservatively high estimate of background concentration for the area surrounding the Micron Campus. The monitor is approximately five miles southwest of the Syracuse Hancock International Airport. Based on the windrose for KSYR as shown in Figure 2-4, winds in the area are predominantly from the west. Figure 2-5 shows the location of the Syracuse monitor relative to the location of Title V and Air State facilities compared to where the Micron Campus will be located. As many more sources are located to the west of the monitor, which is upwind based on the prevailing wind direction, compared to the Micron Campus, the monitor was a conservative representation of background for the Proposed Air Permit Project.

5.1.2.3 Modeled Regional Sources

Based on proximity to background monitor locations, distance from the Micron Campus, and windrose data, Micron determined three sources where the plume of emissions may coincide with the maximum impacts of the Proposed Air Permit Project. As shown in Figure 2-4, the prevailing wind direction in the Syracuse area is mostly from the west, although there are secondary prevailing winds from the east and south as well.

The list of facilities and emission sources modeled in this analysis was provided by the NYSDEC and included detailed source parameter data provided by the NYSDEC.¹³ These sources were conservatively included in the cumulative modeling even though background data would be expected to adequately represent emissions from these nearby sources.

Micron included the following nearby sources in the cumulative modeling demonstration for NO₂, CO, PM₁₀, and PM_{2.5}, as shown in Figure 5-1:

- ▶ Paul de Lima Co. Inc.: Located 3 km east of the Micron Campus
- ▶ Anheuser Busch Baldwinsville Brewery: Located 13 km west of the Micron Campus

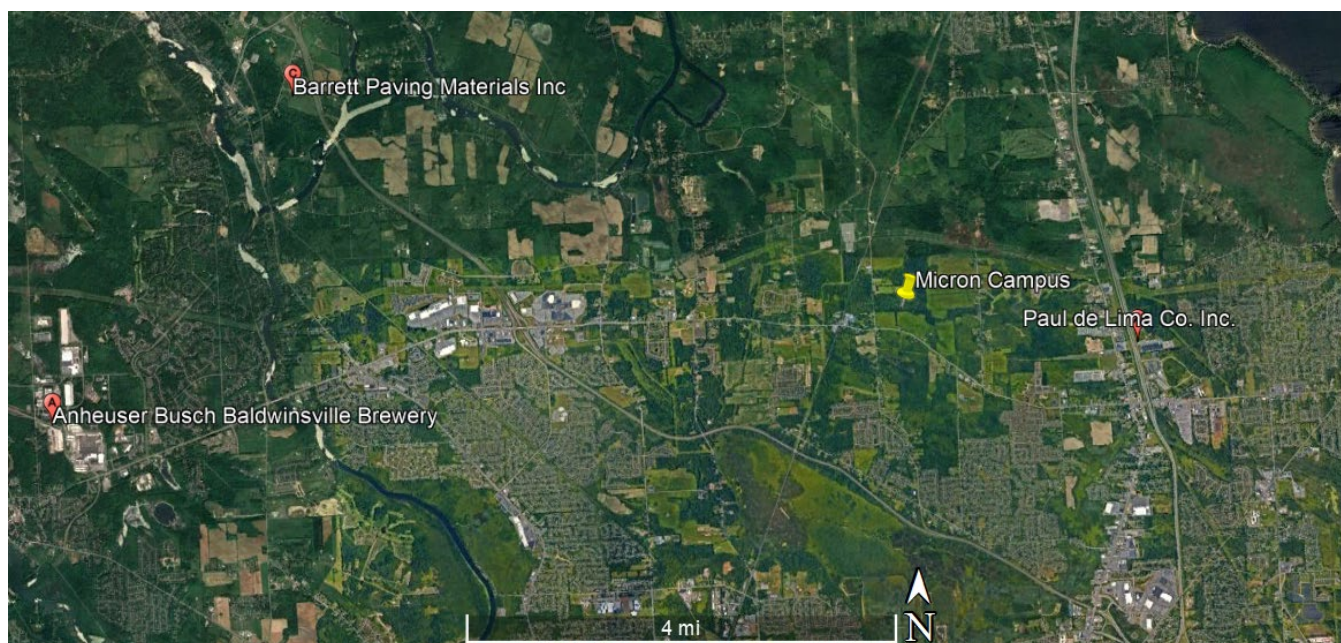
¹³ Email from Mr. Mark Nowak of NYSDEC to Mr. John Ke of Trinity Consultants on March 18, 2024.

- ▶ Barrett Paving Materials Inc.: Located 10 km northwest of the Micron Campus.

All three nearby sources were included in the cumulative analyses for all four pollutants.

All other sources listed in the regional inventory provided by NYSDEC were either accounted for in the ambient background monitoring or are located further than 20 km from the site and their highest impacts would not be expected to affect the significant receptors used in the cumulative impact analysis as determined through the significant impact analysis. Stack parameters and emission rates for these regional sources are listed in Appendix D.

Figure 5-1. Nearby Sources



5.2 Source Emission Rates

Emission rate calculation methodology and example calculations for each relevant averaging period is included in Appendix B for Proposed Air Permit Project sources. Tables 5-3, 5-4, 5-5, 5-6 and 5-7 of this air dispersion modeling report represent the emission rates that were utilized in the AERMOD model for all sources of NO₂, PM_{2.5}, PM₁₀, and CO for SIL, NAAQS, and Increment modeling and SO₂ for Part 212 modeling.

Emission rates for SIL, NAAQS, and Increment modeling conservatively assumed potential to emit and continuous operation for all sources, with hourly and annual emergency engine emissions calculated assuming a maximum of 100 hours of operation per year for 1-hour NO₂ and annual standards, while modeling peak 1-hour emissions for other short-term standards. This approach was also used for the sources identified in footnote B of Tables 5-3, 5-4, and 5-5.

Emission rates for air contaminants modeled for Part 212 are available in Appendix C. Derivations for these emission rates are available in Appendix D.

Table 5-3. Nitrogen Oxides Modeled Emission Rates

Source			Stack Emission Rates ^{b,c}			
Building ^a	Stack Type	Description	NO _x 1-hr		NO _x Annual	
			(lb/hr)	(g/s)	(lb/hr)	(g/s)
Fab	AE	Acid Exhaust Fan Stack	0.173	2.17E-02	0.162	2.04E-02
Fab	AME	Ammonia Exhaust Fan Stack	--	--	--	--
Fab	CVD	CVD Exhaust Fan Stack ^d	2.204	0.29	1.768	0.23
Fab	GE	General Exhaust Fan Stack	--	--	--	--
Fab	SEA	RCTO Oxidizer Exhaust Stack	0.541	6.81E-02	0.511	6.44E-02
Fab	SE	Solvent Exhaust Fan Stack	--	--	--	--
CUB	AE	Acid Exhaust Fan Stack	--	--	--	--
CUB	BEX	Boiler Exhaust Stack	0.365	4.59E-02	0.250	3.15E-02
CUB	CT	Cooling Tower Discharge	--	--	--	--
CUB	GEN2	Engine Exhaust Stack - Group of 2 ^e	3.689	0.697	8.42E-02	1.06E-02
CUB	GEN3	Engine Exhaust Stack - Group of 3 ^e	5.534	0.465	0.126	1.59E-02
HPM	AE	Acid Exhaust Fan Stack	--	--	--	--
HPM	AME	Ammonia Exhaust Fan Stack	--	--	--	--
HPM	GEN	Engine Exhaust Stack	1.845	0.232	4.21E-02	5.31E-03
HPM	GE1	General Exhaust Fan Stack	--	--	--	--
HPM	GE2	General Exhaust Fan Stack	--	--	--	--
HPM	GBE1	General Exhaust Fan Stack	--	--	--	--
HPM	GBE2	General Exhaust Fan Stack	--	--	--	--
HPM	SEA	RCTO Oxidizer Exhaust Stack	0.804	0.10	0.126	1.59E-02
HPM	SE	Solvent Exhaust Fan Stack	--	--	--	--
HPM	FRE	Flammable Exhaust Stack	--	--	--	--
WWT	AE	Acid Exhaust Fan Stack	--	--	--	--
WWT	AME	Ammonia Exhaust Fan Stack	--	--	--	--
WWT	SE	Solvent Exhaust Fan Stack	--	--	--	--
GY	GEN	Engine Exhaust Stack	1.845	0.232	4.21E-02	5.31E-03
GY	WBV	Vaporizer Exhaust Stack	2.100	0.265	0.479	6.04E-02
GY	CT	Venturi Style Cooling Tower Stack	--	--	--	--
PROBE	GEN	Engine Exhaust Stack	1.845	0.232	4.21E-02	5.31E-03
PROBE	SE	Solvent Exhaust Fan Stack	--	--	--	--
PROBE	AE	Acid Exhaust Fan Stack	--	--	--	--
BIO	GEN	Engine Exhaust Stack	1.845	0.232	4.21E-02	5.31E-03
BIO	GE	General and Odor Scrubber Exhaust	--	--	--	--
IWW	GEN	Engine Exhaust Stack	1.845	0.232	4.21E-02	5.31E-03
MPH	FWP	Emergency Fire Pump ^f	9.38E-02	1.18E-02	9.38E-02	1.18E-02

- a. CUB = central utilities building, HPM = hazardous process material building, WWT = wastewater treatment operations, GY = gas yard, PROBE = Admin/Probe building, BIO = Bio building, IWW = industrial wastewater treatment operations, and MPH = mech pump house
- b. For 1-hour and annual NO₂, the modeled emission rates for emergency generators are based on 100 hours of operation per year. For annual NO₂, the modeled emission rate for WBV sources are based on 2,000 hours of operation per year

(with no more than four units operating at a time), the modeled emission rate for BEX sources are based on 6,000 hours of operations per year, and the modeled emission rate for FWP sources are based on 500 hours of operation per year.

- c. 1-hour NO_x is only modeled for SIL and NAAQS.
- d. Fab CVD stack parameters represent the emission rate of two merged stacks.
- e. CUB GEN engines are merged as groups of two or three stacks. Stack emission rates represent the modeled merged emission rates for these groups of stacks. For 1-hr NO_x, emission rates have been adjusted based on a limit of a maximum of 30 minutes of operation per hour.
- f. MPH FWP engine is limited to 500 hours of operation per year. 1-hour and annual emission rates have been adjusted to reflect this limit, per EPA modeling guidance.

Table 5-4. Particulate Matter (≤ 10 microns) Modeled Emission Rates

Source			Stack Emission Rates ^{b,c,d}			
Building ^a	Stack Type	Description	PM ₁₀ 24-hr		PM ₁₀ Annual	
			(lb/hr)	(g/s)	(lb/hr)	(g/s)
Fab	AE	Acid Exhaust Fan Stack	2.81E-02	3.55E-03	2.81E-02	3.55E-03
Fab	AME	Ammonia Exhaust Fan Stack	1.10E-02	1.38E-03	1.10E-02	1.38E-03
Fab	CVD	CVD Exhaust Fan Stack ^e	0.233	2.93E-02	2.33E-01	2.93E-02
Fab	GE	General Exhaust Fan Stack	--	--	--	--
Fab	SEA	RCTO Oxidizer Exhaust Stack	8.81E-02	1.11E-02	8.81E-02	1.11E-02
Fab	SE	Solvent Exhaust Fan Stack	--	--	--	--
CUB	AE	Acid Exhaust Fan Stack	--	--	--	--
CUB	BEX	Boiler Exhaust Stack	0.244	3.07E-02	1.67E-01	2.10E-02
CUB	CT	Cooling Tower Discharge	1.22E-02	1.53E-03	1.22E-02	1.53E-03
CUB	GEN2	Engine Exhaust Stack - Group of 2 ^f	8.81E-02	1.11E-02	1.01E-03	1.27E-04
CUB	GEN3	Engine Exhaust Stack - Group of 3 ^f	0.132	1.67E-02	1.51E-03	1.90E-04
HPM	AE	Acid Exhaust Fan Stack	--	--	--	--
HPM	AME	Ammonia Exhaust Fan Stack	--	--	--	--
HPM	GEN	Engine Exhaust Stack	4.41E-02	1.85E-03	5.03E-04	6.34E-05
HPM	GE1	General Exhaust Fan Stack	--	--	--	--
HPM	GE2	General Exhaust Fan Stack	--	--	--	--
HPM	GBE1	General Exhaust Fan Stack	--	--	--	--
HPM	GBE2	General Exhaust Fan Stack	--	--	--	--
HPM	SEA	RCTO Oxidizer Exhaust Stack	2.59E-02	3.26E-03	2.59E-02	3.26E-03
HPM	SE	Solvent Exhaust Fan Stack	--	--	--	--
HPM	FRE	Flammable Exhaust Stack	--	--	--	--
WWT	AE	Acid Exhaust Fan Stack	--	--	--	--
WWT	AME	Ammonia Exhaust Fan Stack	--	--	--	--
WWT	SE	Solvent Exhaust Fan Stack	1.88E-05	2.37E-06	1.88E-05	2.37E-06
GY	GEN	Engine Exhaust Stack	4.41E-02	1.85E-03	5.03E-04	6.34E-05
GY	WBV	Vaporizer Exhaust Stack	0.319	4.02E-02	7.29E-02	9.18E-03
GY	CT	Venturi Style Cooling Tower Stack	1.22E-02	1.54E-03	1.22E-02	1.54E-03
PROBE	GEN	Engine Exhaust Stack	4.41E-02	1.85E-03	5.03E-04	6.34E-05
PROBE	SE	Solvent Exhaust Fan Stack	--	--	--	--
PROBE	AE	Acid Exhaust Fan Stack	--	--	--	--
BIO	GEN	Engine Exhaust Stack	4.41E-02	1.85E-03	5.03E-04	6.34E-05
BIO	GE	General and Odor Scrubber Exhaust	1.63E-03	2.06E-04	1.63E-03	2.06E-04
IWW	GEN	Engine Exhaust Stack	4.41E-02	1.85E-03	5.03E-04	6.34E-05
MPH	FWP	Emergency Fire Pump	8.22E-02	1.04E-02	4.69E-03	5.91E-04
-	SILO	Lime Silo Transfer	4.35E-02	5.48E-03	4.35E-02	5.48E-03

- a. CUB = central utilities building, HPM = hazardous process material building, WWT = wastewater treatment operations, GY = gas yard, PROBE = Admin/Probe building, BIO = Bio building, IWW = industrial wastewater treatment operations, and MPH = mech pump house
- b. Annual PM₁₀ is only modeled for SIL and Increment.

- c. For annual PM₁₀, the modeled emission rate for emergency generators are based on 100 hours of operation per year, the modeled emission rate for WBV sources are based on 2,000 hours of operation per year (with no more than four units operating at a time), the modeled emission rate for BEX sources are based on 6,000 hours of operations per year, and the modeled emission rate for FWP sources are based on 500 hours of operation per year.
- d. For 24-hr PM₁₀, certain emergency generators are modeled based on 4-hour or 8-hour daily operating limitations. The emission rate listed here represents the maximum hourly emission rate.
- e. Fab CVD stack parameters represent the emission rate of two merged stacks.
- f. CUB GEN engines are merged as groups of two or three stacks. Stack emission rates represent the modeled merged emission rates for these groups of stacks.

Table 5-5. Particulate Matter (<2.5 microns) Modeled Emission Rates

Source			Stack Emission Rates ^{b,c}			
Building ^a	Stack Type	Description	PM _{2.5} 24-hr		PM _{2.5} Annual	
			(lb/hr)	(g/s)	(lb/hr)	(g/s)
Fab	AE	Acid Exhaust Fan Stack	2.81E-02	3.55E-03	2.81E-02	3.55E-03
Fab	AME	Ammonia Exhaust Fan Stack	1.10E-02	1.38E-03	1.10E-02	1.38E-03
Fab	CVD	CVD Exhaust Fan Stack ^d	0.23	2.93E-02	0.23	2.93E-02
Fab	GE	General Exhaust Fan Stack	--	--	--	--
Fab	SEA	RCTO Oxidizer Exhaust Stack	8.81E-02	1.11E-02	8.81E-02	1.11E-02
Fab	SE	Solvent Exhaust Fan Stack	--	--	--	--
CUB	AE	Acid Exhaust Fan Stack	--	--	--	--
CUB	BEX	Boiler Exhaust Stack	0.24	3.07E-02	0.17	2.10E-02
CUB	CT	Cooling Tower Discharge	4.07E-05	5.13E-06	4.07E-05	5.13E-06
CUB	GEN2	Engine Exhaust Stack - Group of 2 ^e	8.81E-02	1.11E-02	1.01E-03	1.27E-04
CUB	GEN3	Engine Exhaust Stack - Group of 3 ^e	0.13	1.67E-02	1.51E-03	1.90E-04
HPM	AE	Acid Exhaust Fan Stack	--	--	--	--
HPM	AME	Ammonia Exhaust Fan Stack	--	--	-	--
HPM	GEN	Engine Exhaust Stack	4.41E-02	5.55E-03	5.03E-04	6.34E-05
HPM	GE1	General Exhaust Fan Stack	--	--	--	--
HPM	GE2	General Exhaust Fan Stack	--	--	--	--
HPM	GBE1	General Exhaust Fan Stack	--	--	--	--
HPM	GBE2	General Exhaust Fan Stack	--	--	--	--
HPM	SEA	RCTO Oxidizer Exhaust Stack	2.59E-02	3.26E-03	2.59E-02	3.26E-03
HPM	SE	Solvent Exhaust Fan Stack	--	--	--	--
HPM	FRE	Flammable Exhaust Stack	--	--	--	--
WWT	AE	Acid Exhaust Fan Stack	--	--	--	--
WWT	AME	Ammonia Exhaust Fan Stack	--	--	--	--
WWT	SE	Solvent Exhaust Fan Stack	1.88E-05	2.37E-06	1.88E-05	2.37E-06
GY	GEN	Engine Exhaust Stack	4.41E-02	5.55E-03	5.03E-04	6.34E-05
GY	WBV	Vaporizer Exhaust Stack	0.32	4.02E-02	7.29E-02	9.18E-03
GY	CT	Venturi Style Cooling Tower Stack	4.09E-05	5.16E-06	4.09E-05	5.16E-06
PROBE	GEN	Engine Exhaust Stack	4.41E-02	5.55E-03	5.03E-04	6.34E-05
PROBE	SE	Solvent Exhaust Fan Stack	--	--	--	--
PROBE	AE	Acid Exhaust Fan Stack	--	--	--	--
BIO	GEN	Engine Exhaust Stack	4.41E-02	5.55E-03	5.03E-04	6.34E-05
BIO	GE	General and Odor Scrubber Exhaust	1.63E-03	2.06E-04	1.63E-03	2.06E-04
IWW	GEN	Engine Exhaust Stack	4.41E-02	5.55E-03	5.03E-04	6.34E-05
MPH	FWP	Emergency Fire Pump	8.22E-02	1.04E-02	4.69E-03	5.91E-04
-	SILO	Lime Silo Transfer	4.35E-02	5.48E-03	4.35E-02	5.48E-03

a. CUB = central utilities building, HPM = hazardous process material building, WWT = wastewater treatment operations, GY = gas yard, PROBE = Admin/Probe building, BIO = Bio building, IWW = industrial wastewater treatment operations, and MPH = mech pump house

- b. For annual $PM_{2.5}$, the modeled emission rate for emergency generators are based on 100 hours per year of operation, the modeled emission rate for WBV sources are based on 2,000 hours of operation per year (with no more than four units operating at a time), the modeled emission rate for BEX sources are based on 6,000 hours of operations per year, and the modeled emission rate for FWP sources are based on 500 hours of operation per year.
- c. For 24-hr $PM_{2.5}$, certain emergency generators are modeled based on 4-hour or 8-hour daily operating limitations. The emission rate listed here represents the maximum hourly emission rate.
- d. Fab CVD stack parameters represent the emission rate of two merged stacks.
- e. CUB GEN engines are merged as groups of two or three stacks. Stack emission rates represent the modeled merged emission rates for these groups of stacks.

Table 5-6. Carbon Monoxide Modeled Emission Rates

Source			Stack Emission Rates	
Building ^a	Stack Type	Description	CO 1-hr/8-hr	
			(lb/hr)	(g/s)
Fab	AE	Acid Exhaust Fan Stack	0.49	6.23E-02
Fab	AME	Ammonia Exhaust Fan Stack	--	--
Fab	CVD	CVD Exhaust Fan Stack ^b	9.19	1.16
Fab	GE	General Exhaust Fan Stack	--	--
Fab	SEA	RCTO Oxidizer Exhaust Stack	1.65	0.21
Fab	SE	Solvent Exhaust Fan Stack	--	--
CUB	AE	Acid Exhaust Fan Stack	--	--
CUB	BEX	Boiler Exhaust Stack	4.91	0.62
CUB	CT	Cooling Tower Discharge	--	--
CUB	GEN2	Engine Exhaust Stack - Group of 2 ^c	38.55	4.86
CUB	GEN3	Engine Exhaust Stack - Group of 3 ^c	57.82	7.28
HPM	AE	Acid Exhaust Fan Stack	--	--
HPM	AME	Ammonia Exhaust Fan Stack	--	--
HPM	GEN	Engine Exhaust Stack	19.27	2.43
HPM	GE1	General Exhaust Fan Stack	--	--
HPM	GE2	General Exhaust Fan Stack	--	--
HPM	GBE1	General Exhaust Fan Stack	--	--
HPM	GBE2	General Exhaust Fan Stack	--	--
HPM	SEA	RCTO Oxidizer Exhaust Stack	0.41	5.19E-02
HPM	SE	Solvent Exhaust Fan Stack	--	--
HPM	FRE	Flammable Exhaust Stack	--	--
WWT	AE	Acid Exhaust Fan Stack	--	--
WWT	AME	Ammonia Exhaust Fan Stack	--	--
WWT	SE	Solvent Exhaust Fan Stack	--	--
GY	GEN	Engine Exhaust Stack	19.27	2.43
GY	WBV	Vaporizer Exhaust Stack	3.53	0.44
GY	CT	Venturi Style Cooling Tower Stack	--	--
PROBE	GEN	Engine Exhaust Stack	19.27	2.43
PROBE	SE	Solvent Exhaust Fan Stack	--	--
PROBE	AE	Acid Exhaust Fan Stack	--	--
BIO	GEN	Engine Exhaust Stack	19.27	2.43
BIO	GE	General and Odor Scrubber Exhaust	--	--
IWW	GEN	Engine Exhaust Stack	19.27	2.43

Source			Stack Emission Rates	
Building ^a	Stack Type	Description	CO 1-hr/8-hr	
			(lb/hr)	(g/s)
MPH	FWP	Emergency Fire Pump	1.44	0.18

- a. CUB = central utilities building, HPM = hazardous process material building, WWT = wastewater treatment operations, GY = gas yard, PROBE = Admin/Probe building, BIO = Bio building, IWW = industrial wastewater treatment operations, and MPH = mech pump house
- b. FAB CVD stack parameters represent the emission rate of two merged stacks.
- c. CUB GEN engines are merged as groups of two or three stacks. Stack emission rates represent the modeled merged emission rates for these groups of stacks.

Table 5-7. Sulfur Dioxide Modeled Emission Rates

Source			Stack Emission Rates			
Building ^a	Stack Type	Description	SO ₂ 1-hr		SO ₂ Annual	
			(lb/hr)	(g/s)	(lb/hr)	(g/s)
Fab	AE	Acid Exhaust Fan Stack	7.61E-02	9.59E-03	6.09E-02	7.67E-03
Fab	AME	Ammonia Exhaust Fan Stack	--	--	--	--
Fab	CVD	CVD Exhaust Fan Stack	--	--	--	--
Fab	GE	General Exhaust Fan Stack	--	--	--	--
Fab	SEA	RCTO Oxidizer Exhaust Stack	4.79E-05	6.03E-06	3.83E-05	4.83E-06
Fab	SE	Solvent Exhaust Fan Stack	--	--	--	--
CUB	AE	Acid Exhaust Fan Stack	--	--	--	--
CUB	BEX	Boiler Exhaust Stack	--	--	--	--
CUB	CT	Cooling Tower Discharge	--	--	--	--
CUB	GEN2	Engine Exhaust Stack - Group of 2	--	--	--	--
CUB	GEN3	Engine Exhaust Stack - Group of 3	--	--	--	--
HPM	AE	Acid Exhaust Fan Stack	--	--	--	--
HPM	AME	Ammonia Exhaust Fan Stack	--	--	--	--
HPM	GEN	Engine Exhaust Stack	--	--	--	--
HPM	GE1	General Exhaust Fan Stack	--	--	--	--
HPM	GE2	General Exhaust Fan Stack	--	--	--	--
HPM	GBE1	General Exhaust Fan Stack	--	--	--	--
HPM	GBE2	General Exhaust Fan Stack	--	--	--	--
HPM	SEA	RCTO Oxidizer Exhaust Stack	--	--	--	--
HPM	SE	Solvent Exhaust Fan Stack	--	--	--	--
HPM	FRE	Flammable Exhaust Stack	--	--	--	--
WWT	AE	Acid Exhaust Fan Stack	--	--	--	--
WWT	AME	Ammonia Exhaust Fan Stack	--	--	--	--
WWT	SE	Solvent Exhaust Fan Stack	--	--	--	--
GY	GEN	Engine Exhaust Stack	--	--	--	--
GY	WBV	Vaporizer Exhaust Stack	--	--	--	--
GY	CT	Venturi Style Cooling Tower Stack	--	--	--	--
PROBE	GEN	Engine Exhaust Stack	--	--	--	--
PROBE	SE	Solvent Exhaust Fan Stack	--	--	--	--
PROBE	AE	Acid Exhaust Fan Stack	--	--	--	--
BIO	GEN	Engine Exhaust Stack	--	--	--	--
BIO	GE	General and Odor Scrubber Exhaust	--	--	--	--
IWW	GEN	Engine Exhaust Stack	--	--	--	--
MPH	FWP	Emergency Fire Pump	--	--	--	--

a. CUB = central utilities building, HPM = hazardous process material building, WWT = wastewater treatment operations, GY = gas yard, PROBE = Admin/Probe building, BIO = Bio building, IWW = industrial wastewater treatment operations, and MPH = mech pump house

5.3 Part 212 Initial Unit Emission Rate Modeling Methodology

For Part 212 modeling, emission rate calculation methodology and example calculations for each relevant averaging period are included in Appendix B. Due to the number of toxic air contaminants that are subject to modeling, as listed in Table 2-2, Micron used an initial unit emission rate modeling methodology to determine the modeled impact for a number of toxics.

The initial modeling methodology modeled all emission sources at 1 g/s and analyzed the High 1st High (H1H) modeled impact from every emission source. The H1H modeled impact for each emission source was multiplied by the emission rate for every toxic air contaminant for each source and the products were summed together to calculate a worst-case modeled impact for each toxic air contaminant. This methodology conservatively estimated the total modeled impact for each toxic air contaminant based on the extremely conservative assumption that all H1H modeled impacts occur at the same time and same receptor (for a 1-hour averaging period model) or the same year and same receptor (for an annual averaging period model). This methodology was discussed and approved by the NYSDEC.¹⁴

For any toxic air contaminant where the worst-case modeled impact, based on this methodology, was lower than the corresponding SGC and AGC, that toxic air contaminant was not modeled further using AERMOD. Toxic air contaminants, where the modeled impact determined as described above exceeded the corresponding SGC and AGC, were evaluated further by conducting modeling for that specific air contaminant. Separately, the NYSDEC requested Micron to model certain pollutants individually.¹⁵ These are listed in Table 5-8.

¹⁴ Call with NYSDEC, Micron, and Trinity Consultants on June 2, 2025.

¹⁵ Email from Andy LoFaro, NYSDEC, to John Ke, Trinity Consultants, on June 27, 2025.

Table 5-8. Contaminants to be Modeled Individually

CAS#	Chemical Name	PTE Emissions (lb/yr)	Initial Env Rating	SGC (µg/m³)	AGC (µg/m³)
288-88-0	1,2,4-Triazole	7,299	INT-B	-	0.48
7664-41-7	Ammonia group	109,690	C	2,400	500
7726-95-6	Bromine	26,103	B	130	1.6
7782-41-4	Fluorine	3,488	B	5.3	0.067
7783-54-2	Nitrogen trifluoride	3,048	B*	6.6	0.083
10024-97-2	Nitrous oxide	327,782	B*	-	210
7631-86-9	Silicon dioxide	52,185	INT-B	-	2
7446-09-5	Sulfur dioxide	38,415	B*	196	80
75-73-0	Tetrafluoromethane	114,405	INT-B	-	300

6. MODELING RESULTS

Following the procedures and methods discussed in this report, the following tables summarize the results from the conducted SIL, NAAQS, Increment, Part 212, and MERPs analyses. The AERMOD model outputs for each modeled pollutant and averaging period are presented in a table with a brief discussion of the results. Electronic copies of the input and output files are included with this modeling report submittal to the NYSDEC.

6.1 PSD Significance, NAAQS and Increment Results

As shown in the tables below, the results of the modeling analyses indicated that the Proposed Air Permit Project is significant for 24-hour and annual PM_{2.5}, 24-hr and annual PM₁₀, 1-hour and annual NO₂, and 1-hour and 8-hour CO. The analysis also showed that cumulative impacts from the Proposed Air Permit Project, nearby sources identified in Section 5.1.2.3, and existing ambient background concentration were lower than the respective NAAQS and PSD Increment thresholds at, and beyond, the facility ambient air boundary.

Table 6-1. PSD SIL Analysis Results

Pollutant	Averaging Period	Output Value	Class II Modeling Significance Level (µg/m ³)	Maximum Modeled Concentration (µg/m ³)	Year of Max. Modeled Value	Significant Impact Area (km)
PM _{2.5}	24-hour	See Table 6-5				
	Annual					
PM ₁₀	24-hour	H1H	5	10.61	N/A	6
	Annual	H1H	1	1.64	2019	2
NO ₂	1-hour	H1H	7.5	288.03	N/A	50
	Annual	H1H	1	7.02	2021	5
CO	1-hour	H1H	2,000	4,245.04	N/A	6
	8-hour	H1H	500	2,596.15	N/A	8

Table 6-2. NAAQS Analysis Results

Pollutant	Averaging Period	Output Value	Modeled Conc. (µg/m³)	Background Conc. (µg/m³)	Total Conc. (µg/m³)	Year of Max. Modeled Value	Primary NAAQS (µg/m³)	Secondary NAAQS (µg/m³)	Below NAAQS?
PM _{2.5}	24-hour		See Table 6-5						
	Annual								
PM ₁₀	24-hour	H6H	8.12	32.67	40.78	N/A	150	150	Yes
NO ₂	1-hour	H8H	179.2	Included	179.2	N/A	188	--	Yes
	Annual	H1H	6.37	13.16	19.53	2019	100	100	Yes
CO	1-hour	H2H	4,199.28	1,718.4	5,917.7	2019	40,000	--	Yes
	8-hour	H2H	2,038.48	1,260.2	3,298.6	2020	10,000	--	Yes
SO ₂ ^a	1-hour	H4H	6.40	4.4	10.8	N/A	196	--	Yes
	Annual	H1H	0.37	0.3	0.65	2023	80	--	Yes

a. SO₂ is not a PSD pollutant.

Table 6-3. PSD Class II Increment Analysis Results

Pollutant	Averaging Period	Output Value	Modeled Conc. (µg/m³)	Year of Max. Modeled Value	Class II Increment (µg/m³)	Below Class II Increment?
PM _{2.5}	24-hour		See Table 6-6			
	Annual					
PM ₁₀	24-hour	H2H	8.36	2023	30	Yes
	Annual	H1H	1.65	2023	17	Yes
NO ₂	Annual	H1H	6.37	2019	25	Yes

6.2 Modeled Emission Rates for Precursors (MERPs)

As part of consideration of modeling analyses, per the revised and updated EPA guidance,¹⁶ an analysis considering the impacts of direct PM_{2.5} combined with impacts from both NO_x and SO₂ as precursors to PM_{2.5} (secondary PM_{2.5}) was completed. As such, a Tier 1 impact assessment using MERPs for secondary PM_{2.5} impacts, where NO_x and SO₂ are precursors, was included in this modeling analysis. This approach is discussed in detail in an April 2019 memo and 2024 clarification from U.S. EPA.¹⁷

Based on the MERPs guidance offered by U.S. EPA, Micron prepared a site-specific secondary PM_{2.5} impact assessment to comprehensively demonstrate precursor emissions from the proposed project will not cause or contribute to a violation of the PM_{2.5} NAAQS or PSD increment standards.

¹⁶ https://www.epa.gov/system/files/documents/2022-07/Guidance_for_O3_PM25_Permit_Modeling.pdf and <https://www.epa.gov/system/files/documents/2024-05/clarification-memorandum-o3-pm25-permit-modeling-guidance-04302024.pdf>

¹⁷ <https://www.epa.gov/sites/default/files/2019-05/documents/merps2019.pdf> and https://www.epa.gov/sites/default/files/2020-09/documents/epa-454_r-19-003.pdf

To evaluate the Proposed Air Permit Project's impact on secondary PM_{2.5}, EPA's April 2019 MERPs Memo was utilized where the impacts on secondary PM_{2.5} are estimated using the following equation.¹⁸

$$\text{Project Air Quality Impacts} = \text{Project emission rate} \times \frac{\text{Hypothetical Source Air Quality Impact}}{\text{Hypothetical Source Emissions}}$$

The nearest hypothetical source by the EPA to the Micron Campus was found in EPA's MERPs View Qlik website and located in Livingston County, New York, approximately 123 km west of the Micron Campus. This hypothetical source location has similar terrain and surrounding land use to the Micron Campus and is also expected to be subject to similar atmospheric chemistry and secondary pollutant formation processes as the area surrounding the Micron Campus. Therefore, the Livingston County source was determined as the most hypothetical source in EPA's compiled photochemical modeling data and used in the Tier-1 modeling analysis.

Table 6-4 shows the selected MERPs values for the Livingston County hypothetical source, the calculated PM_{2.5} MERPs, project emissions increases of NO_x and SO₂, and secondary estimated PM_{2.5} impact associated with the project.

Table 6-4. PM_{2.5} MERPs Analysis

Averaging Period	Precursor	Modeled ER from Hypo. Source (tpy)	Modeled Impact from Hypo Source (µg/m ³)	Project Emissions Increase (tpy)	PM _{2.5} Project Impact (µg/m ³)
24-hour	NO _x	500	0.271	357.2	0.193
	SO ₂	500	0.355	21.7	0.015
	Total				0.209
Annual	NO _x	500	0.007	357.2	0.0049
	SO ₂	500	0.006	21.7	0.0002
	Total				0.0051

In Table 6-5 the calculated MERPs concentrations were added to the modeled SIL and NAAQS analysis results for PM_{2.5} to show that PM_{2.5} impacts remained below relevant standards after consideration of the impacts of secondary formation of PM_{2.5}.

Table 6-5. PM_{2.5} SIL and NAAQS Analysis Considering Secondary Formation

Averaging Period	Pollutant	Primary PM _{2.5} Project Impact ^a (µg/m ³)	Secondary PM _{2.5} Project Impact (µg/m ³)	PM _{2.5} Background Conc. (µg/m ³)	Cumulative PM _{2.5} Impact (µg/m ³)	Standard (µg/m ³)
SIL						
24-hour	PM _{2.5}	7.31	0.209	-	7.52	1.2
Annual	PM _{2.5}	1.29	0.0051	-	1.29	0.13

¹⁸ Clarification on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM_{2.5} under the PSD Permitting Program. Memorandum from Mr. Tyler Fox to Regional Office Modeling Contacts, April 30, 2024.

NAAQS						
24-hour	PM _{2.5}	5.572	0.209	14	19.78	35
Annual	PM _{2.5}	1.291	0.0051	5.6	6.90	9

- a. PM_{2.5} SIL 24-hr results reference the maximum result averaged over 5 years. PM_{2.5} SIL annual results reference the maximum result averaged over 5 years. PM_{2.5} NAAQS 24-hr results reference the maximum 8th highest result averaged over 5 years. PM_{2.5} NAAQS Annual results reference the maximum annual results averaged over 5 years.

In Table 6-6 the calculated MERPs concentrations were added to the modeled PSD Increment analysis results for PM_{2.5} to show that PM_{2.5} impacts remain below relevant standards after consideration of the impacts of secondary formation of PM_{2.5}.

Table 6-6. PM_{2.5} PSD Increment Analysis Considering Secondary Formation

Averaging Period	Pollutant	Primary PM_{2.5} Project Impact^a (µg/m³)	Secondary PM_{2.5} Project Impact (µg/m³)	Cumulative PM_{2.5} Impact (µg/m³)	Class II PSD Increment (µg/m³)
24-hour	PM _{2.5}	7.243	0.209	7.452	9
Annual	PM _{2.5}	1.3525	0.0051	1.3576	4

- a. PM_{2.5} PSD 24-hr results reference the maximum 2nd highest result averaged over 5 years; the highest result was from 2020. PM_{2.5} PSD Annual results reference maximum 1st highest result over 5 years; the highest result was from 2023.

6.3 Additional Impacts Analysis

As required by PSD regulations, this PSD permit application contains additional impact analyses: 1) an analysis of the air quality impacts projected for the area as a result of any commercial, residential, and industrial growth associated with the proposed facility, 2) an analysis of the impairment to soils, vegetation, and animals that may occur as a result of the proposed facility, and 3) a Class II visibility impairment analysis. This section of the modeling report discusses the resulting additional impacts analyses and summarizes the results for each portion of the analysis.

6.3.1 Growth Analysis

The purpose of the growth analysis is to consider new commercial, residential, and industrial growth that will occur associated with the Proposed Air Permit Project, and then to assess the secondary air quality impacts from this growth. Following is an analysis of the relevant employment data for the Proposed Air Permit Project, which is the key factor in assessing secondary impacts from growth.

Activities related to the broader Micron Campus and ancillary development on nearby properties is currently undergoing review pursuant to the federal National Environmental Policy Act (NEPA) and the New York State Environmental Quality Review Act (SEQRA). The Micron Campus, together with ancillary development on nearby properties, are referred to collectively as the "Proposed Project" for the purposes of the NEPA environmental impact analysis and the SEQRA evaluation. The growth inducing implications of the NEPA/SEQRA Proposed Project are being analyzed as part of an Environmental Impact Statement (EIS). Per Section 3.6.5 of the EIS:

Construction activities associated with the Proposed Project components would result in temporary adverse, direct impacts to air quality. In addition, based on the regulatory requirements for preconstruction and operational air quality permitting and compliance, the emissions controls inherent to the Proposed Project operations, and the confirmation through atmospheric dispersion modeling that stationary sources associated with the Proposed Project would not cause or contribute to an

exceedance of any applicable NAAQS, AGC or SGC, the stationary and mobile source emissions from construction and long-term operation of the Proposed Project would not have a significant adverse effect on air quality. The potential effects on air quality from induced growth anticipated from the Proposed Project would not cause a significant adverse effect within the five-county region.

6.3.2 Soils and Vegetation Analysis

The U.S. EPA developed the secondary NAAQS where necessary to protect certain air quality related values (i.e., soils and vegetation) not sufficiently protected by the primary NAAQS. The secondary NAAQS represent levels that provide protection for public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. In general, if ambient concentrations from a PSD project are determined to be less than the secondary NAAQS, then emissions of that pollutant would not result in harmful effects to either soil or vegetation.¹⁹

Micron has demonstrated compliance with the secondary NAAQS by complying with the primary and secondary NAAQS for NO₂, PM₁₀, PM_{2.5}, and CO indicating that the Proposed Air Permit Project will not cause or contribute to adverse impacts on soils, vegetation, and animals.

6.3.3 Class II Visibility Areas

A visibility impairment analysis is required to demonstrate that emissions from the Proposed Air Permit Project will not have an adverse impact on visibility in the vicinity of the facility. Elements of the visibility impairment analysis include determining the visual quality of the area and assessing the visual impact of the Micron Campus. While the Micron Campus is not near a Class I area, a visibility analysis was conducted at Green Lakes State Park, which is the closest state park to the Micron Campus that is open all year.

The EPA's Workbook for Plume Visual Impact Screening and Analysis²⁰ provides guidance for conducting a visibility impairments analysis through the use of VISCREEN, a plume visibility impact model. The methods in this workbook are designed for Class I area impacts; however, the procedures are generally applicable to other areas and are used in this analysis.²¹ See Appendix I for the VISCREEN output included in the modeling files.

VISCREEN allows for two levels of visibility impact screening. Level 1 screening involves a series of conservative calculations designed to identify those emissions sources that have little potential for adversely affecting visibility. If visibility impairments are indicated, a Level 2 analysis, which allows for modification of default parameters including meteorological data, is performed. Only a Level 1 analysis was performed for this study.

Results from a VISCREEN analysis are expressed in terms of perceptibility (ΔE) and contrast. The color contrast parameter, ΔE , is used as the primary basis for determining the perceptibility of plume visual impacts in screening analyses. ΔE provides a single measure of the difference between two arbitrary colors as perceived by humans. U.S. EPA guidance for plume visual impact screening suggests a critical value for ΔE of 2.0 for untrained observers under reasonable worst-case conditions. A green contrast value is also

¹⁹ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, New Source Review Workshop Manual, Research Triangle Park, North Carolina, October 1990, p. D.5.

²⁰ U.S. Environmental Protection Agency, *Workbook for Plume Visual Impact Screening and Analysis*, EPA-450/4-88-015, 1988.

²¹ *New Source Review Workshop Manual (Draft)*, p. D.6.

recorded because the human eye is most sensitive to intensity changes in green. The critical value for this contrast is 0.05. VISCREEN may re-estimate these critical values based on inputs during the analysis.

VISCREEN conducts four tests of screening calculations. The first two tests refer to visual impacts caused by plume parcels located *inside* the boundaries of the given area. Tests of impacts inside the boundary are used to determine visual impacts when integral vistas are not protected. The last two tests are for plume parcels located *outside* the boundaries of the area. The tests of visual impacts outside the boundaries of Class I areas are only required if analyses for protected integral vistas are required. An integral vista is a view from a location inside a Class I area of landscape features located outside the boundaries of the Class I area. Because there are no protected integral vistas *outside* the pseudo-Class I areas chosen for this analysis, the tests for plume parcels located outside the boundaries of these points are not required. The tests of visual impacts inside the boundaries of the areas will be the only tests considered in the VISCREEN analysis.

6.3.3.1 Level 1 VISCREEN Input Requirements and Methodology

The input parameters required for a Level 1 analysis in VISCREEN are shown in Table 6-7. Since NO_x, PM, and SO₄ emissions have the potential to trigger PSD modeling, these pollutants are considered for this analysis.

Table 6-7. Level 1 VISCREEN Input Parameters

Input Parameter	Input Value	Notes
NO ₂ Emission Rate	374.2 tpy	VISCREEN is a single source model; consequently, all elevated and ground-based emissions are lumped together as if they originated from a single source.
PM Emission Rate	77.7 tpy	VISCREEN is a single source model; consequently, all elevated and ground-based emissions are lumped together as if they originated from a single source.
SO ₄ Emission Rate	0.03 tpy	VISCREEN is a single source model; consequently, all elevated and ground-based emissions are lumped together as if they originated from a single source.
Background Visual Range	25.00 km	From Figure 9 of the Workbook for Plume Visual Impact Screening and Analysis.
Source-Observer Distance: Green Lakes State Park	21.03 km	The distance from the Micron Campus to the middle of the state park is used in VISCREEN as the source-observer distance.
Minimum Distance to Class I Area (Class II Area in this case): Green Lakes State Park	19.84 km	The closest boundary of Green Lakes State Park to the Micron Campus
Maximum Distance to Class I Area (Class II Area in this case): Green Lakes State Park	23.77 km	The distance across the far boundary of Green Lakes State Park
Meteorological Conditions: Stability Wind Speed	Stability: 6 Wind Speed: 1.0 m/s	Default worst-case meteorological data are used in the Level 1 analysis.

6.3.3.2 Level 1 VISCREEN Results

The results of the Level 1 VISCREEN analysis are summarized in Table 6-8. The table presents the following information:

- Background: the background against which the plume is viewed.
- Theta: the sun elevation angle above the horizon.
- Azimuth: the angle between the line of sight and the line connecting the source and observer (an azimuth angle of zero implies that the observer is looking directly toward the source).
- Distance: the distance from the source to the point at which the observer's line of sight intersects the plume.
- Alpha: the angle between the line of sight and the plume centerline.
- Delta E Critical: the perceptibility screening threshold (2.0).
- Delta E Plume: the maximum modeled plume perceptibility.
- Contrast Critical: the contrast screening threshold (0.05).

Table 6-8. Level VISCREEN Results – Green Lakes State Park

	Background	Theta (degrees)	Azimuth (degrees)	Distance (km)	Alpha (degrees)	Delta E		Contrast	
						Critical	Plume	Critical	Plume
Inside Class II Area	Sky	10	68	19.8	101	2.00	1.551	0.05	0.001
	Sky	140	68	19.8	101	2.00	0.523	0.05	-0.008
	Terrain	10	68	19.8	101	2.00	0.621	0.05	0.008
	Terrain	140	68	19.8	101	2.00	0.152	0.05	0.005

The Level 1 VISCREEN results indicate no potential adverse visibility impacts on the Class II area that was analyzed. Therefore, the emissions from the Proposed Air Permit Project at the chosen location do not require more refined Level 2 VISCREEN analyses.

6.4 6 NYCRR Part 212 Modeling Results

As discussed in Section 5.3, Micron used a unit modeling methodology to initially determine the modeled concentration for the contaminants listed in Table 2-2. The worst-case modeled impact for each toxic air contaminant determined by taking the sum of the products of multiplying the H1H modeled impact for each emission source by the emission rate for every toxic air contaminant for each source are provided in Table 6-9 and Table 6-10. For contaminants where the unit modeling shows the modeled concentration as greater than the respective guideline concentration, these contaminants were modeled discretely, along with the contaminants listed in Table 5-7. The results for these modeling demonstrations are provided in Table 6-11 and Table 6-12.

Table 6-9. Part 212 Unit Modeling Modeled Concentrations (Short-Term)

Pollutant¹	CAS #	Threshold (µg/m³)	Modeled Concentration (µg/m³)	% of Threshold	Pass?
TMB (1,2,4-TMB and 1,3,5-TMB)	95-63-6	-	NA	NA	NA
1-Methyl-2-pyrrolidone	872-50-4	-	NA	NA	NA
4-Methylpentan-2-ol	108-11-2	17000	0.69	0%	Yes
Aluminum oxide	1344-28-1	-	NA	NA	NA
Boron trioxide	1303-86-2	-	NA	NA	NA
Citric acid	77-92-9	2100	0.13	0%	Yes
Cyclohexanone	108-94-1	20000	1.36	0%	Yes
Dibutyl ether	142-96-1	15000	15.34	0%	Yes
Diethylamine	109-89-7	4500	0.22	0%	Yes
Ethanol	64-17-5	-	NA	NA	NA
Ethyl lactate	97-64-3	370	0.17	0%	Yes
Hexamethyldisilazane	999-97-3	-	NA	NA	NA
Hydrogen bromide	10035-10-6	680	0.41	0%	Yes
Hydrogen peroxide	7722-84-1	-	NA	NA	NA
Isopropanol	67-63-0	98000	376.30	0%	Yes
Methacrylic Acid	79-41-4	-	NA	NA	NA
Methanol	67-56-1	33000	0.54	0%	Yes
Naphthalene	91-20-3	7900	3.50	0%	Yes
n-Butyl acetate	123-86-4	71300	9.30	0%	Yes
Nitric acid	7697-37-2	86	20.79	24%	Yes
Phosphoric acid	7664-38-2	300	0.35	0%	Yes
Phosphorus pentoxide	1314-56-3	300	1.58	1%	Yes

Pollutant¹	CAS #	Threshold (µg/m³)	Modeled Concentration (µg/m³)	% of Threshold	Pass?
Solvent naphtha (petroleum), heavy arom.	64742-94-5	-	NA	NA	NA
Sulfur dioxide	7446-09-5	196	32.17	16%	Yes
Tetramethylammonium hydroxide	75-59-2	3600	1.12	0%	Yes
Titanium dioxide	13463-67-7	-	NA	NA	NA
Tungsten trioxide	1314-35-8	-	NA	NA	NA
Zirconium oxide	1314-23-4	380	0.77	0%	Yes
1-Methoxy-2-propanol	107-98-2	36850	81.41	0%	Yes
Acetic acid	64-19-7	3700	0.65	0%	Yes
Difluoromethane	75-10-5	-	NA	NA	NA
Ethenediol	107-21-1	1000	0.39	0%	Yes
Hexafluoroethane	76-16-4	-	NA	NA	NA
Sulfuric acid	7664-93-9	120	9.15	8%	Yes
Silane Group	7803-62-5	-	NA	NA	NA
Triethylamine	121-44-8	2800	0.31	0%	Yes

1. There are no silane group chemical emissions (i.e. the ERP of all silane group chemicals is 0).

Table 6-10. Part 212 Unit Modeling Modeled Concentrations (Annual)

Pollutant¹	CAS #	Threshold (µg/m³)	Modeled Concentration (µg/m³)	% of Threshold	Pass?
TMB (1,2,4-TMB and 1,3,5-TMB)	95-63-6	60	0.01	0%	Yes
1-Methyl-2-pyrrolidone	872-50-4	100	0.20	0%	Yes
4-Methylpentan-2-ol	108-11-2	250	0.01	0%	Yes
Aluminum oxide	1344-28-1	2.4	5.324E-03	0%	Yes
Boron trioxide	1303-86-2	24	0.01	0%	Yes
Citric acid	77-92-9	20	1.984E-03	0%	Yes
Cyclohexanone	108-94-1	190	0.02	0%	Yes
Dibutyl ether	142-96-1	2887	0.01	0%	Yes
Diethylamine	109-89-7	36	3.179E-03	0%	Yes
Ethanol	64-17-5	45000	0.03	0%	Yes
Ethyl lactate	97-64-3	71	2.486E-03	0%	Yes
Hexamethyldisilazane	999-97-3	36	0.02	0%	Yes
Hydrogen bromide	10035-10-6	0.1	6.295E-03	6%	Yes
Hydrogen peroxide	7722-84-1	3.3	0.20	6%	Yes
Isopropanol	67-63-0	7000	7.74	0%	Yes
Methacrylic Acid	79-41-4	170.0	1.748E-03	0%	Yes
Methanol	67-56-1	4000	7.950E-03	0%	Yes
Naphthalene	91-20-3	3	3.442E-03	0%	Yes
n-Butyl acetate	123-86-4	565	0.14	0%	Yes
Nitric acid	7697-37-2	12.3	0.32	3%	Yes
Phosphoric acid	7664-38-2	10	5.465E-03	0%	Yes
Phosphorus pentoxide	1314-56-3	4.8	0.02	1%	Yes
Solvent naphtha (petroleum), heavy arom.	64742-94-5	100	0.13	0%	Yes
Sulfur dioxide	7446-09-5	80	0.50	1%	Yes

Pollutant¹	CAS #	Threshold (µg/m³)	Modeled Concentration (µg/m³)	% of Threshold	Pass?
Tetramethylammonium hydroxide	75-59-2	29	0.02	0%	Yes
Titanium dioxide	13463-67-7	24	0.03	0%	Yes
Tungsten trioxide	1314-35-8	7.1	0.01	0%	Yes
Zirconium oxide	1314-23-4	12	0.01	0%	Yes
1-Methoxy-2-propanol	107-98-2	2000	1.22	0%	Yes
Acetic acid	64-19-7	60	9.994E-03	0%	Yes
Difluoromethane	75-10-5	50600	8.837E-03	0%	Yes
Ethenediol	107-21-1	400	5.678E-03	0%	Yes
Hexafluoroethane	76-16-4	16799	0.02	0%	Yes
Sulfuric acid	7664-93-9	1	0.14	14%	Yes
Silane Group	7803-62-5	16	0	0%	Yes
Triethylamine	121-44-8	7	4.522E-03	0%	Yes

1. There are no silane group chemical emissions (i.e. the ERP of all silane group chemicals is 0).

Table 6-11. Part 212 Discrete Modeling Modeled Concentrations (Short-Term)

CAS#	Chemical Name	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	SGC ($\mu\text{g}/\text{m}^3$)	% of Threshold	Pass?
7664-41-7	Ammonia group	164	2,400	7%	Yes
7726-95-6	Bromine	9.00	130	7%	Yes
7783-54-2	Nitrogen trifluoride	1.06	6.6	16%	Yes
7446-09-5	Sulfur dioxide	10.8	196	5%	Yes
7783-06-4	Hydrogen Sulfide	0.39	14	20%	Yes

a. Modeled concentrations presented reference the maximum 1st highest result averaged over 5 years.

Table 6-12. Part 212 Discrete Modeling Modeled Concentrations (Annual)

CAS#	Chemical Name	Modeled Concentration (µg/m³)	Year of Max. Modeled Value	AGC (µg/m³)	% of Threshold	Pass?
288-88-0	1,2,4-Triazole	0.32	2023	0.48	67%	Yes
7664-41-7	Ammonia group	7.45	2019	500	1%	Yes
7726-95-6	Bromine	0.25	2019	1.6	16%	Yes
7783-54-2	Nitrogen trifluoride	0.029	2023	0.083	35%	Yes
10024-97-2	Nitrous oxide	3.03	2019	210	1%	Yes
7631-86-9	Silicon dioxide	0.54	2019	2	27%	Yes
7446-09-5	Sulfur dioxide	0.65	2023	80	1%	Yes
75-73-0	Tetrafluoromethane	1.08	2019	300	0.4%	Yes

a. Modeled concentration references the maximum 1st highest result over 5 years.

6.5 6 NYCRR Part 257 Modeling Results

Micron modeled total fluorides compared to the thresholds listed in Table 2-4. Total fluoride emissions include emissions from:

► Fluorine

► Hydrogen fluoride

A summary of results is presented in Table 6-13 below.

Table 6-13. Part 257-4 Analysis Results

Standard	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Year of Max. Modeled Value	Threshold ($\mu\text{g}/\text{m}^3$)	% of Threshold	Pass?
12-hour	1.6	2023	3.7	44%	Yes
24-hour	1.12	2020	2.85	39%	Yes
1-week	0.74	2023	1.68	45%	Yes
1-month	0.42	2023	0.8	52%	Yes

Source: 6 NYCRR Part 257-4.2(b)

a. Modeled concentrations presented reference the maximum 1st highest result over 5 years.

Micron modeled H₂S compared to the threshold listed in Section 2.9. A summary of results is presented in Table 6-14 below.

Table 6-14. Part 257-5 Analysis Results

Standard	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Threshold ($\mu\text{g}/\text{m}^3$)	% of Threshold	Pass?
1-hour	0.39	14	3%	Yes

Source: 6 NYCRR Part 257-5.3

a. Modeled concentrations presented reference the maximum 1st highest result averaged over 5 years.

APPENDIX A: PROPOSED AIR PERMIT PROJECT MODELED PLOT PLAN

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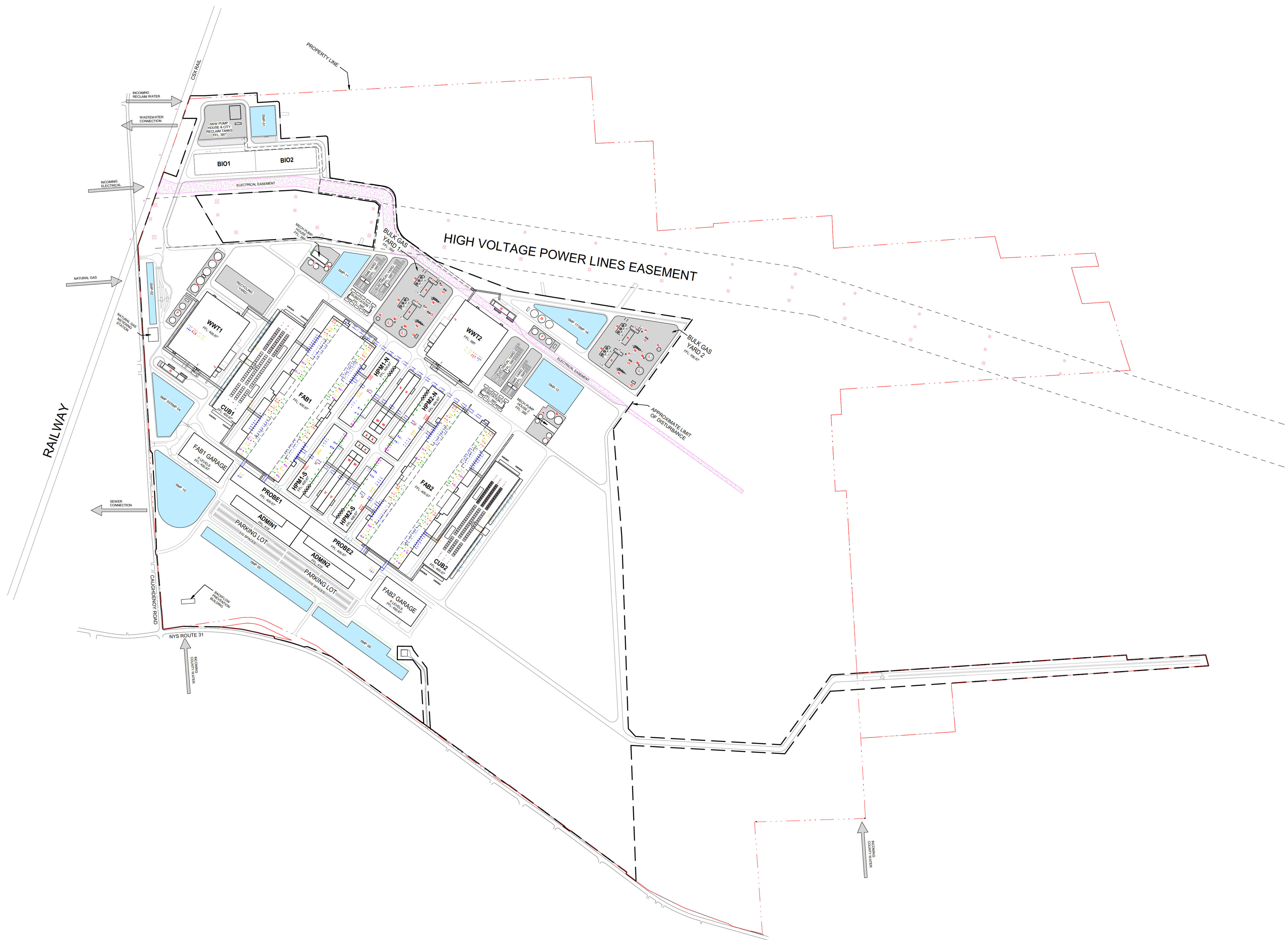
CONTRACTOR

PROJECT ADDRESS

KEY PLAN

STAMP

It is a violation of this law for any person to alter any document that bears the seal of a professional engineer or architect, unless the person is acting under the direction of a licensed professional engineer or architect.



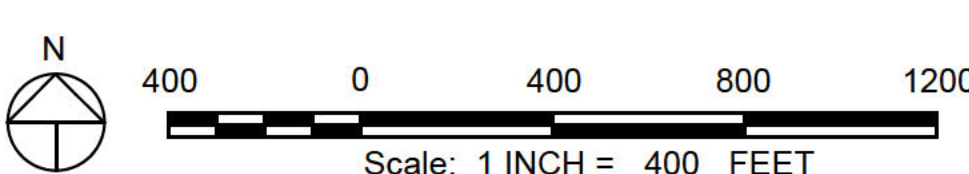
1 SITE MASTER PLAN - AIR PERMIT - EMISSION LOCATIONS (TRUE NORTH)
1" = 400'-0"

- ABBREVIATION**
- AE = ACID EXHAUST
 - AME = AMMONIA EXHAUST
 - CVD = CHEMICAL VAPOR DEPOSITION EXHAUST
 - FWP = FIRE WATER PUMP
 - GE = GENERAL EXHAUST
 - GSE = GENERAL BUILDING EXHAUST
 - SE = SOLVENT EXHAUST
 - SEA = SOLVENT EXHAUST (RECTO OXIDIZER)
 - FRE = FLAMMABLE EXHAUST
 - GEN = ENGINE EXHAUST
 - DUPS = UPS ENGINE EXHAUST
 - WBV = WATER BATH VAPORIZER EXHAUST
 - CT = COOLING TOWER

- EXTERNAL TANKS/TREATMENT AREA (PER FAB)**
- A. DOMESTIC WATER TANKS (2)
 - B. NON-POTABLE WATER TANKS (2)
 - C. FIRE WATER TANKS (2)
 - D. INDUSTRIAL WATER TANKS W/ PUMP HOUSE (3)
 - E. VIA
 - F. DIVERSION/OFF SPEC TANKS W/ PUMP HOUSE (3)
 - G. DIESEL TANKS (2)
 - H. APM & IPAL TREATMENT AREA (1)
 - I. WH250A & WH250P (1)
 - J. LIME AREA (1)
 - K. 380K GAL TANK (1)
 - L. 3.2 MM GAL TANK (2)
 - M. HP LIN TANK (2)
 - N. COLD BOX (12)
 - O. HP LIN TANK (2)
 - P. LIN ASSIST TANK (2)
 - Q. CONTROL ROOM (1)
 - R. COOLING TOWER STRUCTURE (2)
 - S. MACHINE BUILDING (2)
 - T. ELECTRICAL AND POC BUILDING (2)
 - U. HPM - CHEMICAL ROOM (2)
 - V. HPM - BSGS ROOM (2)
 - W. HPM - WATER REACTIVES ROOM WITH REFILL
 - X. SHELTER (2)
 - Y. HPM - GAS ROOM (2)

- EXTERNAL TANKS/TREATMENT AREA (PER FAB)**
- A. DOMESTIC WATER TANKS (2)
 - B. NON-POTABLE WATER TANKS (2)
 - C. FIRE WATER TANKS (2)
 - D. INDUSTRIAL WATER TANKS W/ PUMP HOUSE (3)
 - E. NPS TANKS (2)
 - F. DIVERSION/OFF SPEC TANKS W/ PUMP HOUSE (3)
 - G. DIESEL TANKS (2)
 - H. APM & IPAL TREATMENT AREA (1)
 - I. WH250A & WH250P (1)
 - J. LIME AREA (1)
- LEGEND**
- AMHS LINK
 - TRESTLE

DRAFT FOR AGENCY REVIEW. THE INFORMATION PROVIDED IS CONSIDERED PROPRIETARY, CONFIDENTIAL BUSINESS INFORMATION, AND/OR TRADE SECRET INFORMATION OF MICRON TECHNOLOGY, INC., PARENT COMPANY OF MICRON NEW YORK SEMICONDUCTOR MANUFACTURING LLC, INCLUDING INFORMATION THAT IS EXEMPT FROM PUBLIC DISCLOSURE PURSUANT TO NEW YORK PUBLIC OFFICERS LAW SECTION 87(2)(d) AND/OR 5 U.S.C. SECTION 2(b)(4). THE PLANS FOR MICRON'S PROJECT IN NEW YORK ARE PRELIMINARY AND SUBJECT TO CHANGE.



PROJECT TITLE	Yankee
PROJECT PHASE	Revisions
DRAWING TITLE	PERMIT SCOPE DRAWINGS ARCHITECTURE SITE MASTER PLAN PHASE 2B - OVERALL EMISSION LOCATIONS
DESIGNED BY	DRAWN BY
CHECKED BY	SCALE
DATE	JOB NO.
DRAWING NO.	PMTA0-0002-2
MODEL NAME	REV
PERMIT DRAWINGS NOT FOR CONSTRUCTION	SHEET H 60

APPENDIX B: EMISSION RATE CALCULATIONS

Appendix B includes emission calculations for new units. These calculations are the same as those submitted to the NYSDEC on July 15, 2025 as part of the Notification of Incomplete Application (NOIA) response. The calculation methodology submitted as Section 2 of the aforementioned air permit application is reproduced in its entirety as part of this appendix.

2. EMISSIONS QUANTIFICATION

This section provides the detailed potential to emit (PTE) calculation methodologies for air emissions sources planned for the Proposed Air Permit Project. Appendix F includes the emission calculations described in this section.

2.1 Semiconductor Manufacturing Process Emissions

The semiconductor manufacturing processes described in Section 1.4 include several fab processes that each will exhaust through one or more of five exhaust types. The process flow diagrams in Appendix E illustrate the relationship between the fab processes and exhaust types. The methods used to quantify emissions from fab processes are described in this section.

2.1.1 Projected Material Use Inventory

The PTE from the semiconductor manufacturing process operations is based on the chemical material use inventory that Micron currently projects will be required for operation of Fab 1 presented in Table 6-1 of Appendix F. The chemical material use inventory has been updated for this application based on more recent design information. This inventory includes both raw materials that are incorporated into the product as well as materials used to support the manufacturing process, such as gases used to clean process equipment. In Permit Application 1, Fab 2 was projected to require approximately 75% of the raw materials used in Fab 1. In this application, Fab 2 is projected to have equal material usage to Fab 1. Therefore, the annual projected quantities for Fab 1 were multiplied by 2 to estimate total usage in both Fab 1 and Fab 2.

As discussed above, the nature of Micron's business requires rapidly-changing product mix, architecture, and functionality to meet customer needs. The nature and rapid pace of constant technological change affects the type, number, and configuration of semiconductor process tools required to fabricate devices. The need for this flexibility extends to use of raw materials, process gases, etc. The process categories and exhaust types planned for the fabs described in this application represent typical industry operations and are not expected to change substantially. However, the specific operations, equipment, and materials to be used in each process category have the potential to change throughout the remainder of detailed design and operation of the fabs to keep pace with evolving technology. Many materials that are commonly used in the industry will remain the same. However, evolution of technology may result in the requirement to use different materials and/or change the total quantity of materials projected to be used. Therefore, Micron cannot predict the exact identity and quantity of materials that will be used in the semiconductor manufacturing process operations in Fab 2 and recognizes that the projected material use inventory for Fab 1 may change prior to commencement of operation. To account for this further possible refinement in emission calculations, the PTE for process equipment was developed using conservative assumptions discussed in detail in Appendix G.

2.1.2 Manufacturing Process Categories

Materials used in the manufacturing process (Table 6-1 of Appendix F) have been aligned with one or more of the process categories described in Section 1.4.1. This alignment is documented in the "Process Category" column of Table 6-1 of Appendix F. The process category in which a material will be used determines what the resulting air emissions and exhaust type will be.

Some materials are projected to be used in multiple process categories. For these materials, Micron has projected the percent of the total quantity of each primary chemical that will be used in each process category. This percentage is shown in the “% of Total Usage” column in Table 6-1 of Appendix F. The total quantity of each material projected to be used in each process category is listed in the “Projected Usage in Process Category” column of the same table. The quantity of each primary chemical may be listed multiple times if there is more than one emission chemical associated with the primary chemical for a process category. This is to facilitate calculation of emissions of each emission chemical and the repeated values in the “Projected Usage in Process Category” column for primary chemicals in each process are not additive.

2.1.3 Determination of Emission Chemicals

Table 6-1 of Appendix F refers to “Emission Chemicals” as those that have the potential to be emitted to the atmosphere as a result of using raw materials, process gases and other materials in the manufacturing process, which are collectively listed as “Primary Chemicals” in the same table. The emission chemicals may be the primary chemicals themselves or may be formed due to chemical reactions occurring as part of semiconductor process operations, or through oxidation in tool-level thermal oxidation systems or RCTOs. Materials used in multiple process categories may have different emission chemicals for each process in which they are used. The emission chemicals resulting from the use of each primary chemical were identified using published emission factors and semiconductor process knowledge. An explanation of emission chemical selection is provided in Appendix G. Emission chemicals proposed by the NYSDEC in TR Comment #12 are incorporated into Table 6-1 of Appendix F and Appendix G.

For fluorinated greenhouse gases (F-GHGs), emission chemicals were determined in part by using emission factors presented by the Intergovernmental Panel on Climate Change (IPCC) in the 2019 refinement to the 2006 Guidelines for National Greenhouse Gas Inventories for semiconductor industry manufacturing operations¹⁷ (the “2019 Refinement”). F-GHGs have the potential to react and form other F-GHGs as part of the process. The 2019 Refinement prescribes the F-GHG emission chemicals for each F-GHG based on the semiconductor manufacturing process category in which it is used. In addition, chemical engineering judgement was used to identify emission chemicals from treating F-GHGs in a thermal oxidation system, notably hydrogen fluoride (HF), carbon dioxide (CO₂), carbon monoxide (CO), and other oxidation products.

To determine emission chemicals for primary chemicals for which there are no published emission factors, Micron evaluated the use of each primary chemical in each semiconductor manufacturing process and how each may be treated by thermal oxidation systems. For example, silane (SiH₄) gas will be used in thin films/diffusion processes to deposit silicon atoms onto wafers. Any gaseous silane not utilized for this purpose will react in exhaust ductwork or in a thermal oxidation system to form silicon dioxide, the emission chemical. In addition, some materials will be used as liquid solvents in photolithography processes. A portion of these materials may evaporate and then oxidize in a RCTO to form CO₂, SO₂ and/or NO_x, which are the emission chemicals.

2.1.3.1 Carbon Monoxide Emission Calculation

Carbon monoxide potentially could be generated as a byproduct of thermal oxidation for any of the primary chemicals listed in Table 6-1 to Appendix F that contain a carbon atom. Carbon monoxide emissions also may be generated from incomplete combustion of fuels in thermal oxidation systems. Because of the nature

¹⁷ IPCC 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 6: Electronics Industry Emissions, Table 6.11.

of the semiconductor process operations, the ratio of CO to CO₂ generation from carbon-based process gases and raw materials in semiconductor manufacturing operations is not easily quantifiable. To account for this, the air emission calculations for CO are based on assumptions presented in a semiconductor exhaust management and control book on this topic, the relevant excerpt of which is included in Appendix U.¹⁸ This approach assumes that CO emissions for all operations can be conservatively estimated using an emission factor equal to five times the emission factor for CO in AP-42 Vol. I, Chapter 1.4: Natural Gas Combustion, Table 1.4-1. This approach is used to estimate emissions of both process-based CO (i.e., that is generated from chemical reactions of process gases) and from incomplete combustion.

2.1.4 Emission Factors

For each emission chemical listed in Table 6-1 of Appendix F a "Process Emission Factor" is given in pounds of emission chemical emitted per pound of primary chemical used (lb emitted / lb used). These emission factors were developed as described previously in this section and as documented in Appendix G.

A large number of primary chemicals listed on Table 6-1 of Appendix F are available to be emitted from semiconductor manufacturing process operations in a quantity equal to the "Projected Usage in Process Category", either directly or through formation of an emission chemical. However, for other chemicals, such as liquids that are emitted by evaporation, a portion of the material used is collected as waste or otherwise is not available to be emitted from the process tool. The "Process Emission Factor" for direct emissions of such primary chemicals accounts for this fact. However, when there is an emission chemical created from a primary chemical, an additional step in the emission calculations in Table 6-1 is necessary. This step includes multiplying the "Process Emission Factor" for each emission chemical by the "Process Emission Factor" for the primary chemical. This additional calculation step accounts for the fact that only the material released into the exhaust stream has the potential to convert from the primary chemical into the emission chemical.

For example, 1-methoxy-2-propanol (PGME) is used in the liquid phase as a solvent in photolithography processes and is assigned a "Process Emission Factor" of 0.2 lb emitted / lb used, indicating that up to 20% of PGME used is assumed to evaporate and enter the exhaust. When PGME is oxidized in an RCTO, CO₂ is generated. Only the 20% of PGME which evaporates is available to be oxidized; therefore, the emission factor for CO₂, 1.95 lb CO₂ / lb PGME (per Table 3-1 of Appendix F), must be multiplied by the "Process Emission Factor" for PGME, 0.2, to calculate mass of CO₂ emitted per quantity of PGME used in production (lb CO₂ / lb PGME used). Emission chemicals for which this adjustment is made are indicated with an "X" in the column "Emission Chem Formation Depends on Primary Chem EF?" in Table 6-1 of Appendix F.

2.1.5 Exhaust Treatment Efficiencies

In Table 6-1 of Appendix F, each emission chemical is assigned an exhaust type based on the identity of the primary chemical and the process category in which it is used. The exhaust types are described in more detail in Section 1.4.3. Table 6-1 of Appendix F includes factors for how semiconductor manufacturing process equipment emissions will be changed prior to exhaust to the atmosphere. Those factors are described below. It is assumed that POU control devices and centralized control devices will be operating 100% of the time during which tools are operating.

¹⁸ J. Michael Sherer, *Semiconductor Industry Wafer Fab Exhaust Management*, pg. 166, published 2005 by CRC Press, Taylor & Francis Group, Boca Raton, FL.

2.1.5.1 Equipment for Employee, Process, and Facility Safety

Thin films and wet etch/clean process tools require PEECs to minimize hazards in the ductwork and protect personnel and equipment, as introduced in Section 1.4.2 above. PEECs are essential to the safe operation of semiconductor fabrication facilities, and, in the process, they may also incidentally reduce certain chemical compounds in the exhaust beyond those they are intended to manage. The estimated effect of PEECs is summarized in Table 5-1 of Appendix F, based on preliminary information available from potential vendors and conservative engineering estimates. For GHGs, the fraction treated is based on the default values published by the IPCC in the 2019 Refinement.

2.1.5.2 POU Destruction and Removal Efficiency

POU control devices will be installed on a subset of plasma etch tools that etch metal substrates ("metal etch" tools) to mitigate emissions of F-GHGs. These POU devices will consist of a thermal oxidizer in series with a wet scrubber (known as burn/wet units). Micron is evaluating alternative POU technologies that will achieve the equivalent performance without combusting natural gas. The GHG destruction and removal efficiency (DRE) of the POU control devices, summarized in Table 5-2 of Appendix F, is based on default values provided in the IPCC 2019 Refinement. For other contaminants used alongside F-GHGs, the DRE is based on preliminary information available from potential vendors and conservative engineering estimates.

2.1.5.3 Centralized Control DRE

As described in Section 1.4.3 above, each exhaust type will be controlled by a unique control device, other than general fab exhaust. The DRE values used in PTE calculations for each of these control devices are summarized in Tables 5-3 and 5-4 of Appendix F. For this application, Micron has updated the DRE values to reflect the most recent available information from potential vendors, as well as updated engineering estimates. As described in Section 1.4.3, Micron plans to equip the ionizing wet scrubbers on the CVD exhausts with DeNO_x technology. Micron also plans to install RCS units on non-metal plasma etch tools rather than POU devices to provide reductions in natural gas usage. The DRE values for F-GHGs abated in the RCS units are based on default values provided in the IPCC 2019 Refinement.

Micron has begun the procurement process with potential vendors for centralized control devices but has not selected vendors at this time. In lieu of vendor specification sheets, Micron has provided outlines of its expectations for potential vendors in Appendix V. These documents are for use in the procurement process to help select vendors that are able to meet these specifications.

2.1.6 Process Tool and Operations Emissions

PTE for each emission chemical was calculated using the usage quantities, emission factors, PEEC exhaust management, and DRE values discussed above. Emissions are displayed at the outlet of semiconductor process operations, at the outlet of POU devices, and at the exhaust to atmosphere in the "Process Emissions Quantification" section in Table 6-1 of Appendix F as described below.

2.1.6.1 Process Emissions

Emissions at the outlet of the semiconductor manufacturing process equipment are shown for each emission chemical in the "Process Emissions" column in Table 6-1 of Appendix F. These values were determined by multiplying the "Projected Usage in Process Category" of each primary chemical by the "Process Emission Factor" for the emission chemical. If indicated with an "X" in the "Emission Chem Formation Depends on

Primary Chem EF?" column of the same table, the result was then multiplied by the "Process Emission Factor" for direct emissions of the primary chemical. Finally, exhaust management from PEECs listed in the "PEEC Fraction Managed" column was accounted for.

For example, for the example discussed in Section 2.1.4 of CO₂ emitted as an emission chemical for PGME, the value in the "Process Emissions" column was determined by multiplying the "Projected Usage in Process Category" for PGME, 35,817 lb/yr, by the "Process Emission Factor" for CO₂ as an emission chemical of PGME, 1.95. Since an "X" is listed in the "Emission Chem Formation Depends on Primary Chem EF?" column, the product is then multiplied by the "Process Emission Factor" for direct emissions of PGME, 0.2. This value is then multiplied by (1 – "PEEC Fraction Managed"), which in this case is 1 since CO₂ is not managed in a PEEC. This calculation results in the "Pre-Control Process Emissions" quantity of 13,993 lb CO₂/yr for CO₂ as an emission chemical of use of PGME in photolithography.

2.1.6.2 Post POU or RCS Control Device Emissions

Emissions at the outlet of POU control devices, if applicable, are shown for each emission chemical in the "Post POU or RCS Emissions" column in Table 6-1 of Appendix F. This calculation was performed by multiplying the process emissions described above by (1 – "POU or RCS DRE"), where POU DRE is the fraction of emission chemical expected to be controlled by the POU. Emissions at the outlet of the RCS control devices were calculated using the same methodology, where applicable.

2.1.6.3 Post Control Emissions

Emissions from the exhaust stack to atmosphere are shown for each emission chemical in the "Post Control Emissions" column in Table 6-1 of Appendix F. This calculation was performed by multiplying the "Post POU or RCS Emissions", or the "Pre-Control Process Emissions" if a POU is not used, by (1 – "Centralized Control DRE"), where Centralized Control DRE is the fraction of emission chemical expected to be controlled by the applicable centralized control device. Emissions in this column represent the post control emissions of each emission chemical for the specific primary chemical used, process category it is used in, and exhaust type.

2.1.7 Additional Fab Process Emissions

Emissions from certain cleanroom operations were calculated independently from the emissions described in Sections 2.1.1 through 2.1.6. These operations include use of HTFs in process chillers, cleaning with IPA, the photoresist ashing processes, and generation of ozone. The separate methodologies used to calculate these emissions are described below.

2.1.7.1 Heat Transfer Fluid Losses

Various manufacturing processes will require the use of HTFs to maintain appropriate operating temperatures for equipment or components. The HTFs currently projected to be used in Fab 1 are listed in Table 9-1. Micron is currently developing and soliciting U.S. EPA approval for alternative HTFs with lower GWPs than the fluorocarbons compounds currently projected to be used. Potential greenhouse gas emissions are conservatively estimated based on the current usage projections. Emissions from HTF use are a result of losses from process chiller systems components (e.g., valves, connectors, etc).

The 100-year GWPs in units of kg CO₂e/kg HTF were determined based on information available in the IPCC 2019 Refinement. The projected usage in lb/year of each HTF was based on usage information available

from similar processes at other Micron facilities. The annual emissions of HTFs were assumed to be equal to the projected usage (i.e., the amount of fluid added to chillers is expected to equal the amount of fluid lost).

Each HTF was analyzed to determine whether it would contribute to total potential VOC or HAP emissions. The chemical structure of each HTF and documentation provided by manufacturers¹⁹ were used to determine VOC status with respect to the definition in 6 NYCRR 200.1(cg). No HTF planned to be used in the Proposed Air Permit Project are defined as HAP. To calculate total CO₂e emissions (on either a 100-year or 20-year basis) from each HTF, the appropriate GWP of each HTF was multiplied by the corresponding HTF usage quantity.

2.1.7.2 Fab Cleaning Emissions

IPA will be used for miscellaneous cleaning operations conducted by hand, including cleaning process equipment, workspaces and other surfaces within the semiconductor fab. This use is separate from IPA used in wet etch/wet clean process tools for cleaning wafers and is purely for routine maintenance as opposed to semiconductor process operations. The quantity of IPA used for wiping is estimated based on the current detailed engineering design information. Since IPA is a volatile solvent, 100% of IPA used for cleaning is assumed to be emitted from the fab. Total annual emissions are presented in Table 10-1 of Appendix F.

IPA used for cleaning will evaporate into the cleanroom air and be dispersed. Therefore, IPA used for cleaning is assumed to exhaust through each stack type at a rate proportional to the total flowrate through all stacks of each type. Each solvent exhaust is divided into two stacks, one at the outlet of the pair of zeolite rotors, and one at the outlet of the thermal oxidizer. For the purpose of this calculation, they are treated as one stack. The annual emissions of IPA through each stack type is calculated in Table 10-2 of Appendix F by dividing the total flowrate for all stacks of each type by the total flowrate for all fab stacks, then multiplying by the total annual emissions of IPA. Emissions are also calculated on an hourly basis per quadrant and per stack by applying a variance factor of 25% to account for potential variability in operations from hour to hour, then dividing by the appropriate number of halves (four for Fab 1 and Fab 2 combined) or stacks.

2.1.7.3 Ozone Emissions

Ozone (O₃) is used as a raw material in thin films processes and will be generated onsite as opposed to being purchased from a supplier. Therefore, it is not included on the Projected Material Use Inventory. Micron has conservatively estimated the amount of O₃ that will be generated per year based on demands for similar manufacturing facilities. Ozone that is not utilized in the process will be managed by PEECs that serve to prevent safety and odor issues in the fab if reentrainment of O₃ were to occur. These assumptions are documented in Table 11-1 of Appendix F.

Emissions of ozone will exhaust through centralized acid scrubbers and CVD scrubbers along with other emissions from thin films processes. Using a similar methodology to calculate emissions as is used for IPA, O₃ is assumed to be emitted through acid and CVD exhausts at rates proportional to the total flowrate of all stacks of each type. The methodology described in Section 2.1.7.2 above that is used for IPA is also used to calculate annual emissions per stack type, hourly emissions per half, and hourly emissions per stack of O₃ in Table 11-2 of Appendix F.

¹⁹ Details of the analysis of exclusions from being a VOC per 6 NYCRR 200.1(cg) are presented with Table 9-1 in Appendix F.

2.1.7.4 Photoresist Ashing

As described in Section 1.4.1.4, photoresist material, which is composed of solids in a solvent solution, is selectively applied to wafers to protect certain areas of the wafer during processes like etching. When the photoresist remaining on the wafer is no longer needed, it is combusted in a process called “ashing” and is oxidized to form CO₂ and CO. Emissions associated with this process are presented on Tables 8-1 and 8-2 of Appendix F.

Multiple materials on the material use inventory are used to formulate photoresist mixtures, and some of those may be used for other purposes as well. To calculate emissions of CO₂ and CO, the total annual photoresist usage quantity for the Proposed Air Permit Project was projected based on available design information. The percentage of remaining photoresist material assumed to be solid material that could remain on a wafer was 30%, based on semiconductor process knowledge. Of the total amount of photoresist solids, 5% were assumed to remain on the surface of wafers after the “development” of the photoresist material, in which photoresist material is removed from areas exposed to light. These remaining photoresist solids were conservatively assumed to be composed of 100% carbon atoms for the purposes of calculating potential CO and CO₂ emissions. It was assumed that, on a molar basis, 50% of the carbon solids would oxidize to CO while 50% would oxidize to CO₂. In reality, some photoresist material may react with process gases used in the plasma etch process before it has the potential to be combusted in the ashing process, forming F-GHG byproducts. These emissions are captured as part of the IPCC 2019 Refinement emission factors discussed in Appendix E.

The total amount of material to be oxidized into either pollutant during combustion was calculated by multiplying each percentage by the total estimated usage of photoresist material. The amount of material to be oxidized into each pollutant in lb/year was then multiplied by the ratio of the molar weight of each pollutant in pounds per pound-mole (lb/lb-mole) to the molar weight of carbon in lb/lb-mole. This calculated pollutant-specific emission rates of CO₂ and CO in lb/year. These emission rates were converted to final pollutant-specific ton per year (tpy) potential emission rates.

2.2 Emissions from Combustion Sources

The following sections detail the different pieces of equipment that will combust fossil fuels as part of the Proposed Air Permit Project and the calculation methodology associated with each that was used to calculate potential emissions from combustion.

2.2.1 Diesel Fuel-Fired Emergency Generators and Emergency Fire Pump Engine

As part of the Proposed Air Permit Project, diesel fuel-fired generator sets will be installed to provide power during emergency events for health and safety purposes. One diesel fuel-fired emergency fire pump engine will be used to provide fire water supply in the event of an emergency during which the primary electric fire pump cannot be used. Emission calculations using information from potential vendors are shown on Tables 17-1, 17-2, and 17-3 of Appendix F for the generators, and Tables 32-1, 32-2, 32-3 of Appendix F for the fire pump.

Diesel fuel-fired generator sets will be compliant with Tier 4 exhaust emissions standards.²⁰ Therefore, these standards were used to determine potential emissions of criteria pollutants. Criteria pollutant emission

²⁰ 40 CFR 1039 Subpart B

factors for combustion of ultra-low sulfur diesel (ULSD) were obtained from AP-42²¹ for pollutants for which Tier 4 emissions standards have not been set. The AP-42 emission factors were multiplied by the brake horsepower (bhp) provided in specifications from potential vendors at full load to calculate the emission rate of each pollutant in lb/hr. To calculate emissions using the Tier 4 emission standards, the bhp rating was converted to kilowatts (kW) and then multiplied by the provided emission factors in grams per kW hour. These emission rates were then converted to units of pounds per hour (lbs/hr).

Hazardous air pollutant (HAP) emission factors in pounds per million British thermal unit (lb/MMBtu) were obtained from AP-42.^{22,23} These emission factors were multiplied by the conversion of MMBtu to brake horsepower-hour (bhp-hr) and subsequently multiplied by the brake horsepower of the engines at full load to calculate the emission rate of each HAP in lb/hr.

The diesel fuel-fired emergency fire pump will be compliant with Tier 3 exhaust emissions standards.²⁴ Therefore, these standards were used to determine potential emissions of criteria pollutants, supplemented with AP-42²⁵ factors for other criteria pollutants and for HAP.

The emission factor for CO₂ was obtained from 40 CFR Part 98 Table C-1,²⁶ while the emission factors for methane (CH₄) and nitrous oxide (N₂O) were obtained from 40 CFR Part 98 Table C-2.²⁷ The greenhouse gas (GHG) emission factors were provided in units of kilograms per million British thermal units (kg/MMBtu). These emission factors were converted to units of lb/hr using both the conversion from kilograms to pounds and by multiplying the conversion from MMBtu to bhp-hr by the brake horsepower of each generator set engine model at full load.

Potential carbon dioxide equivalent (CO₂e) emissions were calculated across a 20-year and 100-year period using established global warming potentials (GWPs) for CH₄ and N₂O.²⁸ The GWPs of both CH₄ and N₂O were multiplied by the respective calculated lb/hr emission rate of each gas and summed with the CO₂ lb/hr emission rate. To calculate potential annual emissions from these generator sets, the emission rates from each generator set were multiplied by the proposed 100 hr/yr limit for each generator, then multiplied by the total estimated amount of generator sets to be installed as part of the Proposed Air Permit Project. To calculate potential annual emissions from the fire pump, the emission rates were multiplied by the required 500 hr/yr limit to maintain emergency status. Upstream emissions as a result of the extraction and

²¹ AP-42 Vol. I, Chapter 3.4: Large Stationary Diesel and All Stationary Dual-fuel Engines, Table 3.4-1: Gaseous Emission Factors for Large Stationary Diesel and All Stationary Dual-fuel Engines and Table 3.4-2: Particulate and Particle-sizing Emission Factors for Large Uncontrolled Stationary Diesel Engines

²² AP-42 Vol. I, Chapter 3.4: Large Stationary Diesel and All Stationary Dual-fuel Engines, Table 3.4-3: Speciated Organic Compound Emission Factors for Large Uncontrolled Stationary Diesel Engines

²³ AP-42 Vol. I, Chapter 3.4: Large Stationary Diesel and All Stationary Dual-fuel Engines, Table 3.4-4: PAH Emission Factors for Large Uncontrolled Stationary Diesel Engines

²⁴ 40 CFR 1039 Subpart B

²⁵ AP-42 Vol. I, Chapter 3.3: Gasoline and Diesel Industrial Engines

²⁶ 40 CFR Part 98, Table C-1: Default CO₂ Emission factors and High Heat Values for Various Types of Fuel

²⁷ 40 CFR Part 98 Table C-2: Default CH₄ and N₂O Emission Factors for Various Types of Fuel

²⁸ 20-year GWPs per 6 NYCRR Part 496. 100-year GWPs per 40 CFR Part 98, Table A-1: Global Warming Potentials

transmission of ULSD were quantified using emission factors published by the NYSDEC in the 2024 NYS Statewide GHG Emissions Report, Table A1.²⁹

2.2.2 Tool-Level Thermal Oxidation Systems and RCS

Tool-level thermal oxidation systems, which include metal etch POUs and thin films PEECs, will be utilized as described in Section 1.4.2. RCS will be used on non-metal plasma etch tools that would otherwise require POUs. The operation of these devices will require the combustion of natural gas. Emission calculations are shown on Tables 13-1, 13-2, and 13-3 of Appendix F for tool-level thermal oxidation systems, and on Tables 31-1, 31-2, and 31-3 of Appendix F for RCS.

To calculate potential emissions from natural gas use, the total estimated natural gas usage for metal etch POUs and thin films PEECs was estimated based on available design information in Table 13-1 of Appendix F. RCS natural gas usage is based on the required burner size.

Emission factors for criteria pollutants, greenhouse gases, and HAPs were obtained from AP-42³⁰ in units of pounds per million standard cubic feet (lb/MMscf). The emission factors for PM₁₀ and PM_{2.5} were conservatively assumed equal to the emission factor for total PM, which is the sum of the emission factors for filterable and condensable PM. These emission factors were multiplied by the estimated total annual natural gas usage in MMscf/year to determine emission rates in lb/year. The emission factor for CO was multiplied by a safety factor of five to account for the incomplete oxidation of process chemicals and the incomplete combustion of natural gas, as described in Section 2.1.3.1 above. To calculate the 20-year and 100-year CO_{2e} emission rates, the GWPs³¹ of both CH₄ and N₂O were multiplied by the respective lb/year emission rate of each gas and summed with the CO₂ lb/year emission rate. Upstream emissions as a result of the extraction and transmission of natural gas were quantified using emission factors published by the NYSDEC in the 2024 NYS Statewide GHG Emissions Report, Table A1.

The annual emission rates were divided by the total operational stack count by oxidation system exhaust type to determine per-stack emission rates in units of tpy. To determine pollutant-specific lb/hr emission rates per stack, a conversion factor of 8,760 hours of operation per year was applied. Multiplying the per-stack pollutant-specific tpy emission rates by each respective total operational stack count yielded the total pollutant-specific tpy emission rate by device-specific stack type.

2.2.3 Rotor-Concentrator Thermal Oxidizers

Rotor-concentrator/thermal oxidizer (RCTO) units will be employed as part of the Proposed Air Permit Project to control emissions from certain semiconductor manufacturing processes. Emission calculations are presented in Tables 14-1, 14-2, and 14-3 of Appendix F.

²⁹ Emission Factors for Use by State Agencies and Applicants, Appendix A to the 2024 NYS Statewide GHG Emissions Report, Table A1

³⁰ AP-42 Vol. I, Chapter 1.4: Natural Gas Combustion, Tables 1.4-1 through 1.4-4

³¹ 20-year GWPs per 6 NYCRR Part 496. 100-year GWPs per 40 CFR Part 98, Table A-1: Global Warming Potentials

Natural gas will be combusted in the burners as part of the operation of the RCTOs. Emission factors for criteria pollutants, greenhouse gases, and HAPs were obtained from AP-42³² in units of pounds per million standard cubic feet (lb/MMscf). The emission factor for CO was multiplied by a safety factor of five as described in Section 2.1.3.1 above.

Each pollutant-specific emission factor in lb/MMscf was multiplied by the natural gas flow rate in MMscf/hr to each RCTO model type, the latter of which was calculated using the model-specific burner rating in MMBtu/hr and the Btu/scf heat value of natural gas established in AP-42,³³ to calculate emission rates in units of lb/hr. To calculate the 20-year and 100-year CO₂e emission rates, the GWPs³⁴ of both CH₄ and N₂O were multiplied by the respective calculated lb/hr emission rate of each gas and summed with the CO₂ lb/hr emission rate. Upstream emissions as a result of the extraction and transmission of natural gas were quantified using emission factors published by the NYSDEC in the 2024 NYS Statewide GHG Emissions Report, Table A1.

The pollutant-specific per-RCTO lb/hr emission rates were converted to per-RCTO tpy emission rates using a potential 8,760 hours of operation per year. Total potential tpy emission rates were calculated by multiplying the per-RCTO tpy emission rates by the projected number of operational RCTOs.

2.2.4 Water Bath Vaporizers

WBVs will be installed to heat large baths of water to vaporize nitrogen when needed to supplement the supply from the onsite air separation unit. Potential combustion emissions were calculated as shown in Tables 15-1, 15-2, and 15-3 of Appendix F.

The natural gas flow rate to the burners in scf/hr was calculated using the proposed burner rating and the Btu/scf heat value of natural gas established in AP-42.³⁵ Potential emissions for NO_x, CO, and VOC were based on applicable BACT or LAER emission limits for WBVs. Emission factors for other criteria pollutants, greenhouse gases, and HAPs were obtained from AP-42³⁶ in units of pounds per million standard cubic feet (lb/MMscf). Pollutant-specific per-WBV lb/hr emission rates were calculated by multiplying the natural gas flow rate to the burners in MMscf/hr by the lb/MMscf emission factors. To calculate the 20-year and 100-year CO₂e emission rates, the GWPs³⁷ of both CH₄ and N₂O were multiplied by the respective calculated lb/hr emission rate of each gas and summed with the CO₂ lb/hr emission rates. Upstream emissions as a result of the extraction and transmission of natural gas were quantified using emission factors published by the NYSDEC in the 2024 NYS Statewide GHG Emissions Report, Table A1. All hourly emission rates were converted to per-WBV tpy emission rates using a proposed limit of 8,000 total hours of operation per year.

The potential per-WBV pollutant-specific emission rates in lb/hr and tpy were multiplied by the projected total count of operational WBVs to calculate total potential lb/hr and tpy emission rates for the operation of

³² AP-42 Vol. I, Chapter 1.4: Natural Gas Combustion, Tables 1.4-1 through 1.4-4

³³ AP-42 Vol. I, Chapter 1.4: Natural Gas Combustion

³⁴ 20-year GWPs per 6 NYCRR Part 496. 100-year GWPs per 40 CFR Part 98, Table A-1: Global Warming Potentials

³⁵ AP-42 Vol. I, Chapter 1.4: Natural Gas Combustion

³⁶ AP-42 Vol. I, Chapter 1.4: Natural Gas Combustion, Tables 1.4-1 through 1.4-4

³⁷ 20-year GWPs per 6 NYCRR Part 496. 100-year GWPs per 40 CFR Part 98, Table A-1: Global Warming Potentials

WBVs as part of the Proposed Air Permit Project. Emissions from redundant WBVs were assumed to be zero, as Micron will operate the four redundant and four operational WBVs for a total of no more than 8,000 hours per year.

2.2.5 Natural Gas-Fired Boilers

Micron plans to install natural gas-fired boilers as part of the Proposed Air Permit Project to supplement heat recycled within the fab when necessary. Emission calculations are shown in Tables 16-1, 16-2, and 16-3 of Appendix F.

Potential emissions for NO_x, CO, and VOC were based on applicable BACT or LAER emission limits for natural gas-fired boilers. Other criteria pollutant, greenhouse gas, and HAP emission factors from AP-42 Chapter 1.4 in units of lb/MMscf for natural gas combustion were divided by the standard heat value of natural gas in Btu/scf before being multiplied by the burner rating of the boilers to calculate pollutant-specific lb/hr emission rates. To calculate the 20-year and 100-year CO₂e emission rates, the GWPs³⁸ of both CH₄ and N₂O were multiplied by the respective calculated lb/hr emission rate of each gas and summed with the CO₂ lb/hr emission rate. Upstream emissions as a result of the extraction and transmission of natural gas were quantified using emission factors published by the NYSDEC in the 2024 NYS Statewide GHG Emissions Report, Table A1.

These potential emission rates were converted to units of tpy using the proposed limit of 6,000 hours of operation per year.

2.3 Facility Support Emissions

Outside of emissions generated from combustion and from semiconductor fab manufacturing processes, several pieces of equipment to be installed as part of the Proposed Air Permit Project will result in air emissions during daily operation. The following sections describe the different methodologies that were used to calculate potential emissions for each type of facility support equipment.

2.3.1 Cooling Towers

As part of the Proposed Air Permit Project, cooling towers will be installed in the CUB and gas yard for heat dissipation purposes. Specifications sheets provided by potential vendors were used to determine the drift loss and flow rate in gallons per minute (gal/min) of each cooling tower model for use in the emissions calculations.

To begin the calculation, lb/hr emission rates of total dissolved solids (TDS) were calculated by multiplying together the density of water in pounds per gallon (lb/gal), the flow rate to each cooling tower model in gallons per minute (gpm), the drift loss percentage of each cooling tower model, and the concentration of TDS in the circulating water in parts per million by weight (ppmw) (converted to a percentage). Then, percentages of TDS emissions that were PM₁₀ or PM_{2.5} based on the drift loss percentages of each cooling tower model were interpolated based on droplet diameter and total PM concentration data compiled by

³⁸ 20-year GWPs per 6 NYCRR Part 496. 100-year GWPs per 40 CFR Part 98, Table A-1: Global Warming Potentials

Environmental Canada.³⁹ These pollutant-specific emission percentages were multiplied by the lb/hr emission rate of TDS to obtain per-unit lb/hr emission rates of PM₁₀ and PM_{2.5}. The per-unit lb/hr emission rates were converted to per-unit tpy emission rates using 8,760 hours/year of operation, which were subsequently multiplied by the estimated total cooling tower count to calculate the total tpy emission rates.

To calculate speciated particulate matter emissions from the cooling towers, the inventory of additives to the cooling water was evaluated to determine constituents that could potentially emit as particulate matter. The speciated particulate matter PTE from the cooling towers is based on the potential annual usage of the additives and weight percent of each constituent in each additive, as shown in Table 20-3 of Appendix F. The average concentration of each additive constituent in the cooling water was estimated by dividing the total annual projected constituent usage by the total annual projected cooling water flow. Then, the ratio of the constituent concentration to the estimated total TDS concentration was multiplied by the total estimated TDS emissions to calculate the total estimated constituent emissions.

2.3.2 Storage Tanks

Storage tanks will be used as part of the Proposed Air Permit Project to store both raw chemical components and waste from manufacturing processes. A list of projected storage tanks is provided on Table 21-1 of Appendix F. The proposed storage tanks will all be equipped with fixed roofs, and the majority will be installed indoors. For indoor tanks, breathing losses were not considered since the tanks will not be exposed to direct sunlight or outdoor temperature fluctuations. Potential working loss emissions of volatile chemicals from all storage tanks were calculated. The working loss equations referenced below were obtained from AP-42 Chapter 7.1.⁴⁰

For outdoor tanks, the tank emissions calculation software tool BREEZE TankESP™ was utilized to calculate potential breathing losses based on historical meteorological data for near Clay, NY and projected attributes of the tanks (i.e., design, color, and capacity). BREEZE TankESP™ uses the emission estimation procedures from Chapter 7 of U.S. EPA's Compilation of Air Pollutant Emission Factors (AP-42) to estimate emissions from tanks. Breathing loss estimates are presented in Table 23-3 of Appendix F.

The throughput for each tank in terms of gal/day of raw material was based on projected raw material needs and waste generation capacities. A default filling rate of 2,500 gal/hr was assumed for all bulk chemical tanks, while waste tanks were assumed to be filled constantly based on continual fab operation. The filling rate of waste tanks was calculated by dividing the annual throughput in gal/year by 8,760 hours of operation per year.

The molecular weight and vapor pressure of each chemical projected to be stored is documented on Table 22-1 of Appendix F. Using this information, working losses were calculated as shown on Table 23-2. A normalized mole percentage of each component by tank was calculated based on the projected weight percent of chemicals in solution in each tank. The weight percent of the particular chemical in the raw material delivered was divided by the molecular weight of the chemical. These ratios, representative of the pound-moles (lb-mole) of each individual chemical constituent per pound of stored material, were then

³⁹ <https://www.canada.ca/en/environment-climate-change/services/national-pollutant-release-inventory/report/sector-specific-tools-calculate-emissions/wet-cooling-tower-particulate-guide.html>, Accessed February 1, 2024

⁴⁰ AP-42 Vol. I, Chapter 7.1.3.1: Routine Losses From Fixed Roof Tanks

divided against the sum of all ratios belonging to the same particular raw material to calculate a normalized mole percentage.

The methodology summarized in Table 23-1 of Appendix F was used to calculate working losses. The stock vapor density in lb/gal was calculated by multiplying the vapor pressure of the component in pounds per square inch absolute (psia) by the molecular weight of the vapors of the raw material in lb/lb-mole and dividing by the product of the temperature of the bulk raw material loaded into the tank (assumed to be 540 degrees Rankine (°R)) and the ideal gas constant in units of psia*scf/lb-mole*°R. The stock vapor density of each component was multiplied by the throughput in gal/year, the dimensionless working loss turnover factor (calculated using the amount of annual turnovers), the dimensionless working loss product factor, the dimensionless vent setting correction factor, and the vapor weight percent of the component to calculate the working loss emissions in units of lb/year. The working loss product factor and vent setting correction factor were both assumed equal to one for the purposes of these calculations.

The pre-control lb/year working loss emission rates for each group of tanks were converted to total tpy. The "Control Efficiency" for each group of tanks is shown in Table 23-2. The control efficiencies for each group and pollutant are determined based on specifications that Micron has required of vendors and conservative engineering estimates. Controlled lb/yr working and breathing loss emission rates were calculated by multiplying the pre-control emission rates by (1 – "Control Efficiency"). Emissions that were classified as HAP or VOC emissions based on the constituent in question were added to the total potential facilities emissions.

2.3.3 Storage Silos

Bulk material storage silos will be installed as part of the Proposed Air Permit Project to store lime. The calculation methodology described below was used to estimate emissions of particulate matter from daily use of the storage silo, as shown on Tables 24-1 and 24-2 of Appendix F.

It was assumed that filters will be installed on the silos to control particulate emissions. A particulate capture rate of 100% was assumed along with a 99.5% control efficiency. To estimate emissions of total PM, PM₁₀, and PM_{2.5}, emission factors were obtained from AP-42⁴¹ in units of lb/ton of material processed. The factor for "product loading to an enclosed truck" was used as truck loading operations were deemed representative of the operations taking place at the storage silos. Emission factors for PM₁₀ and PM_{2.5} were conservatively assumed equivalent to total PM.

The pollutant-specific emission rate in lb/hr for each silo was calculated by multiplying the emission factor by the throughput of lime in ton per day and applying the 99.5% control efficiency. The emission rate in lb/hr was then converted to units of tpy by multiplying by 8,760 hours/yr of operations. To determine the final potential emission rates of particulate matter from all silos, the per-silo emission rates were multiplied by the total silo count.

⁴¹ AP-42 Vol. I, Chapter 11.17: Lime Manufacturing, Table 11.17-4: Emission Factors for Lime Manufacturing Raw Material and Product Processing and Handling

2.3.4 Process Wastewater Emissions

The treatment of wastewater generated in the semiconductor fab manufacturing process will result in the emission of certain organic and inorganic compounds to the atmosphere. Estimates of these emissions are provided in Table 12-1 of Appendix F.

These emission estimates were developed using the Toxchem modeling software developed by Hydromantis. Toxchem is a steady-state mass balance simulator capable of predicting the fate of organic and inorganic compounds in water streams. Toxchem uses the Henry's Law constant for each organic and inorganic compound to simulate emission rates attributable to liquid-to-gas mass transfer as influenced by specific design criteria (e.g., liquid surface area, agitator horsepower) for each wastewater treatment operation.

The wastewater flow rates used in the Toxchem model originate from Micron's water balance for Fab 1 and Fab 2. The concentrations of organic and inorganic compounds in these wastewater streams are conservative engineering estimates derived from chemical usage rates, design data, and process simulations. Certain compounds that may be present in the wastewater streams from Fab 1 and Fab 2 are not represented in Toxchem's chemical database. In order to simulate emissions of these compounds, representative surrogate compounds were selected based on similarities in chemical structure.

Although Toxchem is capable of simulating the biodegradation rate for various compounds in biological treatment units, Toxchem does not quantify the generation of secondary compounds such as hydrogen sulfide and nitrates. Emissions of these secondary compounds were calculated manually assuming stoichiometric conversion of the incoming biodegraded compounds (e.g., sulfur-bearing compounds and ammonia) along with the biodegradation rate predicted by Toxchem.

2.3.5 Roadway Emissions

Traffic on roadways surrounding Fab 1 and Fab 2 has the potential to generate PM emissions by disturbing silt present on the surface. These roads will be paved to minimize such emissions, which was determined to be PM BACT as discussed in Appendix K. An estimate of PM emissions from roadways is provided in Table 26-1 of Appendix F.

To estimate PTE from this source, industrial truck traffic expected to travel on roads surrounding Fab 1 and Fab 2 for trucks delivering raw materials and removing waste was considered. For raw materials expected to be delivered or accumulated for shipment and stored in bulk, identified as the "Materials Hauled" in Table 26-1, the location of the storage vessel/container was determined based on the current site master plan, and an "Estimated Round Trip Distance Traveled" was calculated based on the difference between the destination and nearest entrance from a public roadway. Process materials were assumed to be delivered to the buildings in or near which they will be stored (e.g., HPM, WWT, BIO, or Fab).

Emissions were calculated using the equation and table in AP-42 Chapter 13⁴² for particulate emissions from ubiquitous paved roads (i.e., not roads used for heavy industry). The equation is presented in footnote 4 to Table 26-1. A silt loading factor of 1.5 was chosen to conservatively estimate emissions assuming winter conditions occur for half of the year. It was assumed that traditional rock salt would be used in winter. The

⁴² AP-42 Vol. I, Chapter 13.2.1: Paved Roads, Equation 2, and Table 13.2.1-2: Ubiquitous Silt Loading Default Values with Hot Spot Contributions from Anti-Skid Abrasives (g/m²)

average weight of each shipment was calculated using an “Estimated Weight When Empty” for each truck, the specific gravity or density of each material being transported in bulk, and an estimated capacity of each shipment. The number of shipments of each material in a year was determined by dividing the total annual “Material Throughput” by the “Estimated Load Weight” (for throughputs in tons) or an estimated load volume of 5,000 gallons (for throughputs in gallons). The total number of vehicle miles traveled (VMT) to transport each material was calculated by multiplying the number of “Pickup / Delivery Trips” by the “Estimated Round Trip Distance Traveled” for each trip. Then, Equation 2 from AP-42 Chapter 13.2.1 was used to calculate the emissions of PM as total suspended particulate (TSP), PM₁₀, and PM_{2.5}.

2.3.6 Electrical Insulation Emissions

High-voltage equipment, such as circuit breakers and ion implant tools, require the use of insulating gases such as sulfur hexafluoride (SF₆). These gases have the potential to leak over time and are therefore a source of air emissions.

The projected total usage of SF₆ in all circuit breakers and similar equipment was multiplied by a manufacturer guaranteed leak rate of 0.5% per year to calculate PTE. To calculate the 20-yr and 100-yr CO_{2e} emission rates, the GWPs⁴³ of SF₆ were multiplied by the calculated lb/yr emission rate.

2.3.7 Lab Process Emissions

The Proposed Air Permit Project includes two laboratories to support each fab with testing and quality assurance, one in each Probe building and WWT building. Lab operations are exempt from permitting per 6 NYCRR 201-3.2(c)(40), therefore only criteria pollutant and HAP emissions were considered for the purpose of determining PTE with respect to relevant Title V and PSD/NNSR thresholds, consistent with 6 NYCRR 201-3.1(b).

An inventory of projected chemicals to be used in each lab was reviewed to identify VOC and HAP compounds, as well as compounds that may react to form criteria pollutants through use in the labs. Constituents present in amounts below the thresholds in 6 NYCRR 201-3.3(c)(94) were not considered. For each chemical, the potential amount of VOC, HAP, or criteria pollutant present after use was estimated by multiplying the projected annual usage by the appropriate concentration and/or conversion rate. It was conservatively assumed that the entire amount of each constituent used/generated is emitted. These calculations are shown on Tables 29-1 and 29-2 of Appendix F.

2.3.8 Solvent Waste Neutralization Emissions

The spin-on dielectric (SOD) process is a subset of the thin films processes that results in the formation of an unstable liquid waste byproduct. The SOD waste, a mixture of polysilazane and dibutyl ether, will be transferred to an HPM building for neutralization required to ensure safe shipment offsite. A rinse solvent will be transferred along with the SOD waste to ensure that it is removed from the tool. In the HPM building, the SOD waste will be reacted with ethanol and potassium hydroxide into a stable silicon-based product for safe shipment. Byproducts of the reaction will include silane, ammonia, and hydrogen. The RCTOs in the HPM building will oxidize the silane- and ammonia-containing exhaust before it is emitted to atmosphere.

⁴³ 20-year GWPs per 6 NYCRR Part 496. 100-year GWPs per 40 CFR Part 98, Table A-1: Global Warming Potentials

The PTE from the SOD waste neutralization process is based on the potential generation rate of SOD waste, including rinse solvent, and estimated usage of reactant, as shown in Table 30-1 of Appendix F. The methodology used in Table 30-2 is very similar to that used on Table 6-1 to calculate emissions from fab process operations. Refer to Section 2.1 for details on that methodology.

2.4 Emissions Summaries

All of the emission calculations described in the sections above are summarized on an annual PTE basis, and also on an hourly basis as needed. These emissions summaries are described in this section.

2.4.1 Annual Emissions Summaries

Table 1-1 of Appendix F summarizes the PTE for the Proposed Air Permit Project for criteria pollutants on an annual basis. The "Semiconductor Process Tools" column represents the sum of all relevant rows in the "Post Control Emissions (lb/yr)" column in Table 6-1 of Appendix for each pollutant, plus photoresist ashing emissions. The classification of each emission chemicals in Table 6-1 is shown in the "Emission Chemical Classifications" set of columns.

Table 1-2 of Appendix F summarizes criteria pollutants by proposed emission unit. These quantities should be used as a basis for setting specific emission limits in permit conditions. Refer to the emission unit matrix in Appendix Q, which identifies the emission sources and processes that are part of each proposed emission unit.

Table 1-3 of Appendix F summarizes the total annual emissions subject to 6 NYCRR Part 212 for each toxic air contaminant, including individual PM, HAP, VOC, and GHG. Each row in the "Total Emissions (lb/yr)" columns represents the sum of the "Post control Emissions (lb/yr)" column in Table 6-1 for all rows where the emission chemical is the chemical listed in Table 1-3. Additional information relevant to analysis under 6 NYCRR Part 212, discussed in Section 3.3.4 below, is provided.

For certain emission chemicals, structural and/or toxicological similarity was used to create groups that should be evaluated as a whole under 6 NYCRR Part 212. Combined emission rates for these groups are provided in Table 1-4. This concept is discussed in more detail in Section 3.3.4.5 below.

Compliance with Part 212 PM grain standards is assessed on a facility-wide basis in Table 1-5.

2.4.2 Fab Process Hourly Emissions Calculations

For the emissions sources discussed in Sections 2.1.7, 2.2 and 2.3, hourly emissions are presented alongside annual emissions in each table. For the emissions from semiconductor manufacturing processes discussed in Section 2.1, hourly emissions from each exhaust type are summarized in Tables 7-1 through 7-3 of Appendix F. In Table 7-1, each potential exhaust type through which each emission chemical may emit is identified.

In Tables 7-1 and 7-2, a row exists for each unique pair of emission chemical and exhaust type. Table 7-1 summarizes emissions for toxic air contaminants, while Table 7-2 summarizes emissions for criteria pollutants that require air dispersion modeling. The total annual pre-control emissions in each row, shown in the "Annual Pre-Control Emissions" column, is determined by summing relevant rows in the "Process Emissions (lb/yr)" column in Table 6-1. The "Average Hourly Pre-Control Emissions" column is calculated

simply by dividing the annual pre-control emissions by 8,760 hours per year. To account for the fact that in any one given hour, emissions may fluctuate due to variability in manufacturing operations, a 25% variance factor is added to the "Average Hourly Pre-Control Emissions" to conservatively estimate maximum hourly emissions. Using this factor and dividing emissions by the 4 total halves that will comprise Fab 1 and Fab 2 combined, the "Emission Rate Potential per Half" column was generated. The values in this column are used in the analysis with respect to 6 NYCRR Part 212 described in Section 3.3.4 below. The "POU or RCS DRE" and "Centralized Control DRE" used in Table 6-1 calculations are presented on this table for reference. Finally, emissions per stack were determined by dividing the "Annual Potential Emissions" by the number of stacks of each exhaust type by 8,760 to calculate the "Average Hourly Emissions Per Stack" and adding the Variance Factor to calculate the "Maximum Hourly Emissions Per Stack". These values are used for air dispersion modeling where required. Note that the number of stacks of each exhaust type used to calculate "Maximum Hourly Emissions Per Stack" was set to the projected number of operational stacks, and excluded the redundant stacks to calculate an accurate per-stack emission rate.

All emissions from organic compounds from solvent exhaust are listed in Table 7-3. As described in Section 2.1.7.2, each RCTO is equipped with two separate stacks, one at the outlet of the pair of zeolite rotors, and one at the outlet of the thermal oxidizer. The column layout and calculations align with that described above for Tables 7-1 and 7-2. However, for each Emission Chemical, the "Exhaust Type" column is labelled as either "Solvent Exhaust" or "RCTO Burner Exhaust" to clarify the exhaust stack. It is assumed based on semiconductor process experience that 95% of total emissions of each emission chemical from each RCTO will be from the stacks at the outlet of the zeolite rotors, indicated as "Solvent Exhaust". The remaining 5% of emissions are assumed to be emitted from the stacks at the outlet of the thermal oxidizers, indicated as "RCTO Burner Exhaust".

Micron - Clay, NY Fabs 1 & 2
Total Emissions Summary

Table 1-1: Criteria Pollutant Annual Potential Emissions - By Source Type

CAS#	Chemical Name	Semiconductor Process Tools	Heat Transfer Fluids	IPA Cleaning	Wastewater Treatment	Tool-Level Thermal Oxidation Systems	RCTO Combustion	Water Bath Vaporizers	Boilers	Emergency Generators	Cooling Towers	Storage Tanks & Silos	Roadway	SF ₆ Leaks	Lab Operations	SOD Waste Processing	RCS Combustion	Fire Pump Engine	Total PTE
		(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
0NY075-00-0	PM	34.2	--	--	0.01	4.04	9.92	1.28	4.39	0.27	15.5	0.08	6.49	--	--	0.97	0.39	0.02	77.6
0NY075-00-5	PM ₁₀	34.2	--	--	0.01	4.04	9.92	1.28	4.39	0.26	11.8	0.08	1.30	--	--	0.97	0.39	0.02	68.7
0NY750-02-5	PM _{2.5}	34.2	--	--	0.01	4.04	9.92	1.28	4.39	0.26	0.04	0.08	0.32	--	--	0.97	0.39	0.02	55.9
0NY998-00-0	VOC	131.3	1.74	11.7	32.0	8.11	7.18	0.92	1.00	6.17	--	0.80	--	--	0.29	3.87	0.28	0.41	205.7
0NY100-00-0	Total HAP	13.8	--	--	2.31E-05	2.79	2.47	0.32	1.09	0.08	--	2.06E-03	--	--	0.31	2.79	0.10	6.16E-04	23.7
0NY750-00-0	GHG (CO ₂ e 100-yr)	485,957	110,084	--	22,430	177,955	157,495	40,399	69,382	8,233	--	--	--	11,762	--	79.3	6,217	26.0	1,090,018
0NY210-00-0	NO _x	138.9	--	--	--	44.0	130.5	8.40	6.56	21.8	--	--	--	--	--	1.48	5.15	0.41	357.2
007446-09-5	SO _x	19.2	--	--	--	0.89	0.78	0.10	0.35	0.24	--	--	--	--	--	--	0.03	0.13	21.7
N/A	Fluorides	2.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.48
630-08-0	CO	4.07	--	--	--	619.5	548.3	14.1	88.3	113.7	--	--	--	--	--	--	21.6	0.36	1,410
7439-92-1	Lead	--	--	--	--	7.38E-04	6.53E-04	8.40E-05	2.89E-04	--	--	--	--	--	--	--	2.58E-05	--	1.79E-03
N/A	Direct GHG (CO ₂ e 20-yr)	378,913	111,272	--	61,545	178,142	157,660	40,442	69,456	8,251	--	--	--	8,759	--	79.3	6,223	26.1	1,020,768
N/A	Upstream GHG (CO ₂ e 20-yr)	--	--	--	--	135,583	119,994	30,885	53,044	2,612	--	--	--	--	--	--	4,737	8.26	346,863
10028-15-6	Ozone	0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.50
7664-93-9	Sulfuric Acid	2.96	--	--	--	--	--	--	--	--	0.40	9.15E-07	--	--	--	--	--	--	3.36

Table 1-2: Criteria Pollutant Annual Potential Emissions - By Emission Unit

CAS#	Chemical Name	1-FABOP	2-FABOP	1-CMBOP	2-CMBOP	1-HPMCU	2-HPMCU	1-WWBIO	2-WWBIO	1-ADMPR	2-ADMPR	1-FUGEM	2-FUGEM
		(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
0NY075-00-0	PM	24.3	24.3	2.99	2.96	8.26	0.01	0.00	0.01	0.00	0.00	3.24	3.24
0NY075-00-5	PM ₁₀	24.3	24.3	2.98	2.96	6.43	0.01	0.00	0.65	0.65	0.00	0.65	0.65
0NY750-02-5	PM _{2.5}	24.3	24.3	2.98	2.96	0.54	0.54	0.01	0.01	0.00	0.00	0.16	0.16
0NY998-00-0	VOC	80.4	80.4	4.51	4.00	2.08	7.08	16.0	0.09	0.09	0.09	0.00	0.00
0NY100-00-0	Total HAP	9.56	9.56	0.74	0.74	1.39	1.39	0.05	0.05	0.11	0.11	0.00	0.00
0NY750-00-0	GHG (CO ₂ e 100-yr)	468,854	468,854	59,102	58,937	39.7	39.7	11,215	11,215	0.00	0.00	5,881	5,881
0NY210-00-0	NO _x	159.3	159.3	19.0	18.2	0.74	0.74	0.00	0.00	0.00	0.00	0.00	0.00
007446-09-5	SO _x	10.5	10.5	0.47	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N/A	Fluorides	1.24	1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
630-08-0	CO	596.7	596.7	109.4	107.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7439-92-1	Lead	7.08E-04	7.08E-04	1.86E-04	1.86E-04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N/A	Direct GHG (CO ₂ e 20-yr)	416,105	416,105	59,170	59,005	39.7	39.7	30,773	30,773	0.00	0.00	4,379	4,379
N/A	Upstream GHG (CO ₂ e 20-yr)	130,157	130,157	43,301	43,248	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10028-15-6	Ozone	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7664-93-9	Sulfuric Acid	1.48	1.48	0.00	0.40	4.57E-07	4.57E-07	0.00	0.00	0.00	0.00	0.00	0.00

Table 1-3: 6 NYCRR Part 212 Applicability and Compliance - Individual Contaminants

CAS#	Chemical Name	PTE from Process Operations	VOC	HAP	HTAC	PM	Env. Rating ^{1,2,3,4}	SGC	AGC	ERP (lb/hr)										Applicable Citation	Compliance Requirement		
		(lb/yr)						(ug/m³)	(ug/m³)	Fab Acid	Fab CVD	Fab Ammonia	Fab Solvent	Fab General	HPM Acid	HPM Solvent	WWT Acid	WWT Ammonia	WWT Solvent			Bio General	Indiv. Tank
288-88-0	1,2,4-Triazole	7,299	X				INT-B	-	0.48	-	-	3.10E-02	-	-	-	-	-	-	0.37	0.55	-	212-1.5(f)	Comply w/ VOC LAER
95-63-6	TMB (1,2,4-TMB and 1,3,5-TMB)	710.6	X				B	-	60.0	-	-	-	0.19	-	-	3.90	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER
1436-34-6	1,2-Epoxyhexane	0.12	X				INT-B	-	-	-	-	1.40E-04	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
123-91-1	1,4-Dioxane	0.19	X				INT-B																
			X																				
			X																				
			X	X			INT-B																
			X			X	INT-B																
107-98-2	1-Methoxy-2-propanol	214.9	X				B	36,850	2,000	-	-	-	0.26	-	-	-	-	-	-	-	-	N/A - Part of Analog Group	
872-50-4	1-Methyl-2-pyrrolidone	5,017	X				B	-	100	-	-	-	3.95	-	-	-	-	-	0.10	0.14	-	212-1.5(f)	Comply w/ VOC LAER
929-06-6	2-(2-aminoethoxy)ethanol	65.1	X				INT-B	1,500	18.0	-	-	-	0.08	-	-	-	-	-	7.87E-11	3.40E-10	-	N/A - Part of Analog Group	
			X				INT-B																
			X				B*																
			X				INT-B																
			X																				
			X				INT-B*																
108-65-6	2-Methoxy-1-methylethyl acetate	87,410	X				INT-B																
			X				B	36,850	2,000	-	-	-	103.9	-	-	-	-	-	-	-	-	N/A - Part of Analog Group	
			X				INT-B																
			X				INT-B																
			X				INT-A																
75-65-0	2-Methylpropan-2-ol	8.33E-03	X				B*	-	720	-	-	-	9.91E-06	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
			X				INT-B																
123-42-2	4-Hydroxy-4-methylpentan-2-one	2.36E-02	X				B	-	570	-	-	-	2.81E-05	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
			X				B*																
108-11-2	4-Methylpentan-2-ol	788.0	X				B*	17,000	250	-	-	-	0.94	-	-	-	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER
			X				INT-B																
			X				INT-B																
64-19-7	Acetic acid	419.4	X			X	INT-B																
74-86-2	Acetylene	375.2	X				B*	3,700	60.0	1.50E-02	-	-	-	-	-	-	-	-	1.59E-08	6.63E-08	-	N/A - Part of Analog Group	
			X				INT-C	2,400	500	-	1.34E-02	-	-	-	-	-	-	-	-	-	-	N/A - Part of Analog Group	
			X				INT-B																
1344-28-1	Aluminum oxide	420.6				X	B*	-	240	9.64E-03	2.98E-02	-	-	-	-	-	-	-	-	-	-	212-2.4(b)(1)	PM Grain Standard
7664-41-7	Ammonia	109,231					C	2,400	500	0.47	0.72	41.0	-	-	-	0.78	-	-	376.5	-	-	N/A - Part of Analog Group	
7784-42-1	Arsine	4.15		X	X		A	0.20	0.05	1.48E-04	-	-	-	-	-	-	-	-	-	-	-	212-1.5(e)(2)	MEL - 10 lb/yr
1303-86-2	Boron trioxide	1,134				X	B*	-	24.0	3.73E-02	1.76E-02	-	-	-	-	-	-	-	-	-	-	212-2.4(b)(1)	PM Grain Standard
7726-95-6	Bromine	26,103					B	130	1.60	1.86	-	-	-	-	-	-	-	-	-	-	-	212-2.3(b)	Dispersion Modeling
124-38-9	Carbon dioxide	69,261,376					D	-	21,000	153.9	18.0	-	2,088	-	-	113.2	-	-	-	819.9	-	212-1.4(a)	None
463-58-1	Carbonyl sulfide	14.4	X				B	250	28.0	0.05	-	-	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
7782-50-5	Chlorine	791.8		X			B	116	0.20	2.82	-	-	-	-	-	-	-	-	-	-	-	212-1.5(e)(2)	Comply w/ NESHAP
77-92-9	Citric acid	166.5	X				INT-B	2,100	20.0	5.94E-03	-	-	-	-	-	-	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER

Table 1-3: 6 NYCRR Part 212 Applicability and Compliance - Individual Contaminants

CAS#	Chemical Name	PTE from Process Operations	VOC	HAP	HTAC	PM	Env. Rating ^{1,2,3,4}	SGC	AGC	ERP (lb/hr)											Applicable Citation	Compliance Requirement	
		(lb/yr)						(ug/m³)	(ug/m³)	Fab Acid	Fab CVD	Fab Ammonia	Fab Solvent	Fab General	HPM Acid	HPM Solvent	WWT Acid	WWT Ammonia	WWT Solvent	Bio General			Indiv. Tank
			X				INT-B																
			X				INT-B																
108-94-1	Cyclohexanone	1,565	X				B	20,000	190	-	-	-	1.86	-	-	-	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER
			X				B																
120-92-3	Cyclopentanone	0.98	X				INT-B	4,000	30.0	-	-	-	1.17E-03	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
19287-45-7	Diborane	1.97					B*	-	0.26	-	-	7.01E-05	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
142-96-1	Dibutyl ether	630.8	X				INT-C	15,000	2,887	-	-	-	-	-	-	3.46	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER
109-89-7	Diethylamine	227.2	X				B*	4,500	36.0	-	-	8.10E-03	-	-	-	-	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER
			X				B																
75-10-5	Diffuoromethane	86.4	X				INT-C	-	50,600	0.31	-	-	-	-	-	-	-	-	-	-	-	N/A - Part of Analog Group	
124-40-3	Dimethylamine	78.5	X				B*	2,800	22.0	-	2.80E-03	-	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
			X				INT-B																
74-84-0	Ethane	186.9					N/A	N/A	N/A	-	6.67E-03	-	-	-	-	-	-	-	-	-	-	212-1.4(a)	None
107-21-1	Ethanediol	173.5	X	X			B*	1,000	400	-	-	6.19E-03	-	-	-	-	-	-	2.73E-08	1.42E-07	-	N/A - Part of Analog Group	
64-17-5	Ethanol	1,691	X				C	-	45,000	-	-	1.97E-02	-	-	-	8.13	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER
			X				B																
687-47-8	ethyl (S)-2-hydroxypropionate	215.7	X				INT-B	-	71.0	-	-	-	0.26	-	-	-	-	-	-	-	-	N/A - Part of Analog Group	
97-64-3	Ethyl lactate	190.9	X				INT-B	370	71.0	-	-	-	0.23	-	-	-	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER
7782-41-4	Fluorine	3,488					B	5.30	0.07	-	-	0.12	-	-	-	-	-	-	-	-	-	212-2.3(b)	Dispersion Modeling
593-53-3	Fluoromethane	65.5	X				INT-C	-	50,600	0.23	-	-	-	-	-	-	-	-	-	-	-	N/A - Part of Analog Group	
50-00-0	Formaldehyde	14.8	X	X	X		A	30.0	6.0E-02	-	5.27E-04	-	-	-	-	-	-	-	-	-	-	212-1.5(e)(2)	MEL - 100 lb/yr
96-48-0	Gamma-butyrolactone	82.6	X				B	-	3.60	-	-	-	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
1310-53-8	Germanium dioxide	34.1				X	INT-B	-	12.9	-	6.75E-03	-	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
			X			X	INT-C																
			X			X	INT-B																
110-43-0	Heptan-2-one	14.2	X				B*	-	550	-	-	-	1.69E-02	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
685-63-2	Hexafluorobutadiene	49.4	X				INT-A	7.50	0.10	0.09	-	-	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
76-16-4	Hexafluoroethane	796.2					INT-C*	-	16,799	1.42	-	-	-	-	-	-	-	-	-	-	-	N/A - Part of Analog Group	
999-97-3	Hexamethyldisilazane	1,318	X				INT-B	-	36.0	-	-	-	1.57	-	-	-	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER
10035-10-6	Hydrogen bromide	528.4					C	680	-	1.88	-	-	-	-	-	-	-	-	-	-	-	212-2.3(b)	Dispersion Modeling
7647-01-0	Hydrogen chloride	1,462		X			B	2,100	20.0	0.24	0.08	-	-	-	-	-	-	1.21	-	-	-	212-1.5(e)(2)	Comply w/ NESHAP
7664-39-3	Hydrogen fluoride	24,423		X			B	5.60	0.07	24.7	0.27	-	-	-	4.72E-03	-	1.50E-03	-	-	-	-	212-1.5(e)(2)	Comply w/ NESHAP
7722-84-1	Hydrogen peroxide	17,121					B*	-	3.30	0.61	-	-	-	-	-	0.08	-	8.45E-04	-	-	-	212-2.3(b)	Dispersion Modeling
			X			X	INT-B																
13966-94-4	Indium iodide	8.74E-03					INT-A	100	0.24	3.12E-07	-	-	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
67-63-0	Isopropanol	218,425	X				B	98,000	7,000	0.33	3.65E-02	0.06	166.0	0.84	-	-	-	-	5.11	2.70	-	212-1.5(f)	Comply w/ VOC LAER
						X	INT-B																
			X			X	INT-B																
			X			X	INT-B																
79-41-4	Methacrylic Acid	134.2	X				B*	-	170.0	-	-	-	0.16	-	-	-	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER
74-82-8	Methane	1,410,078					N/A	N/A	N/A	0.12	1.89E-03	-	-	-	-	-	-	-	-	199.3	-	212-1.4(a)	None
67-56-1	Methanol	575.9	X	X			B	33,000	4,000	-	1.46E-02	-	-	5.99E-03	-	-	-	-	4.21E-06	2.20E-06	-	212-1.5(f)	Comply w/ NESHAP
2110-78-3	Methyl 2-hydroxy-2-methylpropionate	37.0	X				INT-B	-	71.0	-	-	-	4.40E-02	-	-	-	-	-	-	-	-	N/A - Part of Analog Group	
1319-77-3	Mixed cresols	0.19	X	X			B	-	180	-	-	-	2.22E-04	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
			X				INT-B																
91-20-3	Naphthalene	191.3	X	X			B	7,900	3.00	-	-	-	0.10	-	-	0.78	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER
123-86-4	n-Butyl acetate	10,682	X				C	71,300	565	-	-	-	12.7	-	-	-	-	-	-	-	-	212-1.5(f)	Comply w/ VOC LAER
7697-37-2	Nitric acid	26,902					B	86.0	12.3	1.60	-	-	-	-	-	-	-	-	-	-	-	212-2.3(b)	Dispersion Modeling
7783-54-2	Nitrogen trifluoride	3,048					B*	6.60	0.08	1.52	3.27E-02	-	-	-	-	-	-	-	-	-	-	212-2.3(b)	Dispersion Modeling
10024-97-2	Nitrous oxide	327,782					B*	-	210	0.19	11.8	-	0.62	-	-	-	-	-	3.45E-02	-	-	212-2.3(b)	Demonstrate T-BACT
115-25-3	Octafluorocyclobutane	90.1				X	INT-C*	-	16,799	0.16	-	-	-	-	-	-	-	-	-	-	-	N/A - Part of Analog Group	
			X			X	B																
10028-15-6	Ozone	1,000					INT-A	N/A	N/A	3.21E-02	3.55E-03	-	-	-	-	-	-	-	-	-	-	N/A - See Section 3 of App	
7803-51-2	Phosphine	8.12		X			B	21.0	0.30	2.47E-04	4.24E-05	-	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
7664-38-2	Phosphoric acid	458.9				X	B	300	10.0	1.64E-02	-	-	-	-	-	-	1.58E-04	-	-	-	1.67E-03	212-2.4(b)(1)	PM Grain Standard
1314-56-3	Phosphorus pentoxide	2,028				X	INT-B	300	4.80	0.07	8.85E-03	-	-	-	-	-	-	-	-	-	-	212-2.4(b)(1)	PM Grain Standard
1310-58-3	Potassium hydroxide	111.9				X	B*	200	11.9	4.24E-04	-	-	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
74-98-6	Propane	2.32	X				N/A	N/A	N/A	-	8.26E-05	-	-	-	-	-	-	-	-	-	-	NOIA Cmt. #58	None
52125-53-8	Propanol, 1(or 2)-ethoxy-	111.7	X				INT-B	36,850	2,000	-	-	-	0.13	-	-	-	-	-	-	-	-	N/A - Part of Analog Group	
115-07-1	Propylene	70.2	X				B*	-	3,000	-	2.50E-03	-	-	-	-	-	-	-	-				

Table 1-3: 6 NYCRR Part 212 Applicability and Compliance - Individual Contaminants

CAS#	Chemical Name	PTE from Process Operations	VOC	HAP	HTAC	PM	Env. Rating ^{1,2,3,4}	SGC	AGC	ERP (lb/hr)											Applicable Citation	Compliance Requirement		
		(lb/yr)						(ug/m³)	(ug/m³)	Fab Acid	Fab CVD	Fab Ammonia	Fab Solvent	Fab General	HPM Acid	HPM Solvent	WWT Acid	WWT Ammonia	WWT Solvent	Bio General			Indiv. Tank	
1310-73-2	Sodium hydroxide	5.10					B*	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr
7681-52-9	Sodium hypochlorite	26.1					INT-B	116	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	212-1.5(g)	Actuals < 100 lb/yr

1. B* indicates that a compound is listed in DAR-1 with no toxicity rating assigned.
2. INT - (X) indicates an environmental rating was assigned by NYSEDEC for chemicals not listed in DAR-1.
3. INT - (X*) indicates an environmental rating assigned pending review by NYSEDEC for chemicals not listed in DAR-1.
4. Table 1-3 only includes chemicals with a non-zero PTE from process operations.
5. Table 1-3 does not address emissions of NO_x and CO. These pollutants are addressed individually in the regulatory analysis in Section 3 of the application.

Table 1-4: 6 NYCRR Part 212 Applicability and Compliance - Analog Groups

Analog CAS#	Analog Chemical Name and Group Title	Emission Chemical CAS#	Emission Chemical Name	Analog Group	VOC	HAP	HTAC	PM	Env. Rating ^{1,2,3}	SGC	AGC	ERP (lb/hr)											Applicable Part 212 Citation	Compliance Requirement		
				PTE (lb/yr)						(ug/m ³)	(ug/m ³)	Fab Acid	Fab CVD	Fab Ammonia	Fab Solvent	Fab General	HPM Acid	HPM Solvent	WWT Acid	WWT Ammonia	WWT Solvent	BIO General			Indiv. Tank	
107-98-2	1-Methoxy-2-propanol Group	107-98-2	1-Methoxy-2-propanol		X			X	INT-B			36,850	2,000													
					X			X	INT-B																	
					X				INT-B																	
		108-65-6	2-Methoxy-1-methylethyl acetate		X				B	36,850	2,000															
					X				INT-B																	
					X				B																	
64-19-7	Acetic Acid Group	52125-53-8	Propanol, 1(or 2)-ethoxy-		X				INT-B	36,850	2,000															
		64-19-7	Acetic acid		X				B*																	
7664-41-7	Ammonia Group	7664-41-7	Ammonia		X			X	INT-B			2,400	500													
		74-86-2	Acetylene		X				INT-C	2,400	500															
		687-47-8	Ethyl (S)-2-Hydroxypropionate		X			X	INT-C			-	71.0													
					X				INT-B																	
		2110-78-3	Methyl 2-Hydroxy-2-Methylpropionate		X				INT-B	-	71.0															
					X			X	INT-B																	
75-10-5	Difluoromethane Group	75-10-5	Difluoromethane	655.3	X				INT-C	-	50,600	1.44	-	-	-	-	-	-	-	-	-	-	-	212-2.3(b)	Dispersion Modeling	
		593-53-3	Fluoromethane		X				INT-C	-	50,600															
		75-46-7	Trifluoromethane		X				INT-C	-	50,600															
		107-21-1	Ethanediol		X	X			B*	1,000	400															
					X				INT-B			1,500	18.0													
					X				B																	
		929-06-6	2-(2-Aminoethoxy)ethanol		X				INT-B																	
					X				INT-C																	
					X			X	INT-B																	
					X																					
76-16-4	Hexafluoroethane Group	76-16-4	Hexafluoroethane	886.2					INT-C*	-	16,799	1.58	-	-	-	-	-	-	-	-	-	-	-	212-2.3(b)	Dispersion Modeling	
		115-25-3	Octafluorocyclobutane						INT-C*	-	16,799															
7664-93-9	Sulfuric Acid Group	7664-93-9	Sulfuric acid	6,719	X			X	INT-B	120	1.00	0.84	-	-	-	-	6.91E-06	-	1.27E-06	-	-	-	-	212-2.4(b)(1)	PM Grain Standard	
		3144-16-9	2-Oxobornane-10-Sulphonic Acid		X			X	INT-B	120	1.00															
7803-62-5	Silane Group				X				B			-	16.0													
		1590-87-0	Disilane						INT-B																	
121-44-8	Triethylamine Group	121-44-8	Triethylamine		X	X			B*	2,800	7.00															
					X				INT-B																	

1. B* indicates that a B rating has been assumed for chemicals listed on DAR-1, but not assigned a toxicity therein.
2. INT-(X) indicates an environmental rating was assigned by NYSEDEC for chemicals, but it is not yet listed in DAR-1.
3. INT - (X*) indicates an environmental rating assigned pending review by NYSEDEC for chemicals not listed in DAR-1.
4. [REDACTED] and 2-Oxoborane-10-Sulphonic acid are no longer planned to be used as part of the Proposed Air Permit Project. Their projected PTE from process operations is 0.0 lbs/yr.
5. The Silane Group PTE from process operations is 0 lbs/yr because these compounds are extremely reactive and are expected to react completely into byproducts before being emitted.

Table 1-5: 6 NYCRR Part 212 Compliance - Particulate Matter

Exhaust Type	Number of Operational Stacks	Exhaust Rate (ACFM)	PM PTE from Process Operations (lb/yr)	Applicable Part 212 Grain Standard (gr/dscf)	Potential Exhaust PM Concentration (gr/dscf)
Fab Acid	72	80,000	17,826	0.05	0.003
Fab CVD	24	26,500	21,331	0.05	0.011
Fab Ammonia	24	40,000	2,308	0.05	0.001
Fab Solvent	64	52,500	32,967	0.05	0.008
HPM Solvent	12	24,150	2,004	0.05	0.001
WWT Solvent	4	2,000	0.7	0.05	4.39E-06
BIO General	2	66,234	28.6	0.05	5.76E-06

1. PM emitted from the Fab Solvent exhaust will be created in and emitted from the RCTO burner, not the zeolite rotor exhaust. However, the combined exhaust rate from the RCTO burners and zeolite rotor is considered the total "exhaust gas" from the "process emission source" for purposes of compliance with 6 NYCRR 212-2.4(b)(1).
2. PM concentration estimates assume dry standard conditions in each stack

Table 1-6: NESHAP Subpart BBBBBB Compliance

Stack Type	Process Category	Pollutant	CAS	Organic or Inorganic HAP?	Molecular Weight	Number of Operational Stacks	Exhaust Rate	Annual Emissions per Stack Type	Annual Emissions per Stack	Applicable NESHAP Subpart BBBBBB Outlet Conc. Standard	Average Outlet Conc. per Stack
					(lb/lb-mol)		(scfm)	(lb/yr)	(lb/yr/stack)	(ppmv)	(ppmv)
Fab Acid	All	Hydrogen fluoride	7664-39-3	Inorganic	20.01	72	80,000	21.372	296.84	0.42	0.14
Fab Acid	All	Arsine	7784-42-1	Inorganic	77.95	72	80,000	4.1	0.06	0.42	6.77E-06
Fab Acid	All	Hydrogen chloride	7647-01-0	Inorganic	36.46	72	80,000	612	8.50	0.42	2.14E-03
Fab Acid	All	Carbonyl sulfide	463-58-1	Organic	60	72	80,000	14.42	0.20	0.42	3.05E-05
Fab Acid	All	Chlorine	7782-50-5	Inorganic	70.91	72	80,000	791.83	11.00	0.42	1.43E-03
Fab Acid	All	Phosphine	7803-51-2	Inorganic	33.998	72	80,000	7	0.10	0.42	0.00
Fab Acid	All	Triethylamine	121-44-8	Organic	101.19	72	80,000	10	0.14	0.42	0.00
Fab CVD	All	Methanol	67-56-1	Organic	32.04	24	26,500	408	17.00	0.42	0.01
Fab CVD	All	Hydrogen chloride	7647-01-0	Inorganic	36.46	24	26,500	846.04	35.25	0.42	2.67E-02
Fab CVD	All	Hydrogen fluoride	7664-39-3	Inorganic	20.01	24	26,500	3,051	127.12	0.42	1.76E-01
Fab CVD	All	Phosphine	7803-51-2	Inorganic	34	24	26,500	1	0.05	0.42	4.03E-05
Fab CVD	All	Formaldehyde	50-00-0	Organic	30.03	24	26,500	14.77	0.62	0.42	5.67E-04
Fab Ammonia	All	Ethanediol	107-21-1	Organic	62.07	24	40,000	173.54	7.23	0.42	2.14E-03
Fab Solvent	All	1,4-Dioxane	123-91-1	Organic	88.11	64	52,500	0	0.00	0.42	4.62E-07
Fab Solvent	All	Mixed cresols	1319-77-3	Organic	108.14	64	52,500	0	0.00	0.42	3.77E-07
Fab Solvent	All	Naphthalene	91-20-3	Organic	128.17	64	52,500	8.20E+01	1.28E+00	0.42	1.40E-04
Fab General	All	Methanol	67-56-1	Organic	32.04	70	55,000	1.68E+02	2.40E+00	0.42	9.97E-04
HPM Acid	HPM Storage Tanks	Hydrogen fluoride	7664-39-3	Inorganic	20.01	12	36,500	5.57E-02	4.64E-03	0.42	4.66E-06
HPM Ammonia	HPM Storage Tanks	Hydrogen fluoride	7664-39-3	Inorganic	20.01	12	18,000	Trace	Trace	0.42	Trace
HPM Solvent	HPM Storage Tanks	Hydrogen fluoride	7664-39-3	Inorganic	20.01	12	24,150	Trace	Trace	0.42	Trace
WWT Acid	WWT Storage Tanks	Hydrogen chloride	7647-01-0	Inorganic	36.46	6	15,000	4.00	6.67E-01	0.42	8.94E-04
WWT Ammonia	WWT Storage Tanks	Hydrogen chloride	7647-01-0	Inorganic	36.46	4	2,000	Trace	Trace	0.42	Trace
WWT Solvent	WWT Storage Tanks	Hydrogen chloride	7647-01-0	Inorganic	36.46	4	2,000	Trace	Trace	0.42	Trace
WWT Acid	WWT Storage Tanks	Hydrogen fluoride	7664-39-3	Inorganic	20.01	6	15,000	6.55E-02	1.09E-02	0.42	2.67E-05
WWT Ammonia	WWT Storage Tanks	Hydrogen fluoride	7664-39-3	Inorganic	20.01	4	2,000	Trace	Trace	0.42	Trace
WWT Solvent	WWT Storage Tanks	Hydrogen fluoride	7664-39-3	Inorganic	20.01	4	2,000	Trace	Trace	0.42	Trace

Conversions
1 year = 525600 minutes
1 lb-mole of gas (@ 20C) 385.3 Cubic feet

Micron - Clay, NY Fabs 1 & 2
Emission Reduction Credit Summary by Phase

Table 2-1: NOx ERC Summary

Source	Proposed Air Permit Project Potential Emissions (tpy)	ERC Multiplier	ERCs Required
Semiconductor Process Tools	138.9	1.15	159.8
Heat Transfer Fluids	--	1.15	0.00
IPA Cleaning	--	1.15	0.00
Wastewater Treatment	--	1.15	0.00
Tool-Level Thermal Oxidation Systems	44.0	1.15	50.6
RCTO Combustion	130.5	1.15	150.1
Water Bath Vaporizers	8.40	1.15	9.66
Boilers	6.56	1.15	7.55
Emergency Generators	21.8	1.15	25.0
Cooling Towers	--	1.15	0.00
Storage Tanks & Silos	--	1.15	0.00
Roadway	--	1.15	0.00
SF6 Leaks	--	1.15	0.00
Lab Operations	--	1.15	0.00
SOD Waste Processing	1.48	1.15	1.71
RCS Combustion	5.15	1.15	5.93
Fire Pump Engine	0.41	1.15	0.47
Total	357.2	--	411.0

Table 2-2: VOC ERC Summary

Source	Proposed Air Permit Project Potential Emissions (tpy)	ERC Multiplier	ERCs Required
Semiconductor Process Tools	131.3	1.15	150.9
Heat Transfer Fluids	1.74	1.15	2.01
IPA Cleaning	11.7	1.15	13.5
Wastewater Treatment	32.0	1.15	36.8
Tool-Level Thermal Oxidation Systems	8.11	1.15	9.33
RCTO Combustion	7.18	1.15	8.26
Water Bath Vaporizers	0.92	1.15	1.06
Boilers	1.00	1.15	1.15
Emergency Generators	6.17	1.15	7.10
Cooling Towers	--	1.15	0.00
Storage Tanks & Silos	0.80	1.15	0.92
Roadway	--	1.15	0.00
SF6 Leaks	--	1.15	0.00
Lab Operations	0.29	1.15	0.33
SOD Waste Processing	3.87	1.15	4.45
RCS Combustion	0.28	1.15	0.33
Fire Pump Engine	0.41	1.15	0.47
Total	205.7	--	237.0

Micron - Clay, NY Fabs 1 & 2**1-FABOP and 2-FABOP****Destruction and Removal Efficiency (DRE) and PEEC Management Values****Table 5-1: Process Equipment Exhaust Conditioner (PEEC) Management**

Category/Chemical Controlled ¹	Chemical Names(s)	CAS #	Fleet Average Fraction Managed	Source
Flammable	Includes pyrophorics	Multiple	0.99	Engineering Estimate
Reactive	Cl ₂ , etc	Multiple	0.99	Engineering Estimate
Acid Gas	HCl and HF	Multiple	0.99	Engineering Estimate
PM	SiO ₂ , metal oxides, etc	Multiple	0.00	Engineering Estimate
F ₂	Fluorine	7782-41-4	0.995	Engineering Estimate
NH ₃	Ammonia	7664-41-7	0.95	Engineering Estimate
CF ₄	Tetrafluoromethane	75-73-0	0.89	IPCC Table 6.17
N ₂ O	Nitrous Oxide-Other	10024-97-2	0.60	IPCC Table 6.17
N ₂ O	Nitrous Oxide-CVD	10024-97-2	0.60	IPCC Table 6.17
NF ₃	Nitrogen Trifluoride-In Situ	7783-54-2	0.95	IPCC Table 6.17
NF ₃	Nitrogen Trifluoride-Remote	7783-54-2	0.95	IPCC Table 6.17

1. CF₄ generated in a PEEC as a result of management of F₂ is not itself managed in the PEEC

Table 5-2: Point-of-Use Control Device DRE Values

Category/Chemical Controlled	Chemical Names(s)	CAS #	Fleet Average DRE Value	Source
Flammable	Includes pyrophorics	Multiple	0.99	Engineering Estimate
Br ₂	Bromine	7726-95-6	0.50	Engineering Estimate
Acid Gas	HCl, HF, and HBr	Multiple	0.99	Engineering Estimate
PM	SiO ₂ , metal oxides, etc	Multiple	0.00	Engineering Estimate
CO ₂ , NO ₂ , SO ₂	Carbon Dioxide, Nitrogen Dioxide, Sulfur Dioxide	Multiple	0.00	Engineering Estimate
CH ₂ F ₂	Difluoromethane	75-10-5	0.99	IPCC Table 6.17
CH ₃ F	Fluoromethane	593-53-3	0.99	IPCC Table 6.17
CF ₄	Tetrafluoromethane	75-73-0	0.89	IPCC Table 6.17
C ₂ F ₆	Hexafluoroethane	76-16-4	0.98	IPCC Table 6.17
CHF ₃	Trifluoromethane	75-46-7	0.98	IPCC Table 6.17
C ₄ F ₈	Octafluorocyclobutane	115-25-3	0.98	IPCC Table 6.17
C ₄ F ₆	Hexafluorobutadiene	685-63-2	0.98	IPCC Table 6.17
NF ₃	Nitrogen Trifluoride-Etch	7783-54-2	0.95	IPCC Table 6.17
SF ₆	Sulfur Hexafluoride	2551-62-4	0.96	IPCC Table 6.17

Table 5-3: Centralized Control Equipment DRE Values

Exhaust Type(s) Controlled	Chemical Names(s)	CAS #	Fleet Average DRE Value	Source
Acid & CVD	Hydrogen Fluoride	7664-39-3	0.60	Projected Performance from Preferred Vendor
Acid & CVD	Hydrogen Chloride	7647-01-0	0.60	Projected Performance from Preferred Vendor
Acid & CVD	Sulfuric Acid	7664-93-9	0.75	Projected Performance from Preferred Vendor
Acid & CVD	Nitric Acid	7697-37-2	0.40	Projected Performance from Preferred Vendor
Acid & CVD	Organic Acids	Multiple	0.00	Engineering Estimate
CVD	Particulate - CVD	Multiple	0.82	Projected Performance from Preferred Vendor
CVD	NO ₂	0NY210-00-0	0.90	Projected Performance from Preferred Vendor
Ammonia	Ammonia	7664-41-7	0.98	Info. from Potential Supplier
Solvent	Solvent	Multiple	0.97	VOC LAER limit at projected inlet concentration

Table 5-4: Regenerative Catalytic System DRE Values

Category/Chemical Controlled	Chemical Names(s)	Primary CAS #	Fleet Average DRE Value	Source
C ₄ F ₈	Octafluorocyclobutane	115-25-3	0.98	Info. from Potential Supplier
C ₄ F ₆	Hexafluorobutadiene	685-63-2	0.98	Info. from Potential Supplier
CH ₂ F ₂	Difluoromethane	75-10-5	0.99	Info. from Potential Supplier
CH ₃ F	Fluoromethane	593-53-3	0.99	Info. from Potential Supplier
CHF ₃	Trifluoromethane	75-46-7	0.98	Info. from Potential Supplier
CF ₄	Tetrafluoromethane	75-73-0	0.89	Info. from Potential Supplier
NF ₃	Nitrogen Trifluoride-All	7783-54-2	0.95	Info. from Potential Supplier
SF ₆	Sulfur Hexafluoride	2551-62-4	0.96	Info. from Potential Supplier
C ₂ F ₆	Hexafluoroethane	76-16-4	0.98	Info. from Potential Supplier
C ₃ F ₈	Octafluoropropane	76-19-7	0.89	Assumed to be the same as CF ₄
C ₅ F ₈	Octafluorocyclopentene	559-40-0	0.98	IPCC Table 6.17
N ₂ O	Nitrous Oxide-All	10024-97-2	0.60	IPCC Table 6.17
CO ₂	Carbon Dioxide	124-38-9	0.00	
CH ₄	Methane	74-82-8	0.89	Assumed to be the same as CF ₄

Micron - Clay, NY Fabs 1 & 2
1-FABOP and 2-FABOP
Process Chemical Emissions Calculations

Table 6-1: Process Chemical Emissions Calculations

Chemical Use Case ID #	Primary Chemical				SHOW?	Process Category	% of Total Usage	Projected Usage in Process Category (lb/yr)	Emission Chemical			Emission Chem Formation Depends on Primary Chem EF?	Process Emission Factor (lb emitted / lb used)	Emission Chemical Classifications										Exhaust Type	PEEC Fraction Managed	Process Emission Quantification				
	CAS #	Chemical Name	Common Acronym/Alternate Name	Molecular Formula					CAS #	Emission Chemical	Molecular Formula			VOC	PM	NO _x	CO	SO ₂	HAP	GHG	HTAC	Fluorides	Pre-Control Process Emissions (lb/yr)			POU or RCS DRE	Post POU Emissions (lb/yr)	Centralized Control DRE	Post-Control Emissions (lb/yr)	
1					Y	Thin Films / Diffusion Deposition	100%																Fab CVD	0.00		N/A		0.00		
1					Y	Thin Films / Diffusion Deposition	100%		124-38-9	Carbon dioxide	CO2												Fab CVD	0.00		N/A		0.00		
1					Y	Thin Films / Diffusion Deposition	100%																Fab CVD	0.99		N/A		0.00		
1					Y	Thin Films / Diffusion Deposition	100%		124-40-3	Dimethylamine	C2H7N												Fab CVD	0.99		N/A		0.00		
1					Y	Thin Films / Diffusion Deposition	100%																Fab CVD	0.00		N/A		0.82		
1					Y	Thin Films / Diffusion Deposition	100%		67-56-1	Methanol	CH3OH												Fab CVD	0.99		N/A		0.00		
1					Y	Thin Films / Diffusion Deposition	100%		10102-44-0	Nitrogen dioxide	NO2												Fab CVD	0.00		N/A		0.90		
1	20654-88-0	[118]boron trifluoride		¹¹ BF ₃	Y	Ion Implant	100%	158.4	20654-88-0	[118]boron trifluoride	11BF3		0.00								X		Fab Acid	0.00	0.00	N/A	N/A	0.00	0.00	
1	20654-88-0	[118]boron trifluoride		¹¹ BF ₃	Y	Ion Implant	100%	158.4	1303-86-2	Boron trioxide	B2O3		0.13		X								Fab Acid	0.00	20.3	N/A	N/A	0.00	20.3	
1	20654-88-0	[118]boron trifluoride		¹¹ BF ₃	Y	Ion Implant	100%	158.4	7664-39-3	Hydrogen fluoride	HF		0.89										Fab Acid	0.00	140.2	N/A	N/A	0.60	56.1	
1					Y	Thin Films / Diffusion Deposition	100%							X									Fab CVD	0.00		N/A		0.00		
1					Y	Thin Films / Diffusion Deposition	100%		124-38-9	Carbon dioxide	CO2												Fab CVD	0.00		N/A		0.00		
1					Y	Thin Films / Diffusion Deposition	100%		67-56-1	Methanol	CH3OH				X								Fab CVD	0.99		N/A		0.00		
1					Y	Thin Films / Diffusion Deposition	100%		7631-86-9	Silicon dioxide	SiO2												Fab CVD	0.00		N/A		0.82		
1					Y	Thin Films / Diffusion Deposition	100%		288-88-0	1,2,4-Triazole	C2H3N3		0.05	X									Fab Ammonia	0.00		N/A		0.00		
1					Y	Photolithography	100%	27,331	95-63-6	TMB (1,2,4-TMB and 1,3,5-TMB)	C9H12		0.20	X									Fab Solvent	0.00	5,466	N/A	N/A	0.97	164.0	
1					Y	Photolithography	100%	27,331	124-38-9	Carbon dioxide	CO2	X	3.30							X			Fab Solvent	0.00	18,014	N/A	N/A	0.00	18,014	
1					Y	Photolithography	100%		2634-33-5	1,2-Benzisothiazol-3(2H)-one	C7H5NOS			X	X								Fab Solvent	0.00		N/A		0.97		
1					Y	Photolithography	100%		124-38-9	Carbon dioxide	CO2	X								X			Fab Solvent	0.00		N/A		0.00		
1					Y	Photolithography	100%		10102-44-0	Nitrogen dioxide	NO2	X											Fab Solvent	0.00		N/A		0.00		
1					Y	Photolithography	100%		7446-09-5	Sulfur dioxide	SO2	X											Fab Solvent	0.00		N/A		0.00		
1	1436-34-6	1,2-Epoxyhexane		C ₆ H ₁₂ O	Y	Photolithography	100%	19.7	1436-34-6	1,2-Epoxyhexane	C6H12O		0.20	X									Fab Solvent	0.00	3.93	N/A	N/A	0.97	0.12	
1	1436-34-6	1,2-Epoxyhexane		C ₆ H ₁₂ O	Y	Photolithography	100%	19.7	124-38-9	Carbon dioxide	CO2	X	2.64								X		Fab Solvent	0.00	10.4	N/A	N/A	0.00	10.4	
1					Y	Wet Etch / Wet Clean	100%							X									Fab Acid	0.00		N/A		0.00		
1	123-91-1	1,4-Dioxane		C ₄ H ₈ O ₂	Y	Photolithography	100%	31.1	123-91-1	1,4-Dioxane	C4H8O2		0.20	X							X		Fab Solvent	0.00	6.23	N/A	N/A	0.97	0.19	
1	123-91-1	1,4-Dioxane		C ₄ H ₈ O ₂	Y	Photolithography	100%	31.1	124-38-9	Carbon dioxide	CO2	X	2.00								X		Fab Solvent	0.00	12.4	N/A	N/A	0.00	12.4	
1					Y	CMP	100%																Fab Ammonia	0.00		N/A		0.00		
1	1569-02-4	1-Ethoxypropan-2-ol		C ₅ H ₁₂ O ₂	Y	Photolithography	100%	0.00	1569-02-4	1-Ethoxypropan-2-ol	C5H12O2		0.20	X									Fab Solvent	0.00	0.00	N/A	N/A	0.97	0.00	
1	1569-02-4	1-Ethoxypropan-2-ol		C ₅ H ₁₂ O ₂	Y	Photolithography	100%	0.00	124-38-9	Carbon dioxide	CO2	X	2.11								X		Fab Solvent	0.00	0.00	N/A	N/A	0.00	0.00	
1					Y	CMP	100%							X	X								Fab Ammonia	0.00		N/A		0.00		
1	107-98-2	1-Methoxy-2-propanol	PGME	C ₄ H ₁₀ O ₂	Y	Photolithography	100%	35,817	107-98-2	1-Methoxy-2-propanol	C4H10O2		0.20	X									Fab Solvent	0.00	7,163	N/A	N/A	0.97	214.9	
1	107-98-2	1-Methoxy-2-propanol	PGME	C ₄ H ₁₀ O ₂	Y	Photolithography	100%	35,817	124-38-9	Carbon dioxide	CO2	X	1.95								X		Fab Solvent	0.00	13,993	N/A	N/A	0.00	13,993	
1	872-50-4	1-Methyl-2-pyrrolidone	NMP	C ₄ H ₇ NO	Y	Wet Etch / Wet Clean	100%	2,213,132	872-50-4	1-Methyl-2-pyrrolidone	CSH9NO		0.05	X									Fab Solvent	0.00	110,657	N/A	N/A	0.97	3,320	
1	872-50-4	1-Methyl-2-pyrrolidone	NMP	C ₄ H ₇ NO	Y	Wet Etch / Wet Clean	100%	2,213,132	124-38-9	Carbon dioxide	CO2	X	2.22								X		Fab Solvent	0.00	245,630	N/A	N/A	0.00	245,630	
1	872-50-4	1-Methyl-2-pyrrolidone	NMP	C ₄ H ₇ NO	Y	Wet Etch / Wet Clean	100%	2,213,132	10102-44-0	Nitrogen dioxide	NO2	X	0.46				X						Fab Solvent	0.00	51,353	N/A	N/A	0.00	51,353	
1	929-06-6	2-(2-aminoethoxy)ethanol		C ₄ H ₁₁ NO ₂	Y	Photolithography	100%	10,845	929-06-6	2-(2-aminoethoxy)ethanol	C4H11NO2		0.20	X									Fab Solvent	0.00	2,169	N/A	N/A	0.97	65.1	
1	929-06-6	2-(2-aminoethoxy)ethanol		C ₄ H ₁₁ NO ₂	Y	Photolithography	100%	10,845	124-38-9	Carbon dioxide	CO2	X	1.67								X		Fab Solvent	0.00	3,632	N/A	N/A	0.00	3,632	
1	929-06-6	2-(2-aminoethoxy)ethanol		C ₄ H ₁₁ NO ₂	Y	Photolithography	100%	10,845	10102-44-0	Nitrogen dioxide	NO2	X	0.44				X						Fab Solvent	0.00	949.1	N/A	N/A	0.00	949.1	
1					Y	Photolithography	100%							X									Fab Solvent	0.00		N/A		0.97		
1					Y	Photolithography	100%		124-38-9	Carbon dioxide	CO2	X									X		Fab Solvent	0.00		N/A		0.00		
1					Y	Photolithography	100%		10102-44-0	Nitrogen dioxide	NO2	X											Fab Solvent	0.00		N/A		0.00		
1					Y	CMP	100%							X									Fab Ammonia	0.00		N/A		0.00		
1					Y	Photolithography	100%							X									Fab Solvent	0.00		N/A		0.97		
1					Y	Photolithography	100%		124-38-9	Carbon dioxide	CO2	X											Fab Solvent	0.00		N/A		0.00		
1					Y	Photolithography	100%							X									Fab Solvent	0.99		N/A		0.97		
1					Y	Photolithography	100%		124-38-9	Carbon dioxide	CO2	X											Fab Solvent	0.00		N/A		0.00		
1					Y	Photolithography	100%		10102-44-0	Nitrogen dioxide	NO2	X											Fab Solvent	0.00		N/A		0.00		
1					Y	Photolithography	100%							X	X								Fab Solvent	0.00		N/A		0.97		
1					Y	Photolithography	100%		124-38-9	Carbon dioxide	CO2	X											Fab Solvent	0.00		N/A		0.00		
1	108-65-6	2-Methoxy-1-methylethyl acetate	PGMEA	C ₆ H ₁₂ O ₂	Y	Photolithography	37%	5,352,987	108-65-6	2-Methoxy-1-methylethyl acetate	C6H12O																			

Table 6-1: Process Chemical Emissions Calculations

Chemical Use Case ID #	Primary Chemical				SHOW?	Process Category	% of Total Usage	Projected Usage in Process Category (lb/yr)	Emission Chemical			Emission Chem Formation Depends on Primary Chem EF?	Process Emission Factor (lb emitted / lb used)	Emission Chemical Classifications								Exhaust Type	PEEC Fraction Managed	Process Emission Quantification					
	CAS #	Chemical Name	Common Acronym/Alternate Name	Molecular Formula					CAS #	Emission Chemical	Molecular Formula			VOC	PM	NO _x	CO	SO ₂	HAP	GHG	HTAC			Fluorides	Pre-Control Process Emissions (lb/yr)	POU or RCS DRE	Post POU Emissions (lb/yr)	Centralized Control DRE	Post-Control Emissions (lb/yr)
1					Y	Photolithography	100%																Fab Solvent	0.00		N/A		0.97	
1					Y	Photolithography	100%		124-38-9	Carbon dioxide	CO2	X											Fab Solvent	0.00		N/A		0.00	
1					Y	Photolithography	100%		10102-44-0	Nitrogen dioxide	NO2	X											Fab Solvent	0.00		N/A		0.00	
1					Y	CMP	100%							X									Fab Ammonia	0.00		N/A		0.00	
1					Y	CMP	100%							X	X								Fab Ammonia	0.00		N/A		0.00	
1	64-19-7	Acetic acid		CH ₃ CO ₂	Y	Wet Etch / Wet Clean	100%	8,389	64-19-7	Acetic acid	CH4CO2		0.05	X									Fab Acid	0.00	419.4	N/A	N/A	0.00	419.4
1	74-86-2	Acetylene		C ₂ H ₂	Y	Thin Films / Diffusion Deposition	100%	37,524	74-86-2	Acetylene	C2H2		1.00	X									Fab CVD	0.99	375.2	N/A	N/A	0.00	375.2
1	74-86-2	Acetylene		C ₂ H ₂	Y	Thin Films / Diffusion Deposition	100%	37,524	124-38-9	Carbon dioxide	CO2	X	3.38										Fab CVD	0.00	126,839	N/A	N/A	0.00	126,839
1					Y	Photolithography	100%																Fab Solvent	0.00		N/A		0.97	
1					Y	Photolithography	100%		124-38-9	Carbon dioxide	CO2	X											Fab Solvent	0.00		N/A		0.00	
1	7664-41-7	Ammonia		NH ₃	Y	Thin Films / Diffusion Deposition	16%	446,468	7664-41-7	Ammonia	NH3		0.90										Fab CVD	0.95	20,091	N/A	N/A	0.00	20,091
1	7664-41-7	Ammonia		NH ₃	Y	Thin Films / Diffusion Deposition	16%	446,468	10102-44-0	Nitrogen dioxide	NO2		1.08			X							Fab CVD	0.00	482,414	N/A	N/A	0.90	48,241
3	7664-41-7	Ammonia		NH ₃	Y	CMP	10%	272,102	7664-41-7	Ammonia	NH3		0.50										Fab Ammonia	0.00	136,051	N/A	N/A	0.98	2,721
4	7664-41-7	Ammonia		NH ₃	Y	Wet Etch / Wet Clean	74%	2,026,052	7664-41-7	Ammonia	NH3		0.50										Fab Ammonia	0.00	1,013,026	N/A	N/A	0.98	20,261
1	1341-49-7	Ammonium bifluoride		F ₂ H ₉ N	Y	Wet Etch / Wet Clean	100%	588,349	1341-49-7	Ammonium bifluoride	F2HSN		0.00		X							X	Fab Acid	0.00	0.00	N/A	N/A	0.00	0.00
1	1341-49-7	Ammonium bifluoride		F ₂ H ₉ N	Y	Wet Etch / Wet Clean	100%	588,349	7664-41-7	Ammonia	NH3		0.01										Fab Acid	0.00	5,883	N/A	N/A	0.00	5,883
1	1341-49-7	Ammonium bifluoride		F ₂ H ₉ N	Y	Wet Etch / Wet Clean	100%	588,349	7664-39-3	Hydrogen fluoride	HF		0.02										Fab Acid	0.00	11,767	N/A	N/A	0.60	4,707
1	12125-01-8	Ammonium fluoride		NH ₄ F	Y	Wet Etch / Wet Clean	100%	724,074	12125-01-8	Ammonium fluoride	NH4F		0.00		X								Fab Acid	0.00	0.00	N/A	N/A	0.00	0.00
1	12125-01-8	Ammonium fluoride		NH ₄ F	Y	Wet Etch / Wet Clean	100%	724,074	7664-41-7	Ammonia	NH3		0.01										Fab Acid	0.00	7,241	N/A	N/A	0.00	7,241
1	12125-01-8	Ammonium fluoride		NH ₄ F	Y	Wet Etch / Wet Clean	100%	724,074	7664-39-3	Hydrogen fluoride	HF		0.01					X					Fab Acid	0.00	7,241	N/A	N/A	0.60	2,896
1	100-66-3	Anisole		C ₇ H ₈ O	Y	Photolithography	100%	0.00	100-66-3	Anisole	C7H8O		0.20		X								Fab Solvent	0.00	0.00	N/A	N/A	0.97	0.00
1	100-66-3	Anisole		C ₇ H ₈ O	Y	Photolithography	100%	0.00	124-38-9	Carbon dioxide	CO2	X	2.85										Fab Solvent	0.00	0.00	N/A	N/A	0.00	0.00
1	7784-42-1	Arsine		AsH ₃	Y	Ion Implant	100%	82.9	7784-42-1	Arsine	AsH3		0.05						X				Fab Acid	0.00	4.15	N/A	N/A	0.00	4.15
1					Y	Thin Films / Diffusion Deposition	100%																Fab CVD	0.00		N/A		0.00	
1					Y	Thin Films / Diffusion Deposition	100%		7664-41-7	Ammonia	NH3												Fab CVD	0.99		N/A		0.00	
1					Y	Thin Films / Diffusion Deposition	100%		124-38-9	Carbon dioxide	CO2												Fab CVD	0.00		N/A		0.00	
1					Y	Thin Films / Diffusion Deposition	100%		124-40-3	Dimethylamine	C2H7N			X									Fab CVD	0.99		N/A		0.00	
1					Y	Thin Films / Diffusion Deposition	100%		74-82-8	Methane	CH4												Fab CVD	0.99		N/A		0.00	
1					Y	Thin Films / Diffusion Deposition	100%		10102-44-0	Nitrogen dioxide	NO2												Fab CVD	0.00		N/A		0.90	
1					Y	Thin Films / Diffusion Deposition	100%		7631-86-9	Silicon dioxide	SiO2												Fab CVD	0.00		N/A		0.82	
1					Y	CMP	100%																Fab Ammonia	0.00		N/A		0.00	
1	10294-34-5	Boron trichloride		BCl ₃	Y	Plasma Etch	100%	68,999	10294-34-5	Boron trichloride	BCl3		0.00										Fab Acid	0.00	0.00	0.95	0.00	0.00	0.00
1	10294-34-5	Boron trichloride		BCl ₃	Y	Plasma Etch	100%	68,999	1344-28-1	Aluminum oxide	Al2O3		3.92E-03		X								Fab Acid	0.00	270.1	0	270.1	0.00	270.1
1	10294-34-5	Boron trichloride		BCl ₃	Y	Plasma Etch	100%	68,999	1303-86-2	Boron trioxide	B2O3		0.01		X								Fab Acid	0.00	1,025	0	1,025	0.00	1,025
1	10294-34-5	Boron trichloride		BCl ₃	Y	Plasma Etch	100%	68,999	7647-01-0	Hydrogen chloride	HCl		0.05						X				Fab Acid	0.00	3,222	0.99	32.2	0.60	12.9
1	10294-34-5	Boron trichloride		BCl ₃	Y	Plasma Etch	100%	68,999	13463-67-7	Titanium dioxide	TiO2		5.10E-04		X								Fab Acid	0.00	35.2	0	35.2	0.00	35.2
1	124-38-9	Carbon dioxide		CO ₂	Y	Wet Etch / Wet Clean	100%	4,047,301	124-38-9	Carbon dioxide	CO2		1.00										Fab Acid	0.00	4,047,301	N/A	N/A	0.00	4,047,301
1	630-08-0	Carbon monoxide		CO	Y	Plasma Etch	100%	36,835	630-08-0	Carbon monoxide	CO		1.00										Fab Acid	0.00	36,835	0.99	368.3	0.00	368.3
1	463-58-1	Carbonyl sulfide		COS	Y	Plasma Etch	100%	1,442	463-58-1	Carbonyl sulfide	COS		1.00						X				Fab Acid	0.00	1,442	0.99	14.4	0.00	14.4
1	463-58-1	Carbonyl sulfide		COS	Y	Plasma Etch	100%	1,442	124-38-9	Carbon dioxide	CO2	X	0.73										Fab Acid	0.00	1,057	0	1,057	0.00	1,057
1	463-58-1	Carbonyl sulfide		COS	Y	Plasma Etch	100%	1,442	7446-09-5	Sulfur dioxide	SO2	X	1.07						X				Fab Acid	0.00	1,538	0	1,538	0.00	1,538
1	7782-50-5	Chlorine		Cl ₂	Y	Plasma Etch	100%	79,183	7782-50-5	Chlorine	Cl2		1.00						X				Fab Acid	0.00	79,183	0.99	791.8	0.00	791.8
1	7790-91-2	Chlorine trifluoride		ClF ₃	Y	Thin Films / Diffusion Deposition	100%	6,845	7790-91-2	Chlorine trifluoride	ClF3		0.00									X	Fab CVD	0.00	0.00	N/A	N/A	0.00	0.00
1	7790-91-2	Chlorine trifluoride		ClF ₃	Y	Thin Films / Diffusion Deposition	100%	6,845	7647-01-0	Hydrogen chloride	HCl		0.39										Fab CVD	0.99	27.0	N/A	N/A	0.60	10.8
1	7790-91-2	Chlorine trifluoride		ClF ₃	Y	Thin Films / Diffusion Deposition	100%	6,845	7664-39-3	Hydrogen fluoride	HF		0.65										Fab CVD	0.99	44.4	N/A	N/A	0.60	17.8
1	77-92-9	Citric acid		C ₆ H ₈ O ₇	Y	Wet Etch / Wet Clean	100%	3,3,																					

Table 6-1: Process Chemical Emissions Calculations

Chemical Use Case ID #	Primary Chemical				SHOW?	Process Category	% of Total Usage	Projected Usage in Process Category (lb/yr)	Emission Chemical			Emission Chem Formation Depends on Primary Chem EF?	Process Emission Factor (lb emitted / lb used)	Emission Chemical Classifications										Exhaust Type	PEEC Fraction Managed	Process Emission Quantification				
	CAS #	Chemical Name	Common Acronym/Alternate Name	Molecular Formula					CAS #	Emission Chemical	Molecular Formula			VOC	PM	NO _x	CO	SO ₂	HAP	GHG	HTAC	Fluorides	Pre-Control Process Emissions (lb/yr)			POU or RCS DRE	Post POU Emissions (lb/yr)	Centralized Control DRE	Post-Control Emissions (lb/yr)	
1					Y	Photolithography	100%	10102-44-0		Nitrogen dioxide	NO2	X					X					Fab Solvent	0.00			N/A		0.00		
1	687-47-8	ethyl (S)-2-hydroxypropionate		C ₅ H ₁₀ O ₃	Y	Photolithography	100%	35,947	687-47-8	ethyl (S)-2-hydroxypropionate	CSH10O3		0.20	X								Fab Solvent	0.00	7,189	N/A	N/A	N/A	0.97	215.7	
1	687-47-8	ethyl (S)-2-hydroxypropionate		C ₅ H ₁₀ O ₃	Y	Photolithography	100%	35,947	124-38-9	Carbon dioxide	CO2	X	1.86									Fab Solvent	0.00	13,392	N/A	N/A	N/A	0.00	13,392	
1	97-64-3	Ethyl lactate		C ₅ H ₁₀ O ₃	Y	Photolithography	100%	31,809	97-64-3	Ethyl lactate	CSH10O3		0.20	X								Fab Solvent	0.00	6,362	N/A	N/A	N/A	0.97	190.9	
1	97-64-3	Ethyl lactate		C ₅ H ₁₀ O ₃	Y	Photolithography	100%	31,809	124-38-9	Carbon dioxide	CO2	X	1.86									Fab Solvent	0.00	11,851	N/A	N/A	N/A	0.00	11,851	
1	74-85-1	Ethylene		C ₂ H ₄	Y	Thin Films / Diffusion Deposition	100%	0.00	74-85-1	Ethylene	C2H4		1.00	X								Fab CVD	0.99	0.00	N/A	N/A	N/A	0.00	0.00	
1	74-85-1	Ethylene		C ₂ H ₄	Y	Thin Films / Diffusion Deposition	100%	0.00	124-38-9	Carbon dioxide	CO2	X	3.14									Fab CVD	0.00	0.00	N/A	N/A	N/A	0.00	0.00	
1	7782-41-4	Fluorine		F ₂	Y	Thin Films / Diffusion Deposition	100%	1,795	7782-41-4	Fluorine	F2		1.00									Fab CVD	0.995	8.97	N/A	N/A	N/A	0.00	8.97	
1	7782-41-4	Fluorine		F ₂	Y	Thin Films / Diffusion Deposition	100%	1,795	7664-39-3	Hydrogen fluoride	HF		1.05									Fab CVD	0.99	18.8	N/A	N/A	N/A	0.60	7.54	
1	7782-41-4	Fluorine		F ₂	Y	Thin Films / Diffusion Deposition	100%	1,795	75-73-0	Tetrafluoromethane	CF4		0.12									Fab CVD	0.00	208.2	N/A	N/A	N/A	0.00	208.2	
1	593-53-3	Fluoromethane		CH ₃ F	Y	Plasma Etch	100%	3,201	593-53-3	Fluoromethane	CHF3		0.32	X								Fab Acid	0.00	1,024	0.99	10.2	0.00	10.2		
1	593-53-3	Fluoromethane		CH ₃ F	Y	Plasma Etch	100%	3,201	124-38-9	Carbon dioxide	CO2		1.29									Fab Acid	0.00	4,140	0	4,140	0.00	4,140		
1	593-53-3	Fluoromethane		CH ₃ F	Y	Plasma Etch	100%	3,201	75-10-5	Difluoromethane	CH2F2		2.30E-03	X								Fab Acid	0.00	7.36	0.99	0.07	0.00	0.07		
1	593-53-3	Fluoromethane		CH ₃ F	Y	Plasma Etch	100%	3,201	685-63-2	Hexafluorobutadiene	C4F6		1.20E-03	X								Fab Acid	0.00	3.84	0.98	0.08	0.00	0.08		
1	593-53-3	Fluoromethane		CH ₃ F	Y	Plasma Etch	100%	3,201	76-16-4	Hexafluoroethane	C2F6		0.01									Fab Acid	0.00	35.2	0.98	0.70	0.00	0.70		
1	593-53-3	Fluoromethane		CH ₃ F	Y	Plasma Etch	100%	3,201	7664-39-3	Hydrogen fluoride	HF		0.59									Fab Acid	0.00	1,882	0.99	18.8	0.60	7.53		
1	593-53-3	Fluoromethane		CH ₃ F	Y	Plasma Etch	100%	3,201	75-73-0	Tetrafluoromethane	CF4		0.03									Fab Acid	0.00	99.2	0.89	10.9	0.00	10.9		
1	593-53-3	Fluoromethane		CH ₃ F	Y	Plasma Etch	100%	3,201	75-46-7	Trifluoromethane	CHF3		1.60E-03									Fab Acid	0.00	5.12	0.98	0.10	0.00	0.10		
1	593-53-3	Fluoromethane		CH ₃ F	Y	Plasma Etch	100%	3,201	115-25-3	Octafluorocyclobutane	C4F8		0.01									Fab Acid	0.00	22.4	0.98	0.45	0.00	0.45		
1	96-48-0	Gamma-butyrolactone		C ₄ H ₆ O ₂	Y	Photolithography	100%	13,766	96-48-0	Gamma-butyrolactone	CH4O2		0.20	X								Fab Solvent	0.00	2,753	N/A	N/A	N/A	0.97	82.6	
1	96-48-0	Gamma-butyrolactone		C ₄ H ₆ O ₂	Y	Photolithography	100%	13,766	124-38-9	Carbon dioxide	CO2	X	2.04									Fab Solvent	0.00	5,630	N/A	N/A	N/A	0.00	5,630	
1	62566-74-9	Germanium tetrafluoride		GeF ₄	Y	Thin Films / Diffusion Deposition	100%	81.5	62566-74-9	Germanium tetrafluoride	GeF4		0.00									Fab CVD	0.00	0.00	N/A	N/A	N/A	0.00	0.00	
1	62566-74-9	Germanium tetrafluoride		GeF ₄	Y	Thin Films / Diffusion Deposition	100%	81.5	1310-53-8	Germanium dioxide	GeO2		0.70		X							Fab CVD	0.00	57.4	N/A	N/A	N/A	0.82	10.3	
1	62566-74-9	Germanium tetrafluoride		GeF ₄	Y	Thin Films / Diffusion Deposition	100%	81.5	7664-39-3	Hydrogen fluoride	HF		0.54									Fab CVD	0.99	0.44	N/A	N/A	N/A	0.60	0.18	
1	7782-65-2	Germanium tetrahydride	Germane	GeH ₄	Y	Thin Films / Diffusion Deposition	100%	96.6	7782-65-2	Germanium tetrahydride	GeH4		0.00									Fab CVD	0.00	0.00	N/A	N/A	N/A	0.00	0.00	
1	7782-65-2	Germanium tetrahydride	Germane	GeH ₄	Y	Thin Films / Diffusion Deposition	100%	96.6	1310-53-8	Germanium dioxide	GeO2		1.36		X							Fab CVD	0.00	131.8	N/A	N/A	N/A	0.82	23.7	
1					Y	Wet Etch / Wet Clean	100%							X								Fab Acid	0.00			N/A		0.00		
1	110-43-0	Heptan-2-one		C ₇ H ₁₄ O	Y	Photolithography	100%	2,366	110-43-0	Heptan-2-one	C7H14O		0.20	X								Fab Solvent	0.00	473.1	N/A	N/A	N/A	0.97	14.2	
1	110-43-0	Heptan-2-one		C ₇ H ₁₄ O	Y	Photolithography	100%	2,366	124-38-9	Carbon dioxide	CO2	X	2.70									Fab Solvent	0.00	1,276	N/A	N/A	N/A	0.00	1,276	
1	13465-77-5	Hexachlorodisilane		Si ₂ Cl ₆	Y	Thin Films / Diffusion Deposition	100%	5,266	13465-77-5	Hexachlorodisilane	Si2Cl6		0.00									Fab CVD	0.00	0.00	N/A	N/A	N/A	0.00	0.00	
1	13465-77-5	Hexachlorodisilane		Si ₂ Cl ₆	Y	Thin Films / Diffusion Deposition	100%	5,266	7647-01-0	Hydrogen chloride	HCl		0.81									Fab CVD	0.99	42.9	N/A	N/A	N/A	0.60	17.1	
1	13465-77-5	Hexachlorodisilane		Si ₂ Cl ₆	Y	Thin Films / Diffusion Deposition	100%	5,266	7631-86-9	Silicon dioxide	SiO2		0.45									Fab CVD	0.00	2,353	N/A	N/A	N/A	0.82	423.6	
1	685-63-2	Hexafluorobutadiene		C ₄ F ₆	Y	Plasma Etch	100%	11,751	685-63-2	Hexafluorobutadiene	C4F6		0.15	X								Fab Acid	0.00	1,763	0.98	35.3	0.00	35.3		
1	685-63-2	Hexafluorobutadiene		C ₄ F ₆	Y	Plasma Etch	100%	11,751	124-38-9	Carbon dioxide	CO2		1.09									Fab Acid	0.00	12,767	0	12,767	0.00	12,767		
1	685-63-2	Hexafluorobutadiene		C ₄ F ₆	Y	Plasma Etch	100%	11,751	75-10-5	Difluoromethane	CH2F2		3.00E-05	X								Fab Acid	0.00	0.35	0.99	3,53E-03	0.00	3,53E-03		
1	685-63-2	Hexafluorobutadiene		C ₄ F ₆	Y	Plasma Etch	100%	11,751	593-53-3	Fluoromethane	CHF3		6.50E-04	X								Fab Acid	0.00	7.64	0.99	0.08	0.00	0.08		
1	685-63-2	Hexafluorobutadiene		C ₄ F ₆	Y	Plasma Etch	100%	11,751	76-16-4	Hexafluoroethane	C2F6		0.06									Fab Acid	0.00	728.6	0.98	14.6	0.00	14.6		
1	685-63-2	Hexafluorobutadiene		C ₄ F ₆	Y	Plasma Etch	100%	11,751	7664-39-3	Hydrogen fluoride	HF		0.74									Fab Acid	0.00	8,708	0.99	87.1	0.60	34.8		
1	685-63-2	Hexafluorobutadiene		C ₄ F ₆	Y	Plasma Etch	100%	11,751	75-73-0	Tetrafluoromethane	CF4		0.06									Fab Acid	0.00	693.3	0.89	76.3	0.00	76.3		
1	685-63-2	Hexafluorobutadiene		C ₄ F ₆	Y	Plasma Etch	100%	11,751	75-46-7	Trifluoromethane	CHF3		0.02									Fab Acid	0.00	199.8	0.98	4.00	0.00	4.00		
1	685-63-2	Hexafluorobutadiene		C ₄ F ₆	Y	Plasma Etch	100%	11,751	115-25-3	Octafluorocyclobutane	C4F8		0.01									Fab Acid	0.00	59.9	0.98	1.20	0.00	1.20		
1	999-97-3	Hexamethyldisilazane	HMDS	C ₆ H ₁₈ NSi ₂																										

Table 6-1: Process Chemical Emissions Calculations

Chemical Use Case ID #	Primary Chemical				SHOW?	Process Category	% of Total Usage	Projected Usage in Process Category (lb/yr)	Emission Chemical			Emission Chem Formation Depends on Primary Chem EF?	Process Emission Factor (lb emitted / lb used)	Emission Chemical Classifications										Exhaust Type	PEEC Fraction Managed	Process Emission Quantification				
	CAS #	Chemical Name	Common Acronym/Alternate Name	Molecular Formula					CAS #	Emission Chemical	Molecular Formula			VOC	PM	NO _x	CO	SO ₂	HAP	GHG	HTAC	Fluorides	Pre-Control Process Emissions (lb/yr)			POU or RCS DRE	Post POU Emissions (lb/yr)	Centralized Control DRE	Post-Control Emissions (lb/yr)	
1	123-86-4	n-Butyl acetate		C ₄ H ₈ O ₂	Y	Photolithography	100%	1,780,301	123-86-4	n-Butyl acetate	CBH1202		0.20	X								Fab Solvent	0.00	356,060	N/A	N/A	0.97	10,682		
1	123-86-4	n-Butyl acetate		C ₄ H ₈ O ₂	Y	Photolithography	100%	1,780,301	124-38-9	Carbon dioxide	CO2	X	2.27									Fab Solvent	0.00	809,412	N/A	N/A	0.00	809,412		
1	7697-37-2	Nitric acid		HNO ₃	Y	Wet Etch / Wet Clean	100%	4,483,725	7697-37-2	Nitric acid	HNO3		0.01									Fab Acid	0.00	44,837	N/A	N/A	0.40	26,902		
1	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Plasma Etch	24%	266,465	7783-54-2	Nitrogen trifluoride	NF3		0.16				X					Fab Acid	0.00	42,634	0.95	2,132	0.00	2,132		
1	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Plasma Etch	24%	266,465	75-10-5	Diffuoromethane	CH2F2		8.60E-04	X								Fab Acid	0.00	229.2	0.99	2.29	0.00	2.29		
1	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Plasma Etch	24%	266,465	593-53-3	Fluoromethane	CH3F		0.01	X				X				Fab Acid	0.00	2,132	0.99	21.3	0.00	21.3		
1	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Plasma Etch	24%	266,465	76-16-4	Hexafluoroethane	C2F6		0.05				X					Fab Acid	0.00	11,991	0.98	239.8	0.00	239.8		
1	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Plasma Etch	24%	266,465	7664-39-3	Hydrogen fluoride	HF		0.85				X					Fab Acid	0.00	225,163	0.99	2,252	0.60	900.7		
1	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Plasma Etch	24%	266,465	10102-44-0	Nitrogen dioxide	NO2	X	0.65			X						Fab Acid	0.00	27,626	0	27,626	0.00	27,626		
1	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Plasma Etch	24%	266,465	75-73-0	Tetrafluoromethane	CF4		0.05				X					Fab Acid	0.00	11,991	0.89	1,319	0.00	1,319		
1	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Plasma Etch	24%	266,465	75-46-7	Trifluoromethane	CHF3		0.03				X					Fab Acid	0.00	6,662	0.98	133.2	0.00	133.2		
2	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - In-Situ Clean	1%	5,665	7783-54-2	Nitrogen trifluoride	NF3		0.20									Fab CVD	0.95	56.6	N/A	N/A	0.00	56.6		
2	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - In-Situ Clean	1%	5,665	7664-39-3	Hydrogen fluoride	HF		0.85				X					Fab CVD	0.99	47.9	N/A	N/A	0.60	19.1		
2	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - In-Situ Clean	1%	5,665	10102-44-0	Nitrogen dioxide	NO2	X	0.65			X						Fab CVD	0.00	734.1	N/A	N/A	0.90	73.4		
2	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - In-Situ Clean	1%	5,665	75-73-0	Tetrafluoromethane	CF4		0.04				X					Fab CVD	0.89	23.1	N/A	N/A	0.00	23.1		
3	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - Remote Clean	76%	866,532	7783-54-2	Nitrogen trifluoride	NF3		0.02				X					Fab CVD	0.95	779.9	N/A	N/A	0.00	779.9		
3	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - Remote Clean	76%	866,532	7782-41-4	Fluorine	F2		0.80							X		Fab CVD	1.00	3,479	N/A	N/A	0.00	3,479		
3	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - Remote Clean	76%	866,532	7664-39-3	Hydrogen fluoride	HF		0.85				X					Fab CVD	0.99	7,322	N/A	N/A	0.60	2,929		
3	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - Remote Clean	76%	866,532	10102-44-0	Nitrogen dioxide	NO2	X	0.65			X						Fab CVD	0.00	10,107	N/A	N/A	0.90	1,011		
3	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - Remote Clean	76%	866,532	75-73-0	Tetrafluoromethane	CF4		0.04				X					Fab CVD	0.89	3,622	N/A	N/A	0.00	3,622		
3	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - Remote Clean	76%	866,532	75-73-0	Tetrafluoromethane	CF4		0.09					X				Fab CVD	0.00	80,588	N/A	N/A	0.00	80,588		
4	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - Thermal Clean	1%	5,665	7783-54-2	Nitrogen trifluoride	NF3		0.28				X					Fab CVD	0.95	79.3	N/A	N/A	0.00	79.3		
4	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - Thermal Clean	1%	5,665	7664-39-3	Hydrogen fluoride	HF		0.85				X					Fab CVD	0.99	47.9	N/A	N/A	0.60	19.1		
4	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - Thermal Clean	1%	5,665	10102-44-0	Nitrogen dioxide	NO2	X	0.65			X						Fab CVD	0.00	1,028	N/A	N/A	0.90	102.8		
4	7783-54-2	Nitrogen trifluoride		NF ₃	Y	Thin Films - Thermal Clean	1%	5,665	75-73-0	Tetrafluoromethane	CF4		0.01					X				Fab CVD	0.00	56.6	N/A	N/A	0.00	56.6		
2	10024-97-2	Nitrous oxide		N ₂ O	Y	Thin Films / Diffusion Deposition	100%	1,576,605	10024-97-2	Nitrous oxide	N2O		0.50				X					Fab CVD	0.60	315,321	N/A	N/A	0.00	315,321		
2	10024-97-2	Nitrous oxide		N ₂ O	Y	Thin Films / Diffusion Deposition	100%	1,576,605	10102-44-0	Nitrogen dioxide	NO2	X	1.25			X						Fab CVD	0.00	988,787	N/A	N/A	0.90	98,879		
2	10024-97-2	Nitrous oxide		N ₂ O	Y	Thin Films / Diffusion Deposition	100%	1,576,605	10102-44-1	Nitrogen dioxide	NO2		0.21			X						Fab CVD	0.00	329,596	N/A	N/A	0.90	32,960		
1	115-25-3	Octafluorocyclobutane		C ₂ F ₈	Y	Plasma Etch	100%	11,619	115-25-3	Octafluorocyclobutane	C4F8		0.18							X		Fab Acid	0.00	2,091	0.98	41.8	0.00	41.8		
1	115-25-3	Octafluorocyclobutane		C ₂ F ₈	Y	Plasma Etch	100%	11,619	124-38-9	Carbon dioxide	CO2		0.88							X		Fab Acid	0.00	10,226	0	10,226	0.00	10,226		
1	115-25-3	Octafluorocyclobutane		C ₂ F ₈	Y	Plasma Etch	100%	11,619	75-10-5	Diffuoromethane	CH2F2		1.40E-03	X								Fab Acid	0.00	16.3	0.99	0.16	0.00	0.16		
1	115-25-3	Octafluorocyclobutane		C ₂ F ₈	Y	Plasma Etch	100%	11,619	593-53-3	Fluoromethane	CH3F		2.20E-03	X						X		Fab Acid	0.00	25.6	0.99	0.26	0.00	0.26		
1	115-25-3	Octafluorocyclobutane		C ₂ F ₈	Y	Plasma Etch	100%	11,619	685-63-2	Hexafluorobutadiene	C4F6		0.01	X						X		Fab Acid	0.00	109.2	0.98	2.18	0.00	2.18		
1	115-25-3	Octafluorocyclobutane		C ₂ F ₈	Y	Plasma Etch	100%	11,619	76-16-4	Hexafluoroethane	C2F6		0.03							X		Fab Acid	0.00	313.7	0.98	6.27	0.00	6.27		
1	115-25-3	Octafluorocyclobutane		C ₂ F ₈	Y	Plasma Etch	100%	11,619	7664-39-3	Hydrogen fluoride	HF		0.80						X			Fab Acid	0.00	9,295	0.99	93.0	0.60	37.2		
1	115-25-3	Octafluorocyclobutane		C ₂ F ₈	Y	Plasma Etch	100%	11,619	75-73-0	Tetrafluoromethane	CF4		0.05							X		Fab Acid	0.00	522.9	0.89	57.5	0.00	57.5		
1	115-25-3	Octafluorocyclobutane		C ₂ F ₈	Y	Plasma Etch	100%	11,619	75-46-7	Trifluoromethane	CHF3		0.03								X	Fab Acid	0.00	337.0	0.98	6.74	0.00	6.74		
1	556-67-2	Octamethylcyclotetrasiloxane	OMCTS / D4	C ₈ H ₂₀ O ₄ Si ₄	Y	Thin Films / Diffusion Deposition	100%	26,181	556-67-2	Octamethylcyclotetrasiloxane	CSH24O4Si4		0.00									Fab CVD	0.99	0.00	N/A	N/A	0.00	0.00		
1	556-67-2	Octamethylcyclotetrasiloxane	OMCTS / D4	C ₈ H ₂₀ O ₄ Si ₄	Y	Thin Films / Diffusion Deposition	100%	26,181	124-38-9	Carbon dioxide	CO2		1.19								X	Fab CVD	0.00	31,077	N/A	N/A	0.00	31,077		
1	556-67-2	Octamethylcyclotetrasiloxane	OMCTS / D4	C ₈ H ₂₀ O ₄ Si ₄	Y	Thin Films / Diffusion Deposition	100%	26,181	67-56-1	Methanol	CH3OH		0.86	X					X			Fab CVD	0.99	226.2	N/A	N/A	0.00	226.2		
1	556-67-2	Octamethylcyclotetrasiloxane	OMCTS / D4	C ₈ H ₂₀ O ₄ Si ₄	Y	Thin Films / Diffusion Deposition	100%	26,181	7631-86-9	Silicon dioxide	SiO2		0.81																	

Table 6-1: Process Chemical Emissions Calculations

Chemical Use Case ID #	Primary Chemical				SHOW?	Process Category	% of Total Usage	Projected Usage in Process Category (lb/yr)	Emission Chemical			Emission Chem Formation Depends on Primary Chem EF?	Process Emission Factor (lb emitted / lb used)										VOC	PM	Emission Chemical Classifications								Exhaust Type	PEEC Fraction Managed	Process Emission Quantification					
	CAS #	Chemical Name	Common Acronym/Alternate Name	Molecular Formula					CAS #	Emission Chemical	Molecular Formula		NO _x	CO	SO ₂	HAP	GHG	HTAC	Fluorides	Pre-Control Process Emissions (lb/yr)	POU or RCS DRE	Post POU Emissions (lb/yr)			Centralized Control DRE	Post-Control Emissions (lb/yr)														
1	2551-62-4	Sulfur hexafluoride		SF ₆	Y	Plasma Etch	100%	5,149	593-53-3	Fluoromethane	CH3F		0.01	X					X				Fab Acid	0.00	42.2	0.99	0.42	0.00	0.42											
1	2551-62-4	Sulfur hexafluoride		SF ₆	Y	Plasma Etch	100%	5,149	76-16-4	Hexafluoroethane	C2F6		0.04						X				Fab Acid	0.00	211.1	0.98	4.22	0.00	4.22											
1	2551-62-4	Sulfur hexafluoride		SF ₆	Y	Plasma Etch	100%	5,149	7664-39-3	Hydrogen fluoride	HF		0.82						X				Fab Acid	0.00	4,233	0.99	42.3	0.60	16.9											
1	2551-62-4	Sulfur hexafluoride		SF ₆	Y	Plasma Etch	100%	5,149	2446-09-5	Sulfur dioxide	SO2		0.44				X						Fab Acid	0.00	2,259	0	2,259	0.00	2,259											
1	2551-62-4	Sulfur hexafluoride		SF ₆	Y	Plasma Etch	100%	5,149	75-73-0	Tetrafluoromethane	CF4		0.03						X				Fab Acid	0.00	175.1	0.89	19.3	0.00	19.3											
1	2551-62-4	Sulfur hexafluoride		SF ₆	Y	Plasma Etch	100%	5,149	75-46-7	Trifluoromethane	CHF3		3.90E-03						X				Fab Acid	0.00	20.1	0.98	0.40	0.00	0.40											
1	7664-93-9	Sulfuric acid		H2SO4	Y	Wet Etch / Wet Clean	100%	23,673,997	7664-93-9	Sulfuric acid	H2SO4		1.00E-03		X								Fab Acid	0.00	23,674	N/A	N/A	0.75	5,918											
1	78-10-4	Tetraethyl orthosilicate	TEOS	C4H10OSi4	Y	Thin Films / Diffusion Deposition	100%		78-10-4	Tetraethyl orthosilicate	SiC8H20O4			X									Fab CVD	0.00		N/A		0.00												
1	78-10-4	Tetraethyl orthosilicate	TEOS	C4H10OSi4	Y	Thin Films / Diffusion Deposition	100%		124-38-9	Carbon dioxide	CO2									X			Fab CVD	0.00		N/A		0.00												
1	78-10-4	Tetraethyl orthosilicate	TEOS	C4H10OSi4	Y	Thin Films / Diffusion Deposition	100%		64-17-5	Ethanol	C2H5OH			X									Fab CVD	0.99		N/A		0.00												
1	78-10-4	Tetraethyl orthosilicate	TEOS	C4H10OSi4	Y	Thin Films / Diffusion Deposition	100%		7631-86-9	Silicon dioxide	SiO2				X								Fab CVD	0.00		N/A		0.82												
1	75-73-0	Tetrafluoromethane	Tetrafluoromethane	CF4	Y	Plasma Etch	100%	392,549	75-73-0	Tetrafluoromethane	CF4		0.65						X				Fab Acid	0.00	255,157	0.89	28,067	0.00	28,067											
1	75-73-0	Tetrafluoromethane	Tetrafluoromethane	CF4	Y	Plasma Etch	100%	392,549	124-38-9	Carbon dioxide	CO2		0.50						X				Fab Acid	0.00	196,309	0	196,309	0.00	196,309											
1	75-73-0	Tetrafluoromethane	Tetrafluoromethane	CF4	Y	Plasma Etch	100%	392,549	75-10-5	Diffuoromethane	CH2F2		0.01	X									Fab Acid	0.00	5,496	0.99	55.0	0.00	55.0											
1	75-73-0	Tetrafluoromethane	Tetrafluoromethane	CF4	Y	Plasma Etch	100%	392,549	593-53-3	Fluoromethane	CH3F		0.01	X						X			Fab Acid	0.00	2,081	0.99	20.8	0.00	20.8											
1	75-73-0	Tetrafluoromethane	Tetrafluoromethane	CF4	Y	Plasma Etch	100%	392,549	685-63-2	Hexafluorobutadiene	C4F6		1.50E-03	X					X				Fab Acid	0.00	588.8	0.98	11.8	0.00	11.8											
1	75-73-0	Tetrafluoromethane	Tetrafluoromethane	CF4	Y	Plasma Etch	100%	392,549	76-16-4	Hexafluoroethane	C2F6		0.06										Fab Acid	0.00	23,945	0.98	478.9	0.00	478.9											
1	75-73-0	Tetrafluoromethane	Tetrafluoromethane	CF4	Y	Plasma Etch	100%	392,549	7664-39-3	Hydrogen fluoride	HF		0.91						X				Fab Acid	0.00	357,023	0.99	3,570	0.60	1,428											
1	75-73-0	Tetrafluoromethane	Tetrafluoromethane	CF4	Y	Plasma Etch	100%	392,549	75-46-7	Trifluoromethane	CHF3		0.01							X			Fab Acid	0.00	5,103	0.98	102.1	0.00	102.1											
1	75-73-0	Tetrafluoromethane	Tetrafluoromethane	CF4	Y	Plasma Etch	100%	392,549	115-25-3	Octafluorocyclobutane	C4F8		3.30E-03							X			Fab Acid	0.00	1,295	0.98	25.9	0.00	25.9											
1					Y	Thin Films / Diffusion Deposition	100%							X								Fab CVD	0.99		N/A		0.00													
1					Y	Thin Films / Diffusion Deposition	100%		124-38-9	Carbon dioxide	CO2											Fab CVD	0.00		N/A		0.00													
1	97-99-4	Tetrahydrofurfuryl Alcohol		C4H6O2	Y	Photolithography	100%	3,571	97-99-4	Tetrahydrofurfuryl Alcohol	C5H10O2	X	0.20	X						X			Fab Solvent	0.00	714.1	N/A	N/A	0.97	21.4											
1	97-99-4	Tetrahydrofurfuryl Alcohol		C4H6O2	Y	Photolithography	100%	3,571	124-38-9	Carbon dioxide	CO2	X	2.15										Fab Solvent	0.00	1,539	N/A	N/A	0.00	1,539											
1					Y	Photolithography	100%							X	X							Fab Solvent	0.00		N/A		0.97													
1					Y	Photolithography	100%		124-38-9	Carbon Dioxide	CO2	X								X			Fab Solvent	0.00		N/A		0.00												
1					Y	Photolithography	100%		10102-44-0	Nitrogen Dioxide	NO2	X											Fab Solvent	0.00		N/A		0.00												
1					Y	Wet Etch / Wet Clean	100%							X	X							X	Fab Acid	0.00		N/A		0.00												
1	75-59-2	Tetramethylammonium hydroxide	TMAH	C4H13NO	Y	Photolithography	100%	934,483	75-59-2	Tetramethylammonium hydroxide	C4H13NO		1.00E-03	X	X								Fab Ammonia	0.00	934.5	N/A	N/A	0.00	934.5											
1	7550-45-0	Titanium tetrachloride		TiCl4	Y	Thin Films / Diffusion Deposition	100%	30,122	7550-45-0	Titanium tetrachloride	TiCl4		0.00		X				X				Fab CVD	0.00	0.00	N/A	N/A	0.82	0.00											
1	7550-45-0	Titanium tetrachloride		TiCl4	Y	Thin Films / Diffusion Deposition	100%	30,122	7647-01-0	Hydrogen chloride	HCl		0.77						X				Fab CVD	0.99	231.6	N/A	N/A	0.60	92.7											
1	7550-45-0	Titanium tetrachloride		TiCl4	Y	Thin Films / Diffusion Deposition	100%	30,122	13463-67-7	Titanium dioxide	TiO2		0.42										Fab CVD	0.00	12,683	N/A	N/A	0.82	2,283											
1					Y	Wet Etch / Wet Clean	100%							X	X								Fab Acid	0.00		N/A		0.00												
1	150-46-9	Triethyl borate	TEB	C4H10BO2	Y	Thin Films / Diffusion Deposition	100%	0.00	150-46-9	Triethyl borate	C6H15BO3		0.00	X									Fab CVD	0.00	0.00	N/A	N/A	0.00	0.00											
1	150-46-9	Triethyl borate	TEB	C4H10BO2	Y	Thin Films / Diffusion Deposition	100%	0.00	1303-86-2	Boron trioxide	B2O3		0.24		X								Fab CVD	0.00	0.00	N/A	N/A	0.82	0.00											
1	150-46-9	Triethyl borate	TEB	C4H10BO2	Y	Thin Films / Diffusion Deposition	100%	0.00	124-38-9	Carbon dioxide	CO2		1.81						X				Fab CVD	0.00	0.00	N/A	N/A	0.00	0.00											
1	150-46-9	Triethyl borate	TEB	C4H10BO2	Y	Thin Films / Diffusion Deposition	100%	0.00	64-17-5	Ethanol	C2H5OH		0.95	X									Fab CVD	0.99	0.00	N/A	N/A	0.00	0.00											
1	78-40-0	Triethyl phosphate	TEPO	C6H15O4P	Y	Thin Films / Diffusion Deposition	100%	0.00	78-40-0	Triethyl phosphate	C6H15O4P		0.00	X									Fab CVD	0.00	0.00	N/A	N/A	0.00	0.00											
1	78-40-0	Triethyl phosphate	TEPO	C6H15O4P	Y	Thin Films / Diffusion Deposition	100%	0.00	124-38-9	Carbon dioxide	CO2		1.45						X				Fab CVD	0.00	0.00	N/A	N/A	0.00	0.00											
1	78-40-0	Triethyl phosphate	TEPO	C6H15O4P	Y	Thin Films / Diffusion Deposition	100%	0.00	64-17-5	Ethanol	C2H5OH		0.76	X									Fab CVD	0.99	0.00	N/A	N/A	0.00	0.00											
1	78-40-0	Triethyl phosphate	TEPO	C6H15O4P	Y	Thin Films / Diffusion Deposition	100%	0.00	1314-56-3	Phosphorus pentoxide	P2O5		0.39		X								Fab CVD	0.00	0.00	N/A	N/A	0.82	0.00											
1	121-44-8	Triethylamine		C6H15N	Y	Wet Etch / Wet Clean	100%	196.3	121-44-8	Triethylamine	C6H15N		0.05	X				X					Fab Acid	0.00	9.82	N/A	N/A	0.00	9.82											
1	75-46-7	Trifluoromethane		CHF3	Y	Plasma Etch	100%	31,689	75-46-7	Trifluoromethane	CHF3		0.38							X			Fab Acid	0.00	12,042	0.98	240.8	0.00	240.8											
1	75-46-7	Trifluoromethane		CHF3	Y	Plasma Etch	100%	31,689	124-38-9	Carbon dioxide	CO2		0.63							X			Fab Acid	0.00	19,920	0	19,920	0.00	19,920											
1	75-46-7	Trifluoromethane		CHF3	Y	Plasma Etch	100%	31,689	75-10-5	Diffuoromethane	CH2F2		2.60E-03	X									Fab Acid	0.00	82.4	0.99	0.82.													

Micron - Clay, NY Fabs 1 & 2
1-FABOP and 2-FABOP
Process Chemical Emissions Summary

Table 7-1: Process Chemical Emissions Per Stack Type

CAS	Emission Chemical Name	Stack Type	Annual Pre-Control Emissions	Average Hourly Pre-Control Emissions	Variance Factor to Account for Hourly Operational Differences	Emission Rate Potential per Half ^d	POU or RCS DRE	Centralized Control DRE	Annual Potential Emissions	Number of Operational Stacks	Maximum Hourly Emissions Per Stack	Average Hourly Emissions Per Stack	Env. Rating ^{2,3,4}	SGC	AGC
			(lb/yr)	(lb/hr)		(lb/hr)			(lb/yr)		(lb/hr/stack)	(lb/hr/stack)		(ug/m ³)	(ug/m3)
288-88-0	1,2,4-Triazole	Fab Ammonia	867.7	0.10	25%	3.10E-02	N/A	0.00	868	24	5.16E-03	4.13E-03	INT-B	-	0.48
95-63-6	TMB (1,2,4-TMB and 1,3,5-TMB)	Fab Solvent	5,466	0.62	25%	0.19	N/A	0.97	164	64	3.66E-04	2.92E-04	B	-	60.0
1436-34-6	1,2-Epoxyhexane	Fab Solvent	3.93	4.49E-04	25%	1.40E-04	N/A	0.97	0.12	64	2.63E-07	2.11E-07	INT-B	-	-
		Fab Acid			25%		N/A	0.00		72			INT-B		
123-91-1	1,4-Dioxane	Fab Solvent	6.23	7.11E-04	25%	2.22E-04	N/A	0.97	0.19	64	4.16E-07	3.33E-07	B	3,000	0.20
		Fab Ammonia			25%		N/A	0.00		24			INT-B		
		Fab Ammonia			25%		N/A	0.00		24			INT-B		
107-98-2	1-Methoxy-2-propanol	Fab Solvent	7,163	0.82	25%	0.26	N/A	0.97	215	64	4.79E-04	3.83E-04	B	36,850	2,000
872-50-4	1-Methyl-2-pyrrolidone	Fab Solvent	110,657	12.6	25%	3.95	N/A	0.97	3,320	64	7.40E-03	5.92E-03	B	-	100
929-06-6	2-(2-aminoethoxy)ethanol	Fab Solvent	2,169	0.25	25%	0.08	N/A	0.97	65.1	64	1.45E-04	1.16E-04	INT-B	1,500	18.0
		Fab Solvent			25%		N/A	0.97		64			INT-B		
		Fab Ammonia			25%		N/A	0.00		24			B*		
		Fab Solvent			25%		N/A	0.97		64			INT-B		
		Fab Solvent			25%		N/A	0.97		64			INT-B*		
		Fab Solvent			25%		N/A	0.97		64			INT-B		
108-65-6	2-Methoxy-1-methylethyl acetate	Fab Solvent	2,912,639	332.5	25%	103.9	N/A	0.97	87,379	64	1.95E-01	1.56E-01	B	36,850	2,000
		Fab Solvent			25%		N/A	0.97		64			INT-B		
		Fab Solvent			25%		N/A	0.97		64			INT-B		
		Fab Ammonia			25%		N/A	0.00		24			INT-A		
75-65-0	2-Methylpropan-2-ol	Fab Solvent	0.28	3.17E-05	25%	9.91E-06	N/A	0.97	0.01	64	1.86E-08	1.49E-08	B*	-	720
		Fab Solvent			25%		N/A	0.97		64			INT-B		
123-42-2	4-Hydroxy-4-methylpentan-2-one	Fab Solvent	0.79	8.98E-05	25%	2.81E-05	N/A	0.97	0.02	64	5.26E-08	4.21E-08	B	-	570
		Fab Solvent			25%		N/A	0.97		64			B*		
108-11-2	4-Methylpentan-2-ol	Fab Solvent	26,266	3.00	25%	0.94	N/A	0.97	788	64	1.76E-03	1.41E-03	B*	17,000	250
		Fab Solvent			25%		N/A	0.97		64			INT-B		
		Fab Ammonia			25%		N/A	0.00		24			INT-B		
		Fab Ammonia			25%		N/A	0.00		24			INT-B		
64-19-7	Acetic acid	Fab Acid	419.4	0.05	25%	1.50E-02	N/A	0.00	419	72	8.31E-04	6.65E-04	B*	3,700	60.0
74-86-2	Acetylene	Fab CVD	375.2	0.04	25%	1.34E-02	N/A	0.00	375	24	2.23E-03	1.78E-03	INT-C	2,400	500
		Fab Solvent			25%		N/A	0.97		64			INT-B		
1344-28-1	Aluminum oxide	Fab Acid	270.1	0.03	25%	9.64E-03	0.00	0.00	270	72	5.35E-04	4.28E-04	B*	-	2.40
1344-28-1	Aluminum oxide	Fab CVD	835.8	0.10	25%	2.98E-02	N/A	0.82	150	24	8.94E-04	7.16E-04	B*	-	2.40
7664-41-7	Ammonia	Fab Acid	13,124	1.50	25%	0.47	N/A	0.00	13,124	72	2.60E-02	2.08E-02	C	2,400	500
7664-41-7	Ammonia	Fab Ammonia	1,149,077	131.2	25%	41.0	N/A	0.98	22,982	24	1.37E-01	1.09E-01	C	2,400	500
7664-41-7	Ammonia	Fab CVD	20,151	2.30	25%	0.72	N/A	0.00	20,151	24	1.20E-01	9.58E-02	C	2,400	500
7784-42-1	Arsine	Fab Acid	4.15	4.73E-04	25%	1.48E-04	N/A	0.00	4.15	72	8.22E-06	6.58E-06	A	0.20	0.05
1303-86-2	Boron trioxide	Fab Acid	1,045	0.12	25%	3.73E-02	0.00	0.00	1,045	72	2.07E-03	1.66E-03	B*	-	24.0
1303-86-2	Boron trioxide	Fab CVD	494.6	0.06	25%	1.76E-02	N/A	0.82	89.0	24	5.29E-04	4.24E-04	B*	-	24.0
7726-95-6	Bromine	Fab Acid	52,206	5.96	25%	1.86	0.50	0.00	26,103	72	5.17E-02	4.14E-02	B	130	1.60
124-38-9	Carbon dioxide	Fab CVD	505,318	57.7	25%	18.0	N/A	0.00	505,318	24	3.00E+00	2.40E+00	D	-	21,000
124-38-9	Carbon dioxide	Fab Solvent	58,538,662	6,682	25%	2,088	N/A	0.00	58,538,662	64	1.31E+02	1.04E+02	D	-	21,000
124-38-9	Carbon dioxide	Fab Acid	4,312,977	492.3	25%	153.9	0.00	0.00	4,312,977	72	8.55E+00	6.84E+00	D	-	21,000
463-58-1	Carbonyl sulfide	Fab Acid	1,442	0.16	25%	0.05	0.99	0.00	14.4	72	2.86E-05	2.29E-05	B	250	28.0
7782-50-5	Chlorine	Fab Acid	79,183	9.04	25%	2.82	0.99	0.00	792	72	1.57E-03	1.26E-03	B	116	0.20
77-92-9	Citric acid	Fab Acid	166.5	0.02	25%	5.94E-03	N/A	0.00	167	72	3.30E-04	2.64E-04	INT-B	2,100	20.0
		Fab Solvent			25%		N/A	0.97		64			INT-B		
		Fab Solvent			25%		N/A	0.97		64			INT-B		
108-94-1	Cyclohexanone	Fab Solvent	52,173	5.96	25%	1.86	N/A	0.97	1,565	64	3.49E-03	2.79E-03	B	20,000	190
		Fab CVD			25%		N/A	0.00		24			B		
120-92-3	Cyclopentanone	Fab Solvent	32.8	3.75E-03	25%	1.17E-03	N/A	0.97	0.98	64	2.20E-06	1.76E-06	INT-B	4,000	30.0
19287-45-7	Diborane	Fab CVD	1.97	2.24E-04	25%	7.01E-05	N/A	0.00	1.97	24	1.17E-05	9.35E-06	B*	-	0.26
142-96-1	Dibutyl ether	Fab Solvent	4,853	0.55	25%	0.17	N/A	0.97	146	64	3.25E-04	2.60E-04	INT-C	15,000	2,887
109-89-7	Diethylamine	Fab CVD	227.2	0.03	25%	8.10E-03	N/A	0.00	227	24	1.35E-03	1.08E-03	B*	4,500	36.0
		Fab Ammonia			25%		N/A	0.00		24			B		
75-10-5	Difluoromethane	Fab Acid	8,644	0.99	25%	0.31	0.99	0.00	86.4	72	1.71E-04	1.37E-04	INT-C	-	50,600

124-40-3	Dimethylamine	Fab CVD	78.5	0.01	25%	2.80E-03	N/A	0.00	78.5	24	4.67E-04	3.73E-04	B*	2,800	22.0
		Fab Acid			25%		N/A	0.00		72			INT-B		
74-84-0	Ethane	Fab CVD	186.9	0.02	25%	6.67E-03	N/A	0.00	187	24	1.11E-03	8.89E-04	N/A	N/A	N/A
107-21-1	Ethanediol	Fab Ammonia	173.5	0.02	25%	6.19E-03	N/A	0.00	174	24	1.03E-03	8.25E-04	B*	1,000	400
64-17-5	Ethanol	Fab CVD	551.1	0.06	25%	1.97E-02	N/A	0.00	551	24	3.28E-03	2.62E-03	C	-	45,000
		Fab Solvent			25%		N/A	0.97		64			B		
687-47-8	ethyl (S)-2-hydroxypropionate	Fab Solvent	7,189	0.82	25%	0.26	N/A	0.97	216	64	4.81E-04	3.85E-04	INT-B	-	71.0
97-64-3	Ethyl lactate	Fab Solvent	6,362	0.73	25%	0.23	N/A	0.97	191	64	4.26E-04	3.40E-04	INT-B	370	71.0
7782-41-4	Fluorine	Fab CVD	3,488	0.40	25%	0.12	N/A	0.00	3,488	24	2.07E-02	1.66E-02	B	5.30	0.07
593-53-3	Fluoromethane	Fab Acid	6,547	0.75	25%	0.23	0.99	0.00	65.5	72	1.30E-04	1.04E-04	INT-C	-	50,600
50-00-0	Formaldehyde	Fab CVD	14.8	1.69E-03	25%	5.27E-04	N/A	0.00	14.8	24	8.78E-05	7.03E-05	A	30.0	6.0E-02
96-48-0	Gamma-butyrolactone	Fab Solvent	2,753	0.31	25%	0.10	N/A	0.97	82.6	64	1.84E-04	1.47E-04	B	-	3.60
1310-53-8	Germanium dioxide	Fab CVD	189.2	0.02	25%	6.75E-03	N/A	0.82	34.1	24	2.02E-04	1.62E-04	INT-B		
		Fab Acid			25%		N/A	0.00		72			INT-C		
		Fab CVD			25%		N/A	0.82		24			INT-B		
110-43-0	Heptan-2-one	Fab Solvent	473.1	0.05	25%	1.69E-02	N/A	0.97	14.2	64	3.16E-05	2.53E-05	B*	-	550
685-63-2	Hexafluorobutadiene	Fab Acid	2,468	0.28	25%	0.09	0.98	0.00	49.4	72	9.78E-05	7.83E-05	INT-A	7.50	0.10
76-16-4	Hexafluoroethane	Fab Acid	39,809	4.54	25%	1.42	0.98	0.00	796	72	1.58E-03	1.26E-03	INT-C*	-	16,799
999-97-3	Hexamethyldisilazane	Fab Solvent	43,928	5.01	25%	1.57	N/A	0.97	1,318	64	2.94E-03	2.35E-03	INT-B	-	36.0
10035-10-6	Hydrogen bromide	Fab Acid	52,840	6.03	25%	1.88	0.99	0.00	528	72	1.05E-03	8.38E-04	C	680	-
7647-01-0	Hydrogen chloride	Fab Acid	6,685	0.76	25%	0.24	0.99	0.60	612	72	1.21E-03	9.70E-04	B	2,100	20.0
7647-01-0	Hydrogen chloride	Fab CVD	2,115	0.24	25%	0.08	N/A	0.60	846	24	5.03E-03	4.02E-03	B	2,100	20.0
7664-39-3	Hydrogen fluoride	Fab Acid	692,941	79.1	25%	24.7	0.99	0.60	21,372	72	4.24E-02	3.39E-02	B	5.60	0.07
7664-39-3	Hydrogen fluoride	Fab CVD	7,627	0.87	25%	0.27	N/A	0.60	3,051	24	1.81E-02	1.45E-02	B	5.60	0.07
7722-84-1	Hydrogen peroxide	Fab Acid	17,069	1.95	25%	0.61	N/A	0.00	17,069	72	3.38E-02	2.71E-02	B*	-	3.30
		Fab Acid			25%		N/A	0.00		72			INT-B		
13966-94-4	Indium iodide	Fab Acid	0.01	9.97E-07	25%	3.12E-07	N/A	0.00	0.01	72	1.73E-08	1.39E-08	INT-A	100	0.24
67-63-0	Isopropanol	Fab Solvent	4,647,421	530.5	25%	165.8	N/A	0.97	139,423	64	3.11E-01	2.49E-01	B	98,000	7,000
		Fab Ammonia			25%		N/A	0.00		24			INT-B		
		Fab Ammonia			25%		N/A	0.00		24			INT-B		
		Fab Acid			25%		N/A	0.00		72			INT-B		
		Fab Solvent			25%		N/A	0.97		64			INT-B		
79-41-4	Methacrylic Acid	Fab Solvent	4,472	0.51	25%	0.16	N/A	0.97	134	64	2.99E-04	2.39E-04	B*	Not in DAR-1	170.0
74-82-8	Methane	Fab CVD	53.1	0.01	25%	1.89E-03	N/A	0.00	53.1	24	3.16E-04	2.53E-04	N/A	N/A	N/A
74-82-8	Methane	Fab Acid	3,411	0.39	25%	0.12	0.99	0.00	34.1	72	6.76E-05	5.41E-05	N/A	N/A	N/A
67-56-1	Methanol	Fab CVD	408.1	0.05	25%	1.46E-02	N/A	0.00	408	24	2.43E-03	1.94E-03	B	33,000	4,000
67-56-1	Methanol	Fab General	167.8	0.02	25%	5.99E-03	N/A	0.00	168	70	3.42E-04	2.74E-04	B	33,000	4,000
2110-78-3	Methyl 2-hydroxy-2-methylpropionate	Fab Solvent	1,234	0.14	25%	4.40E-02	N/A	0.97	37.0	64	8.25E-05	6.60E-05	INT-B	-	71.0
1319-77-3	Mixed cresols	Fab Solvent	6.23	7.11E-04	25%	2.22E-04	N/A	0.97	0.19	64	4.16E-07	3.33E-07	B	-	180
		Fab Ammonia			25%		N/A	0.00		24			INT-B		
91-20-3	Naphthalene	Fab Solvent	2,733	0.31	25%	0.10	N/A	0.97	82.0	64	1.83E-04	1.46E-04	B	7,900	3.00
123-86-4	n-Butyl acetate	Fab Solvent	356,060	40.6	25%	12.7	N/A	0.97	10,682	64	2.38E-02	1.91E-02	C	71,300	565
7697-37-2	Nitric acid	Fab Acid	44,837	5.12	25%	1.60	N/A	0.40	26,902	72	5.33E-02	4.27E-02	B	86.0	12.3
7783-54-2	Nitrogen trifluoride	Fab Acid	42,634	4.87	25%	1.52	0.95	0.00	2,132	72	4.22E-03	3.38E-03	B*	6.60	0.08
7783-54-2	Nitrogen trifluoride	Fab CVD	915.8	0.10	25%	3.27E-02	N/A	0.00	916	24	5.45E-03	4.36E-03	B*	6.60	0.08
10024-97-2	Nitrous oxide	Fab CVD	315,321	36.0	25%	11.2	N/A	0.00	315,321	24	1.87E+00	1.50E+00	B*	-	210
115-25-3	Octafluorocyclobutane	Fab Acid	4,503	0.51	25%	0.16	0.98	0.00	90.1	72	1.78E-04	1.43E-04	INT-C*	-	16,799
		Fab Ammonia			25%		N/A	0.00		24			B		
7803-51-2	Phosphine	Fab CVD	1.19	1.36E-04	25%	4.24E-05	N/A	0.00	1.19	24	7.07E-06	5.65E-06	B	21.0	0.30
7803-51-2	Phosphine	Fab Acid	6.93	7.92E-04	25%	2.47E-04	N/A	0.00	6.93	72	1.37E-05	1.10E-05	B	21.0	0.30
7664-38-2	Phosphoric acid	Fab Acid	458.7	0.05	25%	1.64E-02	N/A	0.00	459	72	9.09E-04	7.27E-04	B	300	10.0

1314-56-3	Phosphorus pentoxide	Fab CVD	248.1	0.03	25%	8.85E-03	N/A	0.82	44.7	24	2.66E-04	2.12E-04	INT-B	300	4.80
1314-56-3	Phosphorus pentoxide	Fab Acid	1,983	0.23	25%	0.07	0.00	0.00	1,983	72	3.93E-03	3.14E-03	INT-B	300	4.80
1310-58-3	Potassium hydroxide	Fab Acid	11.9	1.36E-03	25%	4.24E-04	N/A	0.00	11.9	72	2.35E-05	1.88E-05	B*	200	-
74-98-6	Propane	Fab CVD	2.32	2.64E-04	25%	8.26E-05	N/A	0.00	2.32	24	1.38E-05	1.10E-05	N/A	N/A	N/A
52125-53-8	Propanol, 1(or 2)-ethoxy-	Fab Solvent	3,723	0.43	25%	0.13	N/A	0.97	112	64	2.49E-04	1.99E-04	INT-B	36,850	2,000
115-07-1	Propylene	Fab CVD	70.2	0.01	25%	2.50E-03	N/A	0.00	70.2	24	4.17E-04	3.34E-04	B*	-	3,000
110-86-1	Pyridine	Fab Solvent	75.8	0.01	25%	2.71E-03	N/A	0.97	2.27	64	5.07E-06	4.06E-06	C	-	74.0
		Fab Ammonia			25%		N/A	0.00		24			INT-C		
7631-86-9	Silicon dioxide	Fab CVD	92,902	10.6	25%	3.31	N/A	0.82	16,722	24	9.94E-02	7.95E-02	INT-B	-	2.00
7631-86-9	Silicon dioxide	Fab Solvent	32,706	3.73	25%	1.17	N/A	0.00	32,706	64	7.29E-02	5.83E-02	INT-B	-	2.00
7631-86-9	Silicon dioxide	Fab Acid	817.8	0.09	25%	2.92E-02	0.00	0.00	818	72	1.62E-03	1.30E-03	INT-B	-	2.00
7664-93-9	Sulfuric acid	Fab Acid	23,674	2.70	25%	0.84	N/A	0.75	5,918	72	1.17E-02	9.38E-03	B	120	1.00
64742-94-5	Solvent naphtha (petroleum), heavy arom.	Fab Solvent	54,661	6.24	25%	1.95	N/A	0.97	1,640	64	3.66E-03	2.92E-03	B	-	100
7446-09-5	Sulfur dioxide	Fab Solvent	21.5	2.45E-03	25%	7.66E-04	N/A	0.00	21.5	64	4.79E-05	3.83E-05	B*	196	80.0
7446-09-5	Sulfur dioxide	Fab Acid	38,393	4.38	25%	1.37	0.00	0.00	38,393	72	7.61E-02	6.09E-02	B*	196	80.0
2551-62-4	Sulfur hexafluoride	Fab Acid	1,493	0.17	25%	0.05	0.96	0.00	59.7	72	1.18E-04	9.47E-05	B*	6.80	0.09
75-73-0	Tetrafluoromethane	Fab Acid	271,890	31.0	25%	9.70	0.89	0.00	29,908	72	5.93E-02	4.74E-02	INT-B	-	330
75-73-0	Tetrafluoromethane	Fab CVD	84,498	9.65	25%	3.01	N/A	0.00	84,498	24	5.02E-01	4.02E-01	INT-B	-	330
		Fab CVD			25%		N/A	0.00		24			B		
97-99-4	Tetrahydrofurfuryl Alcohol	Fab Solvent	714.1	0.08	25%	2.55E-02	N/A	0.97	21.4	64	4.78E-05	3.82E-05	INT-B	N/A	N/A
		Fab Solvent			25%		N/A	0.97		64			INT-B		
		Fab Acid			25%		N/A	0.00		72			INT-B		
75-59-2	Tetramethylammonium hydroxide	Fab Ammonia	934.5	0.11	25%	3.33E-02	N/A	0.00	934	24	5.56E-03	4.44E-03	INT-B	3,600	29.0
13463-67-7	Titanium dioxide	Fab Acid	35.2	4.02E-03	25%	1.26E-03	0.00	0.00	35.2	72	6.97E-05	5.58E-05	B*	-	24.0
13463-67-7	Titanium dioxide	Fab CVD	12,683	1.45	25%	0.45	N/A	0.82	2,283	24	1.36E-02	1.09E-02	B*	-	24.0
3458-72-8	Triammonium citrate	Fab Acid	83.3	0.01	25%	2.97E-03	N/A	0.00	83.3	72	1.65E-04	1.32E-04	INT-C	2,400	500
121-44-8	Triethylamine	Fab Acid	9.82	1.12E-03	25%	3.50E-04	N/A	0.00	9.82	72	1.95E-05	1.56E-05	B*	2,800	7.00
75-46-7	Trifluoromethane	Fab Acid	25,170	2.87	25%	0.90	0.98	0.00	503	72	9.98E-04	7.98E-04	INT-C	-	50,600
1314-35-8	Tungsten trioxide	Fab CVD	4,657	0.53	25%	0.17	N/A	0.82	838	24	4.98E-03	3.99E-03	INT-B	-	7.10
1314-23-4	Zirconium oxide	Fab CVD	4,354	0.50	25%	0.16	N/A	0.82	784	24	4.66E-03	3.73E-03	INT-B	380	12.0
		Fab Ammonia			25%		N/A	0		24			INT-B		
107-98-2	1-Methoxy-2-propanol Group	Fab Ammonia	4,544	0.52	25%	0.16	N/A	0	4,544	24	2.70E-02	2.16E-02	B	36,850	2,000
107-98-2	1-Methoxy-2-propanol Group	Fab Solvent	2,923,527	333.7	25%	104.3	N/A	0.97	87,706	64	1.96E-01	1.56E-01	B	36,850	2,000
64-19-7	Acetic Acid Group	Fab Solvent	0.00	0.00	25%	0.00	N/A	0.97	0.00	64	0.00E+00	0.00E+00	B*	3,700	60.0
64-19-7	Acetic Acid Group	Fab Acid	419.4	0.05	25%	1.50E-02	N/A	0	419	72	8.31E-04	6.65E-04	B*	3,700	60.0
7664-41-7	Ammonia Group	Fab CVD	20,526	2.34	25%	0.73	N/A	0	20,526	24	1.22E-01	9.76E-02	C	2,400	500
7664-41-7	Ammonia Group	Fab Ammonia	1,149,077	131.2	25%	41.0	N/A	0.98	22,982	24	1.37E-01	1.09E-01	C	2,400	500
7664-41-7	Ammonia Group	Fab Acid	13,207	1.51	25%	0.47	N/A	0	13,207	72	2.62E-02	2.09E-02	C	2,400	500
		Fab Solvent			25%		N/A	0.97		64			B*		
75-10-5	Difluoromethane Group	Fab Acid	40,361	4.61	25%	1.44	0.99, 0.98	0	655	72	1.30E-03	1.04E-03	INT-C	-	50,600
		Fab Solvent			25%		N/A	0.97		64			B*		
		Fab Ammonia			25%		N/A	0		24			B*		
		Fab Solvent			25%		N/A	0.97		64			B		
		Fab Acid			25%		N/A	0		72			INT-C		
76-16-4	Hexafluoroethane Group	Fab Acid	44,312	5.06	25%	1.58	0.98	0	886	72	1.76E-03	1.41E-03	INT-C*	-	16,799
		Fab Solvent			25%		N/A	0.97		64			B		
		Fab Ammonia			25%		N/A	0		24			B		
7664-93-9	Sulfuric Acid Group	Fab Acid	23,674	2.70	25%	0.84	N/A	0, 0.75	5,918	72	1.17E-02	9.38E-03	B	120	1.00
7803-62-5	Silane Group	Fab CVD			25%		N/A	0		24			B		
7803-62-5	Silane Group	Fab Ammonia			25%		N/A	0		24			B		
121-44-8	Triethylamine Group	Fab Acid	9.82	1.12E-03	25%	3.50E-04	N/A	0	9.82	72	1.95E-05	1.56E-05	B*	2,800	7.00
121-44-8	Triethylamine Group	Fab Ammonia	273.2	0.03	25%	9.75E-03	N/A	0	273	24	1.62E-03	1.30E-03	B*	2,800	7.00

1. The Proposed Air Permit Project is divided into two fabs each of which is divided into two halves with similar operations and stack design.
2. B* indicates that a B rating has been assumed for chemicals not assigned an environmental rating in DAR-1.
3. A** indicates that an A rating has been assumed for chemicals that are not listed in DAR-1.
4. INT - (X) indicates an environmental rating was assigned by NYSDEC for chemicals not listed in DAR-1.

Table 7-2: Process Chemical Criteria Pollutant Emissions per Stack Type

Criteria Pollutant	Stack Type ¹	Annual Pre-Control Emissions	Average Hourly Pre-Control Emissions	Variance Factor to Account for Hourly Operational Differences	Emission Rate Potential per Half ²	POU or RCS DRE	Centralized Control DRE	Annual Potential Emissions	Number of Operational Stacks	Maximum Hourly Emissions Per Stack	Average Hourly Emissions Per Stack
		(lb/yr)	(lb/hr)		(lb/hr)			(lb/yr)		(lb/hr/stack)	(lb/hr/stack)
PM-10	Fab Acid	29,859	3.41	25%	1.07	Process Category/Emission Chemical Specific - Refer to Table 6-1		12,103	72	0.02	0.02
PM-2.5	Fab Acid	29,859	3.41	25%	1.07			12,103	72	0.02	0.02
NOx	Fab Acid	27,626	3.15	25%	0.99			27,626	72	0.05	0.04
SO2	Fab Acid	38,393	4.38	25%	1.37			38,393	72	0.08	0.06
PM-10	Fab Ammonia	2,308	0.26	25%	0.08			2,308	24	0.01	0.01
PM-2.5	Fab Ammonia	2,308	0.26	25%	0.08			2,308	24	0.01	0.01
NOx	Fab Ammonia	0.00	0.00	25%	0.00			0.00	24	0.00	0.00
PM-10	Fab CVD	118,495	13.5	25%	4.23			21,329	24	0.13	0.10
PM-2.5	Fab CVD	118,495	13.5	25%	4.23			21,329	24	0.13	0.10
NOx	Fab CVD	1,835,087	209.5	25%	65.5			183,509	24	1.09	0.87
PM-10	Fab Solvent	32,715	3.73	25%	1.17			32,706	64	0.07	0.06
PM-2.5	Fab Solvent	32,715	3.73	25%	1.17			32,706	64	0.07	0.06
NOx	Fab Solvent	66,695	7.61	25%	2.38			66,695	64	0.15	0.12
SO ₂	Fab Solvent	21.5	2.45E-03	25%	7.66E-04			21.5	64	4.79E-05	3.83E-05

1. PM, NOx, and SO₂ emitted from the Fab Solvent exhaust will be created in and emitted from the RCTO burner, not the zeolite rotor exhaust.

2. The Proposed Air Permit Project is divided into two fabs each of which is divided into two halves with similar operations and stack design.

Table 7-3: Solvent Exhaust Emissions per Exhaust Type

CAS	Emission Chemical Name	Exhaust Type ^{1,2}	Annual Pre-Control Emissions	Average Hourly Pre-Control Emissions	Variance Factor to Account for Hourly Operational Differences	Emission Rate per Half ³	POU or RCS DRE	Centralized Control DRE	Annual Potential Emissions	Number of Operational Stacks	Maximum Hourly Emissions Per Stack	Average Hourly Emissions Per Stack
			(lb/yr)	(lb/hr)		(lb/hr)			(lb/yr)		(lb/hr/stack)	(lb/hr/stack)
95-63-6	TMB (1,2,4-TMB and 1,3,5-TMB)	Solvent Exhaust	5,193	0.59	25%	0.19	N/A	0.97	155.8	64	3.47E-04	2.78E-04
95-63-6	TMB (1,2,4-TMB and 1,3,5-TMB)	RCTO Burner Exhaust	273.3	0.03	25%	0.01	N/A	0.97	8.20	64	1.83E-05	1.46E-05
1436-34-6	1,2-Epoxyhexane	Solvent Exhaust	3.74	4.27E-04	25%	1.33E-04	N/A	0.97	0.11	64	2.50E-07	2.00E-07
1436-34-6	1,2-Epoxyhexane	RCTO Burner Exhaust	0.20	2.25E-05	25%	7.02E-06	N/A	0.97	0.01	64	1.32E-08	1.05E-08
123-91-1	1,4-Dioxane	Solvent Exhaust	5.91	6.75E-04	25%	2.11E-04	N/A	0.97	0.18	64	3.96E-07	3.16E-07
123-91-1	1,4-Dioxane	RCTO Burner Exhaust	0.31	3.55E-05	25%	1.11E-05	N/A	0.97	0.01	64	2.08E-08	1.67E-08
107-98-2	1-Methoxy-2-propanol	Solvent Exhaust	6,805	0.78	25%	0.24	N/A	0.97	204.2	64	4.55E-04	3.64E-04
107-98-2	1-Methoxy-2-propanol	RCTO Burner Exhaust	358.2	0.04	25%	0.01	N/A	0.97	10.7	64	2.40E-05	1.92E-05
872-50-4	1-Methyl-2-pyrrolidone	Solvent Exhaust	105,124	12.0	25%	3.75	N/A	0.97	3,154	64	0.01	0.01
872-50-4	1-Methyl-2-pyrrolidone	RCTO Burner Exhaust	5,533	0.63	25%	0.20	N/A	0.97	166.0	64	3.70E-04	2.96E-04
929-06-6	2-(2-aminoethoxy)ethanol	Solvent Exhaust	2,061	0.24	25%	0.07	N/A	0.97	61.8	64	1.38E-04	1.10E-04
929-06-6	2-(2-aminoethoxy)ethanol	RCTO Burner Exhaust	108.4	0.01	25%	3.87E-03	N/A	0.97	3.25	64	7.25E-06	5.80E-06
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
108-65-6	2-Methoxy-1-methylethyl acetate	Solvent Exhaust	2,767,007	315.9	25%	98.7	N/A	0.97	83,010	64	0.19	0.15
108-65-6	2-Methoxy-1-methylethyl acetate	RCTO Burner Exhaust	145,632	16.6	25%	5.20	N/A	0.97	4,369	64	0.01	0.01
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
75-65-0	2-Methylpropan-2-ol	Solvent Exhaust	0.26	3.01E-05	25%	9.41E-06	N/A	0.97	0.01	64	1.76E-08	1.41E-08
75-65-0	2-Methylpropan-2-ol	RCTO Burner Exhaust	0.01	1.59E-06	25%	4.95E-07	N/A	0.97	4.17E-04	64	9.29E-10	7.43E-10
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
123-42-2	4-Hydroxy-4-methylpentan-2-one	Solvent Exhaust	0.75	8.53E-05	25%	2.67E-05	N/A	0.97	0.02	64	5.00E-08	4.00E-08
123-42-2	4-Hydroxy-4-methylpentan-2-one	RCTO Burner Exhaust	0.04	4.49E-06	25%	1.40E-06	N/A	0.97	1.18E-03	64	2.63E-09	2.11E-09
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
124-38-9	Carbon dioxide	Solvent Exhaust	55,611,729	6,348	25%	1,984	N/A	0.00	55,611,729	64	124.0	99.2
124-38-9	Carbon dioxide	RCTO Burner Exhaust	2,926,933	334.1	25%	104.4	N/A	0.00	2,926,933	64	6.53	5.22
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
		Solvent Exhaust			25%		N/A	0.97		64		
		RCTO Burner Exhaust			25%		N/A	0.97		64		
108-94-1	Cyclohexanone	Solvent Exhaust	49,564	5.66	25%	1.77	N/A	0.97	1,487	64	3.32E-03	2.65E-03
108-94-1	Cyclohexanone	RCTO Burner Exhaust	2,609	0.30	25%	0.09	N/A	0.97	78.3	64	1.74E-04	1.40E-04
120-92-3	Cyclopentanone	Solvent Exhaust	31.2	3.56E-03	25%	1.11E-03	N/A	0.97	0.94	64	2.09E-06	1.67E-06
120-92-3	Cyclopentanone	RCTO Burner Exhaust	1.64	1.87E-04	25%	5.85E-05	N/A	0.97	0.05	64	1.10E-07	8.78E-08
142-96-1	Dibutyl ether	Solvent Exhaust	4,610	0.53	25%	0.16	N/A	0.97	138.3	64	3.08E-04	2.47E-04
142-96-1	Dibutyl ether	RCTO Burner Exhaust	242.6	0.03	25%	0.01	N/A	0.97	7.28	64	1.62E-05	1.30E-05
		Solvent Exhaust			25%		N/A	0.97		64		

		RCTO Burner Exhaust			25%		N/A	0.97		64			
		ethyl (S)-2-hydroxypropionate	Solvent Exhaust	6,830	0.78	25%	0.24	N/A	0.97	204.9	64	4.57E-04	3.65E-04
		ethyl (S)-2-hydroxypropionate	RCTO Burner Exhaust	359.5	0.04	25%	0.01	N/A	0.97	10.8	64	2.40E-05	1.92E-05
		Ethyl lactate	Solvent Exhaust	6,044	0.69	25%	0.22	N/A	0.97	181.3	64	4.04E-04	3.23E-04
		Ethyl lactate	RCTO Burner Exhaust	318.1	0.04	25%	0.01	N/A	0.97	9.54	64	2.13E-05	1.70E-05
96-48-0		Gamma-butyrolactone	Solvent Exhaust	2,615	0.30	25%	0.09	N/A	0.97	78.5	64	1.75E-04	1.40E-04
96-48-0		Gamma-butyrolactone	RCTO Burner Exhaust	137.7	0.02	25%	4.91E-03	N/A	0.97	4.13	64	9.21E-06	7.37E-06
110-43-0		Heptan-2-one	Solvent Exhaust	449.5	0.05	25%	0.02	N/A	0.97	13.5	64	3.01E-05	2.41E-05
110-43-0		Heptan-2-one	RCTO Burner Exhaust	23.7	2.70E-03	25%	8.44E-04	N/A	0.97	0.71	64	1.58E-06	1.27E-06
999-97-3		Hexamethyldisilazane	Solvent Exhaust	41,732	4.76	25%	1.49	N/A	0.97	1,252	64	2.79E-03	2.23E-03
999-97-3		Hexamethyldisilazane	RCTO Burner Exhaust	2,196	0.25	25%	0.08	N/A	0.97	65.9	64	1.47E-04	1.18E-04
67-63-0		Isopropanol	Solvent Exhaust	4,415,050	504.0	25%	157.5	N/A	0.97	132,451	64	0.30	0.24
67-63-0		Isopropanol	RCTO Burner Exhaust	232,371	26.5	25%	8.29	N/A	0.97	6,971	64	0.02	0.01
		Solvent Exhaust			25%		N/A	0.97		64			
		RCTO Burner Exhaust			25%		N/A	0.97		64			
79-41-4		Methacrylic Acid	Solvent Exhaust	4,249	0.48	25%	0.15	N/A	0.97	127.5	64	2.84E-04	2.27E-04
79-41-4		Methacrylic Acid	RCTO Burner Exhaust	223.6	0.03	25%	0.01	N/A	0.97	6.71	64	1.50E-05	1.20E-05
2110-78-3		Methyl 2-hydroxy-2-methylpropionate	Solvent Exhaust	1,172	0.13	25%	0.04	N/A	0.97	35.2	64	7.84E-05	6.27E-05
2110-78-3		Methyl 2-hydroxy-2-methylpropionate	RCTO Burner Exhaust	61.7	0.01	25%	2.20E-03	N/A	0.97	1.85	64	4.13E-06	3.30E-06
1319-77-3		Mixed cresols	Solvent Exhaust	5.91	6.75E-04	25%	2.11E-04	N/A	0.97	0.18	64	3.96E-07	3.16E-07
1319-77-3		Mixed cresols	RCTO Burner Exhaust	0.31	3.55E-05	25%	1.11E-05	N/A	0.97	0.01	64	2.08E-08	1.67E-08
91-20-3		Naphthalene	Solvent Exhaust	2,596	0.30	25%	0.09	N/A	0.97	77.9	64	1.74E-04	1.39E-04
91-20-3		Naphthalene	RCTO Burner Exhaust	136.7	0.02	25%	4.87E-03	N/A	0.97	4.10	64	9.14E-06	7.31E-06
123-86-4		n-Butyl acetate	Solvent Exhaust	338,257	38.6	25%	12.1	N/A	0.97	10,148	64	0.02	0.02
123-86-4		n-Butyl acetate	RCTO Burner Exhaust	17,803	2.03	25%	0.64	N/A	0.97	534.1	64	1.19E-03	9.53E-04
52125-53-8		Propanol, 1(or 2)-ethoxy-	Solvent Exhaust	3,537	0.40	25%	0.13	N/A	0.97	106.1	64	2.37E-04	1.89E-04
52125-53-8		Propanol, 1(or 2)-ethoxy-	RCTO Burner Exhaust	186.2	0.02	25%	0.01	N/A	0.97	5.58	64	1.25E-05	9.96E-06
110-86-1		Pyridine	Solvent Exhaust	72.0	0.01	25%	2.57E-03	N/A	0.97	2.16	64	4.82E-06	3.85E-06
110-86-1		Pyridine	RCTO Burner Exhaust	3.79	4.33E-04	25%	1.35E-04	N/A	0.97	0.11	64	2.54E-07	2.03E-07
7631-86-9		Silicon dioxide	Solvent Exhaust	31,071	3.55	25%	1.11	N/A	0.00	31,071	64	0.07	0.06
7631-86-9		Silicon dioxide	RCTO Burner Exhaust	1,635	0.19	25%	0.06	N/A	0.00	1,635	64	3.65E-03	2.92E-03
64742-94-5		Solvent naphtha (petroleum), heavy arom.	Solvent Exhaust	51,928	5.93	25%	1.85	N/A	0.97	1,558	64	3.47E-03	2.78E-03
64742-94-5		Solvent naphtha (petroleum), heavy arom.	RCTO Burner Exhaust	2,733	0.31	25%	0.10	N/A	0.97	82.0	64	1.83E-04	1.46E-04
7446-09-5		Sulfur dioxide	Solvent Exhaust	20.4	2.33E-03	25%	7.28E-04	N/A	0.00	20.4	64	4.55E-05	3.64E-05
7446-09-5		Sulfur dioxide	RCTO Burner Exhaust	1.07	1.23E-04	25%	3.83E-05	N/A	0.00	1.07	64	2.39E-06	1.92E-06
97-99-4		Tetrahydrofurfuryl Alcohol	Solvent Exhaust	678.4	0.08	25%	0.02	N/A	0.97	20.4	64	4.54E-05	3.63E-05
97-99-4		Tetrahydrofurfuryl Alcohol	RCTO Burner Exhaust	35.7	4.08E-03	25%	1.27E-03	N/A	0.97	1.07	64	2.39E-06	1.91E-06
		Solvent Exhaust			25%		N/A	0.97		64			
		RCTO Burner Exhaust			25%		N/A	0.97		64			
107-98-2		1-Methoxy-2-propanol Group	Solvent Exhaust	2,777,351	317.0	25%	99.1	N/A	0.97	83,321	64	0.19	0.15
107-98-2		1-Methoxy-2-propanol Group	RCTO Burner Exhaust	146,176	16.7	25%	5.21	N/A	0.97	4,385	64	0.01	0.01
64-19-7		Acetic Acid Group	Solvent Exhaust	0.00	0.00	25%	0.00	N/A	0.97	0.00	64	0.00	0.00
64-19-7		Acetic Acid Group	RCTO Burner Exhaust	0.00	0.00	25%	0.00	N/A	0.97	0.00	64	0.00	0.00
138-22-7		Butyl Lactate Group	Solvent Exhaust	8,003	0.91	25%	0.29	N/A	0.97	240.1	64	5.35E-04	4.28E-04
138-22-7		Butyl Lactate Group	RCTO Burner Exhaust	421.2	0.05	25%	0.02	N/A	0.97	12.6	64	2.82E-05	2.25E-05
107-21-1		Ethanediol Group	Solvent Exhaust	560.7	0.06	25%	0.02	N/A	0.97	16.8	64	3.75E-05	3.00E-05
107-21-1		Ethanediol Group	RCTO Burner Exhaust	29.5	3.37E-03	25%	1.05E-03	N/A	0.97	0.89	64	1.97E-06	1.58E-06
		Solvent Exhaust			25%		N/A	0.97		64			
		RCTO Burner Exhaust			25%		N/A	0.97		64			
		Solvent Exhaust			25%		N/A	0.97		64			
		RCTO Burner Exhaust			25%		N/A	0.97		64			

1. 95% of total emissions are emitted through the Solvent Exhaust
2. 5% of total emissions are emitted through the RCTO Burner Exhaust
3. The Proposed Air Permit Project is divided into two fabs each of which is divided into two halves with similar operations and stack design.

Table 7-4: Total Fluorides Emissions per Exhaust Type

CAS	Emission Chemical Name	Stack Type	Annual Potential Emissions as Emission Chemical	Total Molecular Weight	Molecular Weight of Fluorine Atoms	Annual Potential Emissions as Fluoride	Average Hourly Potential Emissions as F (lb/hr)	Variance Factor for Hourly Operational Differences	Number of Operational Stacks	Maximum Hourly Emissions Per (lb/hr/stack)	Average Hourly Emissions Per Stack as F
			(lb/yr)			(lb/yr)					(lb/hr/stack)
7782-41-4	Fluorine	Fab CVD	3,488	38	38	3,488	0.40	25%	24	2.07E-02	1.66E-02
373-68-2	Tetramethylammonium fluoride tetrahydrate	Fab Acid	1,475	93.14	19	301.0	0.03	25%	72	5.96E-04	4.77E-04
7664-39-3	Hydrogen fluoride	Fab Acid	21,372	20.01	19	20,293	2.32	25%	72	4.02E-02	3.22E-02
7664-39-3	Hydrogen fluoride	Fab CVD	3,051	20.01	19	2,897	0.33	25%	24	1.72E-02	1.38E-02

Micron - Clay, NY Fabs 1 & 2
1-FABOP and 2-FABOP
Isopropanol Cleaning Emissions

Table 10-1: Isopropanol Cleaning Emissions Data

Chemical Name	CAS	Total Usage	Emission Factor	Total Emissions	Molecular Weight
		(lb/yr)	(lb/lb)	(lb/yr)	(lb/lb-mol)
Isopropanol	67-63-0	23,424	1.00	23,424	60.1

Table 10-2: Isopropanol Cleaning Emission Rates and Stack Concentrations

Stack Type	Number of Operational Stacks	Exhaust Rate	Annual Emissions per Stack Type	Annual Emissions per Stack	Average Hourly Emissions per Stack Type	Variance Factor to Account for Hourly Operational Differences	Emission Rate Potential per Half ³	Maximum Hourly Emissions per Stack	Average Hourly Emissions per Stack	Avg. IPA Conc. per Stack
		(scfm)	(lb/yr)	(lb/yr)	(lb/hr)		(lb/hr)	(lb/hr/stack)	(lb/hr/stack)	(ppmv)
Fab Acid ¹	72	80,000	9,263	128.7	1.06	25%	0.33	0.02	0.01	0.02
Fab CVD ¹	24	26,500	1,023	42.6	0.12	25%	0.04	0.01	0.00	0.02
Fab Ammonia ¹	24	40,000	1,544	64.3	0.18	25%	0.06	0.01	0.01	0.02
Fab General ¹	70	55,000	6,191	88.4	0.71	25%	0.22	0.01	0.01	0.02
Fab Solvent ¹	64	52,500	5,403	84.4	0.62	25%	0.19	0.01	0.01	0.02
Fab General ²	70	55,000	23,424	335	2.7	25%	0.84	0.05	0.04	0.07

1. Emission rates calculated assuming Isopropanol is dispersed and vented through all stacks.

2. Emission rates calculated assuming Isopropanol is vented exclusively through General Exhaust.

3. The Proposed Air Permit Project includes two fabs, each of which is divided into two halves with similar operations and stack design.

Conversions

1 year = 525,600 minutes
 1 lb-mole of gas (@ 20C) = 385.3 Cubic feet

Micron - Clay, NY Fabs 1 & 2**1-FABOP and 2-FABOP****Tool-Level Thermal Oxidation System Combustion Emissions****Table 13-1. Tool-Level Thermal Oxidation System Specifications and Inventory**

Exhaust Type	Number of Operational Exhaust Stacks	Total Natural Gas Usage (MMscf/year) ^{1,2}
Metal Etch POUs - Process FA1 and FA2	72	650
Thin Films PEECs - Process FC1 and FC2	24	2,300
Total NG Flow Rate		2,950

1. Total natural gas usage by thermal oxidation systems provided by Micron and scaled accordingly for Fab 1 and Fab 2.

2. Emissions from GHG thermal oxidation system natural gas combustion will pass through acid exhausts.

Table 13-2. Tool-Level Thermal Oxidation System Criteria Pollutant and GHG Potential to Emit

Pollutant	Emission Factor ^{1,2,3} (lb/MMscf)	Potential to Emit (per Stack) ⁴				Potential to Emit (Total per Stack Type)	
		Metal Etch POUs - FA1 and FA2		Thin Films PEECs - FC1 and FC2		FA1 and FA2	FC1 and FC2
		(lb/hr)	(tpy)	(lb/hr)	(tpy)	(tpy)	(tpy)
PM (Total)	7.6	0.01	0.03	0.01	0.07	2.47	1.57
PM ₁₀	7.6	0.01	0.03	0.01	0.07	2.47	1.57
PM _{2.5}	7.6	0.01	0.03	0.01	0.07	2.47	1.57
SO ₂	0.6	6.18E-04	2.71E-03	0.01	0.03	0.20	0.69
CO	420	0.43	1.90	4.59	20.1	136.5	483.0
NO _x	100	0.10	0.45	0.11	0.48	32.5	11.5
VOC	5.5	0.01	0.02	0.06	0.26	1.79	6.33
Lead	0.0005	5.15E-07	2.26E-06	5.47E-06	2.40E-05	1.63E-04	5.75E-04
CO ₂	120,000	123.7	541.7	1,313	5,750	39,000	138,000
CH ₄	2.3	2.37E-03	0.01	0.03	0.11	0.75	2.65
N ₂ O	2.2	2.27E-03	0.01	0.02	0.11	0.72	2.53
CO ₂ e - 20-yr ⁵	-	124.5	545.2	1,321	5,787	39,252	138,890
CO ₂ e - 100-yr ⁶	-	124.3	544.6	1,320	5,781	39,210	138,745
Upstream CO ₂ e ⁷	91,921	94.7	414.9	1,006	4,405	29,874	105,709
Upstream CO ₂ ⁷	28,219	29.1	127.4	308.7	1,352	9,171	32,452
Upstream CH ₄ ⁷	758	0.78	3.42	8.29	36.3	246.3	871.5
Upstream N ₂ O ⁷	0.31	3.24E-04	1.42E-03	3.44E-03	0.02	0.10	0.36

1. Emission Factors from AP-42 Section 1.4 Table 1.4-1 and 1.4-2 for Small Boilers.

2. Per AP-42 Section 1.4 Table 1.4-2, PM (total) = PM₁₀ = PM_{2.5}.

3. AP-42 emission factor for CO from NG combustion multiplied by safety factor of 5 to account for emissions as a result of partial oxidation of process chemicals.

4. The CVD exhaust ionizing wet scrubbers (IWS) will provide the following destruction and removal efficiencies:

PM/PM₁₀/PM_{2.5}: 82%
NO_x: 90%

5. 20-yr Global warming potentials per 6 NYCRR Part 496.

6. 100-yr Global warming potentials per 40 CFR Part 98, Table A-1 (*Global Warming Potentials*).

7. Upstream GHG emission factors per Appendix of 2024 NYS Statewide GHG Emissions Report:

CO₂e: 40,877 g/MMBtu
CO₂: 12,549 g/MMBtu
CH₄: 337 g/MMBtu
N₂O: 0.14 g/MMBtu

Table 13-3. Tool-Level Thermal Oxidation System HAP Potential to Emit

Pollutant	HAP?	Emission Factor ¹	Potential to Emit (per Stack)				Potential to Emit (Total per Stack Type)	
			Metal Etch POUs - FA1 and FA2		Thin Films PEECs - FC1 and FC2		FA1 and FA2	FC1 and FC2
		(lb/MMscf)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(tpy)	(tpy)
Benzene	Yes	2.10E-03	2.16E-06	9.48E-06	2.30E-05	1.01E-04	6.83E-04	2.42E-03
Formaldehyde	Yes	7.50E-02	7.73E-05	3.39E-04	8.20E-04	3.59E-03	0.02	0.09
Toluene	Yes	3.40E-03	3.50E-06	1.53E-05	3.72E-05	1.63E-04	1.11E-03	3.91E-03
2-Methylnaphthalene	Yes	2.40E-05	2.47E-08	1.08E-07	2.63E-07	1.15E-06	7.80E-06	2.76E-05
3-Methylchloranthrene	Yes	1.80E-06	1.86E-09	8.13E-09	1.97E-08	8.63E-08	5.85E-07	2.07E-06
7,12-Dimethylbenz(a)anthracene	Yes	1.60E-05	1.65E-08	7.22E-08	1.75E-07	7.67E-07	5.20E-06	1.84E-05
Acenaphthylene	Yes	1.80E-06	1.86E-09	8.13E-09	1.97E-08	8.63E-08	5.85E-07	2.07E-06
Benzo(a)pyrene	Yes	1.20E-06	1.24E-09	5.42E-09	1.31E-08	5.75E-08	3.90E-07	1.38E-06
Benzo(b)fluoranthene	Yes	1.80E-06	1.86E-09	8.13E-09	1.97E-08	8.63E-08	5.85E-07	2.07E-06
Benzo(k)fluoranthene	Yes	1.80E-06	1.86E-09	8.13E-09	1.97E-08	8.63E-08	5.85E-07	2.07E-06
Dibenzo(a,h)anthracene	Yes	1.20E-06	1.24E-09	5.42E-09	1.31E-08	5.75E-08	3.90E-07	1.38E-06
Dichlorobenzene	Yes	1.20E-03	1.24E-06	5.42E-06	1.31E-05	5.75E-05	3.90E-04	1.38E-03
Hexane	Yes	1.80E+00	1.86E-03	0.01	0.02	0.09	0.59	2.07
Naphthalene	Yes	6.10E-04	6.29E-07	2.75E-06	6.67E-06	2.92E-05	1.98E-04	7.02E-04
Acenaphthene	Yes	1.80E-06	1.86E-09	8.13E-09	1.97E-08	8.63E-08	5.85E-07	2.07E-06
Anthracene	Yes	2.40E-06	2.47E-09	1.08E-08	2.63E-08	1.15E-07	7.80E-07	2.76E-06
Benzo(a)anthracene	Yes	1.80E-06	1.86E-09	8.13E-09	1.97E-08	8.63E-08	5.85E-07	2.07E-06
Benzo(g,h,i)perylene	Yes	1.20E-06	1.24E-09	5.42E-09	1.31E-08	5.75E-08	3.90E-07	1.38E-06
Chrysene	Yes	1.80E-06	1.86E-09	8.13E-09	1.97E-08	8.63E-08	5.85E-07	2.07E-06
Fluoranthene	Yes	3.00E-06	3.09E-09	1.35E-08	3.28E-08	1.44E-07	9.75E-07	3.45E-06
Fluorene	Yes	2.80E-06	2.89E-09	1.26E-08	3.06E-08	1.34E-07	9.10E-07	3.22E-06
Indeno(1,2,3-cd)pyrene	Yes	1.80E-06	1.86E-09	8.13E-09	1.97E-08	8.63E-08	5.85E-07	2.07E-06
Phenanthrene	Yes	1.70E-05	1.75E-08	7.67E-08	1.86E-07	8.15E-07	5.53E-06	1.96E-05
Pyrene	Yes	5.00E-06	5.15E-09	2.26E-08	5.47E-08	2.40E-07	1.63E-06	5.75E-06
Arsenic	Yes	2.00E-04	2.06E-07	9.03E-07	2.19E-06	9.58E-06	6.50E-05	2.30E-04
Beryllium	Yes	1.20E-05	1.24E-08	5.42E-08	1.31E-07	5.75E-07	3.90E-06	1.38E-05
Cadmium	Yes	1.10E-03	1.13E-06	4.97E-06	1.20E-05	5.27E-05	3.58E-04	1.27E-03
Chromium	Yes	1.40E-03	1.44E-06	6.32E-06	1.53E-05	6.71E-05	4.55E-04	1.61E-03
Cobalt	Yes	8.40E-05	8.66E-08	3.79E-07	9.19E-07	4.03E-06	2.73E-05	9.66E-05
Lead	Yes	5.00E-04	5.15E-07	2.26E-06	5.47E-06	2.40E-05	1.63E-04	5.75E-04
Manganese	Yes	3.80E-04	3.92E-07	1.72E-06	4.16E-06	1.82E-05	1.24E-04	4.37E-04
Mercury	Yes	2.60E-04	2.68E-07	1.17E-06	2.84E-06	1.25E-05	8.45E-05	2.99E-04
Nickel	Yes	2.10E-03	2.16E-06	9.48E-06	2.30E-05	1.01E-04	6.83E-04	2.42E-03
Selenium	Yes	2.40E-05	2.47E-08	1.08E-07	2.63E-07	1.15E-06	7.80E-06	2.76E-05
Total HAP PTE			1.95E-03	8.52E-03	0.02	0.09	0.61	2.17

1. Emission factors are from AP-42, Section 1.4, Tables 1.4-3 and 1.4-4.

Conversions

1 lb =	453.59 g
1 scf NG =	1,020 BTU - Average heat content of NG from AP-42 1.4.1.
1 year =	8,760 hours

Micron - Clay, NY Fabs 1 & 2
1-FABOP, 2-FABOP, 1-HPMCU, 2-HPMCU
RCTO Combustion Emissions

Table 14-1. RCTO Specifications and Inventory

Description	Operating Status	Equipment Count	Burner Rating (Each) (MMBtu/hr)	Natural Gas Flow (scfh)
Fab RCTOs - Process FS1 and FS2	Active	64	4.00	3,922
Fab RCTOs - Process FS1 and FS2	Redundant	8	4.00	3,922
HPM RCTOs - Process HS1 and HS2	Active	12	1.00	980.4
HPM RCTOs - Process HS1 and HS2	Redundant	4	1.00	980.4
			Total NG Flow Rate (scfh)	298,039

Table 14-2. RCTO Criteria Pollutant and GHG Potential to Emit

Pollutant	Emission Factor ^{1,2,3} (lb/MMscf)	Potential to Emit (per RCTO)				Potential to Emit (RCTO Totals)
		Fab RCTOs - FS1 and FS2		HPM RCTOs - HS1 and HS2		
		(lb/hr)	(tpy)	(lb/hr)	(tpy)	
PM (Total)	7.6	0.03	0.13	0.01	0.03	9.92
PM ₁₀	7.6	0.03	0.13	0.01	0.03	9.92
PM _{2.5}	7.6	0.03	0.13	0.01	0.03	9.92
SO ₂	0.6	2.35E-03	0.01	5.88E-04	2.58E-03	0.78
CO ²	420	1.65	7.21	0.41	1.80	548.3
NO _x	100	0.39	1.72	0.10	0.43	130.5
VOC	5.5	0.02	0.09	0.01	0.02	7.18
Lead	0.0005	1.96E-06	8.59E-06	4.90E-07	2.15E-06	6.53E-04
CO ₂	120,000	470.6	2,061	117.6	515.3	156,649
CH ₄	2.3	0.01	0.04	2.25E-03	0.01	3.00
N ₂ O	2.2	0.01	0.04	2.16E-03	0.01	2.87
CO ₂ e - 20-yr ⁴	-	473.6	2,074	118.4	518.6	157,660
CO ₂ e - 100-yr ⁵	-	473.1	2,072	118.3	518.1	157,495
Upstream CO ₂ e ⁶	91,921	360.5	1,579	90.1	394.7	119,994
Upstream CO ₂ ⁶	28,219	110.7	484.7	27.7	121.2	36,838
Upstream CH ₄ ⁶	758	2.97	13.0	0.74	3.25	989.3
Upstream N ₂ O ⁶	0	1.23E-03	0.01	3.09E-04	1.35E-03	0.41

1. Emission factors are from AP-42, Section 1.4, Tables 1.4-1 and 1.4-2.

2. Per AP-42 Section 1.4 Table 1.4-2, PM (total) = PM₁₀ = PM_{2.5}.

3. AP-42 emission factor for CO from NG combustion multiplied by safety factor of 5 to account for emissions as a result of partial oxidation of process chemicals.

4. 20-yr Global warming potentials per 6 NYCRR Part 496.

5. 100-yr Global warming potentials per 40 CFR Part 98, Table A-1 (*Global Warming Potentials*).

6. Upstream GHG emission factors per Appendix of 2024 NYS Statewide GHG Emissions Report:

CO ₂ e:	40,877	g/MMBtu
CO ₂ :	12,549	g/MMBtu
CH ₄ :	337	g/MMBtu
N ₂ O:	0.14	g/MMBtu

Table 14-3. RCTO HAP Potential to Emit

Pollutant	HAP?	Emission Factor ¹	Potential to Emit (per RCTO)				Potential to Emit (RCTO Totals)
			Fab RCTOs - FS1 and FS2		HPM RCTOs - HS1 and HS2		
		(lb/MMscf)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(tpy)
Benzene	Yes	2.10E-03	8.24E-06	3.61E-05	2.06E-06	9.02E-06	2.74E-03
Formaldehyde	Yes	0.08	2.94E-04	1.29E-03	7.35E-05	3.22E-04	0.10
Toluene	Yes	3.40E-03	1.33E-05	5.84E-05	3.33E-06	1.46E-05	4.44E-03
2-Methylnaphthalene	Yes	2.40E-05	9.41E-08	4.12E-07	2.35E-08	1.03E-07	3.13E-05
3-Methylchloranthrene	Yes	1.80E-06	7.06E-09	3.09E-08	1.76E-09	7.73E-09	2.35E-06
7,12-Dimethylbenz(a)anthracene	Yes	1.60E-05	6.27E-08	2.75E-07	1.57E-08	6.87E-08	2.09E-05
Acenaphthylene	Yes	1.80E-06	7.06E-09	3.09E-08	1.76E-09	7.73E-09	2.35E-06
Benzo(a)pyrene	Yes	1.20E-06	4.71E-09	2.06E-08	1.18E-09	5.15E-09	1.57E-06
Benzo(b)fluoranthene	Yes	1.80E-06	7.06E-09	3.09E-08	1.76E-09	7.73E-09	2.35E-06
Benzo(k)fluoranthene	Yes	1.80E-06	7.06E-09	3.09E-08	1.76E-09	7.73E-09	2.35E-06
Dibenzo(a,h)anthracene	Yes	1.20E-06	4.71E-09	2.06E-08	1.18E-09	5.15E-09	1.57E-06
Dichlorobenzene	Yes	1.20E-03	4.71E-06	2.06E-05	1.18E-06	5.15E-06	1.57E-03
Hexane	Yes	1.80	0.01	0.03	1.76E-03	0.01	2.35
Naphthalene	Yes	6.10E-04	2.39E-06	1.05E-05	5.98E-07	2.62E-06	7.96E-04
Acenaphthene	Yes	1.80E-06	7.06E-09	3.09E-08	1.76E-09	7.73E-09	2.35E-06
Anthracene	Yes	2.40E-06	9.41E-09	4.12E-08	2.35E-09	1.03E-08	3.13E-06
Benzo(a)anthracene	Yes	1.80E-06	7.06E-09	3.09E-08	1.76E-09	7.73E-09	2.35E-06
Benzo(g,h,i)perylene	Yes	1.20E-06	4.71E-09	2.06E-08	1.18E-09	5.15E-09	1.57E-06
Chrysene	Yes	1.80E-06	7.06E-09	3.09E-08	1.76E-09	7.73E-09	2.35E-06
Fluoranthene	Yes	3.00E-06	1.18E-08	5.15E-08	2.94E-09	1.29E-08	3.92E-06
Fluorene	Yes	2.80E-06	1.10E-08	4.81E-08	2.75E-09	1.20E-08	3.66E-06
Indeno(1,2,3-cd)pyrene	Yes	1.80E-06	7.06E-09	3.09E-08	1.76E-09	7.73E-09	2.35E-06
Phenanthrene	Yes	1.70E-05	6.67E-08	2.92E-07	1.67E-08	7.30E-08	2.22E-05
Pyrene	Yes	5.00E-06	1.96E-08	8.59E-08	4.90E-09	2.15E-08	6.53E-06
Arsenic	Yes	2.00E-04	7.84E-07	3.44E-06	1.96E-07	8.59E-07	2.61E-04
Beryllium	Yes	1.20E-05	4.71E-08	2.06E-07	1.18E-08	5.15E-08	1.57E-05
Cadmium	Yes	1.10E-03	4.31E-06	1.89E-05	1.08E-06	4.72E-06	1.44E-03
Chromium	Yes	1.40E-03	5.49E-06	2.40E-05	1.37E-06	6.01E-06	1.83E-03
Cobalt	Yes	8.40E-05	3.29E-07	1.44E-06	8.24E-08	3.61E-07	1.10E-04
Lead	Yes	5.00E-04	1.96E-06	8.59E-06	4.90E-07	2.15E-06	6.53E-04
Manganese	Yes	3.80E-04	1.49E-06	6.53E-06	3.73E-07	1.63E-06	4.96E-04
Mercury	Yes	2.60E-04	1.02E-06	4.47E-06	2.55E-07	1.12E-06	3.39E-04
Nickel	Yes	2.10E-03	8.24E-06	3.61E-05	2.06E-06	9.02E-06	2.74E-03
Selenium	Yes	2.40E-05	9.41E-08	4.12E-07	2.35E-08	1.03E-07	3.13E-05
Total HAP PTE			7.41E-03	0.03	1.85E-03	8.11E-03	2.47

1. HAP emission factors are from AP-42, Section 1.4, Tables 1.4-3 and 1.4-4.

Conversions

1 lb = 453.59 g
 1 year = 8,760 hr
 1 scf NG = 1,020 BTU - Average heat content of NG from AP-42 1.4.1.

Micron - Clay, NY Fabs 1 & 2
1-CMBOP and 2-CMBOP
Water Bath Vaporizer Combustion Emissions

Table 15-1. Water Bath Vaporizer Inventory

Equipment Description	Operating Status	Equipment Count	Operating Hours Limit (hrs) ¹	Burner Rating (Each)	Natural Gas Flow Rate ²	Maximum Stack Flow Rate
				(MMBtu/hr)	(scfh)	(scfm)
Water Bath Vaporizers - Process WBV	Active	4	2,000	42.8	42,000	22,500
Water Bath Vaporizers - Process WBV	Redundant	4	0	42.8	0	0
				Total	168,000	90,000

1. Micron proposes a permit condition limiting total hours of WBV operation to 8,000 per year and specifying that no more than 4 WBV are operated at any given time. Therefore, the PTE is calculated assuming that redundant units do not operate.

2. Natural gas flow rate to the vaporizer based on manufacturer specifications.

Table 15-2. Water Bath Vaporizer Criteria Pollutant and GHG Potential to Emit

Pollutant	Molecular Weight	Emission Factor ^{1,2} (lb/MMscf)	BACT/LAER Limits		Potential to Emit (Per Unit)		Potential to Emit (All Units)	
	(lb/lb-mole)		Value	Unit	(lb/hr)	(tpy)	(lb/hr)	(tpy)
PM (Total)		7.6			0.32	0.32	1.28	1.28
PM ₁₀		7.6			0.32	0.32	1.28	1.28
PM _{2.5}		7.6			0.32	0.32	1.28	1.28
SO ₂		0.6			0.03	0.03	0.10	0.10
CO			84	lb/MMscf	3.53	3.53	14.1	14.1
NO _x	46.01		50	lb/MMscf	2.10	2.10	8.40	8.40
VOC			0.0054	lb/MMBtu	0.23	0.23	0.92	0.92
Lead		0.0005			2.10E-05	2.10E-05	8.40E-05	8.40E-05
CO ₂		120,000			5,040	5,040	20,160	20,160
CH ₄		2.3			0.10	0.10	0.39	0.39
N ₂ O		0.64			0.03	0.03	0.11	0.11
CO ₂ e - 20-yr ³		-			5,055	5,055	40,442	40,442
CO ₂ e - 100-yr ⁴		-			5,050	5,050	40,399	40,399
Upstream CO ₂ e ⁵		91,921			3,861	3,861	30,885	30,885
Upstream CO ₂ ⁵		28,219			1,185	1,185	9,482	9,482
Upstream CH ₄ ⁵		758			31.8	31.8	254.6	254.6
Upstream N ₂ O ⁵		0			0.01	0.01	0.11	0.11

1. Emission Factors from AP-42 Section 1.4 Tables 1.4-1 and 1.4-2 for Small Boilers. Assuming low NO_x burners.

2. Per AP-42 Section 1.4 Table 1.4-2, PM (total) = PM₁₀ = PM_{2.5}.

3. 20-yr Global warming potentials per 6 NYCRR Part 496.

4. 100-yr Global warming potentials per 40 CFR Part 98, Table A-1 (*Global Warming Potentials*).

5. Upstream GHG emission factors per Appendix of 2024 NYS Statewide GHG Emissions Report:

CO ₂ e:	40,877	g/MMBtu
CO ₂ :	12,549	g/MMBtu
CH ₄ :	337	g/MMBtu
N ₂ O:	0.14	g/MMBtu

Table 15-3. Water Bath Vaporizer HAP Potential to Emit

Pollutant	HAP?	Emission Factor ¹	Potential to Emit (All Units)	
		(lb/MMscf)	(lb/hr)	(tpy)
Benzene	Yes	2.10E-03	3.53E-04	3.53E-04
Formaldehyde	Yes	7.50E-02	0.01	0.01
Toluene	Yes	3.40E-03	5.71E-04	5.71E-04
2-Methylnaphthalene	Yes	2.40E-05	4.03E-06	4.03E-06
3-Methylchloranthrene	Yes	1.80E-06	3.02E-07	3.02E-07
7,12-Dimethylbenz(a)anthracene	Yes	1.60E-05	2.69E-06	2.69E-06
Acenaphthylene	Yes	1.80E-06	3.02E-07	3.02E-07
Benzo(a)pyrene	Yes	1.20E-06	2.02E-07	2.02E-07
Benzo(b)fluoranthene	Yes	1.80E-06	3.02E-07	3.02E-07
Benzo(k)fluoranthene	Yes	1.80E-06	3.02E-07	3.02E-07
Dibenzo(a,h)anthracene	Yes	1.20E-06	2.02E-07	2.02E-07
Dichlorobenzene	Yes	1.20E-03	2.02E-04	2.02E-04
Hexane	Yes	1.80E+00	0.30	0.30
Naphthalene	Yes	6.10E-04	1.02E-04	1.02E-04
Acenaphthene	Yes	1.80E-06	3.02E-07	3.02E-07
Anthracene	Yes	2.40E-06	4.03E-07	4.03E-07
Benzo(a)anthracene	Yes	1.80E-06	3.02E-07	3.02E-07
Benzo(g,h,i)perylene	Yes	1.20E-06	2.02E-07	2.02E-07
Chrysene	Yes	1.80E-06	3.02E-07	3.02E-07
Fluoranthene	Yes	3.00E-06	5.04E-07	5.04E-07
Fluorene	Yes	2.80E-06	4.70E-07	4.70E-07
Indeno(1,2,3-cd)pyrene	Yes	1.80E-06	3.02E-07	3.02E-07
Phenanthrene	Yes	1.70E-05	2.86E-06	2.86E-06
Pyrene	Yes	5.00E-06	8.40E-07	8.40E-07
Arsenic	Yes	2.00E-04	3.36E-05	3.36E-05
Beryllium	Yes	1.20E-05	2.02E-06	2.02E-06
Cadmium	Yes	1.10E-03	1.85E-04	1.85E-04
Chromium	Yes	1.40E-03	2.35E-04	2.35E-04
Cobalt	Yes	8.40E-05	1.41E-05	1.41E-05
Lead	Yes	5.00E-04	8.40E-05	8.40E-05
Manganese	Yes	3.80E-04	6.38E-05	6.38E-05
Mercury	Yes	2.60E-04	4.37E-05	4.37E-05
Nickel	Yes	2.10E-03	3.53E-04	3.53E-04
Selenium	Yes	2.40E-05	4.03E-06	4.03E-06
Total HAP PTE			0.32	0.32

1. HAP emission factors are from AP-42, Section 1.4, Tables 1.4-3 and 1.4-4.

Conversions

1 lb =	453.59 g
1 year =	8,760 hr
1 scf NG =	1,020 BTU - Average heat content of NG from AP-42 1.4.1.
1 year =	525,600 minutes
1 lb-mole of gas (@ 20C) =	385.3 Cubic feet
1 hr=	60 minutes
Fd Factor=	8,710

Micron - Clay, NY Fabs 1 & 2
1-CMBOP and 2-CMBOP
Natural Gas Boiler Combustion Emissions

Table 16-1. Total Boiler Burner Rating

Equipment Description	Equipment Count	Operating Hours Limit ¹	Burner Rating	Maximum Outlet Flow
		(hrs/yr)	(MMBtu/hr)	(scfm)
Natural Gas Boilers - Process BLR	6	6,000	32.7	22,500
		Total	196.2	135,000

1. Micron proposes a permit condition limiting each boiler to 6,000 hours of operation per year.

Table 16-2. Boiler Criteria Pollutant/GHG Potential to Emit

Pollutant	Molecular Weight	Emission Factor ^{1,2} (lb/MMscf)	BACT/LAER Limits		Potential to Emit (Per Unit)		Potential to Emit (All Units)	
	(lb/lb-mole)		Value	Unit	(lb/hr)	(tpy)	(lb/hr)	(tpy)
PM (Total)		7.6			0.24	0.73	1.46	4.39
PM ₁₀		7.6			0.24	0.73	1.46	4.39
PM _{2.5}		7.6			0.24	0.73	1.46	4.39
SO ₂		0.6			0.02	0.06	0.12	0.35
CO	28.01		50	ppmvd @3% O ₂	4.91	14.7	29.4	88.3
NO _x	46.01		9	ppmvd @3% O ₂	0.36	1.09	2.19	6.56
VOC			0.0017	lb/MMBtu	0.06	0.17	0.33	1.00
Lead		0.0005			1.60E-05	4.81E-05	9.62E-05	2.89E-04
CO ₂		120,000			3,847	11,541	23,082	69,247
CH ₄		2.3			0.07	0.22	0.44	1.33
N ₂ O		0.64			0.02	0.06	0.12	0.37
CO ₂ e - 20-yr ³		-			3,859	11,576	23,152	69,456
CO ₂ e - 100-yr ⁴		-			3,855	11,564	23,127	69,382
Upstream CO ₂ e ⁵		91,921			2,947	8,841	17,681	53,044
Upstream CO ₂ ⁵		28,219			904.7	2,714	5,428	16,284
Upstream CH ₄ ⁵		758			24.3	72.9	145.8	437.3
Upstream N ₂ O ⁵		0.31			0.01	0.03	0.06	0.18

1. Criteria pollutant emission factors are from AP-42, Section 1.4, Tables 1.4-1 and 1.4-2. Assuming low-NO_x burners and flue gas recirculation.

2. Per AP-42 Section 1.4 Table 1.4-2, PM (total) = PM₁₀ = PM_{2.5}.

3. 20-yr Global warming potentials per 6 NYCRR Part 496.

4. 100-yr Global warming potentials per 40 CFR Part 98, Table A-1 (*Global Warming Potentials*).

5. Upstream GHG emission factors per Appendix of 2024 NYS Statewide GHG Emissions Report:

CO ₂ e:	40,877	g/MMBtu
CO ₂ :	12,549	g/MMBtu
CH ₄ :	337	g/MMBtu
N ₂ O:	0.14	g/MMBtu

Table 16-3. Boiler HAP Potential to Emit

Pollutant	HAP?	Emission Factor ¹	Potential to Emit (All Units)	
		(lb/MMscf)	(lb/hr)	(tpy)
Benzene	Yes	2.10E-03	4.04E-04	1.21E-03
Formaldehyde	Yes	7.50E-02	0.01	0.04
Toluene	Yes	3.40E-03	6.54E-04	1.96E-03
2-Methylnaphthalene	Yes	2.40E-05	4.62E-06	1.38E-05
3-Methylchloranthrene	Yes	1.80E-06	3.46E-07	1.04E-06
7,12-Dimethylbenz(a)anthracene	Yes	1.60E-05	3.08E-06	9.23E-06
Acenaphthylene	Yes	1.80E-06	3.46E-07	1.04E-06
Benzo(a)pyrene	Yes	1.20E-06	2.31E-07	6.92E-07
Benzo(b)fluoranthene	Yes	1.80E-06	3.46E-07	1.04E-06
Benzo(k)fluoranthene	Yes	1.80E-06	3.46E-07	1.04E-06
Dibenzo(a,h)anthracene	Yes	1.20E-06	2.31E-07	6.92E-07
Dichlorobenzene	Yes	1.20E-03	2.31E-04	6.92E-04
Hexane	Yes	1.80E+00	0.35	1.04
Naphthalene	Yes	6.10E-04	1.17E-04	3.52E-04
Acenaphthene	Yes	1.80E-06	3.46E-07	1.04E-06
Anthracene	Yes	2.40E-06	4.62E-07	1.38E-06
Benzo(a)anthracene	Yes	1.80E-06	3.46E-07	1.04E-06
Benzo(g,h,i)perylene	Yes	1.20E-06	2.31E-07	6.92E-07
Chrysene	Yes	1.80E-06	3.46E-07	1.04E-06
Fluoranthene	Yes	3.00E-06	5.77E-07	1.73E-06
Fluorene	Yes	2.80E-06	5.39E-07	1.62E-06
Indeno(1,2,3-cd)pyrene	Yes	1.80E-06	3.46E-07	1.04E-06
Phenanthrene	Yes	1.70E-05	3.27E-06	9.81E-06
Pyrene	Yes	5.00E-06	9.62E-07	2.89E-06
Arsenic	Yes	2.00E-04	3.85E-05	1.15E-04
Beryllium	Yes	1.20E-05	2.31E-06	6.92E-06
Cadmium	Yes	1.10E-03	2.12E-04	6.35E-04
Chromium	Yes	1.40E-03	2.69E-04	8.08E-04
Cobalt	Yes	8.40E-05	1.62E-05	4.85E-05
Lead	Yes	5.00E-04	9.62E-05	2.89E-04
Manganese	Yes	3.80E-04	7.31E-05	2.19E-04
Mercury	Yes	2.60E-04	5.00E-05	1.50E-04
Nickel	Yes	2.10E-03	4.04E-04	1.21E-03
Selenium	Yes	2.40E-05	4.62E-06	1.38E-05
Total HAP PTE			0.36	1.09E+00

1. Emission factors are from AP-42, Section 1.4, Tables 1.4-3 and 1.4-4. Emissions factors corrected for actual heating value from standard of 1020 BTU/ft³.

Conversions

1 lb =	453.59 g
1 year =	8,760 hr
1 scf NG =	1,020 BTU - Average heat content of NG from AP-42 1.4.1.
1 kW =	3,413 BTU - AP-42 appendix A pg. 15
	0.85 kW out/kW in
1 year =	525,600 minutes
1 lb-mole of gas (@ 20C) =	385.3 Cubic feet
1 hr=	60 minutes
Fd Factor=	8,710

Micron - Clay, NY Fabs 1 & 2
1-CMBOP and 2-CMBOP
Diesel Emergency Generator Combustion Emissions

Table 17-1. Diesel Generator Inventory

Equipment Description	Equipment Count	Annual Operating Hours Limit (hrs/yr/engine)	Engine Full Load	Engine Power
			HP	kW
CUB 1 Diesel Emergency Generators - Process EMD	60	100	3,350	2,498
CUB 2 Diesel Emergency Generators - Process EMD	58			
Total Load (All Units)	118	--	395,300	8,367,272

1. Emergency generators are limited to the following 24-hour operation during emergencies: 46 engines limited to 4 hours of operation, 80 engines limited to 8 hours of operation, and the remaining 118 engines are unlimited in a 24-hour period.

Table 17-2. Diesel Emergency Generators Criteria Pollutant and GHG Potential to Emit

Pollutant	Tier 4 Exhaust Emission Standards ^{1,2}	AP-42 Emission Factors ³	GHG Emission Factors ⁴	Potential to Emit (Per Unit)		Potential to Emit (All Diesel Generators)
	(g/kW-hr)	(lb/HP-hr)	(kg/MMBtu)	(lb/hr)	(tpy)	(tpy)
PM (Total)	0.008	-	-	0.05	2.29E-03	0.27
PM ₁₀	0.008	-	-	0.04	2.20E-03	0.26
PM _{2.5}	0.008	-	-	0.04	2.20E-03	0.26
SO ₂	-	1.21E-05	-	0.04	2.03E-03	0.24
CO	3.5	-	-	19.3	0.96	114
NO _x	0.67	-	-	3.69	0.18	21.77
VOC	0.19	-	-	1.05	0.05	6.17
CO ₂	-	-	73.96	1,391	69.5	8,206
CH ₄	-	-	0.0030	0.06	2.82E-03	0.33
N ₂ O	-	-	0.00060	0.01	5.64E-04	0.07
CO ₂ e - 20-yr ⁵	-	-	-	1,399	69.9	8,251
CO ₂ e - 100-yr ⁶	-	-	-	1,395	69.8	8,233
Upstream CO ₂ e ⁷	-	-	23.54	442.7	22.1	2,612
Upstream CO ₂ ⁷	-	-	13.63	256.4	12.8	1,513
Upstream CH ₄ ⁷	-	-	0.12	2.20	0.11	13
Upstream N ₂ O ⁷	-	-	0.00	4.70E-03	2.35E-04	2.77E-02

1. PM Emissions factors are based on manufacturer guarantee. Tier 4 emission factors for balance of the pollutants are from Table 1 of 40 CFR Part 1039 Subpart B - Emission Standards and Related Requirements.

2. PM_{2.5} and PM₁₀ emission factors conservatively assumed to be equal to that of PM (total).

3. AP-42 Section 3.4 SO₂ emission factor based on ULSD which contains 15 ppm sulfur content.

4. CO₂, N₂O and CH₄ emission factors based on 40 CFR Part 98 Table C-1 and C-2 Default diesel emissions factors.

5. 20-yr Global warming potentials per 6 NYCRR Part 496.

6. 100-yr Global warming potentials per 40 CFR Part 98, Table A-1 (*Global Warming Potentials*).

7. Upstream GHG emission factors per Appendix of 2024 NYS Statewide GHG Emissions Report:

CO ₂ e:	23,540	g/MMBtu
CO ₂ :	13,634	g/MMBtu
CH ₄ :	117	g/MMBtu
N ₂ O:	0.25	g/MMBtu

Table 17-3. Diesel Emergency Generators HAP Potential to Emit

Pollutant	HAP?	Emission Factor ¹	Potential to Emit	
		(lb/MMBtu)	(lb/hr)	(tpy)
Benzene	Yes	7.76E-04	0.78	0.04
Toluene	Yes	2.81E-04	0.28	0.01
Xylenes	Yes	1.93E-04	0.19	0.01
Formaldehyde	Yes	7.89E-05	0.08	3.97E-03
Acetaldehyde	Yes	2.52E-05	0.03	1.27E-03
Acrolein	Yes	7.88E-06	0.01	3.97E-04
Total PAH	Yes	2.12E-04	0.21	0.01
		Total HAP PTE	1.58	0.08

1. Emissions are calculated based on emission factors for diesel engines per AP-42 Section 3.4, Table 3.4-3 and 3.4-4.

2. Emergency generators covered by NSPS Subpart IIII.

Conversions

1 lb =	453.59	g
1 year (Emergency Operation) =	500	hr
Energy Conversion Factor:	392.75	bhp-hr/MMBtu (mechanical) in AP-42 Appendix A
15 ppm S =	0.0015	wt% S
Horsepower (mechanical) =	0.74558	Kilowatts
Diesel Usage Conversion Factor:	0.138	MMBtu/gal

Micron - Clay, NY Fabs 1 & 2
1-HPMCU and 2-HPMCU
Cooling Tower Particulate Matter Emissions

Table 20-1. Percent of PM Emissions Based on Drift

Drift ¹	PM ₁₀ ¹	PM _{2.5} ¹
0.01%	18.7%	0.68%
0.002%	64.7%	0.45%
0.005%	47.5%	0.54%
0.0005%	76.4%	0.26%
0.0003%	77.6%	0.24%

1. Bold values were interpolated from calculated data.

Table 20-2. Cooling Tower Inventory and Specifications

Description	Equipment Count	Drift Loss ¹	Flow Rate ²	Total Annual Flow Rate	
		(%)	(gpm)	(gal/yr)	(lb/yr)
CUB Cooling Tower - Process CT1 and CT2	210	0.0005%	5,300	5.85E+11	4.88E+12
Gas Yard Cooling Tower - Process CT1 and CT2	12	0.0005%	5,330	3.36E+10	2.80E+11
		Total	10,630	6.19E+11	5.16E+12

1. The drift loss is based on BACT determinations.

2. Flow rate for each new cooling tower is based on manufacturer's specifications.

Table 20-3. Cooling Tower Speciated Particulate Matter Speciated Potential to Emit

Additive Mixture	CAS #	Chemical Name	Density	Annual Usage of Mixture	Weight Percent in Mixture	Concentration in Cooling Water	Total PM Emissions ²
			(lb/gal)	lb/yr	(%)	(ppmw)	tpy
Sodium Hypochlorite, 12%	7681-52-9	Sodium hypochlorite	9.76	204,133	12.5	0.49	6.38E-03
	1310-73-2	Sodium hydroxide	9.76	204,133	5.0	0.20	2.55E-03
Sulfuric Acid, 70%	7664-93-9	Sulfuric acid	15.35	1,600,853	100	31.03	4.00E-01
Biocide (NALCO 77352NA)	10377-60-3	Magnesium Nitrate	8.50	298,520	5.0	2.89E-01	3.73E-03
	2682-20-4	2-Methyl-4-Isothiazolin-3-one	8.50	298,520	1.0	5.79E-02	7.46E-04
	26172-55-4	5-Chloro-2-Methyl-4-Isothiazolin-3-one	8.50	298,520	5.0	0.29	3.73E-03
Corrosion Inhibitor	37971-36-1	2-Phosphonobutane-1,2,4-tricarboxylic acid	9.76	670,556	10.00	1.30	1.68E-02
	29329-71-3	Phosphonic acid, (1-hydroxyethylidene)bis-, sodium salt	9.76	670,556	5.00	0.65	8.38E-03
Antiscalant and Biocide (NALCO Trasar Trac101)	7632-00-0	Sodium nitrite	10.76	44,756	30.0	0.26	3.36E-03
	7631-95-0	Sodium molybdate	10.76	44,756	5.0	0.04	5.59E-04
	Proprietary ¹	Substituted triazole	-	-	1.0	-	-

1. CAS not listed on manufacturer SDS.

2. Total PM emissions as a result of each additive are estimated by multiplying the ratio of the additive concentration to the total TDS concentration by the total estimated TDS emissions.

3. TDS is speciated to the extent possible based on known additives. Constituents present in municipal water resulting in TDS emissions are unknown.

Table 20-4. Cooling Tower Particulate Matter Potential to Emit

Pollutant	Emissions (Per Unit)				Total Emissions
	CUB Cooling Tower		Gas Yard Cooling Tower		
	(lb/hr)	(tpy)	(lb/hr)	(tpy)	
TDS ¹	0.02	0.07	0.02	0.07	15.48
PM ₁₀ ²	0.01	0.05	0.01	0.05	11.82
PM _{2.5} ²	4.07E-05	1.78E-04	4.09E-05	1.79E-04	0.04

1. Estimated Solids in Cooling Water, TDS = 1200 ppm

Water Density = 8.34 lb/gal

2. The percentage of PM₁₀ and PM_{2.5} emissions of TDS is based on cooling tower data compiled by Environmental Canada:

<https://www.canada.ca/en/environment-climate-change/services/national-pollutant-release-inventory/report/sector-specific-tools-calculate-emissions/wet-cooling-tower-particulate-guide.html>

Conversions

1 year = 8,760 hours

Micron - Clay, NY Fabs 1 & 2
Greenhouse Gas Global Warming Potentials

Table 25-1: Greenhouse Gas Global Warming Potentials

CAS	GHG Name	HFC/PFC Number	Molecular Formula	GWP (20-yr)	GWP (100-yr)
124-38-9	Carbon dioxide	--	CO ₂	1	1
74-82-8	Methane	--	CH ₄	84	28
10024-97-2	Nitrous oxide	--	N ₂ O	264	265
75-10-5	Difluoromethane	HFC-32	CH ₂ F ₂	2,430	677
593-53-3	Fluoromethane	HFC-41	CH ₃ F	427	116
75-73-0	Tetrafluoromethane	PFC-14	CF ₄	4,880	6,630
76-16-4	Hexafluoroethane	PFC-116	C ₂ F ₆	8,210	11,100
75-46-7	Trifluoromethane	HFC-23	CHF ₃	10,800	12,400
115-25-3	Octafluorocyclobutane	PFC-318	C ₄ F ₈	7,110	9,540
685-63-2	Hexafluorobutadiene	--	C ₄ F ₆	1	1
7783-54-2	Nitrogen trifluoride	--	NF ₃	12,800	16,100
2551-62-4	Sulfur hexafluoride	--	SF ₆	17,500	23,500

Table 25-2: 2024 Upstream Natural Gas CO₂e Emission Factors

GHG	g/MMBtu	lb/MMBtu
CO ₂ e	40,877	90.12
CO ₂	12,549	27.67
CH ₄	337	0.74
N ₂ O	0.14	0.00

1. Per Appendix of 2024 NYS Statewide GHG Emissions Report

Table 25-3: 2024 Upstream Diesel CO₂e Emission Factors

GHG	g/MMBtu	lb/MMBtu
CO ₂ e	23,540	51.90
CO ₂	13,634	30.06
CH ₄	117	0.26
N ₂ O	0.25	0.00

1. Per Appendix of 2024 NYS Statewide GHG Emissions Report

Micron - Clay, NY Fabs 1 & 2
1-FUGEM and 2-FUGEM
Roadway Emission Calculations

Table 26-1: Roadway Emission Calculations

Material Hauled	Estimated Round Trip Distance Traveled	Silt Loading ¹	Estimated Truck Weight When Empty	Material Phase	Specific Gravity ²	Liquid Density ³	Estimated Load Weight	Truck Weight Loaded	Avg. Empty & Loaded Weight	Material Throughput		Pickup / Delivery Trips	Total Mileage	TSP EF ^{4,5,6}	PM ₁₀ EF ^{4,5,6}	PM _{2.5} EF ^{4,5,6}	TSP Emissions	PM ₁₀ Emissions	PM _{2.5} Emissions
	(mi)	(g/m^2)	(Tons)			(g/cm³)	(Tons)	(Tons)	(Tons)	(Tons/yr)	(gal/yr)	(#/yr)	(Mi/yr)	lb/VMT	lb/VMT	lb/VMT	(Ton/yr)	(Ton/yr)	(Ton/yr)
Solid Chemicals to WWT																			
Lime (Calcium hydroxide) to WWT1	0.5	1.5	20	Solid			5	25	22.5	6250		1250	606	0.34	0.07	0.02	0.10	0.02	5.01E-03
Lime (Calcium hydroxide) to WWT2	1.7	1.5	20	Solid			5	25	22.5	6250		1250	2069	0.34	0.07	0.02	0.35	0.07	0.02
Process Bulk Chemicals to HPM1 North																			
Hydrogen Peroxide 31%	1.5	1.5	20	Liquid		1.13	23.63	43.63	31.81		2,275,593	455	689.6	0.48	0.10	0.02	0.17	0.03	8.11E-03
Sulfuric Acid 96%	1.5	1.5	20	Liquid		1.84	38.29	58.29	39.15		1,326,958	265.4	402.1	0.59	0.12	0.03	0.12	0.02	5.84E-03
Hydrofluoric Acid 49%	1.5	1.5	20	Liquid		1.20	24.99	44.99	32.50		727,263	145.5	220.4	0.49	0.10	0.02	0.05	0.01	2.65E-03
Hydrofluoric Acid 100:1	1.5	1.5	20	Liquid		1.02	21.28	41.28	30.64		2,190,000	438.0	663.6	0.46	0.09	0.02	0.15	0.03	7.51E-03
Aqueous Ammonia 29%	1.5	1.5	20	Liquid		0.89	18.61	38.61	29.30		385,805	77.2	116.9	0.44	0.09	0.02	0.03	5.15E-03	1.26E-03
Tetramethyl Ammonium Hydroxide (TMAH) 25%	1.5	1.5	20	Liquid		1.02	21.20	41.20	30.60		291,453	58.3	88.3	0.46	0.09	0.02	0.02	4.07E-03	9.98E-04
Diluted Tetramethyl Ammonium Hydroxide with Surfactant (2.38%)	1.5	1.5	20	Liquid		1.02	21.20	41.20	30.60		27,558	5.5	8.4	0.46	0.09	0.02	1.92E-03	3.85E-04	9.44E-05
	1.5	1.5	20	Liquid		1.02	21.20	41.20	30.60		1,045,725	209.1	316.9	0.46	0.09	0.02	0.07	0.01	3.58E-03
Isopropyl Alcohol	1.5	1.5	20	Liquid	0.79		16.46	36.46	28.23		1,682,468	336.5	509.8	0.42	0.08	0.02	0.11	0.02	5.31E-03
Propylene Glycol Methyl Ether Acetate	1.5	1.5	20	Liquid		0.97	20.24	40.24	30.12		375,950	75.2	113.9	0.45	0.09	0.02	0.03	5.16E-03	1.27E-03
Industrial Grade Sulfuric Acid 93%	1.5	1.5	20	Liquid		1.84	38.29	58.29	39.15		964	1.0	1.5	0.59	0.12	0.03	4.49E-04	8.97E-05	2.20E-05
NaOH 50%	1.5	1.5	20	Liquid		1.52	31.71	51.71	35.85		2,602,370	520.5	788.6	0.54	0.11	0.03	0.21	0.04	0.01
Argon	1.5	1.5	23.5	Gas	1.38		5.28	28.78	26.14	1216		230.5	349.2	0.39	0.08	0.02	0.07	0.01	3.36E-03
Hydrogen chloride	1.5	1.5	23.5	Gas	1.27		4.85	28.35	25.93	4.5		0.9	1.4	0.39	0.08	0.02	2.72E-04	5.43E-05	1.33E-05
Ammonia	1.5	1.5	23.5	Gas	0.60		2.28	25.78	24.64	55.7		24.4	36.9	0.37	0.07	0.02	6.82E-03	1.36E-03	3.35E-04
Carbon dioxide	1.5	1.5	23.5	Gas	1.53		5.85	29.35	26.43	505		86.3	130.7	0.40	0.08	0.02	0.03	5.18E-03	1.27E-03
Nitrogen trifluoride	1.5	1.5	23.5	Gas	2.46		9.41	32.91	28.20	141		15.0	22.8	0.42	0.08	0.02	4.82E-03	9.65E-04	2.37E-04
Nitrous oxide	1.5	1.5	23.5	Gas	1.53		5.85	29.35	26.43	197		33.6	50.9	0.40	0.08	0.02	0.01	2.02E-03	4.96E-04
Tetrafluoromethane	1.5	1.5	23.5	Gas	3.04		11.63	35.13	29.31	49.0		4.2	6.4	0.44	0.09	0.02	1.41E-03	2.81E-04	6.90E-05
Hydrogen	1.5	1.5	23.5	Gas	0.07		0.27	23.77	23.63	35.5		133.6	202.5	0.35	0.07	0.02	0.04	7.17E-03	1.76E-03
Helium	1.5	1.5	23.5	Gas	0.14		0.52	24.02	23.76	35.3		67.5	102.3	0.36	0.07	0.02	0.02	3.64E-03	8.94E-04
Silane	1.5	1.5	23.5	Gas	1.11		4.25	27.75	25.62	11.5		2.7	4.1	0.38	0.08	0.02	7.92E-04	1.58E-04	3.89E-05
Chlorine	1.5	1.5	23.5	Gas	2.49		9.52	33.02	28.26	9.9		1.0	1.6	0.42	0.08	0.02	3.34E-04	6.67E-05	1.64E-05
Process Bulk Chemicals to HPM1 South																			
Hydrogen Peroxide 31%	0.9	1.5	20	Liquid		1.13	23.63	43.63	31.81		2,275,593	455.1	415.5	0.48	0.10	0.02	0.10	0.02	4.89E-03
Sulfuric Acid 96%	0.9	1.5	20	Liquid		1.84	38.29	58.29	39.15		1,326,958	265.4	242.3	0.59	0.12	0.03	0.07	0.01	3.52E-03
Hydrofluoric Acid 49%	0.9	1.5	20	Liquid		1.20	24.99	44.99	32.50		727,263	145.5	132.8	0.49	0.10	0.02	0.03	6.50E-03	1.60E-03
Hydrofluoric Acid 100:1	0.9	1.5	20	Liquid		1.02	21.28	41.28	30.64		2,190,000	438.0	399.8	0.46	0.09	0.02	0.09	0.02	4.53E-03
Aqueous Ammonia 29%	0.9	1.5	20	Liquid		0.89	18.61	38.61	29.30		385,805	77.2	70.4	0.44	0.09	0.02	0.02	3.10E-03	7.62E-04
Tetramethyl Ammonium Hydroxide (TMAH) 25%	0.9	1.5	20	Liquid		1.02	21.20	41.20	30.60		291,453	58.3	53.2	0.46	0.09	0.02	0.01	2.45E-03	6.02E-04
Diluted Tetramethyl Ammonium Hydroxide with Surfactant (2.38%)	0.9	1.5	20	Liquid		1.02	21.20	41.20	30.60		27,558	5.5	5.0	0.46	0.09	0.02	1.16E-03	2.32E-04	5.69E-05
	0.9	1.5	20	Liquid		1.02	21.20	41.20	30.60		1,045,725	209.1	190.9	0.46	0.09	0.02	0.04	8.79E-03	2.16E-03
Isopropyl Alcohol	0.9	1.5	20	Liquid	0.79		16.46	36.46	28.23		1,682,468	336.5	307.2	0.42	0.08	0.02	0.07	0.01	3.20E-03
Propylene Glycol Methyl Ether Acetate	0.9	1.5	20	Liquid		0.97	20.24	40.24	30.12		375,950	75.2	68.6	0.45	0.09	0.02	0.02	3.11E-03	7.64E-04
Industrial Grade Sulfuric Acid 93%	0.9	1.5	20	Liquid		1.84	38.29	58.29	39.15		964	1.0	0.9	0.59	0.12	0.03	2.70E-04	5.41E-05	1.33E-05
NaOH 50%	0.9	1.5	20	Liquid		1.52	31.71	51.71	35.85		2,602,370	520.5	475.1	0.54	0.11	0.03	0.13	0.03	6.31E-03
Argon	0.9	1.5	23.5	Gas	1.38		5.28	28.78	26.14	1216		230.5	210.4	0.39	0.08	0.02	0.04	8.25E-03	2.03E-03
Hydrogen chloride	0.9	1.5	23.5	Gas	1.27		4.85	28.35	25.93	4		0.9	0.8	0.39	0.08	0.02	1.64E-04	3.27E-05	8.03E-06
Ammonia	0.9	1.5	23.5	Gas	0.60		2.28	25.78	24.64	56		24.4	22.3	0.37	0.07	0.02	4.11E-03	8.22E-04	2.02E-04
Carbon dioxide	0.9	1.5	23.5	Gas	1.53		5.85	29.35	26.43	505		86.3	78.8	0.40	0.08	0.02	0.02	3.12E-03	7.67E-04
Nitrogen trifluoride	0.9	1.5	23.5	Gas	2.46		9.41	32.91	28.20	141		15.0	13.7	0.42	0.08	0.02	2.91E-03	5.81E-04	1.43E-04
Nitrous oxide	0.9	1.5	23.5	Gas	1.53		5.85	29.35	26.43	197		33.6	30.7	0.40	0.08	0.02	6.08E-03	1.22E-03	2.99E-04
Tetrafluoromethane	0.9	1.5	23.5	Gas	3.04		11.63	35.13	29.31	49.0		4.2	3.8	0.44	0.09	0.02	8.47E-04	1.69E-04	4.16E-05
Hydrogen	0.9	1.5	23.5	Gas	0.07		0.27	23.77	23.63	35.5		133.6	122.0	0.35	0.07	0.02	0.02	4.32E-03	1.06E-03
Helium	0.9	1.5	23.5	Gas	0.14		0.52	24.02	23.76	35.3		67.5	61.6	0.36	0.07	0.02	0.01	2.19E-03	5.38E-04
Silane	0.9	1.5	23.5	Gas	1.11		4.25	27.75	25.62	11.5		2.7	2.5	0.38	0.08	0.02	4.77E-04	9.54E-05	2.34E-05
Chlorine	0.9	1.5	23.5	Gas	2.49		9.52	33.02	28.26	9.9		1.0	0.9	0.42	0.08	0.02	2.01E-04	4.02E-05	9.87E-06

Table 26-1: Roadway Emission Calculations

Material Hauled	Estimated Round Trip Distance Traveled	Silt Loading ¹	Estimated Truck Weight When Empty	Material Phase	Specific Gravity ²	Liquid Density ³	Estimated Load Weight	Truck Weight Loaded	Avg. Empty & Loaded Weight	Material Throughput		Pickup / Delivery Trips	Total Mileage	TSP EF ^{4,5,6}	PM ₁₀ EF ^{4,5,6}	PM _{2.5} EF ^{4,5,6}	TSP Emissions	PM ₁₀ Emissions	PM _{2.5} Emissions
	(mi)	(g/m^2)	(Tons)			(g/cm ³)	(Tons)	(Tons)	(Tons)	(Tons/yr)	(gal/yr)	(#/yr)	(Mi/yr)	lb/VMT	lb/VMT	lb/VMT	(Ton/yr)	(Ton/yr)	(Ton/yr)
Process Bulk Chemicals to HPM2 North																			
Hydrogen Peroxide 31%	1.6	1.5	20	Liquid		1.13	23.63	43.63	31.81		2,275,593	455.1	732.7	0.48	0.10	0.02	0.18	0.04	8.62E-03
Sulfuric Acid 96%	1.6	1.5	20	Liquid		1.84	38.29	58.29	39.15		1,326,958	265.4	427.2	0.59	0.12	0.03	0.13	0.03	6.21E-03
Hydrofluoric Acid 49%	1.6	1.5	20	Liquid		1.20	24.99	44.99	32.50		727,263	145.5	234.2	0.49	0.10	0.02	0.06	0.01	2.81E-03
Hydrofluoric Acid 100:1	1.6	1.5	20	Liquid		1.02	21.28	41.28	30.64		2,190,000	438.0	705.1	0.46	0.09	0.02	0.16	0.03	7.98E-03
Aqueous Ammonia 29%	1.6	1.5	20	Liquid		0.89	18.61	38.61	29.30		385,805	77.2	124.2	0.44	0.09	0.02	0.03	5.47E-03	1.34E-03
Tetramethyl Ammonium Hydroxide (TMAH) 25%	1.6	1.5	20	Liquid		1.02	21.20	41.20	30.60		291,453	58.3	93.8	0.46	0.09	0.02	0.02	4.32E-03	1.06E-03
Diluted Tetramethyl Ammonium Hydroxide with Surfactant (2.38%)	1.6	1.5	20	Liquid		1.02	21.20	41.20	30.60		27,558	5.5	8.9	0.46	0.09	0.02	2.04E-03	4.09E-04	1.00E-04
Isopropyl Alcohol	1.6	1.5	20	Liquid	0.79		16.46	36.46	28.23		1,045,725	209.1	336.7	0.46	0.09	0.02	0.08	0.02	3.81E-03
Propylene Glycol Methyl Ether Acetate	1.6	1.5	20	Liquid		0.97	20.24	40.24	30.12		1,682,468	336.5	541.7	0.42	0.08	0.02	0.11	0.02	5.64E-03
Industrial Grade Sulfuric Acid 93%	1.6	1.5	20	Liquid		1.84	38.29	58.29	39.15		964	1.0	1.6	0.59	0.12	0.03	4.77E-04	9.53E-05	2.34E-05
NaOH 50%	1.6	1.5	20	Liquid		1.52	31.71	51.71	35.85		2,602,370	520.5	837.9	0.54	0.11	0.03	0.23	0.05	0.01
Argon	1.6	1.5	23.5	Gas	1.38		5.28	28.78	26.14	1216		230.5	366.6	0.39	0.08	0.02	0.07	0.01	3.53E-03
Hydrogen chloride	1.6	1.5	23.5	Gas	1.27		4.85	28.35	25.93	4		0.9	1.5	0.39	0.08	0.02	2.85E-04	5.70E-05	1.40E-05
Ammonia	1.6	1.5	23.5	Gas	0.60		2.28	25.78	24.64	56		24.4	38.8	0.37	0.07	0.02	7.16E-03	1.43E-03	3.52E-04
Carbon dioxide	1.6	1.5	23.5	Gas	1.53		5.85	29.35	26.43	505		86.3	137.2	0.40	0.08	0.02	0.03	5.44E-03	1.34E-03
Nitrogen trifluoride	1.6	1.5	23.5	Gas	2.46		9.41	32.91	28.20	141		15.0	23.9	0.42	0.08	0.02	5.06E-03	1.01E-03	2.49E-04
Nitrous oxide	1.6	1.5	23.5	Gas	1.53		5.85	29.35	26.43	197		33.6	53.5	0.40	0.08	0.02	0.01	2.12E-03	5.20E-04
Tetrafluoromethane	1.6	1.5	23.5	Gas	3.04		11.63	35.13	29.31	49		4.2	6.7	0.44	0.09	0.02	1.48E-03	2.95E-04	7.25E-05
Hydrogen	1.6	1.5	23.5	Gas	0.07		0.27	23.77	23.63	36		133.6	212.6	0.35	0.07	0.02	0.04	7.52E-03	1.85E-03
Helium	1.6	1.5	23.5	Gas	0.14		0.52	24.02	23.76	35		67.5	107.4	0.36	0.07	0.02	0.02	3.82E-03	9.38E-04
Silane	1.6	1.5	23.5	Gas	1.11		4.25	27.75	25.62	12		2.7	4.3	0.38	0.08	0.02	8.31E-04	1.66E-04	4.08E-05
Chlorine	1.6	1.5	23.5	Gas	2.49		9.52	33.02	28.26	10		1.0	1.6	0.42	0.08	0.02	3.50E-04	7.01E-05	1.72E-05
Process Bulk Chemicals to HPM2 South																			
Hydrogen Peroxide 31%	1.0	1.5	20	Liquid		1.13	23.63	43.63	31.81		2,275,593	455.1	458.6	0.48	0.10	0.02	0.11	0.02	5.39E-03
Sulfuric Acid 96%	1.0	1.5	20	Liquid		1.84	38.29	58.29	39.15		1,326,958	265.4	267.4	0.59	0.12	0.03	0.08	0.02	3.89E-03
Hydrofluoric Acid 49%	1.0	1.5	20	Liquid		1.20	24.99	44.99	32.50		727,263	145.5	146.6	0.49	0.10	0.02	0.04	7.18E-03	1.76E-03
Hydrofluoric Acid 100:1	1.0	1.5	20	Liquid		1.02	21.28	41.28	30.64		2,190,000	438.0	441.3	0.46	0.09	0.02	0.10	0.02	5.00E-03
Aqueous Ammonia 29%	1.0	1.5	20	Liquid		0.89	18.61	38.61	29.30		385,805	77.2	77.7	0.44	0.09	0.02	0.02	3.43E-03	8.41E-04
Tetramethyl Ammonium Hydroxide (TMAH) 25%	1.0	1.5	20	Liquid		1.02	21.20	41.20	30.60		291,453	58.3	58.7	0.46	0.09	0.02	0.01	2.70E-03	6.64E-04
	1.0	1.5	20	Liquid		1.02	21.20	41.20	30.60		27,558	5.5	5.6	0.46	0.09	0.02	1.28E-03	2.56E-04	6.28E-05
Isopropyl Alcohol	1.0	1.5	20	Liquid	0.79		16.46	36.46	28.23		1,682,468	336.5	339.0	0.42	0.08	0.02	0.07	0.01	3.53E-03
Propylene Glycol Methyl Ether Acetate	1.0	1.5	20	Liquid		0.97	20.24	40.24	30.12		375,950	75.2	75.8	0.45	0.09	0.02	0.02	3.43E-03	8.43E-04
Industrial Grade Sulfuric Acid 93%	1.0	1.5	20	Liquid		1.84	38.29	58.29	39.15		964	1.0	1.0	0.59	0.12	0.03	2.98E-04	5.97E-05	1.46E-05
NaOH 50%	1.0	1.5	20	Liquid		1.52	31.71	51.71	35.85		2,602,370	520.5	524.4	0.54	0.11	0.03	0.14	0.03	6.97E-03
Argon	1.0	1.5	23.5	Gas	1.38		5.28	28.78	26.14	1216		230.5	232.2	0.39	0.08	0.02	0.05	9.11E-03	2.24E-03
Hydrogen chloride	1.0	1.5	23.5	Gas	1.27		4.85	28.35	25.93	4		0.9	0.9	0.39	0.08	0.02	1.81E-04	3.61E-05	8.86E-06
Ammonia	1.0	1.5	23.5	Gas	0.60		2.28	25.78	24.64	56		24.4	24.6	0.37	0.07	0.02	4.54E-03	9.07E-04	2.23E-04
Carbon dioxide	1.0	1.5	23.5	Gas	1.53		5.85	29.35	26.43	505		86.3	86.9	0.40	0.08	0.02	0.02	3.45E-03	8.46E-04
Nitrogen trifluoride	1.0	1.5	23.5	Gas	2.46		9.41	32.91	28.20	141		15.0	15.1	0.42	0.08	0.02	3.21E-03	6.41E-04	1.57E-04
Nitrous oxide	1.0	1.5	23.5	Gas	1.53		5.85	29.35	26.43	197		33.6	33.9	0.40	0.08	0.02	6.71E-03	1.34E-03	3.30E-04
Tetrafluoromethane	1.0	1.5	23.5	Gas	3.04		11.63	35.13	29.31	49.0		4.2	4.2	0.44	0.09	0.02	9.35E-04	1.87E-04	4.59E-05
Hydrogen	1.0	1.5	23.5	Gas	0.07		0.27	23.77	23.63	35.5		133.6	134.7	0.35	0.07	0.02	0.02	4.77E-03	1.17E-03
Helium	1.0	1.5	23.5	Gas	0.14		0.52	24.02	23.76	35.3		67.5	68.0	0.36	0.07	0.02	0.01	2.42E-03	5.94E-04
Silane	1.0	1.5	23.5	Gas	1.11		4.25	27.75	25.62	11.5		2.7	2.7	0.38	0.08	0.02	5.26E-04	1.05E-04	2.58E-05
Chlorine	1.0	1.5	23.5	Gas	2.49		9.52	33.02	28.26	9.9		1.0	1.0	0.42	0.08	0.02	2.22E-04	4.44E-05	1.09E-05
Industrial Bulk Chemicals to WWT1																			
Industrial Grade Sulfuric Acid 96%	0.5	1.5	20	Liquid		1.87	39.07	59.07	39.54		2,826,940	565.4	274.1	0.60	0.12	0.03	0.08	0.02	4.02E-03
Ferric Chloride	0.5	1.5	20	Liquid		1.49	31.12	51.12	35.56		328,500	65.7	31.9	0.54	0.11	0.03	8.55E-03	1.71E-03	4.20E-04
Industrial Grade Sodium Hydroxide 50%	0.5	1.5	20	Liquid		1.53	31.82	51.82	35.91		208,050	41.6	20.2	0.54	0.11	0.03	5.47E-03	1.09E-03	2.69E-04
Hydrochloric Acid, 36%	0.5	1.5	20	Liquid		1.16	24.18	44.18	32.09		412,450	82.5	40.0	0.48	0.10	0.02	9.67E-03	1.93E-03	4.75E-04
Sodium Hypochlorite, 12%	0.5	1.5	20	Liquid		1.21	25.24	45.24	32.62		250,025	50.0	24.2	0.49	0.10	0.02	5.96E-03	1.19E-03	2.93E-04
Sodium Bisulfite	0.5	1.5	20	Liquid		1.48	30.87	50.87	35.44		18,250	3.7	1.8	0.53					

Table 26-1: Roadway Emission Calculations

Material Hauled	Estimated Round Trip Distance Traveled	Silt Loading ¹	Estimated Truck Weight When Empty	Material Phase	Specific Gravity ²	Liquid Density ³	Estimated Load Weight	Truck Weight Loaded	Avg. Empty & Loaded Weight	Material Throughput		Pickup / Delivery Trips	Total Mileage	TSP EF ^{4,5,6}	PM ₁₀ EF ^{4,5,6}	PM _{2.5} EF ^{4,5,6}	TSP Emissions	PM ₁₀ Emissions	PM _{2.5} Emissions
	(mi)	(g/m^2)	(Tons)			(g/cm³)	(Tons)	(Tons)	(Tons)	(Tons/yr)	(gal/yr)	(#/yr)	(Mi/yr)	lb/VMT	lb/VMT	lb/VMT	(Ton/yr)	(Ton/yr)	(Ton/yr)
Phosphoric Acid, 85%	2.5	1.5	20	Liquid		1.87	39.01	59.01	39.51		36,500	7.3	18.6	0.60	0.12	0.03	5.54E-03	1.11E-03	2.72E-04
Citric Acid, 50%	2.5	1.5	20	Liquid		1.24	25.87	45.87	32.93		13,321	2.7	6.8	0.50	0.10	0.02	1.68E-03	3.36E-04	8.25E-05
Sodium Hypochlorite, 12%	2.5	1.5	20	Liquid		1.21	25.24	45.24	32.62		365,007	73.0	185.5	0.49	0.10	0.02	0.05	9.12E-03	2.24E-03
Industrial Bulk Chemicals to BIO 2																			
Sodium Hydroxide, 50%	2.5	1.5	20	Liquid		1.53	31.82	51.82	35.91		505,385	101.1	256.9	0.54	0.11	0.03	0.07	0.01	3.42E-03
Sulfuric Acid, 70%	2.5	1.5	20	Liquid		1.61	33.59	53.59	36.79		7,721	1.5	3.9	0.56	0.11	0.03	1.09E-03	2.18E-04	5.35E-05
Sodium Bisulfite, 25%	2.5	1.5	20	Liquid		1.48	30.87	50.87	35.44		5,019	1.0	2.6	0.53	0.11	0.03	6.82E-04	1.36E-04	3.35E-05
Phosphoric Acid, 85%	2.5	1.5	20	Liquid		1.87	39.01	59.01	39.51		36,500	7.3	18.6	0.60	0.12	0.03	5.54E-03	1.11E-03	2.72E-04
Citric Acid, 50%	2.5	1.5	20	Liquid		1.24	25.87	45.87	32.93		13,321	2.7	6.8	0.50	0.10	0.02	1.68E-03	3.36E-04	8.25E-05
Sodium Hypochlorite, 12%	2.5	1.5	20	Liquid		1.21	25.24	45.24	32.62		365,007	73.0	185.5	0.49	0.10	0.02	0.05	9.12E-03	2.24E-03
Industrial Bulk Chemicals to CUB 1																			
Sodium Hypochlorite, 12%	0.6	1.5	20	Liquid		1.21	25.24	45.24	32.62		10,460	2.1	1.2	0.49	0.10	0.02	2.92E-04	5.84E-05	1.43E-05
Sulfuric Acid, 70%	0.6	1.5	20	Liquid		1.61	33.59	53.59	36.79		52,160	10.4	5.9	0.56	0.11	0.03	1.65E-03	3.29E-04	8.09E-05
Biocide (NALCO 77352NA)	0.6	1.5	20	Liquid		1.02	21.28	41.28	30.64		17,560	3.5	2.0	0.46	0.09	0.02	4.60E-04	9.20E-05	2.26E-05
Corrosion Inhibitor	0.6	1.5	20	Liquid		1.11	23.07	43.07	31.54		34,360	6.9	3.9	0.47	0.09	0.02	9.27E-04	1.85E-04	4.55E-05
Antiscalant and Biocide (NALCO Trasar Trac101)	0.6	1.5	20	Liquid		1.29	26.91	46.91	33.46		2,080	0.4	0.2	0.50	0.10	0.02	5.96E-05	1.19E-05	2.93E-06
Industrial Bulk Chemicals to CUB 2																			
Sodium Hypochlorite, 12%	1.9	1.5	20	Liquid		1.21	25.24	45.24	32.62		10,460	2.1	3.9	0.49	0.10	0.02	9.65E-04	1.93E-04	4.74E-05
Sulfuric Acid, 70%	1.9	1.5	20	Liquid		1.61	33.59	53.59	36.79		52,160	10.4	19.6	0.56	0.11	0.03	5.44E-03	1.09E-03	2.67E-04
Biocide (NALCO 77352NA)	1.9	1.5	20	Liquid		1.02	21.28	41.28	30.64		17,560	3.5	6.6	0.46	0.09	0.02	1.52E-03	3.04E-04	7.46E-05
Corrosion Inhibitor	1.9	1.5	20	Liquid		1.11	23.07	43.07	31.54		34,360	6.9	12.9	0.47	0.09	0.02	3.06E-03	6.12E-04	1.50E-04
Antiscalant and Biocide (NALCO Trasar Trac101)	1.9	1.5	20	Liquid		1.29	26.91	46.91	33.46		2,080	0.4	0.8	0.50	0.10	0.02	1.97E-04	3.94E-05	9.66E-06
Diesel Storage																			
ULSD Storage Tank ⁸	2.0	1.5	20	Liquid		0.85	17.73	37.73	28.87		729,270	145.9	291.7	0.43	0.09	0.02	0.06	0.01	3.11E-03
Total (lb/yr)																	6.49	1.30	0.32

1. Silt loading values are from AP-42 Table 13.2.1-2. It is conservatively assumed that roads will have average daily traffic (ADT) of less than 500 vehicles, and that half the year is winter. The winter and non-winter factors were averaged, resulting in an average silt loading factor of 1.5 g/m ³.

2. Specific gravity and liquid density values for most materials are from Perry's Chemical Engineers' Handbook, Seventh Edition, Table 2-1 through Table 2-117. Specific gravities for liquid materials are relative to the density of water at STP, and for gaseous materials are relative to the density of air at STP. Specific gravities for nitrogen trifluoride, tetrafluoromethane, and silane are from Pubchem (<https://pubchem.ncbi.nlm.nih.gov/>)

3. Liquid density not available in Perry's are from Pubchem (<https://pubchem.ncbi.nlm.nih.gov/>) or SigmaAldrich (<https://www.sigmaaldrich.com>). Poly aluminum chloride relative density is from a representative SDS (<https://nowchemwatercare.com.au/wp-content/uploads/2019/06/Poly-Aluminium-Chloride-23-SDS-July-2016.pdf>).

4. Emissions based on AP-42 Section 13.2.1 (01/11), Equation (2).

E = [k * (sL)^0.91 * (W)^1.02] * (1 - P/4N)

where

E = emission factor, lb/VMT
k = particle size multiplier
sL = road surface silt loading, g/m^2
W = average vehicle weight, tons
P = number of days with >= 0.01 in precipitation
N = number of days in the averaging period (365)

5. Particle Size Multiplier (k) values are from AP-42 Table 13.2.1-1.

6. Number of days with precipitation estimated from AP-42 Section 13.2.1 (01/11), Figure 13.2.1-2.

7. Transportation is modeled for all liquid chemistries.

8. The round trip distance travelled by diesel trucks for has been conservatively assumed to be 2 miles since the location of the tanks is uncertain.

Constants

Water Density =	8.345	lb/gal
Air Density =	0.0765	lb/ft ³ at STP
Liquid Delivery Tanker Volume =	5,000	gal
Gas Delivery Tanker Volume =	100,000	ft ³
1 gallon =	3,785	cm ³
1 mile =	5,280	ft
k (PM-30) =	0.011	lb/VMT
k (PM-10) =	0.0022	lb/VMT
k (PM-2.5) =	0.00054	lb/VMT
P =	170	days

Micron - Clay, NY Fabs 1 & 2**1-FUGEM and 2-FUGEM****Sulfur Hexafluoride (SF₆) Emissions from Circuit Breakers and other Gas Insulated Equipment****Table 28-1: Sulfur Hexafluoride (SF₆) Leak Emissions**

Pollutant	Total Usage in Ion Implant Tools (lb/yr)	Total Usage in Circuit Breakers, etc. (lb/yr)	Estimated Max Annual SF ₆ Circuit Breaker Leak Rate (%/yr)	Potential Leak Emissions	
				(lb/yr)	(tpy)
SF ₆	600	80,196	0.5%	1,001	0.50
CO ₂ e - 20-yr ²	-	-	-	17,517,132	8,759
CO ₂ e - 100-yr ³	-	-	-	23,523,006	11,762

1. Leak rates based on manufacturer guarantee.

2. 20-yr global warming potentials per 6 NYCRR Part 496.

3. 100-yr global warming potential per IPCC AR5.

Micron - Clay, NY Fabs 1 & 2
1-HPMCU and 2-HPMCU
Spin On Dielectric (SOD) Waste Treatment Emissions

Table 30-1: SOD Waste and Processing Chemical Usage

Mixture	SOD Waste Generated (lb/yr)
SOD Waste	24,714
Rinse Solvent	273,307
Reactant	16,009
Total SOD Waste	314,030

Table 30-2: Individual Chemical Emissions

Mixture	Primary Chemical					Emission Chemical			Process Emission Factor (lb emitted / lb used)	Emission Chemical Classifications								Pre-Controls Emissions (lb/yr)	RCTO DRE	Annual Emissions from Lab (lb/yr)
	CAS #	Chemical Name	Molecular Formula	Weight % of Mixture ¹	Usage (lb/yr)	CAS #	Emission Chemical	Molecular Formula		VOC	PM	NO _x	CO	SO ₂	HAP	GHG	HTAC			
SOD Waste	90387-00-1	Polysilazane	Varies	4%	903	90387-00-1	Polysilazane	Varies	0	X								0	0%	0
SOD Waste	90387-00-1	Polysilazane	Varies	4%	903	7803-62-5	Silane	SiH4	0									0	100%	0
SOD Waste	90387-00-1	Polysilazane	Varies	4%	903	7631-86-9	Silicon dioxide	SiO2	2.15		X							1,939	0%	1,939
SOD Waste	90387-00-1	Polysilazane	Varies	4%	903	7664-41-7	Ammonia	NH3	1.22									1,099	90%	110
SOD Waste	90387-00-1	Polysilazane	Varies	4%	903	10102-44-0	Nitrogen dioxide	NO2	3.29			X						2,969	0%	2,969
SOD Waste	142-96-1	Dibutyl Ether	C ₈ H ₁₈ O	98%	24,263	142-96-1	Dibutyl Ether	C8H18O	0.2	X								4,853	90%	485
SOD Waste	142-96-1	Dibutyl Ether	C ₈ H ₁₈ O	98%	24,263	124-38-9	Carbon dioxide	CO2	0.54						X			13,119	0%	13,119
Rinse Solvent	91-20-3	Naphthalene	C ₁₀ H ₈	8%	21,865	91-20-3	Naphthalene	C10H8	0.05	X				X				1,093	90%	109
Rinse Solvent	91-20-3	Naphthalene	C ₁₀ H ₈	8%	21,865	124-38-9	Carbon dioxide	CO2	0.17						X			3,754	0%	3,754
Rinse Solvent	95-63-6	TMB (1,2,4-TMB and 1,3,5-TMB)	C ₉ H ₁₂	10%	27,331	95-63-6	TMB (1,2,4-TMB and 1,3,5-TMB)	C9H12	0.20	X								5,466	90%	547
Rinse Solvent	95-63-6	TMB (1,2,4-TMB and 1,3,5-TMB)	C ₉ H ₁₂	4%	10,932	124-38-9	Carbon dioxide	CO2	0.66						X			7,206	0%	7,206
Rinse Solvent	64742-94-5	Solvent naphtha (petroleum), heavy arom.	Varies	100%	273,307	64742-94-5	Solvent naphtha (petroleum), heavy arom.	Varies	0.2	X				X				54,661	90%	5,466
Rinse Solvent	64742-94-5	Solvent naphtha (petroleum), heavy arom.	Varies	100%	273,307	124-38-9	Carbon dioxide	CO2	0.41						X			112,765	0%	112,765
Reactant	64-17-5	Ethanol	C ₂ H ₆ O	71%	11,398	64-17-5	Ethanol	C2H6O	1	X								11,398	90%	1,140
Reactant	64-17-5	Ethanol	C ₂ H ₆ O	71%	11,398	124-38-9	Carbon dioxide	CO2	1.91						X			21,777	0%	21,777
Reactant	1310-58-3	Potassium Hydroxide	KOH	10%	1,601	1310-58-3	Potassium Hydroxide	KOH	0									0	0%	0

1. The total of this column for all components in each mixture may exceed 100% due to variable composition.

Conversions

1 gal = 3785 cm³
1 gram = 2.205E-03 lbs

Table 30-3: Emissions per Exhaust Type

CAS	Emission Chemical Name	Exhaust Type ^{1,2}	Annual Pre-Control Emissions	Average Hourly Pre-Control Emissions	Variance Factor to Account for Hourly Operational Differences ³	Emission Rate Potential per HPM Building ⁴	RCTO DRE	Annual Potential Emissions	Number of Operational Stacks	Maximum Hourly Emissions Per Stack	Average Hourly Emissions Per Stack
			(lb/yr)	(lb/hr)		(lb/hr)		(lb/yr)		(lb/hr/stack)	(lb/hr/stack)
7631-86-9	Silicon dioxide	RCTO Burner Exhaust	1,939	2.21E-01	2400%	1.38	0%	1,939	12	4.61E-01	1.84E-02
7664-41-7	Ammonia	Solvent Exhaust	1,044	1.19E-01	2400%	7.45E-01	-	104.4	12	2.48E-02	9.93E-04
7664-41-7	Ammonia	RCTO Burner Exhaust	55.0	6.27E-03	2400%	3.92E-02	90%	5.50	12	1.31E-03	5.23E-05
10102-44-0	Nitrogen dioxide	RCTO Burner Exhaust	2,969	3.39E-01	2400%	2.12	0%	2,969	12	7.06E-01	2.82E-02
142-96-1	Dibutyl Ether	Solvent Exhaust	4,610	5.26E-01	2400%	3.29	-	461.0	12	1.10E-01	4.39E-03
142-96-1	Dibutyl Ether	RCTO Burner Exhaust	242.6	2.77E-02	2400%	1.73E-01	90%	24.3	12	5.77E-03	2.31E-04
124-38-9	Carbon dioxide	RCTO Burner Exhaust	158,620	18.1	2400%	113.2	0%	158,620	12	37.7	1.51E+00
91-20-3	Naphthalene	Solvent Exhaust	1,039	1.19E-01	2400%	7.41E-01	-	103.9	12	2.47E-02	9.88E-04
91-20-3	Naphthalene	RCTO Burner Exhaust	54.7	6.24E-03	2400%	3.90E-02	90%	5.47	12	1.30E-03	5.20E-05
95-63-6	TMB (1,2,4-TMB and 1,3,5-TMB)	Solvent Exhaust	5,193	5.93E-01	2400%	3.70	-	519.3	12	1.23E-01	4.94E-03
95-63-6	TMB (1,2,4-TMB and 1,3,5-TMB)	RCTO Burner Exhaust	273.3	3.12E-02	2400%	1.95E-01	90%	27.3	12	6.50E-03	2.60E-04
64742-94-5	Solvent naphtha (petroleum), heavy arom.	Solvent Exhaust	51,928	5.93	2400%	37.0	-	5,193	12	1.23E+00	4.94E-02
64742-94-5	Solvent naphtha (petroleum), heavy arom.	RCTO Burner Exhaust	2,733	3.12E-01	2400%	1.95	90%	273.3	12	6.50E-02	2.60E-03
64-17-5	Ethanol	Solvent Exhaust	10,828	1.24	2400%	7.73	-	1,083	12	2.58E-01	1.03E-02
64-17-5	Ethanol	RCTO Burner Exhaust	569.9	6.51E-02	2400%	4.07E-01	90%	57.0	12	1.36E-02	5.42E-04

1. 95% of total VOC emissions are emitted through the Solvent Exhaust
2. 5% of total VOC emissions are emitted through the RCTO Burner Exhaust. 100% of thermal oxidation byproducts are emitted through the RCTO burner exhaust.
3. The SOD waste treatment process will occur intermittently. Maximum hourly emission rates are based on the treatment process occurring for one hour each day.
4. There are two proposed separate HPM buildings per fab, a "north" and "south" HPM.

Conversions

1 gal = 3785 cm³
1 gram = 2.205E-03 lbs

Micron - Clay, NY Fabs 1 & 2
1-FABOP and 2-FABOP
Regenerative Catalytic System (RCS) Combustion Emissions

Table 31-1. RCS Specifications and Inventory

Equipment Description ¹	Equipment Count	Burner Rating
		(MMBtu/hr)
Regenerative Catalytic System - Process FA1 and FA2	20	0.6

1. Exhaust from the outlet of each RCS, including emissions from natural gas combustion, will pass through fab acid exhausts.

Table 31-2. RCS Criteria Pollutant and GHG Potential to Emit

Pollutant	Emission Factor ^{1,2,3} (lb/MMscf)	Potential to Emit (per Unit)		Potential to Emit (All Units)	
		(lb/hr)	(tpy)	(lb/hr)	(tpy)
PM (Total)	7.6	4.47E-03	0.02	0.09	0.39
PM ₁₀	7.6	4.47E-03	0.02	0.09	0.39
PM _{2.5}	7.6	4.47E-03	0.02	0.09	0.39
SO ₂	0.6	3.53E-04	1.55E-03	0.01	0.03
CO	420	0.25	1.08	4.94	21.6
NO _x	100	0.06	0.26	1.18	5.15
VOC	5.5	3.24E-03	0.01	0.06	0.28
Lead	0.0005	2.94E-07	1.29E-06	5.88E-06	2.58E-05
CO ₂	120,000	70.6	309.2	1,412	6,184
CH ₄	2.3	1.35E-03	0.01	0.03	0.12
N ₂ O	2.2	1.29E-03	0.01	0.03	0.11
CO ₂ e - 20-yr ⁴	-	71.0	311.2	1,421	6,223
CO ₂ e - 100-yr ⁵	-	71.0	310.8	1,419	6,217
Upstream CO ₂ e ⁶	91,921	54.1	236.8	1,081	4,737
Upstream CO ₂ ⁶	28,219	16.6	72.7	332.0	1,454
Upstream CH ₄ ⁶	758	0.45	1.95	8.92	39.0
Upstream N ₂ O ⁶	0.31	1.85E-04	8.11E-04	3.70E-03	0.02

1. Emission Factors from AP-42 Section 1.4 Table 1.4-1 and 1.4-2 for Small Boilers.

2. Per AP-42 Section 1.4 Table 1.4-2, PM (total) = PM₁₀ = PM_{2.5}.

3. AP-42 emission factor for CO from NG combustion multiplied by safety factor of 5 to account for emissions as a result of partial oxidation of process chemicals.

4. 20-yr Global warming potentials per 6 NYCRR Part 496.

5. 100-yr Global warming potentials per 40 CFR Part 98, Table A-1 (*Global Warming Potentials*).

6. Upstream GHG emission factors per Appendix of 2024 NYS Statewide GHG Emissions Report:

CO ₂ e:	40,877	g/MMBtu
CO ₂ :	12,549	g/MMBtu
CH ₄ :	337	g/MMBtu
N ₂ O:	0.14	g/MMBtu

Table 31-3. RCS HAP Potential to Emit

Pollutant	HAP?	Emission Factor ¹	Potential to Emit (per Unit)		Potential to Emit (Total per Stack)	
		(lb/MMscf)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Benzene	Yes	2.10E-03	1.24E-06	5.41E-06	2.47E-05	1.08E-04
Formaldehyde	Yes	7.50E-02	4.41E-05	1.93E-04	8.82E-04	3.86E-03
Toluene	Yes	3.40E-03	2.00E-06	8.76E-06	4.00E-05	1.75E-04
2-Methylnaphthalene	Yes	2.40E-05	1.41E-08	6.18E-08	2.82E-07	1.24E-06
3-Methylchloranthrene	Yes	1.80E-06	1.06E-09	4.64E-09	2.12E-08	9.28E-08
7,12-Dimethylbenz(a)anthracene	Yes	1.60E-05	9.41E-09	4.12E-08	1.88E-07	8.24E-07
Acenaphthylene	Yes	1.80E-06	1.06E-09	4.64E-09	2.12E-08	9.28E-08
Benzo(a)pyrene	Yes	1.20E-06	7.06E-10	3.09E-09	1.41E-08	6.18E-08
Benzo(b)fluoranthene	Yes	1.80E-06	1.06E-09	4.64E-09	2.12E-08	9.28E-08
Benzo(k)fluoranthene	Yes	1.80E-06	1.06E-09	4.64E-09	2.12E-08	9.28E-08
Dibenzo(a,h)anthracene	Yes	1.20E-06	7.06E-10	3.09E-09	1.41E-08	6.18E-08
Dichlorobenzene	Yes	1.20E-03	7.06E-07	3.09E-06	1.41E-05	6.18E-05
Hexane	Yes	1.80E+00	1.06E-03	4.64E-03	0.02	0.09
Naphthalene	Yes	6.10E-04	3.59E-07	1.57E-06	7.18E-06	3.14E-05
Acenaphthene	Yes	1.80E-06	1.06E-09	4.64E-09	2.12E-08	9.28E-08
Anthracene	Yes	2.40E-06	1.41E-09	6.18E-09	2.82E-08	1.24E-07
Benzo(a)anthracene	Yes	1.80E-06	1.06E-09	4.64E-09	2.12E-08	9.28E-08
Benzo(g,h,i)perylene	Yes	1.20E-06	7.06E-10	3.09E-09	1.41E-08	6.18E-08
Chrysene	Yes	1.80E-06	1.06E-09	4.64E-09	2.12E-08	9.28E-08
Fluoranthene	Yes	3.00E-06	1.76E-09	7.73E-09	3.53E-08	1.55E-07
Fluorene	Yes	2.80E-06	1.65E-09	7.21E-09	3.29E-08	1.44E-07
Indeno(1,2,3-cd)pyrene	Yes	1.80E-06	1.06E-09	4.64E-09	2.12E-08	9.28E-08
Phenanthrene	Yes	1.70E-05	1.00E-08	4.38E-08	2.00E-07	8.76E-07
Pyrene	Yes	5.00E-06	2.94E-09	1.29E-08	5.88E-08	2.58E-07
Arsenic	Yes	2.00E-04	1.18E-07	5.15E-07	2.35E-06	1.03E-05
Beryllium	Yes	1.20E-05	7.06E-09	3.09E-08	1.41E-07	6.18E-07
Cadmium	Yes	1.10E-03	6.47E-07	2.83E-06	1.29E-05	5.67E-05
Chromium	Yes	1.40E-03	8.24E-07	3.61E-06	1.65E-05	7.21E-05
Cobalt	Yes	8.40E-05	4.94E-08	2.16E-07	9.88E-07	4.33E-06
Lead	Yes	5.00E-04	2.94E-07	1.29E-06	5.88E-06	2.58E-05
Manganese	Yes	3.80E-04	2.24E-07	9.79E-07	4.47E-06	1.96E-05
Mercury	Yes	2.60E-04	1.53E-07	6.70E-07	3.06E-06	1.34E-05
Nickel	Yes	2.10E-03	1.24E-06	5.41E-06	2.47E-05	1.08E-04
Selenium	Yes	2.40E-05	1.41E-08	6.18E-08	2.82E-07	1.24E-06
Total HAP PTE			1.11E-03	4.87E-03	2.22E-02	9.73E-02

1. Emission factors are from AP-42, Section 1.4, Tables 1.4-3 and 1.4-4.

Conversions

1 lb =	453.59 g
1 scf NG =	1,020 BTU - Average heat content of NG from AP-42 1.4.1.
1 year =	8,760 hours

Micron - Clay, NY Fabs 1 & 2
1-CMPOP and 2-CMBOP
Diesel Fire Pump Combustion Emissions

Table 32-1. Diesel Fire Pump Engine Information

Equipment Description	Annual Operating Hours Limit (hrs/yr/engine)	Engine Full Load	Engine Power
		HP	kW
Diesel Fire Pump Engine	500	250	186

1. This diesel fire pump engine is a backup to an electric fire pump. It will only run in the event of a fire during a loss of power. It will be tested weekly.

Table 32-2. Diesel Fire Pump Engine Criteria Pollutant and GHG Potential to Emit

Pollutant	Tier 3 Exhaust Emission Standards ^{1,2}	AP-42 Emission Factors ³	GHG Emission Factors ⁴	Potential to Emit	
	(g/kW-hr)	(lb/HP-hr)	(kg/MMBtu)	(lb/hr)	(tpy)
PM (Total)	0.200	-	-	0.08	0.02
PM ₁₀	0.200	-	-	0.08	0.02
PM _{2.5}	0.200	-	-	0.08	0.02
SO ₂	-	2.05E-03	-	0.51	0.13
CO	3.5	-	-	1.44	0.36
NO _x	4.0	-	-	1.64	0.41
VOC	4.0	-	-	1.64	0.41
CO ₂	-	-	73.96	103.8	25.9
CH ₄	-	-	0.0030	4.21E-03	1.05E-03
N ₂ O	-	-	0.00060	8.42E-04	2.10E-04
CO ₂ e - 20-yr ⁵	-	-	-	104.4	26.1
CO ₂ e - 100-yr ⁶	-	-	-	104.1	26.0
Upstream CO ₂ e ⁷	-	-	23.54	33.0	8.26
Upstream CO ₂ ⁷	-	-	13.63	19.1	4.78
Upstream CH ₄ ⁷	-	-	0.12	0.16	0.04
Upstream N ₂ O ⁷	-	-	2.50E-04	3.51E-04	8.77E-05

1. Tier 3 emission factors for all pollutants besides SO₂ are from Table 1 of 40 CFR Part 1039 Subpart B - Emission Standards and Related Requirements.

2. PM_{2.5} and PM₁₀ emission factors conservatively assumed to be equal to that of PM (total).

3. SO₂ emission factor is based on AP-42 Section 3.3, Table 3.3-1.

4. CO₂, N₂O and CH₄ emission factors based on 40 CFR Part 98 Table C-1 and C-2 Default diesel emissions factors.

5. 20-yr Global warming potentials per 6 NYCRR Part 496.

6. 100-yr Global warming potentials per 40 CFR Part 98, Table A-1 (*Global Warming Potentials*).

7. Upstream GHG emission factors per Appendix of 2024 NYS Statewide GHG Emissions Report:

CO ₂ e:	23,540	g/MMBtu
CO ₂ :	13,634	g/MMBtu
CH ₄ :	117	g/MMBtu
N ₂ O:	0.25	g/MMBtu

Table 32-3. Diesel Fire Pump Engine HAP Potential to Emit

Pollutant	HAP?	Emission Factor ¹	Potential to Emit	
		(lb/MMBtu)	(lb/hr)	(tpy)
Benzene	Yes	9.33E-04	5.94E-04	1.48E-04
Toluene	Yes	4.09E-04	2.60E-04	6.51E-05
Xylenes	Yes	2.85E-04	1.81E-04	4.54E-05
1,3 Butadiene	Yes	3.91E-05	2.49E-05	6.22E-06
Formaldehyde	Yes	1.18E-03	7.51E-04	1.88E-04
Acetaldehyde	Yes	7.67E-04	4.88E-04	1.22E-04
Acrolein	Yes	9.25E-05	5.89E-05	1.47E-05
Total PAH	Yes	1.68E-04	1.07E-04	2.67E-05
		Total HAP PTE	2.47E-03	6.16E-04

1. Emissions are calculated based on emission factors for diesel engines per AP-42 Section 3.3, Table 3.3-2.

Conversions

1 lb =	453.59	g
1 year (Emergency Operation) =	500	hr
Energy Conversion Factor:	392.75	bhp-hr/MMBtu (mechanical) in AP-42 Appendix A
15 ppm S =	0.0015	wt% S
Horsepower (mechanical) =	0.74558	Kilowatts
Diesel Usage Conversion Factor:	0.138	MMBtu/gal

APPENDIX C: PART 212 REGULATORY ANALYSIS

Appendix C consists of the analysis of 6 NYCRR Part 212 that was submitted as part of the Micron Clay Air Permit Application for the Micron Campus Proposed Air Permit Project submitted to the NYSDEC on March 7, 2025. For consistency, the content of this appendix has not been revised in this protocol. There are several references in the body of Appendix C that refer to other sections of the Micron Clay Air Permit Application, or other appendices included therein. Please refer to the full submittal if additional information from a referenced document or section is required.

3.4.4 6 NYCRR Part 212: Process Operations

Part 212 applies to process emission sources (PESs) and/or emission points (EPs) from process operations from facilities in New York. The provisions of Part 212 will apply to the Proposed Air Permit Project upon issuance of the air permit.

3.4.4.1 Process Emission Source Alignment

As described in Section 1.4, the Proposed Air Permit Project includes several process tools, a configuration of associated vent collection headers, and a series of redundant control devices that are unique to semiconductor fab operations. The requirements of Part 212 apply to PESs and/or EPs from process operations based on specific configurations and the potential to comingle air contaminants. This section clarifies how the requirements of Part 212 are analyzed for the Proposed Air Permit Project. To support this analysis, select definitions from Part 212 related to this determination are presented in this section.

A process emission source is defined in 6 NYCRR 212-1.2(b)(19) as:

Any apparatus, contrivance or machine, including any appurtenant exhaust system or air cleaning device capable of causing emissions of any air contaminant to the outdoor atmosphere from a process operation.

A process operation is defined in 6 NYCRR 212-1.2(b)(18) as:

Any industrial, institutional, commercial, agricultural or other activity, operation, manufacture or treatment in which chemical, biological and/or physical properties of the material or materials are changed, or in which the material(s) is conveyed or stored without changing the material(s) if the conveyance or storage system is equipped with a vent(s) and is non-mobile, and that emits air contaminants to the outdoor atmosphere. A process operation does not include an open fire, operation of a combustion installation, or incineration of refuse other than by-products or wastes from a process operation(s).

The industrial processes planned to be installed as part of the Proposed Air Permit Project meet these definitions, except as described in Section 3.3.4.2.

Part 212 General Provisions in 6 NYCRR 212-1.5(a) through (c) describe how to address instances in which emissions from multiple PESs are emitted through the same EP and when emissions from a single PES are emitted from more than one EP. As described in more detail in Section 1.4 above, the emissions from multiple process tools and associated PEECs will vent into common headers based on the compatibility of the exhaust streams and appropriate control technology, then emissions from the headers will be exhausted to a bank of control devices with built-in redundancy.

For PESs that follow this configuration, 6 NYCRR 212-1.5(b) indicates that the sum of emissions from all of the connected emission points must not exceed the emissions if they were vented through the same emission point. Per 6 NYCRR 212-2.1(b), the allowable emission rate for any air contaminant is dictated by the contaminant's emission rate potential (ERP) and the associated degree of air cleaning (i.e., control percent) required is based the contaminant's Environmental Rating and Tables 3 or 4 of Part 212. As defined in 6 NYCRR 200.1(u), the ERP is the "maximum rate at which a specified air contaminant from an emission source would be emitted to the outdoor atmosphere in the absence of any control equipment..."

and is measured in pounds per hour prior to an air pollution control device. The Environmental Rating of an air contaminant is described in detail in Section 3.3.4.4.

For the Proposed Air Permit Project, the ERP prior to the control device(s) is the total emission rate measured at each common header due to comingling of emissions from multiple processes therein. Therefore, the collection of process tools and equipment vented to the same vent header is considered one PES. The general exhaust system exhausting air from the cleanroom workspace is not controlled and ERP equals PTE for the small quantity of air contaminants emitted through the general exhaust.

Fab 1 and Fab 2 will be divided into two halves each. Each half of the Fab will be equipped with one centralized vent header of each exhaust type to collect exhaust from many tools. The header and vent types include those described in Section 1.4.3, Fab Exhaust Types.

To summarize the conclusions from this analysis:

- ▶ PESs for semiconductor manufacturing operations consist of the group of process tools and supporting equipment that are vented to a common header.
- ▶ The ERP for process tools will be determined at each common header and will be the sum of emissions from all ducts exhausting from the common header.
- ▶ The control efficiency requirements of Tables 3 and 4 (as applicable) of Part 212 apply to a collective bank of control devices connected to the same header on a mass weighted basis.

3.4.4.2 Applicability of Part 212 to Process Operations

This section identifies the aspects of the Proposed Air Permit Project that are process operations/PESs and therefore are subject to Part 212.

3.4.4.2.1 Combustion Installations

Combustion installations are specifically excluded from the definition of process operation. A combustion installation is defined in 6 NYCRR 200.1(l) as:

An installation, consisting of a single furnace, device, engine or turbine in which fossil fuel, wood, and/or other solid, liquid, or gaseous fuel is burned with air or oxygen and the air contaminant emissions include only those products resulting from: (1) combustion of the fuel; (2) additives or impurities in the fuel; and (3) material introduced for the purpose of altering air contaminant emissions.

The following equipment planned to be installed as part of the proposed air permit project meets the definition of combustion installation, and therefore are not PESs subject to analysis under Part 212:

- ▶ Natural gas-fired boilers;
- ▶ Diesel-fired emergency generators;
- ▶ Diesel-fired emergency fire pump engines; and
- ▶ Natural gas-fired water bath vaporizers.

3.4.4.2.2 Storage and Conveyance Systems Without Vents

According to the definition cited above, "operation[s]... in which the material(s) is conveyed or stored" are only process operations "if the conveyance or storage system is equipped with a vent(s)". Therefore, conveyance and storage systems not equipped with vents do not meet the definition of process operation.

Fab 1 and Fab 2 will include conveyance systems used to transfer process materials from storage tanks to the tools or waste from the tools to storage / waste handling operations. These conveyance systems are not equipped with a vent and are therefore not process operations subject to regulation under Part 212.

Process chillers containing HTFs that are used to regulate tool temperatures are also conveyance/storage systems in which materials are contained in a closed loop that is not equipped with a vent. These process chillers are not process operations subject to Part 212.

Circuit breakers and other gas-insulated electrical equipment are used throughout the Micron Campus. This type of equipment can be considered a storage system containing SF₆ or other alternative insulating mediums, and is not equipped with a vent. Therefore, circuit breakers and gas-insulated electrical equipment are not process operations subject to Part 212.

3.4.4.2.3 Process Operations

Certain process operations are not subject to Part 212 if covered by one or more of the exceptions listed in 6 NYCRR 212-1.4. The first exception, listed in 6 NYCRR 212-1.4(a), indicates that emission sources designated as exempt or trivial under 6 NYCRR 201-3.2 or 201-3.3, respectively, are not subject to Part 212. The following exempt or trivial activities planned for the Proposed Air Permit Project are therefore not subject to further analysis:

- ▶ Non-contact water cooling towers;
- ▶ Diesel storage tanks;
- ▶ Storage tanks with capacities less than 10,000 gallons and not subject to Part 229;
- ▶ Solid material storage silos;
- ▶ Storage tanks with capacities less than 750 gallons; and
- ▶ Laboratory operations.

Additionally, emissions of ethane are trivial per 201-3.3(c)(94) and emissions of CO₂ and CH₄ are trivial per 201-3.3(c)(95) and are therefore not subject to analysis under Part 212. Emissions of propane are also not subject to analysis under Part 212 per NOIA Comment #58 received from the NYSDEC.

The following individual pollutant emissions from process operations planned for the Proposed Air Permit Project are not subject to further analysis under Part 212 due to meeting one of the other listed exception criteria:

- ▶ Emissions of SO_x attributable to sulfur in fuel, as a result of natural gas combustion per 6 NYCRR 212-1.4(i);
- ▶ Emissions of CO and VOCs from combustion per 6 NYCRR 212-1.4(m);
- ▶ Emissions of NO_x produced by RCTOs, RCS, and POU control devices, as they are thermal oxidizers used as air pollution control equipment, per 6 NYCRR 212-1.4(r); and

- ▶ Emissions of VOCs that are not given an A rating in storage tanks subject to Part 229 per 6 NYCRR 212-1.4(f). As described in Section 3.3.8, all tanks storing VOC are subject to Part 229 requirements.

The remaining emissions from process operations associated with the Proposed Air Permit Project are subject to the requirements of Part 212. These process operations are:

- ▶ All semiconductor manufacturing process tools and cleaning operations;
- ▶ PEECs;
- ▶ RCTOs, RCS, and POU control devices;
- ▶ Wastewater treatment operations;
- ▶ Storage tanks 10,000 gallons or larger, except for those storing B- or C-rated VOC that are subject to Part 229; and
- ▶ SOD waste neutralization operations.

Compliance strategies will differ by category of pollutant. Each proposed compliance strategy is described in the subsections below. Tables 1-3 and 1-4 of Appendix F illustrate the compliance strategy that applies to each individual pollutant and analog group with emissions from process operations subject to Part 212.

3.4.4.3 Compliance via Mass-based Thresholds

Both Part 212 and DAR-1, Guidelines for the Evaluation and Control of Ambient Air Contaminants Under 6 NYCRR Part 212¹ include emission rate thresholds that apply to individual chemicals as part of the evaluation of Part 212. In addition, the NYSDEC Division of Air Resources (DAR) Air Toxics Section has established a practice of applying an additional threshold to chemical compounds that are not listed on DAR-1 to confirm they do not meet the criteria for a high toxicity air contaminant (i.e., A-rated – discussed further below) in 6 NYCRR 212-1.2(b)(9). The criteria and associated mass-based thresholds are summarized below:

- ▶ Chemical compounds that are listed in 6 NYCRR 212-2.2, Table 2 as high toxicity air contaminants (HTAC) and that will have actual annual emissions below the compound-specific Mass Emission Limit (MEL) specified in Table 2 require no further evaluation under Part 212 per 6 NYCRR 212-2.1(a).
- ▶ For chemical compounds with less than 100 lb/yr actual emissions, DAR-1 Sections V.A.2 and V.C indicate that an Environmental Rating and ERP are not required to be submitted. Per DAR-1, this applies to compounds that are not Table 2 HTAC and other compounds that are not listed on DAR-1.

Although Part 212 and DAR-1 specifies that actual emissions can be compared to the above thresholds, the thresholds conservatively are applied to the PTE of each compound in this permit application. The PTE accounts for emissions reduction using a federally enforceable control device meeting the provision of 6 NYCRR 212-1.5(g).

Compounds that fall below the mass-based thresholds described above are identified in Tables 1-3 and 1-4 of Appendix F and are not evaluated further under Part 212.

¹ DAR-1: Guidelines for the Evaluation and Control of Ambient Air Contaminants Under 6 NYCRR Part 212, February 12, 2021

3.4.4.4 Environmental Rating of Air Contaminants

An Environmental Rating is established on a chemical-specific basis for use in permitting based on the toxicity and other properties of the compound. According to DAR-1, a rating must be assigned to determine the compliance requirement for contaminants with emissions greater than the mass-based thresholds discussed above. NYSDEC has established and published toxicity ratings for several compounds in DAR-1, with a three-tiered system: high toxicity compounds are A-rated, moderate toxicity compounds are B-rated, and low toxicity compounds are C-rated. For compounds listed in DAR-1 that are not assigned a toxicity, the Environmental Rating is assumed to be B per DAR-1 Section V.C.1. In this application (including appendices), this is represented as "B*".

For those compounds that are not listed in DAR-1 and that will be emitted from the Proposed Air Permit Project, NYSDEC provided Interim Environmental Ratings that had been previously evaluated by the NYSDEC but have not yet been published in DAR-1². NYSDEC DAR Air Toxics Section also has provided feedback on and modifications to toxicity classifications and Interim Environmental Ratings that were proposed by Micron and its consultants, SafeBridge Regulatory & Life Sciences Group (SafeBridge) and Trinity, based on regulatory and literature reviews presented to the agency.

For Interim Environmental Ratings approved by NYSDEC as part of this process or provided directly by the NYSDEC, the Environmental Ratings are presented with the prefix "INT-". For example, a high toxicity rating approved by the DAR Air Toxics Section is presented as "INT-A." Compounds that are not listed in DAR-1 for which a toxicity rating has been proposed by SafeBridge, but not yet been approved by the NYSDEC, will be marked with the prefix "INT-" and the suffix "*". In the event that NYSDEC review requires an amended Environmental Rating, this analysis will be updated.

Table 3-2 below summarizes the Environmental Ratings assigned in this application.

Table 3-2. Summary of Environmental Ratings as Listed in the Micron Clay Air Permit Application

Environmental Rating	Description
A	Compound listed in DAR-1 with high toxicity rating
B	Compound listed in DAR-1 with medium toxicity rating
C	Compound listed in DAR-1 with low toxicity rating
B*	Compound listed in DAR-1 with no toxicity rating
INT-A	Compound not listed in DAR-1, Interim Environmental Rating of A approved by NYSDEC
INT-B	Compound not listed in DAR-1, Interim Environmental Rating of B approved by NYSDEC
INT-C	Compound not listed in DAR-1, Interim Environmental Rating of C approved by NYSDEC
INT-A*	Compound not listed in DAR-1, Interim Environmental Rating of A proposed by SafeBridge but not approved by NYSDEC at the time of this application

² Email from Mr. Donald Ward (NYSDEC) to Trinity Consultants, July 26, 2023, and from Mr. Donald Ward (NYSDEC) to Trinity Consultants, December 21, 2023.

Environmental Rating	Description
INT-B*	Compound not listed in DAR-1, Interim Environmental Rating of B proposed by SafeBridge but not approved by NYSDEC at the time of this application
INT-C*	Compound not listed in DAR-1, Interim Environmental Rating of C proposed by SafeBridge but not approved by NYSDEC at the time of this application

3.4.4.5 Project-Specific Analogous Chemical Combined Evaluation

As part of the collaboration between NYSDEC and SafeBridge, Micron is proposing to characterize the Environmental Rating and establish interim annual and short-term guideline concentrations (AGCs/SGCs) for compounds that have not been previously assessed by the NYSDEC. Part of that assessment includes identifying analogous compounds (i.e., those that have similar structural, toxicological, and/or metabolic properties using a weight-of-evidence approach). For compounds where a proposed analogous compound will also be emitted from the Proposed Air Permit Project, the NYSDEC has requested that Part 212 compliance is assessed for the group of compounds as a whole. Table 1-4 of Appendix F lists the analog groups that have been approved by the NYSDEC.

3.4.4.6 Hazardous Air Pollutants Regulated by a NESHAP

As discussed in Section 3.2 related to NESHAP Subpart BBBBB, emissions of HAP from each "semiconductor manufacturing process unit", which includes fab processes and storage tanks, are subject to NESHAP Subpart BBBBB. The emission sources that are subject to NESHAP Subpart BBBBB for the Proposed Air Permit Project are described in Section 3.2 and cover emissions of all inorganic and organic HAP emitted from process vents and/or storage tanks.

For each HAP regulated by NESHAP Subpart BBBBB, Micron will satisfy the requirements of Part 212 by demonstrating compliance with NESHAP Subpart BBBBB, in accordance with 6 NYCRR 212-1.5(e)(2). NYSDEC has agreed that each individual organic HAP and inorganic HAP is a "respective air contaminant regulated by the Federal standard" in accordance with 6 NYCRR 212-1.5(e)(2). NESHAP Subpart BBBBB regulates organic HAPs and inorganic HAPs categorically.

Two of the inorganic HAPs subject to NESHAP Subpart BBBBB, arsine and formaldehyde, are included in the HTAC list in 6 NYCRR 212-2.2, Table 2. For HTAC subject to a NESHAP, 6 NYCRR 212-1.5(e)(2) requires compliance with either the applicable AGC and SGC through air dispersion modeling, or with the MEL listed in Table 2. Micron will demonstrate compliance with Part 212 by maintaining actual annual emissions of arsine and formaldehyde below the MEL of 10 pounds per year for arsine and 100 pounds per year for formaldehyde, both listed in Table 2, in accordance with §212-2.1(a). Note that arsenic compounds are also a Table 2 HTAC, but arsine is the only arsenic compound emitted from the Proposed Air Permit Project, so the MEL for arsine is used in this analysis.

3.4.4.7 Volatile Organic Compounds Subject to RACT

As discussed in Section 3.3.9, the Proposed Air Permit Project will exceed the VOC thresholds listed in 6 NYCRR 212-3.1(a)(2), so the project is subject to 6 NYCRR 212-3 which requires a VOC Reasonably Available Control Technology (RACT) compliance plan per §212-3.1(f). A VOC RACT plan is included in Appendix N of this permit application.

Per 6 NYCRR 212-1.5(f), facilities that are subject to §212-3 for VOCs are not subject to the VOC control provisions of Subpart 212-2, except for VOC assigned an A rating, which must individually meet Table 4 of Part 212. Micron acknowledges that the NYSDEC reserves the right to assign a final Environmental Rating that is different from the initial Environmental Ratings published in DAR-1 or derived by SafeBridge and approved by the NYSDEC on a case-by-case basis. In the event that the NYSDEC assigns a final Environmental Rating of A to a VOC given a lower initial Environmental Rating, an individual compound analysis of Table 4 of Part 212 will be completed.

3.4.4.8 Particulate Matter

Control requirements for particulate matter (PM) in Part 212 are evaluated according to §212-2.1(c) for solid particulate assigned an Environmental Rating of B or C and according to Table 4 per §212-2.1(b) if not rated B or C.

All solid particulate emitted from the Proposed Air Permit Project has been given an Environmental Rating of B, B* or C in DAR-1 or INT-B, INT-C, INT-B*, or INT-C* through the process described in Section 3.3.4.4. Therefore, the requirements to meet the PM grain standard in 6 NYCRR 212-2.4(b) will apply as all emission sources at the Proposed Air Permit Project will be installed after 1973 and no emission sources at the Proposed Air Permit Project are listed in §212-2.5(a), Table 5. Table 1-5 of Appendix F demonstrates that the combined PM emissions from process operations will meet the applicable PM grain standard.

In the event that the NYSDEC assigns a final Environmental Rating of A to a PM given a lower initial Environmental Rating, an individual compound analysis of Table 4 of Part 212 will be completed.

3.4.4.9 Nitrogen Oxides

As demonstrated in Section 3.3.9 of this permit application, the Proposed Air Permit Project will exceed the thresholds listed in 6 NYCRR 212-3.1(a)(2). Therefore, the Proposed Air Permit Project will be subject to 6 NYCRR 212-3, which requires that a NO_x RACT compliance plan is submitted per §212-3.1(f). A NO_x RACT plan is included in Appendix I of this permit application.

As indicated in 6 NYCRR 212-1.5(f), facilities that are subject to §212-3 for NO_x are not subject to the control provisions of Subpart 212-2 for NO_x. Therefore, compliance with the control requirements of Subpart 212-2 is achieved through demonstrating compliance with the NO_x RACT plan in Appendix I.

3.4.4.10 Carbon Monoxide

Carbon monoxide is generated as a result of certain chemical reactions that take place within process tools, through oxidizing (or “ashing”) excess materials used in the photoresist process, and through incomplete combustion of fuels and organic materials in devices used to thermally oxidize emission streams. As described in Appendix G, the emission calculations also assume full oxidation of all carbon atoms that are used in raw materials and processes gases in the semiconductor manufacturing operations to conservatively calculate CO₂ emissions.

Because of the nature of the semiconductor process operations, the ratio of CO to CO₂ generation from carbon-based process gases and raw materials is not readily quantifiable. To account for this, the air emission calculations for CO have made assumptions based on a semiconductor exhaust management and

control book as described in Section 2.1.3.1 and cited in Appendix U. This approach assumes that CO emissions for all operations can be conservatively estimated using an emission factor equal to five times the emission factor for CO in AP-42 Vol. I, Chapter 1.4: Natural Gas Combustion, Table 1.4-1. This approach is used to conservatively estimate emissions of both process-based CO (i.e., that generated from chemical reactions of process gases) and from incomplete combustion.

This conservative approach to calculating air emissions is based on the fact that a large portion of CO emissions from process operations are generated as a result of operating necessary safety equipment or emissions controls for other pollutants. The requirements set forth in Table 3 or Part 212 specify NAAQS compliance for lower levels of emissions (i.e., <10 lb/hr for B- or C-rated compounds) and to achieve an appropriate level of control for higher levels of emissions.

As indicated in Section 3.3.9, the Proposed Air Permit Project is a major new source of CO under the PSD air permitting program and therefore, is subject to both CO BACT and air dispersion modeling to demonstrate compliance with the NAAQS. Since the Proposed Air Permit Project is a new source, every emission source that generates CO is required to be analyzed to demonstrate BACT and to be included in air dispersion modeling, including those that are subject to analysis under Part 212.

Micron is proposing that compliance with the degree of air cleaning and offsite impact requirements of Part 212 for CO in Table 3 are satisfied by the assessment of CO BACT in Appendix J and air dispersion modeling to satisfy the NAAQS in accordance with 6 NYCRR 231-7.6 and 231-12.3, respectively.

3.4.4.11 Sulfur Dioxide

Sulfur dioxide is generated as a result of certain chemical reactions that take place within process equipment, through oxidation of sulfur-bearing compounds in combustion-based control devices and from oxidation of sulfur in fuel. Sulfur dioxide attributable to sulfur in fuel is excluded from Part 212 is per 6 NYCRR 212-1.4(i) and not considered further. SO₂ emissions attributable to sulfur in raw materials used in process operations is included in the analysis in Table 1-3 of Appendix F. Only the sources of SO₂ that are subject to Part 212 will be included in the required air dispersion modeling.

3.4.4.12 Ozone Emissions

Ozone is used as a raw material in thin films processes and will be generated onsite as opposed to purchased from a supplier. Micron has conservatively estimated the amount of ozone that will be generated per year based on demands for similar manufacturing facilities as shown in Table 11-1 and Table 11-2 of Appendix F. Ozone that is not utilized in the process will be managed by PEECs that serve to prevent odor issues in the fab if reentrainment were to occur. Emissions of ozone will exhaust through centralized acid scrubbers and CVD scrubbers along with other emissions from thin films processes. Direct emissions of ozone are not treated as a criteria pollutant themselves, because "ozone is generally considered an unstable secondary pollutant formed in the atmosphere by the photochemical reaction of nitrogen oxides and reactive hydrocarbons in the presence of high temperatures and ultraviolet light,"³ and the definition of criteria air contaminant in 6 NYCRR 212-1.2(b)(4) lists "ground-level ozone", implying ozone formed by such photochemical reactions. When treated as a non-criteria pollutant for the purposes of Part 212, emissions of ozone would be subject to 6 NYCRR 212-2.1(b) and Table 4. As illustrated in Table 11-2 of Appendix F, the ERP per half (or per PES) is <0.1 lb/hr. Regardless of the Environmental Rating, compliance with Part 212

³ DAR-1, Section V.C.4.

would be demonstrated by air dispersion modeling. However, DAR-1 indicates that because ozone is considered a secondary air contaminant, "the US EPA and NYSDEC do not have an appropriate model to calculate ozone impacts from a single source."⁴ Considering this, Micron includes direct emissions of ozone in this permit application, but recognizes that there is no control or other measures required to satisfy Part 212 for ozone.

3.4.4.13 Air Dispersion Modeling

Air dispersion modeling is required to demonstrate that emissions of several compounds and analog groups meet the requirements of Part 212, per 6 NYCRR 212-2.3 Table 3 and Table 4. As required by Part 212 and DAR-10, NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis,⁵ an initial air dispersion modeling protocol was submitted to the NYSDEC following Permit Application 1. A revised modeling protocol will be submitted to the NYSDEC under separate cover that aligns with this application. Once the revised protocol is approved by the NYSDEC, a modeling report will be submitted.

3.4.4.14 Emissions Control

For compounds with ERPs exceeding the thresholds listed in 6 NYCRR 212-2.3(b) Table 4, emissions control is required for compliance based on both the Environmental Rating and ERP. The ammonia group, which contains compounds rated C or INT-C only, requires 75% control from the Fab Ammonia and WWT Ammonia exhausts according to Table 4. This level of control will be achieved by the fab ammonia scrubbers and WWT ammonia scrubbers, which are projected to provide 98% control of ammonia based on available vendor information.

The only other compound or group requiring control is nitrous oxide which, as a B-rated compound, requires 90% control from the Fab CVD exhaust according to Table 4. This required level of control is greater than what is required by GHG BACT and what is readily feasible based on published industry information. Therefore, as allowed by DAR-1, Micron will submit a toxics BACT (T-BACT) analysis demonstrating that the 60% incidental removal provided by PEECs is representative of the best available technology as compared to similar sources in New York and throughout the semiconductor industry. This T-BACT analysis will be submitted under separate cover at a later date.

⁴ Ibid.

⁵ DAR-10: NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis, September 1, 2020.

APPENDIX D: INDIVIDUAL SOURCE INFORMATION

Appendix D is provided electronically. The "Appendix D Model Inputs CONFIDENTIAL 2025-0808.xls" spreadsheet contains the methodology for calculating emission rates for each source type.

Stack Parameters

Location	Description		Stack Type	Criteria Pollutant Emission Calcs Lookup	Air Toxics Emission Calcs Lookup	NY1 Quantity	NY2 Quantity	NY1 + NY2 Quantity	Stack Orientation
NY	AE	Acid Exhaust Fan Stack	AENY	FAB Acid	FAB Acid	40	40	80	Vertical
NY	AME	Ammonia Exhaust Fan Stack	AMENY	FAB Ammonia	FAB Ammonia	16	16	32	Vertical
NY	CVD	CVD Exhaust Fan Stack	CVDNY	FAB CVD	FAB CVD	0	0	0	Vertical
NY	CVD2	CVD Exhaust Fan Stack - Group of 2	CVD2NY	FAB CVD	FAB CVD	16	16	32	Vertical
NY	GE	General Exhaust Fan Stack	GENY			40	40	80	Vertical
NY	SEA	RCTO Oxidizer Exhaust Stack	SEANY	FAB Solvent	RCTO Burner Exhaust	36	36	72	Vertical
NY	SE	Solvent Exhaust Fan Stack	SENY	Solvent Exhaust - Fab	Solvent Exhaust	36	36	72	Vertical
CUB	AE	Acid Exhaust Fan Stack	AECUB			4	4	8	Vertical
CUB	BEX	Boiler Exhaust Stack	BEXCUB			3	3	6	Rain Cap
CUB	CT	Cooling Tower Discharge	CTCUB			105	105	210	Vertical
CUB	GEN	Engine Exhaust Stack	GENCUB			0	0	0	Vertical
CUB	GEN2	Engine Exhaust Stack - Group of 2	GEN2CUB			6	3	9	Vertical
CUB	GEN3	Engine Exhaust Stack - Group of 3	GEN3CUB			12	14	26	Vertical
HPM	AE	Acid Exhaust Fan Stack	AEHPM			8	8	16	Vertical
HPM	AME	Ammonia Exhaust Fan Stack	AMEHPM			8	8	16	Vertical
HPM	GEN	Engine Exhaust Stack	GENHPM			4	4	8	Vertical
HPM	GE1 ¹	General Exhaust Fan Stack	GE1HPM			10	10	20	Vertical
HPM	GE2 ²	General Exhaust Fan Stack	GE2HPM			8	8	16	Vertical
HPM	GBE1 ³	General Exhaust Fan Stack	GBE1HPM			6	6	12	Vertical
HPM	GBE2 ⁴	General Exhaust Fan Stack	GBE2HPM			6	6	12	Vertical
HPM	SEA	RCTO Oxidizer Exhaust Stack	SEAHPM		RCTO Burner Exhaust	8	8	16	Vertical
HPM	SE	Solvent Exhaust Fan Stack	SEHPM		Solvent Exhaust	8	8	16	Vertical
HPM	FRE	Flammable Exhaust Stack	FREHPM			6	6	12	Vertical
WWT	AE	Acid Exhaust Fan Stack	AEWWT	Acid Scrubbers - WWTP	WWT Acid	4	4	8	Vertical
WWT	AME	Ammonia Exhaust Fan Stack	AMEWWT	Ammonia Scrubbers - WWTP	WWT Ammonia	3	3	6	Vertical
WWT	SE	Solvent Exhaust Fan Stack	SEWWT	WWT Solvent	WWT Solvent	3	3	6	Vertical
GY	GEN	Engine Exhaust Stack	GENGY			2	2	4	Vertical
GY	WBV	Vaporizer Exhaust Stack	WBVGY			4	4	8	Rain Cap
GY	CT	Venturi Style Cooling Tower Stack	CTGY			6	6	12	Vertical
PROBE	GEN	Engine Exhaust Stack	GENPROBE			3	3	6	Vertical
PROBE	SE	Solvent Exhaust Fan Stack	SEPROBE			2	2	4	Vertical
PROBE	AE	Acid Exhaust Fan Stack	AEPROBE			2	2	4	Vertical
FRC	GEN	Engine Exhaust Stack	GENFRC			2	1	3	Vertical
FRC	GE	General and Odor Scrubber Exhaust	GEFRC	BIO General	BIO General	2	2	4	Vertical
IWW	GEN	Engine Exhaust Stack	GENIWW			1	0	1	Vertical
MPH	FWP	Fire Water Diesel Pump	FWPMPH			1	0	1	Vertical

1. GE1 in HPM refers to GE_41 to GE_45 and GE_50 to GE_54.

2. GE2 in HPM refers to GE_46 to GE_49 and GE_55 to GE_58.

3. GBE1 in HPM refers to GBE_1 to GBE_3 and GBE_7 to GBE_9.

4. GBE2 in HPM refers to GBE_4 to GBE_6 and GBE_10 to GBE_12.

5. Generator stack emission rates are divided by 2 for 1-hr NO₂ to account for 30 minutes of maximum runtime per hour.

									Criteria Pollutant Emissions								
Imperial Units					Metric Units				Hourly Emission Rates (lb/hr/stack)					Annual Emission Rates (lb/hr/stack)			
Stack Height (ft)	Stack Temperature (°F)	Stack Airflow (acfm)	Stack Diameter (ft)	Stack Velocity (ft/s)	Stack Height (m)	Stack Temperature (K)	Stack Diameter (m)	Stack Velocity (m/s)	PM ₁₀ 24-hr	PM _{2.5} 24-hr	NO ₂ Hourly ⁵	CO 1-hr/8-hr	SO ₂ Hourly	PM ₁₀ Annual	PM _{2.5} Annual	NO ₂ Annual	SO ₂ Annual
CAS Number																	
154	72	80,000	4.17	97.78	46.94	295.37	1.27	29.80	2.81E-02	2.81E-02	1.73E-01	4.95E-01	7.61E-02	2.81E-02	2.81E-02	1.62E-01	6.09E-02
154	72	40,000	3.00	94.31	46.94	295.37	0.91	28.75	1.10E-02	1.10E-02	-			1.10E-02	1.10E-02	-	
170.4	72	26,500	2.17	119.79	51.94	295.37	0.66	36.51	1.16E-01	1.16E-01	1.10E+00	4.59E+00	-	1.16E-01	1.16E-01	8.84E-01	-
170.4	72	26,500	2.17	119.79	51.94	295.37	0.93	36.51	2.33E-01	2.33E-01	2.20E+00	9.19E+00	-	2.33E-01	2.33E-01	1.77E+00	-
154	72	55,000	3.50	95.28	46.94	295.37	1.07	29.04									
154	600	2,500	0.83	76.39	46.94	588.71	0.25	23.29	8.81E-02	8.81E-02	5.41E-01	1.65E+00	4.79E-05	8.81E-02	8.81E-02	5.11E-01	3.83E-05
154	72	50,000	3.33	95.49	46.94	295.37	1.02	29.11									
81	75	12,000	1.67	91.67	24.69	297.04	0.51	27.94									
71.0	400	22,507	2.00	119.40	21.64	477.59	0.61	36.39	2.44E-01	2.44E-01	3.65E-01	4.91E+00	-	1.67E-01	1.67E-01	2.50E-01	-
100.9	ambient	585,800	19.17	33.84	30.75	0.00	5.84	10.31	1.22E-02	4.07E-05				1.22E-02	4.07E-05		
69.0	973.3	19,662	1.67	150.21	21.03	796.09	0.51	45.78	4.41E-02	4.41E-02	1.84E+00	1.93E+01	-	5.03E-04	5.03E-04	4.21E-02	-
69.0	973.3	19,662	1.67	150.21	21.03	796.09	0.72	45.78	8.81E-02	8.81E-02	3.69E+00	3.85E+01	-	1.01E-03	1.01E-03	8.42E-02	-
69.0	973.3	19,662	1.67	150.21	21.03	796.09	0.88	45.78	1.32E-01	1.32E-01	5.53E+00	5.78E+01	-	1.51E-03	1.51E-03	1.26E-01	-
101.3	72	36,500	3.50	63.23	30.88	295.37	1.07	19.27									
101.3	72	18,000	2.50	61.12	30.88	295.37	0.76	18.63									
27.5	973.3	19,662	1.67	150.21	8.38	796.09	0.51	45.78	4.41E-02	4.41E-02	1.84E+00	1.93E+01	-	5.03E-04	5.03E-04	4.21E-02	-
101.3	72	20,000	2.33	77.95	30.88	295.37	0.71	23.76									
101.3	72	46,700	4.17	57.08	30.88	295.37	1.27	17.40									
101.3	72	6,000	1.50	56.59	30.88	295.37	0.46	17.25									
101.3	72	38,000	3.83	54.88	30.88	295.37	1.17	16.73									
101.3	600	1,150	0.50	97.62	30.88	588.71	0.15	29.75	2.59E-02	2.59E-02	8.04E-01	4.12E-01	-	2.59E-02	2.59E-02	1.26E-01	-
101.3	72	23,000	2.83	60.80	30.88	295.37	0.86	18.53									
101.3	72	27,500	3.33	52.52	30.88	295.37	1.02	16.01									
144	70	15,000	2.17	67.81	43.89	294.26	0.66	20.67									
144	70	2,500	0.83	76.39	43.89	294.26	0.25	23.29									
144	70	2,000	0.50	169.77	43.89	294.26	0.15	51.74	1.88E-05	1.88E-05				1.88E-05	1.88E-05		
11.3	873	6,950	0.67	331.84	3.45	740.37	0.20	101.14	4.41E-02	4.41E-02	1.84E+00	1.93E+01	-	5.03E-04	5.03E-04	4.21E-02	-
17	750	22,507	3.17	47.63	5.18	672.04	0.97	14.52	3.19E-01	3.19E-01	2.10E+00	3.53E+00	-	7.29E-02	7.29E-02	4.79E-01	-
42	ambient	750,000	24.00	27.63	12.80	0.00	7.32	8.42	1.22E-02	4.09E-05				1.22E-02	4.09E-05		
124	973.3	8,065	2.00	42.79	37.80	796.09	0.61	13.04	4.41E-02	4.41E-02	1.84E+00	1.93E+01	-	5.03E-04	5.03E-04	4.21E-02	-
114	70	4,000	1.00	84.88	34.75	294.26	0.30	25.87									
114	70	10,000	1.67	76.39	34.75	294.26	0.51	23.29									
27.5	877	19,662	1.67	150.21	8.38	742.59	0.51	45.78	4.41E-02	4.41E-02	1.84E+00	1.93E+01	-	5.03E-04	5.03E-04	4.21E-02	-
70.6	80	66,234	4.33	74.85	21.52	299.82	1.32	22.81	1.63E-03	1.63E-03				1.63E-03	1.63E-03		
27.5	973.3	19,662	1.67	150.21	8.38	796.09	0.51	45.78	4.41E-02	4.41E-02	1.84E+00	1.93E+01	-	5.03E-04	5.03E-04	4.21E-02	-
26	865	1,186	0.67	56.63	7.92	735.93	0.20	17.26	8.22E-02	8.22E-02	9.38E-02	1.44E+00	-	4.69E-03	4.69E-03	9.38E-02	-

[illegible]

Engine Grouping - Merged Stack

Engine Exhaust Stack - Group of 2

Diameter of Stack	1.67 ft
Area of Stack	2.18 ft ²
# of Stacks	2
Equivalent Stack Area	4.36 ft ²
Equivalent Stack Diamete	2.36 ft

Engine Exhaust Stack - Group of 3

Diameter of Stack	1.67 ft
Area of Stack	2.18 ft ²
# of Stacks	3
Equivalent Stack Area	6.54 ft ²
Equivalent Stack Diamete	2.89 ft

CVD Exhaust Stack - Group of 2

Diameter of Stack	2.17 ft
Area of Stack	3.69 ft ²
# of Stacks	2
Equivalent Stack Area	7.37 ft ²
Equivalent Stack Diamete	3.06 ft

Lime Silo Volume Source

Model ID	Description	What is the source being characterized?	AERMOD Users Guide Table 2.2 Source Characterization	Length of Silo ¹ (ft)	Height of Silo ² (ft)	Drop Distance ³ (ft)	Height of Source off Ground ⁴ (ft)	Release Height (ft)	Sigma Y ⁶ (ft)	Sigma Z ⁷ (ft)	Quantity of Silos ⁸	PM ₁₀ 24- hr	PM ₁₀ Annual	PM _{2.5} 24-hr	PM _{2.5} Annual
												Hourly PM ₁₀ (lb/hr)	Yearly PM ₁₀ (lb/hr)	Hourly PM _{2.5} (lb/hr)	Yearly PM _{2.5} (lb/hr)
SILO1	Transfer of material from lime silo to truck.	Dust released from the dropping of lime from silo into truck.	Elevated source on or adjacent to a structure.	75.46	46	7	8	11.5	17.55	21.40	10	0.044	0.044	0.044	0.044
SILO2											10	0.044	0.044	0.044	0.044

¹Used length of Building J next to the WWT buildings as the length. Length calculated in AERmod.

²Height of silo is set to the height of nearby IW tanks at 46 ft. Assume bottom of silo to the ground is 15 ft that the truck drives under for loading.

³Assumed drop distance from the bottom of the silo halfway into the truck bed as 7 ft.

⁴Assumed mid point of truck bed is 8 ft off the ground. Overall height of truck is 11 ft.

⁵Release height = height above ground of midpoint of the drop distance between the bottom of silo and truck bed.

⁶Sigma y = width of structure / 4.3.

⁷Sigma z = Height of silo / 2.15.

⁸There are 20 total silos. Four volume sources each represent 10 silos.

NAAQS Regional Sources

NO2											
Model ID	Description	Stack Orientation	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Emission Rate (lb/hr)	Emission Rate (g/s)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)
REG01	Paul De Lima Aggregated Stack 1	Vertical	409180.9	4782075.6	124.97	1.234	1.555E-01	12.19	403.98	2.70	0.77
REG02	Barrett Paving Stack 1	Vertical	396446.6	4785915.1	121.92	1.142	1.439E-01	9.14	394.26	15.52	1.52
REG03	Anheuser Busch Aggregated Stack 1	Vertical	393336.1	4780379.2	140.21	11.441	1.441E+00	60.66	319.26	19.92	1.52
REG04	Anheuser Busch Aggregated Flare 2	Vertical	394154.7	4779961.1	140.21	0.874	1.101E-01	6.10	533.15	37.49	0.20
REG05	Anheuser Busch Aggregated Stack 3	Vertical	393327.9	4780289.4	140.21	--	--	17.37	294.26	18.29	0.36

PM2.5											
Model ID	Description	Stack Orientation	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Emission Rate (lb/hr)	Emission Rate (g/s)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)
REG01	Paul De Lima Aggregated Stack 1	Vertical	409180.9	4782075.6	124.97	0.012	1.475E-03	12.19	403.98	2.70	0.77
REG02	Barrett Paving Stack 1	Vertical	396446.6	4785915.1	121.92	0.079	9.955E-03	9.14	394.26	15.52	1.52
REG03	Anheuser Busch Aggregated Stack 1	Vertical	393336.1	4780379.2	140.21	0.518	6.526E-02	60.66	319.26	19.92	1.52
REG04	Anheuser Busch Aggregated Flare 2	Vertical	394154.7	4779961.1	140.21	0.023	2.859E-03	6.10	533.15	37.49	0.20
REG05	Anheuser Busch Aggregated Stack 3	Vertical	393327.9	4780289.4	140.21	--	--	17.37	294.26	18.29	0.36

PM10											
Model ID	Description	Stack Orientation	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Emission Rate (lb/hr)	Emission Rate (g/s)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)
REG01	Paul De Lima Aggregated Stack 1	Vertical	409180.9	4782075.6	124.97	0.253	3.189E-02	12.19	403.98	2.70	0.77
REG02	Barrett Paving Stack 1	Vertical	396446.6	4785915.1	121.92	0.093	1.175E-02	9.14	394.26	15.52	1.52
REG03	Anheuser Busch Aggregated Stack 1	Vertical	393336.1	4780379.2	140.21	0.120	1.516E-02	60.66	319.26	19.92	1.52
REG04	Anheuser Busch Aggregated Flare 2	Vertical	394154.7	4779961.1	140.21	0.041	5.142E-03	6.10	533.15	37.49	0.20
REG05	Anheuser Busch Aggregated Stack 3	Vertical	393327.9	4780289.4	140.21	0.643	8.098E-02	17.37	294.26	18.29	0.36

CO											
Model ID	Description	Stack Orientation	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Emission Rate (lb/hr)	Emission Rate (g/s)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)
REG01	Paul De Lima Aggregated Stack 1	Vertical	409180.9	4782075.6	124.97	1.148	1.446E-01	12.19	403.98	2.70	0.77
REG02	Barrett Paving Stack 1	Vertical	396446.6	4785915.1	121.92	3.808	4.798E-01	9.14	394.26	15.52	1.52
REG03	Anheuser Busch Aggregated Stack 1	Vertical	393336.1	4780379.2	140.21	6.766	8.525E-01	60.66	319.26	19.92	1.52
REG04	Anheuser Busch Aggregated Flare 2	Vertical	394154.7	4779961.1	140.21	0.753	9.484E-02	6.10	533.15	37.49	0.20
REG05	Anheuser Busch Aggregated Stack 3	Vertical	393327.9	4780289.4	140.21	--	--	17.37	294.26	18.29	0.36

APPENDIX E: BACKGROUND DATA ANALYSIS

MEMORANDUM

Micron New York Semiconductor Manufacturing, LLC (Micron) proposes to construct a semiconductor manufacturing campus (the "Micron Campus") in the Town of Clay, New York, at the White Pine Commerce Park (WPCP), an approximately 1,400-acre industrial park currently controlled by the Onondaga County Industrial Development Agency (OCIDA). Micron's Proposed Air Permit Project will be a major facility under the Title V air permitting program, a major source of hazardous air pollutants (HAP) and a major new facility under Prevention of Significant Deterioration (PSD) for nitrogen dioxide (NO₂), particulate matter with a diameter equal to or smaller than 2.5 microns (PM_{2.5}), particulate matter with a diameter equal to or smaller than 10 microns (PM₁₀), and carbon monoxide (CO).

Micron has retained Trinity Consultants, Inc. (Trinity) to conduct the air dispersion modeling analyses for the project. The proposed modeling analysis is performed to provide conservative estimates of ambient concentrations that may potentially result from project emissions. Micron submitted a modeling protocol to New York State Department of Environmental Conservation (NYSDEC) to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS) and Title 6 of the New York Codes, Rules and Regulations (6 NYCRR) Part 212) on June 25, 2024 and will be submitting a revised modeling protocol to address comments from the NYSDEC. Part of the analysis is modeling impacts in comparison to the 24-hr and annual PM_{2.5} NAAQS. The cumulative NAAQS modeling for these pollutants requires incorporation of ambient background PM_{2.5} concentrations. This memorandum provides additional information on the background concentrations for PM_{2.5} used in the air quality analysis.

REGULATORY JUSTIFICATION

In reviewing PM_{2.5} background data for the project, Micron and Trinity identified possible days that were influenced by natural or atypical events which may have affected PM_{2.5} ambient background data. To perform this analysis, Trinity followed EPA's Memo *Additional Methods, Determinations, and Analyses to Modify Air Quality Data Beyond Exceptional Events*, dated April 2019 (Additional Methods Memo).¹ In this memo, EPA recognized that there are determinations and analyses not covered by the Exceptional Events Rule (40 CFR Part 50.14) that "rely on ambient air quality monitoring data that have been influenced by atypical, extreme or unrepresentative events". One of these determinations includes analyses for demonstrating compliance under the PSD permitting program. EPA also referenced this Additional Methods Memo in the April 30, 2024 *Effective Permitting Tools for Fine Particulate Matter under the Prevention of Significant Deterioration Permitting Program Fact Sheet*² stating:

Delegated and approved permitting authorities and permit applicants have discretion in developing representative background concentrations for cumulative assessments. Monitoring data can be adjusted to be representative under the Additional Methods, Determinations, and Analyses to Modify Air Quality Data Beyond Exceptional Events memorandum with justification found in EPA's Guideline.

¹ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Additional methods, Determinations, Analyses to Modify Air Quality Data Beyond Exceptional Events*, Regional Triangle Park, North Carolina, April 2019.

² EPA, April 2024 *Effective Permitting Tools for Fine Particulate Matter under the Prevention of Significant Deterioration Permitting Program Fact Sheet*. Accessed via: <https://www.epa.gov/system/files/documents/2024-04/effective-permitting-tools-for-pm2.5-04-30-2024.pdf>

The Additional Methods memo references 40 CFR Part 51 Appendix W “Guideline on Air Quality Models”. Specifically, the memo points to Sections 8.3.2 (c) (ii) and 8.3.3 (d) that discuss the requirements for obtaining “representative” background concentrations for single isolated sources and multi-source areas. These paragraphs outline that choosing representative background concentrations, such as those used in a PSD application or a cumulative impact analysis for NAAQS compliance, requires consideration of natural and unusual events that occur. It also recognizes challenges related to cumulative impact analyses that arise in the context of defining an appropriate metric to characterize background concentrations from ambient monitoring data. Specifically, Section 8.3.2 (c) of 40 CFR Part 51, Appendix W goes on to state:

There may be other circumstances which would necessitate modifications to the ambient data record. Such cases could include removal of data from specific days or hours when a monitor is being impacted by activities that are not typical or not expected to occur again in the future (e.g., construction, roadway repairs, forest fires, or unusual agricultural activities).

Trinity and Micron identified the East Syracuse, NY PM_{2.5} monitor (AQ5 ID 36-067-1015), operated by the NYSDEC, as the representative monitor for the project in the June 25, 2024 modeling protocol, using data from 2021-2023. In reviewing these data, Trinity determined further review of some days was necessary to understand impacts that smoke from wildfire have had on the PM_{2.5} data. For the purposes of this modeling project, it will be assumed that days identified in this analysis are eligible for removal from the background concentration. The remaining data will be used to calculate an annual PM_{2.5} background concentration for use in the annual PM_{2.5} NAAQS analysis and seasonal PM_{2.5} backgrounds for the 24-hr PM_{2.5} NAAQS analysis.

SMOKE EVENTS

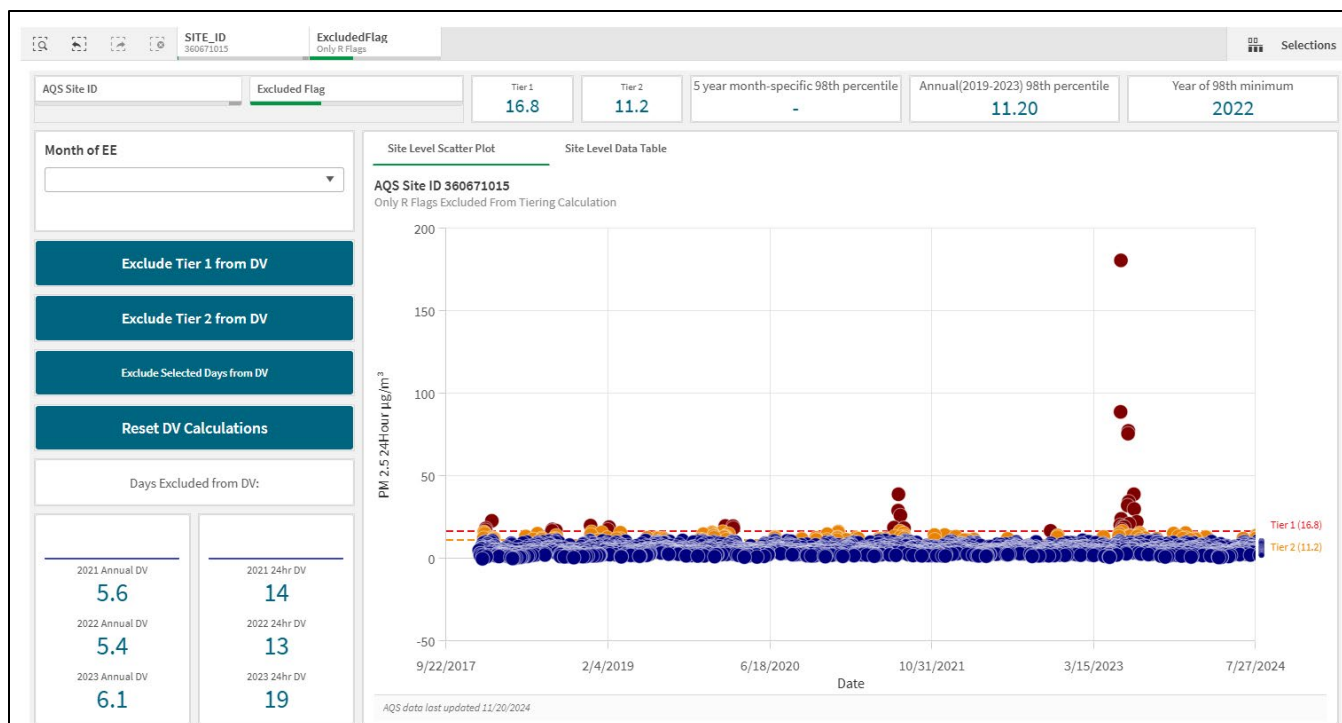
Removal of data from atypical activities such as forest fires is permitted by Section 8.3.2.c.ii of Guideline on Air Quality Models (40 CFR Part 51, Appendix W). Excluding data impacted by forest fires is intended to make the background data “more temporally and/or spatially representative of the area around the ... source”.

With the promulgation of the revised annual PM_{2.5} NAAQS, EPA has released additional guidance documents and tools to determine the influence of smoke from wildfire and other exceptional or natural events on monitored PM_{2.5} data. To evaluate data at the East Syracuse, NY monitor that may have been influenced by smoke from wildfires, Trinity used EPA and other Federal agency tools.

Trinity followed the guidelines from EPA’s “PM_{2.5} Wildland Fire Exceptional Events Tiering Document” Draft January 2024 (Tiering Document) and the tier analysis tool³ to find the relevant Tier 1 concentrations for potential exclusions of smoke impacted days. EPA’s Tiering Document suggests the weight of evidence needed to demonstrate an Exceptional Event under 40 CFR Part 50.14 for concentrations at or above Tier 1, Tier 2, or Tier 3 levels.

Figure 1 Shows the Tiering Tool Output for the East Syracuse PM_{2.5} monitor. It is important to note that the tiering tool shows all daily values and only determines the levels of the Tiers. It does not distinguish which days are potential events. The figure shows that for the East Syracuse PM_{2.5} monitor, the Tier 1 level is 16.8 µg/m³.

³ <https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis>

Figure 1. Tiering Tool Output

To review data that was potentially influenced by smoke, Trinity gathered evidence of smoke influence using tools suggested by EPA's document "*Analytical Tools for Preparing Exceptional Event Demonstrations for Wildfire Events that May Influence Ozone and Particulate Matter Concentrations*", EPA 2023⁴. In this document, EPA discusses that evidence will be evaluated using a "weight of evidence" approach and goes on to discuss how "certain analytics might be considered more or less useful for O₃ and PM demonstrations showing wildfire impacts on near or far downwind surface level monitors". The document also suggests a variety of products that can be used for the demonstrations and indicates some are more useful for situations where fires are nearby while others are more useful in long-range transport situations (see Page 4 of the document).

Given this understanding of the usefulness and accuracy of various smoke models and products, Trinity used a variety of sources to corroborate the presence of smoke near the East Syracuse monitor. For this analysis, Trinity began by identifying 24-hour PM_{2.5} concentrations at or above the Tier 1 levels for the 2021 through 2023 dataset and reviewed which days the NYSDEC flagged for potential events. From there, EPA's AirNowTech⁵ tool was used with the National Oceanic and Atmospheric Administration (NOAA) Hazard Mapping Service (HMS) smoke and fire detect layers to identify whether smoke was likely present in the area. AirNowTech and NOAA update the HMS smoke product once per day. The product is manually generated from several smoke models and does not indicate an exact match to the location of a smoke plume, especially as upper air conditions may change during the day.

If smoke was likely present, other smoke and fire products were consulted to corroborate and build the weight of evidence of smoke on an event day. Other products include National Aeronautics and Space

⁴ [Wildfire Resource Document Final Revised.pdf \(epa.gov\)](#)

⁵ <https://www.airnowtech.org/>

Administration (NASA)'s Worldview satellite website⁶ which provides Moderate Resolution Imaging Spectroradiometer (MODIS) satellite imagery with smoke, aerosol, and fire detections. While Worldview can be a useful tool, the satellites only take one image per day, and there may be clouds present in the image that can obstruct the view. Additionally, timeseries of PM_{2.5} concentrations were plotted for the day in question and determine the source(s) of smoke for events.

For Tier 1 days, one to two products were used to confirm the presence of smoke in the Onondaga County, NY area. Table 1 identifies the Tier 1 days that Trinity will be excluding from background concentration calculations due to presence of smoke from wildfires.

Table 1. Tier 1 Smoke Events

Date	PM_{2.5} 24-Hour concentration
6/5/2023	20.3
6/6/2023	88.9
6/7/2023	180.7
6/8/2023	24.1
6/10/2023	17.5
6/28/2023	32.2
6/29/2023	75.7
6/30/2023	77.4
7/1/2023	34.5
7/17/2023	39.0
7/18/2023	30.1

Weight of Evidence Demonstrations

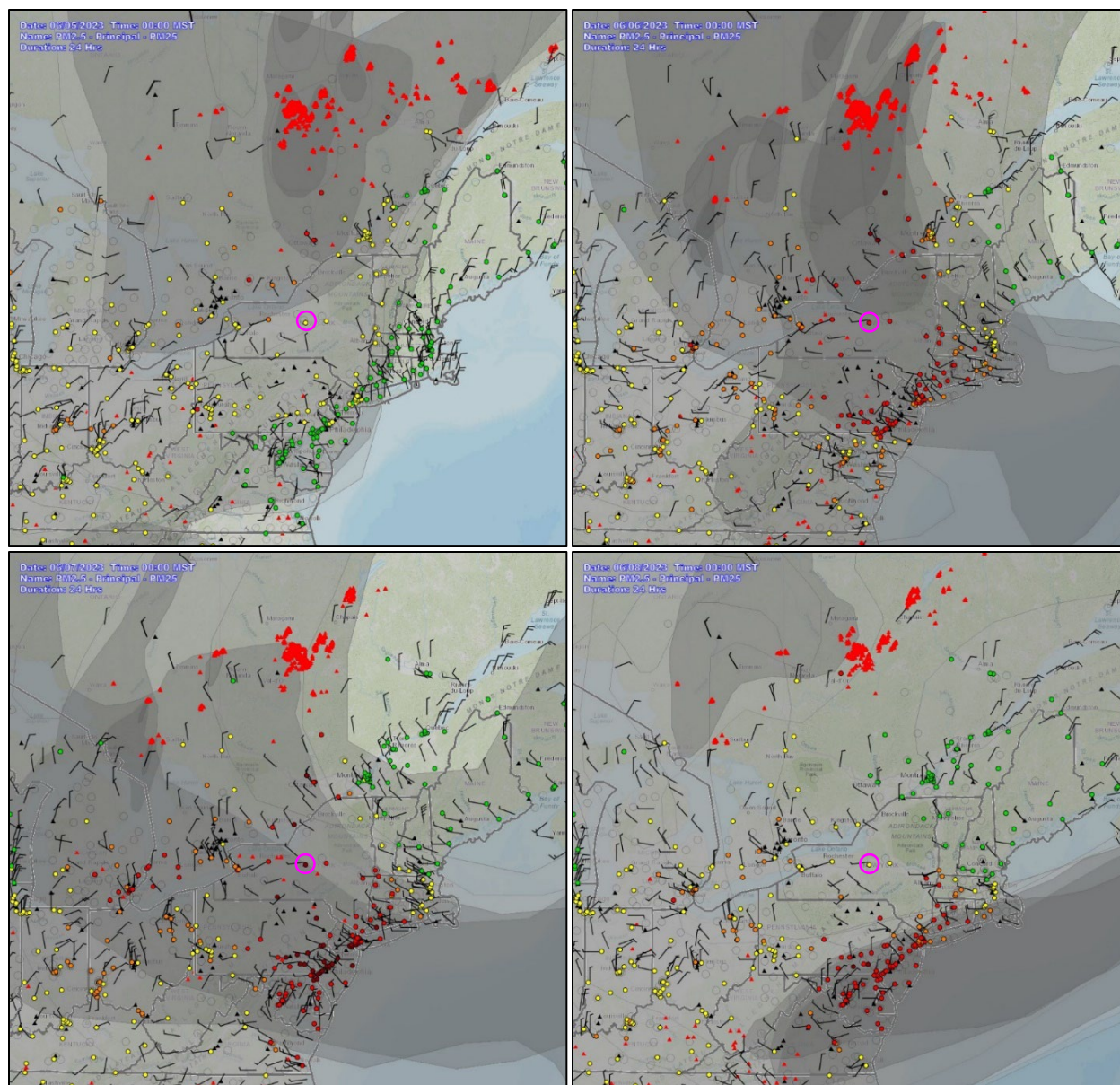
The following section provides the weight of evidence demonstrations found for the Tier 1 smoke days to substantiate dates which will be removed from background concentration calculations.

June 5 through June 8, 2023

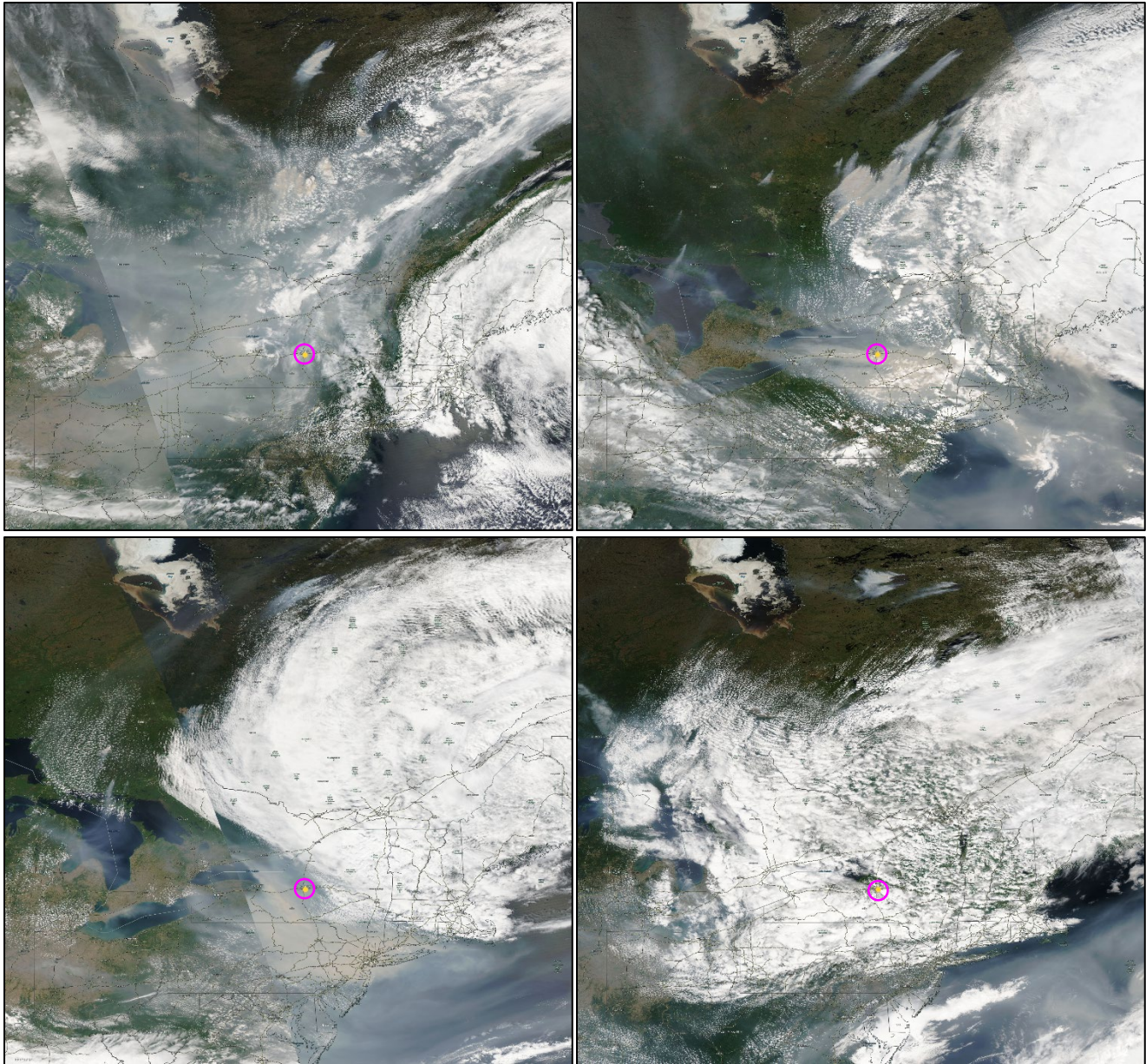
The East Syracuse monitor was flagged as being affected by smoke originating from Canadian wildfires on June 5-8, 2023, with 24-hour PM_{2.5} concentrations for these dates at 20.3 µg/m³, 88.9 µg/m³, 180.7 µg/m³, and 24.1 µg/m³, respectively. Each of these are above the Tier 1 threshold of 16.8 µg/m³ as determined by the EPA Tiering Document. Figure 2 provides maps from the AirNow Tech Navigator page. The concentration is indicated by the coloring scale of the Air Quality Index (AQI)⁷ concentration levels, the average wind for the date is indicated by wind barbs from regional weather stations, and smoke plumes are indicated by the HMS smoke layer. The East Syracuse monitor is circled.

⁶ <https://worldview.earthdata.nasa.gov/>

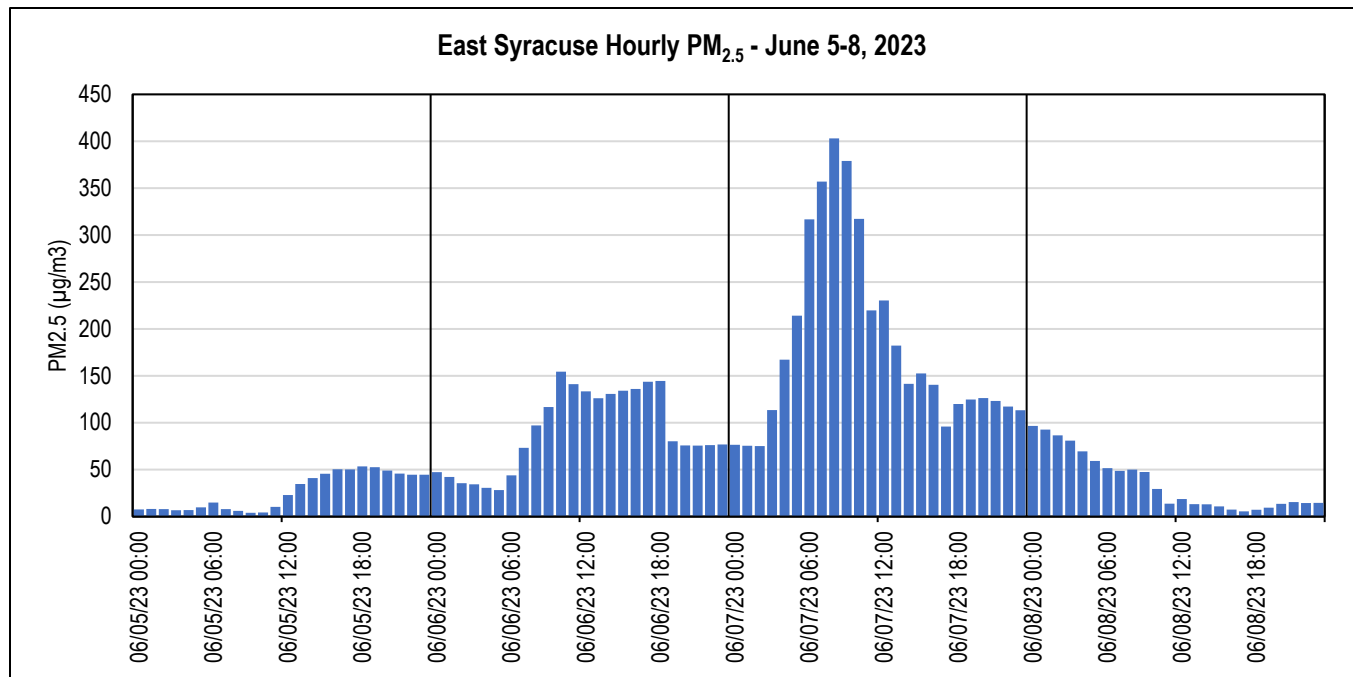
⁷ US EPA, Final Updates to the Air Quality Index (AQI) for Particulate Matter Fact Sheet and Common Questions, (February 2024)

Figure 2. AirNow Tech Navigator Concentration and HMS Maps for June 5-8, 2023

MODIS satellite imagery from the NASA Worldview site is presented in Figure 3 for June 5 through June 8, 2023. The imagery shows the region had dense smoke over the monitor (circled) and region throughout the period.

Figure 3. MODIS Satellite Imagery for June 5-8, 2023

Hourly PM_{2.5} data collected at the site is presented in Figure 4, it shows periods of elevated smoke occurred each of the dates during this period.

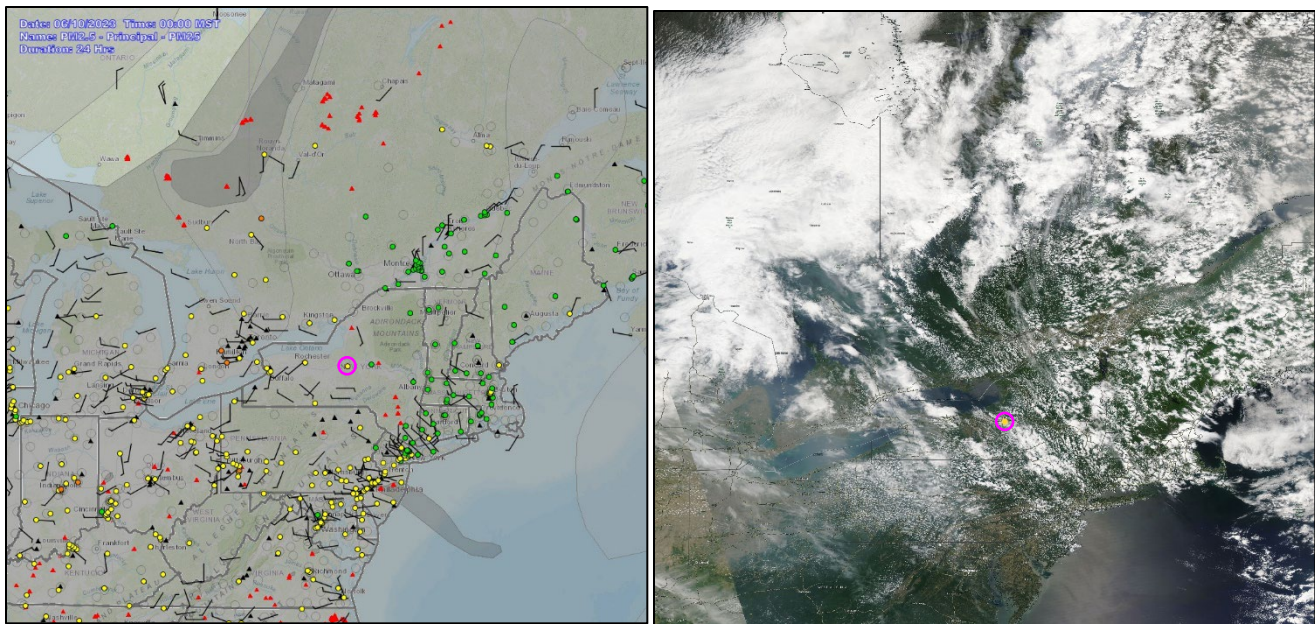
Figure 4. Hourly PM_{2.5} Data - June 5-8, 2023

Information gathered for the period between June 5 through June 8, 2023, including observation data from EPA's Air Quality Service (AQS) Database, HMS smoke maps, and wind flow show a clear causal relationship between smoke from Canadian wildfires and concentrations measured by the East Syracuse station. Each of the dates in this period had 24-hour concentrations above the Tier 1 concentration threshold according to EPA's Tiering Document and are recommended for removal of background concentrations.

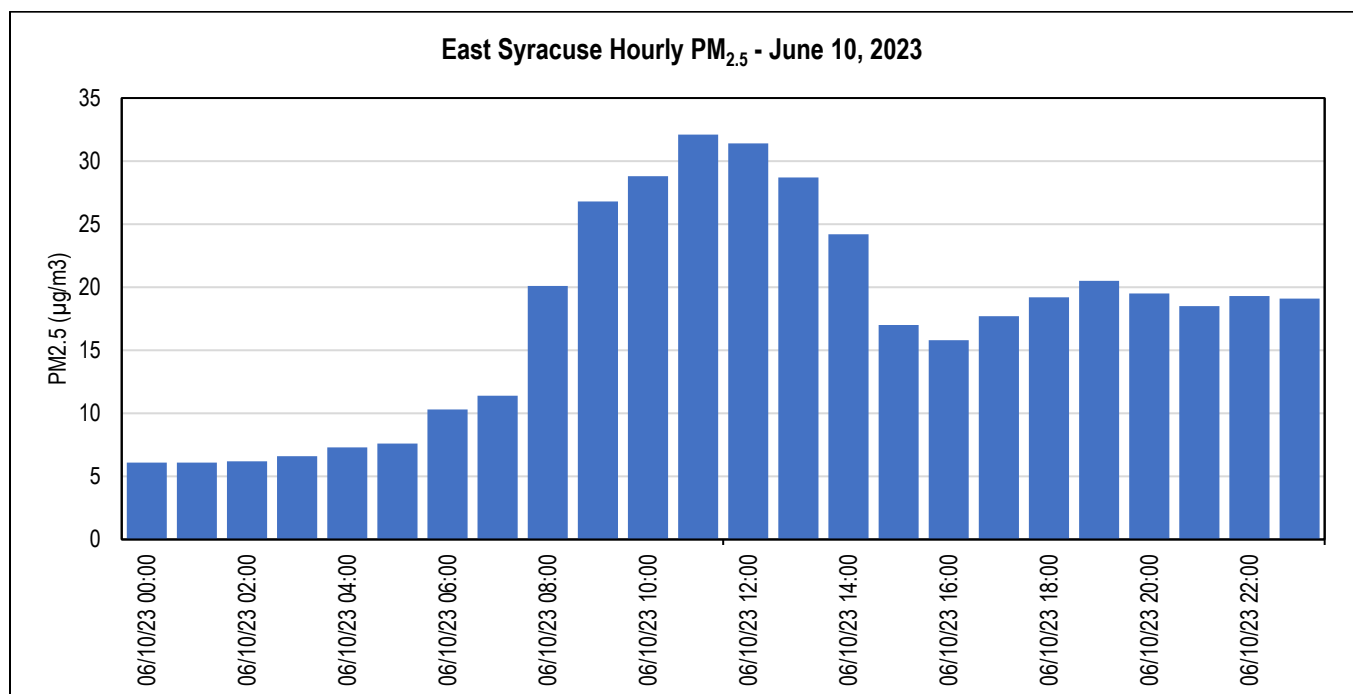
June 10, 2023

Data collected at the East Syracuse monitor was flagged as being affected by wildfire smoke originating from Canadian wildfires on June 10, 2023. The 24-hour PM_{2.5} concentration for this date was 17.5 µg/m³ which is above the Tier 1 threshold of 16.8 µg/m³ as determined by the EPA Tiering Document.

Figure 5 provides a map from the AirNow Tech Navigator page and MODIS satellite imagery. The AirNow Tech map indicates a moderate air quality, and the HMS smoke map indicates smoke was present over the region on this date with most of the neighboring monitors to the northwest, west, southwest, and south showing moderate air quality for the date as well. Satellite imagery shows high level clouds over the area, but also shows the smoke from the regional wildfires.

Figure 5. AirNow Tech Navigator Concentration and HMS Maps for June 10, 2023

Hourly PM_{2.5} data collected at the site on June 10, 2023 is presented in Figure 6. The figure shows PM_{2.5} concentrations were below 10 $\mu\text{g}/\text{m}^3$ for much of the early morning until approximately 06:00 AM Local Time. A weather system had passed through on June 9, 2023 clearing out most of the smoke that was in the area from June 5 through June 8, 2023. After 06:00 AM Local Time on June 10, the concentrations again began to rapidly rise, peaking at 34 $\mu\text{g}/\text{m}^3$ by 11:00 AM Local Time, then again decreasing to approximately 20 $\mu\text{g}/\text{m}^3$ through the rest of the day.

Figure 6. Hourly PM_{2.5} Data - June 10, 2023

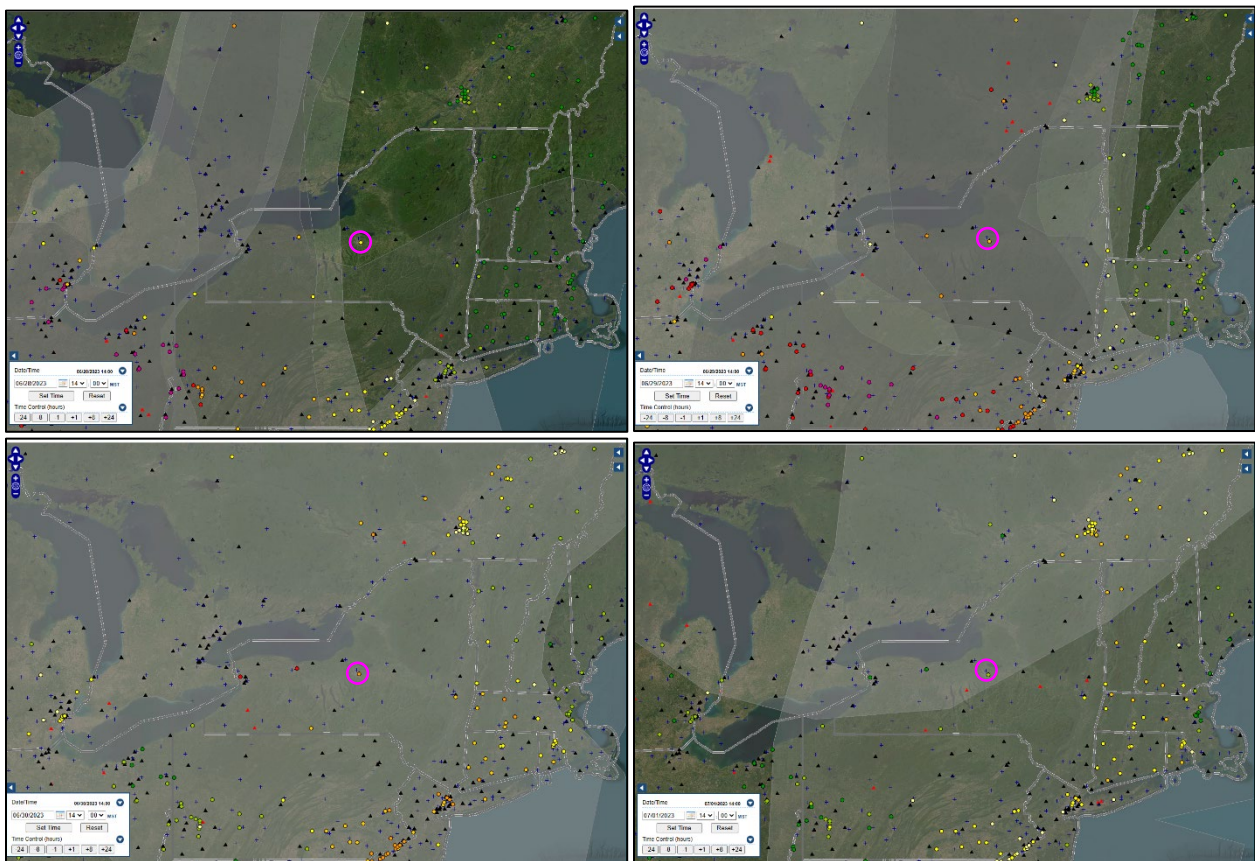
Smoke products from EPA's AirNow Tech and NOAA MODIS satellite imagery as well as elevated concentrations on June 10, 2023 above the Tier 1 threshold for the monitor demonstrate the weight of evidence that smoke affected the monitor for several hours on June 10, 2023 that would otherwise not have had such a high concentration. Therefore, this date is recommended to be excluded from background concentration calculations.

June 28 through July 1, 2023

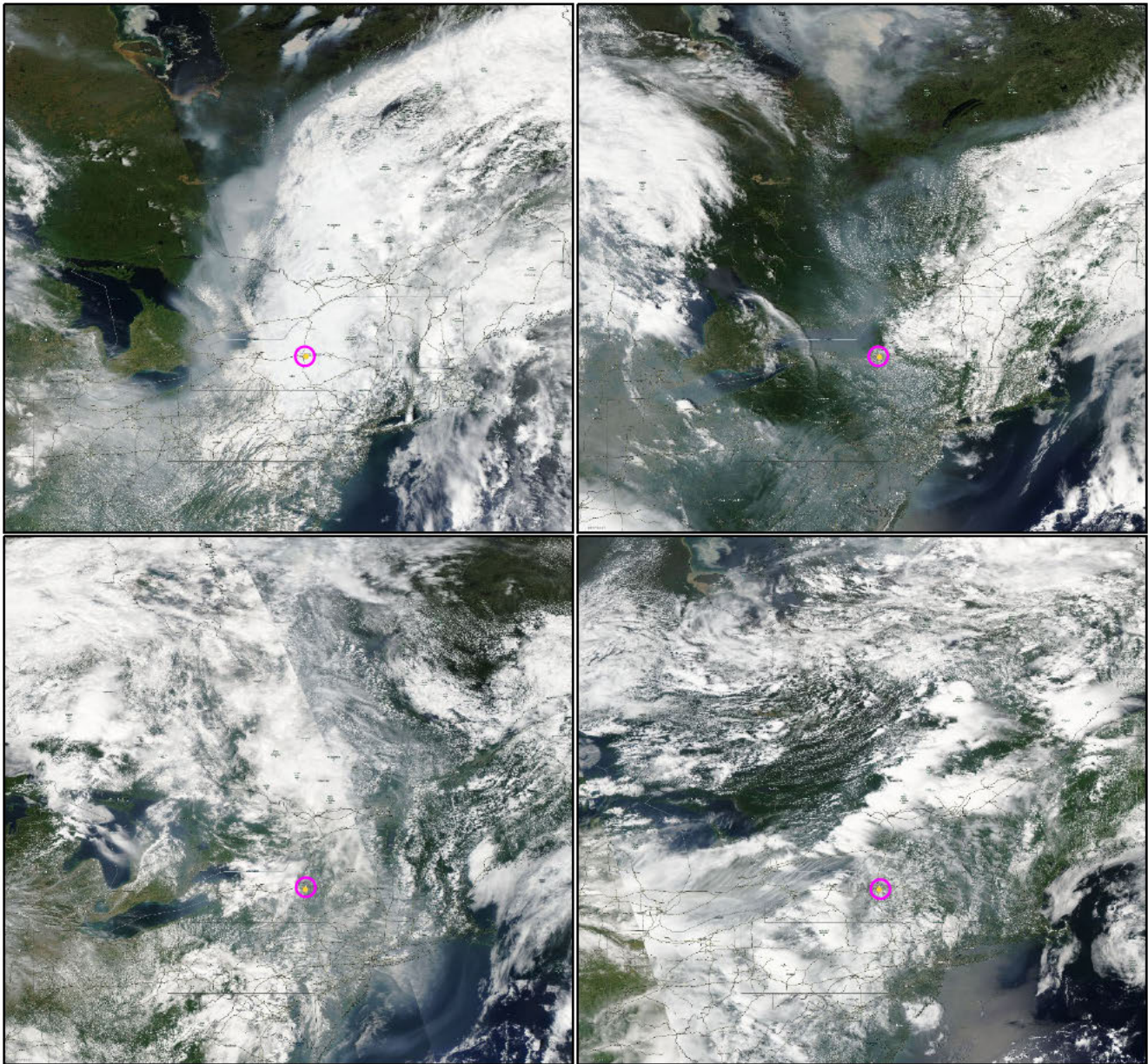
A second four-day elevated PM_{2.5} concentration event was observed by the East Syracuse monitoring station from June 28 through July 1, 2023. Each date during this period was flagged as being affected by Canadian wildfire smoke with observed 24-hour PM_{2.5} concentrations as 32.2 $\mu\text{g}/\text{m}^3$, 75.7 $\mu\text{g}/\text{m}^3$, 77.4 $\mu\text{g}/\text{m}^3$, and 34.5 $\mu\text{g}/\text{m}^3$, respectively. Each of these concentrations are above the Tier 1 threshold of 16.8 $\mu\text{g}/\text{m}^3$ as determined by the EPA Tiering Document.

Figure 7 provides maps from the AirNow Tech Navigator page indicating concentration, wind direction and smoke plumes. The East Syracuse monitor is circled.

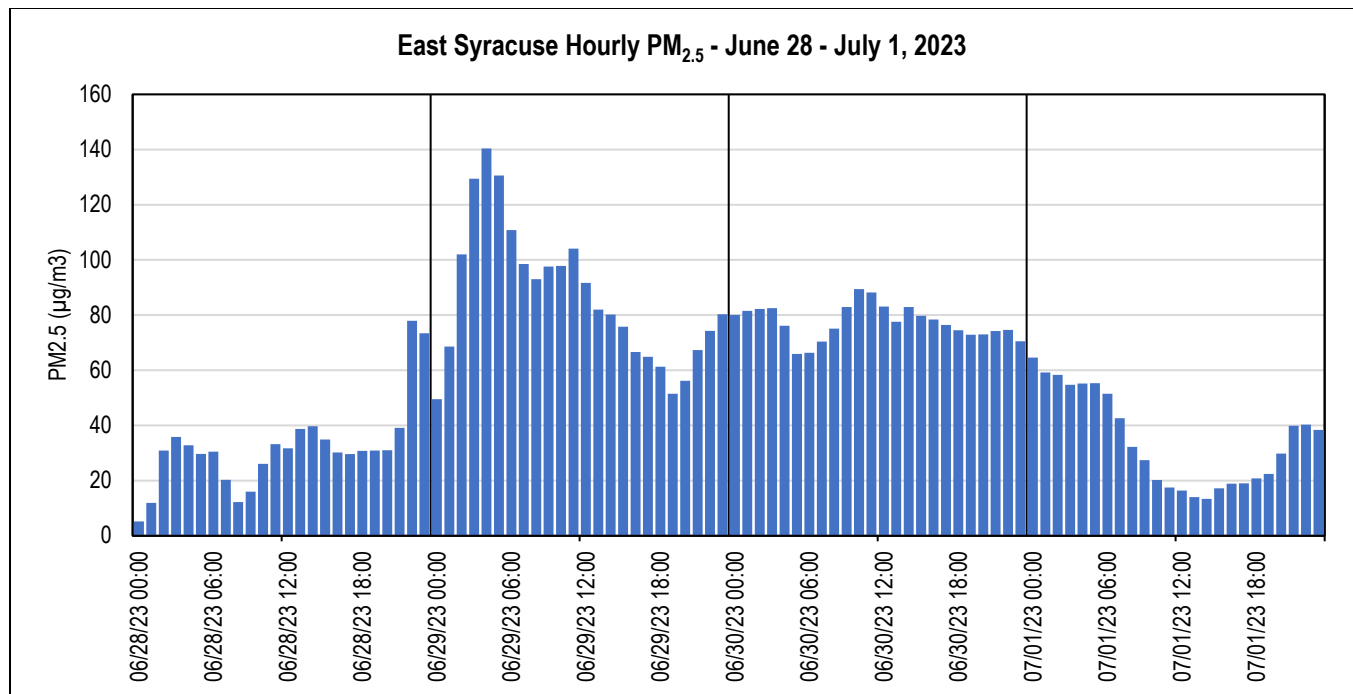
Figure 7. AirNow Tech Navigator Concentration and HMS Maps for June 28-July 1, 2023



Furthermore, MODIS satellite imagery from the NASA Worldview site is presented in Figure 8 for June 28 through July 1, 2023. The imagery shows the region had a mixture of high level clouds a dense smoke over the monitor (circled) and region throughout the period.

Figure 8. MODIS Satellite Imagery for June 28-July 1, 2023

Hourly PM_{2.5} data collected at the site is presented in Figure 9 which shows elevated concentrations starting on June 28, 2023 with all but three hours above the Tier 1 threshold. Concentrations rapidly increase late on June 28th and are over 100 $\mu\text{g}/\text{m}^3$ for three hours on June 29th while concentrations eventually lower to over between 60 and 85 $\mu\text{g}/\text{m}^3$ through the end of June 30th. PM_{2.5} remains elevated for much of the morning on July 1st and eventually declines in the middle of the day while again increasing at night to above 40 $\mu\text{g}/\text{m}^3$ to end the day.

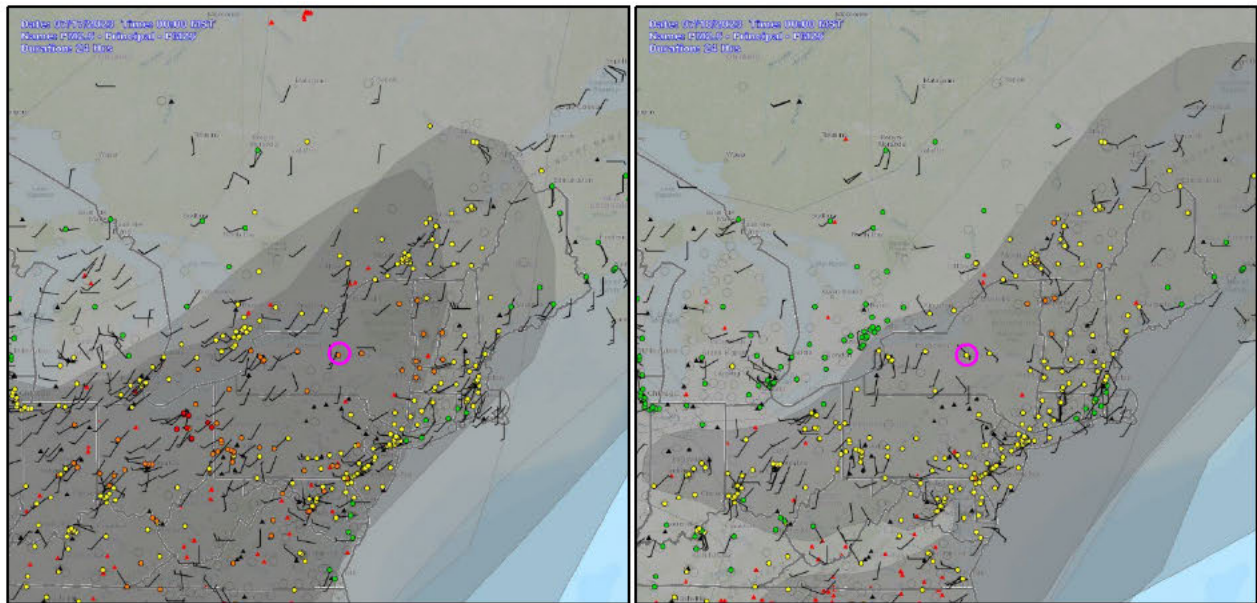
Figure 9. Hourly PM_{2.5} Data - June 28-July 1, 2023

The East Syracuse monitor experienced elevated concentrations from June 28 through July 1, 2023 due to the influence of Canadian wildfires. The information gathered from EPA's AQS database, NASA MODIS satellite imagery, and the AirNow Tech HMS smoke products provide the weight of evidence needed to demonstrate exceptional status for these dates. It is recommended that each of these dates be excluded from background concentration calculations.

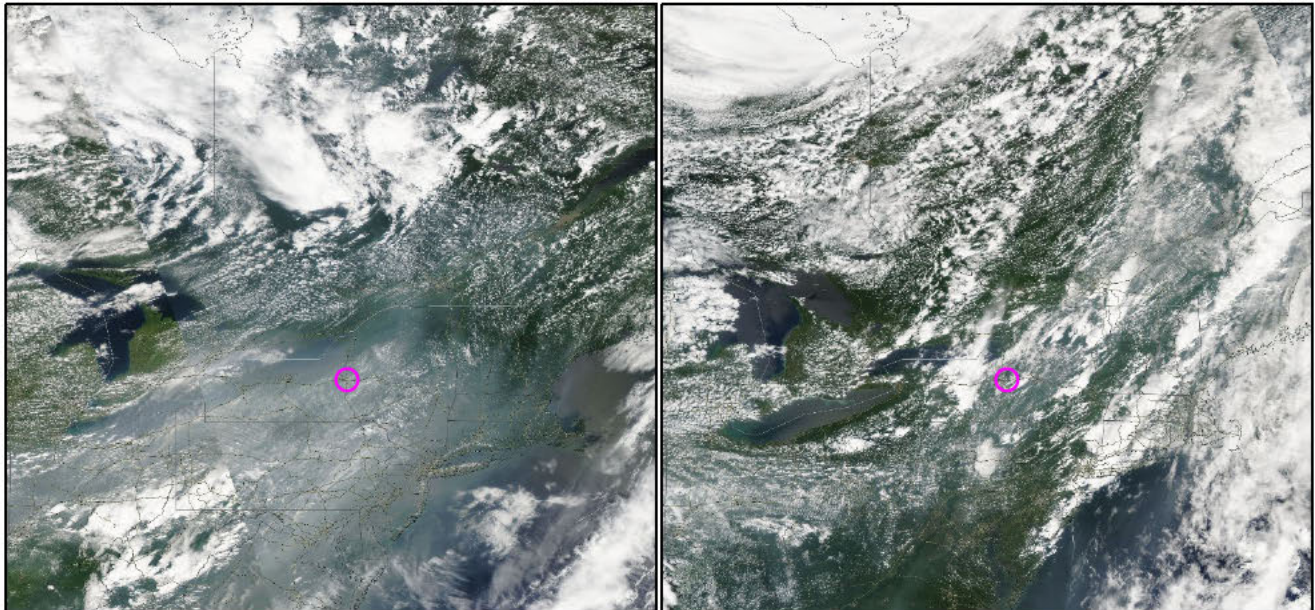
July 17 through July 18, 2023

The East Syracuse monitor experienced another smoke event from July 17 through July 18, 2023. Both dates were flagged as being affected by wildfire smoke with observed 24-hour PM_{2.5} concentrations at 39.0 µg/m³ and 30.1 µg/m³, respectively. Both of these concentrations are above the Tier 1 threshold of 16.8 µg/m³ as determined by the EPA Tiering Document.

Figure 10 provides maps from the AirNow Tech Navigator page indicating concentration, wind direction and smoke plumes with the East Syracuse monitor is circled. The maps show dense smoke across the region with winds out of the southwest on July 17th when concentrations were much higher and light and variable winds on July 18th with smoke still lingering in the region.

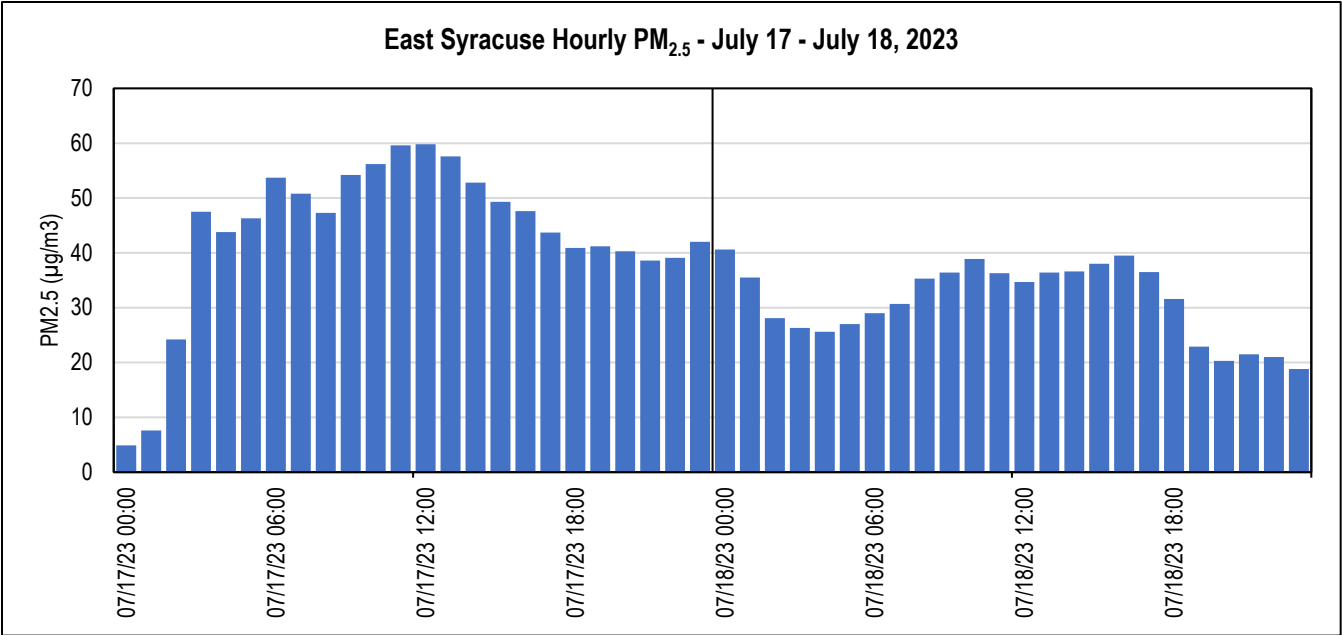
Figure 10. AirNow Tech Navigator Concentration and HMS Maps for July 17-July 18, 2023

MODIS satellite imagery from the NASA Worldview site is presented in Figure 11 for July 17 through July 18, 2023. The imagery shows the region had very dense smoke on July 17th and a mixture of high-level clouds and dense smoke on July 18th over the monitor (circled) and region.

Figure 11. MODIS Satellite Imagery for July 17-July 18, 2023

Hourly PM_{2.5} data collected at the site is presented in Figure 12 which shows elevated concentrations starting on July 17, 2023 with only the first two hours of the day below the Tier 1 threshold. Concentrations rapidly increase to above 40 $\mu\text{g}/\text{m}^3$ and remained elevated through the rest of the day. Concentrations slightly decreased on July 18th ranging between 25 to 40 $\mu\text{g}/\text{m}^3$ through most of the day and eventually dropping below 20 $\mu\text{g}/\text{m}^3$ the last hour of the day.

Figure 12. Hourly PM_{2.5} Data - July 17-July 18, 2023



The East Syracuse monitor experienced elevated concentrations from July 17 through July 18, 2023 due to the influence of Canadian wildfires. The information gathered from EPA’s AQS database, NASA MODIS satellite imagery, and the AirNow Tech HMS smoke products provide the weight of evidence needed to demonstrate exceptional status for these dates. It is recommended that each of these dates be excluded from background concentration calculations.

Background Concentration Determination

The outcome of these documented analyses demonstrates that for the three-year period, eleven (11) days can be excluded for smoke impact from Canadian wildfires. While this process excluded several days from the dataset, these data had originally met the data quality objectives for completeness and comparability according to the definitions stated in EPA’s *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II*, January 2017 (EPA-454/B-17-001). Given these considerations, Table 2 shows the annual averages and the final design value with the exclusions reviewed in this document. The calculation spreadsheets used to determine the annual and 3-year average design values are attached electronically as Attachment 1.

Table 2. Final Background PM_{2.5} Concentrations in Micrograms per Cubic Meter

Annual Statistic	Applicable NAAQS Standard	2021	2022	2023	3-year Average
Average	Annual PM _{2.5}	5.9	5.0	6.0	5.6
98 th Percentile	24-hr PM _{2.5}	16	11	14	14 ^a

^a Seasonal background PM_{2.5} concentrations for use in 24-hr PM_{2.5} NAAQS cumulative modeling will be detailed separately in the project modeling protocol and incorporate the removal of excluded days as proposed in this memo.

Attachment 1

Design Value Calculation Workbooks Attached Electronically

APPENDIX F: FLM RESPONSE

From: [Perron, Ralph - FS, NH](#)
To: [Tony Schroeder](#)
Cc: [Jacobs, Robert \(DEC\)](#); [Nowak, Mark P \(DEC\)](#); sngatzemeier@micron.com; chenry@micron.com; akunz@micron.com; [Brittany Sanders](#); hfeichko@micron.com; [Jesse McMahon](#); [Kailin Schwan](#); [Sundar Sadashivam](#)
Subject: Re: [External Email]Micron Technology Inc. - Clay, NY - FLM Notification
Date: Monday, February 10, 2025 10:43:36 AM
Attachments: [image001.jpg](#)
[image002.png](#)
[FINAL Micron Clay NY FLM Notification Letter 2025-0131.pdf](#)

Hi Tony,

Thank you for sharing this information with us for the proposed Micron New York Semiconductor Manufacturing, LLC facility. Based on the data you have shared in the attached document, including proposed emissions and the distance to the nearest Forest Service Class I area of 255 km, the US Forest Service will not be requesting AQRV analyses for this project.

Please keep us informed of any significant changes to this project, as well as any other proposals which may have an effect on the Lye Brook, Great Gulf, and/or Presidential Range-Dry River Class I areas.

Thanks,

Ralph Perron
Air Quality Specialist

Forest Service
Eastern Region

cell: 802-222-1444

ralph.perron@usda.gov

From: Tony Schroeder <TSchroeder@trinityconsultants.com>
Sent: Friday, January 31, 2025 1:43 PM
To: Perron, Ralph - FS, NH <ralph.perron@usda.gov>
Cc: [Jacobs, Robert \(DEC\) <robert.jacobs@dec.ny.gov>](mailto:Jacobs, Robert (DEC) <robert.jacobs@dec.ny.gov>); [Nowak, Mark P \(DEC\) <Mark.Nowak@dec.ny.gov>](mailto:Nowak, Mark P (DEC) <Mark.Nowak@dec.ny.gov>); sngatzemeier@micron.com <sngatzemeier@micron.com>; chenry@micron.com <chenry@micron.com>; akunz@micron.com <akunz@micron.com>; Brittany Sanders <brittanysand@micron.com>; hfeichko@micron.com <hfeichko@micron.com>; Jesse McMahon <jessemcmahon@micron.com>; Kailin Schwan <kschwan@micron.com>; Sundar Sadashivam <SSadashivam@trinityconsultants.com>
Subject: [External Email]Micron Technology Inc. - Clay, NY - FLM Notification

You don't often get email from tschroeder@trinityconsultants.com. [Learn why this is important](#)

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Use caution before clicking links or opening attachments.
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Micron Confidential

Mr. Perron,

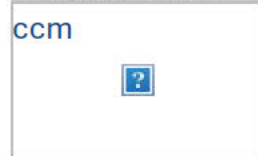
Attached please find the FLM Notification for Micron Technology Inc.'s new facility in Clay, NY.

Please do not hesitate to respond with questions.

Thank you,
Tony

The information provided is considered proprietary and confidential business information and/or trade secrets pursuant to Public Officers Law Section 87(2)(d). As such, we request that agency maintains this information in accordance with Public Officers Law Section 89(5)(a)(3).

Tony Schroeder, CCM, QEP
Principal Consultant



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APPENDIX G: BUILDING INVENTORY

Table G-1. Rectangular Buildings

AERMOD ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Height (m)	X Length (m)	Y Length (m)	Angle
BLDG001	405888.1	4783206.6	121.92	9.14	21.80	87.10	125.7
WWT1	405399.7	4783209.0	121.92	40.84	230.43	178.00	125.7
WWT2	406273.5	4783181.9	121.92	40.84	230.43	178.00	125.7
BLDG002	405750.8	4783334.8	121.92	4.88	59.44	19.81	35.5
RECLAIM1	405354.2	4783673.8	121.92	18.53	70.60	413.80	86.6
BLDG003	405395.1	4783260.3	121.92	4.88	14.02	6.10	216.0
BLDG004	406728.6	4782923.5	121.92	4.88	14.02	6.10	125.0
BLDG005	405325.1	4782916.6	121.92	20.12	92.50	16.00	215.6
BLDG006	406358.4	4783167.6	121.92	20.12	92.50	16.00	35.5
BLDG007	405448.4	4782944.8	121.92	10.06	15.24	11.35	216.3
BLDG008	406225.3	4783134.4	121.92	10.06	15.24	11.35	125.3
BLDG009	406163.6	4783190.6	121.92	22.25	8.60	3.70	125.6
BLDG010	406167.2	4783187.9	121.92	53.64	5.00	3.90	124.5
BLDG011	406171.2	4783185.2	121.92	39.32	4.65	3.90	126.1
BLDG012	406175.3	4783182.1	121.92	40.23	4.20	3.46	125.1
BLDG013	406178.8	4783179.7	121.92	40.23	5.00	3.90	125.5
BLDG014	406108.8	4783114.3	121.92	22.25	8.60	3.70	126.1
BLDG015	406112.4	4783111.7	121.92	53.64	5.00	3.90	125.7
BLDG016	406116.4	4783108.8	121.92	39.32	4.65	3.90	125.1
BLDG017	406120.6	4783105.8	121.92	40.23	4.20	3.46	125.3
BLDG018	406123.9	4783103.4	121.92	40.23	5.00	3.90	125.5
BLDG019	406108.4	4783065.5	121.92	4.88	12.60	7.65	126.3
BLDG020	406152.4	4783257.6	121.92	9.14	9.94	33.53	125.8
BLDG021	406097.7	4783181.3	121.92	9.14	9.94	33.53	125.7
BLDG022	406148.4	4783244.4	121.92	22.86	53.79	18.51	125.7
BLDG023	406093.5	4783168.0	121.92	22.86	53.79	18.51	125.6
BLDG024	406337.9	4782883.4	121.92	9.14	21.80	87.10	125.7
BLDG025	406538.2	4782779.2	121.92	4.88	19.81	59.44	125.8
BLDG026	406846.1	4783027.4	121.92	22.25	8.60	3.70	124.9
BLDG027	406849.7	4783024.8	121.92	53.64	5.00	3.90	124.9
BLDG028	406853.8	4783021.9	121.92	39.32	4.65	3.90	126.3
BLDG029	406857.9	4783019.0	121.92	40.23	4.20	3.46	125.7
BLDG030	406861.3	4783016.5	121.92	40.23	5.00	3.90	125.9
BLDG031	406791.2	4782951.1	121.92	22.25	8.60	3.70	125.5
BLDG032	406794.9	4782948.5	121.92	53.64	5.00	3.90	126.1
BLDG033	406798.9	4782945.6	121.92	39.32	4.65	3.90	126.3
BLDG034	406803.0	4782942.6	121.92	40.23	4.20	3.46	125.7
BLDG035	406806.5	4782940.2	121.92	40.23	5.00	3.90	125.7
BLDG036	406849.8	4782901.7	121.92	4.88	12.60	7.65	215.2
BLDG037	406830.9	4783081.3	121.92	22.86	53.79	18.51	125.8
BLDG038	406834.8	4783094.5	121.92	9.14	9.94	33.53	125.8
BLDG039	406776.0	4783004.9	121.92	22.86	53.79	18.51	125.6

Table G-1. Rectangular Buildings

AERMOD ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Height (m)	X Length (m)	Y Length (m)	Angle
BLDG040	406780.1	4783018.1	121.92	9.14	9.94	33.53	125.6
BLDG041	406056.4	4781996.9	121.92	30.48	21.00	21.00	91.0
BLDG043	406586.3	4782744.6	121.92	4.88	19.81	59.44	125.8
BLDG044	406582.3	4783028.4	121.92	4.88	6.10	14.02	215.7
PROBE1	405511.4	4782620.3	121.92	30.48	57.61	292.61	125.7
PROBE2	405750.5	4782448.4	121.92	30.48	57.61	292.61	125.7
BLDG082	405324.8	4783181.6	121.92	4.88	14.02	6.10	36.5
BLDG083	406479.7	4783146.0	121.92	4.88	6.10	14.02	35.6
BLDG086	405474.7	4783837.4	121.92	9.14	45.90	36.60	86.5
BLDG087	405199.0	4783085.5	121.92	6.10	46.00	33.60	86.5
CUB1	405649.0	4783143.2	121.92	21.03	398.00	99.52	125.8
CUB2	406377.4	4782636.2	121.92	21.03	425.00	99.52	125.8
CUB1_2	405659.5	4783027.3	121.92	28.65	45.72	15.24	125.8
CUB1_3	405564.5	4782894.9	121.92	28.65	45.72	15.24	125.8
CUB2_2	406324.1	4782549.5	121.92	28.65	45.72	15.24	125.8
CUB2_3	406229.1	4782417.4	121.92	28.65	45.72	15.24	125.8
BLDG088	405876.5	4782656.9	121.92	7.73	210.50	24.38	125.7
BLDG089	405896.1	4782642.4	121.92	7.73	210.50	24.38	125.7
BLDG090	405890.0	4782673.3	121.92	6.10	21.20	22.90	125.7
BLDG091	405908.5	4782659.8	121.92	6.10	21.20	22.90	125.7
BLDG092	405910.1	4782704.0	121.92	6.10	18.29	24.38	125.7
BLDG093	405930.0	4782689.6	121.92	6.10	18.29	24.38	125.7
BLDG094	405935.0	4782738.5	121.92	6.10	18.29	24.38	125.7
BLDG095	405954.8	4782724.4	121.92	6.10	18.29	24.38	125.7
BLDG096	405959.3	4782769.7	121.92	6.10	21.20	22.90	125.7
BLDG097	405978.0	4782756.3	121.92	6.10	21.20	22.90	125.7
BLDG098	406080.9	4782941.6	121.92	6.10	210.50	24.38	125.7
BLDG099	406100.6	4782927.3	121.92	6.10	210.50	24.38	125.7
GARAGE1	405355.7	4782732.3	121.92	21.95	91.44	164.59	125.7
GARAGE2	406007.6	4782246.2	121.92	21.95	91.44	164.59	125.7
BLDG112	405311.6	4782167.0	121.92	6.10	15.24	45.72	85.6
BLDG113	406420.1	4782903.2	121.92	3.66	10.06	17.68	125.7
BLDG114	406435.2	4782892.2	121.92	3.66	10.06	17.68	125.7
BLDG115	405921.6	4783261.2	121.92	3.66	10.06	17.68	125.4
BLDG116	405936.9	4783250.2	121.92	3.66	10.06	17.68	125.4
BLDG121	405872.9	4783190.7	121.92	7.62	3.10	11.70	35.8
BLDG122	405946.1	4783138.1	121.92	7.62	3.10	11.70	35.8
BLDG123	406322.6	4782867.5	121.92	7.62	3.10	11.70	35.8
BLDG124	406395.8	4782814.9	121.92	7.62	3.10	11.70	35.8
BLDG129	405333.1	4782919.7	121.92	3.05	25.91	7.32	215.7
BLDG130	405290.8	4782949.9	121.92	3.05	25.91	7.32	215.7
BLDG131	406369.8	4783149.8	121.92	3.05	25.91	7.32	35.8

Table G-1. Rectangular Buildings

AERMOD ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Height (m)	X Length (m)	Y Length (m)	Angle
BLDG132	406411.8	4783119.8	121.92	3.05	25.91	7.32	35.8
FAB1E_1	405683.1	4782622.8	121.92	8.23	11.98	16.40	35.7
FAB1E_2	405919.3	4782951.6	121.92	8.23	11.98	16.40	35.7
FAB1N_1	405827.7	4783127.9	121.92	36.68	7.68	62.88	125.6
FAB1N_2	405932.3	4783052.5	121.92	36.68	7.50	48.37	125.8
FAB1W_1	405678.8	4782933.5	121.92	8.53	7.50	16.58	35.2
FAB1W_2	405614.8	4782844.4	121.92	8.53	7.41	21.90	35.7
FAB1W_3	405683.4	4782977.1	121.92	8.53	29.10	132.90	35.7
FAB1W_4	405515.4	4782743.4	121.92	8.69	29.10	133.10	35.7
FAB2W_1	405935.3	4782441.2	121.92	8.23	12.00	16.30	36.1
FAB2W_2	406171.5	4782770.0	121.92	8.23	11.90	16.70	36.4
FAB2N_1	406233.6	4782836.1	121.92	36.68	7.60	48.50	125.6
FAB2N_2	406326.7	4782769.1	121.92	36.68	7.60	63.20	125.5
FAB2E_1	406235.2	4782533.7	121.92	8.53	7.40	16.50	34.9
FAB2E_2	406171.3	4782444.5	121.92	8.53	7.10	21.90	35.2
FAB2E_3	406257.2	4782564.8	121.92	8.53	29.20	132.90	35.8
FAB2E_4	406089.5	4782331.1	121.92	8.69	29.30	132.70	35.7
BLDG143	405293.4	4783001.8	121.92	3.05	25.70	106.40	125.8
BLDG144	406168.4	4782973.5	121.92	3.05	25.70	106.40	125.7
BLDG147	405753.6	4782486.0	121.92	6.10	6.20	48.80	125.9
BLDG148	406084.5	4782946.6	121.92	6.10	6.20	48.80	125.8
BLDG155	405770.4	4782519.9	121.92	6.10	6.10	21.30	35.7
BLDG156	405815.1	4782487.7	121.92	6.10	6.10	21.30	35.6
BLDG157	406041.6	4782897.5	121.92	6.10	6.10	21.30	35.8
BLDG158	406086.2	4782865.5	121.92	6.10	6.10	21.30	35.9
BLDG159	405724.8	4782523.6	121.92	6.10	21.30	204.20	35.5
BLDG160	405916.9	4782791.6	121.92	6.10	21.30	204.20	35.7
BLDG161	406013.1	4782721.8	121.92	6.10	21.30	204.20	35.7
BLDG162	405820.6	4782454.6	121.92	6.10	21.30	204.20	35.7
BLDG167	405437.1	4782955.2	121.92	3.05	24.60	71.20	35.9
BLDG168	405415.9	4782926.7	121.92	3.05	11.30	19.50	35.9
BLDG169	406130.6	4783023.2	121.92	3.05	23.50	38.80	35.8
BLDG170	406161.2	4783067.2	121.92	3.05	24.60	71.20	35.8
BLDG175	405987.3	4783252.8	121.92	3.66	10.06	17.68	125.5
BLDG176	406002.6	4783241.7	121.92	3.66	10.06	17.68	125.8
BLDG177	406393.1	4782961.0	121.92	3.66	10.06	17.68	125.5
BLDG178	406408.6	4782950.1	121.92	3.66	10.06	17.68	125.6
BLDG189	405830.4	4783080.4	121.92	48.69	8.50	5.10	125.6
BLDG190	405922.4	4783014.6	121.92	48.69	8.50	5.10	125.6
BLDG191	405726.9	4782936.9	121.92	48.69	8.50	5.10	125.6
BLDG192	405819.0	4782870.4	121.92	48.69	8.50	5.10	125.6
BLDG193	405690.0	4782926.8	121.92	48.69	4.70	5.40	125.6

Table G-1. Rectangular Buildings

AERMOD ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Height (m)	X Length (m)	Y Length (m)	Angle
BLDG194	405819.6	4782830.2	121.92	48.69	4.70	5.40	125.6
BLDG195	405647.5	4782858.0	121.92	48.69	4.70	5.40	125.6
BLDG196	405650.4	4782829.5	121.92	48.69	8.50	5.10	125.6
BLDG197	405741.9	4782763.9	121.92	48.69	8.50	5.10	125.6
BLDG198	405778.1	4782772.8	121.92	48.69	4.70	5.40	125.6
BLDG199	405547.2	4782686.1	121.92	48.69	8.50	5.10	125.6
BLDG200	405639.1	4782619.9	121.92	48.69	8.50	5.10	125.6
BLDG201	406236.8	4782788.0	121.92	48.69	8.50	5.10	125.6
BLDG202	406328.9	4782722.2	121.92	48.69	8.50	5.10	125.6
BLDG203	406133.3	4782644.8	121.92	48.69	8.50	5.10	125.6
BLDG204	406225.3	4782578.6	121.92	48.69	8.50	5.10	125.6
BLDG205	406094.6	4782632.6	121.92	48.69	4.70	5.40	125.6
BLDG206	406227.4	4782540.2	121.92	48.69	4.70	5.40	125.6
BLDG207	406053.5	4782575.2	121.92	48.69	4.70	5.40	125.6
BLDG208	406185.2	4782478.4	121.92	48.69	4.70	5.40	125.6
BLDG209	406056.8	4782537.6	121.92	48.69	8.50	5.10	125.6
BLDG210	406148.4	4782471.8	121.92	48.69	8.50	5.10	125.6
BLDG211	405953.6	4782394.4	121.92	48.69	8.50	5.10	125.6
BLDG212	406045.4	4782328.0	121.92	48.69	8.50	5.10	125.6
F1GEN60H	405494.2	4783779.6	121.92	9.14	5.20	20.90	86.5
BLDG237	405890.5	4783219.4	121.92	7.62	7.80	15.30	125.5
BLDG238	405907.1	4783207.7	121.92	7.62	7.80	15.30	125.5
BLDG239	405923.6	4783195.9	121.92	7.62	7.80	15.30	125.5
BLDG240	405941.0	4783183.4	121.92	7.62	7.80	15.30	125.5
BLDG241	405958.8	4783170.4	121.92	7.62	7.80	15.30	125.5
BLDG242	405868.5	4783189.2	121.92	7.62	7.80	15.30	125.5
BLDG243	405885.0	4783177.1	121.92	7.62	7.80	15.30	125.5
BLDG244	405901.2	4783164.7	121.92	7.62	7.80	15.30	125.5
BLDG245	405917.5	4783153.6	121.92	7.62	7.80	15.30	125.5
BLDG246	405933.9	4783141.7	121.92	7.62	7.80	15.30	125.5
BLDG247	406340.4	4782896.8	121.92	7.62	7.80	15.30	125.5
BLDG248	406356.8	4782884.9	121.92	7.62	7.80	15.30	125.5
BLDG249	406372.7	4782873.1	121.92	7.62	7.80	15.30	125.5
BLDG250	406390.8	4782860.4	121.92	7.62	7.80	15.30	125.5
BLDG251	406408.6	4782847.3	121.92	7.62	7.80	15.30	125.5
BLDG252	406320.9	4782863.6	121.92	7.62	7.80	15.30	125.5
BLDG253	406337.4	4782852.1	121.92	7.62	7.80	15.30	125.5
BLDG254	406353.6	4782840.4	121.92	7.62	7.80	15.30	125.5
BLDG255	406369.7	4782828.4	121.92	7.62	7.80	15.30	125.5
BLDG256	406386.2	4782817.0	121.92	7.62	7.80	15.30	125.5
BLDG277	407552.9	4781736.4	121.92	6.10	15.30	45.70	35.8

Table G-2. Circular Buildings

AERMOD ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Height (m)	Radius (m)
CBLDG001	405813.4	4783300.8	121.92	14.02	7.62
CBLDG002	405802.5	4783286.3	121.92	14.02	7.62
CBLDG003	405376.7	4783246.8	121.92	14.02	13.72
CBLDG004	405357.9	4783219.9	121.92	14.02	13.72
CBLDG005	405750.4	4783307.5	121.92	14.02	9.14
CBLDG006	405768.6	4783294.7	121.92	14.02	9.14
CBLDG007	405436.7	4783329.1	121.92	16.46	13.41
CBLDG008	405418.2	4783303.4	121.92	16.46	13.41
CBLDG009	405398.9	4783277.4	121.92	16.46	13.41
CBLDG012	405282.9	4783113.5	121.92	14.02	10.67
CBLDG013	405316.5	4783159.3	121.92	14.02	10.67
CBLDG014	405300.0	4783136.8	121.92	14.02	10.67
CBLDG017	405977.5	4783118.2	121.92	22.86	6.86
CBLDG018	406015.2	4783103.1	121.92	38.10	13.56
CBLDG019	406062.2	4783069.3	121.92	38.10	13.56
CBLDG020	406034.6	4783106.1	121.92	22.86	1.98
CBLDG021	406058.3	4783089.0	121.92	22.86	1.98
CBLDG022	406183.0	4783174.2	121.92	44.50	1.52
CBLDG023	406128.2	4783097.9	121.92	44.50	1.52
CBLDG024	406146.4	4783140.7	121.92	28.96	2.29
CBLDG025	406151.7	4783136.7	121.92	28.96	2.29
CBLDG026	406201.2	4783216.8	121.92	28.96	2.29
CBLDG027	406206.5	4783213.1	121.92	28.96	2.29
CBLDG028	406133.5	4783160.8	121.92	22.86	1.98
CBLDG029	406188.3	4783237.2	121.92	22.86	1.98
CBLDG030	406528.3	4782786.6	121.92	14.02	7.62
CBLDG031	406517.0	4782771.6	121.92	14.02	7.62
CBLDG032	406562.5	4782791.9	121.92	14.02	13.72
CBLDG033	406587.8	4782773.6	121.92	14.02	13.72
CBLDG034	406556.7	4782722.1	121.92	14.02	9.14
CBLDG035	406544.1	4782704.6	121.92	14.02	9.14
CBLDG036	406507.1	4783134.8	121.92	16.46	13.41
CBLDG037	406532.5	4783117.0	121.92	16.46	13.41
CBLDG038	406557.5	4783098.8	121.92	16.46	13.41
CBLDG041	406509.2	4783074.6	121.92	14.02	10.67
CBLDG042	406533.1	4783057.4	121.92	14.02	10.67
CBLDG043	406556.2	4783040.6	121.92	14.02	10.67
CBLDG046	406928.5	4783014.0	121.92	22.86	6.86
CBLDG047	406863.3	4782941.1	121.92	38.10	13.56
CBLDG048	406897.3	4782987.9	121.92	38.10	13.56
CBLDG049	406860.7	4782960.5	121.92	22.86	1.98
CBLDG050	406877.5	4782984.5	121.92	22.86	1.98

Table G-2. Circular Buildings

AERMOD ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Height (m)	Radius (m)
CBLDG051	406865.5	4783011.1	121.92	44.50	1.52
CBLDG052	406810.7	4782934.7	121.92	44.50	1.52
CBLDG053	406883.7	4783053.7	121.92	28.96	2.29
CBLDG054	406888.9	4783049.8	121.92	28.96	2.29
CBLDG055	406828.8	4782977.4	121.92	28.96	2.29
CBLDG056	406834.2	4782973.5	121.92	28.96	2.29
CBLDG057	406870.8	4783073.8	121.92	22.86	1.98
CBLDG058	406816.0	4782997.5	121.92	22.86	1.98
CBLDG059	406644.8	4782702.8	121.92	14.02	7.62
CBLDG060	406633.9	4782687.5	121.92	14.02	7.62
CBLDG061	406613.3	4782755.3	121.92	14.02	13.72
CBLDG062	406638.6	4782737.3	121.92	14.02	13.72
CBLDG063	406574.6	4782709.4	121.92	14.02	9.14
CBLDG064	406561.9	4782691.6	121.92	14.02	9.14
CBLDG070	406748.3	4782902.3	121.92	14.02	10.67
CBLDG071	406771.5	4782885.7	121.92	14.02	10.67
CBLDG072	406795.8	4782868.5	121.92	14.02	10.67

Table G-3. Polygon Buildings

AERMOD ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Height (m)	X Vertices (m)	Y Vertices (m)
BLDG137	406802.6	4783102.6	121.92	6.10	406802.6	4783102.6
					406808.3	4783098.5
					406811	4783102.1
					406818.3	4783096.9
					406794.2	4783063.3
					406781	4783072.8
BLDG138	406747.8	4783026.3	121.92	6.10	406802.6	4783102.6
					406747.8	4783026.3
					406753.6	4783022.2
					406756.3	4783025.7
					406763.5	4783020.6
					406739.5	4782986.9
ADMIN1	405669.1	4782435.9	121.92	18.29	406726.4	4782996.5
					406747.8	4783026.3
					405669.1	4782435.9
					405651.9	4782411.7
					405500.1	4782521
					405477.5	4782489.5
ADMIN2	405716.3	4782401.4	121.92	18.29	405677.6	4782346.2
					405716.3	4782401.7
					405669.1	4782435.9
					405716.3	4782401.4
					405741.6	4782383.3
					405724.3	4782359.6
FAB1	405827.5	4783127.9	121.92	35.61	405900	4782233.4
					405876.7	4782202.1
					405677.6	4782346.2
					405716.3	4782401.4
					405827.5	4783127.9
					405681.6	4782924.7
					405657.7	4782941.9
					405613.9	4782880.9
					405626	4782872.4
					405621.7	4782866.5
					405633.4	4782858
					405496.2	4782666.9
					405640.2	4782563.3
					405799	4782784.1
					405804.8	4782780
					405818.7	4782799.1
					405812.8	4782803.4
					405971.6	4783024.4
					405932.3	4783052.6
					405928	4783046.4
					405874.1	4783085
					405878.6	4783091.3
					405827.5	4783127.9

Table G-3. Polygon Buildings

AERMOD ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Height (m)	X Vertices (m)	Y Vertices (m)
FAB1N_3	405867.7	4783116.7	121.92	8.38	405867.7	4783116.7
					405881	4783107.2
					405876.7	4783101.3
					405882.8	4783096.9
					405878.6	4783091.2
					405859.4	4783105.2
FAB1W_5	405827.5	4783127.9	121.92	45.06	405867.7	4783116.7
					405827.5	4783127.9
					405860.7	4783104.1
					405529.4	4782643
					405496.1	4782666.8
					405544.2	4782733.8
					405568	4782716.6
					405613.9	4782780.5
					405590.2	4782797.5
					405643.1	4782871.3
					405660.9	4782858.4
					405698.3	4782910.5
					405680.5	4782923.2
					405733.6	4782997.2
					405757.3	4782979.9
FAB1E_3	405938.3	4783048.2	121.92	45.06	405803.1	4783043.9
					405779.4	4783060.9
					405827.5	4783127.9
					405938.3	4783048.2
					405971.5	4783024.3
					405923.5	4782957.4
					405899.7	4782974.5
					405853.7	4782910.6
					405877.5	4782893.6
					405824.5	4782819.7
					405806.6	4782832.7
					405769.3	4782780.6
					405787.2	4782767.7
					405734.3	4782694.1
					405710.5	4782711.1
FAB2	406273.1	4782807.8	121.92	35.61	405664.4	4782647.2
					405688.5	4782630.2
					405640.2	4782563.2
					405607	4782587.1
					405938.3	4783048.2
					406273.1	4782807.8
					406233.8	4782836
					406075	4782614.9
					406069.2	4782619.1
					406055.3	4782599.9
					406061.2	4782595.8
					405902.5	4782374.8
					406046.8	4782271.3
					406183.9	4782462.5
					406195.9	4782453.8
					406200.1	4782459.8
					406211.9	4782451.4
					406255.7	4782512.1
					406232	4782529.4
					406377.9	4782732.5
					406326.8	4782769.1
					406322.5	4782763
					406268.7	4782801.7
					406273.1	4782807.8

Table G-3. Polygon Buildings

AERMOD ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Height (m)	X Vertices (m)	Y Vertices (m)
FAB2N_3	406326.8	4782769	121.92	8.38	406326.8	4782769
					406331.1	4782775
					406337.1	4782770.6
					406341.5	4782776.6
					406354.7	4782766.9
					406346.4	4782755
FAB2W_3	406233.3	4782836.1	121.92	45.06	406326.8	4782769
					406233.3	4782836.1
					406267	4782812.1
					405935.8	4782351.3
					405902.5	4782374.6
					405950.6	4782441.7
					405974.4	4782424.5
					406020.2	4782488.5
					405996.3	4782505.5
					406049.4	4782579.4
					406067.6	4782566.4
					406104.7	4782618.7
					406086.8	4782631.2
					406139.8	4782705.2
					406163.7	4782687.9
FAB2E_5	406344.3	4782756.2	121.92	45.06	406209.5	4782751.9
					406185.7	4782768.9
					406233.3	4782836.1
					406344.3	4782756.2
					406378	4782732.5
					406329.8	4782665.4
					406306.3	4782682.4
					406259.9	4782618.6
					406283.9	4782601.5
					406230.9	4782527.7
					406213.2	4782540.6
					406175.6	4782488.5
					406193.5	4782475.7
					406140.6	4782402
					406116.9	4782419.1
HPM1_S	405829.4	4782761.9	121.92	17.07	406070.9	4782355.1
					406094.6	4782338
					406046.8	4782271.6
					406013.4	4782295.2
					406344.3	4782756.2
					405829.4	4782761.9
					405873.3	4782730.4
					405748.5	4782556.6
					405749.7	4782548.9
					405743	4782547.7
					405744	4782540.9
					405737.2	4782539.7
					405738.2	4782533
					405731.5	4782531.8
					405732.6	4782525.2
					405724.8	4782523.8
					405712.9	4782507.4
					405669.3	4782539
					405829.4	4782761.9

Table G-3. Polygon Buildings

AERMOD ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Height (m)	X Vertices (m)	Y Vertices (m)
HPM1_N	406003.6	4783004.5	121.92	17.07	406003.6	4783004.5
					406047.7	4782973
					406035.7	4782956.7
					406037	4782948.7
					406030.4	4782947.7
					406031.4	4782940.8
					406024.6	4782939.9
					406025.7	4782933
					406019	4782931.9
					406020	4782925.1
					406012.1	4782924
					405887.4	4782750.2
					405843.7	4782781.6
					406003.6	4783004.5
HPM2_N	406160.9	4782891.6	121.92	17.07	406160.9	4782891.6
					406149.2	4782875.1
					406141.4	4782873.8
					406142.4	4782867.1
					406135.8	4782866
					406136.8	4782859.1
					406130.1	4782857.9
					406131.2	4782851.3
					406124.3	4782850.1
					406125.6	4782842.2
					406000.9	4782668.6
					406044.7	4782637.2
					406204.9	4782860.1
					406160.9	4782891.6
HPM2_S	405986.7	4782648.9	121.92	17.07	405986.7	4782648.9
					406030.5	4782617.3
					405870.2	4782394.5
					405826.4	4782425.9
					405838.1	4782442.3
					405837	4782450.2
					405843.7	4782451.3
					405842.6	4782458
					405849.4	4782459.2
					405848.4	4782466
					405855.1	4782467
					405854	4782473.9
					405862	4782475.2
					405986.7	4782648.9
BLDG183	405359.5	4782954.5	121.92	5.49	405359.5	4782954.5
					405364.6	4782950.9
					405354.6	4782937.1
					405365.4	4782929.2
					405361	4782923
					405345.3	4782934.3
					405359.5	4782954.5

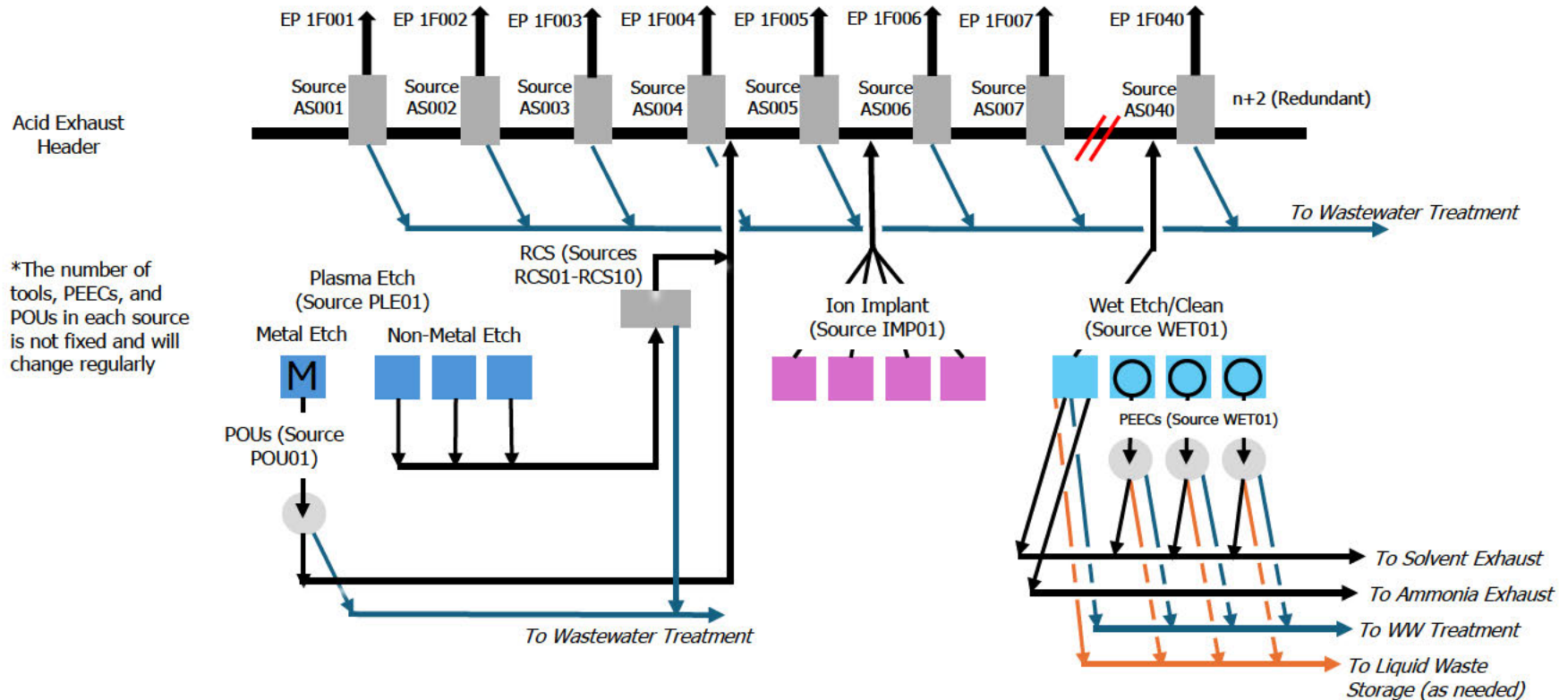
Table G-3. Polygon Buildings

AERMOD ID	X Coordinate (m)	Y Coordinate (m)	Elevation (m)	Height (m)	X Vertices (m)	Y Vertices (m)
BLDG184	406158.5	4782948.9	121.92	5.49	406158.5	4782948.9
					406163	4782955.1
					406173.9	4782947.4
					406183.7	4782961.5
					406188.9	4782957.7
					406174.2	4782937.6
					406158.5	4782948.9
BLDG187	406065.5	4783189.7	121.92	6.10	406065.5	4783189.7
					406071.5	4783185.4
					406074.1	4783189.1
					406081.5	4783183.7
					406057.3	4783150.3
					406044.1	4783159.8
					406065.5	4783189.7
BLDG188	406120.3	4783266	121.92	6.10	406120.3	4783266
					406126.3	4783261.7
					406128.9	4783265.4
					406136.2	4783260.1
					406112	4783226.7
					406098.9	4783236.1
					406120.3	4783266

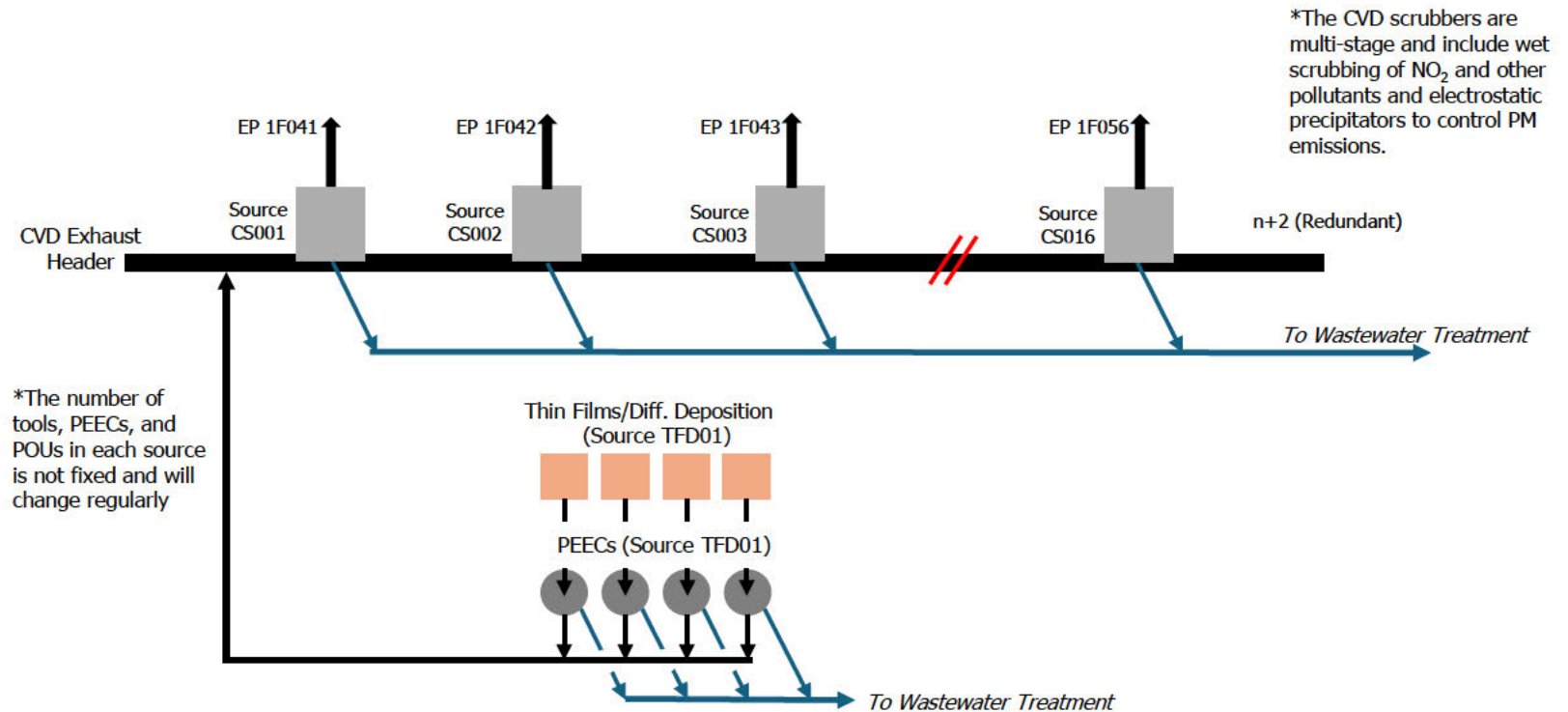
APPENDIX G: BUILDING INVENTORY

APPENDIX H. PROCESS FLOW DIAGRAMS

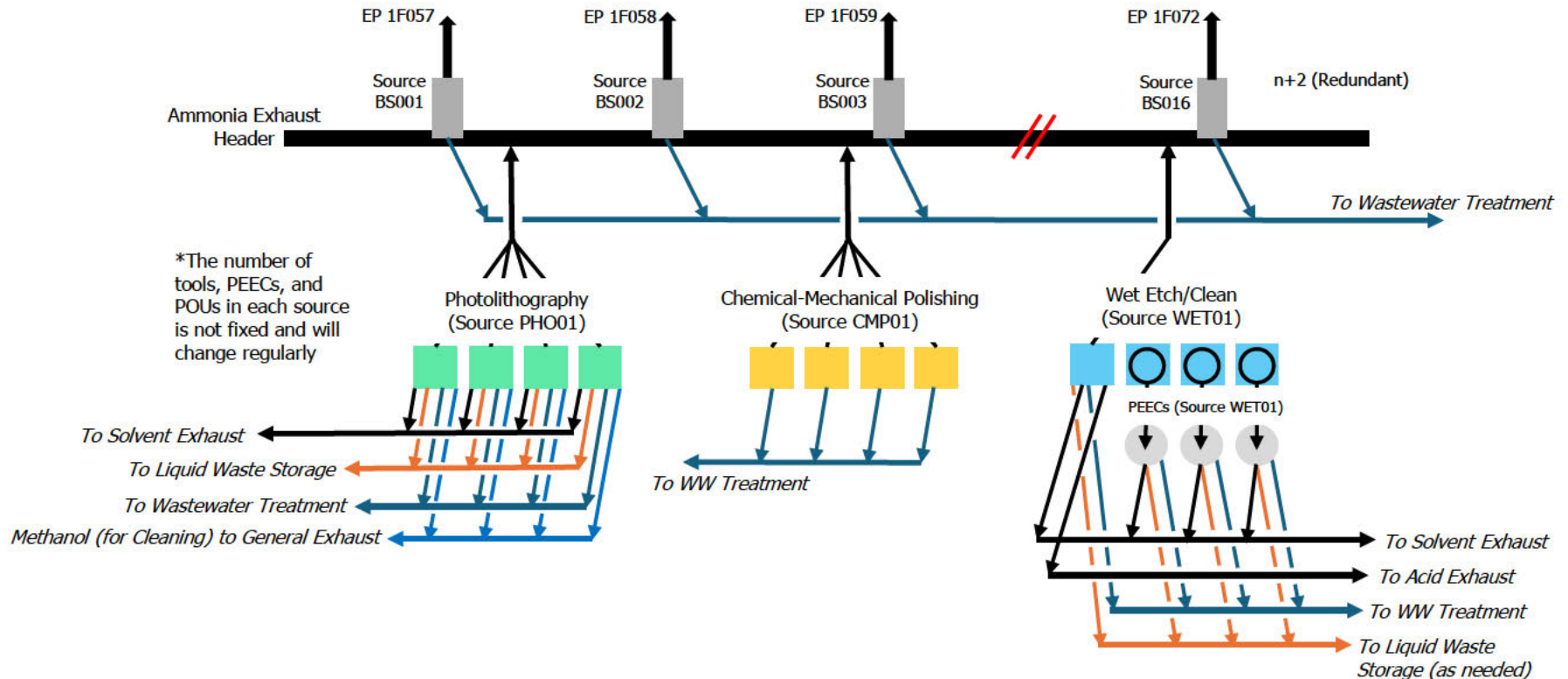
Example Acid Exhaust Configuration Serving One Half of Each Fab Title V codes align with Fab 1 (1-FABOP), Process FA1



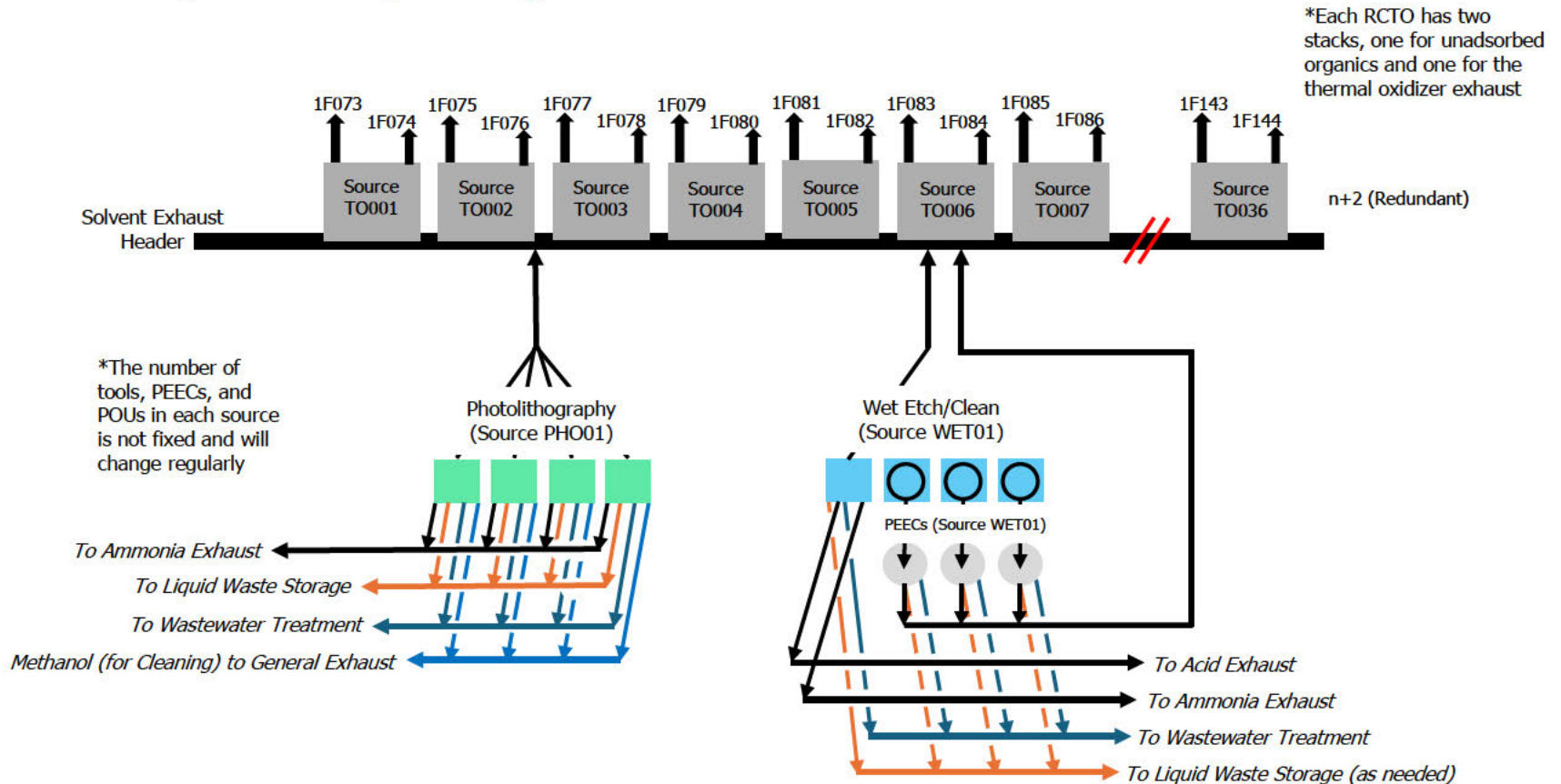
Example CVD Exhaust Configuration Serving One Half of Each Fab
 Title V codes align with Fab 1 (1-FABOP), Process FC1



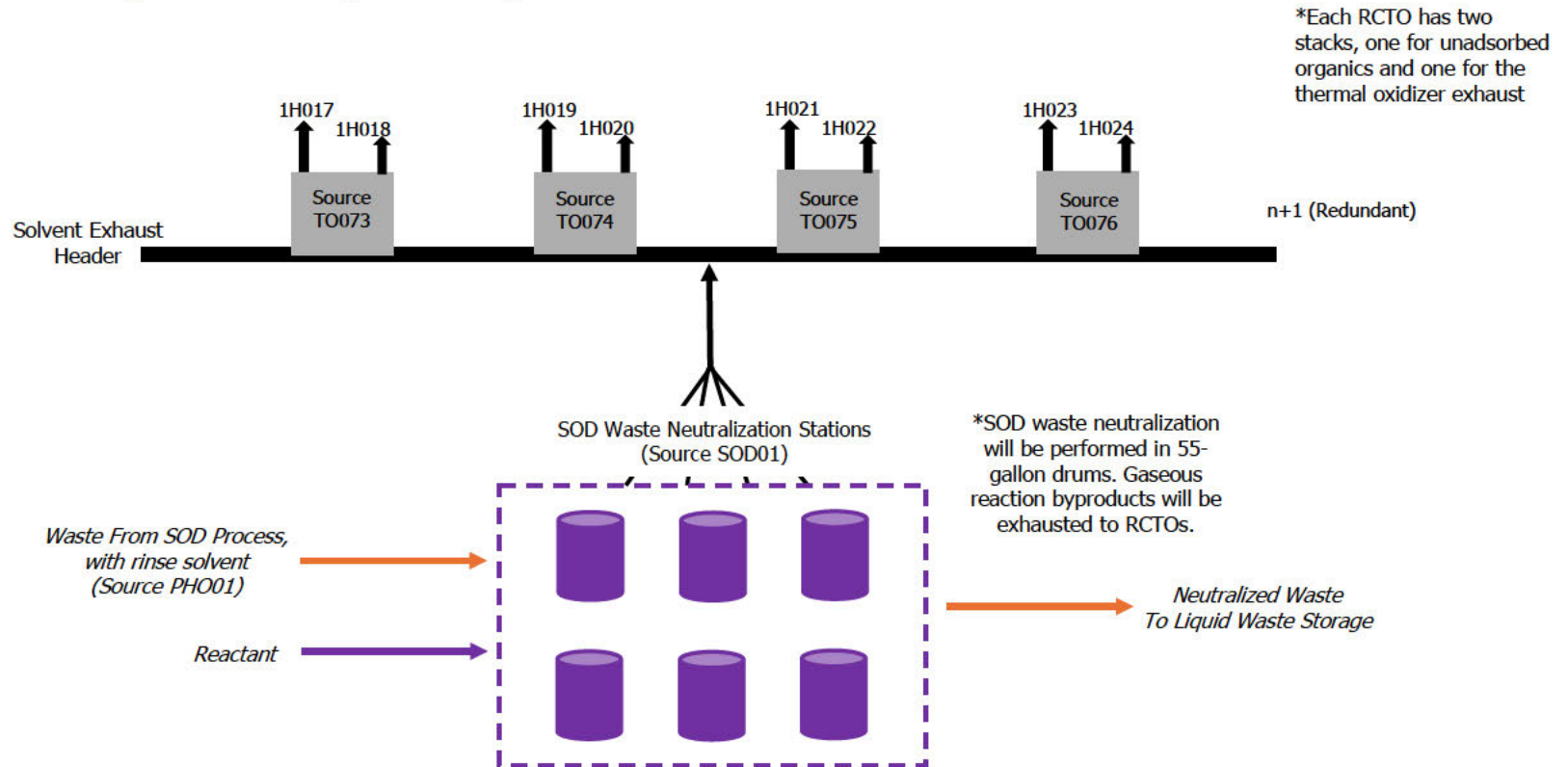
Example Ammonia Exhaust Configuration Serving One Half of Each Fab
 Title V codes align with Fab 1 (1-FABOP), Process FB1



Example Solvent Exhaust Configuration Serving One Half of Each Fab
 Title V codes align with Fab 1 (1-FABOP), Process FS1



Example Spin-on Dielectric (SOD) Waste Neutralization
Title V codes align with Fab 1 (1-HPMCU), Process HS1



APPENDIX I. VISCREEN MODELING FILES

Visual Effects Screening Analysis for
Source: Micron Clay
Class I Area: Green Lakes State Park

*** Level-1 Screening ***

Input Emissions for

Particulates	77.70	TON/YR
NOx (as NO2)	374.20	TON/YR
Primary NO2	0.00	TON/YR
Soot	0.00	TON/YR
Primary SO4	0.03	TON/YR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	0.04 ppm
Background Visual Range:	25.00 km
Source-Observer Distance:	21.03 km
Min. Source-Class I Distance:	19.84 km
Max. Source-Class I Distance:	23.77 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
					=====		=====	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
=====	=====	=====	=====	=====	=====	=====	=====	=====
SKY	10.	68.	19.8	101.	2.00	1.551	0.05	0.001
SKY	140.	68.	19.8	101.	2.00	0.523	0.05	-0.008
TERRAIN	10.	68.	19.8	101.	2.00	0.621	0.05	0.008
TERRAIN	140.	68.	19.8	101.	2.00	0.152	0.05	0.005

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
					=====		=====	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume

=====	=====	===	=====	=====	=====	=====	=====	=====
SKY	10.	35.	16.7	134.	2.00	1.633	0.05	0.002
SKY	140.	35.	16.7	134.	2.00	0.529	0.05	-0.009
TERRAIN	10.	1.	1.0	168.	2.00	1.134	0.05	0.013
TERRAIN	140.	1.	1.0	168.	2.00	0.311	0.05	0.012

APPENDIX J. TOXICS UNIT MODELING RESULTS

1-hr	
2020-2024	
Source ID	Concentration ($\mu\text{g}/\text{m}^3$)
SILO1	1182.7771
SILO2	308.8744
F1GEN_53	158.4499
F1GEN_59	150.1477
F1GEN_1	29.6063
F1GEN_2	29.5982
F1GEN_3	29.5704
F1GEN_4	29.6687
F1GEN_5	29.7665
F1GEN_6	29.8468
F1GEN_7	29.7659
F1GEN_8	29.7851
F1GEN_9	29.7801
F1GEN_10	29.5631
F1GEN_11	29.6312
F1GEN_12	29.7288
F1GEN_13	29.8865
F1GEN_14	29.9402
F1GEN_15	30.0324
F1GEN_16	39.5985
F1GEN_17	39.5354
F1GEN_18	38.7213
F1GEN_19	38.6995
F1GEN_30	49.1008
F1GEN_31	49.0049
F1GEN_32	49.5786
F1GEN_33	49.7662
F1GEN_34	49.7787
F1GEN_35	50.4038
F1GEN_36	50.4050
F1GEN_37	37.6704
F1GEN_38	37.0232
F1GEN_39	36.9901
F1GEN_40	37.0659
F1GEN_41	39.3303
F1GEN_42	39.4225
F1GEN_43	39.4334
F1GEN_44	39.3388
F1GEN_45	39.2672
F1GEN_46	39.1661
F1GEN_47	44.7837
F1GEN_48	44.4482
F1GEN_20	38.7006
F1GEN_21	38.8038
F1GEN_22	29.9966
F1GEN_23	29.9502
F1GEN_24	29.8969
F1GEN_25	54.8610
F1GEN_26	55.0593
F1GEN_27	55.1243
F1GEN_28	55.3597
F1GEN_29	49.1135
F1CT_1	122.8351

Source ID	2020	2021
	Concentration ($\mu\text{g}/\text{m}^3$)	Concentration ($\mu\text{g}/\text{m}^3$)
SILO1	31.4976	29.9048
SILO2	3.4059	3.3251
F1GEN_53	3.8711	3.8658
F1GEN_59	3.2955	3.0577
F1GEN_1	0.6799	0.7066
F1GEN_2	0.6762	0.7063
F1GEN_3	0.6736	0.7063
F1GEN_4	0.6652	0.7043
F1GEN_5	0.6657	0.7036
F1GEN_6	0.6661	0.7028
F1GEN_7	0.6617	0.6957
F1GEN_8	0.6609	0.6949
F1GEN_9	0.6602	0.6941
F1GEN_10	0.6545	0.6985
F1GEN_11	0.6549	0.6991
F1GEN_12	0.6552	0.6995
F1GEN_13	0.6542	0.6993
F1GEN_14	0.6538	0.6993
F1GEN_15	0.6532	0.6986
F1GEN_16	0.8691	0.9257
F1GEN_17	0.8691	0.9239
F1GEN_18	0.8654	0.9180
F1GEN_19	0.8644	0.9166
F1GEN_30	1.3616	1.4496
F1GEN_31	1.3654	1.4554
F1GEN_32	1.3965	1.4982
F1GEN_33	1.4014	1.5025
F1GEN_34	1.4067	1.5062
F1GEN_35	1.4348	1.5374
F1GEN_36	1.4389	1.5418
F1GEN_37	0.9267	0.9205
F1GEN_38	0.9429	0.9467
F1GEN_39	0.9487	0.9548
F1GEN_40	0.9551	0.9626
F1GEN_41	0.9788	0.9899
F1GEN_42	0.9802	0.9914
F1GEN_43	0.9815	0.9927
F1GEN_44	0.9804	0.9933
F1GEN_45	0.9796	0.9929
F1GEN_46	0.9785	0.9923
F1GEN_47	1.1240	1.1381
F1GEN_48	1.1230	1.1375
F1GEN_20	0.8556	0.9242
F1GEN_21	0.8563	0.9251
F1GEN_22	0.6478	0.6850
F1GEN_23	0.6479	0.6838
F1GEN_24	0.6477	0.6826
F1GEN_25	1.5036	1.5745
F1GEN_26	1.5026	1.5753
F1GEN_27	1.5008	1.5820
F1GEN_28	1.5048	1.5869
F1GEN_29	1.3563	1.4429
F1CT_1	1.3456	1.4299

F1CT_2	121.2337
F1CT_3	119.9680
F1CT_4	118.6853
F1CT_5	117.0887
F1CT_6	115.7986
F1CT_7	114.5823
F1CT_8	110.7756
F1CT_9	109.8592
F1CT_10	108.8878
F1CT_11	107.6571
F1CT_12	106.6855
F1CT_13	105.6850
F1CT_14	104.5320
F1CT_15	103.5479
F1CT_16	119.2160
F1CT_17	117.6728
F1CT_18	116.4271
F1CT_19	115.1865
F1CT_20	113.5976
F1CT_21	112.6526
F1CT_22	111.8182
F1CT_23	112.0106
F1CT_24	109.8656
F1CT_25	108.9846
F1CT_26	108.1412
F1CT_27	107.1937
F1CT_28	106.2530
F1CT_29	105.1514
F1CT_30	104.0882
F1CT_31	103.1354
F1CT_32	102.2140
F1CT_33	101.5434
F1CT_34	115.7239
F1CT_35	114.1954
F1CT_36	112.9686
F1CT_37	111.7851
F1CT_38	110.7161
F1CT_39	109.9097
F1CT_40	109.0704
F1CT_41	112.8878
F1CT_42	107.1734
F1CT_43	106.3001
F1CT_44	105.4212
F1CT_45	104.4952
F1CT_46	103.5762
F1CT_47	102.3977
F1CT_48	101.4779
F1CT_49	100.5549
F1CT_50	100.1468
F1CT_51	99.4626
F1CT_52	102.6414
F1CT_53	101.7766
F1CT_54	100.9999
F1CT_55	100.2914
F1CT_56	96.8803
F1CT_57	96.1167
F1CT_58	95.3343
F1CT_59	94.3616
F1CT_60	93.5807

F1CT_2	1.3418	1.4239
F1CT_3	1.3423	1.4223
F1CT_4	1.3381	1.4161
F1CT_5	1.3235	1.4009
F1CT_6	1.3273	1.3984
F1CT_7	1.3226	1.3900
F1CT_8	1.2858	1.3457
F1CT_9	1.2896	1.3342
F1CT_10	1.3127	1.3268
F1CT_11	1.3229	1.3137
F1CT_12	1.3319	1.3070
F1CT_13	1.3332	1.2962
F1CT_14	1.3316	1.2892
F1CT_15	1.3294	1.2890
F1CT_16	1.3274	1.3972
F1CT_17	1.3188	1.3880
F1CT_18	1.3115	1.3787
F1CT_19	1.3143	1.3780
F1CT_20	1.3056	1.3692
F1CT_21	1.2782	1.3463
F1CT_22	1.2815	1.3362
F1CT_23	1.3052	1.3663
F1CT_24	1.3245	1.3318
F1CT_25	1.3348	1.3224
F1CT_26	1.3437	1.3121
F1CT_27	1.3581	1.3208
F1CT_28	1.3684	1.3299
F1CT_29	1.3698	1.3332
F1CT_30	1.3759	1.3425
F1CT_31	1.3812	1.3462
F1CT_32	1.3777	1.3403
F1CT_33	1.3910	1.3516
F1CT_34	1.2345	1.2636
F1CT_35	1.2520	1.2465
F1CT_36	1.2721	1.2360
F1CT_37	1.2920	1.2520
F1CT_38	1.3121	1.2736
F1CT_39	1.3417	1.3062
F1CT_40	1.3595	1.3228
F1CT_41	1.3113	1.3750
F1CT_42	1.3842	1.3466
F1CT_43	1.3884	1.3513
F1CT_44	1.3941	1.3574
F1CT_45	1.3993	1.3653
F1CT_46	1.4233	1.3911
F1CT_47	1.4304	1.3963
F1CT_48	1.4318	1.3965
F1CT_49	1.4307	1.3953
F1CT_50	1.4259	1.3947
F1CT_51	1.4136	1.3797
F1CT_52	1.3285	1.2873
F1CT_53	1.3250	1.2819
F1CT_54	1.3201	1.2760
F1CT_55	1.3104	1.2661
F1CT_56	1.2783	1.2402
F1CT_57	1.2673	1.2275
F1CT_58	1.3846	1.3613
F1CT_59	1.3672	1.3467
F1CT_60	1.3515	1.3331

F1CT_61	92.8446
F1CT_62	92.1138
F1CT_63	91.5653
F1CT_64	91.0192
F1CT_65	90.2907
F1CT_66	89.7059
F1CT_67	89.1156
F1CT_68	100.8399
F1CT_69	99.9198
F1CT_70	99.2193
F1CT_71	98.5024
F1CT_72	97.5564
F1CT_73	96.8086
F1CT_74	99.2472
F1CT_75	95.1162
F1CT_76	94.3600
F1CT_77	93.6015
F1CT_78	92.6348
F1CT_79	91.8661
F1CT_80	91.2328
F1CT_81	90.5205
F1CT_82	89.9629
F1CT_83	89.3998
F1CT_84	88.6903
F1CT_85	88.1045
F1CT_86	87.5260
F1CT_87	98.7716
F1CT_88	97.6098
F1CT_89	97.1761
F1CT_90	96.4726
F1CT_91	95.5513
F1CT_92	94.8164
F1CT_93	98.5631
F1CT_94	93.1264
F1CT_95	92.4309
F1CT_96	91.6733
F1CT_97	90.9558
F1CT_98	90.4253
F1CT_99	89.8685
F1CT_100	89.1778
F1CT_101	88.6368
F1CT_102	88.0743
F1CT_103	87.3561
F1CT_104	86.7899
F1CT_105	86.2069
F1AE_49	145.3574
F1AE_50	145.4827
F1AE_57	154.0069
F1AE_58	157.1868
F1GEN_54	248.2715
F1GEN_55	170.1572
F1CT_106	153.4669
F1CT_107	153.5666
F1CT_108	154.3802
F1CT_109	128.8350
F1CT_110	129.9593
F1CT_111	131.1089
F1AE_41	77.5552
F1AE_42	76.8481

F1CT_61	1.3348	1.3191
F1CT_62	1.3142	1.3012
F1CT_63	1.2969	1.2845
F1CT_64	1.2784	1.2673
F1CT_65	1.2594	1.2491
F1CT_66	1.2487	1.2402
F1CT_67	1.2396	1.2332
F1CT_68	1.3822	1.3442
F1CT_69	1.3734	1.3382
F1CT_70	1.3659	1.3297
F1CT_71	1.3554	1.3185
F1CT_72	1.3401	1.3025
F1CT_73	1.3233	1.2904
F1CT_74	1.3162	1.2776
F1CT_75	1.2913	1.2544
F1CT_76	1.2761	1.2384
F1CT_77	1.2586	1.2218
F1CT_78	1.2393	1.2024
F1CT_79	1.2251	1.1889
F1CT_80	1.2105	1.1771
F1CT_81	1.1931	1.1615
F1CT_82	1.1808	1.1484
F1CT_83	1.2802	1.2674
F1CT_84	1.2641	1.2525
F1CT_85	1.2582	1.2469
F1CT_86	1.2459	1.2358
F1CT_87	1.4047	1.3703
F1CT_88	1.3911	1.3560
F1CT_89	1.3781	1.3420
F1CT_90	1.3615	1.3270
F1CT_91	1.3488	1.3149
F1CT_92	1.3341	1.2993
F1CT_93	1.3080	1.2684
F1CT_94	1.3007	1.2694
F1CT_95	1.2903	1.2588
F1CT_96	1.2834	1.2518
F1CT_97	1.2611	1.2295
F1CT_98	1.2447	1.2143
F1CT_99	1.2290	1.2008
F1CT_100	1.2084	1.1825
F1CT_101	1.1928	1.1673
F1CT_102	1.1783	1.1520
F1CT_103	1.1604	1.1325
F1CT_104	1.1465	1.1188
F1CT_105	1.1342	1.1063
F1AE_49	2.2922	2.2854
F1AE_50	2.2274	2.2624
F1AE_57	2.4899	2.5812
F1AE_58	2.5402	2.6235
F1GEN_54	2.1598	1.9759
F1GEN_55	2.0323	1.8791
F1CT_106	3.2569	3.0195
F1CT_107	2.2904	2.3781
F1CT_108	1.9138	1.8359
F1CT_109	1.7820	1.7749
F1CT_110	1.7311	1.7512
F1CT_111	1.3161	1.3030
F1AE_41	1.1683	1.1838
F1AE_42	1.1591	1.1767

F1AE_43	76.1884
F1AE_44	78.2827
F1AE_45	68.6032
F1AE_46	68.1509
F1AE_47	67.5746
F1AE_48	67.7500
F1AME_17	91.3563
F1AME_18	92.0001
F1AME_19	92.3359
F1AME_20	92.6045
F1AME_21	74.0123
F1AME_22	74.3480
F1AME_23	74.3618
F1AME_24	74.6343
F1SE_37	80.0832
F1SEA_37	89.3943
F1SE_38	80.0392
F1SEA_38	90.1316
F1SE_39	80.6921
F1SEA_39	90.5989
F1SE_40	80.6557
F1SEA_40	90.6336
F1SE_41	74.7671
F1SEA_41	82.4853
F1SE_42	74.8689
F1SEA_42	83.2155
F1SE_43	75.3619
F1SEA_43	83.3317
F1SE_44	75.6186
F1SEA_44	83.9373
F1GEN_49	60.6805
F1GEN_50	89.0922
F1GEN_51	52.0199
F1GEN_52	82.0230
F1AE_1	53.4113
F1AE_2	53.9492
F1AE_3	55.5445
F1AE_4	55.8234
F1AE_5	57.6566
F1AE_6	64.9464
F1AE_7	67.4407
F1AE_8	67.6231
F1AE_9	68.9112
F1AE_10	69.1244
F1AE_11	44.0096
F1AE_12	44.9216
F1AE_13	45.5499
F1AE_14	46.0207
F1AE_15	47.0630
F1AE_16	52.9519
F1AE_17	55.0064
F1AE_18	55.1758
F1AE_19	56.6133
F1AE_20	57.5876
F1AE_21	39.3902
F1AE_22	39.6324
F1AE_23	39.6445
F1AE_24	39.8163
F1AE_25	40.1118

F1AE_43	1.1497	1.1686
F1AE_44	1.1483	1.1646
F1AE_45	1.1328	1.1047
F1AE_46	1.1484	1.1191
F1AE_47	1.1716	1.1406
F1AE_48	1.1889	1.1567
F1AME_17	1.2832	1.2628
F1AME_18	1.2811	1.2634
F1AME_19	1.2816	1.2633
F1AME_20	1.2818	1.2631
F1AME_21	1.0374	1.0056
F1AME_22	1.0429	1.0133
F1AME_23	1.0519	1.0225
F1AME_24	1.0616	1.0351
F1SE_37	1.1959	1.1836
F1SEA_37	1.2807	1.2729
F1SE_38	1.1918	1.1807
F1SEA_38	1.2776	1.2740
F1SE_39	1.1685	1.1649
F1SEA_39	1.2740	1.2744
F1SE_40	1.1634	1.1610
F1SEA_40	1.2711	1.2759
F1SE_41	1.1766	1.1413
F1SEA_41	1.2800	1.2435
F1SE_42	1.1817	1.1466
F1SEA_42	1.2788	1.2423
F1SE_43	1.1894	1.1543
F1SEA_43	1.2624	1.2247
F1SE_44	1.1890	1.1537
F1SEA_44	1.2678	1.2306
F1GEN_49	1.3471	1.3200
F1GEN_50	1.4640	1.4317
F1GEN_51	1.3120	1.2736
F1GEN_52	1.2707	1.2523
F1AE_1	1.1481	1.1639
F1AE_2	1.1547	1.1720
F1AE_3	1.1583	1.1742
F1AE_4	1.1579	1.1727
F1AE_5	1.1540	1.1697
F1AE_6	0.9655	0.9723
F1AE_7	0.8894	0.8921
F1AE_8	0.8610	0.8722
F1AE_9	0.8226	0.8729
F1AE_10	0.7911	0.8388
F1AE_11	1.0189	1.0253
F1AE_12	1.0167	1.0269
F1AE_13	1.0142	1.0257
F1AE_14	0.9993	1.0099
F1AE_15	0.9921	1.0048
F1AE_16	0.8325	0.8397
F1AE_17	0.8219	0.8239
F1AE_18	0.8120	0.8123
F1AE_19	0.7688	0.7629
F1AE_20	0.7100	0.6995
F1AE_21	0.8303	0.8149
F1AE_22	0.8734	0.8612
F1AE_23	0.8895	0.8783
F1AE_24	0.8957	0.8838
F1AE_25	0.9093	0.8986

F1AE_26	43.5954
F1AE_27	44.2236
F1AE_28	45.0508
F1AE_29	46.3439
F1AE_30	47.2482
F1AE_31	34.7260
F1AE_32	34.9037
F1AE_33	34.9725
F1AE_34	35.0668
F1AE_35	35.2691
F1AE_36	39.2283
F1AE_37	39.2841
F1AE_38	39.5829
F1AE_39	40.0554
F1AE_40	40.6010
F1AME_1	51.6365
F1AME_2	51.4617
F1AME_3	51.4787
F1AME_4	52.4648
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F1AME_7	45.7156
F1AME_8	46.3119
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F1AME_10	56.4057
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F1AME_13	50.1602
F1AME_14	50.4837
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F1AME_16	52.8784
F1CVD_1	65.8133
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F1CVD_3	68.9629
F1CVD_4	68.9008
F1CVD_5	53.2466
F1CVD_6	53.5204
F1CVD_7	56.7663
F1CVD_8	56.7624
F1CVD_9	44.7552
F1CVD_10	44.8570
F1CVD_11	46.6760
F1CVD_12	46.6833
F1CVD_13	38.9223
F1CVD_14	39.0210
F1CVD_15	39.8791
F1CVD_16	39.9549
F1SE_1	54.9979
F1SEA_1	61.6234
F1SE_2	55.6899
F1SEA_2	61.6016
F1SE_3	56.3023
F1SEA_3	62.2611
F1SE_4	56.6859
F1SEA_4	61.8228
F1SE_5	57.5410
F1SEA_5	62.5381
F1SE_6	57.8830
F1SEA_6	62.5935

F1AE_26	1.0139	1.0148
F1AE_27	1.0214	1.0219
F1AE_28	1.0397	1.0409
F1AE_29	1.0514	1.0552
F1AE_30	1.0699	1.0754
F1AE_31	0.7265	0.7079
F1AE_32	0.7330	0.7231
F1AE_33	0.7430	0.7347
F1AE_34	0.7520	0.7415
F1AE_35	0.7861	0.7790
F1AE_36	0.9622	0.9476
F1AE_37	0.9665	0.9527
F1AE_38	0.9783	0.9658
F1AE_39	0.9866	0.9736
F1AE_40	0.9932	0.9829
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F1AME_3	1.3267	1.3373
F1AME_4	1.3295	1.3387
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F1AME_6	1.1058	1.1014
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F1AME_8	1.0866	1.0836
F1AME_9	0.9253	0.9038
F1AME_10	0.9377	0.9176
F1AME_11	0.9718	0.9535
F1AME_12	0.9786	0.9607
F1AME_13	0.7691	0.7530
F1AME_14	0.7790	0.7617
F1AME_15	0.8145	0.7944
F1AME_16	0.8314	0.8150
F1CVD_1	0.9063	0.9115
F1CVD_2	0.9012	0.9061
F1CVD_3	0.7617	0.8097
F1CVD_4	0.7595	0.8086
F1CVD_5	0.8170	0.8258
F1CVD_6	0.8161	0.8248
F1CVD_7	0.7450	0.7390
F1CVD_8	0.7414	0.7351
F1CVD_9	1.0082	1.0065
F1CVD_10	1.0101	1.0085
F1CVD_11	1.0417	1.0428
F1CVD_12	1.0435	1.0448
F1CVD_13	0.9441	0.9287
F1CVD_14	0.9453	0.9298
F1CVD_15	0.9640	0.9501
F1CVD_16	0.9648	0.9510
F1SE_1	1.2546	1.2693
F1SEA_1	1.5256	1.5215
F1SE_2	1.2429	1.2574
F1SEA_2	1.5204	1.5135
F1SE_3	1.2299	1.2444
F1SEA_3	1.5068	1.5022
F1SE_4	1.2195	1.2319
F1SEA_4	1.4919	1.4877
F1SE_5	1.2049	1.2137
F1SEA_5	1.4754	1.4737
F1SE_6	1.1877	1.1959
F1SEA_6	1.4597	1.4576

F1SE_7	58.8242
F1SEA_7	62.7854
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F1SE_9	60.0964
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F1SE_10	45.9660
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F1SE_11	46.1470
F1SEA_11	51.5030
F1SE_12	46.5007
F1SEA_12	51.9751
F1SE_13	46.6215
F1SEA_13	52.2015
F1SE_14	46.9776
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F1SE_15	47.1814
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F1SE_18	47.8742
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F1SE_22	43.1950
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F1SE_23	42.5466
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F1SE_25	42.5299
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F1SE_26	42.3836
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F1SE_28	44.2510
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F1SE_29	45.1193
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F1SE_32	46.1761
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F1SE_7	1.1682	1.1763
F1SEA_7	1.4442	1.4402
F1SE_8	1.1456	1.1563
F1SEA_8	1.4251	1.4207
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F1SE_11	0.9847	0.9807
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F1SE_13	0.9593	0.9579
F1SEA_13	1.1448	1.1492
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F1SE_17	0.9201	0.9219
F1SEA_17	1.0851	1.1057
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F1SE_19	0.9636	0.9481
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F1SE_23	0.9930	0.9794
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F1SE_24	1.0038	0.9896
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F1SE_26	1.0275	1.0131
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F1SE_31	0.8888	0.8788
F1SEA_31	1.0407	1.0223
F1SE_32	0.9069	0.8964
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F1SE_33	0.9270	0.9160
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F1SE_34	0.9472	0.9354
F1SEA_34	1.0865	1.0627
F1SE_35	0.9587	0.9454
F1SEA_35	1.0962	1.0711
F1SE_36	0.9683	0.9538

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F1AE_54	143.5594
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F1AME_26	227.4206
F1AME_27	222.0442
F1SE_45	201.3560
F1SE_46	207.9177
F1SE_47	213.5067
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F1AE_55	82.9540
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F1GE_1	49.5441
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F1GE_3	50.9733
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F1GE_33	44.5339
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F1GE_35	39.7954
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F1GE_39	41.0138
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F1GE_41	81.5437

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F1AE_51	7.8793	8.0107
F1AE_52	7.9324	8.0445
F1AE_53	7.9607	8.0354
F1AE_54	7.9198	7.9758
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F1AME_27	10.3547	10.3986
F1SE_45	9.1904	9.3035
F1SE_46	9.4350	9.5310
F1SE_47	9.6186	9.6980
F1GEN_56	1.8064	1.8005
F1GEN_57	1.5730	1.5552
F1GEN_58	0.8832	0.9102
F1SE_48	3.1214	3.0509
F1SE_49	3.1241	3.0503
F1AE_55	2.4830	2.4384
F1AE_56	2.4996	2.4475
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F1GE_2	1.2249	1.2358
F1GE_3	1.2380	1.2515
F1GE_4	1.2420	1.2584
F1GE_5	1.2415	1.2611
F1GE_6	1.2396	1.2574
F1GE_7	1.1052	1.1176
F1GE_8	1.0620	1.0732
F1GE_9	0.9648	0.9880
F1GE_10	0.9211	0.9860
F1GE_11	1.0796	1.0753
F1GE_12	1.0830	1.0783
F1GE_13	1.0829	1.0797
F1GE_14	1.0816	1.0792
F1GE_15	1.0636	1.0640
F1GE_16	1.0592	1.0629
F1GE_17	0.9253	0.9446
F1GE_18	0.8961	0.9048
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F1GE_20	0.8385	0.8336
F1GE_21	0.9012	0.8836
F1GE_22	0.9259	0.9092
F1GE_23	0.9518	0.9357
F1GE_24	0.9609	0.9450
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F1GE_26	1.0835	1.0762
F1GE_27	1.0972	1.0923
F1GE_28	1.1103	1.1070
F1GE_29	1.1174	1.1146
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F1GE_33	0.8203	0.8056
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F1GE_37	1.0276	1.0112
F1GE_38	1.0341	1.0170
F1GE_39	1.0392	1.0225
F1GE_40	1.0438	1.0296
F1GE_41	1.1529	1.1565

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F1GE_46	63.8601
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F1GE_50	71.3143
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F1GBE_1	85.5384
F1GBE_2	85.3864
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F1FRE_1	77.9165
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F1GE_59	117.6863
F1GE_60	106.9289
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F1FWP_01	194.7000
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F2GEN_2	21.3533
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F1GE_43	1.1403	1.1490
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F1GE_48	1.0516	1.0345
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F1GE_50	0.9847	0.9495
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F1GE_57	1.0781	1.0467
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F1GBE_1	1.2554	1.2342
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F1GBE_5	1.1616	1.1890
F1GBE_6	1.2134	1.2641
F1GBE_7	1.0322	0.9940
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F1GBE_9	1.0591	1.0183
F1GBE_10	1.1681	1.1335
F1GBE_11	1.1685	1.1334
F1GBE_12	1.1683	1.1336
F1FRE_1	1.2298	1.2033
F1FRE_2	1.2268	1.2015
F1FRE_3	1.2178	1.1954
F1FRE_4	1.1901	1.1548
F1FRE_5	1.1816	1.1445
F1FRE_6	1.1825	1.1458
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F1GE_60	2.4784	2.4867
F1GEN_60	2.1031	1.6872
F1FWP_01	2.8481	2.8017
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F2GEN_3	0.4746	0.4737
F2GEN_4	0.4707	0.4752
F2GEN_5	0.4697	0.4752
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F2GEN_7	0.4591	0.4738
F2GEN_8	0.4602	0.4746
F2GEN_9	0.4615	0.4758
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F2GEN_11	0.5605	0.5845
F2GEN_12	0.5612	0.5847
F2GEN_13	0.5649	0.5869
F2GEN_14	0.5654	0.5872
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F2GEN_16	0.5654	0.5856
F2GEN_17	0.5647	0.5849
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F2GEN_27	24.2324
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F2GEN_29	24.2845
F2CT_1	95.2362
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F2CT_3	93.6296
F2CT_4	92.8852
F2CT_5	91.9944
F2CT_6	91.2627
F2CT_7	90.5222
F2CT_8	87.2476
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F2CT_10	85.6063
F2CT_11	84.6706
F2CT_12	83.9348
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F2CT_14	82.7275
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F2GEN_32	0.5032	0.4842
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F2GEN_37	0.5085	0.4862
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F2GEN_44	0.5070	0.4849
F2GEN_45	0.5066	0.4845
F2GEN_46	0.5028	0.4804
F2GEN_47	0.5023	0.4799
F2GEN_48	0.5019	0.4790
F2GEN_20	0.5721	0.5893
F2GEN_21	0.6407	0.6437
F2GEN_22	0.6458	0.6461
F2GEN_23	0.6456	0.6463
F2GEN_24	0.6463	0.6466
F2GEN_25	0.5387	0.5200
F2GEN_26	0.5406	0.5216
F2GEN_27	0.5486	0.5285
F2GEN_28	0.5487	0.5286
F2GEN_29	0.5468	0.5267
F2CT_1	0.6068	0.6109
F2CT_2	0.5950	0.6003
F2CT_3	0.5908	0.5973
F2CT_4	0.5867	0.5948
F2CT_5	0.5820	0.5922
F2CT_6	0.5757	0.5886
F2CT_7	0.5696	0.5839
F2CT_8	0.5531	0.5466
F2CT_9	0.5554	0.5398
F2CT_10	0.5568	0.5346
F2CT_11	0.5584	0.5306
F2CT_12	0.5594	0.5313
F2CT_13	0.5602	0.5318
F2CT_14	0.5608	0.5323
F2CT_15	0.5611	0.5326
F2CT_16	0.6045	0.6156
F2CT_17	0.5987	0.6094
F2CT_18	0.5922	0.6045
F2CT_19	0.5856	0.5994
F2CT_20	0.5775	0.5933
F2CT_21	0.5589	0.5709
F2CT_22	0.5550	0.5641
F2CT_23	0.5510	0.5697
F2CT_24	0.5582	0.5517
F2CT_25	0.5591	0.5470
F2CT_26	0.5609	0.5411
F2CT_27	0.5617	0.5369
F2CT_28	0.5622	0.5349
F2CT_29	0.5627	0.5351
F2CT_30	0.5629	0.5353
F2CT_31	0.5632	0.5353

F2CT_32	83.0097
F2CT_33	82.3844
F2CT_34	95.6828
F2CT_35	94.5964
F2CT_36	93.7556
F2CT_37	92.9579
F2CT_38	91.9942
F2CT_39	91.2311
F2CT_40	90.4452
F2CT_41	88.9211
F2CT_42	88.7031
F2CT_43	87.9267
F2CT_44	87.0272
F2CT_45	86.4121
F2CT_46	85.7714
F2CT_47	85.0082
F2CT_48	84.3790
F2CT_49	83.7500
F2CT_50	82.9637
F2CT_51	82.3382
F2CT_52	81.6874
F2CT_53	81.0791
F2CT_54	80.5454
F2CT_55	79.9921
F2CT_56	77.5574
F2CT_57	77.0571
F2CT_58	76.5467
F2CT_59	75.8903
F2CT_60	75.3681
F2CT_61	74.8578
F2CT_62	74.2156
F2CT_63	73.7221
F2CT_64	73.3139
F2CT_65	72.8023
F2CT_66	72.3829
F2CT_67	71.9665
F2CT_68	81.7665
F2CT_69	80.9745
F2CT_70	80.3470
F2CT_71	79.8276
F2CT_72	79.1918
F2CT_73	78.6789
F2CT_74	79.3438
F2CT_75	77.5386
F2CT_76	77.0574
F2CT_77	76.5238
F2CT_78	75.8437
F2CT_79	75.3291
F2CT_80	74.8099
F2CT_81	74.1549
F2CT_82	73.6399
F2CT_83	73.1232
F2CT_84	72.5597
F2CT_85	72.1937
F2CT_86	71.8108
F2CT_87	81.7127
F2CT_88	80.9047
F2CT_89	80.2648
F2CT_90	79.6308

F2CT_32	0.5636	0.5356
F2CT_33	0.5639	0.5359
F2CT_34	0.5920	0.6006
F2CT_35	0.5822	0.5922
F2CT_36	0.5704	0.5833
F2CT_37	0.5630	0.5772
F2CT_38	0.5636	0.5701
F2CT_39	0.5647	0.5647
F2CT_40	0.5654	0.5592
F2CT_41	0.5568	0.5740
F2CT_42	0.5663	0.5456
F2CT_43	0.5665	0.5406
F2CT_44	0.5673	0.5409
F2CT_45	0.5671	0.5407
F2CT_46	0.5670	0.5402
F2CT_47	0.5670	0.5398
F2CT_48	0.5670	0.5397
F2CT_49	0.5669	0.5396
F2CT_50	0.5669	0.5394
F2CT_51	0.5666	0.5391
F2CT_52	0.5614	0.5329
F2CT_53	0.5622	0.5338
F2CT_54	0.5627	0.5342
F2CT_55	0.5631	0.5345
F2CT_56	0.5645	0.5350
F2CT_57	0.5636	0.5351
F2CT_58	0.5640	0.5350
F2CT_59	0.5637	0.5343
F2CT_60	0.5635	0.5337
F2CT_61	0.5634	0.5334
F2CT_62	0.5635	0.5331
F2CT_63	0.5636	0.5326
F2CT_64	0.5622	0.5313
F2CT_65	0.5598	0.5287
F2CT_66	0.5585	0.5278
F2CT_67	0.5579	0.5279
F2CT_68	0.5640	0.5360
F2CT_69	0.5642	0.5361
F2CT_70	0.5640	0.5361
F2CT_71	0.5643	0.5362
F2CT_72	0.5646	0.5358
F2CT_73	0.5645	0.5355
F2CT_74	0.5632	0.5347
F2CT_75	0.5641	0.5351
F2CT_76	0.5635	0.5348
F2CT_77	0.5613	0.5330
F2CT_78	0.5615	0.5326
F2CT_79	0.5617	0.5325
F2CT_80	0.5621	0.5327
F2CT_81	0.5628	0.5329
F2CT_82	0.5624	0.5330
F2CT_83	0.5629	0.5332
F2CT_84	0.5632	0.5331
F2CT_85	0.5634	0.5330
F2CT_86	0.5625	0.5323
F2CT_87	0.5662	0.5386
F2CT_88	0.5664	0.5382
F2CT_89	0.5662	0.5377
F2CT_90	0.5658	0.5373

F2CT_91	78.8385
F2CT_92	78.3769
F2CT_93	78.8198
F2CT_94	77.3787
F2CT_95	76.9724
F2CT_96	76.4561
F2CT_97	75.8602
F2CT_98	75.3956
F2CT_99	74.9154
F2CT_100	74.3110
F2CT_101	73.8323
F2CT_102	73.3691
F2CT_103	72.8310
F2CT_104	72.3926
F2CT_105	71.9549
F2AE_49	50.3829
F2AE_50	50.6019
F2AE_57	51.8415
F2AE_58	52.2203
F2GEN_54	185.9080
F2GEN_55	216.5407
F2GEN_56	50.9829
F2GEN_57	50.4886
F2GEN_58	37.5040
F2SE_48	78.3996
F2SE_49	78.7768
F2AE_55	62.0418
F2AE_56	62.1541
F2CT_106	202.9251
F2CT_107	204.2446
F2CT_108	202.9239
F2CT_109	195.5194
F2CT_110	193.6690
F2CT_111	191.6922
F2AE_41	59.0598
F2AE_42	59.4018
F2AE_43	59.8433
F2AE_44	60.0262
F2AE_45	50.2853
F2AE_46	50.5241
F2AE_47	50.6211
F2AE_48	50.5611
F2AME_17	71.6793
F2AME_18	72.0801
F2AME_19	72.1806
F2AME_20	72.5152
F2AME_21	55.4709
F2AME_22	55.8261
F2AME_23	56.0115
F2AME_24	56.0157
F2SE_37	63.1668
F2SEA_37	75.1923
F2SE_38	63.3150
F2SEA_38	75.7227
F2SE_39	63.8803
F2SEA_39	75.7212
F2SE_40	64.0798
F2SEA_40	76.7624
F2SE_41	58.0676

F2CT_91	0.5652	0.5368
F2CT_92	0.5646	0.5362
F2CT_93	0.5631	0.5347
F2CT_94	0.5634	0.5356
F2CT_95	0.5630	0.5355
F2CT_96	0.5630	0.5352
F2CT_97	0.5623	0.5350
F2CT_98	0.5622	0.5336
F2CT_99	0.5621	0.5336
F2CT_100	0.5624	0.5336
F2CT_101	0.5623	0.5333
F2CT_102	0.5622	0.5331
F2CT_103	0.5617	0.5332
F2CT_104	0.5617	0.5331
F2CT_105	0.5619	0.5333
F2AE_49	0.6514	0.6167
F2AE_50	0.6506	0.6160
F2AE_57	0.6423	0.6678
F2AE_58	0.6410	0.6719
F2GEN_54	1.4244	1.3457
F2GEN_55	2.1600	1.7708
F2GEN_56	0.8156	0.7903
F2GEN_57	0.8187	0.7918
F2GEN_58	0.8190	0.7913
F2SE_48	1.6943	1.8010
F2SE_49	1.7186	1.8261
F2AE_55	1.3675	1.4544
F2AE_56	1.4071	1.4944
F2CT_106	2.2547	2.5605
F2CT_107	2.5681	2.3332
F2CT_108	2.5183	2.2948
F2CT_109	2.4423	2.1655
F2CT_110	2.3998	2.0950
F2CT_111	2.4594	2.0834
F2AE_41	0.9331	0.9067
F2AE_42	0.9431	0.9125
F2AE_43	0.9477	0.9183
F2AE_44	0.9681	0.9244
F2AE_45	0.6473	0.6470
F2AE_46	0.6512	0.6501
F2AE_47	0.6547	0.6542
F2AE_48	0.6593	0.6582
F2AME_17	1.2788	1.2038
F2AME_18	1.2974	1.2211
F2AME_19	1.3150	1.2370
F2AME_20	1.3304	1.2504
F2AME_21	0.6455	0.6307
F2AME_22	0.6466	0.6336
F2AME_23	0.6476	0.6372
F2AME_24	0.6483	0.6406
F2SE_37	0.9812	0.9717
F2SEA_37	0.9802	1.0186
F2SE_38	0.9851	0.9734
F2SEA_38	1.0107	1.0325
F2SE_39	1.0308	0.9936
F2SEA_39	1.0372	1.0489
F2SE_40	1.0372	0.9966
F2SEA_40	1.0604	1.0635
F2SE_41	0.7702	0.7931

F2SEA_41	66.8730
F2SE_42	58.1390
F2SEA_42	67.6883
F2SE_43	58.6852
F2SEA_43	68.0063
F2SE_44	58.8131
F2SEA_44	68.2364
F2GEN_49	71.1455
F2GEN_50	72.7263
F2GEN_51	63.5110
F2GEN_52	64.9886
F2AE_1	30.7827
F2AE_2	31.1271
F2AE_3	31.3005
F2AE_4	31.5097
F2AE_5	31.7720
F2AE_6	33.2649
F2AE_7	33.3798
F2AE_8	33.3127
F2AE_9	33.2087
F2AE_10	32.9027
F2AE_11	31.6167
F2AE_12	31.8553
F2AE_13	32.2443
F2AE_14	32.4351
F2AE_15	32.8138
F2AE_16	34.9831
F2AE_17	35.6344
F2AE_18	35.7252
F2AE_19	36.1484
F2AE_20	36.5621
F2AE_21	26.1955
F2AE_22	26.5690
F2AE_23	26.7484
F2AE_24	26.9069
F2AE_25	27.1807
F2AE_26	28.4023
F2AE_27	28.4741
F2AE_28	28.6500
F2AE_29	28.8973
F2AE_30	29.1720
F2AE_31	26.6904
F2AE_32	26.7822
F2AE_33	26.8313
F2AE_34	26.8493
F2AE_35	27.2901
F2AE_36	28.7634
F2AE_37	28.8282
F2AE_38	29.2171
F2AE_39	29.4716
F2AE_40	29.7565
F2AME_1	43.5562
F2AME_2	43.7466
F2AME_3	44.0745
F2AME_4	44.2202
F2AME_5	34.3161
F2AME_6	34.3314
F2AME_7	34.7751
F2AME_8	35.2492

F2SEA_41	0.7476	0.7635
F2SE_42	0.7725	0.7964
F2SEA_42	0.7559	0.7714
F2SE_43	0.7902	0.8191
F2SEA_43	0.7651	0.7818
F2SE_44	0.7925	0.8223
F2SEA_44	0.7716	0.7900
F2GEN_49	0.9673	0.9754
F2GEN_50	0.9947	0.9987
F2GEN_51	0.9057	0.8629
F2GEN_52	0.9845	0.9620
F2AE_1	0.5048	0.4943
F2AE_2	0.5072	0.4974
F2AE_3	0.5082	0.4993
F2AE_4	0.5086	0.4991
F2AE_5	0.5104	0.5003
F2AE_6	0.5016	0.5131
F2AE_7	0.4965	0.5206
F2AE_8	0.4965	0.5248
F2AE_9	0.5025	0.5308
F2AE_10	0.5096	0.5344
F2AE_11	0.5104	0.5036
F2AE_12	0.5132	0.5054
F2AE_13	0.5141	0.5050
F2AE_14	0.5148	0.5058
F2AE_15	0.5151	0.5043
F2AE_16	0.5385	0.5218
F2AE_17	0.5525	0.5373
F2AE_18	0.5564	0.5422
F2AE_19	0.5626	0.5491
F2AE_20	0.5680	0.5561
F2AE_21	0.4516	0.4319
F2AE_22	0.4585	0.4386
F2AE_23	0.4595	0.4401
F2AE_24	0.4596	0.4400
F2AE_25	0.4578	0.4395
F2AE_26	0.4715	0.4583
F2AE_27	0.4719	0.4604
F2AE_28	0.4760	0.4660
F2AE_29	0.4804	0.4695
F2AE_30	0.4845	0.4741
F2AE_31	0.5012	0.4841
F2AE_32	0.5133	0.4960
F2AE_33	0.5136	0.4966
F2AE_34	0.5151	0.4973
F2AE_35	0.4966	0.4887
F2AE_36	0.4521	0.4413
F2AE_37	0.4548	0.4441
F2AE_38	0.4638	0.4523
F2AE_39	0.4721	0.4604
F2AE_40	0.4818	0.4688
F2AME_1	0.5446	0.5266
F2AME_2	0.5469	0.5286
F2AME_3	0.5525	0.5345
F2AME_4	0.5542	0.5369
F2AME_5	0.5693	0.5567
F2AME_6	0.5719	0.5589
F2AME_7	0.5777	0.5652
F2AME_8	0.5812	0.5676

F2AME_9	38.4727
F2AME_10	38.8461
F2AME_11	40.3994
F2AME_12	40.7205
F2AME_13	32.9593
F2AME_14	33.2117
F2AME_15	34.4315
F2AME_16	29.7428
F2CVD_1	33.0934
F2CVD_2	33.0924
F2CVD_3	32.7529
F2CVD_4	32.7387
F2CVD_5	34.9234
F2CVD_6	35.0084
F2CVD_7	36.2352
F2CVD_8	36.2803
F2CVD_9	28.2726
F2CVD_10	28.2823
F2CVD_11	28.7448
F2CVD_12	28.7718
F2CVD_13	28.8324
F2CVD_14	28.8744
F2CVD_15	29.3983
F2CVD_16	29.4106
F2SE_1	44.5715
F2SEA_1	44.2689
F2SE_2	44.6647
F2SEA_2	44.4501
F2SE_3	44.8469
F2SEA_3	44.4917
F2SE_4	44.8090
F2SEA_4	44.6291
F2SE_5	45.0161
F2SEA_5	44.7345
F2SE_6	45.0968
F2SEA_6	44.8297
F2SE_7	45.1263
F2SEA_7	44.9654
F2SE_8	44.7563
F2SEA_8	44.9666
F2SE_9	43.3187
F2SEA_9	45.0305
F2SE_10	33.9020
F2SEA_10	45.0114
F2SE_11	33.9698
F2SEA_11	45.3793
F2SE_12	34.0692
F2SEA_12	45.7035
F2SE_13	34.3932
F2SEA_13	45.6740
F2SE_14	34.5775
F2SEA_14	46.1508
F2SE_15	34.5675
F2SEA_15	46.4144
F2SE_16	34.8247
F2SEA_16	46.3031
F2SE_17	35.1186
F2SEA_17	46.8274
F2SE_18	35.2631

F2AME_9	0.4846	0.4582
F2AME_10	0.4864	0.4599
F2AME_11	0.4883	0.4616
F2AME_12	0.4875	0.4612
F2AME_13	0.5441	0.5184
F2AME_14	0.5462	0.5214
F2AME_15	0.5480	0.5232
F2AME_16	0.5293	0.5123
F2CVD_1	0.4946	0.5177
F2CVD_2	0.4943	0.5188
F2CVD_3	0.5098	0.5371
F2CVD_4	0.5109	0.5374
F2CVD_5	0.5301	0.5159
F2CVD_6	0.5309	0.5167
F2CVD_7	0.5401	0.5323
F2CVD_8	0.5403	0.5322
F2CVD_9	0.4660	0.4519
F2CVD_10	0.4666	0.4524
F2CVD_11	0.4741	0.4604
F2CVD_12	0.4746	0.4608
F2CVD_13	0.4525	0.4389
F2CVD_14	0.4535	0.4397
F2CVD_15	0.4726	0.4562
F2CVD_16	0.4735	0.4571
F2SE_1	0.5346	0.5191
F2SEA_1	0.6118	0.5862
F2SE_2	0.5352	0.5249
F2SEA_2	0.6132	0.5867
F2SE_3	0.5355	0.5331
F2SEA_3	0.6142	0.5944
F2SE_4	0.5348	0.5406
F2SEA_4	0.6150	0.6025
F2SE_5	0.5341	0.5487
F2SEA_5	0.6155	0.6086
F2SE_6	0.5346	0.5558
F2SEA_6	0.6155	0.6177
F2SE_7	0.5340	0.5612
F2SEA_7	0.6168	0.6252
F2SE_8	0.5349	0.5674
F2SEA_8	0.6175	0.6315
F2SE_9	0.5411	0.5735
F2SEA_9	0.6156	0.6403
F2SE_10	0.5745	0.5602
F2SEA_10	0.6756	0.6506
F2SE_11	0.5793	0.5639
F2SEA_11	0.6834	0.6586
F2SE_12	0.5838	0.5673
F2SEA_12	0.6934	0.6662
F2SE_13	0.5871	0.5701
F2SEA_13	0.7073	0.6733
F2SE_14	0.5907	0.5723
F2SEA_14	0.7204	0.6843
F2SE_15	0.5942	0.5740
F2SEA_15	0.7347	0.6948
F2SE_16	0.5969	0.5762
F2SEA_16	0.7470	0.7055
F2SE_17	0.6047	0.5841
F2SEA_17	0.7605	0.7173
F2SE_18	0.6140	0.5935

F2SEA_18	47.0036
F2SE_19	39.9620
F2SEA_19	53.7454
F2SE_20	39.9964
F2SEA_20	53.8006
F2SE_21	40.3114
F2SEA_21	54.0434
F2SE_22	40.4115
F2SEA_22	54.0918
F2SE_23	40.5058
F2SEA_23	54.2960
F2SE_24	40.7123
F2SEA_24	54.4457
F2SE_25	40.8810
F2SEA_25	54.5941
F2SE_26	40.8049
F2SEA_26	54.7038
F2SE_27	40.9874
F2SEA_27	54.7657
F2SE_28	28.0604
F2SEA_28	35.4070
F2SE_29	28.0691
F2SEA_29	35.7399
F2SE_30	28.2556
F2SEA_30	35.9996
F2SE_31	28.2699
F2SEA_31	36.0461
F2SE_32	28.4831
F2SEA_32	36.4578
F2SE_33	28.6382
F2SEA_33	36.6709
F2SE_34	28.7233
F2SEA_34	36.7855
F2SE_35	28.9150
F2SEA_35	37.1580
F2SE_36	29.0330
F2SEA_36	37.3176
F2AE_51	62.7384
F2AE_52	62.6855
F2AE_53	62.3180
F2AE_54	62.0310
F2AME_25	71.7994
F2AME_26	72.4206
F2AME_27	73.0640
F2SE_45	67.5954
F2SE_46	68.1321
F2SE_47	68.4027
F2GE_1	31.0151
F2GE_2	31.2472
F2GE_3	31.5928
F2GE_4	31.8768
F2GE_5	32.1068
F2GE_6	32.3635
F2GE_7	33.7178
F2GE_8	33.8765
F2GE_9	33.7649
F2GE_10	33.4807
F2GE_11	31.5413
F2GE_12	31.8207

F2SEA_18	0.7764	0.7337
F2SE_19	0.4779	0.4566
F2SEA_19	0.5142	0.4888
F2SE_20	0.4782	0.4574
F2SEA_20	0.5140	0.4886
F2SE_21	0.4791	0.4586
F2SEA_21	0.5143	0.4890
F2SE_22	0.4803	0.4600
F2SEA_22	0.5152	0.4900
F2SE_23	0.4806	0.4622
F2SEA_23	0.5168	0.4919
F2SE_24	0.4822	0.4643
F2SEA_24	0.5183	0.4943
F2SE_25	0.4838	0.4666
F2SEA_25	0.5200	0.4970
F2SE_26	0.4851	0.4680
F2SEA_26	0.5224	0.5001
F2SE_27	0.4866	0.4700
F2SEA_27	0.5248	0.5032
F2SE_28	0.5127	0.5020
F2SEA_28	0.5747	0.5556
F2SE_29	0.5179	0.5048
F2SEA_29	0.5129	0.5049
F2SE_30	0.5199	0.5064
F2SEA_30	0.5184	0.5094
F2SE_31	0.4624	0.4614
F2SEA_31	0.5241	0.5141
F2SE_32	0.4647	0.4638
F2SEA_32	0.5307	0.5196
F2SE_33	0.4710	0.4681
F2SEA_33	0.5347	0.5229
F2SE_34	0.4785	0.4744
F2SEA_34	0.5118	0.4908
F2SE_35	0.4828	0.4778
F2SEA_35	0.5152	0.4941
F2SE_36	0.4862	0.4805
F2SEA_36	0.5179	0.4968
F2AE_51	0.5276	0.5152
F2AE_52	0.5293	0.5198
F2AE_53	0.5335	0.5298
F2AE_54	0.5357	0.5339
F2AME_25	0.5348	0.5195
F2AME_26	0.5374	0.5261
F2AME_27	0.5403	0.5327
F2SE_45	0.5239	0.4964
F2SE_46	0.5257	0.4976
F2SE_47	0.5278	0.5032
F2GE_1	0.5267	0.5121
F2GE_2	0.5300	0.5158
F2GE_3	0.5340	0.5195
F2GE_4	0.5382	0.5227
F2GE_5	0.5408	0.5258
F2GE_6	0.5413	0.5263
F2GE_7	0.5319	0.5386
F2GE_8	0.5317	0.5462
F2GE_9	0.5338	0.5660
F2GE_10	0.5417	0.5738
F2GE_11	0.5355	0.5309
F2GE_12	0.5404	0.5346

F2GE_13	32.1327
F2GE_14	32.4120
F2GE_15	32.6757
F2GE_16	32.9660
F2GE_17	34.8285
F2GE_18	35.1398
F2GE_19	35.8283
F2GE_20	36.2148
F2GE_21	37.6104
F2GE_22	38.2688
F2GE_23	39.0752
F2GE_24	39.3274
F2GE_25	40.4765
F2GE_26	40.6331
F2GE_27	40.8181
F2GE_28	39.9518
F2GE_29	38.6552
F2GE_30	38.0577
F2GE_31	26.7363
F2GE_32	26.8432
F2GE_33	27.2573
F2GE_34	27.0748
F2GE_35	29.0037
F2GE_36	29.2142
F2GE_37	29.4286
F2GE_38	29.6268
F2GE_39	29.7001
F2GE_40	29.9729
F2GE_41	63.1084
F2GE_42	63.1493
F2GE_43	63.7555
F2GE_44	63.7783
F2GE_45	64.4674
F2GE_46	59.8297
F2GE_47	59.8608
F2GE_48	60.5042
F2GE_49	60.5534
F2GE_50	53.3165
F2GE_51	53.4085
F2GE_52	53.8396
F2GE_53	53.9239
F2GE_54	54.7875
F2GE_55	50.2123
F2GE_56	50.2924
F2GE_57	50.7750
F2GE_58	50.8396
F2GBE_1	77.8860
F2GBE_2	78.0202
F2GBE_3	79.0415
F2GBE_4	64.5046
F2GBE_5	64.5833
F2GBE_6	64.5385
F2GBE_7	66.8030
F2GBE_8	67.4110
F2GBE_9	67.4108
F2GBE_10	54.7527
F2GBE_11	55.1909
F2GBE_12	55.2563
F2FRE_1	61.4562

F2GE_13	0.5445	0.5350
F2GE_14	0.5476	0.5375
F2GE_15	0.5492	0.5392
F2GE_16	0.5525	0.5397
F2GE_17	0.5809	0.5612
F2GE_18	0.5981	0.5782
F2GE_19	0.6263	0.6067
F2GE_20	0.6349	0.6176
F2GE_21	0.4727	0.4515
F2GE_22	0.4734	0.4522
F2GE_23	0.4715	0.4506
F2GE_24	0.4707	0.4507
F2GE_25	0.4881	0.4729
F2GE_26	0.4917	0.4774
F2GE_27	0.4955	0.4819
F2GE_28	0.4992	0.4856
F2GE_29	0.5017	0.4876
F2GE_30	0.5045	0.4901
F2GE_31	0.5270	0.5076
F2GE_32	0.5319	0.5115
F2GE_33	0.5182	0.5061
F2GE_34	0.5240	0.5107
F2GE_35	0.4749	0.4601
F2GE_36	0.4820	0.4660
F2GE_37	0.4914	0.4739
F2GE_38	0.5007	0.4821
F2GE_39	0.5052	0.4861
F2GE_40	0.5095	0.4894
F2GE_41	1.0864	1.0317
F2GE_42	1.0935	1.0371
F2GE_43	1.1587	1.0905
F2GE_44	1.1643	1.0959
F2GE_45	1.2230	1.1491
F2GE_46	1.1471	1.0816
F2GE_47	1.1504	1.0861
F2GE_48	1.1894	1.1253
F2GE_49	1.1920	1.1293
F2GE_50	0.6770	0.6718
F2GE_51	0.6786	0.6731
F2GE_52	0.6936	0.6858
F2GE_53	0.6950	0.6876
F2GE_54	0.7182	0.7150
F2GE_55	0.6880	0.6856
F2GE_56	0.6903	0.6896
F2GE_57	0.7037	0.7117
F2GE_58	0.7054	0.7133
F2GBE_1	1.0425	1.0671
F2GBE_2	1.0458	1.0689
F2GBE_3	1.0689	1.0886
F2GBE_4	1.2943	1.2302
F2GBE_5	1.2974	1.2343
F2GBE_6	1.3159	1.2513
F2GBE_7	0.9183	0.9575
F2GBE_8	0.9113	0.9476
F2GBE_9	0.9088	0.9457
F2GBE_10	0.7666	0.7917
F2GBE_11	0.7746	0.8009
F2GBE_12	0.7756	0.8022
F2FRE_1	0.8647	0.9107

F2FRE_2	61.6501
F2FRE_3	61.6549
F2FRE_4	59.3944
F2FRE_5	59.7226
F2FRE_6	59.9714
F2GE_59	120.6363
F2GE_60	109.5859
F2GEN_53	153.5363
F1BEX1	79.8417
F1BEX2	80.2313
F1BEX3	80.9207
F1WBV_1	80.9102
F1WBV_2	80.4167
F1WBV_3	75.4775
F1WBV_4	74.6836
F2BEX1	37.7481
F2BEX2	37.6383
F2BEX3	37.7710
F2WBV_1	80.4679
F2WBV_2	71.4985
F2WBV_3	108.9069
F2WBV_4	120.9083

F2FRE_2	0.8682	0.9151
F2FRE_3	0.8845	0.9260
F2FRE_4	0.8133	0.8472
F2FRE_5	0.8218	0.8562
F2FRE_6	0.8252	0.8606
F2GE_59	2.6517	2.8219
F2GE_60	2.6112	2.6927
F2GEN_53	3.3818	3.5955
F1BEX1	1.3105	1.4390
F1BEX2	1.3220	1.4501
F1BEX3	1.3526	1.4773
F1WBV_1	0.8338	1.0126
F1WBV_2	0.8281	1.0037
F1WBV_3	1.2506	1.1683
F1WBV_4	1.2530	1.1614
F2BEX1	0.6269	0.6504
F2BEX2	0.6279	0.6582
F2BEX3	0.6368	0.6664
F2WBV_1	0.6954	0.7190
F2WBV_2	0.6967	0.6620
F2WBV_3	1.0134	1.1317
F2WBV_4	1.0518	1.1737

Annual			
2022	2023	2024	Maximum
Concentration ($\mu\text{g}/\text{m}^3$)	Concentration ($\mu\text{g}/\text{m}^3$)	Concentration ($\mu\text{g}/\text{m}^3$)	Concentration ($\mu\text{g}/\text{m}^3$)
27.8167	33.6764	50.5239	50.5239
3.0312	3.6543	5.8474	5.8474
3.5336	4.0574	6.2509	6.2509
3.0840	3.2077	4.8087	4.8087
0.5876	0.7455	1.2698	1.2698
0.5873	0.7451	1.2678	1.2678
0.5874	0.7450	1.2662	1.2662
0.5858	0.7427	1.2549	1.2549
0.5853	0.7430	1.2533	1.2533
0.5847	0.7431	1.2530	1.2530
0.5786	0.7379	1.2462	1.2462
0.5780	0.7366	1.2486	1.2486
0.5774	0.7356	1.2505	1.2505
0.5790	0.7320	1.2592	1.2592
0.5795	0.7312	1.2592	1.2592
0.5798	0.7299	1.2587	1.2587
0.5800	0.7358	1.2471	1.2471
0.5799	0.7366	1.2448	1.2448
0.5794	0.7369	1.2436	1.2436
0.7716	0.9832	1.6397	1.6397
0.7696	0.9817	1.6399	1.6399
0.7639	0.9721	1.6399	1.6399
0.7628	0.9718	1.6428	1.6428
1.1413	1.3446	1.8769	1.8769
1.1443	1.3474	1.8862	1.8862
1.1730	1.3794	1.9430	1.9430
1.1759	1.3828	1.9492	1.9492
1.1793	1.3850	1.9547	1.9547
1.2002	1.4062	1.9964	1.9964
1.2035	1.4093	2.0038	2.0038
0.7634	0.9386	1.3411	1.3411
0.7793	0.9684	1.3857	1.3857
0.7840	0.9767	1.3990	1.3990
0.7898	0.9841	1.4127	1.4127
0.8101	1.0132	1.4653	1.4653
0.8113	1.0149	1.4685	1.4685
0.8124	1.0167	1.4717	1.4717
0.8155	1.0205	1.4786	1.4786
0.8146	1.0197	1.4785	1.4785
0.8139	1.0189	1.4777	1.4777
0.9350	1.1697	1.6811	1.6811
0.9340	1.1686	1.6837	1.6837
0.7658	0.9643	1.6502	1.6502
0.7665	0.9617	1.6491	1.6491
0.5685	0.7282	1.2178	1.2178
0.5676	0.7279	1.2181	1.2181
0.5667	0.7275	1.2181	1.2181
1.2547	1.4895	2.0505	2.0505
1.2519	1.4892	2.0451	2.0451
1.2513	1.4899	2.0280	2.0280
1.2542	1.4934	2.0314	2.0314
1.1377	1.3396	1.8678	1.8678
1.1727	1.4711	2.3377	2.3377

1.1680	1.4684	2.3227	2.3227
1.1652	1.4648	2.3238	2.3238
1.1636	1.4567	2.3204	2.3204
1.1497	1.4425	2.2877	2.2877
1.1467	1.4386	2.2879	2.2879
1.1430	1.4283	2.2800	2.2800
1.1020	1.3848	2.2039	2.2039
1.0984	1.3698	2.1877	2.1877
1.1203	1.3633	2.1780	2.1780
1.1348	1.3517	2.1515	2.1515
1.1412	1.3429	2.1433	2.1433
1.1394	1.3312	2.1265	2.1265
1.1399	1.3308	2.1043	2.1043
1.1437	1.3337	2.0927	2.0927
1.1494	1.4365	2.2822	2.2822
1.1442	1.4252	2.2723	2.2723
1.1395	1.4186	2.2533	2.2533
1.1365	1.4167	2.2538	2.2538
1.1301	1.4056	2.2413	2.2413
1.1084	1.3820	2.1992	2.1992
1.0967	1.3685	2.1815	2.1815
1.1247	1.4050	2.2429	2.2429
1.1311	1.3704	2.1642	2.1642
1.1441	1.3605	2.1535	2.1535
1.1553	1.3511	2.1375	2.1375
1.1662	1.3603	2.1256	2.1256
1.1781	1.3686	2.1127	2.1127
1.1866	1.3764	2.0905	2.0905
1.1955	1.3855	2.0722	2.0722
1.1998	1.3882	2.0564	2.0564
1.1943	1.3823	2.0354	2.0354
1.2103	1.3964	2.0378	2.0378
1.0446	1.3074	2.0675	2.0675
1.0529	1.2852	2.0266	2.0266
1.0693	1.2759	2.0155	2.0155
1.0891	1.2824	2.0042	2.0042
1.1109	1.3074	1.9867	1.9867
1.1409	1.3405	1.9818	1.9818
1.1580	1.3563	1.9718	1.9718
1.1319	1.4154	2.2527	2.2527
1.1879	1.3827	1.9353	1.9353
1.1999	1.3923	1.9216	1.9216
1.2094	1.4010	1.9084	1.9084
1.2174	1.4093	1.8942	1.8942
1.2460	1.4368	1.9134	1.9134
1.2498	1.4423	1.9151	1.9151
1.2577	1.4418	1.9129	1.9129
1.2613	1.4444	1.9139	1.9139
1.2585	1.4421	1.9072	1.9072
1.2473	1.4267	1.8806	1.8806
1.1424	1.3319	2.0746	2.0746
1.1414	1.3264	2.0478	2.0478
1.1415	1.3230	2.0321	2.0321
1.1382	1.3178	2.0105	2.0105
1.1381	1.2976	1.9469	1.9469
1.1295	1.2856	1.9253	1.9253
1.1822	1.3875	1.9022	1.9022
1.1675	1.3723	1.8790	1.8790
1.1559	1.3571	1.8538	1.8538

1.1447	1.3409	1.8386	1.8386
1.1307	1.3203	1.8092	1.8092
1.1192	1.3014	1.7818	1.7818
1.1013	1.2820	1.7473	1.7473
1.0839	1.2624	1.7186	1.7186
1.0717	1.2516	1.7031	1.7031
1.0614	1.2430	1.6960	1.6960
1.2094	1.3938	2.0147	2.0147
1.2038	1.3869	1.9789	1.9789
1.1952	1.3769	1.9613	1.9613
1.1908	1.3645	1.9379	1.9379
1.1828	1.3532	1.9057	1.9057
1.1738	1.3431	1.8847	1.8847
1.1527	1.3307	2.0017	2.0017
1.1482	1.3050	1.8184	1.8184
1.1362	1.2907	1.7989	1.7989
1.1243	1.2755	1.7808	1.7808
1.1110	1.2562	1.7614	1.7614
1.0999	1.2433	1.7448	1.7448
1.0898	1.2303	1.7252	1.7252
1.0780	1.2125	1.7069	1.7069
1.0674	1.1992	1.6877	1.6877
1.1111	1.2885	1.6641	1.6641
1.0965	1.2710	1.6416	1.6416
1.0924	1.2656	1.6274	1.6274
1.0782	1.2529	1.6280	1.6280
1.2370	1.4157	1.8620	1.8620
1.2250	1.4003	1.8376	1.8376
1.2175	1.3899	1.8174	1.8174
1.2035	1.3742	1.7953	1.7953
1.1927	1.3615	1.7758	1.7758
1.1845	1.3455	1.7553	1.7553
1.1516	1.3202	1.9863	1.9863
1.1622	1.3201	1.7177	1.7177
1.1559	1.3084	1.7001	1.7001
1.1564	1.3056	1.6972	1.6972
1.1419	1.2843	1.6676	1.6676
1.1287	1.2690	1.6464	1.6464
1.1151	1.2540	1.6244	1.6244
1.0964	1.2340	1.5953	1.5953
1.0823	1.2173	1.5719	1.5719
1.0698	1.2007	1.5484	1.5484
1.0536	1.1815	1.5189	1.5189
1.0409	1.1674	1.4984	1.4984
1.0276	1.1536	1.4817	1.4817
1.9479	2.3528	3.6331	3.6331
1.9610	2.3307	3.6930	3.6930
2.2187	2.6586	4.1840	4.1840
2.2589	2.7046	4.2716	4.2716
1.8511	2.2795	3.5611	3.5611
1.8039	2.1614	3.5188	3.5188
2.6785	3.4086	5.5430	5.5430
1.8486	2.1562	3.5209	3.5209
1.6242	1.9560	3.1159	3.1159
1.4850	1.7111	2.8477	2.8477
1.4379	1.6720	2.7687	2.7687
1.1016	1.3352	2.0182	2.0182
1.1299	1.2347	1.5919	1.5919
1.1232	1.2264	1.5834	1.5834

1.1159	1.2172	1.5749	1.5749
1.1040	1.2124	1.5643	1.5643
0.9860	1.1521	1.5243	1.5243
1.0009	1.1689	1.5476	1.5476
1.0235	1.1943	1.5821	1.5821
1.0405	1.2130	1.6070	1.6070
1.1365	1.2989	1.6114	1.6114
1.1387	1.2995	1.6169	1.6169
1.1404	1.3010	1.6216	1.6216
1.1420	1.3026	1.6261	1.6261
0.9121	1.0555	1.3946	1.3946
0.9151	1.0602	1.4019	1.4019
0.9203	1.0659	1.4101	1.4101
0.9259	1.0730	1.4200	1.4200
1.1225	1.2487	1.5998	1.5998
1.2147	1.3420	1.7012	1.7012
1.1201	1.2455	1.5945	1.5945
1.2184	1.3423	1.6995	1.6995
1.1087	1.2263	1.5670	1.5670
1.2206	1.3414	1.7012	1.7012
1.1057	1.2219	1.5610	1.5610
1.2230	1.3413	1.7060	1.7060
1.0344	1.1971	1.5925	1.5925
1.1233	1.3003	1.7203	1.7203
1.0400	1.2033	1.6006	1.6006
1.1266	1.3008	1.7164	1.7164
1.0532	1.2164	1.6080	1.6080
1.1200	1.2858	1.6953	1.6953
1.0537	1.2165	1.6066	1.6066
1.1308	1.2941	1.7023	1.7023
1.2197	1.4153	2.0667	2.0667
1.2788	1.4672	2.6134	2.6134
1.1826	1.3727	1.9747	1.9747
1.0597	1.2753	2.2878	2.2878
1.0581	1.1919	1.5244	1.5244
1.0649	1.2022	1.5496	1.5496
1.0674	1.2050	1.5584	1.5584
1.0638	1.2065	1.5651	1.5651
1.0596	1.2002	1.5690	1.5690
0.8805	1.0053	1.3638	1.3638
0.8137	0.9280	1.3508	1.3508
0.7911	0.9154	1.3505	1.3505
0.7435	0.9150	1.3481	1.3481
0.6928	0.8776	1.2948	1.2948
0.9546	1.0625	1.3293	1.3293
0.9588	1.0632	1.3306	1.3306
0.9585	1.0619	1.3298	1.3298
0.9499	1.0445	1.3122	1.3122
0.9475	1.0379	1.3079	1.3079
0.7912	0.8593	1.2031	1.2031
0.7460	0.8545	1.1523	1.1523
0.7356	0.8412	1.1462	1.1462
0.7051	0.8025	1.0699	1.0699
0.6448	0.7366	1.0158	1.0158
0.7354	0.8457	1.0759	1.0759
0.7754	0.8908	1.1360	1.1360
0.7908	0.9072	1.1525	1.1525
0.7969	0.9134	1.1609	1.1609
0.8112	0.9307	1.1790	1.1790

0.9224	1.0432	1.3176	1.3176
0.9321	1.0521	1.3273	1.3273
0.9576	1.0754	1.3547	1.3547
0.9738	1.0883	1.3727	1.3727
0.9905	1.1070	1.3957	1.3957
0.6474	0.7463	0.9578	0.9578
0.6510	0.7484	0.9625	0.9625
0.6542	0.7534	0.9716	0.9716
0.6640	0.7647	0.9851	0.9851
0.6937	0.7978	1.0255	1.0255
0.8625	0.9859	1.2634	1.2634
0.8678	0.9912	1.2684	1.2684
0.8800	1.0069	1.2776	1.2776
0.8899	1.0137	1.2828	1.2828
0.9004	1.0251	1.2892	1.2892
1.1962	1.3398	1.6687	1.6687
1.2020	1.3487	1.6843	1.6843
1.2140	1.3683	1.7181	1.7181
1.2157	1.3725	1.7330	1.7330
1.0320	1.1456	1.4094	1.4094
1.0343	1.1469	1.4106	1.4106
1.0289	1.1317	1.3950	1.3950
1.0302	1.1288	1.3926	1.3926
0.8150	0.9382	1.1854	1.1854
0.8267	0.9506	1.2033	1.2033
0.8592	0.9864	1.2410	1.2410
0.8662	0.9938	1.2492	1.2492
0.6779	0.7849	1.0026	1.0026
0.6863	0.7939	1.0129	1.0129
0.7137	0.8254	1.0558	1.0558
0.7293	0.8437	1.0768	1.0768
0.8250	0.9367	1.2477	1.2477
0.8191	0.9314	1.2473	1.2473
0.6820	0.8408	1.2174	1.2174
0.6765	0.8397	1.2156	1.2156
0.7527	0.8402	1.1245	1.1245
0.7507	0.8390	1.1232	1.1232
0.6806	0.7723	0.9839	0.9839
0.6769	0.7691	0.9792	0.9792
0.9220	1.0371	1.2819	1.2819
0.9243	1.0393	1.2842	1.2842
0.9625	1.0727	1.3250	1.3250
0.9646	1.0744	1.3271	1.3271
0.8459	0.9668	1.2151	1.2151
0.8469	0.9679	1.2155	1.2155
0.8695	0.9899	1.2316	1.2316
0.8709	0.9910	1.2323	1.2323
1.1385	1.2970	1.6752	1.6752
1.4030	1.5699	1.9528	1.9528
1.1264	1.2877	1.6671	1.6671
1.3974	1.5586	1.9507	1.9507
1.1156	1.2757	1.6587	1.6587
1.3891	1.5513	1.9450	1.9450
1.1031	1.2612	1.6467	1.6467
1.3771	1.5408	1.9353	1.9353
1.0890	1.2467	1.6302	1.6302
1.3640	1.5275	1.9281	1.9281
1.0737	1.2317	1.6109	1.6109
1.3529	1.5118	1.9164	1.9164

1.0559	1.2142	1.5944	1.5944
1.3390	1.4943	1.8989	1.8989
1.0387	1.1921	1.5701	1.5701
1.3234	1.4784	1.8777	1.8777
1.0191	1.1665	1.5418	1.5418
1.3052	1.4593	1.8535	1.8535
0.9552	1.0419	1.3081	1.3081
1.1431	1.2416	1.5190	1.5190
0.9489	1.0337	1.3021	1.3021
1.1406	1.2365	1.5181	1.5181
0.9421	1.0254	1.2964	1.2964
1.1362	1.2303	1.5151	1.5151
0.9245	1.0068	1.2671	1.2671
1.1078	1.1953	1.4899	1.4899
0.9137	0.9911	1.2567	1.2567
1.1025	1.1875	1.4878	1.4878
0.9030	0.9800	1.2480	1.2480
1.0916	1.1726	1.4790	1.4790
0.8976	0.9725	1.2428	1.2428
1.0797	1.1605	1.4698	1.4698
0.8500	0.9455	1.2136	1.2136
1.0703	1.1469	1.4566	1.4566
0.8353	0.9347	1.2149	1.2149
1.0599	1.1360	1.4530	1.4530
0.8586	0.9824	1.2251	1.2251
0.9677	1.1042	1.3773	1.3773
0.8644	0.9899	1.2339	1.2339
0.9768	1.1130	1.3870	1.3870
0.8729	0.9989	1.2442	1.2442
0.9866	1.1220	1.3967	1.3967
0.8819	1.0081	1.2547	1.2547
0.9991	1.1334	1.4102	1.4102
0.8918	1.0179	1.2664	1.2664
1.0124	1.1456	1.4245	1.4245
0.9025	1.0220	1.2749	1.2749
1.0255	1.1579	1.4383	1.4383
0.9141	1.0345	1.2900	1.2900
1.0384	1.1698	1.4511	1.4511
0.9260	1.0464	1.3051	1.3051
1.0457	1.1813	1.4620	1.4620
0.9373	1.0601	1.3191	1.3191
1.0535	1.1945	1.4757	1.4757
0.7285	0.8436	1.0784	1.0784
0.8398	0.9725	1.2424	1.2424
0.7418	0.8613	1.1002	1.1002
0.8620	0.9987	1.2788	1.2788
0.7588	0.8805	1.1249	1.1249
0.8841	1.0250	1.3127	1.3127
0.7755	0.8993	1.1489	1.1489
0.9066	1.0514	1.3462	1.3462
0.7924	0.9180	1.1754	1.1754
0.9272	1.0750	1.3761	1.3761
0.8106	0.9407	1.2061	1.2061
0.9399	1.0886	1.3918	1.3918
0.8309	0.9641	1.2368	1.2368
0.9569	1.1016	1.4065	1.4065
0.8417	0.9760	1.2495	1.2495
0.9681	1.1130	1.4189	1.4189
0.8520	0.9869	1.2615	1.2615

0.9774	1.1219	1.4278	1.4278
7.1565	8.0628	10.0232	10.0232
7.1789	8.1204	10.0062	10.0062
7.1870	8.1656	9.9430	9.9430
7.1802	8.1284	9.9206	9.9206
9.3021	10.5673	12.3430	12.3430
9.3513	10.5770	12.3946	12.3946
9.3543	10.5334	12.3884	12.3884
8.2549	9.3259	11.2123	11.2123
8.3978	9.5558	11.3723	11.3723
8.5189	9.7490	11.4699	11.4699
1.6589	1.8711	2.4377	2.4377
1.5284	1.6826	2.2162	2.2162
0.8127	0.9158	1.4189	1.4189
2.8382	3.2208	4.0072	4.0072
2.8282	3.2121	4.0110	4.0110
2.2348	2.5850	3.2594	3.2594
2.2449	2.5867	3.2511	3.2511
1.1204	1.2521	1.5737	1.5737
1.1314	1.2675	1.5959	1.5959
1.1417	1.2803	1.6228	1.6228
1.1464	1.2905	1.6366	1.6366
1.1473	1.2890	1.6499	1.6499
1.1427	1.2864	1.6531	1.6531
1.0189	1.1561	1.5301	1.5301
0.9809	1.1131	1.4951	1.4951
0.8932	1.0327	1.4974	1.4974
0.8513	1.0261	1.4962	1.4962
1.0015	1.1186	1.3832	1.3832
1.0070	1.1228	1.3875	1.3875
1.0114	1.1260	1.3892	1.3892
1.0135	1.1255	1.3897	1.3897
1.0053	1.1057	1.3721	1.3721
1.0044	1.1031	1.3737	1.3737
0.9055	0.9803	1.3000	1.3000
0.8374	0.9231	1.2676	1.2676
0.8032	0.9142	1.2060	1.2060
0.7668	0.8736	1.1305	1.1305
0.7955	0.9167	1.1651	1.1651
0.8214	0.9446	1.1983	1.1983
0.8439	0.9709	1.2268	1.2268
0.8551	0.9819	1.2370	1.2370
0.9761	1.1035	1.3763	1.3763
0.9930	1.1185	1.3932	1.3932
1.0106	1.1338	1.4108	1.4108
1.0251	1.1432	1.4252	1.4252
1.0322	1.1510	1.4340	1.4340
1.0406	1.1612	1.4470	1.4470
0.6633	0.7666	0.9792	0.9792
0.6788	0.7831	1.0008	1.0008
0.7197	0.8305	1.0615	1.0615
0.7441	0.8597	1.1012	1.1012
0.9086	1.0403	1.3181	1.3181
0.9175	1.0467	1.3236	1.3236
0.9260	1.0537	1.3260	1.3260
0.9325	1.0584	1.3273	1.3273
0.9385	1.0658	1.3332	1.3332
0.9468	1.0734	1.3408	1.3408
1.1005	1.2150	1.5517	1.5517

1.1002	1.2144	1.5508	1.5508
1.0955	1.2047	1.5413	1.5413
1.0951	1.2039	1.5405	1.5405
1.0923	1.1952	1.5366	1.5366
1.0550	1.1511	1.5186	1.5186
1.0531	1.1501	1.5172	1.5172
0.9770	1.0934	1.3858	1.3858
0.9742	1.0912	1.3835	1.3835
0.8678	1.0050	1.3292	1.3292
0.8718	1.0088	1.3341	1.3341
0.8963	1.0387	1.3710	1.3710
0.8970	1.0400	1.3730	1.3730
0.9191	1.0660	1.4138	1.4138
0.9024	1.0519	1.3973	1.3973
0.9055	1.0556	1.4017	1.4017
0.9390	1.0932	1.4489	1.4489
0.9439	1.0984	1.4566	1.4566
1.1701	1.3069	1.6826	1.6826
1.1699	1.3059	1.6808	1.6808
1.1668	1.2988	1.6687	1.6687
0.9807	1.1399	1.4327	1.4327
0.9813	1.1407	1.4352	1.4352
1.0175	1.1998	1.4974	1.4974
0.8971	1.0471	1.3929	1.3929
0.9165	1.0692	1.4192	1.4192
0.9211	1.0740	1.4252	1.4252
1.0419	1.1999	1.5794	1.5794
1.0466	1.2025	1.5786	1.5786
1.0475	1.2027	1.5785	1.5785
1.1353	1.2785	1.6550	1.6550
1.1335	1.2755	1.6485	1.6485
1.1292	1.2665	1.6325	1.6325
1.0697	1.2251	1.6039	1.6039
1.0676	1.2195	1.5896	1.5896
1.0703	1.2217	1.5904	1.5904
2.5374	2.9596	4.3221	4.3221
2.3567	2.5719	3.7443	3.7443
2.8816	1.2491	1.3278	2.8816
2.7499	2.9704	4.7825	4.7825
0.4307	0.5016	0.7388	0.7388
0.4303	0.5008	0.7373	0.7373
0.4299	0.5001	0.7361	0.7361
0.4281	0.4966	0.7295	0.7295
0.4276	0.4952	0.7280	0.7280
0.4277	0.4943	0.7263	0.7263
0.4209	0.4849	0.7084	0.7084
0.4202	0.4840	0.7067	0.7067
0.4195	0.4829	0.7048	0.7048
0.4722	0.5457	0.8139	0.8139
0.4726	0.5463	0.8149	0.8149
0.4733	0.5469	0.8160	0.8160
0.4767	0.5504	0.8236	0.8236
0.4771	0.5508	0.8247	0.8247
0.4775	0.5513	0.8258	0.8258
0.4778	0.5522	0.8283	0.8283
0.4774	0.5514	0.8277	0.8277
0.4769	0.5510	0.8269	0.8269
0.4828	0.5568	0.8487	0.8487
0.4708	0.5670	0.8408	0.8408

0.4335	0.5222	0.7926	0.7926
0.4337	0.5222	0.7920	0.7920
0.4342	0.5220	0.7919	0.7919
0.4402	0.5263	0.7947	0.7947
0.4412	0.5272	0.7953	0.7953
0.4423	0.5280	0.7961	0.7961
0.4478	0.5322	0.8018	0.8018
0.4483	0.5326	0.8025	0.8025
0.4485	0.5328	0.8029	0.8029
0.4483	0.5318	0.8020	0.8020
0.4482	0.5315	0.8016	0.8016
0.4477	0.5309	0.8006	0.8006
0.4454	0.5278	0.7940	0.7940
0.4450	0.5274	0.7932	0.7932
0.4441	0.5270	0.7925	0.7925
0.4406	0.5233	0.7848	0.7848
0.4415	0.5234	0.7838	0.7838
0.4412	0.5229	0.7829	0.7829
0.4845	0.5585	0.8532	0.8532
0.5484	0.6303	0.9670	0.9670
0.5535	0.6364	0.9801	0.9801
0.5542	0.6371	0.9818	0.9818
0.5549	0.6380	0.9837	0.9837
0.4629	0.5568	0.8237	0.8237
0.4646	0.5587	0.8270	0.8270
0.4719	0.5680	0.8436	0.8436
0.4731	0.5685	0.8442	0.8442
0.4712	0.5673	0.8416	0.8416
0.5035	0.5942	0.7235	0.7235
0.4928	0.5838	0.7095	0.7095
0.4885	0.5789	0.7046	0.7046
0.4849	0.5749	0.7006	0.7006
0.4849	0.5711	0.6968	0.6968
0.4866	0.5666	0.7018	0.7018
0.4881	0.5613	0.7064	0.7064
0.4933	0.5624	0.7249	0.7249
0.4933	0.5638	0.7286	0.7286
0.4936	0.5651	0.7312	0.7312
0.4936	0.5657	0.7339	0.7339
0.4935	0.5661	0.7359	0.7359
0.4932	0.5665	0.7375	0.7375
0.4925	0.5668	0.7393	0.7393
0.4917	0.5670	0.7404	0.7404
0.4992	0.5946	0.7193	0.7193
0.4946	0.5884	0.7138	0.7138
0.4900	0.5830	0.7067	0.7067
0.4915	0.5774	0.7081	0.7081
0.4929	0.5707	0.7129	0.7129
0.4943	0.5619	0.7178	0.7178
0.4953	0.5637	0.7214	0.7214
0.4920	0.5601	0.7202	0.7202
0.4965	0.5662	0.7277	0.7277
0.4968	0.5669	0.7299	0.7299
0.4973	0.5677	0.7330	0.7330
0.4972	0.5679	0.7346	0.7346
0.4968	0.5679	0.7359	0.7359
0.4953	0.5678	0.7374	0.7374
0.4946	0.5682	0.7382	0.7382
0.4940	0.5682	0.7390	0.7390

0.4937	0.5686	0.7406	0.7406
0.4934	0.5687	0.7418	0.7418
0.4983	0.5808	0.7159	0.7159
0.4996	0.5720	0.7206	0.7206
0.5008	0.5678	0.7239	0.7239
0.5011	0.5693	0.7269	0.7269
0.5017	0.5709	0.7301	0.7301
0.5018	0.5718	0.7321	0.7321
0.5019	0.5723	0.7338	0.7338
0.4909	0.5582	0.7162	0.7162
0.5019	0.5725	0.7371	0.7371
0.5015	0.5723	0.7381	0.7381
0.5011	0.5721	0.7396	0.7396
0.5003	0.5714	0.7399	0.7399
0.4994	0.5710	0.7402	0.7402
0.4989	0.5715	0.7411	0.7411
0.4972	0.5710	0.7418	0.7418
0.4967	0.5712	0.7423	0.7423
0.4960	0.5714	0.7426	0.7426
0.4955	0.5716	0.7436	0.7436
0.4911	0.5671	0.7416	0.7416
0.4907	0.5679	0.7438	0.7438
0.4904	0.5682	0.7453	0.7453
0.4901	0.5686	0.7467	0.7467
0.4888	0.5690	0.7538	0.7538
0.4894	0.5698	0.7540	0.7540
0.4899	0.5705	0.7554	0.7554
0.4900	0.5713	0.7562	0.7562
0.4903	0.5719	0.7578	0.7578
0.4906	0.5723	0.7596	0.7596
0.4905	0.5726	0.7624	0.7624
0.4903	0.5727	0.7644	0.7644
0.4890	0.5718	0.7643	0.7643
0.4853	0.5691	0.7616	0.7616
0.4829	0.5673	0.7601	0.7601
0.4803	0.5649	0.7591	0.7591
0.4932	0.5690	0.7428	0.7428
0.4928	0.5696	0.7442	0.7442
0.4923	0.5698	0.7455	0.7455
0.4919	0.5699	0.7466	0.7466
0.4916	0.5699	0.7480	0.7480
0.4910	0.5697	0.7486	0.7486
0.4893	0.5685	0.7480	0.7480
0.4903	0.5686	0.7496	0.7496
0.4899	0.5686	0.7494	0.7494
0.4889	0.5682	0.7486	0.7486
0.4880	0.5680	0.7497	0.7497
0.4876	0.5680	0.7515	0.7515
0.4878	0.5687	0.7541	0.7541
0.4882	0.5697	0.7576	0.7576
0.4882	0.5705	0.7593	0.7593
0.4884	0.5712	0.7613	0.7613
0.4880	0.5716	0.7642	0.7642
0.4881	0.5717	0.7665	0.7665
0.4873	0.5708	0.7668	0.7668
0.4948	0.5715	0.7444	0.7444
0.4943	0.5714	0.7453	0.7453
0.4937	0.5710	0.7456	0.7456
0.4935	0.5706	0.7459	0.7459

0.4929	0.5698	0.7457	0.7457
0.4925	0.5691	0.7454	0.7454
0.4888	0.5687	0.7495	0.7495
0.4915	0.5686	0.7466	0.7466
0.4911	0.5685	0.7474	0.7474
0.4905	0.5685	0.7489	0.7489
0.4900	0.5687	0.7507	0.7507
0.4893	0.5687	0.7517	0.7517
0.4888	0.5688	0.7528	0.7528
0.4880	0.5690	0.7544	0.7544
0.4872	0.5685	0.7556	0.7556
0.4861	0.5682	0.7566	0.7566
0.4855	0.5679	0.7585	0.7585
0.4857	0.5681	0.7604	0.7604
0.4859	0.5678	0.7620	0.7620
0.5635	0.6617	0.9574	0.9574
0.5638	0.6614	0.9589	0.9589
0.5626	0.6550	0.9743	0.9743
0.5626	0.6542	0.9770	0.9770
1.1727	1.4998	2.4382	2.4382
2.0625	1.8689	2.3213	2.3213
0.7099	0.8510	1.2184	1.2184
0.7130	0.8532	1.1919	1.1919
0.7148	0.8542	1.1714	1.1714
1.4436	1.6690	2.0289	2.0289
1.4647	1.6915	2.0597	2.0597
1.1589	1.3453	1.7188	1.7188
1.1932	1.3813	1.7400	1.7400
1.9617	2.6626	3.7421	3.7421
2.2711	2.3504	3.6410	3.6410
2.2119	2.2199	3.5479	3.5479
2.2176	2.1584	3.1809	3.1809
2.1705	2.1144	3.1142	3.1142
2.2336	2.1939	3.1571	3.1571
0.8930	0.9885	1.4439	1.4439
0.9013	0.9988	1.4506	1.4506
0.9025	0.9979	1.4600	1.4600
0.9191	1.0232	1.4679	1.4679
0.5624	0.6488	1.1079	1.1079
0.5662	0.6528	1.1136	1.1136
0.5710	0.6567	1.1209	1.1209
0.5758	0.6607	1.1275	1.1275
1.1387	1.3398	1.8452	1.8452
1.1514	1.3561	1.8743	1.8743
1.1644	1.3715	1.9018	1.9018
1.1748	1.3885	1.9245	1.9245
0.5547	0.6445	1.0706	1.0706
0.5559	0.6457	1.0766	1.0766
0.5570	0.6471	1.0829	1.0829
0.5580	0.6481	1.0887	1.0887
0.9542	1.0387	1.5089	1.5089
0.9276	1.0294	1.6105	1.6105
0.9565	1.0431	1.5113	1.5113
0.9617	1.0705	1.6331	1.6331
0.9851	1.0887	1.5392	1.5392
0.9890	1.1036	1.6538	1.6538
0.9898	1.0954	1.5434	1.5434
1.0094	1.1277	1.6720	1.6720
0.7143	0.7857	1.2934	1.2934

0.6269	0.7621	1.3141	1.3141
0.7178	0.7887	1.2971	1.2971
0.6362	0.7720	1.3267	1.3267
0.7402	0.8092	1.3215	1.3215
0.6504	0.7804	1.3442	1.3442
0.7429	0.8121	1.3254	1.3254
0.6760	0.7900	1.3575	1.3575
0.8136	0.9961	1.7686	1.7686
0.8290	1.0192	1.8151	1.8151
0.8012	0.9533	1.5030	1.5030
0.8517	1.0127	1.5377	1.5377
0.4480	0.5156	0.6549	0.6549
0.4520	0.5214	0.6620	0.6620
0.4537	0.5243	0.6655	0.6655
0.4537	0.5263	0.6690	0.6690
0.4555	0.5273	0.6722	0.6722
0.4414	0.5187	0.6666	0.6666
0.4374	0.5138	0.6631	0.6631
0.4360	0.5137	0.6630	0.6630
0.4349	0.5135	0.6676	0.6676
0.4356	0.5167	0.6721	0.6721
0.4441	0.5232	0.7318	0.7318
0.4452	0.5249	0.7446	0.7446
0.4457	0.5271	0.7526	0.7526
0.4464	0.5282	0.7624	0.7624
0.4470	0.5285	0.7720	0.7720
0.4728	0.5599	0.8391	0.8391
0.4829	0.5741	0.8528	0.8528
0.4850	0.5788	0.8564	0.8564
0.4886	0.5845	0.8641	0.8641
0.4929	0.5900	0.8748	0.8748
0.3857	0.4608	0.6020	0.6020
0.3929	0.4665	0.6107	0.6107
0.3957	0.4700	0.6106	0.6106
0.3958	0.4697	0.6096	0.6096
0.3960	0.4683	0.6050	0.6050
0.4128	0.4831	0.6130	0.6130
0.4143	0.4848	0.6146	0.6146
0.4182	0.4873	0.6186	0.6186
0.4217	0.4910	0.6225	0.6225
0.4264	0.4943	0.6283	0.6283
0.4339	0.5142	0.6701	0.6701
0.4436	0.5244	0.6807	0.6807
0.4417	0.5210	0.6772	0.6772
0.4427	0.5221	0.6768	0.6768
0.4261	0.4973	0.6474	0.6474
0.3967	0.4631	0.6334	0.6334
0.4001	0.4665	0.6388	0.6388
0.4095	0.4766	0.6521	0.6521
0.4181	0.4867	0.6624	0.6624
0.4282	0.4993	0.6756	0.6756
0.4802	0.5552	0.6921	0.6921
0.4822	0.5581	0.6955	0.6955
0.4855	0.5656	0.7041	0.7041
0.4889	0.5687	0.7098	0.7098
0.4949	0.5780	0.8380	0.8380
0.4974	0.5811	0.8445	0.8445
0.5073	0.5900	0.8642	0.8642
0.5151	0.5965	0.8773	0.8773

0.4103	0.4899	0.6402	0.6402
0.4125	0.4915	0.6421	0.6421
0.4164	0.4941	0.6391	0.6391
0.4152	0.4924	0.6357	0.6357
0.4646	0.5516	0.7144	0.7144
0.4667	0.5538	0.7157	0.7157
0.4667	0.5505	0.7091	0.7091
0.4465	0.5250	0.6751	0.6751
0.4379	0.5113	0.6447	0.6447
0.4376	0.5110	0.6445	0.6445
0.4346	0.5117	0.6488	0.6488
0.4347	0.5120	0.6494	0.6494
0.4649	0.5502	0.7889	0.7889
0.4649	0.5509	0.7895	0.7895
0.4716	0.5610	0.8077	0.8077
0.4716	0.5611	0.8082	0.8082
0.4065	0.4746	0.5941	0.5941
0.4069	0.4749	0.5944	0.5944
0.4147	0.4826	0.6020	0.6020
0.4151	0.4830	0.6025	0.6025
0.3957	0.4615	0.6196	0.6196
0.3967	0.4625	0.6203	0.6203
0.4155	0.4830	0.6407	0.6407
0.4164	0.4840	0.6411	0.6411
0.4728	0.5479	0.6901	0.6901
0.5399	0.6235	0.7795	0.7795
0.4729	0.5472	0.6903	0.6903
0.5406	0.6253	0.7817	0.7817
0.4727	0.5474	0.6904	0.6904
0.5411	0.6257	0.7830	0.7830
0.4725	0.5475	0.6912	0.6912
0.5422	0.6271	0.7855	0.7855
0.4726	0.5469	0.6911	0.6911
0.5425	0.6263	0.7880	0.7880
0.4729	0.5470	0.6911	0.6911
0.5427	0.6276	0.7896	0.7896
0.4729	0.5476	0.6922	0.6922
0.5431	0.6292	0.7911	0.7911
0.4730	0.5457	0.6935	0.6935
0.5438	0.6301	0.7938	0.7938
0.4731	0.5487	0.6943	0.6943
0.5452	0.6289	0.7964	0.7964
0.5068	0.5910	0.8838	0.8838
0.6331	0.6947	1.0607	1.0607
0.5120	0.5977	0.8896	0.8896
0.6424	0.7033	1.0691	1.0691
0.5190	0.6037	0.8960	0.8960
0.6529	0.7142	1.0799	1.0799
0.5253	0.6088	0.9010	0.9010
0.6630	0.7303	1.0891	1.0891
0.5303	0.6136	0.9074	0.9074
0.6756	0.7467	1.1002	1.1002
0.5328	0.6160	0.9124	0.9124
0.6882	0.7621	1.1104	1.1104
0.5371	0.6197	0.9196	0.9196
0.6996	0.7795	1.1189	1.1189
0.5418	0.6296	0.9266	0.9266
0.7116	0.7942	1.1296	1.1296
0.5469	0.6396	0.9324	0.9324

0.7233	0.8145	1.1391	1.1391
0.4117	0.4863	0.6283	0.6283
0.4436	0.5201	0.6704	0.6704
0.4124	0.4869	0.6277	0.6277
0.4439	0.5197	0.6690	0.6690
0.4140	0.4880	0.6281	0.6281
0.4451	0.5203	0.6687	0.6687
0.4156	0.4894	0.6286	0.6286
0.4466	0.5215	0.6691	0.6691
0.4171	0.4909	0.6289	0.6289
0.4489	0.5235	0.6705	0.6705
0.4184	0.4921	0.6296	0.6296
0.4507	0.5252	0.6710	0.6710
0.4202	0.4935	0.6304	0.6304
0.4527	0.5270	0.6713	0.6713
0.4220	0.4948	0.6310	0.6310
0.4548	0.5279	0.6729	0.6729
0.4236	0.4964	0.6322	0.6322
0.4567	0.5303	0.6740	0.6740
0.4371	0.5129	0.6573	0.6573
0.4909	0.5723	0.7355	0.7355
0.4407	0.5187	0.6619	0.6619
0.4294	0.5025	0.7396	0.7396
0.4428	0.5213	0.6660	0.6660
0.4344	0.5086	0.7474	0.7474
0.3933	0.4611	0.6700	0.6700
0.4396	0.5146	0.7529	0.7529
0.3958	0.4645	0.6748	0.6748
0.4455	0.5217	0.7596	0.7596
0.4005	0.4692	0.6801	0.6801
0.4490	0.5258	0.7672	0.7672
0.4070	0.4772	0.6836	0.6836
0.4431	0.5177	0.7725	0.7725
0.4106	0.4815	0.6897	0.6897
0.4466	0.5214	0.7799	0.7799
0.4136	0.4850	0.6947	0.6947
0.4497	0.5245	0.7869	0.7869
0.4508	0.5315	0.6828	0.6828
0.4523	0.5329	0.6842	0.6842
0.4561	0.5367	0.6879	0.6879
0.4580	0.5390	0.6900	0.6900
0.4557	0.5398	0.6947	0.6947
0.4579	0.5420	0.6972	0.6972
0.4604	0.5444	0.6997	0.6997
0.4488	0.5303	0.6832	0.6832
0.4505	0.5317	0.6849	0.6849
0.4524	0.5334	0.6869	0.6869
0.4635	0.5375	0.6746	0.6746
0.4680	0.5415	0.6819	0.6819
0.4716	0.5459	0.6886	0.6886
0.4741	0.5504	0.6941	0.6941
0.4763	0.5528	0.6990	0.6990
0.4775	0.5533	0.7007	0.7007
0.4723	0.5502	0.7042	0.7042
0.4701	0.5496	0.7029	0.7029
0.4694	0.5531	0.7122	0.7122
0.4714	0.5572	0.7205	0.7205
0.4706	0.5507	0.7697	0.7697
0.4727	0.5544	0.7804	0.7804

0.4744	0.5584	0.7938	0.7938
0.4778	0.5623	0.8049	0.8049
0.4805	0.5653	0.8154	0.8154
0.4836	0.5693	0.8280	0.8280
0.5203	0.6057	0.8957	0.8957
0.5315	0.6229	0.9077	0.9077
0.5475	0.6502	0.9283	0.9283
0.5536	0.6594	0.9393	0.9393
0.4032	0.4799	0.6261	0.6261
0.4066	0.4830	0.6257	0.6257
0.4062	0.4807	0.6199	0.6199
0.4063	0.4800	0.6165	0.6165
0.4264	0.4974	0.6284	0.6284
0.4291	0.5011	0.6319	0.6319
0.4332	0.5048	0.6354	0.6354
0.4371	0.5086	0.6395	0.6395
0.4390	0.5106	0.6418	0.6418
0.4412	0.5129	0.6452	0.6452
0.4548	0.5390	0.7000	0.7000
0.4567	0.5396	0.7018	0.7018
0.4412	0.5182	0.6721	0.6721
0.4465	0.5249	0.6785	0.6785
0.4178	0.4865	0.6680	0.6680
0.4249	0.4933	0.6763	0.6763
0.4324	0.5035	0.6872	0.6872
0.4413	0.5136	0.6972	0.6972
0.4455	0.5181	0.7026	0.7026
0.4498	0.5224	0.7097	0.7097
1.0230	1.1466	1.5626	1.5626
1.0262	1.1528	1.5658	1.5658
1.0588	1.2144	1.6586	1.6586
1.0621	1.2190	1.6672	1.6672
1.0986	1.2783	1.7627	1.7627
1.0103	1.1989	1.6840	1.6840
1.0128	1.2031	1.6888	1.6888
1.0370	1.2404	1.7505	1.7505
1.0397	1.2443	1.7550	1.7550
0.5911	0.6763	1.1531	1.1531
0.5942	0.6784	1.1551	1.1551
0.6182	0.6967	1.1750	1.1750
0.6198	0.6985	1.1770	1.1770
0.6414	0.7213	1.2113	1.2113
0.6160	0.6916	1.1698	1.1698
0.6190	0.6941	1.1733	1.1733
0.6403	0.7114	1.1950	1.1950
0.6423	0.7127	1.1976	1.1976
1.0133	1.0932	1.6394	1.6394
1.0164	1.0971	1.6417	1.6417
1.0434	1.1227	1.6579	1.6579
1.1237	1.3523	1.9068	1.9068
1.1265	1.3565	1.9121	1.9121
1.1386	1.3736	1.9312	1.9312
0.7595	0.8582	1.2314	1.2314
0.7560	0.8541	1.2374	1.2374
0.7542	0.8521	1.2382	1.2382
0.7196	0.7846	1.2905	1.2905
0.7323	0.7942	1.3004	1.3004
0.7338	0.7953	1.3020	1.3020
0.8638	0.9221	1.4366	1.4366

0.8714	0.9313	1.4422	1.4422
0.8898	0.9534	1.4565	1.4565
0.7782	0.8382	1.3586	1.3586
0.7922	0.8470	1.3715	1.3715
0.7971	0.8507	1.3768	1.3768
2.3810	2.9159	4.1919	4.1919
2.3411	2.7808	3.9789	3.9789
3.0387	3.7126	5.5926	5.5926
1.1954	1.4669	2.4555	2.4555
1.2073	1.4867	2.4810	2.4810
1.2326	1.5149	2.5319	2.5319
0.8528	1.1815	1.7515	1.7515
0.8445	1.1707	1.7448	1.7448
1.0671	1.3629	2.1929	2.1929
1.0553	1.3626	2.1946	2.1946
0.5558	0.6521	0.9055	0.9055
0.5543	0.6488	0.9002	0.9002
0.5544	0.6475	0.8982	0.8982
0.7896	0.6945	0.7237	0.7896
0.7883	0.5945	0.7342	0.7883
1.1721	1.0335	1.1790	1.1790
1.2009	1.0644	1.1765	1.2009

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
BEX	BEX1	F1BEX1	79.84174	2.45551
BEX	BEX2	F1BEX2	80.2313	2.48103
BEX	BEX3	F1BEX3	80.92069	2.53188
WBV	WBV_1	F1WBV_1	80.9102	1.75146
WBV	WBV_2	F1WBV_2	80.41673	1.74478
WBV	WBV_3	F1WBV_3	75.47747	2.19287
WBV	WBV_4	F1WBV_4	74.68359	2.19464
BEX	BEX1	F2BEX1	37.74807	0.90549
BEX	BEX2	F2BEX2	37.63831	0.9002
BEX	BEX3	F2BEX3	37.77097	0.89817
WBV	WBV_1	F2WBV_1	80.4679	0.78955
WBV	WBV_2	F2WBV_2	71.49853	0.78833
WBV	WBV_3	F2WBV_3	108.9069	1.17896
WBV	WBV_4	F2WBV_4	120.90832	1.20093
GEN	GEN_53	F1GEN_53	158.44992	6.2509
GEN	GEN_59	F1GEN_59	150.14774	4.80871
GEN	GEN_1	F1GEN_1	29.60625	1.26977
GEN	GEN_2	F1GEN_2	29.59818	1.26781
GEN	GEN_3	F1GEN_3	29.5704	1.26621
GEN	GEN_4	F1GEN_4	29.66865	1.25488
GEN	GEN_5	F1GEN_5	29.76647	1.25331
GEN	GEN_6	F1GEN_6	29.84684	1.25303
GEN	GEN_7	F1GEN_7	29.7659	1.24622
GEN	GEN_8	F1GEN_8	29.78505	1.24855
GEN	GEN_9	F1GEN_9	29.78007	1.25051
GEN	GEN_10	F1GEN_10	29.56313	1.25917
GEN	GEN_11	F1GEN_11	29.63124	1.25919
GEN	GEN_12	F1GEN_12	29.72882	1.25874
GEN	GEN_13	F1GEN_13	29.8865	1.24714
GEN	GEN_14	F1GEN_14	29.94019	1.24476
GEN	GEN_15	F1GEN_15	30.03244	1.24356
GEN	GEN_16	F1GEN_16	39.59852	1.63967
GEN	GEN_17	F1GEN_17	39.53535	1.6399
GEN	GEN_18	F1GEN_18	38.72128	1.63991
GEN	GEN_19	F1GEN_19	38.6995	1.64277
GEN	GEN_30	F1GEN_30	49.10075	1.87685
GEN	GEN_31	F1GEN_31	49.00488	1.8862
GEN	GEN_32	F1GEN_32	49.5786	1.94301
GEN	GEN_33	F1GEN_33	49.76624	1.9492
GEN	GEN_34	F1GEN_34	49.7787	1.95471
GEN	GEN_35	F1GEN_35	50.40383	1.99637
GEN	GEN_36	F1GEN_36	50.40503	2.00379
GEN	GEN_37	F1GEN_37	37.67042	1.34105
GEN	GEN_38	F1GEN_38	37.02322	1.38572
GEN	GEN_39	F1GEN_39	36.99006	1.39895
GEN	GEN_40	F1GEN_40	37.06585	1.4127
GEN	GEN_41	F1GEN_41	39.33025	1.46527
GEN	GEN_42	F1GEN_42	39.42252	1.46852
GEN	GEN_43	F1GEN_43	39.43344	1.47165
GEN	GEN_44	F1GEN_44	39.33875	1.47863

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
GEN	GEN_45	F1GEN_45	39.2672	1.4785
GEN	GEN_46	F1GEN_46	39.16614	1.47774
GEN	GEN_47	F1GEN_47	44.78368	1.68113
GEN	GEN_48	F1GEN_48	44.44821	1.68367
GEN	GEN_20	F1GEN_20	38.70061	1.65019
GEN	GEN_21	F1GEN_21	38.8038	1.64913
GEN	GEN_22	F1GEN_22	29.9966	1.21777
GEN	GEN_23	F1GEN_23	29.9502	1.2181
GEN	GEN_24	F1GEN_24	29.89688	1.21811
GEN	GEN_25	F1GEN_25	54.86097	2.05053
GEN	GEN_26	F1GEN_26	55.05932	2.04508
GEN	GEN_27	F1GEN_27	55.12433	2.02801
GEN	GEN_28	F1GEN_28	55.35972	2.03136
GEN	GEN_29	F1GEN_29	49.11346	1.8678
CT	CT_1	F1CT_1	122.8351	2.33771
CT	CT_2	F1CT_2	121.23373	2.32273
CT	CT_3	F1CT_3	119.96804	2.32378
CT	CT_4	F1CT_4	118.68529	2.32041
CT	CT_5	F1CT_5	117.08873	2.28765
CT	CT_6	F1CT_6	115.79864	2.28794
CT	CT_7	F1CT_7	114.58233	2.28004
CT	CT_8	F1CT_8	110.77555	2.20385
CT	CT_9	F1CT_9	109.85924	2.18768
CT	CT_10	F1CT_10	108.88775	2.17801
CT	CT_11	F1CT_11	107.6571	2.15147
CT	CT_12	F1CT_12	106.68548	2.14327
CT	CT_13	F1CT_13	105.68496	2.1265
CT	CT_14	F1CT_14	104.532	2.10432
CT	CT_15	F1CT_15	103.54794	2.09267
CT	CT_16	F1CT_16	119.21596	2.28216
CT	CT_17	F1CT_17	117.67275	2.27233
CT	CT_18	F1CT_18	116.42706	2.25328
CT	CT_19	F1CT_19	115.18647	2.2538
CT	CT_20	F1CT_20	113.59757	2.24127
CT	CT_21	F1CT_21	112.65264	2.19922
CT	CT_22	F1CT_22	111.81817	2.18153
CT	CT_23	F1CT_23	112.0106	2.24293
CT	CT_24	F1CT_24	109.86561	2.16415
CT	CT_25	F1CT_25	108.98455	2.15354
CT	CT_26	F1CT_26	108.14124	2.13749
CT	CT_27	F1CT_27	107.19373	2.12563
CT	CT_28	F1CT_28	106.25297	2.11269
CT	CT_29	F1CT_29	105.15135	2.09045
CT	CT_30	F1CT_30	104.08824	2.07222
CT	CT_31	F1CT_31	103.13536	2.05635
CT	CT_32	F1CT_32	102.21401	2.03543
CT	CT_33	F1CT_33	101.54343	2.03783
CT	CT_34	F1CT_34	115.72388	2.0675
CT	CT_35	F1CT_35	114.19541	2.02655
CT	CT_36	F1CT_36	112.9686	2.01552
CT	CT_37	F1CT_37	111.7851	2.00423

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
CT	CT_38	F1CT_38	110.71609	1.98673
CT	CT_39	F1CT_39	109.90968	1.98181
CT	CT_40	F1CT_40	109.0704	1.9718
CT	CT_41	F1CT_41	112.8878	2.25274
CT	CT_42	F1CT_42	107.17336	1.93533
CT	CT_43	F1CT_43	106.30006	1.9216
CT	CT_44	F1CT_44	105.42119	1.90836
CT	CT_45	F1CT_45	104.49524	1.89423
CT	CT_46	F1CT_46	103.57624	1.9134
CT	CT_47	F1CT_47	102.39768	1.91507
CT	CT_48	F1CT_48	101.47793	1.91287
CT	CT_49	F1CT_49	100.55494	1.91391
CT	CT_50	F1CT_50	100.14679	1.90721
CT	CT_51	F1CT_51	99.46257	1.88058
CT	CT_52	F1CT_52	102.64135	2.07456
CT	CT_53	F1CT_53	101.77655	2.04781
CT	CT_54	F1CT_54	100.99992	2.03206
CT	CT_55	F1CT_55	100.29139	2.0105
CT	CT_56	F1CT_56	96.88025	1.94694
CT	CT_57	F1CT_57	96.1167	1.92533
CT	CT_58	F1CT_58	95.33431	1.9022
CT	CT_59	F1CT_59	94.36158	1.87901
CT	CT_60	F1CT_60	93.58069	1.85376
CT	CT_61	F1CT_61	92.84462	1.83863
CT	CT_62	F1CT_62	92.11381	1.80917
CT	CT_63	F1CT_63	91.56526	1.78176
CT	CT_64	F1CT_64	91.01921	1.74733
CT	CT_65	F1CT_65	90.29072	1.71861
CT	CT_66	F1CT_66	89.70587	1.7031
CT	CT_67	F1CT_67	89.1156	1.69604
CT	CT_68	F1CT_68	100.83988	2.0147
CT	CT_69	F1CT_69	99.91979	1.97888
CT	CT_70	F1CT_70	99.21926	1.96134
CT	CT_71	F1CT_71	98.50241	1.93794
CT	CT_72	F1CT_72	97.55643	1.90574
CT	CT_73	F1CT_73	96.80864	1.88472
CT	CT_74	F1CT_74	99.24718	2.0017
CT	CT_75	F1CT_75	95.11619	1.81844
CT	CT_76	F1CT_76	94.35995	1.79886
CT	CT_77	F1CT_77	93.60147	1.78083
CT	CT_78	F1CT_78	92.63478	1.76137
CT	CT_79	F1CT_79	91.86612	1.74484
CT	CT_80	F1CT_80	91.23277	1.72518
CT	CT_81	F1CT_81	90.52046	1.70689
CT	CT_82	F1CT_82	89.96291	1.68768
CT	CT_83	F1CT_83	89.39984	1.66408
CT	CT_84	F1CT_84	88.69027	1.6416
CT	CT_85	F1CT_85	88.10447	1.62744
CT	CT_86	F1CT_86	87.52597	1.62795
CT	CT_87	F1CT_87	98.7716	1.86196
CT	CT_88	F1CT_88	97.60975	1.83761

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
CT	CT_89	F1CT_89	97.17607	1.81738
CT	CT_90	F1CT_90	96.4726	1.7953
CT	CT_91	F1CT_91	95.55125	1.77575
CT	CT_92	F1CT_92	94.81636	1.7553
CT	CT_93	F1CT_93	98.5631	1.98631
CT	CT_94	F1CT_94	93.12635	1.7177
CT	CT_95	F1CT_95	92.43093	1.70008
CT	CT_96	F1CT_96	91.67331	1.69721
CT	CT_97	F1CT_97	90.95579	1.66755
CT	CT_98	F1CT_98	90.42534	1.64639
CT	CT_99	F1CT_99	89.86847	1.62438
CT	CT_100	F1CT_100	89.17783	1.59532
CT	CT_101	F1CT_101	88.6368	1.57189
CT	CT_102	F1CT_102	88.07432	1.54842
CT	CT_103	F1CT_103	87.3561	1.51886
CT	CT_104	F1CT_104	86.78988	1.49835
CT	CT_105	F1CT_105	86.20693	1.48172
AE	AE_49	F1AE_49	145.35735	3.63309
AE	AE_50	F1AE_50	145.48271	3.69303
AE	AE_57	F1AE_57	154.0069	4.18396
AE	AE_58	F1AE_58	157.18681	4.27158
GEN	GEN_54	F1GEN_54	248.27151	3.56111
GEN	GEN_55	F1GEN_55	170.15721	3.5188
CT	CT_106	F1CT_106	153.46686	5.54295
CT	CT_107	F1CT_107	153.56655	3.52085
CT	CT_108	F1CT_108	154.38018	3.11594
CT	CT_109	F1CT_109	128.83495	2.84774
CT	CT_110	F1CT_110	129.95933	2.7687
CT	CT_111	F1CT_111	131.10894	2.01818
AE	AE_41	F1AE_41	77.55515	1.59192
AE	AE_42	F1AE_42	76.84806	1.58344
AE	AE_43	F1AE_43	76.18835	1.57487
AE	AE_44	F1AE_44	78.28274	1.56428
AE	AE_45	F1AE_45	68.60323	1.52431
AE	AE_46	F1AE_46	68.15088	1.54764
AE	AE_47	F1AE_47	67.57458	1.58206
AE	AE_48	F1AE_48	67.75	1.60698
AME	AME_17	F1AME_17	91.35633	1.61138
AME	AME_18	F1AME_18	92.00014	1.61689
AME	AME_19	F1AME_19	92.33594	1.62155
AME	AME_20	F1AME_20	92.60453	1.6261
AME	AME_21	F1AME_21	74.01234	1.39457
AME	AME_22	F1AME_22	74.348	1.40193
AME	AME_23	F1AME_23	74.36177	1.41014
AME	AME_24	F1AME_24	74.63425	1.41999
SE	SE_37	F1SE_37	80.08323	1.59976
SEA	SEA_37	F1SEA_37	89.39426	1.70119
SE	SE_38	F1SE_38	80.03917	1.59449
SEA	SEA_38	F1SEA_38	90.13164	1.69946
SE	SE_39	F1SE_39	80.6921	1.56702
SEA	SEA_39	F1SEA_39	90.59889	1.70116

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
SE	SE_40	F1SE_40	80.65568	1.56102
SEA	SEA_40	F1SEA_40	90.63363	1.706
SE	SE_41	F1SE_41	74.76705	1.59252
SEA	SEA_41	F1SEA_41	82.48534	1.72025
SE	SE_42	F1SE_42	74.86893	1.60062
SEA	SEA_42	F1SEA_42	83.21545	1.71644
SE	SE_43	F1SE_43	75.36188	1.60801
SEA	SEA_43	F1SEA_43	83.33166	1.69534
SE	SE_44	F1SE_44	75.6186	1.6066
SEA	SEA_44	F1SEA_44	83.93726	1.70227
GEN	GEN_49	F1GEN_49	60.68047	2.06668
GEN	GEN_50	F1GEN_50	89.09215	2.61343
GEN	GEN_51	F1GEN_51	52.01991	1.97469
GEN	GEN_52	F1GEN_52	82.02298	2.28783
AE	AE_1	F1AE_1	53.4113	1.5244
AE	AE_2	F1AE_2	53.94916	1.54957
AE	AE_3	F1AE_3	55.54452	1.55836
AE	AE_4	F1AE_4	55.82336	1.56505
AE	AE_5	F1AE_5	57.65658	1.56901
AE	AE_6	F1AE_6	64.94638	1.36382
AE	AE_7	F1AE_7	67.44071	1.35075
AE	AE_8	F1AE_8	67.62309	1.35047
AE	AE_9	F1AE_9	68.91121	1.34807
AE	AE_10	F1AE_10	69.12444	1.29476
AE	AE_11	F1AE_11	44.00957	1.32933
AE	AE_12	F1AE_12	44.92157	1.33061
AE	AE_13	F1AE_13	45.54985	1.32978
AE	AE_14	F1AE_14	46.02068	1.31221
AE	AE_15	F1AE_15	47.06298	1.30788
AE	AE_16	F1AE_16	52.95187	1.20311
AE	AE_17	F1AE_17	55.00641	1.15225
AE	AE_18	F1AE_18	55.17576	1.14621
AE	AE_19	F1AE_19	56.61326	1.06992
AE	AE_20	F1AE_20	57.5876	1.01578
AE	AE_21	F1AE_21	39.39016	1.07591
AE	AE_22	F1AE_22	39.63239	1.136
AE	AE_23	F1AE_23	39.64453	1.15248
AE	AE_24	F1AE_24	39.81631	1.16085
AE	AE_25	F1AE_25	40.11178	1.17902
AE	AE_26	F1AE_26	43.59538	1.31755
AE	AE_27	F1AE_27	44.22361	1.32733
AE	AE_28	F1AE_28	45.05079	1.35467
AE	AE_29	F1AE_29	46.34385	1.37272
AE	AE_30	F1AE_30	47.24817	1.39569
AE	AE_31	F1AE_31	34.72601	0.9578
AE	AE_32	F1AE_32	34.90368	0.96254
AE	AE_33	F1AE_33	34.97249	0.97163
AE	AE_34	F1AE_34	35.06675	0.9851
AE	AE_35	F1AE_35	35.26911	1.02553
AE	AE_36	F1AE_36	39.22827	1.26335
AE	AE_37	F1AE_37	39.28414	1.26842

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
AE	AE_38	F1AE_38	39.58294	1.27755
AE	AE_39	F1AE_39	40.05541	1.28279
AE	AE_40	F1AE_40	40.60096	1.28915
AME	AME_1	F1AME_1	51.63654	1.66872
AME	AME_2	F1AME_2	51.46171	1.68425
AME	AME_3	F1AME_3	51.47871	1.71809
AME	AME_4	F1AME_4	52.46484	1.73299
AME	AME_5	F1AME_5	44.55672	1.40944
AME	AME_6	F1AME_6	44.97063	1.41062
AME	AME_7	F1AME_7	45.71559	1.39503
AME	AME_8	F1AME_8	46.31189	1.39262
AME	AME_9	F1AME_9	55.15138	1.18538
AME	AME_10	F1AME_10	56.4057	1.20331
AME	AME_11	F1AME_11	58.53087	1.24096
AME	AME_12	F1AME_12	58.68093	1.24922
AME	AME_13	F1AME_13	50.16018	1.00263
AME	AME_14	F1AME_14	50.48372	1.01285
AME	AME_15	F1AME_15	52.45794	1.05584
AME	AME_16	F1AME_16	52.87839	1.07676
CVD	CVD_1	F1CVD_1	65.81326	1.24767
CVD	CVD_2	F1CVD_2	66.01298	1.24725
CVD	CVD_3	F1CVD_3	68.96292	1.21735
CVD	CVD_4	F1CVD_4	68.90075	1.21564
CVD	CVD_5	F1CVD_5	53.24664	1.12446
CVD	CVD_6	F1CVD_6	53.52041	1.12321
CVD	CVD_7	F1CVD_7	56.76633	0.98389
CVD	CVD_8	F1CVD_8	56.76237	0.97918
CVD	CVD_9	F1CVD_9	44.75518	1.28194
CVD	CVD_10	F1CVD_10	44.85703	1.28418
CVD	CVD_11	F1CVD_11	46.67603	1.32495
CVD	CVD_12	F1CVD_12	46.68331	1.32714
CVD	CVD_13	F1CVD_13	38.92229	1.21506
CVD	CVD_14	F1CVD_14	39.02103	1.21546
CVD	CVD_15	F1CVD_15	39.87909	1.23158
CVD	CVD_16	F1CVD_16	39.95494	1.23231
SE	SE_1	F1SE_1	54.99785	1.67524
SEA	SEA_1	F1SEA_1	61.62343	1.95283
SE	SE_2	F1SE_2	55.68991	1.66713
SEA	SEA_2	F1SEA_2	61.60163	1.95069
SE	SE_3	F1SE_3	56.30226	1.65868
SEA	SEA_3	F1SEA_3	62.26108	1.94496
SE	SE_4	F1SE_4	56.6859	1.64673
SEA	SEA_4	F1SEA_4	61.82277	1.93534
SE	SE_5	F1SE_5	57.54095	1.63023
SEA	SEA_5	F1SEA_5	62.53807	1.92812
SE	SE_6	F1SE_6	57.88296	1.6109
SEA	SEA_6	F1SEA_6	62.59348	1.91637
SE	SE_7	F1SE_7	58.82423	1.59436
SEA	SEA_7	F1SEA_7	62.78537	1.89891
SE	SE_8	F1SE_8	59.45796	1.57012
SEA	SEA_8	F1SEA_8	63.33148	1.87765

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
SE	SE_9	F1SE_9	60.0964	1.54184
SEA	SEA_9	F1SEA_9	62.72047	1.85348
SE	SE_10	F1SE_10	45.96603	1.30806
SEA	SEA_10	F1SEA_10	50.79439	1.51901
SE	SE_11	F1SE_11	46.147	1.3021
SEA	SEA_11	F1SEA_11	51.50303	1.51806
SE	SE_12	F1SE_12	46.50074	1.29641
SEA	SEA_12	F1SEA_12	51.97506	1.51511
SE	SE_13	F1SE_13	46.62147	1.26706
SEA	SEA_13	F1SEA_13	52.20147	1.48994
SE	SE_14	F1SE_14	46.97762	1.25665
SEA	SEA_14	F1SEA_14	52.17884	1.48775
SE	SE_15	F1SE_15	47.18136	1.24803
SEA	SEA_15	F1SEA_15	53.25481	1.47896
SE	SE_16	F1SE_16	47.54958	1.24278
SEA	SEA_16	F1SEA_16	53.21179	1.46978
SE	SE_17	F1SE_17	47.78645	1.21361
SEA	SEA_17	F1SEA_17	53.02361	1.45661
SE	SE_18	F1SE_18	47.87422	1.21487
SEA	SEA_18	F1SEA_18	52.70092	1.453
SE	SE_19	F1SE_19	43.22294	1.2251
SEA	SEA_19	F1SEA_19	59.7639	1.3773
SE	SE_20	F1SE_20	43.159	1.23389
SEA	SEA_20	F1SEA_20	60.09078	1.38702
SE	SE_21	F1SE_21	43.0267	1.24423
SEA	SEA_21	F1SEA_21	60.41357	1.39666
SE	SE_22	F1SE_22	43.19499	1.2547
SEA	SEA_22	F1SEA_22	60.3519	1.41024
SE	SE_23	F1SE_23	42.54655	1.26643
SEA	SEA_23	F1SEA_23	60.66436	1.4245
SE	SE_24	F1SE_24	42.58022	1.27487
SEA	SEA_24	F1SEA_24	60.99816	1.43825
SE	SE_25	F1SE_25	42.52988	1.28995
SEA	SEA_25	F1SEA_25	60.91899	1.45106
SE	SE_26	F1SE_26	42.3836	1.30512
SEA	SEA_26	F1SEA_26	61.31547	1.46199
SE	SE_27	F1SE_27	42.5862	1.31913
SEA	SEA_27	F1SEA_27	61.64917	1.47565
SE	SE_28	F1SE_28	44.25101	1.07842
SEA	SEA_28	F1SEA_28	55.31346	1.24243
SE	SE_29	F1SE_29	45.11926	1.10018
SEA	SEA_29	F1SEA_29	55.68349	1.27882
SE	SE_30	F1SE_30	45.672	1.12485
SEA	SEA_30	F1SEA_30	55.71582	1.3127
SE	SE_31	F1SE_31	45.97592	1.14885
SEA	SEA_31	F1SEA_31	54.67045	1.34621
SE	SE_32	F1SE_32	46.17608	1.17539
SEA	SEA_32	F1SEA_32	54.43005	1.37607
SE	SE_33	F1SE_33	46.14149	1.20611
SEA	SEA_33	F1SEA_33	54.484	1.39175
SE	SE_34	F1SE_34	46.02384	1.23679

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
SEA	SEA_34	F1SEA_34	54.58741	1.40648
SE	SE_35	F1SE_35	45.62898	1.24946
SEA	SEA_35	F1SEA_35	54.96723	1.41886
SE	SE_36	F1SE_36	46.08227	1.26149
SEA	SEA_36	F1SEA_36	54.99749	1.42776
AE	AE_51	F1AE_51	152.63752	10.02319
AE	AE_52	F1AE_52	150.94328	10.00618
AE	AE_53	F1AE_53	147.53765	9.94295
AE	AE_54	F1AE_54	143.55941	9.9206
AME	AME_25	F1AME_25	228.7086	12.34295
AME	AME_26	F1AME_26	227.42057	12.39464
AME	AME_27	F1AME_27	222.04421	12.38836
SE	SE_45	F1SE_45	201.356	11.21233
SE	SE_46	F1SE_46	207.91772	11.37225
SE	SE_47	F1SE_47	213.50666	11.46991
GEN	GEN_56	F1GEN_56	48.48661	2.43772
GEN	GEN_57	F1GEN_57	39.52841	2.21616
GEN	GEN_58	F1GEN_58	32.79384	1.41885
SE	SE_48	F1SE_48	102.91415	4.00716
SE	SE_49	F1SE_49	102.82183	4.01104
AE	AE_55	F1AE_55	82.95399	3.25935
AE	AE_56	F1AE_56	83.54873	3.25107
GE	GE_1	F1GE_1	49.54406	1.57372
GE	GE_2	F1GE_2	49.96706	1.59591
GE	GE_3	F1GE_3	50.97329	1.62283
GE	GE_4	F1GE_4	51.33728	1.63658
GE	GE_5	F1GE_5	52.21487	1.64994
GE	GE_6	F1GE_6	52.49094	1.65306
GE	GE_7	F1GE_7	58.5546	1.53006
GE	GE_8	F1GE_8	60.09257	1.49513
GE	GE_9	F1GE_9	62.39142	1.49737
GE	GE_10	F1GE_10	63.91661	1.4962
GE	GE_11	F1GE_11	44.1566	1.38324
GE	GE_12	F1GE_12	44.64655	1.38746
GE	GE_13	F1GE_13	45.13586	1.38923
GE	GE_14	F1GE_14	45.75806	1.38974
GE	GE_15	F1GE_15	46.34553	1.37209
GE	GE_16	F1GE_16	46.88072	1.3737
GE	GE_17	F1GE_17	50.41895	1.29999
GE	GE_18	F1GE_18	51.14874	1.26764
GE	GE_19	F1GE_19	51.87729	1.20601
GE	GE_20	F1GE_20	53.29272	1.13051
GE	GE_21	F1GE_21	39.45853	1.16506
GE	GE_22	F1GE_22	40.97351	1.19832
GE	GE_23	F1GE_23	42.5468	1.22679
GE	GE_24	F1GE_24	43.14069	1.23699
GE	GE_25	F1GE_25	43.4865	1.37633
GE	GE_26	F1GE_26	43.37679	1.3932
GE	GE_27	F1GE_27	43.34484	1.41077
GE	GE_28	F1GE_28	44.03199	1.42523
GE	GE_29	F1GE_29	45.08265	1.43395

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
GE	GE_30	F1GE_30	45.81636	1.44699
GE	GE_31	F1GE_31	42.58341	0.97919
GE	GE_32	F1GE_32	43.55735	1.00082
GE	GE_33	F1GE_33	44.53389	1.06148
GE	GE_34	F1GE_34	44.45415	1.1012
GE	GE_35	F1GE_35	39.79536	1.31808
GE	GE_36	F1GE_36	39.97052	1.32355
GE	GE_37	F1GE_37	40.40385	1.32603
GE	GE_38	F1GE_38	40.71587	1.32725
GE	GE_39	F1GE_39	41.01379	1.33317
GE	GE_40	F1GE_40	41.16698	1.34083
GE1	GE_41	F1GE_41	81.54367	1.55169
GE1	GE_42	F1GE_42	81.63449	1.55084
GE1	GE_43	F1GE_43	82.37804	1.54132
GE1	GE_44	F1GE_44	82.49221	1.54053
GE1	GE_45	F1GE_45	81.91055	1.53662
GE2	GE_46	F1GE_46	63.86006	1.51855
GE2	GE_47	F1GE_47	63.84527	1.51724
GE2	GE_48	F1GE_48	64.35214	1.38577
GE2	GE_49	F1GE_49	64.5927	1.38352
GE1	GE_50	F1GE_50	71.31429	1.32915
GE1	GE_51	F1GE_51	71.42825	1.33413
GE1	GE_52	F1GE_52	72.04537	1.37098
GE1	GE_53	F1GE_53	72.0977	1.37303
GE1	GE_54	F1GE_54	73.13681	1.41383
GE2	GE_55	F1GE_55	60.77785	1.3973
GE2	GE_56	F1GE_56	60.834	1.4017
GE2	GE_57	F1GE_57	60.70694	1.44892
GE2	GE_58	F1GE_58	60.62544	1.45656
GBE1	GBE_1	F1GBE_1	85.53837	1.6826
GBE1	GBE_2	F1GBE_2	85.38638	1.68079
GBE1	GBE_3	F1GBE_3	85.80427	1.66872
GBE2	GBE_4	F1GBE_4	66.8167	1.4327
GBE2	GBE_5	F1GBE_5	66.61405	1.43515
GBE2	GBE_6	F1GBE_6	66.0179	1.49742
GBE1	GBE_7	F1GBE_7	76.49696	1.39294
GBE1	GBE_8	F1GBE_8	76.58797	1.41922
GBE1	GBE_9	F1GBE_9	76.62546	1.42524
GBE2	GBE_10	F1GBE_10	67.65827	1.57943
GBE2	GBE_11	F1GBE_11	67.17133	1.5786
GBE2	GBE_12	F1GBE_12	67.10089	1.57846
FRE	FRE_1	F1FRE_1	77.91647	1.65496
FRE	FRE_2	F1FRE_2	77.8004	1.64853
FRE	FRE_3	F1FRE_3	77.13171	1.63253
FRE	FRE_4	F1FRE_4	76.2001	1.60391
FRE	FRE_5	F1FRE_5	76.62957	1.58955
FRE	FRE_6	F1FRE_6	76.30905	1.59044
GE	GE_59	F1GE_59	117.68634	4.32213
GE	GE_60	F1GE_60	106.92885	3.74427
GEN	GEN_60	F1GEN_60	104.01896	2.88164
FWP	FWP_01	F1FWP_01	194.69998	4.78245

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
GEN	GEN_1	F2GEN_1	21.3672	0.73875
GEN	GEN_2	F2GEN_2	21.35334	0.73728
GEN	GEN_3	F2GEN_3	21.36707	0.73606
GEN	GEN_4	F2GEN_4	21.32883	0.72946
GEN	GEN_5	F2GEN_5	21.36556	0.72795
GEN	GEN_6	F2GEN_6	21.33105	0.72628
GEN	GEN_7	F2GEN_7	21.02284	0.7084
GEN	GEN_8	F2GEN_8	20.95552	0.70665
GEN	GEN_9	F2GEN_9	20.9703	0.70484
GEN	GEN_10	F2GEN_10	21.16886	0.81391
GEN	GEN_11	F2GEN_11	21.18759	0.81494
GEN	GEN_12	F2GEN_12	21.22394	0.81598
GEN	GEN_13	F2GEN_13	21.32682	0.82357
GEN	GEN_14	F2GEN_14	21.32293	0.8247
GEN	GEN_15	F2GEN_15	21.31989	0.82582
GEN	GEN_16	F2GEN_16	21.15798	0.82827
GEN	GEN_17	F2GEN_17	21.12613	0.82765
GEN	GEN_18	F2GEN_18	21.12997	0.82692
GEN	GEN_19	F2GEN_19	20.98811	0.84872
GEN	GEN_30	F2GEN_30	24.31814	0.84079
GEN	GEN_31	F2GEN_31	21.37404	0.79257
GEN	GEN_32	F2GEN_32	21.41725	0.79201
GEN	GEN_33	F2GEN_33	21.34684	0.79191
GEN	GEN_34	F2GEN_34	21.4852	0.79467
GEN	GEN_35	F2GEN_35	21.52242	0.79534
GEN	GEN_36	F2GEN_36	21.45522	0.79614
GEN	GEN_37	F2GEN_37	21.53055	0.80175
GEN	GEN_38	F2GEN_38	21.56714	0.80247
GEN	GEN_39	F2GEN_39	21.59656	0.80285
GEN	GEN_40	F2GEN_40	21.53787	0.80204
GEN	GEN_41	F2GEN_41	21.56523	0.80156
GEN	GEN_42	F2GEN_42	21.59677	0.80057
GEN	GEN_43	F2GEN_43	21.56285	0.79403
GEN	GEN_44	F2GEN_44	21.48648	0.79323
GEN	GEN_45	F2GEN_45	21.50514	0.79245
GEN	GEN_46	F2GEN_46	21.39966	0.78484
GEN	GEN_47	F2GEN_47	21.41438	0.78381
GEN	GEN_48	F2GEN_48	21.37426	0.7829
GEN	GEN_20	F2GEN_20	20.98685	0.85318
GEN	GEN_21	F2GEN_21	20.97887	0.96698
GEN	GEN_22	F2GEN_22	20.84068	0.98011
GEN	GEN_23	F2GEN_23	20.83902	0.98179
GEN	GEN_24	F2GEN_24	20.83584	0.98365
GEN	GEN_25	F2GEN_25	24.08119	0.82366
GEN	GEN_26	F2GEN_26	24.05926	0.82696
GEN	GEN_27	F2GEN_27	24.23238	0.84358
GEN	GEN_28	F2GEN_28	24.27953	0.84423
GEN	GEN_29	F2GEN_29	24.28451	0.84163
CT	CT_1	F2CT_1	95.23623	0.7235
CT	CT_2	F2CT_2	94.33662	0.70946
CT	CT_3	F2CT_3	93.62955	0.70456

[illegible]

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
CT	CT_4	F2CT_4	92.88518	0.70062
CT	CT_5	F2CT_5	91.99439	0.69682
CT	CT_6	F2CT_6	91.26269	0.70179
CT	CT_7	F2CT_7	90.52223	0.70639
CT	CT_8	F2CT_8	87.24763	0.72487
CT	CT_9	F2CT_9	86.35152	0.7286
CT	CT_10	F2CT_10	85.60628	0.73124
CT	CT_11	F2CT_11	84.67056	0.73389
CT	CT_12	F2CT_12	83.93481	0.73586
CT	CT_13	F2CT_13	83.42036	0.73751
CT	CT_14	F2CT_14	82.72749	0.73931
CT	CT_15	F2CT_15	82.22243	0.74035
CT	CT_16	F2CT_16	95.4217	0.71932
CT	CT_17	F2CT_17	94.23845	0.71384
CT	CT_18	F2CT_18	93.29641	0.70667
CT	CT_19	F2CT_19	92.34741	0.70805
CT	CT_20	F2CT_20	91.52966	0.71285
CT	CT_21	F2CT_21	90.89395	0.71778
CT	CT_22	F2CT_22	90.22081	0.72144
CT	CT_23	F2CT_23	88.19093	0.72021
CT	CT_24	F2CT_24	88.73338	0.7277
CT	CT_25	F2CT_25	88.08647	0.72989
CT	CT_26	F2CT_26	87.2127	0.73296
CT	CT_27	F2CT_27	86.5415	0.73459
CT	CT_28	F2CT_28	85.85384	0.73586
CT	CT_29	F2CT_29	84.99615	0.73736
CT	CT_30	F2CT_30	84.38545	0.73818
CT	CT_31	F2CT_31	83.77731	0.73898
CT	CT_32	F2CT_32	83.00967	0.74058
CT	CT_33	F2CT_33	82.3844	0.74183
CT	CT_34	F2CT_34	95.68279	0.71587
CT	CT_35	F2CT_35	94.59639	0.72055
CT	CT_36	F2CT_36	93.75564	0.72393
CT	CT_37	F2CT_37	92.95789	0.72693
CT	CT_38	F2CT_38	91.99422	0.73013
CT	CT_39	F2CT_39	91.2311	0.73205
CT	CT_40	F2CT_40	90.44515	0.73382
CT	CT_41	F2CT_41	88.92107	0.71624
CT	CT_42	F2CT_42	88.70311	0.73706
CT	CT_43	F2CT_43	87.92671	0.73814
CT	CT_44	F2CT_44	87.02718	0.73962
CT	CT_45	F2CT_45	86.41212	0.73992
CT	CT_46	F2CT_46	85.7714	0.74016
CT	CT_47	F2CT_47	85.00817	0.7411
CT	CT_48	F2CT_48	84.37904	0.74175
CT	CT_49	F2CT_49	83.74996	0.74232
CT	CT_50	F2CT_50	82.96372	0.7426
CT	CT_51	F2CT_51	82.33815	0.74355
CT	CT_52	F2CT_52	81.68739	0.7416
CT	CT_53	F2CT_53	81.07912	0.74377
CT	CT_54	F2CT_54	80.54544	0.74525

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
CT	CT_55	F2CT_55	79.99206	0.74667
CT	CT_56	F2CT_56	77.55744	0.75377
CT	CT_57	F2CT_57	77.05706	0.75396
CT	CT_58	F2CT_58	76.54674	0.7554
CT	CT_59	F2CT_59	75.89031	0.75622
CT	CT_60	F2CT_60	75.36805	0.75776
CT	CT_61	F2CT_61	74.85775	0.75955
CT	CT_62	F2CT_62	74.21558	0.76235
CT	CT_63	F2CT_63	73.72208	0.76439
CT	CT_64	F2CT_64	73.31394	0.76425
CT	CT_65	F2CT_65	72.80225	0.76161
CT	CT_66	F2CT_66	72.38286	0.76012
CT	CT_67	F2CT_67	71.9665	0.75911
CT	CT_68	F2CT_68	81.7665	0.74281
CT	CT_69	F2CT_69	80.97452	0.74417
CT	CT_70	F2CT_70	80.34703	0.74554
CT	CT_71	F2CT_71	79.82761	0.74664
CT	CT_72	F2CT_72	79.19178	0.74804
CT	CT_73	F2CT_73	78.67894	0.74861
CT	CT_74	F2CT_74	79.34382	0.74803
CT	CT_75	F2CT_75	77.5386	0.74955
CT	CT_76	F2CT_76	77.05735	0.74943
CT	CT_77	F2CT_77	76.52378	0.74855
CT	CT_78	F2CT_78	75.84366	0.74968
CT	CT_79	F2CT_79	75.32914	0.75151
CT	CT_80	F2CT_80	74.80992	0.75411
CT	CT_81	F2CT_81	74.15494	0.75758
CT	CT_82	F2CT_82	73.63992	0.75925
CT	CT_83	F2CT_83	73.12315	0.76134
CT	CT_84	F2CT_84	72.55968	0.76418
CT	CT_85	F2CT_85	72.19367	0.76648
CT	CT_86	F2CT_86	71.81084	0.76682
CT	CT_87	F2CT_87	81.71266	0.74443
CT	CT_88	F2CT_88	80.90471	0.74529
CT	CT_89	F2CT_89	80.2648	0.74557
CT	CT_90	F2CT_90	79.63075	0.74585
CT	CT_91	F2CT_91	78.83848	0.74566
CT	CT_92	F2CT_92	78.37685	0.74536
CT	CT_93	F2CT_93	78.81975	0.74947
CT	CT_94	F2CT_94	77.37868	0.7466
CT	CT_95	F2CT_95	76.97244	0.74738
CT	CT_96	F2CT_96	76.4561	0.74886
CT	CT_97	F2CT_97	75.8602	0.75065
CT	CT_98	F2CT_98	75.39556	0.75168
CT	CT_99	F2CT_99	74.91537	0.75281
CT	CT_100	F2CT_100	74.31099	0.75441
CT	CT_101	F2CT_101	73.83229	0.75558
CT	CT_102	F2CT_102	73.36909	0.75664
CT	CT_103	F2CT_103	72.83095	0.75851
CT	CT_104	F2CT_104	72.39255	0.76041
CT	CT_105	F2CT_105	71.95487	0.76197

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
AE	AE_49	F2AE_49	50.38291	0.9574
AE	AE_50	F2AE_50	50.60193	0.95892
AE	AE_57	F2AE_57	51.84146	0.97434
AE	AE_58	F2AE_58	52.22033	0.977
GEN	GEN_54	F2GEN_54	185.90801	2.43816
GEN	GEN_55	F2GEN_55	216.54073	2.32132
GEN	GEN_56	F2GEN_56	50.98289	1.21835
GEN	GEN_57	F2GEN_57	50.48863	1.19185
GEN	GEN_58	F2GEN_58	37.50403	1.17137
SE	SE_48	F2SE_48	78.39958	2.02887
SE	SE_49	F2SE_49	78.77676	2.05973
AE	AE_55	F2AE_55	62.04182	1.71881
AE	AE_56	F2AE_56	62.1541	1.73999
CT	CT_106	F2CT_106	202.92514	3.74211
CT	CT_107	F2CT_107	204.24464	3.64099
CT	CT_108	F2CT_108	202.92393	3.5479
CT	CT_109	F2CT_109	195.51943	3.18087
CT	CT_110	F2CT_110	193.66896	3.11419
CT	CT_111	F2CT_111	191.69215	3.15709
AE	AE_41	F2AE_41	59.05976	1.44387
AE	AE_42	F2AE_42	59.40177	1.45056
AE	AE_43	F2AE_43	59.84325	1.45995
AE	AE_44	F2AE_44	60.02624	1.46792
AE	AE_45	F2AE_45	50.2853	1.10786
AE	AE_46	F2AE_46	50.52407	1.11355
AE	AE_47	F2AE_47	50.62107	1.12092
AE	AE_48	F2AE_48	50.5611	1.12753
AME	AME_17	F2AME_17	71.67934	1.84515
AME	AME_18	F2AME_18	72.08008	1.8743
AME	AME_19	F2AME_19	72.18061	1.90183
AME	AME_20	F2AME_20	72.51522	1.92448
AME	AME_21	F2AME_21	55.47087	1.07055
AME	AME_22	F2AME_22	55.82614	1.07662
AME	AME_23	F2AME_23	56.01151	1.08291
AME	AME_24	F2AME_24	56.01569	1.08869
SE	SE_37	F2SE_37	63.16683	1.50887
SEA	SEA_37	F2SEA_37	75.19226	1.61051
SE	SE_38	F2SE_38	63.315	1.51134
SEA	SEA_38	F2SEA_38	75.72266	1.63308
SE	SE_39	F2SE_39	63.8803	1.53915
SEA	SEA_39	F2SEA_39	75.72124	1.65377
SE	SE_40	F2SE_40	64.07976	1.54337
SEA	SEA_40	F2SEA_40	76.76235	1.67196
SE	SE_41	F2SE_41	58.06762	1.29339
SEA	SEA_41	F2SEA_41	66.87302	1.31408
SE	SE_42	F2SE_42	58.13901	1.29713
SEA	SEA_42	F2SEA_42	67.6883	1.32666
SE	SE_43	F2SE_43	58.68519	1.3215
SEA	SEA_43	F2SEA_43	68.00625	1.34416
SE	SE_44	F2SE_44	58.8131	1.3254
SEA	SEA_44	F2SEA_44	68.23636	1.35748

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
GEN	GEN_49	F2GEN_49	71.14546	1.76863
GEN	GEN_50	F2GEN_50	72.72632	1.81512
GEN	GEN_51	F2GEN_51	63.51101	1.50295
GEN	GEN_52	F2GEN_52	64.98864	1.53765
AE	AE_1	F2AE_1	30.78267	0.65488
AE	AE_2	F2AE_2	31.12711	0.66203
AE	AE_3	F2AE_3	31.30047	0.66554
AE	AE_4	F2AE_4	31.5097	0.669
AE	AE_5	F2AE_5	31.77201	0.67221
AE	AE_6	F2AE_6	33.26493	0.66658
AE	AE_7	F2AE_7	33.37984	0.66308
AE	AE_8	F2AE_8	33.31273	0.66298
AE	AE_9	F2AE_9	33.20869	0.66756
AE	AE_10	F2AE_10	32.90272	0.6721
AE	AE_11	F2AE_11	31.6167	0.73183
AE	AE_12	F2AE_12	31.85531	0.74464
AE	AE_13	F2AE_13	32.2443	0.75261
AE	AE_14	F2AE_14	32.43507	0.76237
AE	AE_15	F2AE_15	32.81384	0.77201
AE	AE_16	F2AE_16	34.98305	0.83906
AE	AE_17	F2AE_17	35.63439	0.85283
AE	AE_18	F2AE_18	35.72519	0.85637
AE	AE_19	F2AE_19	36.14837	0.86412
AE	AE_20	F2AE_20	36.56214	0.87484
AE	AE_21	F2AE_21	26.19547	0.60195
AE	AE_22	F2AE_22	26.56895	0.61069
AE	AE_23	F2AE_23	26.74838	0.61059
AE	AE_24	F2AE_24	26.90693	0.60957
AE	AE_25	F2AE_25	27.1807	0.60496
AE	AE_26	F2AE_26	28.40227	0.61296
AE	AE_27	F2AE_27	28.47411	0.61458
AE	AE_28	F2AE_28	28.65002	0.61857
AE	AE_29	F2AE_29	28.89731	0.62245
AE	AE_30	F2AE_30	29.172	0.62831
AE	AE_31	F2AE_31	26.69036	0.6701
AE	AE_32	F2AE_32	26.78217	0.6807
AE	AE_33	F2AE_33	26.83126	0.67716
AE	AE_34	F2AE_34	26.84926	0.67677
AE	AE_35	F2AE_35	27.29008	0.64744
AE	AE_36	F2AE_36	28.76336	0.63336
AE	AE_37	F2AE_37	28.82815	0.63876
AE	AE_38	F2AE_38	29.21708	0.65209
AE	AE_39	F2AE_39	29.47161	0.66239
AE	AE_40	F2AE_40	29.75654	0.67557
AME	AME_1	F2AME_1	43.55623	0.69211
AME	AME_2	F2AME_2	43.74663	0.69551
AME	AME_3	F2AME_3	44.07449	0.7041
AME	AME_4	F2AME_4	44.22016	0.70977
AME	AME_5	F2AME_5	34.31614	0.838
AME	AME_6	F2AME_6	34.33139	0.84453
AME	AME_7	F2AME_7	34.77508	0.8642

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
AME	AME_8	F2AME_8	35.24922	0.87733
AME	AME_9	F2AME_9	38.47269	0.64021
AME	AME_10	F2AME_10	38.84613	0.64214
AME	AME_11	F2AME_11	40.3994	0.63914
AME	AME_12	F2AME_12	40.72049	0.63569
AME	AME_13	F2AME_13	32.95928	0.71438
AME	AME_14	F2AME_14	33.21165	0.71568
AME	AME_15	F2AME_15	34.43146	0.70906
AME	AME_16	F2AME_16	29.74281	0.67513
CVD	CVD_1	F2CVD_1	33.09341	0.64468
CVD	CVD_2	F2CVD_2	33.09238	0.64445
CVD	CVD_3	F2CVD_3	32.7529	0.64877
CVD	CVD_4	F2CVD_4	32.73868	0.64939
CVD	CVD_5	F2CVD_5	34.92335	0.78892
CVD	CVD_6	F2CVD_6	35.00843	0.78949
CVD	CVD_7	F2CVD_7	36.23517	0.80766
CVD	CVD_8	F2CVD_8	36.28025	0.80821
CVD	CVD_9	F2CVD_9	28.27258	0.59405
CVD	CVD_10	F2CVD_10	28.28227	0.59439
CVD	CVD_11	F2CVD_11	28.74477	0.60198
CVD	CVD_12	F2CVD_12	28.77183	0.60248
CVD	CVD_13	F2CVD_13	28.83242	0.61962
CVD	CVD_14	F2CVD_14	28.87443	0.62034
CVD	CVD_15	F2CVD_15	29.39829	0.6407
CVD	CVD_16	F2CVD_16	29.41055	0.64108
SE	SE_1	F2SE_1	44.57153	0.69011
SEA	SEA_1	F2SEA_1	44.26894	0.77954
SE	SE_2	F2SE_2	44.66465	0.69033
SEA	SEA_2	F2SEA_2	44.45013	0.78165
SE	SE_3	F2SE_3	44.84693	0.6904
SEA	SEA_3	F2SEA_3	44.49165	0.78302
SE	SE_4	F2SE_4	44.80895	0.69117
SEA	SEA_4	F2SEA_4	44.62913	0.78553
SE	SE_5	F2SE_5	45.01614	0.69111
SEA	SEA_5	F2SEA_5	44.7345	0.78796
SE	SE_6	F2SE_6	45.09682	0.6911
SEA	SEA_6	F2SEA_6	44.82966	0.78961
SE	SE_7	F2SE_7	45.12632	0.69221
SEA	SEA_7	F2SEA_7	44.96541	0.79106
SE	SE_8	F2SE_8	44.75634	0.69346
SEA	SEA_8	F2SEA_8	44.96658	0.79381
SE	SE_9	F2SE_9	43.31868	0.69434
SEA	SEA_9	F2SEA_9	45.03048	0.7964
SE	SE_10	F2SE_10	33.90196	0.88381
SEA	SEA_10	F2SEA_10	45.0114	1.06069
SE	SE_11	F2SE_11	33.96978	0.88956
SEA	SEA_11	F2SEA_11	45.37926	1.06906
SE	SE_12	F2SE_12	34.06922	0.89597
SEA	SEA_12	F2SEA_12	45.70345	1.07992
SE	SE_13	F2SE_13	34.39316	0.90096
SEA	SEA_13	F2SEA_13	45.67401	1.08905

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
SE	SE_14	F2SE_14	34.57746	0.90736
SEA	SEA_14	F2SEA_14	46.15082	1.10017
SE	SE_15	F2SE_15	34.56752	0.91244
SEA	SEA_15	F2SEA_15	46.4144	1.1104
SE	SE_16	F2SE_16	34.82469	0.91962
SEA	SEA_16	F2SEA_16	46.30311	1.11891
SE	SE_17	F2SE_17	35.11858	0.9266
SEA	SEA_17	F2SEA_17	46.82737	1.12956
SE	SE_18	F2SE_18	35.26306	0.93238
SEA	SEA_18	F2SEA_18	47.00355	1.13913
SE	SE_19	F2SE_19	39.96202	0.62829
SEA	SEA_19	F2SEA_19	53.74539	0.67039
SE	SE_20	F2SE_20	39.99635	0.6277
SEA	SEA_20	F2SEA_20	53.80061	0.669
SE	SE_21	F2SE_21	40.31135	0.62807
SEA	SEA_21	F2SEA_21	54.04343	0.66873
SE	SE_22	F2SE_22	40.41153	0.62861
SEA	SEA_22	F2SEA_22	54.09184	0.66911
SE	SE_23	F2SE_23	40.50583	0.62891
SEA	SEA_23	F2SEA_23	54.29599	0.67053
SE	SE_24	F2SE_24	40.71232	0.62955
SEA	SEA_24	F2SEA_24	54.44571	0.67102
SE	SE_25	F2SE_25	40.88097	0.63037
SEA	SEA_25	F2SEA_25	54.5941	0.67132
SE	SE_26	F2SE_26	40.80491	0.63102
SEA	SEA_26	F2SEA_26	54.70379	0.67286
SE	SE_27	F2SE_27	40.98737	0.6322
SEA	SEA_27	F2SEA_27	54.76571	0.67403
SE	SE_28	F2SE_28	28.06037	0.65729
SEA	SEA_28	F2SEA_28	35.40695	0.73549
SE	SE_29	F2SE_29	28.06907	0.66194
SEA	SEA_29	F2SEA_29	35.7399	0.7396
SE	SE_30	F2SE_30	28.25564	0.66601
SEA	SEA_30	F2SEA_30	35.99964	0.74741
SE	SE_31	F2SE_31	28.26991	0.66995
SEA	SEA_31	F2SEA_31	36.04606	0.7529
SE	SE_32	F2SE_32	28.48309	0.67483
SEA	SEA_32	F2SEA_32	36.45779	0.75959
SE	SE_33	F2SE_33	28.63819	0.68006
SEA	SEA_33	F2SEA_33	36.67091	0.76717
SE	SE_34	F2SE_34	28.72327	0.68356
SEA	SEA_34	F2SEA_34	36.78546	0.77253
SE	SE_35	F2SE_35	28.91502	0.68974
SEA	SEA_35	F2SEA_35	37.15797	0.77992
SE	SE_36	F2SE_36	29.03304	0.69467
SEA	SEA_36	F2SEA_36	37.31757	0.78688
AE	AE_51	F2AE_51	62.73843	0.68279
AE	AE_52	F2AE_52	62.6855	0.68419
AE	AE_53	F2AE_53	62.31804	0.68787
AE	AE_54	F2AE_54	62.03098	0.68996
AME	AME_25	F2AME_25	71.79938	0.69471

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
AME	AME_26	F2AME_26	72.42056	0.69722
AME	AME_27	F2AME_27	73.06403	0.69967
SE	SE_45	F2SE_45	67.59539	0.68318
SE	SE_46	F2SE_46	68.13214	0.6849
SE	SE_47	F2SE_47	68.40274	0.68685
GE	GE_1	F2GE_1	31.01512	0.6746
GE	GE_2	F2GE_2	31.2472	0.68185
GE	GE_3	F2GE_3	31.5928	0.68859
GE	GE_4	F2GE_4	31.8768	0.69413
GE	GE_5	F2GE_5	32.10678	0.69901
GE	GE_6	F2GE_6	32.36346	0.70069
GE	GE_7	F2GE_7	33.71778	0.70424
GE	GE_8	F2GE_8	33.87651	0.70291
GE	GE_9	F2GE_9	33.76485	0.71223
GE	GE_10	F2GE_10	33.48071	0.72045
GE	GE_11	F2GE_11	31.54128	0.76967
GE	GE_12	F2GE_12	31.82072	0.78037
GE	GE_13	F2GE_13	32.13266	0.79381
GE	GE_14	F2GE_14	32.41196	0.80487
GE	GE_15	F2GE_15	32.67574	0.81537
GE	GE_16	F2GE_16	32.96603	0.82797
GE	GE_17	F2GE_17	34.82847	0.89567
GE	GE_18	F2GE_18	35.13984	0.90771
GE	GE_19	F2GE_19	35.82832	0.92825
GE	GE_20	F2GE_20	36.21479	0.93929
GE	GE_21	F2GE_21	37.61044	0.62611
GE	GE_22	F2GE_22	38.26882	0.62572
GE	GE_23	F2GE_23	39.07519	0.6199
GE	GE_24	F2GE_24	39.32739	0.61646
GE	GE_25	F2GE_25	40.47647	0.6284
GE	GE_26	F2GE_26	40.63309	0.63192
GE	GE_27	F2GE_27	40.81814	0.63541
GE	GE_28	F2GE_28	39.95178	0.63946
GE	GE_29	F2GE_29	38.65516	0.6418
GE	GE_30	F2GE_30	38.05774	0.64523
GE	GE_31	F2GE_31	26.73629	0.7
GE	GE_32	F2GE_32	26.84323	0.70184
GE	GE_33	F2GE_33	27.25729	0.67214
GE	GE_34	F2GE_34	27.07482	0.67853
GE	GE_35	F2GE_35	29.0037	0.668
GE	GE_36	F2GE_36	29.2142	0.6763
GE	GE_37	F2GE_37	29.42858	0.68717
GE	GE_38	F2GE_38	29.62683	0.69715
GE	GE_39	F2GE_39	29.7001	0.70257
GE	GE_40	F2GE_40	29.97285	0.70972
GE1	GE_41	F2GE_41	63.10836	1.56264
GE1	GE_42	F2GE_42	63.14926	1.56575
GE1	GE_43	F2GE_43	63.7555	1.65857
GE1	GE_44	F2GE_44	63.77828	1.66718
GE1	GE_45	F2GE_45	64.46744	1.76267
GE2	GE_46	F2GE_46	59.82971	1.68395

Lookup	Lookup	Source	1-hr Dispersion Value ($\mu\text{g}/\text{m}^3$)	Annual Dispersion Value ($\mu\text{g}/\text{m}^3$)
GE2	GE_47	F2GE_47	59.86081	1.68875
GE2	GE_48	F2GE_48	60.50423	1.7505
GE2	GE_49	F2GE_49	60.55338	1.75498
GE1	GE_50	F2GE_50	53.31645	1.1531
GE1	GE_51	F2GE_51	53.40854	1.15508
GE1	GE_52	F2GE_52	53.83956	1.17501
GE1	GE_53	F2GE_53	53.92392	1.17702
GE1	GE_54	F2GE_54	54.78749	1.21133
GE2	GE_55	F2GE_55	50.21225	1.16983
GE2	GE_56	F2GE_56	50.29235	1.17326
GE2	GE_57	F2GE_57	50.77498	1.19504
GE2	GE_58	F2GE_58	50.83959	1.1976
GBE1	GBE_1	F2GBE_1	77.88595	1.63935
GBE1	GBE_2	F2GBE_2	78.0202	1.64168
GBE1	GBE_3	F2GBE_3	79.04145	1.65788
GBE2	GBE_4	F2GBE_4	64.50462	1.90684
GBE2	GBE_5	F2GBE_5	64.58326	1.91209
GBE2	GBE_6	F2GBE_6	64.53852	1.93115
GBE1	GBE_7	F2GBE_7	66.803	1.23135
GBE1	GBE_8	F2GBE_8	67.41099	1.23739
GBE1	GBE_9	F2GBE_9	67.41077	1.23818
GBE2	GBE_10	F2GBE_10	54.75268	1.29051
GBE2	GBE_11	F2GBE_11	55.19086	1.30044
GBE2	GBE_12	F2GBE_12	55.25629	1.30203
FRE	FRE_1	F2FRE_1	61.45622	1.43656
FRE	FRE_2	F2FRE_2	61.65007	1.44224
FRE	FRE_3	F2FRE_3	61.65491	1.45649
FRE	FRE_4	F2FRE_4	59.39444	1.35856
FRE	FRE_5	F2FRE_5	59.7226	1.37145
FRE	FRE_6	F2FRE_6	59.97139	1.37679
GE	GE_59	F2GE_59	120.63627	4.19189
GE	GE_60	F2GE_60	109.5859	3.97887
GEN	GEN_53	F2GEN_53	153.53629	5.5926

Location	Description		Lookup	Emission Calcs Lookup	NY1 Quantity	NY2 Quantity	Stack Orientation
NY	AE	Acid Exhaust Fan Stack	AENY	Fab Acid	40	40	Vertical
NY	AME	Ammonia Exhaust Fan Stack	AMENY	Fab Ammonia	16	16	Vertical
NY	CVD	CVD Exhaust Fan Stack	CVDNY	Fab CVD	16	16	Vertical
NY	SEA	RCTO Oxidizer Exhaust Stack	SEANY	RCTO Burner Exhaust	36	36	Vertical
NY	SE	Solvent Exhaust Fan Stack	SENY	Fab Solvent	36	36	Vertical
NY	GE	General Exhaust Fan Stack	GENY	Fab General	40	40	Vertical
HPM	AE	Acid Exhaust Fan Stack	AEHPM	HPM Acid	8	8	Vertical
HPM	SEA	RCTO Oxidizer Exhaust Stack	SEAHPM	RCTO Burner Exhaust	8	8	Vertical
HPM	SE	Solvent Exhaust Fan Stack	SEHPM	Solvent Exhaust	8	8	Vertical
WWT	AE	Acid Exhaust Fan Stack	AEWWT	WWT Acid Exhaust	4	4	Vertical
WWT	AME	Ammonia Exhaust Fan Stack	AMEWWT	WWT Ammonia	3	3	Vertical
WWT	SE	Solvent Exhaust Fan Stack	SEWWT	Solvent Exhaust	3	3	Vertical
BIO	GE	General and Odor Scrubber Exhaust	GEBIO	BIO General	2	2	Vertical

Hourly Emission Rates Per Stack Type (lb/hr)

TMB (1,2,4-TMB and 1,3,5-TMB)		1-Methyl-2-pyrrolidone		4-Methylpentan-2-ol	Aluminum oxide	Boron trioxide
95-63-6		872-50-4		108-11-2	1344-28-1	1303-86-2
				-	-	-
				-	-	-
				-	-	-
-		-		8.784E-05	-	-
-		-		1.669E-03	-	-
				-	-	-
				-	-	-
				-	-	-
				-	-	-
				-	-	-
				-	-	-
-		-		-	-	-
-		-		-	-	-

Citric acid	Cyclohexanone	Dibutyl ether	Diethylamine	Ethanol	Ethyl lactate	
77-92-9	108-94-1	142-96-1	109-89-7	64-17-5	97-64-3	
3.300E-04	-	-	-	-		
-	-	-	-	-		
-	-	-	1.351E-03	-	-	
-	1.745E-04	1.623E-05	-	-	2.128E-05	
-	3.315E-03	3.083E-04	-	-	4.043E-04	
-	-	-	-	-		
-	-	-	-	-		
-	-	5.770E-03	-	-		
-	-	0.1096	-	-		
-	-	-	-	-		
-	-	-	-	-		
-	-	-	-	-		
-	-	-	-	-		

Hexamethyldisilazane	Hydrogen bromide	Hydrogen peroxide	Isopropanol	Methacrylic Acid	Methanol	Naphthalene
999-97-3	10035-10-6	7722-84-1	67-63-0	79-41-4	67-56-1	91-20-3
-	1.047E-03	-	-	-	-	7.805E-06
-	-	-	-	-	-	-
-	-	-	-	-	2.426E-03	6.673E-06
-	-	-	0.0155	-	-	1.153E-05
-	-	-	0.3001	-	-	1.737E-04
-	-	-	0.0478	-	3.420E-04	-
-	-	-	-	-	-	-
-	-	-	-	-	-	1.302E-03
-	-	-	0.1947	-	-	0.0247
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	1.2782	-	1.051E-06	-
-	-	-	1.3499	-	1.102E-06	-

n-Butyl acetate	Nitric acid	Phosphoric acid	Phosphorus pentoxide	Solvent naphtha (petroleum), heavy arom.	Sulfur dioxide	
123-86-4	7697-37-2	7664-38-2	1314-56-3	64742-94-5	7446-09-5	
-	0.0533	9.090E-04	3.930E-03	-	0.0788	
-	-	-	-	-	-	
-	-	-	2.656E-04	-	9.412E-04	
1.191E-03	-	-	-	-	2.355E-03	
0.0226	-	-	-	-	4.549E-05	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	5.882E-04	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	

	Tetramethylammonium hydroxide	Titanium dioxide	Tungsten trioxide	Zirconium oxide		1-Methoxy-2-propanol
	75-59-2	13463-67-7	1314-35-8	1314-23-4		107-98-2
	-	-	-			-
	5.556E-03	-	-			0.0270
	-	-	-	4.660E-03		-
	-	-	-			9.801E-03
	-	-	-			0.1862
	-	-	-			-
	-	-	-			-
	-	-	-			-
	-	-	-			-
	-	-	-			-
	-	-	-			-
	2.351E-05	-	-			-
	2.043E-03	-	-			-

Acetic acid		Difluoromethane	Ethanediol		Hexafluoroethane
64-19-7		75-10-5	107-21-1		76-16-4
1.663E-03		-			-
-		-	2.064E-03		-
		-			-
-		-	1.974E-06		-
-		-	3.750E-05		-
		-			-
		-			-
		-			-
		-			-
		-			-
		-			-
3.983E-09		-	6.825E-09		-
3.313E-08		-	7.092E-08		-

	Sulfuric acid		Triethylamine
	7664-93-9		121-44-8
	0.0235		3.891E-05
	-		1.624E-03
			-
	-		-
	-		-
			-
			-
			-
	7.909E-08		-
			-
	5.518E-07		-

Location	Description		Lookup	Emission Calcs Lookup	NY1 Quantity	NY2 Quantity	Stack Orientation
NY	AE	Acid Exhaust Fan Stack	AENY	Fab Acid	40	40	Vertical
NY	AME	Ammonia Exhaust Fan Stack	AMENY	Fab Ammonia	16	16	Vertical
NY	CVD	CVD Exhaust Fan Stack	CVDNY	Fab CVD	16	16	Vertical
NY	SEA	RCTO Oxidizer Exhaust Stack	SEANY	RCTO Burner Exhaust	36	36	Vertical
NY	SE	Solvent Exhaust Fan Stack	SENY	Fab Solvent	36	36	Vertical
NY	GE	General Exhaust Fan Stack	GENY	Fab General	40	40	Vertical
HPM	AE	Acid Exhaust Fan Stack	AEHPM	HPM Acid	8	8	Vertical
HPM	SEA	RCTO Oxidizer Exhaust Stack	SEAHPM	RCTO Burner Exhaust	8	8	Vertical
HPM	SE	Solvent Exhaust Fan Stack	SEHPM	Solvent Exhaust	8	8	Vertical
WWT	AE	Acid Exhaust Fan Stack	AEWWT	WWT Acid Exhaust	4	4	Vertical
WWT	AME	Ammonia Exhaust Fan Stack	AMEWWT	WWT Ammonia	3	3	Vertical
WWT	SE	Solvent Exhaust Fan Stack	SEWWT	Solvent Exhaust	3	3	Vertical
BIO	GE	General and Odor Scrubber Exhaust	GEBIO	BIO General	2	2	Vertical

Hourly Emission Rates Per Stack Type (g/s)						
TMB (1,2,4-TMB and 1,3,5-TMB)		1-Methyl-2-pyrrolidone		4-Methylpentan-2-ol	Aluminum oxide	Boron trioxide
95-63-6		872-50-4		108-11-2	1344-28-1	1303-86-2
				-	-	-
				-	-	-
				-	-	-
-		-		1.11E-05	-	-
-		-		2.10E-04	-	-
				-	-	-
				-	-	-
				-	-	-
				-	-	-
				-	-	-
				-	-	-
-		-		-	-	-
-		-		-	-	-

Citric acid	Cyclohexanone	Dibutyl ether	Diethylamine	Ethanol	Ethyl lactate	
77-92-9	108-94-1	142-96-1	109-89-7	64-17-5	97-64-3	
4.16E-05	-	-	-	-		
-	-	-	-	-		
-	-	-	1.70E-04	-	-	
-	2.20E-05	2.04E-06	-	-	2.68E-06	
-	4.18E-04	3.89E-05	-	-	5.09E-05	
-	-	-	-	-		
-	-	-	-	-		
-	-	7.27E-04	-	-		
-	-	0.0	-	-		
-	-	-	-	-		
-	-	-	-	-		
-	-	-	-	-		
-	-	-	-	-		

Hexamethyldisilazane	Hydrogen bromide	Hydrogen peroxide	Isopropanol	Methacrylic Acid	Methanol	Naphthalene
999-97-3	10035-10-6	7722-84-1	67-63-0	79-41-4	67-56-1	91-20-3
-	1.32E-04	-	-	-	-	9.83E-07
-	-	-	-	-	-	-
-	-	-	-	-	3.06E-04	8.41E-07
-	-	-	1.96E-03	-	-	1.45E-06
-	-	-	0.0	-	-	2.19E-05
-	-	-	6.02E-03	-	4.31E-05	-
-	-	-	-	-	-	-
-	-	-	-	-	-	1.64E-04
-	-	-	0.0	-	-	3.11E-03
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	0.2	-	1.32E-07	-
-	-	-	0.2	-	1.39E-07	-

n-Butyl acetate	Nitric acid	Phosphoric acid	Phosphorus pentoxide	Solvent naphtha (petroleum), heavy arom.	Sulfur dioxide
123-86-4	7697-37-2	7664-38-2	1314-56-3	64742-94-5	7446-09-5
-	6.72E-03	1.15E-04	4.95E-04	-	9.93E-03
-	-	-	-	-	-
-	-	-	3.35E-05	-	1.19E-04
1.50E-04	-	-	-	-	2.97E-04
2.85E-03	-	-	-	-	5.73E-06
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	7.41E-05
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

	Tetramethylammonium hydroxide	Titanium dioxide	Tungsten trioxide	Zirconium oxide		1-Methoxy-2-propanol
	75-59-2	13463-67-7	1314-35-8	1314-23-4		107-98-2
	-	-	-			-
	7.00E-04	-	-			3.40E-03
	-	-	-	5.87E-04		-
	-	-	-			1.23E-03
	-	-	-			0.0
	-	-	-			-
	-	-	-			-
	-	-	-			-
	-	-	-			-
	-	-	-			-
	-	-	-			-
	2.96E-06	-	-			-
	2.57E-04	-	-			-

Acetic acid		Difluoromethane	Ethanediol		Hexafluoroethane
64-19-7		75-10-5	107-21-1		76-16-4
2.09E-04		-			-
-		-	2.60E-04		-
		-			-
-		-	2.49E-07		-
-		-	4.73E-06		-
		-			-
		-			-
		-			-
		-			-
		-			-
5.02E-10		-	8.60E-10		-
4.17E-09		-	8.94E-09		-

	Sulfuric acid		Triethylamine
	7664-93-9		121-44-8
	2.96E-03		4.90E-06
	-		2.05E-04
			-
	-		-
	-		-
			-
			-
			-
			-
	9.96E-09		-
			-
	6.95E-08		-

Location	Description		Lookup	Emission Calcs Lookup	NY1 Quantity	NY2 Quantity	Stack Orientation
NY	AE	Acid Exhaust Fan Stack	AENY	Fab Acid	40	40	Vertical
NY	AME	Ammonia Exhaust Fan Stack	AMENY	Fab Ammonia	16	16	Vertical
NY	CVD	CVD Exhaust Fan Stack	CVDNY	Fab CVD	16	16	Vertical
NY	SEA	RCTO Oxidizer Exhaust Stack	SEANY	RCTO Burner Exhaust	36	36	Vertical
NY	SE	Solvent Exhaust Fan Stack	SENY	Fab Solvent	36	36	Vertical
NY	GE	General Exhaust Fan Stack	GENY	Fab General	40	40	Vertical
HPM	AE	Acid Exhaust Fan Stack	AEHPM	HPM Acid	8	8	Vertical
HPM	SEA	RCTO Oxidizer Exhaust Stack	SEAHPM	RCTO Burner Exhaust	8	8	Vertical
HPM	SE	Solvent Exhaust Fan Stack	SEHPM	Solvent Exhaust	8	8	Vertical
WWT	AE	Acid Exhaust Fan Stack	AEWWT	WWT Acid Exhaust	4	4	Vertical
WWT	AME	Ammonia Exhaust Fan Stack	AMEWWT	WWT Ammonia	3	3	Vertical
WWT	SE	Solvent Exhaust Fan Stack	SEWWT	Solvent Exhaust	3	3	Vertical
BIO	GE	General and Odor Scrubber Exhaust	GEBIO	BIO General	2	2	Vertical

Annual Emission Rates Per Stack Type (lb/hr)						
TMB (1,2,4-TMB and 1,3,5-TMB)		1-Methyl-2-pyrrolidone		4-Methylpentan-2-ol	Aluminum oxide	Boron trioxide
95-63-6		872-50-4		108-11-2	1344-28-1	1303-86-2
-		-		-	4.283E-04	1.657E-03
				-	-	-
				-	7.156E-04	4.235E-04
1.462E-05		2.961E-04		7.027E-05	-	-
2.779E-04		5.625E-03		1.335E-03	-	-
				-	-	-
				-	-	-
2.600E-04				-	-	-
4.940E-03				-	-	-
				-	-	-
				-	-	-
-		0.0202		-	-	-
-		0.0566		-	-	-

Citric acid	Cyclohexanone	Dibutyl ether	Diethylamine	Ethanol	Ethyl lactate	Hafnium dioxide
77-92-9	108-94-1	142-96-1	109-89-7	64-17-5	97-64-3	12055-23-1
2.640E-04	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	1.081E-03	2.621E-03	-	1.824E-03
-	1.396E-04	1.298E-05	-	-	1.702E-05	-
-	2.652E-03	2.467E-04	-	-	3.234E-04	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	2.308E-04	-	5.421E-04	-	-
-	-	4.385E-03	-	0.0103	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Hexamethyldisilazane	Hydrogen bromide	Hydrogen peroxide	Isopropanol	Methacrylic Acid	Methanol	Naphthalene
999-97-3	10035-10-6	7722-84-1	67-63-0	79-41-4	67-56-1	91-20-3
-	8.378E-04	0.0271	-	-	-	7.805E-06
-	-	-	-	-	-	-
-	-	-	-	-	1.941E-03	6.673E-06
1.175E-04	-	-	0.0124	1.197E-05	-	9.705E-06
2.233E-03	-	-	0.2365	2.273E-04	-	1.389E-04
-	-	-	0.0382	-	2.736E-04	-
-	-	-	-	-	-	-
-	-	-	-	-	-	5.439E-05
-	-	-	3.740E-03	-	-	9.880E-04
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	1.0226	-	8.411E-07	-
-	-	-	1.0799	-	8.815E-07	-

n-Butyl acetate	Nitric acid	Phosphoric acid	Phosphorus pentoxide	Solvent naphtna (petroleum), heavy arom.	Sulfur dioxide	
123-86-4	7697-37-2	7664-38-2	1314-56-3	64742-94-5	7446-09-5	
-	0.0427	7.272E-04	3.144E-03	-	0.0636	
-	-	-	-	-	-	
-	-	-	2.125E-04	-	9.412E-04	
9.526E-04	-	-	-	1.462E-04	2.355E-03	
0.0181	-	-	-	2.779E-03	3.639E-05	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	2.600E-03	5.882E-04	
-	-	-	-	0.0494	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	

	Tetramethylammonium hydroxide	Titanium dioxide	Tungsten trioxide	Zirconium oxide	1-Hydroxybenzotriazole	1-Methoxy-2-propanol
	75-59-2	13463-67-7	1314-35-8	1314-23-4	2592-95-2	107-98-2
	-	5.579E-05	-	-	-	-
	4.445E-03	-	-	-	3.034E-05	0.0216
	-	0.0109	3.987E-03	3.728E-03	-	-
	-	-	-	-	-	7.841E-03
	-	-	-	-	-	0.1490
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	1.881E-05	-	-	-	2.668E-08	-
	1.634E-03	-	-	-	7.220E-08	-

Acetic acid		Difluoromethane	Ethanediol		Hexafluoroethane
64-19-7		75-10-5	107-21-1		76-16-4
1.330E-03		1.176E-03	-		2.667E-03
-		-	1.651E-03		-
		-			-
-		-	1.579E-06		-
-		-	3.000E-05		-
		-			-
		-			-
		-			-
		-			-
		-			-
		-			-
3.187E-09		-	5.460E-09		-
2.651E-08		-	5.673E-08		-

	Sulfuric acid		Triethylamine
	7664-93-9		121-44-8
	0.0188		3.113E-05
	-		1.299E-03
			-
	-		-
	-		-
			-
			-
			-
			-
	5.104E-09		-
			-
	9.656E-11		-

Location	Description		Lookup	Emission Calcs Lookup	NY1 Quantity	NY2 Quantity	Stack Orientation
NY	AE	Acid Exhaust Fan Stack	AENY	Fab Acid	40	40	Vertical
NY	AME	Ammonia Exhaust Fan Stack	AMENY	Fab Ammonia	16	16	Vertical
NY	CVD	CVD Exhaust Fan Stack	CVDNY	Fab CVD	16	16	Vertical
NY	SEA	RCTO Oxidizer Exhaust Stack	SEANY	RCTO Burner Exhaust	36	36	Vertical
NY	SE	Solvent Exhaust Fan Stack	SENY	Fab Solvent	36	36	Vertical
NY	GE	General Exhaust Fan Stack	GENY	Fab General	40	40	Vertical
HPM	AE	Acid Exhaust Fan Stack	AEHPM	HPM Acid	8	8	Vertical
HPM	SEA	RCTO Oxidizer Exhaust Stack	SEAHPM	RCTO Burner Exhaust	8	8	Vertical
HPM	SE	Solvent Exhaust Fan Stack	SEHPM	Solvent Exhaust	8	8	Vertical
WWT	AE	Acid Exhaust Fan Stack	AEWWT	WWT Acid Exhaust	4	4	Vertical
WWT	AME	Ammonia Exhaust Fan Stack	AMEWWT	WWT Ammonia	3	3	Vertical
WWT	SE	Solvent Exhaust Fan Stack	SEWWT	Solvent Exhaust	3	3	Vertical
BIO	GE	General and Odor Scrubber Exhaust	GEBIO	BIO General	2	2	Vertical

Annual Emission Rates Per Stack Type (g/s)

TMB (1,2,4-TMB and 1,3,5-TMB)		1-Methyl-2-pyrrolidone		4-Methylpentan-2-ol	Aluminum oxide	Boron trioxide
95-63-6		872-50-4		108-11-2	1344-28-1	1303-86-2
-		-		-	5.396E-05	2.088E-04
				-	-	-
				-	9.016E-05	5.336E-05
1.843E-06		3.730E-05		8.854E-06	-	-
3.501E-05		7.088E-04		1.682E-04	-	-
				-	-	-
				-	-	-
3.276E-05				-	-	-
6.224E-04				-	-	-
				-	-	-
				-	-	-
-		2.539E-03		-	-	-
-		7.127E-03		-	-	-

Citric acid	Cyclohexanone	Dibutyl ether	Diethylamine	Ethanol	Ethyl lactate	
77-92-9	108-94-1	142-96-1	109-89-7	64-17-5	97-64-3	
3.327E-05	-	-	-	-		
-	-	-	-	-		
-	-	-	1.362E-04	3.303E-04	-	
-	1.759E-05	1.636E-06	-	-	2.145E-06	
-	3.342E-04	3.108E-05	-	-	4.075E-05	
-	-	-	-	-		
-	-	-	-	-		
-	-	2.908E-05	-	6.831E-05	-	
-	-	5.525E-04	-	1.298E-03	-	
-	-	-	-	-		
-	-	-	-	-		
-	-	-	-	-		
-	-	-	-	-		

Hexamethyldisilazane	Hydrogen bromide	Hydrogen peroxide	Isopropanol	Methacrylic Acid	Methanol	Naphthalene
999-97-3	10035-10-6	7722-84-1	67-63-0	79-41-4	67-56-1	91-20-3
-	1.056E-04	3.410E-03	-	-	-	9.834E-07
-	-	-	-	-	-	-
-	-	-	-	-	2.446E-04	8.408E-07
1.481E-05	-	-	1.567E-03	1.508E-06	-	1.223E-06
2.814E-04	-	-	0.03	2.864E-05	-	1.751E-05
-	-	-	4.813E-03	-	3.447E-05	-
-	-	-	-	-	-	-
-	-	-	-	-	-	6.853E-06
-	-	-	4.713E-04	-	-	1.245E-04
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	0.13	-	1.060E-07	-
-	-	-	0.14	-	1.111E-07	-

n-Butyl acetate	Nitric acid	Phosphoric acid	Phosphorus pentoxide	Solvent naphtha (petroleum), heavy arom.	Sulfur dioxide	
123-86-4	7697-37-2	7664-38-2	1314-56-3	64742-94-5	7446-09-5	
-	5.374E-03	9.163E-05	3.961E-04	-	8.011E-03	
-	-	-	-	-	-	
-	-	-	2.677E-05	-	1.186E-04	
1.200E-04	-	-	-	1.843E-05	2.967E-04	
2.281E-03	-	-	-	3.501E-04	4.585E-06	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	3.276E-04	7.412E-05	
-	-	-	-	6.224E-03	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	

	Tetramethylammonium hydroxide	Titanium dioxide	Tungsten trioxide	Zirconium oxide	1-Hydroxybenzotriazole	1-Methoxy-2-propanol
	75-59-2	13463-67-7	1314-35-8	1314-23-4	2592-95-2	107-98-2
	-	7.030E-06	-	-	-	-
	5.600E-04	-	-	-	3.823E-06	2.723E-03
	-	1.368E-03	5.024E-04	4.697E-04	-	-
	-	-	-	-	-	9.880E-04
	-	-	-	-	-	0.02
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	2.370E-06	-	-	-	3.362E-09	-
	2.059E-04	-	-	-	9.097E-09	-

Acetic acid		Difluoromethane	Ethanediol		Hexafluoroethane
64-19-7		75-10-5	107-21-1		76-16-4
1.676E-04		1.482E-04	-		3.361E-04
-		-	2.080E-04		-
		-			-
-		-	1.990E-07		-
-		-	3.780E-06		-
		-			-
		-			-
		-			-
		-			-
		-			-
		-			-
4.015E-10		-	6.879E-10		-
3.340E-09		-	7.148E-09		-

	Sulfuric acid		Triethylamine
	7664-93-9		21-44-8
	2.365E-03		3.922E-06
	-		1.637E-04
			-
	-		-
	-		-
			-
			-
			-
			-
	6.432E-10		-
			-
	1.217E-11		-

Pollutant ¹	CAS #	Threshold (µg/m ³)	Modeled Concentration (µg/m ³)	% of Threshold	Pass?
TMB (1,2,4-TMB and 1,3,5-TMB)	95-63-6	-	NA	NA	NA
1-Methyl-2-pyrrolidone	872-50-4	-	NA	NA	NA
4-Methylpentan-2-ol	108-11-2	17000	0.69	0%	Yes
Aluminum oxide	1344-28-1	-	NA	NA	NA
Boron trioxide	1303-86-2	-	NA	NA	NA
Citric acid	77-92-9	2100	0.13	0%	Yes
Cyclohexanone	108-94-1	20000	1.36	0%	Yes
Dibutyl ether	142-96-1	15000	16.39	0%	Yes
Diethylamine	109-89-7	4500	0.23	0%	Yes
Ethanol	64-17-5	-	NA	NA	NA
Ethyl lactate	97-64-3	370	0.17	0%	Yes
Hexamethyldisilazane	999-97-3	-	NA	NA	NA
Hydrogen bromide	10035-10-6	680	0.41	0%	Yes
Hydrogen peroxide	7722-84-1	-	NA	NA	NA
Isopropanol	67-63-0	98000	380.52	0%	Yes
Methacrylic Acid	79-41-4	-	NA	NA	NA
Methanol	67-56-1	33000	0.55	0%	Yes
Naphthalene	91-20-3	7900	3.74	0%	Yes
n-Butyl acetate	123-86-4	71300	9.31	0%	Yes
Nitric acid	7697-37-2	86	21.08	25%	Yes
Phosphoric acid	7664-38-2	300	0.36	0%	Yes
Phosphorus pentoxide	1314-56-3	300	1.60	1%	Yes
Solvent naphtha (petroleum), heavy arom.	64742-94-5	-	NA	NA	NA
Sulfur dioxide	7446-09-5	196	32.53	17%	Yes
Tetramethylammonium hydroxide	75-59-2	3600	1.12	0%	Yes
Titanium dioxide	13463-67-7	-	NA	NA	NA
Tungsten trioxide	1314-35-8	-	NA	NA	NA
Zirconium oxide	1314-23-4	380	0.78	0%	Yes
1-Methoxy-2-propanol	107-98-2	36850	81.47	0%	Yes
Acetic acid	64-19-7	3700	0.66	0%	Yes
Difluoromethane	75-10-5	-	NA	NA	NA
Ethanediol	107-21-1	1000	0.39	0%	Yes
Hexafluoroethane	76-16-4	-	NA	NA	NA
Sulfuric acid	7664-93-9	120	9.28	8%	Yes
Triethylamine	121-44-8	2800	0.31	0%	Yes

Pollutant ¹	CAS #	Threshold (µg/m ³)	Modeled Concentration (µg/m ³)	% of Threshold	Pass?
TMB (1,2,4-TMB and 1,3,5-TMB)	95-63-6	60	0.02	0%	Yes
1-Methyl-2-pyrrolidone	872-50-4	100	0.26	0%	Yes
4-Methylpentan-2-ol	108-11-2	250	0.01	0%	Yes
Aluminum oxide	1344-28-1	2.4	6.903E-03	0%	Yes
Boron trioxide	1303-86-2	24	0.02	0%	Yes
Citric acid	77-92-9	20	2.591E-03	0%	Yes
Cyclohexanone	108-94-1	190	0.03	0%	Yes
Dibutyl ether	142-96-1	2887	0.02	0%	Yes
Diethylamine	109-89-7	36	4.078E-03	0%	Yes
Ethanol	64-17-5	45000	0.04	0%	Yes
Ethyl lactate	97-64-3	71	3.202E-03	0%	Yes
Hexamethyldisilazane	999-97-3	36	0.02	0%	Yes
Hydrogen bromide	10035-10-6	0.1	8.221E-03	8%	Yes
Hydrogen peroxide	7722-84-1	3.3	0.27	8%	Yes
Isopropanol	67-63-0	7000	9.61	0%	Yes
Methacrylic Acid	79-41-4	170.0	2.251E-03	0%	Yes
Methanol	67-56-1	4000	0.01	0%	Yes
Naphthalene	91-20-3	3	4.675E-03	0%	Yes
n-Butyl acetate	123-86-4	565	0.18	0%	Yes
Nitric acid	7697-37-2	12.3	0.42	3%	Yes
Phosphoric acid	7664-38-2	10	7.136E-03	0%	Yes
Phosphorus pentoxide	1314-56-3	4.8	0.03	1%	Yes
Solvent naphtha (petroleum), heavy arom.	64742-94-5	100	0.19	0%	Yes
Sulfur dioxide	7446-09-5	80	0.66	1%	Yes
Tetramethylammonium hydroxide	75-59-2	29	0.02	0%	Yes
Titanium dioxide	13463-67-7	24	0.04	0%	Yes
Tungsten trioxide	1314-35-8	7.1	0.02	0%	Yes
Zirconium oxide	1314-23-4	12	0.01	0%	Yes
1-Methoxy-2-propanol	107-98-2	2000	1.56	0%	Yes
Acetic acid	64-19-7	60	0.01	0%	Yes
Difluoromethane	75-10-5	50600	0.01	0%	Yes
Ethenediol	107-21-1	400	7.169E-03	0%	Yes
Hexafluoroethane	76-16-4	16799	0.03	0%	Yes
Sulfuric acid	7664-93-9	1	0.18	18%	Yes
Triethylamine	121-44-8	7	5.714E-03	0%	Yes

[illegible]

[illegible]

Date		Time		Location		Weather		Temperature		Humidity		Wind		Pressure		Visibility		Clouds		Sun		Moon		Tide		Notes	
Day	Month	Year	Hour	Minute	Second	City	State	Country	Temp (F)	Temp (C)	Humid (%)	Wind (MPH)	Wind (KPH)	Press (in)	Press (hPa)	Vis (mi)	Cloud (%)	Sun (Rise)	Sun (Set)	Moon (Rise)	Moon (Set)	Tide (In)	Tide (Out)	Notes			
1	1	2025	12	00	00	New York	NY	USA	32	0	65	10	16	30.1	1013.2	10	10	7:00	16:00	12:00	12:00	Low	High	Clear			
2	1	2025	12	01	00	New York	NY	USA	31	-1	65	10	16	30.1	1013.2	10	10	7:01	16:01	12:01	12:01	Low	High	Clear			
3	1	2025	12	02	00	New York	NY	USA	30	-1	65	10	16	30.1	1013.2	10	10	7:02	16:02	12:02	12:02	Low	High	Clear			
4	1	2025	12	03	00	New York	NY	USA	29	-2	65	10	16	30.1	1013.2	10	10	7:03	16:03	12:03	12:03	Low	High	Clear			
5	1	2025	12	04	00	New York	NY	USA	28	-2	65	10	16	30.1	1013.2	10	10	7:04	16:04	12:04	12:04	Low	High	Clear			
6	1	2025	12	05	00	New York	NY	USA	27	-3	65	10	16	30.1	1013.2	10	10	7:05	16:05	12:05	12:05	Low	High	Clear			
7	1	2025	12	06	00	New York	NY	USA	26	-3	65	10	16	30.1	1013.2	10	10	7:06	16:06	12:06	12:06	Low	High	Clear			
8	1	2025	12	07	00	New York	NY	USA	25	-4	65	10	16	30.1	1013.2	10	10	7:07	16:07	12:07	12:07	Low	High	Clear			
9	1	2025	12	08	00	New York	NY	USA	24	-4	65	10	16	30.1	1013.2	10	10	7:08	16:08	12:08	12:08	Low	High	Clear			
10	1	2025	12	09	00	New York	NY	USA	23	-5	65	10	16	30.1	1013.2	10	10	7:09	16:09	12:09	12:09	Low	High	Clear			
11	1	2025	12	10	00	New York	NY	USA	22	-6	65	10	16	30.1	1013.2	10	10	7:10	16:10	12:10	12:10	Low	High	Clear			
12	1	2025	12	11	00	New York	NY	USA	21	-6	65	10	16	30.1	1013.2	10	10	7:11	16:11	12:11	12:11	Low	High	Clear			
13	1	2025	12	12	00	New York	NY	USA	20	-7	65	10	16	30.1	1013.2	10	10	7:12	16:12	12:12	12:12	Low	High	Clear			
14	1	2025	12	13	00	New York	NY	USA	19	-7	65	10	16	30.1	1013.2	10	10	7:13	16:13	12:13	12:13	Low	High	Clear			
15	1	2025	12	14	00	New York	NY	USA	18	-8	65	10	16	30.1	1013.2	10	10	7:14	16:14	12:14	12:14	Low	High	Clear			
16	1	2025	12	15	00	New York	NY	USA	17	-8	65	10	16	30.1	1013.2	10	10	7:15	16:15	12:15	12:15	Low	High	Clear			
17	1	2025	12	16	00	New York	NY	USA	16	-9	65	10	16	30.1	1013.2	10	10	7:16	16:16	12:16	12:16	Low	High	Clear			
18	1	2025	12	17	00	New York	NY	USA	15	-9	65	10	16	30.1	1013.2	10	10	7:17	16:17	12:17	12:17	Low	High	Clear			
19	1	2025	12	18	00	New York	NY	USA	14	-10	65	10	16	30.1	1013.2	10	10	7:18	16:18	12:18	12:18	Low	High	Clear			
20	1	2025	12	19	00	New York	NY	USA	13	-10	65	10	16	30.1	1013.2	10	10	7:19	16:19	12:19	12:19	Low	High	Clear			
21	1	2025	12	20	00	New York	NY	USA	12	-11	65	10	16	30.1	1013.2	10	10	7:20	16:20	12:20	12:20	Low	High	Clear			
22	1	2025	12	21	00	New York	NY	USA	11	-11	65	10	16	30.1	1013.2	10	10	7:21	16:21	12:21	12:21	Low	High	Clear			
23	1	2025	12	22	00	New York	NY	USA	10	-12	65	10	16	30.1	1013.2	10	10	7:22	16:22	12:22	12:22	Low	High	Clear			
24	1	2025	12	23	00	New York	NY	USA	9	-12	65	10	16	30.1	1013.2	10	10	7:23	16:23	12:23	12:23	Low	High	Clear			
25	1	2025	12	24	00	New York	NY	USA	8	-13	65	10	16	30.1	1013.2	10	10	7:24	16:24	12:24	12:24	Low	High	Clear			
26	1	2025	12	25	00	New York	NY	USA	7	-13	65	10	16	30.1	1013.2	10	10	7:25	16:25	12:25	12:25	Low	High	Clear			
27	1	2025	12	26	00	New York	NY	USA	6	-14	65	10	16	30.1	1013.2	10	10	7:26	16:26	12:26	12:26	Low	High	Clear			
28	1	2025	12	27	00	New York	NY	USA	5	-15	65	10	16	30.1	1013.2	10	10	7:27	16:27	12:27	12:27	Low	High	Clear			
29	1	2025	12	28	00	New York	NY	USA	4	-15	65	10	16	30.1	1013.2	10	10	7:28	16:28	12:28	12:28	Low	High	Clear			
30	1	2025	12	29	00	New York	NY	USA	3	-16	65	10	16	30.1	1013.2	10	10	7:29	16:29	12:29	12:29	Low	High	Clear			
31	1	2025	12	30	00	New York	NY	USA	2	-16	65	10	16	30.1	1013.2	10	10	7:30	16:30	12:30	12:30	Low	High	Clear			
32	1	2025	12	31	00	New York	NY	USA	1	-17	65	10	16	30.1	1013.2	10	10	7:31	16:31	12:31	12:31	Low	High	Clear			
33	1	2025	12	32	00	New York	NY	USA	0	-17	65	10	16	30.1	1013.2	10	10	7:32	16:32	12:32	12:32	Low	High	Clear			
34	1	2025	12	33	00	New York	NY	USA	-1	-18	65	10	16	30.1	1013.2	10	10	7:33	16:33	12:33	12:33	Low	High	Clear			
35	1	2025	12	34	00	New York	NY	USA	-2	-18	65	10	16	30.1	1013.2	10	10	7:34	16:34	12:34	12:34	Low	High	Clear			
36	1	2025	12	35	00	New York	NY	USA	-3	-19	65	10	16	30.1	1013.2	10	10	7:35	16:35	12:35	12:35	Low	High	Clear			
37	1	2025	12	36	00	New York	NY	USA	-4	-19	65	10	16	30.1	1013.2	10	10	7:36	16:36	12:36	12:36	Low	High	Clear			
38	1	2025	12	37	00	New York	NY	USA	-5	-20	65	10	16	30.1	1013.2	10	10	7:37	16:37	12:37	12:37	Low	High	Clear			
39	1	2025	12	38	00	New York	NY	USA	-6	-20	65	10	16	30.1	1013.2	10	10	7:38	16:38	12:38	12:38	Low	High	Clear			
40	1	2025	12	39	00	New York	NY	USA	-7	-21	65	10	16	30.1	1013.2	10	10	7:39	16:39	12:39	12:39	Low	High	Clear			
41	1	2025	12	40	00	New York	NY	USA	-8	-21	65	10	16	30.1	1013.2	10	10	7:40	16:40	12:40	12:40	Low	High	Clear			
42	1	2025	12	41	00	New York	NY	USA	-9	-22	65	10	16	30.1	1013.2	10	10	7:41	16:41	12:41	12:41	Low	High	Clear			
43	1	2025	12	42	00	New York	NY	USA	-10	-22	65	10	16	30.1	1013.2	10	10	7:42	16:42	12:42	12:42	Low	High	Clear			
44	1	2025	12	43	00	New York	NY	USA	-11	-23	65	10	16	30.1	1013.2	10	10	7:43	16:43	12:43	12:43	Low	High	Clear			
45	1	2025	12	44	00	New York	NY	USA	-12	-23	65	10	16	30.1	1013.2	10	10	7:44	16:44	12:44	12:44	Low	High	Clear			
46	1	2025	12	45	00	New York	NY	USA	-13	-24	65	10	16	30.1	1013.2	10	10	7:45	16:45	12:45	12:45	Low	High	Clear			
47	1	2025	12	46	00	New York	NY	USA	-14	-24	65	10	16	30.1	1013.2	10	10	7:46	16:46	12:46	12:46	Low	High	Clear			
48	1	2025	12	47	00	New York	NY	USA	-15	-25	65	10	16	30.1	1013.2	10	10	7:47	16:47	12:47	12:47	Low	High	Clear			
49	1	2025	12	48	00	New York	NY	USA	-16	-25	65	10	16	30.1	1013.2	10	10	7:48	16:48	12:48	12:48	Low	High	Clear			
50	1	2025	12	49	00	New York	NY	USA	-17	-26	65	10	16	30.1	1013.2	10	10	7:49	16:49	12:49	12:49	Low	High	Clear			
51	1	2025	12	50	00	New York	NY	USA	-18	-26	65	10	16	30.1	1013.2	10	10	7:50	16:50	12:50	12:50	Low	High	Clear			
52	1	2025	12	51	00	New York	NY	USA	-19	-27	65	10	16	30.1	1013.2	10	10	7:51	16:51	12:51	12:51	Low	High	Clear			
53	1	2025	12	52	00	New York	NY	USA	-20	-27	65	10	16	30.1	1013.2	10	10	7:52	16:52	12:52	12:52	Low	High	Clear			
54	1	2025	12	53	00	New York	NY	USA	-21	-28	65	10	16	30.1	1013.2	10	10	7:53	16:53	12:53	12:53	Low	High	Clear			
55	1	2025	12	54	00	New York	NY	USA	-22	-28	65	10	16	30.1	1013.2	10	10	7:54	16:54	12:54	12:54	Low	High	Clear			
56	1	2025	12	55	00	New York	NY	USA	-23	-29	65	10	16	30.1	1013.2	10	10	7:55	16:55	12:55	12:55	Low	High	Clear			
57	1	2025	12	56	00	New York	NY	USA	-24	-29	65	10	16	30.1	1013.2	10	10	7:56	16:56	12:56	12:56	Low	High	Clear			
58	1	2025	12	57	00	New York	NY	USA	-25	-30	65	10	16	30.1	1013.2	10	10	7:57	16:57	12:57	12:57	Low	High	Clear			
59	1	2025	12	58	00	New York	NY	USA	-26	-30	65	10	16	30.1	1013.2	10	10	7:58	16:58	12:58	12:58	Low	High	Clear			
60	1	2025	12	59	00	New York	NY	USA	-27	-31	65	10	16	30.1	1013.2	10	10	7:59	16:59	12:59	12:59	Low	High	Clear			
61	1	2025	12	60	00	New York	NY	USA	-28	-31	65	10	16	30.1	1013.2	10	10	8:00	17:00	1:00	1:00	Low	High	Clear			
62	1	2025	12	61	00	New York	NY	USA	-29	-32	65	10	16	30.1	1013.2	10	10	8:01	17:01	1:01	1:01	Low	High	Clear			
63	1	2025	12	62	00	New York	NY	USA	-30	-32	65	10	16	30.1	1013.2	10	10	8:02	17:02	1:02	1:02	Low	High	Clear			
64	1	2025	12	63	00	New York	NY	USA	-31	-33	6																

[illegible]

APPENDIX K. SIA CONTOUR PLOTS

Figure K-1. 1-hr NO₂ SIL Contour Plot

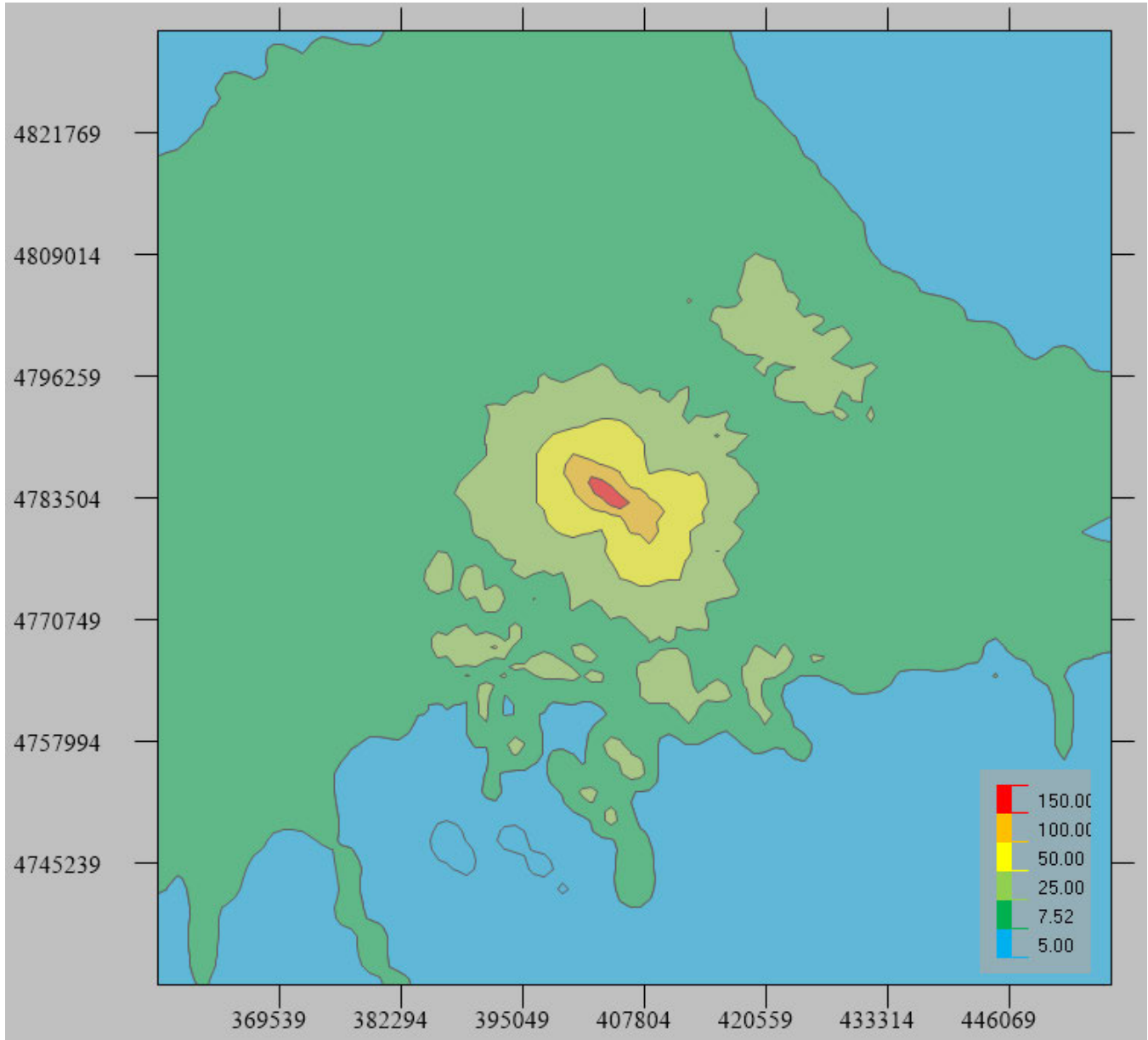


Figure K-2. 1-hr CO SIL Contour Plot

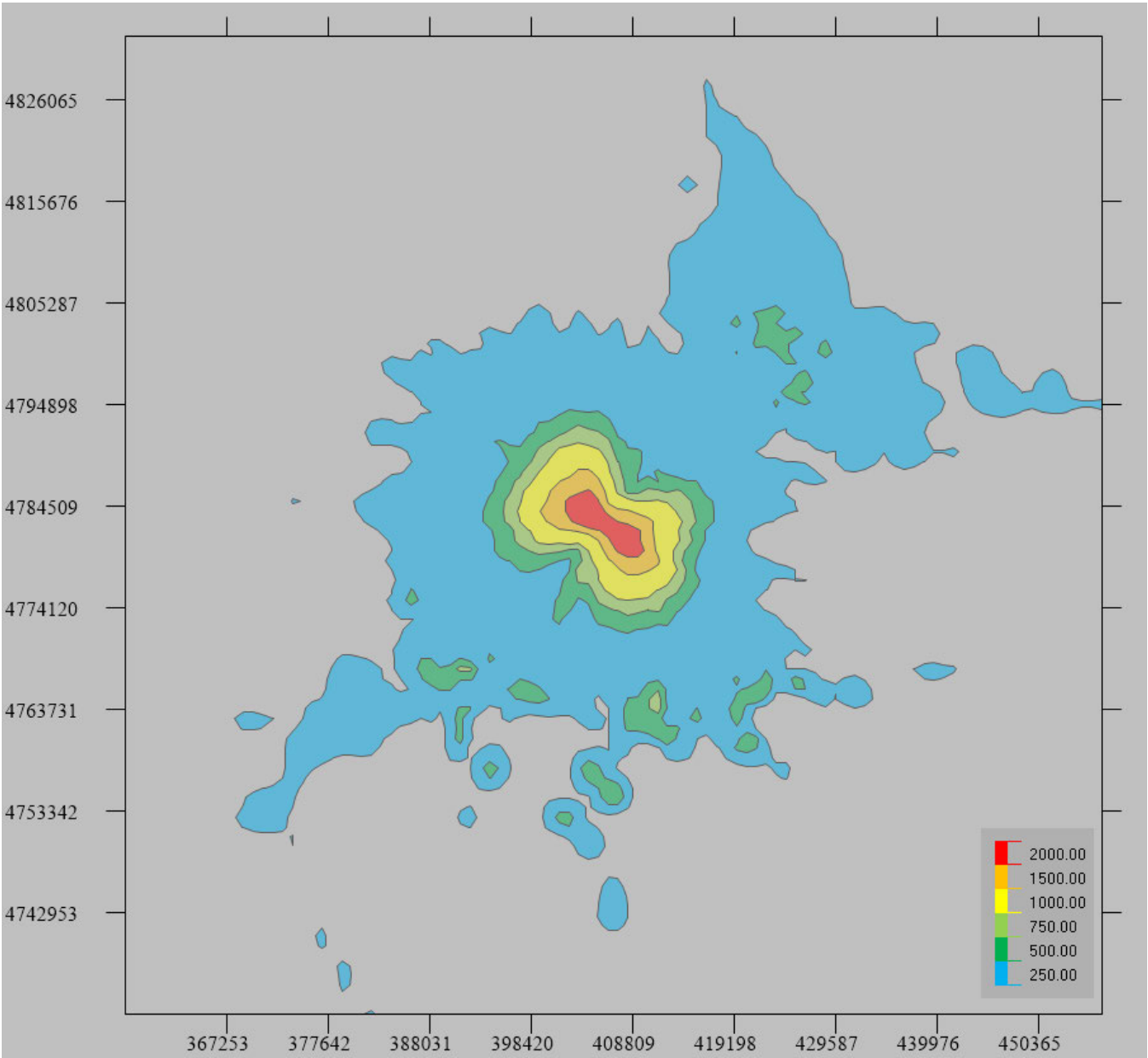


Figure K-3. 8-hr CO SIL Contour Plot

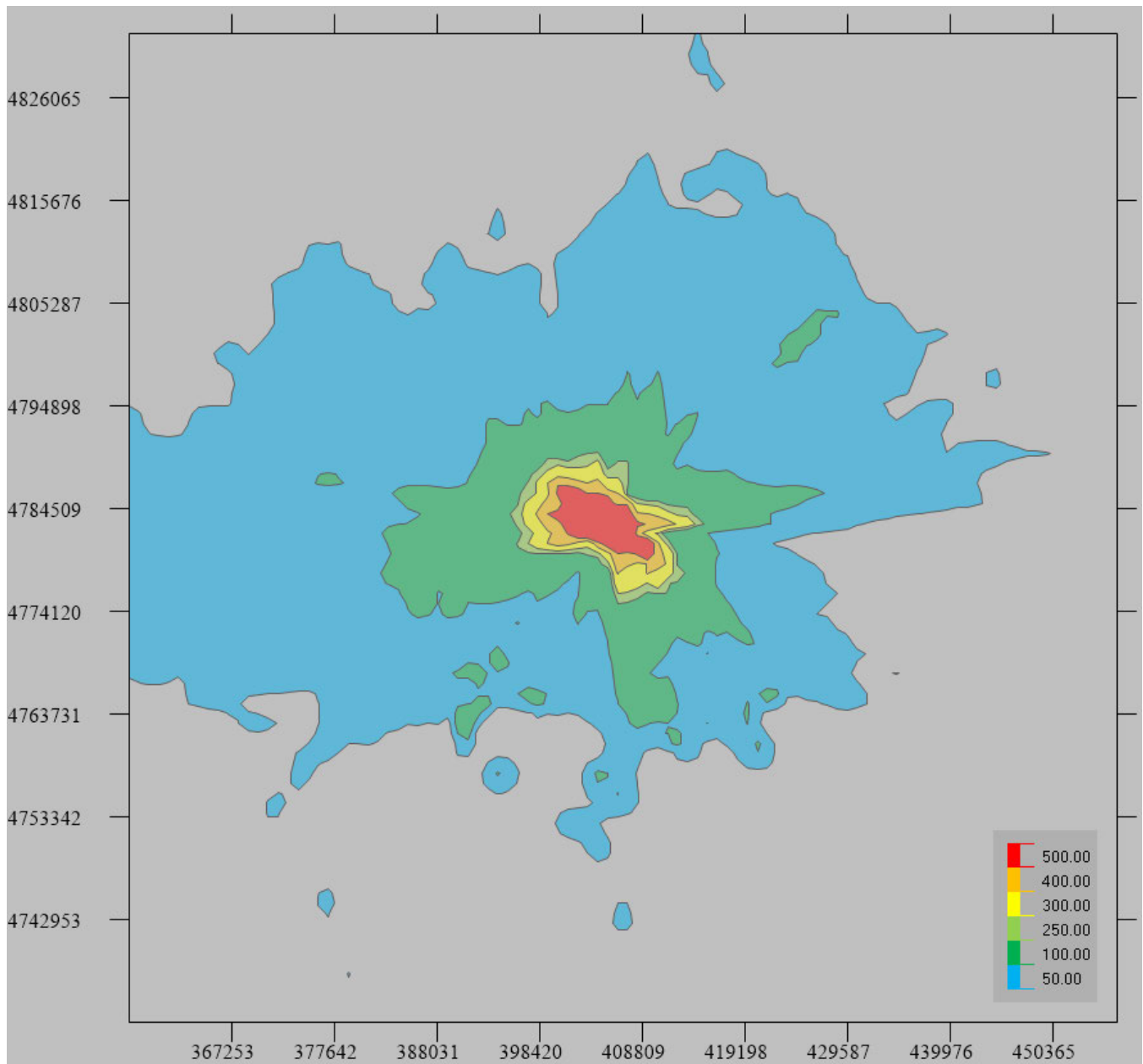


Figure K-4. 24-hr PM_{2.5} SIL Contour Plot

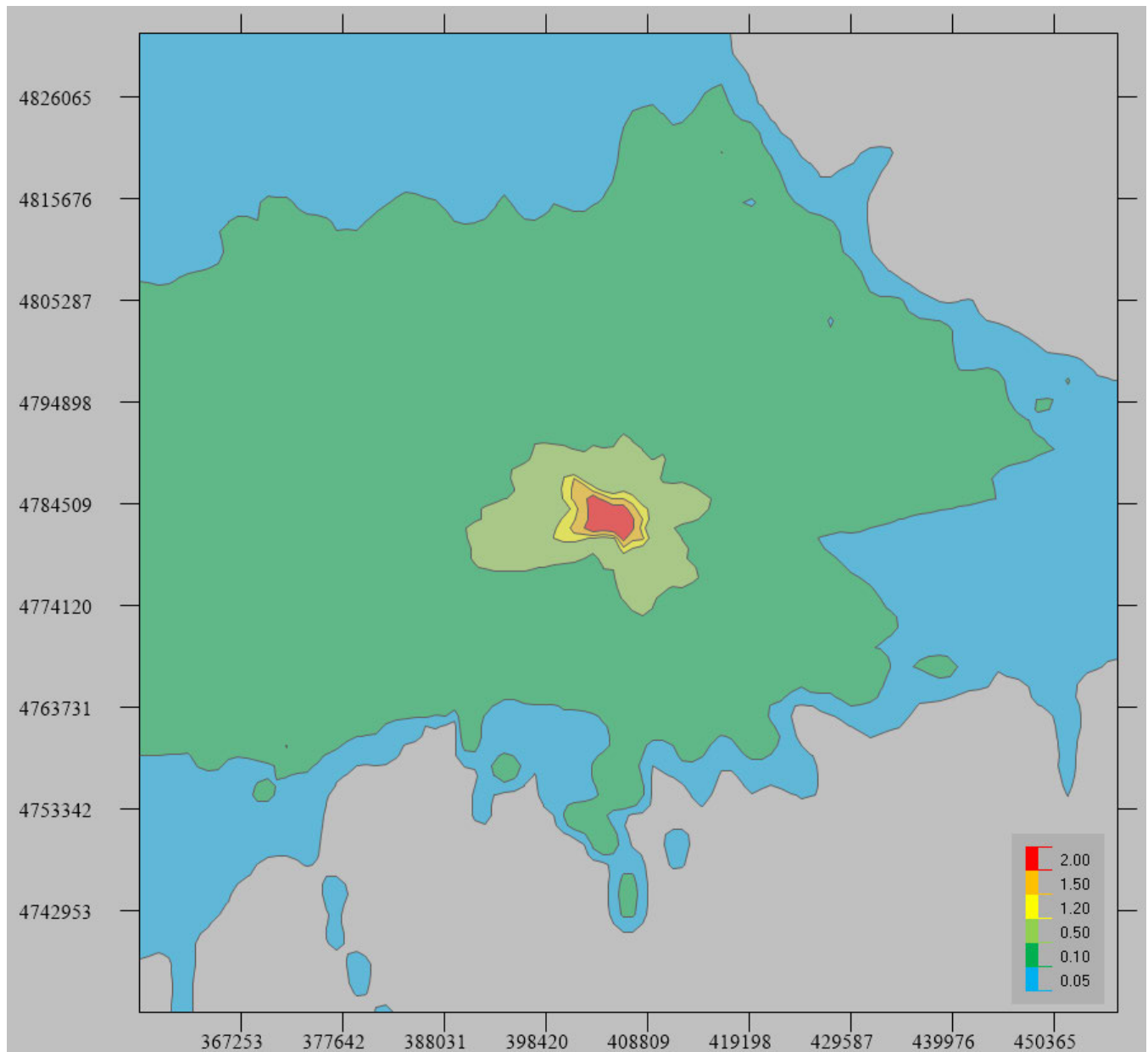


Figure K-5. 24-hr PM₁₀ SIL Contour Plot

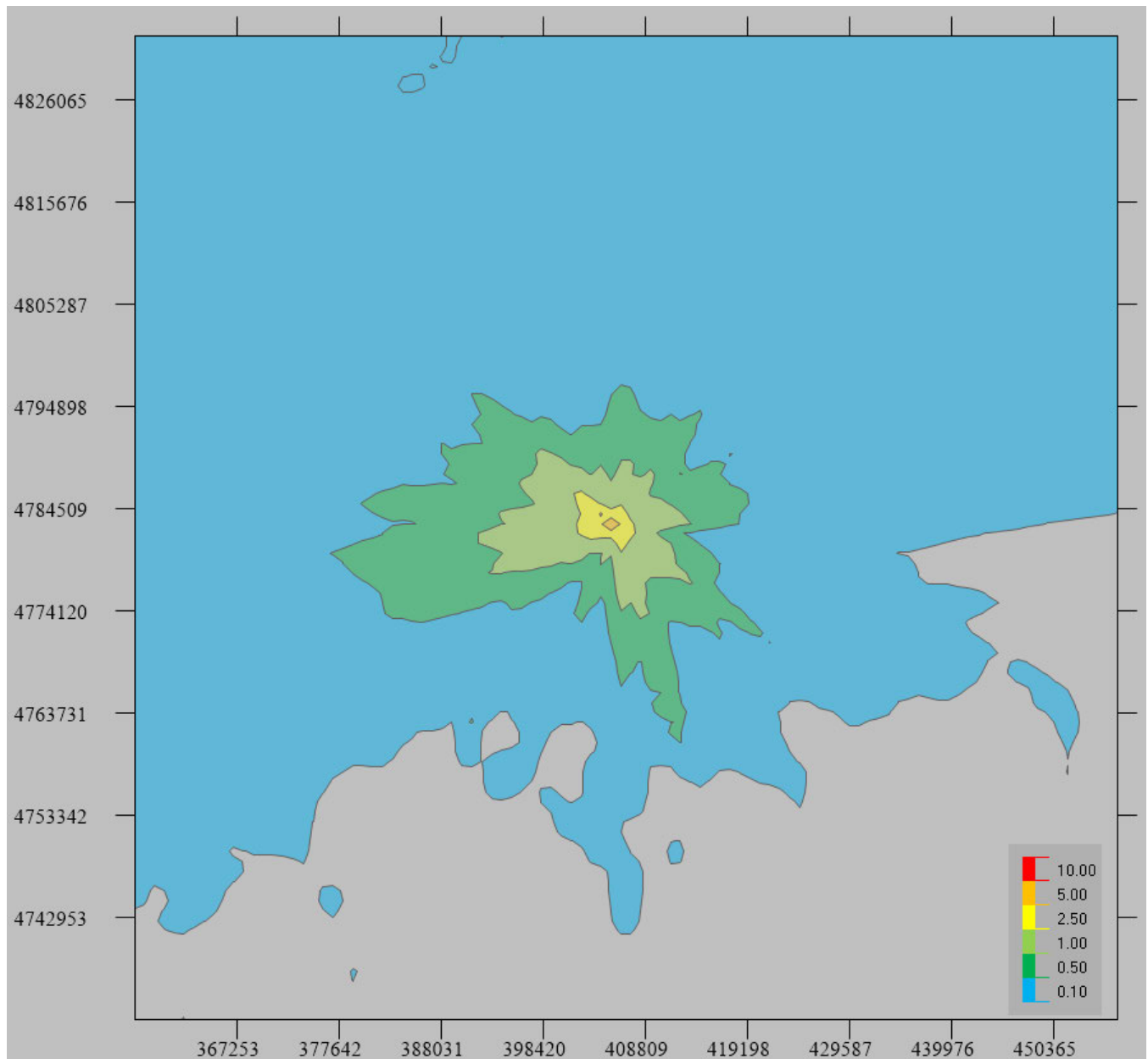


Figure K-6. Annual PM_{2.5} SIL Contour Plot

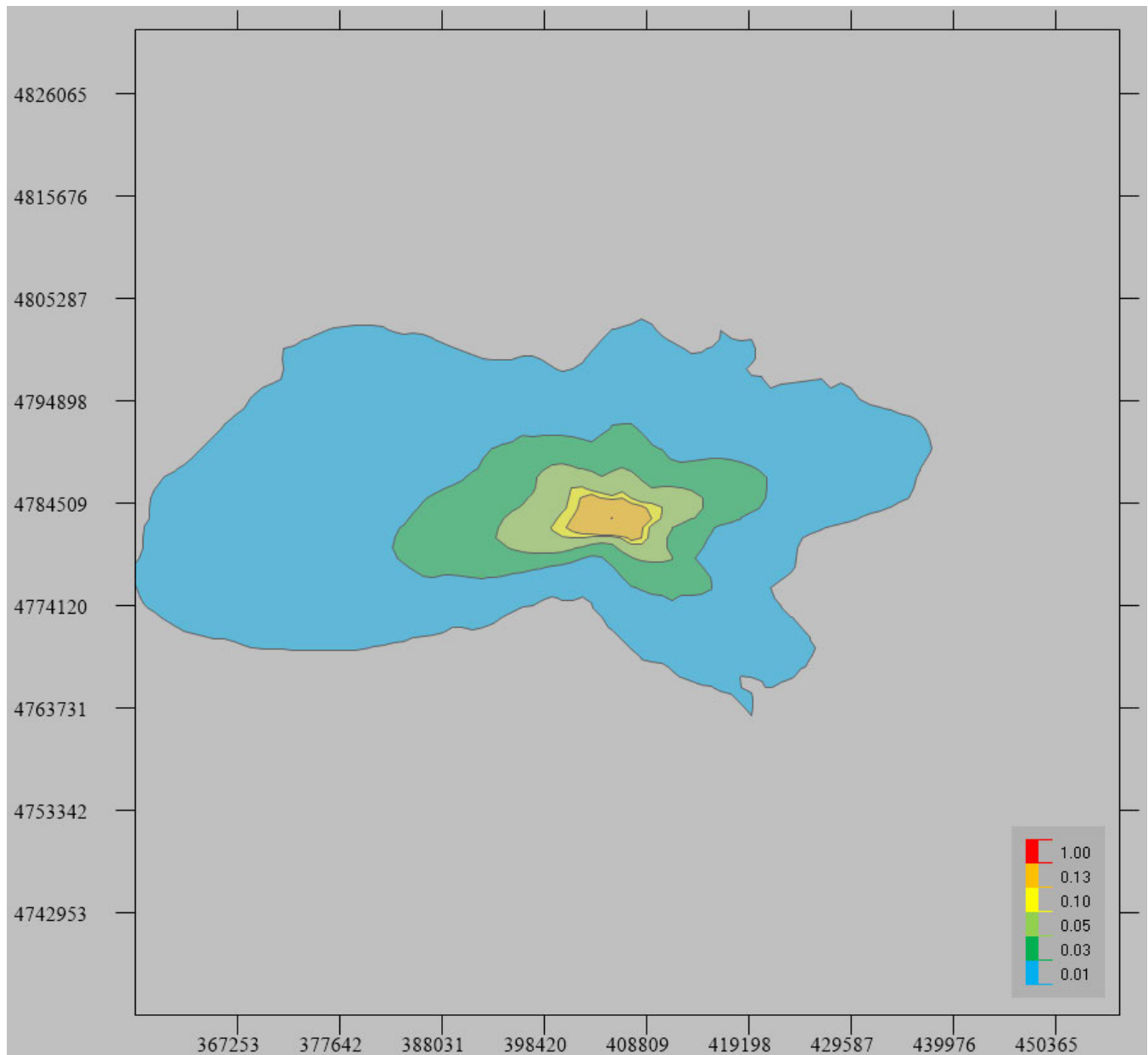


Figure K-7. Annual PM₁₀ SIL Contour Plot – 2019

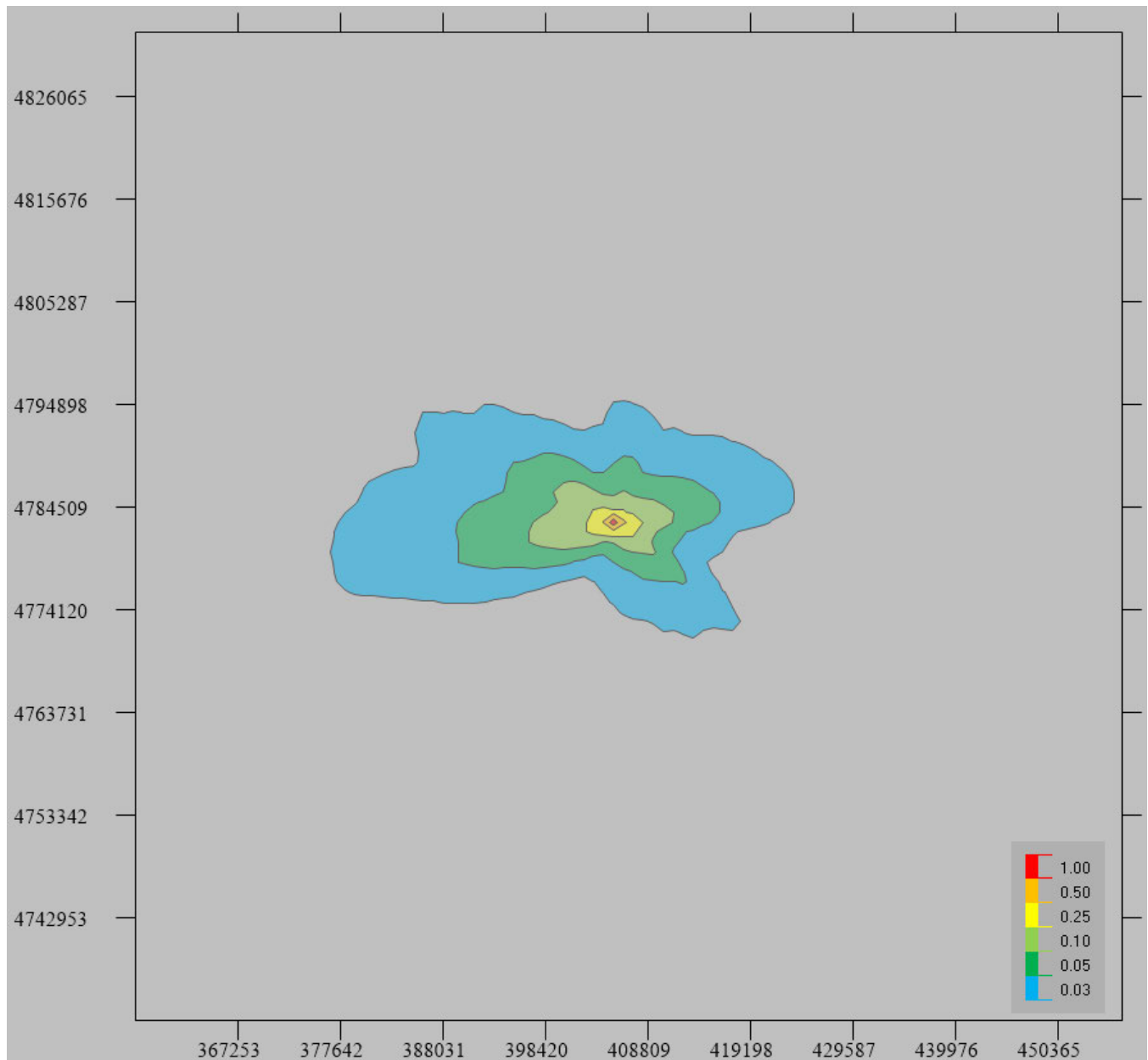


Figure K-8. Annual NO₂ SIL Contour Plot – 2021

