

Technical Support Document:

Chapter 19

Intended Round 3 Area Designations for the 2010 1-Hour SO₂ Primary National Ambient Air Quality Standard for Michigan

1. Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (the EPA, we, or us) must designate areas as either “nonattainment,” “attainment,” or “unclassifiable” for the 2010 1-hour sulfur dioxide (SO₂) primary national ambient air quality standard (NAAQS) (2010 SO₂ NAAQS). The CAA defines a nonattainment area as an area that does not meet the NAAQS or that contributes to a nearby area that does not meet the NAAQS. An attainment area is defined by the CAA as any area that meets the NAAQS and does not contribute to a nearby area that does not meet the NAAQS. Unclassifiable areas are defined by the CAA as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS. In this action, the EPA has defined a nonattainment area as an area that the EPA has determined violates the 2010 SO₂ NAAQS or contributes to a violation in a nearby area, based on the most recent 3 years of air quality monitoring data, appropriate dispersion modeling analysis, and any other relevant information. An unclassifiable/attainment area is defined by the EPA as an area that either: (1) based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined (i) meets the 2010 SO₂ NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS¹. An unclassifiable area is defined by EPA as an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO₂ NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

This technical support document (TSD) addresses designations for all remaining undesignated areas in Michigan for the 2010 SO₂ NAAQS. In previous final actions, the EPA has issued

¹ The term “designated attainment area” is not used in this document because the EPA uses that term only to refer to a previous nonattainment area that has been redesignated to attainment as a result of the EPA’s approval of a state-submitted maintenance plan.

designations for the 2010 SO₂ NAAQS for selected areas of the country.² The EPA is under a December 31, 2017, deadline to designate the areas addressed in this TSD as required by the U.S. District Court for the Northern District of California.³ We are referring to the set of designations being finalized by the December 31, 2017, deadline as “Round 3” of the designations process for the 2010 SO₂ NAAQS. After the Round 3 designations are completed, the only remaining undesignated areas will be those where a state has installed and begun timely operating a new SO₂ monitoring network meeting EPA specifications referenced in EPA’s SO₂ Data Requirements Rule (DRR). (80 FR 51052). The EPA is required to designate those remaining undesignated areas by December 31, 2020. However, Michigan has no areas that began operating a new monitoring network in accordance with the DRR.

Michigan submitted its first recommendation⁴ regarding designations for the 2010 1-hour SO₂ NAAQS on June 1, 2011. The state submitted updated recommendations⁵ for the areas subject to the second round of designations on September 18, 2015. For the current round of designations, Michigan submitted an updated analysis and recommendation⁶ on January 13, 2017, and supplemented that analysis on February 14, 2017. In our intended designations, we have considered all the submissions from the state, except where a recommendation in a later submission regarding a particular area indicates that it replaces an earlier recommendation for that area we have considered the recommendation in the later submission.

For the areas in Michigan that are part of the Round 3 designations process, Table 1 identifies the EPA’s intended designations and the counties or portions of counties to which they would apply. It also lists Michigan’s current recommendations. The EPA’s final designation for these areas will be based on an assessment and characterization of air quality through ambient air quality data, air dispersion modeling, other evidence and supporting information, or a combination of the above.

Table 1. Summary of the EPA’s Intended Designations and the Designation Recommendations by Michigan

| Area/County | Michigan’s Recommended Area Definition | Michigan’s Recommended Designation | EPA’s Intended Area Definition⁺ | EPA’s Intended Designation |
|--------------------|---|---|---|-----------------------------------|
| Alpena County | Alpena County | Attainment | Same as State’s Recommendation | Unclassifiable/Attainment |
| Delta County | Delta County | Attainment | Same as State’s Recommendation | Unclassifiable/Attainment |

² A total of 94 areas throughout the U.S. were previously designated in actions published on August 5, 2013 (78 FR 47191), July 12, 2016 (81 FR 45039), and December 13, 2016 (81 FR 89870).

³ *Sierra Club v. McCarthy*, No. 3-13-cv-3953 (SI) (N.D. Cal. Mar. 2, 2015).

⁴ In their June 1, 2011, recommendation, Michigan recommended a portion of Wayne County to be designated as nonattainment based on a violating monitor, and unclassifiable for all other areas of the state.

⁵ In their September 18, 2015, recommendation, Michigan recommended a portion of St. Clair County to be designated as nonattainment, and the counties of Bay, Eaton, Ingham, Marquette, Monroe, and Ottawa to be designated as attainment.

⁶ See Table 1.

| Area/County | Michigan's Recommended Area Definition | Michigan's Recommended Designation | EPA's Intended Area Definition ⁺ | EPA's Intended Designation |
|---|--|------------------------------------|--|----------------------------|
| Remaining Undesignated Areas to Be Designated in this Action [*] | All other not yet designated partial and full counties | Unclassifiable | All other not yet designated partial and full counties | Unclassifiable/Attainment |

^{*} The EPA intends to designate the remaining undesignated counties (or portions of counties) in Michigan as “unclassifiable/attainment” as these areas were not required to be characterized by the state and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the areas may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS. These areas that we intend to designate as unclassifiable/attainment (those to which this row of this table is applicable) are identified more specifically in section five of this TSD.

⁺Includes all areas of Indian country geographically located with the county, unless otherwise noted.

2. General Approach and Schedule

Updated designations guidance documents were issued by the EPA through a July 22, 2016, memorandum and a March 20, 2015, memorandum from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Air Division Directors, U.S. EPA Regions I-X. These memoranda supersede earlier designation guidance for the 2010 SO₂ NAAQS, issued on March 24, 2011, and identify factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO₂ NAAQS. The documents also contain the factors that the EPA intends to evaluate in determining the boundaries for designated areas. These factors include: 1) air quality characterization via ambient monitoring or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and topography; and 5) jurisdictional boundaries.

To assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling for sources that emit SO₂, the EPA released its most recent version of a draft document titled, “SO₂ NAAQS Designations Modeling Technical Assistance Document” (Modeling TAD) in August 2016.⁷

Readers of this chapter of this TSD should refer to the additional general information for the EPA’s Round 3 area designations in Chapter 1 (Background and History of the Intended Round 3 Area Designations for the 2010 1-Hour SO₂ Primary National Ambient Air Quality Standard) and Chapter 2 (Intended Round 3 Area Designations for the 2010 1-Hour SO₂ Primary National Ambient Air Quality Standard for States with Sources Not Required to be Characterized).

⁷ <https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf>. In addition to this TAD on modeling, the EPA also has released a technical assistance document addressing SO₂ monitoring network design, to advise states that have elected to install and begin operation of a new SO₂ monitoring network. See Draft SO₂ NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, February 2016, <https://www.epa.gov/sites/production/files/2016-06/documents/so2monitoringtad.pdf>.

As specified by the March 2, 2015, court order, the EPA is required to designate by December 31, 2017, all “remaining undesignated areas in which, by January 1, 2017, states have not installed and begun operating a new SO₂ monitoring network meeting the EPA specifications referenced in the EPA’s” DRR. The EPA will therefore designate by December 31, 2017, areas of the country that are not, pursuant to the DRR, timely operating the EPA-approved and valid monitoring networks. The areas to be designated by December 31, 2017, include the areas associated with two sources in Michigan meeting DRR emissions criteria that states have chosen to be characterized using air dispersion modeling, three sources that met the DRR requirements by demonstrating shut down of the source, and other areas not specifically required to be characterized by the state under the DRR.

Because many of the intended designations have been informed by available modeling analyses, this preliminary TSD is structured based on the availability of such modeling information. There is a section for each county for which modeling information is available. The remaining to-be-designated counties are then addressed together in section five.

The EPA does not plan to revise this TSD after consideration of state and public comment on our intended designation. A separate TSD will be prepared as necessary to document how we have addressed such comments in the final designations.

The following are definitions of important terms used in this document:

- 1) 2010 SO₂ NAAQS – The primary NAAQS for SO₂ promulgated in 2010. This NAAQS is 75 ppb, based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. See 40 CFR 50.17.
- 2) Design Value - a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the NAAQS.
- 3) Designated Nonattainment Area – an area that, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined either: (1) does not meet the 2010 SO₂ NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS.
- 4) Designated Unclassifiable/Attainment Area – an area that either: (1) based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined (i) meets the 2010 SO₂ NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.⁸
- 5) Designated Unclassifiable Area – an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not

⁸ The term “designated attainment area” is not used in this document because the EPA uses that term only to refer to a previous nonattainment area that has been redesignated to attainment as a result of the EPA’s approval of a state-submitted maintenance plan.

- meeting the 2010 SO₂ NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.
- 6) Modeled Violation – a violation of the SO₂ NAAQS demonstrated by air dispersion modeling.
 - 7) Recommended Attainment Area – an area that a state, territory, or tribe has recommended that the EPA designate as attainment.
 - 8) Recommended Nonattainment Area – an area that a state, territory, or tribe has recommended that the EPA designate as nonattainment.
 - 9) Recommended Unclassifiable Area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable.
 - 10) Recommended Unclassifiable/Attainment Area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable/attainment.
 - 11) Violating Monitor – an ambient air monitor meeting 40 CFR parts 50, 53, and 58 requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
 - 12) We, our, and us – these refer to the EPA.

3. Technical Analysis for the Alpena County Area

3.1. Introduction

The EPA must designate the Alpena County area by December 31, 2017, because the area has not been previously designated and Michigan has not installed and begun timely operation of a new, approved SO₂ monitoring network to characterize air quality in the vicinity of any source in Alpena County.

3.2. Air Quality Monitoring Data for the Alpena County Area

This factor considers the SO₂ air quality monitoring data in the area of Alpena County. There are no SO₂ air quality monitors in Alpena County or any of the surrounding counties.

3.3. Air Quality Modeling Analysis for the Alpena County Area

3.3.1. Introduction

This section 3.3 presents all the available air quality modeling information for Alpena County. This area contains Lafarge, a Portland Cement facility, which emits 2,000 tons or more annually. Specifically, Lafarge emitted 2,503.57 tons of SO₂ in 2014. This source meets the DRR criteria and thus is on the SO₂ DRR Source list, and Michigan has chosen to characterize it via modeling. No other party has submitted modeling or other information regarding SO₂ air quality near this facility.

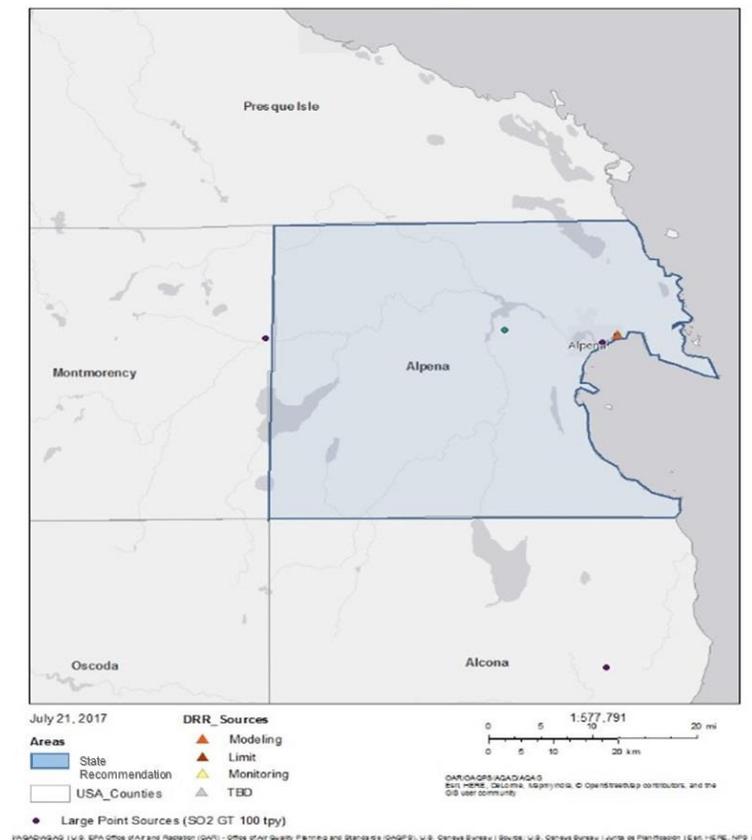
Michigan's initial submittal, dated January 13, 2017, aimed to characterize air quality for 2014 to 2016 but did not include emissions or other characterization information for the last month of that period, i.e. it did not address December 2016. Michigan then supplemented this information on February 14, 2017, providing modeling addressing all 36 months of 2014 to 2016, and intended the complete modeling to replace the January 2017 modeling as the support for the state's most recent recommendation. This chapter evaluates the latter modeling, addressing the entire 36-month period.

In its submission, Michigan recommended that an area that includes the area surrounding the facility, specifically the entirety of Alpena County, be designated as attainment based in part on an assessment and characterization of air quality impacts from this facility. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees with the state's recommendation for the area, and intends to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained in a later section, after all the available information is presented.

The area that the state has assessed via air quality modeling is located in the eastern portion of Alpena County along Thunder Bay in Lake Huron and includes a portion of the city of Alpena.

As seen in Figure 1 below, the Lafarge facility is located to the east of Alpena, Michigan, along the north shore of Thunder Bay in Lake Huron. There currently are no other nearby emitters of SO₂. See section 3.3.6 below for more information on a source that recently converted to natural gas. Also included in the figure is the state's recommended area for the attainment designation.

Figure 1. Map of the Alpena County Area Addressing Lafarge



Michigan reviewed and submitted modeling conducted by a consulting company on behalf of the Lafarge facility. Because the modeling was submitted as part of the state's official recommendation, it will from here on be referred to as the state's modeling. The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

3.3.2. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO₂ NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRM: the building input processor

- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: the surface characteristics processor for AERMET
- AERSCREEN: a screening version of AERMOD

The modeling for this area was completed using AERMOD version 16216r and AERMET version 16216. The modeling for this area included the use of the regulatory option ADJ_U* which is a surface friction velocity option in the model. This regulatory option is appropriate when used without site-specific turbulence data, which is the case with the modeling conducted here. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

3.3.3. *Modeling Parameter: Rural or Urban Dispersion*

For any dispersion modeling exercise, the determination of whether a source is in an “urban” or “rural” area is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO₂ modeling, the urban/rural determination is also important because AERMOD invokes a 4-hour half-life for urban SO₂ sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

For the purpose of performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in rural mode. This determination was made by applying USGS electronic land use data to the Auer's land use methodology. The analysis found that the land use is more than 80 percent rural, so the EPA finds the rural mode to be appropriate.

3.3.4. *Modeling Parameter: Area of Analysis (Receptor Grid)*

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO₂ emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO₂ concentrations.

The source of SO₂ emissions subject to the DRR in this area is described in the introduction to this section. For the Alpena County area, the state did not include any other nearby emitters of SO₂. The state determined that there were no current emitters of SO₂ near the source or area of characterization.

The grid receptor spacing for the area of analysis chosen is as follows:

- 50 m spacing along the fence line
- 100 m from the fence line out to 2.5 km,
- 250 m spacing beginning at 2.5 km from the facility and extending out to 5 km,
- 500 m spacing beginning at 5 km from the facility and extending out to 15 km

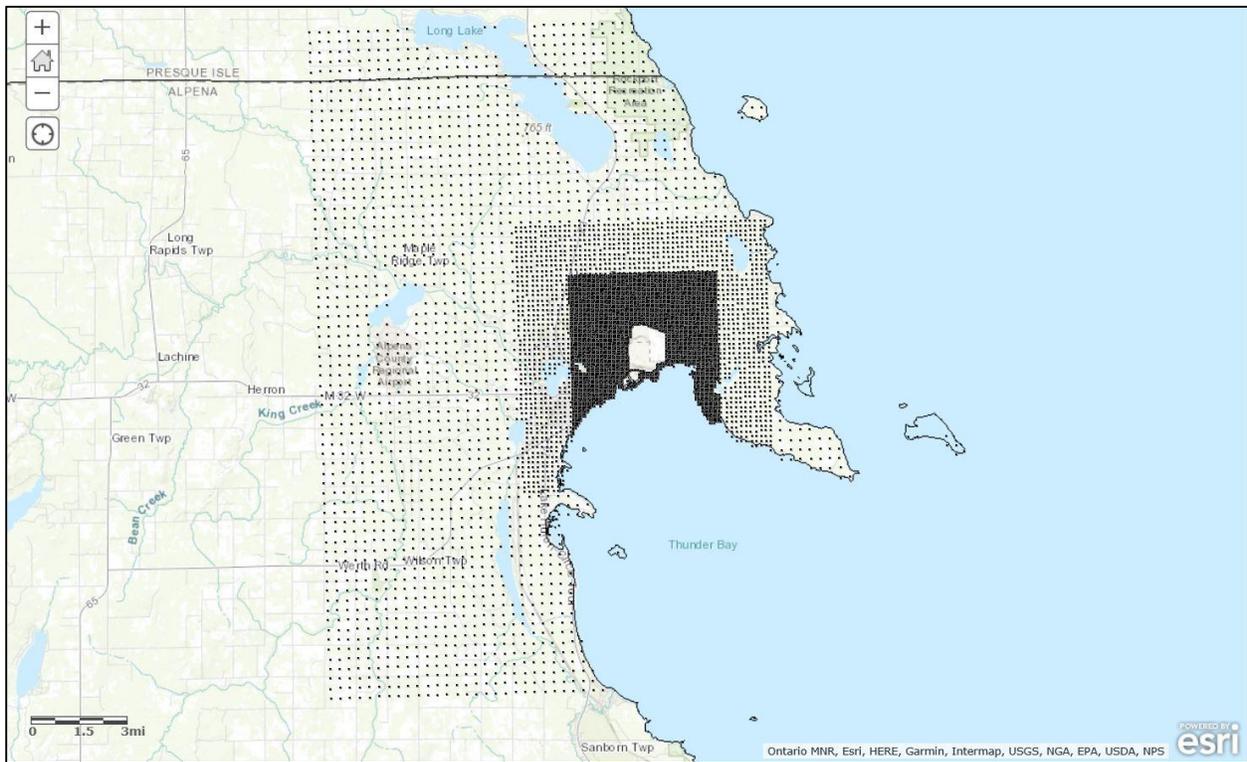
The maximum impact area falls within the 100 m spacing.

The receptor network contained approximately 7,800 receptors, and the network covered a 15 km radius from the facility covering the majority of the eastern half of Alpena county.

Figure 2, shows the state's chosen area of analysis surrounding the Lafarge Facility, as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the state placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to the modeled facility, including other facilities' property with the exceptions of locations described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor. For the Lafarge facility, receptors were excluded over Lake Huron. The state also did not place receptors in other locations that it considered to not be ambient air relative to the modeled facility. Consistent with the Modeling TAD, receptors beyond the fenceline were included, but receptors were not included on Lafarge's facility and adjacent quarry, both of which are fenced in.

Figure 2: Receptor Grid for the Alpena County Area



The EPA finds the receptor grid spacing and excluded receptors to be appropriate for characterizing the ambient air quality near this facility.

3.3.5. Modeling Parameter: Source Characterization

Section 6 of the Modeling TAD offers recommendations on source characterization including source types, use of accurate stack parameters, inclusion of building dimensions for building downwash (if warranted), and the use of actual stack heights with actual emissions or following GEP policy with allowable emissions.

For this area, only the Lafarge Facility was included in the area modeling. No other sources of SO₂ over 100 tpy are currently located anywhere in the county. The next closest source of SO₂ is the Alpena County Regional Airport, 13 km west of Lafarge, which emits two tpy of SO₂. The next closest source is the Hillman Power Company, 39 km west of Lafarge in neighboring Montmorency County and emits 124 tpy of SO₂ emissions.

The state characterized this source in accordance with the best practices outlined in the Modeling TAD. Specifically, the state used actual stack heights in conjunction with actual emissions. The state also adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPFRM was used to assist in addressing building downwash. The EPA finds the source characterization used in this model to be appropriate.

3.3.6. Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purpose of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD also indicates that it would be acceptable to use allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate that is federally enforceable and effective.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information, when they are available. These data are available for many electric generating units. In the absence of CEMS data, the EPA's Modeling TAD highly encourages the use of AERMOD's hourly varying emissions keyword HOUREMIS, or through the use of AERMOD's variable emissions factors keyword EMISFACT. When choosing one of these methods, the EPA recommends using detailed throughput, operating schedules, and emissions information from the impacted source(s).

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, where a facility has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO₂ emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO₂ emissions inventories used for permitting or SIP planning demonstrations. In the event that these

short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, “Guideline on Air Quality Models.” As previously noted, the state included the Lafarge facility and no other emitters of SO₂ within the area of analysis. The state has chosen to model this facility using actual emissions. The facility included in the state’s modeling analysis and its associated annual actual SO₂ emissions between 2014 and 2016 are summarized below in Table 2. A description of how the state obtained hourly emission rates is given below this table. As noted above, this section reviews Michigan’s supplemental submittal of February 14, 2017, which models the entire 36-month period of 2014 to 2016.

Table 2. Actual SO₂ Emissions Between 2014 – 2016 from Facilities in the Alpena County Area

| Facility Name | SO ₂ Emissions (tpy) | | |
|---|---------------------------------|-------|-------|
| | 2014 | 2015 | 2016 |
| Lafarge | 2,510 | 2,364 | 2,150 |
| Total Emissions from All Modeled Facilities in the State’s Area of Analysis | 2,510 | 2,364 | 2,150 |

For the Lafarge facility, the actual hourly emissions data were obtained from CEMs.

A nearby source (2 km away from Lafarge), Decorative Panels International, emitted 499 tons of SO₂ in 2014, according to the 2014 NEI, but has a permanent and enforceable construction permit⁹ that required the facility to convert to natural gas in 2015. The EPA agrees with the rationale for exclusion of this facility from the modeling analysis.

The EPA finds the use of the most recent years of CEMs data for Lafarge and the exclusion of Decorative Panels International (based on a permanent and enforceable switch to natural gas) to be appropriate emissions characterizations for the Alpena County area.

3.3.7. Modeling Parameter: Meteorology and Surface Characteristics

As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data is determined based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

⁹ Permit to Install Number 4-15 issued June 15, 2015.

For the area of analysis for the Alpena County area, the state selected the surface meteorology from Alpena NWS Station located 12 km to the west of the source, and coincident upper air observations from the Flint NWS Station located 235 km to the south of the source as best representative of meteorological conditions within the area of analysis.

The state used AERSURFACE version 13016 using data from the Alpena NWS station to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness (z_o)) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as “ z_o ” The state estimated surface roughness values for 12 spatial sectors out to 1 km at a seasonal temporal resolution for dry, wet, and average conditions. As noted previously, Michigan used the non-default regulatory ADJ_U* option in this analysis.

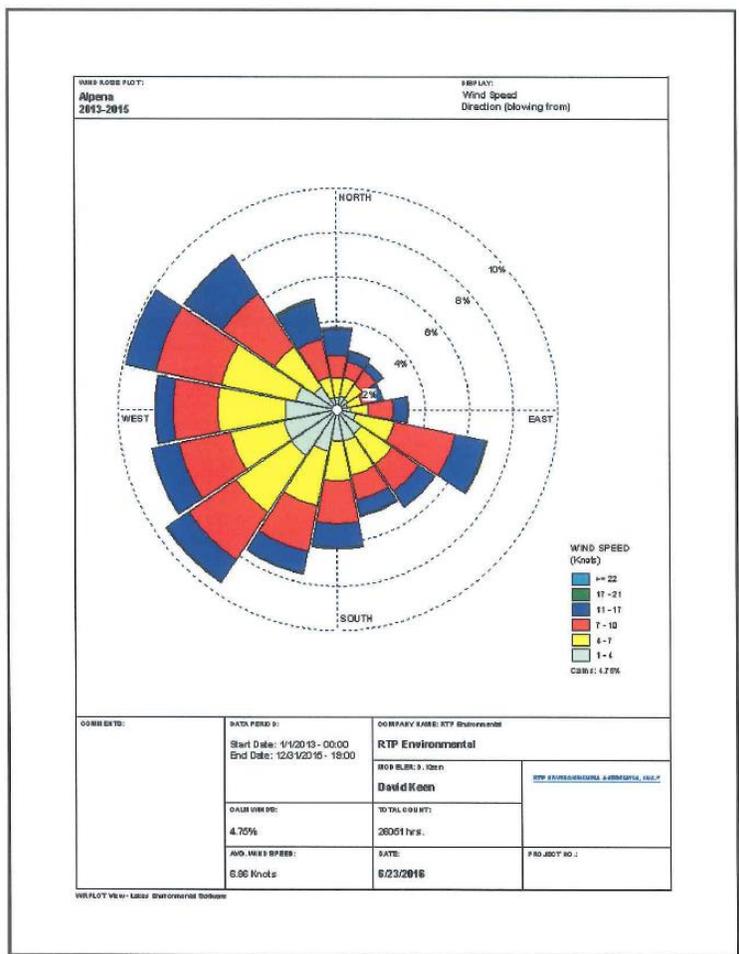
In the figure below, included in the state’s recommendation, the location of this NWS station is shown relative to the area of analysis.

Figure 3. Area of Analysis and the NWS station in the Alpena County Area



As part of its recommendation, the state provided the 3-year surface wind rose for the Alpena NWS station. In Figure 4, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The wind predominantly comes from westerly directions. Although the figure below shows predominant wind directions for 2013 through 2015, the model used 2014 through 2016 meteorology data, consistent with the years of modeled actual emissions. The figure below, provided in the state’s January 2017 submittal, is meant as a visual representation of the predominate wind directions, and the EPA would not expect that to change greatly for the updated modeling set.

Figure 4: Alpena County Area Cumulative Annual Wind Rose for Years 2013 – 2015



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET version 16216 processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The state followed the methodology and settings presented in the modeling TAD in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration was provided from Alpena NWS station, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the state set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data. The EPA finds the weather station selection and processing of the met data to be reasonable and appropriate to be representative of the area including the effects of Lake Huron.

3.3.8. Modeling Parameter: Geography, Topography (Mountain Ranges or Other Air Basin Boundaries) and Terrain

The terrain in the area of analysis is best described as flat. To account for any terrain changes, the AERMAP version 11103 terrain program within AERMOD was used to specify terrain elevations for all the receptors. The elevation data incorporated into the model 1/3 arc second USGS National Elevation Data. The EPA finds the state's processing of the noncomplex terrain in the area to be appropriate.

3.3.9. Modeling Parameter: Background Concentrations of SO₂

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO₂ that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the state chose the tier 2 approach based on the Forest County, Wisconsin, SO₂ monitor (AQS Site No. 55-041-007). This site was selected as the most representative of the Lafarge area. Other available SO₂ monitors in Michigan are located in the southern part of the state, either in urbanized areas or adjacent to large sources. The Forest County site is at a similar latitude to Lafarge. Also there are no other significant sources of SO₂ near Lafarge which is also true for the Forest County site. The state developed temporally varying data based on the 99th percentile concentration for each season based on 2013 to 2015 monitoring values. The background concentrations for this area of analysis were determined by the state to vary from 1.5 micrograms

per cubic meter ($\mu\text{g}/\text{m}^3$), equivalent to 0.58 ppb¹⁰, to 5.1 $\mu\text{g}/\text{m}^3$ (2.0 ppb), with an average value of 2.9 $\mu\text{g}/\text{m}^3$ (1.1 ppb). Although the tier 2 approach generally generates lower background concentrations than the more conservative tier 1 approach, the EPA finds the state's tier 2 approach is appropriate for characterizing the background concentrations for the area.

3.3.10. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Alpena County area of analysis are summarized below in Table 3.

Table 3: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Alpena County Area

| Input Parameter | Value |
|--|--|
| AERMOD Version | 16216r (with ADJ_U*) |
| Dispersion Characteristics | Rural |
| Modeled Sources | 1 |
| Modeled Stacks | 4 |
| Modeled Structures | 36 |
| Modeled Fence lines | 1 |
| Total receptors | 7,769 |
| Emissions Type | Actual |
| Emissions Years | 2014-2016 |
| Meteorology Years | 2014-2016 |
| NWS Station for Surface Meteorology | Alpena NWS (KAPN) |
| NWS Station Upper Air Meteorology | Flint NWS (KFNT) |
| NWS Station for Calculating Surface Characteristics | Alpena NWS (KAPN) |
| Methodology for Calculating Background SO ₂ Concentration | Seasonally varying based on Forest County, WI monitor, (AQS Site No. 55-041-007) |
| Calculated Background SO ₂ Concentration | Seasonally varying: 1.5 $\mu\text{g}/\text{m}^3$ to 5.1 $\mu\text{g}/\text{m}^3$ |

The results presented below in Table 4 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

¹⁰ The SO₂ NAAQS level is expressed in ppb but AERMOD gives results in $\mu\text{g}/\text{m}^3$. The conversion factor for SO₂ (at the standard conditions applied in the ambient SO₂ reference method) is 1ppb = approximately 2.619 $\mu\text{g}/\text{m}^3$.

Table 4. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO₂ Concentration Averaged Over Three Years for the Area of Analysis for the Alpena County Area

| Averaging Period | Data Period | Receptor Location UTM zone 17 | | 99 th percentile daily maximum 1-hour SO ₂ Concentration (µg/m ³) | |
|--------------------------------|-------------|----------------------------------|------------------|---|-------------|
| | | UTM Easting (m) | UTM Northing (m) | Modeled concentration (including background) | NAAQS Level |
| 99th Percentile 1-Hour Average | 2014-2016 | 310296.20 | 4993996.50 | 194.5 | 196.4* |

*Equivalent to the 2010 SO₂ NAAQS of 75 ppb

The state’s modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 194.5 µg/m³, equivalent to 74.3 ppb. This modeled concentration included the background concentration of SO₂, and is based on actual emissions from the facility. Figure 5 below was included as part of the state’s recommendation, and indicates that the predicted value occurred 0.5 km west of the facility.

Figure 5: Predicted 99th Percentile Daily Maximum 1-Hour SO₂ Concentrations Averaged Over Three Years for the Area of Analysis for the Alpena County Area



The modeling submitted by the state does not indicate that the 1-hour SO₂ NAAQS is violated at the receptor with the highest modeled concentration.

3.3.11. The EPA's Assessment of the Modeling Information Provided by the State

The modeling conducted by the state for the area around the Lafarge facility followed the recommendations in the TAD. The important components of a modeling assessment, i.e., models used, meteorology, emission estimates, nearby sources modeled, and background concentrations, all adequately comply with the TAD and with general modeling expectations. The EPA verified that the nearby source excluded from the modeling does have a valid construction permit requiring the use of natural gas and therefore finds the exclusion from the analysis appropriate. The design value predicted in the compliance run is near, but below the SO₂ NAAQS.

3.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Alpena County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

3.5. Jurisdictional Boundaries in the Alpena County Area

The EPA's goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable. Michigan recommended that the EPA designate Alpena County as attainment. The boundaries of Alpena County are well established and well known, so that these boundaries provide a good basis for defining the area being designated.

3.6. Other Information Relevant to the Designations for the Alpena County Area

The EPA has received no third party modeling or other relevant information for this area.

3.7. The EPA's Assessment of the Available Information for the Alpena County Area

The best available evidence regarding air quality in Alpena County is the modeling provided by Michigan. The modeling reflected the recommendations of the TAD and provides a reliable assessment that supports Michigan's recommended finding that the modeled portion of this area is attaining the standard. There is no available nearby monitoring information.

Michigan, in its January 13, 2017, submittal, provided a recommendation of attainment for the entirety of Alpena County. This recommendation was supported by modeling, supplemented on February 14, 2017, that characterized air quality for the entire 36-month period from 2014 to 2016. The modeling domain only included the eastern half of Alpena county. However, the EPA did not find any other sources of SO₂ within or near the county boundary that were likely to cause or contribute to a violation of the standard within the county. The EPA believes, as a result, that Michigan's modeling, showing Eastern Alpena County to be attaining, also supports a conclusion that the remainder of Alpena County attains the standard as well. Therefore, the EPA concurs with the state's recommendation to designate the entirety of Alpena County as unclassifiable/attainment.

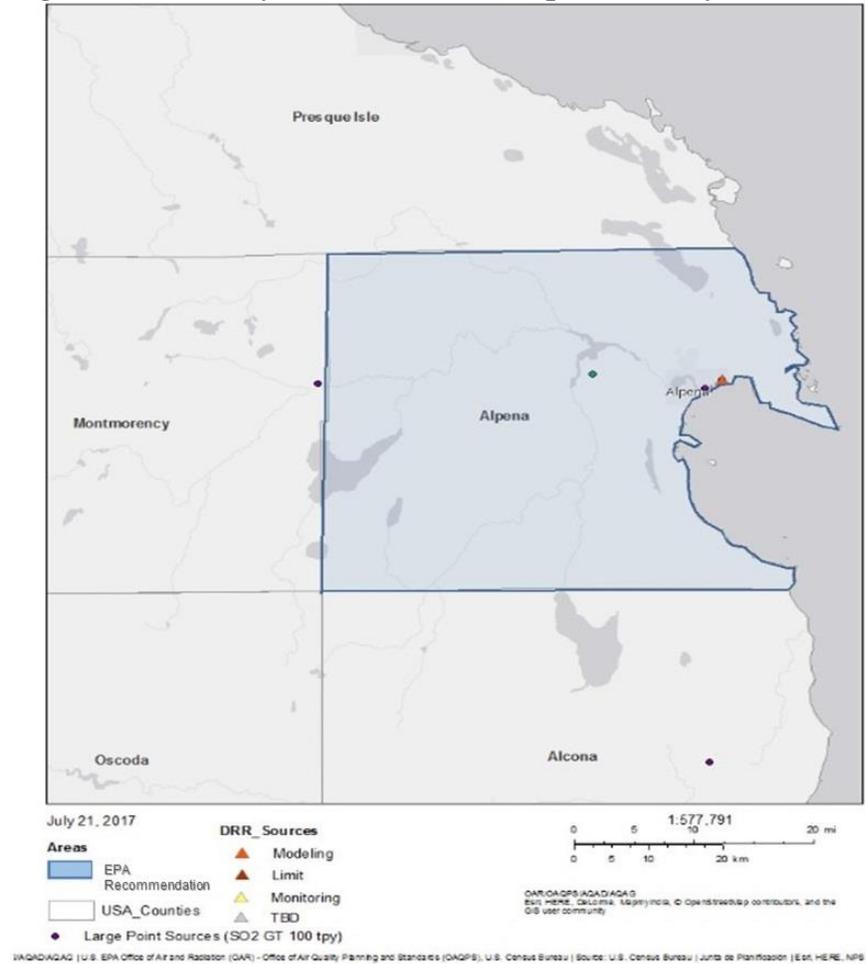
The EPA believes that our intended unclassifiable/attainment area, bounded by Alpena County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

3.8. Summary of Our Intended Designation for the Alpena County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Alpena County area as

unclassifiable/attainment for the 2010 SO₂ NAAQS. Specifically, the boundaries are comprised of the entirety of Alpena County, Michigan. Figure 6 shows the boundary of this intended designated area.

Figure 6. Boundary of Our Intended Alpena County Unclassifiable/Attainment Area



4. Technical Analysis for the Delta County Area

4.1. Introduction

The EPA must designate the Delta County area by December 31, 2017, because the area has not been previously designated and Michigan has not installed and begun timely operation of a new, approved SO₂ monitoring network to characterize air quality in the vicinity of any source in Delta County.

4.2. Air Quality Monitoring Data for the Delta County Area

This factor considers the SO₂ air quality monitoring data in the area of Delta County. There are no SO₂ air quality monitors in Delta County or any of the surrounding counties.

4.3. Air Quality Modeling Analysis for the Delta County Area Addressing the Escanaba Paper Company

4.3.1. Introduction

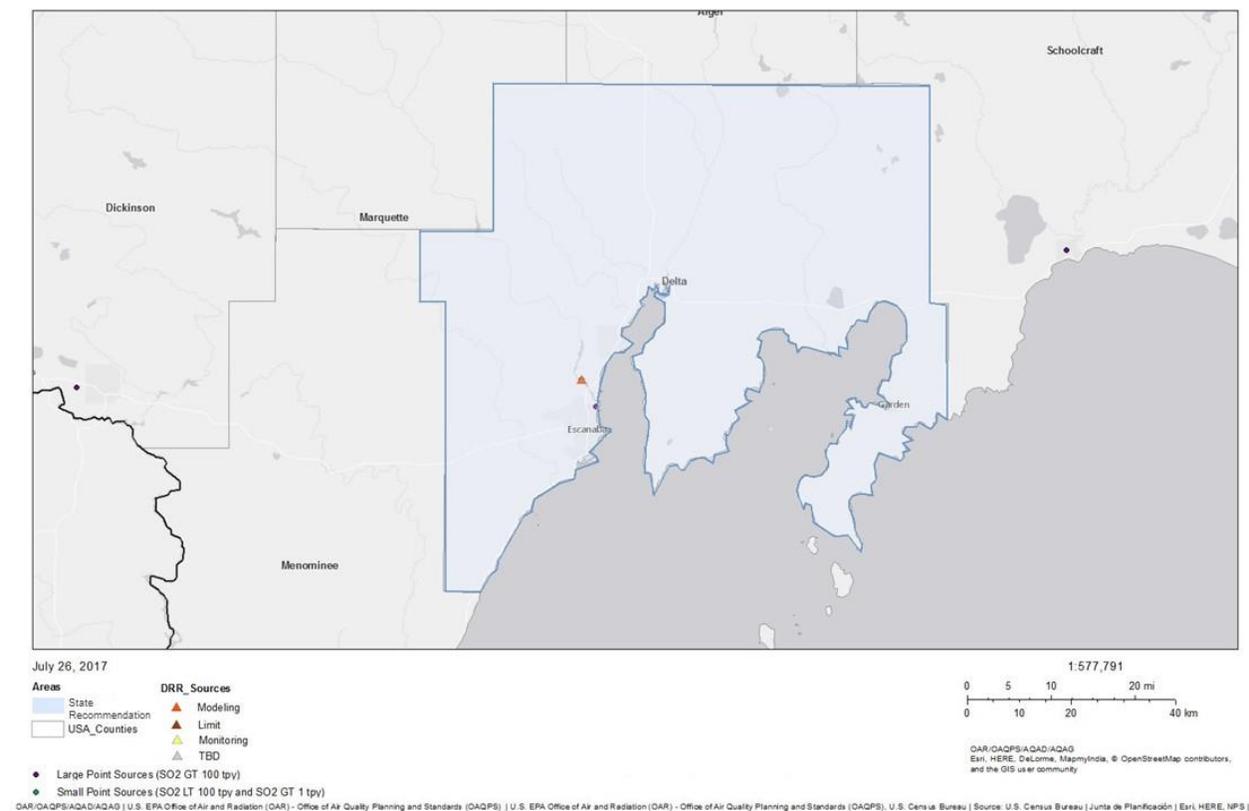
This section 4.3 presents all the available air quality modeling information for a portion of Delta County that includes the Escanaba Paper Company facility (“Escanaba Paper”). This facility emits 2,000 tons or more annually. Specifically, the Escanaba Paper Company emitted 2,069 tons of SO₂ in 2014. This source meets the DRR criteria and thus is on the SO₂ DRR Source list, and Michigan has chosen to characterize it via modeling. No other party has submitted modeling or other information regarding SO₂ air quality near this facility.

In its submission, Michigan recommended that an area that includes Escanaba Paper, specifically the entirety of Delta County, be designated as attainment based in part on an assessment and characterization of air quality impacts from this facility. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing a mixture of actual and allowable emissions. After careful review of the state’s assessment, supporting documentation, and all available data, the EPA agrees with the state’s conclusion that the Delta County area is meeting the 1-hour SO₂ NAAQS and the EPA is modifying the state’s recommendation for the area, and intends to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

The area that the state has assessed via air quality modeling is located in the southwestern portion of Delta County along Lake Michigan.

As seen in Figure 7 below, Escanaba Paper is located in the western portion of Delta County on the coastline of Lake Michigan. There are currently no other nearby emitters of 1 tpy or more of SO₂. See section 4.3.6 below for more information on a recently shut down facility. Also included in the figure is the state’s recommended area for the attainment designation.

Figure 7. Map of the Delta County Area Addressing the Escanaba Paper Company



Michigan reviewed and submitted modeling conducted by a consulting company on behalf of the Escanaba Paper Company. Because the modeling was submitted as part of the state’s official recommendation, it will from here on be referred to as the state’s modeling. The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA’s July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

4.3.2. Model Selection and Modeling Components

The EPA’s Modeling TAD notes that for area designations under the 2010 SO₂ NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRM: the building input processor
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: the surface characteristics processor for AERMET
- AERSCREEN: a screening version of AERMOD

The state used AERMOD version 15181 in default mode. The current regulatory version of AERMOD is 16216r. This version was released on January 17, 2017. The previous version (16216) was released on December 20, 2016. The modeling for this area was completed prior to the release of AERMOD 16216 and 16216r. The results of this modeling are not expected to significantly differ had this modeling effort used 16216r instead of 15181. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

4.3.3. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the determination of whether a source is in an “urban” or “rural” area is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO₂ modeling, the urban/rural determination is also important because AERMOD invokes a 4-hour half-life for urban SO₂ sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

For the purpose of performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in rural mode. This determination was made by applying USGS electronic land use data to the Auer's land use methodology. The analysis found that the land use is 85 percent rural, so the EPA finds the state's use of rural mode to be appropriate.

4.3.4. Modeling Parameter: Area of Analysis (Receptor Grid)

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO₂ emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO₂ concentrations.

The source of SO₂ emissions subject to the DRR in this area are described in the introduction to this section. For the Delta County area, the state did not include any other nearby emitters of SO₂. The state determined that there were no significant emitters of SO₂ near the source or area of characterization.

The grid receptor spacing for the area of analysis chosen is as follows:

- 25 m spacing from the facility out to 0.5 km,
- 50 m spacing beginning at 0.5 km from the facility and extending out to 1 km,
- 100 m spacing beginning at 1 km from the facility and extending out to 5 km, and
- 250 m spacing beginning at 5 km from the facility and extending out to 10 km

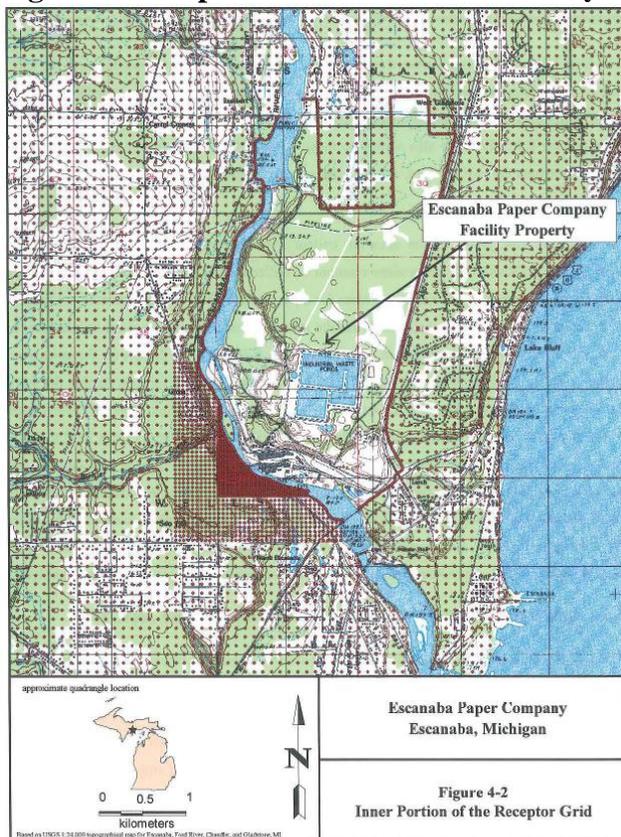
In addition to the main rectangular coordinate receptor grid, property line receptors were spaced approximately every 25 m. No receptors were placed in locations where an ambient monitor could not be physically located (i.e., over bodies of water).

The receptor network contained 12,636 receptors, and the network covered a 10 km radius from the facility covering the southwestern portion of Delta county.

Figure 8, included in the state’s recommendation, shows the state’s chosen area of analysis surrounding the facility, as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the state placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to the modeled facility, including other facilities’ property with the exceptions of locations described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor. For Escanaba Paper, receptors were excluded over Lake Michigan and the Escanaba River. The state also did not place receptors in other locations that it considered to not be ambient air relative to the modeled facility. For the Escanaba Paper Company, the modeling document reports that the entire facility is surrounded by fencing and natural barriers. The natural barrier includes the Escanaba river. Additionally, gated access with cameras help prevent unauthorized access. Receptors were not included on company property where public access is prevented, and we do not have information at this time suggesting this area is ambient air.

Figure 8: Receptor Grid for the Delta County Area



The EPA finds the receptor grid spacing and excluded receptors to be appropriate for characterizing the ambient air quality near this facility.

4.3.5. Modeling Parameter: Source Characterization

Section 6 of the Modeling TAD offers recommendations on source characterization including source types, use of accurate stack parameters, inclusion of building dimensions for building downwash (if warranted), and the use of actual stack heights with actual emissions or following GEP policy with allowable emissions.

For this area, only Escanaba Paper was included in the area modeling. No other sources of SO₂ over 100 tpy are located anywhere in the county. The next closest source of at least 100 tpy of SO₂ is MPI Acquisition, LLC, which is 67 km east of the Escanaba Paper Company, and 18 km east of the Delta County border, emitted 1,086 tons of SO₂ in 2014.

The state characterized this source within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the state used actual stack heights in conjunction with a combination of actual and allowable emissions. The GEP stack height policy was used for sources using allowable emissions. However, since all facility stacks were determined to be less than GEP height, actual stack heights were used in the modeling. The state also adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPFRM version 04274 was used to assist in addressing building downwash. The EPA found the source characterization used in this model to be appropriate.

4.3.6. Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purpose of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD also indicates that it would be acceptable to use allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate that is federally enforceable and effective.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information, when they are available. These data are available for many electric generating units. In the absence of CEMS data, the EPA's Modeling TAD highly encourages the use of AERMOD's hourly varying emissions keyword HOUREMIS, or through the use of AERMOD's variable emissions factors keyword EMISFACT. When choosing one of these methods, the EPA recommends using detailed throughput, operating schedules, and emissions information from the impacted source(s).

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, where a facility has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO₂ emissions to a level that indicates

compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO₂ emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, “Guideline on Air Quality Models.”

As previously noted, the state included Escanaba Paper and no other emitters of SO₂ within in the area of analysis. The state has chosen to model this facility using a combination of actual and allowable emissions. The facility in the state’s modeling analysis and its associated annual actual SO₂ emissions between 2012 and 2014 are summarized below in Table 2. A description of how the state obtained hourly emission rates is given below this table.

Table 5. Actual SO₂ Emissions Between 2012 – 2014 from Facilities in the Delta County Area

| Facility Name | SO ₂ Emissions (tpy) | | |
|---|---------------------------------|-------|-------|
| | 2012 | 2013 | 2014 |
| Escanaba Paper Company | 1,210 | 1,950 | 2,069 |
| Total Emissions from All Modeled Facilities in the State’s Area of Analysis | 1,210 | 1,950 | 2,069 |

For the Escanaba Paper Company, the actual hourly emissions data were obtained from a variety of sources. For the No. 7 Boiler, No. 8 Boiler, No. 10 Recovery Furnace, and Lime Kiln vented through the PCC Plant, actual hourly emissions were developed based on daily fuel usage, hours of operation, and emissions factors. The remaining six SO₂ emissions units were conservatively modeled utilizing one-hour PTE emissions from permitted limits or calculated from emissions factors by multiplying the emissions factor by the maximum heat input to generate a conservative one hour emissions rate.

A nearby source of SO₂ (4 km away from Escanaba Paper), the Escanaba Power Plant, which emitted 412 tons of SO₂ in 2014 according to the 2014 NEI, permanently shut down in 2015. After the plant shut down in 2015, the state revoked its permits effectively making the shutdown federally enforceable. Therefore, the EPA agrees with the exclusion of this facility from the modeling analysis.

The EPA finds the use of a variety of emissions data and emissions factors for Escanaba Paper and the exclusion of the Escanaba Power Plant, based on its permanent shutdown, appropriate emissions characterizations for the Delta County area.

4.3.7. Modeling Parameter: Meteorology and Surface Characteristics

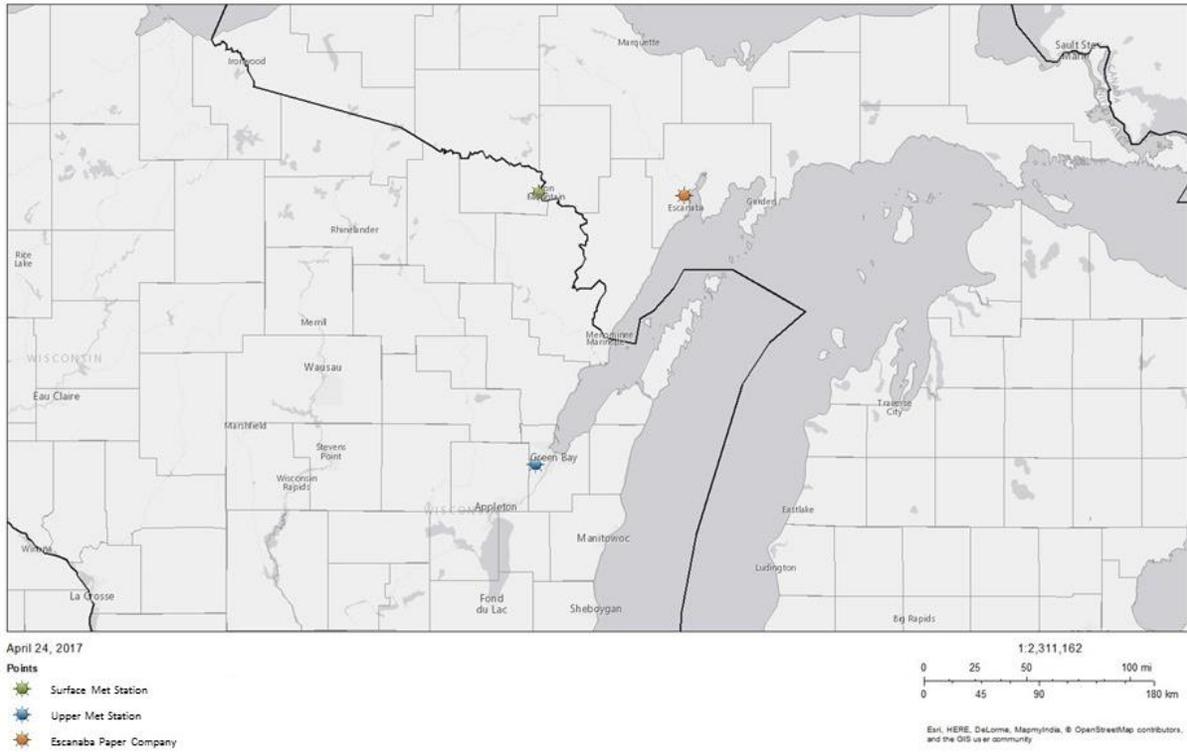
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data is determined based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

For the area of analysis for the Delta County area, the state selected the surface meteorology from the Iron Mountain, Michigan, NWS station located 79 km to the west of the source, and coincident upper air observations from the Green Bay, Wisconsin, NWS station, located 169 km to the southwest of the source as best representative of meteorological conditions within the area of analysis.

The state used AERSURFACE version 13016 using data from the Iron Mountain, Michigan, NWS station to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness (z_o)) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as “ z_o .” The state estimated surface roughness values for 12 spatial sectors out to 1 km at a seasonal temporal resolution for dry, wet, and average conditions. Michigan did not use the non-default regulatory ADJ_U* option in this analysis.

In the figure below, generated by the EPA, the location of these NWS stations are shown relative to the area of analysis.

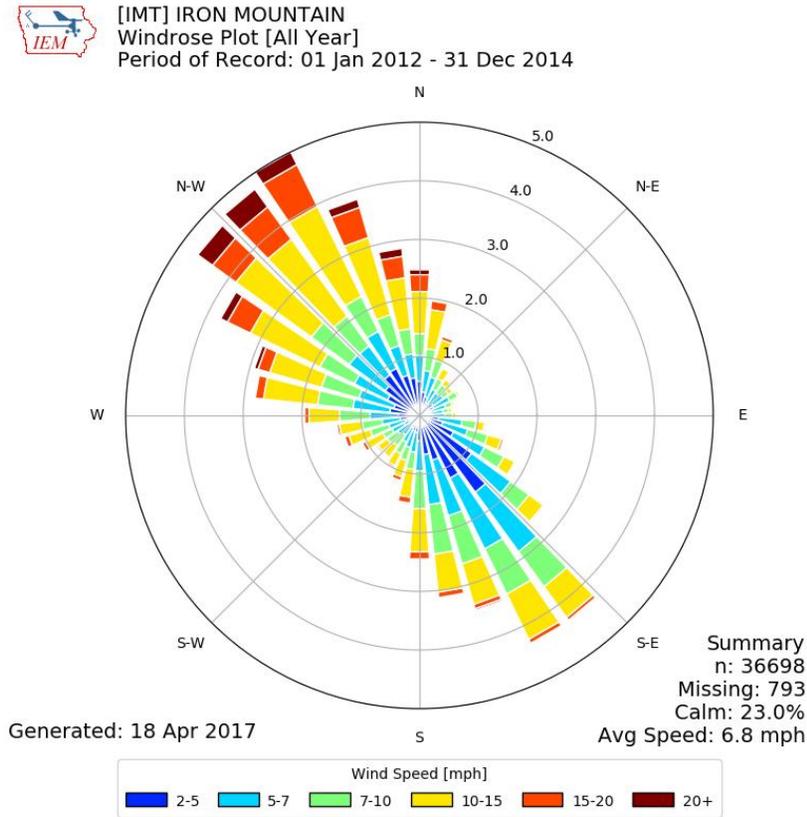
Figure 9. Area of Analysis and the NWS stations for the Delta County Area



© Garmin, NOAA, USGS, NPS | OAR/OAQPS/OAQAD/OAQAG | U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality Planning and Standards (OAQPS) | U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality Planning and Standards (OAQPS), U.S. Census Bureau | Source: U.S. Census Bureau | Esri, HERE |

In Figure 10, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing for the Iron Mountain NWS station. Winds are predominantly either from the northwest or from the southeast.

Figure 10: Delta County Area Cumulative Annual Wind Rose for Years 2012 – 2014



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Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET version 14134 processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The state followed the methodology and settings presented in the modeling TAD in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration was provided from the Iron Mountain NWS station, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration

estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the state set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data. The EPA finds the weather station selection and processing of the met data to be reasonable and appropriate to be representative of the area.

4.3.8. Modeling Parameter: Geography, Topography (Mountain Ranges or Other Air Basin Boundaries) and Terrain

The terrain in the area of analysis is best described as flat to gently rolling. To account for these terrain changes, the AERMAP version 11103 terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Database. This appears to be an appropriate processing of the simple terrain in the area.

4.3.9. Modeling Parameter: Background Concentrations of SO₂

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO₂ that are ultimately added to the modeled design values: 1) a “tier 1” approach, based on a monitored design value, or 2) a temporally varying “tier 2” approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the state chose the tier 1 approach based on the Forest County, Wisconsin, SO₂ monitor (AQS Site No. 55-041-0007) based on 2013 to 2015 monitored design value. The Forest County monitor is the nearest SO₂ monitor to the Escanaba facility. Additionally, the facility is in a rural area with no other significant sources of SO₂ nearby. The Forest County monitor is in a similar environment. The single value of the background concentration for this area of analysis was determined by the state to be 7 ppb,¹¹ and that value was incorporated into the final AERMOD results. The EPA finds this is an appropriate approach as tier 1 is a generally more conservative approach than tier 2 for determining background.

4.3.10. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Delta County area of analysis are summarized below in Table 6.

¹¹ The SO₂ NAAQS level is expressed in ppb but AERMOD gives results in µg/m³. The conversion factor for SO₂ (at the standard conditions applied in the ambient SO₂ reference method) is 1ppb = approximately 2.619 µg/m³.

Table 6: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Delta County Area

| Input Parameter | Value |
|--|---|
| AERMOD Version | 15181 (Regulatory Default Mode) |
| Dispersion Characteristics | Rural |
| Modeled Sources | 1 |
| Modeled Stacks | 20 |
| Modeled Structures | 79 |
| Modeled Fence lines | 1 |
| Total receptors | 12,636 |
| Emissions Type | Mixed |
| Emissions Years | 2012-2014 |
| Meteorology Years | 2012-2014 |
| NWS Station for Surface Meteorology | Iron Mountain NWS (KIMT) |
| NWS Station Upper Air Meteorology | Green Bay NWS (KGRB) |
| NWS Station for Calculating Surface Characteristics | Iron Mountain NWS |
| Methodology for Calculating Background SO ₂ Concentration | Tier 1 based on Forest County, WI monitor (55-041-0007) |
| Calculated Background SO ₂ Concentration | 7 ppb |

The results presented below in Table 7 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

Table 7. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO₂ Concentration Averaged Over Three Years for the Area of Analysis for the Delta County Area

| Averaging Period | Data Period | Receptor Location UTM zone 17 | | 99th percentile daily maximum 1-hour SO₂ Concentration (ppb) | |
|--------------------------------|--------------------|--|-------------------------|---|--------------------|
| | | UTM Easting (m) | UTM Northing (m) | Modeled concentration (including background) | NAAQS Level |
| 99th Percentile 1-Hour Average | 2012-2014 | 493962.7 | 5071960.00 | 113.18 | 196.4* |

*Equivalent to the 2010 SO₂ NAAQS of 75 ppb

The state's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 43.2 ppb. This modeled concentration includes the background concentration of SO₂, and is based on a mixture of actual and PTE emissions from the facility. Figure 11 below was included as part of the state's recommendation, and indicates that the predicted value occurred in the southeastern corner of the facility near the fence line. The state's receptor grid is also shown in the figure.

Figure 11: Predicted 99th Percentile Daily Maximum 1-Hour SO₂ Concentrations Averaged Over Three Years for the Area of Analysis for the Delta County Area



The modeling submitted by the state indicates that the 1-hour SO₂ NAAQS is not violated in this area.

4.3.11. The EPA's Assessment of the Modeling Information Provided by the State

The modeling conducted by the state for the area around Escanaba Paper followed the recommendations in the TAD. The important components of a modeling assessment, i.e., models used, meteorology, emission estimates, nearby sources modeled, and background concentrations, all adequately comply with the TAD and with general modeling expectations. The EPA verified that the nearby excluded source is permanently shut down therefore finds the exclusion appropriate.

4.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Delta County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

4.5. Jurisdictional Boundaries in the Delta County Area

The EPA's goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable. Michigan recommended that the EPA designate Delta County as attainment. The boundaries of Delta County are well established and well known, so that these boundaries provide a good basis for defining the area being designated.

4.6. Other Information Relevant to the Designations for the Delta County Area

The EPA has received no third party modeling or other relevant information for this area.

4.7. The EPA's Assessment of the Available Information for the Delta County Area

The best available evidence regarding air quality in Delta County is the modeling provided by Michigan. The modeling reflected the recommendations of the TAD and provides a reliable assessment that supports Michigan's recommended finding that the modeled portion of this area is attaining the standard. There is no available nearby monitoring information.

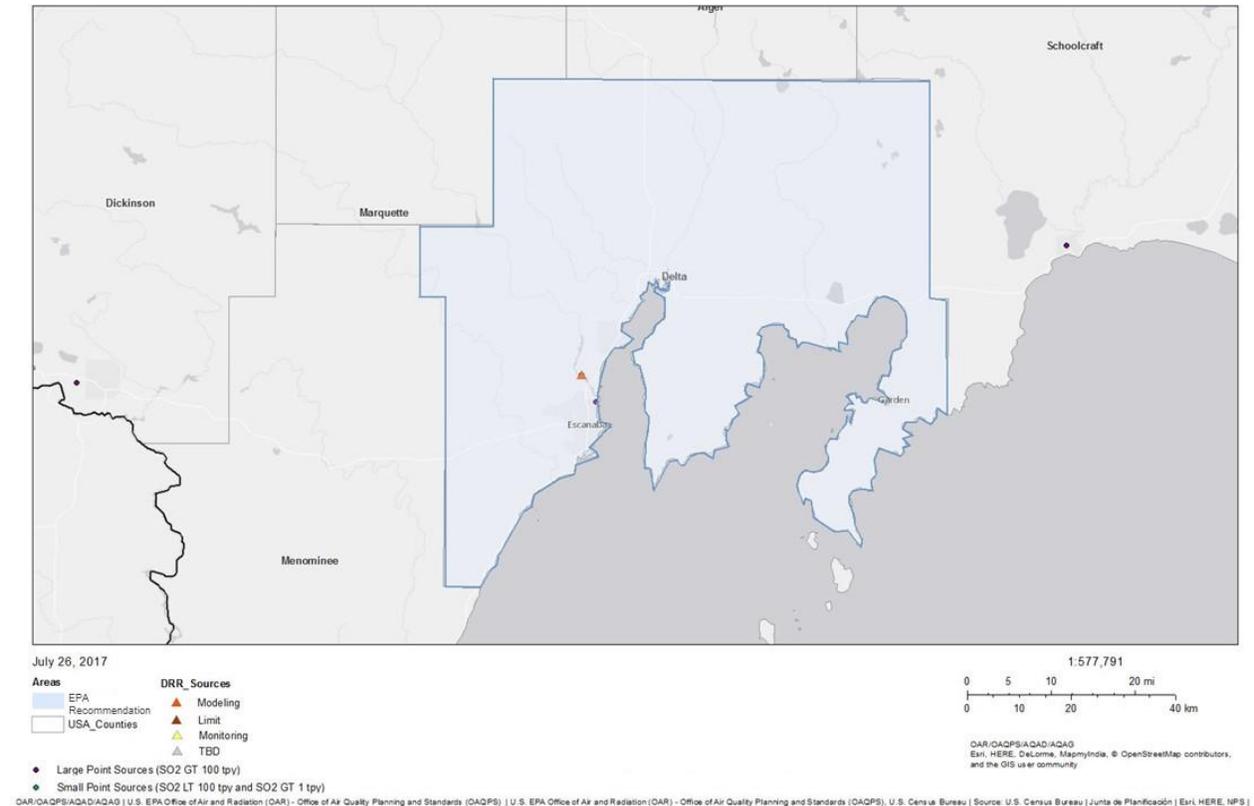
Michigan, in its January 13, 2017 submittal, provides a recommendation for the entirety of Delta County. The modeling domain included a portion of the western half of the county. However, no other sources of SO₂ in the county currently exist that might cause or contribute to a violation of the standard within the county. In the neighboring county, MPI Acquisition, LLC, a paper mill, emitted 1,086 tpy according to the 2014 NEI. This facility is 18 km from the Delta County border. Like the Escanaba Paper Company, impacts of this facility would likely be nearby that source, so the source would be unlikely to have impacts within Delta County that would cause or contribute to a violation of the 2010 SO₂ NAAQS. The EPA believes, as a result, that Michigan's modeling, showing Western Delta County to be attaining, also supports a conclusion that the remainder of Delta County attains the standard as well. Therefore, the EPA concurs with the state's recommendation to designate the entirety of Delta County as unclassifiable/attainment.

The EPA believes that our intended unclassifiable/attainment area, bounded by Delta County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

4.8. Summary of Our Intended Designation for the Delta County Area

After careful evaluation of the state’s recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Delta County area as unclassifiable/attainment for the 2010 SO₂ NAAQS. Specifically, the boundaries are comprised of the entirety of Delta County. Figure 12 shows the boundary of this intended designation area.

Figure 12. Boundary of the Intended Delta County Unclassifiable/Attainment Area



5. Technical Analysis for the Remainder of Michigan

5.1. Introduction

The state has not installed and begun operation of a new, approved SO₂ monitoring network meeting EPA specifications referenced in EPA’s SO₂ DRR for any sources of SO₂ emissions in the counties identified in Table 8 below. Accordingly, the EPA must designate these counties by December 31, 2017. At this time, there are no air quality modeling results available to the EPA for these counties. In addition, there is no air quality monitoring data that indicate any violation of the 1-hour SO₂ NAAQS.

Michigan recommended that the remainder of the state be designated as “unclassifiable.” Michigan’s support for this recommendation was providing SO₂ monitoring data. Michigan also indicated that it had satisfied the requirements of the DRR. After careful review of the state’s assessment, supporting documentation, and all available data, the EPA intends to modify the state’s recommendation for these areas, and designate the areas as “unclassifiable/attainment” since these counties were not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

Table 8. Counties that the EPA Intends to Designate Unclassifiable/Attainment

| Michigan’s Recommended Definition County or Partial County (p) | Michigan’s Recommended Designation | EPA’s Intended Area Definition County or Partial County (p)⁺ | EPA’s Intended Designation |
|---|---|--|-----------------------------------|
| Alcona | Unclassifiable | Alcona | Unclassifiable/Attainment |
| Alger | Unclassifiable | Alger | Unclassifiable/Attainment |
| Allegan | Unclassifiable | Allegan | Unclassifiable/Attainment |
| Antrim | Unclassifiable | Antrim | Unclassifiable/Attainment |
| Arenac | Unclassifiable | Arenac | Unclassifiable/Attainment |
| Baraga | Unclassifiable | Baraga | Unclassifiable/Attainment |
| Barry | Unclassifiable | Barry | Unclassifiable/Attainment |
| Benzie | Unclassifiable | Benzie | Unclassifiable/Attainment |
| Berrien | Unclassifiable | Berrien | Unclassifiable/Attainment |

| Michigan's Recommended Definition County or Partial County (p) | Michigan's Recommended Designation | EPA's Intended Area Definition County or Partial County (p)⁺ | EPA's Intended Designation |
|---|---|--|-----------------------------------|
| Branch | Unclassifiable | Branch | Unclassifiable/Attainment |
| Calhoun | Unclassifiable | Calhoun | Unclassifiable/Attainment |
| Cass | Unclassifiable | Cass | Unclassifiable/Attainment |
| Charlevoix | Unclassifiable | Charlevoix | Unclassifiable/Attainment |
| Cheboygan | Unclassifiable | Cheboygan | Unclassifiable/Attainment |
| Chippewa | Unclassifiable | Chippewa | Unclassifiable/Attainment |
| Clare | Unclassifiable | Clare | Unclassifiable/Attainment |
| Clinton | Unclassifiable | Clinton | Unclassifiable/Attainment |
| Crawford | Unclassifiable | Crawford | Unclassifiable/Attainment |
| Dickinson | Unclassifiable | Dickinson | Unclassifiable/Attainment |
| Emmet | Unclassifiable | Emmet | Unclassifiable/Attainment |
| Genesee | Unclassifiable | Genesee | Unclassifiable/Attainment |
| Gladwin | Unclassifiable | Gladwin | Unclassifiable/Attainment |
| Gogebic | Unclassifiable | Gogebic | Unclassifiable/Attainment |
| Grand Traverse | Unclassifiable | Grand Traverse | Unclassifiable/Attainment |
| Gratiot | Unclassifiable | Gratiot | Unclassifiable/Attainment |
| Hillsdale | Unclassifiable | Hillsdale | Unclassifiable/Attainment |
| Houghton | Unclassifiable | Houghton | Unclassifiable/Attainment |
| Huron | Unclassifiable | Huron | Unclassifiable/Attainment |
| Ionia | Unclassifiable | Ionia | Unclassifiable/Attainment |

| Michigan's Recommended Definition County or Partial County (p) | Michigan's Recommended Designation | EPA's Intended Area Definition County or Partial County (p)⁺ | EPA's Intended Designation |
|---|---|--|-----------------------------------|
| Iosco | Unclassifiable | Iosco | Unclassifiable/Attainment |
| Iron | Unclassifiable | Iron | Unclassifiable/Attainment |
| Isabella | Unclassifiable | Isabella | Unclassifiable/Attainment |
| Jackson | Unclassifiable | Jackson | Unclassifiable/Attainment |
| Kalamazoo | Unclassifiable | Kalamazoo | Unclassifiable/Attainment |
| Kalkaska | Unclassifiable | Kalkaska | Unclassifiable/Attainment |
| Kent | Unclassifiable | Kent | Unclassifiable/Attainment |
| Keweenaw | Unclassifiable | Keweenaw | Unclassifiable/Attainment |
| Lake | Unclassifiable | Lake | Unclassifiable/Attainment |
| Lapeer | Unclassifiable | Lapeer | Unclassifiable/Attainment |
| Leelanau | Unclassifiable | Leelanau | Unclassifiable/Attainment |
| Lenawee | Unclassifiable | Lenawee | Unclassifiable/Attainment |
| Livingston | Unclassifiable | Livingston | Unclassifiable/Attainment |
| Luce | Unclassifiable | Luce | Unclassifiable/Attainment |
| Mackinac | Unclassifiable | Mackinac | Unclassifiable/Attainment |
| Macomb | Unclassifiable | Macomb | Unclassifiable/Attainment |
| Manistee | Unclassifiable | Manistee | Unclassifiable/Attainment |

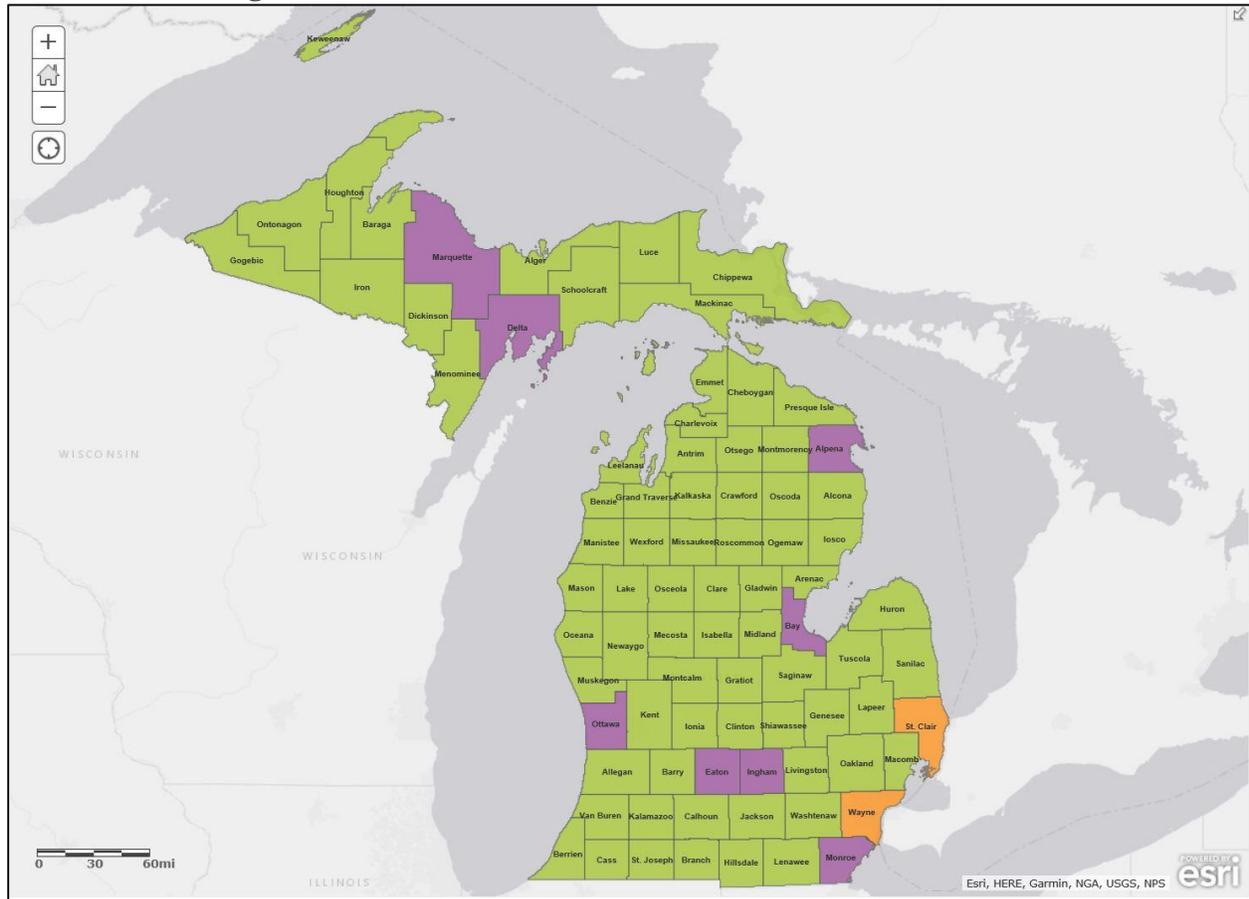
| Michigan's Recommended Definition County or Partial County (p) | Michigan's Recommended Designation | EPA's Intended Area Definition County or Partial County (p)⁺ | EPA's Intended Designation |
|---|---|--|-----------------------------------|
| Mason | Unclassifiable | Mason | Unclassifiable/Attainment |
| Mecosta | Unclassifiable | Mecosta | Unclassifiable/Attainment |
| Menominee | Unclassifiable | Menominee | Unclassifiable/Attainment |
| Midland | Unclassifiable | Midland | Unclassifiable/Attainment |
| Missaukee | Unclassifiable | Missaukee | Unclassifiable/Attainment |
| Montcalm | Unclassifiable | Montcalm | Unclassifiable/Attainment |
| Montmorency | Unclassifiable | Montmorency | Unclassifiable/Attainment |
| Muskegon | Unclassifiable | Muskegon | Unclassifiable/Attainment |
| Newaygo | Unclassifiable | Newaygo | Unclassifiable/Attainment |
| Oakland | Unclassifiable | Oakland | Unclassifiable/Attainment |
| Oceana | Unclassifiable | Oceana | Unclassifiable/Attainment |
| Ogemaw | Unclassifiable | Ogemaw | Unclassifiable/Attainment |
| Ontonagon | Unclassifiable | Ontonagon | Unclassifiable/Attainment |
| Osceola | Unclassifiable | Osceola | Unclassifiable/Attainment |
| Oscoda | Unclassifiable | Oscoda | Unclassifiable/Attainment |
| Otsego | Unclassifiable | Otsego | Unclassifiable/Attainment |
| Presque Isle | Unclassifiable | Presque Isle | Unclassifiable/Attainment |
| Roscommon | Unclassifiable | Roscommon | Unclassifiable/Attainment |
| Saginaw | Unclassifiable | Saginaw | Unclassifiable/Attainment |
| St. Clair (p) | Unclassifiable | St. Clair (p) | Unclassifiable/Attainment |

| Michigan's Recommended Definition County or Partial County (p) | Michigan's Recommended Designation | EPA's Intended Area Definition County or Partial County (p)⁺ | EPA's Intended Designation |
|---|---|--|-----------------------------------|
| St. Joseph | Unclassifiable | St. Joseph | Unclassifiable/Attainment |
| Sanilac | Unclassifiable | Sanilac | Unclassifiable/Attainment |
| Schoolcraft | Unclassifiable | Schoolcraft | Unclassifiable/Attainment |
| Shiawassee | Unclassifiable | Shiawassee | Unclassifiable/Attainment |
| Tuscola | Unclassifiable | Tuscola | Unclassifiable/Attainment |
| Van Buren | Unclassifiable | Van Buren | Unclassifiable/Attainment |
| Washtenaw | Unclassifiable | Washtenaw | Unclassifiable/Attainment |
| Wayne (p) | Unclassifiable | Wayne (p) | Unclassifiable/Attainment |
| Wexford | Unclassifiable | Wexford | Unclassifiable/Attainment |

* Portions of St. Clair and Wayne Counties are both existing nonattainment areas.

+Includes all areas of Indian country geographically located with the county, unless otherwise noted.

Figure 12. The EPA’s Intended Unclassifiable/Attainment Designations for Remaining Counties in Michigan



As referenced in the introduction, no area in Michigan installed and begun timely operation of a new, approved SO₂ monitoring network meeting EPA specifications referenced in EPA’s SO₂ DRR, which would have been designated by December 31, 2020. Michigan counties or partial counties previously designated in Round 1 (78 FR 47191)¹² and Round 2 (81 FR 45039)¹³ will remain unchanged unless otherwise noted. As seen in Figure 3 above, the areas previously designated as unclassifiable/attainment in Round 2 and the areas intended to be designated in as unclassifiable/attainment in the previous sections of this chapter are shown in purple. St. Clair and Wayne counties, shown in orange, have partial county nonattainment areas from previous rounds of designations. The remaining portions of the counties are intended to be designated as unclassifiable/attainment. The boundaries for these areas are shown in further detail in Figures 14 and 15.

¹² The EPA previously designated as nonattainment in Round 1 (78 FR 47191) a portion of Wayne County.

¹³ The EPA previously designated a portion of St. Clair county as nonattainment and the entireties of Bay, Eaton, Ingham, Marquette, Monroe, and Ottawa Counties as unclassifiable/attainment in Round 2 (81 FR 45039).

5.2. Air Quality Monitoring Data for the Remaining Counties in Michigan

As indicated in Table 9, the monitors below have sufficient valid data for 2013-2015 and 2014-2016 and these data indicate that there was no violation of the 2010 SO₂ NAAQS at the monitoring site in those periods. These data were available to the EPA for consideration in the designations process, however, since it is unclear if these monitors are located in areas of maximum concentration, it is unclear if the data are representative of the area's actual air quality.

Table 9. Design values for SO₂ Monitors in Michigan

| Location | 2013-2015 DV (ppb) | 2014-2016 DV (ppb) |
|------------------------------------|---------------------------|---------------------------|
| Allen Park | 44 | 38 |
| Detroit- W. Fort St. ¹⁴ | 44 | 41 |
| Detroit- Waterman | 64 | 62 |
| Grand Rapids | 10 | 9 |
| Lansing | 16 | 13 |
| Port Huron | 70 | 63 |
| Sterling State Park, Monroe | 18 | 16 |

Air quality design values for all monitors can be found at <https://www.epa.gov/air-trends/air-quality-design-values>.

5.3. Jurisdictional Boundaries in the Remaining Counties in Michigan

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for all other counties. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable. County boundaries are well established boundaries that are appropriate for defining areas to be designated.

5.4. The EPA's Assessment of the Available Information for the Remaining Counties in Michigan

These counties were not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS. These counties therefore meet the definition of an "unclassifiable/attainment" area.

¹⁴ Three other monitors are located nearby; this table shows the data for the site with the highest design value.

Our intended unclassifiable/attainment areas, bounded by county and state boundaries, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

Following the completion of these Round 3 designations, there will be no remaining undesignated areas in Michigan that will be addressed in Round 4.

5.5. Summary of Our Intended Designation for the Remaining Counties in Michigan

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to modify the state's recommendation of unclassifiable and intends to designate the areas in the above Table 8 as unclassifiable/attainment for the 2010 SO₂ NAAQS.

For the remaining counties in Michigan other than Wayne and St. Clair, the boundary of the unclassifiable/attainment area is the county boundary. For both the St. Clair and Wayne partial county areas, the area to be designated as unclassifiable/attainment is the entirety of the county not previously designated as nonattainment. The boundaries for the unclassifiable/attainment St. Clair and Wayne Partial County areas are shown below in Figures 13 and 14.

Figure 13. Boundary of the Intended St. Clair County Partial County Unclassifiable/Attainment Area

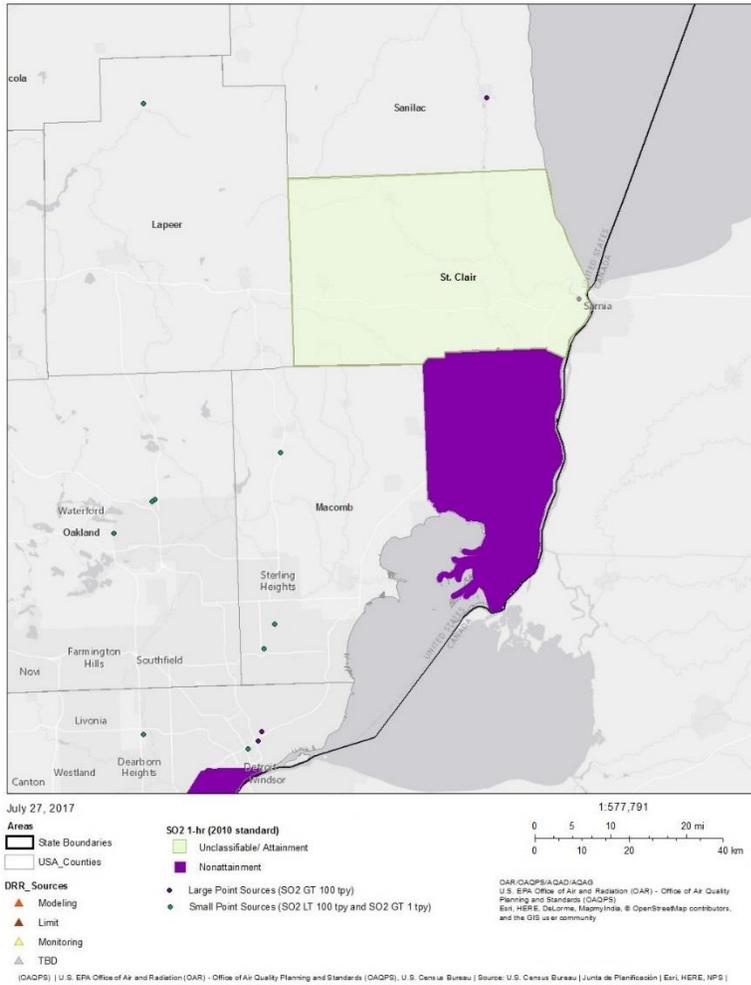
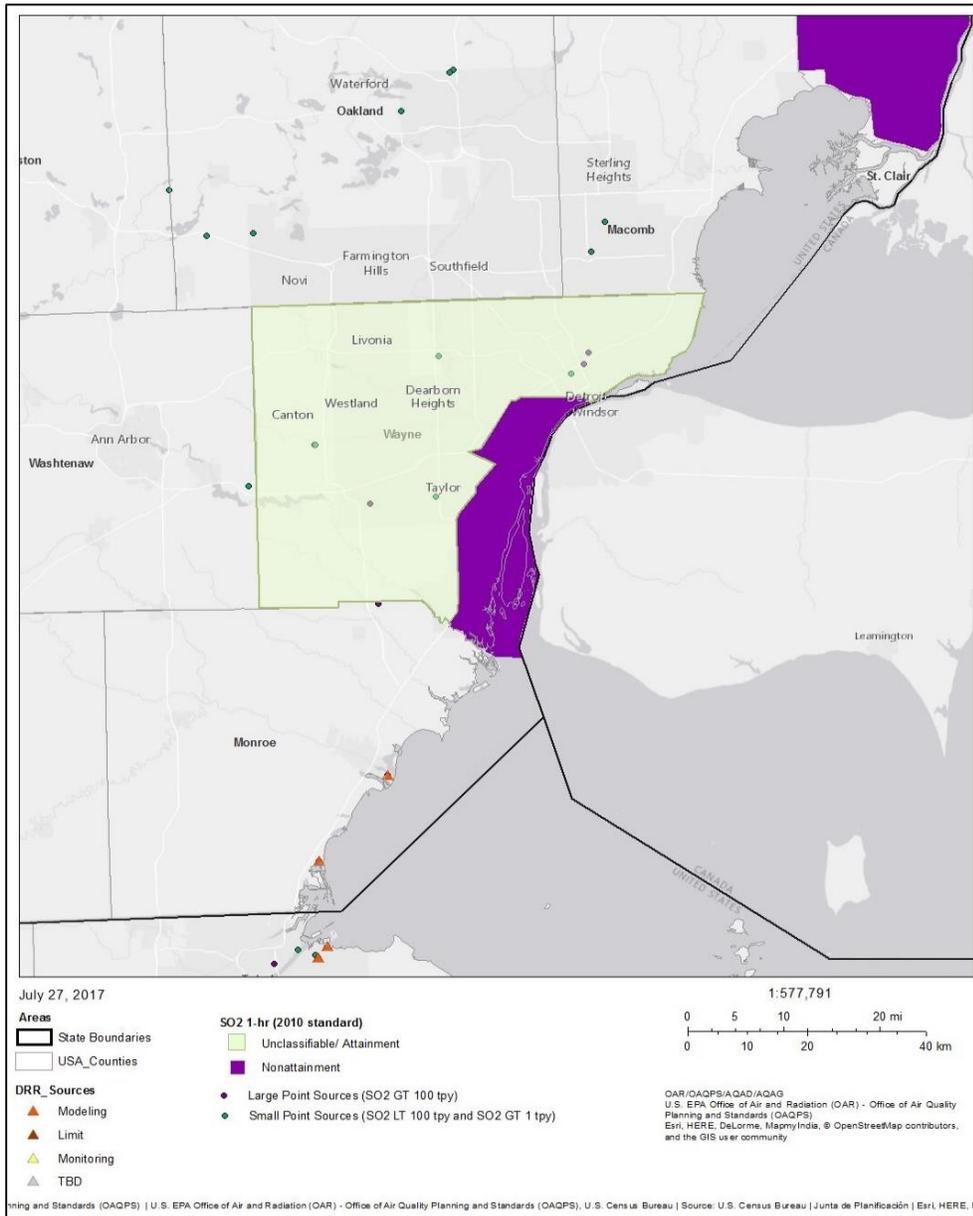


Figure 14. Boundary of the Intended Wayne County Partial County Unclassifiable/Attainment Area



After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate all other counties and remaining partial counties (except for those other counties already designated by the EPA¹⁵ or specifically listed for intended designation elsewhere in this Chapter¹⁶) as unclassifiable/attainment for the 2010 SO₂ NAAQS. Figure 12 above shows the location of these areas within Michigan. For each of the counties listed in Table 8 the boundary of the unclassifiable/attainment area is the county boundary unless otherwise noted. At this time, our intended designations for the state only apply to these areas and the other areas presented in this Chapter. Following the completion of these Round 3 designations, there will be no remaining undesignated areas in Michigan that will be addressed in Round 4.

¹⁵ See 78 FR 47191 and 81 FR 45039.

¹⁶ Alpena and Delta counties.