The applicant is Sinova Silicon, LLC with a mailing address of 5241 Calgary Trail, Unit 610, Edmonton, AB, Canada, T6H 5GB. They seek to obtain an air contaminant permit from the Tennessee Division of Air Pollution Control (TDAPC) for the construction of a Silicon Manufacturing Plant located at 4255 Cates Landing Road, Tiptonville, TN 38079. The proposed silicon manufacturing plant would involve physical construction. The processes to be constructed or modified at this location will consist of the following, including the type of control:

1) Raw Material Receiving by Railcar and Truck and conveying to a mist-controlled hopper prior to being conveyed to the Proportioning Building. This source includes haul road traffic (fugitive emissions) Water spray misting will be used as control for when trucks are unloaded and when front-end loaders are operating. All roads will be paved and sprayed to suppress dust (48-0086-01)

2) Proportioning Building. Materials are transferred into this building by closed conveyor and are loaded into day bins. Weighing hoppers are used to dispense the proportioned raw materials onto an enclosed belt conveyor which then transfers this material to the Furnace Building. Emissions from the transfer points at this process are collected and are controlled by a baghouse. (48-0086-02)

3) Two identical Submerged Arc Furnaces (SAF) produce silicon from raw materials received from the proportioning building. Each SAF (with associated operations) has one dedicated baghouse. There is one collecting hood ducted to the SAF baghouse for each of these four identical operations at SAF #1 and SAF #2:
   - SAF
   - Tapping (from furnace into ladle)
   - Refining (occurs at ladle, injection of air and oxygen into molten silicon)
   - Product Casting (from ladle) and Slag removal from Ladle

A natural gas burner permitted with one of the Ladle Heaters at source 48-0046-04 may be used at either SAF during startup to heat materials, although this would be an infrequent occurrence. Each SAF is subject to federal NSPS Subpart Z and NESHAP Subpart YYYY. There is one stack that exhausts combined flow from both SAF’s during normal operation. Each SAF has a bypass stack that is intended for use during emergencies only. (48-0086-03)

4) Ladle Preheating (three units) A burner from any of these three 10 MMBtu/hr (each) natural gas-fired units may be used during startup for either SAF. (48-0086-04)

5) Fume Silo Operation with bag packing. Baghouse control. Dust from SAF baghouses is received and packaged for sale. (48-0086-05)
6) Slag Handling and Crushing and Screening (following the SAF process) Outdoor Operation with Water Misting control (48-0086-06)

7) Finished Product Building including crushing, screening, and bagging of silicon with enclosed truck and rail loadout. Baghouse control (48-0086-07)

8) Emergency Generator Engine, one natural gas fired unit subject to federal NSPS Subpart JJJJ and NESHAP Subpart ZZZZ (48-0086-08)

9) One Diesel Fuel Storage tank with submerged fill (48-0086-09)

Regulated air contaminants would be emitted by each of the above sources. Pollution control is present as indicated for the above-described operations. Mr. G. Forte is the assigned TDAPC permit writer. Mr. Forte may be reached at greg.forte@tn.gov or 615-532-0548.

The project is subject to review under the Tennessee rule for Prevention of Significant Deterioration (PSD) of air quality, paragraph 1200-03-09-.01(4) of the Tennessee Air Pollution Control Regulations, which requires a public notification and thirty-day public comment period. The TDAPC has reviewed the proposed project with respect to the above referenced PSD rule. The TDAPC has made the determination that construction of the proposed facility can be approved if certain conditions are met. A copy of the application forms submitted by Sinova Silicon, Inc. and other materials used by the TDAPC in making this determination, are available for public inspection on the Department of Environment and Conservation’s (TDEC’s) dataviewer found at https://dataviewers.tdec.tn.gov/pls/enf_reports/f?p=19031:34001 or during normal business hours at the following locations:

Division of Air Pollution Control
Jackson Environmental Field Office
1625 Hollywood Drive
Jackson, TN 38305

and

Tennessee Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

Public Hearing Participation Instructions

A public hearing will be held by the Tennessee Air Pollution Control Board (TAPCB) pursuant to TAPCR 1200-03-09-.01(4)(l)(v). On April 21, 2022, at 5:30 p.m. CST, a public hearing will be held for participants to submit verbal comments concerning the TAPCB’s
consideration and review of this new facility. Prior to the public hearing, a public information session will be held to discuss the technical and regulatory air pollution-related issues concerning the permitting of the Silicon Manufacturing Plant. The information session will have a question-and-answer format and will include a presentation on the proposed permit action by TDAPC staff.

The hearing location will be:

Reelfoot Lake State Park
2595 Highway 21E
Tiptonville, TN 38079

A copy of the draft permit, preliminary determination, construction permit application, as well as materials used by the TDAPC in making this determination, are available for public view via the Tennessee Department of Environment and Conservation’s (TDEC) data viewer at the following webpage:

https://dataviewers.tdec.tn.gov/pls/enf_reports/?p=19031:34001

Interested persons are invited to review these materials and comment on the proposed installation. Comments should be addressed to Michelle W. Owenby, Director, Tennessee Division of Air Pollution Control, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 15th Floor, Nashville, TN 37243 and may be submitted by email at Air.Pollution.Control@tn.gov. Written comments must be received by TDAPC by 4:30 PM CST on April 22, 2022, and must include the phrase “Comments on Sinova Silicon, Inc. Construction Permit” in the subject line.

Individuals with disabilities who wish to participate should contact TDEC to discuss any auxiliary aids or services needed to facilitate such participation. Such contact may be in person, by writing, telephone, or other means, and should be made by April 8, 2022, to allow time to provide such aid or services. Contact the Tennessee Department of Environment and Conservation ADA Coordinator, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 2nd Floor, Nashville, TN 37243, 1-866-253-5827. Hearing impaired callers may use the Tennessee Relay Service, 1-(800)-848-0298. If it is hard for you to read, speak, or understand English, TDEC may be able to provide translation or interpretation services free of charge. Please contact Air Pollution Control at (615) 532-0554 for more information.
This review was performed by the Tennessee Air Pollution Control Division in accordance with the Rules for Prevention of Significant Deterioration (PSD).

March 21, 2022
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Appendix

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<th>Description</th>
</tr>
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<tr>
<td>A</td>
<td>Proposed PSD Construction Permit</td>
</tr>
<tr>
<td>B</td>
<td>Correspondence related to Application and Permit Limits</td>
</tr>
<tr>
<td>C</td>
<td>Correspondence Related to Modeling (includes FLM Notification)</td>
</tr>
<tr>
<td>D</td>
<td>Emission Summary</td>
</tr>
<tr>
<td>E</td>
<td>Public Notice with associated comments from public and EPA</td>
</tr>
</tbody>
</table>
I. Rule Background

On June 3, 1981, the State of Tennessee adopted Tennessee Air Pollution Regulations (TAPCR); Rule 1200-03-09-.01(4), Prevention of Significant Air Quality Deterioration (PSD). This Rule has been subsequently amended, with the latest amendments effective April 4, 2018. Under these regulations, a new major stationary source that is included in one of 28 source categories and has the potential to emit 100 tons per year (TPY) or more of any criteria pollutant, or 250 tons per year (TPY) or more of any criteria pollutant located in an attainment area, must be reviewed with regard to significant deterioration prior to construction. In addition, any major stationary source which makes a major modification in an attainment area that causes a significant emissions increase must be reviewed with the same regard.

In order to comply with the amended PSD regulations, a source with potential emissions greater than significant amounts of a regulated pollutant must meet several criteria. The first criterion is that Best Available Control Technology (BACT) must be applied to all emission points for the applicable PSD pollutant. The second criterion is that the proposed source or modification must not cause or contribute to any violation of the National Ambient Air Quality Standards (NAAQS – see Table 1). Finally, increases in ambient concentrations of sulfur dioxide, nitrogen dioxide and particulate matter resulting from emissions discharged by the proposed source must not exceed the increments specified by the PSD regulations (Table 2).

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulate Matter</td>
<td>(PM$_{10}$), 24-hour (primary and secondary)</td>
<td>150 µg/m$^3$</td>
</tr>
<tr>
<td></td>
<td>(PM$_{2.5}$), Annual</td>
<td>12.0 µg/m$^3$ (primary)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.0 µg/m$^3$ (secondary)</td>
</tr>
<tr>
<td></td>
<td>(PM$_{2.5}$), 24-hour (primary and secondary)</td>
<td>35 µg/m$^3$</td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO$_2$)</td>
<td>Annual (primary and secondary)</td>
<td>53 ppb</td>
</tr>
<tr>
<td></td>
<td>1-hour (primary)</td>
<td>100 ppb</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>8-hour</td>
<td>9 ppm</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>35 ppm</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO$_2$)</td>
<td>1-hour (primary)</td>
<td>75 ppb</td>
</tr>
<tr>
<td></td>
<td>3-hour (secondary)</td>
<td>0.5 ppm</td>
</tr>
<tr>
<td>Lead</td>
<td>3-month (primary and secondary)</td>
<td>0.15 µg/m$^3$</td>
</tr>
<tr>
<td>Ozone</td>
<td>8-hour (primary and secondary)</td>
<td>0.070 ppm</td>
</tr>
</tbody>
</table>

Table 1: National Ambient Air Quality Standards

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>µg/m$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$, annual arithmetic mean</td>
<td>17</td>
</tr>
<tr>
<td>PM$_{10}$, 24-hour maximum</td>
<td>30</td>
</tr>
<tr>
<td>PM$_{2.5}$, annual arithmetic mean</td>
<td>4</td>
</tr>
<tr>
<td>PM$_{2.5}$, 24-hour maximum</td>
<td>9</td>
</tr>
<tr>
<td>Sulfur dioxide: Annual arithmetic mean</td>
<td>20</td>
</tr>
<tr>
<td>Sulfur dioxide: 24-hour maximum</td>
<td>91</td>
</tr>
<tr>
<td>Sulfur dioxide: 3-hour maximum</td>
<td>512</td>
</tr>
<tr>
<td>Nitrogen dioxide: Annual arithmetic mean</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 2: Maximum Allowable Increases (µg/m$^3$) for Class II Areas
II. Project Background and Description

On September 16, 2021, Sinova Silicon, Inc. submitted a construction permit application for a new Silicon Manufacturing facility to be located approximately 4 miles (6 kilometers) north of Tiptonville in Lake County, Tennessee. Updated applications were submitted on October 28 and November 17, 2021.

The silicon manufacturing process will involve processing raw materials, including quartz, coal, charcoal, and wood chips. After being unloaded from trucks or railcars, these materials are conveyed to a proportioning building, where measured quantities are dispensed onto a conveyor belt. The material is then conveyed to one of two Submerged Arc Furnaces (SAFs), which are heated by electric arcs. The SAFs will convert the raw materials to 99 percent-pure silicon in molten form. Ladle Heaters will be used to warm the Ladles before they receive molten silicon from the furnaces. Emissions from the tapping, refining, and casting associated with each SAF are ducted to the baghouse associated with that SAF.

The molten silicon in the furnace is tapped to ladles and poured into molds to cool, producing ingots. Some of these ingots are then broken and sized in the Finished Product Building according to customer specifications.

A large baghouse filter is used to recover the particulate/powdered silicon along with silicon “fume.” This Fume material is pneumatically conveyed to the Fume Silo Building, where this material is bagged and sold as a byproduct either in bags or in bulk trucks.

The slag remaining from the tapping process is transferred to storage bins and is then crushed and screened in an open area.

Equipment and operations with the potential to emit regulated air pollutants include:

- Raw material receiving, handling operations and Road traffic
- Material transfer to day bins in proportioning building
- Two (2) Submerged Arc Furnaces
- Three Ladle Heaters
- Silica fume silos.
- Slag handling, crushing and screening
- Finished Product Building
- Emergency generator.
- Tank used to store diesel fuel

The project is subject to review for the following pollutants under regulations governing the Prevention of Significant Air Quality Deterioration (PSD).

Particulate Matter (PM, PM10, PM2.5)
Sulfur Dioxide (SO₂)
Carbon Monoxide (CO)
Volatile Organic Compounds (VOC)
Nitrogen Oxides (NOₓ)
Greenhouse gases (CO₂e)
Also note that this new facility will be an area source for combined and single Hazardous Air Pollutants (HAPs)

**III. Information Used in Analysis**

The applicant provided the following information in their October 29, 2021, permit application (Appendix A). The proposed construction project will consist of the following emissions sources as shown in Figure 2.

- Two (2) SAFs with baghouses;
- Secondary baghouses for raw material and product handling;
- Three (3) natural gas-fired ladle pre-heaters;
- Raw material receiving, handling, and storage operations;
- Raw material day bins to support the SAFs;
- Silica fume silos;
- Emergency generator;
- Tanks used to store diesel fuel; and
- Vehicle traffic on paved on-site surfaces.
- Slag Handling
Figure 2. Detailed Plot Plan
IV. Emissions Analysis

Projected emission increases from the proposed project (Vol 1, Tables 1-1 & 3-5 of the application) were obtained from the information and assumptions given in the September 8, 2021, permit application. See Emission Summary for details.

Sinova updated the daily and annual average SO₂ emission factor for the SAFs during the review of the application. Where the SO₂ emission factor had been 17.6 lb SO₂/ton Si produced, it is now 15 lb SO₂/ton Si produced as shown below in Table 3. The overall projected emissions increases are shown in Table 4.

Table 3. Application Original Emissions for CO, NOx and SO₂

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Hourly Average</th>
<th>Daily &amp; Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hourly Emission Factor (lb/ton Si)</td>
<td>Hourly Emission Rate (lb/hr)</td>
</tr>
<tr>
<td>SAF #1</td>
<td>SAF #2</td>
<td>SAF #1</td>
</tr>
<tr>
<td>NO₂</td>
<td>45</td>
<td>174</td>
</tr>
<tr>
<td>SO₂</td>
<td>21.1</td>
<td>81.4</td>
</tr>
<tr>
<td>CO</td>
<td>34</td>
<td>131</td>
</tr>
</tbody>
</table>

Notes:
1. Maximum hourly average NO₂ and CO emission factors were based on a combination of the expected maximum daily and annual average emission factors for NO₂ and CO and the variability observed in CEMS data collected by Mississippi Silicon. The maximum hourly average SO₂ emission factor is based on the expected maximum daily and annual average emission factor with a 20% safety factor to account for potential variation in coal sulfur content.
2. The maximum hourly, daily, and annual average emission rates are based on a maximum hourly average silicon production rate of 3.86 tons of silicon per hour.
3. The maximum daily and annual average emission factors are based on engineering judgement.

Table 4. Updated Emissions for CO, NOx and SO₂

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Hourly Average</th>
<th>Daily &amp; Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hourly Emission Rate (lb/hr)</td>
<td>Daily Emission Rate (lb/day)</td>
</tr>
<tr>
<td>SAF #1</td>
<td>SAF #2</td>
<td>SAF #1</td>
</tr>
<tr>
<td>NOx</td>
<td>45</td>
<td>174</td>
</tr>
<tr>
<td>SO₂</td>
<td>21.1</td>
<td>81.4</td>
</tr>
<tr>
<td>CO</td>
<td>34</td>
<td>131</td>
</tr>
</tbody>
</table>
Table 5: Projected Emissions Increases

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Project Emissions Increase (tpy)</th>
<th>PSD Significance Threshold (tpy)</th>
<th>Subject to PSD Review?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filterable Particulate Matter (PM)</td>
<td>28.27</td>
<td>25</td>
<td>Yes</td>
</tr>
<tr>
<td>Total PM ≤ 10 microns (PM10)</td>
<td>28.25</td>
<td>15</td>
<td>Yes</td>
</tr>
<tr>
<td>Total PM ≤ 2.5 microns (PM2.5)</td>
<td>28.05</td>
<td>10</td>
<td>Yes</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO₂)</td>
<td>306</td>
<td>40</td>
<td>Yes</td>
</tr>
<tr>
<td>Nitrogen Oxides (NOₓ)</td>
<td>1,230</td>
<td>40</td>
<td>Yes</td>
</tr>
<tr>
<td>Volatile Organic Compounds (VOC)</td>
<td>83.3</td>
<td>40</td>
<td>Yes</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>1,163.5</td>
<td>100</td>
<td>Yes</td>
</tr>
<tr>
<td>Carbon Dioxide equivalent (CO₂e)</td>
<td>717,831</td>
<td>75,000</td>
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</tr>
<tr>
<td>Sulfuric Acid Mist (H₂SO₄)</td>
<td>-</td>
<td>7</td>
<td>No</td>
</tr>
<tr>
<td>Fluorides</td>
<td>-</td>
<td>3</td>
<td>No</td>
</tr>
<tr>
<td>Total HAPs</td>
<td>11</td>
<td>25</td>
<td>No</td>
</tr>
<tr>
<td>Max of any HAP</td>
<td>7.6</td>
<td>10</td>
<td>No</td>
</tr>
</tbody>
</table>

V. Control Technology Review

1.1 1. REGULATORY ANALYSIS Air Quality Standard Attainment Status
The proposed Plant will be located in Lake County, Tennessee, which is in attainment of, or unclassifiable for, all ambient air quality standards. The proposed project would be governed by the regulations for attainment areas as defined in the Tennessee state rules. Attainment areas are areas defined by EPA as meeting the National Ambient Air Quality Standards (NAAQS) which were established to protect human health and welfare.

1.2 Air Quality Permits

1.2.1 Prevention of Significant Deterioration
The PSD permit process was established to ensure that new or expanded major stationary sources that emit criteria pollutants above a significance rate do not cause air quality in areas that currently meet the standards (i.e., attainment areas) to deteriorate significantly. These regulations require the application of Best Available Control Technology (BACT), and set PSD increments, which limit the increases in SO₂, NO₂, and PM concentrations that may be produced by a new source. Increments have been established for three land classifications. The most stringent increments apply to Class I areas, which include wilderness areas and national parks.

The facility is subject to PSD regulations because it will have the potential to emit more than 250 tons per year of at least one regulated pollutant. As shown in Table 12 of the application, the maximum potential annual emission increases of NOₓ, CO, SO₂, PM, PM₁₀, PM₂.₅, and VOCs attributable to the project are greater than the PSD significant emission rates (SERs) and, therefore, are all subject to PSD review. Compliance with PSD increments is addressed for Class II areas (those deemed able to accommodate normal well-managed industrial growth), and for Class I areas. BACT for criteria pollutants (i.e., NOₓ, CO, SO₂, PM, and VOCs) and GHGs is addressed.
1.2.2 Air Quality Construction Permit
Tennessee Air Pollution Control Regulations Rule 1200-03-09-.01 requires an application be filed, and construction permit issued, prior to the construction of an air contaminant source or emission unit. To obtain a construction permit, the applicant must demonstrate that emission increases attributable to the new source will not cause or contribute to violation of any applicable ambient air quality standard and will be in compliance with all other applicable regulatory requirements. This permit application is intended to fulfill all requirements needed for the TN Division of Air Pollution Control to issue a construction permit.

1.2.3 Air Operating Permit
Because emissions of at least one air pollutant subject to regulation emitted by the facility are expected to exceed 100 tpy, the facility will be a major stationary source of emissions under the Rule 1200-03-090-.02 Operating Permit program. Sinova will submit a complete operating permit application no more than 360 days following facility startup in accordance with Rule 1200-03-09-.02(11)(d)(i)(II).

1.3 New Source Performance Standards
New source Performance Standards (NSPS) are nationally uniform standards applied to specific categories of stationary sources that are constructed, modified, or reconstructed after the standard was proposed. NSPS are found in Title 40, Part 60 of the Code of Federal Regulations (CFR). NSPS usually represent a minimum level of control that is required on a new source. The following portions of the NSPS regulations potentially apply to the Plant, and applicability will be discussed in the following sections.

- Subpart A – General Provisions
- Subpart Z – Ferroalloy Production Facilities
- Subpart OOO – Nonmetallic Mineral Processing Plants
- Subpart JJJJ – Stationary Spark Ignition Internal Combustion Engines

1.3.1 Subpart A – General Provisions
Any stationary source that is subject to any NSPS regulation is also subject to the general notification, recordkeeping, and monitoring requirements of 40 CFR Part 60 General Provisions, unless the applicable Part 60 Subpart regulation specifically exempts the source from the provisions of Subpart A. As detailed below, some of the equipment for the proposed Plant will be subject to NSPS rules; therefore, the general provisions will apply with respect to those sources.

1.3.2 Subpart Z – Ferroalloy Production Facilities
This subpart applies to the following affected facilities: “electric submerged arc furnaces which produce silicon metal, ferrosilicon, calcium silicon, silicomanganese zirconium, ferrochrome silicon, silvery iron, high-carbon ferrochrome, chargechrome, standard ferromanganese, silicomanganese, ferromanganese silicon, or calcium carbide; and dust-handling equipment” that commenced construction or modification after October 21, 1974.

The semi-enclosed submerged arc furnaces at the proposed plant meet the definition of an “electric
submerged arc furnace” and the facility will produce one or more of the products listed for this subpart (silicon metal). Since the facility will commence construction after October 21, 1974, the proposed Plant will be considered an affected facility under this subpart.

Sinova will comply with all applicable emission limitations and testing, monitoring, reporting, and recordkeeping requirements of this subpart. According to this subpart, an initial performance test should be conducted based on 40 CFR Part 60 §60.8. Additionally, the subpart outlines standards for PM and CO, and requires a continuous monitoring device on the furnace power input and the vent capture system. The Division has submitted a request to EPA for clarification of the location of the flow monitoring unit.

1.3.3 Subpart OOO – Nonmetallic Mineral Processing Plants
This subpart applies to nonmetallic mineral processing plants, which is defined as equipment used to crush or grind any nonmetallic mineral. Quartz, a raw material used at the plant, is defined as a nonmetallic mineral; however, the proposed plant will not crush or grind quartz. Crushing and grinding equipment will only be used in the product-refinement step on the silicon metal product. Therefore, this subpart does not apply to the proposed plant.

1.3.4 Subpart JJJJ – Stationary Spark Ignition Internal Combustion Engines
This subpart applies to stationary spark ignition (SI) internal combustion engines (ICEs) that commence construction after June 12, 2006, where the SI ICE engine is manufactured:

- On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 hp (except lean burn engines with a maximum engine power greater than or equal to 500 hp and less than 1,350 hp);
- On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 hp and less than 1,350 hp;
- On or after July 1, 2008, for engines with a maximum engine power less than 500 hp;
- or
- On or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 KW (25 hp).

It is assumed that the emergency generator engine will be a new unit constructed after June 12, 2006, and manufactured after July 1, 2007, so it is considered an affected facility under this subpart. This subpart provides emission limitations and monitoring, reporting, and recordkeeping requirements for various types of SI ICE.

Subpart JJJJ requires that the owner purchase a certified engine that has a permanent label demonstrating that it meets the emission limits applicable for its model year and power rating, install a non-resettable hour meter, and operate the engine according to emergency provisions (i.e., no limit to emergency operation, 100 hours per year of non-emergency operation, 50 of which can be non-emergency, non-maintenance, and/or non-testing operation). For natural gas-fueled engines such as the unit that will power the proposed emergency generator, propane may be used for a maximum of 100 hours per year as an alternative fuel solely during emergency operations.
In accordance with the Subpart, Sinova will:

- Install a certified engine that complies with the applicable model year and power rating emission limits.
- Operate and maintain the engine according to the manufacturer’s emission-related written instructions.
- Install a non-resettable hour meter.
- Combust fuels that meet the applicable requirements; and
- Maintain records of the engine certification and maintenance conducted to demonstrate compliance.

Subpart JJJJ does not require any performance testing, notification, or reporting for this engine.

1.4 National Emission Standards for Hazardous Air Pollutants

The National Emission Standards for Hazardous Air Pollutants (NESHAPs) regulations contained in 40 CFR Parts 61 and 63 establish emission standards for certain source categories of hazardous air pollutant (HAP) emissions. This part represents the federal regulatory mechanism used to regulate HAPs under the Clean Air Act (CAA) after the CAA was amended on November 15, 1990. A key component of regulatory applicability under this part is the distinction between a “major source” and an “area source” of HAPs. In short, a major source is a stationary source that emits or has the potential to emit, considering controls, in the aggregate, 10 tpy or more of any HAP or 25 tpy or more of any combination of HAPs. An area source means any stationary source of HAPs that is not a major source as defined in this part. The proposed plant is an area source under this part, as indicated in the Summary of HAP Emissions Table 5 below. Note that the Division will require testing for HCl in order to verify the HAP emission status, as this is the single HAP with the highest emission level. The following portions of the NESHAP regulations potentially apply to the plant, and applicability will be discussed in the following sections.

- Subpart A – General Provisions
- Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines
- Subpart JJJJJ – Area Sources Industrial, Commercial, and Institutional Boilers
- Subpart YYYYY – Area Sources: Ferroalloys Production Facilities
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>CAS #</th>
<th>Emissions (lb/year)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Furnace</td>
<td>Ladle Heaters</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
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<tr>
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<tr>
<td>Carbon Tetrachloride</td>
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<tr>
<td>Pollutant</td>
<td>CAS #</td>
<td>Furnace</td>
<td>Ladle Heaters</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------</td>
<td>---------</td>
<td>---------------</td>
</tr>
<tr>
<td>Chlorine</td>
<td>7782-50-5</td>
<td>1.39E+03</td>
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<tr>
<td>Chlorobenzene</td>
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<td>Chloroform</td>
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<td>Chromium</td>
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<td>Cobalt</td>
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<td>Cumene</td>
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<tr>
<td>Dichlorobenzene</td>
<td>25321-22-6</td>
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<td>3.09E-04</td>
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<tr>
<td>Dimethyl sulfate</td>
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<tr>
<td>Ethylbenzene</td>
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<td>Ethyl chloride</td>
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<td>Ethylene Dibromide</td>
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<td>Formaldehyde</td>
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<td>Hydrogen chloride</td>
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<td>Isopropylbenzene</td>
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<td>Lead and compounds (NOS)</td>
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<tr>
<td>Methanol</td>
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<tr>
<td>Methyl bromide</td>
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<td>Methyl chloride</td>
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<td>8.46E+01</td>
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<tr>
<td>Methyl ethyl ketone</td>
<td>78-93-3</td>
<td>4.41E+01</td>
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<td>Methyl hydrazine</td>
<td>60-34-4</td>
<td>1.66E+01</td>
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<td>Methyl methacrylate</td>
<td>80-62-6</td>
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</tr>
<tr>
<td>Methyl tert butyl ether</td>
<td>1634-04-4</td>
<td>3.42E+00</td>
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<tr>
<td>Methylenepropionate</td>
<td>75-09-2</td>
<td>5.34E+02</td>
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</table>
### Table 1: Pollutant Emissions (lb/year)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>CAS #</th>
<th>Furnace</th>
<th>Ladle Heaters</th>
<th>Emergency Generator</th>
<th>Total</th>
<th>Total (tpy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naphthalene</td>
<td>91-20-3</td>
<td>1.72E+02</td>
<td>1.57E-01</td>
<td>5.23E-02</td>
<td>1.72E+02</td>
<td>8.59E-02</td>
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<td>Nickel</td>
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<td>3.85E+01</td>
<td>5.41E-01</td>
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<td>3.90E+01</td>
<td>1.95E-02</td>
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<tr>
<td>Pentachlorophenol</td>
<td>87-86-5</td>
<td>8.96E-02</td>
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<td>8.96E-02</td>
<td>4.48E-05</td>
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<tr>
<td>Phenol</td>
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<td>9.10E+01</td>
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<td>9.10E+01</td>
<td>4.55E-02</td>
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<tr>
<td>Phosphorus</td>
<td>7723-14-0</td>
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<td>9.08E+02</td>
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<tr>
<td>Polychlorinated Biphenyls</td>
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<td>1.75E-01</td>
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<td>1.75E-01</td>
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<td>Polycyclic Organic Matter</td>
<td>POM</td>
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<td>7.60E-02</td>
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<td>Propionaldehyde</td>
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<td>1.39E+02</td>
<td>6.94E-02</td>
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<td>Selenium &amp; Selenium Compounds (other than Hydrogen Selenide)</td>
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<td>3.30E+00</td>
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<td>Styrene</td>
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<td>6.41E-03</td>
<td>3.08E+00</td>
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<td>Tetrachloroethylene</td>
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<tr>
<td>Trichloroethylene</td>
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<td>5.27E+01</td>
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<td>Vinyl Chloride</td>
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<td>3.87E-03</td>
<td>3.16E+01</td>
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<td>Xylene</td>
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<td>--</td>
<td>1.05E-01</td>
<td>4.71E+01</td>
<td>2.36E-02</td>
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<td><strong>Total HAPs</strong></td>
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<td><strong>Maximum Single HAP</strong></td>
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<td></td>
<td>7.64</td>
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### 1.4.1 Subpart A – General Provisions

Any stationary source that is subject to any NESHAP regulation is also subject to the general notification, recordkeeping, and monitoring requirements of 40 CFR Part 63 General Provisions, unless the applicable regulation specifically exempts the source from the provisions of Subpart A. As detailed below, some of the equipment for the proposed plant will be subject to NESHAP rules; therefore, the general provisions will apply with respect to those sources.

### 1.4.2 Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines

This subpart applies to stationary reciprocating internal combustion engines (RICEs) located at a major source or area source of HAP emissions. The emergency
generator is considered an affected source under this subpart. Because this equipment unit is considered a new stationary RICE located at an area source, the equipment may comply with this subpart by meeting the requirements of NSPS Subpart JJJJ, per 40 CFR Part 63 §63.6590(c)(1). Sinova will comply with this subpart by complying with NSPS JJJJ requirements.

1.4.3 Subpart JJJJJJ - Area Sources: Industrial, Commercial, and Institutional Boilers
This subpart applies to industrial, commercial, and institutional boilers that are located at or part of an area source of HAPs. According to the subpart, a boiler is defined as “an enclosed device using controlled flame combustion in which water is heated to recover thermal energy in the form of steam and/or hot water. Controlled flame combustion refers to a steady-state, or near steady-state, process wherein fuel and/or oxidizer feed rates are controlled.”

The proposed plant does not include any equipment that meets the definition of a boiler for this subpart; therefore, this subpart does not apply.

1.4.4 Subpart YYYYYY - Area Sources: Ferroalloys Production Facilities
This subpart applies to ferroalloys production facilities that are an area source of HAPs. A ferroalloy production facility is defined as a facility that manufactures “silicon metal, ferrosilicon, ferrotitanium using the aluminum reduction process, ferrovanadium, ferromolybdenum, calcium silicon, silicomanganese zirconium, ferrochrome silicon, silvery iron, high-carbon ferrochrome, charge chrome, standard ferromanganese, silicomanganese, ferromanganese silicon, calcium carbide or other ferroalloy products using electrometallurgical operations including electric arc furnaces (EAFs) or other reaction vessels.” An electrometallurgical operation affected source is considered new if construction or reconstruction of the EAF or other reaction vessel commenced after September 15, 2008.

The proposed facility is considered a ferroalloy production facility and is an area source of HAPs. Since the facility will commence construction after September 15, 2008, the proposed plant will be considered new under this subpart. Sinova will comply with all applicable standards (including opacity) and testing, monitoring, reporting, and recordkeeping requirements of this subpart.
1.5 State Emission Limits and Regulations

1.5.1 0400-30-39 Standards of Performance for New Stationary Sources
The provisions of 40 CFR 60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines) are adopted by reference in 0400-30-39-.02(2). Applicability and requirements of this rule are summarized in Section 4.3.4 of the application.

1.5.2 1200-03-01 General Provisions
These regulations are intended to implement provisions of the “Tennessee Air Quality Act” and are known as the Tennessee Air Pollution Control Regulation. This rule does not contain any requirements specific to the facility.

1.5.3 1200-03-03 Ambient Air Quality Standards
This section provides the Tennessee Ambient Air Quality Standards. The modeling assessment in Section 6 discusses compliance with these standards. In addition to the criteria pollutant standards, this section includes guidance levels for gaseous fluorides expressed as hydrogen fluoride (HF) and hydrogen chloride (HCl). Sinova does not emit gaseous fluorides but does emit HCl from the furnaces. Compliance with the HCl guidance level is discussed in Section 6 of the application.

1.5.4 1200-03-05 Visible Emission Regulations
Per 1200-03-05-.04(2), SAFs at the facility are exempt from the visible emission limit in this section, because there is an applicable visible emissions standard under chapter 1200-03-16 (New Source Performance Standards). The SAFs will produce silicon metal and is therefore subject to the opacity limit in 1200-03-16-.27(3)(a)3. (Ferroalloy Production Facilities – Standards for Particulate Matter and Opacity). Per 1200-03-05-.01(1), the opacity of emissions from other emission units at the facility is limited to 20 percent for an aggregate of more than 5 minutes in any 1 hour, or more than twenty 20 minutes in any twenty-four 24 hour period.

1.5.5 1200-03-06 Non-Process Emission Standards
This rule limits the particulate emissions for existing and new non-process equipment based on the size and construction or modification date of the equipment. “Process emission” is defined as any emission of an air contaminant to the ambient air other than that from fuel burning equipment, incinerator, wigwam burners, or open burning. “Fuel burning equipment” is defined as any equipment, device, or contrivance and all appurtenances thereto, in which fuel is burned for the primary purpose of producing thermal or mechanical energy and in which the material being heated is not contacted by, and adds no substance to, the products of combustion.

Because the primary purpose of the facility will be to produce silicon metal rather than thermal or mechanical energy, the non-process emission standards in 1200-03-06 do not apply to any individual source at the proposed facility.
1.5.6 1200-03-07 Process Emission Standards
This rule limits particulate emissions from existing and new process equipment. Using the process weight rate limit equation provided in 1200-03-07-.03 Table 2 for new processes, emissions from the SAFs will be subject to the process-based emission limits in Table 2 of 1200-03-07. Based on the expected hourly raw material consumption rate, the SAFs would be subject to a particulate emission rate of 32.5 lb/hr. However, per 1200-03-07-.04(1) the maximum allowable emission as determined by any of the equations in 1200-03-07 shall not be less than 0.02 grains per dry standard cubic foot of stack gases. Based on the expected volumetric exhaust flow rate from the main baghouse (419,129 scfm), the particulate emission limit imposed on the SAFs by 1200-03-07 is 71.9 lb/hr. Also, Table 2 would apply to various units that are controlled by baghouse, but the BACT limit of 0.0022 gr/dscf limit would override Table 2. Table 2 would apply to the Slag Crushing unit, but the BACT lb/hr PM limit is stricter than Table 2. Table 2 could apply to the Ladle Preheat units, but the BACT proposal is stricter.

1.5.7 1200-03-08 Fugitive Dust
This rule requires facilities to take reasonable precautions to prevent particulate matter from becoming airborne and prohibits visible fugitive dust emissions beyond the property line. The applicant will comply with the requirements of this rule, including during periods of construction.

1.5.8 1200-03-09 Construction Permits
This rule requires facilities to obtain a construction permit prior to initiating construction and applies to both major and minor stationary sources. The applicant is complying with the requirements of this rule by submitting this construction permit application.

1.5.9 1200-03-11 Hazardous Air Contaminants
This rule details requirements for specific source categories and emission units with the potential to emit the following designated hazardous air contaminants: asbestos, beryllium, mercury, vinyl chloride, benzene, radionuclides, and inorganic arsenic. The proposed facility will not be among the source categories or include
any of the emission units subject to the rule and is therefore not subject to any of the requirement of this rule.

1.5.10 1200-03-14 Control of Sulfur Dioxide
This rule limits the sulfur dioxide emissions from process equipment in Class VI counties, which includes Lake County, to 2,000 ppmvd or less. The facility will comply with this rule by limiting the sulfur content of raw materials.

1.5.11 1200-03-16 New Source Performance Standards
Tennessee has its own NSPS rules, which apply in addition to any federal NSPS rules to which may be applicable to an affected source. The SAFs are affected facilities under Section 1200-03-16-.27 (Ferroalloy Production Facilities), and, while many of the requirements are similar to those in 40 CFR Part 60 Subpart Z (Ferroalloy Production Facilities), there are some differences. Sinova will comply with both the federal and state rules and will request a variance if there are incompatible requirements.

1.5.12 1200-03-18 Volatile Organic Compounds
This rule limits the emissions of Volatile Organic Compounds (VOCs) from specific sources. One of these sources is petroleum liquid storage in external fixed roof tanks. Because the capacity of each tank at the Facility that will be used to store petroleum liquids will be less than 40,000 gallons, this rule will not apply to any of the proposed tanks. Also, the Diesel storage tank is not subject to 1200-03-18-.48 Volatile Organic Liquid Storage Tanks. The diesel fuel storage tank is subject to BACT requirements, but because the estimated VOC emissions are so low, there is not a numeric VOC standard, only work practice requirements.

1.5.13 1200-03-26 Administrative Fees Schedule
This rule outlines fees associated with the Tennessee visible emissions evaluation course fees, and construction and annual emission fees. In accordance with this rule, the applicant has included the appropriate fee payment for this construction permit application.

1.5.14 1200-03-27 Nitrogen Oxides
This rule establishes the emission standards and requirements for certain sources of NOX. Applicability of the rule is limited to stationary sources in Davidson, Rutherford, Sumner, Williamson, or Wilson Counties. Because the Facility will be located in Lake County, the requirements of this rule will not apply to the Facility.

Also, an electric arc furnace would not be subject to the NOX SIP Call.
1.6 Compliance Assurance Monitoring
EPA established the Compliance Assurance Monitoring (CAM) program to regulate emission sources that employ a control device to maintain compliance with an enforceable emission limit. 40 CFR Part 64.2 establishes the three applicability criteria for the CAM program:

- The unit is subject to an emission limit;
- The unit uses a control device to achieve compliance with that limit; and
- The unit has pre-control emissions of 100 percent of the major source threshold.

Compliance with the requirements of this subpart, if needed, will be addressed as part of the proposed plant’s operating permit application process.

1.7 Chemical Accident Prevention Provisions
40 CFR Part 68 sets the requirements for owners and operators of stationary sources concerning the prevention of accidental releases of regulated substances, and the State accidental release prevention programs approved under Clean Air Act section 112(r). This regulation is designed to prevent the accidental release of the toxic and flammable substances regulated under 40 CFR 68.130. A stationary source that has more than a threshold quantity of a regulated substance in a process must develop a Risk Management Plan (RMP).

Sinova does not anticipate processing any chemicals that would trigger applicability of the chemical accident prevention provisions.

1.8 Greenhouse Gas Reporting
40 CFR Part 98 establishes mandatory GHG reporting requirements for owners and operators of certain facilities that directly emit GHG as well as for certain fossil fuel suppliers and industrial GHG suppliers. Included in this rule is the requirement to quantify and report GHG emissions on an annual basis.

Sinova will evaluate the applicability and reporting requirements of the GHG regulations upon operation of the proposed plant.
2 BEST AVAILABLE CONTROL TECHNOLOGY

2.1 Background and Methodology
Any major stationary source or major modification subject to PSD must conduct an analysis to ensure the application of BACT, which is defined in Tennessee regulations (1200-03-02-.01(1)(g)) as:

“…an emission limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under these rules which would be emitted from any proposed new or modified air contaminant source which the Technical Secretary, on a case-by-case bases, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.”

In a December 1, 1987, memorandum from the U.S. Environmental Protection Agency (USEPA) Assistant Administrator for Air and Radiation, the agency provided guidance on the “top-down” methodology for determining BACT. The “top-down” process involves the identification of all applicable control technologies according to control effectiveness. Evaluation begins with the “top,” or most stringent, control alternative. If the most stringent option is shown to be technically or economically infeasible, or if environmental impacts are severe enough to preclude its use, then it is eliminated from consideration and then the next most stringent control technology is similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by technical or economic considerations, energy impacts, or environmental impacts. The top control alternative that is not eliminated in this process becomes the proposed BACT basis.

Despite the use of the phrase “Control Technology” in the name, BACT alternatives are not limited to add-on control equipment or alternative equipment designs, production processes, or techniques. BACT may be a work practice or operational standard if it is not feasible to impose an emissions standard on the source of the emissions. BACT for fugitive emissions is frequently a work practice standard.

The top-down BACT analysis presented here contains five basic steps, and follows USEPA’s suggested approach:
• Step 1: Identify all available emission reduction alternatives with practical potential for application to the specific emission unit for the regulated pollutant under evaluation;

• Step 2: Eliminate all technically infeasible alternatives;

• Step 3: Rank remaining alternatives by effectiveness;

• Step 4: Evaluate the economic, energy, and environmental impacts starting with the most effective alternative; and

• Step 5: Select BACT, which will be the most effective, practical alternative not rejected in the previous steps.

2.1.1 Technical Feasibility

EPA's new source review guidance suggests that "…control alternatives should include not only existing controls for the source category in question, but also (through technology transfer) controls applied to similar source categories and gas streams." EPA guidance also indicates that in order for such a technology transfer to be judged technically feasible, its application should be relatively seamless and free of technical speculation. For this BACT analysis, technical feasibility was determined using the following criteria:

The control technology was previously applied to emission streams sufficiently similar to the one being proposed. Any differences between the proposed current and previous applications should not impact the performance of the control technology. The control technology and emission limit should not cause deterioration of the related process equipment, or irretrievably affect product quality.

The emission limit associated with the control technology, including consideration for normal and reasonable variability in the level control, should be consistently achievable under normal and conscientious operating practices.

The emission limits should not result in frequent violations despite a well-designed and installed, and conscientiously operated control system. Frequent violations increase costs to both the source and the regulatory agency (and consequently the public) as a result of investigation, litigation, and reconstruction, and do not benefit the environment.

2.1.2 Economic Justifiability

An economically justifiable control technology is neither the maximum amount a source is able to spend, nor the maximum amount any source in the same source category has spent in the past. For this BACT analysis, economic justifiability was determined based on cost effectiveness. If the cost per ton of pollutant reduced for a particular technically feasible control system is disproportionately high compared
to the cost per ton in recent BACT determinations for other sources in the same source category, the control technology is deemed not cost-effective, and can be rejected as economically unjustifiable.

The following resources were utilized to research alternative methods of control:

USEPA Control Technology Database, also known as the Reasonably Achievable Technology (RACT)/BACT/Lowest Achievable Control Technology (LAER) Clearinghouse (RBLC);

Air quality permits issued by state and local agencies; and

Information provided by control technology vendors.

2.2 Emission Units Subject to BACT

The following emission units are addressed by this BACT analysis:

- NOX, SO2, PM, PM10, PM2.5, CO, VOCs, and GHGs from Two SAFs;
- Three natural gas-fired ladle pre-heaters, which are expected to emit NOXx, CO, SO2, VOCs, PM/PM10/PM2.5, and GHGs; PM emissions from material and product processing;
- PM emissions from raw material handling and storage;
- PM, NOX, CO, VOCs, and SO2 emissions from the emergency generator; and
- PM emissions from roadways.
- VOC from diesel fuel storage

2.3 Submerged Arc Furnace

The Facility will include two SAFs, each rated at 42 MW and 3.86 tons of silicon produced per hour. Silicon is produced in the SAFs by a process that involves a carbothermic reduction reaction. Silicon oxide (SiO2) is reduced using carbon (C) to produce elemental silicon (Si) and carbon monoxide (CO). The high temperature required to promote the reduction reaction is supplied by an electric arc, not combustion, and the carbon monoxide produced by the reaction is not the result of combustion. Nevertheless, the silicon production process results in criteria pollutant emissions that are similar in nature to those produced by combustion sources, and are subject to BACT: NOXx, SO2, PM, PM10, PM2.5, CO, VOCs, and GHGs. Because combustion operations are much more common than silicon production operations, many of the emission reduction alternatives considered here have been developed for application to combustion sources and would be adapted for reducing emissions from the proposed SAFs.
In the search for similar sources in the RBLC to use as a basis for comparison of emission reduction alternatives, electric arc furnaces (EAFs) at steel mills were often grouped with SAFs. The EAFs used to melt scrap for steel production is an open arc furnace that operates in an oxygen-rich atmosphere. These EAFs commonly use 600 mm-diameter graphite electrodes which are consumed by oxidation during the melting process. The primary emissions from these EAFs are dust produced by the steel melting process and off-gases that contain high levels of oxygen. There are many steel plants using EAF melting processes in operation in the US.

The SAFs used for smelting ores, such as those proposed for the Facility, are operated with a packed bed of raw materials and semi-closed furnace hood configuration that allows the carbon reductants to react with the ore, in our case high purity silica. The SAF uses carbon electrodes that are 1,000 to 1,400 mm in diameter, depending on the furnace power input, and, because the electrodes provide a portion of the reductant needed by the smelting process, they are consumed as part of the process. The SAF arc is formed under a packed bed of raw materials that absorb the gases formed in the arc cavity as they pass upward through the bed and transforms the gases into a CO-rich off-gas that contains any silica that escapes the bed as a fine particulate dust. This dust is captured in large baghouse filters and sold as a high-value by-product.

In summary, EAFs used for steel making are more similar to combustion sources than SAFs used to make silicon because of the extensive oxidation that occurs, as opposed to the reductive nature of the silicon smelting process. For this reason, the RBLC entries that involve EAFs used to make steel are not included in the SAF BACT assessment.

2.3.1 \( \text{NO}_x \) BACT Analysis

\( \text{NO}_x \) is generated when air is heated to a temperature great enough for the nitrogen in the air to combine with oxygen to form nitric oxide \((\text{NO})\). Depending upon conditions, some portions of the NO will react to form nitrogen dioxide \((\text{NO}_2)\). In SAFs, which are not combustion sources, NO is formed above the furnace surface, where air is introduced to combust the CO produced by the silicon production process and the temperature is sufficient to promote creation of NO. Thermal formation is the primary mechanism, but nitrogen components from the reduction materials used by the silicon production process (i.e., coal, charcoal, and/or wood) can also contribute by reacting with oxygen to form \( \text{NO} \).

2.3.1.1 Step 1: Identify all available emission reduction alternatives

There are a variety of options available for reducing \( \text{NO}_x \) emissions. Some options involve measures intended to prevent \( \text{NO}_x \) formation, while others utilize add-on devices to remove \( \text{NO}_x \) after it has formed.

Good combustion practices include design elements and operational strategies intended to
regulate the amount and distribution of excess air in the combustion zone to ensure that enough oxygen is present for complete combustion, while not creating high temperatures that promote the creation of NOX.

Add-on controls such as selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR), and non-selective catalytic reduction (NSCR) systems are widely-used technologies for controlling NOX emissions from combustion sources. Add-on controls are considered post-combustion controls, as they are installed downstream of the combustion process and act on the combustion exhausts.

SCR employs ammonia in some form (e.g., anhydrous, aqueous, or in urea) in the presence of a catalyst to convert NOX to nitrogen and water. Ammonia is injected into the exhaust gas stream and the ammonia/exhaust gas mixture is passed through a catalyst bed. The NOX reacts with the ammonia, aided by the catalyst, to form nitrogen and water. The catalyst is used to lower the activation energy of the NOX decomposition reaction.

SNCR is similar to SCR in that it uses ammonia mixed with the exhaust gas to convert NOX to nitrogen and water. However, SNCR does not utilize a catalyst to promote the reaction, and therefore is highly dependent on the ability to achieve uniform mixing of the ammonia into the exhaust gas within the temperature range at which the reaction will occur, typically 1,600 – 2,200 °F. The consequences of operating outside the optimum temperature range are severe; the reagent will not react with the NOX and significant quantities of ammonia will be discharged from the stack (ammonia slip).

NSCR systems employ a catalyst to reduce NO using residual hydrocarbons (HC) and CO. Because HC and CO will more readily react with oxygen than NOX, there must be little oxygen in the exhaust (between 0.5 to 4 percent, depending upon the system). NSCR systems are widely used to control NOX in rich burn engines and as a “three-way” catalyst (reducing hydrocarbons, CO, and NOX) in the automotive industry.

A review of the RBLC database, presented in Table 6, did not provide any additional emission reduction alternatives but did show that potential control options include a combination of the alternatives. Based on the above, the following emission reduction alternatives are identified:

- Good combustion practices
- SCR
- SNCR
- NSCR
- Combinations of pre- and post-combustion alternatives presented above
Table 7. Recent RBLC Entries for NOx Emissions from SAFs

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issue Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum (MW)</th>
<th>Limit (lb/MW-hr)</th>
<th>Emission Reduction Method</th>
</tr>
</thead>
</table>

Using the Simcala limit of 5.96 lb/MW-hr, the Sinova plant would be restricted to 42 MW per unit x 5.96 lb/MW-hr = 250 lb NOx/hr or approximately 64.8 lb NOx/ton of silicon. This is compared with the Sinova proposed factor of 45.0 lb NOx per ton of Silicon produced.

Also note that Mississippi Silicon in Burnsville Mississippi has a PSD BACT limit of 45.0 lb NOx/ton of silicon produced.

2.3.1.2 Step 2: Eliminate technically infeasible alternatives

The NOX emission reduction alternatives identified in Step 1 of the BACT process were evaluated to determine whether each was technically feasible for application to an SAF.

Because the SAF is not a combustion unit, good combustion practice is technically not a feasible emission reduction alternative. However, the concept of tailoring equipment design and/or operation to achieve reduced emissions is a universally applicable concept that will be referred to hereafter in this analysis as “best practices.” In this case, Sinova has contracted with design firms to employ computational fluid dynamics (CFD) for the purposes of designing a furnace system that is expected to result in reduced NOX emissions.

SCR systems are frequently used to reduce NOX emissions from combustion sources but have never been applied to reduce NOX emissions from an SAF. Vendors and/or manufacturers of SCR systems used to reduce NOX emissions from large coal-fired power plants were contacted but were unwilling to provide a cost estimate for application of SCR to an SAF with performance and reliability guarantees, because it has never been done before, and it is unclear how trace elements in the exhaust would interact with the catalyst, even downstream of the proposed baghouse used to capture silica. Because using SCR to reduce NOX emissions from an SAF has never been achieved in practice, this alternative is removed from consideration as BACT for NOX emitted by the proposed SAFs.

Like SCR, SNCR has never been applied to reduce NOX emissions from an SAF. The temperature range required for the reduction reaction to take place is present in the SAF exhaust system, but only upstream of the proposed baghouse. Injecting ammonia or urea upstream of the baghouse could cause the baghouse to plug and may negatively impact the quality of the silica fume collected, which is a saleable commodity. While it is theoretically possible to locate an SNCR system downstream of the proposed baghouse and to reheat the exhaust to the temperature required for the reduction reaction, but this configuration has never been achieved in practice, and so SNCR is removed from consideration as BACT to reduce NOX emitted.
by the proposed SAFs.

The proposed SAFs will not operate similar to a rich-burn engine, and the exhaust from the furnace will not be the low-oxygen atmosphere necessary for NOX in the exhaust to be reduced by CO. NSCR is removed from consideration as BACT for NOX emitted by the proposed SAFs.

2.3.1.3 Step 3: Rank remaining alternatives
Because there is only one remaining alternative (best practices), no ranking is necessary.

2.3.1.4 Step 4: Evaluate economic, energy, and environmental impacts
Because there is only one remaining alternative (best practices), no evaluation of economic, energy, and environmental impact is necessary.

2.3.1.5 Step 5: Select BACT
Based on the analysis presented in this section, and the value of 45.0 lb NOx/ton Si as proposed by Sinova in an email submitted February 23, 2022, that value will be used as BACT for NOX. Also, Sinova proposes that BACT for NOX emissions from the proposed SAFs be the work practice of employing best practices design and operation.

Due to compliance with ambient air standards for the applicable NOx emissions averages, the following BACT limits are set for the SAF’s:

Daily (24 hr.) limit: 3,333 lb NOx per SAF (6,666 pounds per day NOx for both SAF’s combined)

Any consecutive 12-month period: 608 tons NOx per SAF (1,216 tons NOx per any consecutive 12-month period for both SAF’s combined)

2.3.2 CO and VOC BACT Analysis
CO will be a product of the chemical reaction in the SAF between the SiO2 and the carbonaceous reductants (i.e., coal, charcoal, and wood). Despite the high-temperature conditions in the SAF, some of the volatiles from the reductants will escape the process and be emitted as VOCs.

2.3.2.1 Step 1: Identify all available emission reduction alternatives

Note that Mississippi Silicon in Burnsville, Mississippi has the following PSD-BACT values

CO: 34.0 lbs/ton of Silicon produced (3-hour average)

VOC: 2.4 lb/ton (30-day period)

Similar to NOX, the options available for reducing CO and VOC emissions include those intended to prevent formation, as well as those that seek to remove the pollutant from the exhaust or convert it to a non-pollutant.

As with NOX, good combustion practices are an effective CO and VOC control technology for many combustion operations. Processes that emit CO and/or VOCs are sometimes able to modify raw materials or
operational practices to reduce emissions. Add-on equipment used to remove or destroy CO and VOC emissions include various forms of thermal oxidation and catalytic oxidation.

Thermal oxidation, sometimes referred to as thermal incineration, flaring, or afterburning, seeks to combust the pollutant(s), leaving CO₂ and H₂O. Destruction efficiency is dependent on the temperature of the gas, residence time, inlet pollutant concentration, pollutant types, and degree of mixing.

Catalytic oxidation uses a catalyst to reduce the temperature at which the oxidation reaction between oxygen, CO, and VOCs will proceed. Exhaust gases are introduced into a catalytic bed, and the catalyst oxidizes CO to CO₂ (and VOCs to CO₂ and H₂O). However, the catalyst can also promote other, less desirable oxidation reactions such as ammonia to NOₓ and SO₂ to SO₃. Consequently, the presence of an oxidation catalyst can cause emissions of other pollutants to increase, and therefore its design needs to be carefully considered.

An RBLC database search did not reveal any additional emission reduction alternatives. Based on the discussion above, the following emission reduction alternatives are identified:

- Good combustion practices
- Thermal oxidation
- Catalytic oxidation

2.3.2.2 Step 2: Eliminate technically infeasible alternatives

The CO and VOC emission reduction alternatives identified in Step 1 of the BACT process were evaluated to determine whether each was technically feasible for application to an SAF.

As discussed in the NOₓ BACT evaluation, the SAF is not a combustion unit; therefore, good combustion practice is technically not a feasible emission reduction alternative, and best practices regarding equipment design and operation will be used to minimize emissions to the degree possible, without increasing emissions of other pollutants or negatively impacting product quality.

A thermal or catalytic oxidation system used to reduce CO and VOC emissions from the SAF would have to be located downstream of the baghouse used to capture silica fume, which is a saleable product primarily used as a concrete additive. While it is theoretically possible to use either a thermal or catalytic oxidation system to reduce CO and VOC emission from an SAF, there are significant technical challenges. There is no evidence that either alternative has ever been applied to reduce emissions from an SAF or similar equipment.

The expected concentrations of CO and VOC in the exhaust of the proposed SAFs are expected to be on the order of 55 parts per million by volume (ppmv) and 29 ppmv, respectively. These concentrations are more typical of the outlet of an oxidizer, not the inlet stream to be treated. Because the exhaust volume is so large (~ 419,000 actual cubic feet per minute (acfm)), and pollutant concentrations are so small, the oxidizer would have to be physically massive to achieve the residence time necessary to achieve a significant destruction efficiency. Further, the pollutants emitted by the gas combustion required to generate the heat input
necessary for a thermal oxidizer to raise the temperature of the exhaust to the levels necessary for pollutant destruction (~500 MMBtu) would offset most, if not all, of the pollutant reduction achieved. Similar to the SCR system discussed in a previous section, a catalytic oxidizer would be subject to poisoning by trace elements in the exhaust.

Because using thermal or catalytic oxidizers to reduce CO and VOC emissions from an SAF has never been achieved in practice, these alternatives are removed from consideration as BACT for CO and VOCs emitted by the proposed SAFs.

2.3.2.3 Step 3: Rank remaining alternatives
Because there is only one remaining alternative (best practices), no ranking is necessary.

2.3.2.4 Step 4: Evaluate economic, energy, and environmental impacts
Because there is only one remaining alternative (best practices), no evaluation of economic, energy, and environmental impact is necessary.

2.3.2.5 Step 5: Select BACT
Based on the analysis presented in this section, Sinova proposes that BACT for CO and VOC emissions from the proposed SAFs be the following:

- **CO:** 34.0 lbs/ton of Silicon produced (daily average). This value was proposed by Sinova in an email submitted February 23, 2022.
- **VOC:** 2.4 lb/ton of Silicon produced (daily average), VOC is presented as carbon

Also the company shall use the work practice of employing best practices design and operation.

2.3.3 SO₂ BACT Analysis for submerged arc furnaces
SO₂ emissions are entirely dependent on the sulfur content of the raw materials charged to the SAFs to produce elemental silicon.

2.3.3.1 Step 1: Identify all available emission reduction alternatives
The Simcala Alabama plant has a BACT of 0.800%wt sulfur in coal

The Mississippi Silicon plant in Burnsville Mississippi has a SO₂ BACT of 52.0 lb/ton and use of low-sulfur coal

Techniques used to reduce SO₂ emissions from emission sources in general can be divided into two categories: those that seek to limit the quantity of sulfur-containing compounds in fuels or raw materials, and those that seek to remove SO₂ from exhaust gases after being created (i.e., flue gas desulfurization, or FGD).
Coal contributes the majority of the sulfur to the elemental silicon production process. The fraction of total carbon contributed by coal, as compared to charcoal and wood, will vary depending on the blend of reductants used in a given batch, which will be dictated by the customer’s product specification.

A review of the RBLC database did not reveal any emission reduction alternatives for SAFs. Based on the above, the following emission reduction alternatives are identified:

- Low-sulfur raw materials
- FGD

### 2.3.3.2 Step 2: Eliminate technically infeasible alternatives

Of the raw materials used to produce elemental silicon in an SAF, the reductants are the primary source of sulfur. It is technically feasible to obtain low-sulfur coal, and both charcoal and wood are inherently low-sulfur materials. However, it is not possible to eliminate coal from the process without negatively affecting the produced elemental silicon. Using low-sulfur raw materials is a technically feasible alternative for reducing SO$_2$ emissions from the proposed SAFs.

FGD systems can be divided into wet and dry designs. Wet designs, which are more efficient than dry, inject an aqueous slurry of sorbent, usually limestone or lime, into the flue gas. Semi-dry or Spray Dry FGD systems use a slurry of reagent (typically lime or hydrated lime) that reacts with the SO$_2$, after which the moisture is evaporated by the heat of the exhaust, and the dry solid product is collected by a particulate control system. Dry FGD systems, also called Dry Sorbent Injection (DSI) systems, inject a powdered sorbent, typically hydrated lime, trona, or sodium bicarbonate, into the flue gas. FGC systems are typically used to reduce SO$_2$ emissions from large coal-fired boilers at electric generation facilities, as well as certain other industrial facilities that generate SO$_2$ (e.g., metal smelters, petroleum refineries).

Modern FGD systems applied to large coal-fired boilers are typically able to achieve 99 or greater percent reduction in SO$_2$. However, the exhaust from an SAF differs considerably from that of a coal-fired boiler, which has a moisture content of approximately 10 percent, and an uncontrolled SO$_2$ concentration in the range of 2,000 to 4,000 ppm. In contrast, the exhaust from the SAF has a moisture content of 1 to 2 percent, and a maximum SO$_2$ concentration of approximately 25 ppm. The low moisture content of the exhaust makes semi-dry FGD systems impractical.

Most applications to which FGD systems, wet or dry, are applied to reduce SO$_2$ emissions are relatively steady state. A boiler load or throughput rate of an industrial process may vary over long periods of time, but the sulfur content of the coal, ore, or other sulfur-containing materials typically does not vary. FGD systems are similarly steady and are not able to follow a widely- and quickly varying SO$_2$ concentration. Silicon production is a hybrid between a batch and continuous process, and the various forms of carbon in the raw materials mixture become involved at different stages, so the sulfur from the coal will not be oxidized to SO$_2$ at a steady rate throughout the process.

For the reasons stated above, FGD is deemed to be not technically feasible for reducing SO$_2$ emissions from
the proposed SAFs.

2.3.3.3 Step 3: Rank remaining alternatives
Because there is only one remaining alternative (low-sulfur raw materials), no ranking is necessary.

2.3.3.4 Step 4: Evaluate economic, energy, and environmental impacts
Because there is only one remaining alternative (low-sulfur raw materials), no evaluation of economic, energy, and environmental impact is necessary.

2.3.3.5 Step 5: Select BACT
Based on the analysis presented in this section, it is proposed that BACT for SO2 emissions from the proposed SAFs should be the work practice of using low-sulfur raw materials (up to 1% sulfur) and compliance with 21.1 lb SO2 per ton of silicon produced. This value was proposed by Sinova in an email submitted February 23, 2022, a 1% maximum coal sulfur limit is proposed as BACT as a worst-case value. Based on a factor obtained from testing at the Mississippi Silicon plant in Burnsville, Mississippi, the company estimates that 67% of all sulfur introduced to the process will be oxidized to SO2. The 67% conversion of sulfur to sulfur dioxide will be used for compliance purposes until a factor based on results stack testing for SO2 emissions can be developed.

The company has proposed an emission factor of 21.1 pounds of SO2 per ton of Silicon produced, and that value will be used as BACT.

The Division may require the facility to develop an equation to calculate the SO2 emissions on an hourly basis after the SAF test results for SO2 are provided.

Due to compliance with ambient air standards for the applicable SO2 emissions averages, the following BACT limits are set for the SAF’s:

Daily (24 hr) limit: 1,389 lb SO2 per SAF (2,778 pounds per day SO2 for both SAF’s combined)

Any consecutive 12-month period: 253 tons SO2 per SAF (506 tons per any consecutive 12-month period for both SAF’s combined)

2.3.4 PM, PM10, and PM2.5 BACT Analysis
Particulate matter emissions are typically generated by mechanical processes, chemical processes, or by combustion. In this case, the PM created by the silicon production process is amorphous (i.e., non-crystalline) SiO2, which is called “silica fume,” and, when used as a concrete additive, makes concrete stronger and more durable. Because the PM in the exhaust is a valuable commodity, equipment used to capture PM from the SAFs is considered product recovery equipment by Sinova. Nevertheless, this section provides an evaluation of PM emission reduction alternatives. PM emissions from the SAFs are expected to be entirely composed of PM2.5, so all PM and PM10 are PM2.5, and, therefore, any reference to PM in this section is also a reference to PM10 and PM2.5.

2.3.4.1 Step 1: Identify all available emission reduction alternatives
Alternatives for reducing PM emissions includes those that seek to prevent formation of the PM, and
those that seek to capture the PM after it has been formed (i.e., add-on controls). Changes to the elemental silicon production process could influence the quantity of silica fume generated by the process.

Add-on systems used to reduce PM emissions include cyclone separators, wet collectors, electrostatic precipitators (ESPs), and fabric filters.

A cyclone separator, also called simply a “cyclone,” employs centrifugal force generated by spinning a gas stream in a cylindrical chamber. Because operating costs and collection efficiency for fine PM are low, cyclones are often used to remove larger particulate matter before the exhaust reaches the primary control device (e.g., ESP, fabric filter).

Wet collectors use a liquid, typically water, to capture PM or to increase the size of aerosol to facilitate capture in another control device. Configurations include spray chambers (with or without impingement baffles), wet cyclones, and venturi scrubbers. They tend to complicate handling of the collected PM by creating a sludge.

ESPs remove PM from an exhaust stream by imposing an electrical charge on the particles and then attracting them to an oppositely charged plate. The dust collected on the charged plates is periodically removed by vibrating or rapping of the plates.

Fabric filters, frequently configured as “baghouses,” use various types of materials, typically fabrics, to trap PM while exhaust gases pass through voids in the material. The dust that becomes caked on the fabric bags is removed periodically by shaking, blowing jets of air, or using sonic horns.

A review of the RBLC database, presented in Table 8, did not provide any additional emission reduction alternatives.

Table 8. Recent RBLC Entries for PM/PM10/PM2.5 Emissions from SAFs

<table>
<thead>
<tr>
<th>RBLIC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum (MW)</th>
<th>Limit (gr/dscf)</th>
<th>Emission Reduction Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL-0124</td>
<td>9/18/1998</td>
<td>Simcala Inc</td>
<td>Montgomery, AL</td>
<td>Furnace, Electric Arc Silicon</td>
<td>4</td>
<td>0.0032</td>
<td>Positive Pressure Baghouse and Multiclones</td>
</tr>
</tbody>
</table>

Also, the Burnsville Mississippi plant has a PM/PM10/PM2.5 BACT of 0.005 gr/scf limit.

2.3.4.2 Step 2: Eliminate technically infeasible alternatives
Silica fume is a by-product of the elemental silicon production process and cannot be reduced through process changes without negatively affecting the product.
However, the process will be conducted using best practices, so the quantity of silica fume generated will be appropriate considering the quantity of elemental silicon generated. Best practices operation of the SAF is considered the baseline alternative.

Cyclones are technically feasible for collecting PM from SAFs but are the least effective add-on alternative because the silica fume PM is extremely small.

Wet scrubbers are not technically feasible because the pozzolanic properties of silica fume that makes it a valuable concrete additive would cause the sludge created by the scrubber to harden and plug the system. There are no instances of wet scrubbers being used to reduce PM emissions from SAFs, and they are removed from consideration as BACT for reducing PM emissions from the SAF exhaust.

The SAF exhaust will contain traces of metal compounds which will strongly adhere to the charged plates of the ESP and will affect the performance of the ESP until they are removed. There are no instances of ESPs being used to reduce PM emissions from SAFs, and they are removed from consideration as BACT for reducing PM emissions from the SAF exhaust.

Baghouses are the most effective method of collecting silica fume from an SAF, have been employed in that capacity for all SAFs of which Sinova is aware. A baghouse is considered technically feasible as BACT for reducing PM emissions from the SAF exhaust.

2.3.4.3 Step 3: Rank remaining alternatives
Ranking all technically feasible PM emission reduction alternatives in descending order:

- Baghouses – 99.9 percent reduction (0.005 grains per dry standard cubic foot (gr/dscf) was deemed BACT for PM emissions from the most recently permitted submerged arc furnaces at Mississippi Silicon);
- Cyclones – 50 to 90 percent reduction; and
- Best Practices – baseline

2.3.4.4 Step 4: Evaluate economic, energy, and environmental impacts Because the most effective combination of alternatives (i.e., baghouse and best practices) will be employed to reduce PM emissions from the proposed SAFs, no evaluation of economic, energy, and environmental impact is necessary.

2.3.4.5 Step 5: Select BACT
Based on the analysis presented in this section, the BACT for PM emissions from the proposed SAFs be is set at 0.0022 gr/dscf, achieved through employing fabric filters (i.e., baghouses) and also the permittee shall use best practices design and operation. The value of 0.0022 gr/dscf allowable PM emissions is set for each PM filterable, PM10, PM2.5, and combined PM from all PM categories.
2.3.5 Startup BACT Analysis

Sinova will use graphitized electrodes that arrive at the site pre-baked, meaning that the furnace lining curing periods, and associated emissions, experienced by other existing silicon plants will not occur. Sinova will also employ a special baghouse filter compartment equipped with sacrificial bags during startup that will remove particulate matter from the furnace off-gas before it is released to the atmosphere. This will eliminate the need to bypass the baghouse filter system as is normally done at other existing silicon plants. Best operational practices will be used during shutdown to minimize emissions. These techniques and operational methods are proposed as startup and shutdown BACT for the SAFs.

2.3.6 GHG BACT Analysis

The elemental silicon production process produces CO as a by-product. While CO is not considered a GHG, high temperature conditions in the SAF cause the majority of the CO to be oxidized to CO₂. In addition, a small amount of methane (CH₄) is generated from the carbonaceous reductants in the SAF, and an even smaller amount of nitrous oxide (N₂O) is created from nitrogen (N₂) and oxygen (O₂) from air introduced to the upper part of the SAF that combines after dissociating in the high furnace temperatures.

2.3.6.1 Step 1: Identify all available emission reduction alternatives

Most GHG emission reduction alternatives seek to decrease GHG emission intensity by increasing efficiency, whether it be through better use of fuels or raw materials, or improved equipment or process design. Alternatives we were able to identify include:

- Process control improvements – Modern control systems can optimize operations, which makes more effective use of the energy that drives the reactions in the SAF.
- Variable speed drive (VSD) fans – The volume of the flue gas produced by the SAF varies over time and having the ability to adjust the exhaust flow rate to match the flue gas volume allows for more effective use of energy by the SAF.
- Ultra-high-power transformers – Use of transformers with capacities greater than 700 kilovolt-amps (kVA) reduce energy losses and improve SAF productivity.
- Post-process combustion of flue gases – In certain types of furnaces, energy from combusting CO and H₂ in the flue gas is used to heat raw materials before entering the furnace, thus reducing energy costs.
- Direct current arc furnace design – Certain types of furnaces have been designed to operate with direct current (DC) and a single electrode. These designs have demonstrated reduced power consumption compared to alternating current (AC) furnaces.
- Engineered refractories – Use of more durable materials reduces material and energy leakages, which increases the overall efficiency of the operation.
- Airtight operation – Limiting or eliminating the introduction of air into the furnace reduces thermal losses.
- Carbon capture and sequestration (CCS), which involves removing CO₂ from the flue gas, pressurizing it, transporting it to a storage or use location, and using or permanently storing it, is the


only add-on GHG emission reduction alternative identified.

2.3.6.2 Step 2: Eliminate technically infeasible alternatives
The emission reduction alternatives identified in the previous step are evaluated for technical feasibility, as applied to the proposed SAFs.

Process control improvements – Modern control systems are commonly employed in new SAFs used to produce elemental silicon and are considered technically feasible.

VSD fans – VSD fans are commonly employed in new SAFs used to produce elemental silicon and are considered technically feasible.

Ultra-high-power transformers – These transformers are commonly employed in new SAFs used to produce elemental silicon and are considered technically feasible.

Post-process combustion of flue gases – The concentration of combustible material in the flue gases from the proposed SAFs is insufficient to support combustion. This alternative is removed from consideration as BACT for reducing GHG emissions from the proposed SAFs.

Direct current arc furnace design – An SAF with a DC design has never been successfully used to produce elemental silicon. Because this alternative is experimental and has not been achieved in practice, it is removed from consideration as BACT for reducing GHG emissions from the proposed SAFs.

Engineered refractories – These materials are commonly employed in new SAFs used to produce elemental silicon and are considered technically feasible.

Airtight operation – The proposed SAFs are of a semi-enclosed design, which introduces air into the upper portion of the furnace to facilitate oxidation of the CO produced by the silicon-creation process. Limiting or eliminating the introduction of air would result in a potentially dangerous accumulation of CO and is considered technically infeasible.

CCS - As indicated in the previous section, there are four steps to the CCS process: 1) capture the CO2, 2) purify and compress the CO2, 3) transport the CO2, and 4) use or permanently store the CO2. Robust technologies are available for the first three steps, but commercially available alternatives for the use or permanent storage of CO2 are extremely limited.

While there are a considerable number of geological formations with the potential to store CO2, the suitability of any given site depends on many factors, including qualities such as porosity, permeability, potential for leakage, and proximity to the source of the CO2 to be stored. The U.S. Department of Energy’s Regional Carbon Sequestration Partnership has seven projects currently in the development phase that are evaluating the safety, permanence, and economics of industrial-scale CO2 geologic storage. Although none of these projects are commercially available for CO2 storage at the moment, or in the foreseeable future, the nearest is in Decatur, Illinois, approximately 240 miles from the proposed Facility.
Industrial uses of CO₂ include Enhanced Oil Recovery (EOR), increasing the yield of ammonia production, food and beverage manufacturing, pulp and paper manufacturing, fire-fighting equipment, and metal fabrication. Currently, the majority of industrial demand for CO₂, which is primarily for EOR, is met by CO₂ extracted from natural underground reservoirs. For the reasons outlined above, CCS is considered technically infeasible as a strategy for reducing GHG emissions from the proposed SAFs.

2.3.6.3 Step 3: Rank remaining alternatives
The top level of emission reduction is a combination of the technically feasible available emission reduction alternatives:

- Process control improvements;
- VSD fans;
- Ultra-high-power transformers; and
- Engineered refractories.

2.3.6.4 Step 4: Evaluate economic, energy, and environmental impacts
Because Sinova is proposing to employ the most effective remaining alternative, no analysis of economic, energy, and environmental impacts is necessary.

2.3.6.5 Step 5: Select BACT
Based on the review presented above, Sinova proposes that BACT for GHGs generated by the SAFs is utilization of new generation furnaces with inherently lower-emitting technologies and energy efficiency measures, and good operation and maintenance. Also a numeric value of 702,315 ton/yr will be set, and compliance will be determined from 40 CFR Part 98 Subpart K until the testing factor required by condition G16 has been incorporated into the permit. Testing is only required for CO₂.

2.4 Natural Gas-Fired Ladle Preheaters
The facility will operate three natural gas-fired ladle preheaters, each with a maximum design heat input capacity of 10 MMBtu/hr. The following pollutants are emitted from this source and are subject to BACT: CO, NOₓ, PM, SO₂, VOCs, and GHGs.

2.4.1 NOₓ BACT Analysis
2.4.1.1 Step 1: Identify all available emission reduction alternatives
A review of the RBLC database and recent permit applications provided the following summary of control options for NOₓ emissions from similar-sized natural gas combustion devices:

As shown in the table below, options for reducing NOₓ emissions from the natural gas-fired ladle preheaters are:

- Low-NOₓ burners; and
- Good combustion practices.
Table 9. Recent RBLC Entries for NOx Emissions from Ladle Preheaters

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum (MMBtu/hr)</th>
<th>Limit (lb/MMBtu)</th>
<th>Emission Reduction Method¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR-0030</td>
<td>9/24/1998</td>
<td>ARKANSAS STEEL ASSOCIATES</td>
<td>JACKSON, AR</td>
<td>PREHEATER, LADLE</td>
<td>4</td>
<td>0.1</td>
<td>GCP</td>
</tr>
<tr>
<td>AR-0055</td>
<td>10/10/2001</td>
<td>NUCOR YAMATO STEEL (ARMOREL)</td>
<td>MISSISSIPPI, AR</td>
<td>PREHEATER, LADLE</td>
<td>225</td>
<td>0.098</td>
<td>LNB</td>
</tr>
<tr>
<td>AR-0056</td>
<td>10/28/1993</td>
<td>MACSTEEL DIVISION</td>
<td>SEBASTIAN, AR</td>
<td>LADLE PREHEAT &amp; DRYOUT STATIONS</td>
<td>5.5</td>
<td>0.4</td>
<td>LNB</td>
</tr>
<tr>
<td>FL-0368</td>
<td>2/14/2019</td>
<td>NUCOR STEEL FLORIDA FACILITY</td>
<td>POLK, FL</td>
<td>PREHEATERS, LADLE</td>
<td>45.75</td>
<td>0.1</td>
<td>GCP</td>
</tr>
<tr>
<td>IA-0055</td>
<td>1/3/1995</td>
<td>IPSCO STEEL, INC</td>
<td>MUSCATINE, IA</td>
<td>Ladle and Tundish Preheaters, Dryers and Skull Cutting</td>
<td>Unknown</td>
<td>60 PPMV*</td>
<td>LNB</td>
</tr>
<tr>
<td>IA-0087</td>
<td>5/29/2007</td>
<td>GERDAU AMERISTEEL WILTON</td>
<td>MUSCATINE, IA</td>
<td>LADLE PREHEATER STATIONS, (3)</td>
<td>5</td>
<td>0.098</td>
<td>GCP</td>
</tr>
<tr>
<td>IN-0034</td>
<td>6/1/2012</td>
<td>NUCOR STEEL</td>
<td>MONTGOMERY, IN</td>
<td>SOUTH LADLE DRYERS AND PREHEATERS</td>
<td>12</td>
<td>0.1</td>
<td>LNB, GCP, PNG</td>
</tr>
<tr>
<td>IN-0062</td>
<td>10/7/1994</td>
<td>STEEL DYNAMICS, INC.</td>
<td>DEKALB, IN</td>
<td>PREHEAT STATION, LADLE, 4</td>
<td>30</td>
<td>0.14</td>
<td>LNB</td>
</tr>
<tr>
<td>IN-0073</td>
<td>10/31/1996</td>
<td>QUALITECH STEEL CORP.</td>
<td>HENDRICKS, IN</td>
<td>LADLE PREHEATERS (3)</td>
<td>8</td>
<td>0.1</td>
<td>LNB</td>
</tr>
<tr>
<td>IN-0090</td>
<td>6/1/2012</td>
<td>NUCOR STEEL</td>
<td>MONTGOMERY, IN</td>
<td>LADLE PREHEAT/DRYER STATIONS</td>
<td>10</td>
<td>0.098</td>
<td>None</td>
</tr>
<tr>
<td>MI-0438</td>
<td>10/29/2018</td>
<td>GERDAU MACSTEEL MONROE</td>
<td>MONROE, MI</td>
<td>LADLE PREHEATERS</td>
<td>30</td>
<td>0.08 Revised to 0.095 lb/MMBtu, see text below</td>
<td>LNB, GCP, PNG</td>
</tr>
</tbody>
</table>

¹ Revised to 0.095 lb/MMBtu, see text below
<p>| MN-0070 | 9/7/2007 | MINNESOTA STEEL INDUSTRIES, LLC | ITASCA, MN | Ladle preheater | Unknown | None | LNB |</p>
<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum (MMBtu/hr)</th>
<th>Limit (lb/MMBtu)</th>
<th>Emission Reduction Method¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH-0245</td>
<td>1/27/1999</td>
<td>REPUBLIC TECHNOLOGIES INTERNATIONAL</td>
<td>STARK, OH</td>
<td>ECCENTRIC BOTTOM TAPPING LADLE PREHEATER FURNACE</td>
<td>14</td>
<td>0.089 (per Michael Maleski of Ohio EPA, January 5, 2022 email, this unit was not installed)</td>
<td>LNB</td>
</tr>
<tr>
<td>OH-0302</td>
<td>08/30/2005</td>
<td>REPUBLIC ENGINEERED PRODUCTS, INC.</td>
<td>STARK, OH</td>
<td>Ladle Dryer/Preheater</td>
<td>14.5 MMBTU/HR HEAT INPUT</td>
<td>1.45 lb NOx/hr NOx emission limit with heat input of 14.5 MMBtu/hr is 0.1 lb/MMBtu</td>
<td>Burner design</td>
</tr>
<tr>
<td>OH-0276</td>
<td>10/2/2017</td>
<td>CHARTER STEEL (misidentified as Republic Technologies on November 17, 2021 company submittal)</td>
<td>CUYAHOGA, OH</td>
<td>LADLE PREHEATER AND DRYER, 4 UNITS</td>
<td>10</td>
<td>0.36 ton/month Calculated as equivalent to 0.10 lb/mMBtu See Appendix B November 17, 2021 submittal, Section 8</td>
<td>None</td>
</tr>
<tr>
<td>OH-0302</td>
<td>8/30/2005</td>
<td>REPUBLIC ENGINEERED PRODUCTS, INC.</td>
<td>STARK, OH</td>
<td>LADLE DRYERS/PREHEATERS (2)</td>
<td>14.5</td>
<td>0.1</td>
<td>LNB</td>
</tr>
<tr>
<td>OH-0379</td>
<td>2/6/2019</td>
<td>PETMIN USA INCORPORATED</td>
<td>ASHTABULA, OH</td>
<td>Ladle Preheaters (P002, P003 and P004)</td>
<td>15</td>
<td>0.14</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>OH-0381</td>
<td>9/27/2019</td>
<td>NORTHSTAR BLUESCOPE STEEL, LLC</td>
<td>FULTON, OH</td>
<td>Ladle Preheaters and Dryers (P021-023, P025-026)</td>
<td>16</td>
<td>0.1</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>OK-0128</td>
<td>9/8/2008</td>
<td>MID AMERICAN STEEL ROLLING MILL</td>
<td>MARSHALL, OK</td>
<td>Ladle pre-heater and refractory drying</td>
<td>Unknown</td>
<td>0.1</td>
<td>PNG</td>
</tr>
<tr>
<td>TN-0071</td>
<td>4/28/2000</td>
<td>WAUPACA FOUNDRY, INC.</td>
<td>MCMINN, TN</td>
<td>MISC. NATURAL GAS USAGE FOR PREHEATING LADLES</td>
<td>15</td>
<td>0.1</td>
<td>Heat input limit</td>
</tr>
<tr>
<td>TX-0867</td>
<td>1/2/2020</td>
<td>STEEL MANUFACTURING FACILITY</td>
<td>ORANGE, TX</td>
<td>MELT SHOP LADLE PREHEATERS</td>
<td>Unknown</td>
<td>None</td>
<td>GCP</td>
</tr>
<tr>
<td>TX-0882</td>
<td>1/17/2020</td>
<td>SDSW STEEL MILL</td>
<td>SAN PATRICO, TX</td>
<td>LADLE DRYERS AND PREHEATERS</td>
<td>Unknown</td>
<td>0.1</td>
<td>GCP, PNG</td>
</tr>
</tbody>
</table>

1. GCP = good combustion practice, LNB = low-NOx burners, PNG = pipeline natural gas

* Note- this IA-0055 value appears to be invalid and was not used.

The NOx limit for a ladle preheater at Gerdau MacSteel (0.08 lb/MMBtu) is based on a similar limit in a permit Arkansas DEQ issued to Big River Steel in September 2013 (see PDF pages 15 and 26 of the nonattainment analysis for Gerdau MacSteel). The current Title V permit issued to Big River Steel indicates that the NOx BACT limit on several sources, including the ladle pre-heater, were updated; see the last paragraph on document page 56, PDF page 66, of the permit. As shown in the table that follows on permit page 57, PDF page 67, the ladle pre-heater NOx limit was changed from 0.08 lb/MMBtu, the value in the RBLC, to 0.095 lb/MMBtu (this appears to be the gas combustion emission factor from AP-42 Section 1.4 converted to a
heat-input basis using a gas heat value of 1,050 Btu/scf), and the source testing requirement was removed. Based on this information, I believe it would be appropriate to return to Sinova’s original BACT proposal for NOx emissions from the ladle pre-heaters, which is 0.098 lb/MMBtu, and for the permit to not require the ladle pre-heaters to undergo performance testing to demonstrate compliance.
See APC dataviewer December 7, 2021, entry From December 12, 2021 correspondence from Sinova /Ramboll
Low-NOX burners often reduce NOX emissions by staging the combustion process to reduce flame temperatures and are typically employed in equipment that has a furnace or firebox, such as gas-fired boilers or process heaters. What constitutes a low-NOX burner, and the level of NOX emissions achieved, varies with manufacturer. Ladle heaters are relatively simple combustion units where a flame is placed within an empty ladle to raise its temperature prior to it being filled with molten metal. Because the primary purpose is quick heating, staged combustion schemes that reduce flame temperatures are typically not employed. With this understanding, the term “low-NOX burner,” as used in the RBLC for ladle heaters, is equivalent with “good combustion practices”, and does not imply a staged combustor design.

2.4.1.2 Step 2: Eliminate technically infeasible alternatives
All of the options identified in Step 1 are technically feasible.

2.4.1.3 Step 3: Rank remaining alternatives
The top level of emission reduction is a combination of both technically feasible alternatives: use of low-NOX burners and/or good combustion practices.

2.4.1.4 Step 4: Evaluate economic, energy, and environmental impacts
Sinova will employ the most effective emission reduction alternative available for gas-fired ladle heaters (i.e., low-NOX burners and/or good combustion practices), and therefore an analysis of economic, energy, and environmental impacts was not conducted.

2.4.1.5 Step 5: Select BACT
Based on review of the RBLC and state permits for similar sized natural gas combustion devices, no add-on controls are utilized to control emissions from these sources. Sinova proposes 0.098 lb/MMBtu as BACT for NOX emissions from the natural gas-fired ladle preheaters, achieved by:
Good combustion practices and natural gas combustion only.

2.4.2 CO and VOC BACT Analysis
2.4.2.1 Step 1: Identify all available emission reduction alternatives
A review of the RBLC database and recent permit applications provided the following summary of control options for CO and VOC emissions from similar sized natural gas combustion devices:
### Table 10. Recent RBLC Entries for CO Emissions from Ladle Preheaters

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum (MMBtu/hr)</th>
<th>Limit (lb/MMBtu)</th>
<th>Emission Reduction Method¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR-0044</td>
<td>1/5/2001</td>
<td>JACKSON, AR</td>
<td>PREHEATERS, LADLE, (3)</td>
<td>4</td>
<td>0.025</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>AR-0055</td>
<td>10/10/2001</td>
<td>MISSISSIPPI, AR</td>
<td>LADLE PREHEAT &amp; DRYOUT STATIONS</td>
<td>225</td>
<td>0.082</td>
<td>GCP</td>
</tr>
<tr>
<td>*FL-0368</td>
<td>2/14/2019</td>
<td>POLK, FL</td>
<td>Ladle and Tundish Preheaters, Dryers and Skull Cutting</td>
<td>45.75</td>
<td>0.084</td>
<td>GCP</td>
</tr>
<tr>
<td>IA-0055</td>
<td>1/3/1995</td>
<td>MUSCATINE, IA</td>
<td>LADLE PREHEATER STATIONS, (3)</td>
<td>Unknown</td>
<td>200 PPMV</td>
<td>None</td>
</tr>
<tr>
<td>IA-0087</td>
<td>5/29/2007</td>
<td>MUSCATINE, IA</td>
<td>SOUTH LADLE DRYERS AND PREHEATERS</td>
<td>5</td>
<td>0.082</td>
<td>GCP</td>
</tr>
<tr>
<td>IN-0034</td>
<td>6/1/2012</td>
<td>MONTGOMERY, IN</td>
<td>PREHEAT STATION, LADLE, 4</td>
<td>12</td>
<td>0.084</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>IN-0090</td>
<td>6/1/2012</td>
<td>MONTGOMERY, IN</td>
<td>LADLE PREHEATERS</td>
<td>10</td>
<td>0.082</td>
<td>None</td>
</tr>
<tr>
<td>MI-0438</td>
<td>10/29/2018</td>
<td>MONROE, MI</td>
<td>Ladle preheater</td>
<td>30</td>
<td>0.084</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>OH-0245</td>
<td>1/27/1999</td>
<td>STARK, OH</td>
<td>ECCENTRIC BOTTOM TAPPING LADLE PREHEATER FURNACE</td>
<td>14</td>
<td>0.086</td>
<td>None</td>
</tr>
<tr>
<td>OH-0276</td>
<td>10/2/2017</td>
<td>CUYAHOGA, OH</td>
<td>LADLE PREHEATER AND DRYER, 4 UNITS</td>
<td>10</td>
<td>0.30 ton/month</td>
<td>None</td>
</tr>
<tr>
<td>OH-0302</td>
<td>8/30/2005</td>
<td>STARK, OH</td>
<td>LADLE DRYERS/PREHEATERS (2)</td>
<td>14.5</td>
<td>0.082</td>
<td>GCP</td>
</tr>
<tr>
<td>*OH-0381</td>
<td>9/27/2019</td>
<td>FULTON, OH</td>
<td>Ladle Preheaters and Dryers (P021-023, P025-026)</td>
<td>16</td>
<td>0.02</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>RBLC ID</td>
<td>Permit Issuance Date</td>
<td>Company</td>
<td>Location</td>
<td>System Description</td>
<td>Rated Maximum (MMBtu/hr)</td>
<td>Limit (lb/MMBtu)</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------</td>
<td>---------</td>
<td>----------</td>
<td>--------------------</td>
<td>--------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>OK-0128</td>
<td>9/8/2008</td>
<td>MID AMERICAN STEEL ROLLING MILL</td>
<td>MARSHALL, OK</td>
<td>Ladle pre-heater and refractory drying</td>
<td>Unknown</td>
<td>0.084</td>
</tr>
<tr>
<td>TN-0071</td>
<td>4/28/2000</td>
<td>WAUPACA FOUNDRY, INC.</td>
<td>MCMINN, TN</td>
<td>MISC. NATURAL GAS USAGE FOR PREHEATING LADLES</td>
<td>15</td>
<td>0.087</td>
</tr>
<tr>
<td>TX-0398</td>
<td>5/5/2000</td>
<td>NUCOR JEWETT PLANT</td>
<td>LEON, TX</td>
<td>LADLE PREHEAT</td>
<td>Unknown</td>
<td>0.51 LB/H</td>
</tr>
<tr>
<td>TX-0398</td>
<td>5/5/2000</td>
<td>NUCOR JEWETT PLANT</td>
<td>LEON, TX</td>
<td>PREHEAT LADLE</td>
<td>Unknown</td>
<td>0.58 LB/H</td>
</tr>
<tr>
<td>TX-0867</td>
<td>1/2/2020</td>
<td>STEEL MANUFACTURING FACILITY</td>
<td>ORANGE, TX</td>
<td>MELT SHOP LADLE PREHEATERS</td>
<td>Unknown</td>
<td>None</td>
</tr>
<tr>
<td>TX-0882</td>
<td>1/17/2020</td>
<td>SDSW STEEL MILL</td>
<td>SAN PATRICO, TX</td>
<td>LADLE DRYERS AND PREHEATERS</td>
<td>Unknown</td>
<td>0.082</td>
</tr>
</tbody>
</table>

1. GCP = good combustion practice, PNG = pipeline natural gas

The CO limits provided in the RBLC for ladle preheaters at Arkansas Steel Associates (0.025 lb/MMBtu) and Northstar Bluescope Steel (0.020 lb/MMBtu) are unusually stringent, and those sources do not have correspondingly stringent VOC limits placed on the ladle preheaters (i.e., 0.0083 lb/MMBtu for Arkansas Steel Associates and 0.0056 lb/MMBtu for Northstar Bluescope Steel). This inconsistency, combined with a lack of add-on CO/VOC emission reduction alternatives for ladle pre-heaters (the permits indicate that BACT for CO is good combustion practices), suggests that these CO limits may have been revised and/or never achieved in practice.

The CO BACT proposal, 0.082 lb/MMBtu, is equivalent to a ladle heater CO exhaust concentration of 130 ppmvd, which is more stringent than the IPSCO CO limit of 200 ppmv.

Assuming 30 days per month and continuous operation, the Republic Technologies CO limit of 0.30 tons per month is equivalent to 0.083 lb/MMBtu which is less stringent than the CO limit proposed by Sinova.

Permit application and permitting materials associated with the NUCOR Jewett Plant in Texas indicate that emission rates calculated for the ladle preheaters are based on default emission factors from AP-42 Chapter 1.4 (Natural Gas Combustion), all of which are no more stringent than the BACT emission limits proposed by Sinova for the ladle preheater. The CO emission factor is 84 lb/MMscf, which is equivalent to 0.082 lb/MMBtu, assuming the heating value of natural gas is 1,020 Btu/scf.

See Appendix B November 17 Correspondence Section 9
Table 11. Recent RBLC Entries for VOC Emissions from Ladle Preheaters

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum (MMBtu/hr)</th>
<th>Limit (lb/MMBtu)</th>
<th>Emission Reduction Method1</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR-0030</td>
<td>9/24/1998</td>
<td>ARKANSAS STEEL ASSOCIATES</td>
<td>JACKSON, AR</td>
<td>PREHEATER, LADLE</td>
<td>4</td>
<td>0.0083</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>AR-0055</td>
<td>10/10/2001</td>
<td>NUCOR YAMATO STEEL (ARMOREL)</td>
<td>MISSISSIPPI, AR</td>
<td>LADLE PREHEAT &amp; DRYOUT STATIONS</td>
<td>225</td>
<td>0.0054</td>
<td>GCP</td>
</tr>
<tr>
<td>*FL-0368</td>
<td>2/14/2019</td>
<td>NUCOR STEEL FLORIDA FACILITY</td>
<td>POLK, FL</td>
<td>Ladle and Tundish Preheaters, Dryers and Skull Cutting</td>
<td>45.75</td>
<td>0.0055</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>IN-0034</td>
<td>6/1/2012</td>
<td>NUCOR STEEL</td>
<td>MONTGOMERY, IN</td>
<td>PREHEAT STATION, LADLE, 4</td>
<td>12</td>
<td>0.0054</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>RBLC ID</td>
<td>Permit Issuance Date</td>
<td>Company</td>
<td>Location</td>
<td>System Description</td>
<td>Rated Maximum (MMBtu/hr)</td>
<td>Limit (lb/MMBtu)</td>
<td>Emission Reduction Method¹</td>
</tr>
<tr>
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<td>----------------------</td>
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<td>NE-0025</td>
<td>6/1/2012</td>
<td>NUCOR STEEL DIVISION</td>
<td>MONTGOMERY, IN</td>
<td>LADLE PREHEATERS (TOTAL)</td>
<td>10</td>
<td>0.0054</td>
<td>None</td>
</tr>
<tr>
<td>OH-0302</td>
<td>8/30/2005</td>
<td>REPUBLIC ENGINEERED PRODUCTS, INC.</td>
<td>STARK, OH</td>
<td>LADLE DRYERS/PREHEATERS (2)</td>
<td>14.5</td>
<td>5.5</td>
<td>GCP</td>
</tr>
<tr>
<td>*OH-0381</td>
<td>9/27/2019</td>
<td>NORTHSTAR BLUESCOPE STEEL, LLC</td>
<td>FULTON, OH</td>
<td>Ladle Preheaters and Dryers (P021-023, P025-026)</td>
<td>16</td>
<td>0.0056</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>OK-0128</td>
<td>9/8/2008</td>
<td>MID AMERICAN STEEL ROLLING MILL</td>
<td>MARSHALL, OK</td>
<td>Ladle pre-heater and refractory drying</td>
<td>Unknown</td>
<td>0.0055</td>
<td>PNG</td>
</tr>
<tr>
<td>SC-0183</td>
<td>5/4/2018</td>
<td>NUCOR STEEL - BERKELEY</td>
<td>BERKELEY, SC</td>
<td>Ancillary Equipment (ladle preheaters/dryers)</td>
<td>Unknown</td>
<td>None</td>
<td>GCP</td>
</tr>
<tr>
<td>TN-0071</td>
<td>4/28/2000</td>
<td>WAUPACA FOUNDRY, INC.</td>
<td>MCMINN, TN</td>
<td>MISC. NATURAL GAS USAGE FOR PREHEATING LADLES</td>
<td>15</td>
<td>0.004</td>
<td>Heat input limit</td>
</tr>
<tr>
<td>TX-0398</td>
<td>5/5/2000</td>
<td>NUCOR JEWETT PLANT</td>
<td>LEON, TX</td>
<td>LADLE PREHEAT</td>
<td>Unknown</td>
<td>0.04 LB/H</td>
<td>None</td>
</tr>
<tr>
<td>TX-0398</td>
<td>5/5/2000</td>
<td>NUCOR JEWETT PLANT</td>
<td>LEON, TX</td>
<td>PREHEAT LADLE</td>
<td>Unknown</td>
<td>0.01 LB/H</td>
<td>None</td>
</tr>
<tr>
<td>TX-0867</td>
<td>1/2/2020</td>
<td>STEEL MANUFACTURING FACILITY</td>
<td>ORANGE, TX</td>
<td>MELT SHOP LADLE PREHEATERS</td>
<td>Unknown</td>
<td>None</td>
<td>GCP</td>
</tr>
<tr>
<td>TX-0882</td>
<td>1/17/2020</td>
<td>SDSW STEEL MILL</td>
<td>SAN PATRICO, TX</td>
<td>LADLE DRYERS AND PREHEATERS</td>
<td>Unknown</td>
<td>0.0054</td>
<td>GCP, PNG</td>
</tr>
</tbody>
</table>

¹ GCP = good combustion practice, PNG = pipeline natural gas

The VOC limit provided in the RBLC for ladle preheaters at the Waupaca Foundry (0.004 lb/MMBtu) is unusually stringent, and this source does not have a correspondingly stringent CO limits placed on the ladle preheaters (i.e., 0.087 lb/MMBtu). This inconsistency, combined with a lack of add-on CO/VOC emission reduction alternatives for ladle pre-heaters (the permit indicates BACT for VOC is good combustion practices), suggests that this VOC limit may have been revised and/or has never been achieved in practice.

Permit application and permitting materials associated with the NUCOR Jewett Plant in Texas indicate that emission rates calculated for the ladle preheaters are based on default emission factors from AP-42 Chapter 1.4 (Natural Gas Combustion), all of which are no more stringent than the BACT emission limits proposed by Sinova for the ladle preheater. The VOC emission factor is 5.5 lb/MMscf, which is equivalent to 0.0054 lb/MMBtu, assuming the heating value of natural gas is 1,020 Btu/scf.

See Appendix B November 17 Correspondence Section 10
As shown in the table above, use of good combustion practices is the only available alternative for reducing CO and VOC emissions from the natural gas-fired ladle preheaters.

2.4.2.2 Step 2: Eliminate technically infeasible alternatives
All alternatives identified in Step 1 are technically feasible.

2.4.2.3 Step 3: Rank remaining alternatives
The only available alternative for reducing CO and VOCs from natural gas combustion is the use of good combustion practices.

2.4.2.4 Step 4: Evaluate economic, energy, and environmental impacts
The only available alternative for reducing CO and VOCs from natural gas combustion is the use of good combustion practices. Therefore, an evaluation of economic, energy, and environmental impacts was not conducted.

2.4.2.5 Step 5: Select BACT
Based on review of the RBLC and state permits for similar-sized natural gas combustion devices, no add-on controls are utilized to reduce CO and VOC emissions from these sources. Sinova proposes 0.082 lb/MMBtu and 0.82 lb/hr (for each of three units for a total of 2.47 lb CO/hr) as BACT for CO. Sinova proposes 0.0054 lb/MMBtu and 0.054 lb/hr as BACT for VOC emissions (0.162 lb VOC/hr for all three units combined). These BACT levels from the natural gas-fired ladle preheaters are to be achieved combusting natural gas only and using good combustion practices.

2.4.3 SO₂ BACT Analysis for Ladle Pre-Heaters
2.4.3.1 Step 1: Identify all available emission reduction alternatives
A review of the RBLC database and recent permit applications provided the following summary of control options for SO₂ emissions from similar sized natural gas combustion devices:
<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum (MMBtu/hr)</th>
<th>Limit (lb/MMBtu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR-0030</td>
<td>9/24/1998</td>
<td>ARKANSAS STEEL ASSOCIATES</td>
<td>JACKSON, AR</td>
<td>PREHEATER, LADLE</td>
<td>4</td>
<td>0.0083</td>
</tr>
<tr>
<td>AR-0055</td>
<td>10/10/2001</td>
<td>NUCOR YAMATO STEEL (ARMOREL)</td>
<td>MISSISSIPPI, AR</td>
<td>LADLE PREHEAT &amp; DRYOUT STATIONS</td>
<td>225</td>
<td>0.0006</td>
</tr>
<tr>
<td>*FL-0368</td>
<td>2/14/2019</td>
<td>NUCOR STEEL FLORIDA FACILITY</td>
<td>POLK, FL</td>
<td>Ladle and Tundish Preheaters, Dryers and Skull Cutting</td>
<td>45.75</td>
<td>0.0006</td>
</tr>
<tr>
<td>IN-0090</td>
<td>1/19/2001</td>
<td>NUCOR STEEL</td>
<td>MONTGOMERY, IN</td>
<td>LADLE PREHEATERS</td>
<td>15</td>
<td>None</td>
</tr>
<tr>
<td>MI-0438</td>
<td>10/29/2018</td>
<td>GERDAU MACSTEEL MONROE</td>
<td>MONROE, MI</td>
<td>Ladle preheater</td>
<td>30</td>
<td>0.0006</td>
</tr>
<tr>
<td>OH-0276</td>
<td>6/10/2004</td>
<td>CHARTER STEEL</td>
<td>CUYAHOGA, OH</td>
<td>LADLE PREHEATER AND DRYER, 4 UNITS</td>
<td>10</td>
<td>None</td>
</tr>
<tr>
<td>OH-0302</td>
<td>8/30/2005</td>
<td>REPUBLIC ENGINEERED PRODUCTS, INC.</td>
<td>STARK, OH</td>
<td>LADLE DRYERS/PREHEATERS (2)</td>
<td>14.5</td>
<td>0.00058</td>
</tr>
<tr>
<td>*OH-0381</td>
<td>9/27/2019</td>
<td>NORTHSTAR BLUESCOPE STEEL, LLC</td>
<td>FULTON, OH</td>
<td>Ladle Preheaters and Dryers (P021-023, P025-026)</td>
<td>16</td>
<td>0.0006</td>
</tr>
<tr>
<td>OK-0128</td>
<td>9/8/2008</td>
<td>MID AMERICAN STEEL ROLLING MILL</td>
<td>MARSHALL, OK</td>
<td>Ladle pre-heater and refractory drying</td>
<td>Unknown</td>
<td>0.0006</td>
</tr>
<tr>
<td>TN-0071</td>
<td>4/28/2000</td>
<td>WAUPACA FOUNDRY, INC.</td>
<td>MCMINN, TN</td>
<td>MISC. NATURAL GAS USAGE FOR PREHEATING LADLES</td>
<td>15</td>
<td>0.00049</td>
</tr>
<tr>
<td>TX-0398</td>
<td>5/5/2000</td>
<td>NUCOR JEWETT PLANT</td>
<td>LEON, TX</td>
<td>LADLE PREHEAT</td>
<td>Unknown</td>
<td>0.01 LB/H</td>
</tr>
<tr>
<td>TX-0867</td>
<td>1/2/2020</td>
<td>STEEL MANUFACTURING FACILITY</td>
<td>ORANGE, TX</td>
<td>MELT SHOP LADLE PREHEATERS</td>
<td>Unknown</td>
<td>None</td>
</tr>
</tbody>
</table>
The SO₂ limit provided in the RBLC for ladle preheaters at the Waupauca Foundry (0.00049 lb/MMBtu) is unusually stringent and does not agree with the proposed means for achieving this limit (i.e., use of pipeline natural gas). This inconsistency, combined with a lack of add-on SO₂ emission reduction alternatives for ladle pre-heaters, suggests that this SO₂ limit may have been revised and/or has never been achieved in practice.

Permit application and permitting materials associated with the NUCOR Jewett Plant in Texas indicate that emission rates calculated for the ladle preheaters are based on default emission factors from AP-42 Chapter 1.4 (Natural Gas Combustion), all of which are no more stringent than the BACT emission limits proposed by Sinova for the ladle preheater. The SO₂ emission factor is 0.6 lb/MMscf, which is equivalent to 0.0006 lb/MMBtu, assuming the heating value of natural gas is 1,020 Btu/scf.

See Appendix B November 17 Correspondence Section 11
As shown in the table above, available alternatives for reducing SO₂ emissions from the natural gas-fired ladle preheaters are:

- Combustion of natural gas only; and
- Good combustion practices.

0.0006 lb/MMBtu for each preheater and 0.006 lb/hr for each of three preheaters, 0.018 lb/hr for all three units combined

2.4.3.2 Step 2: Eliminate technically infeasible alternatives
All alternatives identified in Step 1 are technically feasible.

2.4.3.3 Step 3: Rank remaining alternatives
The top level of emission reduction available for the natural gas-fired ladle preheaters is a combination of the two remaining alternatives:

- Combustion of natural gas only; and
- Good combustion practices.

2.4.3.4 Step 4: Evaluate economic, energy, and environmental impacts
An evaluation of economic, energy, and environmental impacts was not conducted, because Sinova proposes to use both of the remaining available alternatives for control of SO₂ from natural gas combustion is utilizing good combustion practices.

2.4.3.5 Step 5: Select BACT
Based on review of the RBLC and state permits for similar sized natural gas combustion devices, no add-on controls are utilized to control SO₂ emissions from these sources. A value of 0.0006 lb/MMBtu is proposed as BACT for SO₂ emissions from the natural gas-fired ladle preheaters, achieved by:

- Combustion of natural gas only; and
- Good combustion practices.

2.4.4 PM BACT Analysis

2.4.4.1 Step 1: Identify all available emission reduction alternatives
A review of the RBLC database and recent permit applications provided the following summary of control options for PM emissions from similar sized natural gas combustion devices:
<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum (MMBtu/hr)</th>
<th>Limit (lb/MMBtu)</th>
<th>Emission Reduction Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR-0044</td>
<td>1/5/2001</td>
<td>ARKANSAS STEEL ASSOCIATES</td>
<td>JACKSON, AR</td>
<td>PREHEATERS, LADLE, (3)</td>
<td>4</td>
<td>0.017</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>AR-0055</td>
<td>10/10/2001</td>
<td>NUCOR YAMATO STEEL (ARMOREL)</td>
<td>MISSISSIPPI, AR</td>
<td>LADLE PREHEAT &amp; DRYOUT STATIONS</td>
<td>225</td>
<td>0.0075</td>
<td>GCP</td>
</tr>
<tr>
<td>*FL-0368</td>
<td>2/14/2019</td>
<td>NUCOR STEEL FLORIDA FACILITY</td>
<td>POLK, FL</td>
<td>Ladle and Tundish Preheaters, Dryers and Skull Cutting</td>
<td>45.75</td>
<td>0.0076</td>
<td>PNG</td>
</tr>
<tr>
<td>*FL-0368</td>
<td>2/14/2019</td>
<td>NUCOR STEEL FLORIDA FACILITY</td>
<td>POLK, FL</td>
<td>Ladle and Tundish Preheaters, Dryers and Skull Cutting</td>
<td>45.75</td>
<td>0.0076</td>
<td>PNG</td>
</tr>
<tr>
<td>IN-0034</td>
<td>6/1/2012</td>
<td>NUCOR STEEL</td>
<td>MONTGOMERY, IN</td>
<td>PREHEAT STATION, LADLE, 4</td>
<td>12</td>
<td>0.0076</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>IN-0034</td>
<td>6/1/2012</td>
<td>NUCOR STEEL</td>
<td>MONTGOMERY, IN</td>
<td>PREHEAT STATION, LADLE, 4</td>
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<td>0.0075</td>
<td>None</td>
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<td>IN-0040</td>
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<td>BETA STEEL</td>
<td>PORTER, IN</td>
<td>LADLE PREHEAT STATIONS (2)</td>
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<td>None</td>
<td>PNG</td>
</tr>
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<td>IN-0040</td>
<td>2/24/1992</td>
<td>BETA STEEL</td>
<td>PORTER, IN</td>
<td>LADLE PREHEAT STATIONS (2)</td>
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<td>None</td>
<td>PNG</td>
</tr>
<tr>
<td>IN-0090</td>
<td>1/19/2001</td>
<td>NUCOR STEEL</td>
<td>MONTGOMERY, IN</td>
<td>LADLE PREHEATERS</td>
<td>15</td>
<td>None</td>
<td>PNG</td>
</tr>
<tr>
<td>MI-0438</td>
<td>10/29/2018</td>
<td>GERDAU MACSTEEL MONROE</td>
<td>MONROE, MI</td>
<td>Ladle preheater</td>
<td>30</td>
<td>0.0076</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>MI-0438</td>
<td>10/29/2018</td>
<td>GERDAU MACSTEEL MONROE</td>
<td>MONROE, MI</td>
<td>Ladle preheater</td>
<td>30</td>
<td>0.0076</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>MI-0438</td>
<td>10/29/2018</td>
<td>GERDAU MACSTEEL MONROE</td>
<td>MONROE, MI</td>
<td>Ladle preheater</td>
<td>30</td>
<td>0.0076</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>RBLC ID</td>
<td>Permit Issuance Date</td>
<td>Company</td>
<td>Location</td>
<td>System Description</td>
<td>Rated Maximum (MMBtu/hr)</td>
<td>Limit (lb/MMBtu)</td>
<td>Emission Reduction Method</td>
</tr>
<tr>
<td>---------</td>
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<td>----------</td>
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<td>--------------------------</td>
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</tr>
<tr>
<td>OH-0245</td>
<td>1/27/1999</td>
<td>REPUBLIC TECHNOLOGIES INTERNATIONAL</td>
<td>STARK, OH</td>
<td>ECCENTRIC BOTTOM TAPPING LADLE PREHEATER FURNACE</td>
<td>14</td>
<td>0.014</td>
<td>None</td>
</tr>
<tr>
<td>OH-0276</td>
<td>10/2/2017</td>
<td>CHARTER STEEL</td>
<td>CUYAHOGA, OH</td>
<td>LADLE PREHEATER AND DRYER, 4 UNITS</td>
<td>10</td>
<td>0.02</td>
<td>None</td>
</tr>
<tr>
<td>OH-0302</td>
<td>8/30/2005</td>
<td>REPUBLIC ENGINEERED PRODUCTS, INC.</td>
<td>STARK, OH</td>
<td>LADLE DRYERS/PREHEATERS (2)</td>
<td>14.5</td>
<td>0.0075</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>OH-0379</td>
<td>2/6/2019</td>
<td>PETMIN USA INCORPORATED</td>
<td>ASHTABULA, OH</td>
<td>Ladle Preheaters (P002, P003 and P004)</td>
<td>15</td>
<td>0.0075</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>OH-0379</td>
<td>2/6/2019</td>
<td>PETMIN USA INCORPORATED</td>
<td>ASHTABULA, OH</td>
<td>Ladle Preheaters (P002, P003 and P004)</td>
<td>15</td>
<td>0.0075</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>*OH-0381</td>
<td>9/27/2019</td>
<td>NORTHSTAR BLUESCOPE STEEL, LLC</td>
<td>FULTON, OH</td>
<td>Ladle Preheaters and Dryers (P021-023, P025-026)</td>
<td>16</td>
<td>0.003</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>*OH-0381</td>
<td>9/27/2019</td>
<td>NORTHSTAR BLUESCOPE STEEL, LLC</td>
<td>FULTON, OH</td>
<td>Ladle Preheaters and Dryers (P021-023, P025-026)</td>
<td>16</td>
<td>0.003</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>*OH-0381</td>
<td>9/27/2019</td>
<td>NORTHSTAR BLUESCOPE STEEL, LLC</td>
<td>FULTON, OH</td>
<td>Ladle Preheaters and Dryers (P021-023, P025-026)</td>
<td>16</td>
<td>0.003</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>OK-0128</td>
<td>9/8/2008</td>
<td>MID AMERICAN STEEL ROLLING MILL</td>
<td>MARSHALL, OK</td>
<td>Ladle pre-heater and refractory drying</td>
<td>Unknown</td>
<td>0.0076</td>
<td>PNG</td>
</tr>
<tr>
<td>TX-0398</td>
<td>5/5/2000</td>
<td>NUCOR JEWETT PLANT</td>
<td>LEON, TX</td>
<td>LADLE PREHEAT</td>
<td>Unknown</td>
<td>0.2 LB/H</td>
<td>None</td>
</tr>
<tr>
<td>TX-0398</td>
<td>5/5/2000</td>
<td>NUCOR JEWETT PLANT</td>
<td>LEON, TX</td>
<td>PREHEAT LADLE</td>
<td>Unknown</td>
<td>0.23 LB/H</td>
<td>None</td>
</tr>
<tr>
<td>TX-0882</td>
<td>1/17/2020</td>
<td>SDSW STEEL MILL</td>
<td>SAN PATRICO, TX</td>
<td>LADLE DRYERS AND PREHEATERS</td>
<td>Unknown</td>
<td>0.0075</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>TX-0882</td>
<td>1/17/2020</td>
<td>SDSW STEEL MILL</td>
<td>SAN PATRICO, TX</td>
<td>LADLE DRYERS AND PREHEATERS</td>
<td>Unknown</td>
<td>0.0075</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>RBLC ID</td>
<td>Permit Issuance Date</td>
<td>Company</td>
<td>Location</td>
<td>System Description</td>
<td>Rated Maximum Limit (MMBtu/hr)</td>
<td>Limit (lb/MMBtu)</td>
<td>Emission Reduction Method¹</td>
</tr>
<tr>
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<tr>
<td>TX-0882</td>
<td>1/17/2020</td>
<td>SDSW STEEL MILL</td>
<td>SAN PATRICO, TX</td>
<td>LADLE DRYERS AND PREHEATERS</td>
<td>Unknown</td>
<td>0.0075</td>
<td>GCP, PNG</td>
</tr>
</tbody>
</table>

1. GCP = good combustion practice, PNG = pipeline natural gas

The PM/PM₁₀/PM₂.₅ limit provided in the RBLC for ladle preheaters at Northstar Bluescope Steel (0.003 lb/MMBtu) is unusually stringent and does not agree with the proposed means for achieving this limit (i.e., good combustion practices and use of pipeline natural gas). This inconsistency, combined with a lack of add-on PM emission reduction alternatives for ladle pre-heaters, suggests that this PM limit may have been revised and/or never achieved in practice.

Permit application and permitting materials associated with the NUCOR Jewett Plant in Texas indicate that emission rates calculated for the ladle preheaters are based on default emission factors from AP-42 Chapter 1.4 (Natural Gas Combustion), all of which are no more stringent than the BACT emission limits proposed by Sinova for the ladle preheater. The PM/PM₁₀/PM₂.₅ emission factor is 7.6 lb/MMscf, which is equivalent to 0.0075 lb/MMBtu, assuming the heating value of natural gas is 1,020 Btu/scf.

See Appendix B November 17 Correspondence Section 12
As shown in the table above, available alternatives for reducing PM emissions from the natural gas-fired ladle preheaters are:

- Combustion of natural gas only; and
- Good combustion practices.

2.4.4.2 Step 2: Eliminate technically infeasible alternatives
All available alternatives identified in Step 1 are technically feasible.

2.4.4.3 Step 3: Rank remaining alternatives
The top level of emission reduction available for the natural gas-fired ladle preheaters is a combination of the two remaining alternatives:

- Combustion of natural gas only; and
- Good combustion practices.

2.4.4.4 Step 4: Evaluate economic, energy, and environmental impacts
An evaluation of economic, energy, and environmental impacts was not conducted because Sinova proposes to use both of the remaining available alternatives to reduce PM from the natural gas-fire ladle preheaters.

2.4.4.5 Step 5: Select BACT
Based on review of the RBLC and state permits for similar-sized natural gas combustion devices, no add-on controls are utilized to reduce particulate emissions from these sources. Sinova proposes 0.0075 lb/MMBtu as BACT for each of the following PM categories: PM-filterable/PM10/PM2.5 and combined PM categories. Also, PM shall not exceed the 0.075 lb/hr for each of the following categories, for each Ladle Preheater: PM-filterable, PM10, PM2.5 and combined PM categories. These limits shall be achieved by:

- Combustion of natural gas only; and
- Good combustion practices.

Also, as specified at Condition S4-5, an opacity is limit of 10% is being set.

2.4.5 GHG BACT Analysis
2.4.5.1 Step 1: Identify all available emission reduction alternatives
Review of the RBLC database and recent permit applications provided the following summary of GHG control options from combustion of natural gas.
<table>
<thead>
<tr>
<th>RBL CID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum (MMBtu/hr)</th>
<th>Limit (lb/MMBtu)</th>
<th>Emission Reduction Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH-0379</td>
<td>02/06/2019</td>
<td>PETMIN USA INCORPORATED</td>
<td>ASHTABULA, OH</td>
<td>Ladle Preheaters (P002, P003 and P004)</td>
<td>15</td>
<td>0</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>*OH-0381</td>
<td>09/27/2019</td>
<td>NORTHSTAR BLUESCOPE STEEL, LLC</td>
<td>FULTON, OH</td>
<td>Ladle Preheaters and Dryers (P021-023, P025-026)</td>
<td>16</td>
<td>0.000</td>
<td>GCP</td>
</tr>
<tr>
<td>TX-0882</td>
<td>01/17/2020</td>
<td>SDSW STEEL MILL</td>
<td>SAN PATRICIO, TX</td>
<td>LADLE DRYERS AND PREHEATERS</td>
<td>0</td>
<td>0</td>
<td>GCP</td>
</tr>
</tbody>
</table>

1. GCP = good combustion practice, PNG = pipeline natural gas

Based on the RBLC listings and permits issued to similar sources options for reducing GHG emissions from the natural gas-fired ladle preheaters are:

- Combustion of low carbon-content fuel (i.e., natural gas);
- Energy efficiency and pollution prevention measures, including utilizing high-efficiency burners, preventative maintenance, and energy monitoring and management systems; and
- CCS (Carbon capture and sequestration)

2.4.5.2 Step 2: Eliminate technically infeasible alternatives
All of the options identified in Step 1 are considered technically feasible, except for CCS, which has not previously been applied to natural gas combustion sources and is not a demonstrated emission reduction alternative for ladle preheaters. CCS is targeted for facilities that emit high levels of CO₂, such as fossil fuel-fired power plants. Therefore, CCS is not considered technically feasible for reducing GHG emissions from the natural gas-fired ladle preheaters.

2.4.5.3 Step 3: Rank remaining alternatives
The top level of emission reduction available for the natural gas-fired ladle preheaters is a combination of the two remaining alternatives: combustion of clean fuel with implementation of energy efficiency and pollution prevention measures.
2.4.5.4 **Step 4: Evaluate economic, energy, and environmental impacts**

Sinova is selecting the top control alternative, and therefore an analysis of economic, energy, and environmental impacts was not conducted, per EPA guidance.

2.4.5.5 **Step 5: Select BACT**

Based on review of the RBL and other available resources, GHG control measures focus on fuel type and energy efficiency measures. Sinova proposes the following BACT for GHG emissions from the natural gas-fired ladle preheaters based on 40 CFR 98 Subpart C, Tables C-1 and C-2

- 15,387 tons per consecutive 12-month period for GHG (CO₂e)
- Combustion of natural gas only.
- Good combustion practices.
- Selection of the most energy efficient burner design available; and
- Periodic maintenance.

The following emission factors from 40 CFR 98 Subpart C are proposed for compliance assurance for the above annual GHG BACT emission rate until the test report (or manufacturer’s data) required by condition G16 is submitted. Testing is not required for CH₄ or N₂O) due to the comparative low level of emissions compared with CO₂. The permittee will be requested to provide manufacturer’s data or GHG emissions test (CO₂ only)

- CO₂ – 117 lb/MMBtu
- CH₄ – 0.0022 lb/MMBtu
- N₂O – 0.00022 lb/MMBtu

2.5 **BACT – Outdoor and Indoor Sources of Fugitive Emissions**

The sources listed immediately below (Sources 01 and 06) are Outdoor Material Handling:

- Source 48-0046-01 Raw material handling - Outdoor Sources of Fugitive Emissions
- Source 48-0046-06 Slag Crushing and Screening

Raw materials will be received at the site by rail and truck between the hours of 7 AM CST and 11 PM CST. The primary raw materials to be stored at the facility are quartz, wood, coal, and charcoal. All raw materials will either be unloaded, conveyed, and stored in piles or unloaded directly onto storage piles between the hours of 7 AM CST and 11 PM CST. The raw materials will then be transferred via front end loaders and a conveyor system to day bins in the submerged arc furnace building. The raw material handling and storage activities are sources of PM emissions, which are subject to BACT.

Also, activities at Source 48-0046-06 Slag Crushing and Screening will take place only between the hours of 7 AM CST and 11 PM CST.
2.5.1 PM BACT Analysis – Raw material handling - Outdoor Transfer and Storage

This section applies to:
Source 48-0046-01 Raw material handling
Source 48-0046-06 Slag Crushing and Screening (BACT)

2.5.1.1 Step 1: Identify all available emission reduction alternatives

Fugitive emissions of PM will be generated during the receiving, transferring, and storage of the raw materials. The following are available control technologies for control of particulates during outdoor material transfer and storage:

Best management practices, including development of a dust control plan and utilizing inherent pollution control technologies such as covered conveyors, enclosed storage bins, and partially enclosed drop points. Implementation of best management practices can reduce PM fugitive emissions by more than 50 percent.

Wet suppression system to suppress the formation of airborne dust through agglomerate formation by combining small dust particles with larger aggregate or with liquid droplets. There are two types of wet suppression systems: 1) liquid sprays using water or water/surfactant mixtures as wetting agent, and 2) use of foam as wetting agent. Wet suppression systems typically achieve PM emission reduction efficiencies of 50 to greater than 90 percent.

Review of the RBLC database and recent permit applications provided the following summary of material transfer and storage control options.
<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Limits</th>
<th>Limit Units</th>
<th>Emission Reduction Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR-0074</td>
<td>08/20/2003</td>
<td>PLUM POINT ENERGY</td>
<td>MISSISSIPPI, AR</td>
<td>MATERIAL HANDLING, FLY ASH, SUPPRESSION</td>
<td>0.1</td>
<td>LB/H</td>
<td>Misting</td>
</tr>
<tr>
<td>*FL-0368</td>
<td>02/14/2019</td>
<td>NUCOR STEEL FLORIDA FACILITY</td>
<td>POLK, FL</td>
<td>Raw and Waste Material Storage and Handling &amp; Slag Yard</td>
<td>0</td>
<td>0</td>
<td>Misting</td>
</tr>
<tr>
<td>GA-0140</td>
<td>12/03/2010</td>
<td>MITCHELL STEAM-GENERATING PLANT (PLANT MITCHELL)</td>
<td>DOUGHERTY, GA</td>
<td>Storage and Handling, biomass</td>
<td>0</td>
<td>0</td>
<td>Misting</td>
</tr>
<tr>
<td>LA-0201</td>
<td>05/24/2006</td>
<td>RED RIVER MILL</td>
<td>NATCHITOCHES, LA</td>
<td>CHIP HANDLING</td>
<td>0.0001</td>
<td>LB/T</td>
<td>Enclosure</td>
</tr>
<tr>
<td>*LA-0356</td>
<td>09/27/2019</td>
<td>GARYVILLE REFINERY</td>
<td>ST. JOHN THE BAPTIST, LA</td>
<td>Coke Handling</td>
<td>0</td>
<td>0</td>
<td>Misting</td>
</tr>
<tr>
<td>*LA-0356</td>
<td>09/27/2019</td>
<td>GARYVILLE REFINERY</td>
<td>ST. JOHN THE BAPTIST, LA</td>
<td>Coke Handling</td>
<td>0</td>
<td>0</td>
<td>Misting</td>
</tr>
<tr>
<td>MI-0401</td>
<td>12/21/2011</td>
<td>MIDLAND POWER STATION</td>
<td>MIDLAND, MI</td>
<td>Biomass feedstock handling</td>
<td>0.001</td>
<td>GR/DSCF</td>
<td>Misting, Baghouse</td>
</tr>
<tr>
<td>MI-0401</td>
<td>12/21/2011</td>
<td>MIDLAND POWER STATION</td>
<td>MIDLAND, MI</td>
<td>Biomass feedstock handling</td>
<td>0.001</td>
<td>GR/DSCF</td>
<td>Misting, Baghouse</td>
</tr>
<tr>
<td>SC-0183</td>
<td>05/04/2018</td>
<td>NUCOR STEEL - BERKELEY</td>
<td>BERKELEY, SC</td>
<td>Raw Material Handling and Processing (carbon dump fugitives)</td>
<td>0</td>
<td>0</td>
<td>GWP</td>
</tr>
<tr>
<td>SC-0183</td>
<td>05/04/2018</td>
<td>NUCOR STEEL - BERKELEY</td>
<td>BERKELEY, SC</td>
<td>Raw Material Handling and Processing (lime dump fugitives)</td>
<td>0</td>
<td>0</td>
<td>GWP</td>
</tr>
<tr>
<td>SC-0183</td>
<td>05/04/2018</td>
<td>NUCOR STEEL - BERKELEY</td>
<td>BERKELEY, SC</td>
<td>Raw Material Handling and Processing (alloy grizzly fugitives)</td>
<td>0</td>
<td>0</td>
<td>GWP</td>
</tr>
<tr>
<td>RBL ID</td>
<td>Permit Issue Date</td>
<td>Company</td>
<td>Location</td>
<td>System Description</td>
<td>Limits</td>
<td>Limit Units</td>
<td>Emission Reduction Method¹</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------</td>
<td>---------</td>
<td>----------</td>
<td>--------------------</td>
<td>--------</td>
<td>-------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>SC-0183</td>
<td>05/04/2018</td>
<td>NUCOR STEEL - BERKELEY</td>
<td>BERKELEY, SC</td>
<td>Raw Material Handling and Processing (misc. debris handling)</td>
<td>0</td>
<td>0</td>
<td>GWP</td>
</tr>
<tr>
<td>SC-0196</td>
<td>04/29/2019</td>
<td>NUCOR CORPORATION - DARLINGTON PLANT</td>
<td>DARLINGTON, SC</td>
<td>Raw Material Handling and Maintenance Activities</td>
<td>0</td>
<td>0</td>
<td>GWP</td>
</tr>
<tr>
<td>SC-0196</td>
<td>04/29/2019</td>
<td>NUCOR CORPORATION - DARLINGTON PLANT</td>
<td>DARLINGTON, SC</td>
<td>Raw Material Handling and Maintenance Activities</td>
<td>0</td>
<td>0</td>
<td>GWP</td>
</tr>
</tbody>
</table>

¹ GWP = Good Work Practices
2.5.1.2  **Step 2: Eliminate technically infeasible alternatives**
Because emissions from this source are fugitive in nature and thus cannot be effectively captured, all of the options identified in Step 1 are technically feasible.

2.5.1.3  **Step 3: Rank remaining alternatives**
The following is a ranking of all feasible options for control of fugitive PM emissions from material transfer and storage:

- Best management practice, including implementation of a fugitive dust control plan using a wet suppression system on an as needed basis; control efficiency greater than 50 percent
- Wet suppression system only; control efficiency 50 to >90%

2.5.1.4  **Step 4: Evaluate economic, energy, and environmental impacts**
Sinova is selecting the top control alternative (best management practices), and therefore an analysis of economic, energy, and environmental impacts was not conducted, per EPA guidance.

2.5.1.5  **Step 5: Select BACT**
Based on review of the RBLC and state permits for similar activities, no add-on controls are utilized to control fugitive particulate emissions from raw material transfer and storage. Sinova proposes the following BACT for PM emissions from this source:

Best management practices, including use of covered conveyors, reduced drop heights, use of chemical stabilization dust suppressants and/or watering to reduce any visible emissions; and

Development of a fugitive dust control plan.

No emission limit is proposed because emissions are fugitive in nature and there are no available test methods to determine the particulate emission rate from these activities.

Source 48-0046-01 Raw material handling - Outdoor Sources of Fugitive Emissions (BACT)
No numeric limit set due to difficulty of calculating fugitive emissions
Misting will be used to suppress fugitive dust when whenever the corresponding operation is active and when front-end loaders are operating.

Charcoal will be stored in a structure with a roof.

The permittee shall comply with the Preventative Maintenance Plan (PMP) for fugitive emissions as required by condition G26 of PSD Construction permit 979383.

The permittee shall use covered conveyors, reduced drop heights, chemical stabilization dust suppressants /or watering to reduce visible emissions
Fugitive emissions from any transfer point at this source shall not exceed seven percent opacity as determined by Tennessee Visible Emission Evaluation Method 4.
Source 48-0046-06 Slag Crushing and Screening (BACT)

Particulate emissions (as described below) from this source shall not exceed the following hourly emission limits

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Crushing (controlled)</th>
<th>Screening (controlled)</th>
<th>Total factor, lb/ton</th>
<th>lb/hr at 20 TPH process rate</th>
<th>TPY at 365 hr/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM</td>
<td>0.0012</td>
<td>0.0022</td>
<td>0.0034</td>
<td>0.068</td>
<td>0.0124</td>
</tr>
<tr>
<td>PM10</td>
<td>0.00054</td>
<td>0.00074</td>
<td>0.00128</td>
<td>0.0256</td>
<td>0.00467</td>
</tr>
<tr>
<td>PM2.5</td>
<td>0.0001</td>
<td>0.00005</td>
<td>0.00015</td>
<td>0.003</td>
<td>0.00055</td>
</tr>
<tr>
<td>Total for all PM categories combined</td>
<td></td>
<td></td>
<td>0.097</td>
<td>0.0176</td>
<td></td>
</tr>
</tbody>
</table>

Emission factors are from AP-42 Section 11.19.2 (Crushed Stone Processing) and 11.19.2-2 (Controlled Screening). It is recognized that AP-42 may not be the most accurate source of emission factors, but that is the best information available at this time.

Also, for Source 48-0046-06 Slag Crushing and Screening there is a limit of 12% opacity.

_The permittee stated - Since the slag is a solid material and should not be producing any fugitive emissions during its limited operation time._

2.5.2 PM BACT Analysis – Indoor Material Handling

This section applies to:

Source 48-0046-02 Proportioning Building

Source 48-0046-07 Finished Product Building

2.5.2.1 Step 1: Identify all available emission reduction alternatives

Emissions of PM will be generated during the handling of raw materials as they are transferred from the day bins to the submerged arc furnaces inside the proportioning building, and PM will also be generated from material transfer within the Finished Product Building. Emissions will typically be in the form of point source release. The following are available control technologies for control of particulates during raw material handling, which are the same technologies discussed earlier for control of particulates from other point sources, like the submerged arc furnace:

- Electrostatic precipitator (ESP)
- High efficiency cyclones (HEC)
- High energy scrubbers (HES)
- Fabric filters or baghouses

Review of the RBLC database and recent permit applications provided the following summary of material transfer and storage control options for enclosed sources.
Table 17. Recent RBLC Entries for PM Emissions from Indoor Material Handling.

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issue Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Limits</th>
<th>Limit Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>*AK-0086</td>
<td>03/26/2021</td>
<td>KENAI NITROGEN OPERATIONS</td>
<td>KENAI PENINSULA BOROUGH, AK</td>
<td>Urea Handling Units</td>
<td>0.005</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>*AK-0086</td>
<td>03/26/2021</td>
<td>KENAI NITROGEN OPERATIONS</td>
<td>KENAI PENINSULA BOROUGH, AK</td>
<td>Urea Handling Units</td>
<td>0.005</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>*AK-0086</td>
<td>03/26/2021</td>
<td>KENAI NITROGEN OPERATIONS</td>
<td>KENAI PENINSULA BOROUGH, AK</td>
<td>Urea Handling Units</td>
<td>0.005</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>AR-0074</td>
<td>08/20/2003</td>
<td>PLUM POINT ENERGY</td>
<td>MISSISSIPPI, AR</td>
<td>MATERIAL HANDLING, FLYASH, BAGHOUSES</td>
<td>0.1</td>
<td>LB/H</td>
</tr>
<tr>
<td>AZ-0053</td>
<td>04/29/2002</td>
<td>SPRNGERVILLE GENERATING STATION</td>
<td></td>
<td>FLY-ASH HANDLING</td>
<td>10</td>
<td>% OPACITY</td>
</tr>
<tr>
<td>AZ-0053</td>
<td>04/29/2002</td>
<td>SPRNGERVILLE GENERATING STATION</td>
<td></td>
<td>LIME HANDLING FACILITY</td>
<td>10</td>
<td>OPACITY</td>
</tr>
<tr>
<td>CO-0057</td>
<td>07/05/2005</td>
<td>COMANCHE STATION</td>
<td>PUEBLO, CO</td>
<td>RECYCLE ASH HANDLING</td>
<td>0.01</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>CO-0057</td>
<td>07/05/2005</td>
<td>COMANCHE STATION</td>
<td>PUEBLO, CO</td>
<td>RECYCLE ASH HANDLING</td>
<td>0.01</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>CO-0057</td>
<td>07/05/2005</td>
<td>COMANCHE STATION</td>
<td>PUEBLO, CO</td>
<td>FLY ASH/ FGD WASTE HANDLING</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CO-0057</td>
<td>07/05/2005</td>
<td>COMANCHE STATION</td>
<td>PUEBLO, CO</td>
<td>FLY ASH/ FGD WASTE HANDLING</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CO-0057</td>
<td>07/05/2005</td>
<td>COMANCHE STATION</td>
<td>PUEBLO, CO</td>
<td>SORBENT HANDLING</td>
<td>0.01</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>CO-0057</td>
<td>07/05/2005</td>
<td>COMANCHE STATION</td>
<td>PUEBLO, CO</td>
<td>SORBENT HANDLING</td>
<td>0.01</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>KY-0100</td>
<td>04/09/2010</td>
<td>J.K. SMITH GENERATING STATION</td>
<td></td>
<td>ASH HANDLING</td>
<td>0.005</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>KY-0100</td>
<td>04/09/2010</td>
<td>J.K. SMITH GENERATING STATION</td>
<td></td>
<td>ASH HANDLING</td>
<td>0.005</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>LA-0201</td>
<td>05/24/2006</td>
<td>RED RIVER MILL</td>
<td>NATCHITOCHES, LA</td>
<td>CHIP HANDLING</td>
<td>0.0001</td>
<td>LB/T</td>
</tr>
<tr>
<td>LA-0305</td>
<td>06/30/2016</td>
<td>LAKE CHARLES METHANOL FACILITY</td>
<td>CALCASIEU PARISH, LA</td>
<td>Coke Handling</td>
<td>0.005</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>LA-0305</td>
<td>06/30/2016</td>
<td>LAKE CHARLES METHANOL FACILITY</td>
<td>CALCASIEU PARISH, LA</td>
<td>Coke Handling</td>
<td>0.005</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>MI-0401</td>
<td>12/21/2011</td>
<td>MIDLAND POWER STATION</td>
<td>MIDLAND, MI</td>
<td>Biomass feedstock handling</td>
<td>0.001</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>RBLC ID</td>
<td>Permit Issuance Date</td>
<td>Company</td>
<td>Location</td>
<td>System Description</td>
<td>Limits</td>
<td>Limit Units</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td>---------</td>
<td>----------</td>
<td>--------------------</td>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>MI-0401</td>
<td>12/21/2011</td>
<td>MIDLAND POWER STATION</td>
<td>MIDLAND, MI</td>
<td>Biomass feedstock handling</td>
<td>0.001</td>
<td>GR/DSCF</td>
</tr>
<tr>
<td>OH-0317</td>
<td>11/20/2008</td>
<td>OHIO RIVER CLEAN FUELS, LLC</td>
<td>COLUMBIANA, OH</td>
<td>FLYASH HANDLING SYSTEM (6)</td>
<td>0.03</td>
<td>LB/H</td>
</tr>
<tr>
<td>OH-0350</td>
<td>07/18/2012</td>
<td>REPUBLIC STEEL</td>
<td>LORAIN, OH</td>
<td>Flux and Carbon storage material handling</td>
<td>2.4</td>
<td>LB/H</td>
</tr>
<tr>
<td>OH-0350</td>
<td>07/18/2012</td>
<td>REPUBLIC STEEL</td>
<td>LORAIN, OH</td>
<td>Flux and Carbon storage material handling</td>
<td>0.37</td>
<td>LB/H</td>
</tr>
<tr>
<td>PA-0275</td>
<td>10/24/2011</td>
<td>CRAWFORD RENEWABLE ENERGY LLC/GREENWOOD TWP - NOT CONSTRUCTED</td>
<td>CRAWFORD COUNTY, PA</td>
<td>Material Handling, Plant Roadways, and Cooling Tower</td>
<td>7.29</td>
<td>T/YR</td>
</tr>
</tbody>
</table>

**2.5.2.2 Step 2: Eliminate technically infeasible alternatives**

The technical feasibility of each control option identified in Step 1 is evaluated below:

Electrostatic precipitator (ESP) is capable of reducing PM emissions from many sources of particulates by 99 percent or more, and are technically feasible for reduction of PM emissions from raw material handling.

High efficiency cyclones (HEC) are considered technically feasible for reduction of PM emissions from raw material handling. PM removal efficiency from this control device is estimated to be less than 90 percent.

High-energy scrubbers (HES) are considered technically feasible for reduction of PM emissions from raw material handling. This technology can achieve a particulate removal efficiency of 90 percent or greater.

Fabric filters or baghouses are technically feasible for reduction of PM emissions from raw material handling. Baghouses typically achieve PM removal efficiencies of greater than 99 percent.

**2.5.2.3 Step 3: Rank remaining alternatives**

The following is a ranking of all technically feasible alternatives for reducing PM emissions from raw material handling, with expected emission reductions:

1. Fabric filter or baghouse – greater than 99 percent;
2. ESP – greater than 99 percent;
3. HES – greater than 90 percent; and
4. HEC – less than 90 percent.
2.5.2.4 **Step 4: Evaluate economic, energy, and environmental impacts** Sinova is selecting the top emission reduction alternative (i.e., fabric filter or baghouse), and therefore an analysis of economic, energy, and environmental impacts was not conducted.

2.5.2.5 **Step 5: Select BACT**

Based on review of the RBLC and state permits for similar activities, fabric filters are the preferred technology to control particulate emissions from sources such as raw material handling. The permittee proposes 0.0022 gr/dscf as BACT for PM emissions, to be achieved using a baghouse. Each category of PM, that is, PM filterable, PM10, and PM2.5 will be restricted to an emission limit of 0.0022 gr/dscf, and the total allowable emission rate of all PM categories combined will also be 0.0022 gr/dscf.

It should be noted that Sinova will employ a baghouse that will meet 0.0022 gr/dscf to minimize the potential for ambient PM filterable/PM10/PM2.5 impacts.

Also, both sources 48-0046-02 (Proportioning Building) and 48-0046-07 (Finished Product Building) have a 10% opacity limit from baghouse exhaust stacks.

2.5.3 **PM BACT Analysis – Indoor Material Handling - Fume Silo Building**

**Silica Fume Silo BACT Analysis** PM BACT Analysis – Indoor Material Handling 48-0046-05

2.5.3.1 **Step 1 – Identify all available emission reduction alternatives**

The EPA’s RACT/BACT/LAER Clearinghouse (RBLC) was queried to identify emission reduction alternatives for the proposed silica fume silos. Facilities with permits issued between January 1, 2011, and November 5, 2021, that include processes with names that include the words “bin” and “silo” were identified using the basic search function provided as part of RBLC web site. Records that did not include the word “bin” or “silo” in the “Process Name” field, were associated with bins or silos combined with other material handling operations or were associated with a bin or silo that did not contain material with the potential to generate particulate emissions (e.g., volatile liquids) were eliminated. The results of the queries are summarized below.
Table 18. Indoor material Handling for Fume Silo Building

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Facility</th>
<th>Permit Date</th>
<th>Process Name</th>
<th>Capacity</th>
<th>Control Method</th>
<th>Limit (gr/dscf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*IA-0117</td>
<td>SHELL ROCK SOY</td>
<td>3/17/2021</td>
<td>Hulls Storage Bin 1</td>
<td>3,300 ton/day</td>
<td>Bin Vent Filter</td>
<td>0.004</td>
</tr>
<tr>
<td>KY-0110</td>
<td>NUCOR STEEL</td>
<td>7/23/2020</td>
<td>EP 07-05 - DRI Day Bin</td>
<td>577,500 ton/yr</td>
<td>Dust collector</td>
<td>0.001</td>
</tr>
<tr>
<td>LA-0371</td>
<td>LAKE CHARLES</td>
<td>11/7/2019</td>
<td>ALU Vents</td>
<td>--</td>
<td>Fabric filters</td>
<td>0.02</td>
</tr>
<tr>
<td>OH-0368</td>
<td>PALLAS NITROGEN LLC</td>
<td>4/19/2017</td>
<td>Granulated Urea Transfer Points with bin</td>
<td>--</td>
<td>Bin vent filters</td>
<td>0.005</td>
</tr>
<tr>
<td>FL-0366</td>
<td>LIGNOTECH FLORIDA</td>
<td>10/18/2016</td>
<td>Storage silos and packaging bins</td>
<td>7.2 ton/hr</td>
<td>Baghouse or bin-vent filters</td>
<td>0.002</td>
</tr>
<tr>
<td>AR-0124</td>
<td>EL DORADO</td>
<td>8/3/2015</td>
<td>TRUCK BIN SN-08</td>
<td>--</td>
<td>Cyclone</td>
<td>0.002</td>
</tr>
<tr>
<td>*NE-0059</td>
<td>AGP SOY</td>
<td>3/25/2015</td>
<td>Meal Bin #36</td>
<td>106.25 ton/hr</td>
<td>Baghouse</td>
<td>0.003</td>
</tr>
<tr>
<td>ID-0021</td>
<td>MAGNIDA</td>
<td>4/21/2014</td>
<td>UREA LOADOUT VENT</td>
<td>--</td>
<td>Fabric Filter</td>
<td>0.005</td>
</tr>
<tr>
<td>TX-0725</td>
<td>DIRECT REDUCED</td>
<td>3/13/2014</td>
<td>Oxide Unloading Bin and Dedusting</td>
<td>319,7250 ton/yr</td>
<td>Fabric filter</td>
<td>0.002</td>
</tr>
<tr>
<td>IN-0156</td>
<td>STEEL DYNAMICS, INC.</td>
<td>12/21/2012</td>
<td>THREE STORAGE BIN/SILOS ID#12A, 12B, AND 12C</td>
<td>--</td>
<td>Bin vent filter</td>
<td>0.01</td>
</tr>
<tr>
<td>MN-0085</td>
<td>ESSAR STEEL MINNESOTA LLC</td>
<td>5/10/2012</td>
<td>HEARTH LAYER BIN, CARBON BIN, LIME BIN</td>
<td>--</td>
<td>Fabric filter with leak detection</td>
<td>0.002</td>
</tr>
<tr>
<td>MS-0091</td>
<td>DUPONT DELISLE FACILITY</td>
<td>3/21/2011</td>
<td>No. 7 Pigment Grinding Feed Bin (AK-107)</td>
<td>--</td>
<td>Baghouse</td>
<td>0.01</td>
</tr>
</tbody>
</table>
The KY-0110 reference above for Nucor Steel has a PM limit (0.001 gr/dscf) that is stricter than the proposed limit (0.0022 gr/dscf). On February 9, 2022, the contact for the Permit Review Branch for the state of Kentucky said that “they are requesting to remove the DRI emission units from the scope of the project, so after that application is processed and a revised permit is issued, they’ll be removed from the RBLC as well.”

Because an updated permit application for the Nucor Steel-Brandenburg facility no longer includes a DRI handling system, compliance with the 0.001 gr/dscf limit will never be demonstrated in practice. Furthermore, it is questionable that this limit, as applied to a source of DRI particulate matter, is comparable to a source of silica fume particulate matter.

Based on this review, the following are considered available emission reduction alternatives:

- Cyclone; and
- Fabric filter/baghouse.

However, it should be noted that the degree of emission reduction provided by a fabric filter is dependent upon both the design of the filtration media and the nature of the material that comprises the particulate matter to be reduced. Whereas silica fume particles are spherical in shape and have a mean size of 0.1 to 0.3 µm, materials associated with emission limits in the table above such as wood manufacturing residues, direct reduced iron (DRI), activated carbon, hydrated lime, and grains all contain particulate matter that is larger than silica fume and, therefore, easier to capture and collect than the particulate associated with silica fume. As a result, permitted emission limits assigned to bins or silos that contain these materials, which are more readily collected than silica fume, do not provide an equitable basis for comparison, and were not considered in the remainder of this analysis. Also, because the majority of the particle size distribution of silica fume is less than 2.5 µm, the TSP, PM10, and PM2.5 size-range designations were all considered equivalent for this analysis.

2.5.3.2 **Step 2 – Eliminate technically infeasible alternatives**

All of the identified available emission reduction alternatives are considered technically feasible for reducing particulate matter emissions from silica fume silos.

2.5.3.3 **Step 3 – Rank remaining alternatives**

Fabric filters are capable of removing greater than 99% of PM$_{2.5}$, while cyclones are capable of removing up to approximately 70 percent of PM$_{2.5}$.

2.5.3.4 **Step 4 – Evaluate economic, energy, and environmental impacts**

Because the most effective available alternative (i.e., a fabric filter) is proposed, no evaluation of economic, energy, and environmental impacts is necessary.

2.5.3.5 **Step 5 – Select BACT**

Based on the analysis presented above, Sinova proposes that BACT for particulate matter emissions (i.e., PM, PM10, and PM2.5) from the proposed source silica fume silo vents is use of a fabric filter able to achieve a maximum exhaust loading of 5 gm/Nm$^3$, which is equivalent to 0.0022 gr/dscf. and also approximately 0.0266 lb/hr. The following limits are being set for the Fume Silo process: PM filterable- 0.0022 gr/dscf, PM10-0.0022 gr/dscf, PM2.5-0.0022 gr/dscf,
2.6 Emergency Engine BACT Analysis

The facility will include one natural gas-fired emergency generator (rated at 2,682 hp). Note that this unit may not be ordered for more than a year. The following pollutants are emitted from this source and are subject to BACT: NOX, CO, VOC, and SO2. The emergency generator is also a source of GHGs; however, due to the limited use of this unit (108 hours per year) and relatively small GHG contributions, a top-down BACT analysis for GHG from this source was not performed for this permit application. Please note that the default operating time for an emergency engine is assumed to be 500 hours per year. Based on BACT analyses that have been prepared for GHG emissions, including those prepare for higher-capacity emergency engines that combust higher energy-intensity fuels (e.g., diesel), the conclusion of such analyses is to use good combustion practices to ensure efficient use of the fuel.

2.6.1 NOX BACT Analysis

2.6.1.1 Step 1: Identify all available emission reduction alternatives

A review of the RBLC database and recent permit applications provided the following summary of reduction alternatives for NOX emissions from rich-burn natural gas-fired emergency engines:

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum</th>
<th>Limits</th>
<th>Emission Reduction Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA-0287</td>
<td>7/21/2014</td>
<td>COLUMBIA GULF TRANSMISSION COMPANY</td>
<td>Rapides, LA</td>
<td>Emergency Generator</td>
<td>1174 hp</td>
<td>2 g/hp-hr</td>
<td>GCP</td>
</tr>
<tr>
<td>MI-0420</td>
<td>6/3/2016</td>
<td>DTE GAS COMPANY</td>
<td>Oakland, MI</td>
<td>Emergency Generator</td>
<td>2020 hp</td>
<td>2 g/hp-hr</td>
<td>LND, GCP</td>
</tr>
<tr>
<td>MI-0426</td>
<td>3/24/2017</td>
<td>DTE GAS COMPANY</td>
<td>Oakland, MI</td>
<td>Emergency Generator</td>
<td>1818 hp</td>
<td>2 g/hp-hr</td>
<td>LND, GCP</td>
</tr>
<tr>
<td>KY-0110</td>
<td>7/23/2020</td>
<td>NUCOR</td>
<td>Meade, KY</td>
<td>Emergency Generator</td>
<td>636 hp x 2 engines</td>
<td>2 g/hp-hr</td>
<td>GCP</td>
</tr>
</tbody>
</table>

1. GCP = good combustion practice, LND = low-NOX design

As shown in the table above, existing BACT determinations for NOX emissions from natural gas-fired emergency equipment are:

- Low NOX design;
- Good combustion practice; and
- Compliance with NSPS JJJJ.
Combustion modification strategies intended to minimize NO\textsubscript{X} emissions, such as ignition timing retard, air/fuel ratio changes, and exhaust gas recirculation, are variously characterized as low-NO\textsubscript{X} design (LND) and/or good combustion practice (GCP). There is no uniform definition for either of these emission reduction alternatives.

2.6.1.2 Step 2: Eliminate technically infeasible alternatives

A review of technical feasibility of each alternative was conducted as the second step of the BACT analysis.

LND and GCP refer to the application of state-of-the-art design and appropriate operation of a combustion unit. Both LND and GCPs are ubiquitous and technically feasible technology for reducing NO\textsubscript{X} emissions from rich-burn, natural gas-fired emergency engines. These strategies are frequently used to comply with NSPS Subpart JJJJ, which is considered the baseline alternative.

2.6.1.3 Step 3: Rank remaining alternatives

LND and GCPs are used to achieve the baseline NO\textsubscript{X} emission rate of 2.0 g/hp-hr (i.e., to comply with the NSPS Subpart JJJJ NO\textsubscript{X} limit). Thus, the combination of these strategies and the NSPS limit effectively comprise the baseline alternative and no ranking is necessary or possible.

2.6.1.4 Step 4: Evaluate economic, energy, and environmental impacts

Because Sinova is proposing to employ the most stringent available NO\textsubscript{X} emission reduction alternative, which is also the baseline alternative, no evaluation of economic, energy, and environmental impacts is necessary.

2.6.1.5 Step 5: Select BACT

Based on review of the RBLC and state permits for natural gas-fired emergency engines, no add-on emission reduction systems are utilized to reduce particulate emissions from these sources. Sinova proposes the following BACT for NO\textsubscript{X} emissions from the emergency engines:

Good combustion practice; and

Compliance with NSPS JJJJ.

1.2 g/-horsepower-hr and 7.1 lb/hr based on currently available units (note that this is stricter than 40 CFR §60.4233(e) at 2.0 g/brake-horsepower-hr)

The assumed default operating time for an emergency engine is assumed to be 500 hours per year, but this equipment is anticipated to operate only 108 hours per year.

2.6.2 CO and VOC BACT Analysis

2.6.2.1 Step 1: Identify all available emission reduction alternatives

A review of the RBLC database and recent permit applications provided the following summary of emission reduction alternatives for reducing CO and VOC emissions from natural gas-fired emergency engines:
### Table 20. Recent RBLC Entries for CO Emissions from Emergency Engines

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum</th>
<th>Limit</th>
<th>Emission Reduction Method¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA-0311</td>
<td>7/15/2013</td>
<td>CF INDUSTRIES NITROGEN, LLC</td>
<td>Ascension, LA</td>
<td>Emergency Generator</td>
<td>2500 hp</td>
<td>5 g/hp-hr</td>
<td>GCP</td>
</tr>
<tr>
<td>MI-0420</td>
<td>6/3/2016</td>
<td>DTE GAS COMPANY</td>
<td>Oakland, MI</td>
<td>Emergency Generator</td>
<td>2020 hp</td>
<td>4 g/hp-hr</td>
<td>GCP</td>
</tr>
<tr>
<td>MI-0426</td>
<td>3/24/2017</td>
<td>DTE GAS COMPANY</td>
<td>Oakland, MI</td>
<td>Emergency Generator</td>
<td>1818 hp</td>
<td>4 g/hp-hr</td>
<td>GCP</td>
</tr>
<tr>
<td>KY-0110</td>
<td>7/23/2020</td>
<td>NUCOR</td>
<td>Meade, KY</td>
<td>Emergency Generator</td>
<td>636 hp x 2 engines</td>
<td>4 g/hp-hr</td>
<td>GCP</td>
</tr>
</tbody>
</table>

¹ GCP = good combustion practice

### Table 21. Recent RBLC Entries for VOC Emissions from Emergency Engines

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum</th>
<th>Limit</th>
<th>Emission Reduction Method¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>KY-0110</td>
<td>7/23/2020</td>
<td>NUCOR</td>
<td>Meade, KY</td>
<td>Emergency Generator</td>
<td>636 hp x 2 engines</td>
<td>1 g/hp-hr</td>
<td>GCP</td>
</tr>
</tbody>
</table>

¹ GCP = good combustion practice

As shown in the table above, existing BACT determinations for CO and VOC emissions from gas-fired emergency engines are:

Good combustion practice; and

Compliance with NSPS JJJJ.
Good combustion practice, as it applies to CO and VOC emissions, includes adequate fuel residence times to ensure CO\textsubscript{2} formation, proper fuel-air mixing, and maintaining temperatures that ensure complete oxidation.

2.6.2.2 Step 2: Eliminate technically infeasible alternatives
All options identified in Step 1 are technically feasible.

2.6.2.3 Step 3: Rank remaining alternatives
The only feasible alternatives for reducing CO and VOC emissions from gas-fired emergency engines are utilizing good combustion practice and compliance with NSPS JJJJ.

2.6.2.4 Step 4: Evaluate economic, energy, and environmental impacts
Because there are no other feasible alternatives for reducing CO and VOC emissions from the emergency engine, economic, energy, and environmental impacts were not evaluated.

2.6.2.5 Step 5: Select BACT
Based on review of the RBLC and state permits for natural gas-fired emergency engines, no add-on emission reduction systems are utilized to reduce CO and VOC emissions from these sources. Therefore, Sinova proposes the following BACT for CO and VOC emissions from the emergency engine, based on units which are currently available:

- Good combustion practice; and
- Compliance with NSPS JJJJ

**CO**: 2.2 g/hp-hr and 13.01 lb/hr  
Note that this emission limit is stricter than 40 CFR §60.4233(e) at 4.0 g/brake-horsepower-hr which is equal to 23.6 lb/hr

**VOC**: 1.0 g/hp-hr and 5.9 lb/hr  
Note that for this emission limit, the BACT proposal (based on the manufacturer’s guarantee at 1.0 g/hp-hr and 5.9 lb/hr) is the same as NSPS Subpart JJJJ at the same value.

Note that this unit may not be ordered for more than a year.

2.6.3 PM BACT Analysis
2.6.3.1 Step 1: Identify all available emission reduction alternatives
The concept of applying combustion controls or “proper combustion” to minimize PM emissions is similar to the strategy used to control CO and VOC. This includes adequate fuel residence time, proper fuel-air mixing, and temperature control to ensure the maximum amount of fuel is combusted. Combustion of natural gas, a fuel with low ash content and high combustion efficiency, results in correspondingly low particulate emissions.
A review of the RBLC database and recent permit applications provided the following summary of emission reduction alternatives for PM emissions from natural gas-fired emergency engines:

Table 22. Recent RBLC Entries for PM from Emergency Engines

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum</th>
<th>Limit</th>
<th>Emission Reduction Method¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN-0185</td>
<td>4/24/2014</td>
<td>MAG PELLET LLC</td>
<td>White, IN</td>
<td>Emergency Generator</td>
<td>620 hp</td>
<td>0.15 g/hp-hr</td>
<td>None</td>
</tr>
<tr>
<td>LA-0287</td>
<td>7/21/2014</td>
<td>COLUMBIA GULF TRANSMISSION COMPANY</td>
<td>Rapides, LA</td>
<td>Emergency Generator</td>
<td>1174 hp</td>
<td>0.002 g/hp-hr</td>
<td>PNG, GCP</td>
</tr>
<tr>
<td>MI-0420</td>
<td>6/3/2016</td>
<td>DTE GAS COMPANY</td>
<td>Oakland, MI</td>
<td>Emergency Generator</td>
<td>2020 hp</td>
<td>0.01 lb/MMBtu</td>
<td>PNG, GCP</td>
</tr>
<tr>
<td>MI-0426</td>
<td>3/24/2017</td>
<td>DTE GAS COMPANY</td>
<td>Oakland, MI</td>
<td>Emergency Generator</td>
<td>1818 hp</td>
<td>0.01 lb/MMBtu</td>
<td>PNG, GCP</td>
</tr>
<tr>
<td>KY-0110</td>
<td>7/23/2020</td>
<td>NUCOR</td>
<td>Meade, KY</td>
<td>Emergency Generator</td>
<td>636 hp x 2 engines</td>
<td></td>
<td>GCP</td>
</tr>
</tbody>
</table>

1. GCP = good combustion practice, PNG = pipeline natural gas

As shown in the table above, existing BACT determinations for PM emissions from natural gas-fired emergency engines are:

- Combustion of natural gas only
- Good combustion practices; and
- Compliance with NSPS JJJJ requirements.

2.6.3.2 Step 2: Eliminate technically infeasible alternatives

All options identified in Step 1 are technically feasible.

2.6.3.3 Step 3: Rank remaining alternatives

The best feasible alternative for control of particulates from natural gas-fired emergency engine is a combination of all feasible alternatives: combustion of natural gas (a low ash content fuel), utilizing good combustion practices, and compliance with NSPS JJJJ.

The permittee has proposed a value of 0.10 lb PM/hr and 0.016 g/hp-hr
2.6.3.4 **Step 4: Evaluate economic, energy, and environmental impacts** Because Sinova will employ the most effective feasible emission reduction alternatives for reducing particulates from the emergency engines, economic, energy, and environmental impacts were not evaluated.

2.6.3.5 **Step 5: Select BACT**

Based on review of the RBLC and state permits for natural gas-fired emergency engines, no add-on emission reduction systems are utilized to reduce particulate emissions from these sources. Sinova proposes the following BACT for PM emissions from the emergency engine:

- Combustion of natural gas only
- Good combustion practice; and
- Compliance with NSPS JJJJ.

Also, the permittee shall comply the following values, to be verified by manufacturer’s data or testing:

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>BACT Allowable (units)</th>
<th>BACT Allowable (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM filterable</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
</tr>
<tr>
<td>PM10</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
</tr>
<tr>
<td>PM2.5</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
</tr>
<tr>
<td>PM – all categories</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
</tr>
<tr>
<td>combined</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note that some of the RBLC values from Table 22 above were not reconciled with the values proposed in the above table. However, it is noted that there is a very low level of the hourly emissions, and the default annual operating time for an emergency engine is 500 hours. This engine will be expected to operate about 108 hours per year.

A limit of 10% opacity is being implemented.

The proposed BACT values of 0.10 lb PM/hr and 0.016 g/hp-hr are found with currently available units.

This unit may not be ordered for more than a year.

2.6.4 **SO₂ BACT Analysis**

2.6.4.1 **Step 1: Identify all available emission reduction alternatives**

Reducing SO₂ emissions from combustion sources can be done through removal of sulfur from the fuel before it
is combusted and removal of SO₂ from the exhaust gas after combustion. Because natural gas is an inherently low sulfur content fuel, there is no need to remove sulfur from the fuel before it is combusted. Additionally, due to low sulfur content of natural gas, there are no post-combustion sulfur removal technologies typically used for natural gas-fired combustion engines.

A review of the RBLC database and recent permit applications provided the following summary of control options for SO₂ emissions from emergency equipment:

Table 24. Recent RBLC Entries for SO₂ Emissions from Emergency Engines

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum</th>
<th>Limit</th>
<th>Emission Reduction Method¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN-0185</td>
<td>4/24/2014</td>
<td>MAG PELLET LLC</td>
<td>White, IN</td>
<td>Emergency Generator</td>
<td>620 hp</td>
<td>0.0015 g/kW-hr</td>
<td>PNG, GCP</td>
</tr>
<tr>
<td>KY-0110</td>
<td>7/23/2020</td>
<td>NUCOR</td>
<td>Meade, KY</td>
<td>Emergency Generator</td>
<td>636 hp x 2 engines</td>
<td>GCP</td>
<td></td>
</tr>
</tbody>
</table>

1. GCP = good combustion practice, PNG = pipeline natural gas

Based on the existing BACT determinations seen above, the emission reduction alternatives available for SO₂ emissions from natural gas-fired emergency engines are:

- Combustion of natural gas only
- Good combustion practices; and
- Comply with NSPS JJJJ requirements.

Emission rates of 0.0029 lb/hr and 0.000588 lb/MMBtu heat input. Set the SO₂ limit at 0.0029 lb/hr and 0.0005 grams SO₂ per hp-hr based on AP-42 Table 3.2-3

It is recognized that AP-42 may not be the most accurate source of emission factors, but that is the best information available at this time.

2.6.4.2 Step 2: Eliminate technically infeasible alternatives

All options identified in Step 1 are technically feasible.

2.6.4.3 Step 3: Rank remaining alternatives

Combustion of natural gas, utilizing good combustion practices, and compliance with NSPS JJJJ are the only feasible options. The combination of all alternatives is the top option for control of SO₂ emissions from the emergency equipment.

2.6.4.4 Step 4: Evaluate economic, energy, and environmental impacts

Economic, energy, and environmental impacts were not evaluated, because there are no other feasible technologies for control of SO₂ from the emergency engine,
2.6.4.5 Step 5: Select BACT

Based on review of the RBLC and state permits for natural gas-fired emergency engines, no add-on controls are utilized to control particulate emissions from these sources. Sinova proposes the following BACT for SO$_2$ emissions from the emergency engine:

- Combustion of natural gas only
- Good combustion practices; and
- Compliance with NSPS JJJ.J. The values of 0.0029 lb/hr and 5.88 E-04 lb/MBtu (fuel input) based on AP-42 Table 3.2-3 at 5.88E-04 lb SO$_2$ per MMBtu of fuel input. The 5.88E-04 lb/MBtu heat input converts to 0.0005 g SO$_2$/hp-hr based on the engine capacity. These values are based on currently available units. Note that this is based on pipeline natural gas. This unit may not be ordered for another year.

It is recognized that AP-42 may not be the most accurate source of emission factors, but that is the best information available at this time.

The assumed default operating time for an emergency engine is assumed to be 500 hours per year, but this equipment is anticipated to operate only 108 hours per year.

Note that this is based on pipeline natural gas. This unit may not be ordered for another year.

2.6.5 Greenhouse gas (CO$_2$e) BACT Analysis

The emergency generator is also a source of GHGs; however, due to the limited use of this unit (108 hours per year) and relatively small GHG contributions, a complete top-down BACT analysis for GHG from this source using RBLC data was not performed for this permit application. Based on BACT analyses that have been prepared for GHG emissions, including those prepared for higher-capacity emergency engines that combust higher energy-intensity fuels (e.g., diesel), the conclusion of such analyses is to use good combustion practices to ensure efficient use of the fuel.

Some considerations involved in this are the default annual operating time of 500 hours and the fact that this engine is expected to operate about 108 hours per year. Controls are not considered feasible for this source for some of the same reasons as given for the Submerged Arc Furnaces (such as carbon capture and sequestration) at section 2.3.6.

The annual GHG (CO$_2$e) limit for the Emergency Engine is proposed as 145.9 tons per year. This is based on an emission rate of 584.29 lb CO$_2$e per hour at 500 hours per year. Also, the GHG / CO$_2$e limit is based on CO$_2$e emission factors from 40 CFR 98 Subpart C, Tables C-1 and C-2 as seen below.
Table 25  Greenhouse Gas emissions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>CAS No.</th>
<th>Emission Factor</th>
<th>Emission Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>g/bhp-hr</td>
<td>lb/MMBtu</td>
</tr>
<tr>
<td>CO₂</td>
<td>CO2</td>
<td>116.975076</td>
<td>583.69</td>
</tr>
<tr>
<td>CH₄</td>
<td>CH₄</td>
<td>0.0022</td>
<td>0.01</td>
</tr>
<tr>
<td>N₂O</td>
<td>N₂O</td>
<td>0.00022</td>
<td>1.0E-03</td>
</tr>
<tr>
<td>CO₂e</td>
<td>CO₂e</td>
<td>117</td>
<td>584.29</td>
</tr>
</tbody>
</table>

Notes:
1. Unless otherwise noted, emission factors are from AP42, Table 3.2-3. CO₂, methane and nitrous oxide emission factors from 49 CFR 98, Subpart C, Tables C-1 & C-2.
2. Maximum hourly and daily emissions based on 1 engine operating for 60 minutes. Annual emissions based on 100 hours of testing and 8 hrs/yr of emergency operation.
3. CO₂e calculated based on global warming potential (GWP) for each Greenhouse gas: CO₂ = 1; CH₄ = 25; and N₂O = 290 (40 CFR Part 98, Subpart A).

2.7  Paved/Unpaved Surfaces
Fugitive particulate emissions can occur from vehicle traffic on paved and unpaved surfaces. This includes fugitive emissions from Roads at source 48-0046-01 (this section does not include Raw Material receiving at 48-0046-01)

2.7.1  PM BACT Analysis

2.7.1.1  Step 1: Identify all available emission reduction alternatives
Fugitive emissions of PM will be generated as vehicles travel on the paved and unpaved surfaces at the Facility. The following are available control technologies for control of particulates from paved and unpaved surfaces:

2.7.1.1.1  Fugitive dust control plan, including roadway sweeping to reduce the amount of material that can be suspended by vehicle traffic, speed reduction on facility roadways.

2.7.1.1.2  Wet suppression system to suppress the formation of airborne dust through agglomerate formation by combining small dust particles with larger aggregate or with liquid droplets. There are two types of wet suppression systems: 1) liquid sprays using water or water/surfactant mixtures as wetting agent, and 2) use of foam as wetting agent.

Review of the RBLC database and recent permit applications provided the following summary of road dust control options.

Table 26. Recent RBLC Entries for PM Emissions from Haul Roads

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Maximum Throughput (VMT)</th>
<th>Limit</th>
<th>Emission Reduction Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA-0105</td>
<td>10/26/2012</td>
<td>IOWA FERTILIZER COMPANY</td>
<td>LEE, IA</td>
<td>Haul Roads</td>
<td>None</td>
<td>None</td>
<td>Paved Roads, Wet Suppress on, BMP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>---</td>
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<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>IA-0106</td>
<td>07/12/2013</td>
<td>CF INDUSTRIES NITROGEN, LLC - PORT NEAL NITROGEN COMPLEX</td>
<td>New Plant Haul Road</td>
<td>None</td>
<td>None</td>
<td>Paved Roads, Wet Suppression, BMP</td>
<td></td>
</tr>
<tr>
<td>*IA-0117</td>
<td>03/17/2021</td>
<td>SHELL ROCK SOY PROCESSING</td>
<td>GRUNDY, IA</td>
<td>Paved Road Fugitives</td>
<td>None</td>
<td>2.97 TPY</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>IL-0129</td>
<td>07/30/2018</td>
<td>CPV THREE RIVERS ENERGY CENTER</td>
<td>GRUNDY, IL</td>
<td>Roadways</td>
<td>None</td>
<td>10% Opacity</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>IL-0130</td>
<td>12/31/2018</td>
<td>JACKSON ENERGY CENTER</td>
<td>WILL, IL</td>
<td>Roadways</td>
<td>None</td>
<td>10% Opacity</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>IN-0166</td>
<td>06/27/2012</td>
<td>INDIANA GASIFICATION, LLC</td>
<td>SPENCER, IN</td>
<td>FUGITIVE DUST FROM PAVED ROADS</td>
<td>None</td>
<td>90% Control</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>IN-0173</td>
<td>06/04/2014</td>
<td>MIDWEST FERTILIZER CORPORATION</td>
<td>FUGITIVE DUST FROM PAVED ROADS AND PARKING LOTS</td>
<td>10,402</td>
<td>90% Control</td>
<td>Paved Roads, Wet Suppression, BMP</td>
<td></td>
</tr>
<tr>
<td>IN-0179</td>
<td>09/25/2013</td>
<td>OHIO VALLEY RESOURCES, LLC</td>
<td>SPENCER, IN</td>
<td>PAVED ROADWAYS AND PARKING LOTS WITH PUBLIC ACCESS</td>
<td>17,160</td>
<td>90% Control</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>IN-0180</td>
<td>06/04/2014</td>
<td>MIDWEST FERTILIZER CORPORATION</td>
<td>POSEY, IN</td>
<td>FUGITIVE DUST FROM PAVED ROADS AND PARKING LOTS</td>
<td>10,402</td>
<td>90% Control</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>RBLC ID</td>
<td>Permit Issuance Date</td>
<td>Company</td>
<td>Location</td>
<td>System Description</td>
<td>Maximum Throughput (VMT)</td>
<td>Limit</td>
<td>Emission Reduction Method</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td>---------</td>
<td>----------</td>
<td>-------------------</td>
<td>--------------------------</td>
<td>-------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>IN-0317</td>
<td>06/11/2019</td>
<td>RIVERVIEW ENERGY CORPORATION</td>
<td>SPENCER, IN</td>
<td>Paved roads</td>
<td>None</td>
<td>None</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>*KS-0034</td>
<td>05/27/2014</td>
<td>ABENGOA BIOENERGY BIOMASS OF KANSAS (ABBK)</td>
<td>STEVENS, KS</td>
<td>Paved Haul Roads</td>
<td>None</td>
<td>148 Trucks/Day</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>KY-0109</td>
<td>10/24/2016</td>
<td>FRITZ WINTER NORTH AMERICA, LP</td>
<td>SIMPSON, KY</td>
<td>Paved Roadways (EU76)</td>
<td>0.43</td>
<td>None</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>KY-0115</td>
<td>04/19/2021</td>
<td>NUCOR STEEL GALLATIN, LLC</td>
<td>GALLATIN, KY</td>
<td>Paved Roads; Satellite Coil Yard (EPs 04-01 &amp;04-04)</td>
<td>None</td>
<td>None</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>MD-0041</td>
<td>04/23/2014</td>
<td>CPV ST. CHARLES</td>
<td>CHARLES, MD</td>
<td>ROADWAYS</td>
<td>None</td>
<td>None</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>MO-0089</td>
<td>05/12/2016</td>
<td>OWENS CORNING INSULATION SYSTEMS, LLC</td>
<td>JASPER, MO</td>
<td>haul roads</td>
<td>None</td>
<td>None</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>OH-0345</td>
<td>08/16/2011</td>
<td>DP&amp;L J.M. STUART GENERATING STATION</td>
<td>ADAMS, OH</td>
<td>Paved Roadways</td>
<td>None</td>
<td>110.96 TPY</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>RBLC ID</td>
<td>Permit Issuance Date</td>
<td>Company</td>
<td>Location</td>
<td>System Description</td>
<td>Maximum Throughput (VMT)</td>
<td>Limit</td>
<td>Emission Reduction Method</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td>---------</td>
<td>----------</td>
<td>--------------------</td>
<td>--------------------------</td>
<td>-------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>OH-0368</td>
<td>04/19/2017</td>
<td>PALLAS NITROGEN LLC</td>
<td>COLUMBUS, OH</td>
<td>Paved Roadways (F001)</td>
<td>70,000</td>
<td>13.2 TPY</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>OH-0376</td>
<td>02/09/2018</td>
<td>IRONUNITS LLC - TOLEDO HBI</td>
<td>LUCAS, OH</td>
<td>Paved roads (F001)</td>
<td>None</td>
<td>0.63 TPY</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>OH-0378</td>
<td>12/21/2018</td>
<td>PTTGCA PETROCHEMICA L COMPLEX</td>
<td>BELMONT, OH</td>
<td>Facility Roadways (F001)</td>
<td>182,865</td>
<td>1.88 TPY</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>*OH-0380</td>
<td>08/07/2019</td>
<td>AMG VANADIUM LLC</td>
<td>MUSKINGUM, OH</td>
<td>Paved Roadways (F001)</td>
<td>31,689</td>
<td>None</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>*OH-0381</td>
<td>09/27/2019</td>
<td>NORTHSTAR BLUESCOPE STEEL, LLC</td>
<td>FULTON, OH</td>
<td>Plant Roadways &amp; Parking Areas (F005)</td>
<td>686,399</td>
<td>16.74 TPY</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>OK-0156</td>
<td>07/31/2013</td>
<td>NORTHSTAR AGRI ENID</td>
<td>GARDEN, OK</td>
<td>Haul Roads</td>
<td>None</td>
<td>None</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>SC-0181</td>
<td>11/03/2017</td>
<td>RESOLUTE FP US INC. - CATAWBA LUMBER MILL</td>
<td>YORK, SC</td>
<td>Roads</td>
<td>None</td>
<td>0.13 LB/VMT</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
<tr>
<td>*SC-0193</td>
<td>04/15/2016</td>
<td>MERCEDES BENZ VANS, LLC</td>
<td>CHARLESTON, SC</td>
<td>Paved Roads</td>
<td>10.66</td>
<td>None</td>
<td>Paved Roads, Wet Suppression, BMP</td>
</tr>
</tbody>
</table>
2.7.1.2 Step 2: Eliminate technically infeasible alternatives
All of the alternatives identified in Step 1 are technically feasible.

2.7.1.3 Step 3: Rank remaining alternatives
The top level of control is a combination of the two options identified in Step 1. Development of a fugitive dust control plan that includes the use of wet suppression as needed is the top level of emission reduction for PM emissions from paved and unpaved surfaces.

2.7.1.4 Step 4: Evaluate economic, energy, and environmental impacts
Sinova is selecting the most effective emission reduction alternative, and therefore an analysis of economic, energy, and environmental impacts was not conducted.

2.7.1.5 Step 5: Select BACT
Based on review of the RBLC and state permits for similar activities, no add-on emission reduction systems are utilized to control fugitive particulate emissions from paved or unpaved surfaces. Sinova proposes the following BACT for PM emissions from this source:

Roads will be paved. A fugitive dust control plan will be submitted that includes periodic sweeping of roadways to reduce the amount of particulate deposits, speed reduction on facility roadways, and wet suppressants/watering as required. No numeric emission limit is proposed, because the low emissions (at about 0.15 tons per year) are fugitive and there are no available test methods to determine the particulate emission rate from these activities.

2.8 Diesel Storage Tank BACT Analysis

2.8.1 Step 1 – Identify all available emission reduction alternatives
The EPA’s RACT/BACT/LAER Clearinghouse (RBLC) was queried to identify emission reduction alternatives for the proposed diesel fuel storage tank. Facilities with permits issued between January 1, 2011 and November 5, 2021 that include process types 42.005 (Petroleum Liquid Storage in Fixed Roof Tanks) and 42.009 (Volatile Organic Liquid Storage) were identified using the basic search function provided as part of the RBLC web site. Records that did not include the word “tank” in the “Process Name” field and did not indicate that diesel or ultra-low sulfur diesel (ULSD) could be stored in the tank were eliminated. The results of the queries are summarized below.
### Table 27. Recent RBLC for Diesel Storage Tanks

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Facility Name</th>
<th>Permit Date</th>
<th>Process Name</th>
<th>Capacity</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA-0363</td>
<td>HOLDEN WOOD PRODUCTS MILL</td>
<td>10/2/2019</td>
<td>Diesel Storage Tank</td>
<td>14,000 gallons</td>
<td>Good tank design and submerged fill</td>
</tr>
<tr>
<td>IN-0312</td>
<td>LEHIGH CEMENT COMPANY LLC</td>
<td>6/27/2019</td>
<td>Diesel tanks</td>
<td>1,400 gallons</td>
<td>Good design and operating practices</td>
</tr>
<tr>
<td>IN-0318</td>
<td>RIVERVIEW ENERGY CORPORATION</td>
<td>6/11/2019</td>
<td>Diesel product tanks</td>
<td>--</td>
<td>Tanks shall use a white shell, submerged filling,</td>
</tr>
<tr>
<td>IN-0318</td>
<td>RIVERVIEW ENERGY CORPORATION</td>
<td>6/11/2019</td>
<td>Diesel fuel tank T17</td>
<td>--</td>
<td>Tanks shall use a white shell, submerged filling,</td>
</tr>
<tr>
<td>IN-0318</td>
<td>RIVERVIEW ENERGY CORPORATION</td>
<td>6/11/2019</td>
<td>Emergency engine fuel tanks</td>
<td>--</td>
<td>Tanks shall use a white shell, submerged filling,</td>
</tr>
<tr>
<td>TX-0846</td>
<td>MOTOR VEHICLE ASSEMBLY PLANT</td>
<td>9/23/2018</td>
<td>Storage Tanks for Very Low Vapor Pressure Non-Gasoline Automotive Fluids such as Gear Lube, Engine Oil, Diesel fuel, Urea, ATF, etc.</td>
<td>20,000 gallons</td>
<td>White fixed roof storage tanks equipped with a submerged fill pipe; use of drain dry construction is required to minimize the</td>
</tr>
<tr>
<td>AR-0124</td>
<td>EL DORADO SAWMILL</td>
<td>8/3/2015</td>
<td>THREE DIESEL STORAGE TANKS SN-15</td>
<td>--</td>
<td>Light color tanks</td>
</tr>
<tr>
<td>FL-0347</td>
<td>ANADARKO PETROLEUM CORPORATION - EGOM</td>
<td>9/16/2014</td>
<td>Storage Tanks</td>
<td>--</td>
<td>Use of good maintenance practices to minimize fugitive emissions, including</td>
</tr>
<tr>
<td>IA-0106</td>
<td>CF INDUSTRIES NITROGEN, LLC - PORT NEAL NITROGEN COMPLEX</td>
<td>7/12/2013</td>
<td>Diesel Belly Tanks</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>IN-0158</td>
<td>ST. JOSEPH ENERGY CENTER, LLC</td>
<td>12/3/2012</td>
<td>EMERGENCY GENERATOR ULSD TANKS</td>
<td>550 gallons</td>
<td>Good design and operating practices</td>
</tr>
<tr>
<td>IN-0158</td>
<td>ST. JOSEPH ENERGY CENTER, LLC</td>
<td>12/3/2012</td>
<td>FIRE PUMP ENGINE ULSD TANKS</td>
<td>70 gallons</td>
<td>Good combustion practice and fuel</td>
</tr>
<tr>
<td>IN-0158</td>
<td>ST. JOSEPH ENERGY CENTER, LLC</td>
<td>12/3/2012</td>
<td>VEHICLE DIESEL TANK</td>
<td>650 gallons</td>
<td>Good combustion practice and fuel</td>
</tr>
</tbody>
</table>
Based on this review, the following are considered available alternatives for reducing volatile organic compound (VOC) emissions from diesel storage tanks:

- Good design, maintenance, and operating practices;
- A submerged fill system; and
- Light or white tank color

2.8.2 Step 2 – Eliminate technically infeasible alternatives
All of the identified available emission reduction alternatives are considered technically feasible for reducing VOC emissions from diesel storage tanks.

2.8.3 Step 3 – Rank remaining alternatives
Because all identified available emission reduction alternatives are considered technically feasible and none are mutually exclusive, all of the identified alternatives are combined into a single baseline alternative.
2.8.4 Step 4 – Evaluate economic, energy, and environmental impacts
Because there is only one remaining alternative (i.e., the combined baseline), no evaluation of economic, energy, and environmental impacts is necessary.

2.8.5 Step 5 – Select BACT
Based on the analysis presented above, Sinova proposes that BACT for VOC emissions from the proposed diesel storage tank are good design, maintenance, and operating practices; a submerged fill system; and a light or white tank color. No numeric limits are proposed here due to the very low level of anticipated emissions.

2.9 Proposed Emission Limits
The following table summarizes the selected BACT and the proposed emission limit, if any, for each emission source and pollutant included in this BACT analysis.

### Table 28. BACT Proposed Emission Limits

<table>
<thead>
<tr>
<th>Source</th>
<th>Pollutant</th>
<th>Controls</th>
<th>BACT Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Raw Material Transfer and Storage See Section 2.5.1 BACT for outdoor handling /storage sources of fugitive emissions – Raw Material Handling (p. 60)</td>
<td>PM/PM$<em>{10}$/ PM$</em>{2.5}$</td>
<td>Best management practices and Fugitive Dust Control plan with Dust Suppression for Material Handling and Roads</td>
<td>Best management practices and fugitive dust control plan / water misting for Material Transfer Opacity as noted in permit No numeric PM limit</td>
</tr>
<tr>
<td>01 Roadways See Section 2.7 Paved/Unpaved Surfaces and 2.7.1 PM BACT Analysis (page 83)</td>
<td>PM/PM$<em>{10}$/ PM$</em>{2.5}$</td>
<td>Fugitive dust control plan with periodic sweeping of roadways to reduce the amount of particulate deposits, speed reduction on facility roadways, and wet suppressants/watering as required.</td>
<td>Paved Roads, swept or sprayed and Preventive Maintenance Plan Also opacity as noted in permit No numeric PM limit</td>
</tr>
</tbody>
</table>
### Proportioning Building / Raw Material

See Section 2.5.2 PM BACT Analysis – Indoor Material Handling (page 64)

<table>
<thead>
<tr>
<th>Source</th>
<th>Pollutant</th>
<th>Controls</th>
<th>BACT Limit</th>
</tr>
</thead>
</table>
| See Section 2.3 Submerged Arc Furnace for all pollutants (Page 20) | SO₂ | Use of low-sulfur raw materials when possible, up to 2% coal sulfur | 21.1 lb/ton Si produced and 1% sulfur in coal  
81.4 lb SO₂ per hour per SAF  
1,389 lb SO₂ per day per SAF  
253 tons per 12-month period per furnace |
| PM/PM₁₀/PM₂.₅ | Baghouse and best practices design and operation | PM filterable: 0.0022 gr/dscf  
PM₁₀: 0.0022 gr/dscf  
PM₂.₅: 0.0022 gr/dscf  
All PM categories combined: 0.0022 gr/dscf  
Also 10% opacity |

### 02 Submerged Arc Furnaces (2 units)

| Pollutant | Best practices design and operation | 45.0 lb/ton silicon  
174 lb NOX per hour per SAF  
3,333 lb NOX per day per SAF  
608 tons NOX per 12-month period per SAF |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NOₓ</td>
<td></td>
<td>CO</td>
</tr>
<tr>
<td>SO₂</td>
<td>Use of low-sulfur raw materials when possible, up to 2% coal sulfur</td>
<td>34.0 lb/ton silicon</td>
</tr>
<tr>
<td>VOC as carbon</td>
<td>Best practices design and operation</td>
<td>2.4 lb/tons silicon</td>
</tr>
<tr>
<td></td>
<td>GHG</td>
<td>Utilization of new generation furnaces, good operation, and maintenance</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>04 Ladle Preheaters</td>
<td>NOx</td>
<td>Natural gas fuel only and good combustion practices</td>
</tr>
<tr>
<td></td>
<td>CO</td>
<td>Good combustion practices</td>
</tr>
<tr>
<td></td>
<td>VOC</td>
<td>Good combustion practices</td>
</tr>
<tr>
<td></td>
<td>SO2</td>
<td>Combustion of natural gas only, good combustion practices</td>
</tr>
<tr>
<td></td>
<td>PM/PM10/PM2.5</td>
<td>Combustion of natural gas only, good combustion practices</td>
</tr>
<tr>
<td></td>
<td>GHG</td>
<td>Combustion of natural gas only, good combustion practices, selection of most energy efficient burner design available, periodic maintenance</td>
</tr>
<tr>
<td>05 Fume Silos</td>
<td>PM/PM10/PM2.5</td>
<td>Baghouse</td>
</tr>
</tbody>
</table>
| 06 Slag Crushing Handling and Screening | PM/PM$_{10}$/PM$_{2.5}$ | Best management practices and fugitive dust control/ Preventative Maintenance Plan plan, water spray – mist control | PM filterable: 0.068 lb/hr  
PM$_{10}$: 0.0256 lb/hr  
PM$_{2.5}$: 0.003 lb/hr  
All PM categories combined: 0.097 lb/hr  
Also 12% opacity  
(1 hr./day limit) |
| 07 Product Crushing and Screening | PM/PM$_{10}$/PM$_{2.5}$ | Baghouse | PM filterable: 0.0022 gr/dscf  
PM$_{10}$: 0.0022 gr/dscf  
PM$_{2.5}$: 0.0022 gr/dscf  
All PM categories combined: 0.0022 gr/dscf  
Also 10% opacity |
<p>| 08 Emergency Engine | NO$_x$ | Good combustion practice, compliance with NSPS JJJJ | 7.1 lb/hr, 1.2 g/hp-hr and compliance with Subpart JJJJ |
| | CO | Good combustion practice, compliance with NSPS JJJJ | 13.01 lb/hr, 2.2 g/hp-hr and compliance with Subpart JJJJ |
| | VOC | Good combustion practice, compliance with NSPS JJJJ | 5.9 lb/hr, 1.0 g/hp-hr and compliance with Subpart JJJJ |</p>
<table>
<thead>
<tr>
<th>Source</th>
<th>Pollutant</th>
<th>Controls</th>
<th>BACT Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO₂</td>
<td>Combustion of natural gas only, good combustion practice, compliance with NSPS JJJJ</td>
<td>0.0029 lb/hr , 0.0005 gr/hp-hr and good combustion practice</td>
<td></td>
</tr>
</tbody>
</table>
| PM/PM₁₀/PM₂.₅ | Combustion of natural gas only, good combustion practice, compliance with NSPS JJJJ | PM filterable: 0.10 lb/hr  
PM10: 0.10 lb/hr  
PM2.5: 0.10 lb/hr  
All PM categories combined: 0.10 lb/hr  
0.016 g/hp-hr for each above category  
Also 10% opacity |
<p>| GHG/CO₂ₑ | Combustion of natural gas only, good combustion practice, | 145.9 tons per calendar year |</p>
<table>
<thead>
<tr>
<th></th>
<th>VOC</th>
<th>Submerged fill and good work practices, light tank color</th>
</tr>
</thead>
<tbody>
<tr>
<td>09 Diesel Storage Tank</td>
<td>See Section 2.8 (Page 87)</td>
<td></td>
</tr>
</tbody>
</table>

Note that there are no emission points from the warehouse building. All materials in this building are sealed in bags and are moved with forklifts.

Table 29---? (need one more table to coincide with Haidar 28. BACT Proposed Emission Limits)
VI Air Quality Analysis

Air quality impact assessments (AQIAs) are performed using dispersion modeling techniques in accordance with the EPA’s Guideline on Air Quality Models (codified as Appendix W to 40 CFR Part 51, hereafter referred to as “the Guideline”). The results of a modeling analysis can exempt the applicant from ambient air monitoring or cumulative source modeling.

The local AQIA includes emissions attributable to the proposed emission units. The purpose of the AQIA is to assess potential impacts of the proposed project on air quality in the area surrounding the proposed site. Computer-based dispersion modeling techniques were applied to simulate criteria releases from the Facility to assess compliance with PSD Increments and the NAAQS, and the Tennessee ambient air quality standards (AAQS). This section describes the techniques for the AQIA. The AQIA focuses on the prediction of concentrations of pollutants directly emitted by the proposed and affected emission units, but also addresses near-field secondary pollutants.

Dispersion modeling techniques are also used to assess potential impacts to Class I areas, including degradation of visibility and other air-quality-related values (AQRVs). The “regional” AQRV analysis is described in Section 7 of this application.

VI.1 Dispersion Model Selection

The rationale for the dispersion modeling approach is based on the Guideline, considerations of the local terrain, and the emission unit characteristics. AERMOD is currently the preferred dispersion model recommended by the Guideline for complex source configurations, emission units subject to exhaust plume downwash, and situations where there is the potential for exhaust plumes to interact with complex terrain.

AERMOD was used for this modeling analysis primarily because it is the most up-to-date near-field dispersion model currently available. Additionally, the modeling domain and source configuration suggests the potential for exhaust plume downwash.

VI.2 Model Application

AERMOD was applied to calculated emissions using the regulatory defaults in addition to the options and data discussed in this section.
The most recent version of AERMOD (currently version 21112) was applied with the default options for dispersion based on local meteorological data, regional upper air data, and the local physical characteristics of land use surrounding the primary meteorological site. AERMOD contains several options for urban dispersion that were not selected for these analyses due to the rural characteristics of the area in which the Facility is proposed.

VI.2.1 Meteorology
TDEC supplied a pre-processed meteorological data set for the analysis, containing data for the years 2015 through 2019. Surface meteorological data were from McKellar-Sipes Regional Airport (KMKL), located approximately 69 miles (110 km) southeast of the Facility near the town of Jackson, TN. Upper-air data were from Nashville International Airport (KBNA), located approximately 160 miles (260 km) ESE of the Facility near Nashville, TN. The surface data set included ambient temperature, wind speed, wind direction, and relative humidity.

TDEC recommended this representative surface meteorological NWS site because it is the closest to Sinova location (105 km Southeast) in addition to having similar topography and surface characteristics to the PSD source. The other NWS meteorological data site in Memphis (163 km South) is deemed urban and not representative of the Facility location in Cates Landing, which is deemed rural.

A wind rose showing the distribution of wind speeds and directions for the resulting 5-year data set is shown in Figure 3. The mean wind speed during the 5-year period was calculated to be 3.2 m/s, and winds were predominantly southerly.
VI.2.2 Modeling Domain, Receptors, and Terrain

The 80-km-by-80-km modeling domain used for the AQIA is shown in Figure 4. Terrain elevations for receptors and emission units were prepared using available 1/3 arc-second (~10m) data from the National Elevation Dataset (NED) developed by the United States Geological Survey (USGS).

The receptor set included receptors spaced 2500 m apart covering the outermost portion of the simulation domain. Nested grids of 50-m, 100-m, 500-m, and 1000- m spaced receptors covered 2-km, 4-km, 20-km, and 40-km square areas, respectively. Receptor grids were centered on the Facility. Receptors were also located at 10-m intervals along the Facility property boundaries. Preemptively, Ramboll decided to cover the New Madrid Power Plant, 7.5 miles (12 km) northwest of the Facility.
of the Facility, in a 50m spacing receptor grid, due to its high emission rates. The receptor locations are shown in Figure 4, including a zoomed image showing the receptor layout near the Facility. The base-elevation and hill-height scale for each receptor were determined using AERMAP (version 18081).

![Figure 4. 80 km by 80 km Receptor Grid](image)

VI.2.3 Emission Unit Characterization

The AQIA requires estimates of the stack heights and other stack exit parameters to characterize the exhaust flow from the emission units. Stack parameters for the proposed Facility were obtained from vendors and are summarized in Tables 29, Table 30, and Table 31 below:
### Table 29. Point Source Release Parameters

<table>
<thead>
<tr>
<th>Model ID</th>
<th>UTMx</th>
<th>UTMy</th>
<th>Release Height (m)</th>
<th>Temperature (K)</th>
<th>Release Velocity (m/s)</th>
<th>Diameter (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baghouse</td>
<td>278920.2</td>
<td>4035308</td>
<td>45.72</td>
<td>473</td>
<td>15</td>
<td>5.96</td>
</tr>
<tr>
<td>Crush Sc</td>
<td>278693.8</td>
<td>4035609</td>
<td>28</td>
<td>0</td>
<td>15</td>
<td>0.56</td>
</tr>
<tr>
<td>Prop FRM</td>
<td>278904.6</td>
<td>4035253</td>
<td>18</td>
<td>0</td>
<td>13.5</td>
<td>1.46</td>
</tr>
<tr>
<td>EGEN</td>
<td>279024.2</td>
<td>4035526</td>
<td>9.14</td>
<td>735.15</td>
<td>207.22</td>
<td>0.2</td>
</tr>
</tbody>
</table>

### Table 30. Area Source Release Parameters

<table>
<thead>
<tr>
<th>Model ID</th>
<th>UTMx</th>
<th>UTMy</th>
<th>Release Height (m)</th>
<th>Xinit (m)</th>
<th>Yinit (m)</th>
<th>Angle (deg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pile1</td>
<td>278738.7</td>
<td>4035067</td>
<td>3</td>
<td>46.52</td>
<td>38.521</td>
<td>0</td>
</tr>
<tr>
<td>Pile2</td>
<td>278798.9</td>
<td>4035064</td>
<td>3</td>
<td>47.152</td>
<td>36.837</td>
<td>0</td>
</tr>
<tr>
<td>Pile3</td>
<td>278863.1</td>
<td>4035061</td>
<td>3</td>
<td>43.994</td>
<td>35.153</td>
<td>0</td>
</tr>
<tr>
<td>Pile4</td>
<td>278769.5</td>
<td>4034999</td>
<td>3</td>
<td>44.205</td>
<td>36.627</td>
<td>0</td>
</tr>
<tr>
<td>Pile5</td>
<td>278833</td>
<td>4034997</td>
<td>3</td>
<td>46.099</td>
<td>37.679</td>
<td>0</td>
</tr>
</tbody>
</table>

### Table 31. Volume Source Release Parameter

<table>
<thead>
<tr>
<th>Model ID</th>
<th>UTMx</th>
<th>UTMy</th>
<th>Release Height (m)</th>
<th>SYinit</th>
<th>SZinit</th>
</tr>
</thead>
<tbody>
<tr>
<td>LadHea01</td>
<td>278870.2</td>
<td>4035570</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
</tr>
<tr>
<td>LadHea02</td>
<td>278886.3</td>
<td>4035569</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
</tr>
<tr>
<td>LadHea03</td>
<td>278903.5</td>
<td>4035569</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
</tr>
<tr>
<td>LadHea04</td>
<td>278923.7</td>
<td>4035569</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
</tr>
<tr>
<td>LadHea05</td>
<td>278941.6</td>
<td>4035568</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
</tr>
<tr>
<td>LadHea06</td>
<td>278959.9</td>
<td>4035566</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
</tr>
<tr>
<td>LadHea07</td>
<td>278980.4</td>
<td>4035565</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
</tr>
<tr>
<td>LadHea08</td>
<td>278996.9</td>
<td>4035565</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
</tr>
<tr>
<td>Rail_Ld1</td>
<td>279081.4</td>
<td>4035014</td>
<td>2.9</td>
<td>4.651</td>
<td>1</td>
</tr>
<tr>
<td>Rail_Ld2</td>
<td>279082.1</td>
<td>4034999</td>
<td>2.9</td>
<td>4.651</td>
<td>1</td>
</tr>
<tr>
<td>Load_Hop</td>
<td>278875.1</td>
<td>4035104</td>
<td>1</td>
<td>2.326</td>
<td>1</td>
</tr>
<tr>
<td>SlagHand</td>
<td>278612.6</td>
<td>4035237</td>
<td>2</td>
<td>4.651</td>
<td>1.86</td>
</tr>
</tbody>
</table>
The base elevation of each emission unit was estimated using AERMAP.

VI.2.3.1 Building Downwash and Good Engineering Practice

A good engineering practice (GEP) stack height design analysis was conducted based on the specifications of the buildings according to EPA procedures (EPA 1985a). Releases below the GEP stack height are potentially subject to building wake effects that can result in relatively high ground-level predictions from the EPA’s regulatory models. For the purposes of PSD review, the EPA does not allow credit for the added dispersion associated with releases above the GEP stack height and restricts the simulated heights in the modeling to the GEP stack height.

A GEP stack height determination was made for the proposed exhaust stacks for each new emission unit. GEP stack height is equal to the height of the building which has the dominant wake effect (“zone of influence”) on the stack plume plus 1.5 times the lesser of (1) that building’s maximum projected width, or (2) the building height. This GEP stack height is expressed in the following equation:

\[ H_g = H + 1.5L \]  

(Equation 1)

where

- \( H_g \) = GEP stack height
- \( H \) = Building height
- \( L \) = Lesser of the maximum projected building width or height

Use of a stack with the GEP stack height removes the plume completely from the building wake zone.

The cavity height is the stack height required to prevent the stack plume from entering the cavity region of the building. Pollutant plumes which are entrained into
the cavity region of a building often produce extremely high concentrations. EPA defines cavity height by the following equation:

\[ H_c = H + 0.5L \]  \hspace{1cm} (Equation 2)

where:

\[ H_c = \text{Cavity height} \]
\[ H = \text{Building height} \]
\[ L = \text{Lesser of the maximum projected building width or height} \]

EPA's BPIP Prime program was used for the GEP analysis using Stack Information provided in Table 32. Building information is summarized in Table 32 below.

**Table 32. Building Heights**

<table>
<thead>
<tr>
<th>Building Name</th>
<th>Building Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crushing and Screening</td>
<td>25.08</td>
</tr>
<tr>
<td>Furnace Building Tier 1</td>
<td>36.75</td>
</tr>
<tr>
<td>Furnace Building Tier 2</td>
<td>44.0</td>
</tr>
<tr>
<td>Trombone Cooler</td>
<td>29.86</td>
</tr>
<tr>
<td>Baghouse Building</td>
<td>29.86</td>
</tr>
<tr>
<td>Sub Station</td>
<td>3.0</td>
</tr>
<tr>
<td>Prop Building</td>
<td>10.0</td>
</tr>
</tbody>
</table>

VI.2.4 Chemical Transformations

This modeling analysis utilized Tier 2 EPA Guidance for NO-to-NO2 transformations. Specifically, the Ambient Ratio Method 2 (ARM2) was applied to predict the percentage of NOX that is NO2 (equivalently, the percentage of NO converted to NO2). ARM2 applies a minimum and maximum ratio of NO2/NOX to the modeled concentration – the minimum ratio is what the plume from each source starts at, and the maximum ratio is the maximum ratio of NO2/NOX that a plume could ever see. The default ARM2 ratios of 0.5 and 0.9 for minimum and maximum NO2/NOX ratios were used.
VI.3 Project Impact Assessment

Ambient concentrations of criteria pollutants due to emission releases from the proposed project were predicted using AERMOD. Maximum short-term concentrations and annual average concentrations were obtained for comparison with Significant Impact Levels.

Significant Impact Levels (SILs) have been established for various criteria pollutants and are listed in Table 33. If pollutant concentrations exceed the SILs, then further evaluation is required to compare the project’s concentrations to the Class II PSD Increments and the NAAQS. However, if all ambient-impact concentrations modeled for Facility operations are less than the SILs then no further analysis is required. Additionally, under PSD regulations, only facilities with impacts in excess of the SILs are required to include the impacts of other facilities or consider collecting background ambient air quality information.

For 1-hour NO2 and 1-hour SO2 EPA’s interim SIL (4 percent of the NAAQS) has been assumed to apply. On January 22, 2013, the PM2.5 SILs and significant Monitoring Concentration (SMC) were vacated by the United States Court of Appeals for the District of Columbia Circuit. On August 1, 2016, EPA issued for public comment some draft guidance for PM2.5, justifying suggested replacement SILs and SMC. That guidance was finalized on April 17, 2018 (EPA, 2017) and Ramboll used the SILs it suggests.

On April 30, 2019, EPA issued revised guidance on the use of Model Emission Rates for Precursors (MERPs) to estimate near-field secondary PM. Using the same hypothetical sources described in the following section, we will calculate the contribution to near-field total PM2.5 from primary NOX (converted to ammonium nitrate) and primary SO2 (converted to ammonium sulfate). This MERP contribution will be applied to all Class II receptors, but not to the Class I receptors discussed in

---

2 Because the NAAQS for annual average PM10 and 24-hour and annual SO2 have been revoked, further evaluation only of PSD increments is required as a result of predicted concentrations that exceed the SILs for those pollutants and averaging periods.


Section 7. This methodology follows the 2019 updates to the MERP Guidance, which we believe is more relevant than the guidance on air quality impact assessments issued on May 20, 2014.  

4 Available at: https://www3.epa.gov/scram001/guidance/guide/Guidance_for_PM25_Permit_Modeling.pdf
Table 33. Applicable Class II PSD Air Quality Standards

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Significant Impact Levels (µg/m³)</th>
<th>Monitoring De Minimus Conc. (µg/m³)</th>
<th>PSD Class II Increment (µg/m³)</th>
<th>NAAQS / TN AAQS(a) (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO 8-hour</td>
<td>500</td>
<td>575</td>
<td>None</td>
<td>10,000 (b)</td>
</tr>
<tr>
<td>CO 1-hour</td>
<td>2,000</td>
<td>None</td>
<td>None</td>
<td>40,000 (b)</td>
</tr>
<tr>
<td>NO2 annual</td>
<td>1.0</td>
<td>14</td>
<td>25</td>
<td>100 (b)</td>
</tr>
<tr>
<td>NO2 1-hour (d)</td>
<td>7.5</td>
<td>None</td>
<td>None</td>
<td>188</td>
</tr>
<tr>
<td>SO2 annual (h)</td>
<td>1.0</td>
<td>None</td>
<td>20</td>
<td>None</td>
</tr>
<tr>
<td>SO2 24-hour (h)</td>
<td>5</td>
<td>None</td>
<td>91</td>
<td>None</td>
</tr>
<tr>
<td>SO2 3-hour</td>
<td>25</td>
<td>None</td>
<td>512</td>
<td>1300</td>
</tr>
<tr>
<td>SO2 1-hour (e)</td>
<td>7.8</td>
<td>None</td>
<td>None</td>
<td>196</td>
</tr>
<tr>
<td>PM2.5 annual (f)</td>
<td>0.2</td>
<td>None</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>PM2.5 24-hour (f)</td>
<td>1.2</td>
<td>4</td>
<td>9</td>
<td>35</td>
</tr>
<tr>
<td>PM10 annual (h)</td>
<td>1.0</td>
<td>None</td>
<td>17</td>
<td>None</td>
</tr>
<tr>
<td>PM10 24-hour</td>
<td>5</td>
<td>10</td>
<td>30</td>
<td>150 (b)</td>
</tr>
<tr>
<td>HCl 24-hour (a)</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>70</td>
</tr>
<tr>
<td>O3 8-hour (g)</td>
<td>2 (1 ppb)</td>
<td>None</td>
<td>None</td>
<td>137 (70 ppb)</td>
</tr>
<tr>
<td>O3 1-hour</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>235 (120 ppb) (c)</td>
</tr>
</tbody>
</table>
Notes:

a. Tennessee Primary Ambient Air Quality Standards (AAQS) from Tennessee Air Pollution
   Control Regulations, Chapter 1200-3-3, revised October 2006.

b. TN AAQS and NAAQS value.

c. TN AAQS value only.

d. For the 1-hour NO₂ standard (188 µg/m³, or 100 ppb), EPA provided an interim SIL of
   7.5 µg/m³ (1-hr)

e. For the 1-hour SO₂ standard (196 µg/m³, or 75 ppb), EPA provided an interim SIL of
   7.8 µg/m³ (1-hr)

f. The PM2.5 significance and monitoring de minimus levels were vacated on January 22, 2013 from
   the Federal PSD regulations. Revised SILs were released on April 17, 2018

g. For the 8-hour O₃ standard (137 µg/m³, or 70 ppb), EPA suggested a SIL of 1 ppb
   (1.96 µg/m³) on April 17, 2018

h. EPA revoked the NAAQS for 24-hour and annual SO₂ and annual PM10, however the Class II
   SILs and PSD Increments remain in effect.
Table 34. Modeled Emissions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Project Emissions Increase (tpy)</th>
<th>Modeled Project Emissions Increase (tpy)</th>
<th>Permitting Allowable Emission Calculations March 12, 2022</th>
<th>PSD Significance Threshold (tpy)</th>
<th>Subject to PSD Review?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filterable Particulate Matter (PM)</td>
<td>28.0</td>
<td>28.73</td>
<td>28.27</td>
<td>25</td>
<td>Yes</td>
</tr>
<tr>
<td>Total PM ≤ 10 microns (PM10)</td>
<td>28.0</td>
<td>28.73</td>
<td>28.25</td>
<td>15</td>
<td>Yes</td>
</tr>
<tr>
<td>Total PM ≤ 2.5 microns (PM2.5)</td>
<td>27.9</td>
<td>28.73</td>
<td>28.05</td>
<td>10</td>
<td>Yes</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO2)</td>
<td>506</td>
<td>758.54</td>
<td>506</td>
<td>40</td>
<td>Yes</td>
</tr>
<tr>
<td>Nitrogen Oxides (NOX)</td>
<td>1,230</td>
<td>1659.97</td>
<td>1,230.6</td>
<td>40</td>
<td>Yes</td>
</tr>
<tr>
<td>Volatile Organic Compounds (VOC)</td>
<td>83.3</td>
<td>83.3</td>
<td>83.3</td>
<td>40</td>
<td>Yes</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>282</td>
<td>1288.78</td>
<td>1,163.3</td>
<td>100</td>
<td>Yes</td>
</tr>
<tr>
<td>Carbon Dioxide equivalent (CO2e)</td>
<td>717,831</td>
<td>N/A</td>
<td>717,831</td>
<td>75,000</td>
<td>Yes</td>
</tr>
<tr>
<td>Sulfuric Acid Mist (H₂SO₄)</td>
<td>-</td>
<td>-</td>
<td>--</td>
<td>7</td>
<td>No</td>
</tr>
<tr>
<td>Fluorides</td>
<td>-</td>
<td>-</td>
<td>--</td>
<td>3</td>
<td>No</td>
</tr>
<tr>
<td>Total HAPs</td>
<td>11</td>
<td>7.67</td>
<td>11</td>
<td>25/Title V</td>
<td>No</td>
</tr>
<tr>
<td>Max of any HAP</td>
<td>7.6</td>
<td>7.67</td>
<td>7.6</td>
<td>10/Title V</td>
<td>No</td>
</tr>
</tbody>
</table>

VI.3.1 Class II Ozone and Secondary PM2.5 Assessment

The NOX, SO₂, and VOC emission increases from the Facility are above the SERs, triggering an analysis of the Facility’s potential contribution to ozone (O₃) and secondary PM₂.₅ formation.

Following the draft Guidance on the use of MERPs for PSD permitting, as well as TDEC MERPs Guidance (TDEC, 2019), Tier 1 methodologies were used to calculate the contributions to ozone and PM₂.₅ associated with Facility emission increases. Table 35 presents the MERP values for highest maximum daily 8-hour ozone, daily maximum PM₂.₅, and annual average PM₂.₅ for Tennessee PSD Applications. For PM₂.₅, NOX, and SO₂, emissions must be considered together, along with NOX and VOC emissions for ozone.

Table 35. Tennessee PSD MERP Values (TPY)

<table>
<thead>
<tr>
<th>Precursor</th>
<th>8-hr O3</th>
<th>Daily PM₂.₅</th>
<th>Annual PM₂.₅</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOX</td>
<td>156</td>
<td>3,717</td>
<td>7,625</td>
</tr>
<tr>
<td>SO₂</td>
<td>--</td>
<td>716</td>
<td>5,817</td>
</tr>
<tr>
<td>VOC</td>
<td>1,542</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>
For 8-hr ozone, annual PM2.5 and daily PM2.5, the relationship between precursor emissions and secondary chemistry formation from two modeled hypothetical sources (Shelby, Tennessee and Pemiscot, Missouri) are used in Tier 1 calculations. Two hypothetical sources are used for the Tier 1 analysis because the Shelby, Tennessee source results in larger ozone and annual PM2.5 contributions from the Facility while the Pemiscot, Missouri source leads to larger daily PM2.5 contributions. Figures A-2 and A-4 in the draft Guidance shows the locations of modeled hypothetical sources. The results of the Tier 1 analysis are presented in more detail in below. Table 36 presents the hypothetical source configurations that are used in the Tier 1 calculations.

Table 36. Hypothetical Source Configuration for Tier 1 Calculation

<table>
<thead>
<tr>
<th>Source</th>
<th>Source ID</th>
<th>Coordinates</th>
<th>Parameter</th>
<th>NOX</th>
<th>SO₂</th>
<th>VOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelby, Tennessee</td>
<td>12EUS2</td>
<td>35.1249°, -90.0021°</td>
<td>Stack Height</td>
<td>90 m</td>
<td>90 m</td>
<td>90 m</td>
</tr>
<tr>
<td></td>
<td>ID: 8</td>
<td></td>
<td>Emission Rate</td>
<td>1000 TPY</td>
<td>500 TPY</td>
<td>1000 TPY (a)</td>
</tr>
<tr>
<td>Pemiscot, Missouri</td>
<td>12US2</td>
<td>36.223°, -89.851°</td>
<td>Stack Height</td>
<td>90 m</td>
<td>90 m</td>
<td>10 m (b)</td>
</tr>
<tr>
<td></td>
<td>ID: 17</td>
<td></td>
<td>Emission Rate</td>
<td>1000 TPY</td>
<td>500 TPY</td>
<td>500 TPY</td>
</tr>
</tbody>
</table>

Notes:
(a) The Shelby, TN source does not include MERP values for the scenario with VOC emission rates of 500 TPY, so 1000 TPY scenario was used to estimate Facility contribution to ozone.
(b) The Pemiscot, MO source does not include VOC MERP value for 90 m stack heights, so 10 m stack height used for VOC emissions.

Table 37 shows the ozone and PM2.5 increases associated with the hypothetical source configurations presented in Table 36. These contributions were obtained from the Appendices of the EPA MERP Guidance document (EPA, 2019) and are representative of secondary impacts within 50 km of the source.
Table 37. MERP Analysis Results for PM$_{2.5}$ and Ozone

<table>
<thead>
<tr>
<th>Precursor</th>
<th>Daily PM$_{2.5}$ (µg/m$^3$)</th>
<th>Annual Average PM$_{2.5}$ (µg/m$^3$)</th>
<th>8-hr O$_3$ (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOX</td>
<td>0.10</td>
<td>0.003</td>
<td>1.29</td>
</tr>
<tr>
<td>SO$_2$</td>
<td>0.23</td>
<td>0.003</td>
<td>--</td>
</tr>
<tr>
<td>VOC</td>
<td>--</td>
<td>--</td>
<td>0.55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Precursor</th>
<th>Daily PM$_{2.5}$ (µg/m$^3$)</th>
<th>Annual Average PM$_{2.5}$ (µg/m$^3$)</th>
<th>8-hr O$_3$ (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOX</td>
<td>0.12</td>
<td>0.006</td>
<td>1.94</td>
</tr>
<tr>
<td>SO$_2$</td>
<td>0.10</td>
<td>0.003</td>
<td>--</td>
</tr>
<tr>
<td>VOC</td>
<td>--</td>
<td>--</td>
<td>0.09</td>
</tr>
</tbody>
</table>

The Daily maximum PM$_{2.5}$ increases from NOX and SO$_2$ emissions associated with the Shelby, TN and Pemiscot, MO sources in Table 36 are used to calculate the daily maximum secondary PM$_{2.5}$ increases from the proposed Facility in the following equations:

Using Shelby, TN MERP values to calculate daily secondary PM$_{2.5}$ contributions:

\[
\frac{(\text{Project NOx emissions (1225 tpy) / NOx MERP (1000 tpy)} \times (0.10 \mu g/m^3) + (\text{Project SO2 emissions (506 tpy) / SO2 MERP (500 tpy)} \times (0.23 \mu g/m^3))}{\text{]} = 0.36 \mu g/m^3}
\]

Using Pemiscot, MO MERP values to calculate daily secondary PM$_{2.5}$ contributions:

\[
\frac{(\text{Project NOx emissions (1225 tpy) / NOx MERP (1000 tpy)} \times (0.12 \mu g/m^3) + (\text{Project SO2 emissions (506 tpy) / SO2 MERP (500 tpy)} \times (0.10 \mu g/m^3))}{\text{]} = 0.25 \mu g/m^3}
\]
It is estimated that the NOX and SO2 emissions from the proposed Facility will lead to daily maximum secondary PM2.5 increases of up to 0.36 μg/m³.

A similar approach is used to estimate **annual average secondary PM2.5 increases**, as illustrated in the following equations:

**Using Shelby, TN MERP values to calculate annual secondary PM2.5 contributions:**

\[
\left( \frac{\text{Project NOx emissions (1225 tpy)}}{\text{NOx MERP (1000 tpy – 90 m source) \times (0.003 µg/m³)}} + \left( \frac{\text{Project SO2 emissions (506 tpy)}}{\text{SO2 MERP (500 tpy - 90 m source)} \times (0.003 µg/m³)} \right) \right] = 0.01 \mu g/m^3
\]

**Using Pemiscot, MO MERP values to calculate annual secondary PM2.5 contributions:**

\[
\left( \frac{\text{Project NOx emissions (1225 tpy)}}{\text{NOx MERP (1000 tpy – 90 m source) \times (0.003 µg/m³)}} + \left( \frac{\text{Project SO2 emissions (506 tpy)}}{\text{SO2 MERP (500 tpy - 90 m source)} \times (0.003 µg/m³)} \right) \right] = 0.01 \mu g/m^3
\]

It is estimated that the NOX and SO2 emissions from the proposed Facility will lead to an annual maximum secondary PM2.5 increases of up to 0.01 µg/m³. Estimated total (primary + secondary) PM2.5 increases associated with the Facility will be compared to the SIL (see Section 2.3).

The **daily maximum 8-hour ozone increases** from NOX and VOC emissions associated with the Shelby, Tennessee and Pemiscot, Missouri sources in **Table 37** are used to calculate the daily maximum 8-hour ozone increases from the proposed Facility in the equations below:

**Using Shelby, TN MERP values to calculate 8-hour ozone contributions:**

\[
\left( \frac{\text{Project NOx emissions (1225 tpy)}}{\text{NOx MERP (1000 tpy – 90 m source)} \times (1.29 ppb)} + \left( \frac{\text{Project VOC emissions (83.3 tpy)}}{\text{VOC MERP (1000 tpy – 90 m source)} \times (0.55 ppb)} \right) \right] = 1.63 ppb
\]

**Using Pemiscot, MO MERP values to calculate 8-hour ozone contributions:**

\[
\left( \frac{\text{Project NOx emissions (1225 tpy)}}{\text{NOx MERP (1000 tpy – 90 m source)} \times (1.94 ppb)} + \left( \frac{\text{Project VOC emissions (83.3 tpy)}}{\text{VOC MERP (500 tpy - 10 m source)} \times (0.09 ppb)} \right) \right] = 2.4 ppb
\]
These calculations suggest that the proposed Facility will increase daily maximum
8-hour ozone by 1.6 to 2.4 ppb. This increase is largely driven by proposed NOX emissions, which
are over an order of magnitude higher than proposed VOC emissions.

If Tier 1 MERP Guidance methodology does not predict an ozone concentration below the proposed
ozone SIL, further analysis is needed to ensure that Facility ozone increases do not lead to ozone
NAAQS exceedances. In accordance with
recent EPA guidance\textsuperscript{5}, if the estimated ozone contribution is close enough to the

\textsuperscript{5} Presentation by Tyler Fox at AWMA Specialty Modeling Conference (November 14, 2017, Research
Triangle Park, NC).
proposed ozone SIL (e.g., 2-3 times the SIL), a qualitative assessment of the cumulative impacts of ozone in the region surrounding the proposed Facility may be allowed in lieu of a more detailed assessment.

In this assessment, the estimated ozone contribution from the proposed Facility is added to representative regional background ozone concentrations and compared to the difference between the ozone NAAQS and SIL (i.e., 70 ppb – 1 ppb = 69 ppb).

TDEC provided Ramboll with a 2020 background ozone design value of 66 ppb from the EPA Air Quality System (AQS) monitoring site at Hernando, MS (Site ID: 28-033-0002).

The combination of background ozone and predicted Facility ozone increases (68.4 ppb) is still below the difference between the current ozone NAAQS and proposed SIL (69 ppb).

VI.3.2 Significant Impact Level Analysis Results

Maximum model-predicted concentrations of criteria pollutants from emissions attributable to the Project are compared with SIL criteria in Table 38 below. For daily PM2.5, MERP-estimated secondary PM2.5 contributions (discussed in Section 6.3.1) were added to model-predicted concentrations for comparison with their applicable SILs.
### Table 38. Significant Impact Level (Class II) Analysis Results

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Avg. Period</th>
<th>Maximum Model-Predicted Conc. (µg/m³)</th>
<th>MERPs Conc. (µg/m³)</th>
<th>Total Conc. (µg/m³)</th>
<th>Class II SIL (µg/m³)</th>
<th>Greater than Class II SIL?</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>8-hour</td>
<td>91.0</td>
<td>--</td>
<td>91.0</td>
<td>500</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>231</td>
<td>--</td>
<td>231</td>
<td>2,000</td>
<td>No</td>
</tr>
<tr>
<td>NO₂</td>
<td>Annual</td>
<td>0.984</td>
<td>--</td>
<td>0.984</td>
<td>1.0</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>126</td>
<td>--</td>
<td>126</td>
<td>7.5</td>
<td>Yes</td>
</tr>
<tr>
<td>SO₂</td>
<td>Annual</td>
<td>0.352</td>
<td>--</td>
<td>0.352</td>
<td>1.0</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>16.5</td>
<td>--</td>
<td>16.5</td>
<td>5</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>65.2</td>
<td>--</td>
<td>65.2</td>
<td>25</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>81.1</td>
<td>--</td>
<td>81.1</td>
<td>7.8</td>
<td>Yes</td>
</tr>
<tr>
<td>PM₂.₅</td>
<td>Annual</td>
<td>0.603</td>
<td>0.01</td>
<td>0.613</td>
<td>0.2</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>4.27</td>
<td>0.36</td>
<td>4.63</td>
<td>1.2</td>
<td>Yes</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Annual</td>
<td>0.670</td>
<td>--</td>
<td>0.670</td>
<td>1.0</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>15.5</td>
<td>--</td>
<td>15.5</td>
<td>5</td>
<td>Yes</td>
</tr>
</tbody>
</table>

¹ Maximum model predicted concentrations are the maximum concentration by averaging period through 5 years of modeling except for the following: 1-hour NO₂, 1-hour SO₂, and Annual and 24-hour PM₂.₅ concentrations are the maximum concentration at each receptor averaged over 5 years of modeling.
The PM10 and PM2.5 Class II significance modeling impacts:

Table 39. Sinova PM10 and Pm2.5 - Emitting Modeled Sources:

<table>
<thead>
<tr>
<th>Type</th>
<th>E</th>
<th>Base Elev</th>
<th>Height</th>
<th>Diam</th>
<th>Exit Vel</th>
<th>Exit Temp</th>
<th>Release_Type</th>
<th>SigmaY</th>
<th>SigmaZ</th>
<th>Length X</th>
<th>Length Y</th>
<th>Emission Rate</th>
<th>Emission Rate X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>POINT BAGHOUSE</td>
<td>94.0</td>
<td>46.72</td>
<td>5.96</td>
<td>10</td>
<td>473</td>
<td>VERTICAL</td>
<td>-</td>
<td>0.6126</td>
<td>4.8616</td>
<td>278582.34</td>
<td>4035233.29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POINT CRUSH_SC</td>
<td>94.5</td>
<td>28</td>
<td>0.56</td>
<td>15</td>
<td>0</td>
<td>VERTICAL</td>
<td>-</td>
<td>0.0361</td>
<td>0.2866</td>
<td>278593.80</td>
<td>4035936.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POINT PROP_FRM</td>
<td>94.5</td>
<td>15</td>
<td>1.46</td>
<td>13.5</td>
<td>0</td>
<td>VERTICAL</td>
<td>-</td>
<td>0.1250</td>
<td>0.9221</td>
<td>278604.65</td>
<td>4035225.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POINT EGEN</td>
<td>94.5</td>
<td>9.14</td>
<td>0.2</td>
<td>207.22</td>
<td>735.15</td>
<td>VERTICAL</td>
<td>-</td>
<td>0.0122</td>
<td>0.0968</td>
<td>279024.33</td>
<td>4035226.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AREA PILE1</td>
<td>94.5</td>
<td>3</td>
<td>46.52</td>
<td>38.521</td>
<td>0.0000001</td>
<td>0.0000006</td>
<td>278593.80</td>
<td>4035936.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AREA PILE2</td>
<td>94.5</td>
<td>3</td>
<td>47.152</td>
<td>36.837</td>
<td>0.0000001</td>
<td>0.0000006</td>
<td>278768.73</td>
<td>4035968.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AREA PILE3</td>
<td>94.5</td>
<td>3</td>
<td>43.944</td>
<td>35.153</td>
<td>0.0000001</td>
<td>0.0000006</td>
<td>278863.06</td>
<td>4035991.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AREA PILE4</td>
<td>94.5</td>
<td>3</td>
<td>44.250</td>
<td>36.527</td>
<td>0.0000001</td>
<td>0.0000006</td>
<td>279099.46</td>
<td>4034989.49</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AREA PILES</td>
<td>94.5</td>
<td>3</td>
<td>46.09</td>
<td>37.679</td>
<td>0.0000001</td>
<td>0.0000006</td>
<td>278863.02</td>
<td>4034996.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME RAIL LDR1</td>
<td>95.4</td>
<td>2.5</td>
<td>4.651</td>
<td>1</td>
<td>19.9903</td>
<td>0.0061</td>
<td>0.0462</td>
<td>279061.38</td>
<td>4035614.94</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME RAIL LDR2</td>
<td>95.4</td>
<td>2.5</td>
<td>4.651</td>
<td>1</td>
<td>19.9903</td>
<td>0.0061</td>
<td>0.0462</td>
<td>279002.12</td>
<td>4034996.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LOAD_HOP</td>
<td>94.4</td>
<td>5</td>
<td>2.326</td>
<td>1</td>
<td>10.9016</td>
<td>0.0000</td>
<td>0.0001</td>
<td>278575.05</td>
<td>4035105.94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA01</td>
<td>94.6</td>
<td>36.76</td>
<td>17.7</td>
<td>1</td>
<td>76.111</td>
<td>0.0035</td>
<td>0.0279</td>
<td>278872.23</td>
<td>4035989.97</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>VOLUME LADHEA02</td>
<td>94.6</td>
<td>36.76</td>
<td>17.7</td>
<td>1</td>
<td>76.111</td>
<td>0.0035</td>
<td>0.0279</td>
<td>278886.34</td>
<td>4035988.87</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA03</td>
<td>94.6</td>
<td>36.76</td>
<td>17.7</td>
<td>1</td>
<td>76.111</td>
<td>0.0035</td>
<td>0.0279</td>
<td>278953.54</td>
<td>4035988.87</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>VOLUME LADHEA04</td>
<td>94.6</td>
<td>36.76</td>
<td>17.7</td>
<td>1</td>
<td>76.111</td>
<td>0.0035</td>
<td>0.0279</td>
<td>278923.67</td>
<td>4035988.87</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>VOLUME LADHEA05</td>
<td>94.6</td>
<td>36.76</td>
<td>17.7</td>
<td>1</td>
<td>76.111</td>
<td>0.0035</td>
<td>0.0279</td>
<td>278941.61</td>
<td>4035967.77</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA06</td>
<td>94.6</td>
<td>36.76</td>
<td>17.7</td>
<td>1</td>
<td>76.111</td>
<td>0.0035</td>
<td>0.0279</td>
<td>278999.91</td>
<td>4035986.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>VOLUME LADHEA07</td>
<td>94.6</td>
<td>36.76</td>
<td>17.7</td>
<td>1</td>
<td>76.111</td>
<td>0.0035</td>
<td>0.0279</td>
<td>278860.41</td>
<td>4035955.21</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA08</td>
<td>94.6</td>
<td>36.76</td>
<td>17.7</td>
<td>1</td>
<td>76.111</td>
<td>0.0035</td>
<td>0.0279</td>
<td>278966.88</td>
<td>4035954.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME SLAGHAND</td>
<td>95</td>
<td>2</td>
<td>4.65116</td>
<td>1.86047</td>
<td>20</td>
<td>0.0005</td>
<td>0.0036</td>
<td>278612.56</td>
<td>4035237.39</td>
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<td></td>
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</tr>
</tbody>
</table>

Total => 0.8267 6.5610

Modeled max impacts are shown in Table 38 for Class II SIL and in Table 42 for NAAQS demonstration.
The CO (1-Hour) Class II significance modeling impacts are shown below:

Table 40. Sinova CO-Emitting Modeled Sources

<table>
<thead>
<tr>
<th>Type</th>
<th>ID</th>
<th>Base_Elev</th>
<th>Height</th>
<th>Diam</th>
<th>Exit Vel</th>
<th>Exit_Temp</th>
<th>Release_Type</th>
<th>SigmaX</th>
<th>SigmaY</th>
<th>Length_X</th>
<th>Emission_Rate</th>
<th>Emission_Rate X1</th>
<th>Y1</th>
</tr>
</thead>
<tbody>
<tr>
<td>POINT BAGHOUSE</td>
<td>94.3</td>
<td>45.72</td>
<td>5.96</td>
<td>15</td>
<td>473</td>
<td>VERTICAL</td>
<td>35.124</td>
<td>278.761</td>
<td>279802.24</td>
<td>4035356.22</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>POINT EGEN</td>
<td>94.5</td>
<td>9.14</td>
<td>0.2</td>
<td>207.22</td>
<td>735.15</td>
<td>VERTICAL</td>
<td>1.639</td>
<td>13.008</td>
<td>279024.23</td>
<td>4035526.15</td>
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<td></td>
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</tr>
<tr>
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<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>0.039</td>
<td>0.309</td>
<td>278870.23</td>
<td>4035566.97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA02</td>
<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>0.039</td>
<td>0.309</td>
<td>278898.34</td>
<td>4035566.87</td>
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<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>0.039</td>
<td>0.309</td>
<td>278903.54</td>
<td>4035566.87</td>
<td></td>
<td></td>
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</tr>
<tr>
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<td>17.7</td>
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<td>76.11</td>
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<td>0.309</td>
<td>278923.67</td>
<td>4035566.87</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>VOLUME LADHEA05</td>
<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>0.039</td>
<td>0.309</td>
<td>278941.61</td>
<td>4035567.77</td>
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<td>VOLUME LADHEA06</td>
<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>0.039</td>
<td>0.309</td>
<td>278959.91</td>
<td>4035566.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA07</td>
<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>0.039</td>
<td>0.309</td>
<td>278960.41</td>
<td>4035565.21</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA08</td>
<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>0.039</td>
<td>0.309</td>
<td>278966.88</td>
<td>4035564.85</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total => 37.074 294.242

Figure 5. CO (1-Hour) Class II significance modeling max impact
The SO₂ (1-Hour) Class II significance modeling impacts are shown below:

Table 41  Sinova SO₂-Emitting Modeled Sources

<table>
<thead>
<tr>
<th>Type</th>
<th>ID</th>
<th>Base_Elev</th>
<th>Height</th>
<th>Diam</th>
<th>Exit Vel</th>
<th>Exit Temp</th>
<th>Release_Type</th>
<th>SigmaX</th>
<th>SigmaZ</th>
<th>Length_X</th>
<th>Emission_Rate</th>
<th>Emission_Rate</th>
<th>X1</th>
<th>Y1</th>
</tr>
</thead>
<tbody>
<tr>
<td>POINT BAGHOUSE</td>
<td>94.3</td>
<td>45.72</td>
<td>5.95</td>
<td>15</td>
<td>473</td>
<td>VERTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21.8209</td>
<td>173.1817</td>
<td>279024.23</td>
<td>4035526.15</td>
</tr>
<tr>
<td>POINT EGEN</td>
<td>94.5</td>
<td>9.14</td>
<td>0.2</td>
<td>207.22</td>
<td>735.15</td>
<td>VERTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0004</td>
<td>0.0020</td>
<td>279024.23</td>
<td>4035526.15</td>
</tr>
<tr>
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<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>VERTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0003</td>
<td>0.0011</td>
<td>278896.34</td>
<td>4035566.87</td>
</tr>
<tr>
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<td>94.6</td>
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<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>VERTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0003</td>
<td>0.0011</td>
<td>278896.34</td>
<td>4035566.87</td>
</tr>
<tr>
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<td>94.6</td>
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<td>1</td>
<td>76.11</td>
<td>VERTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0003</td>
<td>0.0011</td>
<td>278896.34</td>
<td>4035566.87</td>
</tr>
<tr>
<td>VOLUME LADHEA04</td>
<td>94.6</td>
<td>36.75</td>
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<td>1</td>
<td>76.11</td>
<td>VERTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0003</td>
<td>0.0011</td>
<td>278896.34</td>
<td>4035566.87</td>
</tr>
<tr>
<td>VOLUME LADHEA05</td>
<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>VERTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0003</td>
<td>0.0011</td>
<td>278896.34</td>
<td>4035566.87</td>
</tr>
<tr>
<td>VOLUME LADHEA06</td>
<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>VERTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0003</td>
<td>0.0011</td>
<td>278896.34</td>
<td>4035566.87</td>
</tr>
<tr>
<td>VOLUME LADHEA07</td>
<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>VERTICAL</td>
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<td></td>
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<td>0.0003</td>
<td>0.0011</td>
<td>278896.34</td>
<td>4035566.87</td>
</tr>
<tr>
<td>VOLUME LADHEA08</td>
<td>94.6</td>
<td>36.75</td>
<td>17.7</td>
<td>1</td>
<td>76.11</td>
<td>VERTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0003</td>
<td>0.0011</td>
<td>278896.34</td>
<td>4035566.87</td>
</tr>
</tbody>
</table>

Total => 21.8209  173.1817
Figure 7. SO$_2$ (1-Hour) Class II significance modeling max impact
The NO₂ (1-Hour) Class II significance modeling impacts are shown below:

Table 42. Sinova NOx-Emitting Modeled Sources

<table>
<thead>
<tr>
<th>Type</th>
<th>ID</th>
<th>Base_Elev</th>
<th>Height</th>
<th>Diam</th>
<th>Exit_Vel</th>
<th>Exit_Temp</th>
<th>Release_Type</th>
<th>SigmaY</th>
<th>SigmaZ</th>
<th>Length_X</th>
<th>Emission_Rate</th>
<th>Emission_Rate</th>
<th>X1</th>
<th>Y1</th>
</tr>
</thead>
<tbody>
<tr>
<td>POINT BAGHOUSE</td>
<td>94.3</td>
<td>45.72</td>
<td>5.96</td>
<td>15</td>
<td>473</td>
<td>VERTICAL</td>
<td></td>
<td>46.488</td>
<td>368.951</td>
<td>278920.24</td>
<td>4035308.22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POINT EGEN</td>
<td>94.5</td>
<td>9.14</td>
<td>0.2</td>
<td>207.22</td>
<td>735.15</td>
<td>VERTICAL</td>
<td></td>
<td>0.894</td>
<td>7.095</td>
<td>279024.23</td>
<td>4035526.15</td>
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<td>36.75</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>0.046</td>
<td>0.368</td>
<td>278970.23</td>
<td>4035569.97</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA02</td>
<td>94.6</td>
<td>36.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.046</td>
<td>0.368</td>
<td>278886.34</td>
<td>4035566.87</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA03</td>
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<td>36.75</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>0.046</td>
<td>0.368</td>
<td>278903.54</td>
<td>4035568.87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA04</td>
<td>94.6</td>
<td>36.75</td>
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<td>0.368</td>
<td>278923.67</td>
<td>4035568.87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA05</td>
<td>94.6</td>
<td>36.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.046</td>
<td>0.368</td>
<td>278941.61</td>
<td>4035566.87</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>VOLUME LADHEA06</td>
<td>94.6</td>
<td>36.75</td>
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<td></td>
<td>0.046</td>
<td>0.368</td>
<td>278959.91</td>
<td>4035566.31</td>
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</tr>
<tr>
<td>VOLUME LADHEA07</td>
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<td>36.75</td>
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<td>0.046</td>
<td>0.368</td>
<td>278980.41</td>
<td>4035565.21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLUME LADHEA08</td>
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<td>36.75</td>
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<td>47.752</td>
<td>378.988</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

Total => 47.752 378.988
Figure 9. NO2 (1-Hour) Class II significance modeling max impact

Figure 10. NO2 (1-Hour) Class II significance modeling max impact location
For pollutants that exceed their Class II SIL, cumulative modeling was performed to compare with NAAQS and PSD Class II Increment.

VI.3.2.1 Background Concentrations of Criteria Pollutants

Pre-construction ambient monitoring may be required [per 40 CFR 51.166(m)] for any regulated pollutant that triggers PSD review. As outlined in EPA (1987) Section 2.1.1, if the AERMOD-predicted maximum concentration for the project exceeds a monitoring de minimus concentration, pre-construction ambient monitoring may be required unless existing ambient monitoring data are deemed representative of local conditions.

Because the modeling indicates that pre-construction ambient monitoring is required, Ramboll used current monitoring data from nearby stations as a surrogate for monitoring data. The values presented in Table 43 were provided by TDEC for 2018 – 2020.

Table 44. Background Concentrations

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Time</th>
<th>Averaging Method</th>
<th>Background Value ¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO₂ ²</td>
<td>1-hour</td>
<td>3-year avg. of 98th percentile of daily maxes.</td>
<td>30 ppb</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>Annual mean</td>
<td>5.0 ppb</td>
</tr>
<tr>
<td>PM₂.₅ ³</td>
<td>24-hour</td>
<td>3-year average of the 98th percentile 24-hr averages.</td>
<td>15 µg/m³</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>3-year avg. of annual mean</td>
<td>6.8 µg/m³</td>
</tr>
<tr>
<td>PM₁₀ ²</td>
<td>24-hour</td>
<td>3-year avg. of 2nd highs</td>
<td>29.33 µg/m³</td>
</tr>
<tr>
<td>SO₂ ²</td>
<td>1-hour</td>
<td>3-year avg. of 99th percentile of daily max. 1-hour averages.</td>
<td>10 ppb</td>
</tr>
</tbody>
</table>

1. Values for 3-year averages are from 2018 - 2020. Value for annual mean is from 2018
2. From Jackson Purchase, Paducah, KY; AQS Site 21-145-1024
3. From Dyersburg, TN; AQS site 47-045-0004

The selected two monitoring sites in Paducah, Kentucky and Dyersburg, Tennessee are closest to the Facility from other nearby monitors for the respective impacted criteria pollutants and deemed representative in terms of terrain, topography, and meteorology.

For the NO₂ background 2018-2020 design values, the only other monitoring sites in the state are located in Memphis, Nashville, Kingsport/Eastman and Great Smoky Mountains (GRSM) National Park. The Memphis and Nashville sites are representative of an urban metro area and not a rural environment at the Facility location. The Kingsport/Eastman site (AQS 47-163-0007) does not have data past
2016, and the GRSM Look Rock monitoring site (AQS 47-009-0101) has a much lower design values (5 ppb 1-hour average and 0.64 ppb annual average DVs) than the selected values at the Paducah site (30 ppb for the hourly average and 5.0 ppb for the annual average).

For the PM2.5 background 2018-2020 design values, the same values (14.0 µg/m³ for the 24-hour average) and (6.8 µg/m³ for the annual average) would be obtained from the nearby monitoring site in Jackson, Tennessee (AQS 47-113-0006).

For the PM10 24-hour background 2018-2020 design values, the only other close representative monitoring site is in the Clarksville area in Montgomery County, TN (AQS 47-125-0006), which stopped gathering data in 2016.

For the SO₂ 1-hour background 2018-2020 design value, the only other close monitoring site in the Clarksville area is in Montgomery County, TN (AQS 47-125-0006) stopped gathering data in 2016. The two monitoring sites on Wilburn Drive and Skyland Drive in Sullivan County, TN are showing higher values and are influenced by the nonattainment area surrounding the Eastman Chemical facility. The other remaining sites in Anderson and Blount (GRSM) counties are having much lower design values (2 ppb and 6 ppb respectively) than at the selected Paducah site.

VI.4 Significant Impact Area Determination

For modeling results that exceed a SIL, the Significant Impact Area (SIA) was determined for that pollutant and averaging period. The SIA is a circular area around the source with a radius equal to the distance to the farthest receptor with a concentration exceeding the SIL. It should be noted that the SIA will not exceed 50 km due to constraints of the dispersion model. The SIA is utilized to define the inventory for the full impact analysis. Inventory data was gathered for all sources within up to 50 km of the SIA.

Only those receptors within the SIA where significance results are predicted to exceed the relevant SIL are used in a full impact analysis. Only at those receptors could the Facility potentially significantly contribute to a modeled NAAQS exceedance. For PM2.5 SIAs, the secondary PM2.5 concentrations estimated using the MERPs methodology were included in the determination of the SIA.

The modeled extent of the SO₂ (1-Hour) significant impact area (SIA) is 13.2 km (figure 7), which only encompasses the counties of New Madrid in Missouri and Lake in Tennessee respectively. Currently there are no significant SO₂ emitting sources in Lake County.

The modeled extent of the NO₂ (1-Hour) significant impact area (SIA) is 34.2 km (figure 9), which encompasses the counties of New Madrid in Missouri, and Dyer, Lake and Obion in Tennessee respectively. Currently there are no significant NO₂ emitting sources in Lake County.
VI.4.1 National Ambient Air Quality Standards Analysis Results

A compliance demonstration is required for each criteria pollutant that exceeds the applicable SIL. As indicated in Table 38, such demonstrations are required for 1-hour average NO\textsubscript{2} and SO\textsubscript{2}, 3-hour average SO\textsubscript{2}, 24-hour average PM\textsubscript{2.5} and PM\textsubscript{10}, and annual average PM\textsubscript{2.5} emissions.

To demonstrate compliance with the ambient standards, design concentrations attributable to the Facility, design concentrations attributable to significant nearby industrial facilities, and a representative background concentration are combined and compared to the standard.
The results of the compliance demonstrations for 1-hour average NO2, 1-hour and 3-hour average SO2, 24-hour average PM10, 24-hour average PM2.5 and PM10, and annual average PM2.5 emissions are presented in Table 44. In addition, the 24-hour average HCl concentration for the Facility only is presented in Table 44. The nearby industrial source inventory was provided by TDEC. Cumulative concentrations are based on the sum of the model predicted concentrations attributable to Facility emissions, model-predicted concentrations attributable to significant nearby industrial sources, representative background concentration, and MERPs concentrations when applicable for each pollutant and averaging period.

Table 44. National/Tennessee Ambient Air Quality Standards Analysis Results

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Maximum Model-Predicted Conc. (µg/m³)</th>
<th>MERPs Conc. (µg/m³)</th>
<th>Background Conc. (µg/m³)</th>
<th>Design Conc. (µg/m³)</th>
<th>NAAQS (µg/m³)</th>
<th>Over NAAQS/TAAQS?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO2</td>
<td>1-hour</td>
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<td>--</td>
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</tr>
<tr>
<td></td>
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<td>--</td>
<td>26.1</td>
<td>173.1</td>
<td>196</td>
<td>No</td>
</tr>
<tr>
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<td>7.65</td>
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<td>No</td>
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<td>0.40</td>
<td>15.0</td>
<td>18.7</td>
<td>35</td>
<td>No</td>
</tr>
<tr>
<td>PM10</td>
<td>24-hour</td>
<td>17.9</td>
<td>--</td>
<td>29.3</td>
<td>47.2</td>
<td>150</td>
<td>No</td>
</tr>
<tr>
<td>HCl</td>
<td>24-hour</td>
<td>0.213</td>
<td>--</td>
<td>--</td>
<td>0.213</td>
<td>70</td>
<td>No</td>
</tr>
</tbody>
</table>

1. 1-hour NO2 modeled concentration is the maximum 98th percentile of daily maximum 1-hour concentrations averaged over 5 years of modeling.
2. 1-hour SO2 modeled concentration is the maximum 99th percentile of daily maximum 1-hour concentrations averaged over 5 years of modeling.
3. 24-hour PM2.5 modeled concentration is the maximum 98th percentile of daily maximum concentrations averaged over 5 years of modeling.

As shown in Table 44 1-hour NO2 design concentrations were greater than the applicable NAAQS. Ramboll performed a source apportionment analysis using the MAXDCONT option in AERMOD to determine if the NAAQS exceedances were concurrent with an exceedance of the Class II SIL by the Facility. Ramboll evaluated the 8th highest high through the 300th highest high at each receptor. All the modeled NAAQS exceedances occur when the contribution from the Facility is less than the SIL, therefore the Facility is not a contributor to any NAAQS exceedance. The maximum contribution to a NAAQS exceedance attributable to
Sinova was 3.85 µg/m³. A summary of the MAXDCONT outputs is provided in Appendix D.

Additionally, a TDEC-conducted revised NO2 (1-Hour) NAAQS modeling with the inclusion of 30 more NOx-emitting sources from Dyer and Obion counties in Tennessee (due to the SIA extent of 34.2 Km) resulted in a max H8H impact of 1466 µg/m³. The MAXDCONT contribution from the Sinova facility to this overall impact (in time and space) is only 0.0024 µg/m³, which is way below the 7.5 µg/m³ SIL and is the same in value to the Rambol conducted modeling, (which only included regional sources from Missouri). This overall NAAQS exceedance value occurring in Missouri is due exclusively from the modeled emissions of the New Madrid Power Plant having 1464.73 µg/m³ contribution.

NAAQS Cumulative SO2 Modeling:

Table 45. NAAQS Cumulative SO2-emitting Modeled Sources
Figure 11. SO\textsubscript{2} (1-Hour) NAAQS modeling max impact

Figure 12. SO\textsubscript{2} (1-Hour) NAAQS modeling max impact location
NAAQS Cumulative NO2 Modeling:

Table 46. NAAQS Modeling - Additional 30 modeled sources from Dyer and Obion counties in TN

<table>
<thead>
<tr>
<th>Type ID</th>
<th>Height [m]</th>
<th>Diam [m]</th>
<th>Exit Vel [m/s]</th>
<th>Exit Temp [K]</th>
<th>Release Type</th>
<th>Emission Rate [grams/sec]</th>
<th>Emission Rate [lb/hr]</th>
<th>X1 [m]</th>
<th>Y1 [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>POINT SIEGEL</td>
<td>13.415</td>
<td>0.701</td>
<td>7.317</td>
<td>612.448 VERTICAL</td>
<td></td>
<td>0.0004</td>
<td>0.0033</td>
<td>289467.39</td>
<td>399800.29</td>
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<tr>
<td>POINT TRL_CGEN</td>
<td>0.823</td>
<td>0.049</td>
<td>104.628</td>
<td>904.114 VERTICAL</td>
<td></td>
<td>0.0002</td>
<td>0.0012</td>
<td>291810.07</td>
<td>397974.42</td>
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<tr>
<td>POINT TRL_B1</td>
<td>3.659</td>
<td>0.457</td>
<td>0.062</td>
<td>876.337 VERTICAL</td>
<td></td>
<td>0.0025</td>
<td>0.0198</td>
<td>291810.07</td>
<td>397974.42</td>
</tr>
<tr>
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<td>104.445</td>
<td>1001.337 VERTICAL</td>
<td></td>
<td>0.0014</td>
<td>0.0113</td>
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</tr>
<tr>
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<td>0.073</td>
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<td>0.0036</td>
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</tr>
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<td>397974.42</td>
</tr>
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<tr>
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<td>0.0121</td>
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<td>955.781 VERTICAL</td>
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<tr>
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</tr>
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</tr>
</tbody>
</table>

Total => 7.9852 63.3748
Table 48. Overall NAAQS Cumulative NO2-emitting Modeled Sources
Type

ID

POINT BAGHOUSE
POINT EGEN
VOLUMELADHEA01
VOLUMELADHEA02
VOLUMELADHEA03
VOLUMELADHEA04
VOLUMELADHEA05
VOLUMELADHEA06
VOLUMELADHEA07
VOLUMELADHEA08
POINT NMPP_P1
POINT NMPP_P2
POINT NMPP_P3
POINT MAG7_P19
POINT MAG7_P20
POINT MAG7_P22
POINT MAG7_P23
POINT MAG7_P71
POINT MAG7_P72
POINT MAG7_P73
POINT MAG7_P96
POINT MAG7_P97
POINT MAG7_P98
POINT MAG7_P99
POINT MAG7_P103
POINT MAG7_P104
POINT MAG7_P105
POINT MAG7_P106
POINT MAG7_P107
POINT MAG7_P108
POINT MAG7_P109
POINT MAG7_P110
POINT MAG7_P111
POINT MAG7_P112
POINT MAG7_P113
POINT MAG7_P114
POINT MAG7_P115
POINT MAG7_P116
POINT MAG7_P117
POINT MAG7_P118
POINT MGCO_P2
POINT PFGI_P2
POINT SGCI_P2
POINT SGCI_P3
POINT SGCI_P9
POINT MGNG_P2
POINT ACRC_P2
POINT HASP_P1
POINT HASP_P2
POINT BOOT_P2
POINT RICH_P2
POINT BUNG_P3
POINT SRMS_P1
POINT NUTR_P3
POINT CREM_P1
VOLUMESGCI_V3
VOLUMERICE_V3
VOLUMEADMG_V2
VOLUMEPION_V33
VOLUMEMAG7_L1
VOLUMEMAG7_L2
VOLUMEMAG7_L3
POINT SIEGEL
POINT TRL_CGEN
POINT TRL_B1
POINT TRL_5748
POINT TRL_5701
POINT TRL_5703
POINT TRL_5706
POINT TRL_H1
POINT TRL_5704
POINT TRL_B2
POINT TRL_5702
POINT TRL_5705
POINT TRL_5707
POINT TRL_H2
POINT GP_S10
POINT GP_S110
POINT GP_S50
POINT NWTND_FL1
POINT TXGC_AX3
POINT TXGC_RC9
POINT TXGC_AX1
POINT TXGC_AX2
POINT TXGC_RC7
POINT TXGC_BL1
POINT TXGC_TB2
POINT TXGC_RC8
POINT TXGC_RC5
POINT TXGC_RC6
POINT TXGC_R10
POINT TXGC_AX4

Base_Elev
[m]
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92.26
92
92
92
92
92
92
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92.18
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81.26
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88
88.09
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84.53
88
88.01
84.41
83.64
83.87
87.27
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88
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88
88
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88
88.89
84
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84.21
84.21
84.21
82
90
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91
93
86.99
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80.31
85
84.21
79.59
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91
88.6
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96.24
95.76
95.64
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95.88
95.76
95.97
95.97

Height
[m]
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36.75
36.75
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30.48
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9.144
9.144
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4.572
9.144
9.144
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4.572
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26.82
2.5
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31.7
31.7
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1.493902439
9.664634146
9.664634146
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8.993902439
9.603658537
9.664634146
8.993902439
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2.43902439
9.146341463
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5.487804878
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8.231707317
8.231707317
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Diam Exit_Vel Exit_Temp
Release_Type
[m]
[m/s]
[K]
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15.000
473.000 VERTICAL
0.2 207.220
735.150 VERTICAL

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6.096
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4.3586
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0.509

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12.186
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12.128
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6.370
6.370
6.370
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0.518
1.554
0.518
0.991
0.610
0.310
0.310
0.163
0.782
0.533
0.178
0.533
0.178
0.122
9.835
9.835
5.080
5.080
5.080
9.835
9.835
2.748
10.998
9.835
9.835
0.001
5.080
5.080
4.662

0.7012
7.317
0.0488 104.628
0.4573
0.082
0.128 104.445
0.4268
41.311
0.4268
41.311
0.4573
43.018
0.2134
0.073
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41.311
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43.018
0.254
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3.0732
14.008
0.1524
45.029
0.9146
24.441
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2.448
0.2134
22.561
0.5183
55.793
0.2134
22.561
0.2134
22.561
0.4573
53.354
0.6098 111.505
4.5122
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0.4573
53.354
0.4573
53.354
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55.793
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450.257
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876.337
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876.337
876.337
876.337
876.337
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721.892
955.781
955.781
761.892
737.448
820.781
761.892
761.892
761.892
721.892
959.670

SigmaY SigmaZ
[m]
[m]

Length_X
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17.7

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6.02
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VERTICAL
VERTICAL
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VERTICAL
VERTICAL
HORIZONTAL
Total =>

211

Emission_Rate
Emission_Rate
grams/sec
lb/hr
46.4879
368.9512
0.8940
7.0954
0.0463
0.3676
0.0463
0.3676
0.0463
0.3676
0.0463
0.3676
0.0463
0.3676
0.0463
0.3676
0.0463
0.3676
0.0463
0.3676
215.9247
1713.6881
171.8971
1364.2627
7.3468
58.3079
0.0199
0.1580
0.0199
0.1581
0.2401
1.9052
0.2401
1.9052
0.0066
0.0527
0.0019
0.0150
0.0019
0.0150
0.0458
0.3637
0.0412
0.3270
0.0412
0.3270
0.0253
0.2005
0.0339
0.2690
0.1036
0.8222
0.0318
0.2526
0.1011
0.8024
0.0933
0.7403
0.4106
3.2589
0.1630
1.2935
0.1666
1.3222
0.0376
0.2982
0.0336
0.2668
0.0489
0.3878
0.0870
0.6902
0.0334
0.2649
0.0870
0.6902
0.0334
0.2649
0.0144
0.1146
0.0109
0.0869
1.0676
8.4730
0.0368
0.2920
0.2480
1.9682
1.0226
8.1157
0.1500
1.1905
0.1091
0.8658
0.0410
0.3255
0.0081
0.0641
0.0235
0.1867
0.1260
1.0000
0.0245
0.1948
0.0043
0.0341
0.0536
0.4255
0.0026
0.0210
0.5003
3.9708
0.0141
0.1121
0.0013
0.0106
0.0029
0.0233
0.0001
0.0010
0.0001
0.0008
0.0001
0.0010
0.0004
0.0033
0.0002
0.0012
0.0025
0.0198
0.0014
0.0113
0.0004
0.0034
0.0442
0.3510
0.0425
0.3374
0.0006
0.0050
0.0005
0.0036
0.0519
0.4122
0.1950
1.5479
0.0001
0.0004
0.0011
0.0087
0.0011
0.0084
2.2548
17.8949
0.0015
0.0121
0.0416
0.3303
0.2079
1.6503
0.9395
7.4560
0.6146
4.8775
0.6574
5.2177
0.7651
6.0718
0.3580
2.8413
0.0100
0.0797
0.0988
0.7843
0.4656
3.6953
0.1719
1.3642
0.3724
2.9559
0.6839
5.4281
0.0002
0.0019
456.5170

3623.1505

X1
[m]
278920.24
279024.23
278870.23
278886.34
278903.54
278923.67
278941.61
278959.91
278980.41
278996.88
270597.94
270605.63
270417.59
270437.13
270437.47
270205.78
270204.66
270645.50
270397.75
270196.78
270617.84
270677.88
270678.00
270355.06
270178.22
270209.00
270205.59
270193.28
270189.19
270167.31
270158.41
270295.03
270295.22
270294.78
270159.78
270450.22
270449.47
270441.72
270457.44
270004.25
248069.11
257871.48
257600.73
257600.73
257600.73
238617.86
273101.13
271209.56
271209.56
269264.50
265988.66
272322.25
268946.72
269800.66
257535.73
257600.73
269863.94
269947.72
272339.09
270064.91
270060.06
270524.28
297467.39
291810.07
291810.07
291810.07
291810.07
291810.07
291810.07
291810.07
291810.07
291810.07
291810.07
291810.07
291810.07
291810.07
306904.28
306904.28
306904.28
307374.07
317561.28
317578.10
317561.52
317561.52
317598.16
317606.45
317679.05
317598.40
317588.94
317598.16
317587.08
317587.08

Y1
[m]
4035308.22
4035526.15
4035569.97
4035568.87
4035568.87
4035568.87
4035567.77
4035566.31
4035565.21
4035564.85
4044100.75
4044107.00
4044313.00
4043173.00
4043160.25
4043190.50
4043174.25
4043550.50
4043387.75
4043391.25
4043693.50
4043688.25
4043666.25
4043686.50
4043722.25
4043722.00
4043722.00
4043721.50
4043722.00
4043723.00
4043722.75
4043743.00
4043750.50
4043758.50
4043722.75
4043202.25
4043198.75
4043191.00
4043190.00
4043685.75
4055102.75
4034203.75
4034413.00
4034413.00
4034413.00
4037994.00
4053396.50
4051235.00
4051235.00
4071034.25
4044542.75
4032624.50
4082891.50
4045842.50
4034513.00
4034413.00
4045755.00
4045460.75
4058579.75
4043627.00
4043547.50
4043338.50
3998000.29
3979744.42
3979744.42
3979744.42
3979744.42
3979744.42
3979744.42
3979744.42
3979744.42
3979744.42
3979744.42
3979744.42
3979744.42
3979744.42
4017782.29
4017782.29
4017782.29
4030739.57
4012191.25
4012135.40
4012202.34
4012202.34
4012234.87
4012201.40
4012233.18
4012245.97
4012223.97
4012234.87
4012135.21
4012135.21


Figure 13. NO2 (1-Hour) NAAQS modeling max impact

Figure 14. NO2 (1-Hour) NAAQS modeling max impact location relative to Sinova location
VI.5 Class II PSD Increment Consumption

Concentrations of 1-hour NO2, 1-hour, 3-hour and 24-hour SO2, and 24-hour and annual average PM2.5 exceed the Class II SIL; therefore, a Class II increment consumption analysis must be performed if an increment has been established for that pollutant/averaging time.

The appropriate baseline date for the pollutant are established and actual emissions changes from the baseline date are estimated for offsite sources. The proposed Facility was modeled using potential emissions because they are new emission units.

The major source baseline dates are:

- SO2 January 6, 1975
- PM10 January 6, 1975
- PM2.5 October 20, 2010
- NO2 February 8, 1988

According to TDEC⁶, the minor source baseline date has not been triggered for any criteria pollutant in Lake County.
The difference between the major and minor source baseline dates is explained concisely in a Kansas memo:

*The major source baseline date* is the date after which actual emissions associated with construction at a major stationary source affect the available PSD increment. Other changes in actual emissions occurring at any other source after the major source baseline date do not affect the increment, but instead (until after the minor source baseline date is established) contribute to the baseline concentration. The *trigger date* is the date after which the minor source baseline date may be established. Both the major source baseline date and the trigger date are fixed dates. The *minor source baseline date* is the earliest date after the trigger date on which a complete PSD application is received by the permit reviewing agency.

This PSD permit will establish the minor source baseline dates in Lake County for several PSD pollutants. Any PSD increment consumption analysis should consider emissions increases from all major and minor new or modified sources permitted after the major and minor source baseline dates, respectively.

Ramboll obtained off-property emission sources from TDEC and Missouri Department of Natural Resources - Division of Environmental Quality (MDEQ). At a minimum, for each pollutant and averaging period requiring the cumulative PSD increment analysis, all sources located within the “annular ring” that extends 50 km from the Significant Impact Area must be modeled. Any sources located beyond the 50-km annular ring was evaluated on a case-by-case basis. Past EPA guidance has indicated that sources located beyond the annular ring that are likely to individually or collectively contribute to a significant impact at the receptors within the annular ring should be modeled.

For increments with an annual averaging period, the highest model prediction (H1H) will be compared to the applicable PSD increment. For shorter averaging periods, the highest second-high model-prediction (H2H) will be compared to the applicable PSD increment.
Table 48. Class II Increment Analysis Results

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Maximum Model Predicted Conc. (µg/m³)</th>
<th>MERPs Conc. (µg/m³)</th>
<th>Total Conc. (µg/m³)</th>
<th>Class II Increment (µg/m³)</th>
<th>Over Increment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO₂</td>
<td>24-hour</td>
<td>18.1</td>
<td>--</td>
<td>18.1</td>
<td>91</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>62.7</td>
<td>--</td>
<td>62.7</td>
<td>512</td>
<td>No</td>
</tr>
<tr>
<td>PM2.5</td>
<td>Annual</td>
<td>0.866</td>
<td>0.01</td>
<td>0.875</td>
<td>4</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>8.24</td>
<td>0.4</td>
<td>8.64</td>
<td>9</td>
<td>No</td>
</tr>
</tbody>
</table>

The Facility is not expected to cause or contribute significantly to the exceedance of any Class II PSD increment.

VI.6 Additional Impact Analysis

40 CFR 51.21(o) requires an analysis of the impairment to visibility, soils, and vegetation that would occur as a result of the project, as well as other residential/industrial growth that the project may trigger. A qualitative analysis is presented in Section 8 to address most of these topics. Note that an ozone analysis, which has been included in the Additional Impacts Analysis section of other recent PSD applications, is addressed by the MERPs analysis described in Section VI.3.1.
VI.7  CLASS I AIR QUALITY IMPACT ANALYSIS

PSD guidance requires an analysis of potential impacts to air quality in certain National Parks and Wilderness Areas that are designated as “Class I areas.” The analysis must examine compliance with NAAQS, PSD Increments, and AQRVs. Although the regulations require assessment of Class I areas within 100 km (62.1 miles) of the Facility subject to PSD review, Federal Land Managers (FLMs) and TDEC typically request analyses of AQRV impacts for Class I areas within 200 km (124 miles) of the site. EPA’s Regional Haze Regulations require that Class I areas within 300 km (186 miles) be included.

Table 49 summarizes the applicable Class I PSD increments and proposed Class I SILs. At this point, there are two sets of Class I SILs: those proposed by EPA and those recommended by the FLMs. These proposed and recommended SILs were obtained from the Federal Register, Vol. 61, No. 143, p. 38292, July 23, 1996; and from the draft guidance of August 1, 2016 (revised August 18, 2016).

Table 49. Class I PSD Increments

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>PSD Class I Increment</th>
<th>EPA SIL \textsuperscript{a}</th>
<th>FLM SIL \textsuperscript{a}</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM10</td>
<td>Annual</td>
<td>4</td>
<td>0.2</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>8</td>
<td>0.3</td>
<td>0.27</td>
</tr>
<tr>
<td>PM2.5</td>
<td>Annual</td>
<td>1</td>
<td>0.05 \textsuperscript{b}</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>2</td>
<td>0.27 \textsuperscript{b}</td>
<td>--</td>
</tr>
<tr>
<td>SO\textsubscript{2}</td>
<td>Annual</td>
<td>2</td>
<td>0.1</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>5</td>
<td>0.2</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>25</td>
<td>1</td>
<td>0.48</td>
</tr>
<tr>
<td>NO\textsubscript{2}</td>
<td>Annual</td>
<td>2.5</td>
<td>0.1</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Notes:
\textsuperscript{a} – SIL = Significant Impact Level; EPA proposed and FLM recommended from the Federal Register, Vol. 61, No. 142, p. 38292, July 23, 1996.
\textsuperscript{b} – The Class I PM2.5 SILs were vacated on January 22, 2013. New SILs have been circulated for public comment, which are used in this analysis in place of the vacated SILs.

VI.7.1  Class I PSD Increment Assessment for Mandatory Areas

The Mingo Wilderness Area is the only federally mandated Class I area located within 100 km of the proposed Plant. While the FLAG 2010 guidance presents a
“Q/D” screening methodology to select which Class I areas must be included in an assessment for AQRVs, PSD regulations only require inclusion of Class I areas within a 100-km radius for the increment analysis. Therefore, only the Mingo Wilderness Area has been included in the PSD increment assessment.

VI.7.1.1 Dispersion Model Selection
CALPUFF version 5.8.5 was used. CALPOST version 6.221, level 080724 was used for post-processing.

Any CALPUFF modeling for Class I PSD increment assessment generally followed the modeling methodology detailed in Section 7.2. However, the modeling for this analysis will not use the chemistry or deposition schemes (i.e., chemistry and deposition will be turned “off”), as these were never officially accepted by EPA. Because these schemes are not used, background ammonia and ozone are not required inputs for the increment assessment. Post-processing of the CALPUFF results only requires the use of CALPOST; POSTUTIL is not needed, as there is no deposition or chemistry processing required for the increment assessment. CALPOST was used to summarize the modeling results.

Because CALPUFF was removed from Appendix A of the Guideline during the 2017 revisions, there is currently no preferred model for long-range transport – no preferred model for Class I increment analyses. CALPUFF may still be used in “screening mode” for a SILs analysis, but not for a cumulative PSD increment analysis.

VI.7.1.2 Modeling Domain, Receptors, and Terrain
The modeling domain, receptors and terrain for the Class I PSD increment analysis for the Mingo Wilderness Area will be the same as described in Section 7.2.2. Discrete receptors for the Mingo Class I area were obtained from the NPS.
VI.7.1.3 Meteorology

For the CALPUFF-based Class I PSD increment screening (SILs) analysis, three years of hourly 12-km horizontal resolution WRF model output data from January 2014 through December 2016 were used. This WRF (version 3.8) dataset was acquired from the EPA, and is part of their annual Modeling Platform. 8 The most recent version of EPA’s Mesoscale Model Interface program (MMIF version 3.4.1) was used to generate meteorological input files for CALPUFF. The MMIF setup for

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8 See https://www.epa.gov/air-emissions-modeling/2014-2016-version-7-air-emissions-modeling-platforms

---
any CALPUFF-based PSD increment assessment was the same as the setup for the
Class I AQRV analysis, outlined in Section 7.2.5.

VI.7.1.4 Emission Unit Characterization
Stack parameters and emission rates for the proposed Facility are based on those presented in Section
6.2.3. No downwash was used for distant sources. Each pollutant was modeled as non-reactive, and no
additional speciation or characterization of emissions was needed.

Following EPA comments (dated March 8, 2022) on the applicability of the Calpuff model for cumulative
long-range transport (LRT) analyses in accordance with the GAQM (appendix W of 40 CFR 51, 2017),
Sinova has revised the daily and annual average SO2 emission factor for the SAFs. Where the SO2
emission factor had been 17.6 lb SO2/ton Si produced, it is now 15 lb SO2/ton Si produced. This updated
emission factor was used to recalculate the maximum expected emissions from the Main Baghouse stack
by re-running the Class I impact screening modeling (with no Chemistry) using CALPUFF. As shown in
the updated table 51 below, the maximum 24-hour average SO2 concentration predicted by the model is
0.184 ug/m3, which is less than 24-hour average SO2 SIL proposed by EPA for Class I areas (i.e., 0.2
ug/m3). Because the maximum predicted concentration is less than the proposed SIL, a cumulative analysis
to assess compliance with ambient standards and/or the PSD increments is not required. Updated emission
rate summary table and Class I impact analysis table are provided below tables 49 and 51 respectively.

Therefore, due to the revised SO2 emissions (annual reductions from 595 to 506 tpy), the Class I impacts
for the SO2 averages (in Calpuff) and secondary PM2.5 (in MERPS) have been updated.

VI.7.1.5 Class I Secondary PM2.5
Because there are no Class I PSD increments for ozone, only secondary PM2.5 must be considered at Class
I areas. To account for secondary PM2.5 formation, CALPUFF- predicted concentrations were summed
with the MERP-predicted concentrations of PM2.5 when comparing to the Class I SILs or PSD increments.

Following the 2019 EPA MERP guidance, Tier 2 methodologies were used to calculate the contributions
to PM2.5 associated with Facility emission increases. In this second level assessment, the distance
between the Facility and Class I areas (86 km for Mingo Wilderness) was considered. Table 51 presents
the hypothetical source configurations that are used in the Tier II calculations. Section 6.3.1 described the
reasoning as to why this hypothetical source was selected.
Table 50. Hypothetical Source Configuration for Tier II Calculation

<table>
<thead>
<tr>
<th>Source ID</th>
<th>Source ID</th>
<th>Coordinates</th>
<th>Parameter</th>
<th>NOX</th>
<th>SO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>12EUS2</td>
<td>ID: 8</td>
<td>35.1249°, -90.0021°</td>
<td>Stack Height</td>
<td>90 m</td>
<td>90 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Emission Rate</td>
<td>1,000 tpy</td>
<td>500 tpy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Distance</td>
<td>86 km</td>
<td>86 km</td>
</tr>
</tbody>
</table>

Table 49 shows the ozone and PM2.5 increases associated with the hypothetical source configurations presented in Table 489. These contributions were obtained from the Appendices of the EPA MERP Guidance document (EPA, 2019) and are representative of secondary impacts within 50 km of the source.

Table 51. Class I MERP Analysis Results for PM2.5 from Shelby County

<table>
<thead>
<tr>
<th>Precursor</th>
<th>Daily PM2.5 (μg/m^3)</th>
<th>Annual Average PM2.5 (μg/m^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOX</td>
<td>0.10</td>
<td>0.003</td>
</tr>
<tr>
<td>SO2</td>
<td>0.05</td>
<td>0.001</td>
</tr>
<tr>
<td>VOC</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

The daily maximum PM2.5 increases from NOX and SO2 emissions associated with the Shelby County, TN source in Table 50 is used to calculate the daily maximum secondary PM2.5 increases from the proposed Facility in the following equations:

Using Shelby, TN MERP values to calculate daily secondary PM2.5 contributions:

\[
\text{[(Project NOx emissions (1230 tpy) / NOx MERP (1000 tpy – 90 m source) × (0.10 μg/m^3) + (Project SO2 emissions (506 tpy) / SO2 MERP (500 tpy – 90 m source) × (0.05 μg/m^3))]} = 0.174 \text{ μg/m}^3
\]

It is estimated that the NOX and SO2 emissions from the proposed Facility will lead to daily maximum secondary PM2.5 increases of up to 0.17 μg/m^3.

A similar approach is used to estimate annual average secondary PM2.5 increases, as illustrated in the following equations:

Using Shelby, TN MERP values to calculate annual secondary PM2.5 contributions:

\[
\text{[(Project NOx emissions (1230 tpy) / NOx MERP (1000 tpy – 90 m source) × (0.003 μg/m^3) + (Project SO2 emissions (506 tpy) / SO2 MERP (500 tpy – 90 m source) × (0.001 μg/m^3))]} = 0.005 \text{ μg/m}^3
\]

It is estimated that the NOX and SO2 emissions from the proposed Facility will lead to an annual average
secondary PM2.5 increases of up to 0.005 μg/m³.

VI.7.1.6 Chemical Transformations
The Class I PSD increment analysis for the Mingo Wilderness Area utilized the ARM2 based on EPA’s guidance for NO-to-NO2 transformations. The ARM2 default ratios of 0.5 and 0.9 for minimum and maximum NO2/NOX ratios were used for all sources.

VI.7.1.7 Significant Impact Level Analysis Results
Maximum model-predicted concentrations of criteria pollutants from emissions attributable to the Project are compared with SIL criteria in Table 52 below. For daily PM2.5, MERP-estimated secondary PM2.5 contributions (discussed in Section 7.1.5) were added to model-predicted concentrations for comparison with their applicable SILs. The maximum model-predicted concentrations for all pollutants and averaging period are under the applicable SILs except SO2 24-hour.

Table 52. Class I Significant Impact Level Analysis Results (updated)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging</th>
<th>Maximum Model Predicted Conc. (μg/m³)</th>
<th>MERPs Conc. (μg/m³)</th>
<th>Total Conc. (μg/m³)</th>
<th>Class I SIL (μg/m³)</th>
<th>Greater than Class I SIL?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO2</td>
<td>Annual</td>
<td>0.016</td>
<td>--</td>
<td>0.016</td>
<td>0.1</td>
<td>No</td>
</tr>
<tr>
<td>SO2</td>
<td>Annual</td>
<td>0.006</td>
<td>--</td>
<td>0.006</td>
<td>0.1</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>0.193</td>
<td>--</td>
<td>0.193</td>
<td>0.2</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>0.627</td>
<td>--</td>
<td>0.627</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>PM2.5</td>
<td>Annual</td>
<td>0.0004</td>
<td>0.005</td>
<td>0.005</td>
<td>0.05</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>0.010</td>
<td>0.174</td>
<td>0.184</td>
<td>0.27</td>
<td>No</td>
</tr>
<tr>
<td>PM10</td>
<td>Annual</td>
<td>0.0004</td>
<td>--</td>
<td>0.0004</td>
<td>0.2</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>0.011</td>
<td>--</td>
<td>0.011</td>
<td>0.3</td>
<td>No</td>
</tr>
</tbody>
</table>

Note: While the changed daily and annual average SO2 emission rate will affect the results of the AQRV analyses, these analyses NOTE: Concentration impacts in **bold** were updated from original values due to revised and reduced SO2 daily and annual average emissions (Table 4).

As noted above, the analysis predicted that expected maximum emissions attributable to the Facility would not exceed the SILs.

The updated 24-hour average SO2 SIL modeling (due to the reduction of SO2 emissions from 595 to 506 tpy) is shown below:
Notes:

1. LCC grid can be converted to Latitude/Longitude (DATUM: NWS-84) using the LCC Grid Origin (40.000 N, 97.000W) and the true latitudes of the LCC projection (33.000 N, 45.000N).
Figure 17. Location of Mingo Wilderness Area Max Impact Receptor for the 24-Hour $SO_2$ SIL.
VI.7.2 Class I Air Quality Related Values
Following the Federal Land Managers’ Air Quality Related Workgroup FLAG 2010 guidance document (FLAG 2010), there is no maximum distance when considering which Class I areas to include – inclusion is triggered by a “Q/D” screening value that exceeds 10. There are three federally mandated Class I areas with 300 km of the proposed Facility, and 7 Class I areas within 500 km. Figure 18 displays the location of the site with a 300-km ring encircling it and shows the closest mandatory Class I areas.

The “Q/D” screening method is used to choose which Class I areas should be included in the AQRV assessment. Table 54 lists the approximate distance between

the site and the Class I areas, as well as the Q/D values (total emissions in tons per year, divided by the distance in km). The net emission increase (Q) is based on the sum of the maximum 24-hour average NOX, SO2, PM10, and H2SO4 emissions from the proposed Facility, expressed in tons per year. Note that a Q/D screening value of 10 is the screening threshold currently under consideration by the FLMs. With such a low potential for Class I impacts, Ramboll believes an AQRV analysis other than for the Mingo WA is not required.

The wording from FLAG (2010) is clear, and uses the word “would” instead of “may”:

Therefore, the Agencies will consider a source locating greater than 50 km from a Class I area to have negligible impacts with respect to Class I AQRVs if its total SO2, NOX, PM10, and H2SO4 annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in km) from the Class I area (Q/D) is 10 or less. The Agencies would not request any further Class I AQRV impact analyses from such sources.
Figure 18. Class I Areas Within 500 km of the Proposed Facility

9 FLAG (2010), last paragraph on page 18, continued page 19.
Table 54. Mandatory Class I Area Q/D Analysis

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Distance to Class I Area&lt;sup&gt;1&lt;/sup&gt; (km)</th>
<th>Preliminary Q/D&lt;sup&gt;2&lt;/sup&gt; (tpy/km)</th>
<th>AQRV Analysis Required?</th>
</tr>
</thead>
<tbody>
<tr>
<td>MING</td>
<td>Mingo Wilderness Area</td>
<td>86</td>
<td>21.58</td>
<td>Yes</td>
</tr>
<tr>
<td>SIPS</td>
<td>Sipsey Wilderness Area</td>
<td>292</td>
<td>6.36</td>
<td>No</td>
</tr>
<tr>
<td>MACA</td>
<td>Mammoth Cave National Park</td>
<td>297</td>
<td>6.25</td>
<td>No</td>
</tr>
<tr>
<td>HERC</td>
<td>Hercules-Glades Wilderness Area</td>
<td>304</td>
<td>6.11</td>
<td>No</td>
</tr>
<tr>
<td>UPBU</td>
<td>Upper Buffalo Wilderness Area</td>
<td>356</td>
<td>5.21</td>
<td>No</td>
</tr>
<tr>
<td>COHU</td>
<td>Cohutta Wilderness Area</td>
<td>464</td>
<td>4.00</td>
<td>No</td>
</tr>
<tr>
<td>CACR</td>
<td>Caney Creek Wilderness Area</td>
<td>469</td>
<td>3.96</td>
<td>No</td>
</tr>
</tbody>
</table>

1. Approximate distance to the nearest boundary of the Class I area
2. Based on a composite emission rate of 1,486 tons per year

The modeling domain shown in Figure 19 includes the Mingo Wilderness Area.
The AQRVs of concern include visibility, soil, flora, fauna, and aquatic resources. The CALPUFF modeling system is currently recommended for evaluating impacts to AQRVs in Class I areas affected by long-range transport. Potential impacts are characterized based on predictions of total nitrogen and/or sulfur deposition flux, change in light extinction, and pollutant concentrations.

VI.7.2.1 Dispersion Model Selection
On April 15, 2003, EPA adopted the CALPUFF modeling system as the EPA’s preferred model for long-range transport assessments and for evaluating potential impacts to Class I areas by including CALPUFF in Appendix A of the Guideline. Features of the CALPUFF modeling system include the ability to consider secondary aerosol formation, gaseous and particle deposition, wet and dry deposition processes, and complex three-dimensional wind regimes.
On May 22, 2017, revisions to the Guideline became effective that (among other changes) removed CALPUFF from Appendix A. However, as detailed in the preamble of the proposed rulemaking, this action does not affect the use of CALPUFF under the FLM’s guidance regarding AQRV assessments (FLAG 2010).

CALPUFF version 5.8.5, dated December 14, 2015 was utilized to perform the AQRV analysis. This was the most recent “official” EPA version of CALPUFF, and corrects several errors present in the previous versions of CALPUFF, as detailed in Model Change Bulletins E, F, G, and H. CALPOST version 6.221, level 080724 was utilized for post-processing. The latest version of Mesoscale Model Interface program (MMIF) was utilized in place of CALMET.

The modeling procedures followed the FLM’s FLAG and Interagency Workgroup on Air Quality Modeling (IWAQM) recommendations, in particular, FLAG (2000, revised October 2010)\(^\text{10}\) and IWAQM (1998) guidance documents. FLAG (2010) revises some procedures from the FLAG (2000) report, with the most significant revisions being related to visibility-impact calculations. Ramboll used the procedures and defaults recommended by the FLAG Phase I Report. The general CALPUFF modeling approach is summarized here:

- **Regulatory Options**: CALPUFF was run in the regulatory mode (MREG=1).
- **Modeling Period**: Three years were modeled (2014, 2015, and 2016) using 12 km resolution output from the WRF meteorological model, processed by MMIF.
- **Modeling Domain**: The modeling domain includes the Mingo WA, and extends 50 km beyond the far edge of each Class I area.
- **Background Ammonia**: Past AQRV studies of other regional sources have used a conservative 3 ppb ammonia concentration.
- **Background Ozone**: Hourly surface ozone were extracted from the USEPA’s AQS database, using all stations within 50 km of the modeling domain. A conservative value of 65 ppb was used when none of the supplied ozone stations have valid data.

\(^{10}\) The FLAG 2000 and 2010 documents can be found at [http://www.nature.nps.gov/air/Permits/flag/](http://www.nature.nps.gov/air/Permits/flag/).
• **Receptors**: High-spatial density National Park Service/Forest Service (NPS/FS) receptors\(^\text{11}\) in the Class I area(s) were used.

• **Visibility Impact Assessment**: Visibility impacts were calculated using the FLAG (2010) recommended Method 8, sub-mode 5 included as the default option in CALPOST. Ramboll used the annual average natural conditions tables in FLAG (2010) for monthly species background concentrations and relative humidity adjustment factors.

### VI.7.2.2 Modeling Domain, Receptors, and Terrain

The terrain for the CALPUFF simulations is shown in **Figure 19**. The 228-km by 216-km domain is large enough to include the Class I area of interest with at least a 50-km allowance for complex flows that might cause recirculation of plumes originating from the proposed Facility.

The CALPUFF dispersion model simulations assessed AQRVs at discrete receptors obtained from the National Park Service (NPS). **Figure 17** shows these receptor locations within the modeled Class I area.

### VI.7.2.3 Emission Unit Characterization

The Class I AQRV modeling analysis includes incremental increases in NO\(_X\), PM\(_{10}\), PM\(_{2.5}\), and SO\(_2\) emissions. There are no Class I area deposition flux thresholds associated with CO or VOC, and neither CO nor VOC contributes to visibility impairment in CALPUFF. Therefore, CO and VOC are not included in any of the AQRV analyses.

Data characterizing the chemical composition and size distribution of the PM\(_{10}\) and PM\(_{2.5}\) emissions are needed for the AQRV analysis using the CALPUFF modeling system. Particulate emissions must be divided into these six species:

- Soot or elemental carbon (EC)
- Organic carbon (OC)
- Fine soil particles (PMF)
- Coarse particles (PMC)

---

\(^\text{11}\) Class I receptors are available at [http://www.nature.nps.gov/air/maps/Receptors/index.cfm](http://www.nature.nps.gov/air/maps/Receptors/index.cfm).
• Sulfate (SO₄)
• Nitrate (NO₃)

Following the recent PSD Modeling Protocol for Sinova (Sinova’s proposed facility in NE Washington) rather than using the SPECIATE database to speciate PM into the above components, Ramboll speciated PM into only PMC (coarse) and PMF (fine), where PMF = PM₂.₅ and PMC = PM₁₀ – PM₂.₅.

VI.7.2.4 Chemical Transformations
The NOₓ chemistry in CALPUFF depends on the ambient ammonia concentration to establish the equilibrium between gaseous nitric acid and ammonium nitrate. However, ambient ammonia concentrations are not explicitly simulated by CALPUFF and the user must select an appropriate background concentration. The IWAQM Phase II Recommendations suggest typical ammonia concentrations are 10 parts per billion (ppb) for grasslands, 0.5 ppb for forests, and 1 ppb for arid lands during warmer weather.

For the AQRV analysis, a background ammonia concentration of 3 ppb was used. This conservative concentration was chosen to be consistent with past analyses in the region. The background ensures the conversion of NOₓ to ammonium nitrate is not limited by a lack of ammonia for the range of NOₓ concentrations predicted in this study.

Reaction rates in the CALPUFF chemistry algorithms are also influenced by background ozone concentrations. Hourly ozone monitoring data was extracted from the EPA’s AQS database and formatted for use in this analysis. A background of 65 ppb was used during periods of missing data.

VI.7.2.5 Meteorology
The AQRV analysis used three years of hourly 12-km horizontal mesh size prognostic WRF model output data from January 2014 through December 2016.

Based on recent communication with Tim Allen (USFWS), Ramboll used the most recent version of the EPA’s MMIF program (version 3.4.1) rather than the meteorological pre-processor CALMET. In addition to specifying the three-dimensional wind field, MMIF also estimates the boundary layer parameters used to characterize diffusion and deposition by the dispersion model. The MMIF application setup and input data preparation are as follows:
The model domain is shown in Figure 19. The horizontal mesh size will be 12 km and the domain will cover an area of 228 km by 216 km.

There are ten vertical levels, ranging geometrically from the surface to 4,000 m, using the FLM default layers (MMIF default).

WRF used a Lambert Conformal Conic (LCC) coordinate system with an origin of 40°N, 97°W and standard latitudes of 33°N and 45°N (the so-called Regional Planning Organization or “RPO” projection) which is passed through to the CALPUFF modeling by MMIF.

Land use and terrain data were inherited (passed through by MMIF) from the USGS-based datasets included in the WRF distribution.

The MMIF-default Golder method for calculating Pasquill-Gifford stability class was used.

The MMIF-default WRF-supplied mixing layer heights was used. MMIF was run in monthly segments using the WRF prognostic data.

VI.7.2.6 Post-Processing Procedures

The CALPUFF modeling system was used to predict concentrations of criteria pollutant concentrations, PM10 species that contribute to regional haze, total (wet and dry) deposition fluxes for nitrogen-containing pollutant species, and total deposition fluxes for sulfur species. For each emission case considered, three annual simulations were performed in parallel for each of the three modeling years.

The CALPUFF utility POSTUTIL was used to manipulate the large CALPUFF output files and calculate a number of the parameters needed to assess AQRVs in the areas of interest. Specifically, POSTUTIL was used to:

- Sum the sulfur and nitrogen portions of the deposited gaseous and particle compounds to estimate the total sulfur and nitrogen deposition fluxes.
- Use the MNITRATE method to rebalance HNO3/PNO3. The nitrogen in the ammonium nitrate and ammonium sulfate, including the portion that might be from the background ammonia, was incorporated in the total. A constant value of 3 ppb was used for ammonia background concentrations in the MNITRATE processing.

Following the application of POSTUTIL, the CALPOST post-processor was used to summarize the modeling results.

Predicted annual sulfur and nitrogen deposition fluxes were used as a measure to assess potential impacts to soils and vegetation in regional Class I areas. The FLMs have established Deposition Analysis Thresholds (DATs) for nitrogen and sulfur of
0.005 kilograms per hectare per year (kg/ha/yr). These “thresholds” are based on natural background deposition estimates culled from various research efforts, a variability factor, and a safety factor that accounts for cumulative effects. The nitrogen and sulfur DATs are not adverse impact thresholds but are intended as conservative screening criteria that allow the FLMs to identify potential deposition fluxes that require their consideration on a case-by-case basis.

The FLAG workgroup recommends procedures for estimating the visibility impacts due to proposed new sources at Class I areas using refined CALMET/CALPUFF modeling (FLAG, 2010). The FLAG visibility metric is the estimated maximum 24-hour change in extinction ($\Delta$\text{bext}) over clean natural visibility conditions (Natural Conditions) at the Class I area. The interpretation of the FLAG thresholds for extinction change over natural background is as follows:

- If the source’s visibility impact is < 5% on all days, the FLM will likely not object to the permit.
- If there are days with the source’s visibility impact > 10%, the FLM may object to the permit.
- If there are days in which the source’s visibility impact are above 5% the frequency, magnitude and duration of the visibility impacts are used to make a significance determination.

If a source exceeds a specific threshold at a Class I area, then the frequency, magnitude and duration of the impacts and the reliability and accuracy of the modeling are examined to interpret the modeling results.

The FLAG (2010) procedures employ the IMPROVE extinction equation to calculate $\text{b}_{\text{ext}}$ (Method 8, invoked with MVISCHECK=1 in CALPOST). This equation for extinction uses monthly relative humidity adjustment factors with relative humidity capped at 95%. It uses annual background aerosol concentrations recommended by the FLMs for the Class I area of concern, and assesses the visibility using the 98th percentile modeled values at each receptor. To use Method 8, CALPOST Version 6.221 (Level 080724) was used to post-process the CALPUFF output files.

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12 Guidance on Nitrogen and Sulfur Deposition Analysis Thresholds, available on the FLAG internet site at http://www2.nature.nps.gov/ard/flagfree/NSDATGuidance.htm
For FLAG 2010, a project’s extinction is calculated using the revised IMPROVE reconstructed mass extinction equation as follows:

\[ b_{project} = 2.2 \times f_S(RH) \times [\text{Small Sulfate}] + 4.8 \times f_L(RH) \times [\text{Large Sulfate}] + 2.4 \times f_S(RH) \times [\text{Small Nitrate}] + 5.1 \times f_L(RH) \times [\text{Large Nitrate}] + 2.8 \times [\text{Small Organic Mass}] + 6.1 \times [\text{Large Organic Mass}] + 10 \times [\text{Elemental Carbon}] + 1 \times [\text{Fine Soil}] + 0.6 \times [\text{Coarse Mass}] + 1.7 \times f_{SS}(RH) \times [\text{Sea Salt}] + \text{Rayleigh Scattering (Site Specific)} + 0.33 \times [\text{NO}_2 (\text{ppb})] \{\text{or as: } 0.1755 \times [\text{NO}_2 (\mu \text{g/m}^3)]\} \]

Where:

- \([\ ]\) indicates concentrations in \(\mu \text{g/m}^3\)
- \(f_S(RH)\) = Relative humidity adjustment factor for small sulfate and nitrate
- \(f_L(RH)\) = Relative humidity adjustment factor for large sulfate and nitrate
- \(f_{SS}(RH)\) = Relative humidity adjustment factor for sea salt

For Total Sulfate < 20 \(\mu \text{g/m}^3\):

\[ [\text{Large Sulfate}] = ([\text{Total Sulfate}] / 20 \mu \text{g/m}^3) \times [\text{Total Sulfate}] \]

For Total Sulfate \(\geq\) 20 \(\mu \text{g/m}^3\):

\[ [\text{Large Sulfate}] = [\text{Total Sulfate}] \]

And:

\[ [\text{Small Sulfate}] = [\text{Total Sulfate}] - [\text{Large Sulfate}] \]

To calculate large and small nitrate and organic mass, substitute \([\{\text{Large, Small, Total}\} \{\text{Nitrate, Organic Mass}\}]\) for Sulfate.

**VI.7.2.7 Screening Analysis Results**

As shown in **Table 55** CALPUFF model results predict sulfur and nitrogen deposition flux that is less than the DAT of 0.005 kg/ha/yr.\(^{13}\)

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\(^{13}\) *Guidance on Nitrogen and Sulfur Deposition Analysis Thresholds*, available on the FLAG internet site at [http://www2.nature.nps.gov/ard/flagfree/NSDATGuidance.htm](http://www2.nature.nps.gov/ard/flagfree/NSDATGuidance.htm)
Table 55. Predicted Class I Area Deposition Results

<table>
<thead>
<tr>
<th>Species Group</th>
<th>Modeled Prediction (kg/ha/yr)</th>
<th>Deposition Analysis Thresholds (DAT)</th>
<th>Over DAT?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfur</td>
<td>0.0043</td>
<td>0.005</td>
<td>No</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>0.0034</td>
<td>0.005</td>
<td>No</td>
</tr>
</tbody>
</table>

Note: While the reduced daily and annual average SO₂ emission rates (Table 4) will affect the results of the AQRV analyses, these analyses were not updated, because they already indicate compliance with all applicable thresholds, and updated analyses using reduced SO₂ emission rates are certain to indicate nothing more than an increased compliance margin.

Compliance with FLM-recommended criteria for regional visibility impacts was assessed by calculating the change in 24-hour extinction for each Class I receptor. The CALPUFF modeling system was used to predict both the extinction coefficient attributable to emissions from the Project as well as the background extinction coefficients for that day’s meteorology. Table 56 provides a summary of the predicted 98th percentile change in extinction at the Class I Area.

Table 56. Predicted Class I Area Visibility Results

<table>
<thead>
<tr>
<th>Class I Area of Interest</th>
<th>98th Percentile Change in Visibility (%)</th>
<th>3-year highest value</th>
<th># days over 5%</th>
<th># days over 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2014</td>
<td>2015</td>
<td>2016</td>
<td></td>
</tr>
<tr>
<td>Mingo Wilderness Area</td>
<td>1.11</td>
<td>1.16</td>
<td>1.22</td>
<td>2.49</td>
</tr>
</tbody>
</table>

Note: While the reduced daily and annual average SO₂ emission rates (Table 4) will affect the results of the AQRV analyses, these analyses were not updated, because they already indicate compliance with all applicable thresholds, and updated analyses using reduced SO₂ emission rates are certain to indicate nothing more than an increased compliance margin.

The FLMs recommend in the FLAG Phase I Report that a five percent change in extinction be used to indicate a “just perceptible” change to a landscape. As indicated in Table 54, the highest 98th percentile change in extinction is less than the 5 percent threshold established by the FLMs.
VII. ADDITIONAL IMPACT ANALYSIS

VII.1 Growth
Construction of the Facility would span approximately 24 months. During peak construction, there would be as many as 300 workers employed at the site. Laydown and worker parking areas will be located on the site. The temporary increases in vehicle miles traveled and vehicular emissions associated with both construction and operation of the Facility will be insignificant. During construction, local demand for skilled crafts people will increase; however, this demand will be temporary (less than 24 months). Once operational, Sinova expects to employ 140 full-time employees on site.

Sinova does not expect the Facility to cause significant population growth in the area, nor for there to be significant secondary air quality impacts as a result of that growth. During the construction phase, Sinova will employ various techniques to minimize the potential impact on the surrounding environment. The primary focus will be on preventing the generation and formation of fugitive particulates during the construction phase.

VII.2 Visibility
On a large spatial scale, visibility is typically evaluated as “regional haze” and is addressed as part of the Class I air quality related values (Section 7.2). On a local scale, “visibility” is usually evaluated by considering perceptibility of a plume from a stack. The exhaust from the most significant new emission units (i.e., the SAFs) are expected to seldom, if ever, be visible.

VII.3 Soils and Vegetation
Air quality permitting regulations require proponents of major new PSD sources to provide an evaluation of potential impacts to air quality related values. These include impacts to visibility, soils and vegetation. In virtually all cases, the impact analysis for soils and vegetation is focused on impacts to Class I areas because these areas often include sensitive environments, and sensitive habitat for threatened or endangered species. Section 7.2 addresses expected impacts to soils and vegetation in Class I areas. Such impacts were judged to be insignificant based on impact criteria established by Federal Land Managers.

For Class II areas, the concern for soil and vegetation impacts differs from that of Class I areas. Generally, the concern in Class II areas is for the economic well-
being of the soils and vegetation in the area. There have been instances elsewhere in the U.S. where high levels of sulfur emissions from coal fired power plants, or smelters have caused localized impacts to vegetation and soils near the Facility. In fact, the NAAQS were established to protect the public health and welfare, and secondary standards were identified specifically to protect ecological properties such as soils and vegetation.

The Class II air quality assessment results (see Section 6.3) indicate that the maximum annual ambient impacts due to the proposed Facility are expected to be less than the applicable Significant Impact Levels (SILs) for both NOX and SO2. Because expected ambient concentrations attributable to the Facility will be so low, deposition of nitrogen and sulfur compounds are also expected to be insignificant.

**VIII Conclusions and Conditions Of Approval**

Projected emissions of PM/PM10/PM2.5, SO2, CO, VOC, NOx and GHG from the proposed construction project exceed the PSD significance levels at maximum operating rate and maximum hours of operation. This new construction is subject to review under the regulations for the Prevention of Significant Deterioration regulations contained in 1200-03-09-.01(4). The proposed control technologies satisfy the requirement to install Best Available Control Technology (BACT), as required by the PSD regulations. The BACT requirements are incorporated into the permit to be issued for the proposed construction. The proposed construction will not result in ambient impacts that would exceed any National Ambient Air Quality Standards and will not cause or contribute to adverse impacts on Air Quality Related Values in nearby Class I areas.

After review of the information submitted with the PSD application, it is concluded that the proposed project qualifies for approval, subject to the terms and conditions of the proposed PSD construction permit (Appendix A).
Appendix A
Proposed PSD Construction Permit
Permit Number: 979383
Facility (Permittee): Sinova Silicon LLC
Facility ID: 48-0046
Facility Address: 4255 Cates Landing Road N., Tiptonville, Lake County
Facility Classification: Title V
Federal Requirements: NSPS, NESHAP
Facility Description: Silicon Manufacturing Plant

Permit 979383 consisting of 102 pages is hereby issued **, 20**, pursuant to the Tennessee Air Quality Act and by the Technical Secretary, Tennessee Air Pollution Control Board, Department of Environment and Conservation. This permit supersedes all previously issued permits for this/these source(s). This permit expires on **April 30, 2025**. The holder of this permit shall comply with the conditions contained in this permit as well as all applicable provisions of the Tennessee Air Pollution Control Regulations (TAPCR).

Michelle W. Owenby
Technical Secretary
Tennessee Air Pollution Control Board

No Authority is Granted by this Permit to Operate, Construct, or Maintain any Installation in Violation of any Law, Statute, Code, Ordinance, Rule, or Regulation of the State of Tennessee or any of its Political Subdivisions.
Section I – Sources Included in this Construction Permit

<table>
<thead>
<tr>
<th>Source Number</th>
<th>Source Description</th>
<th>Status</th>
<th>Control Device/Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Fugitive Processes Raw Material receiving and Haul Roads</td>
<td>New</td>
<td>Partial Enclosure and Misting</td>
</tr>
<tr>
<td>02</td>
<td>Proportioning Building</td>
<td>New</td>
<td>with baghouse</td>
</tr>
<tr>
<td>03</td>
<td>Two Submerged Arc Furnaces (SAFs) with tapping, casting with hooding to duct emissions to baghouses</td>
<td>New</td>
<td>Two Baghouses (one for each SAF)</td>
</tr>
<tr>
<td>04</td>
<td>Ladle Preheating (three units)</td>
<td>New</td>
<td>None</td>
</tr>
<tr>
<td>05</td>
<td>Fume Silos and bag packing –</td>
<td>New</td>
<td>Passive vent filter to atmosphere</td>
</tr>
<tr>
<td>06</td>
<td>Slag Handling and Crushing and Screening (following the SAF process)</td>
<td>New</td>
<td>Misting control</td>
</tr>
<tr>
<td>07</td>
<td>Finished Product Building (Crushing and Screening and bagging also enclosed truck and rail loadout)</td>
<td>New</td>
<td>Baghouse control</td>
</tr>
<tr>
<td>08</td>
<td>Emergency Natural gas-fired Reciprocating Engine</td>
<td>New</td>
<td>None</td>
</tr>
<tr>
<td>09</td>
<td>Diesel Fuel Storage</td>
<td>New</td>
<td>Submerged fill</td>
</tr>
</tbody>
</table>

Section II – Permit Record

<table>
<thead>
<tr>
<th>Permit Type</th>
<th>Description of Permit Action</th>
<th>Issue Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSD Construction</td>
<td>Initial Permit Issuance</td>
<td>***</td>
</tr>
</tbody>
</table>

Section III - General Permit Conditions

G1. Responsible Person

The application that was utilized in the preparation of this construction permit is dated September 16, 2021, with a revised application dated October 27, 2021. These are both signed by Jayson Tymko, President, the Responsible Person for the permittee. A letter dated March 1, 2022, identifies William David Tuten, Managing Director of Sinova Silicon LLC as the new Responsible Official. The Responsible Person may be the owner, president, vice-president, general partner, plant manager, environmental/health/safety coordinator, or other person that is able to represent and bind the facility in environmental permitting affairs. If this Responsible Person (William David Tuten) terminates their employment or is assigned different duties and is no longer the person to represent and bind the permittee in environmental permitting affairs, the new Responsible Person for the permittee shall notify the Technical Secretary of the change in writing. The Notification shall include the name and
title of the new Responsible Person assigned by the permittee to represent and bind the permittee in environmental permitting affairs, and the date the new Responsible Person was assigned these duties.

Should a change in the Responsible Person occur, the new Responsible Person must submit the Notification provided in Appendix 1 of this permit no later than 30 days after the change. A separate notification shall be submitted for each subsequent change in Responsible Person.

TAPCR 1200-03-09-.03(8)

G2. Application and Agreement Letters

This source shall operate in accordance with the terms of this permit, the information submitted in the approved permit application referenced in Condition G1, and any documented agreements made with the Technical Secretary. This includes the agreement letters dated January 14, 2022, and February 7, 2022, in Appendix 7.

TAPCR 1200-03-09-.01(1)(d)

G3. Submittals

Unless otherwise specified within this permit, the permittee shall submit, preferably via email and in Adobe Portable Document format (PDF), all applicable plans, checklists, certifications, notifications, test protocols, reports, and applications to the attention of the following Division Programs at the email addresses indicated in the table below:

<table>
<thead>
<tr>
<th>Permitting Program</th>
<th>Compliance Validation Program</th>
<th>Field Services Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Notifications</td>
<td>• Test protocols</td>
<td>• Semiannual reports</td>
</tr>
<tr>
<td>• Startup certifications</td>
<td>• Emission test reports</td>
<td>• Annual compliance certifications/status reports</td>
</tr>
<tr>
<td>• Applications</td>
<td>• Visible emission evaluation reports</td>
<td></td>
</tr>
<tr>
<td>• NSPS reports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MACT/GACT/NESHAP reports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Emission statements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Construction permit extension requests</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Division of Air Pollution Control
William R. Snodgrass TN Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243
Air.Pollution.Control@tn.gov

Jackson Environmental Field Office
1625 Hollywood Drive Jackson,
Tennessee 38401 Or E-mail:
APC.JackEFO@tn.gov

The permittee shall submit the information identified above as requested in this permit. In lieu of submitting this information to the email addresses above, the permittee may submit the information to the attention of the respective Division Programs at the mailing addresses listed above.

TAPCR 1200-03-09-.03(8)

Semiannual reports. Recordkeeping for the processes included in this permit shall commence with the startup date as reported under the provisions of Condition G8 of this permit. The first reporting period shall...
commence on the startup date and shall end on the last day of the calendar quarter when the startup date occurred. The first report shall be submitted no later than 60 days after the end of the first reporting period. The subsequent (semiannual) reporting period shall commence on the first day after the end of the first reporting period and shall consist of the six-month period which commences on that day. Subsequent reports shall be submitted within 60 days after the end of each 6-month period following the first report.

These semiannual reports shall include:

(1) Any monitoring and recordkeeping required by **Conditions S1-6, S2-4, S3-2, S3-4, F1-5, F5-5, S5-4, S6-1, S6-3A, S6-4, S7-4, and S9-6**. However, a summary report of this data is acceptable provided there is sufficient information to enable the Technical Secretary to evaluate compliance. Reports required by 40 CFR 60 Subpart Z, 40 CFR 63 Subpart YYYY, and 40 CFR Subpart JJJJ shall be submitted in accordance with the requirements for those regulations and are not necessarily required to meet the schedule in this condition. Certification of compliance status shall be provided for Condition S1-3 and S6-3. B.

(2) The visible emission evaluation readings from **Condition G12, S1-5, S2-5, S3-5, F2-4, S4-5, S5-5, S6-5, S7-5, and S8-5** of this permit. However, a summary report of this data is acceptable provided there is sufficient information to enable the Technical Secretary to evaluate compliance. Note that condition F1-4 for the SAF’s under Subpart §60.264 requires a COMS and results from those units may be used to represent opacity reporting for **S3-5**. One opacity reading is required for each source, except for sources 04, 08, and 09, per semiannual report period. The Division may adjust the timing or frequency of the submittal dates for opacity readings.

(3) Identification of all instances of deviations from ALL PERMIT REQUIREMENTS.

These reports must be certified by a responsible official and shall be submitted to the Division at the Jackson Environmental Field Office address as stated above.

Any application form, report or compliance certification submitted pursuant to the requirements of this permit shall contain certification by a responsible official of truth, accuracy and completeness. This certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate and complete.

TAPCR 1200-03-09-.02(11)(c)1(iii)
TAPCR 1200-03-09-.03(8)

**G4. Notification of changes**

The permittee shall notify the Technical Secretary for any of the following changes to a permitted air contaminant source which would not be a modification requiring a new construction permit:

- change in air pollution control equipment that does not result in an increase or otherwise meet the definition of a modification
- change in stack height or diameter
• change in exit velocity of more than 25 percent or exit temperature of more than 15 percent based on absolute temperature.

The permittee must submit the Notification provided in Appendix 2 of this permit 30 days before the change is commenced.

TAPCR 1200-03-09-.02(7)

G5. Permit Transference

A. This permit is not transferable from one air contaminant source to another air contaminant source or from one location to another location. The permittee must submit a construction permit application for a new source to the Permitting Program not less than 90 days prior to the estimated starting date of these events. If the new source will be subject to major New Source Review, the application must be submitted not less than 120 days in advance of the estimated starting date of these events.

TAPCR 1200-03-09-.03(6)(b) and 1200-03-09-.01(1)(b)

B. In the event an ownership change occurs at this facility, the new owner must submit the notification provided in Appendix 3 of this permit. The written notification must be submitted by the new owner to the Permitting Program no later than 30 days after the ownership change occurs. If the change in ownership results in a change in Responsible Person for the facility, notification of the change in Responsible Person must also be submitted, as specified in Condition G1.

TAPCR 1200-03-09-.03(6)(a) and (b)

G6. Operating Permit Application Submittal

The permittee shall apply for a Title V operating permit within 360 days of initial startup of the first new or modified emission source that is started up.

TAPCR 1200-03-09-.02(11)(d)1(i)(II)

G7. Temporary Operating Permit

A. This construction permit shall serve as a temporary operating permit from the date of issuance until the Technical Secretary issues a Title V operating permit, provided the permittee submits an operating permit application within the timeframe specified in Condition G6.

TAPCR 1200-03-09-.02(1), 1200-03-09-.02(2) and 1200-03-09-.02(3)(b)1

B. If construction of the air contaminant source(s) cannot be completed and/or an operating permit application cannot be filed with the Technical Secretary by the expiration date of this permit, the permittee must submit a permit extension request 30 days prior to permit expiration.

TAPCR 1200-03-09-.02(1) and 1200-03-09-.02(3)
G8. **Startup Certification for New or Modified Source(s)**

The startup certification provided in Appendix 4 shall be submitted to the Permitting Program once an air contaminant source has started up. A separate startup certification must be submitted for each air contaminant source included in this permit. Startup of the air contaminant source shall be the date the new or modified air contaminant source began operation for the production of product for sale, use as raw materials, or steam or heat production under the terms of this permit.

TAPCR 1200-03-09-.03(8)

**Compliance Method:** The startup certification provided in Appendix 4 shall be submitted no later than 30 days after each air contaminant source has begun startup.

G9. **Fees**

The air contaminant source(s) identified in this permit shall comply with the requirements for payment of applicable Title V Major Source annual emission fees to the Tennessee Division of Air Pollution Control based on the Provisions of 1200-03-26-.02(9) of the TAPCR.

A responsible official of a major source or a source subject to paragraph (11) of Rule 1200-03-09-.02 (hereinafter, “Paragraph 11 source”) must pay an annual fee to the State of Tennessee. A major source or Paragraph 11 source is not subject to the minor and conditional major source annual fees of paragraph (6) of this rule on or after July 1, 1994.

(i) Sources choosing to pay annual fees on an allowable emissions basis pursuant to subparagraph 1200-03-26-.02(9)(b) of this paragraph shall pay 100% of the fee due pursuant to subparagraph 1200-03-26-.02(9)(d).

(I) No later than April 1 of the year immediately following the annual accounting period for which the fee is due for sources paying on a calendar year basis pursuant to subparagraph 1200-03-26-.02(9)(b), or

(II) No later than April 1 of the current fiscal year for sources paying on a fiscal year basis pursuant to subparagraph 1200-03-26-.02(9)(b)

(ii) Sources choosing to pay annual fees on an actual emissions basis or a combination of actual and allowable emissions basis and on a calendar year basis pursuant to subparagraph 1200-03-26-.02(9) (b) shall pay 100% of the fee due pursuant to subparagraph 1200-03-26-.02(9) (d) no later than April 1 of the year immediately following the annual accounting period for which the fee is due, except as allowed by part 1200-03-26-.02(9)(g)3.

(iii) Sources choosing to pay annual fees on an actual emissions basis or a combination of actual and allowable emissions basis and on a fiscal year basis pursuant to subparagraph 1200-03-26-.02(9) (b) of this paragraph shall pay an estimated 65% of the fee due pursuant to subparagraph 1200-03-26-.02(9) (d) of this paragraph no later than April 1 of the current fiscal year. The remainder of the annual fee is due July 1 of each year, except as allowed by part 1200-03-26-.02(9)(g)3.

The permittee shall pay fees on a calendar year and an allowable emissions basis the first year, as required by 1200-03-26-.02(9)(b)4.
G10. General Recordkeeping Requirements

A. All recordkeeping requirements for all data required to be recorded shall follow the following schedules:

<table>
<thead>
<tr>
<th>For Daily Recordkeeping</th>
<th>For Weekly Recordkeeping</th>
<th>For Monthly Recordkeeping</th>
</tr>
</thead>
<tbody>
<tr>
<td>No later than seven days from the end of the day for which the data is required.</td>
<td>No later than seven days from the end of the week for which the data is required.</td>
<td>No later than 30 days from the end of the month for which the data is required.</td>
</tr>
</tbody>
</table>

B. The information contained in logs, records, and submittals required by this permit shall be kept at the facility’s address, unless otherwise noted, and provided to the Technical Secretary or a Division representative upon request. Computer-generated logs are acceptable. Compliance is assured by retaining the logs, records, and submittals specified in this permit for a period of not less than five years at the facility’s address.

G11. Routine Maintenance Requirements

The permittee shall maintain and repair the emission source, associated air pollution control device(s), and compliance assurance monitoring equipment as required to maintain and assure compliance with the specified emission limits.

G12. Visible and Fugitive Emissions

A. Unless otherwise specified, visible emissions from this facility shall not exhibit greater than 20% opacity, except for one six-minute period in any one hour period, and for no more than four six-minute periods in any 24-hour period. A stack is defined as any chimney, flue, conduit, exhaust, vent, or opening of any kind whatsoever, capable of, or used for, the emission of air contaminants.

Compliance Method: Unless otherwise specified, Visible emissions shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).
B. The permittee shall not cause, suffer, allow, or permit any materials to be handled, transported, or stored; or a building, its appurtenances, or a road to be used, constructed, altered, repaired, or demolished without taking reasonable precautions to prevent particulate matter from becoming airborne. Reasonable precautions shall include, but are not limited to, the following:

   (a) Use, where possible, of water or chemicals for control of dust in demolition of existing buildings or structures, construction operations, grading of roads, or the clearing of land;
   (b) Application of asphalt, water, or suitable chemicals on dirt roads, material stockpiles, and other surfaces which can create airborne dusts;
   (c) Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials. Adequate containment methods shall be employed during sandblasting or other similar operations.

The permittee shall not cause, suffer, allow, or permit fugitive dust to be emitted in such manner to exceed five minutes per hour or 20 minutes per day as to produce a visible emission beyond the property line of the property on which the emission originates, excluding malfunction of equipment as provided in TAPCR 1200-03-20. A malfunction is defined as, any sudden and unavoidable failure of process equipment or for a process to operate in an abnormal and unusual manner. Failures that are caused by poor maintenance, careless operation, or any other preventable upset condition or preventable equipment breakdown shall not be considered malfunctions.

TAPCR 1200-03-08-.01(1) and 1200-03-08-.01(2)

Compliance Method: Fugitive emissions shall be determined by Tennessee Visible Emissions Evaluation Method 4 as adopted by the Tennessee Air Pollution Control Board on April 16, 1986.

C. Fugitive emissions from roads and parking areas shall not exhibit greater than 10% opacity.

Compliance Method: When required to demonstrate compliance, fugitive emissions from roads and parking areas shall be determined by utilizing Tennessee Visible Emissions Evaluation (TVEE) Method 1, as adopted by the Tennessee Air Pollution Control Board on April 29, 1982, as amended on September 15, 1982 and August 24, 1984.

TAPCR 1200-03-08-.03

All readings as required by this condition shall be submitted to the Division in accordance with Condition G3.

G13. Facility-wide Limitations

Not applicable

G14. NSPS/NESHAP/MACT/GACT Standards

The following source(s) shall comply with all applicable requirements of the NSPS/NESHAP/MACT/GACT standards as indicated in the table below. This includes compliance with the NSPS and NESHAP general provisions as identified in appendices 9 and 10.
### Source

<table>
<thead>
<tr>
<th>Source</th>
<th>NESHAP/MACT/GACT</th>
<th>NSPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>Two Submerged Arc Furnaces</td>
<td>Subpart YYYYYY - National Emission Standards for Hazardous Air Pollutants for Area Sources: Ferroalloys Production Facilities</td>
</tr>
</tbody>
</table>

TAPCR 1200-03-09-.03(8)

**Compliance Method:** Compliance methods are provided in the conditions in Section IV of this permit.

**G15. VOC and NO\textsubscript{x} Emission Statement**

Not Applicable

**G16. Source Testing Requirements**

The following test methods shall be used when Performance testing (stack testing) is required by this permit unless an alternate method is approved by the Division.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM filterable/PM\textsubscript{10}/PM\textsubscript{2.5}</td>
<td>Method 201A (PM10 and PM2.5- Constant Sampling Rate Procedure) and Method 202 (Condensable Particulate Matter)</td>
</tr>
<tr>
<td>Sulfur dioxide</td>
<td>Method 6</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>Method 10B</td>
</tr>
<tr>
<td>Volatile Organic Compounds (as carbon)</td>
<td>Method 25</td>
</tr>
<tr>
<td>Nitrogen oxides</td>
<td>Method 7</td>
</tr>
<tr>
<td>Hydrogen chloride (HCl)</td>
<td>Method 26 or 26A</td>
</tr>
<tr>
<td>Carbon dioxide (CO\textsubscript{2})</td>
<td>Method 3A</td>
</tr>
</tbody>
</table>
The permittee shall conduct testing of the following sources:

<table>
<thead>
<tr>
<th>Source Number</th>
<th>Source Description</th>
<th>Testing Required for Specified Pollutants</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>Proportioning Building</td>
<td>PM/PM$\text{}<em>{10}$/PM$\text{}</em>{2.5}$</td>
</tr>
<tr>
<td>03</td>
<td>Two Submerged Arc Furnaces (SAFs) with tapping, refining, and casting with hooding to duct emissions to baghouses</td>
<td>PM/PM$\text{}<em>{10}$/PM$\text{}</em>{2.5}$ SO$_2$ CO VOC (as carbon) NOx HCl CO$_2$</td>
</tr>
<tr>
<td>04</td>
<td>Ladle Preheating (three units)</td>
<td>(Testing required unless manufacturer’s emissions data is provided)</td>
</tr>
<tr>
<td>07</td>
<td>Finished Product Building (Crushing and Screening and bagging also enclosed truck and rail loadout)</td>
<td>PM/PM$\text{}<em>{10}$/PM$\text{}</em>{2.5}$</td>
</tr>
<tr>
<td>08</td>
<td>Emergency Natural gas-fired Reciprocating Engine</td>
<td>(Testing required unless manufacturer’s emissions data is provided)</td>
</tr>
</tbody>
</table>

Note that the permittee may submit the manufacturer’s or vendor’s certified emission factors instead of conducting stack testing for the following sources:

<table>
<thead>
<tr>
<th>Unit ID</th>
<th>Description</th>
<th>Pollutants</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>Ladle Preheating (three units)</td>
<td>PM, PM$\text{}<em>{10}$, PM$\text{}</em>{2.5}$ SO$_2$, CO, VOC, NOx, CO$_2$</td>
</tr>
<tr>
<td>08</td>
<td>Emergency Natural Gas-fired Reciprocating Engine</td>
<td>PM, PM$\text{}<em>{10}$, PM$\text{}</em>{2.5}$ SO$_2$, CO, VOC, NOx, CO$_2$</td>
</tr>
</tbody>
</table>

TAPCR 1200-03-10-.01

**Compliance Method:** Submittal of reports in accordance with conditions G17 through G24.

See Conditions G17-G24 for test requirements

The amount of each of the reductants (coal, wood, and charcoal) along with the sulfur content of coal used during testing shall be recorded during the testing for SO$_2$ emissions.

The production of silicon shall be documented during each test.

The permittee must develop emission factors for each pollutant during testing of either SAF, in terms
of pounds pollutant per ton of Silicon produced. For those processes controlled by baghouse(s) or fabric filters, the permittee shall develop emission factors for PM, PM\textsubscript{10} and PM\textsubscript{2.5} (for each PM category) based on the grain loading (grains of PM/PM\textsubscript{10}/PM\textsubscript{2.5} per dry standard cubic foot of exhaust gas) as determined during testing. These factors shall be submitted with the test report as specified at Condition G24. The Division may use these factors for compliance demonstration. The factor for source 06 Fume Silo with Passive vent filter control will be assumed to be 0.0022 gr/dscf due to the low volumetric flow.

Testing is required for Federal Standards as follows:

<table>
<thead>
<tr>
<th>Source 48-0046-03</th>
<th>Description</th>
<th>Condition</th>
<th>Pollutants</th>
<th>Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>SAF</td>
<td>F1-6</td>
<td>PM and CO</td>
<td>40 CFR 60 Subpart Z</td>
</tr>
<tr>
<td>03</td>
<td>SAF</td>
<td>F2-5</td>
<td>Opacity</td>
<td>40 CFR 63 Subpart YYYYYY</td>
</tr>
<tr>
<td>08</td>
<td>Natural gas-fired Emergency Engine</td>
<td>F3-6</td>
<td>CO, VOC, and NOx (Optional test if selected by permittee)</td>
<td>40 CFR 60 Subpart JJJJ</td>
</tr>
</tbody>
</table>

G17. For the two Submerged Arc Furnaces (SAFs) designated as source 48-0046-03, within 60 days after achieving the maximum production rate at which each SAF will be operated, but not later than 180 days after the initial startup date of each SAF, the owner or operator of such facility shall conduct performance test(s) for each SAF and furnish the Administrator a written report of the results of such performance test(s) in accordance with 40 CFR 60.8(a). This schedule shall apply for each of the SAF pollutants required to be tested by 40 CFR 60 Subpart Z for Ferroalloy Production (PM filterable and CO) and also for those SAF pollutants not addressed by 40 CFR 60 Subpart Z. For those sources other than the SAFs that must be tested, the test report shall be submitted at the same time as the required deadline for the test report submittal for the second SAF which is second to be started up. In case the startup of the second SAF is more than 180 days after the startup of the first SAF to be started up, the Division may require testing and a test report submittal of any other sources on a revised time schedule. All testing and report submittal shall conform to the requirements of Conditions G16, G20 and G24.

TAPCR 1200-03-10-.01

**Compliance Method:** Submittal of reports as required

G18. The permittee shall notify the Technical Secretary in writing of their intention to conduct a performance test at least 60 calendar days before the performance test is initially scheduled to begin to allow the Technical Secretary, upon request, to review and approve the site-specific test plan required and to have an observer present during the test.

In the event the permittee is unable to conduct the performance test on the date specified in the notification requirement in this condition due to unforeseeable circumstances beyond their control,
the permittee must notify the Technical Secretary as soon as practical without delay prior to the scheduled performance test date and specify the date when the performance test is rescheduled. This notification of delay in conducting the performance test shall not relieve the permittee of legal responsibility for compliance with any other applicable provisions of any other applicable Federal, State, or local requirement, nor will it prevent the Technical Secretary from implementing or enforcing this permit.

TAPCR 1200-03-10-.01

G19. Before conducting the performance test required by condition G16, the permittee shall develop and submit a site-specific test plan (test protocol) to the Technical Secretary for approval. The test plan shall include a test program summary, the test schedule, data quality objectives, and both an internal and external quality assurance (QA) program. Data quality objectives are the pretest expectations of precision, accuracy and completeness of data. The test plan must include the monitoring and collection of all parametric monitoring data.

TAPCR 1200-03-10-.01

G20. The permittee shall submit the site-specific test plan (test protocol) to the Technical Secretary at least 60 calendar days before the performance test is scheduled to take place, that is, simultaneously with the notification of intention to conduct a performance test required by condition G16. The Division may request inclusion of the ACGIH proposal specified at condition S3-4A at this time. The site-specific test plan and notification shall be submitted to:

Adobe Portable Document Format (PDF) or Hard Copy to:
Copy to [Preferred Method]: Compliance Validation Program
Air.Pollution.Control@tn.gov Division of Air Pollution Control
William R. Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243

TAPCR 1200-03-10-.01

G21. The performance test shall be conducted, and data reduced in accordance with methods and procedures specified in 40 CFR part 60 appendix A.

TAPCR 1200-03-10-.01

G22. The performance tests shall be conducted under such conditions as the Technical Secretary shall specify to the plant operator based on representative performance of the affected facility. The owner or operator shall make available to the Technical Secretary such records as may be necessary to determine the conditions of the performance tests. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a performance test.
nor shall emissions in excess of the level of the applicable emission limit unless otherwise specified in the applicable standard.

TAPCR 1200-03-10-.01

G23. The owner or operator shall provide, or cause to be provided, performance testing facilities as follows:

(a) Sampling ports adequate for test methods applicable to such facility. This includes constructing the air pollution control system such that volumetric flow rates and pollutant emission rates can be accurately determined by applicable test methods and procedures and providing a stack or duct free of cyclonic flow during performance tests, as demonstrated by applicable test methods and procedures.

(b) Safe sampling platform(s)

(c) Safe access to sampling platform(s)

(d) Utilities for sampling and testing equipment

(e) Each performance test shall consist of three separate runs using the applicable test method. Each run shall be conducted for the time and under conditions specified in the applicable standard. For the purpose of determining compliance with the applicable standard, the arithmetic means of the results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of a forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances, beyond the owner or operator’s control, compliance may, upon the Technical Secretary’s approval, be determined using the arithmetic mean of the results of the two other runs.

TAPCR 1200-03-10-.01

G24. The permittee shall report the results of the performance test to the Technical Secretary before the close of business on the 60th day following the completion of the performance test. The test report shall be submitted to the Technical Secretary at the following address:

Adobe Portable Document Format or Hard Copy to:

Compliance Validation Program
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243

TAPCR 1200-03-10-.01

G25. Baghouse Operating and Monitoring requirements

Processes with baghouse control shall operate that control device at any time that the associated process is operating.

Compliance Method: The permittee shall install, operate, and maintain a baghouse to control PM/PM$_{10}$/PM$_{2.5}$ emissions. The source(s) controlled by the fabric filter(s) / baghouse(s) shall not operate unless the control device(s) is installed and operated. The permittee shall monitor the fabric filter(s) / baghouse(s) control device(s) for this source as follows:
(a) For fabric filter(s) / baghouse(s) with an exhaust gas flow rating of 2,000 actual cubic feet per minute (acfm) or less, the permittee shall perform and record weekly visual inspections of the exterior of the baghouse and the baghouse ductwork, including the baghouse exhaust. The permittee shall initiate, as well as record, corrective action within 24 hours and complete, as well as record, corrective action as expeditiously as practical if the permittee finds that an abrasion hole and/or emissions problem and/or plugging problem has developed during an inspection of the baghouse(s). Identification of an abrasion hole and/or emissions problem and/or plugging problem and corrective action(s) shall be noted in the weekly inspection records. Inspection records shall also include the initials of the person performing the inspection(s) and corrective action(s), along with the date, time, and any relevant comments. Days that the source is not in operation shall be noted. These records shall be retained in accordance with Condition G10.

This provision applies only to Source 48-0046-07 Silica Fume Silo Building at 1,413 acfm exhaust flow. Silica Fume Silo vents are controlled by fabric filters. No baghouses are present at this source. References to baghouses in the above text also refer to the fabric filter.

(b) For fabric filter(s) / baghouse(s) with an exhaust gas flow rating of more than 2,000 actual cubic feet per minute (acfm), the permittee shall:

1. Install and operate a pressure gauge to measure the pressure drop (inches of water) across the fabric filter(s) / baghouse(s). Upon startup of this source, the permittee shall compile 30 consecutive operating days of pressure drop readings across the fabric filter(s) / baghouse(s). The designated person(s) shall note any relevant baghouse conditions/problems/concerns when recording the values. The records shall also include the initials of the person performing the pressure drop reading, any corrective action(s), along with the date, time, and any relevant comments. Days that the source is not in operation shall be noted.

2. Submit the pressure drop data, including a “proposed” minimum pressure drop value, to the Division no later than 15 days after completion of the initial 30 consecutive operating days of pressure drop readings.

3. Assure continued compliance by maintaining the “submitted” minimum pressure drop across each baghouse, recording one pressure drop reading per day while the source is in operation; conducting visual inspections of the exterior of the baghouse and the baghouse ductwork, including the baghouse exhaust; and maintaining the log in Appendix 8. If the permittee finds that a sub-minimum pressure drop, abrasion hole, emissions problem, or plugging problem has developed during an inspection of the baghouse(s), the permittee shall initiate corrective action within 24 hours and complete corrective action as expeditiously as practical. The permittee shall record all corrective action taken including the initiation and completion of all corrective actions in the log.

4. For lower pressure drop reading(s) resulting from replacement of bags, the permittee shall record the deviation(s) in the log. Due allowance will be made for lower pressure drop reading(s) which follow replacement of bags provided the permittee establishes to the satisfaction of the Technical Secretary that these lower readings resulted from the replacement of bags.
(5) In summary, the log shall include the initials of the person performing the pressure drop reading and inspection, any corrective action(s)/deviation(s), along with the date, time, and any relevant comments. Days that the source is not in operation shall be noted. These records shall be retained in accordance with Condition G10.

This provision applies to Sources 48-0046-02 Proportioning Building, 48-0046-03 SAF Furnace Building, and 48-0046-07 Finished Product Building

G26. The permittee shall prepare, submit, and implement a Preventative Maintenance Plan (PMP) for fugitive emissions from the process buildings, process equipment, and outdoor material handling and suppression of road dust operations within 180 days after startup date of the startup date for the first Submerged Arc Furnace that is started up. The plan shall address the prevention of malfunctions and excess emissions from building openings and process equipment.

The plan at a minimum shall contain the following elements:

1. Identification of the process buildings, process equipment and outdoor material handling operations.
2. Type and frequency of monitoring,
3. Type and frequency of preventative maintenance,
4. Identification of persons responsible for implementation, and
5. How and what type of records of monitoring and maintenance activities.
6. Sweeping of roadways to reduce the amount of particulate deposits, speed reduction on facility roadways, and wet suppressants/watering as required.
7. Best management practices for fugitive emissions, including use of covered conveyors, reduced drop heights, use of chemical stabilization dust suppressants and/or watering to reduce any visible emissions
8. Hours of operation of out of doors material handling activities.

The permittee must comply with all of the provisions of the PMP as submitted to the Technical Secretary. If the permittee determines that any revisions of the PMP are necessary or appropriate, the permittee may revise the PMP, but such revisions will not become effective until the permittee submits a description of the changes and a revised plan incorporating them to the Technical Secretary. The plan shall be submitted to the Division at the following address within 180 days after startup date of the first SAF that is started up:

Adobe Portable Document Format (PDF) or Hard Copy to:
Copy to [Preferred Method]: Permitting Program
Air.Pollution.Control@tn.gov Division of Air Pollution Control
William R. Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243

TAPCR 1200-03-09-.01
G27. The permittee must, within 180 days of startup of the first SAF that is started up, prepare and thereafter operate at all times in accordance with, a written operation and maintenance (O&M) plan for each control device for an emissions source. The permittee must maintain a copy of the O&M plan at the facility and make it available for review upon request. At a minimum, each plan must contain the following information:

1. General facility contact information;
2. Positions responsible for inspecting, maintaining, and repairing emissions control devices which are used to comply with this requirement;
3. Description of items, equipment, and conditions that will be inspected, including an inspection schedule for the items, equipment, and conditions.
4. Identity and estimated quantity of the bags, filter media, and similar replacement parts that will be maintained in inventory.

Multiple control devices may be included in a single O&M plan.

TAPCR 1200-03-09-.02(11)(e)1(i)
Section IV - Source Specific Permit Conditions

<table>
<thead>
<tr>
<th>Source No</th>
<th>Source Description</th>
</tr>
</thead>
</table>
| 01        | Material Handling and Roads  
Raw Material Receiving –  
Materials from railcars (Coal, Quartz, Woodchips, Limestone) are received in underground hoppers. Materials are then delivered by conveyor onto outdoor piles and are subsequently delivered by front end loader into a loading hopper.  
Charcoal is received by truck in a covered enclosure. Charcoal is subsequently delivered by front end loader to a Loading Hopper.  
From the Loading Hopper materials delivers are delivered by covered conveyor into the Proportioning Building.  
Misting will be employed to suppress fugitive dust when trucks are being unloaded and when front-end loaders are operating. A fugitive dust control plan will be prepared as part of the operation and maintenance plan.  
Processing shall not be done between the hours of 11 PM CST and 7 AM CST.  
Roads at the facility are paved and misting is used as needed to control dust. |

S1-1. Input Limitation(s) or Statement(s) of Design

Not applicable

S1-2. Production Limitation(s)

Not applicable

S1-3. Operating Hour Limitation(s)

The material receiving, material handling, front-end loader and loading hopper operations at this process shall not operate between the hours of 11 p.m. and 7 a.m. local time. This restriction does not apply to road traffic.

TAPCR 1200-03-09-.01(4) PSD- BACT

Compliance Method: Permittee shall semiannually certify compliance with this requirement when submitting the report required by Condition G3.

S1-4. Emission Limitation(s)

Not applicable

S1-5. Source-Specific Visible Emissions Limitation(s)

Fugitive emissions from any transfer point at this source shall not exceed seven percent opacity as determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).  

TAPCR 1200-03-09-.01(4) PSD- BACT and the applications dated September 16, 2021, and October
Compliance Method:  All Transfer Points (including initial load-in to the facility from truck or railcar-) shall demonstrate compliance with the above fugitive emission limit and submit this information to the Division at the William R. Snodgrass TN Tower, 15th Floor address as required by condition G3. Visible emissions evaluations shall be conducted utilizing the procedures outlined in 40 CFR 60.675 (this procedure is taken from Test Methods and Procedures for Subpart OOO - Standards of Performance for Nonmetallic Mineral Processing Plants, but this source is not subject to Subpart OOO).

All readings as required by this condition shall be submitted to the Division in accordance with Condition G3.

S1-6. Management Practices

A. Misting will be used to suppress fugitive dust whenever the corresponding operation is active and when front-end loaders are operating.

Charcoal will be stored in a structure with a roof.

The permittee shall comply with the Preventative Maintenance Plan (PMP) as required by Condition G26.

The permittee shall use covered conveyors, reduced drop heights, chemical stabilization dust suppressants/or watering to reduce visible emissions

TAPCR 1200-03-09-.01(4) PSD- BACT and the applications dated September 16, 2021, and October 27, 2021.

Compliance Method: The permittee shall keep daily records of dust-control activities and shall follow the preventative maintenance plan as specified in Condition G26 of this permit. In addition, the permittee shall comply with the fugitive emission requirements of Condition G12B of this permit.

B. All roads used for hauling materials must be paved. Roads must be swept and/or sprayed as needed to suppress dust.

The facility shall comply with the provisions of the fugitive dust control plan (as required by condition G26). This plan will include periodic sweeping of roadways to reduce the amount of particulate deposits, speed reduction on facility roadways, and wet suppressants/watering as required.

TAPCR 1200-03-09-.01(4) PSD-BACT and the application dated September 16, 2021, and October 27, 2021

Compliance Method: The permittee shall keep daily records of sweeping and water-spray and misting activities for roads. The permittee shall comply with the road and parking area requirements of Condition G12B and G12C of this permit. In addition, the permittee shall comply with the preventative maintenance plan as specified in Condition G26 of this permit.
C. In order to reduce fugitive emissions, the permittee shall use best management practices, including use of covered conveyors, reduced drop heights, use of chemical stabilization dust suppressants and/or watering to reduce any visible emissions; and shall follow the fugitive dust control plan as required by Condition G26.

TAPCR 1200-03-09-.01(4) PSD- BACT and the applications dated September 16, 2021, and October 27, 2021.

**Compliance Method:** Compliance with the PMP in Condition G26 shall be deemed compliance with this requirement.

<table>
<thead>
<tr>
<th>Source No</th>
<th>Source Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>Proportioning System / Proportioning Building- Materials are transferred by enclosed belt conveyor into the day bins. Materials are conveyed from Hoppers by enclosed belt conveyors into day bins. Hoods are located over the transfer points where material is transferred into the day bins. Materials are weighed by a proportioning system and are layered onto a conveyor belt. This enclosed conveyor belt delivers materials to the Submerged Arc Furnace (SAF) building. Hoods at the transfer points pick up dust which is controlled by the Proportioning Baghouse system.</td>
</tr>
</tbody>
</table>

**S2-1. Input Limitation(s) or Statement(s) of Design**

Not applicable

**S2-2. Production Limitation(s)**

Not applicable

**S2-3. Operating Hour Limitation(s)**

Not applicable

**S2-4. Emission Limitation(s)**

Particulate matter (PM/PM10/PM2.5) emitted from this source shall not exceed the limits specified below on a daily average basis.

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Allowable PM grains per dry standard cubic foot of exhaust gas at 52,980 scfm (ambient)</th>
<th>Allowable PM pounds per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM Filterable</td>
<td>0.0022</td>
<td>0.992</td>
</tr>
<tr>
<td>PM10</td>
<td>0.0022</td>
<td>0.992</td>
</tr>
<tr>
<td>PM2.5</td>
<td>0.0022</td>
<td>0.992</td>
</tr>
<tr>
<td>Combined Total</td>
<td>0.0022</td>
<td>0.992</td>
</tr>
</tbody>
</table>
TAPCR 1200-03-09-.01(4) PSD-BACT and the applications dated September 16, 2021, and October 27, 2021, TAPCR 1200-03-07.01(5) and the agreement letter dated February 7, 2022 (see Appendix 7)

**Compliance Method:** The permittee shall install, operate, and maintain a baghouse to control PM/PM$_{10}$/PM$_{2.5}$ emissions. The source(s) controlled by the fabric filter(s) / baghouse(s) shall not operate unless the control device is installed and in operation.

The permittee shall conduct performance testing in accordance with **Conditions G16** through **G24** of this permit.

The permittee shall conduct baghouse monitoring to establish a minimum pressure drop for this source in accordance with **Condition G25** of this permit. The permittee shall record the pressure drop on a daily basis in accordance with **Condition G10**. The pressure drop shall be recorded in Log 1 of Appendix 8 or in another format providing the same information. Prior to establishment of source-specific minimum pressure drop, the permittee shall meet the minimum pressure drop of 10 inches of water as recommended by the manufacturer.

The permittee shall comply with the silicon production limit specified at **Condition S3-2**.

The permittee shall develop an emission factor for PM/PM$_{10}$/PM$_{2.5}$ and total for all PM categories (each) in terms of grains per dry standard cubic foot of exhaust gas based on the results of the stack test required by **Condition G16**. Until the proposed emission factor is submitted with the stack test report as specified by **Condition G16**, the factor of 0.0022 gr/dscf for each category shall be used.

As a PM BACT limit, the PM/PM$_{10}$/PM$_{2.5}$ emission factor is based on the baghouse vendor maximum exhaust loading guarantee (5 milligrams per normal meter cubed (mg/Nm3), which is equivalent to 0.0022 grains per standard cubic foot (gr/scf)).

**S2-5. Source-Specific Visible Emissions Limitation(s)**

Visible emissions from this source shall not exhibit greater than 10% opacity, except for one six-minute period in any one-hour period, and for no more than four six-minute periods in any 24-hour period. A stack is defined as any chimney, flue, conduit, exhaust, vent, or opening of any kind whatsoever, capable of, or used for, the emission of air contaminants.

TAPCR 1200-03-09-.01(4) BACT-PSD and TAPCR 1200-03-05-.01(3) and agreement letter dated February 7, 2022 (see appendix 7)

**Compliance Method:** Visible emissions shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).

All readings as required by this condition shall be submitted to the Division in accordance with **Condition G3**.
Source No | Source Description
--- | ---
03 | Two Submerged Arc Furnaces (SAFs) #1 and #2 with identical Tapping, Refining and Casting Operations.

SAF #1 and #2 are identical systems with each SAF under a negative pressure enclosure with separate baghouse control ducted to a common stack.

There are separate hoods/collection points for each SAF, tapping operation, refining operation, and casting operation. Emissions from slag removal, which is not a casting operation, are captured at the casting operation hood. Exhaust gases from the process are captured by water-cooled, refractory lined hood over each SAF. Gases are first cooled, then ducted to pre-cleaning cyclones, and are then ducted to the baghouses. The furnace is not completely sealed, there is always one “window” section open at the top of the furnace with an air curtain to keep gases from escaping.

Note that, at the start of a cycle, the gases from the process may contain SiO, which tends to blind the baghouse fabric. During this startup time, a reduced volume of gases will be ducted to ‘sacrificial’ bags which will be disposed when the startup period is over.

Also, during startup, a burner from the Ladle Pre-heat section (Source 48-0046-04) may be used to heat the charge, after which time the burner will be returned to the Ladle Pre-heat section. The burner will be required to meet all applicable provisions as specified in the Ladle Pre-heat permit conditions while in use at the SAFs during startup.

All materials charged to the SAF are introduced by enclosed conveyor from the proportioning building.

A Bypass exhaust stack is intended for use only in emergencies.

After silicon has been cast, the solid molds are transported by front-end loader to the Finished Product Building.

After collection, the slag from the casting operation is transported to by front-end loader to a bin outside the furnace building prior to crushing.

Dust from the Baghouse for each SAF is pneumatically conveyed to the fume Silo Building, where it is transferred to Rail and Truck Loading or a Portable Bag Packing Station.

Dust from the Finished Product Building baghouse is transferred by front-end loader back to the Furnace building.

Startup procedures are specified at the Preconstruction Review (original) application at section 5.3.5, and the revised section in the Current Preconstruction Review at Section 3.3.5

S3-1. Input Limitation(s) or Statement(s) of Design

Not applicable

S3-2. Production Limitation(s)

The production rate of silicon metal shall not exceed the values listed in the table below on an hourly basis. Should the permittee need to modify the source(s) in a manner that increases the production rate, a construction permit shall be applied for and received in accordance with TAPCR 1200-03-09-
.01 prior to making the change.

<table>
<thead>
<tr>
<th>Source</th>
<th>Maximum Silicon Metal Production rate, tons per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAF #1</td>
<td>3.86</td>
</tr>
<tr>
<td>SAF #2</td>
<td>3.86</td>
</tr>
</tbody>
</table>

TAPCR 1200-03-09-.01 and the applications dated September 16, 2021, and October 27, 2021

**Compliance Method:** The permittee shall maintain a log of the actual amount of silicon produced for each SAF on an hourly basis. The log shall be retained in accordance with **Condition G10**.

**Log 1. Silicon Production Recordkeeping for each of two SAF’s**

<table>
<thead>
<tr>
<th>Silicon Production Log for SAF #</th>
<th>Month:</th>
<th>Day:</th>
<th>Year:</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-hour period beginning with designated time</td>
<td>Silicon Produced (tons per hour)</td>
<td>One-hour period Hour beginning with designated time</td>
<td>Silicon Produced (tons per hour)</td>
</tr>
<tr>
<td>12:00 a.m.</td>
<td>12:00 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:00 a.m.</td>
<td>1:00 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:00 a.m.</td>
<td>2:00 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:00 a.m.</td>
<td>3:00 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00 a.m.</td>
<td>4:00 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:00 a.m.</td>
<td>5:00 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6:00 a.m.</td>
<td>6:00 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7:00 a.m.</td>
<td>7:00 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00 a.m.</td>
<td>8:00 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00 a.m.</td>
<td>9:00 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00 a.m.</td>
<td>10:00 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:00 a.m.</td>
<td>11:00 p.m.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**S3-3. Operating Hour Limitation(s)**

Not applicable

**S3-4. Emission Limitation(s)**

A. Particulate matter (PM) emitted from each SAF shall not exceed those limits expressed below. The permittee shall use best practices design and operation. This is specified at the Operation and Maintenance (O&M) Plan at Condition G27.
SAF #1 Allowable emission rate

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Allowable PM grains per dry standard cubic foot of exhaust gas at 130,363 scfm per each baghouse (at 70º F)*</th>
<th>Allowable PM pounds per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM Filterable</td>
<td>0.0022-------------------------------------------------------------------------------------------------</td>
<td>2.43</td>
</tr>
<tr>
<td>PM_{10}</td>
<td>0.0022-------------------------------------------------------------------------------------------------</td>
<td>2.43</td>
</tr>
<tr>
<td>PM_{2.5}</td>
<td>0.0022-------------------------------------------------------------------------------------------------</td>
<td>2.43</td>
</tr>
<tr>
<td>Combined Total</td>
<td>0.0022-------------------------------------------------------------------------------------------------</td>
<td>2.43</td>
</tr>
</tbody>
</table>

* Combined value for two baghouses is 260,726 scfm at 70º F, assumed to be dscfm

TAPCR 1200-03-09-.01(4) PSD-BACT and the applications dated September 16, 2021, October 27, 2021, TAPCR 1200-03-07.01(5) and the agreement letter dated February 7, 2022 (see Appendix 7)

SAF #2 Allowable emission rate

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Allowable PM grains per dry standard cubic foot of exhaust gas at 130,363 scfm per each baghouse (at 70º F)*</th>
<th>Allowable PM pounds per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM Filterable</td>
<td>0.0022-------------------------------------------------------------------------------------------------</td>
<td>2.43</td>
</tr>
<tr>
<td>PM_{10}</td>
<td>0.0022-------------------------------------------------------------------------------------------------</td>
<td>2.43</td>
</tr>
<tr>
<td>PM_{2.5}</td>
<td>0.0022-------------------------------------------------------------------------------------------------</td>
<td>2.43</td>
</tr>
<tr>
<td>Combined Total</td>
<td>0.0022-------------------------------------------------------------------------------------------------</td>
<td>2.43</td>
</tr>
</tbody>
</table>

* Combined value for two baghouses is 260,726 scfm at 70º F, assumed to be dscfm

TAPCR 1200-03-09-.01(4) PSD-BACT and the applications dated September 16, 2021, October 27, 2021, TAPCR 1200-03-07.01(5) and the agreement letter dated February 7, 2022 (see Appendix 7)

**Compliance Method:** The permittee shall install, operate, and maintain a baghouse to control PM/PM_{10}/PM_{2.5} emissions. The source(s) controlled by the fabric filter(s)/baghouse(s) shall not operate unless the baghouse control device is installed and in operation.

The permittee shall conduct performance testing in accordance with **Conditions G16 through G24** of this permit (separate test for each baghouse for PM/PM_{10}/PM_{2.5} and CO).

The permittee shall conduct baghouse monitoring to establish a minimum pressure drop for this source in accordance with **Condition G25** of this permit.

The permittee shall record the pressure drop on a daily basis in accordance with **Condition G10**. The pressure drop shall be recorded in Log 1 of Appendix 8 or in another format providing the same information.

Prior to establishment of source-specific minimum pressure drop, the permittee shall meet the minimum pressure drop of 10 inches of water as recommended by the manufacturer.
The permittee shall comply with the Silicon production limit specified at Condition S3-2.

The permittee shall develop an emission factor for PM/PM_{10}/PM_{2.5} (each) in terms of grains per dry standard cubic foot of exhaust gas based on the results of the stack test required by Condition G16. Until the proposed emission factor is submitted with the stack test report as specified by Condition G16, the factor of 0.0022 gr/dscf shall be used.

As a PM BACT limit, the PM/PM_{10}/PM_{2.5} emission factor is based on the baghouse vendor maximum exhaust loading guarantee (5 milligrams per normal meter cubed (mg/Nm3), which is equivalent to 0.0022 grains per standard cubic foot (gr/scf)).

As an additional compliance assurance method, the permittee shall follow the provisions of Condition F2-4 (which serves as part of the compliance method) and also, § 63.11527 (which serves as part of the compliance method) which concern installation and operation of a Bag Leak detection System.

The permittee shall comply with the provisions of 40 CFR 60 Subpart Z—Standards of Performance for Ferroalloy Production Facilities found at Conditions F1-1 through F1-7 of this permit.

The permittee shall comply with the provisions of 40 CFR 63 Subpart YYYYYY—Standards of Performance for HAPs for Area Sources; Ferroalloy Production Facilities found at Conditions F2-1 through F2-7 of this permit.

Capture/collection systems. For this source which is equipped with an add-on air pollution control device, the owner or operator must:

1. Design and install a system for the capture and collection of emissions to meet the engineering standards for minimum exhaust rates or facial inlet velocities as contained in the ACGIH Guidelines (incorporated by reference, see 40 CFR § 63.14);
2. Vent captured emissions through a closed system, except that dilution air may be added to emission streams for the purpose of controlling temperature at the inlet to a fabric filter;
3. Conduct an Annual inspection of all emission capture, collection, and transport systems to ensure that systems continue to operate in accordance with ACGIH Guidelines. Inspection includes volumetric flow rate measurements or verification of a permanent total enclosure using EPA Method 204.

The permittee shall prepare and maintain documentation verifying details of conformance with ACGIH Guidelines. This documentation shall be completed no later than 60 days before the stack test required by condition G19 and shall be provided to a Division representative upon request as specified at condition G10 of this permit.

*Refers to 40 CFR § 63.14

B. 1. Sulfur dioxide (SO_{2}) emitted from each SAF shall not exceed those limits expressed below

Allowable emission rate, pounds SO_{2} per calendar day per furnace
<table>
<thead>
<tr>
<th>SAF #</th>
<th>Allowable pounds SO₂ emissions per ton of Silicon Produced</th>
<th>Allowable pounds SO₂ per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21.1</td>
<td>81.4</td>
</tr>
<tr>
<td>2</td>
<td>21.1</td>
<td>81.4</td>
</tr>
<tr>
<td>Total for both units combined</td>
<td></td>
<td>162.8</td>
</tr>
</tbody>
</table>

The Division may elect to set requirements on the input rate for coal usage and coal sulfur content based on emission test results in order to comply with the above limits.

TAPCR 1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, October 27, 2021 and information dated February 23, 2022 and March 15, 2022

**Compliance Method:** The permittee shall comply with the silicon production limits as specified at Condition S3-2.

The permittee shall conduct a performance test (stack test) in accordance with condition G16.

During the performance test the usage rate of coal and the sulfur content of that coal shall be recorded. An emission factor for SO₂ shall be calculated from those parameters.

After the testing required by Condition G16, the permittee shall propose an SO₂ emission factor in terms of lb SO₂ emissions per pound of sulfur charged to the furnace. After approval, the Division may require this equation to be used to determine SO₂ emissions for each hour of operation for each furnace.

Until the time that a new calculation method for SO₂ emissions is approved by the Division, the permittee shall calculate (and record) emissions for each hour of operation using the following equation:

\[
SO₂ \text{ lb/hr} = (\text{Pounds of sulfur input per each furnace per hour}) \times (2 \text{ pounds SO₂ per pound of sulfur input}) \times (67\% \text{ factor conversion of S to SO₂}).
\]

The pounds of sulfur input to each furnace, hourly basis shall be calculated as follows:

Pounds of sulfur input per hour per furnace = (Pounds of coal input per furnace per hour)(weight fraction of sulfur in coal in use at that time)

The 67% conversion of sulfur input to SO₂ emissions is based on the Mississippi Silicon plant in Burnsville, Mississippi – per company submittal of February 10, 2022.

Wood and charcoal are assumed to have no sulfur content.

SO₂ hourly emissions are to be calculated from Log 2 of Appendix 8
A submittal from Sinova received February 23, 2022 indicated an SO$_2$ emission factor (based on Engineering Judgement) of 21.1 pounds of SO$_2$ emissions per ton of silicon produced. This emission factor value shall be used as the basis for the BACT SO$_2$ limit for the SAF’s.

The permittee shall maintain daily records of the hours of operation, coal usage, coal sulfur content, wood usage, and charcoal usage.

The Division reserves the right to set limits on hourly coal usage in order to demonstrate compliance with the BACT limit, based on the information obtained during a compliant stack test.

2. Sulfur dioxide (SO$_2$) emitted on a daily basis from each SAF shall not exceed those limits expressed below.

Allowable emission rate, pounds SO$_2$ per calendar day per furnace

<table>
<thead>
<tr>
<th>SAF #</th>
<th>Allowable pounds SO$_2$ per calendar day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,389</td>
</tr>
<tr>
<td>2</td>
<td>1,389</td>
</tr>
<tr>
<td>Total for both units combined</td>
<td>2,778</td>
</tr>
</tbody>
</table>

TAPCR 1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, October 27, 2021 and information dated February 23, 2022 and March 15, 2022

The above hourly SO$_2$ limits are based on information from Sinova March 15, 2022 which indicated that for purposes of a daily SO$_2$ limit, a factor of 15.0 lb SO$_2$ per ton of silicon produced would be used

3.86 tph x 15.0 lb SO$_2$/ton silicon produced x 24 hrs = 1,389 lb SO$_2$ per day maximum daily allowable per SAF

**Compliance Method:** The daily total of SO$_2$ emissions for each furnace shall be calculated using Log 2 of Appendix 8.

3. Sulfur dioxide (SO$_2$) emitted on a consecutive 12 month period basis from each SAF shall not exceed those limits expressed below.

Allowable SO$_2$ emission rate per furnace for each consecutive 12 month period

| SAF # | Allowable pounds SO$_2$ |
TAPCR 1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, October 27, 2021 and information dated February 23, 2022 and March 15, 2022

Compliance Method: The monthly SO₂ total emission rates shall be determined from Log 3 of Appendix 8. The 12-consecutive month SO₂ emission rates shall be determined from Log 4 of Appendix 8.

TAPCR 1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, October 27, 2021 and information dated February 23, 2022 and March 15, 2022

1,389 lb SO₂ per day per furnace maximum allowable  x 365 days/yr = 253.0 tons SO₂ per year per furnace

C. Carbon Monoxide (CO) emitted from this source shall not exceed those limits expressed below

Allowable emission rate

<table>
<thead>
<tr>
<th>SAF #</th>
<th>Allowable pounds CO emissions per ton of Silicon</th>
<th>Allowable pounds CO per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34.0</td>
<td>131.2</td>
</tr>
<tr>
<td>2</td>
<td>34.0</td>
<td>131.2</td>
</tr>
<tr>
<td>Total for both units combined</td>
<td>68.0</td>
<td>262.4</td>
</tr>
</tbody>
</table>

The permittee shall employ best operating practices design and operation.

TAPCR 1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, October 27, 2021 and information dated February 23, 2022

Compliance Method: The permittee shall comply with the silicon production limits as specified at Condition S3-2.

An email submittal received February 23, 2022 indicated a CO emission factor (based on Engineering Judgement) of 34.0 pounds of CO emissions per ton of silicon produced. This proposed emission factor value shall be used as the CO emission factor until the factor required
by condition G16 has been incorporated into the permit.

The permittee shall conduct a performance test (stack test) in accordance with condition G16.

The permittee shall comply with the provisions of 40 CFR 60 Subpart Z—Standards of Performance for Ferroalloy Production Facilities found at conditions F1-1 through F1-7 of this permit.

D. Volatile organic compounds (VOC)* emitted from this source shall not exceed those limits expressed below.

Allowable emission rate

<table>
<thead>
<tr>
<th>SAF #</th>
<th>Allowable pounds VOC emissions per ton of Silicon Produced</th>
<th>Allowable pounds VOC per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.40*</td>
<td>9.26</td>
</tr>
<tr>
<td>2</td>
<td>2.40</td>
<td>9.26</td>
</tr>
<tr>
<td>Total for both units combined</td>
<td>18.5</td>
<td></td>
</tr>
</tbody>
</table>

*VOC as carbon

The permittee shall employ best operating practices design and operation.

TAPCR 1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021

Compliance Method:

The permittee shall comply with the silicon production limits as specified at Condition S3-2. The permittee shall conduct a performance test (stack test) in accordance with condition G16.

The October 28, 2021, application at Table 1 Page 19 indicated a VOC emission factor (based on Engineering Judgement) of 2.40 pounds of VOC (as carbon) emissions per ton of Silicon produced. This the emission factor value shall be used as the VOC emission factor until the factor required by condition G16 has been incorporated into the permit.

E. 1. Nitrogen Oxides (NOx- includes both NO and NO₂ per November 17, 2021, letter) emitted from this source shall not exceed those limits expressed below.

Allowable emission rate

<table>
<thead>
<tr>
<th>SAF #</th>
<th>Allowable pounds NOx emissions per ton of Silicon Produced</th>
<th>Allowable pounds NOx per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>45.0</td>
<td>174.0</td>
</tr>
<tr>
<td>2</td>
<td>45.0</td>
<td>174.0</td>
</tr>
<tr>
<td>Total for both units</td>
<td>348.0</td>
<td></td>
</tr>
</tbody>
</table>
The permittee shall employ best operating practices design and operation.

TAPCR 1200-03-09-01(4) BACT-PSD and the applications dated September 16, 2021, October 27, 2021, and information dated February 23, 2022 and March 15, 2022

**Compliance Method:**

The permittee shall comply with the silicon production limits as specified at Condition S3-2

The permittee shall conduct a performance test (stack test) in accordance with condition G16.

Information dated February 23, 2022 indicated a NOx emission factor (based on Engineering Judgement) of 45.0 pounds of NOx emissions per ton of Silicon produced. This emission factor value shall be used as the NOx emission factor for the hourly emission rate until the factor required by condition G16 has been incorporated into the permit.

The hourly (lb/hr) NOx emissions shall be calculated from Log 5 at Appendix 8.

2. **Nitrogen Oxides (NOx- includes both NO and NO₂ per November 17, 2021, letter) emitted from this source shall not exceed those limits expressed below.**

Allowable emission rate

<table>
<thead>
<tr>
<th>SAF #</th>
<th>Allowable pounds NOx emissions per calendar day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3,333.0</td>
</tr>
<tr>
<td>2</td>
<td>3,333.0</td>
</tr>
<tr>
<td>Total for both units combined</td>
<td>6,666.0</td>
</tr>
</tbody>
</table>

TAPCR 1200-03-09-01(4) BACT-PSD and the applications dated September 16, 2021, October 27, 2021, and information dated February 23, 2022, and March 15, 2022

Compliance Method: Compliance with the daily NOx emission limit shall be calculated from Log 5 at Appendix 8. Until a NOx emission factor is determined as required by Condition G16, a factor of 36.0 pounds of NOx emissions per ton of silicon production shall be used. This value is based on engineering judgment.

3.86 tons Si production per hour x 36.0 lb NOx emissions per ton Si x 24 hr/day = 3,333.0 lb NOx/day per furnace allowable
This would be equal to 6,666.1 pounds of NOx emitted from both furnaces combined, per calendar day

3. The 12-consecutive month NOx emissions for this source shall not exceed the following limits per furnace based on the daily limit at 365 days.

<table>
<thead>
<tr>
<th>SAF #</th>
<th>Allowable tons NOx emissions per consecutive 12-month period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>608.</td>
</tr>
<tr>
<td>2</td>
<td>608.</td>
</tr>
<tr>
<td><strong>Total for both units combined</strong></td>
<td><strong>1216</strong></td>
</tr>
</tbody>
</table>

TAPCR 1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, October 27, 2021, and information dated February 23, 2022, and March 15, 2022

Compliance Method: Compliance with the consecutive 12-month NOx emission limit shall be calculated from Logs 6 and 7 at Appendix 8.

3,333.0 pounds of NOx allowable emissions per day per furnace $\times$ 365 days/yr = 1,216,545 pounds NOx/yr = 608.0 tons NOx per year per furnace (or 1,216.0 tons NOx per year for two furnaces combined)

**F. CO$_2$e (Greenhouse Gases) emitted from this source (both SAFs combined total) shall not exceed 702,315 tons per calendar year.**

The permittee shall use new generation furnaces with inherently lower-emitting technologies and energy efficiency measures, and good operation and maintenance.
TAPCR 1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021

**Compliance Method:**

The permittee shall comply with the silicon production limits as specified at Condition S3-2.

The permittee shall develop an emission factor for CO$_2$e (GHG) in terms of pounds CO$_2$e per ton of silicon produced. Until the proposed emission factor is submitted with the stack test report as specified by G16, the factors from 40 CFR Part 98 Subpart K- Ferroalloy Production as specified below shall be used for compliance.

The permittee shall utilize new generation furnaces, good operation, and maintenance as specified in the applications dated September 16, 2021, and October 27, 2021.

### GHG Emissions

| GHG  | Net Emission Factor $^1$ (lb/ton Si) | Emission Rate |  |
|------|------------------------------------|---------------|
| CO$_2$ | 20.525                             | 159.375       | 693.602 |
| CH$_4$ | 1.74                              | 13.5          | 59     |
| N$_2$O | 0.71                              | 5.48          | 24     |
| CO$_2$e | 20.780                           | 160.346       | 702.315 |

**Notes:**

1. EPA-designated global warming potential for specific greenhouse gases (40 CFR 98, Subpart A).
2. Total Emission Factor - Total Reduction = Net CO$_2$e emission factor

**G.** Hydrogen Chloride (HCl) emitted from this source shall not exceed 1.74 lb/h, daily average basis. 1200-03-07-.07(2) and the applications dated September 16, 2021, and October 27, 2021

**Compliance Method:**

The permittee shall comply with the silicon production limits as specified at Condition S3-2.

The permittee shall conduct a performance test (stack test) in accordance with condition G16.

Until the time of submittal of a compliant stack test, compliance shall be based on the permittee’s stated emission factor of 8.70E-03 lb/MMBtu based on 1,757,437 MMBtu/yr. wood usage,
resulting in an emission value of 6.54 tons HCl per year.

The above HCl emission factor is based on the Mississippi Silicon LLC (Burnsville) application for Permit 2640-00060.

H. The sulfur content of the coal shall be less than or equal to 1 percent by weight.

TAPCR 1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021, and information from February 8, 2022.

**COMPLIANCE METHOD:** Coal supplier certification shall be obtained for each delivery of coal received and stored on site. This certification shall be maintained and kept available for inspection by the Technical Secretary or a Division representative in accordance with **Condition G10**.

S3-5. **Source-Specific Visible Emissions Limitation(s)**

Visible emissions from the stack exhausting the two SAF’s shall not exhibit greater than 10% opacity, except for one six-minute period in any one-hour period, and for no more than four six-minute periods in any 24-hour period. A stack is defined as any chimney, flue, conduit, exhaust, vent, or opening of any kind whatsoever, capable of, or used for, the emission of air contaminants.

TAPCR 1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021 and October 27, 2021.

TAPCR 1200-03-05-.01(3) and agreement letter dated February 7, 2022 (see appendix 7)

**Compliance Method:** The Continuous Opacity Monitoring System (COMS) as required by condition F1-4 (§60.264(a)) of this permit shall be used for demonstration of compliance with this limit. Also, when requested by the Division, visible emissions shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).

The permittee shall comply with the provisions of:

40 CFR 60 Subpart Z—Standards of Performance for Ferroalloy Production Facilities, conditions F1-1 through F1-8

40 CFR 63 Subpart YYYYYY— National Emission Standards for Hazardous Air Pollutants for Area Sources: Ferroalloys Production Facilities, conditions F2-1 through F2-7

Note that there are additional opacity requirements at Conditions F1-2 (§60.262) and F2-5 (§63.11528)

All readings as required by this condition shall be submitted to the Division in accordance with **Condition G3**.

**Federally Applicable Requirements.** The following requirements are included in this permit pursuant to TAPCR 1200-09-.03(8). These requirements are provided verbatim in this document for simplicity. Any reference to the Administrator in these conditions shall instead be a reference to the Technical Secretary,
except for specific authorities that have not been delegated to the State of Tennessee. References to the appropriate Appendix are included for direction to the associated rule tables.

<table>
<thead>
<tr>
<th>40 CFR 60 Subpart Z</th>
<th>40 CFR 60 Subpart Z—Standards of Performance for Ferroalloy Production Facilities</th>
</tr>
</thead>
</table>

#### F1. 40 CFR 60 Subpart Z—Standards of Performance for Ferroalloy Production Facilities

Note that the provisions of TAPCR 1200-03-16-.27 F5-1 through F5-6 are similar to F1-1 through F1-6. In the event TAPCR 1200-03-16-.27 is deleted from the TAPCR, the provisions of TAPCR 1200-03-16-.27 as found in this permit will no longer be applicable.

#### F1-1. § 60.260 Applicability and designation of affected facility.

(a) The provisions of this subpart are applicable to the following affected facilities: Electric submerged arc furnaces which produce silicon metal, ferrosilicon, calcium silicon, silicomanganese zirconium, ferrochrome silicon, silvery iron, high-carbon ferrochrome, charge chrome, standard ferromanganese, silicomanganese, ferromanganese silicon, or calcium carbide; and dust-handling equipment.

(b) Any facility under paragraph (a) of this condition that commences construction or modification after October 21, 1974, is subject to the requirements of this subpart and shall comply with these requirements.

#### F1-2 § 60.262 Standard for particulate matter

(a) On and after the date on which the performance test required to be conducted by § 60.8 is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any electric submerged arc furnace any gases which:

1. Exit from a control device and contain particulate matter in excess of 0.45 kg/MW-hr (0.99 lb/MW-hr) while silicon metal, ferrosilicon, calcium silicon, or silicomanganese zirconium is being produced.

2. Exit from a control device and exhibit 15 percent opacity or greater.

3. Exit from a control device and are visible without the aid of instruments. The requirements under this subparagraph apply only during periods when flow rates are being established under § 60.265(d).
(5) Escape the capture system at the tapping station and are visible without the aid of instruments for more than 40 percent of each tapping period. There are no limitations on visible emissions under this subparagraph when a blowing tap occurs. The requirements under this subparagraph apply only during periods when flow rates are being established under § 60.265(d).

(b) On and after the date on which the performance test required to be conducted by § 60.8 is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any dust-handling equipment any gases which exhibit 10 percent opacity or greater.

F1-3. § 60.263 Standard for carbon monoxide.

(a) On and after the date on which the performance test required to be conducted by § 60.8 is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any electric submerged arc furnace any gases which contain, on a dry basis, 20 or greater volume percent of carbon monoxide. Combustion of such gases under conditions acceptable to the Administrator constitutes compliance with this section. Acceptable conditions include, but are not limited to, flaring of gases or use of gases as fuel for other processes.

F1-4. § 60.264 Emission monitoring.

(a) The owner or operator subject to the provisions of this subpart shall install, calibrate, maintain and operate a continuous monitoring system for measurement of the opacity of emissions discharged into the atmosphere from the control device(s).

(b) For the purpose of reports required under § 60.7(c), the owner or operator shall report as excess emissions all six-minute periods in which the average opacity is 15 percent or greater.

(c) The owner or operator subject to the provisions of this subpart shall submit a written report of any product change to the Administrator. Reports of product changes must be postmarked not later than 30 days after implementation of the product change.

F1-5. § 60.265 Monitoring of Operations

(a) The owner or operator of any electric submerged arc furnace subject to the provisions of this subpart shall maintain daily records of the following information:

(1) Product being produced.

(2) Description of constituents of furnace charge, including the quantity, by weight.

(3) Time and duration of each tapping period and the identification of material tapped (slag or product.)

(4) All furnace power input data obtained under paragraph (b) of this section.

(5) All flow rate data obtained under paragraph (c) of this section or all fan motor power
consumption and pressure drop data obtained under paragraph (c) of this section.

(b) The owner or operator subject to the provisions of this subpart shall install, calibrate, maintain, and operate a device to measure and continuously record the furnace power input. The furnace power input may be measured at the output or input side of the transformer. The device must have an accuracy of ±5 percent over its operating range.

(c) The owner or operator subject to the provisions of this subpart shall install, calibrate, and maintain a monitoring device that continuously measures and records the volumetric flow rate through each separately ducted hood of the capture system, except as provided under paragraph (c) of this section. The owner or operator of an electric submerged arc furnace that is equipped with a water cooled cover which is designed to contain and prevent escape of the generated gas and particulate matter shall monitor only the volumetric flow rate through the capture system for control of emissions from the tapping station. The owner or operator may install the monitoring device(s) in any appropriate location in the exhaust duct such that reproducible flow rate monitoring will result. The flow rate monitoring device must have an accuracy of ±10 percent over its normal operating range and must be calibrated according to the manufacturer's instructions. The Administrator may require the owner or operator to demonstrate the accuracy of the monitoring device relative to Methods 1 and 2 of appendix A to this part.

(d) When performance tests are conducted under the provisions of § 60.8 of this part to demonstrate compliance with the standards under §§ 60.262(a) (4) and (5), the volumetric flow rate through each separately ducted hood of the capture system must be determined using the monitoring device required under paragraph (c) of this section. The volumetric flow rates must be determined for furnace power input levels at 50 and 100 percent of the nominal rated capacity of the electric submerged arc furnace. At all times the electric submerged arc furnace is operated, the owner or operator shall maintain the volumetric flow rate at or above the appropriate levels for that furnace power input level determined during the most recent performance test. If emissions due to tapping are captured and ducted separately from emissions of the electric submerged arc furnace, during each tapping period the owner or operator shall maintain the exhaust flow rates through the capture system over the tapping station at or above the levels established during the most recent performance test. Operation at lower flow rates may be considered by the Administrator to be unacceptable operation and maintenance of the affected facility. The owner or operator may request that these flow rates be reestablished by conducting new performance tests under § 60.8 of this part.

(e) The owner or operator may as an alternative to paragraph (c) of this section determine the volumetric flow rate through each fan of the capture system from the fan power consumption, pressure drop across the fan and the fan performance curve. Only data specific to the operation of the affected electric submerged arc furnace are acceptable for demonstration of compliance with the requirements of this paragraph. The owner or operator shall maintain on file a permanent record of the fan performance curve (prepared for a specific temperature) and shall:

(1) Install, calibrate, maintain, and operate a device to continuously measure and record the power consumption of the fan motor (measured in kilowatts), and

(2) Install, calibrate, maintain, and operate a device to continuously measure and record the pressure drop across the fan. The fan power consumption and pressure drop measurements must be synchronized to allow real time comparisons of the data. The monitoring devices must have an accuracy of ±5 percent over their normal operating ranges.
(f) The volumetric flow rate through each fan of the capture system must be determined from the fan power consumption, fan pressure drop, and fan performance curve specified under paragraph (e) of this section, during any performance test required under §60.8 to demonstrate compliance with the standards under §§60.262(a)(4) and (5). The owner or operator shall determine the volumetric flow rate at a representative temperature for furnace power input levels of 50 and 100 percent of the nominal rated capacity of the electric submerged arc furnace. At all times the electric submerged arc furnace is operated, the owner or operator shall maintain the fan power consumption and fan pressure drop at levels such that the volumetric flow rate is at or above the levels established during the most recent performance test for that furnace power input level. If emissions due to tapping are captured and ducted separately from emissions of the electric submerged arc furnace, during each tapping period the owner or operator shall maintain the fan power consumption and fan pressure drop at levels such that the volumetric flow rate is at or above the levels established during the most recent performance test. Operation at lower flow rates may be considered by the Administrator to be unacceptable operation and maintenance of the affected facility. The owner or operator may request that these flow rates be reestablished by conducting new performance tests under §60.8. The Administrator may require the owner or operator to verify the fan performance curve by monitoring necessary fan operating parameters and determining the gas volume moved relative to Methods 1 and 2 of appendix A to this part.

(g) All monitoring devices required under paragraphs (c) and (e) of this section are to be checked for calibration annually in accordance with the procedures under §60.13(b).

F1-6. §60.266 Test methods and procedures

(a) During any performance test required in §60.8, the owner or operator shall not allow gaseous diluents to be added to the effluent gas stream after the fabric in an open pressurized fabric filter collector unless the total gas volume flow from the collector is accurately determined and considered in the determination of emissions.

(b) In conducting the performance tests required in §60.8, the owner or operator shall use as reference methods and procedures the test methods in appendix A of 40 CFR Part 60 or other methods and procedures as specified in this section, except as provided in §60.8(b).

(c) The permittee shall determine compliance with the particulate matter standards in §60.262 in accordance with the provisions of §60.266 (c).


See Appendix 9 to this subpart for summary of which parts of the General Provisions in §§60.1 through 60.19 are applicable to this facility.

F2. 40 CFR 63 Subpart YYYYYY—National Emission Standards for Hazardous Air Pollutants for Area Sources: Ferroalloys Production Facilities
F2-1 § 63.11524 Am I subject to this subpart?

(a) You are subject to this subpart if you own or operate a ferroalloys production facility that is an area source of hazardous air pollutant (HAP) emissions. A ferroalloys production facility manufactures silicon metal, ferrosilicon, ferrotitanium using the aluminum reduction process, ferrovanadium, ferromolybdenum, calcium silicon, siliconmanganese zirconium, ferrochrome silicon, silvery iron, high-carbon ferrochrome, charge chrome, standard ferromanganese, siliconmanganese, ferromanganese silicon, calcium carbide or other ferroalloy products using electrometallurgical operations including electric arc furnaces (EAFs) or other reaction vessels.

(b) The provisions of this subpart apply to each existing and new electrometallurgical operation affected source as defined in paragraphs (b)(1) and (b)(2) of this section.

(2) An electrometallurgical operation affected source is new if you commenced construction or reconstruction of the EAF or other reaction vessel after September 15, 2008.

F2-2. § 63.11525 What are my compliance dates?

(c) If you start up a new affected source after December 23, 2008, you must achieve compliance with the applicable provisions of this subpart upon startup of your affected source.

F2-3. § 63.11526 What are the standards for new and existing ferroalloys production facilities?

(a) You must not discharge to the atmosphere visible emissions (VE) from the control device that exceed 5 percent of accumulated occurrences in a 60-minute observation period.

(b) You must not discharge to the atmosphere fugitive PM emissions from the furnace building containing the electrometallurgical operations that exhibit opacity greater than 20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 60 percent.

F2-4. § 63.11527 What are the monitoring requirements for new and existing sources?

(a) EAF equipped with fabric filters -

(1) Visual monitoring. You must conduct visual monitoring of the monovent or fabric filter outlet stack(s) for any VE according to the schedule specified in paragraphs (a)(1)(i) and (a)(1)(ii) of this section.

(i) Daily visual monitoring. Perform visual determination of fugitive emissions once per day, on each day the process is in operation, during operation of the process.

(ii) Weekly visual monitoring. If no visible fugitive emissions are detected in consecutive daily visual monitoring performed in accordance with paragraph (a)(1)(i) of this section for 90 days of operation of the process, you may decrease the frequency of visual monitoring to once per calendar week of time the process is in operation, during operation of the process. If visible fugitive emissions are detected during these inspections, you must resume daily visual monitoring of that operation during each day that the process is in operation, in accordance with paragraph (a)(1)(i) of this section until you satisfy the criteria of this section to resume conducting weekly
visual monitoring.

(2) If the visual monitoring reveals the presence of any VE, you must conduct a Method 22 (appendix A-7 of 40 CFR part 60) test following the requirements of § 63.11528(b)(1) within 24 hours of determining the presence of any VE.

(3) If you own or operate an existing affected source, you may install, operate, and maintain a bag leak detection system for each fabric filter as an alternative to the monitoring requirements in paragraph (a)(1) of this section. If you own or operate a new affected source, you must install, operate, and maintain a bag leak detection system for each fabric filter according to the requirements in paragraphs (a)(3)(i) through (a)(3)(vii) of this section. Such source is not subject to the requirements in paragraphs (a)(1) and (a)(2) of this section.

(i) The system must be certified by the manufacturer to be capable of detecting emissions of PM at concentrations of 10 milligrams per actual cubic meter (0.00044 grains per actual cubic foot) or less.

(ii) The bag leak detection system sensor must provide output of relative PM loadings and the owner or operator shall continuously record the output from the bag leak detection system using a strip chart recorder, data logger, or other means.

(iii) The system must be equipped with an alarm that will sound when an increase in relative PM loadings is detected over the alarm set point established in the operation and maintenance plan, and the alarm must be located such that it can be heard, seen, or otherwise detected by the appropriate plant personnel.

(iv) The initial adjustment of the system must, at minimum, consist of establishing the baseline output by adjusting the sensitivity (range) and the averaging period of the device, and establishing the alarm set points. If the system is equipped with an alarm delay time feature, you also must establish a maximum reasonable alarm delay time.

(v) Following the initial adjustment, do not adjust the sensitivity or range, averaging period, alarm set point, or alarm delay time, except that, once per quarter, you may adjust the sensitivity of the bag leak detection system to account for seasonal effects including temperature and humidity.

(vi) For fabric filters that are discharged to the atmosphere through a stack, the bag leak detector sensor must be installed downstream of the fabric filter and upstream of any wet scrubber.

(vii) Where multiple detectors are required, the system's instrumentation and alarm may be shared among detectors.

(4) When operating a bag leak detection system, if an alarm sounds, conduct visual monitoring of the monovent or fabric filter outlet stack(s) as required in paragraph (a)(1) of this section within 1 hour. If the visual monitoring reveals the presence of any VE, you must conduct a Method 22 test following the requirements of § 63.11528(b)(1) within 24 hours of determining the presence of any VE.

(5) You must prepare a site-specific monitoring plan for each bag leak detection system. You must
operate and maintain each bag leak detection system according to the plan at all times. Each plan must address all of the items identified in paragraphs (a)(5)(i) through (a)(5)(v) of this section.

(i) Installation of the bag leak detection system.

(ii) Initial and periodic adjustment of the bag leak detection system including how the alarm set-point and alarm delay time will be established.

(iii) Operation of the bag leak detection system including quality assurance procedures.

(iv) Maintenance of the bag leak detection system including a routine maintenance schedule and spare parts inventory list.

(v) How the bag leak detection system output will be recorded and stored.

F2-5. § 63.11528 What are the performance test and compliance requirements for new and existing sources?

(a) Initial compliance demonstration deadlines. You must conduct an initial Method 22 (appendix A-7 of 40 CFR part 60) test following the requirements of paragraph (b)(1) of this section of each existing electrometallurgical operation control device and an initial Method 9 observation following the requirements of paragraph (c)(1) of this section from the furnace building due to electrometallurgical operations no later than 60 days after your applicable compliance date. For any new electrometallurgical operation control device, you must conduct an initial Method 22 test following the requirements of paragraph (b)(1) of this section within 15 days of startup of the control device.

(b) Visible emissions limit compliance demonstration.

(1) You must conduct a Method 22 (appendix A-7 of 40 CFR part 60) test to determine that VE from the control device do not exceed the emission standard specified in § 63.11526(a). For a fabric filter, conduct the test for at least 60 minutes at the fabric filter monovent or outlet stack(s), as applicable. For a wet scrubber, conduct the test for at least 60 minutes at the outlet stack(s).

(2) You must conduct a semiannual Method 22 test using the procedures specified in paragraph (b)(1) of this section.

(c) Furnace building opacity.

(1) You must conduct an opacity test for fugitive emissions from the furnace building according to the procedures in § 63.6(h) and Method 9 (appendix A-4 of 40 CFR part 60). The test must be conducted for at least 60 minutes and shall include tapping the furnace or reaction vessel. The observation must be focused on the part of the building where electrometallurgical operation fugitive emissions are most likely to be observed.

(2) Conduct subsequent Method 9 tests no less frequently than every 6 months and each time you make a process change likely to increase fugitive emissions.
(3) After the initial Method 9 performance test, as an alternative to the Method 9 performance test, you may monitor VE using Method 22 (appendix A-7 of 40 CFR part 60) for subsequent semi-annual compliance demonstrations. The Method 22 test is successful if no VE are observed for 90 percent of the readings over the furnace cycle (tap to tap) or 60 minutes, whichever is longer. If VE are observed greater than 10 percent of the time over the furnace cycle or 60 minutes, whichever is longer, then the facility must conduct another test as soon as possible, but no later than 15 calendar days after the Method 22 test using Method 9 (appendix A-4 of 40 CFR part 60) as specified in paragraph (c)(1) of this section.

F2-6. § 63.11529 What are the notification, reporting, and recordkeeping requirements?

(a) Initial Notification. You must submit the Initial Notification required by § 63.9(b)(2) no later than 120 days after December 23, 2008, or no later than 120 days after the source becomes subject to this subpart, whichever is later. The Initial Notification must include the information specified in § 63.9(b)(2)(i) through (iv).

(b) Notification of compliance status. You must submit a Notification of Compliance Status in accordance with § 63.9(h) of the General Provisions before the close of business on the 30th day following the completion of the initial compliance demonstration. This notification must include the following:

(1) The results of Method 22 (appendix A-7 of 40 CFR part 60) test for VE as required by § 63.11528(a);

(2) If you have installed a bag leak detection system, documentation that the system satisfies the design requirements specified in § 63.11527(a)(3) and that you have prepared a site-specific monitoring plan that meets the requirements specified in § 63.11527(a)(5);

(3) The results of the Method 9 (appendix A-4 of 40 CFR part 60) test for building opacity as required by § 63.11528(a).

(c) Annual compliance certification. If you own or operate an affected source, you must submit an annual certification of compliance according to paragraphs (e)(1) through (e)(4) of this section.

(1) The results of any daily or weekly visual monitoring events required by § 63.11527(a)(1) and (b)(1), alarm-based visual monitoring at sources equipped with bag leak detection systems as required by § 63.11527(a)(4), or readings outside of the operating range at sources using CPMS on wet scrubbers required by § 63.11527(b)(4).

(2) The results of the follow up Method 22 (appendix A-7 of 40 CFR part 60) tests that are required if VE are observed during the daily or weekly visual monitoring, alarm-based visual monitoring, or out-of-range operating readings as described in paragraph (c)(1) of this section.

(3) The results of the Method 22 (appendix A-7 of 40 CFR part 60) or Method 9 (appendix A-4 of 40 CFR part 60) tests required by § 63.11528(b) and (c), respectively.

(4) If you operate a bag leak detection system for a fabric filter or a CPMS for a wet scrubber, submit annual reports according to the requirements in § 63.10(e) and include summary information
on the number, duration, and cause (including unknown cause, if applicable) for monitor downtime incidents (other than downtime associated with zero and span or other calibration checks, if applicable).

(d) You must keep the records specified in paragraphs (d)(1) through (d)(2) of this section.

1) As required in § 63.10(b)(2)(xiv), you must keep a copy of each notification that you submitted to comply with this subpart and all documentation supporting any Initial Notification, Notification of Compliance Status, and annual compliance certifications that you submitted.

2) You must keep the records of all daily or weekly visual, Method 22 (appendix A-7 of 40 CFR part 60), and Method 9 (appendix A-4 of 40 CFR part 60) monitoring data required by § 63.11527 and the information identified in paragraphs (d)(2)(i) through (d)(2)(v) of this section.

(i) The date, place, and time of the monitoring event;

(ii) Person conducting the monitoring;

(iii) Technique or method used;

(iv) Operating conditions during the activity; and

(v) Results, including the date, time, and duration of the period from the time the monitoring indicated a problem (e.g., VE) to the time that monitoring indicated proper operation.

(e) Your records must be in a form suitable and readily available for expeditious review, according to § 63.10(b)(1).

(f) As specified in § 63.10(b)(1), you must keep each record for 5 years following the date of each recorded action.

(g) You must keep each record onsite for at least 2 years after the date of each recorded action according to § 63.10(b)(1). You may keep the records offsite for the remaining 3 years.

F2-7. § 63.11530 What parts of the General Provisions apply to my facility?

Table 1 of subpart YYYYYY shows which parts of the General Provisions in §§ 63.1 through 63.16 apply to you.

See Appendix 10 for Table 1 to Subpart YYYYYY

F5. TAPCR 1200-03-16--27 Ferroalloy Production Facilities

This rule applies to each of the two SAFs at Source 48-0046-03
In the event TAPCR 1200-03-16-.27 is deleted from the regulations, the following provisions F5-1 through F5-6 of this permit will no longer be valid.

**F5-1. 1200-03-16-.27(1)**

(1) Applicability. The provisions of this rule are applicable to the following affected facilities commenced on or after February 9, 1977: Electric submerged arc furnaces which produce silicon metal, ferrosilicon, calcium silicon, silicomanganese zirconium, ferrochrome silicon, silvery iron, high-carbon ferrochrome, charge chrome, standard ferromanganese, silicomanganese, ferromanganese silicon, or calcium carbide; and dust handling equipment.

**F5-2. 1200-03-16-.27(3) Standards for Particulate Matter and Opacity.**

(a) On and after the date on which the performance test required to be conducted by paragraph .01(5) of this chapter is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any electric submerged arc furnace any gases which:

1. Exit from a control device and contain particulate matter in excess of 0.45 kg/MW-hr (0.99 lb/MW-hr) while silicon metal, ferrosilicon, calcium silicon, or silicomanganese zirconium is being produced.

3. Exit from a control device and exhibit 15 percent opacity or greater.

4. Exit from an electric submerged arc furnace and escape the capture system and are visible without the aid of instruments. The requirements under this part apply only during periods when flow rates are being established under subparagraph (6)(d) of this rule.

5. Escape the capture system at the tapping station and are visible without the aid of instruments for more than 40 percent of each tapping period. There are no limitations on visible emissions under this part when a blowing tap occurs. The requirements under this subparagraph apply only during periods when flow rates are being established under subparagraph (6)(d) of this rule.

(b) On and after the date on which the performance test required to be conducted by paragraph .01(5) of this chapter is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any dust-handling equipment any gases which exhibit 10 percent opacity or greater.

**F5-3. 1200-03-16-.27(4) Standard for Carbon Monoxide.**

(a) On and after the date on which the performance test required to be conducted by paragraph .01(5) of this chapter is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any electric submerged arc furnace any gases which contain, on a dry basis, 20 or greater volume percent of carbon monoxide. Combustion of such gases under conditions...
acceptable to the Technical Secretary constitutes compliance with this section. Acceptable conditions include, but are not limited to, flaring of gases or use of gases as fuel for other processes.

F5-4. 1200-03-16-.27(5)  Emission Monitoring.

(a) The owner or operator subject to the provisions of this rule shall install, calibrate, maintain and operate a continuous monitoring system for measurement of the opacity of emissions discharged into the atmosphere from the control device(s).

(b) For the purpose of reports required under subparagraph .01(7)(c) of this chapter, the owner or operator shall report as excess emissions all six-minute periods in which the average opacity is 15 percent or greater.

(c) The owner or operator subject to the provisions of this subpart shall submit a written report of any product change to the Technical Secretary. Reports of product changes must be postmarked no later than 30 days after implementation of the product change.

F5-5. 1200-03-16-.27(6)  Monitoring of Operations.

(a) The owner or operator of any electric submerged arc furnace subject to the provisions of this rule shall maintain daily records of the following information:

1. Product being produced.

2. Description of constituents of furnace charge, including the quantity, by weight.

3. Time and duration of each tapping period and the identification of material tapped (slag or product).

4. All furnace power input data obtained under subparagraph (b) of this paragraph.

5. All flow rate data obtained under subparagraph (e) of this paragraph or all fan motor power consumption and pressure drop data obtained under subparagraph (e) of this paragraph.

(b) The owner or operator subject to the provisions of this rule shall install, calibrate, maintain, and operate a device to measure and continuously record the furnace power input. The furnace power input may be measured at the output or input side of the transformer. The device must have an accuracy of \( \pm 5 \) percent over its operating range.

(c) The owner or operator subject to the provisions of this rule shall install, calibrate, and maintain a monitoring device that continuously measures and records the volumetric flow rate through each separately ducted hood of the capture system, except as provided under subparagraph (e) of this paragraph. The owner or operator of an electric submerged arc furnace that is equipped with a water cooled cover which is
designed to contain and prevent escape of the generated gas and particulate matter shall monitor only the volumetric flow rate through the capture system for control of emissions from the tapping station. The owner or operator may install the monitoring device(s) in any appropriate location in the exhaust duct such that reproducible flow rate monitoring will result. The flow rate monitoring device must have an accuracy of 10 percent over its normal operating range and must be calibrated according to the manufacturer’s instructions. The Technical Secretary may require the owner or operator to demonstrate the accuracy of the monitoring device relative to Methods 1. and 2. in subparagraph .01(5)(g) of this chapter.

(d) When performance tests are conducted under the provisions of paragraph .01(5) of this chapter to demonstrate compliance with the standards under parts (3)(a)4. and (3)(a)5. of this rule, the volumetric flow rate through each separately ducted hood of the capture system must be determined using the monitoring device required under subparagraph (c) of this paragraph. The volumetric flow rates must be determined for furnace power input levels at 50 and 100 percent of the nominal rated capacity of the electric submerged arc furnace. At all times the electric submerged arc furnace is operated, the owner or operator shall maintain the volumetric flow rate at or above the appropriate levels for that furnace power input level determined during the most recent performance test. If emissions due to tapping are captured and ducted separately from emissions of the electric submerged arc furnace, during each tapping period the owner or operator shall maintain the exhaust flow rates through the capture system over the tapping station at or above the levels established during the most recent performance test. Operation at lower flow rates may be considered by the Technical Secretary to be unacceptable operation and maintenance of the affected facility. The owner or operator may request that these flow rates be reestablished by conducting new performance tests under paragraph .01(5) of this rule.

(e) The owner or operator may as an alternative to subparagraph (c) of this paragraph determine the volumetric flow rate through each fan of the capture system from the fan power consumption, pressure drop across the fan and the fan performance curve. Only data specific to the operation of the affected electric submerged arc furnace are acceptable for demonstration of compliance with the requirements of this subparagraph. The owner or operator shall maintain a permanent record of the fan performance curve (prepared for a specific temperature) and shall:

1. Install, calibrate, maintain and operate a device to continuously measure and record the power consumption of the fan motor (measured in kilowatts), and

1. Install, calibrate, maintain, and operate a device to continuously measure and record the pressure drop across the fan. The fan power consumption and pressure drop measurements must be synchronized to allow real time comparisons of the data. The monitoring devices must have an accuracy of ±5 percent over their normal operating ranges.

(f) The volumetric flow rate through each fan of the capture system must be determined from the fan power consumption, fan pressure drop, and fan performance curve
specified under subparagraph (e) of this paragraph, during any performance test required under paragraph .01(5)(g) of this chapter to demonstrate compliance with the standards under parts (3)(a)4. and 5. of this rule. The owner or operator shall determine the volumetric flow rate at a representative temperature for furnace power input levels of 50 and 100 percent of the nominal rated capacity of the electric submerged arc furnace. At all times the electric submerged arc furnace is operated, the owner or operator shall maintain the fan power consumption and fan pressure drop at levels such that the volumetric flow rate is at or above the levels established during the most recent performance test for the furnace power input level.

If emissions due to tapping are captured and ducted separately from emissions of the electric submerged arc furnace, during each tapping period the owner or operator shall maintain the fan power consumption and fan pressure drop at levels such that the volumetric flow rate is at or above the levels established during the most recent performance test. Operation at lower flow rates may be considered by the Technical Secretary to be unacceptable operation and maintenance of the affected facility. The owner or operator may request that these flow rates be reestablished by conducting new performance tests under paragraph .01(5) of this chapter. The Technical Secretary may require the owner or operator to verify the fan performance curve by monitoring necessary fan operating parameters and determining the gas volume moved relative to Methods 1. and 2. of subparagraph .01(5)(g) of this chapter.

(g) All monitoring devices required under subparagraphs (c) and (e) of this paragraph are to be checked for calibration annually in accordance with the procedures under paragraph .01(8) of this chapter.

F5-6 1200-03-16-.27(7)  Test Methods and Procedures.

Testing shall be conducted in accordance with the provisions of TAPCR 1200-03-16-.27(7)(a) through (h).

<table>
<thead>
<tr>
<th>Source No</th>
<th>Source Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>Ladle Preheating (three separate units at 10 MMBtu/hr each)</td>
</tr>
</tbody>
</table>

Any ladle preheater may be used for either SAF during startup period for heating materials. During that time period, the burner for that ladle preheater shall comply with the heat input and emission limits for any one ladle preheater as specified for this permit unit (48-0046-04).

Exhaust to interior of building

S4-1. Input Limitation(s) or Statement(s) of Design

A. The stated maximum heat input rate for each of the three identical Ladle Preheater units at this source shall not exceed those values specified below; each of three identical Ladle Preheat
Units is 10 MMbtu/hr (also 10,000 design Cu. Ft. per hour) for this source. Should the permittee need to modify this source in a manner that increases the maximum heat input rate for one or more of these units, a construction permit shall be applied for and received in accordance with TAPCR 1200-03-09-.01 prior to making the change.

<table>
<thead>
<tr>
<th>Ladle Preheater</th>
<th>Maximum Heat Input, MMBtu/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td># 1</td>
<td>10</td>
</tr>
<tr>
<td># 2</td>
<td>10</td>
</tr>
<tr>
<td>#3</td>
<td>10</td>
</tr>
<tr>
<td>Total for three units combined</td>
<td>30</td>
</tr>
</tbody>
</table>

TAPCR 1200-03-09-.03(8) and the applications dated September 16, 2021, and October 27, 2021

**COMPLIANCE METHOD:** The permittee shall maintain documentation to demonstrate the maximum heat input rate each of three identical Ladle Preheat Units. Documentation shall include, but is not limited to, manufacturer’s specifications, purchase records, operating manuals, or a tag affixed to the unit by the manufacturer. These documents shall be kept readily available/accessible and made available upon request by the Technical Secretary or a Division representative.

**B.** Only Natural Gas shall be used as fuel for the Ladle Heater. The Ladle Heater Burners are only capable of burning Natural Gas. Should the permittee need to modify the burners for the Ladle Heaters to allow the use of a fuel other than natural gas, a construction permit shall first be applied for and received in accordance with TAPCR 1200-03-09-.01 prior to making the change.

TAPCR 1200-03-09-.01(4) PSD-BACT, the applications dated September 16, 2021, and October 28, 2021

**COMPLIANCE METHOD:** The permittee shall maintain documentation to demonstrate the type(s) of fuel used by the Ladle Heater Burners. Documentation shall include, but is not limited to, manufacturer’s specifications, purchase records, operating manuals, or a tag affixed to the unit by the manufacturer. These documents shall be kept readily available/accessible and made available upon request by the Technical Secretary or a Division representative.

S4-2. Production Limitation(s)

Not applicable

S4-3. Operating Hour Limitation(s)

Not applicable

S4-4. Emission Limitation(s)
A. Particulate matter (including PM filterable, PM$_{10}$, and PM$_{2.5}$) emitted from this source shall not exceed the following values for each Ladle Preheater Unit on a daily average basis

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Maximum Allowable Emissions lb/MMbtu</th>
<th>Allowable pounds per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM filterable</td>
<td>0.0075</td>
<td>0.075</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>0.0075</td>
<td>0.075</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>0.0075</td>
<td>0.075</td>
</tr>
<tr>
<td>Total for all PM categories combined</td>
<td></td>
<td>0.075</td>
</tr>
</tbody>
</table>

Allowable Emissions for Ladle Preheater #2

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Maximum Allowable Emissions lb/MMbtu</th>
<th>Allowable pounds per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM filterable</td>
<td>0.0075</td>
<td>0.075</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>0.0075</td>
<td>0.075</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>0.0075</td>
<td>0.075</td>
</tr>
<tr>
<td>Total for all PM categories combined</td>
<td></td>
<td>0.075</td>
</tr>
</tbody>
</table>

Allowable Emissions for Ladle Preheater #3

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Maximum Allowable Emissions lb/MMbtu</th>
<th>Allowable pounds per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM filterable</td>
<td>0.0075</td>
<td>0.075</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>0.0075</td>
<td>0.075</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>0.0075</td>
<td>0.075</td>
</tr>
<tr>
<td>Total for all PM categories combined</td>
<td></td>
<td>0.075</td>
</tr>
</tbody>
</table>

The permittee shall use good combustion practices and combust only natural gas.

TAPCR 1200-03-09-.01(4) PSD-BACT and the applications dated September 16, 2021, and October 27, 2021

**Compliance Method:** Compliance with the PM emission limitation shall be assured by compliance with Conditions S4-1A, (design heat input rate), S4-1B, (fuel type), and the emission factor of 7.6 lb PM/PM$_{10}$/PM$_{2.5}$/MMScf from AP-42, Chapter 1.4 Table 1.4-2.
The permittee shall conduct testing to determine the emissions level or provide manufacturer’s certified emission factors no later than the date required by condition G20 for test submittal. It is recognized that AP-42 may not be the most accurate source of emission factors, but that is the best information available at this time.

**B. SO₂ emitted from this source shall not exceed the following values for each Ladle Preheater Unit on a daily average basis**

<table>
<thead>
<tr>
<th>Ladle Preheater</th>
<th>Maximum Allowable Emissions of SO₂ lb/MMBtu of natural gas</th>
<th>Allowable pounds SO₂ per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>0.0006</td>
<td>0.006</td>
</tr>
<tr>
<td>#2</td>
<td>0.0006</td>
<td>0.006</td>
</tr>
<tr>
<td>#3</td>
<td>0.0006</td>
<td>0.006</td>
</tr>
<tr>
<td><strong>Total for three units combined</strong></td>
<td></td>
<td><strong>0.018</strong></td>
</tr>
</tbody>
</table>

The permittee shall combust only natural gas and use good combustion practices.

TAPCR 1200-03-09-.01(4) PSD-BACT and the application dated November 17, 2021

**Compliance Method:** Compliance with the SO₂ emission limitation shall be assured by compliance with **Conditions S4-1A., (design heat input rate), S4-1B., (fuel type), and the emission factor of 0.6 lb SO₂/mmmscf from AP-42, Chapter 1.4, Table 1.4-2.**

It is recognized that AP-42 may not be the most accurate source of emission factors, but that is the best information available at this time.

The permittee shall conduct testing to determine the emissions level or provide manufacturer’s certified emission factors no later than the date required by condition G20 for test submittal.

**C. CO emitted from this source shall not exceed the following values for each Ladle Preheater Unit on a daily average basis**

<table>
<thead>
<tr>
<th>Ladle Preheater</th>
<th>Maximum Allowable Emissions of CO lb/MMBtu of natural gas</th>
<th>Allowable pounds CO per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>0.082</td>
<td>0.82</td>
</tr>
<tr>
<td>#2</td>
<td>0.082</td>
<td>0.82</td>
</tr>
<tr>
<td>#3</td>
<td>0.082</td>
<td>0.82</td>
</tr>
<tr>
<td><strong>Total for three units</strong></td>
<td></td>
<td><strong>2.46</strong></td>
</tr>
</tbody>
</table>
The permittee shall combust only natural gas and use good combustion practices

TAPCR 1200-03-09-.01(4) PSD-BACT and the applications dated September 16, 2021, and October 27, 2021

**Compliance Method:** Compliance with the CO emission limitation shall be assured by compliance with **Conditions S4-1A** (design heat input rate, **S4-1B** (fuel type), and the emission factor of 84 lb CO/mmscf from AP-42, Chapter 1.4, Table 1.4-1

It is recognized that AP-42 may not be the most accurate source of emission factors, but that is the best information available at this time.

The permittee shall conduct testing to determine the emissions level or provide manufacturer’s certified emission factors no later than the date required by condition G20 for test submittal.

D. VOC emitted from this source shall not exceed the following values for each Ladle Preheater Unit on a daily average basis

<table>
<thead>
<tr>
<th>Ladle Preheater</th>
<th>Maximum Allowable Emissions of VOC lb/MMBtu of natural gas</th>
<th>Allowable pounds VOC per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td># 1</td>
<td>0.0054</td>
<td>0.054</td>
</tr>
<tr>
<td># 2</td>
<td>0.0054</td>
<td>0.054</td>
</tr>
<tr>
<td># 3</td>
<td>0.0054</td>
<td>0.054</td>
</tr>
<tr>
<td>Total for three units combined</td>
<td>0.0054</td>
<td>0.162</td>
</tr>
</tbody>
</table>

The permittee shall combust only natural gas and use good combustion practices

TAPCR 1200-03-09-.01(4) PSD-BACT and the applications dated September 16, 2021, and October 27, 2021

**Compliance Method:** Compliance with the VOC emission limitation shall be assured by compliance with **Conditions S4-1A**, (design heat input rate, **S4-1B**, (fuel type), and the emission factor of 5.5 lb VOC/mmscf from AP-42, Chapter 1.4, Table 1.4-2

It is recognized that AP-42 may not be the most accurate source of emission factors, but that is the best information available at this time.
The permittee shall conduct testing to determine the emissions level or provide manufacturer’s certified emission factors no later than the date as required by condition G20 for test submittal.

E. NOx (includes both NO and NO₂ per November 17, 2021, letter) emitted from this source shall not exceed the following values for each Ladle Preheater Unit on a daily average basis:

<table>
<thead>
<tr>
<th>Ladle Preheater</th>
<th>Maximum Allowable Emissions of NOx lb/MMBtu of natural gas</th>
<th>Allowable pounds NOx per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>0.098</td>
<td>0.98</td>
</tr>
<tr>
<td>#2</td>
<td>0.098</td>
<td>0.98</td>
</tr>
<tr>
<td>#3</td>
<td>0.098</td>
<td>0.98</td>
</tr>
<tr>
<td>Total for three units combined</td>
<td>0.098</td>
<td>2.94</td>
</tr>
</tbody>
</table>

The permittee shall combust only natural gas and use good combustion practices.

TAPCR 1200-03-09-.01(4) PSD-BACT, the applications dated September 16, 2021, and October 27, 2021, and additional information dated November 24, 2021

**Compliance Method:** Compliance with the NOx emission limitation shall be assured by compliance with **Conditions S4-1A.** (design heat input rate), **S4-1B.**, (fuel type), and the emission factor of 100 lb NOx/mmscf (converted to 0.098 lb NOx/MMBtu based on 1050 BTU/scf) from AP-42 1.4 Natural Gas Combustion Emission Factors Table 1.4-1)

It is recognized that AP-42 may not be the most accurate source of emission factors, but that is the best information available at this time

The permittee shall conduct testing to determine the emissions level or provide manufacturer’s certified emission factors no later than the date required by condition G20 for test submittal.

F. GHG (CO₂e) emitted from this source shall not exceed 15,387 tons per calendar year. The permittee shall combust only natural gas at this source and use good combustion practices, selection of the most efficient burner design available and periodic maintenance.

TAPCR 1200-03-09-.01(4) PSD-BACT and the application dated November 17, 2021

**Compliance Method:** The emission factors below from 40 CFR 98 assure compliance with this limit until the proposed emission factor (or manufacturer’s emission factor) is submitted with the stack test report (or information submitted in lieu of the stack test report) as specified by condition G16.

These values are specified at 40 CFR 98 as indicated below. See application dated November 17, 2021, for calculations
Permit Number: 979383  
Issuance Date: <Issuance Date, 2022>  
Expiration Date: April 30, 2025

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>BACT</th>
<th>Equivalent kg/mmbtu</th>
<th>Table Reference from 40 CFR Part 98 Subpart C</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂</td>
<td>117 lb/MMBtu</td>
<td>53.06</td>
<td>C-1</td>
</tr>
<tr>
<td>CH₄</td>
<td>0.0022 lb/MMBtu</td>
<td>1.0E-03</td>
<td>C-2</td>
</tr>
<tr>
<td>N₂O</td>
<td>0.00022 lb/MMBtu</td>
<td>1.0E-04</td>
<td>C-2</td>
</tr>
</tbody>
</table>

Calculation of maximum annual allowable (and actual) CO₂e emissions: 30 (total) MMBtu/hr x 117.1 lb CO₂e MMBtu x 8760 hrs/yr x 1 ton/2000 lb = 15,387 tons/yr

The permittee shall conduct testing to determine the emissions level of CO₂ or provide manufacturer’s certified emission factors no later than the date required by condition G20 for test submittal. However, testing is not required for CH₄ or N₂O due to the comparatively low level of these emissions.

S4-5. Source-Specific Visible Emissions Limitation(s)

Visible emissions from this source shall not exhibit greater than 10% opacity, except for one six-minute period in any one-hour period, and for no more than four six-minute periods in any 24-hour period. A stack is defined as any chimney, flue, conduit, exhaust, vent, or opening of any kind whatsoever, capable of, or used for, the emission of air contaminants.

TAPCR 1200-03-09-.01(4) BACT-PSD and the application dated November 17, 2021, TAPCR 1200-03-05-.01(3) and agreement letter dated February 7, 2022 (see appendix 7)

**Compliance Method:** Visible emissions shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).

All readings as required by this condition shall be submitted to the Division in accordance with **Condition G3**.

<table>
<thead>
<tr>
<th>Source No</th>
<th>Source Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>Fume Silos and bag packing – with passive vent filter exhaust to atmosphere at 1,413 acfm (ambient)</td>
</tr>
<tr>
<td></td>
<td>Materials collected by the SAF baghouses are pneumatically conveyed to the Fume Silos where they are stored before being transferred to railcars, trucks, or bags</td>
</tr>
</tbody>
</table>

S5-1. Input Limitation(s) or Statement(s) of Design

**Not Applicable**
S5-2. Production Limitation(s)

Not Applicable

S5-3. Operating Hour Limitation(s)

Not Applicable

S5-4. Emission Limitation(s)

Particulate Matter (PM/PM$_{10}$/PM$_{2.5}$) emitted from this source shall not exceed those limits expressed below, on a daily average basis.

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Maximum Allowable Emissions gr/dscf</th>
<th>Allowable pounds per hour at 1,413 acfm ambient</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM filterable</td>
<td>0.0022</td>
<td>0.0265</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>0.0022</td>
<td>0.0265</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>0.0022</td>
<td>0.0265</td>
</tr>
<tr>
<td>Total for all PM categories combined</td>
<td>0.0022</td>
<td>0.0265</td>
</tr>
</tbody>
</table>

1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021, TAPCR 1200-03-07.01(5) and the agreement letter dated February 7, 2022 (see Appendix 7)

Compliance Method: The permittee shall install, operate, and maintain a passive vent filter to control PM/PM$_{10}$/PM$_{2.5}$ emissions. The source(s) controlled by the passive vent filter shall not operate unless the passive vent filter control device is installed and in operation.

The permittee shall conduct passive vent filter monitoring in accordance with Condition G25(a) of this permit.

The permittee shall comply with the silicon production limit specified at condition S3-2.

As a PM BACT limit, the PM/PM$_{10}$/PM$_{2.5}$ emission factor is based on the passive vent filter vendor maximum exhaust loading guarantee (5 milligrams per normal meter cubed (mg/Nm3), which is equivalent to 0.0022 grains per standard cubic foot (gr/scf)). This value will be assumed to be the actual PM/PM$_{10}$/PM$_{2.5}$ emission factor due to the low volumetric flow.
S5-5. Source-Specific Visible Emissions Limitation(s)

Visible emissions from this source shall not exhibit greater than 10% opacity, except for one six-minute period in any one hour period, and for no more than four six-minute periods in any 24-hour period. A stack is defined as any chimney, flue, conduit, exhaust, vent, or opening of any kind whatsoever, capable of, or used for, the emission of air contaminants.

TAPCR 1200-03-09-.01(4) BACT-PSD and the application dated November 17, 2021, TAPCR 1200-03-05-.01(3) and agreement letter dated February 7, 2022 (see appendix 7)

Compliance Method: Visible emissions shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).

All readings as required by this condition shall be submitted to the Division in accordance with **Condition G3**.

<table>
<thead>
<tr>
<th>Source No</th>
<th>Source Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>06</td>
<td>Slag Handling, Crushing and Screening (following the SAF process) with Misting control</td>
</tr>
</tbody>
</table>

S6-1. Input Limitation(s) or Statement(s) of Design

The agreed material input rate for the Slag Handling and Crushing and Screening Operation is 20 tons/hr of slag crushed. Should the permittee need to modify the source(s) in a manner that increases the maximum material input rate a construction permit shall be applied for and received in accordance with TAPCR 1200-03-09-.01 prior to making the change.

TAPCR 1200-03-07-.01(5), applications dated September 16, 2021, and October 27, 2021, and the agreement letter dated January 14, 2022 (see Appendix 7)

Compliance Method: The permittee shall maintain a log of the actual amount of slag crushed on an hourly basis and calculate the daily average production rate. The log shall be retained in accordance with **Condition G10**.

**Log 3 Slag Daily Average Crushing Tonnage and Operation Hours of Operation**

<table>
<thead>
<tr>
<th>Month:</th>
<th>Year:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Day</th>
<th>Slag Crushed (tons)</th>
<th>Hours of Operation</th>
<th>*Daily Average Slag Crushing Rate (tons/hr.)</th>
<th>Day</th>
<th>Slag Crushed (tons)</th>
<th>Hours of Operation</th>
<th>Daily Average Slag Crushing Rate (tons/hr.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
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<td>17</td>
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</tr>
</tbody>
</table>
Permit Number: 979383
Issuance Date: <Issuance Date, 2022
Expiration Date: April 30, 2025

<p>| | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
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<td>31</td>
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<tr>
<td>16</td>
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<td></td>
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</tr>
</tbody>
</table>

*The daily average basis is to be calculated by dividing the mass value of a day’s Slag Crushing Production (tons) by the hours of operation for that same day.

Total hours for month ________________

S6-2. Production Limitation(s)

Not applicable

S6-3. Operating Hour Limitation(s)

A. Operating hours for the Slag Crushing and Screening operation shall not exceed 1 hour per each per calendar day.

TAPCR 1200-03-07-.01(5), applications dated September 16, 2021, and October 27, 2021, and the agreement letter dated January 14, 2022 (See Appendix 7)

**Compliance Method:** The permittee shall record the actual operating hours of the Crushing and Screening Operation on a daily basis in the format specified in condition **S6-1** of this permit, or in an alternative format which provides the same information. The log shall be retained in accordance with **Condition G10**.

B. The Slag Handling, Crushing and Screening operations at this process shall not operate between the hours of 11 p.m. and 7 a.m. local time.

**TAPCR 1200-03-09-.01(4) PSD- BACT**
Compliance Method: Permittee shall semiannually certify compliance with this requirement when submitting the report required by Condition G3.

S6-4. Emission Limitation(s)

Particulate matter (PM/PM$_{10}$/PM$_{2.5}$) emitted from this source (combined crushing and screening) shall not exceed the following limits on a daily average basis.

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Allowable pounds per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM filterable</td>
<td>0.068</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>0.0256</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>0.003</td>
</tr>
<tr>
<td>PM for all categories combined</td>
<td>0.097</td>
</tr>
</tbody>
</table>

Above values are based on the submittal and calculations dated November 17, 2021, from the application 1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021;

Compliance Method: Compliance with this emission limitation is assured by compliance with Condition S6-1 (process weight rate) and the emission factors from AP-42, as specified below.

### Crushed Stone Emission Factors (lb/Ton)

<table>
<thead>
<tr>
<th>Operation</th>
<th>PM</th>
<th>PM$_{10}$</th>
<th>PM$_{2.5}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Crushing (controlled) 3-12 inch</td>
<td>0.0012</td>
<td>0.00054</td>
<td>0.0001</td>
</tr>
<tr>
<td>Screening (controlled)</td>
<td>0.0022</td>
<td>0.00074</td>
<td>0.00005</td>
</tr>
</tbody>
</table>

Notes:

1. Emission factor based on AP-42 Section 11.19.2 (Crushed Stone Processing and Pulverized Mineral Processing), Table 2, controlled screening.

It is recognized that AP-42 may not be the most accurate source of emission factors, but that is the best information available at this time.

Emission control is provided by a water misting system that must operate whenever the crushing and screening operations are active. The facility shall comply with condition G26 for fugitive emissions for this outdoor process.

The facility shall maintain records that indicate if water misting spray was used during any equipment activity. Days when the equipment was not operated shall be noted in the records.
The permittee shall use Best Management Practices and comply with the provisions of condition G26 for submittal of a Preventative Maintenance Plan, including outdoor material handling.

S6-5. **Source-Specific Visible Emissions Limitation(s)**

Visible emissions from this source shall not exhibit greater than 12% opacity, except for one six-minute period in any one-hour period, and for no more than four six-minute periods in any 24-hour period. A stack is defined as any chimney, flue, conduit, exhaust, vent, or opening of any kind whatsoever, capable of, or used for, the emission of air contaminants.

TAPCR 1200-03-09-.01(4) BACT-PSD and applications dated September 16, 2021, and October 27, 2021

**Compliance Method:** Visible emissions shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).

All readings as required by this condition shall be submitted to the Division in accordance with **Condition G3**.

<table>
<thead>
<tr>
<th>Source No</th>
<th>Source Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>07</td>
<td>Finished Product Building (Crushing and Screening and bagging also enclosed truck and rail loadout) Baghouse control at 15,305 dscfm</td>
</tr>
</tbody>
</table>

S7-1. **Input Limitation(s) or Statement(s) of Design**

Not applicable

S7-2. **Production Limitation(s)**

Not applicable

S7-3. **Operating Hour Limitation(s)**

Not applicable

S7-4. **Emission Limitation(s)**

Particulate Matter (PM/PM$_{10}$/PM$_{2.5}$) emitted from this source shall not exceed the limits below,

<table>
<thead>
<tr>
<th>Allowable Emissions for Finished Product Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM Category</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>PM filterable</td>
</tr>
<tr>
<td>PM&lt;sub&gt;10&lt;/sub&gt;</td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>PM&lt;sub&gt;2.5&lt;/sub&gt;</td>
</tr>
<tr>
<td>Total for all PM categories combined</td>
</tr>
</tbody>
</table>

1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021, TAPCR 1200-03-07.01(5) and the agreement letter dated February 7, 2022 (see Appendix 7)

**Compliance Method:** The permittee shall install, operate, and maintain a baghouse to control PM/PM10/PM2.5 emissions. The source(s) controlled by the fabric filter(s) / baghouse(s) shall not operate unless the baghouse control device is installed and in operation.

The permittee shall conduct performance testing in accordance with conditions G16 through G24 of this permit.

The permittee shall conduct baghouse monitoring to establish a minimum pressure drop for this source in accordance with Condition G25 of this permit.

The permittee shall record the pressure drop on a daily basis in accordance with Condition G10. The pressure drop shall be recorded in Log 1 of Appendix 8 or in another format providing the same information. Prior to establishment of source-specific minimum pressure drop, the permittee shall meet the minimum pressure drop of 10 inches of water as recommended by the manufacturer.

The permittee shall comply with the Silicon production limit specified at condition S3-2.

The permittee shall develop an emission factor for PM/PM<sub>10</sub>/PM<sub>2.5</sub> (each) in terms of grains per dry standard cubic foot of exhaust gas based on the results of the stack test required by condition G16. Until the proposed emission factor is submitted with the stack test report as specified by G16, the factor of 0.0022 gr/dscf shall be used.

As a PM BACT limit, the PM/PM<sub>10</sub>/PM<sub>2.5</sub> emission factor is based on the baghouse vendor maximum exhaust loading guarantee (5 milligrams per normal meter cubed (mg/Nm3), which is equivalent to 0.0022 grains per standard cubic foot (gr/scf)).

**S7-5. Source-Specific Visible Emissions Limitation(s)**

Visible emissions from this source shall not exhibit greater than 10% opacity, except for one six-minute period in any one-hour period, and for no more than four six-minute periods in any 24-hour period. A stack is defined as any chimney, flue, conduit, exhaust, vent, or opening of any kind whatsoever, capable of, or used for, the emission of air contaminants.

1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021, TAPCR 1200-03-05-.01(3) and agreement letter dated February 7, 2022 (see appendix 7)

**Compliance Method:** Visible emissions shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).
All readings as required by this condition shall be submitted to the Division in accordance with Condition G3.

<table>
<thead>
<tr>
<th>Source No</th>
<th>Source Description</th>
</tr>
</thead>
</table>
| 08        | Emergency Natural gas-fired Reciprocating Engine 2,682 HP (mech.)  
A 500-hour per year default operating time is assumed |

S8-1. Input Limitation(s) or Statement(s) of Design

Only natural gas shall be used as fuel(s) for the engine. The engine is only capable of burning natural gas as fuel. Should the permittee need to modify the engine to allow the use of a fuel other than natural gas, a construction permit shall first be applied for and received in accordance with TAPCR 1200-03-09-.01 prior to making the change.

TAPCR 1200-03-09-.03(8) and the applications dated September 16, 2021, and October 27, 2021, with additional information dated November 17, 2021, from the permittee.

COMPLIANCE METHOD: The permittee shall maintain documentation to demonstrate the type(s) of fuel used by the engine. Documentation shall include, but is not limited to, manufacturer’s specifications, purchase records, operating manuals, or a tag affixed to the unit by the manufacturer. These documents shall be kept readily available/accessible and made available upon request by the Technical Secretary or a Division representative.
S8-2. Production Limitation(s)

The Mechanical Horsepower Rating of this unit is 2,682 HP. Should the permittee need to modify the source(s) in a manner that increases the Horsepower rating a construction permit shall be applied for and received in accordance with TAPCR 1200-03-09-.01 prior to making the change.

TAPCR 1200-03-1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021, with additional information dated November 17, 2021, from the permittee.

**Compliance Method:** The permittee shall maintain documentation to demonstrate the rated horsepower for the Emergency Engine - Generator. Documentation shall include, but is not limited to, manufacturer’s specifications, purchase records, operating manuals, or a tag affixed to the unit by the manufacturer. These documents shall be kept readily available/accessible and made available upon request by the Technical Secretary or a Division representative.

S8-3. Operating Hour Limitation(s)

*Not applicable*

S8-4. Emission Limitation(s)

A. Particulate matter (PM/PM$_{10}$/PM$_{2.5}$) emitted from this source shall not exceed the value as listed below on a daily average basis.

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Allowable Emissions</th>
<th>Allowable PM Emission rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM filterable</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
</tr>
<tr>
<td>Total for all PM categories combined</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
</tr>
</tbody>
</table>

The permittee shall utilize:

- Combustion of natural gas only;
- Good combustion practice; and
- Compliance with NSPS JJJJ.

TAPCR 1200-03-1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021, with additional information dated November 17, 2021, from the permittee.

**Compliance Method:** Compliance with the PM emission limitation shall be assured by compliance with Conditions S8-2 (power output rating), S8-1 (fuel type), and the Manufacturer’s Engine specification sheet.
emission factor. Also Table 3.2-3 Emission Factors for 4-Stroke Rich Burn engines provides a combined factor of 0.01941 lb/MMBtu for PM filterable and PM condensable, which will serve as a compliance measure until the test report or manufacturer’s certification as required by condition G16 is submitted.

The permittee shall conduct testing to determine the emissions level or provide manufacturer’s certified emission factors no later than the date as required by condition G20 for test submittal.

B. SO₂ emitted from this source shall not exceed the value as listed below on a daily average basis.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Allowable SO₂ (units)</th>
<th>Allowable SO₂ (units)</th>
<th>Basis for Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Natural gas-fired Reciprocating Engine</td>
<td>0.0029 lb/hr</td>
<td>0.0005 g SO₂/hp-hr</td>
<td>AP-42 Table 3.2-3 at 5.88E-04 lb/MMBtu and permittee calculations.</td>
</tr>
</tbody>
</table>

It is recognized that AP-42 may not be the most accurate source of emission factors, but that is the best information available at this time.

The permittee shall utilize:

- Combustion of natural gas only;
- Good combustion practice; and
- Compliance with NSPS JJJJ.

TAPCR 1200-03-1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021, with additional information dated November 17, 2021, from the permittee.

**Compliance Method:** Compliance with the SO₂ emission limitation shall be assured by compliance with Conditions S8-2 (power output rating), S8-1, (fuel type), and AP-42 Table 3.2-3. factor of 0.000588 lb/MMBtu heat input.

It is recognized that AP-42 may not be the most accurate source of emission factors, but that is the best information available at this time.

The permittee shall conduct testing to determine the emissions level or provide manufacturer’s certified emission factors no later than the date as required by condition G20 for test submittal.

C. CO emitted from this source shall not exceed the value below on a daily average basis.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Allowable CO (units)</th>
<th>Allowable CO (units)</th>
<th>Basis for Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Natural gas-firree Reciprocating Engine</td>
<td>13.01 lb/hr</td>
<td>2.2 g/hp-hr</td>
<td>Manufacturer Engine</td>
</tr>
</tbody>
</table>
Note that the above emission limit is stricter than 40 CFR §60.4233(e) at 4.0 g/brake-horsepower-hr which is equal to 23.6 lb/hr

The permittee shall utilize:

- Combustion of natural gas only;
- Good combustion practice; and
- Compliance with NSPS JJJJ.

TAPCR 1200-03-1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021, with additional information dated November 17, 2021, from the permittee. TAPCR 1200-03-09-.03(8) and 40 CFR 60 Subpart JJJJ

**Compliance Method:** Compliance with the above limits is demonstrated by compliance with Conditions S8-2 (power output rating), S8-1, (fuel type), and compliance with 40 CFR 60 Subpart JJJJ.

The permittee shall conduct testing to determine the emissions level or provide manufacturer’s certified emission factors no later than the date as required by condition G20 for test submittal.

D. VOC emitted from this source shall not exceed the value as listed below on a daily average basis.

<table>
<thead>
<tr>
<th>Unit Description</th>
<th>Allowable VOC (units)</th>
<th>Allowable VOC (units)</th>
<th>Basis for Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Natural gas</td>
<td>5.9 lb/hr</td>
<td>1.0 g/hp-hr</td>
<td>40 CFR §60.4233(e)</td>
</tr>
<tr>
<td>fired Reciprocating Engine</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The permittee shall utilize:

- Combustion of natural gas only;
- Good combustion practice; and
- Compliance with NSPS JJJJ.

TAPCR 1200-03-1200-03-09-.01(4) BACT-PSD and the application with date September 16, 2021, with additional information dated November 17, 2021, from the permittee. Also, TAPCR 1200-03-09-.03(8) and 40 CFR 60 Subpart JJJJ

**Compliance Method:** Compliance with the above limits is demonstrated by compliance with Conditions S8-2 (power output rating), S8-1, (fuel type), compliance with 40 CFR 60 Subpart JJJJ (see section F3 conditions)

The permittee shall conduct testing to determine the emissions level or provide manufacturer’s certified emission factors no later than the date as required by condition G20 for test submittal
E. NOx emitted from this source shall not exceed the value below on a daily average basis.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Allowable NOx Emissions, units</th>
<th>NOx Basis for Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Natural gas-fired</td>
<td>1.2 g/ -horsepower-hr</td>
<td>Manufacturer Engine Specifications</td>
</tr>
<tr>
<td>Reciprocating Engine</td>
<td>7.1 lb/hr</td>
<td>Engine Specifications</td>
</tr>
</tbody>
</table>

The above emission limit is stricter than 40 CFR §60.4233(e) at 2.0 g/brake-horsepower-hr which is equal to 11.8 lb/hr

The permittee shall utilize:

- Combustion of natural gas only;
- Good combustion practice; and
- Compliance with NSPS JJJJ.

TAPCR 1200-03-1200-03-09-.01(4) BACT-PSD and the applications dated September 16, 2021, and October 27, 2021, with additional information dated November 17, 2021, from the permittee. TAPCR 1200-03-09-.03(8) and 40 CFR 60 Subpart JJJJ

**Compliance Method:** Compliance with the above limits is demonstrated by compliance with Conditions S8-2 (power output rating), S8-1 (fuel type), and compliance with 40 CFR 60 Subpart JJJJ (see section F3 conditions).

The permittee shall conduct testing to determine the emissions level or provide manufacturer’s certified emission factors no later than the date as required by condition G20 for test submittal.

F. GHG (CO₂e) emitted from this source shall not exceed value as listed below.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Allowable CO₂e Emissions, based on 500 hr/yr default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Natural gas-fired</td>
<td>145.9 tons per calendar year</td>
</tr>
<tr>
<td>Reciprocating Engine</td>
<td></td>
</tr>
</tbody>
</table>

TAPCR 1200-03-1200-03-09-.01(4) BACT-PSD and the application dated September 16, 2021, with additional information dated November 17, 2021, from the permittee.

The permittee shall utilize:

- Combustion of natural gas only;
- Good combustion practice; and
- Compliance with NSPS JJJJ.
Compliance Method: Compliance with the above limits is demonstrated by compliance with conditions S8-2 (power output rating), S8-1 (fuel type), and 40 CFR 98 Subpart C, Tables C-1 and C-2 as seen below.

### Greenhouse Gas Emissions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>CAS No.</th>
<th>Emission Factor $^1$</th>
<th>Emission Rate $^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO$_2$</td>
<td>CO2</td>
<td>-</td>
<td>116.976076 lb/hr</td>
</tr>
<tr>
<td>CH$_4$</td>
<td>CH4</td>
<td>-</td>
<td>0.0022 lb/MMBtu</td>
</tr>
<tr>
<td>N$_2$O</td>
<td>N2O</td>
<td>-</td>
<td>0.00022 lb/hr</td>
</tr>
<tr>
<td>CO$_2$e</td>
<td>CO2e</td>
<td>-</td>
<td>117 lb/day</td>
</tr>
</tbody>
</table>

Notes:

1. Unless otherwise noted, emission factors are from AP42, Table 3.2-3. CO$_2$, methane and nitrous oxide emission factors from 40 CFR 98, Subpart C, Tables C-1 & C-2.
2. Maximum hourly and daily emissions based on 1 engine operating for 60 hours. Annual emissions based on 100 hours of testing and 500 hr/yr of emergency operation.
3. CO$_2$e calculated based on global warming potential (GWP) for each greenhouse gas: CO$_2$ = 1; CH$_4$ = 25; and N$_2$O = 298 (40 CFR Part 98, Subpart A).

At 584.29 lb/hr and 500 hr/yr, the CO$_2$e emissions would be 145.9 tons per year. Calculations are from the applications dated September 16, 2021, and October 27, 2021, and additional information dated November 17, 2021.

The permittee shall conduct testing to determine the CO$_2$ emissions level or provide manufacturer’s certified emission factors no later than the date required by condition G20 for test submittal.

S8--5. Source-Specific Visible Emissions Limitation(s)

Visible emissions from this source shall not exhibit greater than 10% opacity, except for one six-minute period in any one hour period, and for no more than four six-minute periods in any 24-hour period. A stack is defined as any chimney, flue, conduit, exhaust, vent, or opening of any kind whatsoever, capable of, or used for, the emission of air contaminants.

1200-03-09-.01(4) BACT-PSD and applications dated September 16, 2021, and October 27, 2021

Compliance Method: Visible emissions shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).

All readings as required by this condition shall be submitted to the Division in accordance with Condition G3.

Federally Applicable Requirements. The following requirements are included in this permit pursuant to TAPCR 1200-09-.03(8). These requirements are provided verbatim in this document for simplicity. Any reference to the Administrator in these conditions shall instead be a reference to the Technical Secretary, except for specific authorities that have not been delegated to the State of Tennessee. References to the appropriate Appendix are included for direction to the associated rule tables.

| 40 CFR 60 Subpart JJJ | Standards of Performance for Stationary Spark Ignition |
F3. 40 CFR 60 Subpart JJJJ Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

F3-1. §60.4230 Am I subject to this subpart?

(a) The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE) as specified in paragraphs (a)(1) through (6) of §60.4230. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator.

(4) Owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured:

(i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP)

F3-2. § 60.4233 What emission standards must I meet if I am an owner or operator of a stationary SI internal combustion engine?

(e) Owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 75 KW (100 HP) (except gasoline and rich burn engines that use LPG) must comply with the emission standards in Table 1 to this subpart for their stationary SI ICE.

See Appendix 11 for Table 1

F3-3. § 60.4234 How long must I meet the emission standards if I am an owner or operator of a stationary SI internal combustion engine?

Owners and operators of stationary SI ICE must operate and maintain stationary SI ICE that achieve the emission standards as required in § 60.4233 over the entire life of the engine.

F3-4. § 60.4237 What are the monitoring requirements if I am an owner or operator of an emergency stationary SI internal combustion engine?

(a) Starting on July 1, 2010, if the emergency stationary SI internal combustion engine that is greater than or equal to 500 HP that was built on or after July 1, 2010, does not meet the standards applicable to non-emergency engines, the owner or operator must install a non-resettable hour meter.
F3-5. § 60.4243 What are my compliance requirements if I am an owner or operator of a stationary SI internal combustion engine?

(b) If you are an owner or operator of a stationary SI internal combustion engine and must comply with the emission standards specified in § 60.4233(d) or (e), you must demonstrate compliance according to one of the methods specified in paragraphs (b)(1) and (2) of §60.4243.

(1) Purchasing an engine certified according to procedures specified in this subpart, for the same model year and demonstrating compliance according to one of the methods specified in paragraph (a) of §60.4243.

(2) Purchasing a non-certified engine and demonstrating compliance with the emission standards specified in § 60.4233(d) or (e) and according to the requirements specified in § 60.4244, as applicable, and according to paragraphs (b)(2)(i) and (ii) of §60.4243.

(ii) If you are an owner or operator of a stationary SI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

(d) If you own or operate an emergency stationary ICE, you must operate the emergency stationary ICE according to the requirements in paragraphs (d)(1) through (3) of this section. In order for the engine to be considered an emergency stationary ICE under this subpart, any operation other than emergency operation, maintenance and testing, emergency demand response, and operation in non-emergency situations for 50 hours per year, as described in paragraphs (d)(1) through (3) of this section, is prohibited. If you do not operate the engine according to the requirements in paragraphs (d)(1) through (3) of this section, the engine will not be considered an emergency engine under this subpart and must meet all requirements for non-emergency engines.

(1) There is no time limit on the use of emergency stationary ICE in emergency situations.

(2) You may operate your emergency stationary ICE for any combination of the purposes specified in paragraphs (d)(2)(i) through (iii) of this section for a maximum of 100 hours per calendar year. Any operation for non-emergency situations as allowed by paragraph (d)(3) of this section counts as part of the 100 hours per calendar year allowed by this paragraph (d)(2).

(i) Emergency stationary ICE may be operated for maintenance checks and readiness testing, provided that the tests are recommended by federal, state or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that federal, state, or local standards require maintenance and testing of emergency ICE beyond 100 hours per calendar year.

(ii) Emergency stationary ICE may be operated for emergency demand response for periods in which the Reliability Coordinator under the North American Electric Reliability Corporation (NERC) Reliability Standard EOP-002-3, Capacity and Energy Emergencies (incorporated by reference, see §60.17), or other authorized entity as determined by the Reliability
Coordinator, has declared an Energy Emergency Alert Level 2 as defined in the NERC Reliability Standard EOP-002-3.

(iii) Emergency stationary ICE may be operated for periods where there is a deviation of voltage or frequency of 5 percent or greater below standard voltage or frequency.

(3) Emergency stationary ICE may be operated for up to 50 hours per calendar year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per calendar year for maintenance and testing and emergency demand response provided in paragraph (d)(2) of this section. Except as provided in paragraph (d)(3)(i) of this section, the 50 hours per year for non-emergency situations cannot be used for peak shaving or non-emergency demand response, or to generate income for a facility to an electric grid or otherwise supply power as part of a financial arrangement with another entity.

(g) It is expected that air-to-fuel ratio controllers will be used with the operation of three-way catalysts/non-selective catalytic reduction. The AFR controller must be maintained and operated appropriately in order to ensure proper operation of the engine and control device to minimize emissions at all times.

F3-6. §60.4244 What test methods and other procedures must I use if I am an owner or operator of a stationary SI internal combustion engine?

Owners and operators of stationary SI ICE who conduct performance tests must follow the procedures in paragraphs (a) through (f) of this section.

(a) Each performance test must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and according to the requirements in §60.8 and under the specific conditions that are specified by Table 2 to this subpart.

See Appendix 11 for Table 2

(b) You may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in §60.8(c). If your stationary SI internal combustion engine is non-operational, you do not need to startup the engine solely to conduct a performance test; however, you must conduct the performance test immediately upon startup of the engine.

(c) You must conduct three separate test runs for each performance test required in this section, as specified in §60.8(f). Each test run must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and last at least 1 hour.

(d) To determine compliance with the NOX mass per unit output emission limitation use Equation 1 of §60.4244

(e) To determine compliance with the CO mass per unit output emission limitation, use Equation 2 of §60.4244

(f) When calculating emissions of VOC, emissions of formaldehyde should not be included. To determine compliance with the VOC mass per unit output emission limitation use Equation 3 of §60.4244

(g) If the owner/operator chooses to measure VOC emissions using either Method 18 of 40 CFR part 60, Appendix
A, or Method 320 of 40 CFR part 63, appendix A, then it has the option of correcting the measured VOC emissions to account for the potential differences in measured values between these methods and Method 25A. The results from Method 18 and Method 320 can be corrected for response factor differences using Equations 4 and 5 of this section. The corrected VOC concentration can then be placed on a propane basis using Equation 6 of this section.

F3-7. §60.4245 What are my notification, reporting, and recordkeeping requirements if I am an owner or operator of a stationary SI internal combustion engine?

Owners or operators of stationary SI ICE must meet the following notification, reporting and recordkeeping requirements.

(a) Owners and operators of all stationary SI ICE must keep records of the information in paragraphs (a)(1) through (4) of this section.

(1) All notifications submitted to comply with this subpart and all documentation supporting any notification.

(2) Maintenance conducted on the engine.

(3) If the stationary SI internal combustion engine is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR parts 1048, 1054, and 1060, as applicable.

(4) If the stationary SI internal combustion engine is not a certified engine or is a certified engine operating in a non-certified manner and subject to §60.4243(a)(2), documentation that the engine meets the emission standards.

(b) For all stationary SI emergency ICE greater than or equal to 500 HP manufactured on or after July 1, 2010, that do not meet the standards applicable to non-emergency engines, the owner or operator of must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter.

(c) Owners and operators of stationary SI ICE greater than or equal to 500 HP that have not been certified by an engine manufacturer to meet the emission standards in §60.4231 must submit an initial notification as required in §60.7(a)(1). The notification must include the information in paragraphs (c)(1) through (5) of §60.4245.

(1) Name and address of the owner or operator;

(2) The address of the affected source;

(3) Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement;

(4) Emission control equipment; and

(5) Fuel used.

(d) Owners and operators of stationary SI ICE that are subject to performance testing must submit a copy of each performance test as conducted in §60.4244 within 60 days after the test has been completed. Performance test reports using EPA Method 18, EPA Method 320, or ASTM D6348-03 (incorporated by...
reference-see 40 CFR 60.17) to measure VOC require reporting of all QA/QC data. For Method 18, report results from sections 8.4 and 11.1.1.4; for Method 320, report results from sections 8.6.2, 9.0, and 13.0; and for ASTM D6348-03 report results of all QA/QC procedures in Annexes 1-7.

F3-8. §60.4246 What parts of the General Provisions apply to me?

Table 3 to subpart JJJJ shows which parts of the General Provisions in §§60.1 through 60.19 apply to you.

See Appendix 11 for Table 3

Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

F4-1. § 63.6580 What is the purpose of subpart ZZZZ?

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations.

F4-2. § 63.6585 Am I subject to this subpart?

You are subject to this subpart if you own or operate a stationary RICE at a major or area source of HAP emissions, except if the stationary RICE is being tested at a stationary RICE test cell/stand.

(a) A stationary RICE is any internal combustion engine which uses reciprocating motion to convert heat energy into mechanical work and which is not mobile. Stationary RICE differ from mobile RICE in that a stationary RICE is not a non-road engine as defined at 40 CFR 1068.30, and is not used to propel a motor vehicle or a vehicle used solely for competition.

(b) A major source of HAP emissions is a plant site that emits or has the potential to emit any single HAP at a rate of 10 tons (9.07 megagrams) or more per year or any combination of HAP at a rate of 25 tons (22.68 megagrams) or more per year, except that for oil and gas production facilities, a major source of HAP emissions is determined for each surface site.

(c) An area source of HAP emissions is a source that is not a major source.

F4-3. § 63.6590 What parts of my plant does this subpart cover?

This subpart applies to each affected source.

(a) Affected source. An affected source is any existing, new, or reconstructed stationary RICE located at a major or area source of HAP emissions, excluding stationary RICE being tested at a stationary RICE test cell/stand.

(2) New stationary RICE.
(i) A stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions is new if you commenced construction of the stationary RICE on or after December 19, 2002.

(ii) A stationary RICE with a site rating of equal to or less than 500 brake HP located at a major source of HAP emissions is new if you commenced construction of the stationary RICE on or after June 12, 2006.

(iii) A stationary RICE located at an area source of HAP emissions is new if you commenced construction of the stationary RICE on or after June 12, 2006.

(c) **Stationary RICE subject to Regulations under 40 CFR Part 60.** An affected source that meets any of the criteria in paragraphs (c)(1) through (7) of this section must meet the requirements of this part by meeting the requirements of 40 CFR part 60 subpart IIII, for compression ignition engines or 40 CFR part 60 subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under this part.

(1) A new or reconstructed stationary RICE located at an area source;

F4-4. § 63.6595 When do I have to comply with this subpart?

(a) **Affected sources.**

(7) If you start up your new or reconstructed stationary RICE located at an area source of HAP emissions after January 18, 2008, you must comply with the applicable emission limitations and operating limitations in this subpart upon startup of your affected source.
<table>
<thead>
<tr>
<th>Source No</th>
<th>Source Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>09</td>
<td>Diesel Fuel Storage 10,000 gallon storage tank</td>
</tr>
</tbody>
</table>

VOC emissions are estimated at less than 1 lb/year (this is for reference purposes and is not a limit) based on AP-Section 7.1 Organic Liquid Storage Tanks, Section 7.1.3.1 Routine Losses From Fixed Roof Tanks

S9-1. Input Limitation(s) or Statement(s) of Design

Not applicable

S9-2. Production Limitation(s)

Not Applicable

S9-3. Operating Hour Limitation(s)

Not Applicable

S9-4. Emission Limitation(s)

Not applicable

S9-5. Source-Specific Visible Emissions Limitation(s)

Not applicable

S9-6. Operational requirements

Any fuel introduced into this storage tank shall be conveyed by submerged fill. Submerged fill refers to the filling of a storage tank in a way that causes product to enter the vessel below the liquid level. The permittee shall utilize good design, operation, and maintenance practices to minimize VOC emissions. The permittee shall use good design, maintenance, and operating practices. The tank shall have a light or white tank color.

TAPCR 1200-03-09-.01(4)  BACT-PSD

Compliance Method: Permittee shall semiannually certify compliance with this requirement when submitting the report required by Condition G3.

(End of conditions)

The permit application gives the location of this source as 36.439° Latitude and -89.467° Longitude.
### Appendix 1: Notification of Change in Responsible Person

<table>
<thead>
<tr>
<th>Facility (Permittee)</th>
<th>Sinova Silicon LLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility ID</td>
<td>48-0046</td>
</tr>
</tbody>
</table>

#### Former Responsible Person

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
</table>

#### New Responsible Person

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
</table>

**Email**

**Date New Responsible Person was assigned this duty:**

As the Responsible Person of the above mentioned facility (permittee), I certify that the information contained in this Notification is accurate and true to the best of my knowledge. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

<table>
<thead>
<tr>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

**Signer’s name (print)** | **Title** | **Phone (with area code)** |
|--------------------------|-----------|-----------------------------|
## Appendix 2: Notification of Changes

**Facility (Permittee)**

Sinova Silicon LLC

**Facility ID**

48-0046

**Source No.**


<table>
<thead>
<tr>
<th>Control Equipment</th>
<th>Stack Height (Feet)</th>
<th>Stack Diameter (Feet)</th>
<th>Exit Velocity (Feet/Second)</th>
<th>Exit Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td></td>
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<td></td>
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<tr>
<td>Proposed</td>
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<tr>
<td>Current</td>
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<td>Proposed</td>
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</tbody>
</table>

**Comments:**

As the Responsible Person of the above mentioned facility (permittee), I certify that the information contained in this Notification is accurate and true to the best of my knowledge. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.
Appendix 3: Notification of Ownership Change

Facility (Permittee)  Sinova Silicon LLC  (Previous Owner)
Facility ID  48-0046

Facility (Permittee)  ____________________________  (New Owner)

Email Address  ____________________________

Secretary of State Control Number  [as registered with the TN Secretary of State]

Date of Ownership Change  ____________________________

Comments:

As the responsible person for the new owner or operator of the above mentioned facility (permittee):

- I agree to not make any changes to the stationary source(s) that meet the definition of modification as defined in Division 1200-03 or Division 0400-30\(^1\), and
- I agree to comply with the conditions contained in the permits listed below, Division 1200-03 and Division 0400-30 of the Tennessee Air Pollution Control Regulations, the Tennessee Air Quality Act, and any documented agreements made by the previous owner to the Technical Secretary.

List all active permits issued to the facility for which the owner wishes to assume

\(^1\) Appropriate application forms must be submitted prior to modification of the stationary source(s).
ownership:

As the Responsible Person of the above mentioned facility (permittee), I certify that the information contained in this Notification is accurate and true to the best of my knowledge. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

<table>
<thead>
<tr>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signer’s name (print)</td>
<td>Title</td>
</tr>
</tbody>
</table>
Appendix 4: Startup Certification

Facility (Permittee): Sinova Silicon LLC

Facility ID 48-0046

Startup Certification for Source No. 

The permittee shall certify the startup date for each new or modified air contaminant source regulated by construction permit 979383 by submitting this document.

Date of startup: ___________________ /___________ / ___________

Month   Day   Year

As the Responsible Person of the above mentioned facility (permittee), I certify that the information contained in this Startup Certification is accurate and true to the best of my knowledge. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

Signature

Date

Signer’s name (print) Title Phone (with area code)
Appendix 5: Fees

Not Applicable
Appendix 6: Emission Statement for VOC and NOx

Not Applicable
Appendix 7: Agreement Letters
January 14, 2022

Jim Johnson  
Tennessee Department of Environment and Conservation  
Division of Air Pollution Control  
William R. Snodgrass Tennessee Tower, 15th Floor  
312 Rosa L. Parks Avenue  
Nashville, Tennessee 37243

RE: Permit Agreement  
Sinova Silicon, Inc.  
Cates Landing, Tennessee

Dear Mr. Johnson:

On behalf of Sinova Silicon, Inc. (Sinova), the following operational and emission permit limitations are agreed upon for the following emission units and/or air pollution control devices located at the above referenced facility:

- Slag Crushing and Slag Screening operations will each not process more than 20 tons of slag per hour, and will each operate for no more than 1 hour per day; and
- PM10/PM2.5 emissions from the Fume Silo Vents will be limited to no more than 0.0022 grains per dry standard cubic foot (gr/dscf) using fabric filter media.

Ongoing compliance with the above limitations on the Slag Crushing and Slag Screening operations will be demonstrated by Sinova through maintaining records associated with those operations. The Fume Silo Vents will additionally not exceed an opacity limit of 10%. Ongoing compliance with the above emission limitation on the Fume Silo Vents will be assured by employing manufacturer-recommended filter media and maintaining associated operation and maintenance records.

Should you have any questions or require additional information, please contact James May via phone at (780) 328-6542 ext. 250 or via email at jim.may@sinovaglobal.com.

On behalf of Sinova, I agree to the above limitations. I am authorized to represent and bind the facility in environmental affairs.

Signature: [Signature]
Name (printed): Jayson Tymko  
Title: President  
Date: January 14, 2022

Sinova Silicon, Inc.  
5241 Calgary Trail Unit 601  
Edmonton, AB T6H 5G8
February 7, 2022

Michelle Owenby
Tennessee Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, Tennessee 37243

RE: Permit Agreement Letter
Sinova Silicon, Inc.
Cates Landing, Tennessee

Emission Source Reference No. 48-0046 / Permit No. 979383

Dear Ms. Owenby:

Sinova Silicon, Inc. (Sinova) agrees that particulate matter (PM) emissions from the sources located at the above referenced facility and indicated in this letter will each be limited by permit conditions to not exceed 5 milligrams of PM per normal cubic meter (mg/Nm³), which is equivalent to 0.0022 grains of PM per dry standard cubic foot (gr/dscf), of exhaust gas. These sources will comply with the emission limits by employing fabric filter air pollution control devices. The indicated sources are:

- Source 48-0046-02 Proportioning System Building Baghouse
- Source 48-0046-03 Submerged Arc Furnace #1 & #2 (Main Furnace Building Baghouse)
- Source 48-0046-05 Silica Fume Silo Vents
- Source 48-0046-07 Finished Product Crushing & Screening Building Baghouse

Hourly limits for each of these sources are presented below.

**48-0046-02 Proportioning System Building Baghouse**

Particulate matter (PM) emitted from Proportioning System Building Baghouse shall not exceed the limits specified in the table below.

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Allowable PM Emission Factor (gr/dscf)</th>
<th>Allowable Emission Rate (lb/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM Filterable</td>
<td>0.0022</td>
<td>0.992</td>
</tr>
<tr>
<td>PM_{10}</td>
<td>0.0022</td>
<td>0.992</td>
</tr>
<tr>
<td>PM_{2.5}</td>
<td>0.0022</td>
<td>0.992</td>
</tr>
<tr>
<td>Combined Total</td>
<td>0.0022</td>
<td>0.992</td>
</tr>
</tbody>
</table>

1. Allowable emission rates are calculated using a maximum exhaust gas flow rate of 52,980 scfm (assumed to be dry scfm).

Sinova Silicon, Inc.
5241 Calgary Trail Unit 601
Edmonton, AB T6H 5G8
48-0046-03 Two Submerged Arc Furnace #1 and #2 (Main Furnace Building Baghouse)

Particulate matter (PM) emitted from Submerged Arc Furnace #1 and Submerged Arc Furnace #2, which both exhaust to the atmosphere through the Main Furnace Building Baghouse, shall not exceed the limits specified in the tables below.

**Submerged Arc Furnace #1**

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Allowable PM Emission Factor (gr/dscf)</th>
<th>Allowable PM Emission Rate¹ (lb/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM Filterable</td>
<td>0.0022</td>
<td>2.43</td>
</tr>
<tr>
<td>PM_{10}</td>
<td>0.0022</td>
<td>2.43</td>
</tr>
<tr>
<td>PM_{2.5}</td>
<td>0.0022</td>
<td>2.43</td>
</tr>
<tr>
<td>Combined Total</td>
<td>0.0022</td>
<td>2.43</td>
</tr>
</tbody>
</table>

1. Allowable emission rates are calculated using a maximum exhaust gas flow rate of 129,815 scfm (assumed to be dry scfm), which is the maximum combined flow rate of the two Submerged Arc Furnaces.

**Submerged Arc Furnace #2**

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Allowable PM Emission Factor (gr/dscf)</th>
<th>Allowable PM Emission Rate¹ (lb/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM Filterable</td>
<td>0.0022</td>
<td>2.43</td>
</tr>
<tr>
<td>PM_{10}</td>
<td>0.0022</td>
<td>2.43</td>
</tr>
<tr>
<td>PM_{2.5}</td>
<td>0.0022</td>
<td>2.43</td>
</tr>
<tr>
<td>Combined Total</td>
<td>0.0022</td>
<td>2.43</td>
</tr>
</tbody>
</table>

1. Allowable emission rates are calculated using a maximum exhaust gas flow rate of 129,815 scfm (assumed to be dry scfm), which is the maximum combined flow rate of the two Submerged Arc Furnaces.

48-0046-05 Silica Fume Silo Vents

Particulate Matter (PM) emitted from the Silica Fume Silo Vents shall not exceed the limits specified in the table below

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Allowable PM Emission Factor (gr/dscf)</th>
<th>Allowable Emission Rate¹ (lb/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM Filterable</td>
<td>0.0022</td>
<td>0.0265</td>
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<tr>
<td>PM_{10}</td>
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<td>0.0265</td>
</tr>
<tr>
<td>PM_{2.5}</td>
<td>0.0022</td>
<td>0.0265</td>
</tr>
<tr>
<td>Combined Total</td>
<td>0.0022</td>
<td>0.0265</td>
</tr>
</tbody>
</table>

1. Allowable emission rates are calculated using a maximum exhaust gas flow rate of 1,413 scfm (assumed to be dry scfm).

48-0046-07 Finished Product Crushing & Screening Building Baghouse

Particulate Matter (PM) emitted from the Finished Product Crushing & Screening Building Baghouse shall not exceed the limits specified in the table below.

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Allowable PM Emission Factor (gr/dscf)</th>
<th>Allowable Emission Rate¹ (lb/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM Filterable</td>
<td>0.0022</td>
<td>0.287</td>
</tr>
<tr>
<td>PM_{10}</td>
<td>0.0022</td>
<td>0.287</td>
</tr>
</tbody>
</table>
### Table

<table>
<thead>
<tr>
<th>Component</th>
<th>Emission Rate (0.0022)</th>
<th>Maximum (0.287)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{2.5}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combined Total</td>
<td>0.0022</td>
<td>0.287</td>
</tr>
</tbody>
</table>

1. Allowable emission rates are calculated using a maximum exhaust gas flow rate of 15,305 scfm (assumed to be dry scfm).

In addition, an opacity limit of 10 percent will apply to each of these baghouses. Sinova shall demonstrate compliance with these limitations by initial performance tests conducted under production rates within 90 percent of maximum design production rates. These initial performance tests shall be conducted not later than 180 days after achieving the maximum production rate. Ongoing compliance will be assured by employing manufacturer-recommended filter media and measuring the pressure drop across each baghouse to monitor performance.

Should you have any questions or require additional information, please contact James May via phone at (780) 328-6542 ext. 250 or via email at jim.may@sinovaglobal.com.

On behalf of Sinova, I agree to the above limitations. I am authorized to represent and bind the facility in environmental affairs.

**Signature**

Name (printed): Jayson Tymko  
Title: President  
Date: February 7, 2022
Appendix 8: Example Logs
LOG 1 Plantwide Baghouse Pressure Drop Monitoring

<table>
<thead>
<tr>
<th>Day</th>
<th>Reading Time</th>
<th>&lt;Process Source&gt; operating?</th>
<th>Baghouse operating?</th>
<th>Pressure Drop, inches of water</th>
<th>Comments / Corrective Actions</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tr>
</tbody>
</table>
Log 2. SO₂ emissions for each SAF, Hourly basis

Silicon Production Log for SAF #_____  Month:_____  Day:_______  Year:_____

<table>
<thead>
<tr>
<th>One-hour period beginning with designated time</th>
<th>Pounds of Coal Input per hour</th>
<th>% Sulfur by weight in coal</th>
<th>Pounds sulfur charged to furnace per hour</th>
<th>Emission Factor, Fraction of Sulfur converted to SO₂ in exhaust*</th>
<th>Pounds of SO₂ emissions per hour (except last row, which is the daily total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 a.m.</td>
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<tr>
<td>1:00 a.m.</td>
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<td>2:00 a.m.</td>
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<tr>
<td>3:00 a.m.</td>
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<tr>
<td>4:00 a.m.</td>
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<tr>
<td>11:00 p.m.</td>
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<tr>
<td>Total pounds of SO₂ emissions per day for this SAF</td>
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</tr>
</tbody>
</table>

*This factor may be revised after testing as required by condition G16. Until that time, a factor of 0.67 (67%) shall be used.

The following equation, also included at condition S3-4 B, shall be used to calculate hourly SO₂ emissions:

\[ \text{SO}_2 \text{ lb/hr} = (\text{Pounds of sulfur input per each furnace per hour}) \times (2 \text{ pounds SO}_2 \text{ per pound of sulfur input}) \times (67\% \text{ factor conversion of S to SO}_2). \]

The pounds of sulfur input to each furnace, hourly basis shall be calculated as follows:
Pounds of sulfur input per hour per furnace = (Pounds of coal input per furnace per hour)(weight fraction of sulfur in coal in use at that time)

### Log 3  SO$_2$ emissions, Monthly total

Monthly SO$_2$ emissions Log for Source 48-0046-03, SAF #

<table>
<thead>
<tr>
<th>Month:</th>
<th>Year:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Day</th>
<th>SO$_2$ emissions, lbs. per day</th>
<th>Day</th>
<th>SO$_2$ emissions, lbs. per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>18</td>
<td></td>
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<tr>
<td>3</td>
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<td>19</td>
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<td>15</td>
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</tbody>
</table>
*An emission factor of 17.6 lbs. SO₂ per ton of Silicon produced shall be used until an emission factor based on the requirements of Condition S3-4 B is approved by the Division.

Total SO₂ emissions for month________ lbs._______

**Log 4  Monthly / 12-Consecutive Month Total SO₂ emissions, Recordkeeping for Source 48-0046-03,  SAF # ____________

<table>
<thead>
<tr>
<th>Month and Year</th>
<th>SO₂ emissions, tons per month</th>
<th>Previous 11 month Total</th>
<th>12-Consecutive Month Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Note:** The tons per 12-consecutive month values are the sum of the ‘description’ (usage, emissions, output, etc.) in the 11 months preceding the month just completed + the ‘description’ in the month just completed. If data is not available for the 11 months preceding the initial use of the table, this value will be equal to the value for tons per month. For the second month, it will be the sum of the first month and the second month. Indicate in parentheses the number of months summed [i.e., 6 (2) represents 6 tons emitted in 2 months].
Log 5. NOx emissions for each SAF, Hourly basis

Silicon Production Log for SAF # _____  Month: _____ Day: ________  Year: _____

<table>
<thead>
<tr>
<th>One-hour period beginning with designated time</th>
<th>Silicon Production, tins per hour</th>
<th>NOx emission factor, pounds NOx per ton of silicon produced*</th>
<th>Pounds NOx emissions per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 a.m.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:00 a.m.</td>
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<td></td>
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<tr>
<td>2:00 a.m.</td>
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<tr>
<td>3:00 a.m.</td>
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<tr>
<td>4:00 a.m.</td>
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</tr>
<tr>
<td>11:00 p.m.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total pounds of NOx emissions per day for this SAF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*This factor may be revised after testing and submittal of an emission factor based on testing as required by condition G16. Until the Division has approved a new emission factor, a factor of 36.0 lbs NOx per tons of Silicon produced shall be used. This factor is based on engineering judgment.

Log 6  NOx emissions, Monthly total

Monthly NOx emissions Log for Source 48-0046-03, SAF # _____
Month: ___________________  Year: ___________________

<table>
<thead>
<tr>
<th>Day</th>
<th>NOx emissions, lbs. per day</th>
<th>Day</th>
<th>NOx emissions, lbs. per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Month</td>
<td>NOx emissions, tons per month</td>
<td>Previous 11 month Total</td>
<td>12-Consecutive Month Total</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------------</td>
<td>-------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td></td>
<td></td>
</tr>
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</table>

Total NOx emissions for month _______ lbs. _______
Note: The tons per 12-consecutive month values are the sum of the ‘description’ (usage, emissions, output, etc.) in the 11 months preceding the month just completed + the ‘description’ in the month just completed. If data is not available for the 11 months preceding the initial use of the table, this value will be equal to the value for tons per month. For the second month, it will be the sum of the first month and the second month. Indicate in parentheses the number of months summed [i.e., 6 (2) represents 6 tons emitted in 2 months].

<table>
<thead>
<tr>
<th>Month</th>
<th>Description</th>
<th>Tons</th>
<th>Notes</th>
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</tbody>
</table>


You are required to comply with the following General Provisions of the federal Standards of Performance for New Stationary Sources (NSPS):

<table>
<thead>
<tr>
<th>General Provisions citation</th>
<th>Subject of citation</th>
<th>Applies to subpart</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>§ 60.1</td>
<td>General applicability of the General Provisions</td>
<td>Yes</td>
<td>through (c) are applicable</td>
</tr>
<tr>
<td>§ 60.2</td>
<td>Definitions</td>
<td>Yes</td>
<td>Additional terms defined in § 60.261</td>
</tr>
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<td>§ 60.3</td>
<td>Units and abbreviations</td>
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<td>§ 60.4</td>
<td>Address</td>
<td>Yes</td>
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<tr>
<td>§ 60.5</td>
<td>Determination of construction or modification</td>
<td>Yes</td>
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<tr>
<td>§ 60.6</td>
<td>Review of plans</td>
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</tr>
<tr>
<td>§ 60.7</td>
<td>Notification and Recordkeeping</td>
<td>Yes</td>
<td>Excess emissions report to be submitted</td>
</tr>
<tr>
<td>§ 60.8</td>
<td>Performance tests</td>
<td>Yes</td>
<td>Submit test report within 180 days of initial startup, also see § 60.265 (a) through (f) are applicable, (g) is not applicable because performance audit program is not currently in effect, (h) and (i) are applicable</td>
</tr>
<tr>
<td>§ 60.9</td>
<td>Availability of information</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.10</td>
<td>State Authority</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.11</td>
<td>Compliance with standards and maintenance</td>
<td>Yes</td>
<td>Also see requirements at § 60.263 and § 60.264</td>
</tr>
<tr>
<td></td>
<td>requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>§ 60.12</td>
<td>Circumvention</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.13</td>
<td>Monitoring requirements</td>
<td>Yes</td>
<td>Also see § 60.265</td>
</tr>
<tr>
<td>§ 60.14</td>
<td>Modification</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.15</td>
<td>Reconstruction</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.16</td>
<td>Priority list</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 10: General Provisions of 40 CFR Part 63, Subpart A that are applicable to 40 CFR 63 Subpart YYYYYY

Table 1 to Subpart YYYYYY of Part 63 - Applicability of General Provisions

As required in § 63.11530, you must meet each requirement in the following table that applies to you.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>63.11</td>
<td>Applicability.</td>
</tr>
<tr>
<td>63.2</td>
<td>Definitions.</td>
</tr>
<tr>
<td>63.3</td>
<td>Units and abbreviations.</td>
</tr>
<tr>
<td>63.4</td>
<td>Prohibited activities.</td>
</tr>
<tr>
<td>63.5</td>
<td>Construction/reconstruction.</td>
</tr>
<tr>
<td>63.6</td>
<td>Compliance with standards and maintenance.</td>
</tr>
<tr>
<td>63.8</td>
<td>Monitoring.</td>
</tr>
<tr>
<td>63.9</td>
<td>Notification.</td>
</tr>
<tr>
<td>63.10</td>
<td>Recordkeeping and reporting.</td>
</tr>
<tr>
<td>63.12</td>
<td>State authority and delegations.</td>
</tr>
<tr>
<td>63.13</td>
<td>Addresses of State air pollution control agencies and EPA regional offices.</td>
</tr>
<tr>
<td>63.14</td>
<td>Incorporation by reference.</td>
</tr>
<tr>
<td>63.15</td>
<td>Availability of information and confidentiality.</td>
</tr>
<tr>
<td>63.16</td>
<td>Performance track provisions.</td>
</tr>
</tbody>
</table>

1 § 63.11524(d), “Am I subject to this subpart?” exempts affected sources from the obligation to obtain title V operating permits.
**Appendix 11 Tables 1-3 Applicable Requirements for 40 CFR 60 Subpart JJJJ**

**Table 1 to Subpart JJJ of Part 60 - NO\textsubscript{x}, CO, and VOC Emission Standards for Stationary Non-Emergency SI Engines ≥100 HP (Except Gasoline and Rich Burn LPG), Stationary SI Landfill/Digester Gas Engines, and Stationary Emergency Engines >25 HP**

<table>
<thead>
<tr>
<th>Engine type and fuel</th>
<th>Maximum engine power</th>
<th>Manufacture date</th>
<th>Emission standards\textsuperscript{a}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>NO\textsubscript{x}</td>
</tr>
<tr>
<td>Non-Emergency SI Natural Gas\textsuperscript{b} and Non-Emergency SI Lean Burn LPG\textsuperscript{b}</td>
<td>100≤HP&lt;500</td>
<td>7/1/2008</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/1/2011</td>
<td>1.0</td>
</tr>
<tr>
<td>Non-Emergency SI Lean Burn</td>
<td>500≤HP&lt;1,350</td>
<td>1/1/2008</td>
<td>2.0</td>
</tr>
<tr>
<td>Engine type and fuel</td>
<td>Maximum engine power</td>
<td>Manufacture date</td>
<td>Emission standardsa</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------</td>
<td>------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>g/HP-hr ppmvd at 15% O₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOₓ CO VOCd NOₓ CO VOCd</td>
</tr>
<tr>
<td>Natural Gas and LPG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Emergency SI Natural Gas and Non-Emergency SI Lean Burn LPG (except lean burn 500≤HP&lt;1,350)</td>
<td>HP≥500</td>
<td>7/1/2007</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landfill/Digester Gas (except lean burn 500≤HP&lt;1,350)</td>
<td>HP&lt;500</td>
<td>7/1/2008</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landfill/Digester Gas Lean Burn</td>
<td>500≤HP&lt;1,350</td>
<td>1/1/2009</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency</td>
<td>25&lt;HP&lt;130</td>
<td>1/1/2009</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Owners and operators of stationary non-certified SI engines may choose to comply with the emission standards in units of either g/HP-hr or ppmvd at 15 percent O₂.

b Owners and operators of new or reconstructed non-emergency lean burn SI stationary engines with a site rating of greater than or equal to 250 brake HP located at a major source that are meeting the requirements of 40 CFR part 63, subpart ZZZZ, Table 2a do not have to comply with the CO emission standards of Table 1 of this subpart.

c The emission standards applicable to emergency engines between 25 HP and 130 HP are in terms of NOₓ + HC.

d For purposes of this subpart, when calculating emissions of volatile organic compounds, emissions of formaldehyde should not be included.

[76 FR 37975, June 28, 2011]
### Table 2 to Subpart JJJJ of Part 60 - Requirements for Performance Tests

As stated in § 60.4244, you must comply with the following requirements for performance tests within 10 percent of 100 percent peak (or the highest achievable) load.

<table>
<thead>
<tr>
<th>For each</th>
<th>Complying with the requirement to</th>
<th>You must</th>
<th>Using</th>
<th>According to the following requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Stationary SI internal combustion engine demonstrating compliance according to § 60.4244</td>
<td>a. Limit the concentration of NOx in the stationary SI internal combustion engine exhaust</td>
<td>i. Select the sampling port location and the number/location of traverse points at the exhaust of the stationary internal combustion engine;</td>
<td></td>
<td>(a) Alternatively, for NOx, O2, and moisture measurement, ducts ≤6 inches in diameter may be sampled at a single point located at the duct centroid and ducts &gt;6 and ≤12 inches in diameter may be sampled at 3 traverse points located at 16.7, 50.0, and 83.3% of the measurement line (‘3-point long line’). If the duct is &gt;12 inches in diameter and the sampling port location meets the two and half-diameter criterion of Section 11.1.1 of Method 1 of 40 CFR part 60, Appendix A, the duct may be sampled at ‘3-point long line’; otherwise, conduct the stratification testing</td>
</tr>
<tr>
<td>For each</td>
<td>Complying with the requirement to</td>
<td>You must</td>
<td>Using</td>
<td>According to the following requirements</td>
</tr>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>and select sampling points according to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Section 8.1.2 of 40 CFR part 60, Appendix A.</td>
</tr>
<tr>
<td>ii.</td>
<td>Determine the O\textsubscript{2}</td>
<td></td>
<td></td>
<td>(2) Method 3, 3A, or 3b\textsuperscript{b} of 40 CFR part 60, appendix A-2 or ASTM Method D6522-00 (Reapproved 2005) and (b) Measurements to determine O\textsubscript{2} concentration must be made at the same time as the measurements for NO\textsubscript{x} concentration.</td>
</tr>
<tr>
<td></td>
<td>concentration of the stationary internal combustion engine exhaust at the sampling port location;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii.</td>
<td>If necessary, determine the exhaust flowrate of the stationary internal combustion engine exhaust;</td>
<td></td>
<td></td>
<td>(c) Measurements to determine the exhaust flowrate must be made (1) at the same time as the measurement for NO\textsubscript{x} concentration or, alternatively (2) according to the option in Section 11.1.2 of Method 1A of 40 CFR part 60, Appendix A-1, if applicable.</td>
</tr>
<tr>
<td>iv.</td>
<td>If necessary, measure moisture content of the stationary internal combustion engine exhaust at the sampling port location; and</td>
<td></td>
<td></td>
<td>(d) Measurements to determine moisture must be made at the same time as the measurement for NO\textsubscript{x} concentration.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For each</td>
<td>Complying with the requirement to</td>
<td>You must</td>
<td>Using</td>
<td>According to the following requirements</td>
</tr>
<tr>
<td>----------</td>
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<td>-----------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>v. Measure NOx at the exhaust of the stationary internal combustion engine; if using a control device, the sampling site must be located at the outlet of the control device</td>
<td>(5) Method 7E of 40 CFR part 60, appendix A-4, ASTM Method D6522-00 (Reapproved 2005), and Method 320 of 40 CFR part 63, appendix A, or ASTM Method D6348-03 d e</td>
<td>(e) Results of this test consist of the average of the three 1-hour or longer runs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Limit the concentration of CO in the stationary SI internal combustion engine exhaust</td>
<td>(1) Method 1 or 1A of 40 CFR part 60, appendix A-1, if measuring flow rate</td>
<td>(a) Alternatively, for CO, O2, and moisture measurement, ducts ≤6 inches in diameter may be sampled at a single point located at the duct centroid and ducts &gt;6 and ≤12 inches in diameter may be sampled at 3 traverse points located at 16.7, 50.0, and 83.3% of the measurement line (‘3-point long line’). If the duct is &gt;12 inches in diameter and the sampling port location meets the two and half-diameter criterion of Section 11.1.1 of Method 1 of 40 CFR.</td>
</tr>
<tr>
<td>For each</td>
<td>Complying with the requirement to</td>
<td>You must</td>
<td>Using</td>
<td>According to the following requirements</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------</td>
<td>----------</td>
<td>-------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>part 60, Appendix A, the duct may be sampled at `3-point long line'; otherwise, conduct the stratification testing and select sampling points according to Section 8.1.2 of Method 7E of 40 CFR part 60, Appendix A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii. Determine the O\textsubscript{2} concentration of the stationary internal combustion engine exhaust at the sampling port location;</td>
<td>(2) Method 3, 3A, or 3B\textsuperscript{b} of 40 CFR part 60, appendix A-2 or ASTM Method D6522-00 (Reapproved 2005) abd</td>
<td>(b) Measurements to determine O\textsubscript{2} concentration must be made at the same time as the measurements for CO concentration.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(c) Measurements to determine the exhaust flowrate must be made (1) at the same time as the measurement for CO concentration or, alternatively (2) according to the option in Section 11.1.2 of Method 1A of 40 CFR part 60, Appendix A-1, if applicable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii. If necessary, determine the exhaust flowrate of the stationary internal combustion engine exhaust;</td>
<td>(3) Method 2 or 2C of 40 CFR 60, appendix A-1 or Method 19 of 40 CFR part 60, appendix A-7</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(d) Measurements to determine moisture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iv. If necessary, measure moisture</td>
<td>(4) Method 4 of 40 CFR part 60,</td>
<td></td>
</tr>
<tr>
<td>For each</td>
<td>Complying with the requirement to</td>
<td>You must</td>
<td>Using</td>
<td>According to the following requirements</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------------</td>
<td>----------</td>
<td>-------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>content of the stationary internal combustion engine exhaust at the sampling port location; and</td>
<td>appendix A-3, Method 320 of 40 CFR part 63, appendix A,e or ASTM Method D6348-03 d e</td>
<td>must be made at the same time as the measurement for CO concentration.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>v. Measure CO at the exhaust of the stationary internal combustion engine; if using a control device, the sampling site must be located at the outlet of the control device</td>
<td>(5) Method 10 of 40 CFR part 60, appendix A4, ASTM Method D6522-00 (Reapproved 2005), a d e Method 320 of 40 CFR part 63, appendix A,e or ASTM Method D6348-03 d e</td>
<td>(e) Results of this test consist of the average of the three 1-hour or longer runs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Limit the concentration of VOC in the stationary SI internal combustion engine exhaust</td>
<td>(1) Method 1 or 1A of 40 CFR part 60, appendix A-1, if measuring flow rate</td>
<td>(a) Alternatively, for VOC, O₂, and moisture measurement, ducts ≤6 inches in diameter may be sampled at a single point located at the duct centroid and ducts &gt;6 and ≤12 inches in diameter may be sampled at 3 traverse points located at 16.7, 50.0, and 83.3% of the measurement line (‘3-point long line’). If the duct is &gt;12</td>
</tr>
<tr>
<td>For each</td>
<td>Complying with the requirement to</td>
<td>You must</td>
<td>Using</td>
<td>According to the following requirements</td>
</tr>
<tr>
<td>----------</td>
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<td>-------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>inches in diameter and the sampling port location meets the two and half-diameter criterion of Section 11.1.1 of Method 1 of 40 CFR Part 60, Appendix A, the duct may be sampled at '3-point long line'; otherwise, conduct the stratification testing and select sampling points according to Section 8.1.2 of Method 7E of 40 CFR Part 60, Appendix A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2) Method 3, 3A, or 3B of 40 CFR Part 60, Appendix A-2 or ASTM Method D6522-00 (Reapproved 2005) and (b) Measurements to determine O₂ concentration must be made at the same time as the measurements for VOC concentration.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(c) Measurements to determine the exhaust flowrate must be made (1) at the same time as the measurement for VOC concentration or, alternatively (2) according to the option in Section.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ii. Determine the O₂ concentration of the stationary internal combustion engine exhaust at the sampling port location;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>iii. If necessary, determine the exhaust flowrate of the stationary internal combustion engine exhaust;</td>
</tr>
</tbody>
</table>
For each requirement to comply with the following requirements,

<table>
<thead>
<tr>
<th>Requirement</th>
<th>You must</th>
<th>Using</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1.2 of Method 1A of 40 CFR part 60, Appendix A-1, if applicable.</td>
<td>iv. If necessary, measure moisture content of the stationary internal combustion engine exhaust at the sampling port location; and (4) Method 4 of 40 CFR part 60, appendix A-3, Method 320 of 40 CFR part 63, appendix A, or ASTM Method D6348-03</td>
<td>d. Measurements to determine moisture must be made at the same time as the measurement for VOC concentration.</td>
</tr>
</tbody>
</table>

v. Measure VOC at the exhaust of the stationary internal combustion engine; if using a control device, the sampling site must be located at the outlet of the control device; and (5) Methods 25A and 18 of 40 CFR part 60, appendices A-6 and A-7, Method 25A with the use of a hydrocarbon cutter as described in 40 CFR 1065.265, Method 18 of 40 CFR part 60, appendix A-6, Method 320 of 40 CFR part 63, appendix A, or ASTM Method D6348-03 | e. Results of this test consist of the average of the three 1-hour or longer runs. |

\[^{a}\text{Also, you may petition the Administrator for approval to use alternative methods for portable analyzer.}\]

\[^{b}\text{You may use ASME PTC 19.10-1981, Flue and Exhaust Gas Analyses, for measuring the O}_2\text{ content of the exhaust gas as an alternative to EPA Method 3B. AMSE PTC 19.10-1981}\]
incorporated by reference, see 40 CFR 60.17

c You may use EPA Method 18 of 40 CFR part 60, appendix A-6, provided that you conduct an adequate pre-survey test prior to the emissions test, such as the one described in OTM 11 on EPA's website (http://www.epa.gov/ttn/emc/prelim/otm11.pdf).

d Incorporated by reference; see 40 CFR 60.17.

e You must meet the requirements in § 60.4245(d).

[85 FR 63408, Oct. 7, 2020]

Table 3 to Subpart JJJJ of Part 60 - - Applicability of General Provisions to Subpart JJJJ

[As stated in § 60.4246, you must comply with the following applicable General Provisions]

<table>
<thead>
<tr>
<th>General provisions citation</th>
<th>Subject of citation</th>
<th>Applies to subpart</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>§ 60.1</td>
<td>General applicability of the General Provisions</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.2</td>
<td>Definitions</td>
<td>Yes</td>
<td>Additional terms defined in § 60.4248.</td>
</tr>
<tr>
<td>§ 60.3</td>
<td>Units and abbreviations</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.4</td>
<td>Address</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.5</td>
<td>Determination of construction or modification</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.6</td>
<td>Review of plans</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.7</td>
<td>Notification and Recordkeeping</td>
<td>Yes</td>
<td>Except that § 60.7 only applies as specified in § 60.4245.</td>
</tr>
<tr>
<td>§ 60.8</td>
<td>Performance tests</td>
<td>Yes</td>
<td>Except that § 60.8 only applies to owners and operators who are subject to performance testing in subpart JJJJ.</td>
</tr>
<tr>
<td>General provisions citation</td>
<td>Subject of citation</td>
<td>Applies to subpart</td>
<td>Explanation</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------------------</td>
<td>--------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>§ 60.9</td>
<td>Availability of information</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.10</td>
<td>State Authority</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.11</td>
<td>Compliance with standards and maintenance requirements</td>
<td>Yes</td>
<td>Requirements are specified in subpart JJJJ.</td>
</tr>
<tr>
<td>§ 60.12</td>
<td>Circumvention</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.13</td>
<td>Monitoring requirements</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>§ 60.14</td>
<td>Modification</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.15</td>
<td>Reconstruction</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.16</td>
<td>Priority list</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.17</td>
<td>Incorporations by reference</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>§ 60.18</td>
<td>General control device requirements</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>§ 60.19</td>
<td>General notification and reporting requirements</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B
Correspondence related to Application Completeness, Permit Limits and Responsible Official
November 17, 2021

Via email

James P. Johnston, P.E.
Tennessee Department of Environment and Conservation
William R. Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243
James.Johnston@tn.gov

Re: Second Response to Construction Permit Application Incompleteness Determination
Sinova Silicon, Inc.
4480 Cates Landing Road, N.
Emission Source Reference No. 48-0046/Permit No. 979383

Mr. Johnston:

Thank you for the November 9, 2021 letter which detailed the information required for TDEC to determine that the construction permit application submitted on September 16, 2021 and revised on October 28, 2021 is complete. This letter includes our responses to the information requests and questions TDEC provided in the October 13 letter. Sinova’s October 28 responses, as well as TDEC’s follow-up questions and clarification requests provided on November 9 and our responses. For clarity, all of our responses, previous and current, are provided in red, italicized text.

1. Note that forms were not submitted for several processes, such as the Fugitive Operations, Proportioning Building, and Crushing and Screening (for Slag), and Diesel Fuel Storage. Please submit the appropriate forms for these operations.

These forms have been included with the Title V Permit Application Forms in Appendix A to the revised air permit application provided with this letter.

TDEC Response: Much of the information requested on these forms may be found elsewhere in the submittal, but in the interest of completeness and ease of comprehension by external stakeholders, you are requested to complete these forms as indicated below.

Updated Title V Permit Application Forms are provided with this letter. The table below is a summary of the forms provided.
<table>
<thead>
<tr>
<th>Source</th>
<th>Provided Forms</th>
</tr>
</thead>
</table>
| Material Handling             | APC 10 Miscellaneous Processes  
|                               | APC 19 Compliance Certification Methods  
|                               | APC 26 Recordkeeping  
|                               | APC 28 Process Emissions  
|                               | Calculations provided in Appendix B                                          |
| Paved Roads                   | APC 10 Miscellaneous Processes  
|                               | APC 19 Compliance Certification Methods  
|                               | APC 26 Recordkeeping  
|                               | APC 28 Process Emissions  
|                               | Calculations provided in Appendix B                                          |
| Proportioning Building        | APC 3 Stack Identification  
|                               | APC 10 Miscellaneous Processes  
|                               | APC 18 Control Equipment - Baghouses/Fabric Filters  
|                               | APC 19 Compliance Certification Methods  
|                               | APC 24 Stack Testing  
|                               | APC 28 Emissions from Process Source  
|                               | Calculations provided in Appendix B                                          |
| Slag Crushing and Screening   | APC 10 Miscellaneous Processes  
|                               | APC 11 Control Equipment - Miscellaneous  
|                               | APC 19 Compliance certification Methods  
|                               | APC 26 Compliance by Recordkeeping  
|                               | APC 28 Emissions from Process Source  
|                               | Calculations provided in Appendix B                                          |
| Diesel Fuel Storage           | APC 6 Storage Tanks  
|                               | APC 19 Compliance Certification Methods  
|                               | APC 26 Compliance by Recordkeeping  
|                               | APC 28 Emissions from Process Source  
|                               | Calculations provided in Appendix B                                          |
| Ladle Preheating              | APC 10 Miscellaneous Processes  
|                               | APC 19 Compliance Certification Methods  
|                               | APC 26 Compliance by Recordkeeping  
|                               | APC 28 Emissions from Process Source  
|                               | Calculations provided in Appendix B                                          |
| Product Crushing and Screening| APC 3 Stack Identification  
|                               | APC 10 Miscellaneous processes  
|                               | APC 18 Control Equipment - Baghouses/Fabric Filters  
|                               | APC 19 Compliance Certification Methods  
|                               | APC 24 Stack Testing  
|                               | APC 28 Emissions from Process Source  
|                               | Calculations provided in Appendix B                                          |
| Emergency Generator           | APC 4 Fuel Burning Non-Process Equipment  
|                               | APC 5 Internal combustion engines  
|                               | APC 19 Compliance Certification Methods  
|                               | APC 26 Compliance by Recordkeeping  
|                               | APC 28 Emissions from Process Source  
|                               | Calculations provided in Appendix B (including HAPs)                          |
Permit Number: 979383
Issuance Date: <Issuance Date, 2022
Expiration Date: April 30, 2025

<table>
<thead>
<tr>
<th>Silica Fume Silo</th>
<th>APC 3 Stack Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>APC 10 Miscellaneous Processes</td>
</tr>
<tr>
<td></td>
<td>APC 19 Compliance Certification Methods</td>
</tr>
<tr>
<td></td>
<td>APC 26 Compliance by Recordkeeping</td>
</tr>
<tr>
<td></td>
<td>APC 28 Emissions from Process Source</td>
</tr>
<tr>
<td></td>
<td>Calculations provided in Appendix B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Submerged Arc Furnaces (SAFs)</th>
<th>APC 3 Stack Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>APC 10 Miscellaneous Processes</td>
</tr>
<tr>
<td></td>
<td>APC 18 Control Equipment - Baghouses/Fabric Filters</td>
</tr>
<tr>
<td></td>
<td>APC 19 Compliance Certification Methods</td>
</tr>
<tr>
<td></td>
<td>APC 24 Stack Testing</td>
</tr>
<tr>
<td></td>
<td>APC 26 Compliance by Recordkeeping</td>
</tr>
<tr>
<td></td>
<td>APC 28 Emissions from Process Source</td>
</tr>
<tr>
<td></td>
<td>Calculations provided in Appendix B</td>
</tr>
</tbody>
</table>

These updated forms are included with this response. Appendix B with detailed calculations has been updated to reflect the updated and expanded calculations noted above.

2. Please include a simple diagram showing all processes and type of control, also exhaust gas flow and recycling of materials. This would include outdoor concrete storage pads and partially enclosed storage buildings along with the application. The Division has received a non-certified diagram with this information, but we are not sure if this is the final version of this document.

A process flow diagram and a facility plot plan that identify each emission unit are attached to this letter.

TDEC Response: A simple diagram has been submitted, although it is understood that another one is being submitted soon.

To be provided separately.

3. An unsigned agreement letter restricting PM was submitted. Please submit a signed agreement letter, included PM, PM10, and PM2.5, if that is the intention. There should be a written and signed agreement to restrict opacity to 10% if the proposed exhaust flow particulate concentration is less than 0.02 grains per dry standard cubic foot for any baghouse.

The signed agreement letter, including the pound per hour emission rate for PM and the 10% opacity limit, is attached to this letter.

TDEC Response: Letter has been submitted and 10% opacity is proposed. Note that another state has a 3% limit for opacity as BACT, so further explanation may be required by EPA.

Based on recent information from the company, the Fume Silo Building has a controlled exhaust venting directly to the atmosphere and there would possibly be an agreement for the same 0.0022 gr PM/dscf for this new activity. See Item 1 of this letter.
Please let us know if EPA requires further explanation regarding the opacity limit proposal. The Fume Silo Vent BACT Analysis is provided with this letter.

4. Please remember that we need the calculations or factors for all processes. For the Submerged Arc Furnaces (SAF) specifically, for the criteria pollutant factors in Table 1 of the application for the Submerged Arc Furnaces (SAF), please submit the basis for the calculations used to determine these values. It is anticipated, but not required, that the values in Table 1 would represent the proposed BACT values for the indicated pollutants. Please indicate if NOx includes species other than NO2. Page 18 of the application states that “The SO2 emission factor is based on the sulfur content of the planned mixture of coal, charcoal, and wood chips, using a mass balance approach.” For SO2, please advise what coal sulfur content was used for the factor, what percent of sulfur is estimated to be released as SO2 and if any sulfur from wood is considered. If the sulfur content of coal will be variable, please indicate how that might affect the emission factor, in each scenario, and be aware that separate testing may be required for each scenario. If sulfur is assumed to be a constituent of slag, please indicate the calculations for this value. For VOC, please advise if the value as presented is based on all VOC compounds present or if it is based on “VOC as-carbon.” Include the basis for the CO emissions factor. For Table 2 for Greenhouse gas emissions, please present calculations. Calculations are not required for PM, as this unit will be tested for PM10 / PM2.5. For Tables 3 and 4 for Ladle Preheaters please present emission calculations for all pollutants.

NOx includes both NO and NO2. For the coal sulfur, the maximum coal sulfur content allowed by the silicon-making process proposed for the proposed SAFs is 2%. The actual sulfur content of the received coal is expected to vary between 0.75% and 1% sulfur. The emission calculations assume that the worst-case sulfur content (i.e., 2%) will occur at all times; meaning the emission estimates provided in the permit application are extremely conservative. All sulfur in the coal is assumed to be converted into SO2, which is also a conservative assumption. VOC emissions were calculated using a mass balance approach and reflect VOC-as-carbon. The CO emission factor is based on the experience of other silicon manufacturing facilities and an expected offgas analysis conducted by Tenova.

Detailed greenhouse gas emission calculations for the SAFs and ladle preheaters are included in Appendix B (Detailed Emission Calculations) of the submitted permit application, and revised version of which is attached to this letter.

TDEC Response: EPA has expressed concerns about another similar facility which was unable to comply with BACT limitations and suggested that calculations should be submitted for all sources, including those that would, or would not, have emission controls.

Calculations are needed as specified below

<table>
<thead>
<tr>
<th>Description</th>
<th>Status of Calculations Needed</th>
<th>Response - Location of Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportioning Building with baghouse</td>
<td>Calculations for PM/PM10/PM2.5</td>
<td>Table 6 in application, included in Appendix B</td>
</tr>
<tr>
<td>Slag Crushing and Screening</td>
<td>Calculations for Crushing based on worst-case PM estimates (see item 5 of this letter)</td>
<td>Table 10 in application. Updated emissions provided in Sinova Cases Landing Slag Crushing and Screening.pdf</td>
</tr>
<tr>
<td>Activity</td>
<td>Calculations for PM/PM10/PM2.5, SO₂, CO, VOC, NOₓ</td>
<td>Reference</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Two Submerged Arc Furnaces (SAF)</td>
<td>Note that VOC is “VOC as carbon”</td>
<td>Table 1 in application, included in Appendix B</td>
</tr>
<tr>
<td>with tapping, refining and casting with hooding to duct emissions to baghouses</td>
<td>Calculations for PM/PM10/PM2.5</td>
<td>Included with this response (Sinova Cates Lending – Silica Fume Vent Emissions.pdf)</td>
</tr>
<tr>
<td>Silica Fume Silos and bag packing process (assuming permitting is required)</td>
<td>Calculations for PM/PM10/PM2.5</td>
<td>Table 5 in application, included in Appendix B</td>
</tr>
<tr>
<td>Product Crushing and Screening</td>
<td>Need calculations for crushing in addition to the previously submitted screening values</td>
<td>Updated Calculations provided</td>
</tr>
<tr>
<td>Slag Handling and Storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Natural Gas-fired Engine</td>
<td>HAP calculations, BACT was proposed but need BACT calculations and comparison with g/hp-hr limits</td>
<td>Table 8 in application, Detailed Emissions provided with this response (Sinova Cates Lending – Emergency Generator Calculations.pdf)</td>
</tr>
<tr>
<td>Diesel Fuel Storage</td>
<td>VOC Calculations</td>
<td>Tank calculations assuming 1000 gallons included with this response (Diesel Tank Emissions.pdf)</td>
</tr>
</tbody>
</table>

The locations of the calculations are provided in the table above.

5. For Table 7 Raw Material Handling, please revise table to indicate short tons. Also, indicate if any control factors were used and show the calculations and factors that were used to obtain the emission rates. The pounds per hour emission rates in Table 7 do not appear to correlate with the tons per year emission rates at 8760 hours. Please specify limits on operating rates if that is considered in the calculations. For the Calculations for at Appendix B: Detailed Emission calculations, where Crushing and Screening are mentioned, please specify if this is for Product or Slag. Where the term MT is used, please designate those dimensions (Metric Ton). For Slag Handling, please indicate the maximum throughput of slag (ton per hour) and provide the emission factors and control factors. For the Slag Handling Fugitive Emissions at Appendix B, screening factors are included in the calculations, but no crushing factors are included.

A revised version of Table 7 is provided below and in the revised permit application attached to this letter.
<table>
<thead>
<tr>
<th>Operation</th>
<th>Total Material Handled</th>
<th>Pollutant Emission Factor</th>
<th>Control Factor</th>
<th>Emission Rate</th>
<th>Emission Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(ton/day)</td>
<td>(ton/year)</td>
<td>PM/PM₁₀</td>
<td>PM₁₂.₅</td>
<td>PM₂.₅</td>
</tr>
<tr>
<td>Rail Unloading</td>
<td>11,023</td>
<td>402,343</td>
<td>0.021</td>
<td>0.00053</td>
<td>0.0000027</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rail Stackor Conveyor</td>
<td>11,023</td>
<td>402,343</td>
<td>0.000046</td>
<td>0%</td>
<td>0.0000027</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck Unloading</td>
<td>562</td>
<td>205,030</td>
<td>0.020</td>
<td>0.00051</td>
<td>0.0000027</td>
</tr>
<tr>
<td>Material Transfer to Feeder Hopper</td>
<td>11,585</td>
<td>607,373</td>
<td>0.000016</td>
<td>99%</td>
<td>4.1E-07</td>
</tr>
</tbody>
</table>

1. Rail and truck unloading activity emission factors are from AP-42 Chapter 11.9 (Western Coal Mining), Table 11.9-4 for Train Loading (coal) and Bottom Dump Truck Unloading (batch drop; coal), respectively. Emission factors for the rail stacker conveyor are from AP-42 Chapter 11.19.2 (Crushed Stone Processing and Pulverized Mineral Processing) for Conveyor Transfer Point, controlled (SCC 3-05-020-06). Emission factors for material transfer to the Loading Hopper are from AP-42 Chapter 11.19.2, Table 11.19.2-2 for Truck Unloading, fragmented stone (SCC 3-05-020-31). As needed, PM₁₀ and/or PM₂.₅ emission factors were calculated from total suspended particulate (TSP) emission factors using scaling factors provided in AP-42 Chapter 11.3, Table 11.3-1 for Truck Loading.

2. The control factors applied to Rail Unloading, Truck Unloading, and Material Transfer to Feeder Hopper reflect the use of misting systems that operate whenever the corresponding operation is active. No control factor is applied to the Rail Stacker Conveyor operation emission rate calculation because the provided emission factor already incorporates a control factor.

3. Hourly and annual emissions based on maximum daily and annual throughput, respectively, for each operation.

Note that the Material Handling Emission table in Appendix B for Rail Unloading and other categories lists PM₁₀ and PM₂.₅ but not PM. Please include PM emissions.

An updated Appendix B is included as part of the revised permit application document attached to this letter.

Table 11 lists two entries for Slag Crushing and Screening, please advise if this is correct.

A revised version of Table 11 is provided below and in the revised permit application attached to this letter.
Table 11. Criteria Pollutant Summary (revised)

<table>
<thead>
<tr>
<th>Source</th>
<th>NOx</th>
<th>SO2</th>
<th>CO</th>
<th>VOC</th>
<th>PM</th>
<th>PM_{10}</th>
<th>PM_{2.5}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Furnace Baghouse</td>
<td>1,217</td>
<td>595</td>
<td>270</td>
<td>81.1</td>
<td>21.3</td>
<td>21.3</td>
<td>21.3</td>
</tr>
<tr>
<td>Slag Product Crushing &amp; Screening</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.26</td>
<td>1.26</td>
<td>1.26</td>
</tr>
<tr>
<td>Proportioning Bldg.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>4.35</td>
<td>4.35</td>
<td>4.35</td>
</tr>
<tr>
<td>Ladle Pre-heaters</td>
<td>8.24</td>
<td>0.0773</td>
<td>10.8</td>
<td>0.709</td>
<td>0.979</td>
<td>0.979</td>
<td>0.979</td>
</tr>
<tr>
<td>Emergency Generator</td>
<td>0.38</td>
<td>0.000159</td>
<td>0.702</td>
<td>0.319</td>
<td>0.00523</td>
<td>0.00523</td>
<td>0.00523</td>
</tr>
<tr>
<td>Rail Unloading</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.0422</td>
<td>0.0422</td>
<td>0.00107</td>
</tr>
<tr>
<td>Truck Unloading</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.0215</td>
<td>0.0215</td>
<td>0.000545</td>
</tr>
<tr>
<td>Loading Hopper</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.0140</td>
<td>0.0140</td>
<td>0.000808</td>
</tr>
<tr>
<td>Slag Crushing and Screening</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.0497</td>
<td>0.0167</td>
<td>0.00113</td>
</tr>
<tr>
<td>Total</td>
<td>1,225</td>
<td>595</td>
<td>282</td>
<td>82.1</td>
<td>28.0</td>
<td>28.0</td>
<td>27.9</td>
</tr>
</tbody>
</table>

TDEC Response: Table 1, in the latest submittal, indicates (for example) that the tons per year for rail unloading would be 0.042 tons per year at an hourly emission rate of 0.096 lb PM/PM10 per hour at 8760 hours. We believe 0.42 tons per year is correct. Please review the calculations in Table 7. There appears to be several errors.

The hourly emission rate is a maximum short-term estimate based on expected maximum daily throughput, and the annual average emission rate is based on total annual material throughput. Note 3 in the revised Table 7 has been updated to clarify the difference.

For slag handling information, see item #8 of the APC 10 form, the crushing and screening rates are listed at 45,202 tons per year. Please submit this information in terms of maximum pounds per hour. Although the application indicates 24 hr/day, 7 days per week, and 365 days per year, we need to have the tons per hour expressed directly. The Table at Appendix B for Slag Handling and Fugitive Emissions indicates 10% of the Slag is processed for shipment offsite. Please indicate if there is a maximum slag crushing or processing rate, as it is not clear how it is verified that only 10% of the material handled annually would be processed for shipment offsite.
Also the AP-42 table for Primary and Secondary crushing indicates “ND” for PM/PM2.5. It appears that this refers to “no data,” but emission factors for PM-10 for tertiary crushers can be used as an upper limit for primary or secondary crushing according to the footnote. Please review Table 11.19.2-2 for Crushed Stone Processing and revise calculations for the upper limit if appropriate.

Please calculate emissions in accordance with the stated upper limit for crushing. It has been indicated that the Slag Handling Fugitive Emissions page at Appendix B will be revised to account for the factor for Slag Processed for Shipment offsite.

Slag Crushing and Screening emission calculations have been updated by using tertiary crushing emission factors for the primary slag crushing operation, expected annual slag production (instead of the raw material throughput value, which had been used in error), and an expected 100 hours of slag crushing and screening operation expected annually. These calculations are provided with this response.

6. Where the terms Nm³/hr and mg/Nm³ are used as in Table 5 and 6, please also include conversions to cubic feet and / or grains / pounds.

The table below summarizes baghouse parameters, including unit conversions. Units in Tables 1, 5, and 6 have been converted to US customary units.

### Summary of Baghouse Parameters

<table>
<thead>
<tr>
<th>Baghouse</th>
<th>Temperature</th>
<th>Flow Rate</th>
<th>PM/PM$<em>{10}$/PM$</em>{2.5}$ Emission Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(K)</td>
<td>(m³/hr)</td>
<td>(Nm³/hr)$^1$</td>
</tr>
<tr>
<td>Main Furnace</td>
<td>472</td>
<td>712,000</td>
<td>441,049</td>
</tr>
<tr>
<td>Crushing &amp; Screening</td>
<td>Ambient</td>
<td>26,000</td>
<td>26,000</td>
</tr>
<tr>
<td>Proportioning Building</td>
<td>Ambient</td>
<td>90,000</td>
<td>90,000</td>
</tr>
</tbody>
</table>

Sample Calculations:
1. $441,049 \text{Nm}^3/\text{hr} = 712,000 \text{m}^3/\text{hr} \times (293 \text{ K}) / (473 \text{ K})$
2. $419,129 \text{scfm} = 441,049 \text{Nm}^3/\text{hr} / 60 \text{ (min/hr)} \times (3.281 \text{ ft/m})^3$
3. $0.002185 \text{ gr/scf} = 5 \text{mg/Nm}^3 / 0.0648 \text{ grams/grain} / (3.281 \text{ ft/m})^3 / 1,000 \text{ mg/g}$

TDEC Response: Tables #5 and #6 have been updated.

7. A comparison with the PSD permits for Silicon Production at the Simcica Alabama plant and the Mississippi Silicon Plant provided the following comparison of emission factors and BACT values for Submerged Arc Furnaces (SAF) as seen below. If you intend to use the SAF emission factors from Table 1 of the application as BACT, please advise as to how the factors for NOx (Simcica has their BACT in terms of lb/MWh), SO2 (Simcica has an 0.80% sulfur in coal limit), and Opacity (Mississippi Silicon has 3% opacity) would compare with your facility. Please clarify if the PM limit for the SAF units will include not only the SAF emissions directly, but also emissions from the tapping, refining, product casting and slag casting, which are all captured by a hood system.
Permit Number: 979383
Issuance Date: <Issuance Date, 2022
Expiration Date: April 30, 2025

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Sinova Emission Factors from Table 1, (lb/ton Si)</th>
<th>Simcals Alabama facility BACT</th>
<th>Mississippi Silicon LLC Permit 2640-00060 issued Nov. 27, 2013 BACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOx</td>
<td>36.0</td>
<td>5.96 lb/MW-hr</td>
<td>43.0 lb/ton Si</td>
</tr>
<tr>
<td>CO</td>
<td>8.0</td>
<td>34.0 lb/ton Si</td>
<td></td>
</tr>
<tr>
<td>SO2</td>
<td>17.6</td>
<td>0.800 % Sulfur in coal</td>
<td>52.0 lb/ton Si</td>
</tr>
<tr>
<td>VOC</td>
<td>2.4</td>
<td>2.4 lb/ton Si</td>
<td></td>
</tr>
<tr>
<td>PM10/PM2.5</td>
<td>0.0022 gr/ft^3</td>
<td>0.0032 gr/ft^3</td>
<td>0.005 gr/ft^3</td>
</tr>
<tr>
<td>Opacity</td>
<td></td>
<td>3% from control device</td>
<td></td>
</tr>
</tbody>
</table>

We do not believe the NOx and SO2 emission factors given for the Simcals plant should be used as comparisons for determining BACT. The 1998 permit data for Simcals is based on the use of West Virginia sub-bituminous coal, not Kentucky Blue Gem coal which is used at Mississippi Silicon and will be used at the proposed Simova Silicon plant. West Virginia low-sulfur coal is no longer available and has been replaced by the Kentucky Blue Gem coal since production began in the early 2000’s. The type of coal used has a significant effect on NOx and SO2 emissions.

PM emission limits include all sources of PM within the tapping, refining, product casting, and slag casting system. Please see the attached schematic diagram.

TDEC Response: The justification as provided for using emission values higher than those used at other facilities will be reviewed with Region 4 EPA. Note that VOC is expressed as carbon here and possibly as Tennessee Silicon if information is available, please confirm if the VOC factor for that (Mississippi Silicon) site is expressed as "VOC-as-carbon." Also see Item 1 of this letter concerning the need for calculations.

The Mississippi Silicon VOC emission factor basis is not available.

8. For the NOx BACT determination for Ladle Preheaters, a value of 0.096 lb NOx / MMBtu is proposed. Please address the RBLC entry for IA-0087 for Gerdau at 60 ppmv and the RBLC entry for MN-0070 Minnesota Steel at 0.08 lb/MMBtu. Please address RBLC ID OH-0245 for Republic at 0.099 lb/MMBtu. If information is available, please address Republic Technologies RBLC ID OH-0276 at 0.36 tons per month. In general, if the RBLC data is presented in units that are different from those units proposed for BACT, please convert these units to the units as proposed for BACT by Simova to make the task of review simpler, and address the discrepancy if the RBLC value is lower than the proposed Simova value.

Part of the NOx RBLC search results table (Table 16) was incorrectly assembled. A corrected version of the table is provided below.
Table 16. Recent RBLC Entries for NOx Emissions from Ladle Preheaters (revised)

<table>
<thead>
<tr>
<th>RBLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum (MMBtu/hr)</th>
<th>Limit (lb/MMBtu)</th>
<th>Emission Reduction Method(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR-0030</td>
<td>9/24/1998</td>
<td>NUCOR STEEL ASSOCIATES</td>
<td>JACKSON, AR</td>
<td>PREHEATER, LADLE</td>
<td>4</td>
<td>0.1</td>
<td>GCP</td>
</tr>
<tr>
<td>AR-0055</td>
<td>10/10/2001</td>
<td>NUCOR YAMATO STEEL, INC.</td>
<td>MISSISSIPPI, AR</td>
<td>PREHEATER, LADLE</td>
<td>225</td>
<td>0.098</td>
<td>LNB</td>
</tr>
<tr>
<td>AR-0056</td>
<td>10/28/1993</td>
<td>NUCOR STEEL DIVISION</td>
<td>SEBASTIAN, AR</td>
<td>LADLE PREHEAT &amp; DRYOUT STATIONS</td>
<td>5.5</td>
<td>0.4</td>
<td>LNB</td>
</tr>
<tr>
<td>FL-0368</td>
<td>2/14/2019</td>
<td>NUCOR STEEL FLORIDA FACILITY</td>
<td>POLK, FL</td>
<td>PREHEATERS, LADLE</td>
<td>45.75</td>
<td>0.1</td>
<td>GCP</td>
</tr>
<tr>
<td>IA-0056</td>
<td>13/01/1995</td>
<td>IPSCO STEEL, INC</td>
<td>MUSCATINE, IA</td>
<td>Ladle and Tundish Preheaters, Ovens and Skull Cutting</td>
<td>Unknown</td>
<td>50 RPPM</td>
<td>LNB</td>
</tr>
<tr>
<td>IA-0087</td>
<td>5/29/2007</td>
<td>GEA GARDI AMORSTETT INC</td>
<td>MUSCATINE, IA</td>
<td>LADLE PREHEATER STATIONS 3</td>
<td>5</td>
<td>0.098</td>
<td>GCP</td>
</tr>
<tr>
<td>IN-0034</td>
<td>6/1/2012</td>
<td>NUCOR STEEL</td>
<td>MONTGOMERY, IN</td>
<td>SOUTH LADLE DRIVERS AND PREHEATERS</td>
<td>12</td>
<td>0.1</td>
<td>LNB, GCP, PMG</td>
</tr>
<tr>
<td>IN-0052</td>
<td>10/31/1996</td>
<td>STEEL DYNAMICS, INC</td>
<td>DEKALB, IN</td>
<td>PREHEAT STATION, LADLE 3</td>
<td>30</td>
<td>0.14</td>
<td>LNB</td>
</tr>
<tr>
<td>IN-0073</td>
<td>10/31/1996</td>
<td>QUALITEXX CORP</td>
<td>HENDRICKS, IN</td>
<td>LADLE PREHEATERS 3</td>
<td>8</td>
<td>0.1</td>
<td>LNB</td>
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<tr>
<td>IN-0090</td>
<td>8/1/2012</td>
<td>NUCOR STEEL</td>
<td>MONTGOMERY, IN</td>
<td>LADLE PREHEATER/DRYER STATIONS</td>
<td>10</td>
<td>0.098</td>
<td>None</td>
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<tr>
<td>MD-0438</td>
<td>10/29/2018</td>
<td>GEA GARDI AMORSTETT INC</td>
<td>MONROE, MI</td>
<td>LADLE PREHEATERS</td>
<td>30</td>
<td>0.08</td>
<td>LNB, GCP, PMG</td>
</tr>
<tr>
<td>MN-0070</td>
<td>9/7/2007</td>
<td>MINNESOTA STEEL INDUSTRIES, LLC</td>
<td>ITASCA, MN</td>
<td>Ladle preheater</td>
<td>Unknown</td>
<td>None</td>
<td>LNB</td>
</tr>
<tr>
<td>OH-0345</td>
<td>1/27/1999</td>
<td>REPUBLIC TECHNOLOGIES INTERNATIONAL</td>
<td>STARK, OH</td>
<td>ECCENTRIC BOTTOM TAPPING LADLE PREHEATER TAP</td>
<td>14</td>
<td>0.089</td>
<td>LNB</td>
</tr>
<tr>
<td>OH-0276</td>
<td>10/2/2017</td>
<td>CHARTER STEEL</td>
<td>CUYAHOGA, OH</td>
<td>LADLE PREHEATER AND DRYER, 4 UNITS</td>
<td>10</td>
<td>0.36 ton/month</td>
<td>None</td>
</tr>
</tbody>
</table>

Sino Novia, Inc.
SHS Calgary Trail Unit 601,
Vancouver, BC V7B 1E7
<table>
<thead>
<tr>
<th>RRLC ID</th>
<th>Permit Issuance Date</th>
<th>Company</th>
<th>Location</th>
<th>System Description</th>
<th>Rated Maximum (MMBtu/hr)</th>
<th>Limit (lb/MMBtu)</th>
<th>Emission Reduction Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH-0302</td>
<td>8/30/2005</td>
<td>REPUBLIC ENGINEERED PRODUCTS, INC</td>
<td>STARK, OH</td>
<td>DRIERS/PREHEATERS  (2)</td>
<td>14.5</td>
<td>0.1</td>
<td>LNB</td>
</tr>
<tr>
<td>OH-0379</td>
<td>2/6/2019</td>
<td>PETMIN USA INC/COASTED</td>
<td>ASHTABULA, OH</td>
<td>Ladle Preheaters (P002, P003 and P004)</td>
<td>15</td>
<td>0.14</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>OH-0381</td>
<td>9/27/2019</td>
<td>NORTHSTAR BLUERSCOPE STEEL, LLC</td>
<td>FULTON, OH</td>
<td>Ladle Preheaters and Dryers (P021-033, P025-036)</td>
<td>16</td>
<td>0.1</td>
<td>GCP, PNG</td>
</tr>
<tr>
<td>OK-0126</td>
<td>9/8/2003</td>
<td>MID AMERICAN STEEL ROLLING MEL</td>
<td>MARSHALL, OK</td>
<td>Ladle pre-heater and refractory drying</td>
<td>Unknown</td>
<td>0.1</td>
<td>PNG</td>
</tr>
<tr>
<td>TN-0071</td>
<td>4/28/2000</td>
<td>WAUPACA FOUNDRY, INC</td>
<td>WANGEN, TN</td>
<td>MISC. NATURAL GAS USAGE FOR PREHEATING LADLES</td>
<td>15</td>
<td>0.1</td>
<td>Heat input limit</td>
</tr>
<tr>
<td>TX-0857</td>
<td>1/2/2020</td>
<td>STEEL MANUFACTURING FACILITY</td>
<td>ORANGE, TX</td>
<td>MELT SHIP LADLE PREHEATERS</td>
<td>Unknown</td>
<td>None</td>
<td>GCP</td>
</tr>
<tr>
<td>TX-0882</td>
<td>1/17/2020</td>
<td>SCSW STEEL MILL</td>
<td>SAN PATRICO, TX</td>
<td>LADLE DRYERS AND PREHEATERS</td>
<td>Unknown</td>
<td>0.1</td>
<td>GCP, PNG</td>
</tr>
</tbody>
</table>

1. GCP = good combustion practice, LNB = low NOx burners, PNG = pipeline natural gas.
Based on the corrected table provided above and the received request, we believe TDEC is asking Sinova to address the following RBLC entries:

- RBLC ID IA-0055 for IPSCO Steel with a NOx limit of 60 ppmv;
- RBLC ID MI-0438 for Gerdau Macsteel with a NOx limit of 0.08 lb/MMBtu; and
- RBLC ID OH-0245 for Republic Technologies International with a NOx limit of 0.089 lb/MMBtu

The NOx BACT limit proposed in the submitted permit application did not reflect the use of low-NOx burners, and should have been 0.063 lb/MMBtu, which is equivalent to a NOx exhaust concentration of 60 ppmv. With this correction, Sinova is proposing a NOx emission limit for the ladle preheaters that is no less stringent than any of the BACT determinations found in the RBLC for gas-fired ladle preheaters.

Assuming 30 days per month and continuous operation, the Republic Technologies NOx limit of 0.36 tons per month is equivalent to 0.10 lb/MMBtu, which is less stringent than the ladle preheater NOx limit proposed by Sinova.

TDEC Response: The October 28, 2021 submittal indicates that a value of 0.063 lb/MMBtu is proposed as BACT.

Noted.

9. For the CO BACT determination for Ladle Preheaters, a value of 0.082 lb CO/MMBtu is proposed. Please address RBLC ID AR-0044 for Arkansas Steel at 0.025 lb/MMBtu, RBLC ID IA-0055 for Ipscoat 200 ppmv if information is available, RBLC ID OH-0276 at 0.30 tons /month if information is available, RBLC ID OH-0381 at 0.02 lb/MMBtu, and the RBLC ID TX-0398 values at 0.51 and 0.58 lb/hr if information is available. In general, if the RBLC data is presented in units that are different from those units proposed for BACT, please convert these units to the units as proposed for BACT by Sinova.

The CO limits provided in the RBLC for ladle preheaters at Arkansas Steel Associates (0.025 lb/MMBtu) and Northstar Bluescope Steel (0.020 lb/MMBtu) are unusually stringent, and those sources do not have correspondingly stringent VOC limits placed on the ladle preheaters (i.e., 0.0083 lb/MMBtu for Arkansas Steel Associates and 0.0056 lb/MMBtu for Northstar Bluescope Steel). This inconsistency, combined with a lack of add-on CO/VOC emission reduction alternatives for ladle pre-heaters (the permits indicate that BACT for CO is good combustion practices), suggests that these CO limits may have been revised and/or never achieved in practice.

The CO BACT proposal, 0.082 lb/MMBtu, is equivalent to a ladle heater CO exhaust concentration of 130 ppmv, which is more stringent than the IPSCO CO limit of 200 ppmv.

Assuming 30 days per month and continuous operation, the Republic Technologies CO limit of 0.30 tons per month is equivalent to 0.083 lb/MMBtu, which is less stringent than the CO limit proposed by Sinova.

Permit application and permitting materials associated with the NUCOR Jewett Plant in Texas indicate that emission rates calculated for the ladle preheaters are based on default emission factors from AP-42 Chapter 1.4 (Natural Gas Combustion), all of which are no more stringent than the BACT emission limits proposed by Sinova for the ladle preheater. The CO emission factor is 84 lb/MMScf, which is equivalent to 0.082 lb/MMBtu, assuming the heating value of natural gas is 1,020 Btu/scf.
TDEC Response: The justification as provided for using emission values higher than the minimum RLBC value will be reviewed with Region 4 EPA. It is noted that the company response mentioned Republic Engineered Technologies at 0.30 tons per month. Please advise if this was intended to read as Charter Steel (RLBC OH-0276) at 0.30 tons CO/month.

This is correct, Charter Steel has a tons per month limit, not Republic Engineered Technologies.

10. For the VOC BACT determination for Ladle Preheaters, a value of 0.0054 lb VOC/MMBtu is proposed. Please address RLBC ID TN-0044 for Waupaca Foundry at 0.004 lb/MMBtu, and RLBC ID TX-0398 for Nucor Jewett TX-0398 at 0.04 lb/hr and 0.01 lb/hr (if information is available to convert the Nucor plants to lb/MMBtu).

The VOC limit provided in the RLBC for ladle preheaters at the Waupaca Foundry (0.004 lb/MMBtu) is unusually stringent, and this source does not have a correspondingly stringent CO limits placed on the ladle preheaters (i.e., 0.087 lb/MMBtu). This inconsistency, combined with a lack of add-on CO/VOC emission reduction alternatives for ladle pre-heaters (the permit indicates BACT for VOC is good combustion practices), suggests that this VOC limit may have been revised and/or has never been achieved in practice.

Permit application and permitting materials associated with the NUCOR Jewett Plant in Texas indicate that emission rates calculated for the ladle preheaters are based on default emission factors from AP-42 Chapter 1.4 (Natural Gas Combustion), all of which are no more stringent than the BACT emission limits proposed by Sinova for the ladle preheater. The VOC emission factor is 5.5 lb/MMscf, which is equivalent to 0.0054 lb/MMBtu, assuming the heating value of natural gas is 1,020 Btu/scf.

TDEC Response: The justification as provided for using emission values higher than the minimum RLBC value will be reviewed with Region 4 EPA.

11. For the SO2 BACT determination for Ladle Preheaters, a value of 0.0006 lb SO2/MMBtu is proposed. Please address RLBC ID TN-0071 for Waupaca Foundry at 0.00049 lb/MMBtu, and RLBC ID TX-0398 for Nucor at 0.01 lb/hr (if information is available to convert this value to lb/MMBtu).

The SO2 limit provided in the RLBC for ladle preheaters at the Waupaca Foundry (0.00049 lb/MMBtu) is unusually stringent and does not agree with the proposed means for achieving this limit (i.e., use of pipeline natural gas). This inconsistency, combined with a lack of add-on SO2 emission reduction alternatives for ladle pre-heaters, suggests that this SO2 limit may have been revised and/or has never been achieved in practice.

Permit application and permitting materials associated with the NUCOR Jewett Plant in Texas indicate that emission rates calculated for the ladle preheaters are based on default emission factors from AP-42 Chapter 1.4 (Natural Gas Combustion), all of which are no more stringent than the BACT emission limits proposed by Sinova for the ladle preheater. The SO2 emission factor is 0.6 lb/MMscf, which is equivalent to 0.0006 lb/MMBtu, assuming the heating value of natural gas is 1,020 Btu/scf.
TDEC Response: The justification as provided for using BACT emission values higher than the minimum RBLC value will be reviewed with Region 4 EPA. Also note that Republic Products (OH-302) has a value of 0.000588 lb SO2/MMBtu, which is considered to be equal to the proposed BACT value when rounded. The Nucor (TX 0398 BACT) value has been addressed as equivalent to 0.0006 lb/MMBtu.

12. For the PM (presumably PM/PM10/PM2.5) BACT determination for Ladle Preheaters, a value of 0.0075 lb/MMBtu is proposed. Please address RBLC ID OH-0381 for Northstar Bluescope Steel at 0.003 lb/MMBtu. Please address RBLC ID TX-0398 for Nucor at 0.2 and 0.23 lb/hr lb/hr (if information is available to convert this value to lb/MMBtu). Please advise if the PM proposal is for PM/PM10/PM2.5

The PM/PM10/PM2.5 limit provided in the RBLC for ladle preheaters at Northstar Bluescope Steel (0.003 lb/MMBtu) is unusually stringent and does not agree with the proposed means for achieving this limit (i.e., good combustion practices and use of pipeline natural gas). This inconsistency, combined with a lack of add-on PM emission reduction alternatives for ladle pre-heaters, suggests that this PM limit may have been revised and/or never achieved in practice.

Permit application and permitting materials associated with the NUCOR Jewett Plant in Texas indicate that emission rates calculated for the ladle preheaters are based on default emission factors from AP-42 Chapter 1.4 (Natural Gas Combustion), all of which are no more stringent than the BACT emission limits proposed by Sinova for the ladle preheater. The PM/PM10/PM2.5 emission factor is 7.6 lb/MMscf, which is equivalent to 0.0075 lb/MMBtu, assuming the heating value of natural gas is 1,020 Btu/scf.

TDEC Response: The justification as provided for using BACT emission values higher than the minimum RBLC value will be reviewed with Region 4 EPA.

13. Sinova has proposed the following GHG values as BACT for the Ladle Preheaters:

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>BACT proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>117 lb/MMBtu</td>
</tr>
<tr>
<td>CH4</td>
<td>0.0022 lb/MMBtu</td>
</tr>
<tr>
<td>N2O</td>
<td>0.00022 lb/MMBtu</td>
</tr>
</tbody>
</table>

Please advise as to the calculations for these proposals.

These emission factors, which are based on GHG emission factors from 40 CFR Part 98 Subpart C, Tables C-1 and C-2 for natural gas combustion, were used to calculate GHG emission for the ladle preheaters and are proposed as GHG BACT limits for the ladle preheaters.

TDEC Response: Please confirm the equivalent factors in specified in bold font in last two columns of above table. Also, include the equivalent value for CO2 and the table reference in the below table.
14. For the initial raw material handling operations (Section 5.5.1), as materials are received in the plant, there will be truck unloading in semi-enclosed structures, with misting. The quartz, woodchips, coal and limestone would be stored outside on a concrete pad, while charcoal would be stored in a covered storage building. All materials would be delivered to a hopper by a front end loader, with misting control. Baghouse controls rejected as fugitive emissions are addressed here. Please advise as to what procedures would be used as a fugitive dust control plan. Is misting continuous or as needed?

Misting will be employed to suppress fugitive dust when trucks are being unloaded and when front-end loaders are operating. A fugitive dust control plan will be prepared as part of the operation and maintenance plan we assume will be required by the construction permit.

TDEC Response: Note that there will need to be Title V application forms updated for this source as mentioned at Item #1 of this letter.

Noted. Title V Application forms are provided with this response.

15. For the material handling operations at section 5.5.2.1, the transfer of materials from the Day Bins to the Submerged Arc Furnaces (SAF) is mentioned. It was stated that there is an overlap between material handling, transfer and storage. As a review, the (mis-sprayed?) raw materials are transferred by front-end loader from the raw material receiving area to a misted hopper and then by conveyor (what sort of conveyor is this?) to the day bins in the proportioning building. Does the proportioning building baghouse collect and control any emissions from the filling of the day bins, or does it also capture and control any emissions from front end loader filling of the hopper that supplies the day bins as well as emissions from transfer points that are gravity fed from the day bins to the conveyor to the SAF building? The BACT selection at section 5.5.2.5 is proposed as 0.0022 gr/dscf. Subsequently, in section 5.5.2.5, it is stated that a baghouse will meet 0.0022 gr/dscf, but that value is not BACT, and we are not sure which baghouse this is. It is unclear if the emissions from the proportioning building are strictly from the conveyor transfer points to the day bins, or if they also include any emissions from the weigh system under the day bins, or if also there are emissions from front-end loader placing raw materials into a hopper which is outside of the proportioning building. Please clarify if it is correct that the only emissions from the Proportioning Building are from the filling of day bins. The initial agreement letter indicated that there would be a 0.00022 gr/dscf limit for the baghouse for the proportioning building. However, it seems that you are proposing 0.003 gr/dscf as BACT for the Proportioning Building Baghouse, and also agreeing to the more stringent 0.0022 gr/dscf as the limit. It is not clear where, in the Proportioning Building, the PM BACT was reviewed.
The raw materials are transferred from the storage piles or charcoal building by end loader to a misted feed hopper and then by a covered belt conveyer to the day bins in the proportioning building. The proportioning building bag house collects and controls any emissions inside the building — it does not collect emissions from the misted feed hopper outside the building. It also collects emissions from the gravity feed points at the bottom of the day bins — see attached schematic.

TDEC Response: With regard to the 0.0022 vs 0.003 gr/sccf BACT value, the latest October 28, 2021 submittal includes an agreement letter, dated September 16, 2021, that proposes a limit of 0.0022 gr PM/dscf for the Main Furnace Baghouse, the Crushing and Screening/Sizing Baghouse, and the Proportioning Building Baghouse. However, this letter specifies PM as compared with PM/PM10/PM2.5. Please advise as to the correct units for the agreement, as item #20, Table 2 of the response letter specifies PM/PM10/PM2.5 for these sources. Also, Table 29 on page 95 indicates PM/PM10/PM2.5 for all baghouse controlled BACT proposals.

Also, on Page 81, section 5.5.2.1, there is a statement that “Because of the overlap between material handling, transfer and storage, the review of the RBLC database and recent permit applications is provided in table 22 Review of the RBLC database and recent permit applications provided the following summary of material transfer and storage control options.”

This was a typo.

It appears that Table 22, Recent RBLC Entries, is being used as a basis for Raw Material Handling BACT proposal (misting control), but because of the baghouse control methods cited, this section may also be used as a review for the Proportioning building, the Finished Product Building, and possibly may be used when the Furnace Silo Building application is submitted. It is unclear as to which entries apply to the BACT review for Raw Material Handling (at the introduction of materials into the facility), the Proportioning Building (where raw materials are also handled), and the Finished product building (where there is crushing, screening and bagging). Please clarify this matter, identifying which table, or which portion of the table, was used for which process. Also, note that Table 22 specifies material handling, transfer, and storage, but the Finished Product Building includes screening and crushing. Also, PM calculations are required for these operations as specified at item #4 of this letter.

It is noted that Table 22 covers Material Handling, Transfer, and Storage. This table seems to cover Material handling (as fugitive emission) and also as controlled by baghouse. BACT as proposed at section 5.5.1.5 specifies no add-on controls are utilized to control fugitive particulate emissions from raw material transfer and storage. Please explain.

Separate outdoor material handling (fugitive) and indoor material handling BACT analyses are provided with this response. It is not possible to use a baghouse or similar add-on system to reduce particulate emissions from material handling and storage operations that occur outdoors. Baghouses are installed, as appropriate, on material handling operations that occur within buildings. Material handling systems that occur outdoors will use misting systems to reduce fugitive particulate emissions.
16. After silicon is produced (and also Slag is separated and collected) at the Furnace Building, Silicon Product is transferred to the Finished Product building by front-end loader, and slag is also transferred by front end loader to the slag crushing and screening building. Because this material is assumed to be solid (and not finely divided particulate matter) it should not be producing any fugitive emissions as it is being transported for both of these transfer operations, please advise if this is incorrect. Because the slag is being crushed and screened in a separate partially-enclosed building, and misting is being used as control, there should be emission factors, calculations, and (mistinng) control efficiency for this operation and also a BACT determination for the slag crushing/screening and bagging operation. Because the silicon product is being transferred to the Finished Product Building where it is Crushed, Screened, conveyed and bagged, and these emissions are controlled by the Finished Product Building Baghouse, the calculations for finished product crushing do not need to be included. However, it is not clear where the BACT from the Final Product Baghouse is reviewed, and proposed, at the proposed emission limits Table 29 on pages 95 and 96. Please clarify these issues. Also it is indicated that fines from the sizing operation at the Finished Product Building are transferred back to casting. Is this from screening or collected by the baghouse? When these fines are transferred by front-end loader to the casting operation, are any transfer point emissions captured by the furnace baghouse hood system? Is the dust collected by the Finished Product Bldg. baghouse system loaded into bags as a sealed system, with no emissions?

It is noted that the fines collected by the Finished Product Building are collected and transferred by Front-end Loader to be recycled in the process. Please advise as to the final disposition of these fines materials and whether the transfer is enclosed and or collected.

The approximately 6,000 tons/year of furnace slag is moved from the furnace storage area by front-end loader as collected to a slag storage bin outside the furnace building which may or may not be covered for protection from rain. Portable crushing and screening mounted on a skid is set up near the slag storage bin to process the solid slag for sales to customers. The crushing and screening area will be misted to control emissions. Since the slag is a solid material and should not be producing any fugitive emissions during its limited operation time, we do not believe a BACT is necessary for this operation. Emissions for slag handling were calculated using emission factors from AP-42 Section 11.19.2 (Crushed Stone Processing and Pulverized Material Processing). Due to the size of the slag being crushed (3-12 inches), the crushing process falls under the category of Primary Crushing (Controlled), for which AP-42 Section 11.19.2 Table 2 indicates the emission factors are “non detect”. Emission calculations for this process are included in Appendix B, under Slag Handling Fugitive Emissions.

The silicon product is moved to the adjacent Finished Product Building where it is cooled, stored in bins and then crushed and screened to size. It is then either bulk loaded into rail cars or trucks or loaded into one-ton bags and taken to the Finished Goods Storage building. Any fugitive emissions generated during the sizing operation are controlled by the Finished Goods (Crushing and Screening) Baghouse. The undersized fines screened out during sizing are bagged for sale to customers. A small amount of the fines may be recycled back to the Furnace Building and remelted and layered in the bottom of the molds during the casting operation.

TDEC Response: Concerning Slag Crushing and Screening, AP-42 Section 11.19.2 Table 2 seems to indicate that ND means “No data” for Primary Crushing in Table 11.19.2-2. Also for this table, footnote “n” states: “No data available, but emission factors for PM-10 for tertiary crushers can be used as an upper limit for primary or secondary crushing.”
Although this Slag Crushing and Screening Operation is used for a limited amount of time, this should be reviewed and compared to new calculations for crushing.

If you are in agreement that this information can be used, please submit revised calculations for crushing at the Slag Crushing and Screening Process. There would also need to be a BACT update for Slag Crushing and screening, and there would need to be a revised application APC 10 that would specify maximum tons per hour (in addition to the currently specified tons per year).

See response to Question 5. Updated calculations are provided with this application.

It is not clear where the BACT from the Final Product Baghouse is reviewed, please advise.

BACT for the Raw Material Handling and Storage concludes that a baghouse with a filter efficiency of 0.003 gr/dscf is BACT. This also applies to the Final Product Crushing and Screening.

17. It is noted that the materials collected by the SAF baghouse are pneumatically conveyed to the Fume Silos where they are stored before being transferred to railcars, trucks, or bags. These operations are completely sealed with no emissions, and are not considered to be emission sources. No BACT or emissions estimates are required here, but please include this process on the plant diagram and specify that there are no emissions from this completely sealed system.

The fume silos and associated fume handling and packaging operation occur within the main building and do not exhaust to the atmosphere – please refer to the attached drawings for confirmation.

TDEC Response: The company has verbally advised APC that there is a baghouse collecting the transfer points inside the Fume Silo building which exhausts to the atmosphere. Title V application forms, calculations and BACT comparison are needed here. There may be a need for a new agreement letter if the fume silo baghouse would have a limit similar to the limits for other baghouses at the plant. Also see Item 10 of this letter.

Fume Silo information and associated Title V forms are provided with this response.

18. For the emergency natural gas-fired engine generator, please propose numeric BACT values for PM/PM10/PM2.5, SO2, CO, VOC, NOx, and GHG. GHG may be a ton per year limit, but PM/PM10/PM2.5 and SO2 must be in pounds per hour.

Proposed numeric BACT limits for the natural gas-fired emergency generator:

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>BACT Limit</th>
<th>Limit Units</th>
<th>BACT Limit</th>
<th>Limit Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOx</td>
<td>7.1</td>
<td>lb/hr</td>
<td>1.2</td>
<td>g/hp-hr</td>
</tr>
<tr>
<td>CO</td>
<td>13</td>
<td>lb/hr</td>
<td>2.2</td>
<td>g/hp-hr</td>
</tr>
<tr>
<td>VOC</td>
<td>5.9</td>
<td>lb/hr</td>
<td>1.0</td>
<td>g/hp-hr</td>
</tr>
<tr>
<td>PM/PM10/PM2.5</td>
<td>0.10</td>
<td>lb/hr</td>
<td>0.016</td>
<td>g/hp-hr</td>
</tr>
<tr>
<td>SO2</td>
<td>0.0029</td>
<td>lb/hr</td>
<td>0.10</td>
<td>g/hp-hr</td>
</tr>
</tbody>
</table>
Permit Number: 979383
Issuance Date: <Issuance Date, 2022>
Expiration Date: April 30, 2025

| GHG | 32 | tpy CO₂e | -- | -- |

TDEC Response: Information has been provided, but also see items 1 and 3 of this letter.

Numeric BACT limits in g/hp-hr are provided in the table above. The emergency generator has a rated design capacity of 2,682 hp.

19. For clarification, no additional BACT values for Roadways need to be proposed

Noted.

TDEC Response: No action needed

Noted.

20. The BACT Proposed Limits Summary on Page 95, Table 29, of the application is not entirely clear. The Proportioning Building and the Final Product Building are not specifically indicated on Table 29.

Table 2. BACT Proposed Emission Limits (Revised)

<table>
<thead>
<tr>
<th>Source</th>
<th>Pollutant</th>
<th>Means of Compliance</th>
<th>BACT Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submerged Arc Furnaces (2 units) and Associated Operations in Final Product Building (i.e., product crushing, screening &amp; bagging)</td>
<td>NOₓ</td>
<td>Best practices design and operation</td>
<td>-- (work practice)</td>
</tr>
<tr>
<td></td>
<td>CO</td>
<td>Best practices design and operation</td>
<td>-- (work practice)</td>
</tr>
<tr>
<td></td>
<td>VOC</td>
<td>Best practices design and operation</td>
<td>-- (work practice)</td>
</tr>
<tr>
<td></td>
<td>SO₂</td>
<td>Use of low-sulfur raw materials</td>
<td>-- (work practice)</td>
</tr>
<tr>
<td></td>
<td>PM₁₀/PM₂.₅</td>
<td>Baghouse and best practices design and operation</td>
<td>0.0022 gr/dscf</td>
</tr>
<tr>
<td>GHG</td>
<td>Utilization of new generation furnaces, good operation, and maintenance</td>
<td>-- (work practice)</td>
<td></td>
</tr>
<tr>
<td>Fume Silos and Fume Packaging</td>
<td>PM₁₀/PM₂.₅</td>
<td>Fully enclosed process that does not exhaust to the atmosphere</td>
<td>--</td>
</tr>
<tr>
<td>Ledle Preheaters (3 units)</td>
<td>NOₓ</td>
<td>Low-NOₓ burner, good combustion practices</td>
<td>0.063 lb/MMBtu</td>
</tr>
<tr>
<td></td>
<td>CO</td>
<td>Good combustion practices</td>
<td>0.082 lb/MMBtu</td>
</tr>
<tr>
<td></td>
<td>VOC</td>
<td>Good combustion practices</td>
<td>0.0054 lb/MMBtu</td>
</tr>
<tr>
<td></td>
<td>SO₂</td>
<td>Combustion of natural gas, good combustion practices</td>
<td>0.0006 lb/MMBtu</td>
</tr>
<tr>
<td></td>
<td>PM₁₀/PM₂.₅</td>
<td>Combustion of natural gas, good combustion practices</td>
<td>0.0075 lb/MMBtu</td>
</tr>
<tr>
<td>Source</td>
<td>Pollutant</td>
<td>Means of Compliance</td>
<td>BACT Limit</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-----------</td>
<td>----------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>GHG</td>
<td></td>
<td>Combustion of natural gas, good combustion practices, selection of most energy efficient burner design available, periodic maintenance</td>
<td>CO₂: 117 lb/MBtu, CH₄: 0.0022 lb/MMBtu, N₂O: 0.00022 lb/MMBtu</td>
</tr>
<tr>
<td>Raw Material Receiving, Transfer &amp; Storage</td>
<td>PM/PM₁₀/ PEM₂₅</td>
<td>Best management practices and fugitive dust control plan</td>
<td>-- (work practice)</td>
</tr>
<tr>
<td>Product Crushing and Screening</td>
<td>PM/PM₁₀/ PEM₂₅</td>
<td>Baghouse</td>
<td>0.0022 gr/dscf</td>
</tr>
<tr>
<td>Proportioning Building / Raw Material Handling</td>
<td>PM/PM₁₀/ PEM₂₅</td>
<td>Baghouse</td>
<td>0.0022 gr/dscf</td>
</tr>
<tr>
<td>Slag Handling, Crushing, &amp; Screening</td>
<td></td>
<td>Misting</td>
<td>-- (work practice)</td>
</tr>
<tr>
<td>Emergency Engine</td>
<td>NOₓ</td>
<td>Low-NOₓ design, good combustion practice, compliance with NSPS JJJJ</td>
<td>7.1 lb/hr</td>
</tr>
<tr>
<td></td>
<td>CO</td>
<td>Good combustion practice, compliance with NSPS JJJJ</td>
<td>13 lb/hr</td>
</tr>
<tr>
<td></td>
<td>VOC</td>
<td>Good combustion practice, compliance with NSPS JJJJ</td>
<td>5.9 lb/hr</td>
</tr>
<tr>
<td></td>
<td>SO₂</td>
<td>Combustion of natural gas, good combustion practice, compliance with NSPS JJJJ</td>
<td>0.0029 lb/hr</td>
</tr>
<tr>
<td></td>
<td>PM/PM₁₀/ PEM₂₅</td>
<td>Combustion of natural gas, good combustion practice, compliance with NSPS JJJJ</td>
<td>0.10 lb/hr</td>
</tr>
<tr>
<td></td>
<td>GHG</td>
<td>Combustion of natural gas, good combustion practice, compliance with NSPS JJJJ</td>
<td>32 tpy CO₂e</td>
</tr>
<tr>
<td>Roadways</td>
<td>PM/PM₁₀/ PEM₂₅</td>
<td>Fugitive dust control plan</td>
<td>-- (work practice)</td>
</tr>
<tr>
<td>Diesel Storage Tank</td>
<td>VOC</td>
<td>TDEC Regulation 1200-03-18-.48(3)(d) compliant storage vessel port cap consistent with the vessel manufacturer requirements</td>
<td>-- (work practice)</td>
</tr>
</tbody>
</table>
TDEC Response: The Proportioning Building and the Final Product Building are included at Table 29, but it appears that the Proportioning and Finished Product building BACT proposals may be covered at Table 22, as both of these include Material Handling, Transfer, and Storage. The Finished Product Building also includes crushing, but crushing does not seem to be addressed. Please review and specify which RBL/C review applies to which source. This matter is also addressed at item 3 of this letter.

The Final Product Building is where silicon is crushed and screened. The Proportioning Building is where raw materials are received and mixed to prepare for the SAF. Both of these buildings are controlled by baghouses. The Table 22 RBL/C search can apply to both areas.

21. A BACT proposal is required (and an application must be submitted) for the Diesel Fuel Storage Tank. The following is a listing of the proposed sources for this facility, please verify that applications and aBACT proposal is proposed for each, except for Fume Silos. The BACT proposal need not always be a numeric value.

The exact size of the diesel fuel tank has not yet been determined, but the capacity will be less than 10,000 gallons. Per TDEC Regulation 1200-03-18-.48(1)(b) any volatile organic liquid storage tank with a capacity of 10,000 gallons or less is required to comply with 1200-03-18-.48(3)(d), which requires tanks subject to 1200-03-18-.48(1)(b) to be equipped with a cap consistent with the vessel manufacturer’s requirements, unless the port is used for a pressure relief valve. Sinova proposes compliance with these regulations as BACT for VOC emissions from the proposed diesel storage tank.

The revised Table 29 provided above in the previous response is a comprehensive list of project BACT proposals.

<table>
<thead>
<tr>
<th>Description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fugitive Processes- Raw Material Receiving – partially enclosed, outdoor storage concrete pads, front end conveyor to misted hopper and also dust from Initial Road Traffic</td>
<td></td>
</tr>
<tr>
<td>Proportioning Building with baghouse</td>
<td></td>
</tr>
<tr>
<td>Ladle Preheating (three units)</td>
<td></td>
</tr>
<tr>
<td>Two Submerged Arc Furnaces (SAF) with tapping, casting with hooding to duct emissions to baghouses</td>
<td></td>
</tr>
<tr>
<td>Slag Handling and Crushing and Screening (following the SAF process) Partially enclosed building with Mist control</td>
<td></td>
</tr>
<tr>
<td>Fume Silos and bag packing – all sealed units</td>
<td>Not a source due to no exhaust to atmosphere</td>
</tr>
<tr>
<td>Final Product Building (Crushing and Screening and bagging also enclosed truck and rail loadout) Baghouse control</td>
<td></td>
</tr>
<tr>
<td>Emergency Engines</td>
<td></td>
</tr>
<tr>
<td>Diesel Fuel Storage</td>
<td></td>
</tr>
</tbody>
</table>

Response: There is no RBL/C BACT analysis for diesel storage tanks, just a reference to 1200-03-18-.48(3)(d). This is insufficient.
Please revise the Title V APC 6 form, indicating submerged fill if that is the case, and include calculations and completing item 17 of the application. If the usage rate is unknown, please propose the maximum anticipated value. A RBLC comparison is needed. See item 1 of this letter.

**Title V Forms, a more detailed BACT analysis, and RBLC search are included with this response.**

22. Please submit a statement of which specifications from 40 CFR 60 Subpart IIIJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines would apply to your facility. This may consist of a copy of those regulations marked up to note which requirements would apply. If standards are referenced to another rule, please include the limits from the referenced regulations.

**Attached to this response.**

TDEC Response: It doesn’t appear this information was submitted, please submit specific requirements that would apply to this source and also the calculations that would be used to determine the numeric BACT limits proposed in item 18 of this letter (for example g/HP-hr. and HP)

**Numeric limits are provided in Item 18. We are also providing a highlighted version of 40 CFR 60 Subpart IIIJ.**

23. If it will be used, please include charcoal with the usage rate/proportion as one of the input materials for the SAF units

**This is included in the updated Title V Forms attached to this letter.**

TDEC Response: This information has been submitted, but note that item 1 of this letter requests clarification of the intermittent nature of material charging.

**The additional Title V forms requested by TDEC are provided with this response.**

24. The application was submitted on non-Title V application forms. The applications for major sources must be submitted on Title V application forms.

**Title V forms are attached to this letter.**

TDEC Response: This information has been provided for most sources, but additional information is needed as specified at item 1 of this letter

**The additional Title V forms and emission rate calculations requested by TDEC are provided with this response.**

25. Table 28 Addresses RBLC entries for Haul Roads, and Section 5.7.1.5 proposes a Fugitive dust control plan for Haul Roads as BACT, but there are no calculations for traffic dust. Please provide these calculations.
Paved Road Emission calculations are attached to this letter.

TDEC Response: This information has been provided

Noted.

We appreciate your diligent review of our permit application. If you have any questions or require additional information, please contact James May via phone at (780) 328-6542 ext. 250 or via email at jim.may@sinovaglobal.com.

Sincerely,

Jayson Tymko
President
Sinova Silicon, Inc.

Attachments

Copy: Greg Forte, TDEC
     Jim May, Sinova
From: Jim May <jim.may@sinovaglobal.com>
Sent: Tuesday, March 15, 2022 7:54 AM
To: Greg Forte <Greg.Forte@tn.gov>
Cc: Jim May <jim.may@sinovaglobal.com>; Dave Tuten <dave.tuten@sinovaglobal.com>
Subject: [EXTERNAL] FW: Daily/annual average SO₂ update

*** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. ***

Greg,

Please see the attached emission charts from Eric Albright for our input on the SAF emissions in the PSD permit.

As we discussed we would like to stay with the 34 lbs/ton Si value CO emissions for both the daily and annual averages,

Please advise if any questions,

Jim

From: Eric Albright <ealbright@landauinc.com>
Sent: Thursday, March 10, 2022 3:45 PM
To: Haidar Alrawi <haidar.alrawi@tn.gov>
Cc: Greg Forte <Greg.Forte@tn.gov>; Doug S. Wright <Doug.S.Wright@tn.gov>; Jim May <jim.may@sinovaglobal.com>; Dave Tuten <dave.tuten@sinovaglobal.com>; Kat Baker <kbaker@landauinc.com>
Subject: Daily/annual average SO₂ update

Haidar:

Following our call this past Monday, we have updated the daily and annual average SO₂ emission factor for the SAFs. Where the SO₂ emission factor had been 17.6 lb SO₂/ton Si produced, it is now, based on information provided by Sinova, 15 lb SO₂/ton Si produced. We used this emission factor to recalculate the maximum expected emissions from the Main Baghouse stack and reran the Class I impact screening modeling using CALPUFF. As shown in the updated table below, the maximum 24-hour average SO₂ concentration predicted by the model is 0.193 ug/m³, which is less than 24-hour average SO₂ SIL proposed by EPA for Class I areas (i.e., 0.2 ug/m³). Because the maximum predicted concentration is less
than the proposed SIL, a cumulative analysis to assess compliance with ambient standards and/or the PSD increments is not required. Updated Class I impact analysis and emission rate summary tables are provided below.

### Table 45. Class I Significant Impact Level Analysis Results (updated)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Concentration (µg/m³)</th>
<th>Greater than Class I SIL?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO₂</td>
<td>Annual</td>
<td>0.016 -- 0.016</td>
<td>0.016</td>
</tr>
<tr>
<td>SO₂</td>
<td>Annual</td>
<td>0.008 -- 0.008</td>
<td>0.008</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>0.226 -- 0.193</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>0.736 -- 0.736</td>
<td>0.736</td>
</tr>
<tr>
<td>PM_{2.5}</td>
<td>Annual</td>
<td>0.0004 -- 0.0004</td>
<td>0.0006</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>0.010 -- 0.24</td>
<td>0.25</td>
</tr>
<tr>
<td>PM_{10}</td>
<td>Annual</td>
<td>0.0004 -- 0.0004</td>
<td>0.0004</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>0.011 -- 0.011</td>
<td>0.011</td>
</tr>
</tbody>
</table>

While the changed daily and annual average SO₂ emission rate will affect the results of the AQRV analyses, these analyses were not updated, because they already indicate compliance with all applicable thresholds, and updated analyses using reduced SO₂ emission rates are certain to indicate nothing more than an increased compliance margin.

We are in the process of locating the WRF files used as input to MMIF you requested and will let you know when they are available for your review. Please let us know whether our delivery of those files is necessary for TDEC to issue Sinova’s air permit.

Thanks, and please let me know if you have any questions or want to discuss.

Eric
// ERIC ALBRIGHT PE
PRINCIPAL
D: 206.631.8691 M:206.909.0591 // ealbright@landauinc.com

LANDAU ASSOCIATES
206.631.8680
155 NE 100th St, Ste 302, Seattle, WA 98125
www.landauinc.com

// PLEASE NOTE: Effective June 28th our CORPORATE HEADQUARTERS has relocated to SEATTLE.
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Permit Number: 979383
Issuance Date: <Issuance Date, 2022>
Expiration Date: April 30, 2025
March 1, 2022

VIA E-MAIL: doug.s.wright@tn.gov

TENNESSEE DEPT. OF ENVIRONMENT
AND CONSERVATION (TDEC)
Division of Air Pollution Control
William R. Snodgrass TN Tower, 15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243

Attention: Doug S. Wright
Environmental Manager 3

Dear Mr. Wright,

RE: CHANGE OF RESPONSIBLE PERSON

This letter is to confirm the request from Sinova Silicon LLC to change the name of the Responsible Person for the Tennessee Silicon Plant from Jayson Tymko to William David Tuten, Managing Director of Sinova Silicon LLC and a resident of Dyersburg, TN.

Please advise if you have any questions or concerns about this change.

Sincerely yours,

JAYSON TYMKO
PRESIDENT AND CEO
Appendix C
Correspondence Related to Modeling

Federal Land Managers (FLM) Notification dated 11/13/2019
Permit Number: 979383
Issuance Date: <Issuance Date, 2022
Expiration Date: April 30, 2025

From:  Bart Brashers
To:  Haidar/React, Tim Allen (tim.allen@fhwa.gov), Andrea Stace (Andrea.stace@nps.gov), Bret Anderson (bret.anderson@fhwa.gov)
Cc:  Susan Johnson, John Neter (john.neter@nps.gov), Bobby Carson, Kristen King, Jason Trinko, John Carlson (johncarlson@mit.edu)
Subject:  [EXTERNAL] HiTest Cates Landing PSD Modeling Protocol
Date:  Wednesday, November 13, 2019 4:46:55 PM

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Andrea, Tim, Bret, and Haidar,

HiTest Silicon, Inc. proposes to construct a facility near the Port of Cates Landing, Tennessee (on the Mississippi river) to produce metallic silicon. Initial emissions estimates indicate it will be a major source with respect to PSD. The closest Class I areas are Mingo (FWS), Mammoth Cave (NPS), Sipsey and Hercules Glades (USFS). More details can be found in the enclosed PSD Modeling Protocol, for your review.

Feel free to forward to any interested parties that I have inadvertently omitted. In particular, I did not cc: Jim Renfro (NPS) because of the distance between the proposed site and the Great Smoky Mountains.

Please email any comments or feedback on the Protocol to me.

Bart

Bart Brashers, Ph.D.
Senior Managing Consultant
Global Air Quality Practice Network Leader

D +1 (425) 412-1812
M +1 (206) 550-2606
bbwashers@ramboll.com

Ramboll
19200 33rd Avenue West
Suite 310
Lynnwood, WA 98036
USA
https://ramboll.com
Response from FLM (USFS) dated 11/17/2021 on the Modeling Protocol

Haidar Alrawi

From: Melanie Pitrolo <melanie.pitrolo@usda.gov>
Sent: Wednesday, November 17, 2021 8:29 PM
To: Haidar Alrawi
Cc: Majidi-Weest, Ghazal -FS
Subject: [EXTERNAL] RE: Sinova Silicon PSD application and modeling files

--- This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS Security. ---

Hi Haidar,

Thank you for sending the information regarding the Sinova Silicon PSD application. Based on the emission rates and distances to Forest Service Class I Areas, we do not anticipate that modeling would show significant additional impacts to the air quality related values (AQIVs) at any of the Class I Areas administered by the Forest Service. Therefore, we are not requesting that an AQRV modeling analysis be conducted or included as part of the PSD permitting application. Our screening of this analysis does not indicate agreement with any AQRV modeling protocols or conclusions that applicants may make independent of Federal Land Manager review. Please note that we are specifically addressing the need for an AQRV modeling analysis for only those Class I Areas managed by the USDA Forest Service. The state and/or EPA may have a different opinion regarding the need for a Class I increment analysis.

Thank you again for keeping us informed about PSD permit actions that may potentially impact Forest Service Class I Areas.

Melanie

Melanie Pitrolo
Regional Air Program Manager
Forest Service
Southern Region
p: 470-482-3654
melanie.pitrolo@usda.gov
160 Zilliox Street
Asheville, NC 28801

Caring for the land and serving people.

---

From: Haidar Alrawi <Haidar.Alrawi@tn.gov>
Sent: Tuesday, November 2, 2021 12:50 PM
To: Tim_Allen@fws.gov; Andrea_Story@nps.gov; Andrea_Story@nps.gov; Catherine_Collins@fws.gov; Catherine_Collins@fws.gov; John_Nottar@nps.gov; Catherine_Collins@fws.gov; Catherine_Collins@fws.gov; Anderson, Bret -FS; bmartin@usda.gov; Dom_Shepherd@nps.gov; Kristen_King@nps.gov; susan_johnson@nps.gov; Melanie Pitrolo@usda.gov; Melanie.Pitrolo@usda.gov; Greg_Potts@tn.gov; Paul_LaRock@tn.gov; Paul.LaRock@tn.gov; Lacey_Hardin@Lacey.Hardin@tn.gov; Richard_Smizy@tn.gov; Richard.Smizy@tn.gov
Cc: Greg.Potts@tn.gov; Paul.LaRock@tn.gov; Lacey_Hardin@Lacey.Hardin@tn.gov; Richard_Smizy@tn.gov; Richard.Smizy@tn.gov
Subject: Sinova Silicon PSD application and modeling files
Good morning,

Attached, please find the link to the received PSD application and modeling files for the Sinova Silicon (formerly PecoWest/PitTest Gates Landing) proposed PSD project in Gates Landing, TN, north of the City of Tiptonville in west Tennessee.

The modeling protocol was already e-mailed to you on 11/19/2019 by the consultant (the late Dr. Bart Brothers of Ramboll - see attachment) and we have not received any comments from you with regard to the modeling protocol.

Please let me know if you have any questions or any trouble accessing the data.

Best regards,

Haider

Haider Al-Rawi, P.E., BCEE | Environmental Consultant II
Tennessee Division of Air Pollution Control
Williamson R. Snodgrass TN Tower | 3112 Ross L. Parks Ave, 15th Floor | Nashville, TN 37244
Tel: 615-532-0578 | Fax: 615-532-0514
Email: haider.alrawi@tn.gov | Website: http://www.tn.gov/environmentair

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Environmental Protection Agency – Region IV (EPA R4) Notification dated 11/14/2019
From: Haidar Alrawi <Haidar.Alrawi@tn.gov>  
Sent: Thursday, November 14, 2019 2:08 PM  
To: Walker, Katherine <Walker.Katherine@epa.gov>; Howard, Chris <Howard.Chris@epa.gov>; Gillam, Rick <Rick.Gillam@epagov>  
Subject: FW: HiTest: Gates Landing PSD Modeling Protocol

Good afternoon folks,

Forwarded e-mail and attachments, please find a modeling protocol for the proposed HiTest Silicon PSD project in Gates Landing in west TN, north of Dyersburg, TN.

Please let me know if you have any questions, or need further information.

Regards,

Haidar

Haidar Al-rawi, P.E., BCEE | Environmental Consultant -3  
Tennessee Division of Air Pollution Control  
William B. Snodgrass TN Tower | 311 West Bicentennial Mall | Nashville, TN 37243  
Tel: 615-741-6010 | Fax: 615-741-6020  
Email: haidar.alrawi@tn.gov | Website: http://www.tn.gov/environment/air

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---

From: Bart Brashears [mailto:bbrashers@rambell.com]  
Sent: Wednesday, November 13, 2019 4:48 PM  
To: Haidar Alrawi; Tim Allen (tim.allen@tn.gov); Andrea Estes (andrea.estes@tn.gov); Brett Anderson (brett.anderson@tn.gov);  
Cc: Susan Johnson; John Notar (john_notar@tn.gov); Bobby Carlson; Kristen King; Jayson Tymko; John Carlson (jcarlson@trec.tn.gov)  
Subject: [EXTERNAL] HiTest Gates Landing PSD Modeling Protocol

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Environmental Protection Agency – Region IV (EPA R4) Notification dated 11/2/2021
From: Haidar Alrawi <Haidar.Alrawi@tn.gov>
Sent: Tuesday, November 2, 2021 12:29 PM
To: Howard, Chris (Howard.Chris@epa.gov) <Howard.Chris@epa.gov>; Gillam, Rick <gillam.rick@epa.gov>; Rinck, Todd <Rinck.Todd@epa.gov>; 'shepherd.Lorinda@epa.gov' <shepherd.Lorinda@epa.gov>
Cc: Greg Forte <Greg.Forte@tn.gov>; Paul LaRock <Paul.LaRock@tn.gov>; Lacey Hardin <Lacey.Hardin@tn.gov>; Richard Smrz <Richard.Smrz@tn.gov>
Subject: Sinova Silicon PSD application and modeling files

Good morning,

Attached, please find the link to the received PSD application and modeling files for the Sinova Silicon (formerly PacWest/HiTest Cates Landing) proposed PSD project in Cates Landing, TN, north of the City of Tiptonville in west Tennessee.

The modeling protocol was already e-mailed to you on 11/14/2019 and we have received your comments on 12/18/2019 and are our responses to those comments dated 1/18/2020 (see attachments). I believe our responses to your comments were not submitted to you at that time as we were waiting on a concurrence from the consultant on our responses (and in any case we were planning on addressing the comments in the preliminary modeling determination for the PSD project when we get there) and at that time we have not heard from the consultant/facility for over a year and now the project was restarted recently and there are no significant changes to the modeling protocol as the final modeling was revised with the updated met data, background concentrations and in addressing your initial modeling comments.

https://tennessee.sharepoint.com/:f:/s/environment/air/Regulatory/EsqKc-8BN5_UCp0N6GbN4NgtUwNGvqTRiFwK7tKG_S5cQEA

Please let me know if you have any questions or any trouble accessing the data.

Best regards,
Haidar

Haidar Al-Rawi, P.E., BCEE | Environmental Consultant 3
Tennessee Division of Air Pollution Control
William R. Snodgrass TN Tower | 3112 Rosa L. Parks Ave, 15th Floor | Nashville, TN 37214

Tel: 615-532-0578 | Fax: 615-532-0614
Email: haidar.alrawi@tn.gov | Website: http://www.tn.gov/environment/air
EPA Comments (dated 12/18/2019) on the Modeling Protocol

Haidar:

I hope you are doing well this holiday season! We thank you for providing us with the opportunity to review the PSD Modeling Protocol for the proposed Cates Landing HiTest Silicon facility.

We have reviewed the protocol and our comments are listed below:

- **Section 2.1.3 – Meteorology**
  - The applicant proposes to utilize meteorological data from the McKellar-Sipes Regional Airport located near Jackson, Tennessee and upper air data from Nashville as provided by TDEC. Additional justification regarding the representativeness of this meteorological data set for the project site should be provided.

- **Section 2.2 – Class II Ozone and Secondary PM2.5 Assessment**
  - In the paragraph below Table 2, the distances from the proposed facility to the two hypothetical sources seem to be reversed.
  - The protocol indicates that two hypothetical sources (Shelby County, Tennessee and Pemiscot, Missouri) will be used for the ozone and secondary PM2.5 analyses. Based on the information provided in the protocol, use of these two hypothetical sources seems appropriate. To further justify the use of these two hypothetical sources, we recommend that the following information be included as described in Section 4 of the April 30, 2019, EPA MERPs guidance:

  "The permit applicant should provide the appropriate permitting authority with a technically credible justification that the source characteristics (e.g., stack height, emissions rate) of the specific project source described in a permit application and the chemical and physical environment (e.g., meteorology, background pollutant concentrations, and regional/local emissions) near that project source are adequately represented by the selected hypothetical source(s)."

- **Section 2.3 Table 4** – No values are listed for the PM10 Annual, SO2 Annual or SO2 24-hour increments. These increments remain effective and should be addressed in the modeling.

- **Section 2.4 Table 5**
  - Additional justification should be provided for use of the background concentrations listed in Table 5. For each pollutant, this should include information supporting why a given background monitor is representative of the area of the proposed facility.

- **Section 2.6 Class II PSD Increment Consumption**
  - Secondary PM2.5 impacts from existing background PM2.5 increment consumers should be accounted for in cumulative Class II increment modeling for PM2.5, if such modeling is necessary.

- **Section 2.7 – Criteria Pollutant Ambient Air Quality Standards Assessment**
  - The second paragraph suggests that emission rates used in NAAQS compliance modeling may be based on 2-year average actual operating conditions. If actual operating
conditions are used in NAAQS compliance modeling, it should be done in a manner consistent with Table 8-2 of Appendix W – Guideline on Air Quality Models and the approach used should be well documented in the final modeling report. For nearby background sources, Table 8-2 allows the use of an actual operating level in computation of the emission rate to be modeled. Specifically, a temporally representative operating level when the facility is operating, reflective of the most recent 2 years, may be used.

- **Section 3.1.4 – Class I Secondary PM$_{2.5}$**
  - Additional justification should be provided for use of the Shelby County, Tennessee, hypothetical source for the calculation of downwind MERPs for Class I areas.

- **3.1.6 Class I Cumulative PSD Increment Analysis**
  - Secondary PM$_{2.5}$ impacts from existing background PM$_{2.5}$ increment consumers should be accounted for if a cumulative Class I increment consumption analysis is necessary for PM$_{1.0}$.
  - If Cumulative Class I increment modeling is required for any pollutant, we recommend that a separate modeling protocol be developed addressing issues such as alternative models, input data, modeling domain and the inventory of sources to be modeled.

- **Section 3.2 – Class I Air Quality Related Values Assessment**
  - We recommend consultation with the US Fish and Wildlife Service regarding the AQRV assessment for the Mingo Wilderness Area.

Don’t hesitate to let me know if you have any questions about any of these comments.

Chris

Christopher M. Howard
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US EPA Region 4
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Division Response (dated 1/8/2020) to EPA Comments on the Modeling Protocol
DIVISION RESPONSE TO MODELING COMMENTS

The following are the Division response to EPA R4 comments dated 12/18/2019 on the modeling protocol:

1. **Section 2.1.3 – Meteorology indicates** that the applicant proposes to utilize meteorological data from the McKellar-Sipes Regional Airport located near Jackson, Tennessee and upper air data from Nashville as provided by TDEC. Additional justification regarding the representativeness of this meteorological data set for the project site should be provided.

   **Division Response to Comment #1:**
   The Division has recommended this representative surface meteorological NWS site because it is the closest to HiTest location (105 km Southeast) in addition to have similar topography and surface characteristics to the PSD source. The other NWS meteorological data site in Memphis (163 km South) is deemed urban and not representative of the Hi Test facility location in Cates Landing, which is deemed rural. See Figure 1 below.

   **Figure 1: HiTest Silicon facility location relative to Jackson and Memphis airports**
2. Section 2.2 – Class II Ozone and Secondary PM2.5 Assessment) indicates that

- In the paragraph below Table 2, the distances from the proposed facility to the two hypothetical sources seem to be reversed.

- The protocol indicates that two hypothetical sources (Shelby County, Tennessee and Pemiscot, Missouri) will be used for the ozone and secondary PM2.5 analyses. Based on the information provided in the protocol, use of these two hypothetical sources seems appropriate. To further justify the use of these two hypothetical sources, we recommend that the following information be included as described in Section 4 of the April 30, 2019, EPA MERPs guidance:

  “The permit applicant should provide the appropriate permitting authority with a technically credible justification that the source characteristics (e.g., stack height, emissions rate) of the specific project source described in a permit application and the chemical and physical environment (e.g., meteorology, background pollutant concentrations, and regional/local emissions) near that project source are adequately represented by the selected hypothetical source(s).”

Division Response to Comment #2:

- The discrepancy will be corrected in the modeling report as part of the PSD application upon submittal.

- The selected two hypothetical sources (Shelby County, Tennessee and Pemiscot, Missouri) for the MERPS ozone and secondary PM2.5 analyses are the closest to the Hi Test site location even though the Shelby County site is more of an urban environment. Section 2.2 of the modeling protocol provided detailed information about these two sites in terms of modeled emissions, stack heights and modeled impacts relative to the applicable precursor emissions.

3. Section 2.3 Table 4 states that no values are listed for the PM_{10} Annual, SO_{2} Annual or SO_{2} 24-hour increments. These increments remain effective and should be addressed in the modeling.

Division Response to Comment #3:

The missing PSD Class II increment values (i.e., 17 ug/m^3 for PM10 Annual, 20 ug/m^3 for SO2 Annual and 91 ug/m^3 for SO2 24-hour) will be listed and addressed in the final modeling report as part of the PSD application upon submittal.
4. **Section 2.4 Table 5** indicates that additional justification should be provided for use of the background concentrations listed in Table 5. For each pollutant, this should include information supporting why a given background monitor is representative of the area of the proposed facility.

**Division Response to Comment #4:**
The selected two monitoring sites in Paducah, KY and Dyersburg, TN are closest to the HITE test facility from other nearby monitors for the respective impacted criteria pollutants and deemed representative in terms of terrain, topography and meteorology.

For the NO2 background 2016-2018 design values, the only other monitoring sites in the state are located in Memphis, Nashville, Kingsport/Eastman and Great Smoky Mountains (GRSM) NP. The Memphis and Nashville sites are representative of an urban metro area and not a rural environment at the HITE test site location. The Kingsport/Eastman site (AQS 47-163-0007) only has data for 2016 and the GRSM look Rock monitoring site (AQS 47-009-0101) has a much lower design values (5 ppb 1-hour average and 0.64 ppb annual average DVs) than the selected values at the Paducah site (30 ppb for the hourly average and 4.71 or 5.0 ppb for the annual average).

For the PM2.5 background 2016-2018 design values, the same value (14.0 ug/m3 for the 24-hour average and 7.0 ug/m3 for the annual average) would be obtained from the nearby monitoring site in Jackson, TN (AQS 47-113-0006).

For the PM10 24-hour background 2016-2018 design values, the only other close representative monitoring site is in the Clarksville area in Montgomery County, TN (AQS 47-125-0006), which has only data for 2016 (19 ug/m3).

For the SO2 1-hour background 2016-2018 design value, the only other close monitoring site in the Clarksville area is in Montgomery County, TN (AQS 47-125-0006) has only data for 2016 (35 ppb). The two monitoring sites on Wilburn Drive and Skyland Drive in Sullivan County, TN are showing higher values and are influenced by the nonattainment area surrounding the Eastman Chemical facility. The other remaining sites in Anderson and Blount (GRSM) counties are having much lower design values (2 ppb and 6 ppb respectively) than at the selected Paducah site.

5. **Section 2.6 Class II PSD Increment Consumption** states that secondary PM2.5 impacts from existing background PM2.5 increment consumers should be accounted for in cumulative Class II increment modeling for PM2.5. If such modeling is mentioned in comment 2, the EPA suggests that a cumulative impact analysis is required for PM2.5, that it includes secondary PM2.5 as well.

**Division Response to Comment #5:**
In general, the secondary PM2.5 impacts for nearby modeled sources will be accounted for in the applied background concentrations for the cumulative impact assessment and only primary PM2.5 emissions from the nearby sources will be modeled along the PSD source for the cumulative NAAQS modeling demonstration and in similar case for the cumulative increment assessment.
However, the HE Test facility will trigger the minor source PSD baseline data for all the impacted pollutants and more likely they will be the only source for increment consumption evaluation for Class I and Class II.

6. **Section 2.7 Criteria Pollutant Ambient Air Quality Standards Assessment** indicates that the second paragraph suggests that emission rates used in NAAQS compliance modeling may be based on 2-year average actual operating conditions. If actual operating conditions are used in NAAQS compliance modeling, it should be done in a manner consistent with Table 8-2 of Appendix W – Guideline on Air Quality Models and the approach used should be well documented in the final modeling report. For nearby background sources, Table 8-2 allows the use of an actual operating level in computation of the emission rate to be modeled. Specifically, a temporally representative operating level when the facility is operating, reflective of the most recent 2 years, may be used.

**Division Response to Comment #6:**
As indicated in the modeling protocol that this selection will be consistent with Table 8-2 of Appendix W – Guideline on Air Quality Models. The approach used will be well documented in the final modeling report as part of the PSD application upon submittal.

7. **Section 3.1.4 - Class I Secondary PM2.5** indicates that additional justification should be provided for use of the Shelby County, Tennessee, hypothetical source for the calculation of downwind MeRPs for Class I areas.

**Division Response to Comment #7:**
Please refer to our response to Comment #2, second bullet.

8. **Section 3.1.6 - Class I Cumulative PSD Increment Analysis** indicates that

- Secondary PM2.5 impacts from existing background PM2.5 increment consumers should be accounted for if a cumulative Class I increment consumption analysis is necessary for PM2.5.
- If Cumulative Class I increment modeling is required for any pollutant, we recommend that a separate modeling protocol be developed addressing issues such as alternative models, input data, modeling domain and the inventory of sources to be modeled.

**Division Response to Comment #8:**
- Please refer to our response to Comment #5.
- As indicated in section 3.1 of the modeling protocol, the tiered approach is appropriate and in the
case that the SII for the PM2.5 is exceeded, then a cumulative modeling assessment would be required and a modeling protocol will be required to identify the appropriate refined dispersion and/or photochemical model, emission inventory and methodology that will be used for this demonstration.

9. **Section 3.2 – Class I Air Quality Related Values Assessment** indicates that EPA recommends consultation with the US Fish and Wildlife Service regarding the AQRV assessment for the Mingo Wilderness Area.

**Division Response to Comment #9:**
The respective federal agencies (FWS and NPS) were already notified of the proposed PSD application impacting the Mingo (FWS) and Mammoth Cave (NPS) Class I areas on November 13, 2019.
EPA Updated Comments (dated 11/18/2021) on the Modeling Report
Haidar Alrawi

From: Howard, Chris <Howard.Chris@epa.gov>
Sent: Thursday, November 18, 2021 3:06 PM
To: Haidar Alrawi
Cc: Gillam, Rick; Lusky, Katy; Shepherd, Lorinda; Greg Forts; Paul LaRoc; Richard Smrz; Rinck, Todd
Subject: [EXTERNAL] EPA Region 4 Comments on PSD Modeling for Sinova Silicon
Attachments: Region 4 PM2.5 Increment Discussion Sept 2021 rev 9 22.pptx

*** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. ***

Haidar,

I hope you’re doing well! It was good to speak with you on the phone a couple of days ago. We have completed our review of the air quality modeling submitted in support of the PSD permit application for Sinova Silicon. Our comments regarding the modeling are listed below. It should be noted that these comments do not include any comments that the Region 4 ARD Permits Section may have regarding permitting or BACT issues. If these comments can be resolved informally, they will not be included in an official comment letter during the public comment period.

Section 6.2.2 – Modeling Domain, Receptors, and Terrain
- Clarification is requested regarding how ambient air was determined for the purpose of receptor placement along the facility property boundaries. Ambient air should be determined in a manner consistent with EPA’s ambient air policy dated December 2, 2019.

Section 6.2.3 – Emission Unit Characterization
- Please provide additional documentation for derivation of the initial vertical dimensions (SZunit) parameter for the Ladle Pre-Heaters shown in Table 32.
- Based on review of AERMOD input files, it does not appear as though emissions from roadways located on Sinova’s property were included in the modeling. We request confirmation that roadway emissions were not included in the modeling. We also request justification for non-inclusion of facility roadway emissions if they were not included in the modeling.
- Several Sinova sources were modeled with the AERMOD “HROFDY” option which essentially turned PM1.0 and PM10 emissions from these sources off at night. For these sources, a scalar of “0” was used daily from hour 23 through hour 7. Sources modeled in this manner include the crushing screen, piles 1-5, rail unloading, and the loading hopper. Additional justification should be provided for the hour of day scalars utilized for these sources including identification of any permit conditions that may apply to these sources.

Section 6.3 Project Impact Assessment – Appendix B
- Appendix B (page 4) provides calculations for the derivation of the emission rates modeled for the SAFs. Based on this table and Section 1 of the application, it seems that 3.86 pounds of silicon per hour is the maximum capacity of each furnace. Section 5.3 and Table 29 of the application indicate that proposed BACT for CO, NOx, and SO2 from the SAFs is best work practices with no numeric limits. Since no numeric emissions limitations are proposed, how are the emission rates modeled for the SAF shown on page 4 of Appendix B consistent with Section 8.2.2 (c) and Table 8-2 of 40-CFR Appendix W which state that the new source shall be modeled with allowable emissions?
Section 6.1.1 – NAAQS Results

- The maximum modeled concentration for 1-hour SO$_2$ (80 ug/m3) reported in Table 40 does not match the concentration shown in the corresponding model output file (so2.5Y.1h.out - 197.9 ug/m3). The value in the model output file does not include background, which would suggest possible violations of the 1-hour SO$_2$ NAAQS. If this is the correct model run for 1-hour SO$_2$ NAAQS, then it must be demonstrated that Sinova does not cause or significantly contribute to any NAAQS violation.

- We also noted that in addition to the AERMOD output file that lists 5-year average 4th high 1-hour SO$_2$ values, there are also output files for each of the five years modeled which list the 4th high 1-hour SO$_2$ value for each year. The 4th high 1-hour SO$_2$ values listed in the individual yearly output files more closely correlate to the 1-hour SO$_2$ value reported in Table 40. There are differences in the SO$_2$ emission rates modeled in these two sets of runs for the nearby source inventory. Explanation is requested regarding these differences in emission rates modeled.

- Based on a review of the SO$_2$ and NO$_x$ NAAQS AERMOD files, it does not appear that any Tennessee or Kentucky sources other than the proposed Sinova sources were included in the modeling. We request confirmation that there were no other Tennessee or Kentucky SO$_2$ or NO$_x$ sources within or near the respective significant areas that should have been included in the NAAQS modeling.

Section 6.2 – Class II Increment Consumption

- It does not appear as though the PM$_{2.5}$ increment analyses (Table 41) accounted for the secondary component of PM$_{2.5}$ increment consumption from precursor SO$_2$ and NO$_x$ emissions from nearby PM$_{2.5}$ increment sources. It appears that Sinova may have used the same AERMOD runs for both the PM$_{2.5}$ NAAQS and PSD Increment modeling. Therefore, it is not possible for us to determine if there are any nearby PM$_{2.5}$ increment sources in the area. Please clarify whether there are any PM$_{2.5}$ increment consumers in the area. If there are PM$_{2.5}$ increment consumers in the area, then, per Section V.3.2 of the September 2021 DRAFT EPA Guidance for Ozone and Fine Particulate Matter Permit Modeling, the cumulative PM$_{2.5}$ increment analysis should account for the impact of allowable precursor emissions from the proposed source as well as actual precursor emissions from nearby PM$_{2.5}$ increment consumers. Table 41 indicates that the impact of allowable precursor emissions from Sinova was accounted for. One method for addressing the secondary component of PM$_{2.5}$ increment consumption from nearby increment consumers in the area near a proposed PSD source was presented in the September 2021 EPA Region 4 virtual modelers workshop (presentation attached). EPA Region 4 is available to discuss methods for addressing the secondary component of PM$_{2.5}$ increment consumption at your convenience.

- As stated in the above comment, it appears that Sinova may have used the same AERMOD runs for both the PM$_{2.5}$ NAAQS and PSD Increment modeling. Based on a review of the PM$_{2.5}$ AERMOD files, it does not appear that any Tennessee or Kentucky sources other than the proposed Sinova sources were included in the modeling. We request confirmation that were no other Tennessee or Kentucky PM$_{2.5}$ sources within or near the respective significant impact areas that should have been included in the PM$_{2.5}$ NAAQS and/or Increment modeling.

- It does not appear as though an increment analysis was performed for 24-hour PM$_{10}$. Table 38 indicates that impacts from the project were greater than the 24-hour PM$_{10}$ Class II SIL, indicating the need for a cumulative increment consumption analysis.

Section 7.1.5 – Class I Secondary PM$_{2.5}$

- Additional justification is requested for the use of the Shelby County, TN, hypothetical source for the assessment of the secondary component of PM$_{2.5}$ impacts from the proposed facility at the Mingo Wilderness area. The Class II secondary PM$_{2.5}$ impact assessment (Section 6.3.1) used both the Shelby County, TN, and the Pemiscot, MO, hypothetical sources. Section 6.3.1 of the application states that the two hypothetical sources were used for the Tier 1 analysis because the Shelby, TN, source results in larger ozone and annual PM$_{2.5}$ contributions from the facility while the Pemiscot, MO, source leads to larger daily PM$_{2.5}$ contributions.
Section 7.1.7 – Significant Impact Level Analysis Results

- This section presents the results of CALPUFF modeling used to assess the impacts of the project on the nearest Class I area – the Mingo Wilderness Area. Table 45 indicates that all predicted pollutant concentrations are less than the respective Class I SIL, except for 24-hour SO2 impacts which are greater than the Class I SIL. This generally indicates the need for a cumulative 24-hour Class I SO2 increment assessment.

EPA Region 4 disagrees with Sinova’s rationale for not performing cumulative modeling for the 24-hour SO2 increment. Predicted 24-hour SO2 concentrations were greater than the Class I SIL at several receptors on only 1 day (9-13-16) of the 3-year (2014-16) period modeled. For SIL modeling, the first-high short-term value is compared to the SIL. For cumulative PSD increment modeling, the second-high short-term value is compared to the increment because the short-term increments may be exceeded once per year at each receptor. Thus, the first-high short-term value from cumulative modeling is not compared to the increment. However, for this case, if cumulative modeling were performed for 2016, the first-high value may not occur on 9-13-16. In other words, if cumulative modeling predicted increment exceedances on 9-13-16, it is possible that 9-13-16 may not be the first-highest day in 2016. Therefore, it is theoretically possible that Sinova could significantly contribute to predicted increment violations at a given receptor on 9-13-16 if the highest cumulative concentration does not occur on that day. Therefore, the modeling results shown in Table 45 generally indicate the need for a cumulative increment assessment for the 24-hour Class I SO2 increment or a sufficient demonstration for why a cumulative increment assessment is not necessary. If a cumulative increment assessment is necessary, the selection and use of an alternative model shall occur in agreement with the appropriate reviewing authority and approval by the EPA Regional office as described in Section 4.2(d) of 40 CFR Appendix W.

- Based on review of the CALPUFF and CALPOST input and output files provided, it appears as though the Class I Significant Impact Level Analysis Results presented in Table 45 reflect the use of plume depletion mechanisms (i.e., CALPUFF chemistry and deposition appear to be turned “on”). Use of plume depletion processes in CALPUFF screening modeling used to assess the impacts of a project for comparison to the Class I SILs is not consistent with the approach described in Section 4.2(c)(ii) of 40 CFR Appendix W.

I will be on leave tomorrow through November 29 for the Thanksgiving Holiday. If you have any questions regarding these comments, please send me an email message and I will get back with you early in the week after Thanksgiving.

I would like to wish you and your family a safe and Happy Thanksgiving!

-Chris

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Division Response (dated 2/24/2022) to EPA Updated Comments on the Modeling Report
Comment #2-3: Several Sinova sources were modeled with the AERMOD "HROFDY" option which essentially turned PM10 and PM2.5 emissions from these sources off at night. For these sources, a scalar of "O" was used daily from hour 23 through hour 7. Sources modeled in this manner include the crushing screen, piles 1-5, rail unloading, and the loading hopper. Additional justification should be provided for the hour of day scalars utilized for these sources including identification of any permit conditions that may apply to these sources.

Division Response to Comment #2-3:
Material Handling (crushing and screening, Piles 1-5, Loading Hopper) and Rail Unloading operations will be operated between 7 am and 10 pm, and aren’t expected to be sources of emissions during these hours. The HROFDY modeling option reflects this operation limitation.

3. Section 6.3 Project Impact Assessment – Appendix B
Comment #3-1: Appendix B (page 4) provides calculations for the derivation of the emission rates modeled for the SAFs. Based on this table and Section 1 of the application, it seems that 3.86 pounds of silicon per hour is the maximum capacity of each furnace. Section 5.3 and Table 29 of the application indicate that proposed BACT for CO, NOx, and SO2 from the SAFs is best work practices with no numeric limits. Since no numeric emissions limitations are proposed, how are the emission rates modeled for the SAF shown on page 4 of Appendix B consistent with Section 8.2.2 (c) and Table 8-2 of 40 CFR Appendix W which state that the new source shall be modeled with allowable emissions?

Division Response to Comment #3-1:
Ramboll updated the 3-hour average NO2, SO2, and CO modeling input files to reflect estimated maximum hourly emission rates. Sinova provided maximum hourly emission factors calculated based on the assumption that the maximum hourly emission factor is 20 percent greater than the maximum daily average emission factor. Hourly emission rates were calculated using a per-furnace maximum throughput of 4.1 tons Si/hour, for a total of 8.2 tons Si/hour for the facility, which is the maximum hourly throughput estimated by Sinova.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>ST Max Emission Factor (lb/ton Si)</th>
<th>ST Emission Rate (g/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO2</td>
<td>45</td>
<td>46.5</td>
</tr>
<tr>
<td>SO2</td>
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<td>21.8</td>
</tr>
<tr>
<td>CO</td>
<td>34</td>
<td>35.1</td>
</tr>
</tbody>
</table>

Notes:
1. Hourly maximum NOx and CO emission factor is based on Mississippi Silicon data.
2. Hourly maximum SO2 emission factor is the daily maximum emission factor (17.6 lb/ton Si) with a 20% safety factor.

The tables below present the maximum 1-hour average project-only modeling for CO, NOx, and SO2, as well as the 1-hour average cumulative modeling for NOx and SO2. As shown in the table, the maximum 1-hour average project-only CO concentration is less than the applicable Significant Impact Level (SIL), which indicates that maximum 1-hour average CO emissions attributable to the Sinova facility do not have the potential to cause or contribute to a violation of the 1-hour average CO ambient standard. The maximum 1-hour average cumulative SO2 concentration, when combined with a representative background concentration, is less than the applicable ambient standard, which indicates that maximum 1-hour average SO2 emissions attributable to the Sinova facility do not have the potential to cause or
Permit Number: 979383
Issuance Date: 2022
Expiration Date: April 30, 2025

Contribute to a violation of the 1-hour average SO₂ ambient standard. The maximum 1-hour average cumulative NOₓ concentration, when combined with a representative background concentration, is greater than the applicable ambient standard, but, as with the analysis presented in the originally submitted permit application, a culpability analysis using the MAXDCONT function in AERMOD indicates that the contributions from Sinova is less than the SIL at all receptors and during all time periods during which NAAQS exceedances occur; therefore, the Sinova facility does not have the potential to cause or contribute to a violation of the 1-hour average NOₓ ambient standard.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Project-Only Modeling</th>
<th>Cumulative Modeling Design Conc.</th>
<th>Background</th>
<th>Total (Cumulative + Background)</th>
<th>NAAQS</th>
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<tbody>
<tr>
<td>NOₓ</td>
<td>1-hour</td>
<td>126</td>
<td>7.5</td>
<td>1,354</td>
<td>56.4</td>
<td>1,410</td>
</tr>
<tr>
<td>SO₂</td>
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<td>81.1</td>
<td>7.8</td>
<td>147</td>
<td>26.1</td>
<td>173</td>
</tr>
<tr>
<td>CO</td>
<td>1-hour</td>
<td>231</td>
<td>2,000</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

4. **Section 6.1.1 – NAAQS Results**

**Comment #4-1**: The maximum modeled concentration for 1-hour SO₂ (80 µg/m³) reported in Table 40 does not match the concentration shown in the corresponding model output file (so2.5y1.out – 197.9 µg/m³). The value in the model output file does not include background, which would suggest possible violations of the 1-hour SO₂ NAAQS. If this is the correct model run for 1-hour SO₂ NAAQS, then it must be demonstrated that Sinova does not cause or significantly contribute to any NAAQS violation.

The input file associated with the five-year SO₂ modeling for off-site cumulative sources mistakenly contained the 1-hour average NOₓ emission rate values instead of the 1-hour average SO₂ emission rate values. However, the five input files associated with the single-year SO₂ modeling contained the correct 1-hour average SO₂ emission rate values, therefore, the maximum concentration presented in Table 40 is the maximum concentration for the single-year modeling across five years, as well as for the five-year modeling.

- We also noted that in addition to the AERMOD output file that lists 5-year average 4th high 1-hour SO₂ values, there are also output files for each of the five years modeled which list the 4th high 1-hour SO₂ value for each year. The 4th high 1-hour SO₂ values listed in the individual yearly output files more closely correlate to the 1-hour SO₂ value reported in Table 40. There are differences in the SO₂ emission rates modeled in these two sets of runs for the nearby source inventory. Explanation is requested regarding these differences in emission rates modeled.

**Division Response to Comment #4-1:**
The off-site cumulative source input file used with the five-year SO₂ modeling mistakenly contained the 1-hour average NOₓ emission rate values instead of the 1-hour average SO₂ emission rate values. Ramboll will provide an updated five-year SO₂ plot file created using a corrected input file to TDEC.

**Comment #4-2**: Based on a review of the SO₂ and NOₓ NAAQS AERMOD files, it does not appear that any Tennessee or Kentucky sources other than the proposed Sinova sources were included in the modeling. We request confirmation that there were no other Tennessee or Kentucky SO₂ or NOₓ sources within or near the respective significant areas that should have been included in the NAAQS modeling.
Division Response to Comment #4-2:
TDEC helped provide the nearby source inventory, and no sources were identified in Tennessee or Kentucky. The included sources are listed below. Based on conversations with TDEC and a review of the list of sources provided by TDEC, there were not any sources of NOx or SOx of sufficient size and proximity in Tennessee or Kentucky to be included in the NAAQS Modeling. The majority of the sources listed below are primarily sources of PM10 and PM2.5. The New Madrid Power Plant and Magnitude 7 Metals are the largest sources of NOx and SOx in the area.

<table>
<thead>
<tr>
<th>Facility ID</th>
<th>Description</th>
<th>AERMOD Identifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>291430004</td>
<td>NEW MADRID POWER PLANT MARSTON</td>
<td>NMPP</td>
</tr>
<tr>
<td>291430008</td>
<td>MAGNITUDE 7 METALS</td>
<td>MAG7</td>
</tr>
<tr>
<td>291430012</td>
<td>MAHAN GIN CO</td>
<td>MGC</td>
</tr>
<tr>
<td>291430013</td>
<td>PORTAGEVILLE FARMERS GIN INC</td>
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<tr>
<td>291430015</td>
<td>SRG GLOBAL COATINGS, INC.</td>
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<td>291430023</td>
<td>MCCORD GIN - NORTH GIDEON</td>
<td>MGNG</td>
</tr>
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<td>291430025</td>
<td>HEARTLAND ASPHALT MATERIALS NEW MADRID</td>
<td>HASP</td>
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<td>291430027</td>
<td>CARGILL INC - NEW MADRID ELEVATOR</td>
<td>CARG</td>
</tr>
<tr>
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<td>A. C. RILEY COTTON COMPANY NEW MADRID GIN</td>
<td>ACRC</td>
</tr>
<tr>
<td>291430047</td>
<td>BOOTH COTTON COMPANY INC MATTHEWS</td>
<td>BOOT</td>
</tr>
<tr>
<td>291430049</td>
<td>D. G. AND G. INC MATTHEWS COTTON CO</td>
<td>DGGI</td>
</tr>
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<td>291430050</td>
<td>RICHARDSON GIN INC</td>
<td>RICH</td>
</tr>
<tr>
<td>291430062</td>
<td>BUNGE NORTH AMERICA INC LINDA ELEVATOR</td>
<td>BUNG</td>
</tr>
<tr>
<td>291430065</td>
<td>RIVER BEND AG NEW MADRID</td>
<td>RBAG</td>
</tr>
<tr>
<td>291430066</td>
<td>RICELAND FOODS INC MARSTON</td>
<td>RICE</td>
</tr>
<tr>
<td>291430069</td>
<td>NUTRIEN AG SOLUTIONS</td>
<td>NUTR</td>
</tr>
<tr>
<td>291430070</td>
<td>SOUTHEAST COOP SERVICE CO MOREHOUSE</td>
<td>SCSC</td>
</tr>
<tr>
<td>291430071</td>
<td>CROP PRODUCTION SERVICES PORTAGEVILLE</td>
<td>CSPS</td>
</tr>
<tr>
<td>291430073</td>
<td>SEMO READY MIX - SIKESTON</td>
<td>SRMS</td>
</tr>
<tr>
<td>291430074</td>
<td>ADM GRAIN COMPANY NEW MADRID</td>
<td>ADMG</td>
</tr>
<tr>
<td>291430076</td>
<td>ETHOS ALTERNATIVE ENERGY OF MISSOURI LLC LILBOURN</td>
<td>ETHO</td>
</tr>
<tr>
<td>291430077</td>
<td>NUTRIEN AG SOLUTIONS</td>
<td>NUTA</td>
</tr>
<tr>
<td>291430078</td>
<td>NUTRIEN, INC</td>
<td>NUTR</td>
</tr>
<tr>
<td>291430079</td>
<td>MONSANTO COMPANY MATTHEWS</td>
<td>MONS</td>
</tr>
<tr>
<td>291430080</td>
<td>PIONEER HI-BRED INTL INC NEW MADRID</td>
<td>PION</td>
</tr>
<tr>
<td>291430083</td>
<td>SOUTHEAST MISSOURI CREMATORY</td>
<td>CREM</td>
</tr>
</tbody>
</table>

5. Section 6.2 – Class II Increment Consumption
Comment #5-1. It does not appear as though the PM2.5 increment analyses (Table 41) accounted for the secondary component of PM10 increment consumption from precursor SOx and NOx emissions from nearby PM10 increment sources. It appears that Sinova may have used the same AERMOD runs for both the PM10, NAAQS and PSD Increment modeling. Therefore, it is not possible for us to determine if there are any nearby PM10 increment sources in the area. Please clarify whether there are any PM10 increment consumers in the area, if there are PM10 increment consumers in the area, then, per Section V.3.2 of the September 2021 DRAFT EPA Guidance for Ozone and Fine Particulate Matter Permit Modeling, the cumulative PM2.5 increment analysis should account for the impact of allowable precursor emissions from the proposed source as well as actual precursor emissions from nearby PM10 increment consumers. Table 41 indicates that the impact of allowable precursor emissions from Sinova was
accounted for. One method for addressing the secondary component of PM$_{2.5}$ increment consumption from nearby increment consumers in the area near a proposed PSD source was presented in the September 2021 EPA Region 4 virtual modelers workshop (presentation attached). EPA Region 4 is available to discuss methods for addressing the secondary component of PM$_{2.5}$ increment consumption at your convenience.

**Division Response to Comment #5-1:**
TDEC Response to EPA Region 4 Protocol Comments: In general, the secondary PM$_{2.5}$ impacts for nearby modeled sources will be accounted for in the applied background concentrations for the cumulative impact assessment and only primary PM$_{2.5}$ emissions from the nearby sources will be modeled along the PSD source for the cumulative NAAQS modeling demonstration and in similar cases for the cumulative increment assessment. However, the Sinova Silicon facility will trigger the minor source PSD baseline date for all the impacted pollutants and more likely they will be the only source for increment consumption evaluation for Class I and Class II.

**Comment #5-2:** As stated in the above comment, it appears that Sinova may have used the same AERMOD runs for both the PM$_{2.5}$ NAAQS and PSD Increment modeling. Based on a review of the PM$_{2.5}$ AERMOD files, it does not appear that any Tennessee or Kentucky sources other than the proposed Sinova sources were included in the modeling. We request confirmation that there are no other Tennessee or Kentucky PM$_{2.5}$ sources within or near the respective significant impact areas that should have been included in the PM$_{2.5}$ NAAQS and/or increment modeling.

**Division Response to Comment #5-2:**
The nearby source inventory used for cumulative modeling was provided by TDEC. The table provided in response to the SO$_2$ and NO$_x$ NAAQS analysis comment also applies to the PM$_{2.5}$ emission inventory. The SIA for 24-hour PM$_{2.5}$ extends to 3.5 km north of the facility boundary in Kentucky, and 2 km south of the facility in Tennessee. Based on the review of the sources provided by TDEC, there are no sources in Kentucky or Tennessee of sufficient size and proximity to be included in the NAAQS modeling. Ramboll conservatively included all sources of PM$_{2.5}$ identified for the NAAQS modeling in the increment modeling. None of these sources are increment consuming sources, because all of them predate Sinova, which will trigger the minor source PSD baseline date.

**Comment #5-3:** It does not appear as though an increment analysis was performed for 24-hour PM$_{10}$. Table 38 indicates that impacts from the project were greater than the 24-hour PM$_{10}$ Class II SIL indicating the need for a cumulative increment consumption analysis.

**Division Response to Comment #5-3:**
The modeling was done to compare the 24-hour PM$_{10}$ increment analysis. The table below shows the results of the increment modeling, and the results are less than the increment. Modeling files were included with the application.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Rank</th>
<th>Modeled Concentration (μg/m$^3$)</th>
<th>Class II Increment (μg/m$^3$)</th>
<th>Exceeds Increment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$</td>
<td>24-hour</td>
<td>2nd</td>
<td>19.02</td>
<td>30</td>
<td>No</td>
</tr>
</tbody>
</table>
6. Section 7.1.5 - Class I Secondary PM₁₀

Comment #6-1: Additional justification is requested for the use of the Shelby County, TN, hypothetical source for the assessment of the secondary component of PM₁₀, impacts from the proposed facility at the Mingo Wilderness area. The Class II secondary PM₁₀ impact assessment (Section 6.3.1) used both the Shelby County, TN, and the Pemiscot, MO, hypothetical sources. Section 6.3.1 of the application states that the two hypothetical sources were used for the Tier 1 analysis because the Shelby, TN, source results in larger ozone and annual PM₁₀ contributions from the facility while the Pemiscot, MO, source leads to larger daily PM₁₀ contributions.

Division Response to Comment #6-1:
For the Class II MERPs calculations, the Pemiscot County, Missouri and the Shelby County, Tennessee hypothetical sources were each used to determine which resulted in the worst case secondary PM₁₀ contribution, and the Shelby County, Tennessee hypothetical source was found to be the worst case and included in the Class II modelling analyses. Based on this result, the Shelby County, Tennessee hypothetical source was assumed to be the worst-case contributor for the Class I PM₁₀ assessment. However, when both hypothetical source contributions are calculated the Pemiscot County, Missouri hypothetical source is the worst-case contributor.

The locations and parameters associated with both Pemiscot County, Missouri and the Shelby County, Tennessee hypothetical sources are summarized in the revised Table 43 below. An updated Table 44 below presents both Shelby and Pemiscot County hypothetical source results. Based on these results Pemiscot, MO was used as the worst-case hypothetical source contributor for the Class I assessment. An updated Table 45, which presents the Class I modeling results using the Pemiscot County, Missouri hypothetical source instead of the Shelby County, Tennessee hypothetical source. As shown in the updated Table 45, the total concentration (i.e., maximum modeling results plus the MERPs concentration) remains less than the Class I SILs, and, therefore, the conclusions presented in the original permit application do not change.

Table 43. Hypothetical Source Configuration for Tier 1 Class I Calculation

<table>
<thead>
<tr>
<th>Source</th>
<th>Source ID</th>
<th>Coordinates</th>
<th>Parameter</th>
<th>NOₓ</th>
<th>SO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelby, Tennessee</td>
<td>12EUS2 ID: 8</td>
<td>35.1249°, -90.0021°</td>
<td>Stack Height</td>
<td>90 m</td>
<td>90 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Emission Rate</td>
<td>1,000 tpy</td>
<td>500 tpy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Distance</td>
<td>86 km</td>
<td>86 km</td>
</tr>
<tr>
<td>Pemiscot, Missouri</td>
<td>12US2 ID: 17</td>
<td>36.223°, -89.851°</td>
<td>Stack Height</td>
<td>90 m</td>
<td>90 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Emission Rate</td>
<td>1,000 tpy</td>
<td>500 tpy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Distance</td>
<td>86 km</td>
<td>86 km</td>
</tr>
</tbody>
</table>
Table 44. MERPS Analysis Results for Class I PM2.5

<table>
<thead>
<tr>
<th>Precursor</th>
<th>Daily PM$_{2.5}$ (µg/m$^3$)</th>
<th>Annual Average PM$_{2.5}$ (µg/m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shelby, TN</td>
<td></td>
</tr>
<tr>
<td>NO$_x$</td>
<td>0.10</td>
<td>0.003</td>
</tr>
<tr>
<td>SO$_2$</td>
<td>0.05</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Pemiscot, MO</td>
<td></td>
</tr>
<tr>
<td>NO$_x$</td>
<td>0.11</td>
<td>0.004</td>
</tr>
<tr>
<td>SO$_2$</td>
<td>0.09</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Using Pemiscot, MO MERP values to calculate daily secondary PM$_{2.5}$ contributions:

\[
\frac{1230 \text{ TPY NO}_x \text{ from proposed facility}}{1000 \text{ TPY NO}_x \text{ from source at 90m}} \cdot 0.11 \frac{\text{µg}}{\text{m}^3} + \frac{505 \text{ TPY SO}_2 \text{ from proposed facility}}{500 \text{ TPY SO}_2 \text{ from source at 90m}} \cdot 0.001 \frac{\text{µg}}{\text{m}^3} = 0.24 \frac{\text{µg}}{\text{m}^3}
\]

It is estimated that the NO$_x$ and SO$_2$ emissions from the proposed facility will lead to daily maximum secondary PM$_{2.5}$ increases of up to 0.24 µg/m$^3$.

A similar approach is used to estimate annual average secondary PM$_{2.5}$ increases, as illustrated in the following equations:

Using Pemiscot, MO MERP values to calculate annual secondary PM$_{2.5}$ contributions:

\[
\frac{1230 \text{ TPY NO}_x \text{ from proposed facility}}{1000 \text{ TPY NO}_x \text{ from source at 90m}} \cdot 0.004 \frac{\text{µg}}{\text{m}^3} + \frac{505 \text{ TPY SO}_2 \text{ from proposed facility}}{500 \text{ TPY SO}_2 \text{ from source at 90m}} \cdot 0.001 \frac{\text{µg}}{\text{m}^3} = 0.006 \frac{\text{µg}}{\text{m}^3}
\]

It is estimated that the NO$_x$ and SO$_2$ emissions from the proposed facility will lead to an annual average secondary PM$_{2.5}$ increases of up to 0.006 µg/m$^3$.

Table 1. Class I Significant Impact Level Analysis Results

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Concentration (µg/m$^3$)</th>
<th>Maximum Modeled$^a$</th>
<th>MERPs</th>
<th>Total (Max + MERPs)</th>
<th>Class I SIL</th>
<th>Greater than Class I SIL?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO$_x$</td>
<td>Annual</td>
<td>0.016</td>
<td>--</td>
<td>0.016</td>
<td>0.1</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>SO$_2$</td>
<td>Annual</td>
<td>0.008</td>
<td>--</td>
<td>0.008</td>
<td>0.1</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>0.226</td>
<td>--</td>
<td>0.226</td>
<td>0.2</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>0.736</td>
<td>--</td>
<td>0.736</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
7. Section 7.1.7 – Significant Impact Level Analysis Results

Comment #7-1: This section presents the results of CALPUFF modeling used to assess the impacts of the project on the nearest Class I area – the Mingo Wilderness Area. Table 45 indicates that all predicted pollutant concentrations are less than the respective Class I SIL except for 24-hour SO_2 impacts which are greater than the Class I SIL. This generally indicates the need for a cumulative 24-hour Class 1 SO_2 increment assessment.

EPA Region 4 disagrees with Simova’s rationale for not performing cumulative modeling for the 24-hour SO_2 increment. Predicted 24-hour SO_2 concentrations were greater than the Class I SIL at several receptors on only 1 day (9-13-16) of the 3-year (2014-16) period modeled. For SIL modeling, the first-high short-term value is compared to the SIL. For cumulative PSD increment modeling, the second-high short-term value is compared to the increment because the short-term increments may be exceeded once per year at each receptor. Thus, the first-high short-term value from cumulative modeling is not compared to the increment. However, for this case, if cumulative modeling were performed for 2016, the first-high value may not occur on 9-13-16. In other words, if cumulative modeling predicted increment exceedances on 9-13-16, it is possible that 9-13-16 may not be the first-highest day in 2016. Therefore, it is theoretically possible that Simova could significantly contribute to predicted increment violations at a given receptor on 9-13-16 if the highest cumulative concentration does not occur on that day. Therefore, the modeling results shown in Table 45 generally indicate the need for a cumulative increment assessment for the 24-hour Class 1 SO_2 increment or a sufficient demonstration for why a cumulative increment assessment is not necessary. If a cumulative increment assessment is necessary, the selection and use of an alternative model shall occur in agreement with the appropriate reviewing authority and approval by the EPA Regional office as described in Section 4.2(d) of 40 CFR Appendix W.

Division Response to Comment #7-1:
Below are the results for the Class I cumulative increment assessment using the same sources as in the Class II cumulative increment assessment. The modeling was complete with CALPUFF with the chemistry turned off. The cumulative modeling results are less than the SO_2 24-hour PSD increment.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Maximum Model-Predicted Concentration (µg/m³)</th>
<th>PSD Increment (µg/m³)</th>
<th>Greater than PSD Increment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO_2</td>
<td>24-hour</td>
<td>3.17</td>
<td>5</td>
<td>No</td>
</tr>
</tbody>
</table>

Comment #7-2: Based on review of the CALPUFF and CALPOST input and output files provided, it appears as though the Class I Significant Impact Level Analysis Results presented in Table 45 reflect the use of plume depletion mechanisms (i.e., CALPUFF chemistry and deposition appear to be turned “on”). Use of plume depletion processes in CALPUFF screening modeling used to assess the impacts of a
Division Response to Comment #7-2:
To reduce the total number of input files and streamline the modeling process the CALPUFF input files include both reactive pollutants that participate in the modeled chemical reactions (i.e., NOx, SOx, etc.) and non-reactive versions of those same pollutants, which are designated with a lower-case “n” at the beginning of the standard pollutant IDs (i.e., nNOx and nSOx, etc.). The non-reactive versions of these pollutants have deposition turned “off” and are not included in the CALPUFF chemistry algorithms. The list of pollutants processed by CALPOST, the postprocessor used to average and report concentrations and deposition values, to calculate pollutant concentrations for the Class I project only analysis included only the non-reactive pollutant IDs (i.e., chemistry and deposition were turned “off”), whereas the nitrogen deposition, sulfur deposition, and visibility calculations included the reactive pollutant IDs (i.e., chemistry and deposition were turned “on”).
EPA Additional Comments (dated 3/8/2022) on the Application of the CALPUFF model for the Class I
Cumulative SO₂ (24-Hour) Modeling Analysis
Haidar,

It was good speaking with you yesterday and it was good to hear you are doing well. On February 24, you provided us with responses to our comments regarding PSD modeling for Sinova Silicon. Our comments on the Sinova Silicon PSD modeling were provided to you in November of last year. We thank you and Sinova for working with us to address our concerns. We have reviewed the responses to our comments and we only have one outstanding concern related to the 24-hour SO$_2$ increment modeling performed for the Mingo Wilderness Area. Section 7.1.7 of the October, 2021, revised air quality permit application presented CALPUFF modeling results demonstrating that predicted impacts from the proposed facility at the Mingo Wilderness Area would be less than the Class I SILs for all relevant pollutants except for 24-hour SO$_2$ impacts which are slightly greater than the Class I SIL. Specifically, the maximum predicted 24-hour SO$_2$ concentration was .23 μg/m$^3$ compared to the Class I SIL which is .2 μg/m$^3$. This generally indicates the need for a cumulative 24-hour Class I SO$_2$ increment assessment.

Predicted 24-hour SO$_2$ concentrations were greater than the Class I SIL at several Mingo receptors on only 1 day (9-13-16) of the 3-year (2014-16) period modeled. Sinova argued that because the SIL exceedances are limited to a single 24-hour period, and short-term increments (e.g., the 24-hour SO$_2$ increment) may be exceeded once per year at each site (i.e., receptor), a cumulative analysis is not required. We disagree with Sinova’s rationale for not performing a cumulative analysis. Our concern is that if cumulative modeling predicts increment violations at Mingo, and the highest predicted impact in 2016 occurs on a day other than 9-13-16, then Sinova could possibly significantly contribute to the predicted violations. Therefore, these SIL modeling results generally indicate the need for a cumulative increment assessment for the 24-hour Class I SO$_2$ increment or a sufficient demonstration for why a cumulative increment assessment is not necessary.

Given that the impact from the proposed facility on 24-hour SO$_2$ concentrations at Mingo is just above the Class I SIL on only 1 day of the three-year period modeled, EPA Region 4 may possibly consider a qualitative approach to demonstrate that a cumulative increment assessment may not be necessary in this unique case. Therefore, feel free to consult with us regarding potential approaches for doing so. As we discussed today, the best way to demonstrate that a cumulative increment assessment is not necessary is to reduce SO$_2$ impacts from the proposed facility to a level less than the 24-hour Class I SIL. Given that the most recent CALPUFF modeling predicts a 24-hour SO$_2$ impact of .23 μg/m$^3$ compared to the SIL which .2 μg/m$^3$, it would not take much of a reduction in daily SO$_2$ emissions to reduce modeled impacts to a level less than the SIL.

In response to our comment, Sinova provided cumulative Class I increment modeling for SO$_2$ for the 24-hour averaging period. This modeling utilized the CALPUFF model, with chemistry turned off, and the same sources used in the Class II cumulative increment assessment to demonstrate that the cumulative 24-hour SO$_2$ increment consumption at the Mingo Wilderness area is less than the increment. Application of CALPUFF for this purpose constitutes an alternative model application as described in Section 4.2 (d) of 40 CFR Appendix W. CALPUFF must be approved as
an alternative model in order for it to be used for a cumulative increment or NAAQS analysis as described in Section 4.2 (d) of Appendix W. Section 4.2 (d) of Appendix W states:

"d. In those situations where a cumulative impact analysis for NAAQS and/or PSD increments analysis beyond 50 km is necessary, the selection and use of an alternative model shall occur in agreement with the appropriate reviewing authority (paragraph 3.0(b)) and approval by the EPA Regional Office based on the requirements of paragraph 3.2.2(e)."

We also have concerns that the inventory of sources included in the cumulative modeling may not be sufficient for a cumulative Class I increment consumption analysis for Mingo. If Sinova elects to proceed with the use of the CALPUFF model to perform a cumulative Class I SO₂ increment analysis for the Mingo Wilderness, we strongly recommend a conference call to discuss the overall approach and data to be used in an alternative model demonstration and the cumulative Class I increment assessment. This call can be arranged by EPA Region 4 upon request. We also strongly recommend the development of a protocol document to establish the overall approach, data and tools to be used in the alternative model demonstration and the Class I cumulative increment consumption analysis.

If Sinova elects to address this issue by proceeding with the current cumulative Class I increment assessment that they have already performed without an alternative model approval, or, if this issue is not otherwise informally resolved, we may submit formal comments regarding this matter during the public comment period.

Thanks, and we look forward to working with you to address our remaining concern.

-Chris

Christopher M. Howard
Regional Meteorologist
US EPA Region 4 - Atlanta
404/562-9036
Howard.chris@epa.gov
Division Response (dated 3/14/2022) on EPA Comments on the Application of the CALPUFF model for the Class I Cumulative SO₂ (24-Hour) Modeling Analysis

TN DIVISION OF AIR POLLUTION CONTROL
RESPONSE TO EPA MODELING COMMENTS
March 14, 2022

The following are the Division response to EPA R4 comments dated 3/8/2022 on the application of CALPUFF model for SO₂ 24-hour average Class I Significance (SIL) Modeling

EPA Comment #1:
This comment is a one outstanding concern related to the 24-hour SO₂ increment modeling performed for the Mingo Wilderness Area. Section 7.1.7 of the October, 2021, revised air quality permit application presented CALPUFF modeling results demonstrating that predicted impacts from the proposed facility at the Mingo Wilderness Area would be less than the Class I SILs for all relevant pollutants except for 24-hour SO₂ impacts which are slightly greater than the Class I SIL. Specifically, the maximum predicted 24-hour SO₂ concentration was 0.23 µg/m³ compared to the Class I SIL which is 0.2 µg/m³. This generally indicates the need for a cumulative 24-hour Class I SO₂ increment assessment.

Predicted 24-hour SO₂ concentrations were greater than the Class I SIL at several Mingo receptors on only 1 day (9-13-18) of the 3-year (2014-16) period modeled. Sinova argued that because the SIL exceedances are limited to a single 24-hour period, and short-term increments (e.g., the 24-hour SO₂ increment) may be exceeded once per year at each site (i.e., receptor), a cumulative analysis is not required. We disagree with Sinova’s rationale for not performing a cumulative analysis. Our concern is that if cumulative modeling predicts increment violations at Mingo, and the highest predicted impact in 2016 occurs on a day other than 9-13-18, then Sinova could possibly significantly contribute to the predicted violations. Therefore, these SIL modeling results generally indicate the need for a cumulative increment assessment for the 24-hour Class I SO₂ increment or a sufficient demonstration for why a cumulative increment assessment is not necessary.

Given that the impact from the proposed facility on 24-hour SO₂ concentrations at Mingo is just above the Class I SIL on only 1 day of the three-year period modeled, EPA Region 4 may possibly consider a qualitative approach to demonstrate that a cumulative increment assessment may not be necessary in this unique case. Therefore, feel free to consult with us regarding potential approaches for doing so. As we discussed today, the best way to demonstrate that a cumulative increment assessment is not necessary is to reduce SO₂ impacts from the proposed facility to a level less than the 24-hour Class I SIL. Given that the most recent CALPUFF modeling predicts a 24-hour SO₂ impact of 0.23 µg/m³ compared to the SIL which 0.2 µg/m³, it would not take much of a reduction in daily SO₂ emissions to reduce modeled impacts to a level less than the SIL.

In response to our comment, Sinova provided cumulative Class I increment modeling for SO₂ for the 24-hour averaging period. This modeling utilized the CALPUFF model, with chemistry turned off, and the same sources used in the Class II cumulative increment assessment to demonstrate
that the cumulative 24-hour SO$_2$ increment consumption at the Mingo Wilderness area is less than the increment. Application of CALPUFF for this purpose constitutes an alternative model application as described in Section 4.2 (d) of 40 CFR Appendix W. CALPUFF must be approved as an alternative model in order for it to be used for a cumulative increment or NAAQS analysis as described in Section 4.2 (d) of Appendix W. Section 4.2 (d) of Appendix W states:

“d. In those situations where a cumulative impact analysis for NAAQS and/or PSD increments analysis beyond 50 km is necessary, the selection and use of an alternative model shall occur in agreement with the appropriate reviewing authority (paragraph 3.0(b)) and approval by the EPA Regional Office based on the requirements of paragraph 3.2.2(e).”

**EPA Comment #2:**

We also have concerns that the inventory of sources included in the cumulative modeling may not be sufficient for a cumulative Class I increment consumption analysis for Mingo. If Sinova elects to proceed with the use of the CALPUFF model to perform a cumulative Class I SO$_2$ increment analysis for the Mingo Wilderness, we strongly recommend a conference call to discuss the overall approach and data to be used in an alternative model demonstration and the cumulative Class I increment assessment. This call can be arranged by EPA Region 4 upon request. We also strongly recommend the development of a protocol document to establish the overall approach, data and tools to be used in the alternative model demonstration and the Class I cumulative increment consumption analysis.

If Sinova elects to address this issue by proceeding with the current cumulative Class I increment assessment that they have already performed without an alternative model approval, or, if this issue is not otherwise informally resolved, we may submit formal comments regarding this matter during the public comment period.

**Division Response to Comment #1:**

We concur with EPA that the Calpuff Class I significance model application is only for a screening analysis and not for a cumulative LRT modeling demonstration in accordance with the Guideline on Air Quality Models (GAQM) (appendix W of 40 CFR 61, 2017). Based on that, the Sinova facility has elected to revise and reduce the SO$_2$ daily and annual averages of emissions based on the revised emission factor (reduced from 17.6 to 15.0 lb SO$_2$/ton 5t) for the submerged arc furnaces (SAFs) as shown in Table 1, and instead of applying for an alternative model application for LRT analysis in accordance with section 3.2.2 of the GAQM.
Table 1. Updated Emissions for CO, NOx and SO2

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Hourly Emission Average</th>
<th>Daily &amp; Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emission Factor¹ (lb/ton Si)</td>
<td>Hourly Emission Rate² (lb/hr)</td>
</tr>
<tr>
<td>NO2</td>
<td>45</td>
<td>174</td>
</tr>
<tr>
<td>SO2</td>
<td>21.1</td>
<td>81.4</td>
</tr>
<tr>
<td>CO</td>
<td>34</td>
<td>131</td>
</tr>
</tbody>
</table>

Notes:
1. Maximum hourly average NOx and CO emission factors were based on a combination of the expected maximum daily and annual average emission factors for NOx and CO and the variability observed in CEMS data collected by Mississippi Silicon. The maximum hourly average SO2 emission factor is based on the expected maximum daily and annual average emission factor with a 20% safety factor to account for potential variation in coal sulfur content.
2. The maximum hourly, daily, and annual average emission rates are based on a maximum hourly average silicon production rate of 3,860 tons of silicon per hour.
3. The maximum daily and annual average emission factors are based on engineering judgement.

Note:
The hourly emission rates presented in the table above are less than those used for the hourly average modeling submitted to TDEQ; however, because the modeling results using greater emission rates demonstrated compliance with ambient standards and other regulatory thresholds, it can be assumed that modeling conducted using these emission rates would also demonstrate compliance, but with wider margins.

Based on the revised emissions (reduction of 482 lb/day and 88 tpy), the Calpuff SO2 Class I significance screening (with no chemistry) modeling was re-conducted for the 2014-2016 (WRF/MMIF prognostic met data) and the following SO2 max 24-hour average impact was obtained.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Maximum Model Predicted Conc. (µg/m³)</th>
<th>MERPIs Conc. (µg/m³)</th>
<th>Total Conc. (µg/m³)</th>
<th>Class I SIL (µg/m³)</th>
<th>Greater than Class I SIL?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO2</td>
<td>Annual</td>
<td>0.016</td>
<td>-</td>
<td>0.016</td>
<td>0.1</td>
<td>N</td>
</tr>
<tr>
<td>SO2</td>
<td>Annual</td>
<td>0.006</td>
<td>-</td>
<td>0.006</td>
<td>0.1</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>0.193</td>
<td>-</td>
<td>0.193</td>
<td>0.2</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>0.627</td>
<td>-</td>
<td>0.627</td>
<td>1</td>
<td>N</td>
</tr>
<tr>
<td>PM2.5</td>
<td>Annual</td>
<td>0.0004</td>
<td>0.005</td>
<td>0.005</td>
<td>0.05</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>0.010</td>
<td>0.1</td>
<td>0.184</td>
<td>0.27</td>
<td>N</td>
</tr>
</tbody>
</table>
Table 2: Updated Class I Significant Impact Level Analysis Results

<table>
<thead>
<tr>
<th>PM10</th>
<th>Annual</th>
<th>0.0004</th>
<th>-</th>
<th>0.0004</th>
<th>0.2</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-hour</td>
<td>0.011</td>
<td>-</td>
<td>-</td>
<td>0.011</td>
<td>0.3</td>
<td>N</td>
</tr>
</tbody>
</table>

NOTE: Concentration impacts in bold were updated from original values due to revised and reduced SO2 daily and annual average emissions (Table 1).

As shown in Table 2, the max 24-hour SO2 impact is 0.193 ug/m³ (from 2016, shown in Figure 1) is below the Class I SIL value of 0.2 ug/m³ and therefore, no requirement for any cumulative analysis.

Figure 1. Location of Mingo Wilderness Area Max Impact Receptor for the 24-Hour SO2 SIL

Division Response to Comment #2:
Due to the max 24-hour SO2 Class I impact is below the SIL, there is no requirement for a Class I cumulative modeling assessment for the Class I increment and therefore, no requirement for emission inventory.
The modeling files associated with this updated revision [Revised 24hr CALPUFF Modeling] is uploaded to our same Share Point site for the Sinova PSD modeling project at the following link:

Sinova Silicon PSD application
Permit Number: 979383
Issuance Date: <Issuance Date, 2022
Expiration Date: April 30, 2025
Appendix D
Emission Summary
Appendix D
Emission Summary
Emission Summary for PSD Construction Permit 979383 and Calculations
With March 15 update for SO₂, NOₓ and CO from SAF’s

Emission Summary for Sinova Silicon, Inc.

Description of Facility Operations: Sinova Silicon, Inc. has applied for an Division of Air Pollution Control (Division) prevention of significant deterioration (PSD) permit for a facility to manufacture Silicon Metal. This facility will be located at 4255 Cates Landing Road N. in Tiptonville, Lake County.

The following sources will be constructed:

Raw materials (quartz, wood, coal, charcoal, and limestone) will be brought in by rail or truck to the site (Source 01). After unloading, these materials will be transferred by front-end loader to a misted hopper and subsequently will be transported by covered conveyor to the Proportioning Building (Source 02). Within this building, covered conveyors will transport apportioned materials to Day Bins. From there, the Day Bins will deposit measured quantities of materials onto a covered conveyor belt in proportions that are necessary for production of silicon. Material from the Proportioning Building is transported to the Furnace Building by covered conveyor, and is fed by gravity into the top level of the furnace (Submerged Arc Furnace or SAF) continuously (Source 03). Heat for the reduction of silicon dioxide is provided by submerged-arc electrodes. Here, silicon is cast into molds, and also slag is collected. Material collected by the SAF baghouses is conveyed to the Fume Silo building (also controlled by baghouse) where it will be collected and sold as product (Source 05). The silicon from the SAF’s is delivered by front-end loader to the Finished Product building where it is crushed and screened (Source 07). Finished Product Building emissions (Source 07) are controlled by baghouse. Three natural gas-fired burners will be used to pre-heat the ladles (Source 04) before they receive the tapped silicon from the furnaces. The Slag by-product from the furnaces is collected from the tapping operating delivered to an outside crusher, and screened, before it is packaged for sale (Source 06). There will be an emergency natural gas fired emergency engine (Source 08) to facilitate the orderly shutdown of the facility in case of loss of power, and there will be a diesel fuel storage tank (Source 09) for the supply of fuel for front-end loaders.
### FACILITY DESCRIPTION

<table>
<thead>
<tr>
<th>Source</th>
<th>Source Description</th>
<th>Status</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Fugitive Processes Raw Material Receiving and Haul Roads</td>
<td>New</td>
<td>Partial Enclosure and Misting</td>
</tr>
<tr>
<td>02</td>
<td>Proportioning Building</td>
<td>New</td>
<td>Baghouse</td>
</tr>
<tr>
<td>03</td>
<td>Two Submerged Arc Furnaces (SAFs) with tapping, casting with hooding to duct emissions to baghouses</td>
<td>New</td>
<td>Two Baghouses (one for each SAF)</td>
</tr>
<tr>
<td>04</td>
<td>Ladle Preheating (three units)</td>
<td>New</td>
<td>None</td>
</tr>
<tr>
<td>05</td>
<td>Fume Silos and bag packing –</td>
<td>New</td>
<td>Passive Vent Filter to atmosphere</td>
</tr>
<tr>
<td>06</td>
<td>Slag Handling and Crushing and Screening (following the SAF process)</td>
<td>New</td>
<td>Misting control</td>
</tr>
<tr>
<td>07</td>
<td>Finished Product Building (Crushing and screening and bagging also enclosed truck and rail loadout)</td>
<td>New</td>
<td>Baghouse</td>
</tr>
<tr>
<td>08</td>
<td>Emergency Natural gas-fired Reciprocating Engine</td>
<td>New</td>
<td>None</td>
</tr>
<tr>
<td>09</td>
<td>Diesel Fuel Storage</td>
<td>New</td>
<td>Submerged fill and light -colored tank</td>
</tr>
</tbody>
</table>

### Source 01 - Fugitive Processes Raw Material Receiving and Haul Roads

This source consists of Rail Unloading (into below-ground hopper,) Rail Stacker Conveyor (directly onto piles), Truck Unloading (directly onto piles), Roads, and Loading Hopper.

Railcars unload to an underground hopper, then conveyor belt to storage pile.

Then front-end loader to “Loading Hopper” which is misted with water before being fed into an enclosed conveyor.

Trucks unload to storage pile outdoors, except for charcoal, which is enclosed.

All of these materials are picked up by front end loader which dumps into hopper (misted) which goes by enclosed conveyor to the Proportioning building.

They do not want small (powdered) material, all useful material is larger than this. Quartz is about 1’ to / by 4” and limestone is ½” by 3”.
If small (powder-type) materials are brought in, they are not desired—these materials will be picked up and sent through the system, but screens at the bottom of the day bin will filter them out—these “fines” will be recirculated back onto process, but only a small amount at a time so as not to recycle too much into the system at once.

Roads will be paved, but there will be wet spray / mist of roads as needed.

<table>
<thead>
<tr>
<th>Category</th>
<th>Process limit</th>
<th>Estimated 12-month all PM categories total</th>
<th>Estimated 12-month PM / PM10</th>
<th>Estimated 12-month PM 2.5</th>
<th>Monitoring Frequency Basis</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Transfer Points</td>
<td>No direct limits have been set (Indirectly set by hourly Production limit for SAF units)</td>
<td>150 pounds PM/PM10 (maximum at 150 lb/yr= 0.075 tons)</td>
<td>144.6 pounds (0.0723 tons)</td>
<td>0.002</td>
<td>Transfer point opacity - as required by Division</td>
<td>Underground Hopper for Railcars, Misting and Covered Conveyors</td>
</tr>
<tr>
<td>Haul Road Dust**</td>
<td>N/A</td>
<td>0.15</td>
<td>0.14</td>
<td>0.01</td>
<td>Daily records of Control Activities</td>
<td>Paved roads and water spray dust suppression</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>0.225</td>
<td>0.21</td>
<td>0.012</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* From Table 1 Raw Material Handling and Storage November 17, 2021, letter from Sinova at page 6/23
** From Emissions from Paved Roads” calculation submittal dated November 17, 2021, from Ramboll
PM is Particulate Matter

Due to overlap of some PM/PM10 factors, the worst case was used here for total PM

These values are estimates due to the fugitive nature of emissions. The 150 lb/yr material transfer emissions estimate is based on plant silicon production value and the use of misting, and the emission factors below. The silicon production rate is determined on a daily basis. The seven percent transfer point opacity limit from NSPS Part 60 Subpart OOO, will be used, although this source is not subject to Subpart OOO. The road opacity limit of 10% at permit condition G12 C is applicable, and roads must be paved (except for the incidental off-road traffic of the front end loaders) and Sinova must keep daily records of dust suppression efforts (sweeping and misting). Permit condition G26 requires preparation and implementation of a Preventative Maintenance Plan for fugitive emissions.

A numeric BACT limit is not set here due to the difficulty of tracking emissions and also because of the low annual level of emissions.

Above table from Application of November 17, 2021, Appendix B- Detailed Emissions Calcs-Revised 11-17-2021 In order to reduce dust from roads, the roads will be paved and wet suppression applied as needed. The road dust value is an estimate of potential emissions.
### 02 Proportioning Building with baghouse control

<table>
<thead>
<tr>
<th>PM Category</th>
<th>Emission Limit: Allowable PM grains per dry standard cubic foot of exhaust gas at 52,980 scfm (ambient)</th>
<th>Allowable PM pounds per hour</th>
<th>Allowable PM tons per year</th>
<th>Monitoring Frequency Basis</th>
<th>Compliance Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM Filterable</td>
<td>0.0022</td>
<td>0.992</td>
<td>4.35</td>
<td>Daily</td>
<td>pressure drop records</td>
</tr>
<tr>
<td>PM10</td>
<td>0.0022</td>
<td>0.992</td>
<td>4.35</td>
<td>Daily</td>
<td>pressure drop records</td>
</tr>
<tr>
<td>PM2.5</td>
<td>0.0022</td>
<td>0.992</td>
<td>4.35</td>
<td>Daily</td>
<td>pressure drop records</td>
</tr>
<tr>
<td>Total for all PM categories combined</td>
<td>0.0022</td>
<td>0.992</td>
<td>4.35</td>
<td>Daily</td>
<td>pressure drop records</td>
</tr>
</tbody>
</table>
Two Submerged Arc Furnaces (SAFs) #1 and #2 each with Identical Tapping, Refining and Casting Operations
- Each SAF will have one associated baghouse but exhaust streams from each are combined in one common stack

Revised information was received from Sinova on March 10, 2022 providing NO2, SO2 and CO emission factors (pounds emission per ton of silicon produced and also lb pollutant emissions per hour). See table below.

In an email dated March 10, 2022, consultant Eric Albright of Ramboll stated “Following our call this past Monday, we have updated the daily and annual average SO2 emission factor for the SAFs. Where the SO2 emission factor had been 17.6 lb SO2/ton Si produced, it is now, based on information provided by Sinova, 15 lb SO2/ton Si produced. We used this emission factor to recalculate the maximum expected emissions from the Main Baghouse stack and reran the Class I impact screening modeling using CALPUFF. ........ the maximum 24-hour average SO2 concentration predicted by the model is 0.193 ug/m3, which is less than 24-hour average SO2 SIL proposed by EPA for Class I areas (i.e., 0.2 ug/m3). Because the maximum predicted concentration is less than the proposed SIL, a cumulative analysis to assess compliance with ambient standards and/or the PSD increments is not required.” “ ............ emission rate summary tables are provided below.” On March 15, 2022, Sinova stated that they would not be requesting lower values (daily or annual) for CO.

March 10, 2022 SAF SO2, NOx and CO Emissions table

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Hourly Average</th>
<th>Daily &amp; Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emission Factor (lb/ton Si)</td>
<td>SAF #1</td>
</tr>
<tr>
<td>NO2</td>
<td>45</td>
<td>174</td>
</tr>
<tr>
<td>SO2</td>
<td>21.1</td>
<td>81.4</td>
</tr>
<tr>
<td>CO</td>
<td>34</td>
<td>131</td>
</tr>
</tbody>
</table>
On February 23, 2022 Sinova had previously stated "After further consideration, all emission rates are based on a maximum production rate of 3.86 tons of silicon per hour per furnace, which Sinova believes is the maximum physical production capacity of each furnace.”
Based on proposed values from Sinova / Eric Albright on March 15, 2022 (see Appendix B March 15 email to APC from Sinova) the new hourly maximum lb/ton Si emission factors for SO2 and NOx will be used for calculating new daily and 12-month emission limits for these pollutants. However, the new factors (15.0 lb SO2 per ton Si and 36.0 lb NOx/ton Si) are used to calculate maximum allowable daily and annual emissions, and these are not BACT. Associated information is included below.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Original Application BACT, lb per ton Silicon produced</th>
<th>Feb 23. BACT proposal, lb per ton Silicon produced</th>
<th>March 15, 2022 Proposed new emission factors, pounds emissions per ton Silicon to be used for compliance with 24-hour daily and annual limits</th>
<th>New daily limit, pounds per day per furnace</th>
<th>New Tons per 12-months limit, per furnace</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO2</td>
<td>17.6</td>
<td>21.1</td>
<td>15.0</td>
<td>1,389.0</td>
<td>253.0 (506.0 for both SAF combined)</td>
</tr>
<tr>
<td>NOx</td>
<td>36.0</td>
<td>45</td>
<td>36.0</td>
<td>3,333.0</td>
<td>608. (1217.2 for both units combined)</td>
</tr>
</tbody>
</table>

3.86 ton/hr maximum permitted Si production is same for both furnaces

**March 15 update for SO2 emissions**

3.86 tons of silicon production per hour per furnace x 15.0 pounds of SO2 per ton of silicon produced x 24 hrs/day = 1389.0 pounds of SO2 allowable emissions per day per furnace

This would be equal to 2,778.0 (March 10) pounds of SO2 emitted from both furnaces combined, per calendar day

Also there would be an annual (12-month interval) SO2 emission limit per furnace based on the daily limit at 365 days.

This would result on the following 12-month limit:
1389.0 pounds of SO₂ allowable emissions per day per furnace \times 365 \text{ days/yr} = 506985 \text{ pounds SO}_2/\text{yr} = 253.0 \text{ tons SO}_2 \text{ per year per furnace} (\text{and 506.0 tons SO}_2 \text{ per year for two furnaces combined}) \text{ The 15.0 lb SO}_2 \text{ per ton Silicon produced is an emission factor used to determine an allowable rate for lbs/day and tpy, it is not a BACT limit. New limits were set for lb/day and TPY SO}_2 \text{ based on modeling considerations.}

\text{NOx calculations March 10}

On March 8, 2022, Sinova stated that, although the maximum one-hour NOx emission rate (set as a BACT limit) would remain at 45.0 pounds per ton of silicon produced, there would be a proposal for daily (24-hour) and annual (365-day) limits that would be based on the previously proposed factor of 36.0 pound NOx emissions per ton of silicon production. This was not required by modeling considerations but was proposed voluntarily. An additional submittal from Sinova on March 10, 2022 provided the suggested daily and annual limits for NOx, per furnace. See the above March 10, 2022 SO₂, NOx and CO Emissions table. These values will be used as daily and annual permit BACT limits, respectively. The allowable limits for daily and annual NOx emissions are calculated as follows:

3.86 \text{ tons of silicon production per hour per furnace} \times 36.0 \text{ pounds of NOx per ton of silicon produced} \times 24 \text{ hrs/day} = 3,333.0 \text{ lb NOx/day per each furnace}

Also there would be an annual (12-month interval) NOx emission limit per furnace based on the daily limit at 365 days.

This would result on the following 12-month limit:

3,333.0 \text{ pounds of NOx allowable emissions per day per furnace} \times 365 \text{ days/yr} = 1,216,545 \text{ pounds NOx/yr} = 608.0 \text{ tons NOx per year per furnace} (\text{or 1,216.0 tons NOx per year for two furnaces combined})

Please be advised that Sinova is not requesting new daily or annual limits for CO.

PM and VOC emissions are not included in the above table, as the BACT values are not changing. Also the GHG BACT is not changing.
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Allowable</th>
<th>Allowable tons per year</th>
<th>Monitoring Frequency Basis</th>
<th>Compliance Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM/PM10/PM2.5</td>
<td>0.0022 gr/dscf for (each) PM filterable, PM10, PM2.5, and all PM categories combined</td>
<td>PM filterable: 21.3</td>
<td>Daily for pressure drop, continuous Bag Leak detector Daily Silicon production</td>
<td>NSPS Stack test will be performed. Records of Daily Pressure drop and records for Subpart YYYYYY Bag leak detector Hourly Silicon production records (with emission factor) will be kept.</td>
</tr>
<tr>
<td></td>
<td>These limits apply to each of two units:</td>
<td>PM10: 21.3</td>
<td>Daily coal input and sulfur content Daily Silicon production</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PM filterable: 2.43 lb/hr</td>
<td>PM2.5: 2135</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PM10: 2.43 lb/hr</td>
<td>All PM categories combined: 21.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PM2.5: 2.43 lb/hr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All PM categories combined: 2.43 lb/hr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM/PM10/PM2.5</td>
<td>Maximum Silicon production for each SAF remains at 3.86 tons per hour.</td>
<td>506.0 tons allowable SO₂ per year</td>
<td></td>
<td>There will be a stack test for SO₂. Records of coal usage, sulfur content of coal, and also daily wood and charcoal usage will be kept. Daily Silicon production (with emission factor) records will be kept. The Division may implement a requirement to consider the coal sulfur content and hourly coal usage to demonstrate compliance with 21.1 lb SO₂ / hr BACT limit, based on SO₂ test results and coal usage / sulfur content during testing to determine if there is a correlation between hourly emissions and hourly sulfur input. Typical sulfur content for coal is 0.75-1.0%, with a maximum allowable coal sulfur content of 1%. The permittee has a range of different input rates for different types of coal along with charcoal to comply with the BACT standard. The company has proposed a factor of 0.67 sulfur recovery in offgas based on a Mississippi Silicon stack test, but this value will later be confirmed or revised by testing Due to modeling considerations, limits are</td>
</tr>
<tr>
<td>Permits</td>
<td>253.0 tons SO₂ per year per furnace (\times 2) furnaces = 506 tons SO₂/yr combined total</td>
<td>set for SO₂ lb/day and tpy which would be below the maximum lb/hr at 8760 hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SO₂</td>
<td>34.0 lb. emissions per ton of Silicon Produced, 131.2 lb CO/hr for each SAF and 262.4 pounds per hour total. Also NSPS specifies maximum 20% CO volume in exhaust (the NSPS limit is predicted to be much higher than the BACT limit)</td>
<td>There will be an NSPS Stack test for CO. Daily Silicon production (with emission factor) records will be kept</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>1149.3 262.4 lb CO/hr allowable at 8760 hr = 1149.3 allowable CO tons per year for both SAF’s combined</td>
<td>Daily Silicon production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOC</td>
<td>81.1 Daily Silicon production</td>
<td>There will be a stack test for VOC as carbon, Daily Silicon production (with emission factor) VOC limits are presented on the basis of “VOC-as-carbon”. Because the VOC emissions are already subject to PSD-BACT, the conversion of VOC as carbon to a VOC species (such as propane) would not affect rule applicability. EPA guidance seems to be mainly concerned with the facility avoiding any applicable rules based on use of VOC as “carbon” as compared with the higher factor that would be calculated if the carbon factor were converted to propane or another compound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOₓ</td>
<td>1216 3.86 TPH Si production (\times 2) SAFs (\times 36) lb NOₓ/ton Si (\times 365) days/yr =1,216 tpy</td>
<td>Daily Silicon production</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Daily Silicon production</td>
<td>There will be a Stack test for NOₓ, Daily Silicon production (with emission factor)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Permit Number: 979383
Issuance Date: April, 2022
Expiration Date: April 30, 2025

**GHG (CO₂e)**
- 702,315 tons per calendar year.

**HCl**
- 1.74 lb/hr (this is not a BACT limit)

**Opacity**
- 10 % BACT and 15% NSPS

<table>
<thead>
<tr>
<th>GHG (CO₂e)</th>
<th>702,315 tons per calendar year.</th>
<th>702,315</th>
<th>-Annual Silicon production</th>
<th>Emission factors calculated using 40 CFR Part 98 Subpart K and also Stack test results for CO₂ (CH₄ and N₂O are not considered as those compounds have emissions factors less than 0.01% of CO₂ value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCl</td>
<td>1.74 lb/hr (this is not a BACT limit)</td>
<td>7.6</td>
<td>Daily Silicon production</td>
<td>There will be a Stack test for HCl, Daily Silicon production (with emission factor) Test because Coal emission factors indicate no HCl, but wood combustion factors indicate 1.74 lb/hr, this source could otherwise be major for HAPs</td>
</tr>
<tr>
<td>Opacity</td>
<td>10 % BACT and 15% NSPS</td>
<td>N/A</td>
<td>Continuous</td>
<td>COMS (Continuous Opacity Monitoring System) as required by § 60.264 F1-4 Also bag leak detection system as required by § 63.11527</td>
</tr>
</tbody>
</table>

**Emission factors:** Because the SAFs are heated by electricity, there are no combustion emissions associated with the SAFs, but because of the temperatures and materials involved, the emissions from the process are similar in nature to combustion emissions.

**Startup:** When startup occurs, before the process is operating at the normal temperature, there will be emissions of SiO which can cause the bags to blind. This period may last up to two weeks. During this time, the exhaust will be ducted to a section of the baghouse with “sacrificial” bags. The volumetric flow during this time would be well below the exhaust flow during normal operation. The sacrificial bags will be discarded when the process reaches normal operating temperature and SiO emissions should cease.

**Low-NOx technology:** Low-NOx technology is not required here because coal, charcoal, and wood are used as reductants and are not combusted. However, some of the AP-42 combustion factors are used here because the process has some similarities to combustion.

**Note:** All limits are PSD-BACT 1200-03-09-.01(4) except for HCl which is 1200-03-07-.07(2)

**Comparison of NSPS allowable CO emissions with CO BACT allowable emissions**
(BACT allowable is 34.0 lb/tons Silicon produced and 174.0 lb CO per hour per SAF)

**CO limit:** Compliance with NSPS CO limit of 20% volume of exhaust gases

Calculations:
- 40 CFR 60.263 states: Exhaust gas must have Less than 20% volume CO on a dry basis
- At 3.86 tons Si per hour per furnace x 2 furnaces = 7.72 tons per hour silicon production
- 7.72 TPH x 34.0 lb CO/ton of silicon is 262.48 lbs/hr CO (total) emissions
- Air flow is 259,629 standard cubic feet per minute (scfm) at 68 °F.

The ideal gas law conversion factor used above is based on the relationship of 1 lb-mole of an ideal gas occupies 185pprox.. 379.3 SCF at standard conditions of 60°F and 14.7 psia (see Reference 1).

- Carbon MW = 12
- Oxygen MW = 16
- CO MW = 28 or 28 lb/lb-mol

\[
379.3 \text{ scf at } 68 \degree \text{F}. \times (60 +460)/(68 +460) = 379.3 \times (520/ 528) = 373.55 \text{ scf at } 60 \degree \text{F}
\]
262.4 allowed lb CO/hr from BACT x (1 lb-mol/28 lbs) = 9.37 lb-mols per hour

9.37 lb-mol/hr x 373.55 scf/lb-mol = 3,501 scf of CO per hour estimated from 20% CO by volume and actual exhaust flow

259,629 scfm total (one stack) exhaust flow x 60 min/hr = 15,577,740 scf/hr

3,501 scf/hr of CO / (15,577,740 scf/hr) = 0.000225 actual volumetric fraction of CO in exhaust gas or 0.0225%

This maximum estimated CO (0.0225% by volume) based on the BACT limit is far below the (less than) 20% volume CO allowed by 40 CFR 60.263

Review of possible HCl emission scenario
HCl emissions using coal combustion factor from AP-42: AP-42 for coal combustion is not applicable here. Sinova shall develop an HCl emission factor in terms of pounds HCl per ton of silicon, based on the results of a compliant stack test to be submitted with the emissions test.

Coal Table 1.1-15 Emissions from coal combustion
HCl 1.2 lb HCl/ton
HF 0.15 lb/ton
Maximum coal usage 48,803 tons/yr x 1.2 lb HCl / ton coal combustion = 58,563.6 lbs HCl/yr = 29.2 tons HCl/year
There is no HCl from coal as coal is a reductant and is not combusted

Wood Residue combustion
AP-42 Table 1.6-3 1.9 E-02 lb/MMBtu
Wood maximum Heat input 1,757,437 MMBtu/yr

1,757,437 MMBtu/yr wood combustion x 1.9 E-02 lb/MMBtu = 33,391 lb HCl/yr = 16.7 tons HCl/yr

Mississippi Silicon application Wood factor: 8.70 E-03 lb/MMBtu for wood
1,757,437 MMBtu/yr wood combustion x 8.70 E-03 lb/MMBtu for wood = 15,289.7 lb HCl/yr = 7.64 tons HCl/year
7.64 tons/yr x 1 yr/8760 hrs = 0.174 lb HCl/hr from wood (no coal assumed)

Require HCl test at standard operating conditions
Compliance Method: The permittee shall conduct a performance test (stack test) in accordance with permit condition G16.

04 Ladle Preheating (three separate units at 10 MMBtu/hr each)

One or more of these units may be temporarily relocated to heat one of the SAFs during startup, during which time the affected ladle heater will still be subject to the existing permit requirements.

At 8760 hrs of operation for each of these units at 10 MMBtu/hr, the NOx emissions would be 4.38 tons per year, which is below the 5 TPY standard for required low-NOx burner technology.
### Process Limitation

<table>
<thead>
<tr>
<th>Process Limitation</th>
<th>Allowable (units)</th>
<th>Frequency Basis</th>
<th>Compliance Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Input Capacity</td>
<td>10 MMBtu/hr per unit (with three total units)</td>
<td>No regular monitoring, use Manufacturer information</td>
<td>Use maximum fuel usage rating from manufacturer</td>
</tr>
<tr>
<td>Fuel Used</td>
<td>Natural Gas only</td>
<td>No regular monitoring, use Manufacturer information</td>
<td>Manufacturer’s information</td>
</tr>
</tbody>
</table>

### Pollutant

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Allowable (units)</th>
<th>Allowable tons per year</th>
<th>Monitoring Frequency Basis</th>
<th>Compliance Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM/PM10/PM2.5</td>
<td>0.0075 lb/MMBtu for PM (filterable), 0.0075 lb/MMBtu for PM10, and 0.0075 lb/MMBtu for PM2.5 Also 0.0075 lb/MMBtu for all PM categories combined Each category would be 0.075 lb PM/hr</td>
<td>0.079</td>
<td>Manufacturer information</td>
<td>Manufacturer information and AP-42 Table 1.4.2 emission factors or test data</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>0.006 lb/MMBtu This is 0.006 lb/hr per unit and 0.018 for all three units combined</td>
<td>0.079</td>
<td>Manufacturer information</td>
<td>Manufacturer information and use of pipeline natural gas and AP-42 factors Table 1.4-2 or test data</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>0.082 lb/MMBtu of natural gas This is 0.82 lb/hr per unit and 2.47 for all three units combined</td>
<td>10.8</td>
<td>Manufacturer information</td>
<td>Manufacturer information and AP-42 Table 1.4.2 emission factors or test data</td>
</tr>
<tr>
<td>Volatile Organic Compounds</td>
<td>0.0054 lb/MMBtu This is 0.054 lb/hr per unit and 0162 lb/hr for all three units combined</td>
<td>0.71</td>
<td>Manufacturer information</td>
<td>Manufacturer information and AP-42 Table 1.4.2 emission factors or test data</td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td>The final proposal from the email of December 7, 2021 was 0.098 lb NOx/MMBtu of heat input. This is 0.98 lb/hr per unit and 2.94 lb/hr NOx for all three units combined</td>
<td>12.9</td>
<td>Manufacturer information</td>
<td>Manufacturer information and manufacturer guarantee or test data Standard low-NOx for burners this size (per AP-42) would be 0.049 lb NOx/MMBtu, but because the purpose of the heaters is quick heating, staged combustion schemes that reduce temperature are typically not employed for this type of source.</td>
</tr>
<tr>
<td>GHG (CO₂e)</td>
<td>15,371 tons per year</td>
<td>15,371 tons per year</td>
<td>Manufacturer information</td>
<td>Maximum fuel usage at 8760 hrs Manufacturer information and CO₂, CH4 and N2O factors from 40 CFR 98 Subpart C or test data</td>
</tr>
<tr>
<td>Opacity</td>
<td>10% 1200-03-09-.01(4)</td>
<td>N/A</td>
<td>As requested by APC</td>
<td>EPA Method 9</td>
</tr>
</tbody>
</table>
All above emission limits are based on 1200-03-09-.01(4) BACT-PSD and the application dated September 16, 2021

The burners (10 MMBtu/hr each) may not be purchased until 2023 so the manufacturer’s data may not be available at the time of permit issuance. However, the values as proposed for Best Available Control Technology (BACT) were based on equipment available at the time of application submittal and are expected to be reasonable.

### 05 Fume Silos and bag packing – with “Passive vent filter to atmosphere” as per email of February 23, 2022

There is no baghouse here

PM emission testing will be required

There will be no pressure drop requirements here, G25(a) provides for inspection and maintenance of the fabric filter

Dscfm at: 1,413 cfm (ambient) and 84,780 scfh

$$1,413 \text{ dscfm} \times 60 \text{ min/hr} \times 0.0022 \text{ gr/dscf} \times 1 \text{ lb/7000 lb} = 0.0266 \text{ lb/hr}$$

At 8760 hrs this is 0.117 tons/yr

DSCFM is dry standard cubic feet per minute
SCFH is dry standard cubic feet per hour

This unit will not be tested for PM due to the very low allowable emission rate, but compliance will be assured through opacity and filter inspection and maintenance. However, 10% opacity is required

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Allowable (units)</th>
<th>Allowable (units)</th>
<th>Allowable tons per year</th>
<th>Monitoring Frequency Basis</th>
<th>Compliance Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM/PM10/PM2.5</td>
<td>PM filterable: 0.0022 gr/dscf</td>
<td>PM filterable: 0.0265 lb/hr</td>
<td>PM filterable: 0.116 tons/yr</td>
<td>Daily</td>
<td>Stack test and Daily pressure drop records</td>
</tr>
<tr>
<td>PM10</td>
<td>0.0022 gr/dscf</td>
<td>PM10: 0.0265 lb/hr</td>
<td>PM10: 0.116 tons/yr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM2.5</td>
<td>0.0022 gr/dscf</td>
<td>PM2.5: 0.0265 lb/hr</td>
<td>PM2.5: 0.116 tons/yr</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Permit Number: 979383
Issuance Date: <Issuance Date, 2022
Expiration Date: April 30, 2025

<table>
<thead>
<tr>
<th>categories combined : 0.0266 lb/hr</th>
<th>PM for all categories combined : 0.116 tons/yr</th>
<th>As requested by Division</th>
<th>EPA Method 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opacity</td>
<td>10%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

All above emission limits are based on 1200-03-09-.01(4) BACT-PSD and the application dated November 17, 2021

**06 Slag Handling, Crushing and Screening (following the SAF process) with Misting control**

Revised Emission calculation based on 12-29-2021 information

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Crushing (controlled)</th>
<th>Screening (controlled)</th>
<th>Total factor , lb/ton</th>
<th>lb/hr based on 20 TPH</th>
<th>TPY based on 365 days per year and one hour per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM</td>
<td>0.0012</td>
<td>0.0022</td>
<td>0.0034</td>
<td>0.068</td>
<td>0.012</td>
</tr>
<tr>
<td>PM10</td>
<td>0.00054</td>
<td>0.00074</td>
<td>0.00128</td>
<td>0.0256</td>
<td>0.0047</td>
</tr>
<tr>
<td>PM2.5</td>
<td>0.0001</td>
<td>0.00005</td>
<td>0.00015</td>
<td>0.003</td>
<td>0.00055</td>
</tr>
<tr>
<td>Total for all PM categories combined</td>
<td></td>
<td></td>
<td></td>
<td>0.097</td>
<td>0.0172</td>
</tr>
</tbody>
</table>

1. Emission factor based on AP-42 Section 11.19.2 (Crushed Stone Processing and Pulverized Mineral Processing), Table 11.19.2-2, controlled screening. Controlled primary crushing operations that produce material between 3 and 12 inches in size is not expected to generate any detectable emissions, but the conservative tertiary crushing emission factor was used.

2. Pounds per hour emission rate is based on 20 TPH and maximum one hour per day of operation

All above emission limits are based on 1200-03-09-.01(4) BACT-PSD and the application dated November 17, 2021 and company statement of 12/29/2021

For Source 48-0046-06 Slag Crushing and Screening there is a limit of 12% opacity.

This facility is not subject to NSPS Subpart OOO - Standards of Performance for Nonmetallic Mineral Processing Plants. However, the 12 percent opacity limit used for this source is based on
Table 3 to Subpart OOO of Part 60 - Fugitive Emission Limits for new for crushers at which a capture system is not used. This was considered to be a reasonable, comparable opacity limit for this source.

07 Finished Product Building

15,305 acfm at ambient x 0.0022 gr/scf x 60 min/hr x 1 lb/7000 gr = 0.289 lb/hr

At 8760 hrs this is 1.27 tons/yr

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Allowable (gr/dscf)</th>
<th>Allowable (units)</th>
<th>Allowable tons per year</th>
<th>Monitoring Frequency Basis</th>
<th>Compliance Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM filterable</td>
<td>0.0022 gr/dscf</td>
<td>0.287 lb/hr</td>
<td>1.26</td>
<td>Daily</td>
<td>Stack test and Daily pressure drop records</td>
</tr>
<tr>
<td>PM10</td>
<td>0.0022 gr/dscf</td>
<td>0.287 lb/hr</td>
<td>1.26</td>
<td>Daily</td>
<td>Stack test and Daily pressure drop records</td>
</tr>
<tr>
<td>PM2.5</td>
<td>0.0022 gr/dscf</td>
<td>0.287 lb/hr</td>
<td>1.26</td>
<td>Daily</td>
<td>Stack test and Daily pressure drop records</td>
</tr>
<tr>
<td>Total for all PM categories combined</td>
<td>0.0022 gr/dscf</td>
<td>0.287 lb/hr</td>
<td>1.26</td>
<td>Daily</td>
<td>Stack test and Daily pressure drop records</td>
</tr>
<tr>
<td>Opacity</td>
<td>10%</td>
<td>N/A</td>
<td>N/A</td>
<td>As requested by Division</td>
<td>EPA Method 9</td>
</tr>
</tbody>
</table>

1. All above emission limits are based on 1200-03-09-.01(4) BACT-PSD and the application dated November 17, 2021
2. “Gr” is grains

08 Emergency Natural gas-fired Reciprocating Engine  2,682 HP (mechanical)
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>BACT Allowable (units)</th>
<th>Allowable tons per year at 500 hr/yr default value</th>
<th>Monitoring Frequency Basis</th>
<th>Compliance Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM filterable</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
<td>N/A or Manufacturer’s data</td>
<td>Manufacturer’s data or test</td>
</tr>
<tr>
<td>PM10</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
<td>N/A or Manufacturer’s data or test</td>
<td>Manufacturer’s data or test</td>
</tr>
<tr>
<td>PM2.5</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
<td>N/A or Manufacturer’s data or test</td>
<td>Manufacturer’s data or test</td>
</tr>
<tr>
<td>PM – all categories combined</td>
<td>0.10 lb/hr</td>
<td>0.016 g/hp-hr</td>
<td>N/A or Manufacturer’s data or test</td>
<td>Manufacturer’s data or test</td>
</tr>
<tr>
<td>SO₂</td>
<td>0.0029 lb/hr</td>
<td>0.0005 g SO₂/hp-hr</td>
<td>N/A Manufacturer’s data</td>
<td>Manufacturer’s data or test</td>
</tr>
<tr>
<td>CO</td>
<td>13.01 lb/hr</td>
<td>2.2 g/hp-hr</td>
<td>N/A Manufacturer’s data</td>
<td>40 CFR §60.4233(e) sets a 4.0 g/brake horsepower limit at 23.6 lb/hr</td>
</tr>
<tr>
<td>VOC</td>
<td>5.9 lb/hr</td>
<td>1.0 g/hp-hr</td>
<td>N/A Manufacturer’s data</td>
<td>Compliance with 40 CFR §60.4233(e) The proposed limit is same as NSPS</td>
</tr>
<tr>
<td>NOx</td>
<td>7.1 lb/hr</td>
<td>1.2 g/hp-hr</td>
<td>N/A Manufacturer’s data</td>
<td>Compliance with 40 CFR §60.4233(e)</td>
</tr>
<tr>
<td>GHG</td>
<td>145.9 tons per 12 months</td>
<td></td>
<td>Annual</td>
<td>Factors as specified in Condition S8-4 F. and default value of 500 hrs/year, test or Manufacturer’s data</td>
</tr>
</tbody>
</table>

1. All above emission limits are based on 1200-03-09-.01(4) BACT-PSD and the application dated November 17, 2021
2. “g” is grams

Note- for SO₂, AP-42 Table 3.2-3. Emission Factors For 4-Stroke Rich-Burn provides a value of 5.88 E-04 lb/MMBtu of fuel input (this is an Emission factor rating of “A.”) For this unit this would be calculated as follows:

\[ 0.000588 \text{ lb/MMBtu} \times 5 \text{ MMBtu/hr heat input} = 0.0029 \text{ lb SO}_2/\text{hr} \]
0.0029 lb SO₂/hr x 454 gram/lb = 1.31 gr SO₂/hr

2682 hp engine x 1 hr = 2682 hp-hr

1.31 g SO₂/2682 hp-hr = 0.0005 g SO₂/hp-hr

2682 hp x 0.7457 = 2,000 kw

Set allowable at 0.0029 lb SO₂/hr and 0.0005 g SO₂/hp-hr (or 1.31 grams/2,000 kw = 0.000655 g/kw-hr)

**09 Diesel Fuel Storage Tank**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Estimated VOC emissions (not a limit)</th>
<th>Operating Requirement</th>
<th>Monitoring Frequency Basis</th>
<th>Compliance Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC</td>
<td>0.38 lb/yr</td>
<td>Submerged fill, light-colored tank</td>
<td>As requested by APC</td>
<td>Allow APC representative to inspect fuel loading equipment</td>
</tr>
</tbody>
</table>

All above emission limits are based on 1200-03-09-.01(4) BACT-PSD and the application dated November 17, 2021

For 40 CFR 60 Subpart KB- the minimum vapor pressure that would cause a storage tank to be subject is 3.5 kPa (kilo pascals at maximum true vapor pressure) is 3.5 kpa - this is 0.5075 psi (pounds per square inch). Diesel fuel vapor pressure is 0.042 psi at 70 degrees Fahrenheit

Tank size has not yet been determined

The following Operational requirements are specified as BACT

Any fuel introduced into this storage tank shall be conveyed by submerged fill. Submerged fill refers to the filling of a storage tank in a way that causes product to enter the vessel below the liquid level. The permittee shall utilize good design, operation, and maintenance practices to minimize VOC emissions. The permittee shall use good design, maintenance, and operating practices. The tank shall have a light or white tank color.

Due to the low level of emissions, the permittee will be required to assure compliance by certification (only) with each semiannual report, and also a numeric emission limit is not being set.
## Plantwide Emission Summary  March 15, 2022

Allowable (or potential) tons per year of Emissions

<table>
<thead>
<tr>
<th>Source 48-0046</th>
<th>PM Filterable</th>
<th>PM10</th>
<th>PM2.5</th>
<th>PM All categories Combined</th>
<th>SO\textsubscript{2}</th>
<th>CO</th>
<th>VOC</th>
<th>NO\textsubscript{x}</th>
<th>GHG</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Raw Material and Roads</td>
<td>0.225</td>
<td>0.21</td>
<td>0.012</td>
<td>0.237</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>02 Proportioning</td>
<td>4.35</td>
<td>4.35</td>
<td>4.35</td>
<td>4.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03 Two SAFs</td>
<td>21.3</td>
<td>21.3</td>
<td>21.3</td>
<td>21.3</td>
<td>506.0</td>
<td>1149.3</td>
<td>81.1*</td>
<td>1216</td>
<td>702,315</td>
</tr>
<tr>
<td>04 Ladle Heating (three units)</td>
<td>0.985</td>
<td>0.985</td>
<td>0.985</td>
<td>0.985</td>
<td></td>
<td>10.8</td>
<td>0.71</td>
<td>12.9</td>
<td>15,371</td>
</tr>
<tr>
<td>05 Fume Silos and bag packing – with baghouse exhaust to atmosphere</td>
<td>0.116</td>
<td>0.116</td>
<td>0.116</td>
<td>0.116</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>06 Slag Handling, Crushing and Screening (following the SAF process) with Misting control</td>
<td>0.012</td>
<td>0.004</td>
<td>0.00055</td>
<td>0.0172</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07 Finished Product Building</td>
<td>1.26</td>
<td>1.26</td>
<td>1.26</td>
<td>1.26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08 Emergency Natural gas-fired</td>
<td>0.025</td>
<td>0.025</td>
<td>0.025</td>
<td>0.025</td>
<td>0.0007</td>
<td>3.25</td>
<td>1.475</td>
<td>1.775</td>
<td>145.9</td>
</tr>
</tbody>
</table>
Reciprocating Engine
2,682 HP (mech.)
500 hr-default

<table>
<thead>
<tr>
<th>Source</th>
<th>SO2</th>
<th>CO</th>
<th>VOC</th>
<th>NOx</th>
</tr>
</thead>
<tbody>
<tr>
<td>09 Diesel Fuel Storage</td>
<td>0.000</td>
<td>83.28</td>
<td>1,230.6</td>
<td>717.83</td>
</tr>
<tr>
<td>10,000 gallon storage tank</td>
<td>22 (no limit specified)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>28.27</td>
<td>28.25</td>
<td>28.05</td>
<td>28.28</td>
</tr>
</tbody>
</table>

* This value is VOC as carbon

Note- there are no numeric limits specified for source 01 Material Handling and Roads and source 09 Diesel tank fuel storage. Source 01 will have opacity limits, and the Source 09 emissions are negligible.

General comments: This facility is an area source for HAPs. Sinova states that coal is a reductant for the furnaces, and the HCl emission factors from coal combustion should not be used here (otherwise the facility would be major for HCl). Also, there are some HCl factors used for wood usage (also a reductant). At the suggestion of the Compliance Validation Section, an HCl test is being required. The maximum emission rate for a single HAP (HCl) is 7.64 tons per year. The maximum emission rate for combined HAPs is 11 tons per year.

EPA advised APC that pounds-per-hour limits for NOx and SO2 were not acceptable if these were set on a daily average basis. Sinova subsequently proposed higher maximum one-hour limits for SO2 and NOx that should be exceeded due to any daily spikes due to fluctuations in process operation. The usual sulfur concentration for the coal used here is 0.75-1.0 % by weight. There will be a 1% maximum sulfur content limit for coal. A March 15, 2022 submittal from Sinova indicated that the SO2 would not exceed 21.1 pounds of SO2 per limit for any one hour. That value will be used as BACT. Daily and annual BACT limits are being set due to concerns with compliance with ambient air standards for SO2 (and NOx). A limit of 1,389 lb/day of SO2 per furnace and 253 tons per year of SO2 per furnace are being set as BACT. After a compliant test for SO2 has been approved, a factor obtained from that test will be used to establish compliance. It is noted that the process is a type of hybrid batch and continuous process, with tapping occurring for about 100 minutes out of every two hours (120 minutes). Also, raw material charge is added periodically to the furnace bath so as to maintain a steady level. During the testing, Sinova will be required to record the coal usage (coal is the only significant source of sulfur) and the coal sulfur content. The Division may elect to develop an emission factor based on the hourly coal sulfur input. Additionally limits of 3,333 lb/day of NOx per furnace and 608 tons per year of NOx per furnace are being set as BACT due to concerns about compliance with ambient air standards.

Subpart Z requires monitoring of the gas flow from the tapping station, but does not
mention the gas flow at the main baghouse inlet, so that it is possible that an incomplete picture of the source may be obtained from this information. The Division has submitted the question to EPA Region 4, and awaits an answer. Compliance Validation is aware of the situation. Presumably this will be resolved before testing takes place.

With regard to fugitive emissions (such as road dust and material transfer), EPA Region 4 was asked about this situation. They responded that where it is impractical to set a limit or monitor emissions, a BACT could be set without a numeric limit. This would possibly involve setting a requirement for wet suppression.

A memo from EPA dated November 21, 1997, addressed the use of VOC-as-carbon (instead of VOC including all species or conversion of carbon-VOC to propane). One of the main considerations was that Sinova might avoid certain requirements if they had a lower VOC emission rate due to use of a VOC-as-carbon value, and this would keep them below a rule applicability threshold. In this case, the facility is already subject to PSD-BACT for VOC, so converting the carbon-VOC to propane would not result in applicability of new requirements. The Sinova-submitted VOC values, which are VOC as carbon, are left in place.
Appendix E
Notice for Public Hearing and Comments
PUBLIC NOTICE and PUBLIC HEARING NOTICE

The applicant is Sinova Silicon, LLC with a mailing address of 5241 Calgary Trail, Unit 610, Edmonton, AB, Canada, T6H 5GB. They seek to obtain an air contaminant permit from the Tennessee Division of Air Pollution Control (TDAPC) for the construction of a Silicon Manufacturing Plant located at 4480 Cates Landing Road N., Tiptonville, TN 38079. The proposed silicon manufacturing plant would involve physical construction. The processes to be constructed or modified at this location will consist of the following, including the type of control:

10) Raw Material Receiving by Railcar and Truck and conveying to a mist-controlled hopper prior to being conveyed to the Proportioning Building. This source includes haul road traffic (fugitive emissions) Water spray misting will be used as control for when trucks are unloaded and when front-end loaders are operating. All roads will be paved and sprayed to suppress dust (48-0086-01)

11) Proportioning Building. Materials are transferred into this building by closed conveyor and are loaded into day bins. Weighing hoppers are used to dispense the proportioned raw materials onto an enclosed belt conveyor which then transfers this material to the Furnace Building. Emissions from the transfer points at this process are collected and are controlled by a baghouse. (48-0086-02)

12) Two identical Submerged Arc Furnaces (SAF) produce silicon from raw materials received from the proportioning building. Each SAF (with associated operations) has one dedicated baghouse. There is one collecting hood ducted to the SAF baghouse for each of these four identical operations at SAF #1 and SAF #2:
   - SAF
   - Tapping (from furnace into ladle)
   - Refining (occurs at ladle, injection of air and oxygen into molten silicon)
   - Product Casting (from ladle) and Slag removal from Ladle

A natural gas burner permitted with one of the Ladle Heaters at source 48-0046-04 may be used at either SAF during startup to heat materials, although this would be an infrequent occurrence. Each SAF is subject to federal NSPS Subpart Z and NESHAP Subpart YYYY. There is one stack that exhausts combined flow from both SAF’s during normal operation. Each SAF has a bypass stack that is intended for use during emergencies only. (48-0086-03)

13) Ladle Preheating (three units) A burner from any of these three 10 MMBtu/hr (each) natural gas-fired units may be used during startup for either SAF. (48-0086-04)

14) Fume Silo Operation with bag packing. Baghouse control. Dust from SAF baghouses is received and packaged for sale. (48-0086-05)
15) Slag Handling and Crushing and Screening (following the SAF process) Outdoor Operation with Water Misting control (48-0086-06)

16) Finished Product Building including crushing, screening, and bagging of silicon with enclosed truck and rail loadout. Baghouse control (48-0086-07)

17) Emergency Generator Engine, one natural gas fired unit –subject to federal NSPS Subpart JJJJ and NESHAP Subpart ZZZZ (48-0086-08)

18) One Diesel Fuel Storage tank with submerged fill (48-0086-09)

Regulated air contaminants would be emitted by each of the above sources. Pollution control is present as indicated for the above-described operations. Mr. G. Forte is the assigned TDAPC permit writer.

The project is subject to review under the Tennessee rule for Prevention of Significant Deterioration (PSD) of air quality, paragraph 1200-03-09-.01(4) of the Tennessee Air Pollution Control Regulations, which requires a public notification and thirty-day public comment period.

The TDAPC has reviewed the proposed project with respect to the above referenced PSD rule. The TDAPC has made the determination that construction of the proposed facility can be approved if certain conditions are met. A copy of the application forms submitted by Sinova Silicon, Inc. and other materials used by the TDAPC in making this determination, are available for public inspection on the Department of Environment and Conservation’s (TDEC’s) dataviewer found at https://dataviewers.tdee.tn.gov/pls/enf_reports/f?p=19031:34001 or during normal business hours at the following locations:

Division of Air Pollution Control
Jackson Environmental Field Office
1625 Hollywood Drive
Jackson, TN 38305

and

Tennessee Department of Environment and Conservatior
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

**Public Hearing Participation Instructions**
A public hearing will be held by the Tennessee Air Pollution Control Board (TAPCB) pursuant to TAPCR 1200-03-09-.01(4)(l)(v). On April ***, 2022, at 5:30 p.m. CST, a public information session will be held to discuss the technical and regulatory air pollution-related issues concerning
the permitting of the Silicon Manufacturing Plant. The information session will have a question-and-answer format and will include a presentation on the proposed permit action by TDAPC staff. **Immediately following the public information session, the public hearing** will be held for participants to submit verbal comments concerning the TAPCB’s consideration and review of this new facility.

All participants must adhere to COVID safety guidelines.

**The hearing location will be:**

Tiptonville City Hall ?
Room #138
305 West Main Street
Tiptonville, TN 38079

A copy of the draft permit, preliminary determination, construction permit application, as well as materials used by the TDAPC in making this determination, are available for public view via the Tennessee Department of Environment and Conservation’s (TDEC) data viewer at the following webpage:

https://dataviewers.tdec.tn.gov/pls/enf_reports/?p=19031:34001

Interested persons are invited to review these materials and comment on the proposed installation. Comments should be addressed to Michelle W. Owenby, Director, Tennessee Division of Air Pollution Control, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 15th Floor, Nashville, TN 37243 and may be submitted by email at Air.Pollution.Control@tn.gov. Written comments must be received by TDAPC by 5:30 PM EST on April 4, 2022, and must include the phrase “Comments on Sinova Silicon, Inc. Construction Permit” in the subject line.

**Individuals with disabilities who wish to participate should contact TDEC to discuss any auxiliary aids or services needed to facilitate such participation. Such contact may be in person, by writing, telephone, or other means, and should be made by March 19 2022, to allow time to provide such aid or services. Contact the Tennessee Department of Environment and Conservation ADA Coordinator, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 2nd Floor, Nashville, TN 37243, 1-866-253-5827. Hearing impaired callers may use the Tennessee Relay Service, 1-(800)-848-0298. If it is hard for you to read, speak, or understand English, TDEC may be able to provide translation or interpretation services free of charge. Please contact Air Pollution Control at (615) 532-0554 for more information.**
Public Hearing and Comments from EPA Sinova Silicon LLC, and Public

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<td>Receipt of Complete Application</td>
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<tr>
<td>Public Notice</td>
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<td>Draft to EPA</td>
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<td>Hearing Date</td>
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<td>Comments from Public</td>
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<td>Comments from Sinova Silicon LLC</td>
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<td>Comments from EPA</td>
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Comments from EPA concerning draft Construction Permit with Responses

Initial EPA Comments
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Comments from Sinova Silicon LLC concerning draft Construction Permit

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Comments from Public concerning draft Construction Permit

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Division of Air Pollution Control Revisions

Public Hearing in Tiptonville

A Public Hearing was requested by Sinova Silicon LLC for the proposed PSD permit. This public hearing, to receive comments concerning Proposed PSD Permit 979383, was held April ***, 2022, at 6:00 p.m. CST at the following location:

Tiptonville ***
The meeting was moderated by ****
There were brief presentations by APC and SInova before the formal hearing.
The following staff were in attendance,

**TDEC Attendees:**

**SInova Silicon LLC:**

There were *** comments received at the meeting. Also, *** additional comments were received by the April ***, 2022 deadline for submittal of comments.