maxeon

November 29, 2023

Mr. Chris Albrecht
Deputy Director, Air Quality Programs
City of Albuquerque - Environmental Health Department
1 Civic Plaza
Room 3023, Floor 3rd
Albuquerque, NM 87102

Subject: **Construction Permit Application for Maxeon Mesa Del Sol Manufacturing Plant**

Dear Mr. Albrecht:

Maxeon Solar Technologies (Maxeon) is pleased to submit this construction permit application for a new photovoltaic solar panel manufacturing facility near Albuquerque, New Mexico. The Facility is expected to manufacture about 5.8 million solar panels, corresponding to 3.5 gigawatts of power annually.

The enclosed Construction Air Permit Application has been prepared in accordance with Title 20 Chapter 11 Part 41 (20.11.41) New Mexico Administrative Code (NMAC) Albuquerque – Bernalillo County Air Quality Control Board Construction Permits (NMAC 20.11.41) (NMAC 2014).

Appendix A of the enclosed construction permit application includes confirmation of payment of the applicable permit application fees.

Maxeon and its consultant, Jacobs Engineering, looks forward to working with the Environmental Health Department on this permit application. Should you have any questions on the enclosed document, please feel free to contact Moha Parikh from Jacobs Engineering at moha.parikh@jacobs.com or the undersigned.

Respectfully Submitted,

Zane Broadhead
Vice President, Global Facilities
zane.broadhead@maxeon.com

Jacobs

Construction Air Permit Application

Maxeon Solar Technologies

Maxeon Mesa Del Sol (MMDS) Manufacturing Plant
Albuquerque, New Mexico

Golden Eagle
November 30, 2023

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Acronyms and Abbreviations

µg/m^3	microgram(s) per cubic meter
AWB	alkaline wet bench
AWN	acid waste neutralization
CFR	*Code of Federal Regulations*
CO	carbon monoxide
EPA	U.S. Environmental Protection Agency
Facility	New photovoltaic solar panel manufacturing facility near Albuquerque, New Mexico
FWT	fluoride waste treatment
H_2O_2	hydrogen peroxide
HAP	hazardous air pollutant
HCl	hydrochloric acid
HF	hydrogen fluoride
m	meter(s)
m/s	meter(s) per second
NAAQS	National Ambient Air Quality Standard
NAD83	North American Datum of 1983
NaOH	sodium hydroxide
NESHAP	National Emission Standard for Hazardous Air Pollutants
NMAC	New Mexico Administrative Code
NO_x	nitrogen oxide
NSPS	New Source Performance Standards
PM_{10}	particulate matter less than 10 micrometers in diameter
$PM_{2.5}$	particulate matter less than 2.5 micrometers in diameter
ppm	part(s) per million
SiH_4	silane
SIL	significant impact level
SO_x	sulfur oxide
VOC	volatile organic compound

1. Introduction

Maxeon Solar Technologies (Maxeon) is proposing to construct and operate a new photovoltaic (PV) solar panel manufacturing facility near Albuquerque, New Mexico (Facility). The air emission sources associated with the Facility include manufacturing process scrubber exhausts, natural gas boiler systems, cooling towers, diesel emergency generators, and a fire pump. The Facility is expected to manufacture about 5.8 million solar panels, corresponding to 3.5 gigawatts of power annually.

1.1 Location

The Facility is located approximately 8 miles southeast of downtown Albuquerque, at the Mesa Del Sol master planning community in Bernalillo County, New Mexico. The Universal Transverse Mercator coordinates of the Facility center are 354,312 meters east and 3,871,339 meters north with North American Datum of 1983 (NAD83) Zone 13 at an elevation of approximately 5,285 feet above mean sea level. The relative location of the Facility is shown on Figure 1-1.

Figure 1-1. Facility Location Map

1.2 Summary of Emissions

Emissions from criteria air pollutants (CAPs), including volatile organic compounds (VOCs), carbon monoxide (CO), nitrogen oxide (NO_X), sulfur oxide (SO_x), particulate matter less than 10 micrometers in diameter (PM_{10}), and particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$), are expected from

the Facility, as well as emissions from various hazardous air pollutants (HAPs) and toxic air contaminants (TACs).

The Facility's uncontrolled and controlled potential to emit (PTE) emissions is summarized in Table 1-1.

Table 1-1. Facility's Potential to Emit (Tons per Year)

Source	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	HAPs
Total Uncontrolled Project Emissions	143	22.3	6.93	1.69	36.9	35.8	194
Total Controlled Project Emissions	82.5	22.3	5.77	1.69	2.94	1.83	12.2
Minor New Source Review (NSR) Thresholds [a]	100	100	100	100	100	100	25
Exceeds Thresholds?	Yes	No	No	No	No	No	Yes

[a] Source: New Mexico Administrative Code (NMAC) 20.11.61.20.

A Construction Air Permit Application will be needed in accordance with Title 20 Chapter 11 Part 41 (20.11.41) New Mexico Administrative Code (NMAC) Albuquerque – Bernalillo County Air Quality Control Board Construction Permits (NMAC 20.11.41) (NMAC 2014). The Facility will be located in Bernalillo County, which is designated as attainment for all National Ambient Air Quality Standards (NAAQS).

The Maxeon facility will be considered a synthetic minor source as the Facility has the potential to emit regulated NSR pollutants in amounts that are at or above the major thresholds but has taken federally enforceable restrictions such that the PTE is less than threshold amounts for major sources. The Facility will utilize physical air pollution control equipment to reduce VOC and HAP emissions below the 100 tpy and 25 tpy respective major source thresholds. Details regarding the air pollution controls are discussed in Section 3.0 of this application.

1.3 Organization of this Air Permit Application Package

This air permit application package is organized by the following components:

- Process description
- Emissions information
- Applicable state and federal air quality regulations
- Air dispersion modeling analysis
- Startup, shutdown, and malfunction plan
- Application forms and the following appendices:
    - Appendix A: Application forms, including the pre-permit application meeting forms and permit fee checklist
    - Appendix B: Emissions Calculations
    - Appendix C: Notice of Intent to Construct and Zoning Requirements
    - Appendix D: Public Notice Documentation
    - Appendix E: Modeling Information

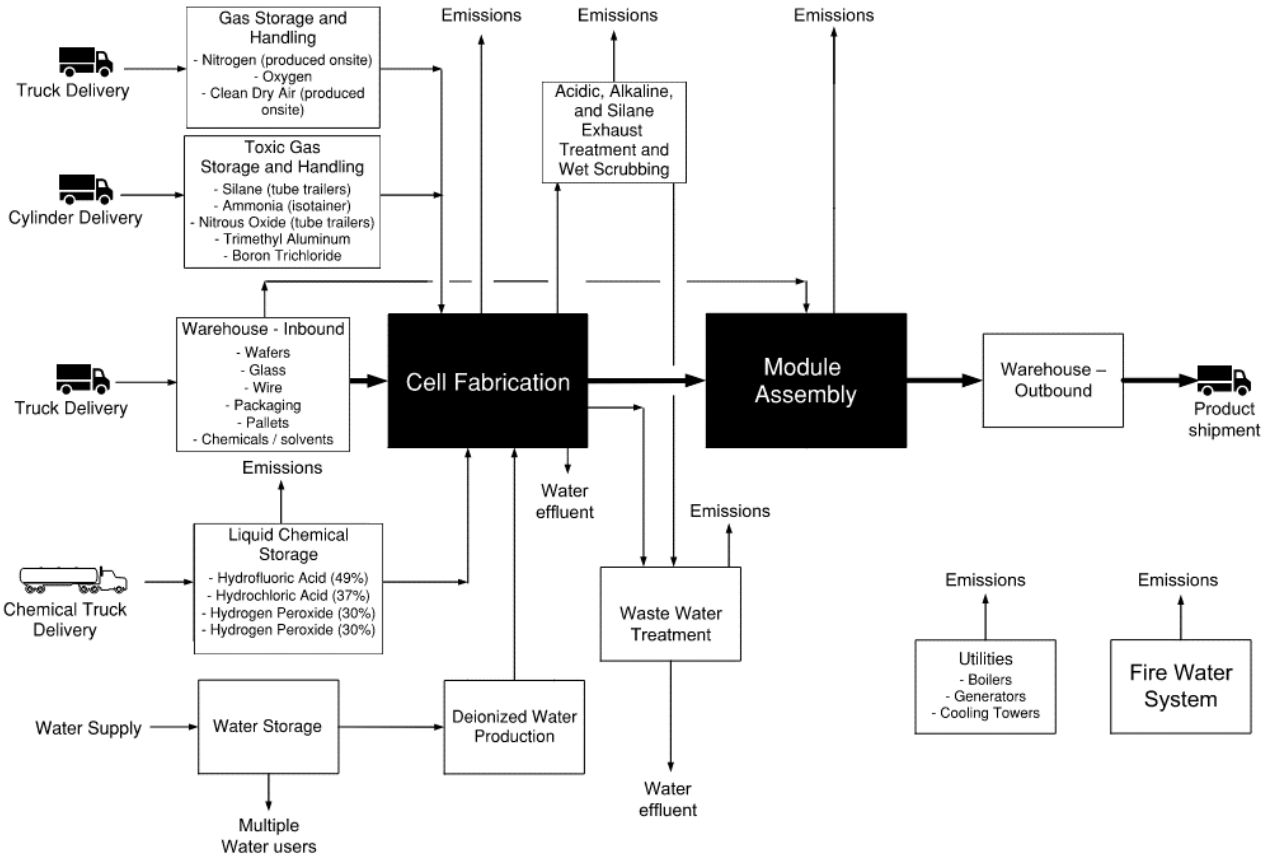
A preapplication meeting attended by Maxeon, Jacobs, and Albuquerque-Bernalillo County Air Quality Program (AQP) personnel was held on November 15, 2023, to discuss the project, emissions information, and air quality dispersion modeling. Completed pre-application meeting forms are included in Appendix A.

2. Process Description

2.1 Overview

The Facility is expected to manufacture the number of solar panels required to produce 3.5 gigawatts of power annually. The proposed manufacturing space contains two (2) main production areas: the Cell Production area (CellFab) and the Module Production area (ModCo). A process flow diagram and associated air emission sources are shown on Figure 2-1.

Figure 2-1. Project Process Flow Diagram



2.2 Manufacturing Processes

Photovoltaic solar panel cells are produced by delivering gases and liquid chemicals to processing tools that perform various processes on a silicon wafer substrate within the CellFab. The cells are then grouped into modules and interconnected to allow the panel to produce electricity within the ModCo.

2.2.1 Cell Fabrication

The CellFab area will be located at the beginning of the process and will receive precut silicon wafers from a third-party supplier. These wafers will be inspected, cleaned, and prepared for the process using an automated assembly line. The wafers will then undergo chemical vapor deposition reactions with several raw materials, followed by a screen-printing step that will create individual photovoltaic cells. Process

materials will be brought to the CellFab via trucks. Liquid chemicals that are used in larger quantities will be received in bulk via chemical tank trailers, and the liquids will be pumped into onsite storage tanks. Lesser-used liquid chemicals will arrive in storage totes via truck. Gaseous chemicals will be received in tube trailers, isotainers, and cylinder form via truck. Multiple totes and cylinders will likely arrive at one time to maintain a sufficient supply.

2.2.2 Module Production

The individual finished cells will then be transported via truck to ModCo where the cells will be interconnected, laminated, trimmed, and framed to create panels. The cells will be interconnected together within the panel to make the photovoltaic panel capable of generating electricity. The final product will be loaded into boxes on pallets, which will be shipped out via truck.

2.2.3 Ancillary Equipment

Ancillary equipment required for process and building conditioning includes boilers, emergency generators, storage tanks, cooling towers, and a fire water pump. Utilities exhaust consists of combustion products from this equipment.

2.2.4 Wastewater Treatment

Wastewater streams from the process will be sent to an onsite wastewater treatment prior to discharge. The wastewater treatment will include acid waste neutralization (AWN) and fluoride waste treatment (FWT). Acid and fluoride containing wastes will be collected from the CellFab and pumped to the AWN and FWT treatment systems for treatment prior to discharge. The wastewater treatment plant is expected to result in negligible air emissions.

3. Emissions Information

This section summarizes emission calculation methodology and provides emissions estimates for the manufacturing processes, boilers, emergency generators, fire pump, bulk chemical and diesel storage tanks, and cooling towers.

3.1 Process Emissions

3.1.1 Wet Scrubbers

Wet scrubber systems will be used to control HAPs and other gases from the CellFab. Emissions from the acid and alkaline wet benches (AWBs) will be routed through wet scrubber systems, where the caustic and acidic streams are scrubbed before release into the atmosphere (Acidic and Alkaline Exhaust). Sodium hydroxide (NaOH), hydrogen fluoride (HF), and hydrochloric acid (HCl) are the primary gases/pollutants treated by the wet scrubber systems. Gas distribution boxes and liquid distribution boxes will be used on the chemical delivery lines to the AWBs. These boxes will house valves or fittings that will minimize personnel exposure to potential leaks. Normally, only ambient air is pulled from these boxes around the pipe and fittings, but in the case of a failure or leak, these boxes will capture releases via the exhaust system and send them to the wet scrubbers for abatement.

An additional set of wet scrubber systems will be used to abate emissions from the passivation, low pressure chemical vapor deposition, plasma enhanced chemical vapor deposition areas and local point-of-use scrubbers. The exhaust streams released from these systems will be routed through the silane (SiH_4) exhaust treatment system. The silane exhaust treatment system will thermally oxidize the silane with compressed dry air (CDA) and dust collectors to capture the Silicon Dioxide from oxidation and a wet scrubber system.

Silane, NO_x, and nonmethane hydrocarbons (NMHC/VOC) are expected to be the primary pollutants/gas releases within the silane exhaust treatment system. Silane exhaust treatment system and wet scrubbers are expected to control silane, acidic, and caustic emissions up to 95 percent.

Preliminary manufacturer data were used to estimate pre-abatement concentrations for each exhaust stream that will be controlled by the wet scrubbers. Control efficiencies for the abatement systems are based on vendor information and engineering estimates based on industry standards.

3.1.2 Organic Exhaust

The Facility is expected to have solvent exhaust streams within the CellFab that will consist of various VOC compounds. These solvent exhaust streams will include VOC emissions from screen printing and the use of various materials such as silver paste and solvent cleaners. Additional solvent exhaust streams will consist of VOCs collected from the ModCo processes. Silver paste, electric conductive adhesives, flux, junction box silicone, framing silicone, and potting compounds are VOC-containing materials that will be used as part of the manufacturing process. Organic Exhaust will be collected from equipment in CellFab and ModCo and exhausted via stacks.

Preliminary tool manufacturer data were used to estimate VOC concentrations from this uncontrolled exhaust stream.

3.1.3 General Process Exhaust

General Process Exhaust will be collected from Facility equipment to remove heat and meet equipment ambient condition requirements. The General Process Exhaust will be collected from equipment in both CellFab and ModCo and exhausted via stacks.

Preliminary manufacturer data were used to estimate PM, Ammonia, HCl, and HF concentrations from this uncontrolled exhaust stream.

Emissions from the manufacturing processes are shown in Table 3-1. Detailed emissions calculations are included in Appendix B.

Table 3-1. Manufacturing Process Emissions Summary

Source	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	HAPs
Uncontrolled Annual Emissions (tons/year)							
Acidic Exhaust	0.05	--	0.81	--	33.8	33.8	173
Alkaline Exhaust	--	--	--	--	--	--	--
Organic Exhaust	28.0	--	--	--	--	--	--
General Exhaust	1.36	--	--	--	0.04	0.04	1.45
Silane Exhaust	61.3	--	1.51	--	0.85	0.85	--
ModCo	50.3	--	--	--	--	--	--
Total Uncontrolled Manufacturing Process Emissions	**141**	**--**	**2.32**	--	**34.7**	**34.7**	**174**
Controlled Annual Emissions (tons/year)							
Acidic Exhaust	0.05	--	0.40	--	0.63	0.63	6.39
Alkaline Exhaust	--	--	--	--	--	--	--
Organic Exhaust	28.0	--	--	--	--	--	--
General Exhaust	1.36	--	--	--	0.04	0.04	1.45
Silane Exhaust	1.21	--	0.76	--	0.01	0.01	--
ModCo	50.3	--	--	--	--	--	--
Total Controlled Manufacturing Process Emissions	**80.8**	**--**	**1.16**	**--**	**0.68**	**0.68**	**7.84**

Note: -- = not applicable

3.2 Chemical Storage Tanks

HF, HCl, hydrogen peroxide (H_2O_2), and NaOH will be stored in tanks onsite. Emissions from these chemical storage tanks have been estimated based on a mass balance of current expected chemical demand. The acid tanks (HF and HCl) will have an abatement efficiency of approximately 80% through a tank-attached control system.

Table 3-2 summarizes the emissions from the chemical storage tanks.

Table 3-2. Chemical Storage Tank Emissions Summary

Source	HF	HCl	H_2O_2	NaOH
Uncontrolled Annual Emissions (tons/year)				
Chemical Storage Tanks	10.61	8.56	0.40	< 0.00
Controlled Annual Emissions (tons/year)				
Chemical Storage Tanks	2.12	1.71	0.40	< 0.00

Note: < 0.00 = less than 0.00 tons/year

3.3 Ancillary Equipment

Ancillary Equipment required for the process and building conditioning include natural gas boilers, emergency generators, diesel storage tanks, cooling towers, and a fire pump.

3.3.1 Boilers

The Facility will have four (4) natural gas-fired boilers, each rated at approximately 30.13 million British thermal units (BTUs) per hour heat input. The boilers will be equipped with Low NO_x Burners to minimize emissions and are expected to operate during the winter months to support the manufacturing processes and support activities at the Facility. The emissions estimate assumes that each boiler will operate for up to 4,380 hours per year.

CAP emissions from the new boilers are estimated using similar-sized boiler manufacturer specified emission rates and HAP emissions are estimated using emission factors from AP-42, Compilation of Air Pollutant Emission Factors Chapter 1, Table 1.4-4 (EPA 2018).

3.3.2 Emergency Generators and Fire Pump

The Facility will have three (3) approximately 2,000-kilowatt generators to be used during periods of emergency. Ultra-low sulfur diesel fuel will be used in these generators and the units will comply with the applicable requirements of 40 *Code of Federal Regulations* (CFR) Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. These generators will be U.S. Environmental Protection Agency (EPA) Tier 4 certified units and will serve as backup generators for the Facility. The emergency generators will be operated no more than 500 hours per year for testing and maintenance.

An approximately 542-horsepower diesel powered fire pump engine will be installed and operated at the Facility. This engine will be an EPA Tier 3 certified unit and will serve as an emergency power source for the Facility fire water system. The fire pump will be operated on ultra-low sulfur diesel fuel and no more than 500 hours per year for testing and maintenance.

CAP emissions from the new generators and fire pump are based on EPA Nonroad Compression Ignition Engine Tier 4 emission factors and Tier 3 emission factors respectively. HAP emissions are estimated using emission factors from AP-42, Compilation of Air Pollutant Emission Factors, Chapter 3, Table 3.4-3 and Table 3.4-4.

Each generator will have an attached diesel fuel storage sub-base tank. The fire pump will have a single 500-gallon external, vertical fixed-roof diesel fuel storage tank. Emissions associated with these tanks are discussed in Section 4.2.3.

3.3.3 Diesel Storage Tanks

The Facility will have four diesel fuel storage tanks. There will be three sub-base tanks connected to the three 2,000-kilowatt diesel-fired emergency generators. An additional vertical fixed-roof diesel storage tank will be used to supply the 542-horsepower diesel-fired fire pump.

VOC emissions from these diesel fuel storage tanks are based on output from the Oklahoma Department of Environmental Quality Storage Tank Emissions Tool[1]. These emission calculations are based on the EPA's AP-42 calculation methodology.

3.3.4 Cooling Towers

The Facility will have eight (8) cooling towers, each consisting of one (1) cell. Each tower will have a cooling water recirculation rate of approximately 4,000 gallons per minute. The cooling towers will be equipped with drift eliminators to control particulate matter emissions by a 0.005% efficiency and will serve the manufacturing process chilled water needs. The project will operate these cooling towers for up to 24 hours per day and 365 days per year.

Particulate emissions from cooling towers are estimated using the *Permitting Guidance for Cooling Tower Particulate Emissions* from the New Mexico Environment Department Air Quality Bureau (September 2013). Emissions are estimated based on water circulating rate, estimated droplet diameter, and efficiency of the drift eliminator.

Table 3-3 summarizes the ancillary equipment emissions from the Facility.

Table 3-3. Ancillary Equipment Emissions Summary

Source	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	HAPs
Uncontrolled Annual Emissions (tons/year)							
Natural Gas Boilers	0.95	9.90	1.53	1.58	1.00	1.00	0.49
Diesel Generators	0.63	11.6	2.22	0.10	0.10	0.10	0.02
Diesel Fire Pump	0.03	0.78	0.86	0.01	0.04	0.04	< 0.00
Diesel Storage Tanks	< 0.00	--	--	--	--	--	--
Cooling Towers	--	--	--	--	1.11	< 0.00	--
Total Uncontrolled Ancillary Equipment Emissions	**1.61**	**22.3**	**4.61**	**1.69**	**2.26**	**1.15**	**0.51**
Controlled Annual Emissions (tons/year)							
Natural Gas Boilers	0.95	9.90	1.53	1.58	1.00	1.00	0.49
Diesel Generators	0.63	11.6	2.22	0.10	0.10	0.10	0.06
Diesel Fire Pump	0.03	0.78	0.86	0.01	0.04	0.04	< 0.00
Diesel Storage Tanks	< 0.00	--	--	--	--	--	--
Cooling Towers	--	--	--	--	1.11	< 0.00	--

[1] https://www.deq.ok.gov/air-quality-division/air-permits/storage-tank-emissions-calculation-tool/

Source	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	HAPs
Total Controlled Ancillary Equipment Emissions	**1.61**	**22.3**	**4.61**	**1.69**	**2.26**	**1.15**	**0.55**

Notes:
-- = not applicable
< 0.00 = less than 0.00 tons/year

3.4 Emissions Summary

Table 3-4 summarizes CAP and total HAP emissions from the Facility. Detailed emissions calculations are included in Appendix B.

Table 3-4. Project Annual Emissions Summary

Source	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	HAPs
Uncontrolled Annual Emissions (tons/year)							
Natural Gas Boilers	0.95	9.90	1.53	1.58	1.00	1.00	0.49
Diesel Generators	0.63	11.6	2.22	0.10	0.10	0.10	0.02
Diesel Fire Pump	0.03	0.78	0.86	0.01	0.04	0.04	< 0.00
Diesel Storage Tanks	< 0.00	--	--	--	--	--	--
Cooling Towers	--	--	--	--	1.11	< 0.00	--
Acidic Exhaust	0.05	--	0.81	--	33.8	33.8	173
Alkaline Exhaust	--	--	--	--	--	--	--
Organic Exhaust	28.0	--	--	--	--	--	--
General Exhaust	1.36	--	--	--	0.04	0.04	1.45
Silane Exhaust	61.3	--	1.51	--	0.85	0.85	--
ModCo	50.3	--	--	--	--	--	--
Chemical Storage Tanks	--	--	--	--	--	--	19.18
Total Uncontrolled Emissions	**143**	**22.3**	**6.93**	**1.69**	**36.9**	**35.8**	**194**
Controlled Annual Emissions (tons/year)							
Natural Gas Boilers	0.95	9.90	1.53	1.58	1.00	1.00	0.49
Diesel Generators	0.63	11.6	2.22	0.10	0.10	0.10	0.06
Diesel Fire Pump	0.03	0.78	0.86	0.01	0.04	0.04	< 0.00
Diesel Storage Tanks	0.00	--	--	--	--	--	--
Cooling Towers	--	--	--	--	1.11	< 0.00	--
Acidic Exhaust	0.05	--	0.40	--	0.63	0.63	6.39
Alkaline Exhaust	--	--	--	--	--	--	--

Source	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	HAPs
Organic Exhaust	28.0	--	--	--	--	--	--
General Exhaust	1.36	--	--	--	0.04	0.04	1.45
Silane Exhaust	1.21	--	0.76	--	0.01	0.01	--
ModCo	50.3	--	--	--	--	--	--
Chemical Storage Tanks	--	--	--	--	--	--	3.84
Total Controlled Emissions	**82.4**	**22.3**	**5.77**	**1.69**	**2.94**	**1.83**	**12.16**

Notes:

-- = not applicable

< 0.00 = less than 0.00 tons/year

Table 3-5 summarizes specific HAP and toxic emissions from the Facility. Detailed emissions calculations are included in Appendix B.

Table 3-5. Project Annual Emissions Summary

Source	NaOH	Cl_2	NH_3	SiH_4	HCl	HF	SiF_4	Zn	H_2O_2
Uncontrolled Annual Emissions (tons/year)									
Natural Gas Boilers	--	--	--	--	--	--	--	--	--
Diesel Generators	--	--	--	--	--	--	--	--	--
Diesel Fire Pump	--	--	--	--	--	--	--	--	--
Diesel Storage Tanks	--	--	--	--	--	--	--	--	--
Cooling Towers	--	--	--	--	--	--	--	--	--
Acidic Exhaust	--	24.9	0.46	--	1.71	146	15.52	0.01	--
Alkaline Exhaust	283	--	--	--	--	--	--	--	--
Organic Exhaust	--	--	--	--	--	--	--	--	--
General Exhaust	--	--	0.04	--	0.01	1.44	--	--	--
Silane Exhaust	--	--	40.94	0.83	--	--	--	--	--
ModCo	--	--	--	--	--	--	--	--	--
Chemical Storage Tanks	< 0.00	--	--	--	8.56	10.6	--	--	0.40
Total Uncontrolled Emissions	**283**	**24.9**	**41.5**	**0.83**	**10.3**	**158**	**15.5**	**0.01**	**0.40**
Controlled Annual Emissions (tons/year)									
Natural Gas Boilers	--	--	--	--	--	--	--	--	--
Diesel Generators	--	--	--	--	--	--	--	--	--
Diesel Fire Pump	--	--	--	--	--	--	--	--	--

Source	NaOH	Cl_2	NH_3	SiH_4	HCl	HF	SiF_4	Zn	H_2O_2
Diesel Storage Tanks	--	--	--	--	--	--	--	--	--
Cooling Towers	--	--	--	--	--	--	--	--	--
Acidic Exhaust	--	2.50	0.46	--	0.11	3.70	0.39	0.01	--
Alkaline Exhaust	14.1	--	--	--	--	--	--	--	--
Organic Exhaust	--	--	--	--	--	--	--	--	--
General Exhaust	--	--	0.04	--	0.01	1.44	--	--	--
Silane Exhaust	--	--	2.46	0.04	--	--	--	--	--
ModCo	--	--	--	--	--	--	--	--	--
Chemical Storage Tanks	< 0.00	--	--	--	1.71	2.12	--	--	0.40
Total Controlled Emissions	**14.1**	**2.50**	**2.96**	**0.04**	**1.84**	**7.26**	**0.39**	**0.01**	**0.40**

Notes:

-- = not applicable

< 0.00 = less than 0.00 tons/year

4. Regulatory Review

4.1 State Permitting Requirements

The State of New Mexico has been granted the authority by EPA to implement and enforce the permitting requirements specified by the federal Clean Air Act. The Facility will be constructed and operated under the jurisdiction of the Air Quality Program of the City of Albuquerque Environmental Health Department and Albuquerque-Bernalillo County Air Quality Control Board. This application is being submitted in accordance with the construction permit regulations of 20.11.41 NMAC. Bernalillo County is either undesignated or designated as attainment for all National Ambient Air Quality Standards (NAAQS).

A summary of applicable construction permit regulations is presented in Table 4-1.

Table 4-1. Applicable Construction Permit Regulations

NMAC Citation	Regulatory Requirement	Applicability
20.11.02	Permit Fees	All new construction permit applications for stationary sources are required to submit the appropriate fee. The receipt from the online fee payment and associated Permit Application Review Fee Checklist is provided in Appendix A of this application.
20.11.05	Visible Air Contaminants	Under this regulation, no emission sources at the plant shall cause or allow visible air contaminant emissions that exceed an opacity of 20 percent, six (6) minute time-averaged. The Facility will meet the applicable visible emissions requirements.

NMAC Citation	Regulatory Requirement	Applicability
20.11.08	Ambient Air Quality Standards	This rule adopts the primary and secondary national ambient air quality standards (NAAQS) codified at 40 CFR Part 50 and to adopt applicable state ambient air quality standards codified at 20.2.3 NMAC. At the federal level, EPA sets the primary and secondary standards for CO, Pb, NO_2, Ozone, PM, and SO_2 which can be harmful to public health and the environment. At the state level, the New Mexico Environmental Improvement board issues the New Mexico Ambient Air Quality Standards (NMAAQS). The NMAAQS includes sulfur compounds, CO, and NOx. Section 6 presents the results of the ambient air impact analysis performed by Maxeon that demonstrate compliance with applicable ambient air quality standards.
20.11.20	Fugitive Dust Control	A fugitive dust control construction permit is for a person who plans to conduct active operations that will disturb three-quarters of an acre or more of any activity preparatory to or related to building, altering, rehabilitating, demolishing or improving property that results in a disturbed surface area, including but not limited to grading, excavation, loading, crushing, pavement milling, cutting, clearing, grubbing, topsoil removal, blading, shaping, dry sweeping, blasting and ground breaking. A fugitive dust control programmatic permit is required for single or multiple Facility locations to address real property totaling three-quarters of an acre or more that is subject to routine maintenance, routine surface disturbance activities, or routine ongoing active operations. Maxeon will submit the application for fugitive dust control permit prior to start of construction.

NMAC Citation	Regulatory Requirement	Applicability
20.11.40	Source Registration	Required permits for any commercial or industrial stationary source that emits more than 2,000 pounds per year of any regulated air pollutant or any amount of a hazardous air pollutant. This rule does not apply to Maxeon as the proposed facility will be covered under 20.11.41 NMAC.
20.11.41	Construction Permits	Prior to the construction or operation of a new stationary source that will emit 10 pounds per hour or more or 25 tons per year or more of any single regulated air contaminant, a construction permit must be obtained. This rule applies to Maxeon, thus Maxeon is submitting this application in order to obtain a construction permit.
20.11.42	Operating Permits	The Facility potential to emit does not exceed100 tons per year or more of any criteria air pollutant, 10 tons per year or more of a single hazardous air pollutant, or 25 tons per year or more of multiple hazardous air pollutants combined. This regulation does not apply to Maxeon.
20.11.46	SO_2 Emissions Inventory Requirements	This rule implements the western backstop (WEB) sulfur dioxide (SO_2) trading program provisions required under the federal Regional Haze Rule, 40 CFR 51.309, and the concomitant Albuquerque-Bernalillo County element of the state of New Mexico's regional haze implementation plan. All stationary sources with actual emissions of 100 tons per year or more of SO_2 shall submit an annual inventory of SO_2 emissions. Does not apply to Maxeon as the proposed SO2 emissions are less than 100 tons per year.

NMAC Citation	Regulatory Requirement	Applicability
20.11.47	Emissions Inventory Requirement	Applies to sources that have obtained Authority to Construct permit or an Operating Permits within Bernalillo County. Pursuant to the rule the owner or operator of a facility with an air quality permit shall submit the emissions inventory report by March 15 of each calendar year. Maxeon will comply with this annual requirement.
20.11.49	Excess Emissions	Excess emissions reports must be submitted to Air Quality Program in accordance with NMAC 20.11.49.15 If an excess emission event Maxeon will submit the excess emissions report as required.
20.11.60	Permitting in Nonattainment Areas	Does not apply as Bernalillo County is considered attainment of the NAAQS for all criteria air pollutants.
20.11.61	Prevention of Significant Deterioration	The Facility is considered a minor stationary source and prevention of significant deterioration requirements do not apply.
20.11.63	New Source Performance Standards (NSPS) for Stationary Sources	Refer to Section 5.2 for applicability.
20.11.64	National Emission Standard for Hazardous Air Pollutants (NESHAP) for Stationary Sources	Refer to Section 5.2 for applicability.
20.11.65	Volatile Organic Compounds	Not applicable to Maxeon as the Facility does not store or handle gasoline. The emissions from diesel storage tanks are less than 100 pounds of organic vapors in any single 24-hour day or 10 pounds per hour.
20.11.66	Process Equipment – Emissions of Particulate Matter	This regulation does not apply to the Facility as the process equipment exhaust does not emit particulate matter.

NMAC Citation	Regulatory Requirement	Applicability
20.11.67	Equipment, Emissions, Limitations	This regulation does not apply to the plant because none of the natural gas-fired fuel burning equipment has a heat input greater than 1,000,000 million BTUs per year.

4.2 Federal Permitting Requirements

4.2.1 Federal New Source Performance Standards

In 40 CFR Part 60, the EPA established emission performance standards for specific source categories. These standards include emission limitations for various regulated pollutants and provide a variety of requirements for monitoring, record keeping, and reporting of emissions and other information. The Facility will be subject to the subparts of 40 CFR Part 60 as shown in Table 4-2.

Table 4-2. Federal Air Quality Permitting Requirements

Regulatory Citation	Regulatory Title	Applicability
Subpart A General Provisions		
40 CFR 60, Subpart A	General Provisions for Standards of Performance for New Sources	Subpart A describes general provisions that are applicable to any source that is subject to NSPS. The project will be subject to 40 CFR 60, Subpart Dc, Standards of Performance for Small Commercial-Industrial-Institutional Steam Generating Units; Subpart IIII, Standards for Stationary Compression Ignition Internal Combustion Engines; and Subpart Kb, Standards for Volatile Organic Liquid Storage Vessels and therefore subject to 40 CFR 60, Subpart A, the General Provisions for Standards of Performance for New Sources.
Subpart Dc Small Commercial-Industrial-Institutional Steam Generating Units		
40 CFR 60, Subpart Dc, 60.48c	Reporting and Recordkeeping Requirements	40 CFR 60.48c requires records of the natural gas combusted each month or records of the amount of natural gas delivered to the Facility monthly.
Subpart IIII Stationary Compression Ignition Internal Combustion Engines		
40 CFR 60, Subpart IIII, 60.4205	Standards for Emergency Engines	40 CFR 60.4205(b) requires the emergency diesel generators to comply with certain emission standards based on engine displacement, model year, and engine power. 40 CFR 60.4205(c) requires fire pump engines with a displacement of less than 30 liters per cylinder to comply with emissions standards in Table 4 – Emission Standards for Stationary Fire Pump Engines within this subpart. Maxeon will purchase EPA certified engines to comply with this subpart.

Regulatory Citation	Regulatory Title	Applicability
40 CFR 60, Subpart IIII, 60.4207	Fuel Requirements	Diesel fuel oil burned in the emergency generator engine must meet the following requirements: 1. A maximum sulfur content of 15 ppm (0.0015%) by weight 2. A minimum cetane index of 40 or a maximum aromatic content of 35% by volume The generator will also only use ultra-low sulfur diesel (ULSD) with a maximum sulfur content of 15 ppm (0.0015%) by weight and a minimum cetane index of 40 or a maximum aromatic content of 35% by volume. Maxeon will utilize ULSD as required.
40 CFR 60, Subpart IIII, 60.4209 and 60.4211	Monitoring and Compliance Requirements	The emergency diesel generator shall be equipped with a non-resettable hour meter, as required by the NSPS monitoring requirements. To remain compliant, the engine must meet all requirements outlined in 40 CFR Section 60.4211. The compliance requirements include but are not limited to operating and maintaining the unit based on manufacturer recommendations; meets requirements of 40 CFR Parts 89 and 1068; and maintaining performance test, manufacturer, and any control device data onsite. Operating requirements under this section include the following: 3. Engine is limited to operating a maximum of 100 hours per year each for maintenance checks and readiness testing. Generator runtime for unplanned power outages is not counted against this annual operating hour limit. 4. The engine is also allowed to operate up to 50 hours per year in non-emergency situations, but the 50 hours are counted toward the 100 hours provided for maintenance and testing.
Subpart Kb Volatile Organic Liquid Storage Vessels		
40 CFR 60, Subpart Kb, 60.116b(c)	Monitoring of Operations	The storage tanks are less than 75 cubic meters; thus this regulation does not apply. Maxeon will keep records to demonstrate non-applicability.

Note: ppm = part(s) per million

4.2.2 Federal National Emission Standards for Hazardous Air Pollutants

The National Emission Standards for Hazardous Air Pollutants (NESHAP) are emission standards set by the EPA for HAPs not covered by National Ambient Air Quality Standards. HAPs may cause acute, chronic, or carcinogenic illness or impacts on human health and the environment. The standards for a source category require the maximum degree of emissions reduction that the EPA determines to be achievable, which are known as the Maximum Achievable Control Technology standards. These standards are codified in 40 CFR Parts 61 and 63. Any emissions unit subject to a NESHAP subpart is also subject to the general provisions under 40 CFR 63 Subpart A. In addition to the general provisions, the sources will be subject to the subparts of 40 CFR 63 as follows.

4.2.2.1 40 CFR Part 63 Subpart ZZZZ – NESHAP for HAPs for Stationary Reciprocating Internal Combustion Engines

Compliance with the NSPS requirements for the emergency engine satisfies compliance with 40 CFR Part 63, Subpart ZZZZ, National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. The proposed engines must meet the requirements of this part by meeting the requirements of 40 CFR part 60 subpart IIII, for compression ignition engines.

4.2.2.2 40 CFR Part 63 JJJJJJ – NESHAP for Industrial, Commercial, and Institutional Boilers at Areas Sources

Per 40 CFR 63.11195 (e) this regulation does not apply to the boilers at Maxeon as they meet the definition of "gas fired boilers." Maxeon will maintain records to keep records documenting each boiler's fuel design and fuel usage.

5. Operational Plan – Air Emissions During Startup, Shutdown and Malfunction

This startup, shutdown, and malfunction plan provides an operational and maintenance strategy for the permitted sources of emissions at the Facility.

As soon as a malfunction occurs, the Facility will shut down equipment as soon as possible to ensure no excess or nonpermitted emissions are released. The Facility will only startup again once the identified malfunction issue is addressed. The process equipment will be equipped with appropriate safeguards in order to reduce frequency of malfunction or shutdown. Maxeon will monitor the opacity and color of the exhaust gasses and taking the unit offline for repairs upon the observation of abnormal soot coming out of the stacks.

Additionally, Maxeon will implement a preventative maintenance program in order to keep equipment running and prevent any costly unplanned downtime from unexpected equipment failure. Maxeon will ensure engines and boiler are achieving good combustion by operating the equipment per the manufacturers recommended guidance. Cooling towers will also be operating based on manufacturers recommendations.

Maxeon will calculate the emissions of regulated air contaminants from the malfunction event to determine if there has been an exceedance of a permitted emission limit. Maxeon will report any excess emission to the Albuquerque-Bernalillo County AQP, as required.

6. Air Dispersion Modeling Analysis

Albuquerque-Bernalillo County Air Quality Control Board regulations 20.11.41.13.E.(4) NMAC (Construction Permits) require an applicant to demonstrate the effects that a proposed facility or modification will have upon any New Mexico Ambient Air Quality Standard (NMAAQS) or NAAQS by performing air dispersion modeling.

This modeling analysis follows the *Air Dispersion Modeling Guidelines for Air Quality Permitting* under the City of Albuquerque Environmental Health Department Air Quality Program Permitting Division (Albuquerque-Bernalillo County AQP 2019).

6.1 Model Source Characterization

Air emission sources associated with the Facility include the following source/process types:

- Four natural gas boilers rated at 900 boiler horsepower (hp)
- Three diesel emergency generators rated at 2,000 kilowatt (kW)
- One diesel emergency fire pump rated at 542 engine hp
- Four diesel belly and aboveground storage tanks to supply the generators and fire pump
- Wet cooling towers
- Process related emissions from gas and chemical usage
- Abatement devices including scrubbers
- Chemical storage tanks

Emergency generators, units that operate less than 500 hours annually, are exempt from air dispersion modeling according to the *Air Dispersion Modeling Guidelines for Air Quality Permitting* (Albuquerque-Bernalillo County AQP 2019). Therefore, emissions from the three emergency diesel generators and one diesel emergency fire pump will not be modeled for this analysis.

For the purposes of air dispersion modelling, preliminary annual average controlled emission estimates for the processes listed above are shown in Table 6-1.

Table 6-1. Preliminary Facility Controlled Emissions Model Summary (Tons per Year)

Source	NO_X	CO	PM_{10}	$PM_{2.5}$	SO_2
Ancillary Equipment					
Boilers	1.53	9.90	1.00	1.00	1.58
Diesel Storage Tanks	--	--	--	--	--
Cooling Towers	--	--	1.11	0.004	--
Manufacturing Process					
Acid Exhaust	0.40	--	0.63	0.63	--
Alkaline Exhaust	--	--	--	--	--
Organic Exhaust	--	--	--	--	--
General Exhaust	--	--	0.04	0.04	--
Silane Exhaust	0.76	--	0.01	0.01	--
ModCo	--	--	--	--	--
Chemical Storage Tanks	--	--	--	--	--
Total	**2.69**	**9.90**	**2.79**	**1.68**	**1.58**

Note: -- = not applicable

Similarly, preliminary hourly controlled emission estimates for the processes listed above are shown in Table 6-2.

Table 6-2. Preliminary Facility Controlled Emissions Model Summary (Pounds per Hour)

Source	NO_X	CO	PM_{10}	$PM_{2.5}$	SO_2
Ancillary Equipment					
Boilers	0.52	3.39	0.34	0.34	0.54
Diesel Storage Tanks	--	--	--	--	--
Cooling Towers	--	--	0.36	0.001	--
Manufacturing Process					
Acid Exhaust	0.09	--	0.14	0.14	--
Alkaline Exhaust	--	--	--	--	--
Organic Exhaust	--	--	--	--	--
General Exhaust	--	--	0.01	0.01	--
Silane Exhaust	0.17	--	0.002	0.002	--
ModCo	--	--	--	--	--
Chemical Storage Tanks	--	--	--	--	--
Total	**0.78**	**3.39**	**0.85**	**0.49**	**0.54**

Note: -- = not applicable

All proposed pieces of equipment will be modeled as a point source within the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD). Modeled source parameters will be determined from the manufacturer's data or EPA established emission factors.

Details of the preliminary source locations and source-specific parameters used in the modeling are included in Table 6-3.

Table 6-3. Model Source Parameters

Source ID	Source Description	UTM NAD83 Easting X (m)	UTM NAD83 Northing Y (m)	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
ACEX_1	Acid Exhaust 1	354,236	3,871,392	16.76	293	15.24	1.52
ACEX_2	Acid Exhaust 2	354,245	3,871,395	16.76	293	15.24	1.52
ACEX_3	Acid Exhaust 3	354,256	3,871,397	16.76	293	15.24	1.52
ALEX_1	Alkaline Exhaust 1	354,278	3,871,402	16.76	293	15.24	1.27
ALEX_2	Alkaline Exhaust 2	354,287	3,871,405	16.76	293	15.24	1.27
ALEX_3	Alkaline Exhaust 3	354,296	3,871,407	16.76	293	15.24	1.27
GEN_1	General Exhaust 1	354,029	3,871,343	16.76	293	51.74	0.76
GEN_2	General Exhaust 2	354,034	3,871,344	16.76	293	51.74	0.76
GEN_3	General Exhaust 3	354,125	3,871,366	16.76	293	51.74	0.76
GEN_4	General Exhaust 4	354,130	3,871,367	16.76	293	51.74	0.76
GEN_5	General Exhaust 5	354,135	3,871,368	16.76	293	51.74	0.76
GEN_6	General Exhaust 6	354,140	3,871,370	16.76	293	51.74	0.76
GEN_7	General Exhaust 7	354,145	3,871,371	16.76	293	51.74	0.76
GEN_8	General Exhaust 8	354,149	3,871,372	16.76	293	51.74	0.76
GEN_9	General Exhaust 9	354,389	3,871,429	16.76	293	51.74	0.76

GEN_10	General Exhaust 10	354,393	3,871,430	16.76	293	51.74	0.76
GEN_11	General Exhaust 11	354,398	3,871,431	16.76	293	51.74	0.76
GEN_12	General Exhaust 12	354,403	3,871,432	16.76	293	51.74	0.76
GEN_13	General Exhaust 13	354,407	3,871,433	16.76	293	51.74	0.76
SIEX_1	Silane Exhaust 1	354,093	3,871,357	16.76	293	15.24	0.61
SIEX_2	Silane Exhaust 2	354,099	3,871,358	16.76	293	15.24	0.61
Boiler_1	Boiler 1	354,214	3,871,335	7.62	511	18.29	0.81
Boiler_2	Boiler 2	354,226	3,871,339	7.62	511	18.29	0.81
Boiler_3	Boiler 3	354,240	3,871,342	7.62	511	18.29	0.81
Boiler_4	Boiler 4	354,254	3,871,345	7.62	511	18.29	0.81
CT_1	Cooling Tower Cell 1	354,328	3,871,366	9.75	0	66.04	2.35
CT_2	Cooling Tower Cell 2	354,334	3,871,367	9.75	0	66.04	2.35
CT_3	Cooling Tower Cell 3	354,339	3,871,369	9.75	0	66.04	2.35
CT_4	Cooling Tower Cell 4	354,346	3,871,370	9.75	0	66.04	2.35
CT_5	Cooling Tower Cell 5	354,351	3,871,371	9.75	0	66.04	2.35
CT_6	Cooling Tower Cell 6	354,357	3,871,373	9.75	0	66.04	2.35
CT_7	Cooling Tower Cell 7	354,362	3,871,374	9.75	0	66.04	2.35
CT_8	Cooling Tower Cell 8	354,367	3,871,375	9.75	0	66.04	2.35

Notes:
ID = identification
m = meters
K = Kelvin
m/s = meter(s) per second

Source-specific pollutant emission rates used in the modeling are included in Table 6-4.

Table 6-4. Model Emission Rates (Pounds per Hour)

Source ID	NOx	CO	PM_{10}	$PM_{2.5}$	SO_2
ACEX_1	0.046	--	0.072	0.072	--
ACEX_2	0.046	--	0.072	0.072	--
ACEX_3	0.000	--	0.000	0.000	--
ALEX_1 [a]	--	--	--	--	--
ALEX_2 [a]	--	--	--	--	--
ALEX_3 [a]	--	--	--	--	--
GEN_1	--	--	0.001	0.001	--
GEN_2	--	--	0.000	0.000	--
GEN_3	--	--	0.001	0.001	--
GEN_4	--	--	0.001	0.001	--
GEN_5	--	--	0.001	0.001	--
GEN_6	--	--	0.001	0.001	--
GEN_7	--	--	0.001	0.001	--
GEN_8	--	--	0.000	0.000	--
GEN_9	--	--	0.001	0.001	--
GEN_10	--	--	0.001	0.001	--
GEN_11	--	--	0.001	0.001	--
GEN_12	--	--	0.001	0.001	--
GEN_13	--	--	0.000	0.000	--
SIEX_1	0.172	--	0.002	0.002	--
SIEX_2	0.000	--	0.000	0.000	--
Boiler_1	0.175	1.13	0.114	0.114	0.181
Boiler_2	0.175	1.13	0.114	0.114	0.181

Boiler_3	0.175	1.13	0.114	0.114	0.181
Boiler_4	0.175	1.13	0.114	0.114	0.181
CT_1	--	--	0.0317	0.0001	--
CT_2	--	--	0.0317	0.0001	--
CT_3	--	--	0.0317	0.0001	--
CT_4	--	--	0.0317	0.0001	--
CT_5	--	--	0.0317	0.0001	--
CT_6	--	--	0.0317	0.0001	--
CT_7	--	--	0.0317	0.0001	--
CT_8	--	--	0.0317	0.0001	--

Note: -- = not applicable

[a] ALEX_1 through ALEX_3 alkaline scrubber exhaust streams do not release any CAP emissions to be modeled; but have been included in the model as a discrete point.

For purposes of modeling annual emissions, all sources are expected to operate continuously at 8,760 hours annually except for the natural gas boilers which are expected to operate for no more than half the year at 4,380 hours annually. Therefore, modeled annual average emissions have been adjusted accordingly. Maximum hourly emissions were included for all short-term average modeling.

6.2 Dispersion Modeling Methodology

This section describes the modeling procedures and data resources that were utilized for the air dispersion modeling analysis. The techniques used for the air dispersion modeling analysis are consistent with the current EPA and Albuquerque-Bernalillo County AQP guidance.

6.2.1 Dispersion Model

AERMOD (Version 23132) was used for this ambient air quality impacts analysis, as recommended in *Appendix W of 40 CFR Part 51—Guideline On Air Quality Models (Revised)* (EPA 2017). AERMOD is a steady-state Gaussian plume model that simulates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain. This model is recommended for short-range (less than 50 kilometers) dispersion from the source.

AERMOD incorporates the plume rise model enhancement (PRIME) algorithm for modeling building downwash. AERMOD is designed to accept input data prepared by two specific preprocessor programs, AERMET and AERMAP. AERMOD was run with the following options:

- Direction specific building downwash
- Regulatory default options unless otherwise specified herein
- Rural dispersion characteristics
- Actual receptor elevations and hill height scales obtained from AERMAP (Version 18081)

Default model options for temperature gradients, wind profile exponents, and calm processing, which includes final plume rise, stack-tip downwash, and elevated receptor (complex terrain) heights option were used in this modeling analysis.

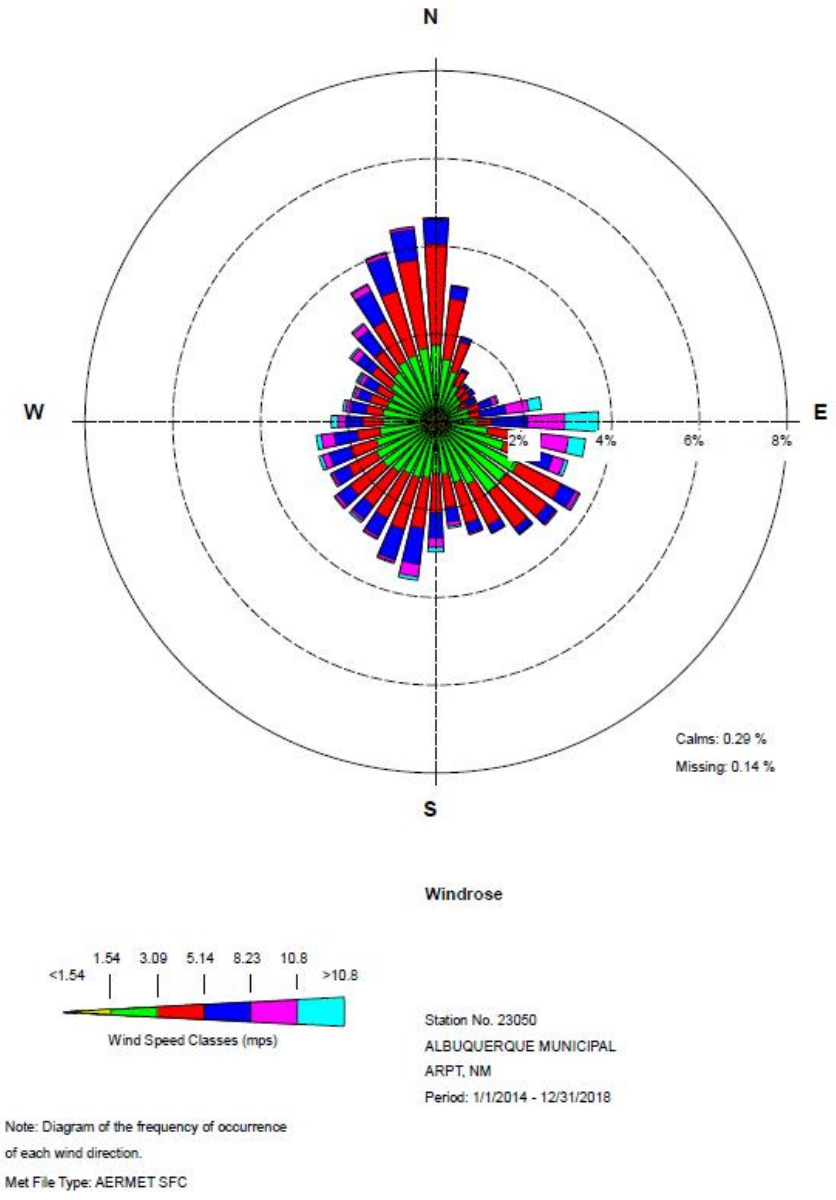
6.2.2 Meteorological Data

Five years of AERMET-processed meteorological data were obtained from Albuquerque-Bernalillo County AQP via email[2] for the Albuquerque Municipal Airport (WBAN ID: 23050), which is located approximately 4.5 miles directly north of the Facility location. The data was processed by Albuquerque-Bernalillo County AQP with AERMET Version 19191 for 2014 through 2018. This dataset has less than 1 percent (%) calms and missing data.

Wind speeds and directions for this dataset are presented in the wind rose in Figure 6-1.

[2] Meteorological data files for Albuquerque Municipal Airport were provided via email by Kyle Tumpane on September 28, 2023 (Tumpane, pers. comm. 2023).

Figure 6-1. Windrose for the 2014 to 2018 Meteorological Data for the Albuquerque Airport



6.2.3 Building Downwash

Building influences on the air dispersion of emissions from point source stacks was calculated by incorporating the EPA Building Profile Input Program for use with the PRIME algorithm. Stack heights, building locations, and building dimensions were obtained from the most current design drawings. Stacks located on or adjacent to buildings were assigned base elevations of those buildings.

Table 6-5 includes building heights and coordinates as included in the model.

Table 6-5. Model Building Information

Building	Tier Height (m)	Corner 1		Corner 2		Corner 3		Corner 4	
		Easting X (m)	Northing Y (m)	Easting X (m)	Northing Y (m)	Easting X (m)	Northing Y (m)	Easting X (m)	Northing Y (m)
CellFab	12.19	353,938	3,871,325	354,525	3,871,464	354,501	3,871,565	353,914	3,871,426
ModCo	12.19	354,104	3,871,205	354,139	3,871,055	354,596	3,871,163	354,561	3,871,314
Bldg_1	6.10	354,198	3,871,343	354,213	3,871,276	354,280	3,871,292	354,264	3,871,358
Bldg_2	6.10	354,267	3,871,359	354,272	3,871,338	354,315	3,871,348	354,310	3,871,369
Bldg_3	6.10	354,365	3,871,359	354,343	3,871,353	354,353	3,871,314	354,375	3,871,319
Bldg_4	6.10	354,308	3,871,326	354,315	3,871,297	354,343	3,871,304	354,336	3,871,333
Bldg_5	6.10	354,486	3,871,420	354,501	3,871,355	354,565	3,871,370	354,550	3,871,435
Cooling Tower	8.23	354,324	3,871,370	354,369	3,871,381	354,371	3,871,371	354,326	3,871,361

Notes:
m = meters
All coordinates in UTM NAD83, Zone 13 coordinate system.

6.2.4 Good Engineering Practice Stack Height

As part of this analysis, a good engineering practice (GEP) stack height screening was performed to determine stack heights that will be used in the modeling. The GEP stack height is defined as the height at which the plume dispersion from the stack is not influenced by building downwash. This GEP stack height is calculated as the lesser of the following two (2) criteria:

- 65 meters
- The sum of the maximum building height for which the stack is in the area of influence plus 1.5 times the lesser of the building height or projected building width

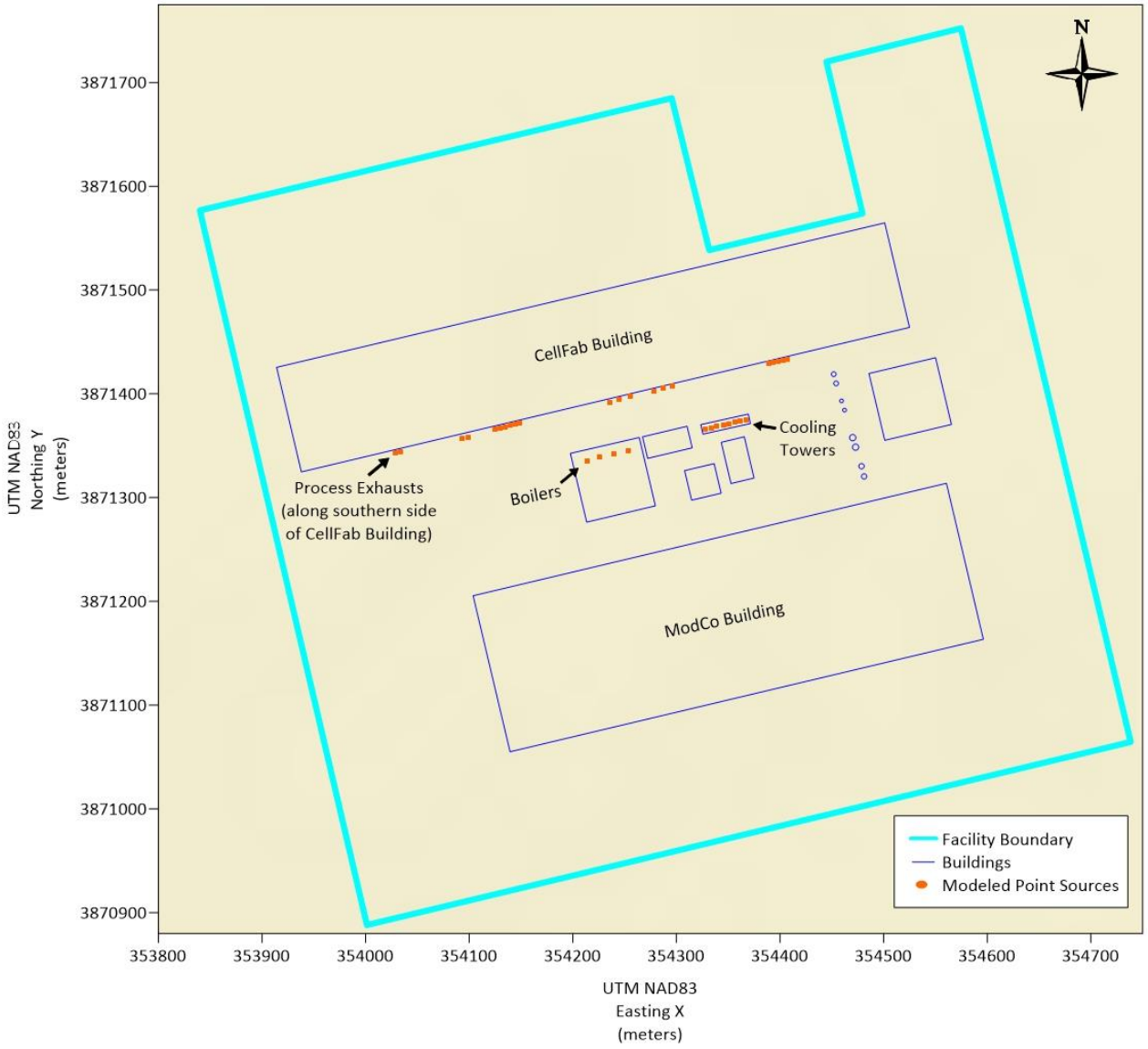
The stack heights that were used in dispersion modeling will be the actual stack height or the GEP stack height, whichever is less.

6.2.5 Ambient Air Boundary

The ambient air boundary is defined by the Maxeon-owned property within which public access is precluded.

Figure 6-2 shows the Facility model layout within the ambient air boundary.

Figure 6-2. Model Layout



6.2.6 Rural versus Urban Option

Aerial imagery of the Facility location and surrounding areas indicates sparsely populated rural land with minimal industry within a 3-kilometer radius; therefore, the more conservative model option of rural has been used for the modeling.

6.2.7 Receptors

The ambient air boundary has been defined by the area around Maxeon property for which public access is precluded. The selection of receptors in AERMOD was as follows:

- Discrete receptors every 25 meters (m) around the ambient air boundary
- 25-m spacing from the ambient air boundary to 50 m from grid origin

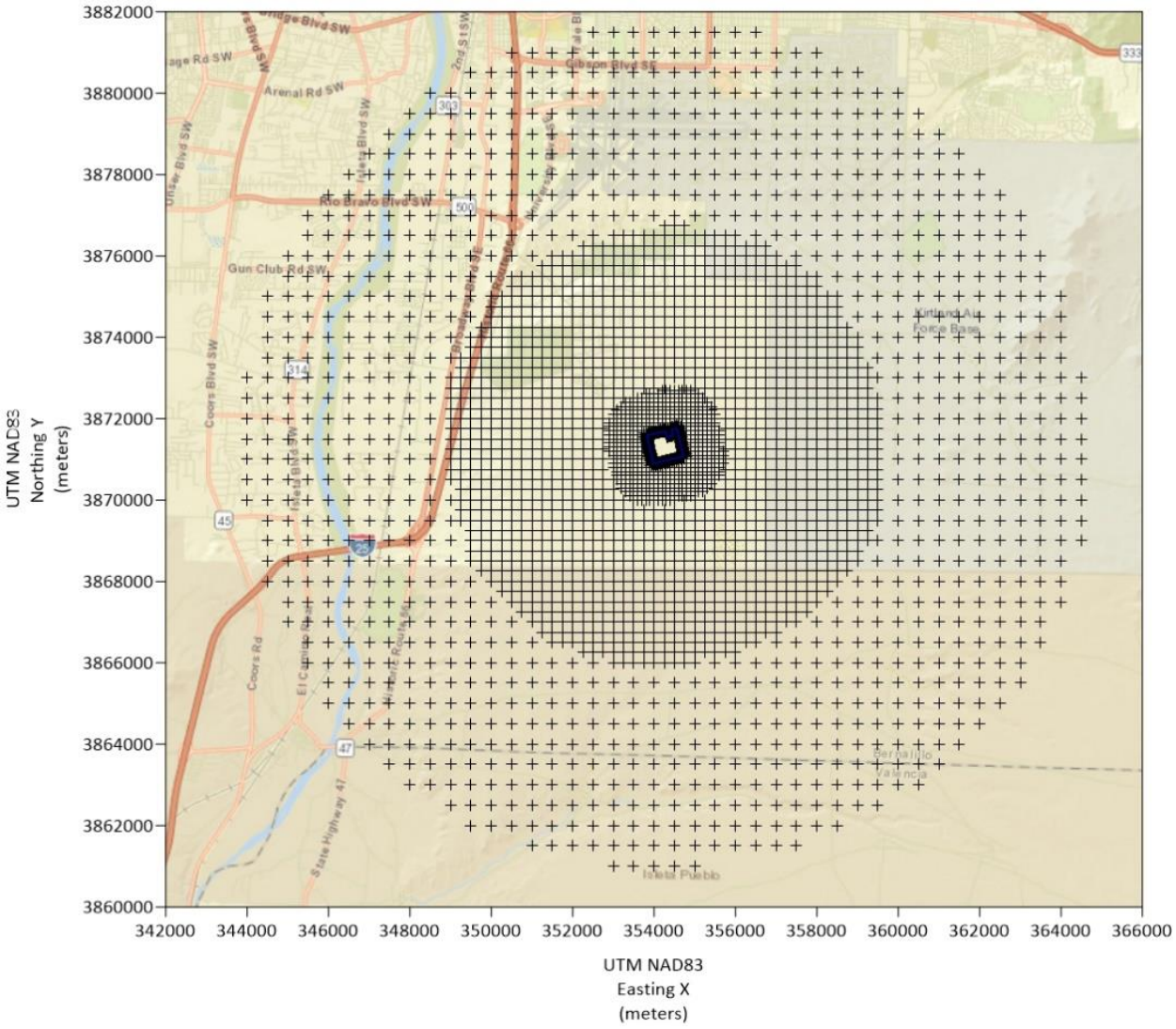
- 50-m spacing from beyond 50 m to 100 m from the ambient air boundary
- 100-m spacing from beyond 100 m to 1,000 m from the ambient air boundary
- 250-m spacing from beyond 1,000 m to 5,000 m from the ambient air boundary
- 500-m spacing from beyond 5,000 m to 10,000 m from the ambient air boundary

Receptor elevations were calculated by AERMAP as described below.

AERMAP (Version 18081) was used to process terrain elevation data for all sources and receptors using National Elevation Dataset files prepared by the USGS. AERMAP first determines the base elevation at each source and receptor. For complex terrain, AERMOD captures the physics of dispersion and creates elevation data for the surrounding terrain identified by a parameter called hill height scale. AERMAP creates hill height scale by searching for the terrain height and location that has the greatest influence on dispersion for each individual source and receptor. Both the base elevation and hill-height scale data are produced for each receptor by AERMAP as a file or files that can be directly accessed by AERMOD.

All receptors and source locations were expressed in the UTM NAD83, Zone 13 coordinate system. Figure 6-3 shows the receptor grid used within the model.

Figure 6-3. Receptor Grid



6.2.8 Criteria Pollutant Background Concentrations

Ambient background concentrations were be added to model results for comparison to the NAAQS/NMAAQS. Background concentration values for all pollutant averaging times were obtained from the Albuquerque-Bernalillo County AQP via email on September 28, 2023 (Tumpane, pers. comm. 2023). Background concentrations were used from the following two air monitoring stations:

- 1-hour and 8-hour CO, 24-hour PM_{10}, 2022 SO_2, and 24-hour and annual $PM_{2.5}$ background concentration values are from the South Valley Monitor Air Quality Station (AQS) Site ID: 35-001-0029, located at 201 Prosperity Ave Southeast (SE) in Albuquerque, New Mexico. Located approximately 4.2 miles northwest of the Facility.
- 1-hour, 24-hour, and annual SO_2, and 1-hour and annual NO_2 background concentration values are from the Del Norte AQS Site ID: 35-001-0023, located at 4700A San Mateo Boulevard Northeast (NE) in Albuquerque, New Mexico. Located approximately 11 miles north of the Facility.

Background concentrations for each criteria pollutant are shown in Table 6-6 for NAAQS comparisons.

Table 6-6. Criteria Pollutant Background Concentrations

Pollutant	Averaging Period	Value Chosen	Value	Units	Monitor
CO	1-hour	Second Max 1-hour	2,290	µg/m³	South Valley
CO	8-hour	Second Max 8-hour	1,259	µg/m³	South Valley
SO_2	1-hour	99th Percentile	13.1	µg/m³	Del Norte
SO_2	3-hour	First Max 1-hour	--	µg/m³	N/A
SO_2	24-hr	Second Max 24-hour	< 0.0	µg/m³	Del Norte
SO_2	Annual	Annual Mean	< 0.0	µg/m³	Del Norte
PM_{10}	24-hour	First Max	45	µg/m³	South Valley
$PM_{2.5}$	24-hour	98th Percentile	23.0	µg/m³	South Valley
$PM_{2.5}$	Annual	Weighted Annual Mean	9.1	µg/m³	South Valley
NO_2	1-hour	98th Percentile	84.6	µg/m³	Del Norte
NO_2	Annual	Annual Mean	19.0	µg/m³	Del Norte

Note: µg/m³ = microgram(s) per cubic meter

6.3 Air Quality Impact Analysis

This air quality analysis was conducted according to the procedures stipulated in *Appendix W of 40 CFR Part 51—Guideline On Air Quality Models (Revised)* (EPA 2017) and *Air Dispersion Modeling Guidelines for Air Quality Permitting* (Albuquerque-Bernalillo County AQP 2019).

6.3.1 Criteria Pollutants

Modeled concentrations of CAPs emitted by the Facility were compared to the applicable significant impact level (SIL) shown in Table 6-7. Concentrations that were not significant (that is, they are less than the SIL) demonstrate that the Facility will not significantly cause or contribute to a violation of the NAAQS. For impacts that are above the SIL, a cumulative modeling analysis was performed.

Table 6-7. Summary of Criteria Pollutant Air Quality Standards

Pollutant	Averaging Period	Significant Impact Level (µg/m³)	NAAQS (µg/m³)	NMAAQS (µg/m³)
CO	1-Hour	2,000[a]	40,069.6[b]	14,997.5[a]
	8-Hour	500[a]	10,303.6[b]	9,960.1[a]
NO_2	1-Hour	7.52[a]	188.03[c]	188.03[c]

Pollutant	Averaging Period	Significant Impact Level (µg/m³)	NAAQS (µg/m³)	NMAAQS (µg/m³)
	Annual	1[a]	99.66[a]	94.02[a]
$PM_{2.5}$	24-Hour	1.2[a]	35[d]	--
	Annual	0.2[a]	12[e]	--
PM_{10}	24-Hour	5[a]	150[f]	--
SO_2	1-Hour	7.8[a]	196.4[g]	--
	3-Hour	25[a]	1,309.3[h,i]	--
	24-Hour	5[a]	--	261.9[a]
	Annual	1[a]	--	52.4[a]

Notes:
Source: NMED Air Dispersion Modeling Guidelines (July 2022)
-- = Not applicable
[a] Maximum modeled concentration.
[b] Highest of the second highest (H2H) concentration.
[c] 5-year average of the annual 98th percentile (H8H) maximum daily 1-hour concentrations.
[d] 5-year average of the annual 98th percentile (H8H) maximum 24-hour concentrations.
[e] 5-year average of maximum annual concentrations.
[f] Highest of the sixth highest (H6H) 24-hour modeled concentrations over 5 years.
[g] 5-year average of the annual 99th percentile (H4H) maximum daily 1-hour concentrations.
[h] Highest of the second highest (H2H) 3-hour concentration over each of the five years.
[i] Secondary standard.

6.3.2 Nitrogen Dioxide Modeling Approach

EPA's *Appendix W of 40 CFR Part 51—Guideline On Air Quality Models (Revised)* (EPA 2017) recommends a tiered screening approach to characterize the conversion of total NO_X from the proposed source to NO_2. A Tier 1 approach assumes a 100 percent conversion of total NO_X to NO_2 and is typically overly conservative. The Tier 2 approach allows for the use of the Ambient Ratio Method 2 (ARM2). The Tier 1 and Tier 2 options do not require agency approval.

A Tier 2 approach has been used for this analysis using ARM2 options in AERMOD to calculate ambient NO_2 concentrations surrounding the site by applying a NO_2/ NO_X equilibrium ratio of 0.90 and a default NO_2/ NO_X in-stack ratio of 0.5.

6.3.3 Special Methods for Modeling Emissions

All four (4) natural gas boilers are expected to operate at 100% load at any given time. However, all four (4) of the boilers are not expected to operate continuously; therefore, the annual modeled emissions assume that all four boilers can operate up to 4,380 hours per year. All other emission rates used in this compliance analysis use an 8,760-hour/year runtime basis.

The acid and alkaline scrubbers as well as the CellFab general exhaust releases are expected to be in a +1 configuration for backup purposes. Each discrete emission source was included in the model, but in some cases, emissions are only expected to be released from fewer point sources based on expected use and operation.

6.4 Model Results

The results of this air dispersion modeling analysis indicate that the Facility would be in compliance with the respective NAAQS and New Mexico AAQS. Details of the results are provided in the following sections. The associated modeling files for this analysis will be provided separately via a storage device sent to the AQP.

6.4.1 Significant Impact Levels (SIL) Analyses

For each modeled pollutant that is below the respective SIL, the Facility would not cause or contribute to an exceedance of the NAAQS and the modeling is completed for that pollutant. Modeled pollutants that exceed the respective SIL require a cumulative analysis to determine compliance with the NAAQS and NMAAQS. When comparing modeled results to the SILs the high first high (H1H) modeled result was used for every short-term standard. 'Disable Special Processing' was checked within the model to enable this.

The results of the SIL analysis are included in Table 6-8 below demonstrating that modeling is completed for the 1-hour CO, 8-hour CO, annual NO_2, 24-hour PM_{10}, 3-hour SO_2, 24-hour SO_2, and annual SO_2 averaging periods and a cumulative analysis is required for 1-hour NO_2, 24-hour $PM_{2.5}$, annual $PM_{2.5}$ and 1-hour SO_2.

Table 6-8. Summary of Significant Impact Level Analyses

Pollutant	Averaging Period	Maximum Modeled Concentration (µg/m³) [a]	Significant Contribution Level (µg/m³)	Cumulative Analysis Required
CO	1-Hour	128.74	2,000	No
	8-Hour	32.22	500	No
NO_2	1-Hour	20.34	7.5	Yes
	Annual	0.36	1	No
$PM_{2.5}$	24-Hour	2.63	1.2	Yes
	Annual	0.29	0.2	Yes
PM_{10}	24-Hour	3.12	5	No
SO_2	1-Hour	20.62	7.8	Yes
	3-Hour	8.94	25	No
	24-Hour	3.03	5	No
	Annual	0.26	1	No

Notes:

[a] Maximum modeled concentration represents maximum impact of respective averaging of all five individual modeled years (2014–2018).

6.4.2 Cumulative NAAQS Impact Analyses

For each modeled pollutant for which the Facility exceeded the SIL, a cumulative NAAQS analysis was performed.

Based on email correspondence from the Albuquerque-Bernalillo AQP on November 22, 2023, a surrounding source search was performed by AQP personnel that found closest permitted stationary

sources to be more than 5.5 kilometers from the Facility fenceline. Therefore, no surrounding sources were required to be included within the cumulative NAAQS modeling analysis.

The results of the cumulative analysis NAAQS modeling indicated the Facility would not significantly cause or contribute to a violation of the NAAQS or NMAAQS. Detailed results of this analysis are included in Table 6-9.

Table 6-9. Summary of Cumulative NAAQS Impact Analyses

Pollutant	Averaging Period	Modeled Design Concentration (µg/m³)	Background Concentration (µg/m³)	Total Impact (µg/m³)	NAAQS (µg/m³)	NMAQQS (µg/m³)
NO_2	1-Hour[a]	12.93	84.6	97.53	188.03	188.03
$PM_{2.5}$	24-Hour[b]	1.41	23.0	24.41	35	--
	Annual[c]	0.29	9.1	9.39	12	--
SO_2	1-Hour[d]	14.71	13.1	27.81	196.4	--

Notes:
[a] Highest of 5-year averages of the 98th percentile (H8H) of the annual distribution of maximum daily 1-hour concentrations.
[b] Highest of 5-year averages of the 98th percentile (H8H) of the annual distribution of maximum 24-hour concentrations.
[c] Highest of the 5-year averages of annual concentrations.
[d] Highest of 5-year averages of the 99th percentile (H4H) of the annual distribution of maximum daily 1-hour concentrations.

7. References

40 Code of Federal Regulations (CFR) Part 60, Subpart A. 2023. Standards of Performance for New Stationary Sources, General Provisions [40 CFR 60].

40 Code of Federal Regulations (CFR) Part 60, Subpart Dc. 2023. Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units [40 CFR 60.48(c)].

40 Code of Federal Regulations (CFR) Part 60, Subpart IIII. 2023. Standards of Performance for Stationary Compression Ignition Internal Combustion Engines [40 CFR 60.4205, 40 CFR 60.4207, 40 CFR 60.4209, 40 CFR 60.4211].

40 Code of Federal Regulations (CFR) Part 60, Subpart Kb. 2023. Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984 [40 CFR 60.116b(c)].

40 Code of Federal Regulations (CFR) Part 63, Subpart ZZZZ. 2023. National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines [40 CFR 63].

40 Code of Federal Regulations (CFR) Part 63, Subpart JJJJJJ. 2023. National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources [40 CFR 63].

Albuquerque–Bernalillo County Air Quality Program (Albuquerque–Bernalillo County AQP). 2019. *Air Dispersion Modeling Guidelines for Air Quality Permitting*. https://documents.cabq.gov/environmental-health/airquality/ADM/final%20COA%20Oct2019%20guidelines.pdf.

AP-42. 1998. Compilation of Air Emissions Factors, Fifth Edition, Volume I, Chapter 1: External Combustion Sources [AP-42 Chapter 1.4].

AP-42. 1996. Compilation of Air Emissions Factors, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combustion Sources [AP-42 Chapter 3.4].

New Mexico Administrative Code (NMAC). 2001. Title 20 Environmental Protection Chapter 2 Air Quality (Statewide) Part 72 Construction Permits [NMAC 20.2.72].

New Mexico Administrative Code (NMAC). 2014. Title 20 Environmental Protection Chapter 11 Albuquerque – Bernalillo County Air Quality Control Board Part 41 Construction Permits [NMAC 20.11.02, 20.11.05, 20.11.08, 20.11.20, 20.11.40, 20.11.41, 20.11.42, 20.11.46, 20.11.47, 20.11.49, 20.11.60, 20.11.61, 20.11.63, 20.11.64, 20.11.65, 20.11.66, 20.11.67].

Oklahoma Department of Environmental Quality (DEQ). 2023. Storage Tank Emissions Tool. https://www.deq.ok.gov/air-quality-division/air-permits/storage-tank-emissions-calculation-tool/

Tumpane, Kyle. 2023. Personal communication (external email) with Jacobs regarding AERMOD Meteorological Data. September 28.

Tumpane, Kyle. 2023. Personal communication (external email) with Jacobs regarding Maxeon Facility Modeling Protocol Approval. November 22.

U.S. Environmental Protection Agency (EPA). 2017. *Appendix W of 40 CFR Part 51—Guideline On Air Quality Models (Revised)*. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, JanuaryPublic Notice DocumentationModeling Information

Appendix A. Application Forms

City of Albuquerque
Environmental Health Department
Air Quality Program

Construction Permit (20.11.41 NMAC)
Application Checklist

This checklist must be returned with the application

Any person seeking a new air quality permit, a permit modification, or an emergency permit under 20.11.41 NMAC (Construction Permits) shall do so by filing a written application with the Albuquerque-Bernalillo County Joint Air Quality Program, which administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County"), on behalf of the City Environmental Health Department ("Department").

The Department will rule an application administratively incomplete if it is missing or has incorrect information. The Department may require additional information that is necessary to make a thorough review of an application, including but not limited to technical clarifications, emission calculations, emission factor usage, additional application review fees if any are required by 20.11.2 NMAC, and new or additional air dispersion modeling.

If the Department has ruled an application administratively incomplete three (3) times, the Department will deny the permit application. Any fees submitted for processing an application that has been denied will not be refunded. If the Department denies an application, a person may submit a new application and the fee required for a new application. The applicant has the burden of demonstrating that a permit should be issued.

The following are the minimum elements that shall be included in the permit application before the Department can determine whether an application is administratively complete and ready for technical review. It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.

At all times before the Department has made a final decision regarding the application, an applicant has a duty to promptly supplement and correct information the applicant has submitted in an application to the Department. The applicant's duty to supplement and correct the application includes but is not limited to relevant information acquired after the applicant has submitted the application and additional information the applicant otherwise determines is relevant to the application and the Department's review and decision. While the Department is processing an application, regardless of whether the Department has determined the application is administratively complete, if the Department determines that additional information is necessary to evaluate or make a final decision regarding the application, the Department may request additional information and the applicant shall provide the requested additional information.

NOTICE REGARDING PERMIT APPEALS: A person who has applied for or has been issued an air quality permit by the Department shall be an obligatory party to a permit appeal filed pursuant to 20.11.81 NMAC.

NOTICE REGARDING SCOPE OF A PERMIT: The Department's issuance of an air quality permit only authorizes the use of the specified equipment pursuant to the air quality control laws, regulations and conditions. Permits relate to air quality control only and are issued for the sole purpose of regulating the emission of air contaminants from said equipment. Air quality permits are not a general authorization for the location, construction and/or operation of a facility, nor does a permit authorize any particular land use or other form of land entitlement. It is the applicant's/permittee's responsibility to obtain all other necessary permits from the appropriate agencies, such as the City Planning Department or County Department of Planning and Development Services, including but not limited to site plan approvals, building permits, fire department approvals and the like, as may be required by law for the location, construction and/or operation of a facility. For more information, please visit the City Planning Department website at https://www.cabq.gov/planning and the County Department of Planning and Development Services website at https://www.bernco.gov/planning.

The Applicant shall:

20.11.41.13(A) NMAC – Pre-Application Requirements:

Item	Completed	N/A[1]	Waived[2]
(1) Request a pre-application meeting with the Department using the pre-application meeting request form. Include a copy of the request form submitted to the Department.	☒	☐	☐
(2) Attend the pre-application meeting. Date of pre-application meeting: **November 15, 2023**	☒	☐	☐
Pre-application meeting agenda and public notice sign checklists included with application?	☒	☐	☐

1. *Not Applicable*
2. *It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.*

20.11.41.13(B) NMAC – Applicant's Public Notice Requirements:

Item	Included in Application	N/A[1]	Waived[2]
(1) Provide public notice in accordance with the regulation, including by certified mail or electronic copy to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are within one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located.	☒	☐	☐
• Contact list of representative(s) of recognized neighborhood associations and recognized coalitions cannot be more than three months old from the application submittal date. • Include contact list provided by Department in application submittal.	☒	☐	☐
• Provide notice using the Notice of Intent to Construct form and Applicant Notice Cover Letter.	☒	☐	☐
(2) In accordance with the regulation, post and maintain in a visible location a weather proof sign provided by the Department. Include pictures in application.	☒	☐	☐
Documentary proof of all public notice requirements listed above and required by 20.11.41.13(E)(15) included with application?	☒	☐	☐

1. *Not Applicable; For emergency permits, the public notice requirements in 20.11.41.24 NMAC shall apply instead.*
2. *It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.*

20.11.41.13(D) NMAC

Item	Included in Application
A person who is seeking a construction permit pursuant to 20.11.41 NMAC shall complete a permit application and file one complete original and one duplicate copy with the Department.	☒
• A high-quality electronic duplicate copy is required by the Department to speed up review and allow for the Department public notice to be posted online. The electronic copy must be an exact duplicate of the hardcopy original, including pages with signatures such as the application certification page. Note: Do not include financial information, such as a copy of a check, in the electronic PDF.	☒
The electronic submittal on thumb drive, unless alternate method is allowed by the Department, must also include modeling files, if applicable, and emission calculations file(s) in Microsoft Excel-compatible format.	☒

The Permit Application shall include:

20.11.41.13(E) NMAC – Application Contents

Item	Included in Application	N/A[1]	Waived[2]
(1) A complete permit application on the most recent form provided by the Department.	☒	☐	☐
(2) The application form includes:			
a. The applicant's name, street and post office address, and contact information;	☒	☐	☐
b. The facility owner/ operator's name, street address and mailing address, if different from the applicant;	☒	☐	☐
c. The consultant's name and contact information, if applicable;	☒	☐	☐
d. All information requested on the application form is included (*i.e.*, the form is complete).	☒	☐	☐
(3) The date the application was submitted to the Department.	☒	☐	☐
(4) Sufficient attachments for the following:			
a. Ambient impact analysis using an atmospheric dispersion model approved by the U.S. Environmental Protection Agency, and the Department to demonstrate compliance with the applicable National Ambient Air Quality Standards (NAAQS). *See* 20.11.1 NMAC. If you are modifying an existing source, the modeling must include the emissions of the entire source to demonstrate the impact the new or modified source(s) will have on existing plant emissions.	☒	☐	☐
b. The air dispersion model has been executed pursuant to a protocol that was approved in advance by the Department.	☒	☐	☐
c. Air dispersion modeling approved (or 2nd denied) protocol date: **November 22, 2023**	☒	☐	☐
d. Basis or source for each emission rate (including manufacturer's specification sheets, AP-42 section sheets, test data, or corresponding supporting documentation for any other source used).	☒	☐	☐
e. All calculations used to estimate potential emission rates and controlled/proposed emissions.	☒	☐	☐
f. Basis for the estimated control efficiencies and sufficient engineering data for verification of the control equipment operation, including if necessary, design, drawing, test report and factors which affect the normal operation.	☒	☐	☐
g. Fuel data for each existing and/or proposed piece of fuel burning equipment.	☒	☐	☐
h. Anticipated maximum production capacity of the entire facility and the requested production capacity after construction and/or modification.	☒	☐	☐
i. Stack and exhaust gas parameters for all existing and proposed emission stacks.	☒	☐	☐
(5) An operational and maintenance strategy detailing:	☒	☐	☐
a. the steps the applicant will take if a malfunction occurs that may cause emission of a regulated air contaminant to exceed a limit that is included in the permit;	☒	☐	☐
b. the nature of emissions during routine startup or shutdown of the source and the source's air pollution control equipment; and	☒	☐	☐
c. the steps the applicant will take to minimize emissions during routine startup or shutdown.	☒	☐	☐
(6) A map, such as a 7.5'-topographic quadrangle map published by the U.S. Geological Survey or a map of equivalent or greater scale, detail, and precision, including a City or County zone atlas map that shows the proposed location of each process equipment unit involved in the proposed construction, modification, or operation of the source, as applicable.	☒	☐	☐

Item	Included in Application	N/A[1]	Waived[2]
(7) An aerial photograph showing the proposed location of each process equipment unit involved in the proposed construction, modification, relocation or technical revision of the source except for federal agencies or departments involved in national defense or national security as confirmed and agreed to by the Department in writing.	☒	☐	☐
(8) A complete description of all sources of regulated air contaminants and a process flow diagram depicting the process equipment unit or units at the facility, both existing and proposed, that are proposed to be involved in routine operations and from which regulated air contaminant emissions are expected to be emitted.	☒	☐	☐
(9) A full description of air pollution control equipment, including all calculations and the basis for all control efficiencies presented, manufacturer's specifications sheets, and site layout and assembly drawings; UTM (universal transverse mercator) coordinates shall be used to identify the location of each emission unit.	☒	☐	☐
(10) A description of the equipment or methods proposed by the applicant to be used for emission measurement.	☒	☐	☐
(11) The maximum and normal operating time schedules of the source after completion of construction or modification, as applicable.	☒	☐	☐
(12) Any other relevant information as the Department may reasonably require, including without limitation:	☒	☐	☐
a. Provide an applicability determination for all potentially applicable federal regulations.	☒	☐	☐
b. Applicants shall provide documentary proof that the proposed air quality permitted use of the facility's subject property is allowed by the zoning designation of the City or County zoning laws, as applicable. Sufficient documentation includes: (i) a zoning certification from the City Planning Department or County Department of Planning and Development Services, as applicable, if the property is subject to City or County zoning jurisdiction; or (ii) a zoning verification from both planning departments if the property is not subject to City or County zoning jurisdiction.[3] A zone atlas map shall not be sufficient.	☒	☐	☐
c. Compliance History Disclosure Form[4]	☒	☐	☐
(13) The signature of the applicant, operator, owner or an authorized representative, certifying to the accuracy of all information as represented in the application and attachments, if any.	☒	☐	☐
(14) A check or money order for the appropriate application fee or fees required by 20.11.2 NMAC, *Fees*. (Online fee payments are now accepted as well. Application must be submitted first, then Department will provide invoice for online payment.)	☒	☐	☐

1. *Not Applicable*
2. *It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.*
3. *Applicants are not required to submit documentation for the subject property's zoning designation when applying for a relocation of a portable stationary source, or a technical or administrative revision to an existing permit.*
4. *Required for applications filed pursuant to the following regulations: Construction Permits (20.11.41 NMAC); Operating Permits (20.11.42 NMAC); Nonattainment Areas (20.11.60 NMAC); Prevention of Significant Deterioration (20.11.61 NMAC); and Acid Rain (20.11.62 NMAC); except this Form shall not be required for asbestos notifications under 20.11.20.22 NMAC, and this Form shall only be required for administrative permit revision (20.11.41.28(A) NMAC) and administrative permit amendments (20.11.42.12(E)(1) NMAC) when the action requested is a transfer of ownership. Air Quality Program staff can answer basic questions about the Compliance History Disclosure Form but will not provide specific advice about which boxes to check or whether information must be disclosed. The decision about how to answer a question and whether there is information to disclose is the responsibility of applicants/permittees.*

City of Albuquerque

Environmental Health Department
Air Quality Program

Permit Application Review Fee Instructions

All source registration, authority-to-construct, and operating permit applications for stationary or portable sources shall be charged an application review fee according to the fee schedule in 20.11.2 NMAC. These filing fees are required for both new construction, reconstruction, and permit modifications applications. Qualified small businesses as defined in 20.11.2 NMAC may be eligible to pay one-half of the application review fees and 100% of all applicable federal program review fees.

Please fill out the permit application review fee checklist and submit with a check or money order payable to the "City of Albuquerque Fund 242" and either:

1. be delivered in person to the Albuquerque Environmental Health Department, 3rd floor, Suite 3023 or Suite 3027, Albuquerque-Bernalillo County Government Center, south building, One Civic Plaza NW, Albuquerque, NM or,

2. mailed to Attn: Air Quality Program, Albuquerque Environmental Health Department, P.O. Box 1293, Albuquerque, NM 87103.

The department will provide a receipt of payment to the applicant. The person delivering or filing a submittal shall attach a copy of the receipt of payment to the submittal as proof of payment Application review fees shall not be refunded without the written approval of the manager. If a refund is requested, a reasonable professional service fee to cover the costs of staff time involved in processing such requests shall be assessed. Please refer to 20.11.2 NMAC (effective January 10, 2011) for more detail concerning the "Fees" regulation as this checklist does not relieve the applicant from any applicable requirement of the regulation.

City of Albuquerque

Environmental Health Department
Air Quality Program

Permit Application Review Fee Checklist Effective January 1, 2023 – December 31, 2023

Please completely fill out the information in each section. Incompleteness of this checklist may result in the Albuquerque Environmental Health Department not accepting the application review fees. If you should have any questions concerning this checklist, please call 768-1972.

I. COMPANY INFORMATION:

Company Name	Maxeon Solar Technologies	
Company Address	5700 University Blvd SE, Ste 200, Albuquerque, NM 87106	
Facility Name	Maxeon Mesa Del Sol (MMDS)	
Facility Address	TBD	
Contact Person	Donald Foldenauer	
Contact Person Phone Number	408-489-3388	
Are these application review fees for an existing permitted source located within the City of Albuquerque or Bernalillo County?	**Yes** ☐	**No** ☒
If yes, what is the permit number associated with this modification?	**Permit #** N/A	
Is this application review fee for a Qualified Small Business as defined in 20.11.2 NMAC? (See Definition of Qualified Small Business on Page 4)	**Yes** ☐	**No** ☒

II. STATIONARY SOURCE APPLICATION REVIEW FEES:

If the application is for a new stationary source facility, please check all that apply. If this application is for a modification to an existing permit please see Section III.

Check All That Apply	Stationary Sources	Review Fee	Program Element
Air Quality Notifications			
☐	AQN New Application	$645.00	2801
☐	AQN Technical Amendment	$352.00	2802
☐	AQN Transfer of a Prior Authorization	$352.00	2803
☐	*Not Applicable*	*See Sections Below*	
Stationary Source Review Fees (Not Based on Proposed Allowable Emission Rate)			
☐	Source Registration required by 20.11.40 NMAC	$ 657.00	2401
☐	A Stationary Source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$1,314.00	2301
☐	*Not Applicable*	*See Sections Below*	
Stationary Source Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)			
☐	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$986.00	2302
☐	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$1,971.00	2303
☐	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$3,942.00	2304
☐	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$5,913.00	2305
☒	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$7,884.00	2306
☐	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$9,855.00	2307
☐	*Not Applicable*	*See Section Above*	

Federal Program Review Fees for each subpart (In addition to the Stationary Source Application Review Fees above)			
☒	40 CFR 60 - "New Source Performance Standards" (NSPS)	$1,314.00	2308
☐	40 CFR 61 - "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$1,314.00	2309
☐	40 CFR 63 - (NESHAPs) Promulgated Standards	$1,314.00	2310
☐	40 CFR 63 - (NESHAPs) Case-by-Case MACT Review	$13,140.00	2311
☐	20.11.61 NMAC, Prevention of Significant Deterioration (PSD) Permit	$6,570.00	2312
☐	20.11.60 NMAC, Non-Attainment Area Permit	$6,570.00	2313
☐	*Not Applicable*	*Not Applicable*	

III. MODIFICATION TO EXISTING PERMIT APPLICATION REVIEW FEES:

If the permit application is for a modification to an existing permit, please check all that apply. If this application is for a new stationary source facility, please see Section II.

Check All That Apply	Modifications	Review Fee	Program Element
Modification Application Review Fees (Not Based on Proposed Allowable Emission Rate)			
☐	Proposed modification to an existing stationary source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$1,314	2321
☒	*Not Applicable*	*See Sections Below*	
Modification Application Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)			
☐	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$986.00	2322
☐	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$1,971.00	2323
☐	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$3,942.00	2324
☐	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$5,913.00	2325
☐	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$7,884.00	2326
☐	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$9,855.00	2327
☒	*Not Applicable*	*See Section Above*	
Major Modifications Review Fees (In addition to the Modification Application Review Fees above)			
☐	20.11.60 NMAC, Permitting in Non-Attainment Areas	$6,570	2333
☐	20.11.61 NMAC, Prevention of Significant Deterioration	$6,570	2334
☒	*Not Applicable*	*Not Applicable*	
Federal Program Review Fees for each subpart (This section applies only if a Federal Program Review is triggered by the proposed modification) (These fees are in addition to the Modification and Major Modification Application Review Fees above)			
☐	40 CFR 60 - "New Source Performance Standards" (NSPS)	$1,314.00	2328
☐	40 CFR 61 - "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$1,314.00	2329
☐	40 CFR 63 - (NESHAPs) Promulgated Standards	$1,314.00	2330
☐	40 CFR 63 - (NESHAPs) Case-by-Case MACT Review	$13,140.00	2331
☐	20.11.61 NMAC, Prevention of Significant Deterioration (PSD) Permit	$6,570.00	2332
☐	20.11.60 NMAC, Non-Attainment Area Permit	$6,570.00	2333
☒	*Not Applicable*	*Not Applicable*	

IV. ADMINISTRATIVE AND TECHNICAL REVISION APPLICATION REVIEW FEES:

If the permit application is for an administrative or technical revision of an existing permit issued pursuant to 20.11.41 NMAC, please check one that applies.

Check One	Revision Type	Review Fee	Program Element
☐	Administrative Revisions	$ 250.00	2340
☐	Technical Revisions	$ 500.00	2341
☒	*Not Applicable*	*See Sections II, III or V*	

V. PORTABLE STATIONARY SOURCE RELOCATION FEES:

If the permit application is for a portable stationary source relocation of an existing permit, please check one that applies.

Check One	Portable Stationary Source Relocation Type	Review Fee	Program Element
☐	No New Air Dispersion Modeling Required	$ 500.00	2501
☐	New Air Dispersion Modeling Required	$ 750.00	2502
☒	*Not Applicable*	*See Sections II, III or V*	

VI. Please submit a check or money order in the amount shown for the total application review fee.

Section Totals	Review Fee Amount
Section II Total	$10,512
Section III Total	$0
Section IV Total	$0
Section V Total	$0
Total Application Review Fee	**$10,512.00**

I, the undersigned, a responsible official of the applicant company, certify that to the best of my knowledge, the information stated on this checklist, give a true and complete representation of the permit application review fees which are being submitted. I also understand that an incorrect submittal of permit application reviews may cause an incompleteness determination of the submitted permit application and that the balance of the appropriate permit application review fees shall be paid in full prior to further processing of the application.

Signed this_____ day of _____ 20_____

Peter Aschenbrenner — **Print Name**

EVP — **Print Title**

Peter C Aschenbrenner — **Signature**

Definition of Qualified Small Business as defined in 20.11.2 NMAC:
"Qualified small business" means a business that meets all of the following requirements:

(1) a business that has 100 or fewer employees;
(2) a small business concern as defined by the federal Small Business Act;
(3) a source that emits less than 50 tons per year of any individual regulated air pollutant, or less than 75 tons per year of all regulated air pollutants combined; and
(4) a source that is not a major source or major stationary source.

Note: Beginning January 1, 2011, and every January 1 thereafter, an increase based on the consumer price index shall be added to the application review fees. The application review fees established in Subsection A through D of 20.11.2.18 NMAC shall be adjusted by an amount equal to the increase in the consumer price index for the immediately-preceding year. Application review fee adjustments equal to or greater than fifty cents ($0.50) shall be rounded up to the next highest whole dollar. Application review fee adjustments totaling less than fifty cents ($0.50) shall be rounded down to the next lowest whole dollar. The department shall post the application review fees on the city of Albuquerque environmental health department air quality program website.

Old Fee Total - Please Refer to Previous Page for Correct Fee Information

IV. ADMINISTRATIVE AND TECHNICAL REVISION APPLICATION REVIEW FEES:

If the permit application is for an administrative or technical revision of an existing permit issued pursuant to 20.11.41 NMAC, please check one that applies.

Check One	Revision Type	Review Fee	Program Element
☐	Administrative Revisions	$ 250.00	2340
☐	Technical Revisions	$ 500.00	2341
☒	*Not Applicable*	*See Sections II, III or V*	

V. PORTABLE STATIONARY SOURCE RELOCATION FEES:

If the permit application is for a portable stationary source relocation of an existing permit, please check one that applies.

Check One	Portable Stationary Source Relocation Type	Review Fee	Program Element
☐	No New Air Dispersion Modeling Required	$ 500.00	2501
☐	New Air Dispersion Modeling Required	$ 750.00	2502
☒	*Not Applicable*	*See Sections II, III or V*	

VI. Please submit a check or money order in the amount shown for the total application review fee.

Section Totals	Review Fee Amount
Section II Total	$11,814
Section III Total	$2,628
Section IV Total	$0
Section V Total	$0
Total Application Review Fee	**$14,442.00**

I, the undersigned, a responsible official of the applicant company, certify that to the best of my knowledge, the information stated on this checklist, give a true and complete representation of the permit application review fees which are being submitted. I also understand that an incorrect submittal of permit application reviews may cause an incompleteness determination of the submitted permit application and that the balance of the appropriate permit application review fees shall be paid in full prior to further processing of the application.

Signed this 27TH **day of** NOVEMBER **20** 23

JANE BROADHEAD
Print Name

VICE PRESIDENT GLOBAL FACILITIES
Print Title

Signature

Definition of Qualified Small Business as defined in 20.11.2 NMAC:
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(1) a business that has 100 or fewer employees;
(2) a small business concern as defined by the federal Small Business Act;
(3) a source that emits less than 50 tons per year of any individual regulated air pollutant, or less than 75 tons per year of all regulated air pollutants combined; and
(4) a source that is not a major source or major stationary source.

Note: Beginning January 1, 2011, and every January 1 thereafter, an increase based on the consumer price index shall be added to the application review fees. The application review fees established in Subsection A through D of 20.11.2.18 NMAC shall be adjusted by an amount equal to the increase in the consumer price index for the immediately-preceding year. Application review fee adjustments equal to or greater than fifty cents ($0.50) shall be rounded up to the next highest whole dollar. Application review fee adjustments totaling less than fifty cents ($0.50) shall be rounded down to the next lowest whole dollar. The department shall post the application review fees on the city of Albuquerque environmental health department air quality program website.

City of Albuquerque
Environmental Health Department
Air Quality Program

Air Quality
Compliance History Disclosure Form

The Albuquerque-Bernalillo County Joint Air Quality Program ("Program") administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County") on behalf of the City Environmental Health Department, including the New Mexico Air Quality Control Act ("AQCA"), NMSA 1978, Sections 74-2-1 to -17. In accordance with Sections 74-2-7(P) and (S) of the AQCA, the Program may deny any permit application or revoke any permit issued pursuant to the AQCA if, within ten years immediately preceding the date of submission of the permit application, the applicant or permittee meets any one of the criteria outlined in the AQCA. The Program requires applicants to file this Compliance History Disclosure Form in order for the Program to deem an air permit application administratively complete, or issue an air permit for those permits without an initial administrative completeness determination process. Additionally, an existing permit holder (permits issued prior to the Effective Date of this Form) shall provide this Compliance History Disclosure Form to the Program upon the Program's request. Note: Program Staff can answer basic questions about this Compliance History Disclosure Form but cannot provide specific guidance or legal advice.

Instructions

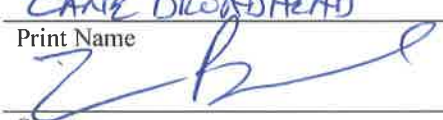
1. Applications filed pursuant to the following regulations shall include this Compliance History Disclosure Form, in accordance with Section 74-2-7(S) of the AQCA: *Construction Permits* (20.11.41 NMAC); *Operating Permits* (20.11.42 NMAC); *Nonattainment Areas* (20.11.60 NMAC); *Prevention of Significant Deterioration* (20.11.61 NMAC); *Acid Rain* (20.11.62 NMAC); and *Fugitive Dust* (20.11.20 NMAC) except this Form shall not be required for asbestos notifications under 20.11.20.22 NMAC.
2. The permittee identified on this Compliance History Disclosure Form shall match the permittee in the existing permit or new application. If the information in an existing permit needs to be changed, please contact the Program about revisions and ownership transfers.
3. Answer every question completely and truthfully, and do not leave any blank spaces. If there is nothing to disclose in answer to a particular question, check the box labeled "No." Failure to provide any of the information requested in this Compliance History Disclosure Form may constitute grounds for an incompleteness determination, application denial, or permit revocation.
4. Be especially careful not to leave out information in a way that might create an impression that you are trying to hide it. Omitting information, even unintentionally, may result in application denial or permit revocation.
5. If necessary, continue answers on a separate page and identify the question. If you submit any document in connection with your answer to any question, refer to it as, "Exhibit No.__", and attach it at the end of the Compliance History Disclosure Form, consecutively numbering each additional page at the top right corner.
6. The Program may require additional information to make a thorough review of an application. At all times before the Program has made a final decision regarding the application, an applicant has a duty to promptly supplement and correct information the applicant has submitted in an application to the Program. The applicant's duty to supplement and correct the application includes, but is not limited to, relevant information acquired after the applicant has submitted the application and additional information the applicant otherwise determines is relevant to the application and the Program's review and decision. While the Program is processing an application, regardless of whether the Program has determined the application is administratively complete, if the Program determines that additional information is necessary to evaluate or make a final decision regarding the application, the Program may request additional information and the applicant shall provide the requested additional information.
7. Supplementary information required by the Program may include responses to public comment received by the Program during the application review process.
8. Any fees submitted for processing an application that has been denied will not be refunded. If the Program denies an application, a person may submit a new application and the fee required for a new application. The applicant has the burden of demonstrating that a permit should be issued.

COMPLIANCE HISTORY		
A. Applicant/Permittee Name: **Maxeon Solar Technologies**		*Check Applicable Box*: ☒ Applicant ☐ Permittee
B. Time Period of Compliance Reporting (10 Years): [N/A] to [N/A] *Instructions: For applicants, answer the following questions with information from within the 10 years preceding the current application. For existing permit holders, answer the following questions with information from within the 10 years preceding the Program's issuance of the permit.*		
C. Questions		
1	Knowingly misrepresented a material fact in an application for a permit?	☐ Yes ☒ No
2	Refused to disclose information required by the provisions of the New Mexico Air Quality Control Act?	☐ Yes ☒ No
3	Been convicted in any court of any state or the United States of a felony related to environmental crime?	☐ Yes ☒ No
4	Been convicted in any court of any state or the United States of a crime defined by state or federal statute as involving or being in restraint of trade, price fixing, bribery, or fraud?	☐ Yes ☒ No
5a	Constructed or operated any facility for which a permit was sought, including the current application, without the required air quality permit(s) under 20.11.41 NMAC, 20.11.42 NMAC, 20.11.60 NMAC, 20.11.61 NMAC, or 20.11.62 NMAC?	☐ Yes ☒ No
5b	If "No" to question 5a, go to question 6. If "Yes" to question 5a, state whether each facility that was constructed or operated without the required air quality permit met at least one of the following exceptions: i. The unpermitted facility was discovered after acquisition during a timely environmental audit that was authorized by the Program or the New Mexico Environment Department; or ii. The operator of the facility, using good engineering practices and established approved calculation methodologies, estimated that the facility's emissions would not require an air permit, **and** the operator applied for an air permit within 30 calendar days of discovering that an air permit was required for the facility.	☐ Yes ☐ No
6	Had any permit revoked or permanently suspended for cause under the environmental laws of any state or the United States?	☐ Yes ☒ No
7	For each "yes" answer, please attach an explanation and supporting documentation.	

I, the undersigned, hereby certify under penalty of law that this Compliance History Disclosure Form (Form) and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. I have knowledge of the information in this Form and it is, to the best of my knowledge and belief, true, accurate, and complete. I understand that there are significant penalties for submitting false information, including denial of the application or revocation of a permit, as well as fines and imprisonment for knowing violations. If I filed an application, I covenant and agree to promptly supplement and correct information in this Form until the Program makes a final decision regarding the application. Further, I certify that I am qualified and authorized to file this Form, to certify to the truth and accuracy of the information herein, and bind the permittee and source.

Signed on [Click to Insert Date]

ZANE BROADHEAD
Print Name


Signature

VICE PRESIDENT GLOBAL FACILITIES
Print Title

MAXEON SOLAR TECHNOLOGIES
Company Name

City of Albuquerque – Environmental Health Department Air Quality Program

Please mail this application to **P.O. Box 1293, Albuquerque, NM 87103** or hand deliver between 8:00 am – 5:00 pm Monday – Friday to:

3rd Floor, Suite 3023 – One Civic Plaza NW, Albuquerque, NM 87102

(505) 768-1972 aqd@cabq.gov

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

Submittal Date: November 30, 2023

Owner/Corporate Information ☐ **Check here and leave this section blank if information is exactly the same as Facility Information below.**

Company Name: **Maxeon Solar Technologies**			
Mailing Address: **5700 University Blvd SE, Ste 200**	City: **Albuquerque**	State: **NM**	Zip: **87106**
Company Phone: **408-489-3388**	Company Contact: **Donald Foldenauer**		
Company Contact Title: **Facility General Manager**	Phone: **408-489-3388**	E-mail: **Donald.Foldenauer@maxeon.com**	

Stationary Source (Facility) Information: **Provide a plot plan (legal description/drawing of the facility property) with overlay sketch of facility processes, location of emission points, pollutant type, and distances to property boundaries.**

Facility Name: **Maxeon Solar Technologies**			
Facility Physical Address: **TBD**	City: **Albuquerque**	State: **NM**	Zip: **87106**
Facility Mailing Address (if different):	City:	State:	Zip:
Facility Contact: **Eric Hilbert**	Title: **Director of Facilities Workplace Services & EHS**		
Phone: **419-918-9741**	E-mail: **eric.hilbert@maxeon.com**		
Authorized Representative Name[1]: **TBD**	Authorized Representative Title: **TBD**		

Billing Information ☐ **Check here if same contact and mailing address as corporate** ☐ **Check here if same as facility**

Billing Company Name: **Maxeon Solar Technologies**			
Mailing Address: **65700 University Blvd SE, Ste 200**	City: **Albuquerque**	State: **NM**	Zip: **87106**
Billing Contact: **Eric Hilbert**	Title: **Director of Facilities Workplace Services & EHS**		
Phone: **419-918-9741**	E-mail: **eric.hilbert@maxeon.com**		

Preparer/Consultant(s) Information ☐ **Check here and leave section blank if no Consultant used or Preparer is same as Facility Contact.**

Name: **Moha Parikh**	Title: **Senior Air Consultant**		
Mailing Address: **6440 S. Milrock Dr. Suite 300**	City: **Holladay**	State: **UT**	Zip: **84121**
Phone: **801-580-8440**	Email: **moha.parikh@jacobs.com**		

1. See 20.11.41.13(E)(13) NMAC.

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

General Operation Information (if any question does not pertain to your facility, type N/A on the line or in the box)

☒ New Permit	☐ Permit Modification Current Permit #:	☐ Technical Permit Revision Current Permit #:	☐ Administrative Permit Revision Current Permit #:
☒ New Registration Certificate	☐ Modification Current Reg. #:	☐ Technical Revision Current Reg. #:	☐ Administrative Revision Current Reg. #:

UTM coordinates of facility (Zone 13, NAD 83): **354,312 meters East and 3,871,339 meters North**	
Facility type (*i.e.*, a description of your facility operations): **Solar Panel Manufacturing Plant**	
Standard Industrial Classification (SIC Code #): **17110403**	North American Industry Classification System (NAICS Code #): **221114**
Is this facility currently operating in Bernalillo County? **No**	If **YES**, list date of original construction: If **NO**, list date of planned startup: **9/1/25**
Is the facility permanent? **Yes**	If **NO**, list dates for requested temporary operation: From Through
Is the facility a portable stationary source? **No**	If **YES**, is the facility address listed above the main permitted location for this source?
Is the application for a physical or operational change, expansion, or reconstruction (*e.g.*, altering process, or adding, or replacing process or control equipment, etc.) to an existing facility? **No**	
Provide a description of the requested changes: **N/A, new facility**	
What is the facility's operation? ☒ Continuous ☐ Intermittent ☐ Batch	

Estimated percent of production/operation:	Jan-Mar: **25**	Apr-Jun: **25**	Jul-Sep: **25**	Oct-Dec: **25**
Requested operating times of facility:	**24** hours/day	**7** days/week	**4** weeks/month	**12** months/year

Will there be special or seasonal operating times other than shown above? This includes monthly- or seasonally-varying hours. **No**
If **YES**, please explain:
List raw materials processed: **--**
List saleable item(s) produced: **Solar Panels**

Permitting action being requested (please refer to the definitions in 20.11.40 NMAC or 20.11.41 NMAC):

USE INSTRUCTIONS: For the forms on the following pages, please do not alter or delete the existing footnotes or page breaks. If additional footnotes are needed then add them to the end of the existing footnote list for a given table. Only update the rows and cells within tables as necessary for your project. Unused rows can be deleted from tables. If multiple scenarios will be represented then the Uncontrolled and Controlled Emission Tables, and other tables as needed, can be duplicated and adjusted to indicate the different scenarios.

Regulated Emission Sources Table

(*E.g.*, Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator-Haul Road-Storage Pile, etc.)
Match the Units listed on this Table to the same numbered line if also listed on Emissions Tables & Stack Table.

Unit Number and Description[1]		Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date[2]	Process Rate or Capacity (Hp, kW, Btu, ft^3, lbs, tons, yd^3, etc.)[3]	Fuel Type
B-1	**Boiler 1**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**900 Hp**	**Natural Gas**
B-2	**Boiler 2**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**900 Hp**	**Natural Gas**
B-3	**Boiler 3**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**900 Hp**	**Natural Gas**
B-4	**Boiler 4**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**900 Hp**	**Natural Gas**
G-1	**Generator 1**	**Caterpillar**	**3516 C**	**TBD**	**TBD**	**TBD**	**N/A**	**2682 Hp**	**Diesel**
G-2	**Generator 2**	**Caterpillar**	**3516 C**	**TBD**	**TBD**	**TBD**	**N/A**	**2682 Hp**	**Diesel**
G-3	**Generator 3**	**Caterpillar**	**3516 C**	**TBD**	**TBD**	**TBD**	**N/A**	**2682 Hp**	**Diesel**
FP-1	**Diesel Fire Pump**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**542 Hp**	**Diesel**
CT-1	**Cooling Tower Cell 1**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-2	**Cooling Tower Cell 2**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-3	**Cooling Tower Cell 3**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-4	**Cooling Tower Cell 4**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-5	**Cooling Tower Cell 5**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-6	**Cooling Tower Cell 6**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-7	**Cooling Tower Cell 7**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-8	**Cooling Tower Cell 8**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
ACEX _1	**Acid Scrubber Exhaust 1**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**58,596 cfm fan rate**	**N/A**
ACEX _2	**Acid Scrubber Exhaust 2**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**58,596 cfm fan rate**	**N/A**
ACEX _3	**Acid Scrubber Exhaust 3**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**58,596 cfm fan rate**	**N/A**

Unit Number and Description[1]		Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date[2]	Process Rate or Capacity (Hp, kW, Btu, ft^3, lbs, tons, yd^3, etc.)[3]	Fuel Type
ALEX_1	**Alkaline Scrubber Exhaust 1**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**40,906 cfm fan rate**	**N/A**
ALEX_2	**Alkaline Scrubber Exhaust 2**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**40,906 cfm fan rate**	**N/A**
ALEX_3	**Alkaline Scrubber Exhaust 3**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**40,906 cfm fan rate**	**N/A**
GEN_1	**General Exhaust 1**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_2	**General Exhaust 2**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_3	**General Exhaust 3**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_4	**General Exhaust 4**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_5	**General Exhaust 5**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_6	**General Exhaust 6**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_7	**General Exhaust 7**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_8	**General Exhaust 8**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_9	**General Exhaust 9**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_10	**General Exhaust 10**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_11	**General Exhaust 11**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_12	**General Exhaust 12**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_13	**General Exhaust 13**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
SIEX_1	**Silane Scrubber Exhaust 1**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**9,437 cfm fan rate**	**N/A**
SIEX_2	**Silane Scrubber Exhaust 2**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**9,437 cfm fan rate**	**N/A**

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Unit numbers must correspond to unit numbers in the previous permit unless a complete cross reference table of all units in both permits is provided.
2. To determine whether a unit has been modified, evaluate if changes have been made to the unit that impact emissions or that trigger modification as defined in 20.11.41.7(U) NMAC. If not, put N/A.

3. Basis for Equipment Process Rate or Capacity (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.) **Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacturing data is available, Maxeon will promptly provide the information to the Department.** Submit information for each unit as an attachment.

Emissions Control Equipment Table

Control Equipment Units listed on this Table should either match up to the same Unit number as listed on the Regulated Emission Sources, Controlled Emissions and Stack Parameters Tables (if the control equipment is integrated with the emission unit) or should have a distinct Control Equipment Unit Number and that number should then also be listed on the Stack Parameters Table.

Control Equipment Unit Number and Description	Controlling Emissions for Unit Number(s)	Manufacturer	Model # | Serial #	Date Installed	Controlled Pollutant(s)	% Control Efficiency[1]	Method Used to Estimate Efficiency	Rated Process Rate or Capacity or Flow
See Appendix B (Detailed Emission Inventory). Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacturing data is available, Maxeon will promptly provide the information to the Department.								

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Control Equipment % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.). Submit information for each unit as an attachment.

Exempted Sources and Exempted Activities Table

See 20.11.41 NMAC for exemptions.

Unit Number and Description	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date[1]	Process Rate or Capacity (Hp, kW, Btu, ft^3, lbs, tons, yd^3, etc.)[2]	Fuel Type
Not Applicable. Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacdturing data is available, Maxeon will promptly provide the information to the Department.								

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. To determine whether a unit has been modified, evaluate if changes have been made to the unit that impact emissions or that trigger modification as defined in 20.11.41.7(U) NMAC. Also, consider if any changes that were made alter the status from exempt to non-exempt. If not, put N/A.
2. Basis for Equipment Process Rate or Capacity (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.) Submit information for each unit as an attachment.

Uncontrolled Emissions Table

(Process potential under physical/operational limitations during a 24 hr/day and 365 day/year = 8760 hrs)

Regulated Emission Units listed on this Table should match up to the same numbered line and Unit as listed on the Regulated Emissions and Controlled Tables. List total HAP values per Emission Unit if overall HAP total for the facility is ≥ 1 ton/yr.

Unit Number*	Nitrogen Oxides (NO_X)		Carbon Monoxide (CO)		Nonmethane Hydrocarbons/Volatile Organic Compounds (NMHC/VOCs)		Sulfur Dioxide (SO_2)		Particulate Matter ≤ 10 Microns (PM_{10})		Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)		Hazardous Air Pollutants (HAPs)		Method(s) used for Determination of Emissions (AP-42, Material Balance, Field Tests, etc.)
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	
See Appendix B (Detailed Emission Inventory).															

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

*A permit is required and this application along with the additional checklist information requested on the Permit Application checklist must be provided if:

(1) any one of these process units or combination of units, has an uncontrolled emission rate greater than or equal to (≥) 10 lbs/hr or 25 tons/yr for any of the above pollutants, excluding HAPs, based on 8,760 hours of operation; or

(2) any one of these process units or combination of units, has an uncontrolled emission rate ≥ 2 tons/yr for any single HAP or ≥ 5 tons/yr for any combination of HAPs based on 8,760 hours of operation; or (3) any one of these process units or combination of units, has an uncontrolled emission rate ≥ 5 tons/yr for lead (Pb) or any combination of lead and its compounds based on 8,760 hours of operation; or

(4) any one of the process units or combination of units is subject to an Air Board or federal emission limit or standard.

* If all of these process units, individually and in combination, have an uncontrolled emission rate less than (<) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8,760 hours of operation), but > 1 ton/yr for any of the above pollutants, then a source registration is required. A Registration is required, at minimum, for any amount of HAP emissions. Please complete the remainder of this form.

Controlled Emissions Table

(Based on current operations with emission controls OR requested operations with emission controls)

Regulated Emission Units listed on this Table should match up to the same numbered line and Unit as listed on the Regulated Emissions and Uncontrolled Tables. List total HAP values per Emission Unit if overall HAP total for the facility is ≥ 1 ton/yr.

Unit Number	Nitrogen Oxides (NO_X)		Carbon Monoxide (CO)		Nonmethane Hydrocarbons/Volatile Organic Compounds (NMHC/VOCs)		Sulfur Dioxide (SO_2)		Particulate Matter ≤ 10 Microns (PM_{10})		Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)		Hazardous Air Pollutants (HAPs)		Control Method	% Efficiency[1]
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr		
See Appendix B (Detailed Emission Inventory). Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacturing data is available, Maxeon will promptly provide the information to the Department.																

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Control Method % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.).
   Submit information for each unit as an attachment.

Hazardous Air Pollutants (HAPs) Emissions Table

Report the Potential Emission Rate for each HAP from each source on the Regulated Emission Sources Table that emits a given HAP. Report individual HAPs with ≥ 1 ton/yr total emissions for the facility on this table. Otherwise, report total HAP emissions for each source that emits HAPs and report individual HAPs in the accompanying application package in association with emission calculations. If this application is for a Registration solely due to HAP emissions, report the largest HAP emissions on this table and the rest, if any, in the accompanying application package.

Unit Number	Total HAPs															
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
See Appendix B (Detailed Emission Inventory).																

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

Use Instructions: Copy and paste the HAPs table here if need to list more individual HAPs.

Purchased Hazardous Air Pollutant Table*

Product Categories (Coatings, Solvents, Thinners, etc.)	Hazardous Air Pollutant (HAP), or Volatile Hazardous Air Pollutant (VHAP) Primary To The Representative As Purchased Product	Chemical Abstract Service (CAS) Number of HAP or VHAP from Representative As Purchased Product	HAP or VHAP Concentration of Representative As Purchased Product (pounds/gallon, or %)	Concentration Determination (CPDS, SDS, etc.)[1]	Total Product Purchases For Category	(-)	Quantity of Product Recovered & Disposed For Category	(=)	Total Product Usage For Category
Hydrogen Fluoride Solution	Hydrogen Fluoride	7664-39-3	49%	SDS	1,322,176 gal/year		0		1,322,176 gal/year
Hydrochloric Acid Solution	Hydrochloric Acid	7647-01-0	37%	SDS	581,649 gal/year		0		581,649 gal/year
TOTALS					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

NOTE: Product purchases, recovery/disposal and usage should be converted to the units listed in this table. If units cannot be converted please contact the Air Quality Program prior to making changes to this table.

1. Submit, as an attachment, information on one (1) product from each Category listed above which best represents the average of all the products purchased in that Category. CPDS = Certified Product Data Sheet; SDS = Safety Data Sheet

*** A Registration is required, at minimum, for any amount of HAP or VHAP emission.**
Emissions from purchased HAP usage should be accounted for on previous tables as appropriate.
A permit may be required for these emissions if the source meets the requirements of 20.11.41 NMAC.

Material and Fuel Storage Table

(*E.g.*, Tanks, barrels, silos, stockpiles, etc.)

Storage Equipment		Product Stored	Capacity (bbls, tons, gals, acres, etc.)	Above or Below Ground	Construction (Welded, riveted) & Color	Installation Date	Loading Rate[1]	Offloading Rate[1]	True Vapor Pressure	Control Method	Seal Type	% Eff.[2]
ST-1	**Chemical Storage Tank**	**Hydrogen Fluoride**	**10,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**20 kPA at 25 C**	**N/A**	**TBD**	**80%**
ST-2	**Chemical Storage Tank**	**Hydrogen Fluoride**	**10,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**20 kPA at 25 C**	**N/A**	**TBD**	**80%**
ST-3	**Chemical Storage Tank**	**Hydrochloric Acid**	**5,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**4620 kPA at 25 C**	**N/A**	**TBD**	**80%**
ST-4	**Chemical Storage Tank**	**Hydrochloric Acid**	**5,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**4620 kPA at 25 C**	**N/A**	**TBD**	**80%**
ST-5	**Chemical Storage Tank**	**Hydrogen Peroxide**	**15,000 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**0.25 kPA at 25 C**	**None**	**N/A**	**0%**
ST-6	**Chemical Storage Tank**	**Hydrogen Peroxide**	**15,000 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**0.25 kPA at 25 C**	**None**	**N/A**	**0%**
ST-7	**Chemical Storage Tank**	**Sodium Hydroxide**	**12,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**20 kPA at 25 C**	**Scrubber**	**TBD**	**80%**
ST-8	**Chemical Storage Tank**	**Sodium Hydroxide**	**12,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**20 kPA at 25 C**	**Scrubber**	**TBD**	**80%**
ST-9	**Sub-Base Belly Tank**	**Diesel Fuel**	**14,506.80 gal**	**Above**	**Construction TBD/Color Black**	**TBD**	**TBD**	**TBD**	**12.13 psi**	**N/A**	**N/A**	**N/A**
ST-10	**Sub-Base Belly Tank**	**Diesel Fuel**	**14,506.80 gal**	**Above**	**Construction TBD/Color Black**	**TBD**	**TBD**	**TBD**	**12.13 psi**	**N/A**	**N/A**	**N/A**
ST-11	**Sub-Base Belly Tank**	**Diesel Fuel**	**14,506.80 gal**	**Above**	**Construction TBD/Color Black**	**TBD**	**TBD**	**TBD**	**12.13 psi**	**N/A**	**N/A**	**N/A**
ST-12	**Vertical Storage Tank**	**Diesel Fuel**	**502.4 gal**	**Above**	**Construction TBD/Color Black**	**TBD**	**TBD**	**TBD**	**12.13 psi**	**N/A**	**N/A**	**N/A**

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Loading/Offloading Rate (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.). **Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacturing data is available, Maxeon will promptly provide the information to the Department.**
   Submit information for each unit as an attachment.
2. Basis for Control Method % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.). **Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacturing data is available, Maxeon will promptly provide the information to the Department.**
   Submit information for each unit as an attachment.

Stack Parameters Table

If any equipment from the Regulated Emission Sources Table is also listed in this Stack Table, use the same numbered line for the emission unit on both tables to show the association between the Process Equipment and its stack.

Unit Number and Description	Pollutant (CO, NOx, PM_{10}, etc.)	UTM Easting (m)	UTM Northing (m)	Stack Height (ft)	Stack Exit Temp. (°F)	Stack Velocity (fps)	Stack Flow Rate (acfm)	Stack Inside Diameter (ft)	Stack Type
Refer to Appendix B and Modeling Details in Section 6 of the Permit Application Report Text.									**Select**

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

Certification

NOTICE REGARDING SCOPE OF A PERMIT: The Environmental Health Department's issuance of an air quality permit only authorizes the use of the specified equipment pursuant to the air quality control laws, regulations and conditions. Permits relate to air quality control only and are issued for the sole purpose of regulating the emission of air contaminants from said equipment. Air quality permits are not a general authorization for the location, construction and/or operation of a facility, nor does a permit authorize any particular land use or other form of land entitlement. It is the applicant's/permittee's responsibility to obtain all other necessary permits from the appropriate agencies, such as the City of Albuquerque Planning Department or Bernalillo County Department of Planning and Development Services, including but not limited to site plan approvals, building permits, fire department approvals and the like, as may be required by law for the location, construction and/or operation of a facility. For more information, please visit the City of Albuquerque Planning Department website at https://www.cabq.gov/planning and the Bernalillo County Department of Planning and Development Services website at https://www.bernco.gov/planning.

NOTICE REGARDING ACCURACY OF INFORMATION AND DATA SUBMITTED: Any misrepresentation of a material fact in this application and its attachments is cause for denial of a permit or revocation of part or all of the resulting registration or permit, and revocation of a permit for cause may limit the permitee's ability to obtain any subsequent air quality permit for ten (10) years. Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan or other document filed or required to be maintained under the Air Quality Control Act, NMSA 1978 §§ 74-2-1 to 74-2-17, is guilty of a misdemeanor and shall, upon conviction, be punished by a fine of not more than ten thousand dollars ($10,000) per day per violation or by imprisonment for not more than twelve months, or by both.

I, the undersigned, hereby certify that I have knowledge of the information and data represented and submitted in this application and that the same is true and accurate, including the information and date in any and all attachments, including without limitation associated forms, materials, drawings, specifications, and other data. I also certify that the information represented gives a true and complete portrayal of the existing, modified existing, or planned new stationary source with respect to air pollution sources and control equipment. I understand that there may be significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. I also understand that the person who has applied for or has been issued an air quality permit by the Department is an obligatory party to a permit appeal filed pursuant to 20.11.81 NMAC. Further, I certify that I am qualified and authorized to file this application, to certify the truth and accuracy of the information herein, and bind the source. Moreover, I covenant and agree to comply with any requests by the Department for additional information necessary for the Department to evaluate or make a final decision regarding the application.

Signed this 6th day of December, 20 23

Zane Broadhead
Print Name

Vice President Global Facilities
Print Title


Signature

Role: ☐ Owner ☐ Operator ☐ Other Authorized Representative

Pre-Application Meeting Materials

City of Albuquerque
Environmental Health Department
Air Quality Program

Construction Permit (20.11.41 NMAC)
Pre-Permit Application Meeting Agenda Checklist & Public Notice Sign Guidelines Checklist

This entire document, including both completed checklists, must be included as part of the application package.

Any person seeking a new permit, a permit modification, or an emergency permit under 20.11.41 NMAC (Construction Permits) shall do so by filing a written application with the Albuquerque-Bernalillo County Joint Air Quality Program, which administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County"), on behalf of the City Environmental Health Department ("Department").

Prior to submitting an application, per 20.11.41.13(A) NMAC, the applicant (or their consultant) shall contact the Department in writing and submit a Pre-Permit Application Meeting Request Form to request a pre-application meeting. The Pre-Permit Application Meeting Request Form is available at https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms. The purpose of the pre-application meeting is for the Department to provide the applicant with information regarding the contents of the application and the application process.

This pre-application meeting agenda checklist is provided to aid the Department and applicant in ensuring that in the pre-permit application meeting all information regarding the contents of the application and the application process are communicated to the applicant. This is because applications that are ruled incomplete because of missing information will delay any determination or the issuance of the permit. The Department reserves the right to request additional relevant information prior to ruling the application complete in accordance with 20.11.41 NMAC.

Also included in this document is the Public Notice Sign Guidelines Checklist, which contains requirements for how the applicant must display the required weather-proof sign.

The applicant should fill out and have this agenda checklist available at the pre-application meeting to be sure all items are covered. Check the boxes to acknowledge that each item from the agenda was discussed and that requirements for the weather-proof sign were followed.

Pre-Permit Application Meeting Agenda Checklist

Applicant Company Name: **Maxeon**
Facility Name: **Golden Eagle Project: Solar Panel Manufacturing Facility**

☒ Fill out and submit a Pre-Permit Application Meeting Request form
Available online at https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms/air-quality-application-forms

I. ☒ Discuss Project:
   a. Facility Location
   b. Facility Description
   c. Main Processes
   d. Equipment
   e. Proposed Schedule

II. ☒ Discuss the requirement for a zoning certification or verifications for new permits and permit modifications. The Zoning Requirement Cover Page form is a required component of this part of the submittal:
   a. For projects on property subject to City or County zoning laws (*i.e.*, **not** located on federal land, **not** located on State of New Mexico land, **not** located on Tribal land), a zoning certification from the appropriate planning department is required.
      i. City Planning Form: https://www.cabq.gov/planning/code-enforcement-zoning
      ii. County Planning Form: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/
   b. If the project's property is not subject to City or County zoning jurisdiction, a zoning verification from both planning departments is required.
      i. City Planning Form: https://www.cabq.gov/planning/code-enforcement-zoning
      ii. County Planning Form: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/
   c. The zoning certification or verifications **must** be obtained from the appropriate Planning Department, either City of Albuquerque or Bernalillo County. For more information, please visit the City's Planning Department website at https://www.cabq.gov/planning or Bernalillo County's Planning Department website at the https://www.bernco.gov/planning/.

III. ☒ Discuss the requirement for a Compliance History Disclosure Form as of Nov. 6, 2023 for permit application submittals except for Administrative Revisions that are not transfers of ownership.

IV. ☐ If permit modification or revision, review current permit:
   a. Review Process Equipment Table and Emissions Table and discuss changes
   b. Request information about the replacement or new equipment (for example, if it is an engine, we need to know if it is new, what year, fuel type, etc…) to give them an idea of the changes that will be needed
   c. Discuss possible changes in permit conditions

V. ☒ Air Dispersion modeling process, procedures and options:
   a. When modeling is required and possibility of waivers
   b. Protocol process, purpose, and time frame
   c. Preliminary review, purpose, and time frame
   d. Full review and time frame
   e. Peer reviews
   f. Assumptions in the modeling become permit conditions
   g. NED data should be used instead of DEM data for assigning elevations to receptors, sources, buildings, etc.

VI. ☒ Applicant's public notice requirements

a. During the same month application package will be submitted, ask Department for memo of neighborhood associations/coalitions within ½ mile of facility
b. Fill out and send Notice of Intent to Construct form as attachment, with Applicant Notice Cover Letter as email body, to neighborhood associations/coalitions listed in memo: https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms
c. Post and maintain a weather-proof sign. Signs are available in the downtown Program office. The Public Notice Sign Guidelines Checklist can be found on the next page of this document.

VII. ☒ Regulatory timelines

a. 30 days to rule application complete
b. 90 days after ruled complete for permitting decision
c. 30-day public comment period after application deemed complete
d. If public interest in application:
    i. 30-day review of technical analysis
    ii. 90-day extension for permitting decision
e. Request for Public Information Hearing - 90-day extension for permitting decision
f. Complex technical issues in application - 90-day extension for permitting decision
g. If application ruled incomplete it stops timeline and restarts at beginning with updated submittal

VIII. ☒ Department Policies

a. One original hard copy must be submitted along with a duplicate copy. The duplicate copy should be a high-quality electronic duplicate submitted on thumb drive as one complete PDF with all application contents found in the hardcopy, including pages with signatures. However, do not include financial information, such as a copy of a check, in the electronic PDF. The electronic submittal should also include emission calculations Excel-compatible file(s) and modeling files, if applicable.
b. Applications will be ruled incomplete if any parts from Permit Application Checklist are missing
c. Review fees paid in full are part of the application package (Except as noted above)
d. Discuss payment format (by check, credit card or online)
e. Use the most recent Permit Application Checklist, found under Part 41 Implementation on this page: https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms
f. After three tries, permit application denied and application must start over including repayment of fees

IX. ☐ Additional Questions?

City of Albuquerque
Environmental Health Department
Air Quality Program

Public Notice Sign Guidelines

Any person seeking a permit under 20.11.41 NMAC, Construction Permits, shall do so by filing a written application with the Department. *Prior to submitting an application, the applicant shall post and maintain a weather-proof sign provided by the department. The applicant shall keep the sign posted until the department takes final action on the permit application; if an applicant can establish to the department's satisfaction that the applicant is prohibited by law from posting, at either location required, the department may waive the posting requirement and may impose different notification requirements.* **A copy of this form must be submitted with your application.**

Applications that are ruled incomplete because of missing information will delay any determination or the issuance of the permit. The Department reserves the right to request additional relevant information prior to ruling the application complete in accordance with 20.11.41 NMAC.

Applicant Company Name: **Maxeon**
Facility Name: **Golden Eagle Project: Solar Panel Manufacturing Facility**

☒ The sign must be posted at the more visible of either the proposed or existing facility entrance (or, if approved in advance and in writing by the department, at another location on the property that is accessible to the public)

- ☒ The sign shall be installed and maintained in a condition such that members of the public can easily view, access, and read the sign at all times.
- ☒ The lower edge of the sign board should be mounted a minimum of 2 feet above the existing ground surface to facilitate ease of viewing

☒ Include at least two pictures of the completed, properly posted sign in the application package immediately following this document. One picture should show the location of the posted sign and the other should be close enough to the sign for the posted information to be legible in the picture.

☐ **Check here if the department has waived the sign posting requirement.**
Alternative public notice details:

City of Albuquerque
Environmental Health Department
Air Quality Program

Pre-Permit Application Meeting Request Form

Please complete appropriate boxes and email to aqd@cabq.gov or mail to:

Environmental Health Department
Air Quality Program
Permitting Division
P.O. Box 1293
Albuquerque, NM 87103

A copy of this form must be included as part of the application package.

Company/Organization: Current Permit #:	**Solar Panel Manufacturing Facility** **N/A – Initial Permit Application**
Point of Contact: (phone number and email): Preferred form of contact (check one): ☐Phone ☒E-mail	Name: **Moha Parikh** **Jacobs** Phone: **801.580.8440** Email: **moha.parikh@jacobs.com**
Preferred meeting date/times: Preferred meeting type (Zoom/In Person):	**November 15, 2023** **Zoom**
Description of Project:	**Maxeon is proposing to construct and operate a new solar cell and panel manufacturing facility in Albuquerque, New Mexico.** **The preliminary process flow diagram, process description and emissions information are included in the attached technical memorandum.**

Golden Eagle: Process Description and Emissions Information

Date:	November 14, 2023
Project name:	Golden Eagle
Project no:	D3794500
Attention:	City of Albuquerque – Environmental Health – Air Program
Company:	Maxeon
Prepared by:	Jacobs

Jacobs Engineering Group Inc.
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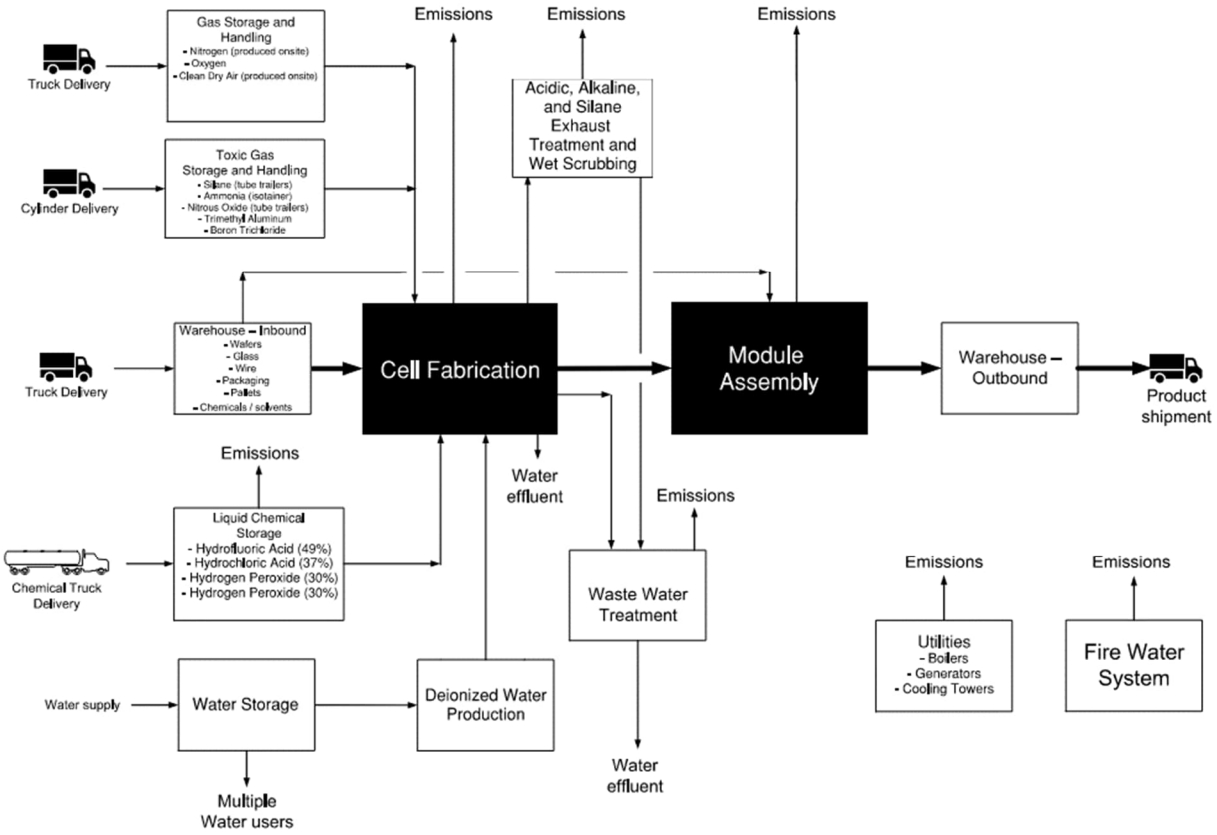
United States
T +1385.474.8500
www.jacobs.com

Maxeon is proposing to construct and operate a new photovoltaic (PV) Solar cell and module manufacturing facility in Albuquerque, New Mexico. This document was prepared to aid with discussions during the pre-application meeting related to the initial construction permit for the facility. A process flow diagram, process description and emissions summary is included herein.

As the design for the proposed project is evolving, Jacobs will develop the air permit application based on the design parameters and information available at this time. A modification to the issued air quality construction permit may be required to match the final design for the proposed project.

1. Process Flow Diagram

A simplified process flow diagram and associated air emission sources is included in the figure below.



2. Process Description

PV solar panel cells are produced by delivering gases and liquid chemicals to processing tools that perform various processes on a silicon wafer substrate within the Cell Fabrication facility (CellFab). The cells are then grouped into modules and interconnected to allow the panel to produce electricity within the Module Assembly facility (ModCo).

2.1 Cell Fabrication

The CellFab facility will be located at the front of the process and will receive precut silicon wafers from a third-party supplier. These wafers will be inspected, cleaned, and prepared for the process using an automated assembly line. The wafers will then undergo chemical vapor deposition reactions with several raw materials, followed by a screen-printing step that will create individual photovoltaic cells. Process materials will be brought to the facility via trucks. Liquid chemicals that are used in larger quantities will be received in bulk via chemical tank trailers, and the liquids will be pumped into onsite storage tanks. Lesser-used liquid chemicals will arrive in storage totes via truck. Gaseous chemicals will be received in tube trailers, isotainers, and cylinder form via truck. Multiple totes and cylinders will likely arrive at one time to maintain a sufficient supply.

2.2 Module Assembly

The individual finished cells will then be transported via truck to the ModCo facility. In the ModCo facility, the cells will be laminated, trimmed, and assembled onto frames to create panels. The cells will be interconnected together within the panel to make the photovoltaic panel capable of generating electricity. The final product will be loaded into boxes on pallets, which will be shipped out via truck.

2.3 Emissions Control

PV solar cell and panel manufacturing emissions will be abated depending upon the emissions source and the characteristics of the emissions.

2.3.1 Wet Scrubbers

Wet scrubber systems will be used to control Hazardous Air Pollutants (HAPs) and other gases from the facilities (CellFab). Emissions from the acid and alkaline wet benches (AWBs) will be routed through wet scrubber systems, where the caustic and acidic streams are scrubbed before release into the atmosphere. Sodium hydroxide (NaOH), hydrogen fluoride (HF), and hydrochloric acid (HCl) are the primary gases/pollutants treated by the wet scrubber systems. Gas distribution boxes and liquid distribution boxes will be used on the chemical delivery lines to the AWBs. These boxes will house valves or fittings that will minimize personnel exposure to potential leaks. Normally, only ambient air is pulled from these boxes around the pipe and fittings, but in the case of a failure or leak, these boxes will capture releases via the exhaust system and send them to the wet scrubbers for abatement.

An additional set of wet scrubber systems will be used to abate emissions from the Passivation (ALD), low pressure chemical vapor deposition (LPCVD), plasma enhanced chemical vapor deposition (PECVD) areas and local point-of-use (POU) scrubbers. The exhaust streams released from these systems will be routed through the Silane (SiH_4) exhaust treatment system. The Silane exhaust treatment system will thermally oxidize the Silane with compressed dry air (CDA) and dust collectors to capture the Silicon Dioxide from oxidation and a wet scrubber system.

Silane, Nitrogen Oxide (NOx), non-methane hydrocarbons (NMHC / VOC), and nitrogen (N_2) are expected to be the primary pollutants/gas releases within the Silane Exhaust treatment system. Silane exhaust treatment system and wet scrubbers are expected to control Silane, acidic and caustic emissions up to 95%.

2.3.2 Organic Exhaust

The project is expected to have solvent exhaust streams within the CellFab facility that will consist of various volatile organic compounds (VOC) compounds. These solvent exhaust streams will include VOC emissions from screen printing and the use of various materials such as silver paste and solvent cleaners. Additional solvent exhaust streams will consist of VOCs collected from the ModCo processes. Silver paste, electric conductive adhesives, flux, junction box silicone, framing silicone, and potting compounds are VOC-containing materials that will be used as part of the manufacturing process. Organic Exhaust will be collected from equipment in each facility (CellFab and ModCo) and exhausted via stacks.

2.3.3 General Process Exhaust

General Process Exhaust will be collected from equipment in the facility to remove heat and meet equipment ambient condition requirements. The General Process Exhaust will be collected from equipment in each facility (CellFab and ModCo) and exhausted via stacks.

2.3.4 Utilities Exhaust

Utilities required for the process and building conditioning of the facilities include boilers, emergency generators, cooling towers, and a fire water pump. Utilities exhaust consists of combustion products from this equipment.

2.3.5 Wastewater Treatment

Wastewater treatment within the facility will include acid waste neutralization (AWN) and fluoride waste treatment (FWT). Acid and fluoride containing wastes will be collected from the CellFab and pumped to the AWN and FWT treatment systems for treatment prior to discharge.

3. Emissions Information

The following table provides a summary of the air emissions sources and associated emissions in tons per year (tpy) from the proposed project. Detailed emissions calculations and emissions factor information will be included in the initial air construction permit application.

Pollutant	Nitrogen Oxide (NOx)	Carbon Monoxide (CO)	Particulate Matter less than 10 micrometers in diameter (PM_{10})	Particulate Matter less than 2.5 micrometers in diameter ($PM_{2.5}$)	Sulfur Dioxide ($SO_{2)}$)	Volatile Organic Compounds (VOCs)	Total HAPs
Ancillary Equipment							
Boilers	1.53	9.90	1.00	1.00	1.58	0.95	0.49
Generators	2.22	11.57	0.10	0.10	0.10	0.63	0.06
Fire Pump	0.86	0.78	0.04	0.04	0.01	0.03	0.01
Diesel Storage Tanks	--	--	--	--	--	0.06	--
Cooling Towers	--	--	0.22	0.00	--	--	--

Total Ancillary Equipment (tpy)	4.61	22.25	1.37	1.15	1.69	1.67	0.56
				Manufacturing Process			
Acidic Exhaust	0.40	--	0.63	0.63	--	0.05	6.40
Alkaline Exhaust	0.000	--	0.00	0.00	--	0.00	0.00
Organic Exhaust	0.000	--	0.00	0.00	--	27.95	0.00
General Exhaust	0.000	--	0.04	0.04	--	1.36	1.45
Silane Exhaust	0.755	--	0	0	--	1.21	0.00
Modco	--	--	--	--	--	50.26	--
Chemical Storage Tanks	--	--	--	--	--	--	3.84
Total Manufacturing Process (tpy)	1.16	0.00	0.68	0.68	0.00	80.82	11.68
Facility Totals (tpy)	5.77	22.25	2.05	1.83	1.69	82.49	12.24
Major Source Threshold Limits (tpy)	100	100	100	100	100	100	25
Above Threshold?	No	No	No	No	No	No	No

Permit Application Fee Payment Confirmation

Your transaction is complete – Thank you!

Your request for payment has been received.

An additional confirmation will be sent to your email account if it was provided with the payment.

Your Reference Number: **2023331005-20**

11/28/2023 2:31:24 PM

Total Amount:	$10,801.08
Health Permits, Air Quality Permits 2023331005-20-1	$10,512.00
Account Permit Fee Information **OWNER ID:** OW0007522 **FEE ID:** IN0014081 **FEE DESC:** AQ-2306:40 CFR 60 STANDARD - FEDERAL REVIEW FEE	$2,628.00
Account Permit Fee Information **OWNER ID:** OW0007522 **FEE ID:** IN0014081 **FEE DESC:** AQ-2306:STATIONARY SOURCE REVIEW FEE 75 - 100 TPY	$7,884.00
Visa Service Fee 2023331005-20-4	$289.08
Visa Credit Sale M **CARD NUMBER:** **********7202 **FIRST NAME:** Melanie **LAST NAME:** Dickison **AUTH CODE:** 093162	$10,512.00
Visa Service Fee Credit Sale M **CARD NUMBER:** **********7202 **FIRST NAME:** Melanie **LAST NAME:** Dickison **PAYMENT TYPE:** credit **AUTH CODE:** 092981	$289.08
Total Amount:	**$10,801.08**

CE2023331005-20

Payment processing disclaimer. Set me in Workgroup Config

Appendix B. Detailed Emission Calculations

Maxeon

Golden Eagle

Emissions Summary
November 2023

Criteria Air Pollutant (CAP) and Hazardous Air Pollutant (HAP) Uncontrolled Emissions Summary

	Uncontrolled Annual Emissions (tons/year)										
Pollutant	**Nitrogen Oxide (NOx)**	**Carbon Monoxide (CO)**	**Particulate Matter less than 10 micrometers in diameter (PM_{10})**	**Particulate Matter less than 2.5 micrometers in diameter ($PM_{2.5}$)**	**Sulfur Oxide (SO_x)**	**Volatile Organic Compounds (VOCs)**	**Total HAPs**	**Chlorine (Cl_2)**	**Hydrochloric Acid (HCl)**	**Hydrogen Fluoride (HF)**	**Zinc (Zn)**
Pollutant Category	CAP	CAP	CAP	CAP	CAP	CAP	HAP	HAP	HAP	HAP	HAP
Ancillary Equipment											
Boilers	1.53	9.90	1.00	1.00	1.58	0.95	0.49	--	--	--	--
Generators	2.22	11.57	0.10	0.10	0.10	0.63	0.02	--	--	--	--
Fire Pump	0.86	0.78	0.04	0.04	0.01	0.03	0.00	--	--	--	--
Diesel Storage Tanks	--	--	--	--	--	0.00	--	--	--	--	--
Cooling Towers	--	--	1.11	0.00	--	--	--	--	--	--	--
Total Ancillary Equipment	**4.61**	**22.25**	**2.26**	**1.15**	**1.69**	**1.61**	**0.51**	**0.00**	**0.00**	**0.00**	**0.00**
Manufacturing Process											
Acidic Exhaust	0.81	--	33.77	33.77	--	0.05	172.67	24.93	1.71	146.02	8.77E-03
Alkaline Exhaust	--	--	--	--	--	--	--	--	--	--	--
Organic Exhaust	--	--	--	--	--	27.95	--	--	--	--	--
General Exhaust	--	--	0.04	0.04	--	1.36	1.45	--	0.01	1.44	--
Silane Exhaust	1.51	--	0.85	0.85	--	61.31	--	--	--	--	--
Modco	--	--	--	--	--	50.26	--	--	--	--	--
Chemical Storage Tanks	--	--	--	--	--	--	19.18	--	8.56	10.61	--
Total Manufacturing Process	**2.32**	**0.00**	**34.66**	**34.66**	**0.00**	**140.93**	**193.30**	**24.93**	**10.29**	**158.07**	**0.01**
Facility Totals	**6.93**	**22.25**	**36.92**	**35.81**	**1.69**	**142.54**	**193.81**	**24.93**	**10.29**	**158.07**	**0.01**
Major Source Threshold Limits	**100**	**100**	**100**	**100**	**100**	**100**	**25**	**10**	**10**	**10**	**10**
Above Threshold?	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No

Criteria Air Pollutant (CAP) and Hazardous Air Pollutant (HAP) Controlled Emissions Summary

	Controlled Annual Emissions (tons/year)										
Pollutant	**Nitrogen Oxide (NOx)**	**Carbon Monoxide (CO)**	**Particulate Matter less than 10 micrometers in diameter (PM_{10})**	**Particulate Matter less than 2.5 micrometers in diameter ($PM_{2.5}$)**	**Sulfur Oxide (SO_x)**	**Volatile Organic Compounds (VOCs)**	**Total HAPs**	**Chlorine (Cl_2)**	**Hydrochloric Acid (HCl)**	**Hydrogen Fluoride (HF)**	**Zinc (Zn)**
Pollutant Category	CAP	CAP	CAP	CAP	CAP	CAP	HAP	HAP	HAP	HAP	HAP
Ancillary Equipment											
Boilers	1.53	9.90	1.00	1.00	1.58	0.95	0.49	--	--	--	--
Generators	2.22	11.57	0.10	0.10	0.10	0.63	0.06	--	--	--	--
Fire Pump	0.86	0.78	0.04	0.04	0.01	0.03	0.00	--	--	--	--
Diesel Storage Tanks	--	--	--	--	--	0.00	--	--	--	--	--
Cooling Towers	--	--	1.11	0.0036	--	--	--	--	--	--	--
Total Ancillary Equipment	**4.61**	**22.25**	**2.26**	**1.15**	**1.69**	**1.61**	**0.55**	**0.00**	**0.00**	**0.00**	**0.00**
Manufacturing Process											
Acidic Exhaust	0.40	--	0.63	0.63	--	0.05	6.32	2.50	0.11	3.70	0.01
Alkaline Exhaust	--	--	--	--	--	--	--	--	--	--	--
Organic Exhaust	--	--	--	--	--	27.95	--	--	--	--	--
General Exhaust	--	--	0.04	0.04	--	1.36	1.45	--	0.01	1.44	--
Silane Exhaust	0.76	--	0.01	0.01	--	1.21	--	--	--	--	--
Modco	--	--	--	--	--	50.26	--	--	--	--	--
Chemical Storage Tanks	--	--	--	--	--	--	3.84	--	1.71	2.12	--
Total Manufacturing Process	**1.16**	**0.00**	**0.68**	**0.68**	**0.00**	**80.82**	**11.61**	**2.50**	**1.84**	**7.26**	**0.01**
Facility Totals	**5.77**	**22.25**	**2.94**	**1.83**	**1.69**	**82.43**	**12.16**	**2.50**	**1.84**	**7.26**	**0.01**
Major Source Threshold Limits	**100**	**100**	**100**	**100**	**100**	**100**	**25**	**10**	**10**	**10**	**10**
Above Threshold?	No	No	No	No	No	No	No	No	No	No	No

Notes:
-- = Not Applicable

Hazardous air pollutants (HAPs) based on U.S. Environmental Protection Agency (EPA) Inital List of HAPs with Modifications found here: https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications.

Maxeon
Golden Eagle
Emissions Summary
November 2023

Criteria Air Pollutant (CAP) Emissions Modeling Summary

	Controlled Hourly Emissions (lb/hr)				
Pollutant	**Nitrogen Oxide (NOx)**	**Carbon Monoxide (CO)**	**Particulate Matter less than 10 micrometers in diameter (PM_{10})**	**Particulate Matter less than 2.5 micrometers in diameter ($PM_{2.5}$)**	**Sulfur Dioxide (SO_2)**
Pollutant Category	CAP	CAP	CAP	CAP	CAP
Ancillary Equipment					
Boilers	0.52	3.39	0.34	0.34	0.54
Generators	8.86	46.30	0.40	0.40	0.38
Fire Pump	3.46	3.12	0.18	0.18	0.05
Diesel Storage Tanks	--	--	--	--	--
Cooling Towers	--	--	0.36	0.001	--
Total Ancillary Equipment	**12.844**	**52.805**	**1.279**	**0.919**	**0.980**
Manufacturing Process					
Acidic Exhaust	0.092	--	0.143	0.143	--
Alkaline Exhaust	--	--	--	--	--
Organic Exhaust	--	--	--	--	--
General Exhaust	--	--	0.010	0.010	--
Silane Exhaust	0.172	--	0.002	0.002	--
Modco	--	--	--	--	--
Chemical Storage Tanks	--	--	--	--	--
Total Manufacturing Process	**0.264**	**0.000**	**0.156**	**0.156**	**0.000**
Facility Totals (lb/hr)	**13.11**	**52.80**	**1.43**	**1.07**	**0.98**
Facility Totals Without Exempt (lb/hr)	**0.79**	**3.39**	**0.86**	**0.50**	**0.54**

Notes:
-- = Not Applicable
lb/hr = pound per hour

Maxeon
Golden Eagle
Natural Gas Boiler Emissions
November 2023

Boiler Data and Assumptions

Boiler Type	Fuel Type	No. of Boilers	Boiler Horsepower	Rating (MMBtu/hour)	Fuel Consumption (MMscf/hour)	Annual Operation (hours/year)
Natural Gas Boilers	Natural Gas	4	900	30.130	0.029	4,380

Notes:
Engine rating and number of units provided by the Jacobs Design Team via email on November 2, 2023.
There is expected to be four boilers total (three operating and one redundant for backup).

Criteria Air Pollutant Emissions (CAPs)

Emission Factors	Value	Unit	Source	Single Boiler			Facility Total		
				Hourly Emissions (lb/hour)	Annual Emissions (lb/year)	Annual Emissions (TPY)	Hourly Emissions (lb/hour) [a]	Annual Emissions (lb/year) [b]	Annual Emissions (TPY) [b]
NOx (Ultra-Low Nox Burner)	0.01	lb/MMBtu	Similar sized natural gas boiler specification (Cleaver-Brooks Boiler CBEX Elite)	0.17	765	0.38	0.70	3,062	1.53
CO	0.038	lb/MMBtu	Similar sized natural gas boiler specification (Cleaver-Brooks Boiler CBEX Elite)	1.13	4,949	2.47	4.52	19,795	9.90
PM_{10}	0.0038	lb/MMBtu	Similar sized natural gas boiler specification (Cleaver-Brooks Boiler CBEX Elite)	0.114	501	0.25	0.46	2,006	1.00
$PM_{2.5}$	0.0038	lb/MMBtu	Similar sized natural gas boiler specification (Cleaver-Brooks Boiler CBEX Elite)	0.11	501	0.25	0.46	2,006	1.00
SO_2	0.01	lb/MMBtu	Similar sized natural gas boiler specification (Cleaver-Brooks Boiler CBEX Elite)	0.18	792	0.40	0.72	3,167	1.58
VOC	0.004	lb/MMBtu	Similar sized natural gas boiler specification (Cleaver-Brooks Boiler CBEX Elite)	0.11	475	0.24	0.43	1,900	0.95

Notes:
[a] Hourly facility total emissions assume that all four boilers could operate at the same time.
[b] Annual facility total emissions assume that all four boilers could operate up to 4,380 hours annually.

Hazardous Air Pollutant Emissions (HAPs)

Pollutant	Emission Factor (lb/MMscf)	Single Boiler			Facility Total		
		Hourly Emissions (lb/hr)	Annual Emissions (lb/year)	Annual Emissions (TPY)	Hourly Emissions (lb/hr) [a]	Annual Emissions (lb/year) [b]	Annual Emissions (TPY) [b]
2-Methylnaphthalene	2.40E-05	7.05E-07	3.09E-03	1.54E-06	2.11E-06	1.23E-02	6.17E-06
3-Methylcholanthrene	1.80E-06	5.29E-08	2.32E-04	1.16E-07	1.59E-07	9.26E-04	4.63E-07
7,12-Dimethylbenz(a)anthracene	1.60E-05	4.70E-07	2.06E-03	1.03E-06	1.41E-06	8.23E-03	4.12E-06
Acenaphthene	1.80E-06	5.29E-08	2.32E-04	1.16E-07	1.59E-07	9.26E-04	4.63E-07
Acenaphthylene	1.80E-06	5.29E-08	2.32E-04	1.16E-07	1.59E-07	9.26E-04	4.63E-07
Anthracene	2.40E-06	7.05E-08	3.09E-04	1.54E-07	2.11E-07	1.23E-03	6.17E-07
Benz(a)anthracene	1.80E-06	5.29E-08	2.32E-04	1.16E-07	1.59E-07	9.26E-04	4.63E-07
Benzene	2.10E-03	6.17E-05	2.70E-01	1.35E-04	1.85E-04	1.08E+00	5.40E-04
Benzo(a)pyrene	1.20E-06	3.52E-08	1.54E-04	7.72E-08	1.06E-07	6.17E-04	3.09E-07
Benzo(b)fluoranthene	1.80E-06	5.29E-08	2.32E-04	1.16E-07	1.59E-07	9.26E-04	4.63E-07
Benzo(g,h,i)perylene	1.20E-06	3.52E-08	1.54E-04	7.72E-08	1.06E-07	6.17E-04	3.09E-07
Benzo(k)fluoranthene	1.80E-06	5.29E-08	2.32E-04	1.16E-07	1.59E-07	9.26E-04	4.63E-07
Chrysene	1.80E-06	5.29E-08	2.32E-04	1.16E-07	1.59E-07	9.26E-04	4.63E-07
Dibenzo(a,h)anthracene	1.20E-06	3.52E-08	1.54E-04	7.72E-08	1.06E-07	6.17E-04	3.09E-07
Dichlorobenzene	1.20E-03	3.52E-05	1.54E-01	7.72E-05	1.06E-04	6.17E-01	3.09E-04
Fluoranthene	3.00E-06	8.81E-08	3.86E-04	1.93E-07	2.64E-07	1.54E-03	7.72E-07
Fluorene	2.80E-06	8.22E-08	3.60E-04	1.80E-07	2.47E-07	1.44E-03	7.20E-07
Formaldehyde	7.50E-02	2.20E-03	9.65E+00	4.82E-03	6.61E-03	3.86E+01	1.93E-02
Hexane	1.80E+00	5.29E-02	2.32E+02	1.16E-01	1.59E-01	9.26E+02	4.63E-01
Indeno(1,2,3-cd)pyrene	1.80E-06	5.29E-08	2.32E-04	1.16E-07	1.59E-07	9.26E-04	4.63E-07
Naphthalene	6.10E-04	1.79E-05	7.85E-02	3.92E-05	5.37E-05	3.14E-01	1.57E-04
Phenanthrene	1.70E-05	4.99E-07	2.19E-03	1.09E-06	1.50E-06	8.75E-03	4.37E-06
Pyrene	5.00E-06	1.47E-07	6.43E-04	3.22E-07	4.40E-07	2.57E-03	1.29E-06
Toluene	3.40E-03	9.98E-05	4.37E-01	2.19E-04	3.00E-04	1.75E+00	8.75E-04
Arsenic	2.00E-04	5.87E-06	2.57E-02	1.29E-05	1.76E-05	1.03E-01	5.15E-05
Beryllium	1.20E-05	3.52E-07	1.54E-03	7.72E-07	1.06E-06	6.17E-03	3.09E-06
Cadmium	1.10E-03	3.23E-05	1.41E-01	7.07E-05	9.69E-05	5.66E-01	2.83E-04
Chromium	1.40E-03	4.11E-05	1.80E-01	9.00E-05	1.23E-04	7.20E-01	3.60E-04
Cobalt	8.40E-05	2.47E-06	1.08E-02	5.40E-06	7.40E-06	4.32E-02	2.16E-05
Manganese	3.80E-04	1.12E-05	4.89E-02	2.44E-05	3.35E-05	1.96E-01	9.78E-05
Mercury	2.60E-04	7.64E-06	3.34E-02	1.67E-05	2.29E-05	1.34E-01	6.69E-05
Nickel	2.10E-03	6.17E-05	2.70E-01	1.35E-04	1.85E-04	1.08E+00	5.40E-04
Selenium	2.40E-05	7.05E-07	3.09E-03	1.54E-06	2.11E-06	1.23E-02	6.17E-06
Lead	5.00E-04	1.47E-05	6.43E-02	3.22E-05	4.40E-05	2.57E-01	1.29E-04
TOTAL	**1.89**	**0.06**	**242.90**	**0.12**	**0.17**	**971.61**	**0.49**

Notes:

Emission factors from AP-42 Chapter 1 Section 4 Tables 1.4-2 and 1.4-3.

[a] Hourly facility total emissions assume that all four boilers could operate at the same time.

[b] Annual facility total emissions assume that all four boilers could operate up to 4,380 hours annually.

Conversions	Value	Notes
Heat Content of Natural Gas (MMBtu/MMscf)	1026	40 CFR 98.33 Table C-1
grams per pound	453.6	--
pounds per kilogram	2.205	--
Btu (mean)/hr to Horsepower (boiler)	2.99E-05	AP-42 Appendix A

Notes:

MMBtu/hour = million British thermal units per hour
MMscf/hour = million standard cubic feet per hour
lb/MMBtu = pound per million British thermal units
lb/hour = pound(s) per hour
lb/year = pound(s) per year
TPY = tons per year
NOx = nitrogen oxide
CO = carbon monoxide
PM_{10} = particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compounds
CFR = Code of Federal Regulations
Btu/hr = British thermal units per hour
MMBtu/MMscf = million British thermal unis per million standard cubic feet

Maxeon

Golden Eagle

Diesel Emergency Generator Emissions

November 2023

Generator Data and Assumptions

Fuel Type	No. of Generators	Engine Rating (kW)	Engine Horsepower	Heat Input (MMBtu/hr)	Fuel Consumption (gals/hour)	Operation (hours/year)	Exhaust Flow Rate (m^3/min)
Diesel	3	2,000	2,682	19.26	137.57	500	461.52

Notes:

Engine parameters from the Caterpillar 3516C generator specifications. The details for this engine are preliminary and will be finalized upon final design.
Heat input and engine horsepower calculated from fuel consumption and engine rating, respectively.

Criteria Air Pollutant Emissions (CAPs)

Emission Factors	Value	Unit	Source	Single Generator			Facility Total		
				Hourly Emissions (lb/hr)	Annual Emissions (lb/year)	Annual Emissions (TPY)	Hourly Emissions (lb/hr)	Annual Emissions (lb/year)	Annual Emissions (TPY)
NOx	0.67	g/kW-hr	U.S. EPA Nonroad Compression-Ignition Engines, Tier 4 Emission Standard for Generators	2.95	1,477	0.74	8.86	4,431	2.22
CO	3.50	g/kW-hr	U.S. EPA Nonroad Compression-Ignition Engines, Tier 4 Emission Standard	15.43	7,716	3.86	46.30	23,148	11.57
PM_{10}	0.03	g/kW-hr	U.S. EPA Nonroad Compression-Ignition Engines, Tier 4 Emission Standard for Generators	0.13	66	0.03	0.40	198	0.10
$PM_{2.5}$	0.03	g/kW-hr	U.S. EPA Nonroad Compression-Ignition Engines, Tier 4 Emission	0.13	66	0.03	0.40	198	0.10
SO_2	2.91E-02	lb/hr	Assumes 15 ppm Ultra-Low Sulfur Diesel	0.13	64	0.03	0.38	192	0.10
VOC	1.90E-01	g/kW-hr	U.S. EPA Nonroad Compression-Ignition Engines, Tier 4 Emission Standard	0.84	419	0.21	2.51	1,257	0.63

Notes:

These emissions are for the three (3) generators combined.

Hazardous Air Pollutant Emissions (HAPs)

Pollutants	Emission Factor (lb/MMBtu)	Single Generator			Facility Total		
		Hourly Emissions (lb/hr)	Annual Emissions (lb/year)	Annual Emissions (TPY)	Hourly Emissions (lb/hr)	Annual Emissions (lb/year)	Annual Emissions (TPY)
Benzene	7.76E-04	1.49E-02	7.47E+00	3.74E-03	4.48E-02	2.24E+01	1.12E-02
Toluene	2.81E-04	5.41E-03	2.71E+00	1.35E-03	1.62E-02	8.12E+00	4.06E-03
Xylenes	1.93E-04	3.72E-03	1.86E+00	9.29E-04	1.12E-02	5.58E+00	2.79E-03
Formaldehyde	7.89E-05	1.52E-03	7.60E-01	3.80E-04	4.56E-03	2.28E+00	1.14E-03
Acetaldehye	2.52E-05	4.85E-04	2.43E-01	1.21E-04	1.46E-03	7.28E-01	3.64E-04
Acrolein	7.88E-06	1.52E-04	7.59E-02	3.79E-05	4.55E-04	2.28E-01	1.14E-04
Naphthalene	1.30E-04	2.50E-03	1.25E+00	6.26E-04	7.51E-03	3.76E+00	1.88E-03
Propylene	2.79E-03	5.37E-02	2.69E+01	1.34E-02	1.61E-01	8.06E+01	4.03E-02
Acenaphthylene	9.23E-06	1.78E-04	8.89E-02	4.44E-05	5.33E-04	2.67E-01	1.33E-04
Acenaphthene	4.68E-06	9.01E-05	4.51E-02	2.25E-05	2.70E-04	1.35E-01	6.76E-05
Fluorene	1.28E-05	2.47E-04	1.23E-01	6.16E-05	7.40E-04	3.70E-01	1.85E-04
Phenanthrene	4.08E-05	7.86E-04	3.93E-01	1.96E-04	2.36E-03	1.18E+00	5.89E-04
Anthracene	1.23E-06	2.37E-05	1.18E-02	5.92E-06	7.11E-05	3.55E-02	1.78E-05
Fluoranthene	4.03E-06	7.76E-05	3.88E-02	1.94E-05	2.33E-04	1.16E-01	5.82E-05
Pyrene	3.71E-06	7.15E-05	3.57E-02	1.79E-05	2.14E-04	1.07E-01	5.36E-05
Benz(a)anthracene	6.22E-07	1.20E-05	5.99E-03	2.99E-06	3.59E-05	1.80E-02	8.98E-06
Chrysene	1.53E-06	2.95E-05	1.47E-02	7.37E-06	8.84E-05	4.42E-02	2.21E-05
Benzo(b)fluoranthene	1.11E-06	2.14E-05	1.07E-02	5.34E-06	6.41E-05	3.21E-02	1.60E-05
Benzo(k)fluoranthene	2.18E-07	4.20E-06	2.10E-03	1.05E-06	1.26E-05	6.30E-03	3.15E-06
Benzo(a)pyrene	2.57E-07	4.95E-06	2.47E-03	1.24E-06	1.48E-05	7.42E-03	3.71E-06
Indeno(1,2,3-cd)pyrene	4.14E-07	7.97E-06	3.99E-03	1.99E-06	2.39E-05	1.20E-02	5.98E-06
Dibenz(a,h)anthracene	3.46E-07	6.66E-06	3.33E-03	1.67E-06	2.00E-05	1.00E-02	5.00E-06
Benzo(g,h,l)perylene	5.56E-07	1.07E-05	5.35E-03	2.68E-06	3.21E-05	1.61E-02	8.03E-06
Total HAPs	**1.49E-03**	**2.87E-02**	**1.44E+01**	**7.18E-03**	**8.62E-02**	**4.31E+01**	**2.16E-02**
Total Toxics	**2.87E-03**	**5.53E-02**	**2.77E+01**	**1.38E-02**	**1.66E-01**	**8.30E+01**	**4.15E-02**
Total Combined	**4.36E-03**	**8.40E-02**	**4.20E+01**	**2.10E-02**	**2.52E-01**	**1.26E+02**	**6.30E-02**

Notes:

Emission factors except for ammonia from AP-42 Chapter 3 Section 4 Tables 3.4-3 and 3.4-4 for Large Stationary Diesel Engines.

Ammonia slip from the expected selective catalytic reduction (SCR) not accounted for in these emissions.

These emissions are for the three (3) generators combined.

Conversions	Value	Notes
Density of Diesel Fuel (lbs/gal)	7.05	AP-42 Appendix A
Heat content of Diesel Fuel (Btu/gal)	140000	AP-42 Appendix A
Heat content of Diesel Fuel (MMBTU/gal)	0.14	AP-42 Appendix A
Horsepower (mechanical) to Btu (mean)/hr	2542.5	AP-42 Appendix A
grams per pound	453.6	--
pounds per kilogram	2.205	--
Liters per Cubic Foot	28.3168	--
Molar Volume of Air (L) at NTP	24.055	--

Notes:

kW = kilowatt

gals/hour = gallons per hour

MMBtu/hour = million British thermal units per hour

kg/MMBtu = kilograms per million British thermal units

m^3/min = meters cubed per minute

g/kW-hr = grams per kilowatt hour

lb/hour = pound(s) per hour

lb/year = pound(s) per year

TPY = tons per year

NOx = nitrogen oxide

CO = carbon monoxide

PM_{10} = particulate matter less than 10 micrometers in diameter

$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter

SO_2 = sulfur dioxide

VOC = volatile organic compounds

NTP = normal temperature and pressure

lbs/gal = pounds per gallon

Btu/gal = British thermal units per gallon

Btu/hr = British thermal units per hour

MMBtu/gal = million British thermal units per gallon

Btu/hr = British thermal units per hour

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Golden Eagle

Diesel Fire Pump Emissions
November 2023

Fire Pump Data and Assumptions

Fuel Type	No. of Fire Pumps	Engine Horsepower	Engine Rating (kW)	Rating (MMBtu/hr)	Fuel Consumption (gals/hour)	Operation (hours/year)
Diesel	1	542	404	2.800	20.00	500

Notes:
Engine rating and number of units provided by the Jacobs Design Team.
Fuel consumption based upon similar engine unit (https://www.clarkefire.com/docs/default-source/legacy-products/ul-fm---usa/jw6h-ufaam8-usa.pdf?sfvrsn=29db2813_2)
Heat input and engine rating calculated from fuel consumption and engine horsepower, respectively.

Criteria Air Pollutant Emissions (CAPs)

Emission Factors	Value	Unit	Source	Hourly Emissions (lb/hr)	Annual Emissions (lb/year)	Annual Emissions (TPY)
NOx	3.88	g/kW-hr	U.S. EPA Nonroad Compression-Ignition Engines, Tier 3 Emission Standard for Generators	3.46	1,729	0.86
CO	3.50	g/kW-hr	U.S. EPA Nonroad Compression-Ignition Engines, Tier 3 Emission Standard for Generators	3.12	1,559	0.78
PM_{10}	2.00E-01	g/kW-hr	U.S. EPA Nonroad Compression-Ignition Engines, Tier 3 Emission Standard for Generators	0.18	89	0.04
$PM_{2.5}$	2.00E-01	g/kW-hr	U.S. EPA Nonroad Compression-Ignition Engines, Tier 3 Emission Standard for Generators	0.18	89	0.04
SO_2	5.25E-02	lb/hr	Assumes 15 ppm Ultra-Low Sulfur Diesel	0.05	26	0.01
VOC	1.20E-01	g/kW-hr	U.S. EPA Nonroad Compression-Ignition Engines, Tier 3 Emission Standard for Generators	0.11	53	0.03

Hazardous Air Pollutant Emissions (HAPs)

Pollutant	Emission Factor (lb/MMBtu)	Hourly Emissions (lb/hr)	Annual Emissions (lb/year)	Annual Emissions (TPY)
Benzene	9.33E-04	2.61E-03	1.31E+00	6.53E-04
Toluene	4.09E-04	1.15E-03	5.73E-01	2.86E-04
Xylenes	2.85E-04	7.98E-04	3.99E-01	2.00E-04
Formaldehyde	1.18E-03	3.30E-03	1.65E+00	8.26E-04
Acetaldehye	7.67E-04	2.15E-03	1.07E+00	5.37E-04
Acrolein	9.25E-05	2.59E-04	1.30E-01	6.48E-05
Naphthalene	8.48E-05	2.37E-04	1.19E-01	5.94E-05
Propylene	2.58E-03	7.22E-03	3.61E+00	1.81E-03
Acenaphthylene	5.06E-06	1.42E-05	7.08E-03	3.54E-06
Acenaphthene	1.42E-06	3.98E-06	1.99E-03	9.94E-07
Fluorene	2.92E-05	8.18E-05	4.09E-02	2.04E-05
Phenanthrene	2.94E-05	8.23E-05	4.12E-02	2.06E-05
Anthracene	1.87E-06	5.24E-06	2.62E-03	1.31E-06
Fluoranthene	7.61E-06	2.13E-05	1.07E-02	5.33E-06
Pyrene	4.78E-06	1.34E-05	6.69E-03	3.35E-06
Benz(a)anthracene	1.68E-06	4.70E-06	2.35E-03	1.18E-06
Chrysene	3.53E-07	9.88E-07	4.94E-04	2.47E-07
Benzo(b)fluoranthene	9.91E-08	2.77E-07	1.39E-04	6.94E-08
Benzo(k)fluoranthene	1.55E-07	4.34E-07	2.17E-04	1.09E-07
Benzo(a)pyrene	1.88E-07	5.26E-07	2.63E-04	1.32E-07
Indeno(1,2,3-cd)pyrene	3.75E-07	1.05E-06	5.25E-04	2.63E-07
Dibenzo(a,h)anthracene	5.83E-07	1.63E-06	8.16E-04	4.08E-07
Benzo(g,h,i)perylene	4.89E-07	1.37E-06	6.85E-04	3.42E-07
Total HAPS	3.75E-03	1.05E-02	5.25E+00	2.63E-03
Total Toxics	2.66E-03	7.46E-03	3.73E+00	1.86E-03
Total Combined	6.41E-03	1.80E-02	8.98E+00	4.49E-03

Notes:

Emission factors except for ammonia from AP-42 Chapter 3 Section 3 Tables 3.3-2.

Conversions	Value	Notes
Density of Diesel Fuel (lbs/gal)	7.05	AP-42 Appendix A
Heat content of Diesel Fuel (BTU/gal)	140000	AP-42 Appendix A
Heat content of Diesel Fuel (MMBTU/gal)	0.14	AP-42 Appendix A
Horsepower (mechanical) to Btu (mean)/hr	2.54E+03	AP-42 Appendix A
grams per pound	453.6	
pounds per kilogram	2.205	

Notes:

kW = kilowatt
gals/hour = gallons per hour
MMBtu/hour = million British thermal units per hour
kg/MMBtu = kilograms per million British thermal units
m^3/min = meters cubed per minute
g/kW-hr = grams per kilowatt hour
lb/hour = pound(s) per hour
lb/year = pound(s) per year
TPY = tons per year
NOx = nitrogen oxide
CO = carbon monoxide
PM_{10} = particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compounds
NTP = normal temperature and pressure
lbs/gal = pounds per gallon
Btu/gal = British thermal units per gallon
Btu/hr = British thermal units per hour
MMBtu/gal = million British thermal units per gallon
Btu/hr = British thermal units per hour

Maxeon

Golden Eagle
Diesel Storage Tank Emissions
November 2023

Tank	Variable	Diesel Sub-Base Belly Tank 1	Diesel Sub-Base Belly Tank 2	Diesel Sub-Base Belly Tank 3	Diesel Vertical 500-Gallon Tank
Fuel Throughput (gal) [assumes five turnovers each year]		8,478	8,478	8,478	2,512
Tank type		Horizontal	Horizontal	Horizontal	Vertical
Met Data:					
Nearest major city		Albuquerque, NM	Albuquerque, NM	Albuquerque, NM	Albuquerque, NM
Met Data (from OK tool)					
Average daily ambient temperature, R (1-30)	Taa	517.6	517.6	517.6	517.6
Average daily minimum ambient temperature, R	Tan	506	506	506	506
Average daily maximum ambient temperature, R	Tax	529.2	529.2	529.2	529.2
Average daily ambient temperature range, R (1-11)	Δta	23.2	23.2	23.2	23.2
Average wind speed, mph	v	8.1	8.1	8.1	8.1
Average daily total insolation factor, Btu/ft2*d	I	1722	1722	1722	1722
Atmospheric pressure, psi	Pa	12.13	12.13	12.13	12.13

Tank Contents:

Liquid category		Refined petroleum liquids	Refined petroleum liquids	Refined petroleum liquids	Refined petroleum liquids
Liquid name		No. 2 Fuel Oil (diesel)	No. 2 Fuel Oil (diesel)	No. 2 Fuel Oil (diesel)	No. 2 Fuel Oil (diesel)
Liquid bulk temperature, R (1-31)	Tb	522.61	522.61	527.78	519.41
Average daily liquid surface temperature, R (1-28)	Tla	528.96	528.96	540.67	521.70
Average daily minimum surface liquid temperature, R	Tln	506.00	506.00	506.00	506.00
Average daily maximum surface liquid temperature, R	Tlx	529.20	529.20	529.20	529.20
Vapor pressure at average daily liquid surface temperature, psia (1-25)	Pva	0.0087	0.0087	0.0126	0.0069
Vapor pressure at average daily minimum liquid surface temperature, psia	Pvn	0.0041	0.0041	0.0041	0.0041
Vapor pressure at average daily maximum liquid surface temperature, psia	Pvx	0.0088	0.0088	0.0088	0.0088
Vapor molecular weight, lb/lb-mole	Mv	130	130	130	130
Constant in vapor pressure equation, dimensionless	A	12.1	12.1	12.1	12.1
Constant in vapor pressure equation, R or C	B	8907	8907	8907	8907

Tank Dimensions:

Width of tank, ft	W	6.0	6.0	6.0	4.0
Depth of tank, ft	Dep	4.0	4.0	4.0	4.0
Length of tank, ft	L	9.0	9.0	9.0	4.0
Tank diameter, vert crosssxn, ft	D	6.0	6.0	6.0	4.0
Max liquid height, ft	Hlx	3.5	3.5	3.5	2
Minimum liquid height, ft	Hln	0	0	0	0
*(tank volume in gal = L*W*H*7.48 gal/ft3 or pi*R^2*height*7.48)*		*1,695.60*	*1695.60*	*1695.60*	*502.40*
Annual net throughput, gal/yr		8,478	8,478	8,478	2,512
Annual net throughput, bbl/yr	Q	202	202	202	60
Vapor balanced?		No	No	No	No

Paint Characteristics:

Shell color/shade		Black	Black	Black	Beige/Cream
Shell condition		Average	Average	Average	Average
Tank surface solar absorptance, dimensionless (table 7.1-6)	α	0.97	0.97	1.97	0.35

Breather Vent Settings

Breather vent vacuum setting, psig	Pbv	-0.03	-0.03	-0.03	-0.03
Breather vent pressure setting, psig	Pbp	0.03	0.03	0.03	0.03

Insulation Characteristics:

Tank insulation		None	None	None	None
Tank heating		No	No	No	No

Standing Loss Calculations

Standing Loss (zero for UST; 1-2)	Ls	1.14	1.14	2.68	0.08
Vapor space expansion factor (1-12)	Ke	0.09	0.09	0.15	0.05
Vapor space volume (1-3)	Vv	176	176	176	28.36
Diameter (effective as horizontal tank, 1-14)	De	8.29	8.29	8.29	4.51
Vapor space outage (1/2 He used, unless UST, 1-15)	Hvo	3.26	3.26	3.26	1.77
Vented Vapor Saturation (1-21)	Ks	1.00	1.00	1.00	1.00
Stock vapor density (1-22)	Wv	0.00	0.00	0.00	0.00
Average vapor temperature, R (1-33, uninsulated; insulated = Tb)	Tv	534	534	551	524

Working Loss Calculations

Working Loss Calculation (1-35)	Lw	0.225	0.225	0.314	0.054
Net working loss throughput, ft^3/yr (1-39)	Vq	1,133	1,133	1,133	336
Working loss turnover (saturation factor), dimensionless; =1 as turnovers ≤36	Kn	1	1	1	1
Working loss product factor, dimensionless	Kp	1	1	1	1
Vent setting correction factor, dimensionless	Kb	1	1	1	1

Total Losses:

Standing losses, lb/yr	Ls	1.14	1.14	2.68	0.08
Working losses, lb/yr	Lw	0.22	0.22	0.31	0.05
Total routine losses, lb/yr	Lt	1.36	1.36	3.00	0.14
Total VOC emissions (lb/yr)		5.859			
Total VOC emissions from tanks (tons/yr)		0.003			

Notes:

- Emissions for four (4) diesel sub-base diesel fuel stoage tank and one (1) standalone diesel storage tank for the diesel fire pump.
- Data pulled from the Oklahoma DEQ Storage Tank Emissions Tool highlighted in yellow (https://www.deq.ok.gov/air-quality-division/air-permits/storage-tank-emissions-calculation-tool/).

R = Rankine
mph = miles per hour
psi = pounds per square inch
psia = pounds per square inch absolute
psig = pounds per square inch gauge
lb = pound(s)
ft = feet
ft^3 = cubic feet
bb = barrel(s)
UST = underground storage tank
VOC = volatile organic compound

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Cooling Tower Emissions

November 2023

Parameters	Cooling Tower Parameters	Units
No. of Towers	8	--
Cell Count	1	--
Operation	8,760	hours/year
Maximum Total Dissolved Solids (TDS)	450	parts per million by weight (ppmw)
Water Circulation Rate (per tower)	4,000	gallons per minute (gpm)
Total Liquid Drift (Drift Eliminators)	0.005	%
Emissions		
TSP	0.4	lb/hour
TSP	3,158	lb/year
TSP	1.6	tpy
PM_{10}	0.25	lb/hour
PM_{10}	1.11	tpy
$PM_{2.5}$	0.0008	lb/hour
$PM_{2.5}$	0.004	tpy

Notes:

Tower count, TDS, and water circulation rate for each tower provided by the Jacobs Design Team via email on November 2, 2023.

PM10 emission rate calculated from the TSP emission rate, assuming 70.51% of TSP is PM10. PM2.5 emission rate calculated as 0.23% of TSP. These estimates are based on methodology presented in *Calculating TSP, PM-10, and PM-2.5 from Cooling Towers* (NDEP, 2013) (https://www.env.nm.gov/wp-content/uploads/sites/2/2019/10/PermittingGuidanceforCoolingTowerParticulateEmissions.pdf)

Conversions	Value	Notes
miligrams per pound (mg/lb)	453,600	--
liter per gallon(l/gal)	3.785	--
minutes per hour (min/hr)	60	--
Water density	8.345	lb/gallon
$PM_{2.5}$	0.23%	of TSP
PM_{10}	70.51%	of TSP

Notes:

TDS = total dissolved solids

lb/hour = pound(s) per hour

lb/year = pound(s) per year

tpy = ton(s) per year

TSP = total suspended particulate

PM_{10} = particulate matter less than 10 micrometers in diameter

$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter

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Manufacturing Process Emission Summary
November 2023

Hourly Emissions Summary

Process Exhaust Stream	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)	Hydrogen Peroxide (H_2O_2)
Pollutant Category	**RAP**	**RAP**	**HAP**	**CAP**	**CAP**	**RAP**	**RAP**	**HAP**	**CAP**	**CAP**	**HAP**	**RAP**	**HAP**	**RAP**
Uncontrolled Emissions														
Acidic Exhaust	--	--	5.69	7.71	0.18	0.11	--	0.39	--	0.01	33.34	3.54	2.00E-03	--
Alkaline Exhaust	1,634	64.55	--	--	--	--	--	--	--	--	--	--	--	--
Organic Exhaust	--	--	--	--	--	--	--	--	--	6.38	--	--	--	--
General Exhaust	--	--	--	0.01	--	0.01	--	3.28E-03	0.31	--	0.33	--	--	--
Silane Exhaust	--	--	--	0.19	0.34	9.35	0.19	--	14.00	--	--	--	--	--
Modco	--	--	--	--	--	--	--	--	--	11.47	--	--	--	--
Chemical Storage Tanks	--	--	--	--	--	--	--	1.96	--	--	2.42	--	--	0.09
Total Uncontrolled (lb/hr)	**1,634**	**64.55**	**5.69**	**7.91**	**0.53**	**9.46**	**0.19**	**2.35**	**14.31**	**17.87**	**36.09**	**3.54**	**2.00E-03**	**0.09**
Contolled/Uncontrolled Emissions														
Acidic Exhaust	--	--	0.57	0.14	0.09	0.11	--	0.02	--	0.01	0.85	0.09	2.00E-03	--
Alkaline Exhaust	1,634	3.23	--	--	--	--	--	--	--	--	--	--	--	--
Organic Exhaust	--	--	--	--	--	--	--	--	--	6.38	--	--	--	--
General Exhaust	--	--	--	0.01	--	0.01	--	3.28E-03	0.31	--	0.33	--	--	--
Silane Exhaust	--	--	--	0.00	0.17	0.56	0.01	--	0.28	--	--	--	--	--
Modco	--	--	--	--	--	--	--	--	--	11.47	--	--	--	--
Chemical Storage Tanks	--	--	--	--	--	--	--	0.39	--	--	0.48	--	--	0.09
Total Controlled/Uncontrolled (lb/hr)	**1,634**	**3.23**	**0.57**	**0.16**	**0.26**	**0.68**	**0.01**	**0.42**	**0.59**	**17.87**	**1.66**	**0.09**	**2.00E-03**	**0.09**

Annual Emissions Summary

Process Exhaust Stream	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)	Hydrogen Peroxide (H_2O_2)
Uncontrolled Emissions														
Acidic Exhaust	--	--	24.93	33.77	0.81	0.46	--	1.71	--	0.05	146.02	15.52	0.01	--
Alkaline Exhaust	7,158	282.73	--	--	--	--	--	--	--	--	--	--	--	--
Organic Exhaust	--	--	--	--	--	--	--	--	--	27.95	--	--	--	--
General Exhaust	--	--	--	0.04	--	0.04	--	0.01	1.36	--	1.44	--	--	--
Silane Exhaust	--	--	--	0.85	1.51	40.94	0.83	--	61.31	--	--	--	--	--
Modco	--	--	--	--	--	--	--	--	--	50.26	--	--	--	--
Chemical Storage Tanks	--	--	--	--	--	--	--	8.56	--	--	10.61	--	--	0.40
Total Uncontrolled (tons/year)	**7,158**	**282.73**	**24.93**	**34.66**	**2.32**	**41.45**	**0.83**	**10.29**	**62.68**	**78.25**	**158.07**	**15.52**	**0.01**	**0.40**
Contolled/Uncontrolled Emissions														
Acidic Exhaust	--	--	2.50	0.63	0.40	0.46	--	0.11	--	0.05	3.70	0.39	0.01	0.00
Alkaline Exhaust	7,158	14.14	--	--	--	--	--	--	--	--	--	--	--	--
Organic Exhaust	--	--	--	--	--	--	--	--	--	27.95	--	--	--	--
General Exhaust	--	--	--	0.04	--	0.04	--	0.01	1.36	--	1.44	--	--	--
Silane Exhaust	--	--	--	0.01	0.76	2.46	0.04	--	1.21	--	--	--	--	--
Modco	--	--	--	--	--	--	--	--	--	50.26	--	--	--	--
Chemical Storage Tanks	--	--	--	--	--	--	--	1.71	--	--	2.12	--	--	0.40
Total Controlled/Uncontrolled (tons/year)	**7,158**	**14.14**	**2.50**	**0.68**	**1.16**	**2.96**	**0.04**	**1.84**	**2.57**	**78.25**	**7.26**	**0.39**	**0.01**	**0.40**

Notes:
CAP = criteria air pollutant
HAP = hazardous air pollutant
RAP = regulated air pollutant
-- = Not Applicable

Maxeon
Golden Eagle
Acid Exhaust Emissions
November 2023

Uncontrolled
Control Efficiency
Controlled

Raw Data

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2) Pre Control Concentration (mg/m^3)	Hydrogen (H_2) Control Efficiency (%)	Hydrogen (H_2) Post Control Concentration (mg/m^3)	Sodium Hydroxide (NaOH) Pre Control Concentration (mg/m^3)	Sodium Hydroxide (NaOH) Control Efficiency (%)	Sodium Hydroxide (NaOH) Post Control Concentration (mg/m^3)	Chlorine (Cl_2) Pre Control Concentration (mg/m^3)	Chlorine (Cl_2) Control Efficiency (%)	Chlorine (Cl_2) Post Control Concentration (mg/m^3)	Particulate Matter (PM) Pre Control Concentration (mg/m^3)	Particulate Matter (PM) Control Efficiency (%)	Particulate Matter (PM) Post Control Concentration (mg/m^3)	Nitrogen Oxide (NOx) Pre Control Concentration (mg/m^3)	Nitrogen Oxide (NOx) Control Efficiency (%)	Nitrogen Oxide (NOx) Post Control Concentration (mg/m^3)	Ammonia (NH_3) Pre Control Concentration (mg/m^3)	Ammonia (NH_3) Control Efficiency (%)	Ammonia (NH_3) Post Control Concentration (mg/m^3)
Batch Texture	Batch Texture	5	33,000							12.38	90%	1.24	16.67	99%	0.21						
Boron Diffusion	Boron Diffusion	8	1,584							12.38	90%	1.24	16.67	99%	0.21						
Oxidation	Oxidation	14	2,772							12.38	90%	1.24	16.67	99%	0.21						
BSG Removal & Polish	Rear BSG Removal	6	42,900							12.38	90%	1.24	16.67	99%	0.21						
BSG Removal & Polish	Rear Polishing	6	43,560							12.38	90%	1.24	16.67	99%	0.21						
Phosphorus Diffusion	POCl3 Diffusion	10	1,980							12.38	90%	1.24	16.67	99%	0.21						
Phosphorus Diffusion	POCl3 Diffusion	10	106							12.38	90%	1.24	16.67	99%	0.21						
PSG Removal-RCA	PSG Wrap-around Removal	6	26,400							12.38	90%	1.24	16.67	99%	0.21						
PSG Removal-RCA	RCA	6	56,100							12.38	90%	1.24	16.67	99%	0.21						
Graphite Boat Cleaning	Graphite boat dry oven	1	550							0.03	0%	0.03	0.43	0%	0.43	1.63	50%	0.82	0.94	0%	0.94
Graphite Boat Cleaning	Graphite boat cleaner	2	17,600							0.03	0%	0.03	0.43	0%	0.43	1.63	50%	0.82	0.94	0%	0.94
Graphite Boat Cleaning	Graphite boat cleaner	2	6,600							0.03	0%	0.03	0.43	0%	0.43	1.63	50%	0.82	0.94	0%	0.94
Quartz Boat Cleaning	Quartz Boat Cleaning (boron diffusion)	2	8,800							0.03	0%	0.03	0.43	0%	0.43	1.63	50%	0.82	0.94	0%	0.94
Quartz Boat Cleaning	Quartz Boat Cleaning (POCl3 diffusion)	1	4,400							0.03	0%	0.03	0.43	0%	0.43	1.63	50%	0.82	0.94	0%	0.94
Quartz Boat Cleaning	Quartz Boat Cleaning (poly)	1	2,200							0.03	0%	0.03	0.43	0%	0.43	1.63	50%	0.82	0.94	0%	0.94
Quartz Boat Cleaning	Quartz tube Cleaning	1	3,300							0.03	0%	0.03	0.43	0%	0.43	1.63	50%	0.82	0.94	0%	0.94
Other Cleaning	Rework Texturing	1	7,700							0.03	0%	0.03	0.43	0%	0.43	1.63	50%	0.82	0.94	0%	0.94

Room	Equipment Name	Silane (SiH_4) Pre Control Concentration (mg/m^3)	Silane (SiH_4) Control Efficiency (%)	Silane (SiH_4) Post Control Concentration (mg/m^3)	Hydrochloric Acid (HCl) Pre Control Concentration (mg/m^3)	Hydrochloric Acid (HCl) Control Efficiency (%)	Hydrochloric Acid (HCl) Post Control Concentration (mg/m^3)	Nonmethane Hydrocarbon (NMHC) Pre Control Concentration (mg/m^3)	Nonmethane Hydrocarbon (NMHC) Control Efficiency (%)	Nonmethane Hydrocarbon (NMHC) Post Control Concentration (mg/m^3)	Nonmethane Volatile Organic Compound (NMVOC) Pre Control Concentration (mg/m^3)	Nonmethane Volatile Organic Compound (NMVOC) Control Efficiency (%)	Nonmethane Volatile Organic Compound (NMVOC) Post Control Concentration (mg/m^3)	Hydrogen Fluoride (HF) Pre Control Concentration (mg/m^3)	Hydrogen Fluoride (HF) Control Efficiency (%)	Hydrogen Fluoride (HF) Post Control Concentration (mg/m^3)	Silicon Tetrafluoride (SiF_4) Pre Control Concentration (mg/m^3)	Silicon Tetrafluoride (SiF_4) Control Efficiency (%)	Silicon Tetrafluoride (SiF_4) Post Control Concentration (mg/m^3)	Zinc (Zn) Concentration (mg/m^3)
Batch Texture	Batch Texture				0.786	94%	0.051							72.43	97%	1.83				0.004
Boron Diffusion	Boron Diffusion				0.786	94%	0.051							72.43	97%	1.83				0.004
Oxidation	Oxidation				0.786	94%	0.051							72.43	97%	1.83				0.004
BSG Removal & Polish	Rear BSG Removal				0.786	94%	0.051							72.43	97%	1.83	27	97%	0.683	0.004
BSG Removal & Polish	Rear Polishing				0.786	94%	0.051							72.43	97%	1.83				0.004
Phosphorus Diffusion	POCl3 Diffusion				0.786	94%	0.051							72.43	97%	1.83				0.004
Phosphorus Diffusion	POCl3 Diffusion				0.786	94%	0.051							72.43	97%	1.83				0.004
PSG Removal-RCA	PSG Wrap-around Removal				0.786	94%	0.051							72.43	97%	1.83	17	97%	0.430	0.004
PSG Removal-RCA	RCA				0.786	94%	0.051							72.43	97%	1.83				0.004
Graphite Boat Cleaning	Graphite boat dry oven				0.200	95%	0.010				0.1	0%	0.1	0.40	95%	0.02				0.004
Graphite Boat Cleaning	Graphite boat cleaner				0.200	95%	0.010				0.1	0%	0.1	0.40	95%	0.02				0.004
Graphite Boat Cleaning	Graphite boat cleaner				0.200	95%	0.010				0.1	0%	0.1	0.40	95%	0.02				0.004
Quartz Boat Cleaning	Quartz Boat Cleaning (boron diffusion)				0.400	95%	0.020				0.1	0%	0.1	0.70	95%	0.04				0.004
Quartz Boat Cleaning	Quartz Boat Cleaning (POCl3 diffusion)				0.400	95%	0.020				0.1	0%	0.1	0.70	95%	0.04				0.004
Quartz Boat Cleaning	Quartz Boat Cleaning (poly)				0.800	95%	0.040				0.1	0%	0.1	1.30	95%	0.07				0.004
Quartz Boat Cleaning	Quartz tube Cleaning				0.100	95%	0.005				0.1	0%	0.1	0.30	95%	0.02				0.004
Other Cleaning	Rework Texturing				0.100	95%	0.005				0.1	0%	0.1	0.50	95%	0.03				0.004

Uncontrolled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Batch Texture	Batch Texture	5	33,000	0.00	0.00	0.90	1.21	0.00	0.00	0.00	0.06	0.00	0.00	5.27	0.00	0.00
Boron Diffusion	Boron Diffusion	8	1,584	0.00	0.00	0.04	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00
Oxidation	Oxidation	14	2,772	0.00	0.00	0.08	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.00
BSG Removal & Polish	Rear BSG Removal	6	42,900	0.00	0.00	1.17	1.58	0.00	0.00	0.00	0.07	0.00	0.00	6.85	2.55	0.00
BSG Removal & Polish	Rear Polishing	6	43,560	0.00	0.00	1.19	1.60	0.00	0.00	0.00	0.08	0.00	0.00	6.96	0.00	0.00
Phosphorus Diffusion	POCl3 Diffusion	10	1,980	0.00	0.00	0.05	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00
Phosphorus Diffusion	POCl3 Diffusion	10	106	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
PSG Removal-RCA	PSG Wrap-around Removal	6	26,400	0.00	0.00	0.72	0.97	0.00	0.00	0.00	0.05	0.00	0.00	4.22	0.99	0.00
PSG Removal-RCA	RCA	6	56,100	0.00	0.00	1.53	2.06	0.00	0.00	0.00	0.10	0.00	0.00	8.96	0.00	0.00
Graphite Boat Cleaning	Graphite boat dry oven	1	550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Graphite Boat Cleaning	Graphite boat cleaner	2	17,600	0.00	0.00	0.00	0.02	0.06	0.04	0.00	0.01	0.00	0.00	0.02	0.00	0.00
Graphite Boat Cleaning	Graphite boat cleaner	2	6,600	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Quartz Boat Cleaning	Quartz Boat Cleaning (boron diffusion)	2	8,800	0.00	0.00	0.00	0.01	0.03	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.00
Quartz Boat Cleaning	Quartz Boat Cleaning (POCl3 diffusion)	1	4,400	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Quartz Boat Cleaning	Quartz Boat Cleaning (poly)	1	2,200	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Quartz Boat Cleaning	Quartz tube Cleaning	1	3,300	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Cleaning	Rework Texturing	1	7,700	0.00	0.00	0.00	0.01	0.03	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00

Uncontrolled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Batch Texture	Batch Texture	5	33,000	0.00	0.00	3.95	5.31	0.00	0.00	0.00	0.25	0.00	0.00	23.08	0.00	0.00
Boron Diffusion	Boron Diffusion	8	1,584	0.00	0.00	0.19	0.26	0.00	0.00	0.00	0.01	0.00	0.00	1.11	0.00	0.00
Oxidation	Oxidation	14	2,772	0.00	0.00	0.33	0.45	0.00	0.00	0.00	0.02	0.00	0.00	1.94	0.00	0.00
BSG Removal & Polish	Rear BSG Removal	6	42,900	0.00	0.00	5.13	6.91	0.00	0.00	0.00	0.33	0.00	0.00	30.01	11.18	0.00
BSG Removal & Polish	Rear Polishing	6	43,560	0.00	0.00	5.21	7.01	0.00	0.00	0.00	0.33	0.00	0.00	30.47	0.00	0.00
Phosphorus Diffusion	POCl3 Diffusion	10	1,980	0.00	0.00	0.24	0.32	0.00	0.00	0.00	0.02	0.00	0.00	1.38	0.00	0.00
Phosphorus Diffusion	POCl3 Diffusion	10	106	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00
PSG Removal-RCA	PSG Wrap-around Removal	6	26,400	0.00	0.00	3.16	4.25	0.00	0.00	0.00	0.20	0.00	0.00	18.47	4.33	0.00
PSG Removal-RCA	RCA	6	56,100	0.00	0.00	6.71	9.03	0.00	0.00	0.00	0.43	0.00	0.00	39.24	0.00	0.00
Graphite Boat Cleaning	Graphite boat dry oven	1	550	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Graphite Boat Cleaning	Graphite boat cleaner	2	17,600	0.00	0.00	0.01	0.07	0.28	0.16	0.00	0.03	0.00	0.02	0.07	0.00	0.00
Graphite Boat Cleaning	Graphite boat cleaner	2	6,600	0.00	0.00	0.00	0.03	0.10	0.06	0.00	0.01	0.00	0.01	0.03	0.00	0.00
Quartz Boat Cleaning	Quartz Boat Cleaning (boron diffusion)	2	8,800	0.00	0.00	0.00	0.04	0.14	0.08	0.00	0.03	0.00	0.01	0.06	0.00	0.00
Quartz Boat Cleaning	Quartz Boat Cleaning (POCl3 diffusion)	1	4,400	0.00	0.00	0.00	0.02	0.07	0.04	0.00	0.02	0.00	0.00	0.03	0.00	0.00
Quartz Boat Cleaning	Quartz Boat Cleaning (poly)	1	2,200	0.00	0.00	0.00	0.01	0.03	0.02	0.00	0.02	0.00	0.00	0.03	0.00	0.00
Quartz Boat Cleaning	Quartz tube Cleaning	1	3,300	0.00	0.00	0.00	0.01	0.05	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Other Cleaning	Rework Texturing	1	7,700	0.00	0.00	0.00	0.03	0.12	0.07	0.00	0.01	0.00	0.01	0.04	0.00	0.00

Controlled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Batch Texture	Batch Texture	5	33,000	0.00	0.00	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	--
Boron Diffusion	Boron Diffusion	8	1,584	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	--
Oxidation	Oxidation	14	2,772	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	--
BSG Removal & Polish	Rear BSG Removal	6	42,900	0.00	0.00	0.12	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.06	--
BSG Removal & Polish	Rear Polishing	6	43,560	0.00	0.00	0.12	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	--
Phosphorus Diffusion	POCl3 Diffusion	10	1,980	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	--
Phosphorus Diffusion	POCl3 Diffusion	10	106	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
PSG Removal-RCA	PSG Wrap-around Removal	6	26,400	0.00	0.00	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.03	--
PSG Removal-RCA	RCA	6	56,100	0.00	0.00	0.15	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.23	0.00	--
Graphite Boat Cleaning	Graphite boat dry oven	1	550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Graphite Boat Cleaning	Graphite boat cleaner	2	17,600	0.00	0.00	0.00	0.02	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	--
Graphite Boat Cleaning	Graphite boat cleaner	2	6,600	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	--
Quartz Boat Cleaning	Quartz Boat Cleaning (boron diffusion)	2	8,800	0.00	0.00	0.00	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	--
Quartz Boat Cleaning	Quartz Boat Cleaning (POCl3 diffusion)	1	4,400	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	--
Quartz Boat Cleaning	Quartz Boat Cleaning (poly)	1	2,200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Quartz Boat Cleaning	Quartz tube Cleaning	1	3,300	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	--
Other Cleaning	Rework Texturing	1	7,700	0.00	0.00	0.00	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	--

Controlled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Batch Texture	Batch Texture	5	33,000	0.00	0.00	0.39	0.07	0.00	0.00	0.00	0.02	0.00	0.00	0.58	0.00	--
Boron Diffusion	Boron Diffusion	8	1,584	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	--
Oxidation	Oxidation	14	2,772	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	--
BSG Removal & Polish	Rear BSG Removal	6	42,900	0.00	0.00	0.51	0.09	0.00	0.00	0.00	0.02	0.00	0.00	0.76	0.28	--
BSG Removal & Polish	Rear Polishing	6	43,560	0.00	0.00	0.52	0.09	0.00	0.00	0.00	0.02	0.00	0.00	0.77	0.00	--
Phosphorus Diffusion	POCl3 Diffusion	10	1,980	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	--
Phosphorus Diffusion	POCl3 Diffusion	10	106	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
PSG Removal-RCA	PSG Wrap-around Removal	6	26,400	0.00	0.00	0.32	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.47	0.11	--
PSG Removal-RCA	RCA	6	56,100	0.00	0.00	0.67	0.11	0.00	0.00	0.00	0.03	0.00	0.00	0.99	0.00	--
Graphite Boat Cleaning	Graphite boat dry oven	1	550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Graphite Boat Cleaning	Graphite boat cleaner	2	17,600	0.00	0.00	0.01	0.07	0.14	0.16	0.00	0.00	0.00	0.02	0.00	0.00	--
Graphite Boat Cleaning	Graphite boat cleaner	2	6,600	0.00	0.00	0.00	0.03	0.05	0.06	0.00	0.00	0.00	0.01	0.00	0.00	--
Quartz Boat Cleaning	Quartz Boat Cleaning (boron diffusion)	2	8,800	0.00	0.00	0.00	0.04	0.07	0.08	0.00	0.00	0.00	0.01	0.00	0.00	--
Quartz Boat Cleaning	Quartz Boat Cleaning (POCl3 diffusion)	1	4,400	0.00	0.00	0.00	0.02	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	--
Quartz Boat Cleaning	Quartz Boat Cleaning (poly)	1	2,200	0.00	0.00	0.00	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	--
Quartz Boat Cleaning	Quartz tube Cleaning	1	3,300	0.00	0.00	0.00	0.01	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	--
Other Cleaning	Rework Texturing	1	7,700	0.00	0.00	0.00	0.03	0.06	0.07	0.00	0.00	0.00	0.01	0.00	0.00	--

	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Total Uncontrolled (tons/year)	**0.00**	**0.00**	**24.93**	**33.77**	**0.81**	**0.46**	**0.00**	**1.71**	**0.00**	**0.05**	**146.02**	**15.52**	**0.01**
Total Controlled/Uncontrolled (tons/year)	**0.00**	**0.00**	**2.50**	**0.63**	**0.40**	**0.46**	**0.00**	**0.11**	**0.00**	**0.05**	**3.70**	**0.39**	**0.01**

Notes:
m^3/h = meters cubed per hour
mg/m^3 = miligram(s) per meters cubed
lb/hour = pound(s) per hour
tons/year = tons per year

Maxeon

Golden Eagle

Alkaline Exhaust Emissions

November 2023

Uncontrolled
Control Efficiency
Controlled

Raw Data

				Hydrogen (H_2)			Sodium Hydroxide (NaOH)			Chlorine (Cl_2)			Particulate Matter (PM)			Nitrogen Oxide (NOx)			Ammonia (NH_3)			Silane (SiH_4)			Hydrochloric Acid (HCl)			Nonmethane Hydrocarbon (NMHC)			Nonmethane Volatile Organic Compound (NMVOC)			Hydrogen Fluoride (HF)			Silicon Tetrafluoride (SiF_4)			Zinc (Zn)
Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Concentration (mg/m^3)
Batch Texture	Batch Texture	5	49,500	3825	0%	3825	151	95%	7.55																															
BSG Removal & Polish	Rear Polishing	6	56,100	4628	0%	4628	183	95%	9.15																															
PSG Removal-RCA	RCA	6	46,200	6205	0%	6205	245	95%	12.25																															
Quartz Boat Cleaning	Quartz Boat Cleaning (poly)	1	2,200	447	0%	447	17.7	95%	0.885																															
Other Cleaning	Rework Texturing	1	2,200	1881	0%	1881	73.4	95%	3.67																															
Other Cleaning	ultrasonic cleaner	1	1,100	447	0%	447	17.7	95%	0.885																															

Uncontrolled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Batch Texture	Batch Texture	5	49,500	417.42	16.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BSG Removal & Polish	Rear Polishing	6	56,100	572.39	22.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PSG Removal-RCA	RCA	6	46,200	632.00	24.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Quartz Boat Cleaning	Quartz Boat Cleaning (poly)	1	2,200	2.17	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Cleaning	Rework Texturing	1	2,200	9.12	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Cleaning	ultrasonic cleaner	1	1,100	1.08	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Uncontrolled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Batch Texture	Batch Texture	5	49,500	1828.30	72.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BSG Removal & Polish	Rear Polishing	6	56,100	2507.07	99.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PSG Removal-RCA	RCA	6	46,200	2768.18	109.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Quartz Boat Cleaning	Quartz Boat Cleaning (poly)	1	2,200	9.50	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Cleaning	Rework Texturing	1	2,200	39.96	1.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Cleaning	ultrasonic cleaner	1	1,100	4.75	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Controlled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Batch Texture	Batch Texture	5	49,500	417.42	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
BSG Removal & Polish	Rear Polishing	6	56,100	572.39	1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
PSG Removal-RCA	RCA	6	46,200	632.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Quartz Boat Cleaning	Quartz Boat Cleaning (poly)	1	2,200	2.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Other Cleaning	Rework Texturing	1	2,200	9.12	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Other Cleaning	ultrasonic cleaner	1	1,100	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--

Controlled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Batch Texture	Batch Texture	5	49,500	1828.30	3.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
BSG Removal & Polish	Rear Polishing	6	56,100	2507.07	4.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
PSG Removal-RCA	RCA	6	46,200	2768.18	5.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Quartz Boat Cleaning	Quartz Boat Cleaning (poly)	1	2,200	9.50	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Other Cleaning	Rework Texturing	1	2,200	39.96	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Other Cleaning	ultrasonic cleaner	1	1,100	4.75	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--

	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Total Uncontrolled (tons/year)	**7157.76**	**282.73**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total Controlled/Uncontrolled (tons/year)	**7157.76**	**14.14**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Notes:

m^3/h = meters cubed per hour

mg/m^3 = miligram(s) per meters cubed

lb/hour = pound(s) per hour

tons/year = tons per year

Maxeon
Golden Eagle
Organic Exhaust Emissions
November 2023

Uncontrolled
Control Efficiency
Controlled

Raw Data

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)			Sodium Hydroxide (NaOH)			Chlorine (Cl_2)			Particulate Matter (PM)			Nitrogen Oxide (NOx)			Ammonia (NH_3)			Silane (SiH_4)			Hydrochloric Acid (HCl)			Nonmethane Hydrocarbon (NMHC)			Nonmethane Volatile Organic Compound (NMVOC)			Hydrogen Fluoride (HF)			Silicon Tetrafluoride (SiF_4)			Zinc (Zn)
				Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Concentration (mg/m^3)
Printer & Dryer & Fast Firing & CTCS	Printing#1	12	3,960																												26.1	0%	26.1							
Printer & Dryer & Fast Firing & CTCS	Printing#2	12	3,960																												26.1	0%	26.1							
Printer & Dryer & Fast Firing & CTCS	Printing#3	12	3,960																												26.1	0%	26.1							
Printer & Dryer & Fast Firing & CTCS	Printing#4	12	3,960																												26.1	0%	26.1							
Printer & Dryer & Fast Firing & CTCS	Firing Furnace	6	21,120																												26.1	0%	26.1							
Printer & Dryer & Fast Firing & CTCS	Dryer#1	24	36,960																												26.1	0%	26.1							
Printer & Dryer & Fast Firing & CTCS	Dryer#2	12	18,480																												26.1	0%	26.1							
Printer & Dryer & Fast Firing & CTCS	Dryer#3	12	18,480																												26.1	0%	26.1							

Uncontrolled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Printer & Dryer & Fast Firing & CTCS	Printing#1	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Printing#2	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Printing#3	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Printing#4	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Firing Furnace	6	21,120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.22	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Dryer#1	24	36,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.13	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Dryer#2	12	18,480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Dryer#3	12	18,480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06	0.00	0.00	0.00

Uncontrolled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Printer & Dryer & Fast Firing & CTCS	Printing#1	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Printing#2	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Printing#3	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Printing#4	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Firing Furnace	6	21,120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.32	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Dryer#1	24	36,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.32	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Dryer#2	12	18,480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.66	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Dryer#3	12	18,480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.66	0.00	0.00	0.00

Controlled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Printer & Dryer & Fast Firing & CTCS	Printing#1	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Printing#2	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Printing#3	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Printing#4	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Firing Furnace	6	21,120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.22	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Dryer#1	24	36,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.13	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Dryer#2	12	18,480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Dryer#3	12	18,480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06	0.00	0.00	--

Controlled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Printer & Dryer & Fast Firing & CTCS	Printing#1	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Printing#2	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Printing#3	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Printing#4	12	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Firing Furnace	6	21,120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.32	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Dryer#1	24	36,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.32	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Dryer#2	12	18,480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.66	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Dryer#3	12	18,480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.66	0.00	0.00	--

	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Total Uncontrolled (tons/year)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**27.95**	**0.00**	**0.00**	**0.00**
Total Controlled/Uncontrolled (tons/year)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**27.95**	**0.00**	**0.00**	**0.00**

Notes:
m^3/h = meters cubed per hour
mg/m^3 = miligram(s) per meters cubed
lb/hour = pound(s) per hour
tons/year = tons per year

Maxeon
Golden Eagle
General Exhaust Emissions
November 2023

Uncontrolled
Control Efficiency
Controlled

Raw Data

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)			Sodium Hydroxide (NaOH)			Chlorine (Cl_2)			Particulate Matter (PM)			Nitrogen Oxide (NOx)			Ammonia (NH_3)		
				Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)
Boron Diffusion	Boron Diffusion	8	7,920										0.00497	0%	0.00497				0.00497	0%	0.00497
Boron Diffusion	Boron Diffusion	8	1,584										0.00497	0%	0.00497				0.00497	0%	0.00497
Boron Diffusion	Boron Diffusion	8	71,280										0.00497	0%	0.00497				0.00497	0%	0.00497
SE	SE	14	12,320										0.00497	0%	0.00497				0.00497	0%	0.00497
Oxidation	Oxidation	14	13,860										0.00497	0%	0.00497				0.00497	0%	0.00497
Oxidation	Oxidation	14	2,772										0.00497	0%	0.00497				0.00497	0%	0.00497
Oxidation	Oxidation	14	124,740										0.00497	0%	0.00497				0.00497	0%	0.00497
LPCVD	LPCVD	10	4,158										0.00497	0%	0.00497				0.00497	0%	0.00497
LPCVD	LPCVD	10	48,510										0.00497	0%	0.00497				0.00497	0%	0.00497
Phosphorus Diffusion	POCl3 Diffusion	10	5,940										0.00497	0%	0.00497				0.00497	0%	0.00497
Phosphorus Diffusion	POCl3 Diffusion	10	69,300										0.00497	0%	0.00497				0.00497	0%	0.00497
Passivation	ALD	10	3,850										0.00497	0%	0.00497				0.00497	0%	0.00497
Passivation	ALD	10	3,850										0.00497	0%	0.00497				0.00497	0%	0.00497
Passivation	ALD	10	11,550										0.00497	0%	0.00497				0.00497	0%	0.00497
Local Scrubber	Local Scrubber	30	1,980										0.00497	0%	0.00497				0.00497	0%	0.00497
Coating	PECVD	18	401,940										0.00497	0%	0.00497				0.00497	0%	0.00497
LECO & TLS Laser	LECO & TLS Laser	24	21,120										0.00497	0%	0.00497				0.00497	0%	0.00497
Printer & Dryer & Fast Firing & CTCS	Firing Furnace	6	5,280										0.00497	0%	0.00497				0.00497	0%	0.00497
Printer & Dryer & Fast Firing & CTCS	Annealing+LED	6	38,280										0.00497	0%	0.00497				0.00497	0%	0.00497
Graphite Boat Cleaning	Graphite Boat Pre-Coating	2	44,660										0.00497	0%	0.00497				0.00497	0%	0.00497
Other Cleaning	Dry cassette washing&oven equipment	1	3,300										0.00497	0%	0.00497				0.00497	0%	0.00497

Room	Equipment Name	Silane (SiH_4)			Hydrochloric Acid (HCl)			Nonmethane Hydrocarbon (NMHC)			Nonmethane Volatile Organic Compound (NMVOC)			Hydrogen Fluoride (HF)			Silicon Tetrafluoride (SiF_4)			Zinc (Zn)
		Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Concentration (mg/m^3)
Boron Diffusion	Boron Diffusion				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Boron Diffusion	Boron Diffusion				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Boron Diffusion	Boron Diffusion				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
SE	SE				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Oxidation	Oxidation				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Oxidation	Oxidation				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Oxidation	Oxidation				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
LPCVD	LPCVD				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
LPCVD	LPCVD				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Phosphorus Diffusion	POCl3 Diffusion				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Phosphorus Diffusion	POCl3 Diffusion				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Passivation	ALD				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Passivation	ALD				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Passivation	ALD				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Local Scrubber	Local Scrubber				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Coating	PECVD				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
LECO & TLS Laser	LECO & TLS Laser				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Printer & Dryer & Fast Firing & CTCS	Firing Furnace				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Printer & Dryer & Fast Firing & CTCS	Annealing+LED				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Graphite Boat Cleaning	Graphite Boat Pre-Coating				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				
Other Cleaning	Dry cassette washing&oven equipment				0.00166	0%	0.00166	0.15727	0%	0.15727				0.1656	0%	0.1656				

Uncontrolled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Boron Diffusion	Boron Diffusion	8	7,920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Boron Diffusion	Boron Diffusion	8	1,584	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Boron Diffusion	Boron Diffusion	8	71,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.00	0.00
SE	SE	14	12,320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oxidation	Oxidation	14	13,860	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Oxidation	Oxidation	14	2,772	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oxidation	Oxidation	14	124,740	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.05	0.00	0.00
LPCVD	LPCVD	10	4,158	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LPCVD	LPCVD	10	48,510	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00
Phosphorus Diffusion	POCl3 Diffusion	10	5,940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phosphorus Diffusion	POCl3 Diffusion	10	69,300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.00	0.00
Passivation	ALD	10	3,850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passivation	ALD	10	3,850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passivation	ALD	10	11,550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Scrubber	Local Scrubber	30	1,980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating	PECVD	18	401,940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.15	0.00	0.00
LECO & TLS Laser	LECO & TLS Laser	24	21,120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Firing Furnace	6	5,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Annealing+LED	6	38,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Graphite Boat Cleaning	Graphite Boat Pre-Coating	2	44,660	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00
Other Cleaning	Dry cassette washing&oven equipment	1	3,300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Uncontrolled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Boron Diffusion	Boron Diffusion	8	7,920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Boron Diffusion	Boron Diffusion	8	1,584	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Boron Diffusion	Boron Diffusion	8	71,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.11	0.00	0.00
SE	SE	14	12,320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00
Oxidation	Oxidation	14	13,860	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00
Oxidation	Oxidation	14	2,772	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oxidation	Oxidation	14	124,740	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.19	0.00	0.20	0.00	0.00
LPCVD	LPCVD	10	4,158	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
LPCVD	LPCVD	10	48,510	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.08	0.00	0.00
Phosphorus Diffusion	POCl3 Diffusion	10	5,940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Phosphorus Diffusion	POCl3 Diffusion	10	69,300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.11	0.00	0.00
Passivation	ALD	10	3,850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Passivation	ALD	10	3,850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Passivation	ALD	10	11,550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00
Local Scrubber	Local Scrubber	30	1,980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating	PECVD	18	401,940	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.61	0.00	0.64	0.00	0.00
LECO & TLS Laser	LECO & TLS Laser	24	21,120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Firing Furnace	6	5,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Printer & Dryer & Fast Firing & CTCS	Annealing+LED	6	38,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.06	0.00	0.00
Graphite Boat Cleaning	Graphite Boat Pre-Coating	2	44,660	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.07	0.00	0.00
Other Cleaning	Dry cassette washing&oven equipment	1	3,300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00

Controlled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Boron Diffusion	Boron Diffusion	8	7,920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Boron Diffusion	Boron Diffusion	8	1,584	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Boron Diffusion	Boron Diffusion	8	71,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.00	--
SE	SE	14	12,320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Oxidation	Oxidation	14	13,860	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	--
Oxidation	Oxidation	14	2,772	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Oxidation	Oxidation	14	124,740	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.05	0.00	--
LPCVD	LPCVD	10	4,158	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
LPCVD	LPCVD	10	48,510	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	--
Phosphorus Diffusion	POCl3 Diffusion	10	5,940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Phosphorus Diffusion	POCl3 Diffusion	10	69,300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.00	--
Passivation	ALD	10	3,850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Passivation	ALD	10	3,850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Passivation	ALD	10	11,550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Local Scrubber	Local Scrubber	30	1,980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Coating	PECVD	18	401,940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.15	0.00	--
LECO & TLS Laser	LECO & TLS Laser	24	21,120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	--

Printer & Dryer & Fast Firing & CTCS	Firing Furnace	6	5,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Printer & Dryer & Fast Firing & CTCS	Annealing+LED	6	38,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	--
Graphite Boat Cleaning	Graphite Boat Pre-Coating	2	44,660	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	--
Other Cleaning	Dry cassette washing&oven equipment	1	3,300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--

Controlled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Boron Diffusion	Boron Diffusion	8	7,920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	--
Boron Diffusion	Boron Diffusion	8	1,584	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Boron Diffusion	Boron Diffusion	8	71,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.11	0.00	--
SE	SE	14	12,320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	--
Oxidation	Oxidation	14	13,860	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	--
Oxidation	Oxidation	14	2,772	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Oxidation	Oxidation	14	124,740	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.19	0.00	0.20	0.00	--
LPCVD	LPCVD	10	4,158	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	--
LPCVD	LPCVD	10	48,510	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.08	0.00	--
Phosphorus Diffusion	POCl3 Diffusion	10	5,940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	--
Phosphorus Diffusion	POCl3 Diffusion	10	69,300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.11	0.00	--
Passivation	ALD	10	3,850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	--
Passivation	ALD	10	3,850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	--
Passivation	ALD	10	11,550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	--
Local Scrubber	Local Scrubber	30	1,980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Coating	PECVD	18	401,940	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.61	0.00	0.64	0.00	--
LECO & TLS Laser	LECO & TLS Laser	24	21,120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	--
Printer & Dryer & Fast Firing & CTCS	Firing Furnace	6	5,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	--
Printer & Dryer & Fast Firing & CTCS	Annealing+LED	6	38,280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.06	0.00	--
Graphite Boat Cleaning	Graphite Boat Pre-Coating	2	44,660	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.07	0.00	--
Other Cleaning	Dry cassette washing&oven equipment	1	3,300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	--

	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Total Uncontrolled (tons/year)	**0.00**	**0.00**	**0.00**	**0.04**	**0.00**	**0.04**	**0.00**	**0.01**	**1.36**	**0.00**	**1.44**	**0.00**	**0.00**
Total Controlled/Uncontrolled (tons/year)	**0.00**	**0.00**	**0.00**	**0.04**	**0.00**	**0.04**	**0.00**	**0.01**	**1.36**	**0.00**	**1.44**	**0.00**	**0.00**

Notes:
m^3/h = meters cubed per hour
mg/m^3 = miligram(s) per meters cubed
lb/hour = pound(s) per hour
tons/year = tons per year

Maxeon

Golden Eagle

Silane Exhaust Emissions

November 2023

Uncontrolled

Control Efficiency

Controlled

Raw Data

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)			Sodium Hydroxide (NaOH)			Chlorine (Cl_2)			Particulate Matter (PM)		
				Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)
LPCVD	vacuum pump	60	2,640												
LPCVD	vacuum pump	60	2,640												
Passivation	ALD pump	30	2,640												
Passivation	Vacuum Pump (Roughing)	6	528												
Local Scrubber	Local Scrubber	30	3,960												
Coating	PECVD-pump	108	4,752										16.675	99%	0.206
Graphite Boat Cleaning	Graphite Boat Pre-Coating - PUMP	12	528										16.675	99%	0.206

Room	Equipment Name	Nitrogen Oxide (NOx)			Ammonia (NH_3)			Silane (SiH_4)			Hydrochloric Acid (HCl)		
		Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)
LPCVD	vacuum pump							4.88	95%	0.244			
LPCVD	vacuum pump							4.88	95%	0.244			
Passivation	ALD pump							4.88	95%	0.244			
Passivation	Vacuum Pump (Roughing)							4.88	95%	0.244			
Local Scrubber	Local Scrubber							4.88	95%	0.244			
Coating	PECVD-pump	31.057	50%	15.528	890.299	94%	53.418	4.88	95%	0.244			
Graphite Boat Cleaning	Graphite Boat Pre-Coating - PUMP	16.675	50%	8.337	16.675	94%	1.000	4.88	95%	0.244			

Room	Equipment Name	Nonmethane Hydrocarbon (NMHC)			Nonmethane Volatile Organic Compound (NMVOC)			Hydrogen Fluoride (HF)			Silicon Tetrafluoride (SiF_4)			Zinc (Zn)
		Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Concentration (mg/m^3)
LPCVD	vacuum pump													
LPCVD	vacuum pump													
Passivation	ALD pump													
Passivation	Vacuum Pump (Roughing)													
Local Scrubber	Local Scrubber													
Coating	PECVD-pump	1334.33	98%	26.30										
Graphite Boat Cleaning	Graphite Boat Pre-Coating - PUMP	16.67	98%	0.33										

Uncontrolled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
LPCVD	vacuum pump	60	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
LPCVD	vacuum pump	60	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Passivation	ALD pump	30	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Passivation	Vacuum Pump (Roughing)	6	528	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Local Scrubber	Local Scrubber	30	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Coating	PECVD-pump	108	4,752	0.00	0.00	0.00	0.17	0.33	9.33	0.05	0.00	13.98	0.00	0.00	0.00	0.00
Graphite Boat Cleaning	Graphite Boat Pre-Coating - PUMP	12	528	0.00	0.00	0.00	0.02	0.02	0.02	0.01	0.00	0.02	0.00	0.00	0.00	0.00

Uncontrolled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
LPCVD	vacuum pump	60	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00
LPCVD	vacuum pump	60	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00
Passivation	ALD pump	30	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00
Passivation	Vacuum Pump (Roughing)	6	528	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Local Scrubber	Local Scrubber	30	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00
Coating	PECVD-pump	108	4,752	0.00	0.00	0.00	0.77	1.43	40.85	0.22	0.00	61.23	0.00	0.00	0.00	0.00
Graphite Boat Cleaning	Graphite Boat Pre-Coating - PUMP	12	528	0.00	0.00	0.00	0.09	0.09	0.09	0.02	0.00	0.09	0.00	0.00	0.00	0.00

Controlled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
LPCVD	vacuum pump	60	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
LPCVD	vacuum pump	60	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Passivation	ALD pump	30	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Passivation	Vacuum Pump (Roughing)	6	528	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Local Scrubber	Local Scrubber	30	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Coating	PECVD-pump	108	4,752	0.00	0.00	0.00	0.00	0.16	0.56	0.00	0.00	0.28	0.00	0.00	0.00	--
Graphite Boat Cleaning	Graphite Boat Pre-Coating - PUMP	12	528	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--

Controlled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
LPCVD	vacuum pump	60	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	--
LPCVD	vacuum pump	60	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	--
Passivation	ALD pump	30	2,640	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	--
Passivation	Vacuum Pump (Roughing)	6	528	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Local Scrubber	Local Scrubber	30	3,960	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	--
Coating	PECVD-pump	108	4,752	0.00	0.00	0.00	0.01	0.71	2.45	0.01	0.00	1.21	0.00	0.00	0.00	--
Graphite Boat Cleaning	Graphite Boat Pre-Coating - PUMP	12	528	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	--

	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Total Uncontrolled (tons/year)	**0.00**	**0.00**	**0.00**	**0.85**	**1.51**	**40.94**	**0.83**	**0.00**	**61.31**	**0.00**	**0.00**	**0.00**	**0.00**
Total Controlled/Uncontrolled (tons/year)	**0.00**	**0.00**	**0.00**	**0.01**	**0.76**	**2.46**	**0.04**	**0.00**	**1.21**	**0.00**	**0.00**	**0.00**	**0.00**

Notes:

m^3/h = meters cubed per hour

mg/m^3 = miligram(s) per meters cubed

lb/hour = pound(s) per hour

tons/year = tons per year

Maxeon
Golden Eagle
Module Production Area (Modco) Emissions
November 2023

Uncontrolled
Control Efficiency
Controlled

Raw Data

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Type	Hydrogen (H_2)			Sodium Hydroxide (NaOH)			Chlorine (Cl_2)			Particulate Matter (PM)			Nitrogen Oxide (NOx)			Ammonia (NH_3)			Silane (SiH_4)			Hydrochloric Acid (HCl)			Nonmethane Hydrocarbon (NMHC)			Nonmethane Volatile Organic Compound (NMVOC)			Hydrogen Fluoride (HF)			Silicon Tetrafluoride (SiF_4)			Zinc (Zn)
					Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Pre Control Concentration (mg/m^3)	Control Efficiency (%)	Post Control Concentration (mg/m^3)	Concentration (mg/m^3)
Modco Welding	4.0 Stringer all-in-one machine	21	58,799	General Exhaust																																					
Modco Welding	4.0 Stringer all-in-one machine	21	8,400	Organic Exhaust																												571.74	0%	571.74							
MODCO ACF	Solder Paste Machine/Bus Bar Welding Machine/Tape Machine/Assembly Line	5	3,000	Organic Exhaust																												0.20	0%	0.20							
MODCO Laminator	One-press eight-layer press machine	9	5,400	Organic Exhaust																												71.08	0%	71.08							
MODCO Framing	Flow pendulum frame machine	5	1,000	Organic Exhaust																												17.51	0%	17.51							

Uncontrolled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Type	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Modco Welding	4.0 Stringer all-in-one machine	21	58,799	General Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Modco Welding	4.0 Stringer all-in-one machine	21	8,400	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.59	0.00	0.00	0.00
MODCO ACF	Solder Paste Machine/Bus Bar Welding	5	3,000	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MODCO Laminator	One-press eight-layer press machine	9	5,400	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.00
MODCO Framing	Flow pendulum frame machine	5	1,000	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00

Uncontrolled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Type	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Modco Welding	4.0 Stringer all-in-one machine	21	58,799	General Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Modco Welding	4.0 Stringer all-in-one machine	21	8,400	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	0.00	0.00	0.00
MODCO ACF	Solder Paste Machine/Bus Bar Welding Machine/Tape Machine/Assembly Line	5	3,000	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
MODCO Laminator	One-press eight-layer press machine	9	5,400	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.71	0.00	0.00	0.00
MODCO Framing	Flow pendulum frame machine	5	1,000	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00

Controlled Hourly (lb/hour)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Type	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Modco Welding	4.0 Stringer all-in-one machine	21	58,799	General Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Modco Welding	4.0 Stringer all-in-one machine	21	8,400	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.59	0.00	0.00	--
MODCO ACF	Solder Paste Machine/Bus Bar Welding Machine/Tape Machine/Assembly Line	5	3,000	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
MODCO Laminator	One-press eight-layer press machine	9	5,400	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.00	0.00	--
MODCO Framing	Flow pendulum frame machine	5	1,000	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	--

Controlled Annual (tons/year)

Room	Equipment Name	Quantity	Total Exhaust Maximum (m^3/h)	Type	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Modco Welding	4.0 Stringer all-in-one machine	21	58,799	General Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Modco Welding	4.0 Stringer all-in-one machine	21	8,400	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	0.00	0.00	--
MODCO ACF	Solder Paste Machine/Bus Bar Welding Machine/Tape Machine/Assembly Line	5	3,000	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	--
MODCO Laminator	One-press eight-layer press machine	9	5,400	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.71	0.00	0.00	--
MODCO Framing	Flow pendulum frame machine	5	1,000	Organic Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	--

	Hydrogen (H_2)	Sodium Hydroxide (NaOH)	Chlorine (Cl_2)	Particulate Matter (PM)	Nitrogen Oxide (NOx)	Ammonia (NH_3)	Silane (SiH_4)	Hydrochloric Acid (HCl)	Nonmethane Hydrocarbon (NMHC)	Nonmethane Volatile Organic Compound (NMVOC)	Hydrogen Fluoride (HF)	Silicon Tetrafluoride (SiF_4)	Zinc (Zn)
Total Uncontrolled (tons/year)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**50.26**	**0.00**	**0.00**	**0.00**
Total Controlled/Uncontrolled (tons/year)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**50.26**	**0.00**	**0.00**	**0.00**

Notes:
m^3/h = meters cubed per hour
mg/m^3 = miligram(s) per meters cubed
lb/hour = pound(s) per hour
tons/year = tons per year

Maxeon

Golden Eagle
Chemical Storage Tanks
November 2023

Hydrogen Fluoride (HF) Tank Emissions

Parameters	Value	Units
Number of Tanks	2	tank(s)
Tank Capacity	10,500	gallons
Tank Volume	1,404	cubic feet
HF Molecular Weight	20.01	grams/mol
HF Concentration in Tank	49	%
System Abatement Efficiency	80	%
Molar Volume of Gas at NTP	24.45	liters per mol
Molar Volume of Gas at NTP	0.8634	cubic feet per mol
Moles of HF in Empty Tank Vapor Space	1,626	mol
Mass of HF in Empty Tank Vapor Space	72	lbs
Annual Volume of HF Usage	207,728	cubic feet
Tank Turnovers Per Year	147.99	--
Hourly Unabated Emissions	2.42	lbs/hr
Annual Unabated Emissions	10.61	TPY
Hourly Abated Emissions	0.48	lbs/hr
Annual Abated Emissions	2.123	TPY

Hydrochloric Acid (HCl) Tank Emissions

Parameters	Value	Units
Number of Tank(s)	2	tank(s)
Tank Capacity	5,500	gallons
Tank Volume	735	cubic feet
HCl Molecular Weight	36.46	grams/mol
HCl Concentration in Tank	37	%
System Abatement Efficiency	80	%
Molar Volume of Gas at NTP	24.45	liters per mol
Molar Volume of Gas at NTP	0.8634	cubic feet per mol
Moles of HCl in Empty Tank Vapor Space	852	mol
Mass of HCl in Empty Tank Vapor Space	68	lbs
Annual Volume of HCl Usage	92,004	cubic feet
Tank Turnovers Per Year	125.13	--
Hourly Unabated Emissions	1.96	lbs/hr
Annual Unabated Emissions	8.56	TPY
Hourly Abated Emissions	0.39	lbs/hr
Annual Abated Emissions	1.71	TPY

Hydrogen Peroxide (H2O2) Tank Emissions

Parameters	Value	Units
Number of Tanks	2	tank(s)
Tank Capacity	15,000	gallons
Tank Volume	2,005	cubic feet
H2O2 Molecular Weight	56.11	grams/mol
H2O2 Concentration in Tank	30	%
System Abatement Efficiency	0	%
Molar Volume of Gas at NTP	34.0147	liters per mol
Molar Volume of Gas at NTP	1.2012	cubic feet per mol
Moles of H2O2 in Empty Tank Vapor Space	1,669	mol
Mass of H2O2 in Empty Tank Vapor Space	206	lbs
Vapor Pressure of H_2O	33	mmHg
Vapor Pressure of H_20_2	0.75	mmHg
Annual Volume of H2O2 Usage	300,853	cubic feet
Tank Turnovers Per Year	150.04	--
Mass load per ft^3 vapor H_2O	1.29E-05	lb/ft^3
Mass load per ft^3 vapor H_2O_2	1.33E-03	lb/ft^3
Hourly Unabated Emissions	0.09	lbs/hr
Annual Unabated Emissions	0.40	TPY
Hourly Abated Emissions	0.09	lbs/hr
Annual Abated Emissions	0.4	TPY

Sodium Hydroxide (NaOH) Tank Emissions

Parameters	Value	Units
Number of Tanks	2	tank(s)
Tank Capacity	12,500	gallons
Tank Volume	1,671	cubic feet
NaOH Molecular Weight	39.997	grams/mol
NaOH Concentration in Tank	30	%
System Abatement Efficiency	80	%
Molar Volume of Gas at NTP	24.45	liters per mol
Molar Volume of Gas at NTP	0.8634	cubic feet per mol
Moles of NaOH in Empty Tank Vapor Space	1,935	mol
Mass of NaOH in Empty Tank Vapor Space	171	lbs
Vapor Pressure of H_2O	33	mmHg
Vapor Pressure of NaOH	0	mmHg
Annual Volume of NaOH Usage	273,372	cubic feet
Tank Turnovers Per Year	163.60	--
Mass load per ft^3 vapor H_2O	1.37E-03	lb/ft^3
Mass load per ft^3 vapor NaOH	0.00E+00	lb/ft^3
Hourly Unabated Emissions	0.00	lbs/hr
Annual Unabated Emissions	0.00	TPY
Hourly Abated Emissions	0.00	lbs/hr
Annual Abated Emissions	0.00	TPY

Notes:

grams/mol = grams per mole

mol = mole

lbs = pounds

mmHg = millimeters of mercury

lb/ft^3 = pound per cubic feet

lbs/hr = pounds per hour

TPY = tons per year

Supporting Documentation for Detailed Emission Calculations

Note: Boiler, generator, and cooling tower example specifications have been included based on expected similar-sized units for reference; however, these specifications are not final and are subject to change upon final project design.

U.S. EPA AP-42 Emission Factors for Boilers, Generators, and Fire Pump

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES (NO_x) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO_x[b]		CO	
	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]				
Uncontrolled (Pre-NSPS)[c]	280	A	84	B
Uncontrolled (Post-NSPS)[c]	190	A	84	B
Controlled - Low NO_x burners	140	A	84	B
Controlled - Flue gas recirculation	100	D	84	B
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]				
Uncontrolled	100	B	84	B
Controlled - Low NO_x burners	50	D	84	B
Controlled - Low NO_x burners/Flue gas recirculation	32	C	84	B
Tangential-Fired Boilers (All Sizes) [1-01-006-04]				
Uncontrolled	170	A	24	C
Controlled - Flue gas recirculation	76	D	98	D
Residential Furnaces (<0.3) [No SCC]				
Uncontrolled	94	B	40	B

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

[b] Expressed as NO_2. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate NO_X emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate NO_X emission factor.

[c] NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
CO_2[b]	120,000	A
Lead	0.0005	D
N_2O (Uncontrolled)	2.2	E
N_2O (Controlled-low-NO_X burner)	0.64	E
PM (Total)[c]	7.6	D
PM (Condensable)[c]	5.7	D
PM (Filterable)[c]	1.9	B
SO_2[d]	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to 1b/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to CO_2. $CO_2[lb/10^6 \text{ scf}] = (3.67)(CON)(C)(D)$, where CON = fractional conversion of fuel carbon to CO_2, C = carbon content of fuel by weight (0.76), and D = density of fuel, 4.2×10^4 $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM_{10}, $PM_{2.5}$ or PM_1 emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to SO_2. Assumes sulfur content is natural gas of 2,000 grains/10^6 scf. The SO_2 emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf.

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
91-57-6	2-Methylnaphthalene[b, c]	2.4E-05	D
56-49-5	3-Methylcholanthrene[b, c]	<1.8E-06	E
	7,12-Dimethylbenz(a)anthracene[b,c]	<1.6E-05	E
83-32-9	Acenaphthene[b,c]	<1.8E-06	E
203-96-8	Acenaphthylene[b,c]	<1.8E-06	E
120-12-7	Anthracene[b,c]	<2.4E-06	E
56-55-3	Benz(a)anthracene[b,c]	<1.8E-06	E
71-43-2	Benzene[b]	2.1E-03	B
50-32-8	Benzo(a)pyrene[b,c]	<1.2E-06	E
205-99-2	Benzo(b)fluoranthene[b,c]	<1.8E-06	E
191-24-2	Benzo(g,h,i)perylene[b,c]	<1.2E-06	E
207-08-9	Benzo(k)fluoranthene[b,c]	<1.8E-06	E
106-97-8	Butane	2.1E+00	E
218-01-9	Chrysene[b,c]	<1.8E-06	E
53-70-3	Dibenzo(a,h)anthracene[b,c]	<1.2E-06	E
25321-22-6	Dichlorobenzene[b]	1.2E-03	E
74-84-0	Ethane	3.1E+00	E
206-44-0	Fluoranthene[b,c]	3.0E-06	E
86-73-7	Fluorene[b,c]	2.8E-06	E
50-00-0	Formaldehyde[b]	7.5E-02	B
110-54-3	Hexane[b]	1.8E+00	E
193-39-5	Indeno(1,2,3-cd)pyrene[b,c]	<1.8E-06	E
91-20-3	Naphthalene[b]	6.1E-04	E
109-66-0	Pentane	2.6E+00	E
85-01-8	Phenanathrene[b,c]	1.7E-05	D
74-98-6	Propane	1.6E+00	E

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION (Continued)

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
129-00-0	Pyrene[b, c]	5.0E-06	E
108-88-3	Toluene[b]	3.4E-03	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $1b/10^6$ scf to lb/MMBtu, divide by 1,020. Emission Factors preceeded with a less-than symbol are based on method detection limits.

[b] Hazardous Air Pollutant (HAP) as defined by Section 112(b) of the Clean Air Act.

[c] HAP because it is Polycyclic Organic Matter (POM). POM is a HAP as defined by Section 112(b) of the Clean Air Act.

[d] The sum of individual organic compounds may exceed the VOC and TOC emission factors due to differences in test methods and the availability of test data for each pollutant.

TABLE 1.4-4. EMISSION FACTORS FOR METALS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
7440-38-2	Arsenic[b]	2.0E-04	E
7440-39-3	Barium	4.4E-03	D
7440-41-7	Beryllium[b]	<1.2E-05	E
7440-43-9	Cadmium[b]	1.1E-03	D
7440-47-3	Chromium[b]	1.4E-03	D
7440-48-4	Cobalt[b]	8.4E-05	D
7440-50-8	Copper	8.5E-04	C
7439-96-5	Manganese[b]	3.8E-04	D
7439-97-6	Mercury[b]	2.6E-04	D
7439-98-7	Molybdenum	1.1E-03	D
7440-02-0	Nickel[b]	2.1E-03	C
7782-49-2	Selenium[b]	<2.4E-05	E
7440-62-2	Vanadium	2.3E-03	D
7440-66-6	Zinc	2.9E-02	E

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. Emission factors preceeded by a less-than symbol are based on method detection limits. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by l6. To convert from $lb/10^6$ scf to 1b/MMBtu, divide by 1,020.

[b] Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.

Table 3.3-1. EMISSION FACTORS FOR UNCONTROLLED GASOLINE AND DIESEL INDUSTRIAL ENGINES[a]

Pollutant	Gasoline Fuel (SCC 2-02-003-01, 2-03-003-01)		Diesel Fuel (SCC 2-02-001-02, 2-03-001-01)		EMISSION FACTOR RATING
	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	
NO_x	0.011	1.63	0.031	4.41	D
CO	6.96 E-03[d]	0.99[d]	6.68 E-03	0.95	D
SO_x	5.91 E-04	0.084	2.05 E-03	0.29	D
PM-10[b]	7.21 E-04	0.10	2.20 E-03	0.31	D
CO_2[c]	1.08	154	1.15	164	B
Aldehydes	4.85 E-04	0.07	4.63 E-04	0.07	D
TOC					
Exhaust	0.015	2.10	2.47 E-03	0.35	D
Evaporative	6.61 E-04	0.09	0.00	0.00	E
Crankcase	4.85 E-03	0.69	4.41 E-05	0.01	E
Refueling	1.08 E-03	0.15	0.00	0.00	E

[a] References 2,5-6,9-14. When necessary, an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code. TOC = total organic compounds.

[b] PM-10 = particulate matter less than or equal to 10 μm aerodynamic diameter. All particulate is assumed to be ≤ 1 μm in size.

[c] Assumes 99% conversion of carbon in fuel to CO_2 with 87 weight % carbon in diesel, 86 weight % carbon in gasoline, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and gasoline heating value of 20,300 Btu/lb.

[d] Instead of 0.439 lb/hp-hr (power output) and 62.7 lb/mmBtu (fuel input), the correct emissions factors values are 6.96 E-03 lb/hp-hr (power output) and 0.99 lb/mmBtu (fuel input), respectively. This is an editorial correction. March 24, 2009

Table 3.3-2. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR UNCONTROLLED DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (Fuel Input) (lb/MMBtu)
Benzene[b]	9.33 E-04
Toluene[b]	4.09 E-04
Xylenes[b]	2.85 E-04
Propylene	2.58 E-03
1,3-Butadiene[b,c]	<3.91 E-05
Formaldehyde[b]	1.18 E-03
Acetaldehyde[b]	7.67 E-04
Acrolein[b]	<9.25 E-05
Polycyclic aromatic hydrocarbons (PAH)	
Naphthalene[b]	8.48 E-05
Acenaphthylene	<5.06 E-06
Acenaphthene	<1.42 E-06
Fluorene	2.92 E-05
Phenanthrene	2.94 E-05
Anthracene	1.87 E-06
Fluoranthene	7.61 E-06
Pyrene	4.78 E-06
Benzo(a)anthracene	1.68 E-06
Chrysene	3.53 E-07
Benzo(b)fluoranthene	<9.91 E-08
Benzo(k)fluoranthene	<1.55 E-07
Benzo(a)pyrene	<1.88 E-07
Indeno(1,2,3-cd)pyrene	<3.75 E-07
Dibenz(a,h)anthracene	<5.83 E-07
Benzo(g,h,l)perylene	<4.89 E-07
TOTAL PAH	1.68 E-04

[a] Based on the uncontrolled levels of 2 diesel engines from References 6-7. Source Classification Codes 2-02-001-02, 2-03-001-01. To convert from lb/MMBtu to ng/J, multiply by 430.
[b] Hazardous air pollutant listed in the *Clean Air Act*.
[c] Based on data from 1 engine.

Table 3.3-3. EFFECT OF VARIOUS EMISSION CONTROL TECHNOLOGIES ON DIESEL ENGINES[a]

Technology	Affected Parameter	
	Increase	Decrease
Fuel modifications		
Sulfur content increase	PM, wear	
Aromatic content increase	PM, NO_x	
Cetane number		PM, NO_x
10% and 90% boiling point		PM
Fuel additives		PM, NO_x
Water/Fuel emulsions		NO_x
Engine modifications		
Injection timing retard	PM, BSFC	NO_x, power
Fuel injection pressure	PM, NO_x	
Injection rate control		NO_x, PM
Rapid spill nozzles		PM
Electronic timing & metering		NO_x, PM
Injector nozzle geometry		PM
Combustion chamber modifications		NO_x, PM
Turbocharging	PM, power	NO_x
Charge cooling		NO_x
Exhaust gas recirculation	PM, power, wear	NO_x
Oil consumption control		PM, wear
Exhaust after-treatment		
Particulate traps		PM
Selective catalytic reduction		NO_x
Oxidation catalysts		TOC, CO, PM

[a] Reference 8. PM = particulate matter. BSFC = brake-specific fuel consumption.

Table 3.4-1. GASEOUS EMISSION FACTORS FOR LARGE STATIONARY DIESEL AND ALL STATIONARY DUAL-FUEL ENGINES[a]

Pollutant	Diesel Fuel (SCC 2-02-004-01)			Dual Fuel[b] (SCC 2-02-004-02)		
	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING
NO_x						
Uncontrolled	0.024	3.2	B	0.018	2.7	D
Controlled	0.013[c]	1.9[c]	B	ND	ND	NA
CO	5.5 E-03	0.85	C	7.5 E-03	1.16	D
SO_x[d]	8.09 E-03S_1	1.01S_1	B	4.06 E-04S_1 + 9.57 E-03S_2	0.05S_1 + 0.895S_2	B
CO_2[e]	1.16	165	B	0.772	110	B
PM	0.0007[c]	0.1[c]	B	ND	ND	NA
TOC (as CH_4)	7.05 E-04	0.09	C	5.29 E-03	0.8	D
Methane	[f]	[f]	E	3.97 E-03	0.6	E
Nonmethane	[f]	[f]	E	1.32 E-03	0.2[g]	E

[a] Based on uncontrolled levels for each fuel, from References 2,6-7. When necessary, the average heating value of diesel was assumed to be 19,300 Btu/lb with a density of 7.1 lb/gallon. The power output and fuel input values were averaged independently from each other, because of the use of actual brake-specific fuel consumption (BSFC) values for each data point and of the use of data possibly sufficient to calculate only 1 of the 2 emission factors (e. g., enough information to calculate lb/MMBtu, but not lb/hp-hr). Factors are based on averages across all manufacturers and duty cycles. The actual emissions from a particular engine or manufacturer could vary considerably from these levels. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code.

[b] Dual fuel assumes 95% natural gas and 5% diesel fuel.

[c] References 8-26. Controlled NO_x is by ignition timing retard.

[d] Assumes that all sulfur in the fuel is converted to SO_2. S_1 = % sulfur in fuel oil; S_2 = % sulfur in natural gas. For example, if sulfer content is 1.5%, then S = 1.5.

[e] Assumes 100% conversion of carbon in fuel to CO_2 with 87 weight % carbon in diesel, 70 weight % carbon in natural gas, dual-fuel mixture of 5% diesel with 95% natural gas, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and natural gas heating value of 1050 Btu/scf.

[f] Based on data from 1 engine, TOC is by weight 9% methane and 91% nonmethane.

[g] Assumes that nonmethane organic compounds are 25% of TOC emissions from dual-fuel engines. Molecular weight of nonmethane gas stream is assumed to be that of methane.

Table 3.4-2. PARTICULATE AND PARTICLE-SIZING EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Filterable particulate[b]	
< 1 μm	0.0478
< 3 μm	0.0479
< 10 μm	0.0496
Total filterable particulate	0.0620
Condensable particulate	0.0077
Total PM-10[c]	0.0573
Total particulate[d]	0.0697

[a] Based on 1 uncontrolled diesel engine from Reference 6. Source Classification Code 2-02-004-01. The data for the particulate emissions were collected using Method 5, and the particle size distributions were collected using a Source Assessment Sampling System. To convert from lb/MMBtu to ng/J, multiply by 430. PM-10 = particulate matter ≤ 10 micrometers (μm) aerometric diameter.

[b] Particle size is expressed as aerodynamic diameter.

[c] Total PM-10 is the sum of filterable particulate less than 10 μm aerodynamic diameter and condensable particulate.

[d] Total particulate is the sum of the total filterable particulate and condensable particulate.

Table 3.4-3. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Benzene[b]	7.76 E-04
Toluene[b]	2.81 E-04
Xylenes[b]	1.93 E-04
Propylene	2.79 E-03
Formaldehyde[b]	7.89 E-05
Acetaldehyde[b]	2.52 E-05
Acrolein[b]	7.88 E-06

[a]Based on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.
[b]Hazardous air pollutant listed in the *Clean Air Act*.

Table 3.4-4. PAH EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

PAH	Emission Factor (lb/MMBtu) (fuel input)
Naphthalene[b]	1.30 E-04
Acenaphthylene	9.23 E-06
Acenaphthene	4.68 E-06
Fluorene	1.28 E-05
Phenanthrene	4.08 E-05
Anthracene	1.23 E-06
Fluoranthene	4.03 E-06
Pyrene	3.71 E-06
Benz(a)anthracene	6.22 E-07
Chrysene	1.53 E-06
Benzo(b)fluoranthene	1.11 E-06
Benzo(k)fluoranthene	<2.18 E-07
Benzo(a)pyrene	<2.57 E-07
Indeno(1,2,3-cd)pyrene	<4.14 E-07
Dibenz(a,h)anthracene	<3.46 E-07
Benzo(g,h,l)perylene	<5.56 E-07
TOTAL PAH	<2.12 E-04

[a] Based on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.

[b] Hazardous air pollutant listed in the *Clean Air Act*.

Table 3.4-5. NO_x REDUCTION AND FUEL CONSUMPTION PENALTIES FOR LARGE STATIONARY DIESEL AND DUAL-FUEL ENGINES[a]

Control Approach		Diesel (SCC 2-02-004-01)		Dual Fuel (SCC 2-02-004-02)	
		NO_x Reduction (%)	ΔBSFC[b] (%)	NO_x Reduction (%)	ΔBSFC (%)
Derate	10%	ND	ND	<20	4
	20%	<20	4	ND	ND
	25%	5 - 23	1 - 5	1 - 33	1 - 7
Retard	2°	<20	4	<20	3
	4°	<40	4	<40	1
	8°	28 - 45	2 - 8	50 - 73	3 - 5
Air-to-fuel	3%	ND	ND	<20	0
	±10%	7 - 8	3	25 - 40	1 - 3
Water injection (H_2O/fuel ratio)	50%	25 - 35	2 - 4	ND	ND
SCR		80 - 95	0	80 - 95	0

[a] References 1,27-28. The reductions shown are typical and will vary depending on the engine and duty cycle. SCC = Source Classification Code. ΔBSFC = change in brake-specific fuel consumption. ND = no data.

Preliminary General Exhaust Fan Specifications

Job Name: VK-CH-44-100-42 Cut Sheet
Tag: MK-1
Quantity: 1
Printed Date: November 8, 2023

Model: VK-CH-44-100-42

Backward Inclined Scrolled Blower with High Plume Conical Nozzle

Standard Construction Features: Scroll housing, welded steel seem and painted construction with high plume discharge nozzle. Coated centrifugal steel wheel. Aluminum inlet cone. Direct driven motor mounted out of the airstream.
Certifications/special requirements: Spark Resistant C

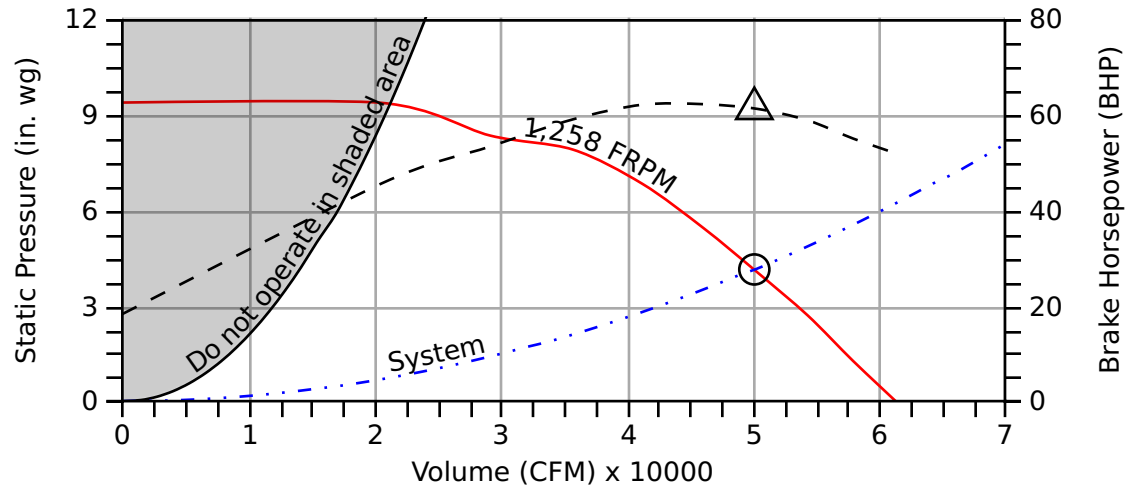
Design Conditions	
Fans Per System	1
Redundancy	None
Bypass Air Plenum	Yes
Total Exhaust Volume (CFM)	50,000
External SP (in. wg)	4

Performance	
Exhaust Volume per Fan (CFM)	50,000
Total SP (in. wg)	4.15
Fan RPM	1,258
Operating Power (bhp)	61
Startup Power (bhp)	62
FEI	1.16
Airstream Temp (F)	75
Windspeed (mph)	10
Elevation (ft)	4900
Effective Plume Ht (ft)	74
Calculation Method	Modified Briggs

Fan Configuration	
Material Type	Steel
Drive Type	Direct
Arrangement	8
Weight w/o Accessories (lbs)	7,488

Motor	
Size (hp)	75
V/C/P	460/60/3
NEC FLA (Amps)	96
Min Circuit Ampacity (MCA)	120
Max Overload Production (MOP)	200

FLA - based on tables 150 or 148 of National Electric Code 2002. Actual motor FLA may vary, for sizing thermal overload, consult factory.
MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc.).
System shown is capable of a 50% turndown. Larger turndowns should be verified in the CAPS program.
The effective plume height includes the height of the fan and a 12 inch roof curb for inline models and 6 inch for scrolled models.



Fan curve
Brake horsepower curve
Operating Point SP
Operating Bhp point
Max system curve
System curve

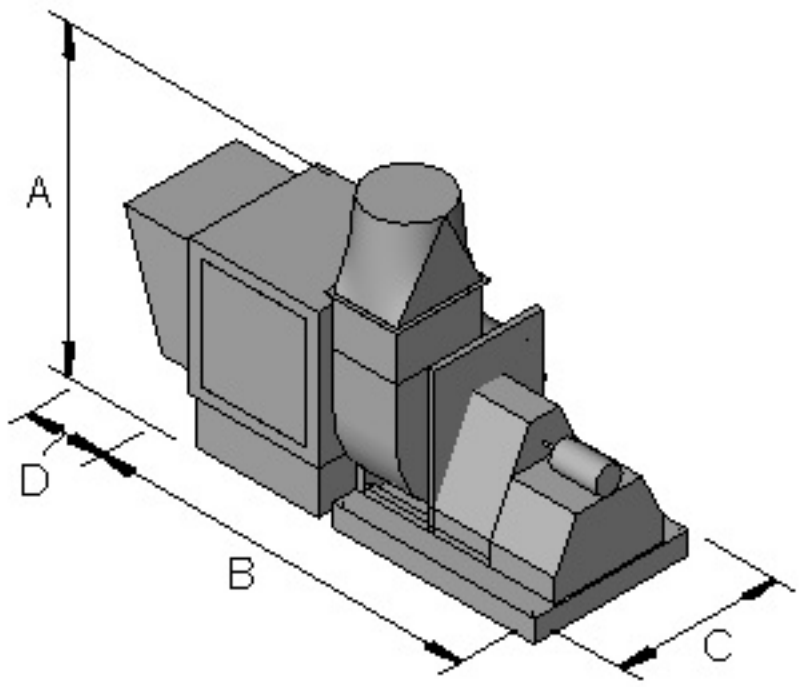
Static Pressure Calculations	
External SP	4 in. wg
Isolation Damper	0.15 in. wg
Total External SP	4.15 in. wg

Sound

	Octave Bands (hz)								LwA	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Inlet	99	108	108	97	93	91	88	81	102	91	74
Outlet	94	112	113	98	93	92	90	83	106	95	93

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.The AMCA certified ratings seal applies to sound and air performance and FEI ratings only.Performance certified is for installation type A: Free inlet, free outlet.Power rating does not include transmission losses.Performance ratings do not include the effects of appurtenances.The AMCA licensed air and/or sound performance data has been modified for installation, appurtenances, etc. not included in the certified data. The modified performance is not AMCA licensed but is provided to aid in selection and applications of the product.The sound power level ratings are shown in decibels, referred to 10^-12 watts calculated per AMCA Standard 301. The A-weighted sound ratings shown have been calculated per AMCA International Standard 301.Values shown are for inlet Lwi, LwiA and outlet Lwo, LwoA sound power levels for installation Type A: free inlet free outlet.dBA levels are not licensed by AMCA International. The AMCA Certified Ratings Seal for Sound applies to LwA ratings only.

Dimensions and Weights		
Label	**Value**	**Description**
-	7488	Weight w/o accessories (lbs)
A	138	Overall Height (in)
B	191	Overall Width (in)
C	85	Overall Length (in)
D	30	BAP WTHD Depth (in)



*All dimensions are in inches.

Preliminary Cooling Tower Specifications

Insight Partners
1 Marcus Drive Ste 303
Greenville 29615 SC

Jimmy Hunt
8642425833
jhunt@insightusa.com

Marley NC Steel Cooling Tower Specification

Options:
Stainless Steel Hot Water Basins
Stainless Steel Cold Water Basin
Factory Mutual Approved (NA on NC8410 thru NC8422 single-cell towers)
Air Inlet Screens
Single Hot Water Inlet
Basin Equalizers
Basin Heaters
Ladder and Guardrail
Ladder Extension
Ladder Safety Cage
Ladder Safety Gate
Access Door Platform
Plenum Walkway
Interior Mechanical Equipment Access Platform (NC8402 thru NC8422 only)
Vibration Switch
Variable Water Flow Distribution

1.0 Base:

1.1 Provide an induced draft, crossflow type, factory assembled, film fill, industrial duty, galvanized steel cooling tower situated as shown on the plans. The limiting overall dimensions of the tower shall be 29.5 ft wide, 158.67 ft long, and 26.984 ft high. Total operating power of all fans shall not exceed 1050 BHp, consisting of 7 @ 150 Hp motor(s). Tower shall be similar and equal in all respects to Marley Model NC8422ZAN7.

1.2 The cooling tower shall be designed for quiet operation, and shall produce an overall level of sound not higher than _____ dB(A) measured at _____ ft from the location: _____. Sound levels shall be independently verified by a CTI-licensed sound test agency to ensure validity and reliability of the manufacturers published values. Measurement and analysis of the sound levels shall be conducted by a certified Professional Engineer in Acoustical Engineering. Sound pressure levels shall be measured and recorded in the acoustic near-field and far-field locations using ANSI S1.4 Type 1 precision instrumentation and in full conformance with CTI ATC-128 test code published by the Cooling Technology Institute (CTI). All low sound options shall be CTI certified for thermal performance.

2.0 Thermal Performance and Efficiency:

2.1 The tower shall be capable of cooling 28000 gpm of water from 87 °F to 72 °F at a design entering air wet-bulb temperature of 65 °F, and its thermal rating shall be Certified by the Cooling Technology Institute.

2.2 The tower shall be capable of a minimum 51.817 gpm/Hp efficiency per ASHRAE Standard 90.1.

3.0 Performance Warranty:

3.1 CTI Certification notwithstanding, the cooling tower manufacturer shall guarantee that the tower supplied will meet the specified performance conditions when the tower is installed according to plan. If, because of a suspected thermal performance deficiency, the owner chooses to conduct an on-site thermal performance test under the supervision of a qualified, disinterested third party in accordance with CTI or ASME standards during the first year of operation; and if the tower fails to perform within the limits of test tolerance; then the cooling tower manufacturer will pay for the cost of the test and will make such corrections as are appropriate and agreeable to the owner to compensate for the performance deficiency.

4.0 Design Loading:

4.1 The tower structure, anchorage and all its components shall be designed by licensed professional engineers, employed by the manufacturer, per the International Building Code to withstand a wind load of 30 psf, as well as a .3g seismic load. The fan deck, hot-water basin covers and, where specified, maintenance platforms shall be designed for 60 psf live load or a 200 lb concentrated load. Guardrails, where specified, shall be capable of withstanding a 200 lb concentrated live load in any direction, and shall be designed in accordance with OSHA guidelines.

5.0 Construction:

5.1 Except where otherwise specified, all components of the cooling tower shall be fabricated of steel, protected against corrosion by G-235 galvanizing. The tower shall be capable of withstanding water having a pH of 6.5 to 8.0; a chloride content (NaCl) up to 300 ppm; a sulfate content (SO4) up to 250 ppm; a calcium content (CaCO3) up to 500 ppm; and silica (SiO2) up to 150 ppm. The circulating water shall contain no oil, grease, fatty acids or organic solvents.

Fiberglass casing, polyurethane barriers, and thermosetting hybrids and the components they are adhered to shall be considered non-recyclable and not allowed.

5.2 The specifications, as written, are intended to indicate those materials that will be capable of withstanding the above water quality in continuing service, as well as the loads described in paragraph 4.1. They are to be regarded as minimum requirements. Where component materials peculiar to individual tower designs are not specified, the manufacturers shall take the above water quality and load carrying capabilities into account in the selection of their materials of manufacture.

5.3 The tower shall be listed in the current FM Approval Guide (approvalguide.com) and conform to the FM Approval Standard for Cooling Towers, Class Number 4930 that is approved for use without sprinkler systems. The tower shall have successfully passed full scale fire testing, static and cyclic wind pressure testing, large missile impact testing (for Zone HM), and structural design evaluation as administered by FM-Approvals. The tower shall be capable of +70/-140 psf for Zone H as defined by FM Global. A copy of the FM Approval Certificate of Compliance, dated November 2013 or later shall be available upon request.

6.0 Mechanical Equipment:

6.1 Fan(s) shall be propeller-type, incorporating aluminum alloy blades that are individually adjustable. Maximum fan tip speed shall be 13,000 ft/min. Fanr(s) shall be driven through a right angle, industrial duty, oil lubricated, geared speed reducer that requires no oil changes for the first five (5) years of operation. All gearbox bearings shall be rated at an L10A service life of 100,000 hours or greater and the gear sets shall have AGMA Quality Class of 9 or greater. The gearbox shall include any modifications to enable operation down to 10% of full speed.

6.2 Single-speed motor(s) shall be 150 Hp maximum, NEMA Premium Efficiency, TEFC, 1.15 service factor, inverter duty, variable torque, and specially insulated for cooling tower duty (Class F). Speed and electrical characteristics shall be 1800 rpm, single-winding, 3-phase, 60 Hz, ____ volts. Motor shall operate in the shaft-horizontal position for geardrive towers and shaft-down position for belt drive towers. Nameplate horsepower shall not be exceeded at design operation.

6.3 The motor to gearbox close coupling shall be a tire-type, single piece, flexible element design to accommodate frequent speed changes that are inherent with VFD applications.

6.4 The complete mechanical equipment assembly for each cell shall be supported by two horizontal steel beams that resist misalignment between the motor and the gear reducer/belt drive system. The mechanical equipment assembly shall be warranted against any failure caused by defects in materials and workmanship for no less than five (5) years following the date of tower shipment. This warranty shall cover the fan, speed reducer, drive shaft and couplings, and the mechanical equipment support. Oil seals shall be warranted for eighteen (18) months with replacement oil seals furnished through the mechanical warranty. Bearing assemblies and V-belts (if applicable) shall be warranted for eighteen (18) months. The electric motor shall carry a manufacturer's warranty of at least one year.

A vibration limit switch in a NEMA 4X housing shall be installed on the mechanical equipment support and wired to the shutdown circuit of the fan motor starter or VFD. The purpose of this switch will be to interrupt control power voltage to a safety circuit in the event of excessive vibration causing the starter or VFD equipment to de-energize the motor. It shall be adjustable for sensitivity, and include a means to reset the switch.

7.0 Fill, Louvers and Drift Eliminators:

7.1 Fill shall be film type, thermoformed of PVC, with louvers and eliminators formed as part of each fill sheet. Fill shall be suspended from hot dip galvanized structural tubing supported from the tower structure, and shall be elevated above the floor of the cold-water basin to facilitate cleaning. Air inlet faces of the tower shall be free of water splash out.

7.2 Drift eliminators shall be PVC, triple-pass, and shall limit drift losses to 0.005% or less of the design water flow rate.

8.1 Two open 301L stainless steel basins (one above each bank of fill) shall receive hot water piped to each cell of the tower. These basin components shall be installed and sealed at the factory and assembled with bolted connections. Tap screws shall not be allowed due to their potential to develop leaks. The basins shall be equipped with removable, stainless steel covers capable of withstanding the loads described in paragraph 4.1. All components of these basins, with the exception of the nozzles, shall be stainless steel. The water distribution system shall be accessible and maintainable during tower fan and water operation.

8.2 Each cell of the tower shall include a single hot-water inlet connection located as shown on the plans. An internal system of PVC piping shall deliver water equally to the distribution basins without the need for balancing valves. This internal piping system shall require no scheduled maintenance, and shall be located such that it does not interfere with normal maintenance access. The internal piping shall extend to the exterior surface of the tower.

The water distribution system shall be equipped with a method to operate under variable flow conditions while maintaining a uniform air-side pressure drop through the fill to maximize cooling efficiency and minimize the risk of ice and scale formation in the fill. System must accommodate flow rates down to _____% of design flow.

8.3 The water distribution system shall be accessible and maintainable while tower is operating.

9.0 Casing, Fan Deck and Fan Guard:

9.1 The casing and fan deck shall be galvanized steel, and shall be capable of withstanding the loads described in paragraph 4.1. The top of the fan opening shall be equipped with a conical, non-sagging, removable fan guard, fabricated of welded 5/16" and 7 gauge rods, and hot dip galvanized after fabrication. Fan cylinders 5'-0" in height and over shall not be required to have a fan guard.

10.0 Access:

10.1 A large galvanized, rectangular access door shall be located on both cased faces for entry into the cold-water basin. Doors shall provide convenient access to the fan plenum area to facilitate inspection and allow maintenance to the fan drive system. The access doors shall be at least 36" wide by 79" high.

The air inlet faces of the tower shall be covered by 1" mesh hot-dipped galvanized welded wire screens. Screens shall be secured to removable galvanized U-edge frames. Screens shall be designed to permit full access to the cold-water basin by removal of one panel on each air inlet.

10.1 A large stainless steel, rectangular access door shall be located on both cased faces for entry into the cold-water basin. Doors shall provide convenient access to the fan plenum area to facilitate inspection and allow maintenance to the fan drive system. The access doors shall be at least 36" wide by 79" high.

The top of the tower shall be equipped with a guardrail complete with kneerail and toeboard, designed according to OSHA guidelines and factory welded into subassemblies for ease of field installation. Posts, toprails and kneerails shall be 1.5" square tubing. The guardrail assembly shall be hot dipped galvanized after welding and capable of withstanding a 200 pound concentrated live load in any direction. Posts shall be spaced on centers of 8'-0" or less. A 1'-6" wide aluminum ladder with 3" I-beam side rails and 1.25" diameter rungs shall be permanently attached to the endwall casing of the tower, rising from the base of the tower to the top of the guardrail.

Provide a ladder extension for connection to the foot of the ladder attached to the tower casing. This extension shall be long enough to rise from the roof (grade) level to the base of the tower. The installing contractor shall be responsible for cutting the ladder to length; attaching it to the foot of the tower ladder; and anchoring it at its base.

A heavy gauge aluminum safety cage, welded into subassemblies for ease of field installation, shall surround the ladder, extending from a point approximately 7'-0" above the foot of the ladder to the top of the guardrail. Maximum

weight of welded subassemblies shall not exceed 20 lb for ease of installation.

A steel, self-closing gate shall be provided at the guardrail level of the ladder.

There shall be an access platform at the base of the tower extending from the vertical ladder to the access door. The platform shall be surrounded by an OSHA compliant guardrail system welded into subassemblies for ease of installation. The walking surface of the platform shall be perforated to provide a non-slip surface for personnel safety.

Provide a factory-installed, walkway extending from one cased-face access door to the other cased face. A steel framework shall support the walkway and the top of the walkway shall be at or above the cold-water basin overflow level. The walkway and framework to be equivalent material as the tower basin and have a minimum width of 36".

An internal ladder shall extend upward from the plenum walkway to an elevated fiberglass bar grating platform convenient for the care and maintenance of the tower's mechanical equipment. The platform shall be surrounded by an OSHA compliant guardrail system welded into subassemblies for ease of installation.

11.0 Cold Water Collection Basin:

11.1 The collection basin shall be welded 301L stainless steel construction. Only low-carbon stainless steel alloys will be accepted in order to minimize the risk of intergranular corrosion in the weld zones. The basin shall include the number and type of suction connections required to accommodate the outflow piping system shown on the plans. Suction connections shall be equipped with stainless steel debris screens. A factory-installed, float-operated, mechanical make-up valve shall be included. An overflow and drain connection shall be provided in each cell of the cooling tower. The basin floor shall slope toward the drain to allow complete flush out of debris and silt that may accumulate. Towers of more than one cell shall include a method for flow and equalization between cells. The basin shall be accessible and maintainable while water is circulating. All steel items that project into the basin shall also be made of stainless steel.

A hole and bolt circle shall be provided in the depressed section of the basin for equalizer piping between cells. A full-face, .25" thick, 50 durometer gasket shall be provided at each equalizer location.

11.2 Provide a system of electric immersion heaters and controls for each cell of the tower to prevent freezing of water in the collection basin during periods of shutdown. The system shall consist of one or more stainless steel electric immersion heaters installed in threaded couplings provided in the side of the basin. A NEMA 4 control panel and associated temperature probe shall include circuitry to monitor cold water temperature and low water level, providing ON OFF thermostatic like control. The temperature probe shall be located in the cold-water basin. The system shall be capable of maintaining 40°F water temperature at an ambient air temperature of _____ °F.

CoolSpec™ Version 7.3.25
Product Data: 8/28/2023 (Current)
11/2/2023 11:42:11 AM

Job Information

11/2/2023 Elevation corrected selection - MAXEON
New Mexico

Selected by

SPX Cooling Technologies
7401 W 129th St
Overland Park, KS 66213 US

Jacob Nall
Tel 9135481805
jacob.nall@spx.com

Cooling Tower Definition

Manufacturer	Marley	Fan Motor Speed	1800 rpm
Product	NC Steel	Required Fan Motor Output per cell *	120.1 BHp
Model	NC8422YAN7	Required Fan Motor Output total *	840.7 BHp
Cells	7	Fan Motor Capacity per cell	125.0 Hp
CTI Certified	Yes	Fan Motor Output per cell	125.0 BHp
Fan	19 ft, 8 Blades, Low Sound	Fan Motor Output total	875.0 BHp
Fan Speed	202 rpm, 12057 fpm	Air Flow per cell	606000 cfm
Fans per cell	1	Air Flow total	4242000 cfm
Fill Type	MX75	Static Lift	23 ft
		Distribution Head Loss	0 ft
		ASHRAE 90.1 Performance	59.2 gpm/Hp

Model Group: Standard Low Sound (A)

* Required Fan Motor Output assumes VFD operation

elevation: 5,312ft above sea level

Conditions

Tower Water Flow	28000 gpm	Air Density In	0.06007 lb/ft³
Hot Water Temperature	87.00 °F	Air Density Out	0.05962 lb/ft³
Range	15.00 °F	Humidity Ratio In	0.01290
Cold Water Temperature	72.00 °F	Humidity Ratio Out	0.02630
Approach	7.00 °F	Wet-Bulb Temp. Out	78.87 °F
Wet-Bulb Temperature	65.00 °F	Estimated Evaporation	397 gpm
Relative Humidity	50 %	Total Heat Rejection	208818000 Btu/h
Capacity	101.3 %		

- This selection satisfies your design conditions.

Weights & Dimensions

	Per Cell	Total
Shipping Weight	40700 lb	285100 lb
Heaviest Section	8300 lb	
Max Operating Weight	100200 lb	701700 lb
Width	29'-6"	29'-6"
Length	22'-5"	158'-8"
Height	26'-11 ¾"	

Weights and dimensions do not include options; refer to sales drawings.

Minimum Enclosure Clearance

Clearance required on air inlet sides of tower without altering performance. Assumes no air from below tower.

Solid Wall	24 ft
50 % Open Wall	16 ft

Cold Weather Operation

Heater Sizing (to prevent freezing in the collection basin during periods of shutdown)

Heater kW/Cell	36.0	30.0	24.0	18.0	15.0
Ambient Temperature °F	6.01	12.28	18.55	24.82	27.95

NMED Cooling Tower Emission Calculation Guidance (2013)

NEW MEXICO
ENVIRONMENT DEPARTMENT

Air Quality Bureau

525 Camino de los Marquez, Suite 1
Santa Fe, New Mexico, 87505
Phone (505) 476-4300 Fax (505) 476-4375
www.env.nm.gov

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Cabinet Secretary-Designate
BUTCH TONGATE
Deputy Secretary

TECHNICAL MEMORANDUM

DATE: September 9, 2013

TO: All Permitting Staff

FROM: Daren Zigich

THROUGH: Ted Schooley, Permit Program Manager
Ned Jerabek, Major Source Section Manager

SUBJECT: Calculating TSP, PM-10 and PM-2.5 from Cooling Towers

The goal of this memo is to offer a Department approved step-by-step approach for calculating particulate emissions from cooling towers. While the Department encourages using this approach, other approaches, that do not use a droplet settling ratio may be approved on a case-by-case basis.

Due to the variability of methods used by permittees to estimate particulate emissions from cooling towers, a consistent, defensible approach is warranted. For example, some permittees have used a droplet settling ratio from Reference 3 to lower the total potential emissions rate of total particulate matter (PM_{total}). This is unacceptable due to the following:

1. Particulate settling is not appropriate since any verification testing would be completed inside the cooling tower fan stack. All particulate mass that can be measured by an EPA reference method and are emitted to the atmosphere shall be counted as particulate emissions. Particle size distribution can then be used to modify the emission rate of each regulated particulate size.
2. The Department is not aware of information that verifies the droplet settling data is representative for arid climates where evaporation rates are high.
3. The droplet size distribution and % mass data from Reference 1 only consider droplets up to 600 microns. Reference 3 states that settling only exists for droplets greater than 450 microns. Reference 1 lists the % mass of droplets greater than 450 microns to be less than 1 percent of the total mass.

4. Reference 2 test data shows that towers with significant drift droplet diameters greater than 600 microns usually suffer from poor installation of the drift eliminator or from poor water distribution due to issues with the tower packing. Large droplets may indicate that the assumed or guaranteed drift eliminator efficiency is not being met. Providing emissions credit for poor installation, operation or maintenance runs counter to general Department practice.
5. References 1 and 2 make no reference to and assign no credit for the settling theory stated in Reference 3.

For the above reasons, the Reference 3 settling ratio is not an acceptable emissions reduction approach.

Acceptable Calculation Method

Cooling tower particulate emissions are a function of the Drift rate and the concentration of dissolved solids present in the water. The Drift rate is normally listed as a percentage of the circulating water flow rate of the cooling tower.

Step 1 – Establish maximum water circulation rate (Q_{circ}) for the cooling tower. This is usually dependent on the capacity of the circulation pumps and the plant cooling system and should be reported as gallons per minute (gpm). The circulation rate is the sum of the circulation rates for each cell in the tower and thus represents the total flow for the tower.

Step 2 – Establish Drift rate (Q_{drift}) of the cooling tower. This information is dependent on the drift eliminator design and is usually supplied by the tower manufacturer. If manufacturer data is unavailable, the standard drift of 0.02 percent, listed in AP-42, should be used.

Step 3 – Establish maximum Total Dissolved Solids concentration (TDS) in the circulating cooling water. This is dependent on the facility's operations. TDS should be reported as parts per million (ppm) or mg/l.

Step 4 – Calculate total potential hourly particulate emissions (PM_{total}) in pounds per hour (lbs/hr).

$$PM_{total} = TDS(mg/l) \times \frac{1(lbs/mg)}{453{,}600} \times 3.785(l/gal) \times Q_{circ}(gpm) \times \frac{Q_{drift}(\%Q_{circ})}{100} \times 60(min/hr)$$

Example: TDS = 3000 ppm or mg/l, Q_{circ} = 50,000 gpm, Q_{drift} = 0.004%

$PM_{total} = 3000 \times (1/453{,}600) \times 3.785 \times 50{,}000 \times (0.004/100) \times 60$

PM_{total} = 3.0 lbs/hr

Step 5 – Estimate particulate size distribution of the PM_{total} to determine potential emissions of TSP/PM, PM_{10} and $PM_{2.5}$.

The current estimating technique used in References 1 and 2 employs a formula for determining a potential particulate size (i.e. diameter) for a given set of variables. The variables are:

d_d = Drift droplet diameter, microns
C_{TDS} = Concentration of TDS in the circulating water, ppm x 10^{-6}
ρ_w = Density of Drift droplet, g/cm^3
ρ_{salt} = Density of particle, g/cm^3

The equation for determining particle size/diameter (d_p), in microns is:

$$d_p = \frac{d_d}{(\rho_{salt} / \rho_w C_{TDS})^{1/3}}$$

The tables below list particle size related to droplet size for various concentrations (1000 ppm to 12,000 ppm) of TDS in the circulating cooling water. The density of the water droplet (ρ_w) is assumed to be 1.0 g/cm3 (based on density of pure water) and the average density of the TDS salts is assumed to be 2.5 g/cm3. This assumed density is selected based on the average density of common TDS constituents, $CaCO_3$, $CaSO_4$, $CaCl_2$ NaCl, Na_2SO_4, and Na_2CO_3. If actual circulating water constituents are available, that data may be used to estimate the dissolved solids average density.

To determine the droplet size that generates particulate matter of the applicable regulated diameters, TSP/PM (defined as 30 microns or less per NM AQB definition[1]), PM10 and PM2.5, find the column in the table that matches the maximum circulating water TDS concentration and read the values associated with the PM2.5, PM10 and TSP/PM boxes. Boxed values are not exactly equal to the applicable sizes, but are the values greater than and closest to the applicable sizes, given the listed water droplet values from Reference 1.

The far right column of each table provides mass distribution data from Reference 1. The values indicate what percent of the total particulate mass emission, calculated in Step 4, is associated with the applicable particulate size. Read the value that is on the same line (same color) as the applicable particulate size associated with the specified TDS concentration column.

Note: Although the relationship between droplet size and percent mass is not linear, a linear interpolation of the tabulated data is acceptable between two adjacent rows (particle size) to determine an estimate of percent mass for a specific particle size (i.e. PM30, PM10 and PM2.5). Particle sizes for droplets with a non-listed TDS ppm concentration may be calculated using the equation in Step 5.

Example: Continuing from Step 4,

PM_{total} = 3.0 lbs/hr
C_{TDS} = 3000 ppm

From Table:

$PM_{2.5}$:	d_d = 30	%Mass = 0.226%
PM_{10}:	d_d = 110	%Mass = 70.509%
TSP/PM:	d_d = 270	%Mass = 96.288%

The mass emission of each applicable particulate size is:

$PM_{2.5} = PM_{total}(\%Mass/100) = 3.0(0.00226) = 0.007$ lbs/hr
$PM_{10} = 3.0(.70509) = 2.115$ lbs/hr
TSP/PM = 3.0(.96288) = 2.889 lbs/hr

[1]Definition of TSP for purposes of permitting emission sources, 11/2/09, see P:\AQB-Permits-Section\NSR-TV-Common\Permitting-Guidance-Documents – Index & Links document

Size Distribution

1000 ppm (TDS)		2000 ppm		3000 ppm		% Mass
d_d	d_p	d_d	d_p	d_d	d_p	≤
10	0.7387304	10	0.930527	10	1.0650435	0
20	1.4774608	20	1.8610539	20	2.130087 PM2.5	0.196
30	2.2161912	30	2.7915809 PM2.5	30	3.1951306 PM2.5	0.226
40	2.9549216 PM2.5	40	3.7221079	40	4.2601741	0.514
50	3.693652	50	4.6526349	50	5.3252176	1.816
60	4.4323825	60	5.5831618	60	6.3902611	5.702
70	5.1711129	70	6.5136888	70	7.4553046	21.348
90	6.6485737	90	8.3747427	90	9.5853917	49.812
110	8.1260345	110	10.235797 PM10	110	11.715479 PM10	70.509
130	9.6034953	130	12.096851	130	13.845566	82.023
150	11.080956 PM10	150	13.957905	150	15.975653	88.012
180	13.297147	180	16.749485	180	19.170783	91.032
210	15.513339	210	19.541066	210	22.365914	92.468
240	17.72953	240	22.332647	240	25.561045	94.091
270	19.945721	270	25.124228	270	28.756175	94.689
300	22.161912	300	27.915809	300	31.951306 TSP/PM30	96.288
350	25.855564	350	32.568444 TSP/PM30	350	37.276523	97.011
400	29.549216	400	37.221079	400	42.601741	98.34
450	33.242868 TSP/PM30	450	41.873714	450	47.926958	99.071
500	36.93652	500	46.526349	500	53.252176	99.071
600	44.323825	600	55.831618	600	63.902611	100

Size Distribution

4000 ppm (TDS)		5000 ppm		6000 ppm		% Mass
d_d	d_p	d_d	d_p	d_d	d_p	≤
10	1.1721197	10	1.2625337	10	1.3415607	0
20	2.3442393	20	2.5250675 PM2.5	20	2.6831215 PM2.5	0.196
30	3.516359 PM2.5	30	3.7876012	30	4.0246822	0.226
40	4.6884787	40	5.0501349	40	5.366243	0.514
50	5.8605984	50	6.3126686	50	6.7078037	1.816
60	7.032718	60	7.5752024	60	8.0493645	5.702
70	8.2048377	70	8.8377361	70	9.3909252	21.348
90	10.549077 PM10	90	11.362804 PM10	90	12.074047 PM10	49.812
110	12.893316	110	13.887871	110	14.757168	70.509
130	15.237556	130	16.412938	130	17.44029	82.023
150	17.581795	150	18.938006	150	20.123411	88.012
180	21.098154	180	22.725607	180	24.148093	91.032
210	24.614513	210	26.513208	210	28.172776	92.468
240	28.130872	240	30.300809 TSP/PM30	240	32.197458 TSP/PM30	94.091
270	31.647231 TSP/PM30	270	34.088411	270	36.22214	94.689
300	35.16359	300	37.876012	300	40.246822	96.288
350	41.024188	350	44.18868	350	46.954626	97.011
400	46.884787	400	50.501349	400	53.66243	98.34
450	52.745385	450	56.814018	450	60.370234	99.071
500	58.605984	500	63.126686	500	67.078037	99.071
600	70.32718	600	75.752024	600	80.493645	100

Size Distribution

7000 ppm (TDS)		8000 ppm		9000 ppm		% Mass
d_d	d_p	d_d	d_p	d_d	d_p	≤
10	1.4122241	10	1.4764371	10	1.5354962	0
20	2.8244482 PM2.5	20	2.9528742 PM2.5	20	3.0709923 PM2.5	0.196
30	4.2366724	30	4.4293112	30	4.6064885	0.226
40	5.6488965	40	5.9057483	40	6.1419846	0.514
50	7.0611206	50	7.3821854	50	7.6774808	1.816
60	8.4733447	60	8.8586225	60	9.2129769	5.702
70	9.8855688	70	10.33506 PM10	70	10.748473 PM10	21.348
90	12.710017 PM10	90	13.287934	90	13.819465	49.812
110	15.534465	110	16.240808	110	16.890458	70.509
130	18.358914	130	19.193682	130	19.96145	82.023
150	21.183362	150	22.146556	150	23.032442	88.012
180	25.420034	180	26.575867	180	27.638931	91.032
210	29.656707	210	31.005179 TSP/PM30	210	32.245419 TSP/PM30	92.468
240	33.893379 TSP/PM30	240	35.43449	240	36.851908	94.091
270	38.130051	270	39.863801	270	41.458396	94.689
300	42.366724	300	44.293112	300	46.064885	96.288
350	49.427844	350	51.675298	350	53.742365	97.011
400	56.488965	400	59.057483	400	61.419846	98.34
450	63.550085	450	66.439668	450	69.097327	99.071
500	70.611206	500	73.821854	500	76.774808	99.071
600	84.733447	600	88.586225	600	92.129769	100

Size Distribution

10,000 ppm (TDS)		11,000 ppm		12,000 ppm		% Mass
d_d	d_p	d_d	d_p	d_d	d_p	≤
10	1.5903253	10	1.6416091	10	1.6898701	0
20	3.1806507 PM2.5	20	3.2832181 PM2.5	20	3.3797403 PM2.5	0.196
30	4.770976	30	4.9248272	30	5.0696104	0.226
40	6.3613013	40	6.5664363	40	6.7594806	0.514
50	7.9516267	50	8.2080453	50	8.4493507	1.816
60	9.541952	60	9.8496544	60	10.139221 PM10	5.702
70	11.132277 PM10	70	11.491263 PM10	70	11.829091	21.348
90	14.312928	90	14.774482	90	15.208831	49.812
110	17.493579	110	18.0577	110	18.588572	70.509
130	20.674229	130	21.340918	130	21.968312	82.023
150	23.85488	150	24.624136	150	25.348052	88.012
180	28.625856	180	29.548963	180	30.417663 TSP/PM30	91.032
210	33.396832 TSP/PM30	210	34.47379 TSP/PM30	210	35.487273	92.468
240	38.167808	240	39.398618	240	40.556883	94.091
270	42.938784	270	44.323445	270	45.626494	94.689
300	47.70976	300	49.248272	300	50.696104	96.288
350	55.661387	350	57.456317	350	59.145455	97.011
400	63.613013	400	65.664363	400	67.594806	98.34
450	71.56464	450	73.872408	450	76.044156	99.071
500	79.516267	500	82.080453	500	84.493507	99.071
600	95.41952	600	98.496544	600	101.39221	100

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Diesel Net U.S. EPA Tier Certified Emission Factors For Generators and Fire Pump

United States: Nonroad Diesel Engines

Background

Emission standards for nonroad (or off-road) engines and vehicles are set by the US EPA. In most cases, federal nonroad engine regulations also apply in California, whose authority to set emission standards for new nonroad engines is limited. The federal Clean Air Act Amendments of 1990 (CAA) preempt California's authority to control emissions from new farm and construction equipment under 175 hp [CAA Section 209(e)(1)(A)] and require California to receive authorization from the federal EPA for controls over other off-road sources [CAA Section 209 (e)(2)(A)].

The important steps in nonroad engine emission regulations include:

- **Tier 1-3 Standards.** The first federal standards (Tier 1) for new nonroad diesel engines were adopted in 1994 for engines over 37 kW (50 hp), to be phased-in from 1996 to 2000. In 1996, a Statement of Principles (SOP) pertaining to nonroad diesel engines was signed between EPA, California ARB and engine makers (including Caterpillar, Cummins, Deere, Detroit Diesel, Deutz, Isuzu, Komatsu, Kubota, Mitsubishi, Navistar, New Holland, Wis-Con, and Yanmar). On August 27, 1998, the EPA signed the final rule reflecting the provisions of the SOP [2787]. The 1998 regulation introduced Tier 1 standards for

equipment under 37 kW (50 hp) and increasingly more stringent Tier 2 and Tier 3 standards for all equipment with phase-in schedules from 2000 to 2008. The Tier 1-3 standards are met through advanced engine design, with no or only limited use of exhaust gas aftertreatment (oxidation catalysts). Tier 3 standards for NOx+HC are similar in stringency to the 2004 standards for heavy-duty onroad engines, however Tier 3 standards for PM were never adopted.

- **Tier 4 Standards.** On May 11, 2004, the EPA signed a final rule introducing Tier 4 emission standards, which were phased-in over the period of 2008-2015 [2786]. The Tier 4 standards require that emissions of PM and NOx be further reduced by about 90%. These emission reductions have been achieved through the use of advanced exhaust gas aftertreatment technologies, with most Tier 4 engine families using urea-SCR catalysts for NOx control. Some Tier 4 engines also utilize a DPF, while others meet the standards without particulate filters.
- **Tier 5 Standards.** In November 2021, the California Air Resources Board held the first public workshop on the development of Tier 5 emission standards that will seek to further reduce NOx and PM emissions by 50-90%, depending on the engine power category, in the 2028-2030 timeframe. The considered changes also include a new low load certification test cycle (LLAC), extended full useful life (FUL) and emission warranty periods, OBD requirements, and more. However, due to the California preemption, California Tier 5 standards would have a limited scope and could produce only very limited emission reductions, unless a corresponding nonroad engine regulation be adopted by the EPA.

Nonroad Diesel Fuel. At the Tier 1-3 stage, the sulfur content in nonroad diesel fuels was not limited by environmental regulations. The oil industry specification was 0.5% (wt., max), with the average in-use sulfur level of about 0.3% = 3,000 ppm. To enable sulfur-sensitive control technologies in Tier 4 engines—such as catalytic particulate filters and NOx adsorbers—the EPA mandated reductions in sulfur content in nonroad diesel fuels, as follows:

- 500 ppm effective June 2007 for nonroad, locomotive and marine (NRLM) diesel fuels
- 15 ppm (ultra-low sulfur diesel) effective June 2010 for nonroad fuel, and June 2012 for locomotive and marine fuels

The US nonroad emission standards are harmonized to a certain degree with European nonroad emission standards.

EPA emission standards for nonroad diesel engines are published in the US Code of Federal Regulations, Title 40, Part 89. Regulatory text, fact sheets and related documents are available from the EPA web site [2788].

Applicability

The nonroad standards cover mobile *nonroad diesel engines* of all sizes used in a wide range of construction, agricultural and industrial equipment. The EPA definition of the *nonroad engine* is based on the principle of mobility/portability, and includes engines installed on (1) self-propelled equipment, (2) on equipment that is propelled while performing its function, or (3) on equipment that is portable or transportable, as indicated by the presence of wheels, skids, carrying handles, dolly, trailer, or platform [40 CFR 1068.30]. In other words, nonroad engines are all internal combustion engines except motor vehicle (highway) engines, stationary engines (or engines that remain at one location for more than 12 months), engines used solely for competition, or engines used in aircraft.

Effective May 14, 2003, the definition of nonroad engines was changed to also include all diesel powered engines—including stationary ones—used in agricultural operations in California. This change applies only to engines sold in the state of California; stationary engines sold in other states are not classified as nonroad engines.

The nonroad diesel emission regulations are not applicable to all nonroad diesel engines. Exempted are the following nonroad engine categories:

- Engines used in railway locomotives; those are subject to separate EPA regulations.
- Engines used in marine vessels, also covered by separate EPA regulations. Marine engines below 37 kW (50 hp) are subject to Tier 1-2—but not Tier 4—nonroad standards. Certain marine engines that are exempted from marine standards may be subject to nonroad regulations.

- Engines used in underground mining equipment. Diesel emissions and air quality in mines are regulated by the Mine Safety and Health Administration (MSHA).
- Hobby engines (below 50 cm^3 per cylinder)

Examples of regulated applications include farm tractors, excavators, bulldozers, wheel loaders, backhoe loaders, road graders, diesel lawn tractors, logging equipment, portable generators, skid steer loaders, or forklifts.

A new definition of a compression-ignition (diesel) engine was introduced in the 1998 rule, consistent with definitions established for highway engines. The definition focuses on the engine cycle, rather than the ignition mechanism, with the presence of a throttle as an indicator to distinguish between diesel-cycle and otto-cycle operation. Regulating power by controlling the fuel supply in lieu of a throttle corresponds with lean combustion and diesel-cycle operation. This language allows the possibility that a natural gas-fueled engine equipped with a spark plug is considered a compression-ignition engine.

Tier 1-3 Emission Standards

The 1998 nonroad engine regulations were structured as a 3-tiered progression. Each tier involved a phase-in (by horsepower rating) over several years. Tier 1 standards were phased-in from 1996 to 2000. The more stringent Tier 2 standards took effect from 2001 to 2006, and yet more stringent Tier 3 standards phased-in from 2006 to 2008 (Tier 3 standards applied only for engines from 37-560 kW).

Tier 1-3 emissions standards are listed in Table 1. Nonroad regulations use the metric system of units, with regulatory limits expressed in grams of pollutant per kWh.

Table 1
EPA Tier 1-3 nonroad diesel engine emission standards, g/kWh (g/bhp·hr)

Engine Power	Tier	Year	CO	HC	NMHC+NOx	NOx	PM
kW < 8 (hp < 11)	Tier 1	2000	8.0 (6.0)	-	10.5 (7.8)	-	1.0 (0.75)
	Tier 2	2005	8.0 (6.0)	-	7.5 (5.6)	-	0.8 (0.6)

Engine Power	Tier	Year	CO	HC	NMHC+NOx	NOx	PM
8 ≤ kW < 19 (11 ≤ hp < 25)	Tier 1	2000	6.6 (4.9)	-	9.5 (7.1)	-	0.8 (0.6)
	Tier 2	2005	6.6 (4.9)	-	7.5 (5.6)	-	0.8 (0.6)
19≤ kW < 37 (25 ≤ hp < 50)	Tier 1	1999	5.5 (4.1)	-	9.5 (7.1)	-	0.8 (0.6)
	Tier 2	2004	5.5 (4.1)	-	7.5 (5.6)	-	0.6 (0.45)
37 ≤ kW < 75 (50 ≤ hp < 100)	Tier 1	1998	-	-	-	9.2 (6.9)	-
	Tier 2	2004	5.0 (3.7)	-	7.5 (5.6)	-	0.4 (0.3)
	Tier 3	2008	5.0 (3.7)	-	4.7 (3.5)	-	-†
75 ≤ kW < 130 (100 ≤ hp < 175)	Tier 1	1997	-	-	-	9.2 (6.9)	-
	Tier 2	2003	5.0 (3.7)	-	6.6 (4.9)	-	0.3 (0.22)
	Tier 3	2007	5.0 (3.7)	-	4.0 (3.0)	-	-†
130 ≤ kW < 225 (175 ≤ hp < 300)	Tier 1	1996	11.4 (8.5)	1.3 (1.0)	-	9.2 (6.9)	0.54 (0.4)
	Tier 2	2003	3.5 (2.6)	-	6.6 (4.9)	-	0.2 (0.15)
	Tier 3	2006	3.5 (2.6)	-	4.0 (3.0)	-	-†
225 ≤ kW < 450 (300 ≤ hp < 600)	Tier 1	1996	11.4 (8.5)	1.3 (1.0)	-	9.2 (6.9)	0.54 (0.4)
	Tier 2	2001	3.5 (2.6)	-	6.4 (4.8)	-	0.2 (0.15)
	Tier 3	2006	3.5 (2.6)	-	4.0 (3.0)	-	-†
450 ≤ kW < 560 (600 ≤ hp < 750)	Tier 1	1996	11.4 (8.5)	1.3 (1.0)	-	9.2 (6.9)	0.54 (0.4)
	Tier 2	2002	3.5 (2.6)	-	6.4 (4.8)	-	0.2 (0.15)
	Tier 3	2006	3.5 (2.6)	-	4.0 (3.0)	-	-†
kW ≥ 560 (hp ≥ 750)	Tier 1	2000	11.4 (8.5)	1.3 (1.0)	-	9.2 (6.9)	0.54 (0.4)
	Tier 2	2006	3.5 (2.6)	-	6.4 (4.8)	-	0.2 (0.15)
† Not adopted, engines must meet Tier 2 PM standard.							

Manufacturers who signed the 1998 Consent Decrees with the EPA may have been required to meet the Tier 3 standards one year ahead of schedule (i.e. beginning in 2005).

Voluntary, more stringent emission standards that manufacturers could use to earn a designation of "Blue Sky Series" engines (applicable to Tier 1-3 certifications) are listed in Table 2.

Table 2
EPA voluntary emission standards for nonroad diesel engines, g/kWh (g/bhp·hr)

Rated Power (kW)	NMHC+NOx	PM
kW < 8	4.6 (3.4)	0.48 (0.36)
8 ≤ kW <19	4.5 (3.4)	0.48 (0.36)
19 ≤ kW <37	4.5 (3.4)	0.36 (0.27)
37 ≤ kW < 75	4.7 (3.5)	0.24 (0.18)
75 ≤ kW <130	4.0 (3.0)	0.18 (0.13)
130 ≤ kW < 560	4.0 (3.0)	0.12 (0.09)
kW ≥ 560	3.8 (2.8)	0.12 (0.09)

Engines of all sizes had to meet smoke standards of 20/15/50% opacity at acceleration/lug/peak modes, respectively.

The regulations included several other provisions, such as averaging, banking and trading of emission credits and maximum "family emission limits" (FEL) for emission averaging.

Tier 4 Emission Standards

The Tier 4 emission standards—phased-in from 2008 through 2015—introduce substantial reductions of NOx (for engines above 56 kW) and PM (above 19 kW), as well as more stringent HC limits. CO emission limits remain unchanged from the Tier 2-3 stage.

Engines up to 560 kW. Tier 4 emission standards for engines up to 560 kW are listed in Table 3.

Table 3
Tier 4 emission standards—Engines up to 560 kW, g/kWh (g/bhp-hr)

Engine Power	Year	CO	NMHC	NMHC+NO_x	NO_x	PM
kW < 8 (hp < 11)	2008	8.0 (6.0)	-	7.5 (5.6)	-	0.4[a] (0.3)
8 ≤ kW < 19 (11 ≤ hp < 25)	2008	6.6 (4.9)	-	7.5 (5.6)	-	0.4 (0.3)
19 ≤ kW < 37 (25 ≤ hp < 50)	2008	5.5 (4.1)	-	7.5 (5.6)	-	0.3 (0.22)
	2013	5.5 (4.1)	-	4.7 (3.5)	-	0.03 (0.022)

37 ≤ kW < 56 (50 ≤ hp < 75)	2008	5.0 (3.7)	-	4.7 (3.5)	-	0.3[b] (0.22)
	2013	5.0 (3.7)	-	4.7 (3.5)	-	0.03 (0.022)
56 ≤ kW < 130 (75 ≤ hp < 175)	2012-2014[c]	5.0 (3.7)	0.19 (0.14)	-	0.40 (0.30)	0.02 (0.015)
130 ≤ kW ≤ 560 (175 ≤ hp ≤ 750)	2011-2014[d]	3.5 (2.6)	0.19 (0.14)	-	0.40 (0.30)	0.02 (0.015)

a - hand-startable, air-cooled, DI engines may be certified to Tier 2 standards through 2009 and to an optional PM standard of 0.6 g/kWh starting in 2010
b - 0.4 g/kWh (Tier 2) if manufacturer complies with the 0.03 g/kWh standard from 2012
c - PM/CO: full compliance from 2012; NOx/HC: Option 1 (if banked Tier 2 credits used)—50% engines must comply in 2012-2013; Option 2 (if no Tier 2 credits claimed)—25% engines must comply in 2012-2014, with full compliance from 2014.12.31
d - PM/CO: full compliance from 2011; NOx/HC: 50% engines must comply in 2011-2013

In engines of 56-560 kW rated power, the NOx and HC standards are phased-in over a few year period, as indicated in the notes to Table 3. The initial standards (PM compliance) are sometimes referred to as the 'interim Tier 4' (or 'Tier 4i'), 'transitional Tier 4' or 'Tier 4 A', while the final standards (NOx/HC compliance) are sometimes referred to as 'Tier 4 B'.

As an alternative to introducing the required percentage of Tier 4 compliant engines, manufacturers may certify all their engines to an *alternative NOx limit* in each model year during the phase-in period. These alternative NOx standards are:

- Engines 56-130 kW:
  - Option 1: NOx = 2.3 g/kWh = 1.7 g/bhp-hr (Tier 2 credits used to comply, MY 2012-2013)
  - Option 2: NOx = 3.4 g/kWh = 2.5 g/bhp-hr (no Tier 2 credits claimed, MY 2012-2014)
- Engines 130-560 kW: NOx = 2.0 g/kWh = 1.5 g/bhp-hr (MY 2011-2013)

Engines Above 560 kW. Tier 4 emission standards for engines above 560 kW are listed in Table 4. The 2011 standards are sometimes referred to as 'transitional Tier 4', while the 2015 limits represent final Tier 4 standards.

Table 4
Tier 4 emission standards—Engines above 560 kW, g/kWh (g/bhp-hr)

Year	Category	CO	NMHC	NO_x	PM
2011	Generator sets > 900 kW	3.5 (2.6)	0.40 (0.30)	0.67 (0.50)	0.10 (0.075)
	All engines except gensets > 900 kW	3.5 (2.6)	0.40 (0.30)	3.5 (2.6)	0.10 (0.075)
2015	Generator sets	3.5 (2.6)	0.19 (0.14)	0.67 (0.50)	0.03 (0.022)
	All engines except gensets	3.5 (2.6)	0.19 (0.14)	3.5 (2.6)	0.04 (0.03)

Other Provisions. The Tier 4 regulation and later amendments include a number of additional provisions:

- *Smoke Opacity*—Existing Tier 2-3 smoke opacity standards and procedures continue to apply in some engines. Exempted from smoke emission standards are engines certified to PM emission standards at or below 0.07 g/kWh (because an engine of such low PM level has inherently low smoke emission).
- *Crankcase Ventilation*—The Tier 4 regulation does not require closed crankcase ventilation in nonroad engines. However, in engines with open crankcases, crankcase emissions must be measured and added to exhaust emissions in assessing compliance.
- *DEF Refill Interval*—For SCR-equipped nonroad diesel engines, a minimum DEF (urea solution) refill interval is defined as at least as long (in engine-hours) as the vehicle's fuel capacity [3408].
- *Ammonia Emissions*—While ammonia emissions are unregulated, the EPA recommends that ammonia slip should be below 10 ppm average over the applicable test cycles [3693].
- *Emergency Operation*—To facilitate the use of certain nonroad engines in temporary emergency situations, the engines can be equipped with an AECD to override performance inducements related to the emission control system—for example, to allow engine operation without urea in the SCR system during an emergency [3408]. This flexibility is intended primarily for engines used in construction equipment and portable equipment used for temporary power generation and flood control.

- *ABT Program*—Similarly to earlier standards, the Tier 4 regulation includes such provisions as averaging, banking and trading of emission credits and FEL limits for emission averaging.

Test Cycles and Fuels

Nonroad engine emissions are measured on a steady-state test cycle that is equivalent to the ISO 8178 C1, 8-mode steady-state test cycle. Other ISO 8178 test cycles are allowed for selected applications, such as constant-speed engines (D2 5-mode cycle), variable-speed engines rated under 19 kW (G2 cycle), and marine engines (E3 cycle).

Transient Testing. Tier 4 standards have to be met over both the steady-state test and the nonroad transient cycle, NRTC. The transient testing requirements started with MY 2013 for engines below 56 kW, MY 2012 for 56-130 kW, and MY 2011 for 130-560 kW engines. Engines above 560 kW are not tested on the transient test. Also constant-speed, variable-load engines of any power category are not subject to transient testing. The NRTC protocol includes a cold start test. The cold start emissions are weighted at 5% and hot start emissions are weighted at 95% in calculating the final result.

Tier 4 nonroad engines must also meet not-to-exceed standards (NTE), which are measured without reference to any specific test schedule. The NTE standards became effective in 2011 for engines above 130 kW; in 2012 for 56-130 kW; and in 2013 for engines below 56 kW. In most engines, the NTE limits are set at 1.25 times the regular standard for each pollutant. In engines certified to NOx standards below 2.5 g/kWh or PM standards below 0.07 g/kWh, the NTE multiplier is 1.5. The NTE standards apply to engines at the time of certification, as well as in use throughout the useful life of the engine. The purpose of the added testing requirements is to prevent the possibility of "defeating" the test cycle by electronic engine controls.

Certification Fuels. Fuels with sulfur levels no greater than 0.2 wt% (2,000 ppm) were used for certification testing of Tier 1-3 engines. From 2011, all Tier 4 engines are tested using fuels of 7-15 ppm sulfur content. The transition from the 2000 ppm S specification to the 7-15 ppm specification took place in the 2006-2010 period (see Certification Diesel Fuel).

A change from measuring total hydrocarbons to nonmethane hydrocarbons (NMHC) has been introduced in the 1998 rule. Since there is no standardized EPA method for measuring methane in diesel engine exhaust, manufacturers can either use their own procedures to analyze nonmethane hydrocarbons or measure total hydrocarbons and subtract 2% from the measured hydrocarbon mass to correct for methane.

Environmental Benefit and Cost

1998 Regulation

At the time of signing the 1998 rule, the EPA estimated that by 2010 NO_x emissions would be reduced by about a million tons per year, the equivalent of taking 35 million passenger cars off the road.

The costs of meeting the emission standards were expected to add under 1% to the purchase price of typical new nonroad diesel equipment, although for some equipment the standards may cause price increases on the order of 2-3%. The program was expected to cost about $600 per ton of NO_x reduced.

Tier 4 Regulation

When the full inventory of older nonroad engines are replaced by Tier 4 engines, annual emission reductions are estimated at 738,000 tons of NOx and 129,000 tons of PM. By 2030, 12,000 premature deaths would be prevented annually due to the implementation of the proposed standards.

The estimated costs for added emission controls for the vast majority of equipment was estimated at 1-3% as a fraction of total equipment price. For example, for a 175 hp bulldozer that costs approximately $230,000 it would cost up to $6,900 to add the advanced emission controls and to design the bulldozer to accommodate the modified engine.

EPA estimated that the average cost increase for 15 ppm S fuel would be 7 cents per gallon. This figure would be reduced to 4 cents by anticipated savings in maintenance costs due to low sulfur diesel.

Preliminary Generator Specifications

Project Sizing Report

Sizing Id	11015450	Electricity Supply	60 Hz 480/277 V
Project Name	Golden Eagle - Production Gen No. 1 (50% MAU's)	Connection	STAR
Customer Name		Max. Ambient Temperature	77.0 F
Region	U.S.	Altitude	5,312.0 Ft. A.S.L
Prepared By	Ruben Valentin	Humidity	30%
Modified Date	3-Nov-2023	Project Description	

Load Analysis Summary

Max Transient Load Step	116.4 SkVA / 104.7 SkW
Peak Transient Load Step	1,280.1 SkVA / 1,152.1 SkW
Final Running Load	1,163.7 kVA / 1,047.3 kW / 0.90 PF
Max Running Non Linear Load	1,163.7 RkVA
Selection Criteria	Step 1 Peak SkW requirements
Project THDI	29.05%

Generator Set

Engine Model	(1) of 3516C	Nameplate Rating	2,000.0 ekW / 2,500.0 kVA / 0.8 PF
Package Model	2000SC4	Site Output Rating	1,988.9 ekW / 2,486.1 kVA
Voltage Regulator and Slope	CDVR 2:1 slope;	Rating Type	Standby
Feature Code	516DRJ9	Open / Enclosure	Open
Fuel	Diesel	UL Listed	No
Sizing Methodology	Conventional	Capacity Used	52.7%
Project THDV	20.34%	Generator Set Type	Stationary

Engine

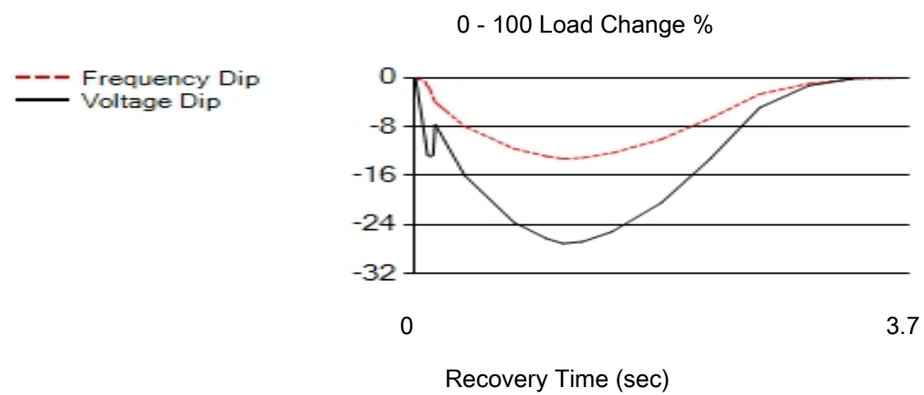
Make/Model	3516 C	Emissions / Certifications	EPA T4 Final
Aspiration	TA	Governor	ADEM4
Cylinder Configuration	VEE - 16	Aftercooler Type	ATAAC
Speed	1800 RPM	Displacement	4,765 Cubic Inch / 78 Liter

Engine Performance Number	DM9368	Bore	170
Fuel Consumption at 100% Load	137.6 gph	Stroke	215
Alternator			
Alternator Type/Frame Size	SR5 / 1645	Insulation Class	H
Alternator Winding Pitch	0.6700	Temperature Rise	150 C
Excitation/Winding Type	PM / FORM	Number Of Poles	4
Alternator Arrangement Number	2523938	Number of Leads	6
Subtransient Reactance X"d	0.1313	Rated Amps	3,007.0

**** See your Caterpillar dealer and/or Spec Sheet for technical information.

***** Package Power Tolerance: +/- 5%

Block Load(Only) Transient Response *			
Load Change %	FDip %	VDip %	Recovery Time (sec)
0 - 25	<5%	<5%	< 3
0 - 50	5.7	11.4	< 3
0 - 75	8.7	17.7	< 3
0 - 100	13.2	27.1	3.7



Transient Performance

Block Load (only) Transient Response values are at factory conditions with a resistive load. This information is representative of a typical Cat generator set, but is not guaranteed. Generator set block load capabilities at site conditions may vary from factory transient response test results due to site altitude, site ambient, and engine to engine variation.

Load Report

Project Name	Golden Eagle - Production Gen No. 1 (50% MAU's)	Electricity Supply	60 Hz 480/277 V
Customer Name		Rating Type	Standby
Region	U.S.	Max. Ambient Temperature	77.0 F
Prepared By	Ruben Valentin	Altitude	5,312.0 Ft. A.S.L
Modified Date	3-Nov-2023	Humidity	30%
Engine Model	(1) of 3516C	Nameplate Rating	2,000.0 ekW / 2,500.0 kVA / 0.8 PF

Load Details		Permitted		Predicted		Transient Inrush		Running		Resultant Peak		Cumulative Running	
Load Step	Load Description	FDip	VDip	FDip	VDip	SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW
Step 1													
1.1	2x125.00 HP - Make-Up Air Units - Cell: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			23.3	20.9	232.7	209.5				
1.2	2x125.00 HP - Make-Up Air Units - Cell: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			23.3	20.9	232.7	209.5				
1.3	2x125.00 HP - Make-Up Air Units - Cell: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			23.3	20.9	232.7	209.5				
1.4	2x125.00 HP - Make-Up Air Units - Cell: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			23.3	20.9	232.7	209.5				
1.5	2x125.00 HP - Make-Up Air Units - Cell: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			23.3	20.9	232.7	209.5				
	Step 1 Total	20%	20%	<5%	<5%	116.4	104.7	1,163.7	1,047.3				
	Total Through Step 1									1,280.1	1,152.1	1,163.7	1,047.3
Load Analysis Summary : Generator set meets site requirements													
						Maximum Step				Maximum Peak		Final Running	

						SkVA	SkW			SkVA	SkW	kVA	kW
						116.4	104.7			1,280.1	1,152.1	1,163.7	1,047.3

Engine Room Tools Summary

Project Name	Golden Eagle - Production Gen No. 1 (50% MAU's)	Electricity Supply	60 Hz 480/277 V
Customer Name		Rating Type	Standby
Region	U.S.	Max. Ambient Temperature	77.0 F
Prepared By	Ruben Valentin	Altitude	5,312.0 Ft. A.S.L
Modified Date	3-Nov-2023	Humidity	30%
Engine Model	(1) of 3516C	Nameplate Rating	2,000.0 ekW / 2,500.0 kVA / 0.8 PF

Fuel Tank Summary

Running Hours	hr	Fuel Tank Size	Data coming soon
Oversize Factor	%	Usable Capacity	Data coming soon
Fuel Consumption @ 100% Load	137.57 US gal/hr		

Radiator Duct and Room Fresh Air Louver Designer Summary

Duct Dimensions from Radiator Side (Length)	93.68 in	Combustion Airflow	6,117.79 ft^3/min
Duct Dimensions from Radiator Side (Width)	116.94 in	Minimum Louver Area	0.32 ft^2
Heat Radiation from Engine & Alternator	260.85 kW	Temp Rise	Data coming soon
Engine & Alternator Airflow	Data coming soon	Radiator Duct Area	0.22 ft^2

Exhaust Back Pressure Summary

Total Straight Pipe Length	0 ft	Exhaust Gas Flow	16,298.58 ft^3/min
Total Number Of 90 Deg Long Radius Elbow	0	Muffler Pressure Drop	Data coming soon
Total Number Of 90 Deg Short Radius Elbow	0	Pressure Drop in Exhaust	0.00 psi
Total Number Of 45 Deg Elbow	0	Max Allowable Pressure Drop	Data coming soon
Minimum Exhaust Pipe Diameter	Data coming soon		
Stack Temperature	916.80 Deg. F		
Gas Density	0.03 lb/ft^3		

Project Sizing Report

Sizing Id	11015747	Electricity Supply	60 Hz 480/277 V
Project Name	Golden Eagle - Production Gen No. 2 (50% MAU's)	Connection	STAR
Customer Name		Max. Ambient Temperature	77.0 F
Region	U.S.	Altitude	5,312.0 Ft. A.S.L
Prepared By	Ruben Valentin	Humidity	30%
Modified Date	3-Nov-2023	Project Description	

Load Analysis Summary

Max Transient Load Step	104.7 SkVA / 94.3 SkW
Peak Transient Load Step	1,152.1 SkVA / 1,036.9 SkW
Final Running Load	1,047.3 kVA / 942.6 kW / 0.90 PF
Max Running Non Linear Load	1,047.3 RkVA
Selection Criteria	Step 1 Peak SkW requirements
Project THDI	29.05%

Generator Set

Engine Model	(1) of 3516C	Nameplate Rating	2,000.0 ekW / 2,500.0 kVA / 0.8 PF
Package Model	2000SC4	Site Output Rating	1,988.9 ekW / 2,486.1 kVA
Voltage Regulator and Slope	CDVR 2:1 slope;	Rating Type	Standby
Feature Code	516DRJ9	Open / Enclosure	Open
Fuel	Diesel	UL Listed	No
Sizing Methodology	Conventional	Capacity Used	47.4%
Project THDV	18.31%	Generator Set Type	Stationary

Engine

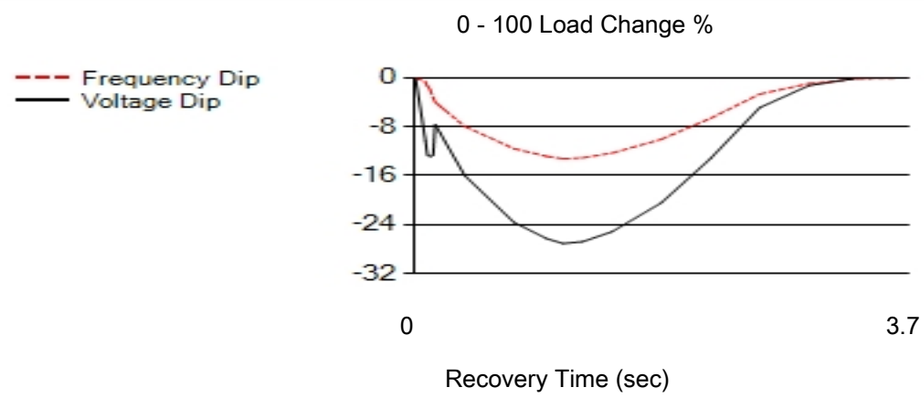
Make/Model	3516 C	Emissions / Certifications	EPA T4 Final
Aspiration	TA	Governor	ADEM4
Cylinder Configuration	VEE - 16	Aftercooler Type	ATAAC
Speed	1800 RPM	Displacement	4,765 Cubic Inch / 78 Liter

Engine Performance Number	DM9368	Bore	170
Fuel Consumption at 100% Load	137.6 gph	Stroke	215
Alternator			
Alternator Type/Frame Size	SR5 / 1645	Insulation Class	H
Alternator Winding Pitch	0.6700	Temperature Rise	150 C
Excitation/Winding Type	PM / FORM	Number Of Poles	4
Alternator Arrangement Number	2523938	Number of Leads	6
Subtransient Reactance X"d	0.1313	Rated Amps	3,007.0

**** See your Caterpillar dealer and/or Spec Sheet for technical information.

***** Package Power Tolerance: +/- 5%

Block Load(Only) Transient Response *			
Load Change %	FDip %	VDip %	Recovery Time (sec)
0 - 25	<5%	<5%	< 3
0 - 50	5.7	11.4	< 3
0 - 75	8.7	17.7	< 3
0 - 100	13.2	27.1	3.7



Transient Performance

Block Load (only) Transient Response values are at factory conditions with a resistive load. This information is representative of a typical Cat generator set, but is not guaranteed. Generator set block load capabilities at site conditions may vary from factory transient response test results due to site altitude, site ambient, and engine to engine variation.

Load Report

Project Name	Golden Eagle - Production Gen No. 2 (50% MAU's)	Electricity Supply	60 Hz 480/277 V
Customer Name		Rating Type	Standby
Region	U.S.	Max. Ambient Temperature	77.0 F
Prepared By	Ruben Valentin	Altitude	5,312.0 Ft. A.S.L
Modified Date	3-Nov-2023	Humidity	30%
Engine Model	(1) of 3516C	Nameplate Rating	2,000.0 ekW / 2,500.0 kVA / 0.8 PF

Load Details		Permitted		Predicted		Transient Inrush		Running		Resultant Peak		Cumulative Running	
Load Step	Load Description	FDip	VDip	FDip	VDip	SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW
Step 1													
1.1	2x125.00 HP - Make-Up Air Units - Cell: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			23.3	20.9	232.7	209.5				
1.2	2x125.00 HP - Make-Up Air Units - Cell: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			23.3	20.9	232.7	209.5				
1.3	2x125.00 HP - Make-Up Air Units - Cell: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			23.3	20.9	232.7	209.5				
1.4	2x125.00 HP - Make-Up Air Units - Cell: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			23.3	20.9	232.7	209.5				
1.5	1x125.00 HP - Make-Up Air Units - Cell: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			11.6	10.5	116.4	104.7				
	Step 1 Total	20%	20%	<5%	<5%	104.7	94.3	1,047.3	942.6				
	Total Through Step 1									1,152.1	1,036.9	1,047.3	942.6
Load Analysis Summary : Generator set meets site requirements													
						Maximum Step				Maximum Peak		Final Running	

						SkVA	SkW			SkVA	SkW	kVA	kW
						104.7	94.3			1,152.1	1,036.9	1,047.3	942.6

Engine Room Tools Summary

Project Name	Golden Eagle - Production Gen No. 2 (50% MAU's)	Electricity Supply	60 Hz 480/277 V
Customer Name		Rating Type	Standby
Region	U.S.	Max. Ambient Temperature	77.0 F
Prepared By	Ruben Valentin	Altitude	5,312.0 Ft. A.S.L
Modified Date	3-Nov-2023	Humidity	30%
Engine Model	(1) of 3516C	Nameplate Rating	2,000.0 ekW / 2,500.0 kVA / 0.8 PF

Fuel Tank Summary

Running Hours	hr	Fuel Tank Size	Data coming soon
Oversize Factor	%	Usable Capacity	Data coming soon
Fuel Consumption @ 100% Load	137.57 US gal/hr		

Radiator Duct and Room Fresh Air Louver Designer Summary

Duct Dimensions from Radiator Side (Length)	93.68 in	Combustion Airflow	6,117.79 ft^3/min
Duct Dimensions from Radiator Side (Width)	116.94 in	Minimum Louver Area	0.32 ft^2
Heat Radiation from Engine & Alternator	260.85 kW	Temp Rise	Data coming soon
Engine & Alternator Airflow	Data coming soon	Radiator Duct Area	0.22 ft^2

Exhaust Back Pressure Summary

Total Straight Pipe Length	0 ft	Exhaust Gas Flow	16,298.58 ft^3/min
Total Number Of 90 Deg Long Radius Elbow	0	Muffler Pressure Drop	Data coming soon
Total Number Of 90 Deg Short Radius Elbow	0	Pressure Drop in Exhaust	0.00 psi
Total Number Of 45 Deg Elbow	0	Max Allowable Pressure Drop	Data coming soon
Minimum Exhaust Pipe Diameter	Data coming soon		
Stack Temperature	916.80 Deg. F		
Gas Density	0.03 lb/ft^3		

Project Sizing Report

Sizing Id	11015429	Electricity Supply	60 Hz 480/277 V
Project Name	Golden Eagle - Utilities Gen (Consolidated)	Connection	STAR
Customer Name		Max. Ambient Temperature	77.0 F
Region	U.S.	Altitude	5,312.0 Ft. A.S.L
Prepared By	Ruben Valentin	Humidity	30%
Modified Date	2-Nov-2023	Project Description	

Load Analysis Summary

Max Transient Load Step	2,650.0 SkVA / 593.6 SkW
Peak Transient Load Step	2,650.0 SkVA / 1,983.3 SkW
Final Running Load	2,172.2 kVA / 1,947.4 kW / 0.90 PF
Max Running Non Linear Load	963.9 RkVA
Selection Criteria	Step 1 Peak SkW requirements
Project THDI	29.71%

Generator Set

Engine Model	(1) of 3516C	Nameplate Rating	2,000.0 ekW / 2,500.0 kVA / 0.8 PF
Package Model	2000SC4	Site Output Rating	1,988.9 ekW / 2,486.1 kVA
Voltage Regulator and Slope	CDVR 2:1 slope;	Rating Type	Standby
Feature Code	516DRJ9	Open / Enclosure	Open
Fuel	Diesel	UL Listed	No
Sizing Methodology	Conventional	Capacity Used	97.9%
Project THDV	15.36%	Generator Set Type	Stationary

Engine

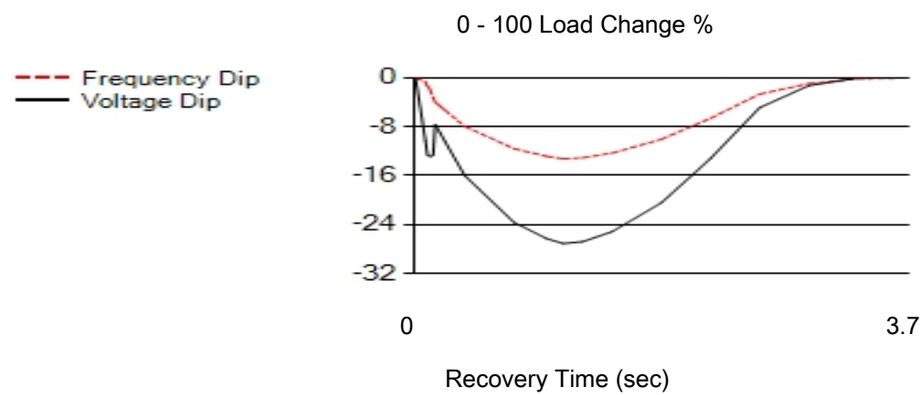
Make/Model	3516 C	Emissions / Certifications	EPA T4 Final
Aspiration	TA	Governor	ADEM4
Cylinder Configuration	VEE - 16	Aftercooler Type	ATAAC
Speed	1800 RPM	Displacement	4,765 Cubic Inch / 78 Liter

Engine Performance Number	DM9368	Bore	170
Fuel Consumption at 100% Load	137.6 gph	Stroke	215
Alternator			
Alternator Type/Frame Size	SR5 / 1645	Insulation Class	H
Alternator Winding Pitch	0.6700	Temperature Rise	150 C
Excitation/Winding Type	PM / FORM	Number Of Poles	4
Alternator Arrangement Number	2523938	Number of Leads	6
Subtransient Reactance X"d	0.1313	Rated Amps	3,007.0

**** See your Caterpillar dealer and/or Spec Sheet for technical information.

***** Package Power Tolerance: +/- 5%

Block Load(Only) Transient Response *			
Load Change %	FDip %	VDip %	Recovery Time (sec)
0 - 25	<5%	<5%	< 3
0 - 50	5.7	11.4	< 3
0 - 75	8.7	17.7	< 3
0 - 100	13.2	27.1	3.7



Transient Performance

Block Load (only) Transient Response values are at factory conditions with a resistive load. This information is representative of a typical Cat generator set, but is not guaranteed. Generator set block load capabilities at site conditions may vary from factory transient response test results due to site altitude, site ambient, and engine to engine variation.

Load Report

Project Name	Golden Eagle - Utilities Gen (Consolidated)	Electricity Supply	60 Hz 480/277 V
Customer Name		Rating Type	Standby
Region	U.S.	Max. Ambient Temperature	77.0 F
Prepared By	Ruben Valentin	Altitude	5,312.0 Ft. A.S.L
Modified Date	2-Nov-2023	Humidity	30%
Engine Model	(1) of 3516C	Nameplate Rating	2,000.0 ekW / 2,500.0 kVA / 0.8 PF

Load Details		Permitted		Predicted		Transient Inrush		Running		Resultant Peak		Cumulative Running	
Load Step	Load Description	FDip	VDip	FDip	VDip	SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW
Step 1													
1.1	1x320.00 kW - RTO System: NEMA, 3-Phase Motor, Across the line, Loaded	30%	30%			2,650.0	530.0	370.4	333.3				
	Step 1 Total	30%	30%	<5%	16.9%	2,650.0	530.0	370.4	333.3				
	Total Through Step 1									2,650.0	530.0	370.4	333.3
Step 2													
2.1	1x250.00 HP - Alcaline Scruber Fan: NEMA, 3-Phase Motor, Across the line, Loaded	30%	30%			1,325.0	318.0	218.0	196.2				
2.2	1x200.00 HP - Acid Scruber Fans No. 1: NEMA, 3-Phase Motor, Across the line, Loaded	30%	30%			1,060.0	275.6	176.3	158.7				
	Step 2 Total	30%	30%	<5%	15.5%	2,384.9	593.6	764.7	688.2				
	Total Through Step 2									2,639.4	926.9	764.7	688.2
Step 3													
3.1	1x200.00 HP - Acid Scruber Fan No. 2: NEMA, 3-Phase Motor, Across the line, Loaded	30%	30%			1,060.0	275.6	176.3	158.7				
	Step 3 Total	30%	30%	<5%	7.5%	1,060.0	275.6	941.0	846.9				
	Total Through Step 3									1,664.4	963.8	941.0	846.9
Step 4													
4.1	3x50.00 HP - Primary Heating Water Pumps: NEMA, 3-Phase Motor, Across the line, Loaded	30%	30%			795.0	294.1	138.2	121.6				
	Step 4 Total	30%	30%	<5%	5.8%	795.0	294.2	1,079.0	968.5				
	Total Through Step 4									1,619.1	1,141.1	1,079.0	968.5
Step 5													

5.1	2x25.00 HP - Acid Scrubber Pumps: NEMA, 3-Phase Motor, Across the line, Loaded	30%	30%			265.0	114.0	48.7	41.4				
5.2	1x216.00 kVA - Server Room: Office Equipment, Distr. 3-Phase , 46.7 THDI%	30%	30%			216.0	194.4	216.0	194.4				
	Step 5 Total	30%	30%	<5%	<5%	454.1	308.4	1,343.5	1,204.3				
	Total Through Step 5									1,511.6	1,276.9	1,343.5	1,204.3
Step 6													
6.1	1x40.00 HP - Alcaline Scrubber Pump: NEMA, 3-Phase Motor, Across the line, Loaded	30%	30%			212.0	82.7	37.7	32.8				
	Step 6 Total	30%	30%	<5%	<5%	212.0	82.7	1,381.2	1,237.1				
	Total Through Step 6									1,510.5	1,287.0	1,381.2	1,237.1
Step 7													
7.1	1x40.00 HP - Silane Scribber Fan: NEMA, 3-Phase Motor, Across the line, Loaded	30%	30%			212.0	82.7	37.7	32.8				
	Step 7 Total	30%	30%	<5%	<5%	212.0	82.7	1,418.8	1,269.9				
	Total Through Step 7									1,548.2	1,319.8	1,418.8	1,269.9
Step 8													
8.1	1x5.00 HP - Silane Scribber Pump: NEMA, 3-Phase Motor, Across the line, Loaded, NEMA H	30%	30%			33.5	19.1	5.6	4.4				
	Step 8 Total	30%	30%	<5%	<5%	33.5	19.1	1,424.3	1,274.3				
	Total Through Step 8									1,448.2	1,289.0	1,424.3	1,274.3
Step 9													
9.1	3x125.00 HP - Secondary Heating Water Pumps: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			34.9	31.4	349.1	314.2				
	Step 9 Total	20%	20%	<5%	<5%	34.9	31.4	1,773.4	1,588.5				
	Total Through Step 9									1,808.3	1,619.9	1,773.4	1,588.5
Step 10													
10.1	3x100.00 HP - Hot Water Boilers: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			28.2	25.4	282.5	254.2				
10.2	1x125.00 HP - Modco MAU: NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse , 29.1 THDI%	20%	20%			11.6	10.5	116.4	104.7				

Step 10 Total		20%	20%	<5%	<5%	39.9	35.9	2,172.2	1,947.4				
Total Through Step 10										2,212.1	1,983.3	2,172.2	1,947.4
Load Analysis Summary : Generator set meets site requirements													
						Maximum Step				Maximum Peak		Final Running	
						SkVA	SkW			SkVA	SkW	kVA	kW
						2,650.0	593.6			2,650.0	1,983.3	2,172.2	1,947.4

Engine Room Tools Summary

Project Name	Golden Eagle - Utilities Gen (Consolidated)	Electricity Supply	60 Hz 480/277 V
Customer Name		Rating Type	Standby
Region	U.S.	Max. Ambient Temperature	77.0 F
Prepared By	Ruben Valentin	Altitude	5,312.0 Ft. A.S.L
Modified Date	2-Nov-2023	Humidity	30%
Engine Model	(1) of 3516C	Nameplate Rating	2,000.0 ekW / 2,500.0 kVA / 0.8 PF

Fuel Tank Summary

Running Hours	hr	Fuel Tank Size	Data coming soon
Oversize Factor	%	Usable Capacity	Data coming soon
Fuel Consumption @ 100% Load	137.57 US gal/hr		

Radiator Duct and Room Fresh Air Louver Designer Summary

Duct Dimensions from Radiator Side (Length)	93.68 in	Combustion Airflow	6,117.79 ft^3/min
Duct Dimensions from Radiator Side (Width)	116.94 in	Minimum Louver Area	0.32 ft^2
Heat Radiation from Engine & Alternator	260.85 kW	Temp Rise	Data coming soon
Engine & Alternator Airflow	Data coming soon	Radiator Duct Area	0.22 ft^2

Exhaust Back Pressure Summary

Total Straight Pipe Length	0 ft	Exhaust Gas Flow	16,298.58 ft^3/min
Total Number Of 90 Deg Long Radius Elbow	0	Muffler Pressure Drop	Data coming soon
Total Number Of 90 Deg Short Radius Elbow	0	Pressure Drop in Exhaust	0.00 psi
Total Number Of 45 Deg Elbow	0	Max Allowable Pressure Drop	Data coming soon
Minimum Exhaust Pipe Diameter	Data coming soon		
Stack Temperature	916.80 Deg. F		
Gas Density	0.03 lb/ft^3		

U.S. EPA AP-42 Emission Factors for Liquid Storage Tanks

7.1.3.1 Routine Losses From Fixed Roof Tanks[8-14,22]

The following equations, provided to estimate standing and working loss emissions, apply to tanks with vertical cylindrical shells and fixed roofs and to tanks with horizontal cylindrical shells. These tanks must be substantially liquid- and vapor-tight. The equations are not intended to be used in estimating losses from tanks which have air or other gases injected into the liquid, or which store unstable or boiling stocks or mixtures of hydrocarbons or petrochemicals for which the vapor pressure is not known or cannot be readily predicted. Tanks containing aqueous mixtures in which phase separation has occurred, resulting in a free layer of oil or other volatile materials floating on top of the water, should have emissions estimated on the basis of the properties of the free top layer.

Total routine losses from fixed roof tanks are equal to the sum of the standing loss and working loss:

$$L_T = L_S + L_W \tag{1-1}$$

where:

L_T = total routine losses, lb/yr
L_S = standing losses, lb/yr, see Equation 1-2
L_W = working losses, lb/yr, see Equation 1-35

7.1.3.1.1 Standing Loss

The standing loss, L_S, for a fixed roof tank refers to the loss of stock vapors as a result of tank vapor space breathing. Fixed roof tank standing losses can be estimated from Equation 1-2.

$$L_S = 365\ V_V\ W_V\ K_E\ K_S \tag{1-2}$$

where:

L_S = standing loss, lb/yr
V_V = vapor space volume, ft^3, see Equation 1-3
W_V = stock vapor density, lb/ft^3
K_E = vapor space expansion factor, per day
K_S = vented vapor saturation factor, dimensionless
365 = constant, the number of daily events in a year, (days/year)

Tank Vapor Space Volume, V_V - The tank vapor space volume is calculated using the following equation:

$$V_V = \left(\frac{\pi}{4} D^2\right) H_{VO} \tag{1-3}$$

where:

V_V = vapor space volume, ft^3
D = tank diameter, ft, see Equation 1-14 for horizontal tanks
H_{VO} = vapor space outage, ft, see Equation 1-16

The standing loss equation can be simplified by combining Equation 1-2 with Equation 1-3. The result is Equation 1-4.

$$L_S = 365 K_E \left(\frac{\pi}{4} D^2 \right) H_{VO} K_S W_V \quad \textbf{(1-4)}$$

where:

L_S = standing loss, lb/yr
K_E = vapor space expansion factor, per day, see Equation 1-5, 1-12, or 1-13
D = diameter, ft, see Equation 1-14 for horizontal tanks
H_{VO} = vapor space outage, ft, see Equation 1-16; use $H_E/2$ from Equation 1-15 for horizontal tanks
K_S = vented vapor saturation factor, dimensionless, see Equation 1-21
W_V = stock vapor density, lb/ft^3, see Equation 1-22
365 = constant, the number of daily events in a year, (days/year)

Vapor Space Expansion Factor, K_E

The calculation of the vapor space expansion factor, K_E, depends upon the properties of the liquid in the tank and the breather vent settings, as shown in Equation 1-5. As shown in the equation, K_E is greater than zero. If K_E is less than zero, standing losses will not occur. In that K_E represents the fraction of vapors in the vapor space that are expelled by a given increase in temperature, a value of 1 would indicate that the entire vapor space has been expelled. Thus the value of K_E must be less than 1, in that it is not physically possible to expel more than 100% of what is present to begin with.

$$0 < K_E \leq 1$$

$$K_E = \frac{\Delta T_V}{T_{LA}} + \frac{\Delta P_V - \Delta P_B}{P_A - P_{VA}} \quad \textbf{(1-5)}$$

where:

ΔT_V = average daily vapor temperature range, °R; see Note 1
ΔP_V = average daily vapor pressure range, psi; see Note 2
ΔP_B = breather vent pressure setting range, psi; see Note 3
P_A = atmospheric pressure, psia
P_{VA} = vapor pressure at average daily liquid surface temperature, psia; see Notes 1 and 2 for Equation 1-22
T_{LA} = average daily liquid surface temperature, °R; see Note 3 for Equation 1-22

Notes:

1. The average daily vapor temperature range, ΔT_V, refers to the daily temperature range of the tank vapor space averaged over all of the days in the given period of time, such as one year, and should

not be construed as being applicable to an individual day. The average daily vapor temperature range is calculated for an uninsulated tank using Equation 1-6.

$$\Delta T_V = \left(1 - \frac{0.8}{2.2\,(H_S/D) + 1.9}\right)\Delta T_A + \frac{0.042 \alpha_R I + 0.026 (H_S/D) \alpha_S I}{2.2\,(H_S/D) + 1.9} \quad (1\text{-}6)$$

where:

ΔT_V = average daily vapor temperature range, °R
H_S = tank shell height, ft
D = tank diameter, ft,
ΔT_A = average daily ambient temperature range, °R; see Note 4
α_R = tank roof surface solar absorptance, dimensionless; see Table 7.1-6
α_S = tank shell surface solar absorptance, dimensionless; see Table 7.1-6
I = average daily total insolation factor, Btu/ft^2 d; see Table 7.1-7.

API assigns a default value of $H_s/D = 0.5$ and an assumption of $\alpha_R = \alpha_S$, resulting in the simplified equation shown below for an uninsulated tank:[22]

$$\Delta T_V = 0.7\,\Delta T_A + 0.02\,\alpha\,I \quad (1\text{-}7)$$

where:

α = average tank surface solar absorptance, dimensionless

For purposes of estimating emissions, a storage tank should be deemed insulated only if the roof and shell are both sufficiently insulated so as to minimize heat exchange with ambient air. If only the shell is insulated, and not the roof, the temperature equations are independent of H_s/D. Also, there likely will be sufficient heat exchange through the roof such that Equation 1-7 would be applicable.

A more accurate method of accounting for the average daily vapor temperature range, ΔT_V, in partially insulated scenarios is given below. When the tank shell is insulated but the tank roof is not, heat gain to the tank from insolation is almost entirely through the tank roof and thus the liquid surface temperature is not sensitive to H_S/D.

$$\Delta T_V = 0.6\,\Delta T_A + 0.02\,\alpha_R\,I \quad (1\text{-}8)$$

In the case of a fully insulated tank maintained at constant temperature, the average daily vapor temperature range, ΔT_V, should be taken as zero. This assumption that ΔT_V is equal to zero addresses only temperature differentials resulting from the diurnal ambient temperature cycle. In the case of cyclic heating of the bulk liquid, see Section 7.1.3.8.4.

2. The average daily vapor pressure range, ΔP_V, refers to the daily vapor pressure range at the liquid surface temperature averaged over all of the days in the given period of time, such as one year, and should not be construed as being applicable to an individual day. The average daily vapor pressure range can be calculated using the following equation:

$$\Delta P_V = P_{VX} - P_{VN} \quad (1\text{-}9)$$

where:

ΔP_V = average daily vapor pressure range, psia
P_{VX} = vapor pressure at the average daily maximum liquid surface temperature, psia; see Note 5
P_{VN} = vapor pressure at the average daily minimum liquid surface temperature, psia; see Note 5

See Section 7.1.6.1 for a more approximate equation for ΔP_V that was used historically, but which is no longer recommended.

In the case of a fully insulated tank maintained at constant temperature, the average daily vapor pressure range, ΔP_V, should be taken as zero, as discussed for the vapor temperature range in Note 1.

3. The breather vent pressure setting range, ΔP_B, is calculated using the following equation:

$$\Delta P_B = P_{BP} - P_{BV} \quad (1\text{-}10)$$

where:

ΔP_B = breather vent pressure setting range, psig
P_{BP} = breather vent pressure setting, psig
P_{BV} = breather vent vacuum setting, psig

If specific information on the breather vent pressure setting and vacuum setting is not available, assume 0.03 psig for P_{BP} and -0.03 psig for P_{BV} as typical values. If the fixed roof tank is of bolted or riveted construction in which the roof or shell plates are not vapor tight, assume that $\Delta P_B = 0$, even if a breather vent is used.

4. The average daily ambient temperature range, ΔT_A, refers to the daily ambient temperature range averaged over all of the days in the given period of time, such as one year, and should not be construed as being applicable to an individual day. The average daily ambient temperature range is calculated using the following equation:

$$\Delta T_A = T_{AX} - T_{AN} \quad (1\text{-}11)$$

where:

ΔT_A = average daily ambient temperature range, °R
T_{AX} = average daily maximum ambient temperature, °R
T_{AN} = average daily minimum ambient temperature, °R

Table 7.1-7 gives historical values of T_{AX} and T_{AN} in degrees Fahrenheit for selected cities in the United States. These values are converted to degrees Rankine by adding 459.7.

5. The vapor pressures associated with the average daily maximum and minimum liquid surface temperatures, P_{VX} and P_{VN}, respectively, are calculated by substituting the corresponding temperatures, T_{LX} and T_{LN}, into Equation 1-25 or 1-26 after converting the temperatures to the units indicated for the respective equation. If T_{LX} and T_{LN} are unknown, Figure 7.1-17 can be used to calculate their values. In

the case of a fully insulated tank maintained at constant temperature, the average daily vapor pressure range, ΔP_V, should be taken as zero.

If the liquid stored in the fixed roof tank has a true vapor pressure less than 0.1 psia and the tank breather vent settings are not greater than ±0.03 psig, Equation 1-12 or Equation 1-13 may be used with an acceptable loss in accuracy.

If the tank location and tank color and condition are known, K_E may be calculated using the following equation in lieu of Equation 1-5:

$$K_E = 0.0018 \Delta T_V = 0.0018 [0.7 (T_{AX} - T_{AN}) + 0.02 \alpha I] \quad (1\text{-}12)$$

where:

K_E = vapor space expansion factor, per day
ΔT_V = average daily vapor temperature range, °R
T_{AX} = average daily maximum ambient temperature, °R
T_{AN} = average daily minimum ambient temperature, °R
α = tank surface solar absorptance, dimensionless
I = average daily total insolation on a horizontal surface, Btu/(ft^2 day)
0.0018 = constant, (°R)$^{-1}$
0.7 = constant, dimensionless
0.02 = constant, (°R ft^2 day)/Btu

Average daily maximum and minimum ambient temperatures and average daily total insolation can be determined from historical meteorological data for the location or may be obtained from historical meteorological data for a nearby location. Historical meteorological data for selected locations are given in Table 7.1-7, where values of T_{AX} and T_{AN} are given in degrees Fahrenheit. These values are converted to degrees Rankine by adding 459.7.

If the tank location is unknown, a value of K_E can be calculated using typical meteorological conditions for the lower 48 states. The typical value for daily insolation is 1,370 Btu/(ft^2 day), the average daily range of ambient temperature is 21°R, and the tank surface solar absorptance is 0.25 for white paint in average condition. Substituting these values into Equation 1-12 results in a value of 0.04, as shown in Equation 1-13.

$$K_E = 0.04 \quad (1\text{-}13)$$

Diameter

For vertical tanks, the diameter is straightforward. If a user needs to estimate emissions from a horizontal fixed roof tank, some of the tank parameters can be modified before using the vertical tank emission estimating equations. First, by assuming that the tank is one-half filled, the surface area of the liquid in the tank is approximately equal to the length of the tank times the diameter of the tank. Next, assume that this area represents a circle, i.e., that the liquid is an upright cylinder. Therefore, the effective diameter, D_E, is then equal to:

$$D_E = \sqrt{\frac{L D}{\frac{\pi}{4}}} \quad \textbf{(1-14)}$$

where:

D_E = effective tank diameter, ft
L = length of the horizontal tank, ft (for tanks with rounded ends, use the overall length)
D = diameter of a vertical cross-section of the horizontal tank, ft

By assuming the volume of the horizontal tank to be approximately equal to the cross-sectional area of the tank times the length of the tank, an effective height, H_E, of an equivalent upright cylinder may be calculated as:

$$H_E = \frac{\pi}{4} D \quad \textbf{(1-15)}$$

D_E should be used in place of D in Equation 1-4 for calculating the standing loss (or in Equation 1-3, if calculating the tank vapor space volume). One-half of the effective height, H_E, should be used as the vapor space outage, H_{VO}, in these equations. This method yields only a very approximate value for emissions from horizontal storage tanks. For underground horizontal tanks, assume that no breathing or standing losses occur ($L_S = 0$) because the insulating nature of the earth limits the diurnal temperature change. No modifications to the working loss equation are necessary for either aboveground or underground horizontal tanks. However, standing losses from underground gasoline tanks, which can experience relatively fast vapor growth after the ingestion of air and dilution of the headspace, are addressed in Section 5.2 of AP-42.

Vapor Space Outage

The vapor space outage, H_{VO} is the height of a cylinder of tank diameter, D, whose volume is equivalent to the vapor space volume of a fixed roof tank, including the volume under the cone or dome roof. The vapor space outage, H_{VO}, is estimated from:

$$H_{VO} = H_S - H_L + H_{RO} \quad \text{(1-16)}$$

where:

H_{VO} = vapor space outage, ft; use $H_E/2$ from Equation 1-15 for horizontal tanks
H_S = tank shell height, ft
H_L = liquid height, ft; typically assumed to be at the half-full level, unless known to be maintained at some other level
H_{RO} = roof outage, ft; see Note 1 for a cone roof or Note 2 for a dome roof

Notes:

1. For a cone roof, the roof outage, H_{RO}, is calculated as follows:

$$H_{RO} = (1/3)\ H_R \tag{1-17}$$

where:

H_{RO} = roof outage (or shell height equivalent to the volume contained under the roof), ft
H_R = tank roof height, ft

$$H_R = S_R\ R_S \tag{1-18}$$

where: S_R = tank cone roof slope, ft/ft; if unknown, a standard value of 0.0625 is used
R_S = tank shell radius, ft

2. For a dome roof, the roof outage, H_{RO}, is calculated as follows:

$$H_{RO} = H_R \left[\frac{1}{2} + \frac{1}{6}\left[\frac{H_R}{R_S}\right]^2\right] \tag{1-19}$$

where:

H_{RO} = roof outage, ft
R_S = tank shell radius, ft
H_R = tank roof height, ft

$$H_R = R_R - \left(R_R^2 - R_S^2\right)^{0.5} \tag{1-20}$$

H_R = tank roof height, ft R_R = tank dome roof radius, ft R_S = tank shell radius,ft

The value of R_R usually ranges from 0.8D - 1.2D, where D = 2 R_S. If R_R is unknown, the tank diameter is used in its place. If the tank diameter is used as the value for R_R, Equations 1-19 and 1-20 reduce to H_{RO} = 0.137 R_S and H_R = 0.268 R_S.

Vented Vapor Saturation Factor, K_S

The vented vapor saturation factor, K_S, is calculated using the following equation:

$$K_S = \frac{1}{1 + 0.053 P_{VA} H_{VO}} \tag{1-21}$$

where:

K_S = vented vapor saturation factor, dimensionless
P_{VA} = vapor pressure at average daily liquid surface temperature, psia; see Notes 1 and 2 to Equation 1-22
H_{VO} = vapor space outage, ft, see Equation 1-16

0.053 = constant, $(psia\text{-}ft)^{-1}$

Stock Vapor Density, W_V - The density of the vapor is calculated using the following equation:

$$W_V = \frac{M_V P_{VA}}{R T_V} \quad \textbf{(1-22)}$$

where:

W_V = vapor density, lb/ft^3
M_V = vapor molecular weight, lb/lb-mole; see Note 1
R = the ideal gas constant, 10.731 psia ft^3/lb-mole °R
P_{VA} = vapor pressure at average daily liquid surface temperature, psia; see Notes 1 and 2
T_V = average vapor temperature, °R; see Note 6

Notes:

1. The molecular weight of the vapor, M_V, can be determined from Table 7.1-2 and 7.1-3 for selected petroleum liquids and selected petrochemicals, respectively, or by analyzing vapor samples. Where mixtures of organic liquids are stored in a tank, M_V can be calculated from the liquid composition. The molecular weight of the vapor, M_V, is equal to the sum of the molecular weight, M_i, multiplied by the vapor mole fraction, y_i, for each component. The vapor mole fraction is equal to the partial pressure of component i divided by the total vapor pressure. The partial pressure of component i is equal to the true vapor pressure of component i (P) multiplied by the liquid mole fraction, (x_i). Therefore,

$$M_V = \sum M_i y_i = \sum M_i \left(\frac{P x_i}{P_{VA}} \right) \quad \textbf{(1-23)}$$

where:

P_{VA}, total vapor pressure of the stored liquid, by Raoult's Law[30], is:

$$P_{VA} = \sum P x_i \quad \textbf{(1-24)}$$

For more detailed information on Raoult's Law, please refer to Section 7.1.4. Frequently, however, the vapor pressure is not known for each component in a mixture. For more guidance on determining the total vapor pressure at a given temperature (*i.e.*, the true vapor pressure), see Note 2 below.

2. True vapor pressure is defined in various ways for different purposes within the industry, such as "bubble point" for transportation specifications, but for purposes of these emissions estimating methodologies it is the sum of the equilibrium partial pressures exerted by the components of a volatile organic liquid, as shown in Equation 1-24. True vapor pressure may be determined by ASTM D 2879 (or ASTM D 6377 for crude oils with a true vapor pressure greater than 3.6 psia) or obtained from standard reference texts. For certain petroleum liquids, true vapor pressure may be predicted from Reid vapor pressure, which is the absolute vapor pressure of volatile crude oil and volatile non-viscous petroleum

liquids, as determined by ASTM D 323. ASTM D 5191 may be used as an alternative method for determining Reid vapor pressure for petroleum products, however, it should not be used for crude oils.

Caution should be exercised when considering ASTM D 2879 for determining the true vapor pressure of certain types of mixtures. Vapor pressure is sensitive to the lightest components in a mixture, and the de-gassing step in ASTM D 2879 can remove lighter fractions from mixtures such as No. 6 fuel oil if it is not done with care (*i.e.* at an appropriately low pressure and temperature). In addition, any dewatering of a sample prior to measuring its vapor pressure must be done using a technique that has been demonstrated to not remove the lightest organic compounds in the mixture. Alternatives to the method may be developed after publication of this chapter.

True vapor pressure can be determined for crude oils from Reid vapor pressure using Figures 7.1-13a and 7.1-13b. However, the nomograph in Figure 7.1-13a and the correlation equation in Figure 7.1-13b for crude oil are known to have an upward bias, and thus use of ASTM D 6377 is more accurate for crude oils with a true vapor pressure greater than 3.6 psia. ASTM D 6377 may be used to directly measure true vapor pressure at a given temperature. In order to utilize ASTM D 6377 to predict true vapor pressure values over a range of temperatures, the method should be applied at multiple temperatures. A regression of the log-transformed temperature versus vapor pressure data thus obtained may be performed to obtain A and B constants for use in Equation 1-25. In order to determine true vapor pressure for purposes of estimating emissions of volatile organic compounds, ASTM D 6377 should be performed using a vapor-to-liquid ratio of 4:1, which is expressed in the method as $VPCR_4$.

For light refined stocks (gasolines and naphthas) for which the Reid vapor pressure and distillation slope are known, Figures 7.1-14a and 7.1-14b can be used. For refined stocks with Reid vapor pressure below the 1 psi applicability limit of Figures 7.1-14a and 7.1-14b, true vapor pressure can be determined using ASTM D 2879. In order to use Figures 7.1-13a, 7.1-13b, 7.1-14a, or 7.1-14b, the stored liquid surface temperature, T_{LA}, must be determined in degrees Fahrenheit. See Note 3 to determine T_{LA}.

Alternatively, true vapor pressure for selected petroleum liquid stocks, at the stored liquid surface temperature, can be determined using the following equation:

$$P_{VA} = \exp\left[A - \left(\frac{B}{T_{LA}}\right)\right] \quad \textbf{(1-25)}$$

where:

exp = exponential function
A = constant in the vapor pressure equation, dimensionless
B = constant in the vapor pressure equation, °R
T_{LA} = average daily liquid surface temperature, °R; see Note 3
P_{VA} = true vapor pressure, psia

For selected petroleum liquid stocks, physical property data including vapor pressure constants A and B for use in Equation 1-25 are presented in Table 7.1-2. For refined petroleum stocks with Reid vapor pressure within the limits specified in the scope of ASTM D 323, the constants A and B can be calculated from the equations presented in Figure 7.1-15 and the distillation slopes presented in Table 7.1-2. For

crude oil stocks, the constants A and B can be calculated from Reid vapor pressure using the equations presented in Figure 7.1-16. However, the equations in Figure 7.1-16 are known to have an upward bias[29], and thus use of ASTM D 6377 is more accurate. Note that in Equation 1-25, T_{LA} is determined in degrees Rankine instead of degrees Fahrenheit.

The true vapor pressure of organic liquids at the stored liquid temperature can also be estimated by Antoine's equation:

$$\log P_{VA} = A - \left(\frac{B}{T_{LA} + C}\right) \quad \textbf{(1-26)}$$

where:

log = log 10
A = constant in vapor pressure equation, dimensionless
B = constant in vapor pressure equation, °C
C = constant in vapor pressure equation, °C
T_{LA} = average daily liquid surface temperature, °C
P_{VA} = vapor pressure at average liquid surface temperature, mm Hg

For selected pure chemicals, the values for the constants A, B, and C are listed in Table 7.1-3. Note that in Equation 1-26, T_{LA} is determined in degrees Celsius instead of degrees Rankine. Also, in Equation 1-26, P_{VA} is determined in mm of Hg rather than psia (760 mm Hg = 14.7 psia).

More rigorous thermodynamic equations of state are available in process simulation software packages. The use of such programs may be preferable in determining the true vapor pressure of mixtures that are not adequately characterized by Raoult's Law.

3. The average daily liquid surface temperature, T_{LA}, refers to the liquid surface temperature averaged over all of the days in the given period of time, such as one year, and should not be construed as being applicable to an individual day. While the accepted methodology is to use the average temperature, this approach introduces a bias in that the true vapor pressure, P_{VA}, is a non-linear function of temperature. However, the greater accuracy that would be achieved by accounting for this logarithmic function is not warranted, given the associated computational burden. The average daily liquid surface temperature is calculated for an uninsulated fixed roof tank using Equation 1-27.

$$T_{LA} = \left(0.5 - \frac{0.8}{4.4(H_S/D) + 3.8}\right) T_{AA} + \left(0.5 + \frac{0.8}{4.4(H_S/D) + 3.8}\right) T_B + \frac{0.021 \alpha_R I + 0.013(H_S/D) \alpha_S I}{4.4(H_S/D) + 3.8} \quad \text{(1-27)}$$

where:

T_{LA} = average daily liquid surface temperature, °R
H_S = tank shell height, ft
D = tank diameter, ft,
T_{AA} = average daily ambient temperature, °R; see Note 4
T_B = liquid bulk temperature, °R; see Note 5

α_R = tank roof surface solar absorptance, dimensionless; see Table 7.1-6
α_S = tank shell surface solar absorptance, dimensionless; see Table 7.1-6
I = average daily total insolation factor, Btu/(ft^2 day); see Table 7.1-7

API assigns a default value of $H_s/D = 0.5$ and an assumption of $\alpha_R = \alpha_S$, resulting in the simplified equation shown below for an uninsulated fixed roof tank:[22]

$$T_{LA} = 0.4T_{AA} + 0.6T_B + 0.005\ \alpha\ I \quad (1\text{-}28)$$

where:

α = average tank surface solar absorptance, dimensionless

Equation 1-27 and Equation 1-28 should not be used to estimate liquid surface temperature for insulated tanks. In the case of fully insulated tanks, the average liquid surface temperature should be assumed to equal the average liquid bulk temperature (see Note 5). For purposes of estimating emissions, a storage tank should be deemed insulated only if the roof and shell are both fully insulated so as to minimize heat exchange with ambient air. If only the shell is insulated, and not the roof, there likely will be sufficient heat exchange through the roof such that Equation 1-28 would be applicable.

A more accurate method of estimating the average liquid surface temperature, T_{LA}, in partially insulated fixed roof tanks is given below. When the tank shell is insulated but the tank roof is not, heat gain to the tank from insolation is almost entirely through the tank roof and thus the liquid surface temperature is not sensitive to H_S/D.

$$T_{LA} = 0.3\ T_{AA} + 0.7\ T_B + 0.005\ \alpha_R\ I \quad (1\text{-}29)$$

If T_{LA} is used to calculate P_{VA} from Figures 7.1-13a, 7.1-13b, 7.1-14a, or 7.1-14b, T_{LA} must be converted from degrees Rankine to degrees Fahrenheit (°F = °R – 459.7). If T_{LA} is used to calculate P_{VA} from Equation 1-26, T_{LA} must be converted from degrees Rankine to degrees Celsius (°C = [°R – 491.7]/1.8).

4. The average daily ambient temperature, T_{AA}, is calculated using the following equation:

$$T_{AA} = \left(\frac{T_{AX} + T_{AN}}{2}\right) \quad \textbf{(1-30)}$$

where:

T_{AA} = average daily ambient temperature, °R
T_{AX} = average daily maximum ambient temperature, °R
T_{AN} = average daily minimum ambient temperature, °R

Table 7.1-7 gives historical values of T_{AX} and T_{AN} in degrees Fahrenheit for selected U.S. cities. These values are converted to degrees Rankine by adding 459.7.

5. The liquid bulk temperature, T_B, should preferably be based on measurements or estimated from process knowledge. For uninsulated fixed roof tanks known to be in approximate equilibrium with

ambient air, heat gain to the bulk liquid from insolation is almost entirely through the tank shell; thus the liquid bulk temperature is not sensitive to H_S/D and may be calculated using the following equation:

$$T_B = T_{AA} + 0.003\ \alpha_S\ I \quad (1\text{-}31)$$

where:

T_B = liquid bulk temperature, °R
T_{AA} = average daily ambient temperature, °R, as calculated in Note 4
α_S = tank shell surface solar absorptance, dimensionless; see Table 7.1-6
I = average daily total insolation factor, Btu/(ft^2 day); see Table 7.1-7.

6. The average vapor temperature, T_V, for an uninsulated tank may be calculated using the following equation:

$$T_V = \frac{[2.2\ (H_S/D)+1.1]\ T_{AA} + 0.8\ T_B + 0.021 \alpha_R I + 0.013 (H_S/D) \alpha_S I}{2.2\ (H_S/D) + 1.9} \quad (1\text{-}32)$$

where:

H_S = tank shell height, ft
D = tank diameter, ft,
T_{AA} = average daily ambient temperature, °R
T_B = liquid bulk temperature, °R
α_R = tank roof surface solar absorptance, dimensionless
α_S = tank shell surface solar absorptance, dimensionless
I = average daily total insolation factor, Btu/(ft^2 day).

API assigns a default value of $H_s/D = 0.5$ and an assumption of $\alpha_R = \alpha_S$, resulting in the simplified equation shown below for an uninsulated tank:[22]

$$T_V = 0.7T_{AA} + 0.3T_B + 0.009\ \alpha\ I \quad (1\text{-}33)$$

where:

α = average tank surface solar absorptance, dimensionless

When the shell is insulated, but not the roof, the temperature equations are independent of H_s/D.

$$T_V = 0.6T_{AA} + 0.4T_B + 0.01\ \alpha_R\ I \quad (1\text{-}34)$$

When the tank shell and roof are fully insulated, the temperatures of the vapor space and the liquid surface are taken as equal to the temperature of the bulk liquid.

7.1.3.1.2 Working Loss

The fixed roof tank working loss, L_W, refers to the loss of stock vapors as a result of tank filling operations. Fixed roof tank working losses can be estimated from:

$$L_W = V_Q K_N K_P W_V K_B \quad \textbf{(1-35)}$$

where:

L_W = working loss, lb/yr

V_Q = net working loss throughput, ft^3/yr, see Note 1

K_N = working loss turnover (saturation) factor, dimensionless

for turnovers > 36, $K_N = (180 + N)/6N$

for turnovers ≤ 36, $K_N = 1$

for tanks that are vapor balanced and tanks in which flashing occurs, $K_N = 1$ regardless of the number of turnovers; further adjustment of K_N may be appropriate in the case of splash loading into a tank.

N = number of turnovers per year, dimensionless:

$$N = \Sigma H_{QI} / (H_{LX} - H_{LN}) \quad \textbf{(1-36)}$$

ΣH_{QI} = the annual sum of the increases in liquid level, ft/yr

If ΣH_{QI} is unknown, it can be estimated from pump utilization records. Over the course of a year, the sum of increases in liquid level, ΣH_{QI}, and the sum of decreases in liquid level, ΣH_{QD}, will be approximately the same. Alternatively, ΣH_{QI} may be approximated as follows:

$$\Sigma H_{QI} = (5.614\ Q) / ((\pi/4)\ D^2) \quad (1\text{-}37)$$

5.614 =the conversion of barrels to cubic feet, ft^3/bbl

Q = annual net throughput, bbl/yr

For horizontal tanks, use D_E (Equation 1-14) in place of D in Equation 1-37

H_{LX} = maximum liquid height, ft

If the maximum liquid height is unknown, for vertical tanks use one foot less than the shell height and for horizontal tanks use (π/4) D where D is the diameter of a vertical cross-section of the horizontal tank

H_{LN} = minimum liquid height, ft

If the minimum liquid height is unknown, for vertical tanks use 1 and for horizontal tanks use 0

K_P = working loss product factor, dimensionless

for crude oils, $K_P = 0.75$; adjustment of K_P may be appropriate in the case of splash loading into a tank

for all other organic liquids, $K_P = 1$

W_V = vapor density, lb/ft^3, see Equation 1-22

K_B = vent setting correction factor, dimensionless, see Note 2 for open vents and for a vent setting range up to ± 0.03 psig, $K_B = 1$

1. Net Working Loss Throughput.

The net working loss throughput, V_Q, is the volume associated with increases in the liquid level, and is calculated as follows:

$$V_Q = (\Sigma H_{QI})(\pi/4)\, D^2 \quad (1\text{-}38)$$

where:

ΣH_{QI} = the annual sum of the increases in liquid level, ft/yr

D_E should be used for horizontal tanks in place of D in Equation 1-38.

If ΣH_{QI} is unknown, ΣH_{QI} can be estimated from pump utilization records. Over the course of a year, the sum of increases in liquid level, ΣH_{QI}, and the sum of decreases in liquid level, ΣH_{QD}, will be approximately the same. Alternatively, V_Q may be approximated as follows:

$$V_Q = 5.614\, Q \quad (1\text{-}39)$$

where:

5.614 = the conversion of barrels to cubic feet, ft^3/bbl

Q = annual net throughput, bbl/yr

Use of gross throughput to approximate the sum of increases in liquid level will significantly overstate emissions if pumping in and pumping out take place at the same time. However, use of gross throughput is still allowed, since it is clearly a conservative estimate of emissions.

2. Vent Setting Correction Factor

When the breather vent settings are greater than the typical values of ± 0.03 psig, and the condition expressed in Equation 1-40 is met, a vent setting correction factor, K_B, must be determined using Equation 1-41. This value of K_B will be used in Equation 1-35 to calculate working losses.

When:

(1-40)

$$K_N \left[\frac{P_{BP} + P_A}{P_I + P_A} \right] > 1.0$$

Then:

(1-41)

$$K_B = \left[\frac{\frac{P_I + P_A}{K_N} - P_{VA}}{P_{BP} + P_A - P_{VA}} \right]$$

where:

K_B = vent setting correction factor, dimensionless

P_I = pressure of the vapor space at normal operating conditions, psig

P_I is an actual pressure reading (the gauge pressure). If the tank is held at atmospheric pressure (not held under a vacuum or at a steady pressure) P_I would be 0.

P_A = atmospheric pressure, psia

K_N = working loss turnover (saturation) factor (dimensionless), see Equation 1-35 P_{VA} = vapor pressure at the average daily liquid surface temperature, psia; see Notes 1 and 2 to Equation 1-22

P_{BP} = breather vent pressure setting, psig.

See Section 7.1.6.2 for a more approximate equation for fixed roof tank working loss that was used historically, but which is no longer recommended.

Appendix C. Notice of Intent to Construct and Zoning Requirements

City of Albuquerque
Environmental Health Department
Air Quality Program

Construction Permit (20.11.41 NMAC)
Zoning Requirement Cover Letter

This Cover Letter Must Be Returned With The Application Along With All Required Attachments

The Albuquerque-Bernalillo County Joint Air Quality Program, which administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County"), on behalf of the City Environmental Health Department ("Department").

Any person seeking a new air quality permit or a permit modification under 20.11.41 NMAC (Construction Permits) shall provide documentary proof that the proposed air quality permitted use of the facility's subject property is allowed by the zoning designation of the City or County zoning laws, as applicable. Sufficient documentation may include (i) a zoning certification from the City Planning Department or County Department of Planning and Development Services, as applicable, if the applicant is subject to City or County zoning jurisdiction; or (ii) a zoning verification from both planning departments if the applicant is not subject to City or County zoning jurisdiction. A zone atlas map shall not be sufficient. At this time, applicants are not required to submit documentation for the subject property's zoning designation when applying for a relocation of a portable stationary source, or a technical or administrative revision to an existing permit.

The Department will rule an application administratively incomplete if it is missing or has incorrect information. If the Department has ruled an application administratively incomplete three (3) times, the Department will deny the permit application. Any fees submitted for processing an application that has been denied will not be refunded. If the Department denies an application, a person may submit a new application and the fee required for a new application. The applicant has the burden of demonstrating that a permit should be issued.

The Department may require additional information that is necessary to make a thorough review of an application. At all times before the Department has made a final decision regarding the application, an applicant has a duty to promptly supplement and correct information the applicant has submitted in an application to the Department. The applicant's duty to supplement and correct the application includes, but is not limited to, relevant information acquired after the applicant has submitted the application and additional information the applicant otherwise determines is relevant to the application and the Department's review and decision. While the Department is processing an application, regardless of whether the Department has determined the application is administratively complete, if the Department determines that additional information is necessary to evaluate or make a final decision regarding the application, the Department may request additional information and the applicant shall provide the requested additional information.

NOTICE REGARDING SCOPE OF A PERMIT: The Department's issuance of an air quality permit only authorizes the use of the specified equipment pursuant to the air quality control laws, regulations and conditions. Permits relate to air quality control only and are issued for the sole purpose of regulating the emission of air contaminants from said equipment. Air quality permits are not a general authorization for the location, construction and/or operation of a facility, nor does a permit authorize any particular land use or other form of land entitlement. It is the applicant's/permittee's responsibility to obtain all other necessary permits from the appropriate agencies, such as the City Planning Department or County Department of Planning and Development Services, including but not limited to site plan approvals, building permits, fire department approvals and the like, as may be required by law for the location, construction and/or operation of a facility. For more information, please visit the City Planning Department website at https://www.cabq.gov/planning and the County Department of Planning and Development Services website at https://www.bernco.gov/planning.

Corporate and Facility Information: This information shall match the information in the permit application**.**

Air Quality Permit Applicant Company Name: **Maxeon Solar Technologies**			
Facility Name: **Maxeon Mesa Del Sol**			
Facility Physical Address: **TBD**	City: **Albuquerque**	State: **NM**	Zip: **TBD**
Facility Legal Description: **TBD**			

General Operation Information: This information shall match the information in the permit application.

Permitting action being requested (please refer to the definitions in 20.11.41 NMAC):
☒ New Permit ☐ Permit Modification, Current Permit #:

Attachment Information: The location information provided to the City Planning Department or County Department of Planning and Development Services, as applicable, and reflected in the zoning certification or verifications, as applicable, shall be the same as the Facility location information provided to the Department in the air quality construction permit application.

☐ Zoning Certification Provided by: Choose an item. *This is a use-specific certification.* **City Planning Form**: https://www.cabq.gov/planning/code-enforcement-zoning **County Planning Form**: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/	☒ City Zoning Verification ☐ County Zoning Verification **City Planning Form**: https://www.cabq.gov/planning/code-enforcement-zoning **County Planning Form**: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/

PRT 23-064 ADDENDUM

To: Mike Bolaskovits, BHINC

Jim Strozier, Consensus Planning

From: Megan Jones, Senior Planner,

City of Albuquerque Planning Department

DATE: 9/8/2023

RE: Golden Eagle/Maxeon PRT 23-064

A meeting was held with the Applicant and Planning Staff on 9-1-2023 to discuss the future development and determine applicable zoning regulations for the proposed uses.

1. It was determined that the production of solar cells would fall under the Light Manufacturing use because: i) assembly, fabrication, and processing would occur in a fully-enclosed building using processes that would not create noise, smoke, fumes, odors, glare, or health or safety hazards outside the building; and 2) manufacturing processes would occur in a Clean Room (see definition) in which any hazardous byproducts and waste would be protected from outside environmental factors.

2. Use determination: Light Manufacturing with a Clean Room

   a. The applicant will be required to follow all Use Specific Standards (USS) for "Light Manufacturing", which is a permissive use in the NR-LM zone district. USS are found in IDO 14-16-4-3(E)(4).

   b. The Mesa del Sol Framework Plan allows M-1 Light Manufacturing, which is equivalent to the NR-LM zone district.

   c. The "Clean Room" use is a Permissive accessory use under the NR-LM zone district in the IDO. The applicant would be required to follow all USS for a clean room pursuant to IDO 14-16-4-3(F)(4). T

   d. The clean room use shall comply with distance separations in the USS for Heavy Manufacturing in IDO 4-3(E)(5)(e).

3. Other Items:

   a. The applicant will apply to the DFT for bulk land platting and for a Sketch Plan review.

   b. Regulatory management of hazardous materials was discussed. Federal, state and local regulations would be followed and pursuant to the IBC, Air Quality in the Environmental Health Dept., OSHA, and the Local Fire Department, etc.

   c. The approximately 160-acre subject site will be platted. The applicant may have the opportunity to purchase land adjacent to the site in the future.

   d. At that time, the applicant will be required to meet all buffering/separation requirements between development and the La Semilla Escarpment. The IDO requires a 330-foot buffer between the use and major public open space. Though the LA Semilla Escarpment is not dedicated open space, it is zoned PC. The Framework Plan specifically calls out the Escarpment as MPOS and it is protected land.

e. Future Residential uses would be required to meet the 1,000-foot buffer between the heavy manufacturing use and any residential development.

Appendix D. Public Notice Documentation

From:	Jim Strozier
To:	dmills544@gmail.com; catburns87106@gmail.com; "Mandy Warr"; P. Davis Willson
Cc:	Dan Cohen; Parikh, Moha; Michael Balaskovits
Subject:	Air Quality Permit Application - Neighborhood Notification
Date:	Tuesday, November 21, 2023 5:30:00 PM
Attachments:	03_Notice of Intent 11142023.pdf 2023-11-20 - GE - Site Context_AQ.pdf Air Quality Permit Application - Cover Letter.pdf

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Neighborhood Representatives,

Please see the attachments providing notification of the applicant's intent to request an air quality permit in connection with the Golden Eagle Maxeon solar cell manufacturing facility. The facility is proposed approximately 1 mile southeast of the Aperture Center building and the existing neighborhood.

As you may recall, we held a facilitated meeting associated with the anticipated Site Plan - DFT application on October 25th. This is part of that same project.

Do not hesitate to reach out if you have any questions or would like to schedule a meeting.

Thank you.

Jim Strozier, FAICP
Consensus Planning, Inc.
302 8th Street NW
(505) 764-9801

CONSENSUS PLANNING

Landscape Architecture
Urban Design
Planning Services

302 Eighth St. NW
Albuquerque, NM 87102

(505) 764-9801
Fax 842-5495
cp@consensusplanning.com
www.consensusplanning.com

November 21, 2023

SUBJECT: Public Notice of Proposed Air Quality Construction Permit Application

Dear Neighborhood Association/Coalition Representatives,

Why did I receive this public notice?

You are receiving this notice in accordance with New Mexico Administrative Code (NMAC) 20.11.41.13.B(1) which requires any applicant seeking an Air Quality Construction Permit pursuant to 20.11.41 NMAC to provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are within one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located.

What is the Air Quality Permit application review process?

The City of Albuquerque, Environmental Health Department, Air Quality Program (Program) is responsible for the review and issuance of Air Quality Permits for any stationary source of air contaminants within Bernalillo County. Once the application is received, the Program reviews each application and rules it either complete or incomplete. Complete applications will then go through a 30-day public comment period. Within 90 days after the Program has ruled the application complete, the Program shall issue the permit, issue the permit subject to conditions, or deny the requested permit or permit modification. The Program shall hold a Public Information Hearing pursuant to 20.11.41.15 NMAC if the Director determines there is significant public interest and a significant air quality issue is involved.

What do I need to know about this proposed application?

Applicant Name	Maxeon Solar Technologies
Site or Facility Name	Maxeon Mesa Del Sol (MMDS)/Golden Eagle
Site or Facility Address	See attached maps
New or Existing Source	New
Anticipated Date of Application Submittal	November 2023
Summary of Proposed Source to Be Permitted	Maxeon is proposing to construct and operate a new solar panel manufacturing facility. Manufacturing processes will include cell plant and module assembly plant. Air emissions from the manufacturing processes will be controlled with scrubbers and other point of use control systems. The facility will also include ancillary equipment such as natural gas boilers, diesel generators, fire pump and cooling towers.

What emission limits and operating schedule are being requested?

See attached Notice of Intent to Construct form for this information.

How do I get additional information regarding this proposed application?

For inquiries regarding the proposed source, contact:

- Jim Strozier
- cp@consensusplanning.com
- (505) 764-9801

For inquiries regarding the air quality permitting process, contact:

- City of Albuquerque Environmental Health Department Air Quality Program
- aqd@cabq.gov
- (505) 768-1972

Sincerely,

James K. Strozier, FAICP
Principal

NOTICE FROM THE APPLICANT

Notice of Intent to Apply for Air Quality Construction Permit

You are receiving this notice because the New Mexico Air Quality Control Act (20.11.41.13B NMAC) requires any owner/operator proposing to construct or modify a facility subject to air quality regulations to provide public notice by certified mail or electronic mail to designated representatives of recognized neighborhood associations and coalitions within 0.5-mile of the property on which the source is or is proposed to be located.

This notice indicates that the owner/operator intends to apply for an Air Quality Construction Permit from the Albuquerque – Bernalillo County Joint Air Quality Program. Currently, no application for this proposed project has been submitted to the Air Quality Program. Applicants are required to include a copy of this form and documentation of mailed notices with their Air Quality Construction Permit Application.

Proposed Project Information

Applicant's name and address:
Nombre y domicilio del solicitante: Maxeon Solar Technologies, 5700 University Blvd SE, Ste 200, Albuquerque, NM 87106

Owner / operator's name and address:
Nombre y domicilio del propietario u operador: Maxeon Mesa Del Sol (MMDS), 5700 University Blvd SE, Ste 200, Albuquerque, NM 87106

Contact for comments and inquires:
Datos actuales para comentarios y preguntas:

Name *(Nombre)*: Jim Strozier
Address *(Domicilio)*: 302 8th Street NW, Albuquerque, NM
Phone Number *(Número Telefónico)*: 505-764-9801
E-mail Address *(Correo Electrónico)*: cp@consensusplanning.com

Actual or estimated date the application will be submitted to the department:
Fecha actual o estimada en que se entregará la solicitud al departamento: November 30, 2023

Description of the source:
Descripción de la fuente: Solar Panel Manufacturing Plant

Exact location of the source or proposed source:
Ubicación exacta de la fuente o fuente propuesta: See attached maps

Nature of business:
Tipo de negocio: Solar Panel Manufacturing

Process or change for which the permit is requested:
Proceso o cambio para el cuál de solicita el permiso: Maxeon is seeking a new minor source air permit to construct and operate a solar panel manufacturing plant.

Maximum operating schedule:
Horario máximo de operaciones: 8,760 hours per year

Normal operating schedule:
Horario normal de operaciones: 8.760 hours per year

Preliminary estimate of the maximum quantities of each regulated air contaminant the source will emit:
Estimación preliminar de las cantidades máximas de cada contaminante de aire regulado que la fuente va a emitir:

Air Contaminant *Contaminante de aire*	**Proposed Construction Permit** *Permiso de Construcción Propuesto*		**Net Changes (for permit modification or technical revision)** *Cambio Neto de Emisiones (para modificación de permiso o revisión técnica)*	
	pounds per hour *libras por hora*	tons per year *toneladas por año*	pounds per hour *libras por hora*	tons per year *toneladas por año*
NO_X	13.2	5.8	--	--
CO	52.8	22.3	--	--
VOC	21.4	82.5	--	--
SO_2	0.98	1.7	--	--
PM_{10}	1.5	2.9	--	--
$PM_{2.5}$	1.1	1.8	--	--
HAP	3.0	12.3	--	--

Questions or comments regarding this Notice of Intent should be directed to the Applicant. Contact information is provided with the Proposed Project Information on the first page of this notice. To check the status of an Air Quality Construction Permit application, call 311 and provide the Applicant's information, or visit www.cabq.gov/airquality/air-quality-permits.

The Air Quality Program will issue a Public Notice announcing a 30-day public comment period on the permit application for the proposed project when the application is deemed complete. The Air Quality Program does not process or issue notices on applications that are deemed incomplete. More information about the air quality permitting process is attached to this notice.

Air Quality Construction Permitting Overview

This is the typical process to obtain an Air Quality Construction Permit for Synthetic Minor and Minor sources of air pollution from the Albuquerque – Bernalillo County Joint Air Quality Program.

Step 1: Pre-application Meeting: The Applicant and their consultant must request a meeting with the Air Quality Program to discuss the proposed action. If air dispersion modeling is required, Air Quality Program staff discuss the modeling protocol with the Applicant to ensure that all proposed emissions are considered.

> **Notice of Intent from the Applicant:** Before submitting their application, the Applicant is required to notify all nearby neighborhood associations and interested parties that they intend to apply for an air quality permit or modify an existing permit. The Applicant is also required to post a notice sign at the facility location.

Step 2: Administrative Completeness Review and Preliminary Technical Review: The Air Quality Program has 30 days from the day the permit is received to review the permit application to be sure that it is administratively complete. This means that all application forms must be signed and filled out properly, and that all relevant technical information needed to evaluate any proposed impacts is included. If the application is not complete, the permit reviewer will return the application and request more information from the Applicant. Applicants have three opportunities to submit an administratively complete application with all relevant technical information.

> **Public Notice from the Department:** When the application is deemed complete, the Department will issue a Public Notice announcing a 30-day public comment period on the permit application. This notice is distributed to the same nearby neighborhood associations and interested parties that the Applicant sent notices to, and published on the Air Quality Program's website.
>
> During this 30-day comment period, individuals have the opportunity to submit written comments expressing their concerns or support for the proposed project, and/or to request a Public Information Hearing. If approved by the Environmental Health Department Director, Public Information Hearings are held after the technical analysis is complete and the permit has been drafted.

Step 3: Technical Analysis and Draft Permit: Air Quality Program staff review all elements of the proposed operation related to air quality, and review outputs from advanced air dispersion modeling software that considers existing emission levels in the area surrounding the proposed project, emission levels from the proposed project, and meteorological data. The total calculated level of emissions is compared to state and federal air quality standards and informs the decision on whether to approve or deny the Applicant's permit.

Draft Permit: The permit will establish emission limits, standards, monitoring, recordkeeping, and reporting requirements. The draft permit undergoes an internal peer review process to determine if the emissions were properly evaluated, permit limits are appropriate and enforceable, and the permit is clear, concise, and consistent.

> **Public Notice from the Department:** When the technical analysis is complete and the permit has been drafted, the Department will issue a second Public Notice announcing a 30-day public comment period on the technical analysis and draft permit. This second Public Notice, along with the technical analysis documentation and draft permit, will be published on the Air Quality Program's website, and the public notice for availability of the technical analysis and draft permit will only be directly sent to those who requested further information during the first comment period.

During this second 30-day comment period, residents have another opportunity to submit written comments expressing their concerns or support for the proposed project, and/or to request a Public Information Hearing.

Possible Public Information Hearing: The Environmental Health Department Director may decide to hold a Public Information Hearing for a permit application if there is significant public interest and a significant air quality issue. If a Public Information Hearing is held, it will occur after the technical analysis is complete and the permit has been drafted.

Step 4: Public Comment Evaluation and Response: The Air Quality Program evaluates all public comments received during the two 30-day public comment periods and Public Information Hearing, if held, and updates the technical analysis and draft permit as appropriate. The Air Quality Program prepares a response document to address the public comments received, and when a final decision is made on the permit application, the comment response document is published on the Air Quality Program's website and distributed to the individuals who participated in the permit process. If no comments are received, a response document is not prepared.

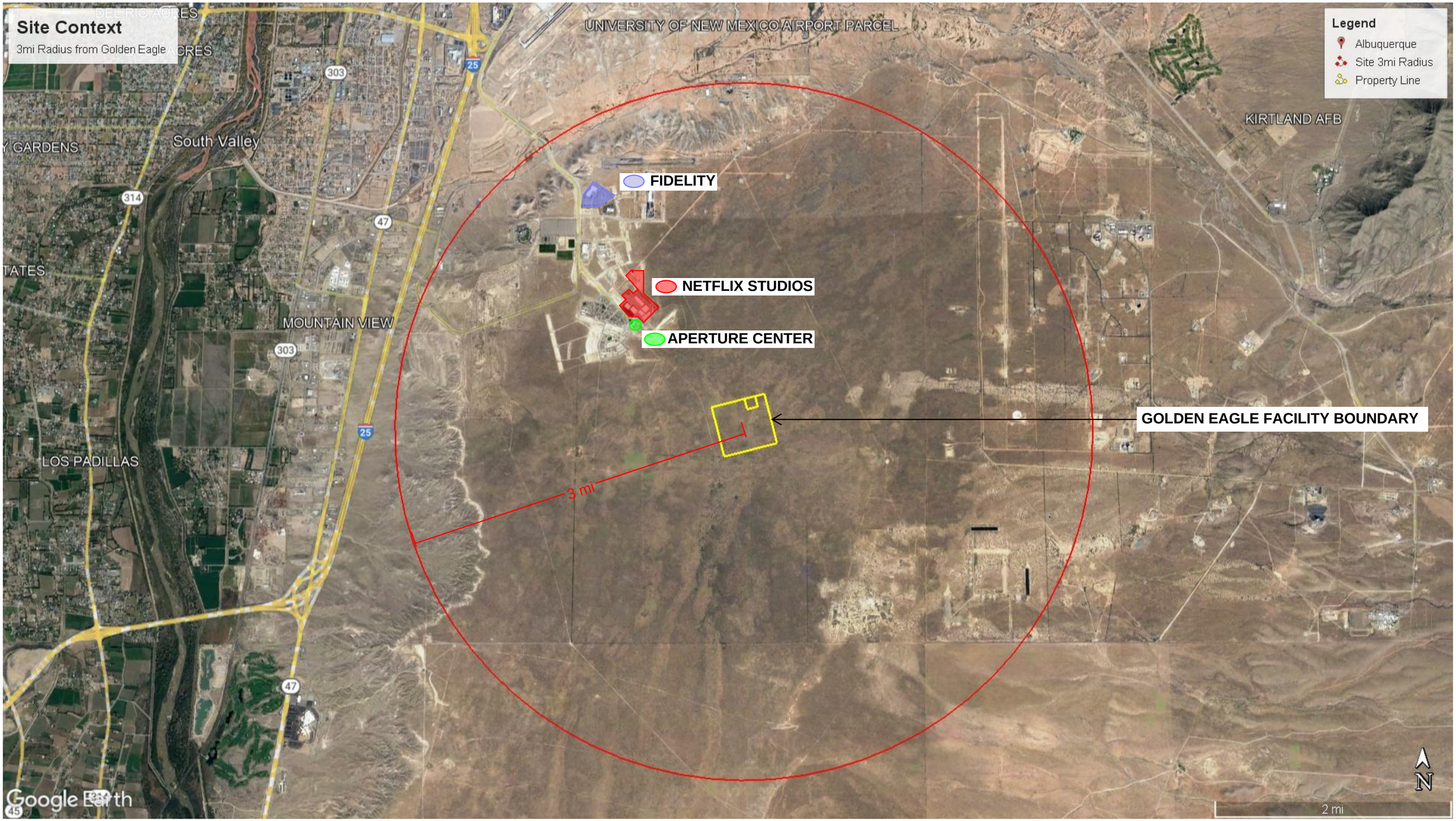
Step 5: Final Decision on the Application: After public comments are addressed and the final technical review is completed, the Environmental Health Department makes a final decision on the application. If the permit application meets all applicable requirements set forth by the New Mexico Air Quality Control Act and the federal Clean Air Act, the permit is approved. If the permit application does not meet all applicable requirements, it is denied.

Notifications of the final decision on the permit application and the availability of the comment response document is published on the Air Quality Program's website and distributed to the individuals who participated in the permit process.

The Department must approve a permit application if the proposed action will meet all applicable requirements and if it demonstrates that it will not result in an exceedance of ambient air quality standards. Permit writers are very careful to ensure that estimated emissions have been appropriately identified or quantified and that the emission data used are acceptable.

The Department must deny a permit application if it is deemed incomplete three times, if the proposed action will not meet applicable requirements, if estimated emissions have not been appropriately identified or quantified, or if the emission data are not acceptable for technical reasons.

For more information about air quality permitting, visit www.cabq.gov/airquality/air-quality-permits

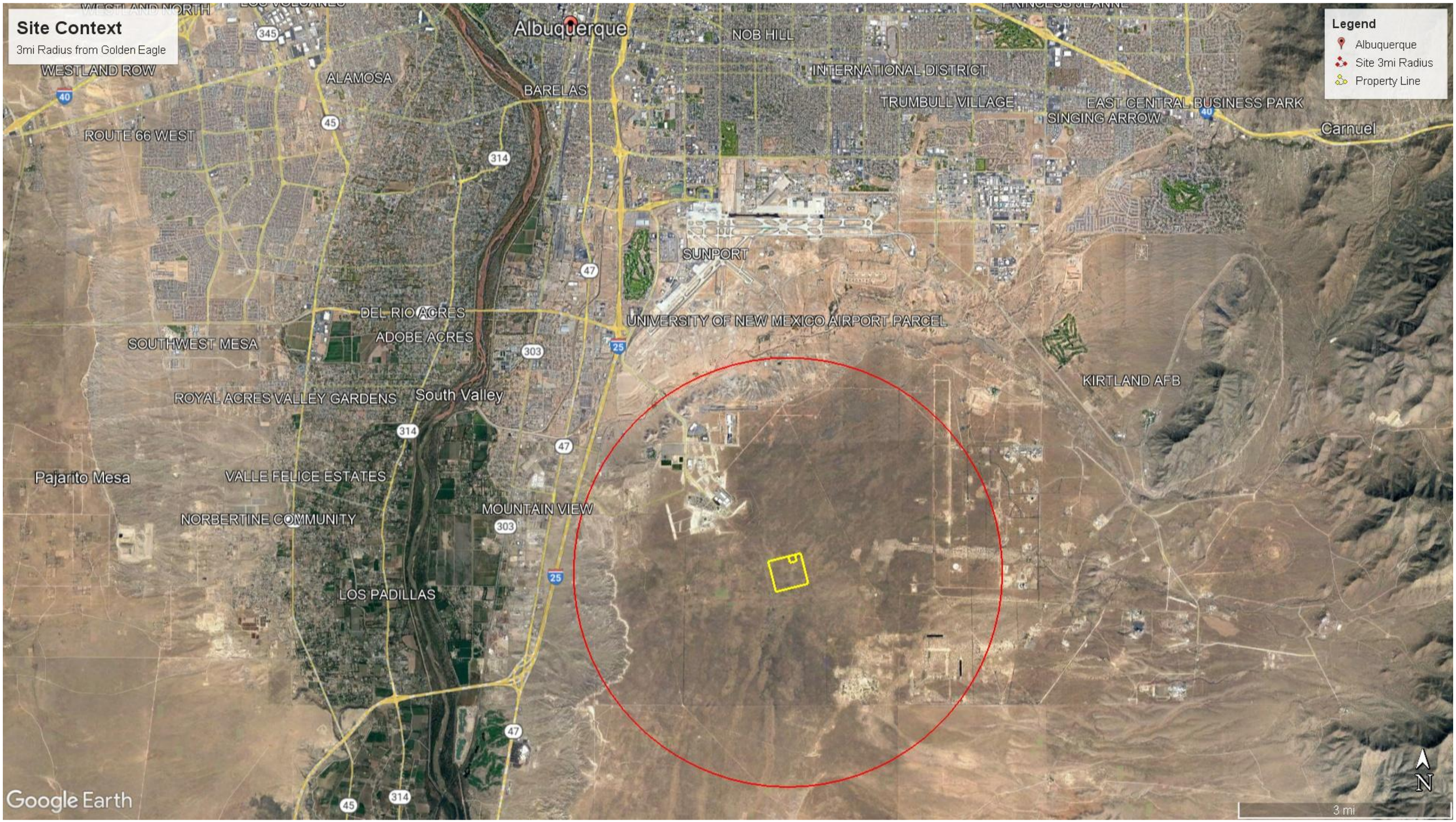


SITE CONTEXT

0 2000 4000 8000

(IN FEET)
SCALE: 1 INCH = 4,000 FT

NOTE: The Universal Transverse Mercator coordinates of the Facility center are 354,312 meters east and 3,871,339 meters north with North American Datum of 1983 Zone 13 at an elevation of approximately 5,285 feet above mean sea level.



SITE CONTEXT

0 3250 6500 13000

(IN FEET)
SCALE: 1 INCH = 6,500 FT

NOTE: The Universal Transverse Mercator coordinates of the Facility center are 354,312 meters east and 3,871,339 meters north with North American Datum of 1983 Zone 13 at an elevation of approximately 5,285 feet above mean sea level.

SITE CONTEXT

0 6250 12500 25000

(IN FEET)

SCALE: 1 INCH = 25,000 FT

NOTE: The Universal Transverse Mercator coordinates of the Facility center are 354,312 meters east and 3,871,339 meters north with North American Datum of 1983 Zone 13 at an elevation of approximately 5,285 feet above mean sea level.

From: Microsoft Outlook
To: "Mandy Warr"
Subject: Relayed: Air Quality Permit Application - Neighborhood Notification
Date: Tuesday, November 21, 2023 5:30:27 PM
Attachments: Air Quality Permit Application - Neighborhood Notification.msg

---

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:
'Mandy Warr' (mandy@theremedydayspa.com) <mailto:mandy@theremedydayspa.com>
Subject: Air Quality Permit Application - Neighborhood Notification

From: Microsoft Outlook
To: dmills544@gmail.com; catburns87106@gmail.com
Subject: Relayed: Air Quality Permit Application - Neighborhood Notification
Date: Tuesday, November 21, 2023 5:30:26 PM
Attachments: Air Quality Permit Application - Neighborhood Notification.msg

---

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:
dmills544@gmail.com (dmills544@gmail.com) <mailto:dmills544@gmail.com>
catburns87106@gmail.com (catburns87106@gmail.com) <mailto:catburns87106@gmail.com>
Subject: Air Quality Permit Application - Neighborhood Notification

From: P. Davis Willson
To: Jim Strozier
Subject: Re: Air Quality Permit Application - Neighborhood Notification
Date: Wednesday, November 22, 2023 4:18:18 PM

Jim,

Yes, I did receive it.

Happy Thanksgiving to you too

Patricia Willson

Victory Hills NA: President
District 6 Coalition: Treasurer
Inter-Coalition Council Representative

> On Nov 22, 2023, at 3:59 PM, Jim Strozier <cp@consensusplanning.com> wrote:
>
> Patty,
>
> I did not receive a delivery confirmation; can you confirm receipt?
>
> Thanks, and have a happy Thanksgiving.
>
> Jim Strozier, FAICP
> Consensus Planning, Inc.
> 302 8th Street NW
> (505) 764-9801
>
> ---
>
> **From:** Jim Strozier
> **Sent:** Tuesday, November 21, 2023 5:30 PM
> **To:** dmills544@gmail.com; catburns87106@gmail.com; 'Mandy Warr' <mandy@theremedydayspa.com>; P. Davis Willson <info@willsonstudio.com>
> **Cc:** Dan Cohen <Dan.Cohen@maxeon.com>; Parikh, Moha <moha.parikh@jacobs.com>; Michael Balaskovits <mbalaskovits@bhinc.com>
> **Subject:** Air Quality Permit Application - Neighborhood Notification
>
> Neighborhood Representatives,

Please see the attachments providing notification of the applicant's intent to request an air quality permit in connection with the Golden Eagle Maxeon solar cell manufacturing facility. The facility is proposed approximately 1 mile southeast of the Aperture Center building and the existing neighborhood.

As you may recall, we held a facilitated meeting associated with the anticipated Site Plan - DFT application on October 25th. This is part of that same project.

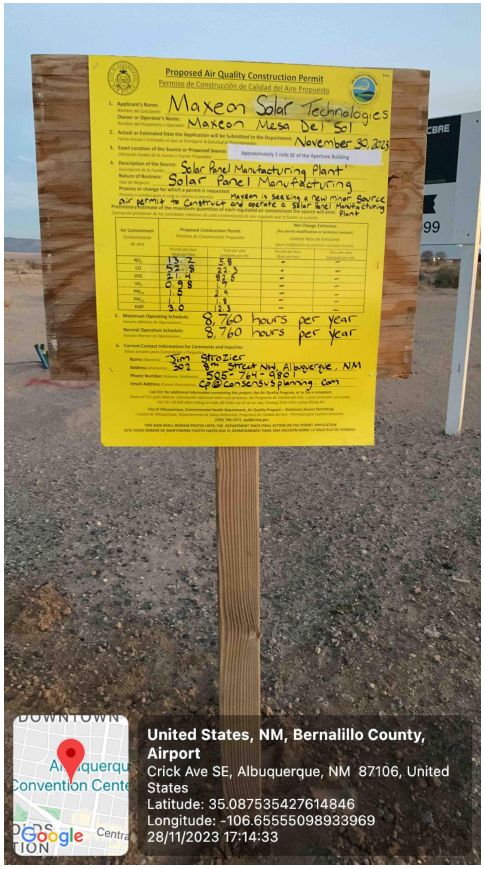
Do not hesitate to reach out if you have any questions or would like to schedule a meeting.

Thank you.

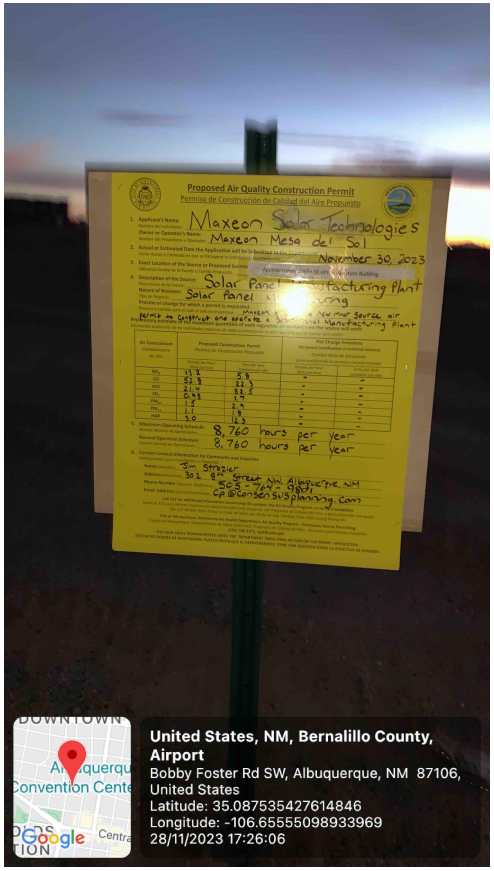
Jim Strozier, FAICP
Consensus Planning, Inc.
302 8th Street NW
(505) 764-9801

<03_Notice of Intent 11142023.pdf><2023-11-20 - GE - Site Context_AQ.pdf><Air Quality Permit Application - Cover Letter.pdf>

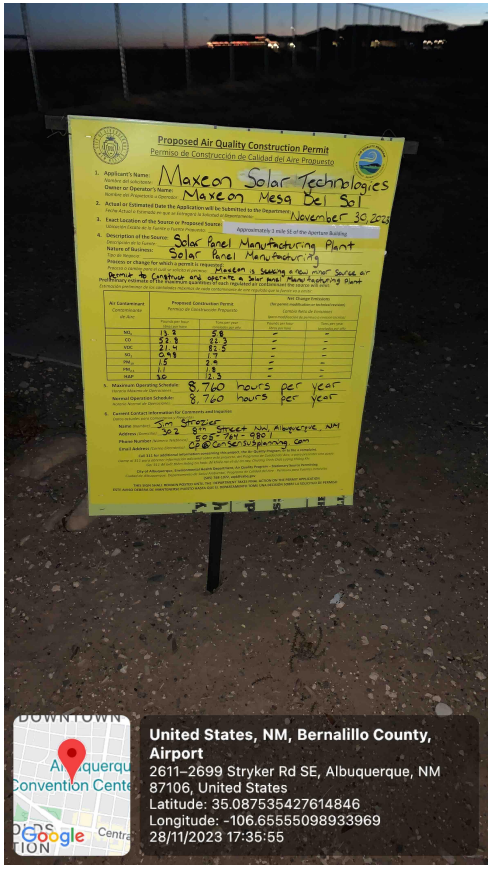

Montessa P
Convenience Ce
Albuquerque Dragway
Fidelity Investments
- Corporate Office
Sign Location #1
Isleta Amphitheater
Dr. EA Swede
Scholer
Regional
Recreation...
Sign Location #2
MESA DEL SOL
Sign Location #3
Sign Location #4
Broadway Blvd SE
University Blvd SE
Bobby Foster Rd
Pan American Fwy
25
85



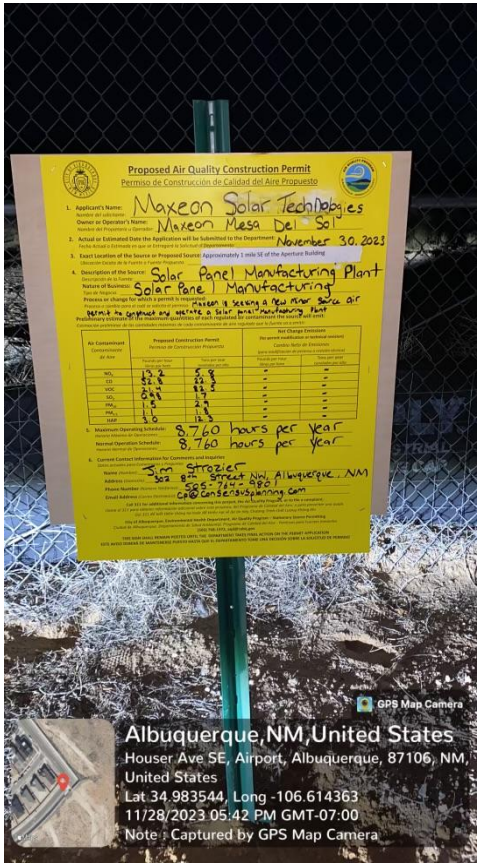
Sign Location #1



Sign Location #2



Sign Location #3



Sign Location #4

Appendix E. Modeling Information

The enclosed flash drive includes electronic modeling files, PDF of the complete Construction Permit Application, Microsoft Word version of Application Text, and Microsoft Excel version of Detailed Emission Calculations.

From:	Parikh, Moha
To:	Lopez, Angela; McKinstry, Michael W.; Tumpane, Kyle
Cc:	Dickison, Melanie; Froehlich, Meredith (Miller); Dan Cohen; Zane Broadhead; Del Profitt
Subject:	Maxeon: Response to Comments # 1
Date:	Thursday, December 7, 2023 9:03:42 AM
Attachments:	PostSubmittal_12072023.pdf

Good morning Angela, attached please Maxeon's responses to EHD's comments discussed on yesterday's call. Please let me know if you have any questions.

Thanks,
Moha

Moha Parikh, P.E. | Jacobs | Air Quality Specialist/Senior Technical Consultant
M:+01.801.580.8440 | moha.parikh@jacobs.com
6440 S. Millrock Dr, Suite 300 | Holladay, UT 84121 | USA

Revised Application Forms

City of Albuquerque
Environmental Health Department
Air Quality Program

Air Quality
Compliance History Disclosure Form

The Albuquerque-Bernalillo County Joint Air Quality Program ("Program") administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County") on behalf of the City Environmental Health Department, including the New Mexico Air Quality Control Act ("AQCA"), NMSA 1978, Sections 74-2-1 to -17. In accordance with Sections 74-2-7(P) and (S) of the AQCA, the Program may deny any permit application or revoke any permit issued pursuant to the AQCA if, within ten years immediately preceding the date of submission of the permit application, the applicant or permittee meets any one of the criteria outlined in the AQCA. The Program requires applicants to file this Compliance History Disclosure Form in order for the Program to deem an air permit application administratively complete, or issue an air permit for those permits without an initial administrative completeness determination process. Additionally, an existing permit holder (permits issued prior to the Effective Date of this Form) shall provide this Compliance History Disclosure Form to the Program upon the Program's request. Note: Program Staff can answer basic questions about this Compliance History Disclosure Form but cannot provide specific guidance or legal advice.

Instructions

1. Applications filed pursuant to the following regulations shall include this Compliance History Disclosure Form, in accordance with Section 74-2-7(S) of the AQCA: *Construction Permits* (20.11.41 NMAC); *Operating Permits* (20.11.42 NMAC); *Nonattainment Areas* (20.11.60 NMAC); *Prevention of Significant Deterioration* (20.11.61 NMAC); *Acid Rain* (20.11.62 NMAC); and *Fugitive Dust* (20.11.20 NMAC) except this Form shall not be required for asbestos notifications under 20.11.20.22 NMAC.
2. The permittee identified on this Compliance History Disclosure Form shall match the permittee in the existing permit or new application. If the information in an existing permit needs to be changed, please contact the Program about revisions and ownership transfers.
3. Answer every question completely and truthfully, and do not leave any blank spaces. If there is nothing to disclose in answer to a particular question, check the box labeled "No." Failure to provide any of the information requested in this Compliance History Disclosure Form may constitute grounds for an incompleteness determination, application denial, or permit revocation.
4. Be especially careful not to leave out information in a way that might create an impression that you are trying to hide it. Omitting information, even unintentionally, may result in application denial or permit revocation.
5. If necessary, continue answers on a separate page and identify the question. If you submit any document in connection with your answer to any question, refer to it as, "Exhibit No.__", and attach it at the end of the Compliance History Disclosure Form, consecutively numbering each additional page at the top right corner.
6. The Program may require additional information to make a thorough review of an application. At all times before the Program has made a final decision regarding the application, an applicant has a duty to promptly supplement and correct information the applicant has submitted in an application to the Program. The applicant's duty to supplement and correct the application includes, but is not limited to, relevant information acquired after the applicant has submitted the application and additional information the applicant otherwise determines is relevant to the application and the Program's review and decision. While the Program is processing an application, regardless of whether the Program has determined the application is administratively complete, if the Program determines that additional information is necessary to evaluate or make a final decision regarding the application, the Program may request additional information and the applicant shall provide the requested additional information.
7. Supplementary information required by the Program may include responses to public comment received by the Program during the application review process.
8. Any fees submitted for processing an application that has been denied will not be refunded. If the Program denies an application, a person may submit a new application and the fee required for a new application. The applicant has the burden of demonstrating that a permit should be issued.

COMPLIANCE HISTORY		
A. Applicant/Permittee Name: **Maxeon Solar Technologies**		*Check Applicable Box*: ☒ Applicant ☐ Permittee
B. Time Period of Compliance Reporting (10 Years): 11/30/2013 to 11/30/2023 *Instructions: For applicants, answer the following questions with information from within the 10 years preceding the current application. For existing permit holders, answer the following questions with information from within the 10 years preceding the Program's issuance of the permit.*		
C. Questions		
1	Knowingly misrepresented a material fact in an application for a permit?	☐ Yes ☒ No
2	Refused to disclose information required by the provisions of the New Mexico Air Quality Control Act?	☐ Yes ☒ No
3	Been convicted in any court of any state or the United States of a felony related to environmental crime?	☐ Yes ☒ No
4	Been convicted in any court of any state or the United States of a crime defined by state or federal statute as involving or being in restraint of trade, price fixing, bribery, or fraud?	☐ Yes ☒ No
5a	Constructed or operated any facility for which a permit was sought, including the current application, without the required air quality permit(s) under 20.11.41 NMAC, 20.11.42 NMAC, 20.11.60 NMAC, 20.11.61 NMAC, or 20.11.62 NMAC?	☐ Yes ☒ No
5b	If "No" to question 5a, go to question 6. If "Yes" to question 5a, state whether each facility that was constructed or operated without the required air quality permit met at least one of the following exceptions: i. The unpermitted facility was discovered after acquisition during a timely environmental audit that was authorized by the Program or the New Mexico Environment Department; or ii. The operator of the facility, using good engineering practices and established approved calculation methodologies, estimated that the facility's emissions would not require an air permit, **and** the operator applied for an air permit within 30 calendar days of discovering that an air permit was required for the facility.	☐ Yes ☐ No
6	Had any permit revoked or permanently suspended for cause under the environmental laws of any state or the United States?	☐ Yes ☒ No
7	For each "yes" answer, please attach an explanation and supporting documentation.	

I, the undersigned, hereby certify under penalty of law that this Compliance History Disclosure Form (Form) and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. I have knowledge of the information in this Form and it is, to the best of my knowledge and belief, true, accurate, and complete. I understand that there are significant penalties for submitting false information, including denial of the application or revocation of a permit, as well as fines and imprisonment for knowing violations. If I filed an application, I covenant and agree to promptly supplement and correct information in this Form until the Program makes a final decision regarding the application. Further, I certify that I am qualified and authorized to file this Form, to certify to the truth and accuracy of the information herein, and bind the permittee and source.

Signed on [11/30/2023]

Zane Broadhead
Print Name


Signature

Vice President Global Facilities
Print Title

Maxeon Solar
Company Name

City of Albuquerque – Environmental Health Department Air Quality Program

Please mail this application to **P.O. Box 1293, Albuquerque, NM 87103** or hand deliver between 8:00 am – 5:00 pm Monday – Friday to:

3rd Floor, Suite 3023 – One Civic Plaza NW, Albuquerque, NM 87102

(505) 768-1972 aqd@cabq.gov

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

Submittal Date: November 30, 2023

Owner/Corporate Information ☐ **Check here and leave this section blank if information is exactly the same as Facility Information below.**

Company Name: **Maxeon Solar Technologies**			
Mailing Address: **5700 University Blvd SE, Ste 200**	City: **Albuquerque**	State: **NM**	Zip: **87106**
Company Phone: **408-489-3388**	Company Contact: **Donald Foldenauer**		
Company Contact Title: **Facility General Manager**	Phone: **408-489-3388**	E-mail: **Donald.Foldenauer@maxeon.com**	

Stationary Source (Facility) Information: **Provide a plot plan (legal description/drawing of the facility property) with overlay sketch of facility processes, location of emission points, pollutant type, and distances to property boundaries.**

Facility Name: **Maxeon Solar Technologies**			
Facility Physical Address: **TBD**	City: **Albuquerque**	State: **NM**	Zip: **87106**
Facility Mailing Address (if different):	City:	State:	Zip:
Facility Contact: **Eric Hilbert**	Title: **Director of Facilities Workplace Services & EHS**		
Phone: **419-918-9741**	E-mail: **eric.hilbert@maxeon.com**		
Authorized Representative Name[1]: **TBD**	Authorized Representative Title: **TBD**		

Billing Information ☐ **Check here if same contact and mailing address as corporate** ☐ **Check here if same as facility**

Billing Company Name: **Maxeon Solar Technologies**			
Mailing Address: **65700 University Blvd SE, Ste 200**	City: **Albuquerque**	State: **NM**	Zip: **87106**
Billing Contact: **Eric Hilbert**	Title: **Director of Facilities Workplace Services & EHS**		
Phone: **419-918-9741**	E-mail: **eric.hilbert@maxeon.com**		

Preparer/Consultant(s) Information ☐ **Check here and leave section blank if no Consultant used or Preparer is same as Facility Contact.**

Name: **Moha Parikh**	Title: **Senior Air Consultant**		
Mailing Address: **6440 S. Milrock Dr. Suite 300**	City: **Holladay**	State: **UT**	Zip: **84121**
Phone: **801-580-8440**	Email: **moha.parikh@jacobs.com**		

1. See 20.11.41.13(E)(13) NMAC.

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

General Operation Information (if any question does not pertain to your facility, type N/A on the line or in the box)

☒ New Permit	☐ Permit Modification Current Permit #:	☐ Technical Permit Revision Current Permit #:	☐ Administrative Permit Revision Current Permit #:
☒ New Registration Certificate	☐ Modification Current Reg. #:	☐ Technical Revision Current Reg. #:	☐ Administrative Revision Current Reg. #:

UTM coordinates of facility (Zone 13, NAD 83): **354,312 meters East and 3,871,339 meters North**	
Facility type (*i.e.*, a description of your facility operations): **Solar Panel Manufacturing Plant**	
Standard Industrial Classification (SIC Code #): **17110403**	North American Industry Classification System (NAICS Code #): **221114**
Is this facility currently operating in Bernalillo County? **No**	If **YES**, list date of original construction: If **NO**, list date of planned startup: **9/1/25**
Is the facility permanent? **Yes**	If **NO**, list dates for requested temporary operation: From Through
Is the facility a portable stationary source? **No**	If **YES**, is the facility address listed above the main permitted location for this source?
Is the application for a physical or operational change, expansion, or reconstruction (*e.g.*, altering process, or adding, or replacing process or control equipment, etc.) to an existing facility? **No**	
Provide a description of the requested changes: **N/A, new facility**	
What is the facility's operation? ☒ Continuous ☐ Intermittent ☐ Batch	

Estimated percent of production/operation:	Jan-Mar: **25**	Apr-Jun: **25**	Jul-Sep: **25**	Oct-Dec: **25**
Requested operating times of facility:	**24** hours/day	**7** days/week	**4** weeks/month	**12** months/year

Will there be special or seasonal operating times other than shown above? This includes monthly- or seasonally-varying hours. **No**
If **YES**, please explain:
List raw materials processed: **--**
List saleable item(s) produced: **Solar Panels**

Permitting action being requested (please refer to the definitions in 20.11.40 NMAC or 20.11.41 NMAC):

USE INSTRUCTIONS: For the forms on the following pages, please do not alter or delete the existing footnotes or page breaks. If additional footnotes are needed then add them to the end of the existing footnote list for a given table. Only update the rows and cells within tables as necessary for your project. Unused rows can be deleted from tables. If multiple scenarios will be represented then the Uncontrolled and Controlled Emission Tables, and other tables as needed, can be duplicated and adjusted to indicate the different scenarios.

Regulated Emission Sources Table

(*E.g.*, Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator-Haul Road-Storage Pile, etc.)
Match the Units listed on this Table to the same numbered line if also listed on Emissions Tables & Stack Table.

Unit Number and Description[1]		Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date[2]	Process Rate or Capacity (Hp, kW, Btu, ft^3, lbs, tons, yd^3, etc.)[3]	Fuel Type
B-1	**Boiler 1**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**900 Hp**	**Natural Gas**
B-2	**Boiler 2**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**900 Hp**	**Natural Gas**
B-3	**Boiler 3**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**900 Hp**	**Natural Gas**
B-4	**Boiler 4**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**900 Hp**	**Natural Gas**
G-1	**Generator 1**	**Caterpillar**	**3516 C**	**TBD**	**TBD**	**TBD**	**N/A**	**2682 Hp**	**Diesel**
G-2	**Generator 2**	**Caterpillar**	**3516 C**	**TBD**	**TBD**	**TBD**	**N/A**	**2682 Hp**	**Diesel**
G-3	**Generator 3**	**Caterpillar**	**3516 C**	**TBD**	**TBD**	**TBD**	**N/A**	**2682 Hp**	**Diesel**
FP-1	**Diesel Fire Pump**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**542 Hp**	**Diesel**
CT-1	**Cooling Tower Cell 1**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-2	**Cooling Tower Cell 2**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-3	**Cooling Tower Cell 3**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-4	**Cooling Tower Cell 4**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-5	**Cooling Tower Cell 5**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-6	**Cooling Tower Cell 6**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-7	**Cooling Tower Cell 7**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
CT-8	**Cooling Tower Cell 8**	**Marley**	**NC8422YA N7**	**TBD**	**TBD**	**TBD**	**N/A**	**4000 gal water/min per tower**	**N/A**
ACEX _1	**Acid Scrubber Exhaust 1**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**58,596 cfm fan rate**	**N/A**
ACEX _2	**Acid Scrubber Exhaust 2**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**58,596 cfm fan rate**	**N/A**
ACEX _3	**Acid Scrubber Exhaust 3**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**58,596 cfm fan rate**	**N/A**

Unit Number and Description[1]		Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date[2]	Process Rate or Capacity (Hp, kW, Btu, ft^3, lbs, tons, yd^3, etc.)[3]	Fuel Type
ALEX_1	**Alkaline Scrubber Exhaust 1**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**40,906 cfm fan rate**	**N/A**
ALEX_2	**Alkaline Scrubber Exhaust 2**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**40,906 cfm fan rate**	**N/A**
ALEX_3	**Alkaline Scrubber Exhaust 3**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**40,906 cfm fan rate**	**N/A**
GEN_1	**General Exhaust 1**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_2	**General Exhaust 2**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_3	**General Exhaust 3**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_4	**General Exhaust 4**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_5	**General Exhaust 5**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_6	**General Exhaust 6**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_7	**General Exhaust 7**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_8	**General Exhaust 8**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_9	**General Exhaust 9**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_10	**General Exhaust 10**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_11	**General Exhaust 11**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_12	**General Exhaust 12**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
GEN_13	**General Exhaust 13**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**50,000 cfm fan rate**	**N/A**
SIEX_1	**Silane Scrubber Exhaust 1**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**9,437 cfm fan rate**	**N/A**
SIEX_2	**Silane Scrubber Exhaust 2**	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**	**N/A**	**9,437 cfm fan rate**	**N/A**

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Unit numbers must correspond to unit numbers in the previous permit unless a complete cross reference table of all units in both permits is provided.
2. To determine whether a unit has been modified, evaluate if changes have been made to the unit that impact emissions or that trigger modification as defined in 20.11.41.7(U) NMAC. If not, put N/A.

3. Basis for Equipment Process Rate or Capacity (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.) **Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacturing data is available, Maxeon will promptly provide the information to the Department.** Submit information for each unit as an attachment.

Emissions Control Equipment Table

Control Equipment Units listed on this Table should either match up to the same Unit number as listed on the Regulated Emission Sources, Controlled Emissions and Stack Parameters Tables (if the control equipment is integrated with the emission unit) or should have a distinct Control Equipment Unit Number and that number should then also be listed on the Stack Parameters Table.

Control Equipment Unit Number and Description	Controlling Emissions for Unit Number(s)	Manufacturer	Model # | Serial #	Date Installed	Controlled Pollutant(s)	% Control Efficiency[1]	Method Used to Estimate Efficiency	Rated Process Rate or Capacity or Flow
See Appendix B (Detailed Emission Inventory). Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacturing data is available, Maxeon will promptly provide the information to the Department.								

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Control Equipment % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.). Submit information for each unit as an attachment.

Exempted Sources and Exempted Activities Table

See 20.11.41 NMAC for exemptions.

Unit Number and Description	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date[1]	Process Rate or Capacity (Hp, kW, Btu, ft^3, lbs, tons, yd^3, etc.)[2]	Fuel Type
Not Applicable. Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacdturing data is available, Maxeon will promptly provide the information to the Department.								

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. To determine whether a unit has been modified, evaluate if changes have been made to the unit that impact emissions or that trigger modification as defined in 20.11.41.7(U) NMAC. Also, consider if any changes that were made alter the status from exempt to non-exempt. If not, put N/A.
2. Basis for Equipment Process Rate or Capacity (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.) Submit information for each unit as an attachment.

Uncontrolled Emissions Table

(Process potential under physical/operational limitations during a 24 hr/day and 365 day/year = 8760 hrs)

Regulated Emission Units listed on this Table should match up to the same numbered line and Unit as listed on the Regulated Emissions and Controlled Tables. List total HAP values per Emission Unit if overall HAP total for the facility is ≥ 1 ton/yr.

Unit Number*	Nitrogen Oxides (NO_X)		Carbon Monoxide (CO)		Nonmethane Hydrocarbons/Volatile Organic Compounds (NMHC/VOCs)		Sulfur Dioxide (SO_2)		Particulate Matter ≤ 10 Microns (PM_{10})		Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)		Hazardous Air Pollutants (HAPs)		Method(s) used for Determination of Emissions (AP-42, Material Balance, Field Tests, etc.)
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	
See Appendix B (Detailed Emission Inventory).															

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

*A permit is required and this application along with the additional checklist information requested on the Permit Application checklist must be provided if:

(1) any one of these process units or combination of units, has an uncontrolled emission rate greater than or equal to (≥) 10 lbs/hr or 25 tons/yr for any of the above pollutants, excluding HAPs, based on 8,760 hours of operation; or

(2) any one of these process units or combination of units, has an uncontrolled emission rate ≥ 2 tons/yr for any single HAP or ≥ 5 tons/yr for any combination of HAPs based on 8,760 hours of operation; or (3) any one of these process units or combination of units, has an uncontrolled emission rate ≥ 5 tons/yr for lead (Pb) or any combination of lead and its compounds based on 8,760 hours of operation; or

(4) any one of the process units or combination of units is subject to an Air Board or federal emission limit or standard.

* If all of these process units, individually and in combination, have an uncontrolled emission rate less than (<) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8,760 hours of operation), but > 1 ton/yr for any of the above pollutants, then a source registration is required. A Registration is required, at minimum, for any amount of HAP emissions. Please complete the remainder of this form.

Controlled Emissions Table

(Based on current operations with emission controls OR requested operations with emission controls)

Regulated Emission Units listed on this Table should match up to the same numbered line and Unit as listed on the Regulated Emissions and Uncontrolled Tables. List total HAP values per Emission Unit if overall HAP total for the facility is ≥ 1 ton/yr.

Unit Number	Nitrogen Oxides (NO_X)		Carbon Monoxide (CO)		Nonmethane Hydrocarbons/Volatile Organic Compounds (NMHC/VOCs)		Sulfur Dioxide (SO_2)		Particulate Matter ≤ 10 Microns (PM_{10})		Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)		Hazardous Air Pollutants (HAPs)		Control Method	% Efficiency[1]
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr		
See Appendix B (Detailed Emission Inventory). Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacturing data is available, Maxeon will promptly provide the information to the Department.																

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Control Method % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.).
   Submit information for each unit as an attachment.

Hazardous Air Pollutants (HAPs) Emissions Table

Report the Potential Emission Rate for each HAP from each source on the Regulated Emission Sources Table that emits a given HAP. Report individual HAPs with ≥ 1 ton/yr total emissions for the facility on this table. Otherwise, report total HAP emissions for each source that emits HAPs and report individual HAPs in the accompanying application package in association with emission calculations. If this application is for a Registration solely due to HAP emissions, report the largest HAP emissions on this table and the rest, if any, in the accompanying application package.

Unit Number	Total HAPs															
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
See Appendix B (Detailed Emission Inventory).																

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

Use Instructions: Copy and paste the HAPs table here if need to list more individual HAPs.

Purchased Hazardous Air Pollutant Table*

Product Categories (Coatings, Solvents, Thinners, etc.)	Hazardous Air Pollutant (HAP), or Volatile Hazardous Air Pollutant (VHAP) Primary To The Representative As Purchased Product	Chemical Abstract Service (CAS) Number of HAP or VHAP from Representative As Purchased Product	HAP or VHAP Concentration of Representative As Purchased Product (pounds/gallon, or %)	Concentration Determination (CPDS, SDS, etc.)[1]	Total Product Purchases For Category	(-)	Quantity of Product Recovered & Disposed For Category	(=)	Total Product Usage For Category
Hydrogen Fluoride Solution	Hydrogen Fluoride	7664-39-3	49%	SDS	1,322,176 gal/year		0		1,322,176 gal/year
Hydrochloric Acid Solution	Hydrochloric Acid	7647-01-0	37%	SDS	581,649 gal/year		0		581,649 gal/year
TOTALS					lb/yr gal/yr	(-)	lb/yr gal/yr	(=)	lb/yr gal/yr

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

NOTE: Product purchases, recovery/disposal and usage should be converted to the units listed in this table. If units cannot be converted please contact the Air Quality Program prior to making changes to this table.

1. Submit, as an attachment, information on one (1) product from each Category listed above which best represents the average of all the products purchased in that Category. CPDS = Certified Product Data Sheet; SDS = Safety Data Sheet

*** A Registration is required, at minimum, for any amount of HAP or VHAP emission.**
Emissions from purchased HAP usage should be accounted for on previous tables as appropriate.
A permit may be required for these emissions if the source meets the requirements of 20.11.41 NMAC.

Material and Fuel Storage Table

(*E.g.*, Tanks, barrels, silos, stockpiles, etc.)

Storage Equipment		Product Stored	Capacity (bbls, tons, gals, acres, etc.)	Above or Below Ground	Construction (Welded, riveted) & Color	Installation Date	Loading Rate[1]	Offloading Rate[1]	True Vapor Pressure	Control Method	Seal Type	% Eff.[2]
ST-1	**Chemical Storage Tank**	**Hydrogen Fluoride**	**10,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**20 kPA at 25 C**	**N/A**	**TBD**	**80%**
ST-2	**Chemical Storage Tank**	**Hydrogen Fluoride**	**10,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**20 kPA at 25 C**	**N/A**	**TBD**	**80%**
ST-3	**Chemical Storage Tank**	**Hydrochloric Acid**	**5,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**4620 kPA at 25 C**	**N/A**	**TBD**	**80%**
ST-4	**Chemical Storage Tank**	**Hydrochloric Acid**	**5,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**4620 kPA at 25 C**	**N/A**	**TBD**	**80%**
ST-5	**Chemical Storage Tank**	**Hydrogen Peroxide**	**15,000 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**0.25 kPA at 25 C**	**None**	**N/A**	**0%**
ST-6	**Chemical Storage Tank**	**Hydrogen Peroxide**	**15,000 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**0.25 kPA at 25 C**	**None**	**N/A**	**0%**
ST-7	**Chemical Storage Tank**	**Sodium Hydroxide**	**12,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**20 kPA at 25 C**	**Scrubber**	**TBD**	**80%**
ST-8	**Chemical Storage Tank**	**Sodium Hydroxide**	**12,500 gal**	**Above**	**TBD**	**TBD**	**TBD**	**TBD**	**20 kPA at 25 C**	**Scrubber**	**TBD**	**80%**
ST-9	**Sub-Base Belly Tank**	**Diesel Fuel**	**14,506.80 gal**	**Above**	**Construction TBD/Color Black**	**TBD**	**TBD**	**TBD**	**12.13 psi**	**N/A**	**N/A**	**N/A**
ST-10	**Sub-Base Belly Tank**	**Diesel Fuel**	**14,506.80 gal**	**Above**	**Construction TBD/Color Black**	**TBD**	**TBD**	**TBD**	**12.13 psi**	**N/A**	**N/A**	**N/A**
ST-11	**Sub-Base Belly Tank**	**Diesel Fuel**	**14,506.80 gal**	**Above**	**Construction TBD/Color Black**	**TBD**	**TBD**	**TBD**	**12.13 psi**	**N/A**	**N/A**	**N/A**
ST-12	**Vertical Storage Tank**	**Diesel Fuel**	**502.4 gal**	**Above**	**Construction TBD/Color Black**	**TBD**	**TBD**	**TBD**	**12.13 psi**	**N/A**	**N/A**	**N/A**

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Loading/Offloading Rate (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.). **Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacturing data is available, Maxeon will promptly provide the information to the Department.**
   Submit information for each unit as an attachment.
2. Basis for Control Method % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.). **Note that the project is still in the preliminary design phase and procurement has not yet been finalized. Once the final equipment and manufacturing data is available, Maxeon will promptly provide the information to the Department.**
   Submit information for each unit as an attachment.

Stack Parameters Table

If any equipment from the Regulated Emission Sources Table is also listed in this Stack Table, use the same numbered line for the emission unit on both tables to show the association between the Process Equipment and its stack.

Unit Number and Description	Pollutant (CO, NOx, PM_{10}, etc.)	UTM Easting (m)	UTM Northing (m)	Stack Height (ft)	Stack Exit Temp. (°F)	Stack Velocity (fps)	Stack Flow Rate (acfm)	Stack Inside Diameter (ft)	Stack Type
Refer to Appendix B and Modeling Details in Section 6 of the Permit Application Report Text.									**Select**

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

Certification

NOTICE REGARDING SCOPE OF A PERMIT: The Environmental Health Department's issuance of an air quality permit only authorizes the use of the specified equipment pursuant to the air quality control laws, regulations and conditions. Permits relate to air quality control only and are issued for the sole purpose of regulating the emission of air contaminants from said equipment. Air quality permits are not a general authorization for the location, construction and/or operation of a facility, nor does a permit authorize any particular land use or other form of land entitlement. It is the applicant's/permittee's responsibility to obtain all other necessary permits from the appropriate agencies, such as the City of Albuquerque Planning Department or Bernalillo County Department of Planning and Development Services, including but not limited to site plan approvals, building permits, fire department approvals and the like, as may be required by law for the location, construction and/or operation of a facility. For more information, please visit the City of Albuquerque Planning Department website at https://www.cabq.gov/planning and the Bernalillo County Department of Planning and Development Services website at https://www.bernco.gov/planning.

NOTICE REGARDING ACCURACY OF INFORMATION AND DATA SUBMITTED: Any misrepresentation of a material fact in this application and its attachments is cause for denial of a permit or revocation of part or all of the resulting registration or permit, and revocation of a permit for cause may limit the permitee's ability to obtain any subsequent air quality permit for ten (10) years. Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan or other document filed or required to be maintained under the Air Quality Control Act, NMSA 1978 §§ 74-2-1 to 74-2-17, is guilty of a misdemeanor and shall, upon conviction, be punished by a fine of not more than ten thousand dollars ($10,000) per day per violation or by imprisonment for not more than twelve months, or by both.

I, the undersigned, hereby certify that I have knowledge of the information and data represented and submitted in this application and that the same is true and accurate, including the information and date in any and all attachments, including without limitation associated forms, materials, drawings, specifications, and other data. I also certify that the information represented gives a true and complete portrayal of the existing, modified existing, or planned new stationary source with respect to air pollution sources and control equipment. I understand that there may be significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. I also understand that the person who has applied for or has been issued an air quality permit by the Department is an obligatory party to a permit appeal filed pursuant to 20.11.81 NMAC. Further, I certify that I am qualified and authorized to file this application, to certify the truth and accuracy of the information herein, and bind the source. Moreover, I covenant and agree to comply with any requests by the Department for additional information necessary for the Department to evaluate or make a final decision regarding the application.

Signed this 6th day of December, 20 23

Zane Broadhead
Print Name

Vice President Global Facilities
Print Title


Signature

Role: ☐ Owner ☐ Operator ☐ Other Authorized Representative

Equivalent Boiler Specification Sheet

Cleaver-Brooks Boiler Expected Emission Data

Producing Steam Firing **Nat Gas**

BACKGROUND INFORMATION

Boiler Model	CBEX Elite
Altitude (feet)	700
Operating Pressure (psig)	100.00
Furnace Volume (cuft)	297.40
Furnace Heat Release (btu/hr/cu ft)	86,988
Heating Surface (sqft)	2481
Nox System	5

Nat Gas		Firing Rate			
		25%	**50%**	**75%**	**100%**
Horsepower		170	340	511	681
Input , Btu/hr		6,872,000	13,724,000	20,660,000	27,662,000
CO	ppm	50	50	50	50
	lb/MMBtu	0.0375	0.0375	0.0375	0.0375
	lb/hr	0.26	0.51	0.77	1.04
	tpy	1.128	2.253	3.392	4.541
NOx	ppm	5	5	5	5
	lb/MMBtu	0.0058	0.0058	0.0058	0.0058
	lb/hr	0.04	0.08	0.12	0.16
	tpy	0.176	0.351	0.528	0.707
NO	ppm	4.3	4.3	4.3	4.3
	lb/MMBtu	0.005	0.005	0.005	0.005
	lb/hr	0.03	0.07	0.10	0.14
	tpy	0.14	0.28	0.42	0.57
NO_2	ppm	0.8	0.8	0.8	0.8
	lb/MMBtu	0.001	0.001	0.001	0.001
	lb/hr	0.01	0.01	0.02	0.02
	tpy	0.04	0.07	0.11	0.14
SOx	ppm	0.34	0.34	0.34	0.34
	lb/MMBtu	0.0006	0.0006	0.0006	0.0006
	lb/hr	0.0040	0.0081	0.0122	0.0163
	tpy	0.018	0.035	0.053	0.071
VOCs	ppm	8	8	8	8
(Non-Methane Only)	lb/MMBtu	0.0036	0.0036	0.0036	0.0036
	lb/hr	0.024	0.049	0.074	0.099
VOCs does not include any background VOC emissions.	tpy	0.107	0.214	0.322	0.431
PM10 (Filterable)	ppm	N/A	N/A	N/A	N/A
	lb/MMBtu	0.0019	0.0019	0.0019	0.0019
	lb/hr	0.013	0.026	0.038	0.052
	tpy	0.056	0.112	0.169	0.226
PM10 (Condensable)	lb/MMBtu	0.0056	0.0056	0.0056	0.0056
	lb/hr	0.038	0.077	0.115	0.155
	tpy	0.168	0.336	0.506	0.677
PM2.5 (Filterable)	lb/MMBtu	0.0019	0.0019	0.0019	0.0019
	lb/hr	0.013	0.026	0.038	0.052
	tpy	0.056	0.112	0.169	0.226
PM2.5 (Condensable)	lb/MMBtu	0.0056	0.0056	0.0056	0.0056
	lb/hr	0.038	0.077	0.115	0.155
	tpy	0.168	0.336	0.506	0.677
Exhaust Data					
Temperature, F		353	369	384	399
Flow	ACFM	2,351	4,617	7,082	9,658
	SCFM (70 Degrees Fah.)	1,570	3,025	4,554	6,097
	DSCFM	1,418	2,721	4,096	5,485
	lb/hr	7,065	13,613	20,492	27,438
Velocity	ft/sec	12.47	24.50	37.57	51.24
	ft/min	748	1,470	2,254	3,074

Notes:

1) All ppm levels are corrected to dry at 3% oxygen.
2) Emission data based on actual boiler efficiency.
3) % H2O , by volume in exhaust gas is **15.51** % O2, by volume **4.41**
4) Water vapor in exhaust gas is **99.62** lbs/MMBtu of fuel fired
5) CO2 produced is **116.31** lbs/MMBtu of fuel fired
6) Particulate is exclusive of any particulates in combustion air or other sources of residual particulates from material.
PM level indicated on this form is based on combustion air and fuel being clean and turndown up to 4:1.
7) Heat input is based on high heating value (HHV).
8.) Emission produced in tons per year (tpy) is based on 24 hours per day for 365 days = 8,760 hours per year
9.) Exhaust data is based on a clean and properly sealed boiler.
10.) Emission data is based on a burner turndown of 4 to 1.
11.) Maximum flame temperature is 2800 degrees fahrenheit.

14) Fuel High Heating Value = **1000** Btu/FT^3

Chemical Safety Data Sheet

Safety Data Sheet
(HYDROFLUORIC ACID 49%)

1 – PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: ..... HYDROFLUORIC ACID 49%
CHEMICAL NAME/
CLASS/SYNONYMS: Aluminum Brightner, Acid Cleaner
PRODUCT NUMBER: ..... HYDROFLUORIC ACID 49%
UN/NA NUMBER: 1790
CHEMICAL FAMILY: ..... Acid
CAS NUMBER: ..... Not applicable for mixtures.
FORMULA: Mixture

COMPANY: ..... **JMN Specialties, Inc.**
1100 Victory Drive – Westwego, Louisiana USA 70094
Phone (504) 341-3749, Fax (504) 341-5868
www.jmnspecialties.com
EMERGENCY PHONE: ..... CALL CHEMTEL: Toll Free US & Canada: (800) 255-3924, Outside USA +01-813-248-0585.
DATE PREPARED: ..... February 28, 2019

2 – HAZARDS IDENTIFICATION

GHS HAZARD CLASSIFICATION:

Physical Hazards
Flammable Liquids: ..... . No hazard statement
Health Hazards
Acute Toxicity (Oral): ..... . Category 3 - Toxic if swallowed, in contact with skin, inhaled
Skin Corrosion/Irritation: ..... . Category 1A - Causes severe skin burns and eye damage
Serious Eye Damage/Irritation: Catagory 1 - Causes severe eye damage
Aspiration Hazard: ..... . Catagory 1 - May be fatal if swallowed and enters airways

WARNING LABEL ITEMS INCLUDING PRECAUTIONARY STATEMENTS:

Pictograms:


SIGNAL WORD: ..... DANGER!

GHS HAZARD AND PRECAUTIONARY STATEMENTS:

H312 H332: Harmful in contact with skin or if inhaled
H315 H320: Causes skin and eye irritation

P101+102+103: If medical advice is needed, have product container or label at hand. Keep out of the reach of children. Read label before use.
P202+270+280+281: Do not handle until all safety precautions have been read and understood. Do not eat, drink or smoke when using this product. Wear protective gloves/protective clothing/eye protection/face protection. Use personal protective equipment as required.

P301+310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
P301+330+331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P305+351+338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing

P501: Dispose of contents/container: Treatment, storage, transportation and disposal must be in accordance with Federal, State/Provincial and Local Regulations, and product characteristics at time of disposal.

TOTAL VOC's: None

3 – COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENT	PERCENT	CAS NUMBER
Hydrogen Fluoride	49%	7664-39-3
Water	51%	7732-18-5

4 – FIRST-AID MEASURES

BREATHING (INHALATION): Remove from exposure area to fresh air immediately. If breathing has stopped, perform artificial resuscitation. Keep person warm and at rest. Treat symptomatically and supportively. Seek medical attention immediately. Qualified medical personnel should consider administering oxygen.

SWALLOWING (INGESTION): Give large amounts of fresh water or milk immediately. Do not give anything by mouth if person is unconscious or otherwise unable to swallow. If vomiting occurs, keep head below hips to prevent aspiration. Treat symptomatically and supportively. Seek medical attention immediately.

EYES: If liquid Hydrofluoric acid or solutions containing Hydrofluoric acid get into the eyes, flush eyes immediately with a directed stream of water for at least 30 minutes while forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissue. **GET MEDICAL ATTENTION IMMEDIATELY.** Contact lenses should not be worn when working with this chemical.

SKIN (DERMAL):..... Remove contaminated clothing and wash affected skin with soap and water. If persistent irritation occurs, obtain medical attention. When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop.

NOTE TO PHYSICIAN: ..... General: For burns of moderate areas, (greater than 8 square inches), ingestion and significant inhalation exposure, severe systemic effects may occur, and admission to a critical care unit should be considered. Monitor and correct for hypocalcemia, cardiac arrhythmias, hypomagnesemia and hyperkalemia. In some cases renal dialysis may be indicated. Inhalation: Treat as chemical pneumonia. Monitor for hypocalcemia, 2.5% calcium gluconate in normal saline by nebulizer or by IPPB with 100% oxygen may decrease pulmonary damage. Bronchodilators may also be administered. Skin: For deep skin burns or contact with concentrated HF (over 50%) solution, consider infiltration about the affected area with 5% calcium gluconate [equal parts of 10% calcium gluconate and sterile saline for injection]. Burns beneath the

nail may require splitting the nail and application of calcium gluconate to the exposed nail bed. For certain burns, especially of the digits, use of intra-arterial calcium gluconate may be indicated. Eyes: Irrigation may be facilitated by use of Morgan lens or similar ocular irrigator, using 1% aqueous calcium gluconate solution [50ml of calcium gluconate 10% in 500 ml normal saline]. AN ALTERNATIVE FIRST AID PROCEDURE: The effect of HF, i.e. onset of pain, particularly in dilute solutions, may not be felt for up to 24 hours. It is important, therefore, that persons using HF have immediate access to an effective antidote even when they are away from their work place in order that first aid treatment can be commenced immediately. We recommend that any person in contact with HF should carry, or have access to a tube of HF Antidote Gel at all times; ideally with one tube at the work place, one on the person and one at home. It is imperative that any person who has been contaminated by HF should seek medical advice when the treatment by HF Antidote Gel has been applied. REFERENCES: 1. Browno, T.D. Treatment of Hydrofluoric Acid Burns 2. Sprout, W.L. et al Treatment of Severe Hydrofluoric Acid Exposures (Journal of American Occupational Medicine 25:12, 1993) 3. Bracken, W.M. et al Comparative Effectiveness of Topical Treatments for Hydrofluoric Acid Burns, University of Kansas (Journal of Occupational Medicine 27:10:1985) 4. Burke, W.J. , et al Systemic Fluoride Poisoning Resulting from A Fluoride Skin Burn (Journal of Occupational Medicine (5,39:1973). HF ANTIDOTE GEL: Distributed by Pharmascience Inc., 8400 Darnley Rd. Montreal, Canada. H4T 1M4, Phone: (514) 340 - 1114, Fax: (514) 342 - 7764, U.S. (Buffalo, NY) distributor: 1-800-207-4477.

5 – FIRE-FIGHTING MEASURES

GENERAL FIRE HAZARDS: May cause severe irritation and possible chemical burns to tissue. Product is slippery when spilled. Emergency responders in the danger area should wear bunker gear and self-contained breathing apparatus for fires beyond the incipient stage (29CFR 1910.156). In addition, wear other appropriate protective equipment as conditions warrant (see Section 8). Contact with water may generate heat. Isolate damage area, keep unauthorized personnel out. If tank, railcar, or tank truck is involved in a fire, isolate for ½ mile in all directions. Consider initial evacuation for ½ mile in all directions. Stop spill/release if it can be done with minimal risk. Move undamaged containers from danger area if it can be done with minimal risk. Fires involving small amounts of combustibles may be smothered with suitable dry chemicals. Use water on combustibles burning but avoid using water directly on acid as it may result in evolution of heat and possible splattering.

AUTOIGNITION TEMP: No Data Available

EXTINGUISHING MEDIA: ..... Fires involving small amount of combustibles may be smothered with suitable dry chemical, soda ash, lime, sand or CO2. Use water on combustibles burning in vicinity of this material but use care as water applied directly to this acid may result in evolution of heat and this may cause splattering.

SPECIAL FIRE FIGHTING

PROCEDURES: ..... Spilled product on ground may be slippery. Accordingly, safety precautions should be strictly observed when handling or cleaning it when spilled as the result of a fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: ..... Containers may explode from internal pressure if confined to fire. Cool with water spray.

6 – ACCIDENTAL RELEASE MEASURES

SPILL PROCEDURES: ..... Wear appropriate personal protective equipment before approaching spill site. For small spills, dilute with water to sewer if allowed by local and state regulations. If unable to wash product with water, absorb with inert material (sand or other approved material) and dispose of in accordance with applicable regulations.

WASTE DISPOSAL: ..... Treatment, storage, transportation and disposal must be in accordance with Federal, State/Provincial and Local Regulations. Regulations may vary in different locations. Characterization and compliance with applicable laws are the responsibility solely of the generator. Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

RCRA STATUS: ..... If discarded in its purchased form, this product is considered a RCRA hazardous waste. It is the responsibility of the product user to determine at the time of disposal, whether a material containing the product should be classified as a hazardous waste. (40CFR261.20-24).

7 – HANDLING and STORAGE

STORAGE: Keep in a tightly closed container, stored in a cool, dry, ventilated area below 44°C (110°F). Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Drum must not be washed out or used for other purposes.

HANDLING: ..... Avoid contact with eyes, skin and clothing. Do not inhale vapors and fumes. Wash thoroughly after handling. Use only with adequate ventilation. Do not take internally. For industrial use only.

8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS

HAZARDOUS INGREDIENT	PEL	TLV-TWA
Hydrogen Fluoride	0.5 ppm	0.5 ppm
Water	None Established	None Established

EXPOSURE CONTROLS: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

RESPIRATORY PROTECTION: If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998. Respirator type: Air-purifying respirator with an appropriate, government approved (where applicable), air-purifying filter, cartridge or canister. Contact health and safety professional or manufacturer for specific information. Self-Contained Breathing Apparatus may be required for use in confined or enclosed spaces.

PROTECTIVE CLOTHING: **Eye/face protection:** Wear chemical goggles; face shield (if splashing is possible). **Skin protection:** Chemical resistant, impermeable gloves. Gloves should be tested to determine suitability for prolonged contact. Use of impervious apron or chemical suit and chemical resistant boots are recommended.

ADDITIONAL MEASURES: ..... Avoid contact with the skin and avoid breathing vapors. Do not eat, drink, or smoke in work area. Wash hands before eating, drinking, or using restroom. Do NOT place food, coffee or other drinks in the area where dusting or splashing of solutions is possible. Handle in accordance with good industrial hygiene and safety practice. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco. Safety shower and eye wash should be available close to work areas.

9 – PHYSICAL / CHEMICAL PROPERITES

BOILING POINT: 220°F (104.4°C)
FREEZING POINT: -32°F (-36°C)
FLASHPOINT: Non-flammable
UPPER FLAME LIMIT (%): ..... NA
LOWER FLAME LIMIT (%): ... NA
VAPOR PRESSURE: ..... ND
VAPOR DENSITY (AIR=1): ..... >1
SPECIFIC GRAVITY: 1.18
pH: ..... <1
SOLUBILITY IN WATER: 100%
VOLATILITY
INCLUDING WATER: 9.84 pounds per gallon
MOLECULAR WEIGHT: ..... ND
EVAPORATION RATE: ..... Similar to water
PHYSICAL STATE: ..... Liquid
COLOR: ..... Clear to light amber
ODOR: ..... Sharp Acidic

PHYSICAL PROPERTIES

PHYSICAL PROPERTIES

10 – STABILITY and REACTIVITY

STABILITY: ..... Stable
HAZARDOUS DECOMP.:..... Will not occur
INCOMPATIBILITY: ..... Contact of acid with organic materials (such as chlorates, carbides, fulminates, and picrates), alkaline materials and water may cause fires and explosions. Contact of acid with metals may form toxic sulfur dioxide fumes and flammable hydrogen gas. Contact with hypochlorites (e.g., chlorine bleach), sulfides, or cyanides will produce toxic gases.
HAZARDOUS REACTIONS: .... This mixture may react with many organic and inorganic chemicals.

11 – TOXICOLOGICAL INFORMATION

THRESHOLD LIMIT VALUE: 0.5 ppm
OSHA PEL: 0.5 ppm
LISTED CARCINOGEN: This product IS NOT listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions) or found to be a potential carcinogen by OSHA.
MEDICAL CONDITION AGGRAVATED: ..... Overexposure to inorganic acid mist may cause lung damage and aggravate pulmonary conditions. Contact of acids with skin may aggravate diseases such as eczema and contact dermatitis.

INFORMATION ON ACUTE TOXICOLOGICAL EFFECTS

ORAL
Product:..... Corrosive. May cause severe irritation and/or serious burns of the mouth esophagus or stomach. May be fatal if swallowed.
DERMAL
Product:..... Corrosive. Splashes on the skin may cause severe skin irritation or possible skin burns. Extended contact with concentrated material can be severely irritating to the skin and may result in redness, swelling, burns and severe skin damage.
INHALATION
Product:..... Corrosive. May be harmful or fatal if inhaled. May cause severe irritation and burns of the nose, throat and respiratory tract.
REPEATED DOSE TOXICITY
Product:..... This product contains Hydrofluoric Acid. Workers exposed to Hydrofluoric Acid mist or prolonged contact to liquids containg Hydrofluoric Acid indicate these products can cause serious tissue damage. May cause fluorosis. Hypocalcemia and hypomagnesemia can occur from absorption of fluoride ion into the blood stream.
SKIN CORROSION / IRRITATION
Product:..... This product in concentrate can cause mild to severe irritation of skin, including burns. The product in dilute form acts as a mild irritant due to acid properties.
SERIOUS EYE DAMAGE / IRRITATION
Product:..... Corrosive. Direct contact with the liquid or exposure to vapors or mists may cause stinging, tearing, redness, swelling, corneal damage and irreversible eye damage. Splashes in the eyes will cause severe burns. Contact lenses should not be worn when working with this chemical.

RESPIRATORY OR SKIN SENSITIZATION

Product:..... Repeated exposure of workers to the mist containing hydroflouric acid have increased incidence of chronic conjunctivitis, tracheobronchitis, stomatitis, and dermatitis, as well as dental erosion.

MUTAGENCITY

IN VITRO

Product:..... No Data Available

IN VIVO

Product:..... No Data Available

Specified Substance(s)	**Information as provided by manufacturer**
Hydrofluoric Acid	No Data Available

CARCINOGENICITY

Product:..... Based on available data, the classification criteria are not met.

REPODUCTIVE TOXICITY

Product:..... Based on the available test, not expected to cause adverse effects on reproduction.

SPECIFIC TARGET ORGAN TOXICITY – SINGLE EXPOSURE

Product: **GENERAL:** This product contains acids that are corrosive and can cause severe and painful burns on contact with any part of the body or if taken internally. The mucous membranes of the eyes and the upper respiratory tract are especially susceptible to these irritating effects. **INHALATION:** Inhalation of excessive concentrations of mist or vapor can cause severe irritation of the upper respiratory tract, resulting in coughing, burning of the throat, and a choking sensation. If inhaled deeply, edema of the lungs may occur. **EYES:** Contact with this product, either in gas or in solution, can cause severe irritation and painful burns of the eyes and eyelids. The acid MUST be removed quickly with thorough irrigation with water or there may be prolonged or permanent visual impairment or total loss of sight. **SKIN:** Concentrated solutions are destructive to clothing and on contact with skin, can cause severe burns unless promptly washed off. **INGESTION:** This product, when swallowed, can cause severe burns of the mucous membranes of the mouth, esophagus and stomach.

SPECIFIC TARGET ORGAN TOXICITY – REPEATED EXPOSURE

Product:..... The effects of long-term, low-level exposures to this product have not been determined. Safe handling of this material on a long-term basis should emphasize the avoidance of all effects from repetitive acute exposure. This product may aggravate existing eye, skin, and respiratory conditions.

ASPIRATION HAZARD

Product:..... Droplets of the product aspirated into the lungs through ingestion or vomiting may cause chemical pneumonia.

OTHER ADVERSE EFFECTS

Product:..... No data available

12 – ECOLOGICAL INFORMATION

ACUTE TOXICITY

FISH

Product: Bluegill/Sunfish: 49 mg/L; 48 Hr; TLm (tap water @ 20°C), Bluegill/Sunfish: 24.5 ppm; 48 Hr; TLm (sulfuric acid in fresh water). Fishes, Salmo gairdneri, LC50, 96 h, 51 mg/l (Fluorides).

AQUATIC INVERTEBRATES

Product:..... Daphnia magna, exposure time: 24 h, EC50: 29 mg/L (IUCLID), sulfuric acid. Crustaceans, Daphnia magna, EC50, 48 h, 97 mg/l (Fluorides).

CHRONIC TOXICITY

FISH

Product:..... Fishes, Salmo gairdneri, LC50, 21 Days, 2.7 - 4.7 mg/l (Fluorides), Crustaceans, Daphnia magna, NOEC, 21 Days, 3.7 mg/l (Fluorides), Algae, Scenedesmus sp., EC50, 96 h, 43 mg/l (Fluorides).

AQUATIC INVERTEBRATES

Product:..... This material has exhibited moderate toxicity to aquatic organisms.

TOXICITY TO AQUATIC PLANTS

Product:..... Harmful to aquatic organisms.

PERSISTENCE AND DEGRADABILITY

BIODEGRADATION

Product:..... Fluorides Result: possible accumulation into vegetable leafs.

BIOLOGICAL OXYGEN DEMAND

Product:..... The methods for determining the biological degradability are not applicable to predominately inorganic substances.

CHEMICAL OXYGEN DEMAND

Product:..... No data available

BOD / COD RATIO

Product:..... No data available

BIOACCUMULATIVE POTENTIAL

Product:..... The acid in this product will dissociate readily in water and no bioaccumulation is predicted. Bioaccumulative potential: log Pow Result: not applicable - (Fluorides).

MOBILITY IN SOIL

Product:..... This product is soluble in water and have high mobility in soil. During transport through the soil, acid solutions will dissolve some of the soil material; in particular, the carbonate based materials. The acid will be neutralized to some degree with adsorption of the proton also occurring on clay materials. However, significant amounts of acid are expected to remain for transport down towards the ground water table. Upon reaching the ground water table, the acid will continue to move, now in the direction of the ground water flow. Lime addition may be required to rectify low pH resulting from acid solution spillages.

RESULTS OF PBT AND mPvB ASSESSMENT

Product:..... Not fulfilling PBT (persistent/bioaccumulative/toxic) criteria. Not fulfilling vPvB (very persistent, very bioaccumulative) criteria.

OTHER ADVERSE EFFECTS

Product: ..... No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this product.

13 –DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: ..... Treatment, storage, transportation and disposal must be in accordance with Federal, State/Provincial and Local Regulations. Regulations may vary in different locations. Characterization and compliance with applicable laws are the responsibility solely of the generator. Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

RCRA STATUS:..... If discarded in its purchased form, this product is considered a RCRA hazardous waste. It is the responsibility of the product user to determine at the time of disposal, whether a material containing the product should be classified as a hazardous waste. (40CFR261.20-24).

14 – TRANSPORTATION INFORMATION

Important Note: Shipping descriptions may vary based on mode of transport, quantities, package size, and/or origin and destination. Consult your company's Hazardous Materials/Dangerous Goods expert for information specific to your situation.

UN/NA NUMBER: 1790
PROPER SHIPPING NAME: ..... Hydrofluoric Acid
HAZARD CLASS:..... 8
PACKAGING GROUP :..... II

O & P

LETTER:..... C (Corrosive substances)
ENVIRONMENTAL HAZARD: At environmentally relevant pH's, the acids are totally dissociated and are totally miscible with water. The removal in all water systems and by sewage treatment plants is thus highly effective. In addition, emissions to the atmosphere are controlled in industrial/professional settings by air-emission abatement.
REPORTABLE QUANTITY: ..... 204 pounds (92.53 kilograms) based on Hydrofluoric Acid (CAS # 7664-39-3) in mixture.

15 - REGULATIONS

This Safety Data Sheet conforms to ANSI Z400.5, and to the format requirements and the International Chemical Safety Cards of the Global Harmonizing System. This SDS complies with 29 CFR 1910.1200 (HAZARD COMMUNICATION STANDARD). **IMPORTANT:** Read this SDS before handling & disposing of this product. Pass this information on to employees, customers, & users of this product.

EPA SRA Title III Chemical Listings:

TSCA STATUS:..... This product is listed on the TSCA inventory. If this product is a blend, all ingredients in the product are listed on the TSCA Inventory List. Any impurities present in this product are exempt from listing.
SECTION 302:..... 204 pounds (92.53 kilograms) based on Hydrofluoric Acid (CAS # 7664-39-3) in mixture. Threshold Planning Quantity (TPQ)
SECTION 304:..... 204 pounds (92.53 kilograms) based on Hydrofluoric Acid (CAS # 7664-39-3) in mixture. (RQ)
SECTION 312:..... Yes
SARA SECTION 313:..... This material contains Hydrofluoric Acid (CAS # 7664-39-3), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
ACUTE:..... Yes
CHRONIC: ..... Yes
FIRE:..... No
PRESSURE:..... No
REACTIVE:..... No

CLEAN WATER ACT: ..... Yes

IMDG – International Marine Dangerous Goods Code
UN1790, Hydrofluoric acid, 8, (6.1) PG II. EmS F-A, S-B. Marine Pollutant: No. Static Accumulator: No.
IATA
UN1790, Hydrofluoric acid, 8, (6.1) PG II.

DEA Chemical Trafficking Act: .. No

16 – OTHER INFORMATION

HMIS*

HEALTH	4
FLAMMABILITY	0
REACTIVITY	1
PERSONAL PROTECTION	H

HMIS®HAZARD INDEX: 0=Minimal Hazard, 1=Slight Hazard, 2=Moderate Hazard, 3=Serious Hazard, 4=Severe Hazard.

HMIS® rating involves data interpretations that may vary from company to company. They are intended only for rapid, general identification of the magnitude of the specific hazard. To deal adequately with the safe handling of this material, all the information contained in this SDS and product label must be considered.

ND = No Data, NA = Not Applicable/Not Available, ≤ = Less than or equal to, ≥ = Greater than or equal to

REVISION STATEMENT: Changes have been made throughout this Safety Data Sheet (SDS). Please read the entire document. Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and The Globally Harmonized System of Classification and Labeling of Chemicals (GHS) by the Company Health and Risk Assessment Unit.

DISCLAIMER:
Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, the Company makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving this Safety Data Sheet (SDS) will make their own determination as to its suitability for their intended purposes prior to use. Since the product is within the exclusive control of the user, it is the user's obligation to determine the conditions of safe use of this product. Such conditions should comply with all Federal and State Regulations concerning the Product. It must be recognized that the physical and chemical properties of any product may not be fully understood and that new, possibly hazardous products may arise from reactions between chemicals. The information given in this data sheet is based on our present knowledge and shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship. **NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.**

*****This is the last page of this SDS*****

Hydrochloric Acid, 37%

1. Identification

Product Name: Hydrochloric Acid, 37%
Item #: 8571, 8575, DI0505082 **Web SDS:**
Synonyms: HCl, Muratic Acid, Hydrogen Chloride
Recommended Use: Laboratory Reagent
Restrictions on Use: Any use other than recommended

Manufacturer:
BBC Biochemical
409 Eleanor Lane,
Mount Vernon, WA 98273
1-800-635-4477

In Case of Emergency:
Chemtrec US 1-800-424-9300
Chemtrec International 703-527-3887

2. Hazards Identification

OSHA Hazard Classification(s):
Acute Toxicity - Inhalation - Category 3
Skin Corrosion - Category 1B
Eye Damage - Category 1
Signal Word: Danger
Hazard Statement(s): Toxic if inhaled. Causes severe skin burns and eye damage. Causes serious eye damage.
Pictogram(s):

Precautionary Statement(s): Prevention: Avoid breathing dust, vapors. Use only outdoors or in a well-ventilated area. Do not breathe dusts or mists. Wash body thoroughly after handling. Wear protective gloves, protective clothing, eye protection and face protection. Wear eye protection, face protection.

Response: If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a doctor. Specific treatment (see first aid section on this label). If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Take off all contaminated clothing and wash it before reuse. Immediately call a doctor. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue Rinsing

Storage: Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Disposal: Dispose of contents/container in accordance with local regulations.
Descriptions of Hazards not otherwise classified: N/A
Percent of mixture with unknown acute toxicity: N/A

3. Composition and Information on Ingredients

Chemical Name	Common Name	CAS #	Concentration %
Hydrochloric Acid	Muratic Acid	7647-01-0	37
Water		7732-18-5	Balance

4. First Aid Measures

Eye Contact: If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Skin Contact: If on skin (or hair): Take off immediately all contaminated clothing and wash before reuse. Wash with plenty of water. If skin irritation occurs: Get medical advice/attention.
Inhalation: Remove to fresh air; give artificial respiration if breathing has stopped. Get medical advice/attention if you feel unwell.
Ingestion: Do not induce vomiting. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Get medical attention.
Symptoms: Irritation eyes, nose, throat; headache, dizziness

Recommendations for immediate medical care/special treatment: Get medical advice/attention if you feel unwell.

5. Fire- Fighting Measures

Extinguishing Media: Dry chemical, carbon dioxide, alcohol foam, water.
Fire Hazards (Chemical): Not flammable.
Special Protective Equipment: Fire fighters should use self-contained breathing apparatus and protective clothing.
Precautions for Firefighters: Carbon monoxide and unidentified organic compounds may be formed during combustion.

6. Accidental Release Measures

Emergency Procedures: Evacuate the area of all unnecessary personnel. Wear suitable protective equipment. Eliminate all sources of ignition and provide ventilation.
Protective Equipment: See section 8
Environmental Precautions: Prevent release to the environment by using barriers.
Containment and Clean-Up Procedures: Use barriers to prevent spreading. Collect spill in container. Call waste authorities.

7. Handling and Storage

Handling: Do not breathe vapors. Do not eat, drink or smoke when using this product.
Storage: Store in a well-ventilated place. Keep container tightly closed. Store locked up.

8. Exposure Controls/Personal Protection

OSHA Permissible Exposure Limits (PELs):

Reagent	CAS #	OSHA PEL TWA
Hydrochloric Acid	7647-01-0	5 ppm (7 mg/m3) Ceiling

ACGIH Threshold Limit Values (TLVs):

Reagent	CAS #	ACGIH PEL TLV	ACGIH STEL
Hydrochloric Acid	7647-01-0	2 ppm (3 mg/m3) Ceiling	

Engineering Controls: Use in a well ventilated area to prevent exposure. Maintain eyewash fountain and quick-drench facilities in work areas.
Personal Protective Measures: Wear gloves, lab coat, eye protection and impervious footwear. Contact lenses should not be worn when working with this material.
Special PPE Requirements: If ventilation hood not available wear respirator.

9. Physical and Chemical Properties Section

Appearance: Colorless, Liquid
Molecular Weight: 36.46
Molecular Formula: HCl
pH: Less than 1
Boiling Point and Boiling Range: -121°F
Melting Point/Freezing Point: -174°F
Flash Point: N/A
Specific Gravity/Relative Density: N/A
Odor: Pungent
Odor Threshold: N/A
Color: Colorless
Flammability (solid/gas): N/A
Vapor Density: N/A

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Upper/Lower flammability or explosive limits: N/A
Vapor Pressure: 40.5 atm
Evaporation Rate: N/A
Partition Coefficient: n-octanol/water: N/A
Viscosity: N/A
Auto-ignition temperature: N/A
Solubility: N/A
Decomposition Temperature: N/A

10. Stability and Reactivity

Reactivity:
Chemical Stability: Stable
Conditions of Stability/Instability: Stable under normal conditions of temperature and pressure.
Stabilizers needed: None
Safety issue indicated by appearance change: N/A
Other: N/A
Hazardous Reactions: N/A
Hazardous Polymerization: Does not occur
Conditions to avoid: N/A
Classes of Incompatible Materials: Oxidizers, Strong Acids, Strong Bases, Hydroxides, amines, alkalis, copper, brass, zinc. Corrosive to most metals.
Hazardous Decomposition Products: Thermal-oxidation degradation can produce oxides of carbon. Toxic gases and vapors (I.e. Carbon monoxide) may be released in a fire.

11. Toxicological Information

Likely Routes of Exposure

Eyes: Corrosive to eyes. May cause burning, reddening, damage to cornea and/or blindness. Damage may be permanent, may result in loss of vision.

Skin: Corrosive to skin. May cause burning, reddening, damage to multiple layers of skin, dermatitis and/or permanent scarring.

Inhalation: Dizziness, headache. Vapors are extremely hazardous by inhalation. May cause respiratory distress and asthma like conditions. May cause coughing spells when in haled.

Ingestion: Corrosive solution. Will cause chemical burns to mouth, throat and stomach. Causes gastrointestinal discomfort including diarrhea. May cause permanent damage to internal tissue. Ingestion of large amounts may be data.

Signs or Symptoms of Exposure: Irritation nose, throat, larynx; cough, choking; dermatitis; solution: eye, skin burns; liquid: frostbite; in animals: laryngeal spasm; pulmonary edema
Effects from short term exposure (delayed, immediate, chronic): Irritation to the eyes, nose, throat; headache, dizziness, nausea.
Acute Toxicity (Numerical Measures): LD50(oral, rat)=900 mg/kg; LC50(inhalation, mouse)=1108 ppm/1H; LC50(inhalation, mouse)=3940 mg/m3/30M
Carcinogenicity (NTP, IARC, OSHA): Not listed as a carcinogen.

12. Ecological Information

Ecotoxicity: CAS 7647-01-0 Hydrochloric Acid
Fish: LC50 (96 Hr) Mosquito Fish: 282 mg/L LC100(24Hr) Trout: 10 mg/L
Invertebrates: LC50(48Hr) Starfish: 100-330 mg/L LC50 (48Hr) Shrimp: 100-330 mg/L
Persistence and degradability: N/A
Bioaccumulation Potential (octanol-water partition coefficient, BCF): N/A
Mobility in the soil: N/A
Adverse Environmental Effects: N/A

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13. Disposal Considerations

Recommended Disposal Containers: Check with your local waste authorities*
Recommended Disposal Methods: Do not dispose of in drains, check with your local waste authorities.*
Physical/Chemical Properties affecting Disposal: See section 2 and section 9 applicable information.*
Special Precautions for Landfill and Incineration Activities: Check with your local waste authorities.*
Waste Stream: Consult your local or regional authorities.*

14. Transport Information

UN Number: UN1789
UN Proper Shipping Name: Hydrchloric acid solution
Transport Hazard Class(es): 8
Packing Group Number: II
Environmental Hazards (IMDG code):
Marine Pollutant: No
Transport in Bulk (IBC Code): N/A
Special Transport Precautions: N/A

15. Regulatory Information

OSHA:
DOT:
EPA:
CPSC:

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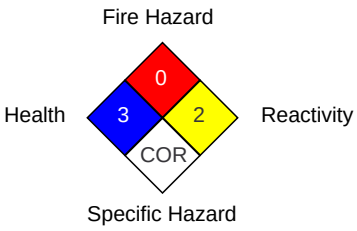
16. Other Information

Revision Date: 10/22/2014

NFPA

Health	3
Fire Hazard	0
Reactivity	2
Specific Hazard	COR

National Fire Protection Association (USA) NFPA



HMIS

Health	3
Flammability	0
Physical Hazard	2
Personal Protection	

Hazardous Material Information System HMIS

Health	3
Flammability	0
Physical Hazard	2
Personal Protection	

Notice to Reader:

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

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Exhaust Flow Calculations Information

Exhaust Flow Rate: The exhaust flow rates for the acid, alkaline, and silane scrubber exhaust streams are based on an industry standard of 3,000 feet per minute (fpm). This flow rate estimate in addition to the expected size (diameter) of the scrubber exhausts was used to calculate velocity (m/s) and flow rate (cfm) within the air dispersion model for these point sources.