

Draft Technical Support Document

Mississippi Area Designations for the 2010 SO₂ Primary National Ambient Air Quality Standard

Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA, or the Agency) must designate areas as either “unclassifiable,” “attainment,” or “nonattainment” for the 2010 one-hour sulfur dioxide (SO₂) primary national ambient air quality standard (NAAQS). The CAA defines a nonattainment area as one that does not meet the NAAQS or that contributes to a violation in a nearby area. An attainment area is defined as any area other than a nonattainment area that meets the NAAQS. Unclassifiable areas are defined as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS.

Mississippi submitted updated recommendations on September 18, 2015, ahead of a July 2, 2016, deadline for the EPA to designate certain areas. This deadline established by the U.S. District Court for the Northern District of California is the first of three deadlines established by the court for the EPA to complete area designations for the 2010 SO₂ NAAQS. Table 1 below lists Mississippi’s recommendations and identifies the county in Mississippi that the EPA intends to designate by July 2, 2016, 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. Mississippi’s Recommended and the EPA’s Intended Designations

Area	Mississippi’s Recommended Area Definition	Mississippi’s Recommended Designation	EPA’s Intended Area Definition	EPA’s Intended Designation
Lamar County, Mississippi	Lamar County	Unclassifiable/Attainment	Same as state’s Recommendation	Same as state’s Recommendation

Background

On June 3, 2010, the EPA revised the primary (health based) SO₂ NAAQS by establishing a new one-hour standard at a level of 75 parts per billion (ppb) which is attained when the three-year average of the 99th percentile of one-hour daily maximum concentrations does not exceed 75 ppb. This NAAQS was published in the Federal Register on June 22, 2010 (75 FR 35520) and is codified at 40 CFR 50.17. The EPA determined this is the level necessary to protect public health with an adequate margin of safety, especially for children, the elderly and those with asthma. These groups are particularly susceptible to the health effects associated with breathing SO₂. The two prior primary standards of 140 ppb evaluated over 24 hours, and 30 ppb evaluated over an

entire year, codified at 40 CFR 50.4, remain applicable.¹ However, the EPA is not currently designating areas on the basis of either of these two primary standards. Similarly, the secondary standard for SO₂, set at 500 ppb evaluated over 3 hours has not been revised, and the EPA is also not currently designating areas on the basis of the secondary standard.

General Approach and Schedule

Section 107(d) of the CAA requires that not later than one year after promulgation of a new or revised NAAQS, state governors must submit their recommendations for designations and boundaries to the EPA. Section 107(d) also requires the EPA to provide notification to states no less than 120 days prior to promulgating an initial area designation that is a modification of a state's recommendation. If a state does not submit designation recommendations, the EPA will promulgate the designations that it deems appropriate. If a state or tribe disagrees with the EPA's intended designations, they are given an opportunity within the 120 day period to demonstrate why any proposed modification is inappropriate.

On August 5, 2013, the EPA published a final rule establishing air quality designations for 29 areas in the United States for the 2010 SO₂ NAAQS, based on recorded air quality monitoring data from 2009 - 2011 showing violations of the NAAQS (78 FR 47191). In that rulemaking, the EPA committed to address, in separate future actions, the designations for all other areas for which the Agency was not yet prepared to issue designations.

Following the initial August 5, 2013 designations, three lawsuits were filed against the EPA in different U.S. District Courts, alleging the agency had failed to perform a nondiscretionary duty under the CAA by not designating all portions of the country by the June 2013 deadline. In an effort intended to resolve the litigation in one of those cases, plaintiffs Sierra Club and the Natural Resources Defense Council and the EPA filed a proposed consent decree with the U.S. District Court for the Northern District of California. On March 2, 2015, the court entered the consent decree and issued an enforceable order for the EPA to complete the area designations according to the court-ordered schedule.

According to the court-ordered schedule, the EPA must complete the remaining designations by three specific deadlines. By no later than July 2, 2016 (16 months from the court's order), the EPA must designate two groups of areas: (1) areas that have newly monitored violations of the 2010 SO₂ NAAQS and (2) areas that contain any stationary sources that had not been announced as of March 2, 2015 for retirement and that according to the EPA's Air Markets Database emitted in 2012 either (i) more than 16,000 tons of SO₂ or (ii) more than 2,600 tons of SO₂ with an annual average emission rate of at least 0.45 pounds of SO₂ per one million British thermal units (lbs SO₂/mmBTU). Specifically, a stationary source with a coal-fired unit that as of January 1, 2010 had a capacity of over 5 megawatts and otherwise meets the emissions criteria, is excluded from the July 2, 2016 deadline if it had announced through a company public

¹ 40 CFR 50.4(e) provides that the two prior primary NAAQS will no longer apply to an area one year after its designation under the 2010 NAAQS, except that for areas designated nonattainment under the prior NAAQS as of August 22, 2010, and areas not meeting the requirements of a state implementation plan (SIP) Call under the prior NAAQS, the prior NAAQS will apply until that area submits and the EPA approves a SIP providing for attainment of the 2010 NAAQS. Lamar County, Mississippi is not such an area.

announcement, public utilities commission filing, consent decree, public legal settlement, final state or federal permit filing, or other similar means of communication, by March 2, 2015, that it will cease burning coal at that unit.

The last two deadlines for completing remaining designations are December 31, 2017, and December 31, 2020. The EPA has separately promulgated requirements for states and other air agencies to provide additional monitoring or modeling information on a timetable consistent with these designation deadlines. We expect this information to become available in time to help inform these subsequent designations. These requirements were promulgated on August 21, 2015 (80 FR 51052), in a rule known as the SO₂ Data Requirements Rule (DRR).

Updated designations guidance was issued by the EPA through 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. This memorandum supersedes earlier designation guidance for the 2010 SO₂ NAAQS, issued on March 24, 2011, and it identifies factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO₂ NAAQS. The guidance also contains the factors the EPA intends to evaluate in determining the boundaries for all remaining areas in the country, consistent with the court's order and schedule. 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. This guidance was supplemented by two technical assistance documents intended to assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling or ambient air quality monitoring for sources that emit SO₂. Notably, the EPA released its most recent versions of documents titled, "SO₂ NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) and "SO₂ NAAQS Designations Source-Oriented Monitoring Technical Assistance Document" (Monitoring TAD) in December 2013.

Based on ambient air quality data collected between 2012 and 2014, no monitored violations of the 2010 SO₂ NAAQS have been recorded in any undesignated part of the state.² However, there is one source in the state meeting the emissions criteria of the consent decree for which the EPA must complete designations by July 2, 2016. In this draft technical support document, the EPA discusses its review and technical analysis of Mississippi's updated recommendations for the area that we must designate. The EPA also discusses any intended modifications from the state's recommendation based on all available data before us.

² For designations based on ambient air quality monitoring data that violates the 2010 SO₂ NAAQS, the consent decree directs the EPA to evaluate data collected between 2013 and 2015. Absent complete, quality assured and certified data for 2015, the analyses of applicable areas for the EPA's intended designations will be informed by data collected between 2012 and 2014. States with monitors that have recorded a violation of the 2010 SO₂ NAAQS during these years have the option of submitting complete, quality assured and certified data for calendar year 2015 by April 19, 2016 to the EPA for evaluation. If after our review, the ambient air quality data for the area indicates that no violation of the NAAQS occurred between 2013 and 2015, the consent decree does not obligate the EPA to complete the designation. Instead, we may designate the area and all other previously undesignated areas in the state on a schedule consistent with the prescribed timing of the court order, i.e., by December 31, 2017, or December 31, 2020.

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 three year average of the 99th percentile of the annual distribution of daily maximum one-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 which the EPA has determined has violated the 2010 SO₂ NAAQS or contributed to a violation in a nearby area. A nonattainment designation reflects considerations of state recommendations and all of the information discussed in this document. The EPA’s decision is based on all available information including the most recent 3 years of air quality monitoring data, available modeling analysis, and any other relevant information.
4. Designated unclassifiable area – an area which the EPA cannot determine based on all available information whether or not it meets the 2010 SO₂ NAAQS.
5. Designated unclassifiable/attainment area – an area which the EPA has determined to have sufficient evidence to find either is attaining or is likely to be attaining the NAAQS. The EPA’s decision is based on all available information including the most recent 3 years of air quality monitoring data, available modeling analysis, and any other relevant information.
6. Modeled violation – a violation based on air dispersion modeling.
7. Recommended attainment area – an area a state or tribe has recommended that the EPA designate as attainment.
8. Recommended nonattainment area – an area a state or tribe has recommended that the EPA designate as nonattainment.
9. Recommended unclassifiable area – an area a state or tribe has recommended that the EPA designate as unclassifiable.
10. Recommended unclassifiable/attainment area – an area a state or tribe has recommended that the EPA designate as unclassifiable/attainment.
11. Violating monitor – an ambient air monitor meeting all methods, quality assurance and siting criteria and requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.

Technical Analysis for the Lamar County, Mississippi Area

Introduction

Lamar County, Mississippi contains a stationary source that according to the EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO₂ or more than 2,600 tons of SO₂ and had an annual average emission rate of at least 0.45 lbs SO₂/mmBTU. As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the R.D. Morrow, Sr. Generating Plant (R.D. Morrow Plant) emitted 3,948 tons of SO₂, and had an emissions rate of 0.64 lbs SO₂/mmBTU. Pursuant to the March 2, 2015 court-ordered schedule, the EPA must designate the area surrounding the facility by July 2, 2016.

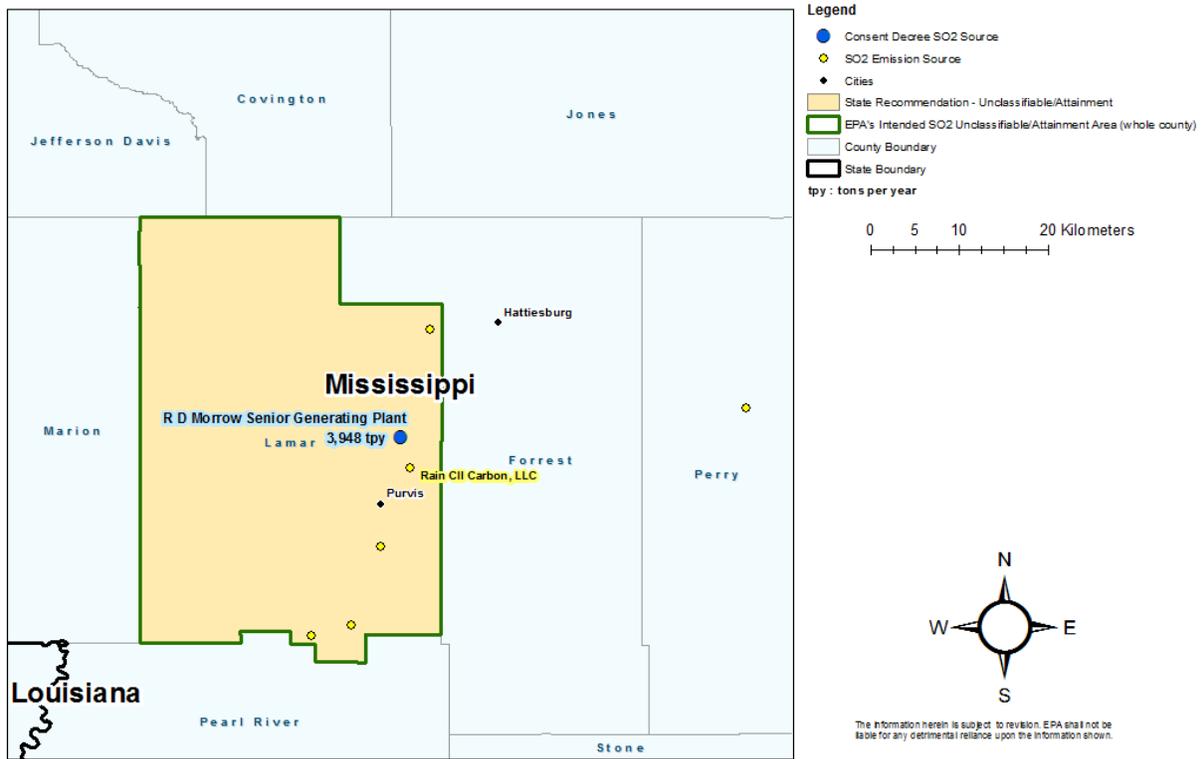
In its submission, Mississippi recommended that the area surrounding the R.D. Morrow Plant, specifically the entirety of Lamar County (Lamar County Area), be designated as unclassifiable/attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO₂ are expected. 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 that the Lamar County Area is attaining the standard, and intends to designate Lamar County as unclassifiable/attainment.

The R.D. Morrow Plant owned and operated by South Mississippi Electric Power Association (SMEPA),³ is located in central Mississippi in the eastern portion of Lamar County. As seen in Figure 1 below, the facility is located approximately 8.5 kilometers (km) northeast of Purvis, Mississippi or approximately 12 km southwest of Hattiesburg. Also included in the figure are nearby emitters of SO₂, the state's recommended area for the unclassifiable/attainment designation, and the EPA's intended unclassifiable/attainment designation for the area.

³ The modeling analysis submitted by state of Mississippi was performed by Trinity Consultants at the request of SMEPA. Throughout this document the EPA will refer to the state of Mississippi when discussing modeling information provided to support their designation recommendation.

Figure 1. The EPA’s intended designation for Lamar County, Mississippi.

R. D. Morrow Senior Generating Plant Lamar County, Mississippi



The SMEPA characterization of the area surrounding R.D. Morrow Plant included the consideration of other nearby sources utilizing emission inventory data from state of Mississippi.

The discussion and analysis that follows below will reference the state’s use of the Modeling TAD, the EPA’s assessment of the state’s modeling in accordance with the Modeling TAD, and the factors for evaluation contained in the EPA’s March 20, 2015 guidance, as appropriate.

Detailed Assessment

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. In some instances the recommended model may be a model other than AERMOD, such as the BLP model for buoyant line sources. The AERMOD modeling system contains the following components:

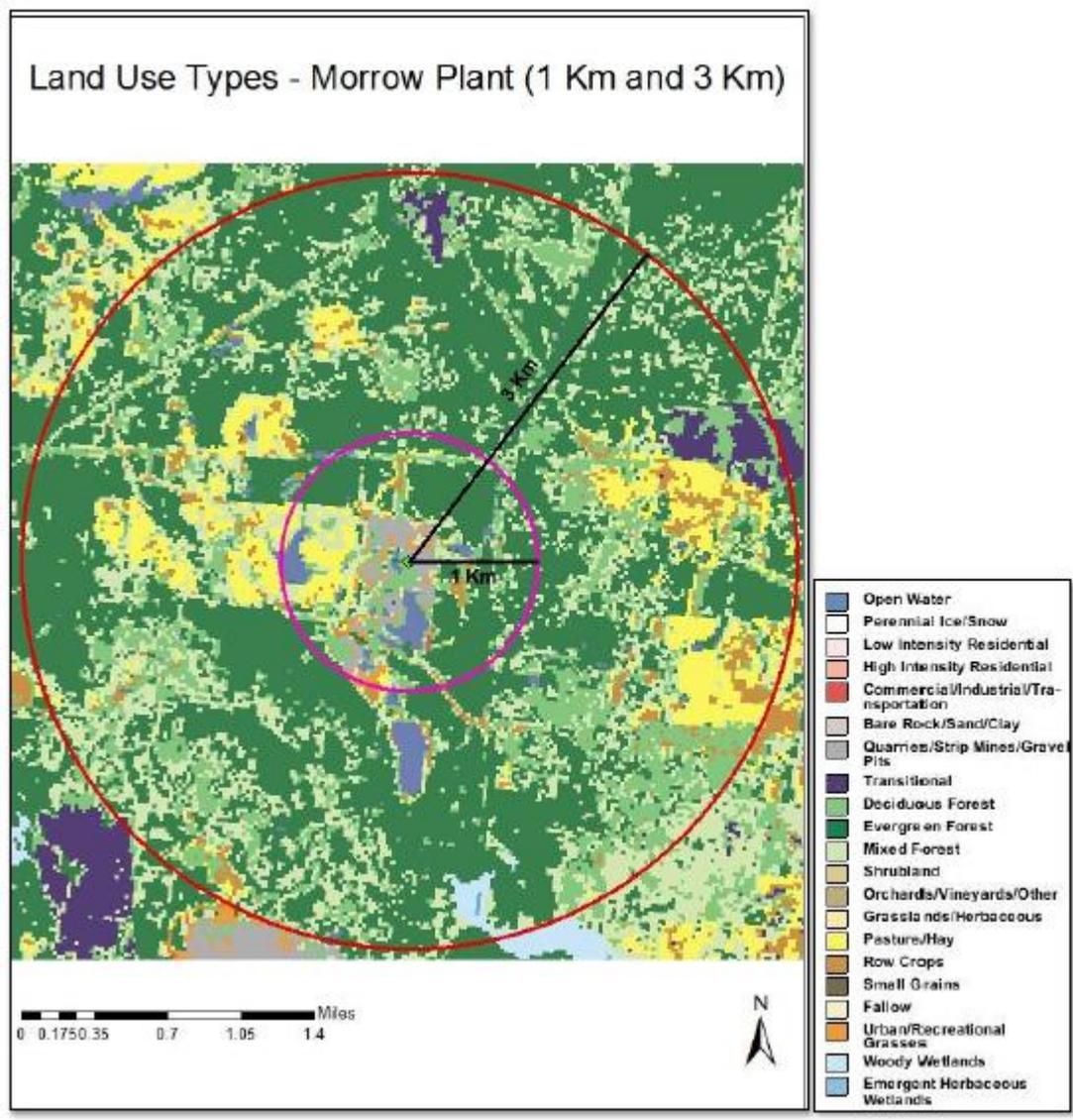
- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRIME: the building input processor
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: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

The state used AERMOD version 14134, and a discussion of the individual components will be referenced in the corresponding discussion that follows as appropriate.

Modeling Parameter: Rural or Urban Dispersion

The EPA's recommended procedure for characterizing an area by prevalent land use is based on evaluating the dispersion environment within 3 km of the facility. According to the EPA's modeling guidelines, rural dispersion coefficients are to be used in the dispersion modeling analysis if more than 50 percent of the area within a 3 km radius of the facility is classified as rural. Conversely, if more than 50 percent of the area is urban, urban dispersion coefficients should be used in the modeling analysis. The state analyzed the land use types within a 3 kilometer radius from the center of the R.D. Morrow Plant as shown in Figure 2. Based on the visual inspection of the land use types, the state determined that it was most appropriate to run the model with rural dispersion coefficients.

Figure 2. Land Use Map for area around the R.D. Morrow Plant. Source: 1-Hour SO₂ NAAQS Designation Modeling Report prepared by Trinity Consultants for the South Mississippi Electric Power Association, August 2015.



Modeling Parameter: Area of Analysis (Receptor Grid)

The EPA believes that a reasonable first step towards characterization of air quality in the area surrounding the R.D. Morrow Plant is to determine the extent of the area of analysis, i.e., 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 of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO₂ concentrations. For

the Lamar County Area, the state has included one other emitter of SO₂ within 10 km of the R.D. Morrow Plant in any direction. The state considered SO₂ sources within 50 km of the R.D. Morrow Plant, showing one source with significant emissions within a 10 km radius, and one source between 10 and 50 km from R.D. Morrow with more than 40 tons per year (tpy) emissions. The emissions from Georgia Pacific Leaf River Cellulose, LLC, the smaller source located approximately 33 km from the R.D. Morrow Plant, were small relative to its distance (65.38 tpy in 2013). The state therefore determined that SO₂ emissions from sources within a 10 km radius around the R.D. Morrow Plant would effectively capture any predicted impacts to air quality considering the size of the source, leaving any smaller source impacts to be accounted for in the background analysis. In addition to the R.D. Morrow Plant, the other emitter of SO₂ included in the area of analysis is Rain CII Carbon, LLC (Rain CII Carbon). The grid receptor spacing for the area of analysis chosen by the state is as follows:

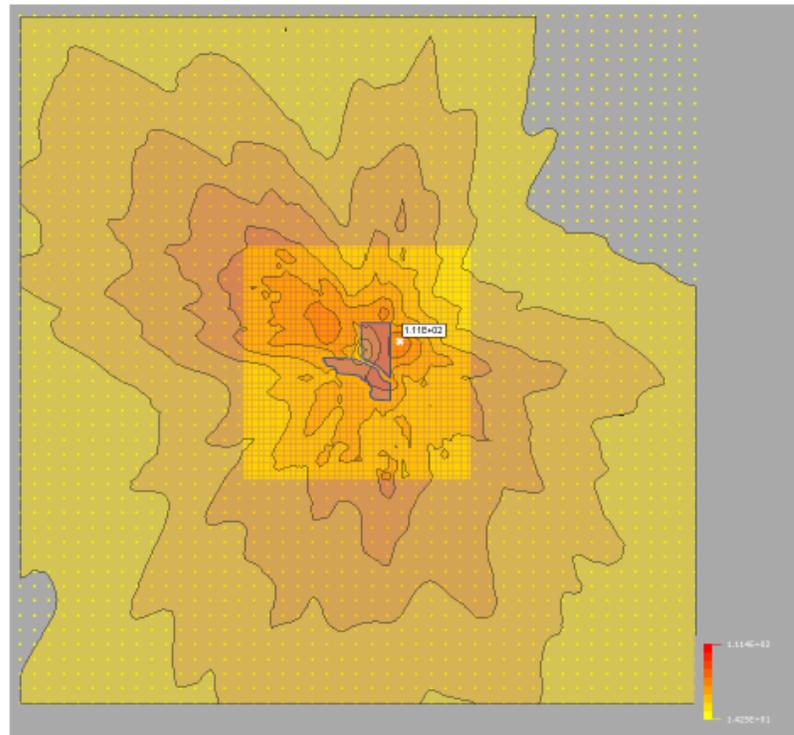
- 25-meter intervals along the fence line
- 100-meter intervals out to a distance of 2.5 km
- 500-meter intervals out to a distance of 10 km

The receptor network contained 8,561 receptors, and the network covered the northeastern portion of Lamar County in Mississippi.

Figure 3 included in the state's recommendation, show the state's chosen area of analysis surrounding the R.D. Morrow Plant to represent the Lamar County Area, as well as receptor grid for the area of analysis.

Consistent with the Modeling TAD, receptors for the purposes of this designation effort were placed only in areas where it would also be feasible to place a monitor to record ambient impacts. The impacts of the area's geography and topography will be discussed later within this document.

Figure 3: Area of Analysis and Receptor Grid for the Lamar County Area of Analysis. Source: 1-Hour SO₂ NAAQS Designation Modeling Report prepared by Trinity Consultants for the South Mississippi Electric Power Association, August 2015.



Modeling Parameter: Source Characterization

The state characterized the sources 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 actual emissions. The state also adequately characterized the sources' building layouts and locations, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. The AERMOD component BPIPPRIME was used to assist in addressing building downwash for the R.D. Morrow Plant.

Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purposes 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 does provide for the flexibility of using allowable emissions in the form of the most recently permitted, (referred to as potential to emit (PTE) or allowable) emissions rate.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information when it is available, and that 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 believes that detailed throughput, operating schedules, and emissions information from the impacted source(s) should be used.

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. Specifically, a facility may have recently adopted a new federally-enforceable emissions limit, been subject to a federally-enforceable consent decree, or implemented other federally enforceable mechanisms and control technologies to limit SO₂ emissions to a level that indicates compliance with the NAAQS. These new limits or conditions may be used in the application of AERMOD. In these cases, the Modeling TAD notes that the existing SO₂ emissions inventories used for permitting or SIP planning demonstrations should contain the necessary emissions information for designations-related modeling. 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 R.D. Morrow Plant and one other emitter of SO₂ within 10 km in the area of analysis. This distance and these facilities were selected because the state believes that this area of analysis adequately represents the area where maximum concentrations of SO₂ are expected and adequately includes the sources which might contribute to those concentrations. SMEPA performed an analysis considering nearby source SO₂ emissions and distance from the R.D. Morrow Plant to determine their potential to cause or contribute to violation of the SO₂ NAAQS. Emissions from the Rain CII Carbon in Lamar County, were included in the modeling analysis due to its close proximity to the R.D. Morrow Plant (approximately 3.85 km) and 2014 actual emissions of 498.63 tpy. Additionally, there are no other sources in Lamar County with SO₂ emissions above 0.10 tpy, according to the 2011 NEI v2 (including the I. H. Bass Jr. Memorial Airport, Hunt Southland Refining Company, Merit Health Wesley Medical Center and Freedom Strip Airport). The Georgia Pacific Leaf River Cellulose plant located in Perry County, MS (two counties east of Lamar County) was not considered in the modeling analysis due to its distance from R.D. Morrow (approximately 33 km) and Lamar county border (28 km) relative to its SO₂ actual emissions. No other sources beyond 10 km were determined by the state to have the potential to cause significant concentration gradient impacts within the area of analysis. The facilities in the area of analysis and their associated annual actual SO₂ emissions between 2012 and 2014 are summarized in Table 2 below.

Table 2: Actual SO₂ Emissions Between 2012 – 2014 from Facilities in the Lamar County, Mississippi Area of Analysis⁴

Facility Name	SO ₂ Emissions (tpy)		
	2012	2013	2014
R.D. Morrow Unit 1 – AA-001	1,500	1,128	938.3
R.D. Morrow Unit 2 – AA-002	2,448	2,043	1,271
Rain CII Carbon	717.22	718.3	498.63
Total Emissions From All Facilities in the State’s Area of Analysis	4,665	3,889	2,708

For R.D. Morrow Units 1 and 2 in the area of analysis, the state used actual emissions from the most recent 3-year data set, i.e., 2012 – 2014. These emissions data were obtained from CEMS data provided by SMEPA. This data was incorporated in the dispersion modeling using the hourly varying emissions options (AERMOD keyword: HOUREMIS) to represent the variability in emissions accurately.

For Rain CII Carbon in the area of analysis, the state used actual emissions from the most recent 3-year data set, i.e., 2012 – 2014. The Rain CII Carbon facility does not have hourly CEMS data available, so these emissions data were calculated from production rates and SO₂ emission factors obtained from stack-testing. The details of the emissions calculations are provided in Appendix C of the modeling report submitted by Mississippi. The calculations show that emissions were derived from annual production rates and annual hours of operation. The EPA requested that Mississippi provide more temporally resolved emissions data, as is recommended in the Modeling TAD. In response to the EPA’s request, Mississippi provided monthly varying emissions rates calculated from monthly production rates and indicated this was the most resolved data available. Mississippi also explained that Rain CII Carbon’s coking process is done in a rotary kiln unit that is operated continuously for long stretches at a time and is not a batch process, which helps support the contention that the emissions from the unit would be relatively consistent. The level of variation in the monthly data is relatively small and indicates that modeling using the emissions from the annual production rates is acceptable. Also due to limited information being available for the Rain CII Carbon facility, potential impacts of building downwash were not included in the modeling of the facility. While this introduces some level of uncertainty in the modeling results near the Rain CII Carbon facility, the potential impacts from building downwash would occur near the Rain CII Carbon facility and the maximum combined impacts from the R.D. Morrow and Rain CII Carbon (148.04 µg/m³) are located near the R.D. Morrow Plant and are significantly below the 1-hour SO₂ NAAQS of 196.5 µg/m³.

⁴ Data provided in the SMEPA modeling report and submitted to the EPA by Mississippi was provided by the state, and is consistent with emissions the state submitted to the Emissions Inventory System (EIS) gateway pursuant to 40 CFR Part 51, Subpart A. The EIS gateway can be accessed via: <http://www3.epa.gov/ttnchie1/eis/gateway/>.

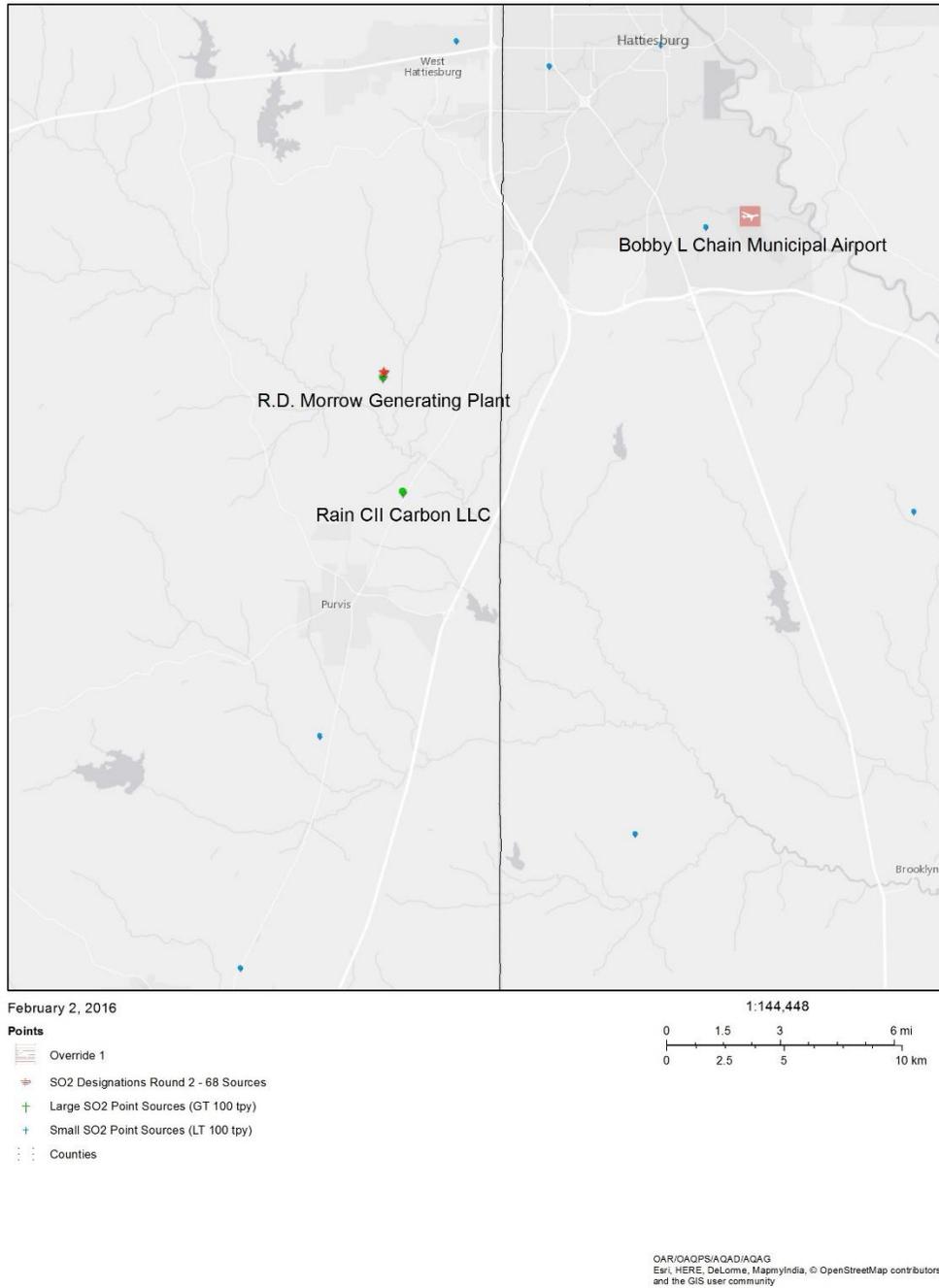
Modeling Parameter: Meteorology and Surface Characteristics

The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data are 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, and military stations.

For the Lamar County Area of analysis, surface meteorology from the U.S. National Climatic Data Center (NCDC) for Bobby L Chain Municipal Airport Station in Hattiesburg, Mississippi, approximately 26 km to the southeast, and coincident upper air observations from the NWS station in Jackson, Mississippi, approximately 140 km to the northwest were selected as best representative of meteorological conditions within the area of analysis.

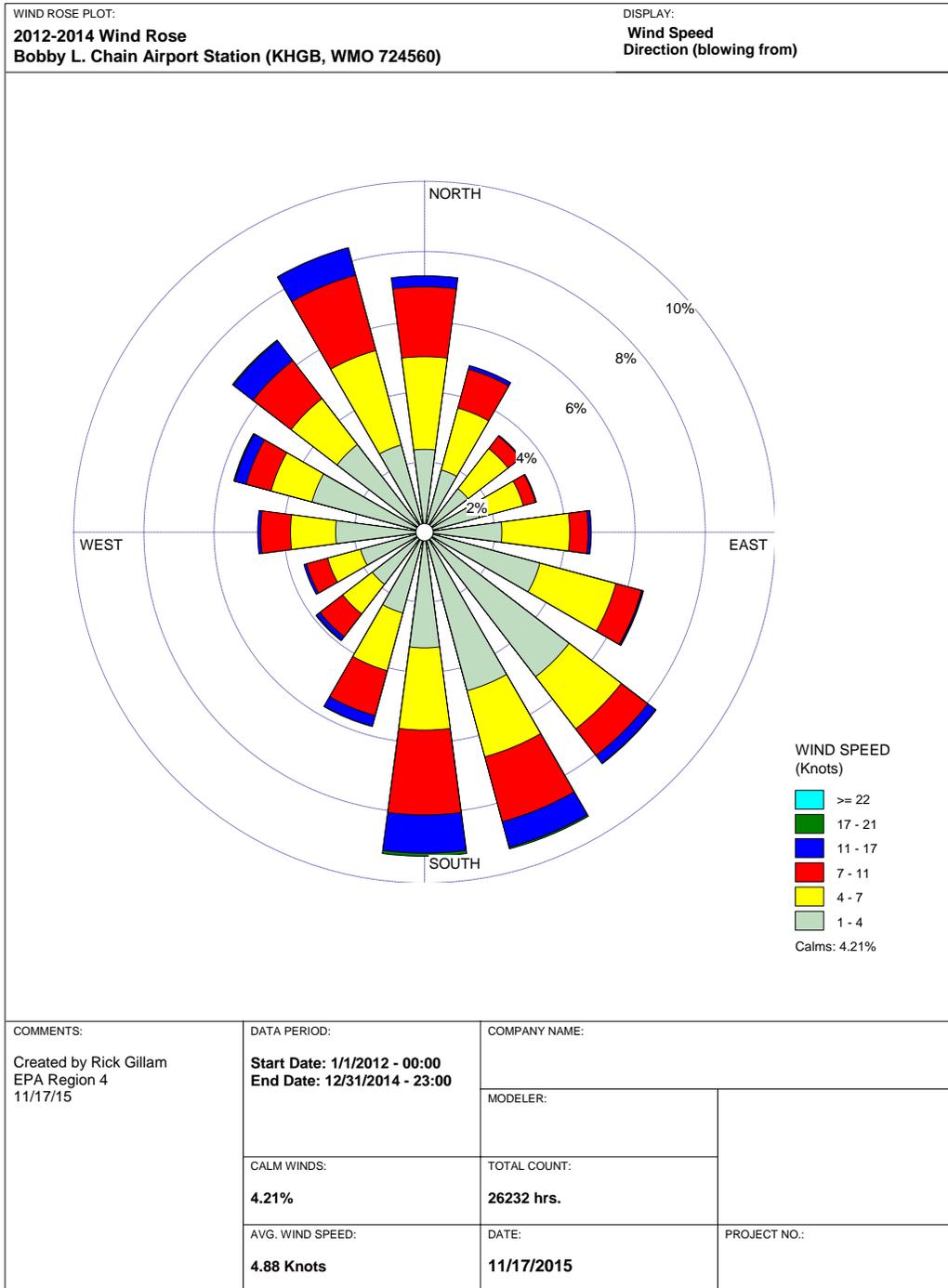
The state used AERSURFACE version 13016 using data from the Bobby L Chain Municipal Airport Station in Hattiesburg, Mississippi (located at [31.269483, -89.256108]) to estimate the surface characteristics of the area of analysis. The state estimated values for 12 spatial sectors out to 1 km at a monthly temporal resolution for average conditions. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as “Zo”). In Figure 4, generated by the EPA, the location of the Bobby L Chain Municipal Airport Station is shown relative to the R.D. Morrow Plant and other sources in the area of analysis.

Figure 4: Lamar County Area of Analysis and the Bobby L Chain Municipal Airport Station in Hattiesburg, Mississippi



The 3-year surface wind rose for Hattiesburg, Mississippi generated by the EPA is depicted in Figure 5. In Figure 5, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The wind rose shows that the winds blow predominately from South-Southeast and North-Northwest directions, mostly at mid-level wind speeds of 4-17 knots.

Figure 5: Hattiesburg, Mississippi Cumulative Annual Wind Rose for Years 2012 – 2014



WRPLOT View - Lakes Environmental Software

Meteorological data from the above surface and upper air stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The Mississippi Department of Environmental Quality provided preprocessed meteorological files for the AERMOD modeling. Integrated surface hourly data was obtained from the National Climatic Data Center (NCDC) in DS3505 format. Radiosonde observations were obtained from the NOAA/ESRL Radiosonde Database. The state followed the methodology and settings presented in the document titled: “MS AERMOD Ready Met Files – Supporting Documentation, July 01, 2014,” as attached in Appendix B of the modeling report provided by Mississippi, 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 one minute duration was provided from the same instrument tower, 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. This approach is consistent with a March 2013 EPA memo titled, “Use of ASOS meteorological data in AERMOD dispersion Modeling.” In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the one minute wind data.

Modeling Parameter: Geography and Terrain

The terrain in the area of analysis is best described as generally flat and without complex terrain. To account for these minor terrain changes, the AERMAP 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 United States Geological Survey National Elevation Database.

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 “first tier” approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th percentile

monitored concentrations by hour of day and season or month. For the Lamar County Area, the state chose the temporally varying approach and used the most recent data (2014) from the Jackson monitoring station. The background concentration for this area of analysis was determined by the state to be 36.65 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), or 13.99 ppb,⁵ and that value was incorporated into the final AERMOD results.

Summary of Modeling Results

The AERMOD modeling parameters for the Lamar County Area of analysis are summarized below in Table 3.

Table 3: AERMOD Modeling Parameters for the Lamar County Area of Analysis

Lamar County Area of Analysis	
AERMOD Version	14134
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	3
Modeled Structures	unavailable
Modeled Fencelines	2
Total receptors	8,561
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
Surface Meteorology Station	Hattiesburg, Mississippi
Upper Air Meteorology Station	Jackson, Mississippi
Methodology for Calculating Background SO ₂ Concentration	Temporal Varying
Calculated Background SO ₂ Concentration	36.65 $\mu\text{g}/\text{m}^3$

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

⁵ The conversion factor for SO₂ (at the standard conditions applied in the ambient SO₂ reference method) is 1 ppb = approximately 2.62 $\mu\text{g}/\text{m}^3$.

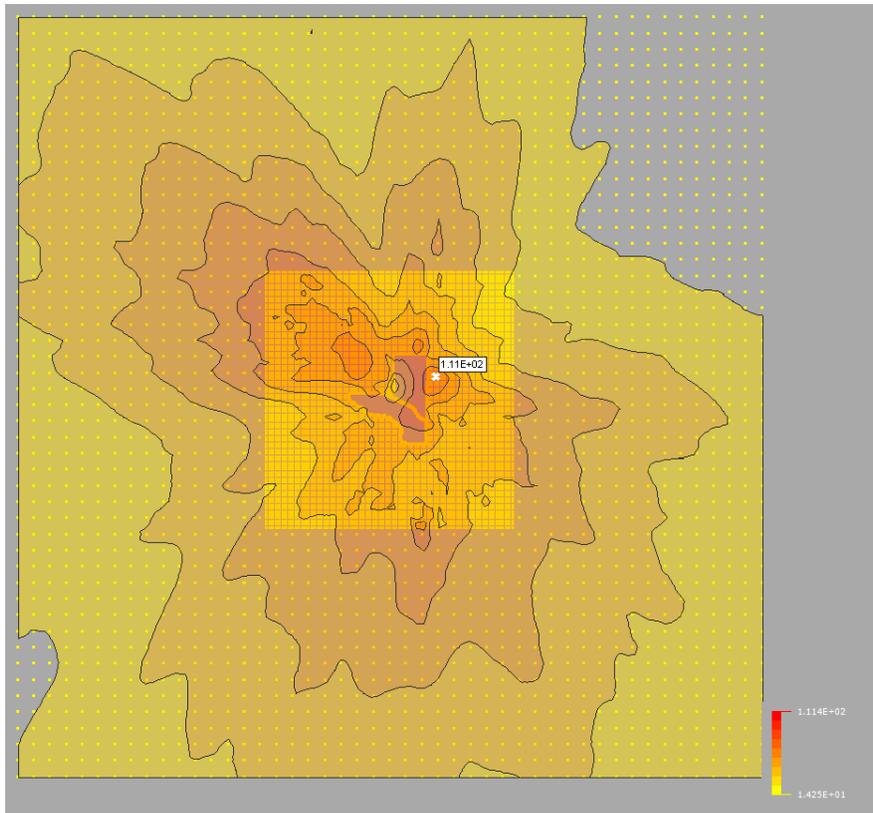
Table 4: Maximum Predicted 99th Percentile 1-Hour SO₂ Concentration in the Lamar County Area of Analysis Based on Actual Emissions

Averaging Period	Data Period	Receptor Location		SO ₂ Concentration (µg/m ³)	
		UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	272900	3456400	148.04	196.5*

*Equivalent to the 2010 SO₂ NAAQS set at 75 ppb

The state’s modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 148.04 µg/m³, or 56.49 ppb. This modeled concentration includes the background concentration of SO₂, and is based on actual emissions from the facilities. Figure 6 below was included as part of the state’s recommendation, and indicates that the predicted value occurred directly east of R.D. Morrow Plant. The state’s receptor grid is also shown in the Figure.

Figure 6: Maximum Predicted 99th Percentile 1-Hour SO₂ Concentrations in the Lamar County Area of Analysis Based on Actual Emissions. Source: 1-Hour SO₂ NAAQS Designation Modeling Report prepared by Trinity Consultants for the South Mississippi Electric Power Association, August 2015.



Jurisdictional Boundaries:

Once the geographic area of analysis associated with the R.D. Morrow Plant, other nearby sources, and background concentration is determined, existing jurisdictional boundaries are considered for the purpose of informing our intended unclassifiable/attainment area, specifically with respect to clearly defined legal boundaries. The state requested the entirety of Lamar County, which includes the area immediately surrounding the R.D. Morrow Plant, be designated as unclassifiable/attainment. This area has no former nonattainment areas for the 2010 SO₂ NAAQS, and as previously discussed, emissions from the R.D. Morrow Plant and Rain CII Carbon were included in the modeling analysis for the Lamar County Area, indicating attainment with the NAAQS. Additionally, there are no other sources in Lamar County with SO₂ emissions above 0.10 tpy, according to the 2011 NEI v2 (these include the I. H. Bass Jr. Memorial Airport, Hunt Southland Refining Company, Merit Health Wesley Medical Center and Freedom Strip Airport).

Furthermore, the only facility within 50 km of the R.D. Morrow Plant with emissions above 40 tpy is Georgia Pacific Leaf River Cellulose, LLC. This facility is located in Perry County (two counties away from Lamar County), and is approximately 33 km east of the R.D. Morrow Plant and 28 km from the Lamar County border. Its 2014 SO₂ emissions were 48.55 tpy, and in conjunction with the distance from Lamar County, the EPA does not believe that emissions from this facility are likely to cause or contribute to a violation of the NAAQS in Lamar County. As a result, the EPA's intended unclassifiable/attainment area, consisting of the entirety of Lamar County, is comprised of clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable/attainment area.

Other Relevant Information

The EPA received no additional information regarding the R.D. Morrow Plant or its surrounding area.

Conclusion

Based on the modeling results provided to the state from SMEPA, including background levels of SO₂ and SO₂ emissions within Lamar County, the state concluded that the entirety of Lamar County should be designated unclassifiable/attainment for the 2010 SO₂ NAAQS.

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Lamar County Area as unclassifiable/attainment for the 2010 SO₂ NAAQS. Specifically, the boundaries are comprised of the entirety of Lamar County.

At this time, our intended designations for Mississippi only applies to this area. Consistent with the conditions in the March 2, 2015 court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in Mississippi by either December 31, 2017, or December 31, 2020.