Technical Support Document:

Chapter 3
Proposed Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for Alabama

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 SO_2 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 SO_2 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 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 SO_2 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[1]. An unclassifiable area is defined by the 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 SO_2 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.

This technical support document (TSD) addresses designations for nearly all remaining undesignated areas in Alabama for the 2010 SO_2 NAAQS. In previous final actions, the EPA has

[1] The term "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.

issued designations for the 2010 SO_2 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 SO_2 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 SO_2 monitoring network meeting the EPA specifications referenced in the EPA's SO_2 Data Requirements Rule (DRR) (80 FR 51052). The EPA is required to designate those remaining undesignated areas by December 31, 2020.

The State of Alabama (through the Alabama Department of Environmental Management (ADEM) submitted its first recommendation regarding designations for the 2010 1-hour SO_2 NAAQS on May 25, 2011. The State submitted updated air quality analysis on January 13, 2017, and later provided supplemental supporting information. 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 Alabama 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 Alabama'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, and could change based on changes to this information (or the availability of new information) that alters EPA's assessment and characterization of air quality.

Table 1. Summary of the EPA's Intended Designations and the Designation Recommendations by Alabama

Area/County	Alabama's Recommended Area Definition	Alabama's Recommended Designation	The EPA's Intended Area Definition	The EPA's Intended Designation
Mobile County	Statewide - Mobile County (Area Surrounding Plant Barry and Akzo Nobel	Attainment	Mobile County	Unclassifiable

[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).

Area/County	Alabama's Recommended Area Definition	Alabama's Recommended Designation	The EPA's Intended Area Definition	The EPA's Intended Designation
Autauga County	Statewide Autauga County (Area Surrounding the IP-Prattville Mill	Attainment	Autauga County	Unclassifiable
Escambia County	Statewide Escambia County (Area Surrounding the Big Escambia Creek Plant)	Attainment	Escambia County	Unclassifiable
Walker County	Statewide Walker County (Area Surrounding Plant Gorgas)	Attainment	Walker County	Unclassifiable
Morgan County	Statewide Morgan County (Area Surrounding Ascend)	Attainment	Morgan County	Unclassifiable
Pike County	Statewide Pike County (Area Surrounding Sanders Lead)	Attainment	Pike County	Unclassifiable
Russell County	Statewide Russell County (Area Surrounding Continental Carbon)	Attainment	Russell County	Unclassifiable
Washington County	Statewide Washington County (Area Surrounding Gaston Plant)	Attainment	Washington County	Unclassifiable
Shelby County (partial)	Statewide Shelby County	Attainment	Shelby County (partial). Includes the portion of Shelby County contained within	Unclassifiable

Area/County	Alabama's Recommended Area Definition	Alabama's Recommended Designation	The EPA's Intended Area Definition	The EPA's Intended Designation
			the 2016 U. S Census Block Groups 011170308001 and 011170308002	
Remaining Undesignated Areas to Be Designated in this Action*	State Wide Rest of the State (all other counties)	Attainment	Rest of the State (except as otherwise noted, all other counties or portions of counties)	Unclassifiable /Attainment

*Except for areas that the EPA intends to designate unclassifiable or the areas that are associated with sources for which Alabama elected to install and began operation of a new SO_2 monitoring network meeting the EPA specifications referenced in the EPA's SO_2 DRR (*see* Table 2), the EPA intends to designate the remaining undesignated counties (or portions of counties) in Alabama as "unclassifiable/attainment." 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 12 of this TSD.

Areas for which Alabama elected to install and began operation of a new, approved SO_2 monitoring network are listed in Table 2. The EPA is required to designate these areas, pursuant to a court-ordered schedule, by December 31, 2020. Table 2 also lists the SO_2 emissions sources around which each new, approved monitoring network has been established.

Table 2 – Undesignated Areas Which the EPA Is Not Addressing in this Round of Designations (and Associated Source or Sources)

Area	Source(s)
Shelby County (portion of)	Lhoist North America of Alabama - Montevallo Plant

Areas that the EPA previously designated unclassifiable in Round 1 (*see* 78 FR 47191) and Round 2 (*see* 81 FR 45039 and 81 FR 89870) are not affected by the designations in Round 3 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 SO_2 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 SO_2 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 SO_2, the EPA released its most recent version of a draft document titled, "SO_2 NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) in August 2016. [4]

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 SO_2 Primary National Ambient Air Quality Standard) and Chapter 2 (Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for States with Sources Not Required to be Characterized).

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 SO_2 monitoring network meeting the EPA specifications referenced in the EPA's" SO_2 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 ten sources in Alabama meeting DRR emissions criteria that states have chosen to be characterized using air dispersion modeling, the areas associated with three sources in Alabama for which air agencies imposed emissions limitations on sources to restrict their SO_2 emissions to less than 2,000 tons per year (tpy), sources that met the DRR requirements by demonstrating shut down of the source (one of which is in Alabama), areas for which the states chose monitoring for the DRR but did not timely meet the approval and operating deadline (one of which is in Alabama), 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. For some counties, multiple portions of the county have modeling information available and the section on the county is divided accordingly. The EPA reviewed the most recent available SO_2 air quality monitoring data in the Air Quality System (AQS) database for all areas for which modeling analyses are available. For areas where air quality monitoring data is available in the county or nearby, a subsection in Section 3 discussing air quality monitoring data relevant to the area is included. Alabama does not have any areas for which air quality monitoring indicates a violation of the SO_2 NAAQS. The remaining to-be-designated counties are then addressed together in Section 12.

[4] https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf. In addition to the TAD on modeling, the EPA also has released a technical assistance document addressing SO_2 monitoring network design, to advise states that have elected to install and begin operation of a new SO_2 monitoring network. See Draft SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, February 2016, https://www.epa.gov/sites/production/files/2016-06/documents/so2monitoringtad.pdf.

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 SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 parts per billion (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, EPA has determined either: (1) does not meet the 2010 SO_2 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 SO_2 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.[5]
5) Designated unclassifiable area – an 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 SO_2 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 SO_2 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.

[5] 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.

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 Mobile County Area

3.1. Introduction

The EPA must designate the Mobile County, Alabama, area by December 31, 2017, because the area has not been previously designated and Alabama has not installed and begun timely operation of a new, approved SO_2 monitoring network meeting the EPA specifications referenced in the EPA's SO_2 DRR for any sources of SO_2 emissions in the vicinity of Mobile County.

There are two DRR sources in Mobile County, Alabama – Akzo Nobel Functional Chemicals – Lemoyne Site (AkzoNobel) and Alabama Power Company James M. Barry Electric Generating Plant (Plant Barry). Due to the close proximity of Plant Barry and AkzoNobel to each other, a combined modeling analysis was conducted for both facilities. The available modeling analysis for the area will be presented in this section of the TSD.

3.2. Air Quality Monitoring Data for the Mobile County Area

This section presents all the available air quality monitoring information for a portion of Mobile County, Alabama, that includes the Akzo Nobel Functional Chemicals and Alabama Power James M. Barry Electric Generating Plant (This portion will often be referred to as "the Mobile County area" within this section 3.2.). Alabama did not include data from the following monitor in its modeling submittal. Instead, the State included monitoring data from Centreville, Alabama, which is over 170 miles away. The following monitor, however, is located in the same county as these two facilities:

- The Chickasaw SO_2 monitor (AQS ID: 01-097-0003) is located at 30.770155, -88.087773 near the intersection of Iroquois Street and Azalea Drive in Mobile County, and is located 23.0 kilometers (km) SSW of AkzoNobel and 27.2 km SSW of Plant Barry. Data collected from this monitor are comparable to the NAAQS, and indicates that the most recent SO_2 levels are below the 1-hr NAAQS. The most recent three years of complete, quality-assured, certified data from this monitor (2014-2016) indicate a 1-hr SO_2 design value of 19 ppb. This monitor was not sited to characterize the maximum 1-hr SO_2 concentrations near either of these facilities or for the Mobile County area. Therefore, Alabama was not able to base its designation recommendation on the monitored data. Alabama chose to provide an air quality modeling analysis to characterize the maximum 1-hr SO_2 concentrations for the Mobile County Area.

In reviewing the available air quality monitoring data in AQS, the EPA determined that other than the data described above, there are no additional relevant data in AQS collected in or near Mobile County that could inform the intended designation action. The most recent SO_2 design values for all areas of the country are available at https://www.epa.gov/air-trends/air-quality-design-values.

3.3. Air Quality Modeling Analysis for the Mobile County Area Addressing Akzo Nobel Functional Chemicals – LeMoyne Site (AkzoNobel) and Alabama Power Company James M. Barry Electric Generating Plant (Plant Barry)

3.3.1. Introduction

This section 3.3 presents all the available air quality modeling information for a portion of Mobile County that includes Plant Barry and Akzo Nobel (This portion of Mobile County will often be referred to as "the Mobile County area" within this section 3.3). This area contains the following SO_2 sources, principally the sources around which Alabama is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy:

- The Plant Barry facility emitted 2,000 tons or more annually. Specifically, Plant Barry emitted 10,691 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Alabama has chosen to characterize it via modeling.

- The Azko Nobel facility emitted 3,857 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Alabama has chosen to characterize it via modeling.

- The SSAB Alabama steel mill (SSAB) is not on the SO_2 DRR Source list, but was included in the modeling analysis because it was identified as a nearby background source based on Alabama's screening methodology. SSAB emitted 423 tons in 2014 and is approximately 7 km south of Plant Barry and 3km south of AkzoNobel.

Because we have available results of air quality modeling in which these sources are modeled together, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

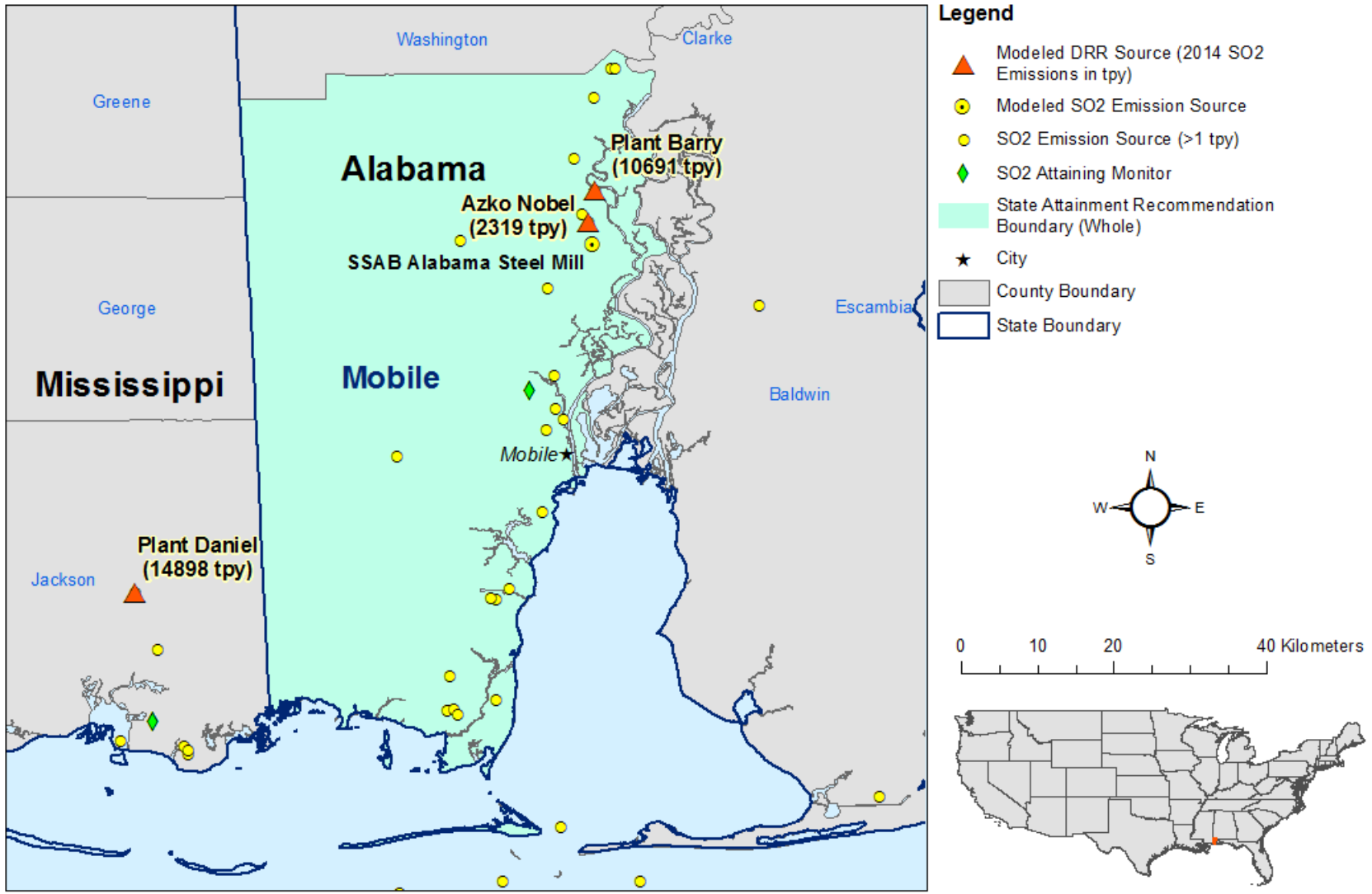
Alabama recommended that the entire state be designated attainment for the SO_2 NAAQS which includes Mobile County and an area surrounding the Plant Barry and AkzoNobel facilities based in part on a combined assessment and characterization of air quality impacts from these facilities and other nearby sources that may have a potential impact in the area where the 2010 SO_2 NAAQS may be violated. 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 is modifying the state's recommendation and intends to designate the

area as unclassifiable. 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 Bucks, Alabama, in Mobile County, approximately 32.2 km north of Mobile, Alabama. The Akzo Nobel site is located north of Axis, Alabama, in Mobile County. Plant Barry is located less than 2 km south of Bucks, Alabama, between Alabama Highway 43 and the Mobile River. See Figure 1. Also included in Figure 1 are other nearby emitters of SO_2[6] including the SSAB Alabama steel mill. Lastly, Figure 1 shows Alabama's attainment designation for the entire state including Mobile County. The EPA's intended unclassifiable designation boundary for the entirety of Mobile County area is not shown in this figure, but is shown in a figure in the section below that summarizes our intended designation.

[6] All other SO_2 emitters of greater than 1 tpy or more (based on information in the 2014 NEI are shown in Figure 1.

Figure 1. Map of the Mobile County Area Addressing Plant Barry and AkzoNobel



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.

For this area, the EPA received and considered one modeling assessment from the State. No assessments from other parties were considered. To avoid confusion in referring to these assessments, the following table lists them, indicates when they were received, provides an identifier for the assessment that is used in the discussion of the assessments that follow, and identifies any distinguishing features of the modeling assessments.

Table 3. Modeling Assessments for the Mobile County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Alabama*	January 2017	Plant Barry and AkzoNobel Modeling Report	State submittal
Alabama	July 2017	ADEM Response to the EPA DRR Comments	Additional information regarding federal enforceability of nearby source

*Alabama forwarded the assessment prepared by AECOM.

3.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 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 16216 with Adjusted U* option using AERMET version 16216. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

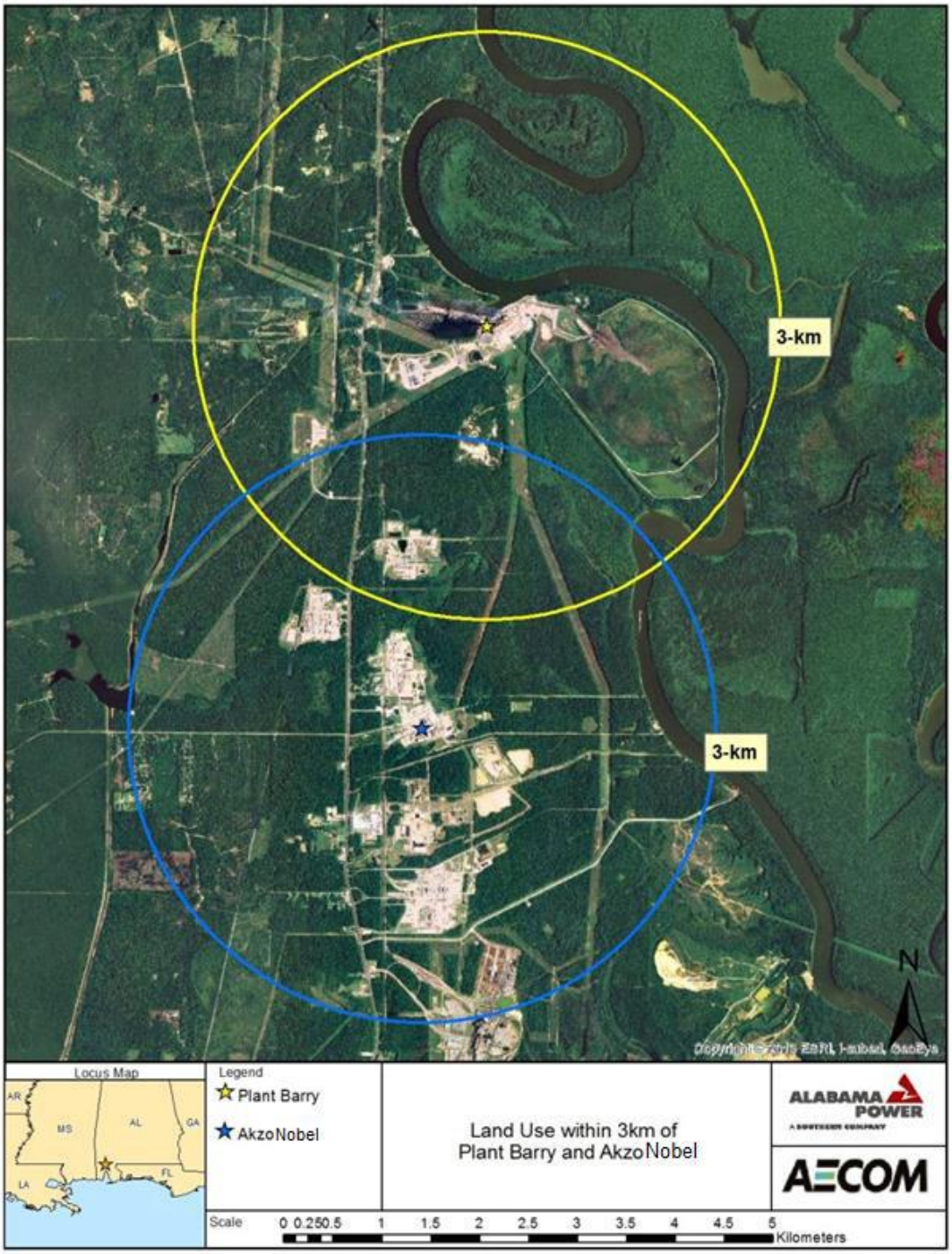
3.3.1.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of

downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 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.

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 km radius around Plant Barry and AkzoNobel as shown in Figure 2 and determined that the area is rural. For the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model with rural dispersion coefficients or rural mode and the EPA concurs with this assessment.

Figure 2. Land-use surrounding the Plant Barry and Akzo Nobel facilities. Source: "Modeling Report Barry Steam Electric Generating Plant & AkzoNobel Functional Chemicals LLC 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017



3.3.1.3. 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 SO_2 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 SO_2 concentrations.

ADEM used the Q/D >20 metric within 20 km to determine which background sources should be included in the modeling analysis for Plant Barry and AkzoNobel.[7] A Q/D value was determined for all sources within 20 km of each facility where Q represents the 2014 actual SO_2 tpy emissions totals, and D represents the distance between the two facilities. If the Q/D metric yielded a value of greater than 20, the facility was retained and additional QA/QC was performed on a unit by unit basis. Using this methodology, ADEM identified one additional nearby background source, SSAB that was included in the modeling analysis for Plant Barry and AkzoNobel. SSAB is located approximately 7 km south of Plant Barry and 3 km south of AkzoNobel, and emitted 423 tons according to the 2014 NEI. Another nearby source, Union Oil of California – Chunchula (Union Oil) located approximately 17 km from Plant Barry and 15 km from AkzoNobel and emitted 795 tons of SO_2 according to the 2014 NEI. Union Oil was not included in the modeling analysis because the facility was undergoing a permit modification resulting in significant reductions in SO_2 emissions. On July 18, 2017, the EPA received additional documentation from ADEM to support not including Union Oil in the modeling analysis. ADEM states that Union Oil is no longer a processing station but rather a storage facility only and, based on revised emissions estimates, were excluded from the Q/D analysis. The EPA has reviewed the additional information from ADEM and agrees that the Union Oil facility does not need to be included in the modeling.

The sources of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. For the Mobile County area, the State has included one other emitter of SO_2 within 20 km of Plant Barry and AkzoNobel in any direction. The State determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. In addition to Plant Barry and AkzoNobel, the other emitter of SO_2 included in the area of analysis is SSAB Alabama steel mill. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis.

The receptor network contains 8,124 receptors. The nested Cartesian receptor grid spacing for the area of analysis chosen by the State is as follows:

[7] The State performed an analysis of emissions data and spatial proximity for all nearby sources to determine which should be included in the modeling demonstration using this screening tool.

- From a central point between Plant Barry and AkzoNobel (UTM northing = 3,429,000 meters [m] and UTM easting = 403,500 m) out to a distance of 3,500 m in the east-west direction and 4,000 m in the north-south direction at 100-m increments.
- From the edge of the 100-m spaced receptors, 250-m spacing was used out an additional 2,000 m;
- From the edge of the 250-m spaced receptors, 500-m spacing was used out an additional 5.000 m;
- From the edge of the 500-m spaced receptors, 1,000-m spacing was used out and additional 5,000 m;
- Receptors were placed at a minimum of 100-m intervals along the modeled potential ambient air boundary for both Plant Barry and AkzoNobel.

Figures 3a and 3b, included in the State's recommendation, show the State's chosen area of analysis surrounding Plant Barry and AkzoNobel as well as the receptor grid for the area of analysis.

Figure 3a. Far-Field Receptor Grid for the Mobile County Area. Source: "Modeling Report Barry Steam Electric Generating Plant & AkzoNobel Functional Chemicals LLC 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017

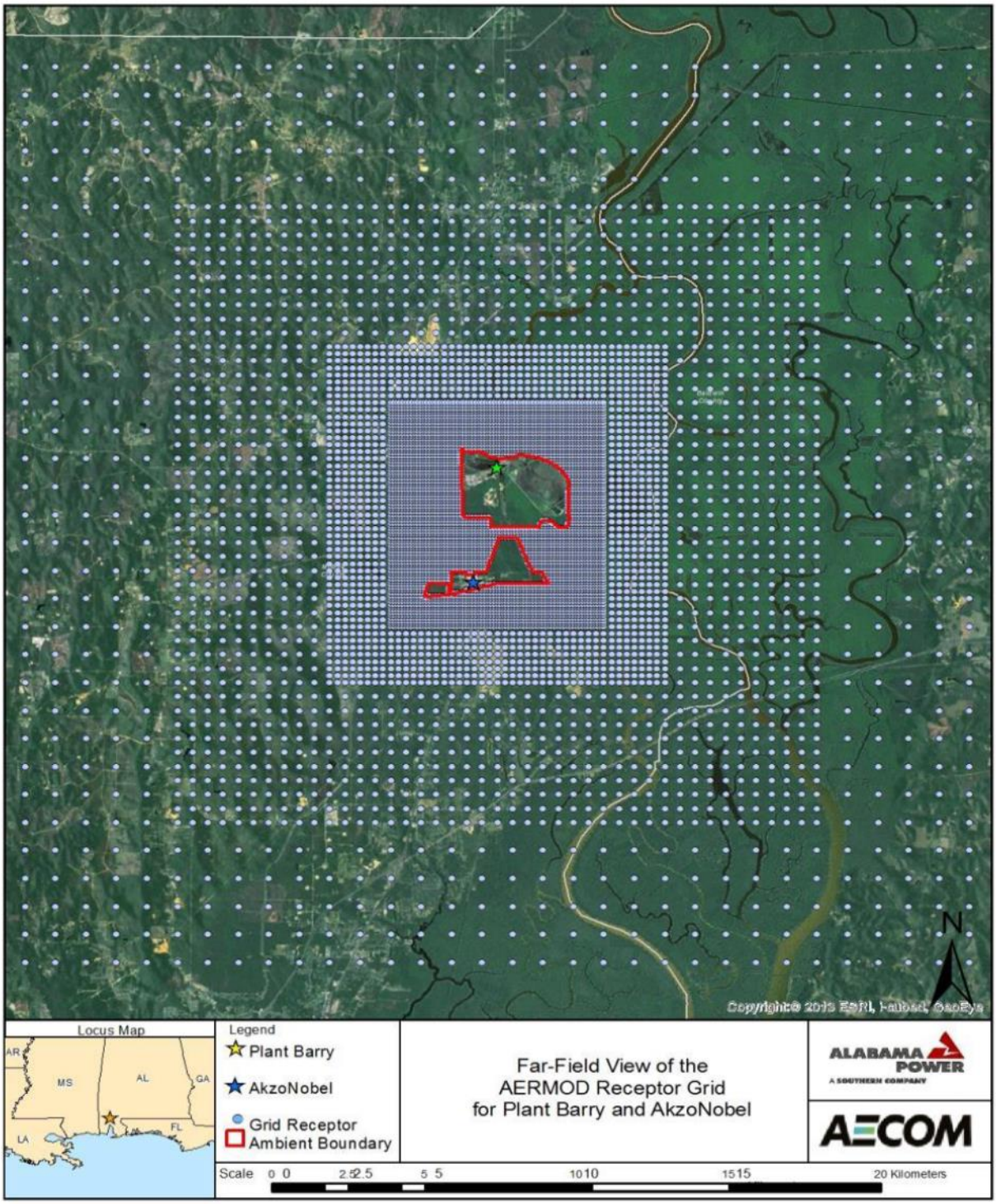
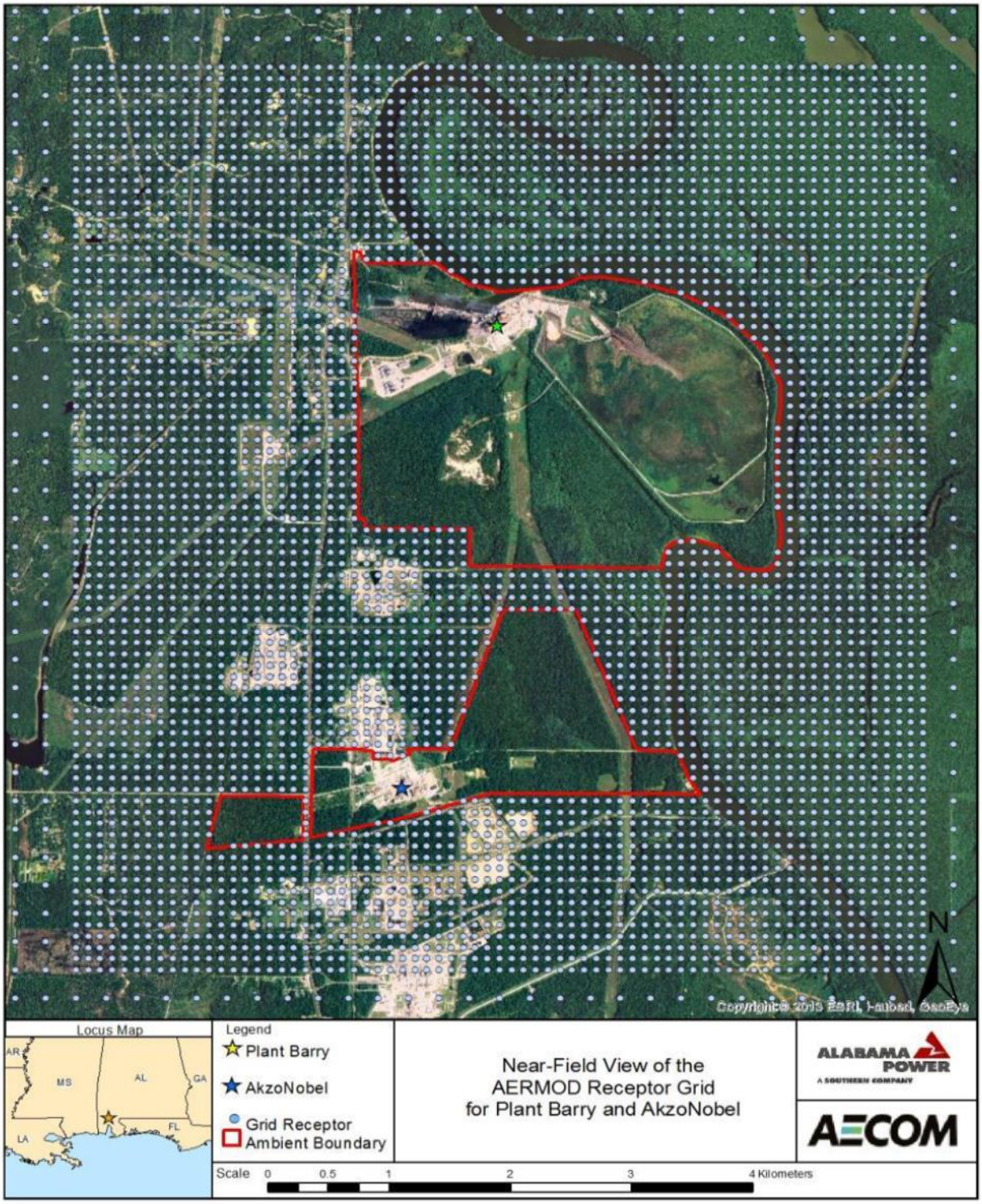


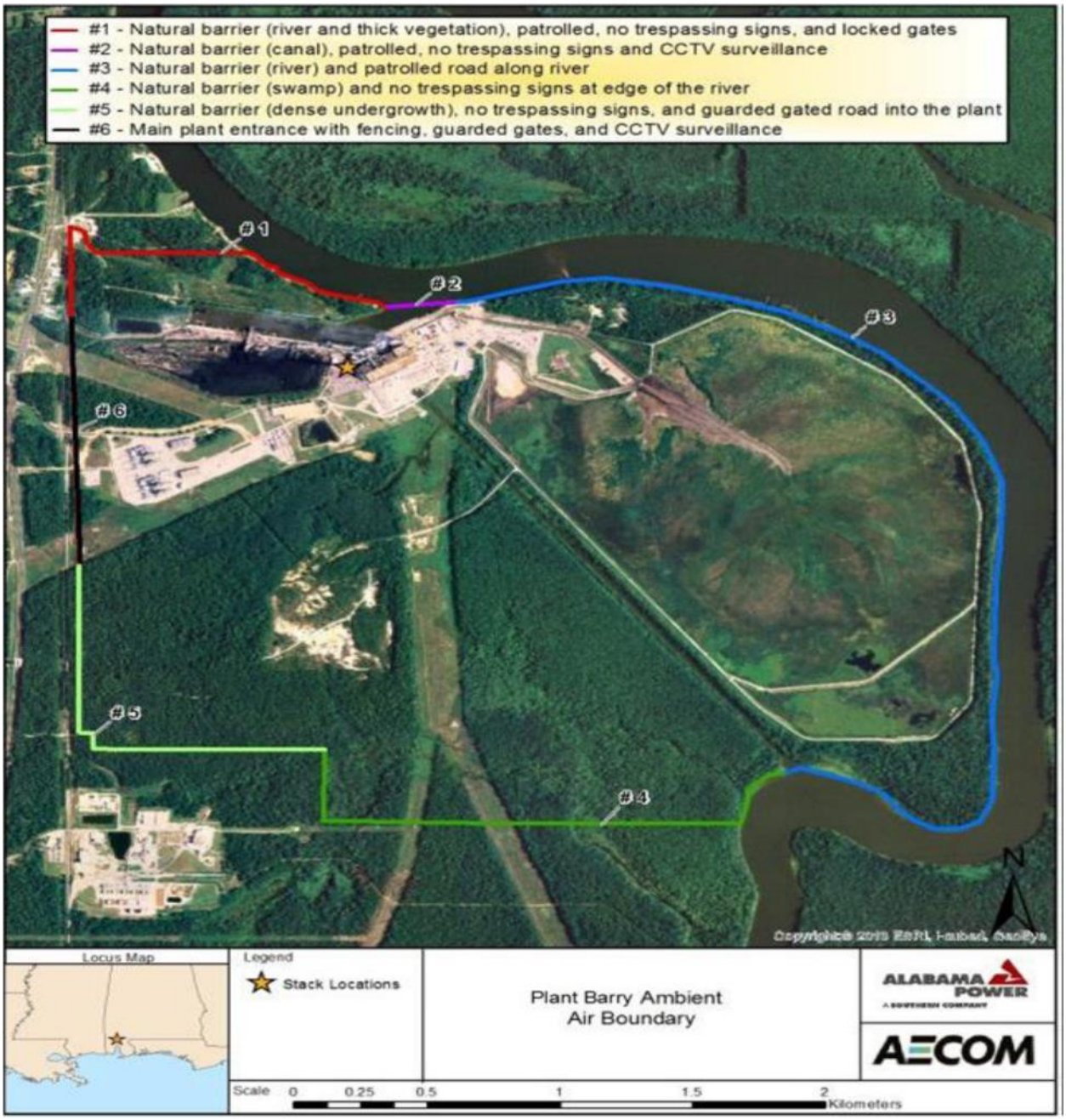
Figure 3b. Near-Field View Receptor Grid for the Mobile County Area. Source: "Modeling Report Barry Steam Electric Generating Plant & AkzoNobel Functional Chemicals LLC 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017



The State placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility, with the exceptions of locations

described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor. The following discussion describes the barriers and procedures in place to prevent public access to the Plant Barry property to justify exclusion of receptors within the fenceline. Figures 3a, 3b and 4 included in the State's recommendation, show the State's asserted ambient air boundaries for Plant Barry and AkzoNobel.

Figure 4. Ambient Air Boundary for Plant Barry. Source: "Modeling Report Barry Steam Electric Generating Plant & AkzoNobel Functional Chemicals LLC 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017



Segment #1 consists in part the Mobile River bank, thick vegetation, "Warning, Private Property, No Trespassing, Violators Will Be Prosecuted" signs, and gates. The gates are locked and only opened when access is needed to that area, which is infrequent. It is patrolled by plant security personnel and also under surveillance by the plant personnel working in the barge canal. Further, there is camera video surveillance in this area. Therefore, this area of Plant Barry encompassed

by segment #1 has signage, is patrolled and controlled and as such, the State asserts it is not ambient air.

Segment #2 consists of the interface between the Mobile River and the man-made barge canal. The canal was constructed by Alabama Power for the dedicated use by Plant Barry. Barge unloading and the constant presence of coal barges along with the pilings and coffer dams located within this narrow canal act as a physical barrier to other vessels. There are "Private Property, No Trespassing" signs on the river bank at the mouth of the canal. The Plant Barry coal generating units are situated at the mouth of the canal and the fuel pile runs along the length of the canal. This area is patrolled and under surveillance – including closed circuit television (CCTV) surveillance of the mouth of the canal and at the barge unloading area, and as such, the State asserts the area inside the barge canal is not ambient air.

Segment #3 consists of the Mobile River bank along the existing ash pond and levee. The steep banks of the river and levee are barriers that restrict public access. In addition, a road runs parallel to the river along this segment to the southeast discharge canal and then circles back to the main generating plant building. This road is patrolled by plant security personnel. Therefore, public access to plant areas inside this segment is controlled and patrolled and as such, the State asserts this area is not ambient air.

Segment #4 delineates swamp land that is impassable due to the terrain and vegetation. The area has no roads and is not navigable or accessible to vehicles. Further, there is "No Trespassing" signage at the river, and steep natural terrain barriers in the area of the transmission line rights-of-way. Therefore, the natural barriers and the absence of roads are sufficient to restrict public access and consider this segment controlled, and as such, the State asserts the area inside Segment #4 is not ambient air.

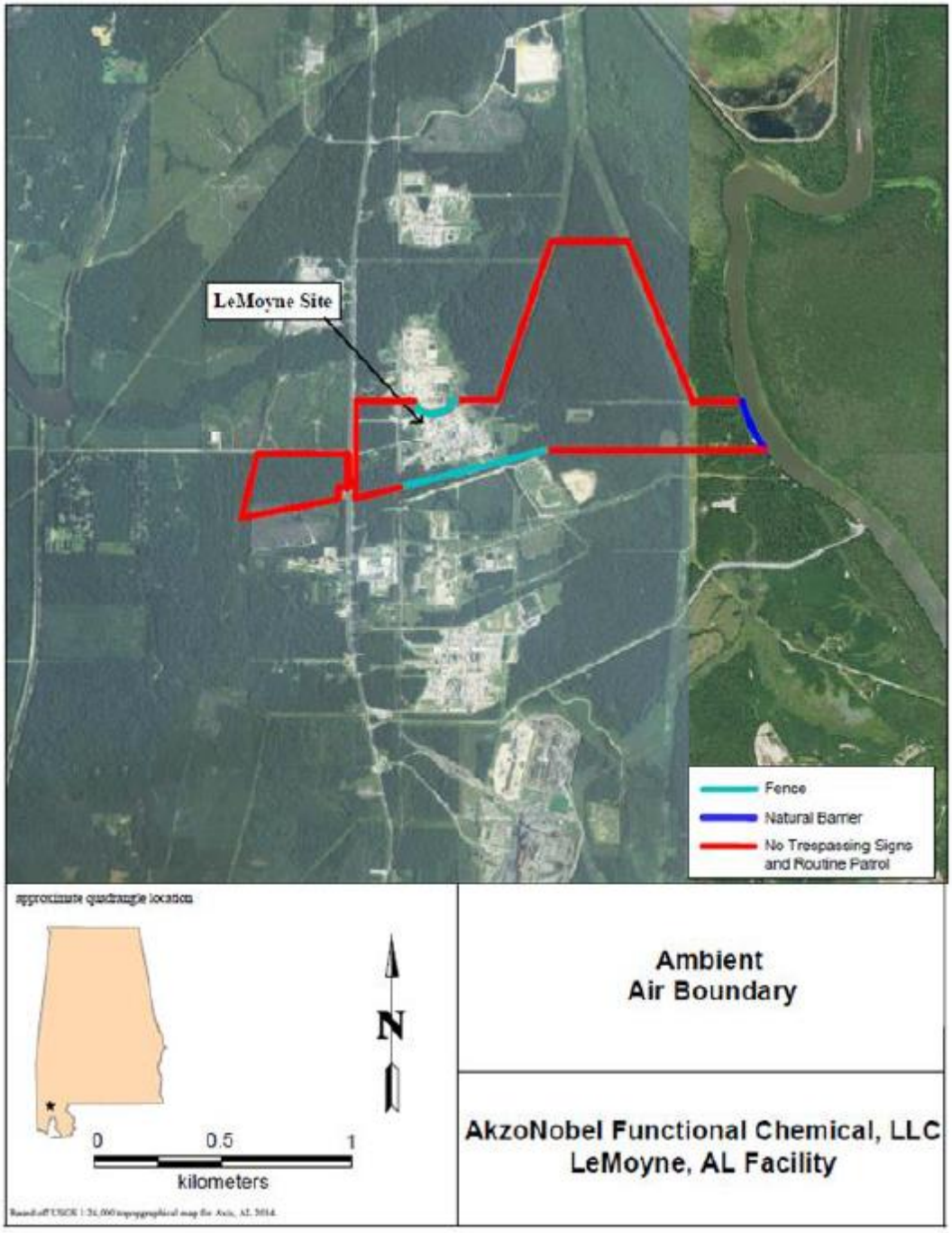
Segment #5 outlines an area of thick vegetation along the boundary that inhibits access. Further, there is a steep bank along the north-south section of this segment. The lone access road that can access plant area in this segment is gated and guarded. Further, there are "Warning, Private Property, No Trespassing, Violators Will Be Prosecuted" signs. Therefore, this segment should be considered patrolled and controlled, and as such, the State asserts the area inside segment #5 is not ambient air.

Segment #6 contains the main plant entrance and contractor gates. All visitors must pass through plant security. Further, areas of this segment have some fencing and are under surveillance by workers located at Barry Units 6 and 7. Further, there is CCTV surveillance in this area. These factors are sufficient to consider this area of Plant Barry to be patrolled and controlled. As such, the State asserts the plant area bounded by segment #6 is not ambient air.

The State also did not place receptors in other locations that it did not consider as ambient air relative to each modeled facility. For AkzoNobel, Figure 5 below shows the ambient air boundary. Public access to the AkzoNobel property is limited by natural barriers, fences, and gates. The banks of the Mobile River to the east of AkzoNobel provide a natural barrier to entry along the roughly 500 m where the AkzoNobel property fronts the river. The banks of the river are steep, and the vegetation along the bank is thick, serving to restrict access to the property between the patrolled roads that bound the property to the north and south of the river bank

segment. Where there is not a fence or natural barrier, AkzoNobel limits public access by patrolling the property routinely and through the use of “Private Property, No Trespassing” signs. AkzoNobel site security is manned 24/7 and patrols the entirety of the property. Therefore, the State asserts these measures are sufficient to consider each property boundary segment as patrolled and controlled. As such, AkzoNobel does not consider this area ambient air and the State did not include receptors in these locations. AkzoNobel has detailed the areas of their property line that are limited by a natural barrier, fenced, gated, or contain no trespassing signs in the figure below.

Figure 5. Ambient Air Boundary for AkzoNobel. Source: "Modeling Report Barry Steam Electric Generating Plant & AkzoNobel Functional Chemicals LLC 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017



Plant Barry's property is in ambient air with respect to AkzoNobel, and vice versa. As shown in Figure 4b above, the two facilities are in very close proximity to each other and the maximum predicted SO_2 concentration using the current receptor grid occurred along the southern edge of AkzoNobel's property boundary. Therefore, the Plant Barry and Akzonobel's receptor grid

creates uncertainty for ambient air for both plants. The final receptor grid, therefore, may not adequately characterize SO_2 impacts from the facilities combined or individually.

3.3.1.4. Modeling Parameter: Source Characterization

ADEM evaluated nearby sources within a 20 km area surrounding the eight facilities who elected to follow the modeling pathway for compliance under the SO_2 1-hour Data Requirements Rule. ADEM believes that this is a reasonable starting point for evaluation of sources and does not preclude sources from choosing alternate screening criteria that include/exclude sources. The State performed an analysis of emissions data and spatial proximity for all nearby sources to determine which should be included in the modeling demonstration using the Q/D screening tool. A spreadsheet provided each DRR subject facility with a listing of the facilities that met the 2014 actual emissions (in tpy) divided by the distance of greater than 20 within a maximum distance of 20 km. This did include small sources at very close distances. Alabama did not define what level of emissions represents small sources. This information is documented in the final submittals submitted to the EPA in January 2017. Below is the metric ADEM used to determine which nearby sources should be further evaluated for inclusion in the modeling for Plant Barry and AkzoNobel.

ADEM Metric: Q/D > 20 within 20 km

First, ADEM identified all nearby sources within 20 km of each DRR facility. Next, a Q/D value was developed for each facility identified based on the 20 km distance criteria, where Q represents the 2014 actual SO_2 tpy emissions total, and D represents the distance between the two facilities. Finally, if the Q/D metric yielded a value greater than 20, the facility was retained and additional QA/QC was performed on a unit by unit basis.

Using the above methodology, ADEM identified one additional nearby background source, SSAB, that was included in the 1-hour SO_2 DRR modeling analysis for Plant Barry and AkzoNobel. SSAB is located approximately 7 km south of Plant Barry and 3 km south of AkzoNobel. Another nearby source, Union Oil of California - Chunchula located approximately 17 km from Plant Barry and 15 km from AkzoNobel, was not included in the modeling analysis. According to ADEM, Union Oil was not included in the modeling analysis for Plant Barry and AkzoNobel due to a permit modification resulting in significant reductions in SO_2 emissions. On July 18, 2017, the EPA received additional documentation from ADEM to support not including Union Oil in the modeling analysis. ADEM states that Union Oil is no longer a processing station and that it is a storage facility only and based on revised emissions estimates was excluded from the Q/D analysis. The EPA has reviewed the additional information from ADEM and agrees that the Union Oil facility does not need to be included in the modeling.

The State characterized these source(s) 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 for some sources and followed the good engineering practices (GEP) stack height regulations for sources modeled with allowable 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 BPIPPRM was used to assist in addressing building downwash.

3.3.1.5. 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 potential to emit [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 SO_2 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 SO_2 emissions inventories used for permitting or state implementation plan (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 Plant Barry and AkzoNobel and one other emitter of SO_2 within 20 km in the area of analysis. For this area of analysis, the State has opted to use a hybrid approach, where emissions from certain facilities are expressed as actual emissions, and those from other facilities are expressed as PTE rates. The facilities in the State's modeling analysis and their associated actual or PTE rates are summarized below.

For Plant Barry and AkzoNobel, the State provided annual actual SO_2 emissions between 2013 and 2015. This information is summarized in Table 4 below. A description of how the State obtained hourly emission rates is discussed below.

Table 4. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Area of Analysis for the Mobile County Area

Facility Name	SO_2 Emissions (tpy)		
	2013	2014	2015
Plant Barry (Units 4 - 7B)	10, 363	7,674	8,174
AzkoNobel	1,394	2,320	1,470
Total Emissions from All Facilities in the Area of Analysis Modeled Based on Actual Emissions	14,842	13,011	10,158

For Plant Barry, Alabama's Modeling Report indicates that the actual hourly emissions data were obtained from combination of CEMs data and emission factors using hourly monitored fuel usage. Units 4 and 5 used CEMs while units 6A, 6B, 7A and 7B were modeled with estimated hourly emission rates using heat input from monitored fuel flow and emission factors. The EPA compared the 2013-2015 actual emissions data to the EPA's CAMD emissions database. The emissions data for Plant Barry's Units 4 and 5 correspond to the CAMD data. For Units 6A, 6B, 7A and 7B, the actual emissions used in the modeling are higher than the emissions contained in CAMD, which will provide a conservative over-estimate in the modeling. However, in the CAMD reports, there are three emissions units (Units 1, 2 & 3) that have combined SO_2 emissions of 3,092 tons in 2013, 3,021 tons in 2014 and 530 tons in 2015, which were not included in the modeling or mentioned in the Modeling Protocol or Modeling Report provided by Alabama. The CAMD emissions from 2015 through preliminary 2017 indicate that these units have either shut down or converted to natural gas. Beginning in 2016, Units 1 and 2 list natural gas as their primary fuel source (previously coal) and subsequently their emissions drop to about 1 ton each in 2016 and are currently at less than 1 ton with 2017 preliminary data. Unit 3 (also previously a coal boiler) drops off entirely from the facility emission data starting in 2016, indicating this unit likely shut down. In order for the emissions from Units 1, 2 & 3 to be excluded from the modeling analysis, documentation is needed to demonstrate that the emissions reductions reflected in the CAMD are both permanent and federally-enforceable.

For AkzoNobel, the hourly emissions data for Unit CS-1 were obtained from a distributed control system beginning in November 2013. Emissions before November 2013 were calculated using monthly CS2 and NaSH production was converted to hourly production. Specifically, monthly CS2 and NaSH production rates (tons CS2 and NaSH per month) were converted to daily production rates by dividing by the number of calendar days in the month. Daily production was then converted to hourly production by dividing by 24 hours per day. The CS2 plant was assumed to operate 24 hours per day. Finally, using hourly production data, AkzoNobel apportioned annual reported emissions for CS-1 to each hour.

For SSAB Alabama steel mill, the State provided PTE values. This information is summarized in Table 5. A description of how the State obtained hourly emission rates is discussed below.

Table 5. SO_2 Emissions based on PTE from Facilities in the Area of Analysis for the Mobile County Area

Facility Name	SO_2 Emissions (tpy, based on PTE)
SSAB	523
AzkoNobel	233
Total Emissions from Facilities in the Area of Analysis Modeled Based on PTE	756

The PTE in tpy for SSAB Alabama steel mill was determined by the State based on ADEM providing emission rate and stack parameter data for SSAB. The State determined hourly emissions corresponding to this annual emission value by an unknown method. Emissions were assumed to be the same in each modeled year. Finally, due to the modification of AzkoNobel's AC-1 unit, AC-1 modeled emission rates were based on the future PTE rates for each hour modeled in the air dispersion modeling analysis. A PTE emissions factor of 1.5 lb of SO_2 emitted/ton H_2SO_4 produced was applied to the maximum production rate of AC-1 (35.42 tons of H_2SO_4/hour) for a total modeled PTE rate of 53.13 lb/hr. AkzoNobel's CS-1 and AC-1 stacks are both less than GEP formula height, and therefore, were modeled at their actual physical height in accordance with the GEP stack height regulations.

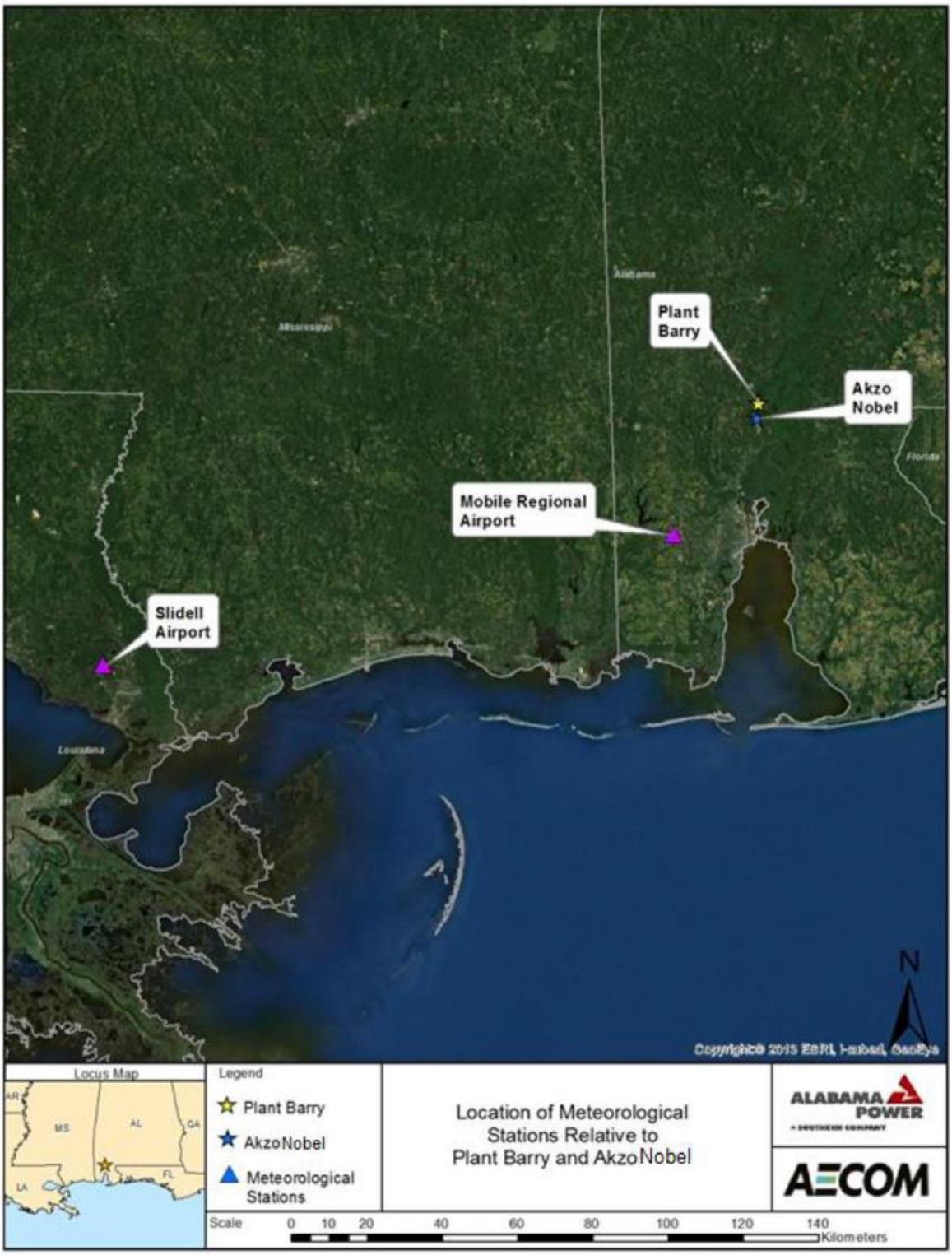
3.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

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 Mobile County area, the State selected the surface meteorology from the NWS station in Mobile, AL, located at 30.61 N, 88.06 W and coincident upper air observations from a different NWS station, located in Slidell, LA, located at 30.34 N, 89.82 Was best representative of meteorological conditions within the area of analysis. The State did not provide the method used 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 "zo". Therefore, we do not know the values for spatial sectors and temporal resolution for any conditions. Furthermore, ADEM did not document how meteorological data was processed in AERMOD.

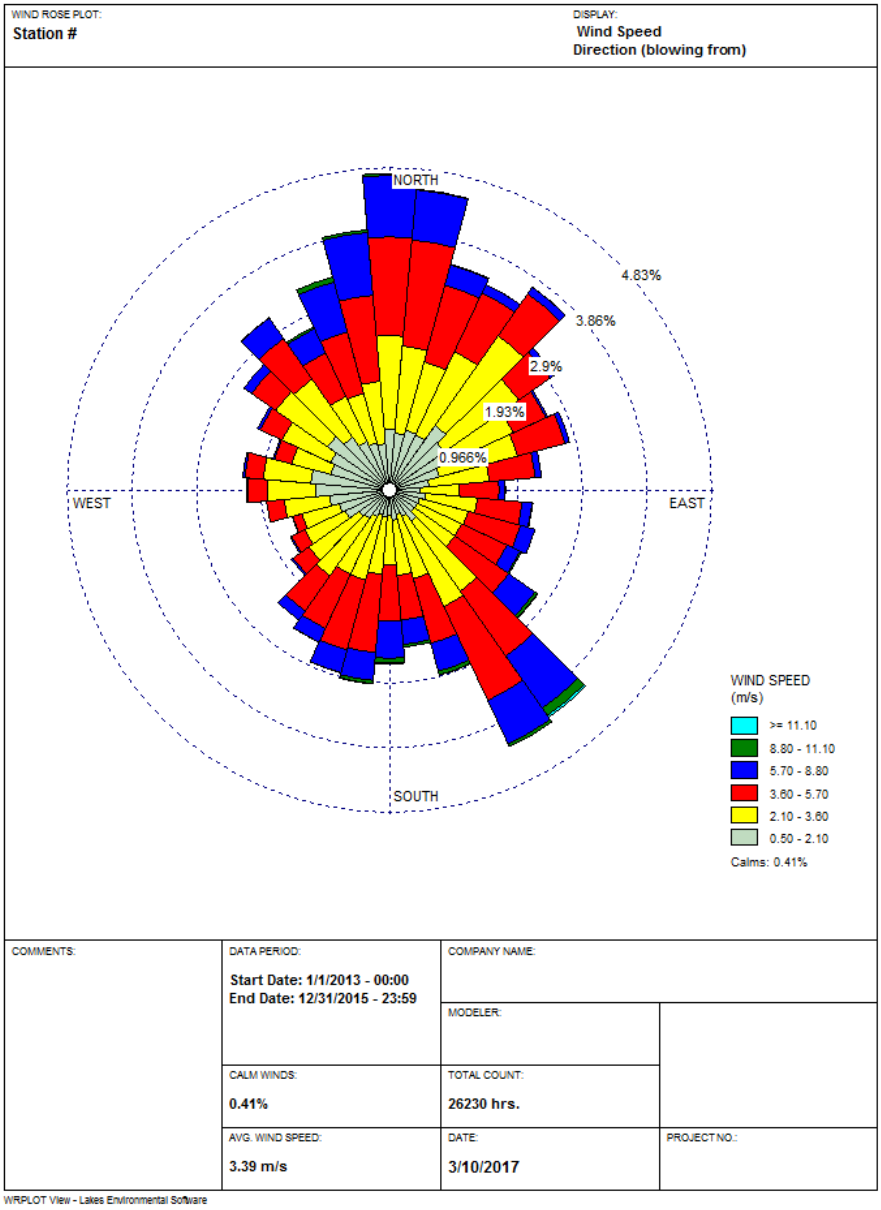
In the figure below, included in the State's recommendation, the locations of these NWS stations are shown relative to the area of analysis.

Figure 6. Area of Analysis and the NWS stations in the Mobile County Area. Source: "Modeling Report Barry Steam Electric Generating Plant & AkzoNobel Functional Chemicals LLC 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017.



The EPA generated a wind rose for the Mobile, AL, NWS station for the 2013-15 period. In Figure 7, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Analysis of the NWS data indicate winds predominately blow from the north and southeast directions.

Figure 7. Mobile, Alabama NWS 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 processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. Since the AERMET files were not provided, it is unknown whether the State followed the methodology and settings presented in the EPA Modeling TAD in the processing of the raw meteorological data into an AERMOD-ready format. Also, the EPA is unsure if the State used AERSURFACE to best represent surface characteristics. The modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, ADEM did not provide details regarding how these files were prepared and no indication in the modeling report that AERMINUTE was used to process 1-minute ASOS wind data. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

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

The terrain in the area of analysis is best described as simple terrain. To account for these 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 (USGS) National Elevation Database (NED). The EPA concurs with the processing of receptor elevation data used in this analysis.

3.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 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 elected to use a "tier 2" approach. Data was obtained for 2013-2015 from the Southeastern Aerosol Research and Characterization (SEARCH) network. The data are from the Centreville monitor located in Centreville, AL. The background concentrations for this area of analysis were determined by the State to vary from 2.619 micrograms per cubic meter ($\mu g/m^3$), equivalent to 1.0 ppb when expressed in three significant figures,[8] to 23.3 $\mu g/m^3$ (8.9 ppb), with an average value of 9.14 $\mu g/m^3$ (3.5 ppb).

The EPA reviewed the Centreville SEARCH monitoring information and determined that the monitor is not a regulatory monitor that meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for prevention of significant deterioration (PSD) monitors. Therefore, the data is not acceptable for use as background concentrations in this modeling demonstration.

[8] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.

The EPA communicated this outstanding issue to Alabama in March 2017[9] and suggested the following options for addressing the issue: 1) demonstrate that the Centreville monitor meets the QA/QC criteria and other requirements in Part 58, Appendix B for PSD monitors, 2) choose a different background monitor that is representative of SO_2 background concentrations in the area around Plant Barry and AkzoNobel and either use the design value from that monitor or use a more refined approach of seasonal hourly varying background values from that monitor, or 3) demonstrate that the Centreville SEARCH background value used in the modeling is more conservative (larger) than an alternative background site that would be representative of background in the area of Plant Barry and AkzoNobel. For this modeling demonstration, if option 3 is chosen, Alabama would need to demonstrate that the Centreville data is higher than the alternate site's data for each hour (96 total values, 4 seasons x 24 hours in each day = 96 values).

Alabama submitted additional information to the EPA[10] to address the issues discussed above. Alabama's supplemental information proposed to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky. For eight of the Alabama DRR sources (including Plant Barry and AkzoNobel), Alabama's analysis compared the Centreville SEARCH data with the Mammoth Cave data, hour-by-hour, for each of the 96 hours in the "season-by-hour-of-day" option used in the AERMOD modeling. Alabama then found the hour where the Mammoth Cave data is greater than the Centreville data by the greatest amount (which they found to be 3.68 ppb = 9.71 $\mu g/m^3$).[11] Alabama added this "adjustment factor" of 9.71 $\mu g/m^3$ to the final modeling results for each of the SO_2 DRR Sources (including Plant Barry and AkzoNobel).

Alabama's supplemental information justifies use of the Mammoth Cave data by stating that it is "the closest background monitor with sufficient data capture that does not show interference from industrial sources." The EPA does not believe that this is an adequate justification for determining whether Mammoth Cave is a representative background monitor pursuant to the criteria provided in Section 8.2.2(c) of the *Guideline on Air Quality Models* contained in 40 CFR Part 51, Appendix W. The criteria in Appendix W state that an appropriate regional site is "*one that is located away from the area of interest but is impacted by similar natural and distant man-made sources."*

The EPA performed an evaluation to determine if the Mammoth Cave site is an appropriate regional background site for the Plant Barry and AkzoNobel modeling. The Mammoth Cave monitor is located in a rural area versus the highly populated urban area near Plant Barry and AkzoNobel in the northeast portion of Mobile County. There are additional SO_2 emissions sources in this area that were not explicitly included in the Plant Barry and AkzoNobel modeling

[9] Email from Beverly Banister, Region 4 Air, Pesticides and Toxics Management (APTMD), Air Director to Ron Gore, ADEM Air Director on March 21, 2017.

[10] Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017.

[11] Note that Alabama used a conversion factor of 2.639 to convert the SO_2 background concentration in ppb to ug/m^3. This differs from the EPA's recommended conversion factor of 2.619. Alabama's conversion factor results in a conservatively higher concentration in ug/m^3, so is therefore acceptable.

as “nearby background sources.” The 2014 National Emissions Inventory (NEI) listed 17,168 tpy of SO_2 emissions in Mobile County. The actual 2014 emissions from the modeled sources are approximately 13,433 tpy, so there are over 3,500 tpy of emissions in Mobile County alone not accounted for in the modeling. In the area around the Mammoth Cave monitor, there are no sources emitting more than 5 tpy of SO_2 within 50 km of the monitor and the total SO_2 emissions in the 3 counties surrounding the monitor are less than 70 tpy, according to the emissions data in the 2014 NEI. The closest major source of SO_2 emissions to the Mammoth Cave monitor is the TVA Paradise power plant (19,654 tpy in 2014) located approximately 75 km from the monitor. The EPA has determined that the SO_2 emissions sources located near the Mammoth Cave monitor are not similar to the sources in the area near Plant Barry and AkzoNobel. As a result, the Mammoth Cave monitor is not an acceptable regional site to provide background concentrations for this modeling analysis, and Alabama’s “adjustment factor” procedure is not acceptable for the Plant Barry and AkzoNobel modeling.

3.3.1.9. Summary of Modeling Inputs and Results

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

Table 6. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Mobile County Area

Input Parameter	Value
AERMOD Version	16216 with Adjusted U*
Dispersion Characteristics	Rural
Modeled Sources	11
Modeled Stacks	11
Modeled Structures	50
Modeled Fencelines	2
Total receptors	8,124
Emissions Type	Mixed/Hybrid
Emissions Years	2013-2015
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	Mobile, AL
NWS Station Upper Air Meteorology	Slidell, LA
NWS Station for Calculating Surface Characteristics	Unknown
Methodology for Calculating Background SO_2 Concentration	Tier 2 approach using SEARCH site at Centreville, AL (2013-2015)
Calculated Background SO_2 Concentration	2.619 – 23.31 $\mu g/m^3$ + Alabama's "adjustment factor" of 9.71 $\mu g/m^3$

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

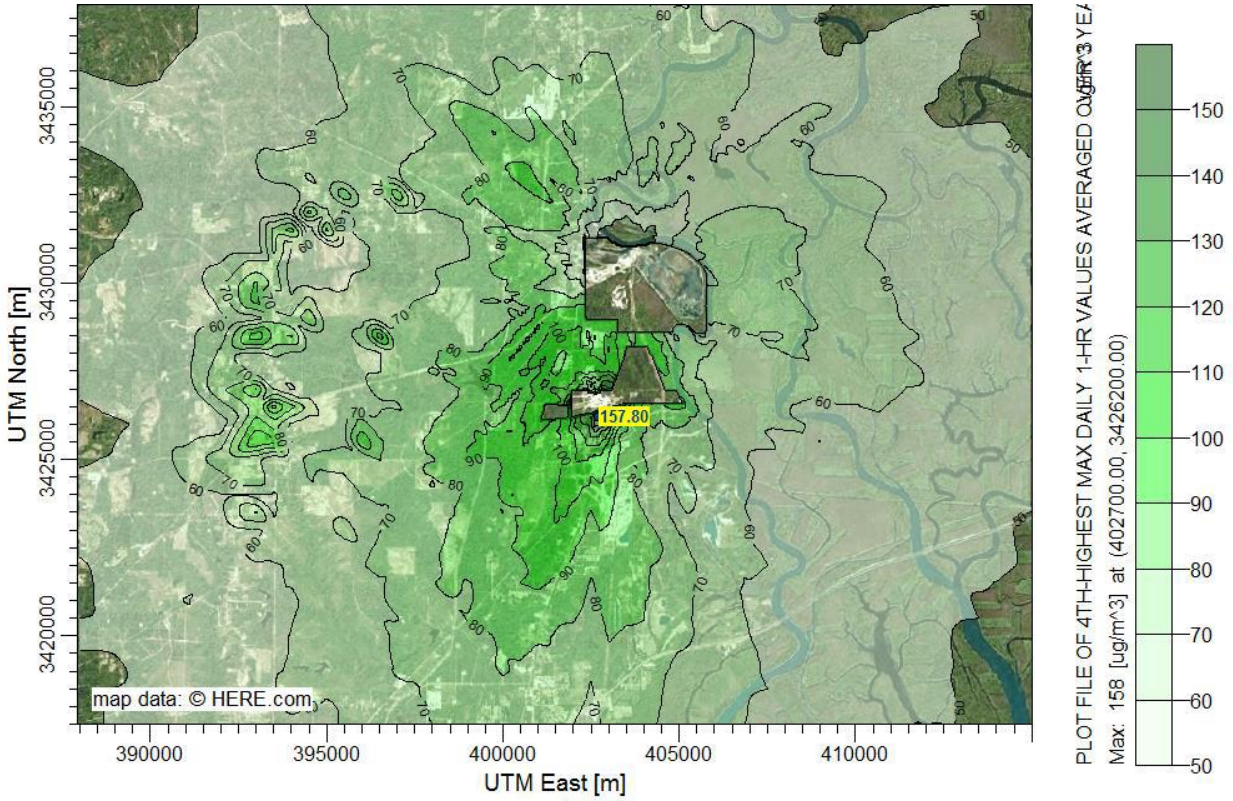
Table 7. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Mobile County Area

Averaging Period	Data Period	Receptor Location UTM zone 16		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM	UTM	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2013-2015	402700	3426200	167.51	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 157.8 $\mu g/m^3$, equivalent to 60.25 ppb. This modeled concentration included the background concentration of SO_2, and is based on a mixture of actual and PTE emissions from the facility/facilities. As discussed in Section 3.3.1.8, in response to the EPA's outstanding questions regarding the background concentrations used in their modeling analysis, Alabama added an "adjustment factor" of 3.68 ppb (9.71 $\mu g/m^3$) to the final modeling result presented in their modeling report (157.8 + 9.71 = 167.51 $\mu g/m^3$). The EPA has determined that Alabama's "adjustment factor" procedure is not acceptable for the Plant Barry and Akzo Nobel Plant modeling. Figure 8 below, generated by the State indicates that the predicted value occurred south of Plant Barry. The State's receptor grid is also shown in the figure. The modeling submitted by the State does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

Figure 8. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Mobile County Area. Source: "Modeling Report Barry Steam Electric Generating Plant & AkzoNobel Functional Chemicals LLC 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017



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

The EPA assessment of the 1-hour SO_2 DRR AERMOD modeling for Plant Barry and AkzoNobel finds that the modeling does not conclusively demonstrate that the area including these two DRR sources meets the 1-hour SO_2 NAAQS.

The EPA notes that ADEM did not provide documentation to support the AERMET modeling used to generate the surface and upper air meteorology files. Additionally, the State did not provide details to determine if AERSURFACE was used to best represent surface characteristics.

Also, the Modeling Report indicates that modeling receptors were excluded from within the fencelines of both the Plant Barry and Akzo Nobel facilities. The EPA notes that Plant Barry's property is in ambient air with respect to AkzoNobel, and vice versa. The two facilities are in very close proximity to each other and the maximum predicted SO_2 concentration using the current receptor grid occurred along the southern edge of Akzo Nobel's property boundary. Therefore, the final receptor grid may not adequately characterize SO_2 impacts from the facilities combined or individually.

Additionally, the modeling for Plant Barry excluded emissions from Units 1, 2 and 3 during the 2013-2015 time period when in fact the combined emissions from these units were 3,092 tons in

2013, 3,021 tons in 2014, and 530 tons in 2015. Based upon an evaluation of 2016-2017 emissions data in EPA's CAMD database, it appears that Units 1 and 2 have been converted to burn natural gas and Unit 3 has been shut down. However, in order for the EPA to accept the modeling, documentation is needed to demonstrate that the emissions reductions for Units 1, 2 and 3 reflected in the CAMD are both permanent and federally enforceable.

Lastly, as mentioned above in section 3.3.1.8, the EPA does not believe the State's justification for determining that the Centerville SEARCH or the Mammoth Cave SO_2 monitors are representative background monitors for the area around Plant Barry and AkzoNobel is consistent with the criteria in Appendix W, and thus is not appropriate.

As a result, the EPA finds that the State's modeling analysis for these two DRR sources was not performed in a manner consistent with Appendix W and the Modeling TAD and does not accurately represent current air quality in the area. Therefore, the EPA does not have sufficient information to determine whether the area meets or does not meet the SO_2 NAAQS, and whether the area contributes to a nearby area that does not meet the NAAQS.

3.4. Jurisdictional Boundaries in the Mobile County, Alabama Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Mobile County. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

Alabama recommended the entire State be designated attainment, including Mobile County, based on an assessment and characterization of air quality from the Plant Barry and AkzoNobel DRR sources and other nearby sources. The State did not provide a specific boundary recommendation for the modeled areas around Plant Barry and AkzoNobel. Mobile County is bounded to the north by Washington County, Alabama; to the east by Baldwin County, Alabama; to the southwest by Jackson County, Mississippi; to the west by George County, Mississippi; to the northwest by Greene County, Mississippi; to the southeast by Mobile Bay; and to the south by the Gulf of Mexico. Both sources are located wholly in Mobile County, Alabama.

ADEM assessed nearby sources within a 20 km area of analysis from the Plant Barry and AkzoNobel facilities in all directions and considered this sufficient to resolve the maximum impacts and any potential impact areas. These area of analyses cover portions of both Mobile County and Baldwin County. Based upon the emissions and spatial analysis screening methodology conducted by ADEM, one additional source, SSAB Alabama steel mill in Mobile County was included in the modeling analysis for Plant Barry and AkzoNobel. SSAB is approximately 3 km from Akzo Nobel and 7 km from Plant Barry DRR sources and emitted 423 tons of SO_2 in 2014. Only one other source, Four Star Oil & Gas(112), was captured within the 20 km area of analysis, emitted over 100 tpy in 2014 but yieled a Q/D > 20. The EPA has assessed that there are no other sources of SO_2 in Mobile County over 100 tpy other than Union Oil within the 20 km area of analysis. Additionally, the remaining SO_2 sources in Mobile County are more than 20 km from the two DRR sources and most likely would not cause a concentration gradient. Lastly, there are no remaining portions of Mobile County that will remain to be characterized by December 31, 2020.

3.5. The EPA's Assessment of the Available Information for the Mobile County, Alabama Area

After evaluating the 1-hour SO_2 DRR AERMOD modeling and other information for the Plant Barry and AkzonNobel facilities, the EPA intends to modify the State's recommendation and designate Mobile County unclassifiable for the SO_2 NAAQS. Alabama recommended attainment for the entire state including Mobile County and the area around Plant Barry and AkzoNobel based in part on a combined modeling assessment using AERMOD Model Version 15181 and characterization of air quality impacts from the two DRR sources, one other nearby source, SSAB Alabama Steel Mill, and background concentration data from the Mammoth Cave monitor in Kentucky. The modeling considered actual emissions for both DRR sources and allowable emissions from SSAB, and background concentrations. Based on these factors, the modeled 1-hour design value is 167.51 $\mu g/m^3$, equivalent to 63.93 ppb modeled concentration is below the level of the 2010 SO_2 NAAQS. However, the EPA's assessment finds that the modeling does not provide sufficient information to demonstrate whether the area containing the two DRR sources around Plant Barry and AkzoNobel meets or does not meet the 1-hour SO_2 NAAQS or contribute to an area that does not meet the standard. As summarized below, the EPA identified the following issues in the modeling including:

- No documentation was provided to support the AERMET inputs used to generate the surface and upper air meteorology files;
- No documentation that State used AERSURFACE to best represent surface characteristics;
- The State's receptor grid may not adequately characterize SO_2 impacts from the facilities on other facility's property;
- Emissions from Plant Barry's Units 1, 2, and 3 were excluded from the modeling analysis without complete documentation that the emissions from those units have permanent and federally enforceable emissions restrictions; and,
- Inappropriate use of background concentrations from the Centreville SEARCH and Mammoth Cave ambient monitoring sites.

ADEM's modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, the State did not provide details regarding how these files were prepared. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate. Additionally, the State did not provide documentation on how or if AERSURFACE was used to best represent surface characteristics.

Also, the Modeling Report indicates that modeling receptors were excluded from within the fencelines of both the Plant Barry and AkzoNobel facilities. The EPA notes that Plant Barry's property is in ambient air with respect to AkzoNobel, and vice versa. The two facilities are in very close proximity to each other and the maximum predicted SO_2 concentration using the current receptor grid occurred along the southern edge of AkzoNobel's property boundary. Therefore, the final receptor grid may not adequately characterize SO_2 impacts from the facilities combined or individually.

Additionally, the modeling for Plant Barry excluded emissions from Units 1, 2 and 3 during the 2013-2015 time period when in fact the combined emissions from these units were 3,092 tons in 2013, 3,021 tons in 2014, and 530 tons in 2015. Based upon an evaluation of 2016-2017 emissions data in EPA's CAMD database, it appears that Units 1 and 2 have been converted to burn natural gas and Unit 3 has been shutdown. However, in order for the EPA to accept the modeling, documentation is needed to demonstrate that the emissions reductions for Units 1, 2 and 3 reflected in the CAMD are both permanent and federally enforceable.

Lastly, as mentioned above in section 3.3.1.8, the EPA does not believe the State's justification for determining that the Mammoth Cave SO_2 monitor is a representative background monitor for the area around Plant Barry and AkzoNobel is consistent with the criteria in Appendix W, and thus is not appropriate. The EPA has determined that the magnitude of SO_2 emissions sources located near the Mammoth Cave monitor differ substantially from the magnitude of emission sources in the area near Plant Barry and AkzoNobel. As a result, the Mammoth Cave monitor is not an acceptable regional site to provide background concentrations for this modeling analysis.

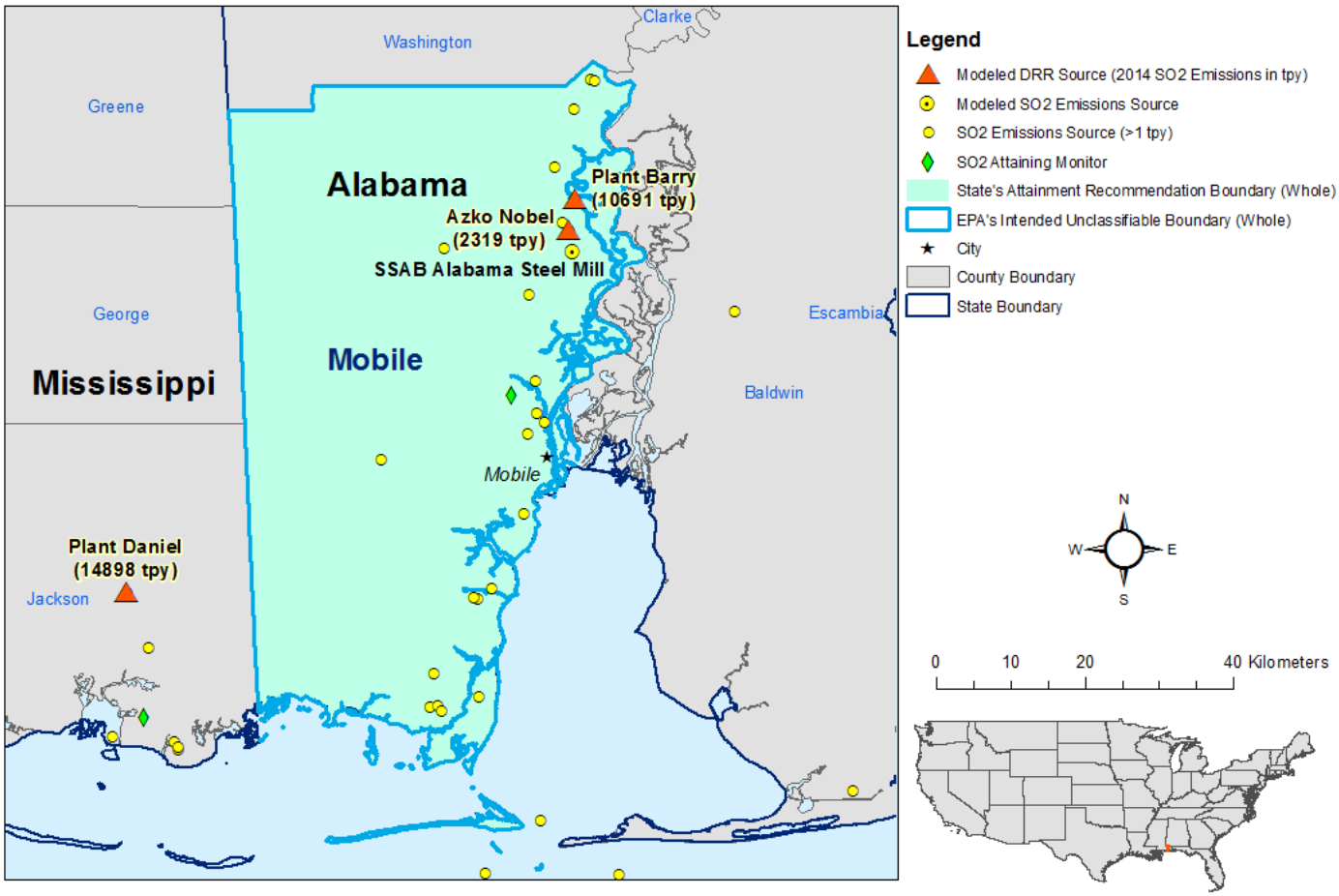
The EPA has assessed that there are no additional SO_2 sources in that emitted over 100 tpy in 2014 Mobile County, other than Union Oil, within the 20 km area of analysis. Only one other source, Four Star Oil & Gas (112), was captured within the 20 km area of analysis, emitted over 100 tpy in 2014 but yieled a Q/D > 20. The remaining SO_2 sources in Mobile County are more than 20 km from the two DRR sources and most likely would not cause a substantial concentration gradient. Lastly, there are no remaining portions of Mobile County that remain to be characterized by December 31, 2020.

Based on the available information, the EPA has determined that Alabama's modeling analysis for Alabama Power Plant Barry and AkzoNobel facilities may not represent current air quality in the area, and was not performed in a manner consistent with Appendix W and the Modeling TADs. Therefore, the EPA does not have sufficient information to determine whether the area meets or does not meet the SO_2 NAAQS or contributes to a nearby area that does not meet the 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 areas around Plant Barry and AkzoNobel as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Mobile County.

3.6. Summary of Our Intended Designation for the Mobile County, Alabama Area

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 and designate Mobile County, in its entirety as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Mobile County. There are no remaining portions of Mobile County that will remain to be characterized by December 31, 2020. The EPA believes that our intended unclassifiable area, bounded by the Mobile County boundary, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area. Figure 9 shows the boundary of this intended designated area.

Figure 9. Boundary of the Intended Mobile County Unclassifiable Area



At this time, our intended designations for the State only apply to this and the other areas presented in this technical support document. The EPA intends in a separate action to evaluate and designate all remaining undesignated areas in Alabama by December 31, 2020.
The EPA believes that our intended unclassifiable area, bounded by the Mobile County boundary, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area.

4. Technical Analysis for the Autauga County Area

4.1. Introduction

The EPA must designate the Autauga County, Alabama, area by December 31, 2017, because the area has not been previously designated and Alabama has not installed and begun timely operation of a new, approved SO_2 monitoring network meeting EPA specifications referenced in EPA's SO_2 DRR for any sources of SO_2 emissions in the vicinity of Autauga County.

4.2. Air Quality Monitoring Data for the Autauga County Area

This factor considers the SO_2 air quality monitoring data in the area of Autauga County. The EPA reviewed the available air quality monitoring data in the AQS database and found no nearby data for Autauga County. In reviewing the available air quality monitoring data in AQS, the EPA determined that there is no relevant data in AQS collected in or near Autauga County that could inform the intended designation action. The most recent SO_2 design values for all areas of the country are available at https://www.epa.gov/air-trends/air-quality-design-values.

4.3. Air Quality Modeling Analysis for the Autauga County Area Addressing International Paper – Prattville Mill

4.3.1. Introduction

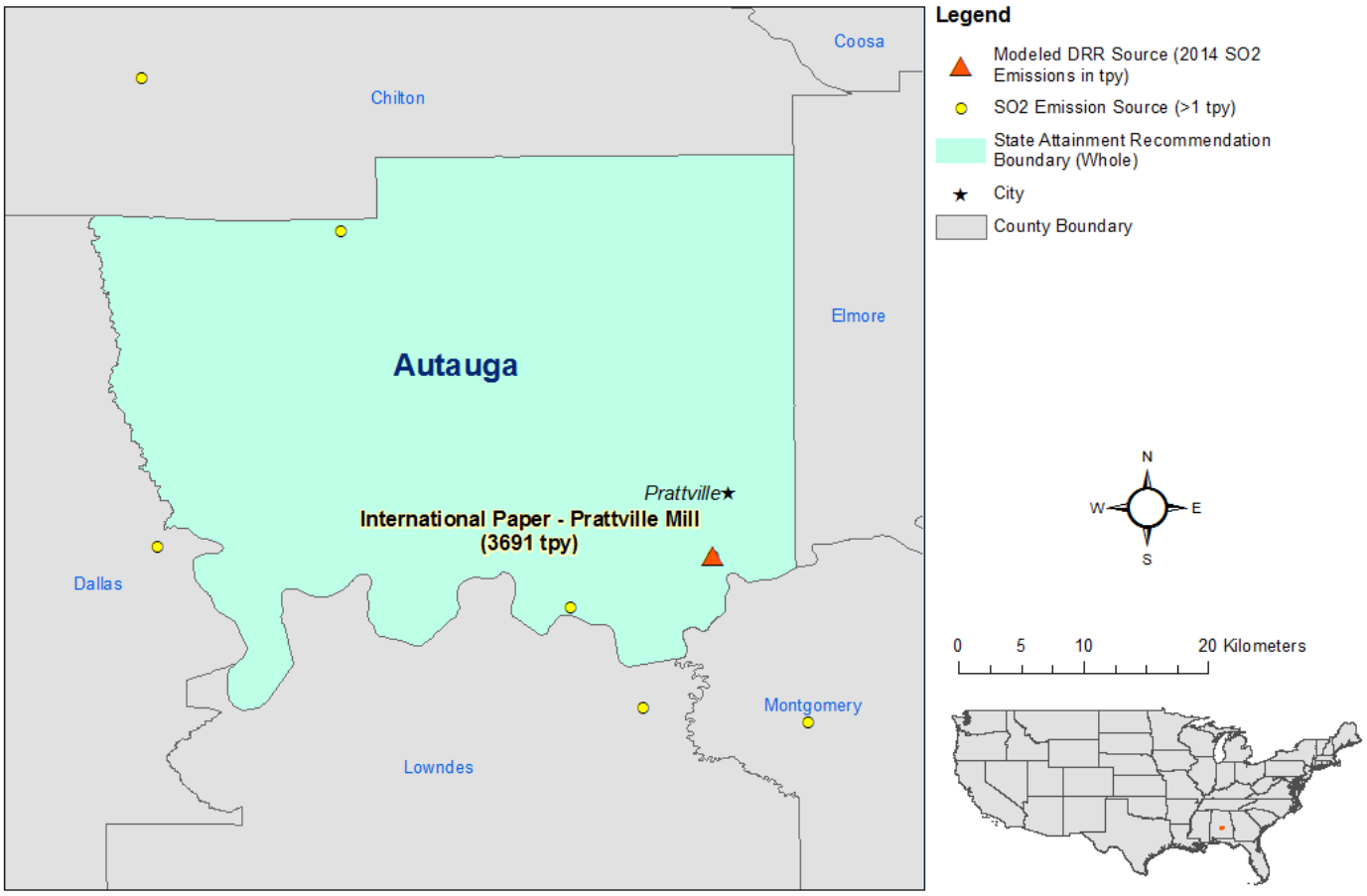
This section 4.3 presents all the available air quality modeling information for a portion of Autauga County that includes International Paper – Prattville Mill. (This portion of Autauga County will often be referred to as "the Autauga County area" within this section 4.3). This area contains the following SO_2 source, principally the sources around which Alabama is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy:

- The International Paper – Prattville Mill facility emitted 2,000 tons or more annually. Specifically, Prattville Mill emitted 3,691 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Alabama has chosen to characterize it via modeling.

Alabama recommended that the entire state be designated attainment for the SO_2 NAAQS which includes Autauga County and the area around IP Prattville Mill based in part on an assessment and characterization of air quality impacts from these facilities and other nearby sources that may have a potential impact in the area where the 2010 SO_2 NAAQS may be violated. 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 is modifying the state's recommendation and intends to designate Autauga County in its entirety as unclassifiable. 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 south of downtown Prattville in Autauga County, Alabama. The Prattville Mill is located approximately 1.5 km northwest of the Alabama River. See Figure 10. Based on ADEM's screening methodology for background sources, the state asserts there are no other nearby emitters of SO_2 that should be included in the IP Prattville Mill modeling analysis. Also included in Figure 10 is Alabama's attainment designation for the entire state including Autauga County. The EPA's intended unclassifiable designation boundary for the entirety of Autauga County area is not shown in this figure, but is shown in a figure in the section below that summarizes our intended designation.

Figure 10. Map of the Autauga County Area Addressing International Paper – Prattville Mill.



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.

For this area, the EPA received and considered two modeling assessment from the State. No assessments from other parties were considered. To avoid confusion in referring to these assessments, the following table lists them, indicates when they were received, provides an identifier for the assessment that is used in the discussion of the assessments that follow, and identifies any distinguishing features of the modeling assessments.

Table 8. Modeling Assessments for the Autauga County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Alabama*	December 9, 2016	December 2016 All4 Modeling Report	Final Modeling Report
Alabama*	January 31, 2017	Revised Modeling	Updated modeling with AERMOD version 16216r

*Alabama forwarded the assessment prepared by ALL4.

4.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 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

In the Revised Modeling, the State used AERMOD version 16216r with all regulatory default settings. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

The original modeling used AERMOD version 15181 with the unapproved Adjusted U* beta option in the AERMET meteorological processor (version 15181). The current version of AERMOD, version 16216r, includes updates to 40 CFR part 51, Appendix W, "Guideline of Air Quality Models," published on January 17, 2017 (82 FR 5203). This version of AERMOD also includes fixes to glitches that were inadvertently included in version 16216. Alabama in its final January 31, 2017, modeling submission used AERMOD version 16216r with all regulatory default settings. The maximum concentration and the location of the maximum concentration did not change between the two model runs.

4.3.1.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 6.3 of the Modeling TAD

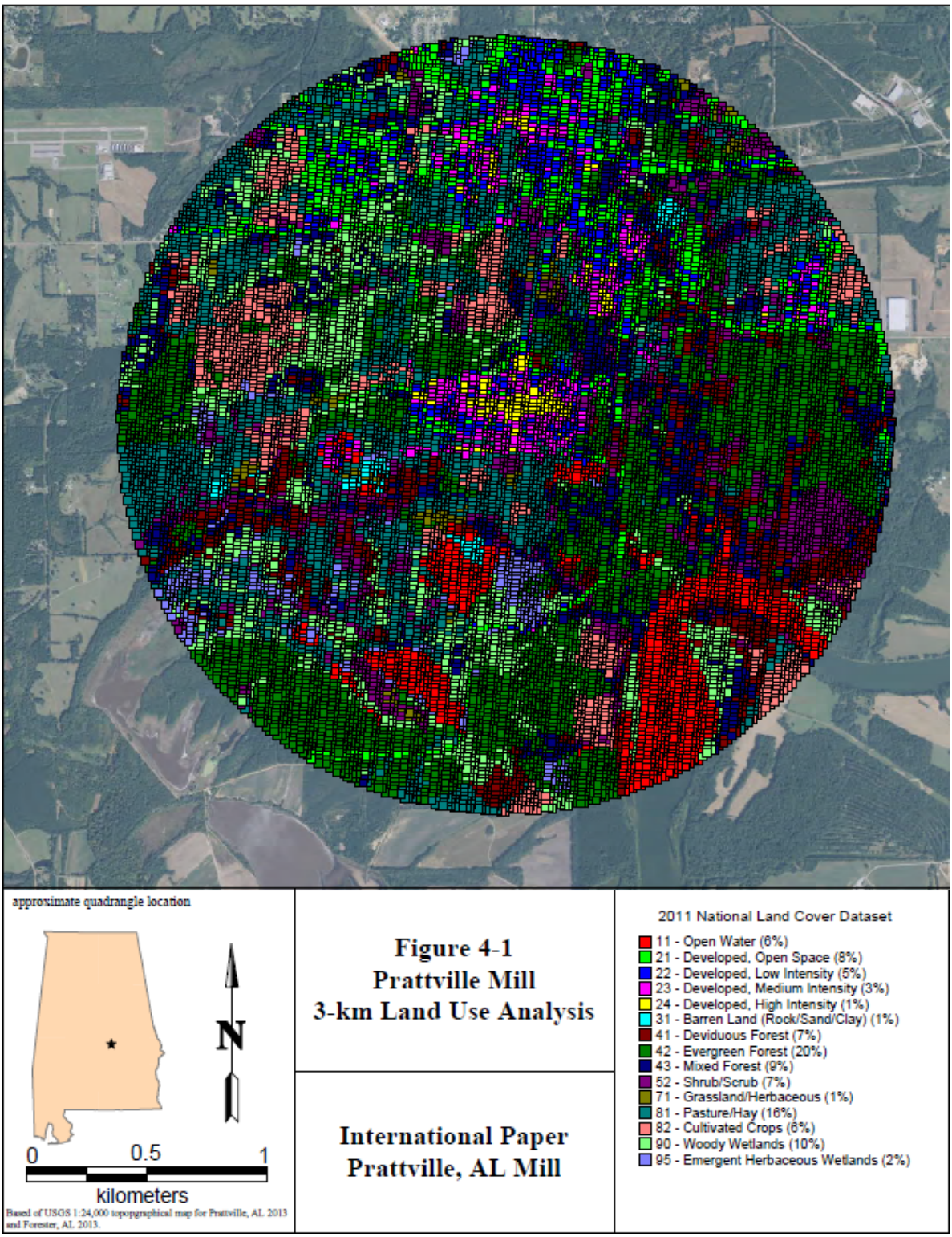
details the procedures used to determine if a source is urban or rural based on land use or population density.

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. 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.

The State analyzed the land use types within a 3 km radius of the Prattville Mill using the Auer's land use methodology. To perform the land use analysis, geographical information system (GIS) software was used to summarize the various land use types contained in the USGS electronic land use dataset. Based on the GIS summary, the land use within a 3 km radius of the Mill is approximately 96 percent rural, with the remaining percentage of land use being urban. See Figure 11.

For the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model with rural dispersion coefficients or rural mode. The EPA concurs that it is appropriate to run the model in rural mode for this modeling analysis.

Figure 11. 3 km Land Use Map for Prattville Mill Facility. Source: "SO_2 Data Requirements Rule (DRR) Air Quality Modeling Report International Paper – Prattville, AL Mill" prepared for Alabama, December 2016.



4.3.1.3. 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 SO_2 emission sources or facilities considered for modeling; the extent of concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

ADEM used the Q/D >20 metric within 20 km to determine which background sources should be included in the modeling analysis for IP-Prattville Mill. A Q/D value was determined for all sources within 20 km of each facility where Q represents the 2014 actual SO_2 tpy emissions totals, and D represents the distance between the two facilities. If the Q/D metric yielded a value of greater than 20, the facility was retained and additional QA/QC was performed on a unit by unit basis. No additional SO_2 sources met the 20D analysis for IP-Prattville Mill therefore, ADEM concluded that no additional analysis for local sources was necessary. The EPA notes four additional SO_2 emitting sources in Autauga County with a cumulative emission profile of approximately 21 tpy in 2014 and 34 tpy in 2015 and located as close as 4 km and as far as 36 km from the vicinity of IP Prattville Mill facility. These sources and their 2014 emissions include Southern Power Company-E.B. Harris Generating Plant (10.1 tons), Tenaska Central Alabama Generating Station(< 1 tons), Tenaska Lindsay Hill Generating Station(10.2 tons) and Autauga County (< 1 tons).

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Autauga County area, the State has included no other emitters of SO_2 within 20 km of Prattville in any direction. The State determined that 20 km was an appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS violation in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis.

The grid receptor spacing for the area of analysis chosen by the State is as follows, taken from the December, 2016, Modeling Report:

A receptor grid for the AERMOD evaluation was developed to cover a 20-by-20 km square area centered on the Mill. All receptors were referenced to the UTM coordinate system, Zone 16, using NAD 83 datum. Rectangular coordinates were used to identify each receptor location. The rectangular receptor grid extends from the Mill property line and has the following grid spacing:

- 100 m out to ± 3 km
- 200 m out to ± 5 km
- 500 m out to ± 7 km and
- 1,000 m out to ± 10 km

In addition to the main rectangular coordinate receptor grid, property line receptors were used in

the air quality modeling evaluation. The property line receptors were spaced approximately every 100 m.

The receptor network contained 20,252 receptors, and the network covered the southeastern portion of Autauga County, the southwestern portion of Elmore County, the northwestern portion of Montgomery County, and the northeastern portion of Lowndes County. Figures 12, generated by the EPA, shows the State's receptor grid from the revised modeling submission 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 Prattville Mill, including other facilities' property. The State opted to apply a regular grid of receptors without excluding selected receptor locations. The only receptors excluded from the receptor network were those located in the plant property portion of Prattville Mill. The state asserted that, for the areas of the property that do not restrict access through fences, gates, or no trespassing signs, Prattville Mill limits public access by patrolling the property routinely. Prattville Mill's site security, manned 24/7, patrols the property. Figure 13 details the areas of the property line that are fenced, gated, or contain no trespassing signs. No other receptors were excluded from the network of receptors described above. The receptors which potentially could have been excluded in accordance with the Modeling TAD do not include the max concentrations shown in this TSD. The EPA concurs with the State on the final receptor grid, which is generally more conservative than the Modeling TAD in that the State chose to apply a regular grid of receptors without excluding selected receptor locations such as receptors over bodies of water. Adequate information was provided for the receptors that were excluded from the plant property. The final receptor grid, therefore, can be expected to adequately characterize SO_2 impacts from the Prattville Mill facility.

Figure 12. Receptor Grid for the Autauga County Area. Source: "SO_2 Data Requirements Rule (DRR) Air Quality Modeling Report International Paper – Prattville, AL Mill" prepared for Alabama, December 2016

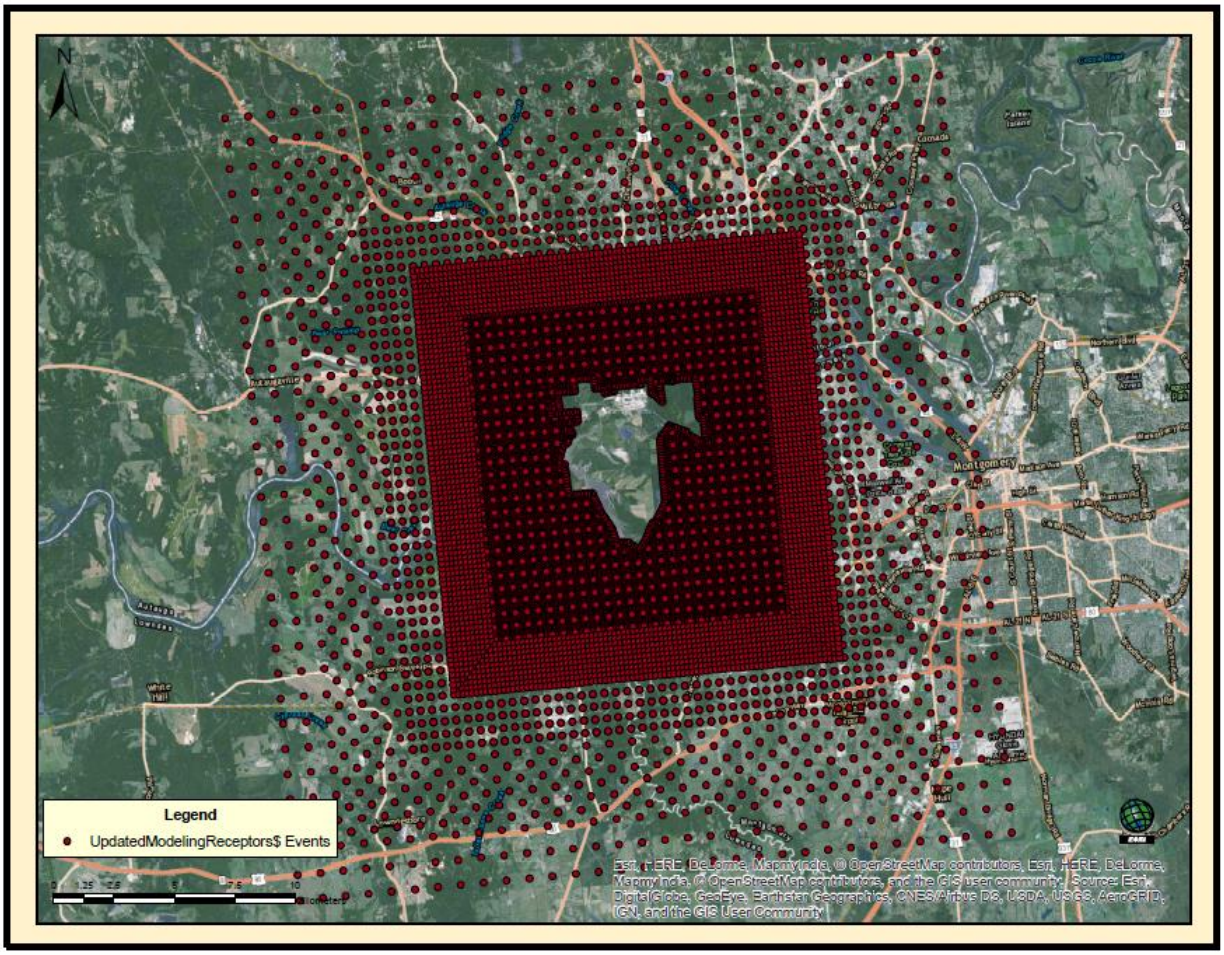
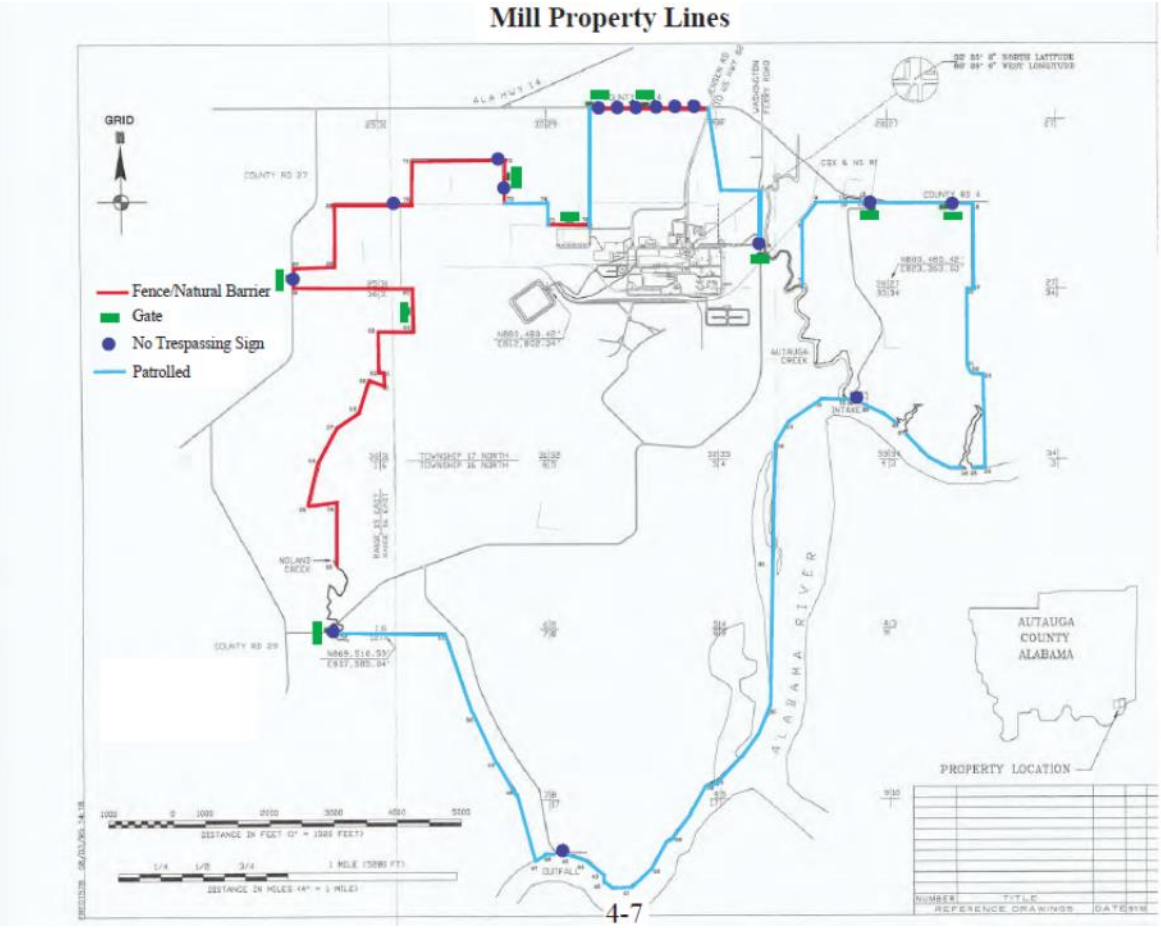


Figure 13. Prattville Mill Property Lines. Source: "SO_2 Data Requirements Rule (DRR) Air Quality Modeling Report International Paper – Prattville, AL Mill" prepared for Alabama, December 2016



4.3.1.4. 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.

According to the December 2016 modeling report, Prattville Mill is an unbleached kraft linerboard mill that consist of the following operations: the pulp mill, an evaporator area, a caustic area, a non-condensable gas collection system, a hydrapulper, a paper mill, a power house area, a recovery area, and numerous miscellaneous activities. The following emissions units at the Prattville Mill emit SO_2 and were considered in the emissions inventory for the modeling:

- No. 1 Recovery Furnace (RF1)
- No. 1 Lime Kiln (LK1)

- No. 1 Power Boiler (PB1)
- No. 1 Smelt Dissolving Tank (RF1SDT)
- No. 2 Lime Kiln (LK2)
- No. 2 Smelt Dissolving Tank (RF2SDT)
- Combined Stack (CS) [includes the No. 2 Recovery Furnace and the No. 2 Power Boiler]

The December 2016 modeling report indicates that ADEM screened for potential nearby sources within a 20 km area surrounding Prattville Mill. A spreadsheet was provided to the facility with a listing of the nearby facilities that met the 2014 actual emissions (in tpy) divided by the distance of greater than 20 within a maximum distance of 20 km, including small sources at a very close distance. No nearby sources were identified within the 20 km radius to be included in the modeling analysis. The EPA notes three SO_2 emitting sources in Autauga County with a cumulative emission profile of approximately 21 tpy in 2014 and 34 tpy in 2015. These sources include Southern Power Company-E.B. Harris Generating Plant, Tenaska Central Alabama Generating Station and Tenaska Lindsay Hill Generating Station. Due to their small level of emissions and distance from the Prattville Mill, none of these sources are likely to cause or contribute to an exceedance of the SO_2 NAAQS within the area near Prattville Mill.

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 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 BPIPPRM was used to assist in dressing building downwash.

Because actual emissions were used in this modeling analysis, the source used actual stack heights to represent the actual ambient air quality conditions as influenced by the source. The screening approach used justifies the exclusion from the modeling of all other sources in the area. The EPA agrees that this component of the modeling analysis was performed in a manner consistent with the SO_2 Modeling TAD.

4.3.1.5. 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 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 SO_2 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 SO_2 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 Prattville Mill and no other emitters of SO_2 in the area of analysis. The State has chosen to model this facility using actual emissions. For International Paper – Prattville Mill, the State provided annual actual SO_2 emissions between 2012 and 2014. This information is summarized in Table 9. A description of how the State obtained hourly emission rates is given below this table.

Table 9. Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Autauga County Area

	SO_2 Emissions (tpy)		
Facility Name	**2012**	**2013**	**2014**
International Paper – Prattville Mill	3,342	3,347	3,600
Total Emissions from All Modeled Facilities in the State's Area of Analysis	3,342	3,347	3,600

For Prattville Mill, the actual hourly emissions data were obtained using site-specific and industry accepted emission factors in conjunction with actual hourly production. The emissions factors were paired with hourly production, fuel usage, or operating hour information to quantify actual hourly SO_2 emissions. Emissions factors consistent with Prattville Mill's annual emissions statement reporting submittals were used in the modeling analysis for all units except for RF1. For RF1, a recent stack testing program was completed on the unit in 2015, and was used to quantify hourly SO_2 emissions for this unit. When hourly production, fuel usage, or operating hours data were missing, an average of the hours directly before and after the event were used to fill in the missing hourly throughput data. Along with the final modeling report, the State submitted a summary of hourly production, fuel usage, operating hours, SO_2 emissions factors, and actual pounds per hour emissions and references for each emissions factor and all production data used.

Annual emissions contained in the EPA's EIS Gateway emissions database do not match up with the emissions that were modeled for Prattville Mill. The 2012-2014 emissions from EIS Gateway are as follows:

- 2012: 2,707 tons

- 2013: 3,597 tons
- 2014: 3,691 tons

The state provided actual emissions from 2012 are higher than those in EIS Gateway; however, the EIS Gateway emissions are higher for 2013 and 2014 than the state-provided actual emissions.

The EPA has compared the sum of the hourly SO_2 emissions modeled for Prattville Mill for each year modeled and determined that these values do not equal the yearly values reported to the EIS Gateway. The EPA has requested that Alabama clarify why the emissions data that was used in the modeling is inconsistent with the yearly values reported to the EIS Gateway The EPA concurs that use of actual emissions data from the 2012-2014 period would be appropriate; however, it's unclear what emissions inventory the state included in the IP Prattville modeling where the emissions used in the modeling do not match those contained in the EPA's EIS Gateway emissions database. The State has not provided a justification for this discrepancy. Therefore, the EPA cannot verify that this component of the modeling analysis was performed in a manner consistent with the SO_2 Modeling TAD.

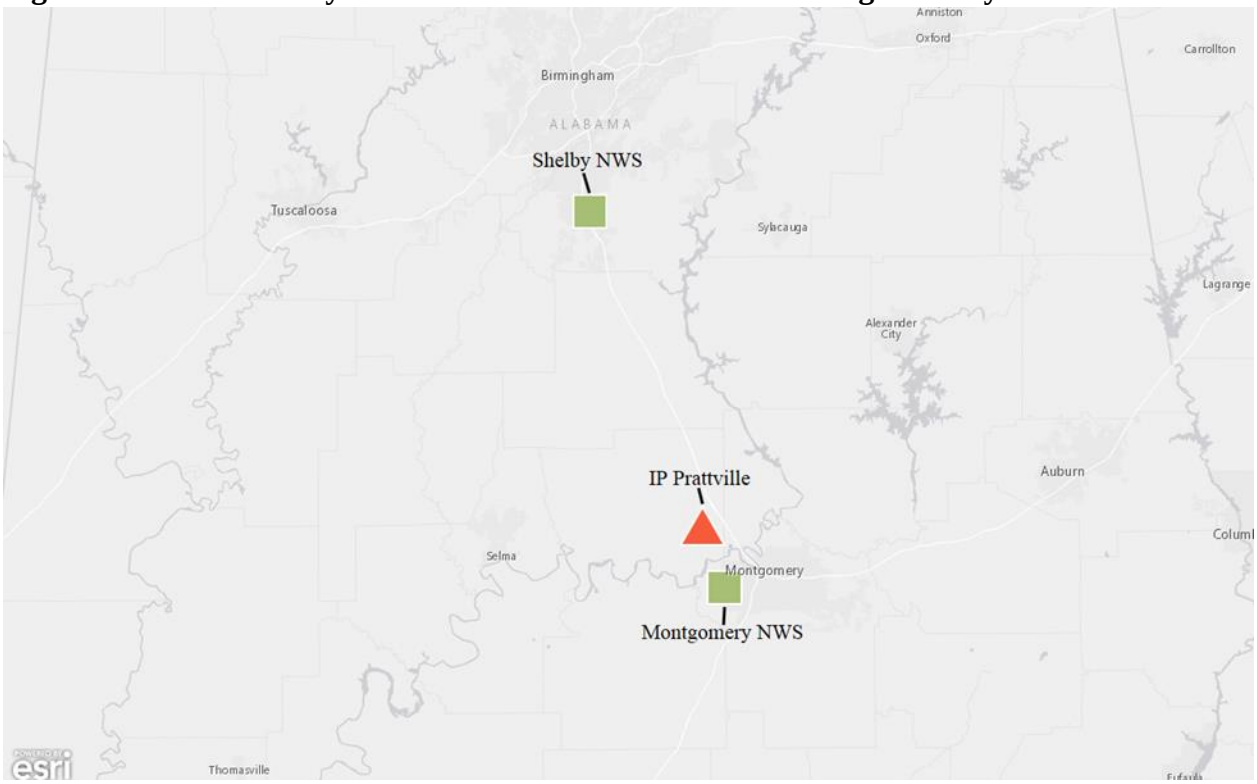
4.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

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 NWS stations, site-specific or onsite data, and other sources such as universities, FAA, and military stations.

For the area of analysis for the Autauga County area, the State selected the surface meteorology from the Dannelly Field NWS station in Montgomery, AL, located at 32.3 N, 86.41 W and coincident upper air observations from the Shelby County Airport NWS station, located in Alabaster, AL, located at 33.18 N, 86.78 Was best representative of meteorological conditions within the area of analysis. The State used AERSURFACE version 13016 using data from the Dannelly Field 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 "zo".

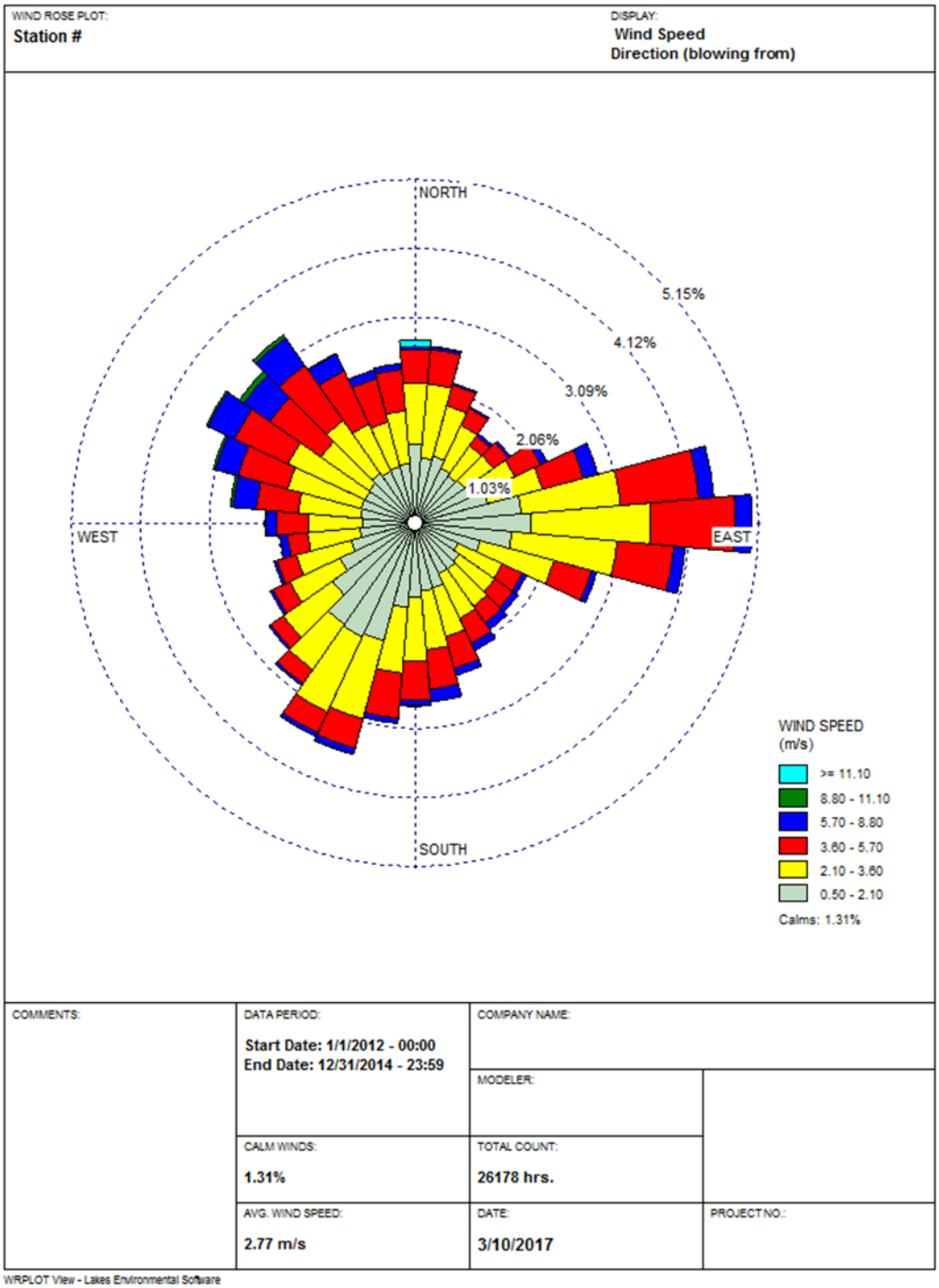
ADEM did not document how meteorological data was processed in AERMOD nor did the State describe how the surface characteristics of the area of analysis were developed. Furthermore, ADEM did not provide the distances or any conditions. Figure 14 below, generated by the EPA, shows the locations of these NWS stations relative to the area of analysis.

Figure 14. Area of Analysis and the NWS stations in the Autauga County Area



The EPA generated a wind rose for the Dannelly Field airport for the 2012-2014 period using meteorological data provided by ADEM. In Figure 15, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Analysis of the NWS data indicate winds predominately blow from the east, northwest and southwest directions.

Figure 15. Dannelly Field NWS Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air NWS 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. Since the AERMET files were not provided, it is unknown whether the State followed the methodology and settings presented in the EPA's AERMOD Implementation Guidance in the processing of the raw meteorological data into an AERMOD-ready format. Also, the EPA is unsure if the State used AERSURFACE to best represent surface characteristics. The modeling used the Adjusted U* option in AERMET. As discussed in Section 4.2.1.1, the modeling was updated in January 2017 with AERMET version 16216 and AERMOD version 16216r to address the "bug-fix" that affected the use of Adjusted U* in AERMET version 15181.

The modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, details regarding how these files were prepared were not provided. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

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

The terrain in the area of analysis is best described as complex terrain (i.e., rolling hills). To account for these terrain changes, the AERMAP terrain program (version 11103) 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 1:24,000 NED.

The EPA believes that the terrain in the area of analysis is accounted for in a manner consistent with the SO_2 Modeling TAD. The stated application of the AERMAP pre-processor should adequately resolve any variations in terrain in the area.

4.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 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 elected to use a "tier 2" approach. Data was obtained for 2012-2014 from the SEARCH network. The data are from the Centreville monitor located 80 km northwest of Prattville Mill in Centreville, Alabama. The background concentrations for this area of analysis were determined by the State to vary from 3.25 μg/m^3, equivalent to 1.24 ppb when expressed in three significant figures[12], to 28.06 μg/m^3 (10.71 ppb), with an average value of 8.90 μg/m^3 (3.40 ppb). See Table 10 for the hourly values modeled sorted by season.

[12] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in μg/m^3. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 μg/m^3.

Table 10. Centreville SO_2 Background Values for 2012-2014 (ppb)

Hour	Winter	Spring	Summer	Autumn
0	3.396	2.130	1.736	1.508
1	3.974	2.326	2.582	1.993
2	2.978	1.909	2.803	2.646
3	2.503	1.920	2.548	3.851
4	3.492	1.502	2.322	6.509
5	5.092	1.653	3.230	7.785
6	6.867	1.880	5.426	7.729
7	6.200	2.730	7.592	8.770
8	5.493	5.505	7.393	9.785
9	3.519	3.832	5.777	10.714
10	4.049	3.149	6.527	4.930
11	4.714	2.647	2.667	3.495
12	3.126	2.351	3.205	4.111
13	2.879	3.078	3.005	2.447
14	3.217	3.263	2.473	1.960
15	3.312	2.791	1.806	2.049
16	3.727	2.875	1.477	2.508
17	2.740	2.987	1.738	2.887
18	3.272	2.632	1.868	2.558
19	2.346	2.349	1.906	1.914
20	2.514	2.327	2.402	2.110
21	2.839	1.771	1.541	1.941
22	3.671	2.676	1.731	2.308
23	3.433	2.590	1.241	2.335

The EPA reviewed the Centreville SEARCH monitoring information and determined that the monitor is not a regulatory monitor that meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the data is not acceptable for use as background concentrations in this modeling demonstration. The EPA communicated this issue to Alabama in March 2017[13] and suggested the following options for addressing the issue: 1) demonstrate that the Centreville monitor meets the QA/QC criteria and other requirements in Part 58, Appendix B for PSD monitors, 2) choose a different background monitor that is representative of SO_2 background concentrations in the area of Prattville Mill and either use the

[13] Email from Beverly Banister, Region 4 Air, Pesticides and Toxics Management (APTMD), Air Director to Ron Gore, ADEM Air Director on March 21, 2017.

design value from that monitor or a use a more refined approach of seasonal hourly varying background values from that monitor, or 3) demonstrate that the Centreville SEARCH background value used in the modeling is more conservative (larger) than an alternative background site that would be representative of background in the area of Prattville Mill. For this modeling demonstration, if option 3 is chosen, Alabama would need to demonstrate that the Centreville data is higher than the alternate site's data for each hour (96 total values, 4 seasons x 24 hours in each day = 96 values).

Alabama submitted additional information to the EPA[14] to address the issues discussed above. Alabama's supplemental information proposed to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky. For eight of the Alabama DRR sources (including the Prattville Mill), Alabama's analysis compared the Centreville SEARCH data with the Mammoth Cave data, hour-by-hour, for each of the 96 hours in the "season-by-hour-of-day" option used in the AERMOD modeling. Alabama then found the hour where the Mammoth Cave data is greater than the Centreville data by the greatest amount (which they found to be 3.68 ppb = 9.71 $\mu g/m^3$)[15]. Alabama added this "adjustment factor" of 9.71 $\mu g/m^3$ to the final modeling results for each SO_2 DRR Source (including Prattville Mill).

Alabama's supplemental information justifies use of the Mammoth Cave data by stating that it is "the closest background monitor with sufficient data capture that does not show interference from industrial sources." The EPA does not believe that this is an adequate justification for determining whether Mammoth Cave is a representative background monitor pursuant to the criteria provided in Section 8.2.2(c) of the *Guideline on Air Quality Models* contained in 40 CFR Part 51, Appendix W. The criteria in Appendix W state that an appropriate regional site is "*one that is located away from the area of interest but is impacted by similar natural and distant man-made sources."*

The EPA performed an evaluation to determine if the Mammoth Cave site is an appropriate regional background site for the Prattville Mill modeling. Both the Mammoth Cave monitor and the Prattville Mill facility are located in rural areas. The 2014 NEI listed 3,867 tpy of SO_2 emissions in Autauga County. The emissions from the modeled sources are approximately 3,691 tpy, so there are approximately 176 tpy of emissions in Autauga County not accounted for in the modeling. In the area around the Mammoth Cave monitor, there are no sources emitting more than 5 tpy of SO_2 within 50 km of the monitor and the total SO_2 emissions in the 3 counties surrounding the monitor are less than 70 tpy, according to the emissions data in the 2014 NEI. The closest major source of SO_2 emissions to the Mammoth Cave monitor is the TVA Paradise power plant (19,654 tpy in 2014) located approximately 75 km from the monitor. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near the Prattville Mill. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58,

[14] Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017.

[15] Note that Alabama used a conversion factor of 2.639 to convert the SO_2 background concentration in ppb to ug/m^3. This differs from the EPA's recommended conversion factor of 2.619. Alabama's conversion factor results in a higher concentration in ug/m^3, so is therefore acceptable.

Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis. The EPA has concluded that Alabama's "adjustment factor" procedure provides an acceptable method for substituting data from the Mammoth Cave background monitor for the Centreville monitor data without the need to remodel for this modeling parameter.

4.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Autauga County area of analysis are summarized below in Table 11.

Table 11. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Autauga County Area

Input Parameter	Value
AERMOD Version	16216r
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	9
Modeled Structures	Not provided by ADEM
Modeled Fencelines	1
Total receptors	20,252
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Montgomery, AL
NWS Station Upper Air Meteorology	Alabaster, AL
NWS Station for Calculating Surface Characteristics	Montgomery, AL
Methodology for Calculating Background SO_2 Concentration	Tier 2 approach using SEARCH site at Centreville, AL (2012-2014)
Calculated Background SO_2 Concentration	3.868 - 28.06 $\mu g/m^3$ + Alabama's "adjustment factor" of 9.71 $\mu g/m^3$

The results presented below in Table 12 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

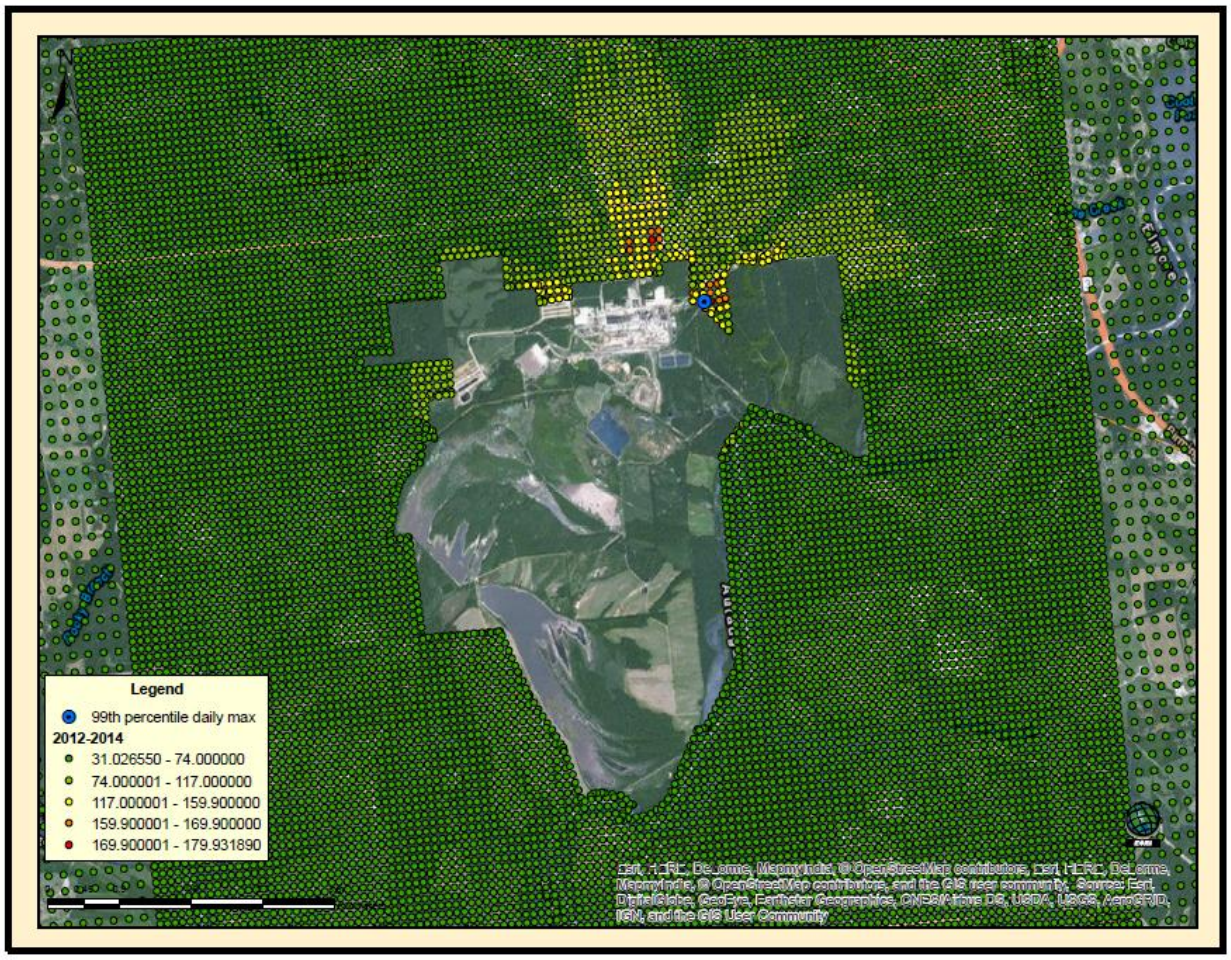
Table 12. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Autauga County Area

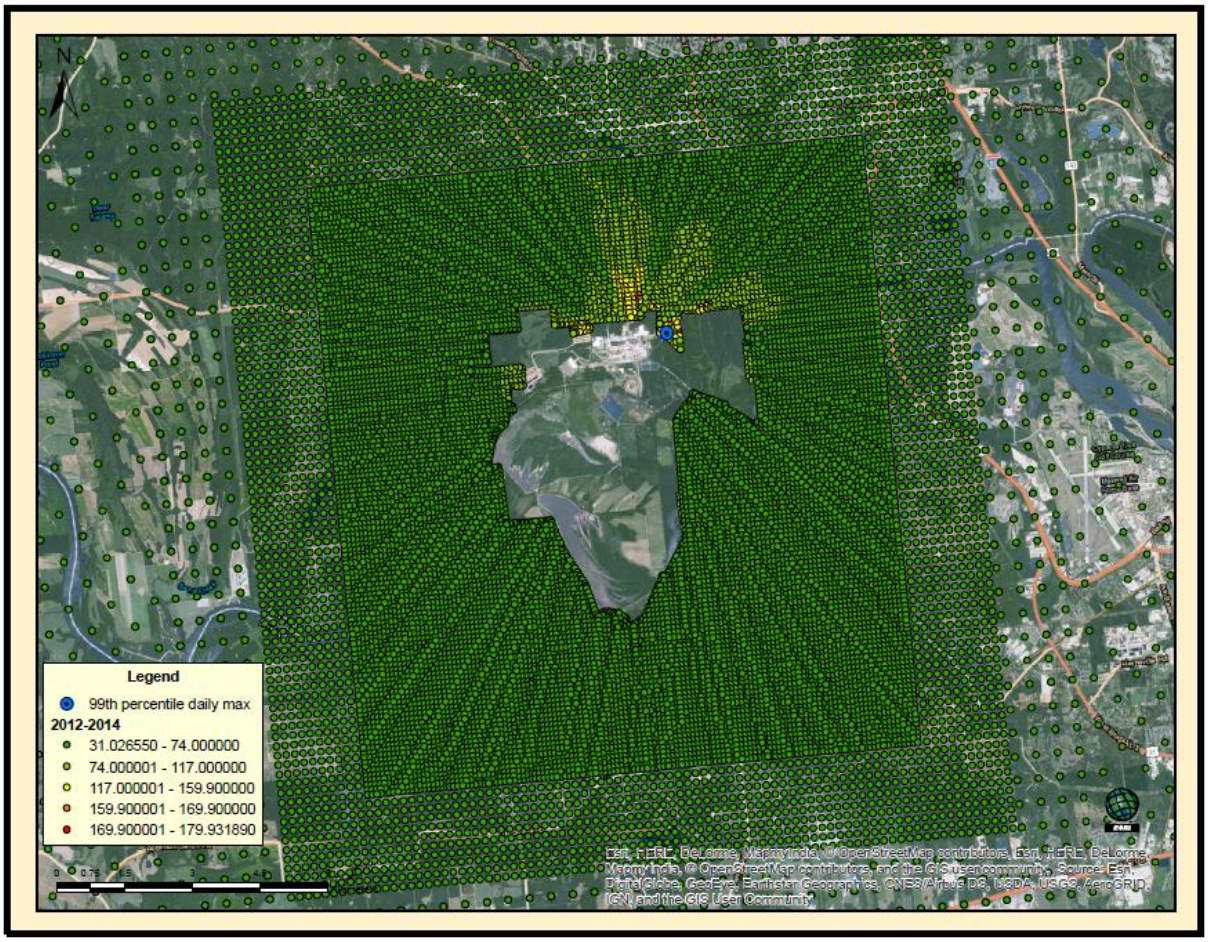
		Receptor Location [UTM zone 16]		99th percentile daily maximum 1-hour SO_2 Concentration (µg/m^3)	
Averaging Period	**Data Period**	**UTM Easting (m)**	**UTM Northing (m)**	**Modeled concentration (including background)**	**NAAQS Level**
99th Percentile 1-Hour Average	2012-2014	550434	3587109	189.6	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 µg/m^3 conversion factor

The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 179.9 µg/m^3, equivalent to 69 ppb. This modeled concentration included the background concentration of SO_2 and adjustment factor, and is based on actual emissions from the facility. As discussed in Section 3.3.1.8, in response to the EPA's outstanding questions regarding the background concentrations used in their modeling analysis, Alabama added an "adjustment factor" of 3.68 ppb (9.71 µg/m^3) to the final modeling result presented in their modeling report (179.9 + 9.71 = 189.61 µg/m^3). Figure 16a and 16b below was generated by the EPA, and indicates that the predicted value occurred along the northern portion of the fence line. The State's receptor grid is also shown in the figure.

Figure 16a and 16b. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Autauga County Area





The modeling submitted by the State does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

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

The EPA assessment of the 1-hour SO_2 DRR AERMOD modeling for the Prattville Mill finds that the modeling does not conclusively demonstrate that the area surrounding this DRR source meets the 1-hour SO_2 NAAQS and does not contribute to a nearby area that violates the NAAQS.

The issues with the modeling analysis include uncertainty regarding the actual emissions used in the modeling, and the need for documentation showing how the meteorology data were processed using AERMET and associated preprocessors. Initially, the State used AERMOD/AERMET version 15181 with the Adjusted_U* option. However, Alabama provided a revised modeling analysis using AERMOD/AERMET version 16216r which contains bug fixes for the Adjusted_U* option in version 15181. Use of AERMOD version 16216r resulted in the same maximum concentration compared to the use of AERMOD version 15181. The State did not include any other nearby emitters of SO_2 in the modeling, and the EPA agrees with this decision, as supported by Alabama's evaluating nearby sources within 20 km of Prattville Mill.

The EPA believes the modeling domain is appropriate to capture predicted maximum impacts in the Autauga County area.

The State adequately represented the topography of the area with the model and its preprocessors. The State chose to model actual emissions from Prattville Mill during 2012 – 2014 to reflect normal operations of Prattville Mill. However, as discussed in Section 4.2.1.5, the EPA found that the total annual actual emissions for IP Prattville during 2013 and 2014 used in the modeling are less than the emissions contained in the EPA's EIS Gateway emissions database. The EPA has requested that Alabama provide information to address this inconsistency, but no additional information has been provided to date.

Alabama's selection of meteorology and surface characteristics for the area may be appropriate to make a valid modeling demonstration, however, the EPA notes that ADEM did not provide documentation to verify that the AERMET processing was appropriate to generate the surface and upper air meteorology files.

The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near the Prattville Mill. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis. The EPA has concluded that Alabama's "adjustment factor" procedure provides an acceptable method for substituting data from the Mammoth Cave background monitor for the Centreville monitor data without the need to remodel.

Based upon the two outstanding issues discussed above, the EPA is unable to determine if the State's modeling analysis for Prattville Mill facility was performed in a manner consistent with Appendix W and the Modeling TADs and accurately accounts for current air quality in the area. Therefore, the EPA does not have sufficient information to determine whether the area meets or does not meet the SO_2 NAAQS or whether the area contributes to ambient air quality in a nearby area that does not meet the NAAQS.

4.4. Jurisdictional Boundaries in the Autauga County, Alabama Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Autauga County. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

Alabama recommended attainment for the entire state. For Autauga County, ADEM based the recommendation on an assessment and characterization of air quality from the IP – Prattville Mill DRR source and other nearby sources. The State did not provide a specific boundary recommendation for the modeled areas around IP – Prattville Mill. Autauga County is bounded to the north by Chilton County; to the east by Elmore County; to the southeast by Montgomery County; to the south by Lowndes County; and to the west by Dallas County.

Alabama assessed nearby sources within a 20 km area of analysis from the IP – Prattville Mill facility in all directions and considered this sufficient to resolve the maximum impacts and any potential impact areas. This area of analysis covers a portion of Autauga, Montgomery, Elmore, and Lowndes Counties. Based upon the emissions and spatial analysis screening methodology conducted by ADEM, the State did not identify additional sources for inclusion in the modeling analysis for IP – Prattville Mill. The EPA notes three SO_2 emitting sources in Autauga County with a cumulative emission profile of approximately 21 tpy in 2014 and 34 tpy in 2015 and are located as close as 4 km and as far as 36 km from the vicinity of IP Prattville Mill facility These sources include Southern Power Company-E.B. Harris Generating Plant (10.1 tpy), Tenaska Central Alabama Generating Station (< 1 tpy), Tenaska Lindsay Hill Generating Station (10.2 tpy) and Autauga County (< 1 tpy). Due to their small level of emissions and distance from the Prattville Mill, none of these sources are likely to impact the SO_2 concentrations in the area near the Prattville Mill.

4.5. The EPA's Assessment of the Available Information for the Autauga County, Alabama Area

After evaluating the 1-hour SO_2 DRR AERMOD modeling and other information for the IP Prattville facility, the EPA intends to modify the State's recommendation and designate Autauga County unclassifiable for the SO_2 NAAQS. Alabama recommended attainment for the entire state including Autauga County and the area containing IP Prattville based in part on a modeling assessment using AERMOD version 16216r and characterization of air quality impacts from the DRR sources, no other nearby source and background concentration data from the Mammoth Cave monitor in Kentucky. The modeling considered actual emissions for IP Prattville and resulted in a modeled 1-hour design value is 189.60 $\mu g/m^3$, equivalent to 72.6 ppb modeled concentration is below the level of the 2010 SO_2 NAAQS. However, the EPA's assessment finds that the modeling does not provide sufficient information to demonstrate whether the area containing the DRR source meets or does not meet the 1-hour SO_2 NAAQS or contributes to an area that does not meet the standard. Issues with the IP Prattville modeling include:

- A lack of adequate documentation to support the AERMET modeling used to generate the surface and upper air meteorology files; and
- A discrepancy between the IP Prattville emission values that were modeled and those included in the EIS Gateway.

ADEM's modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, the State did not provide details regarding how these files were prepared. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate. The State adequately represented the topography of the area with the model and its preprocessors. The State chose to model actual emissions from Prattville Mill during 2012 – 2014 to reflect normal operations of Prattville Mill. However, as discussed in Section 4.2.1.5, the EPA found that the total annual actual emissions for IP Prattville during 2013 and 2014 used in the modeling are less than the emissions contained in the EPA's EIS Gateway emissions database. The EPA has requested that Alabama provide information to address this inconsistency, but no additional information has been provided to date.

The EPA determined that the Mammoth Cave site is an appropriate regional background site for the Prattville Mill modeling. Both the Mammoth Cave monitor and the Prattville Mill facility are located in rural areas. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near the Prattville Mill. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis. The EPA has concluded that Alabama's "adjustment factor" procedure provides an acceptable method for substituting data from the Mammoth Cave background monitor for the Centreville monitor data without the need to remodel.

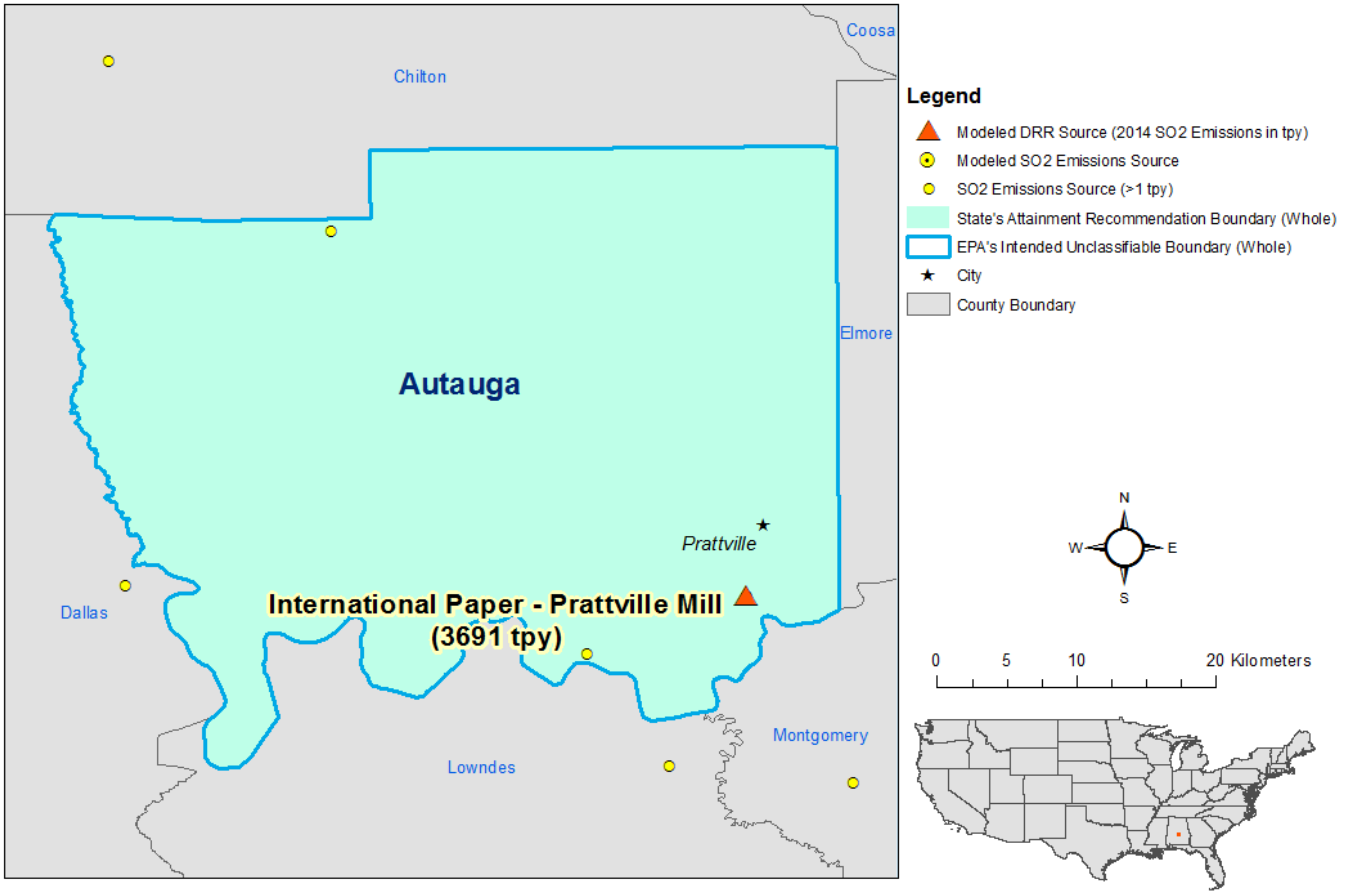
The State used the Q/D >20 methodology to assess other nearby sources within 20 km of the IP – Prattville Mill facility. Using this methodology, Alabama did not identify any additional nearby background sources to be included in the modeling analyhsis. The EPA identified four SO_2 emitting sources in Autauga County with a cumulative emissions profile of approximately 21 tpy in 2014 and 34 tpy in 2015 and are located as close as 4 km and as far as 36 km from the vicinity of IP Prattville Mill facility. These sources include Southern Power Company-E.B. Harris Generating Plant (10.1 tpy) located 10 km, Tenaska Central Alabama Generating Station (< 1 tpy), Tenaska Lindsay Hill Generating Station (10.2 tpy) and Autauga County (< 1 tpy). Due to their low level of emissions and distance from the Prattville Mill, the EPA believes these sources are not likely to impact the SO_2 concentrations in the area near the Prattville Mill. The EPA notes that there are no additional sources in Autauga County or any neighboring counties that would likely cause or contribute to an exceedance of the SO_2 NAAQS in the area of analysis due to their low SO_2 emissions and distance from the IP Prattville.

Based on the available information, the EPA has determined that Alabama's modeling analysis for the IP-Prattville Mill facility was not performed in a manner consistent with Appendix W and the Modeling TAD and may not accurately represent current air quality in the area. Therefore, the EPA does not have sufficient information to determine whether the area meets or does not meet the SO_2 NAAQS or contributes to a nearby area that does not meet the NAAQS.

4.6. Summary of Our Intended Designation for the Autauga County, Alabama Area

After careful evaluation of the State's recommendation, modeling and supporting information, the EPA is modifying the state's recommendation and intends to designate, in its entirety, Autauga County as unclassifiable for the 2010 SO_2 NAAQS because the modeling analysis does not provide sufficient information to determine whether the area meets or does meet the 1-hour SO_2 standard or contributes to a nearby area that does not meet the NAAQS. Specifically, the boundaries are comprised of the entirety of Autauga County. Figure 17 shows the boundary of this intended designated area. The EPA believes that our intended unclassifiable area, bounded by the Autauga County boundary, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area. There will be no remaining portions of Autauga County that remain to be characterized by December 31, 2020. At this time, our intended designations for the State only apply to this and the other areas presented in this technical support document.

Figure 17. Boundary of the Intended Autauga County Unclassifiable Area



5. Technical Analysis for the Escambia County Area

5.1. Introduction

The EPA must designate the Escambia County, Alabama, area by December 31, 2017, because the area has not been previously designated and Alabama has not installed and begun timely operation of a new, approved SO_2 monitoring network meeting the EPA specifications referenced in the EPA's SO_2 DRR for any sources of SO2 emissions in the vicinity of Escambia County.

5.2. Air Quality Monitoring Data for the Escambia County Area

This factor considers the SO_2 air quality monitoring data in the area of Escambia County. The EPA reviewed the available air quality monitoring data in the AQS database and found no nearby data for Escambia County. In reviewing the available air quality monitoring data in AQS, the EPA determined that there is no relevant data in AQS collected in or near Escambia County that could inform the intended designation action. The most recent SO_2 design values for all areas of the country are available at https://www.epa.gov/air-trends/air-quality-design-values.

5.3. Air Quality Modeling Analysis for the Escambia County Area Addressing Big Escambia Creek Plant

5.3.1. Introduction

This section 5.3 presents all the available air quality modeling information for a portion of Escambia County that includes Big Escambia Creek Plant. (This portion of Escambia County will often be referred to as "the Escambia County area" within this section 5.3.). This area contains the following SO_2 sources, principally the sources around which Alabama is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy:

- The Big Escambia Creek Plant facility emitted 2,000 tons or more annually. Specifically, Big Escambia Creek Plant emitted 5,478 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Alabama has chosen to characterize it via modeling.

- The St. Regis Gas Treating facility (Breitburn Operating, L.P.) located in Santa Rosa County, Florida (1,327 tons in 2014) approximately, and the Oil and Gas Production facility (Escambia Operating Company LLC) in Escambia County, Alabama (412 tons in 2014), are not on the SO_2 DRR Source list, but are included in the modeling analysis and are located approximately 21 and 24 km from Big Escambia Creek Plant respectively.

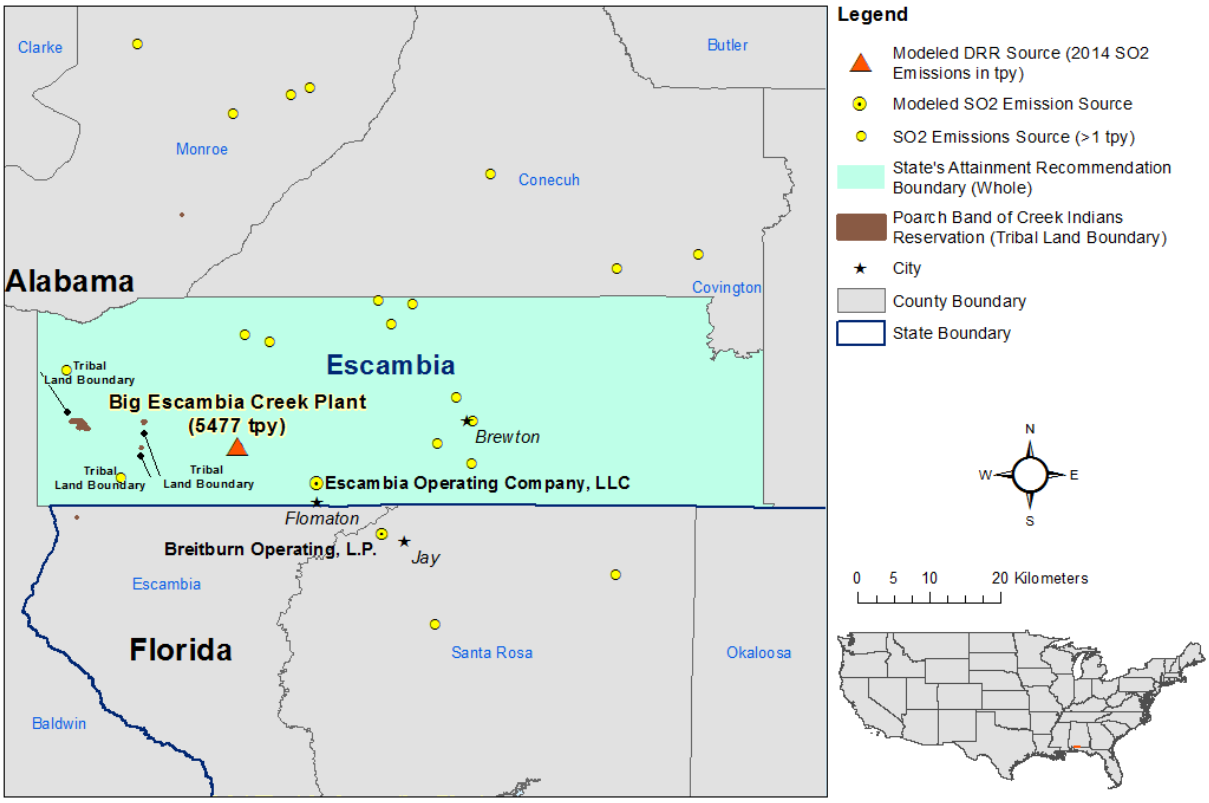
Because we have available results of air quality modeling in which these sources are modeled together, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

Alabama recommended that the entire state be designated attainment for the SO_2 NAAQS including Escambia County and the area containing the Big Escambia Creek facility, based in part on an assessment and characterization of air quality impacts from these facilities and other nearby sources that may have a potential impact in the area where the 2010 SO_2 NAAQS may be violation. 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 is modifying the State's recommendation and intends to designate the area as unclassifiable. 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 approximately 28 km west of Brewton, Escambia County, Alabama. See Figure 18. Also included in the figure are other nearby emitters of SO_2.[16] These are Breitburn Operating, L.P. in Jay, Florida, and Escambia Operating Company in Flomaton, Alabama. Also included in Figure 10 is Alabama's attainment designation for the entire state including Autauga County. The EPA's intended unclassifiable designation boundary for the Escambia County area is not shown in this figure, but is shown in a figure in the section below that summarizes our intended designation. Figure 18 also identifies the Poarch Band of Creek Indian Reservation approximately 16.4 km west of Big Escambia Creek.

[16] All other SO_2 emitters of 10 tpy or more (based on information using the 20D method) are shown in Figure 18. If no sources not named previously are shown, there are no additional SO_2 emitters above this emission level in the vicinity of the named source(s).

Figure 18. Map of the Escambia County Area Addressing Big Escambia Creek Plant.



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.

For this area, the EPA received and considered one modeling assessment from the State. No assessments from other parties were considered. To avoid confusion in referring to these assessments, the following table lists them, indicates when they were received, provides an identifier for the assessment that is used in the discussion of the assessments that follow, and identifies any distinguishing features of the modeling assessments.

Table 13. Modeling Assessments for the Escambia County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Alabama*	January 2017	Big Escambia Creek Modeling Report.	State submittal

*Alabama submitted the assessment prepared by Golder Associates.

5.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 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 with regulatory default options. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate. Alabama chose to use the latest version of AERMOD, version 15181, available at the time of its modeling preparation. Because the State is using the regulatory default options for version 15181 and is not making use of any previously alternative modeling options included in version 16216r and the update to Appendix W, the EPA does not anticipate that using this older version would affect the modeling results.

5.3.1.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 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.

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. 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.

Land use type around the Big Escambia Creek plant within a 3 km radius was determined using the classification scheme proposed by Auer (1977) and used in the dispersion option. Current aerial imagery was used to determine the amount of rural, industrial, commercial, or compact residential (i.e., residences without individual driveways) land use within the 3 km radius. The Escambia County, Alabama, area is primarily rural, therefore, for the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model with rural dispersion coefficients or rural mode. Based upon an evaluation of land use in the area, the EPA concurs that it is appropriate to run the model in rural mode for this modeling analysis.

5.3.1.3. 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 SO_2 emission sources or facilities considered for modeling; the extent of concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The sources of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. For the Escambia County area, the State has included two other emitters of SO_2 within 25 km of Big Escambia Creek in any direction. The State determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS violations in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. In addition to Big Escambia Creek, the other emitters of SO_2 included in the area of analysis are: St. Regis Gas Treating facility (Breitburn Operating LP) and the Oil and Gas Production facility (Escambia Operating Company LLC). No other sources beyond 25 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis.

ADEM used the Q/D >20 metric within 20 km to determine which background sources should be included in the modeling analysis for Big Escambia Creek. A Q/D value was determined for all sources within 25 km of each facility where Q represents the 2014 actual SO_2 tpy emissions totals, and D represents the distance between the two facilities. If the Q/D metric yielded a value of greater than 20, the facility was retained and additional QA/QC was performed on a unit by unit basis. Using this methodology, ADEM identified, two additional nearby background sources that were included in the modeling analysis for Big Escambia Creek. These nearby sources include Escambia Operating Company facility (412) in Flomaton, Alabama, and the Breitburn Operating, L.P. facility in Jay, Florida (Santa Rosa County). The Flomaton and Breitburn facilities are located 25 km northeast and 21 km southeast of the Big Escambia Creek plant, respectively. The EPA notes three additional sources in Escambia County, Georgia-Pacific Brewton LLC(972), Pruet Production Company(193), and Ventex Operating Company(149), that each emit more than 100 tpy of SO_2. Additionally, there are other SO_2 sources that emit less than 100 tpy of SO_2 located in Escambia County. The EPA notes three additional SO_2 sources north of Big Escambia Creek in Conecuh County more than 50 km from the DRR source. These sources emitted 67.53, 31.44 and 2.43 tons of SO_2 in 2014, respectively. The EPA believes that the Georgia-Pacific Brewton facility which had 972 tons of SO_2 emissions in 2014 and is located approximately 24 km from the Big Escambia Creek facility could potentially have impacts in the area of analysis and could cause a significant concentration gradient near the Big Escambia Creek facility. The potential impacts from this facility should be further investigated. The EPA believes there are no additional sources in the counties bordering Escambia County that would likely cause or contribute to an exceedance of the SO_2 NAAQS in the area of analysis.

The Poarch Creek Band of Indians has three non-contiguous areas of off-reservation trust land in Escambia County, Alabama, within the State's area of analysis. There are two small areas of trust land, both approximately 11.5 km west and northwest of the Big Escambia Creek facility. A third area of trust land is located adjacent to the Poarch Creek Indian Reservation. The primary Poarch Creek Indian Reservation is approximately 19 km west-northwest of the Big Escambia Creek facility. There are no SO_2 sources within any of the Poarch Creek tribal land boundaries; therefore, no sources on the tribal reservation trust lands were included in the modeling analysis for Big Escambia Creek. The Poarch Band of Creek Indian Nation did not provide a designation recommendation for this round of SO_2 designations.

Cartesian grid receptors were placed along the ambient air boundary and beyond up to a distance of 15 km. The receptor spacing are as follows:

- Every 50 m along the potential ambient boundary
- Every 100 m outside the ambient boundary out to 2.0 km
- Every 500 m from 2.0 km to 7.0 km
- Every 1,000 m from 7.0 km to 15.0 km.

The receptor network contained 4,964 receptors, and the network covered the Escambia County, Alabama, area. Figures 19 and 20, included in the State's recommendation, show the State's 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 each 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. The EPA accepts the receptor grid and additional sources rationale for the Escambia County AERMOD modeling.

Figure 19. Receptor Grid for the Escambia County Area. Source: "Air Dispersion Modeling for 1-Hour Average SO_2 NAAQS Area Designation Big Escambia Creek Plant, Escambia County, Alabama" prepared for Alabama, January 2017.

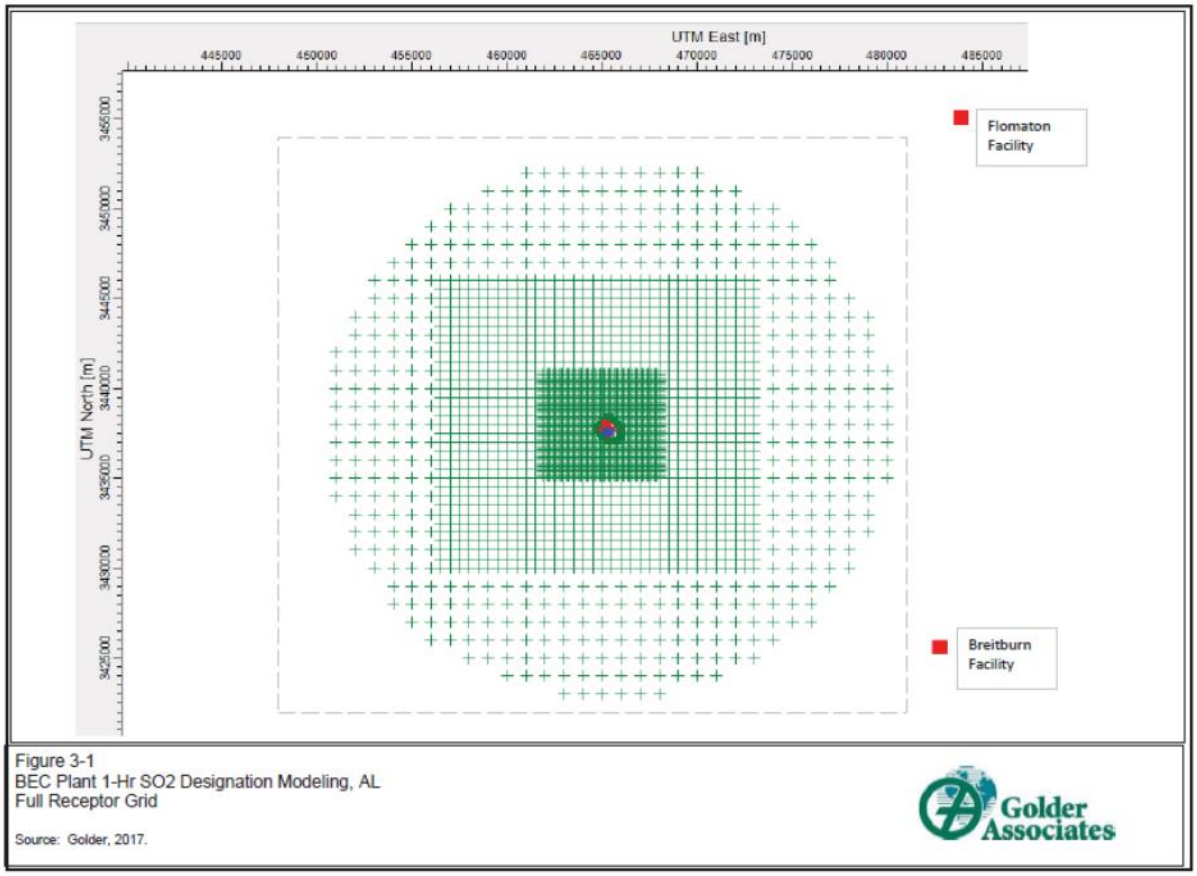
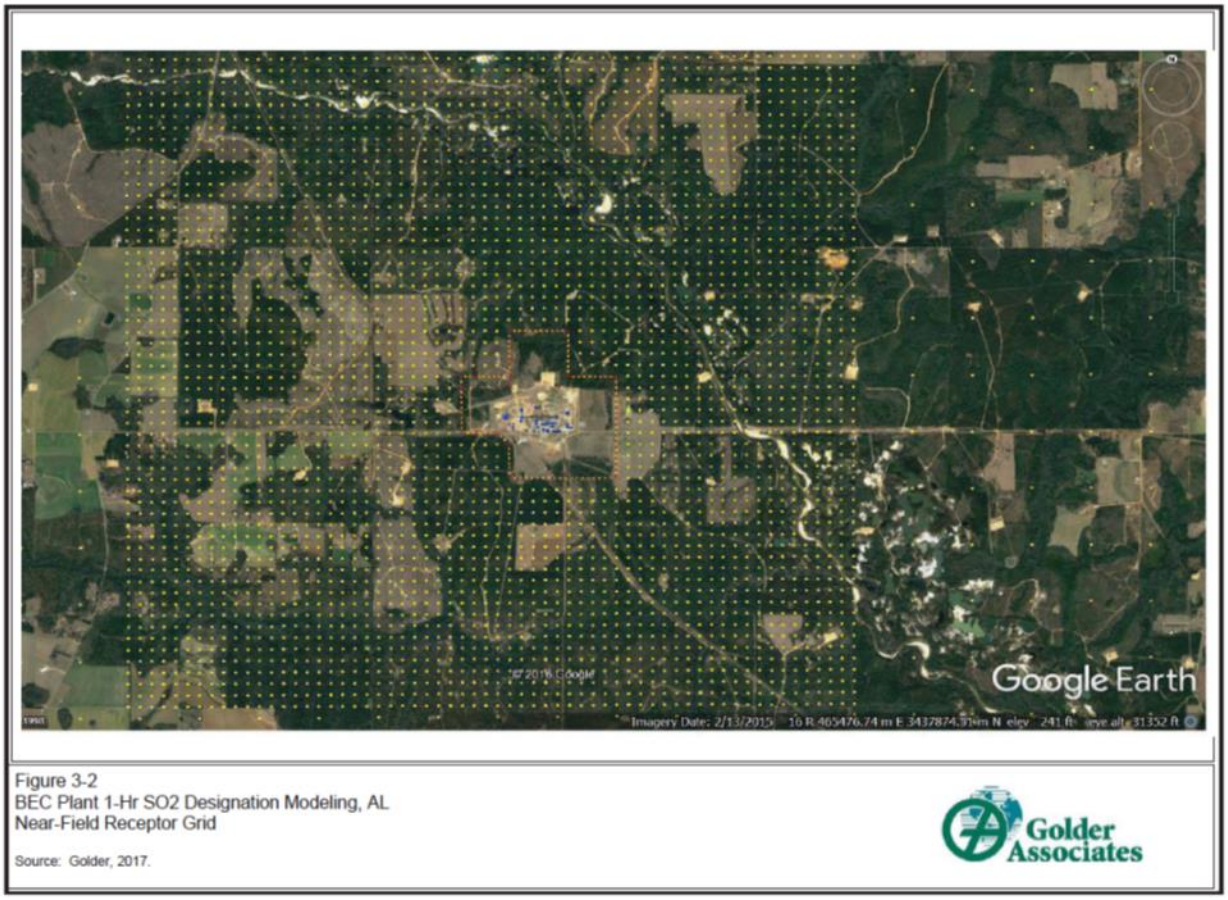


Figure 20. Near-Field Receptor Grid for the Escambia County Area. Source: "Air Dispersion Modeling for 1-Hour Average SO_2 NAAQS Area Designation Big Escambia Creek Plant, Escambia County, Alabama" prepared for Alabama, January 2017.



5.3.1.4. 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.

Based on the EPA comments on the draft modeling protocol previously submitted, the following facilities were included as background SO_2 emissions sources: Escambia Operating Company facility in Flomaton, Alabama, and Breitburn Operating, L.P. facility located in Jay, Florida (Santa Rosa County). The Flomaton and the Breitburn facilities are located 25 km northeast and 21 km southeast of the Big Escambia Creek plant, respectively. ADEM obtained the air operating permit and stack parameters for the Breitburn facility from the Florida Department of Environmental Protection.

The State characterized these 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 for some sources and followed the GEP stack height regulations for sources modeled with allowable 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 BPIPPRM was used to assist in addressing building downwash.

The EPA verified that BPIPPRM was correctly used for Escambia County, Alabama for AERMOD modeling.

5.3.1.5. 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 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 SO_2 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 SO_2 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 Big Escambia Creek Plant and two other emitters of SO_2 within 25 km in the area of analysis. For this area of analysis, the State has opted to use a hybrid approach, where emissions from certain facilities are expressed as actual emissions, and those from other facilities are expressed as PTE rates. The facilities in the State's modeling analysis and their associated annual actual SO_2 emissions between 2013 and 2015 or PTE rates are summarized below.

Actual hourly varying emissions rates for the thermal oxidizer at Big Escambia (source ID S1201) for the period 2013 – 2015 were used in the modeling analysis. Permit allowable or

potential emissions rates were used for all other emissions units. No updated BPIPPRM file was provided with the updated AERMOD modeling received from the state; however, the state indicated that they did used BPIPRIME for their January 2017 DRR submittal to address actual and GEP stack heights. The hourly SO_2 emissions rates of the natural gas-fired engines and boilers at Big Escambia were estimated based on the design heat input or fuel flow rating and a sulfur content of 0.25 grains per 100 standard cubic foot (scf). Emissions rates for the Breitburn facility were initially obtained from the Florida Department of Environmental Protection, however permit allowable emissions rates were used for emissions units with available permit allowable rates and for units with available design heat input rate, the SO_2 emissions were estimated based on fuel sulfur content.

The annual actual SO_2 emissions for Big Escambia (Source ID S1201) and the calculated hourly emission rates converted to tons/year for the remaining Big Escambia units and the units at the Breitburn facility are summarized in Tables 14 and 15. A description of how the State obtained hourly emission rates is given below this table.

Table 14. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Escambia County, Alabama Area

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
Big Escambia Creek Plant (Source ID S1201)	4,079	3,885	3,574
Total Emissions from All Modeled Facilities in the State's Area of Analysis	4,079	3,885	3,574

For Big Escambia Creek Plant, actual hourly varying emissions rates for the thermal oxidizer (source ID S1201) for the period 2013 – 2015 were used in the modeling analysis. The actual hourly emissions data were obtained from CEMS. The EPA compared the emissions for the Big Escambia Creek Plant with the emissions in the EPA's 2014 NEI. The total actual emissions in the 2014 NEI are listed as 4,776 tpy versus the actual emissions from the thermal oxidizer (3,885 tpy) added to the calculated PTE emissions for all other Big Escambia modeled units (17.4 tpy, shown in Table 15) which equal a total of 3,902 tpy. While a direct comparison is difficult due to a lack of complete documentation of all emissions sources at the facility, the large difference (858 tpy) creates uncertainty about whether appropriate emissions were used for the modeling.

Table 15. SO_2 Emissions based on PTE from Facilities in the Area of Analysis for the Escambia County, Alabama Area

Facility Name	**SO_2 Emissions (tpy, based on PTE)**
Big Escambia Creek Plant (all other modeled units)	17.4
Escambia Operating Company-Flomaton	32
Breitburn Operating, L.P.	9,552
Total Emissions from Facilities in the Area of Analysis Modeled Based on PTE	9,601

For the remaining units at Big Escambia, calculated emission rates were provided for the modeling. Table 2-1 of the modeling report indicates that these the emission rates for these units are based on Vanguard data or the rate calculated based on fuel sulfur content. SO_2 emissions rates of the natural gas-fired engines and boilers at the BEC plant were estimated based on the design heat input or fuel flow rating and a sulfur content of 0.25 grains per 100 standard cubic foot (scf).

The PTE in pounds per hour for Escambia Operating Company-Flomaton was determined by the State based on a permit limit. The PTE in tpy for Escambia Operating Company-Flomaton was determined by the EPA by multiplying the provided 7.39 lb/hr emission rate by 0.0005 tons/lb and by 8,760 hours in a year. The PTE for Breitburn Operating, L.P. was provided via permitted allowable emission rates (permit No. 1130005-023-AV) for two of the sources (S0034 at 2001.7 lb/hr and S0035 at 166.7 lb/hr) with the remaining sources based on design heat input and fuel sulfur content. The PTE in tpy was determined by the EPA by taking the emission rates and multiplying by 0.0005 tons/lb and by 8,760 hours in a year.

The EPA's comparison of the emissions from the Big Escambia Creek Plant to emissions for the facility contained in the 2014 NEI raises questions about whether appropriate emissions were used in the modeling.

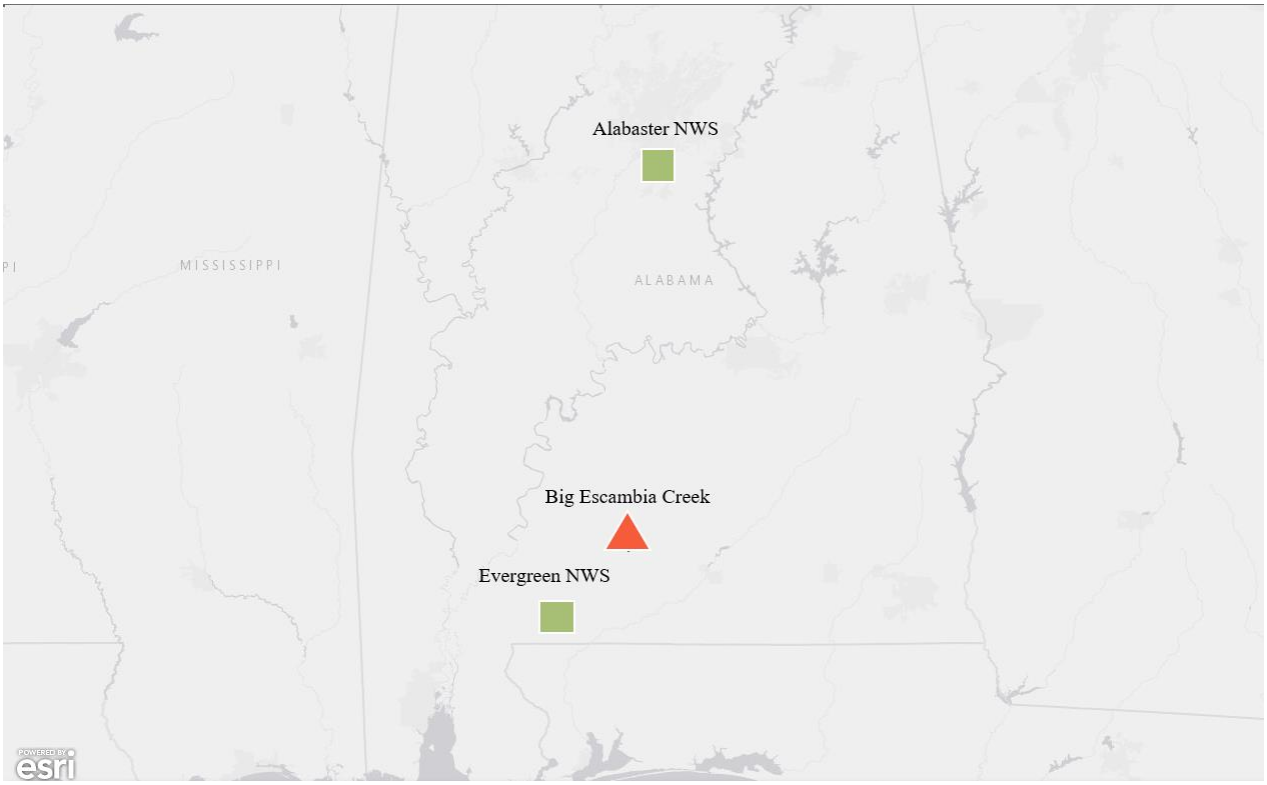
5.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

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 NWS stations, site-specific or onsite data, and other sources such as universities, FAA, and military stations.

For the area of analysis for the Escambia County area, the State selected the surface meteorology from Evergreen NWS site, Alabama, (31.416°N, -87.044°W) and coincident upper air observations from Alabaster, Alabama, (33.22°N, -86.84°W) as best representative of meteorological conditions within the area of analysis.

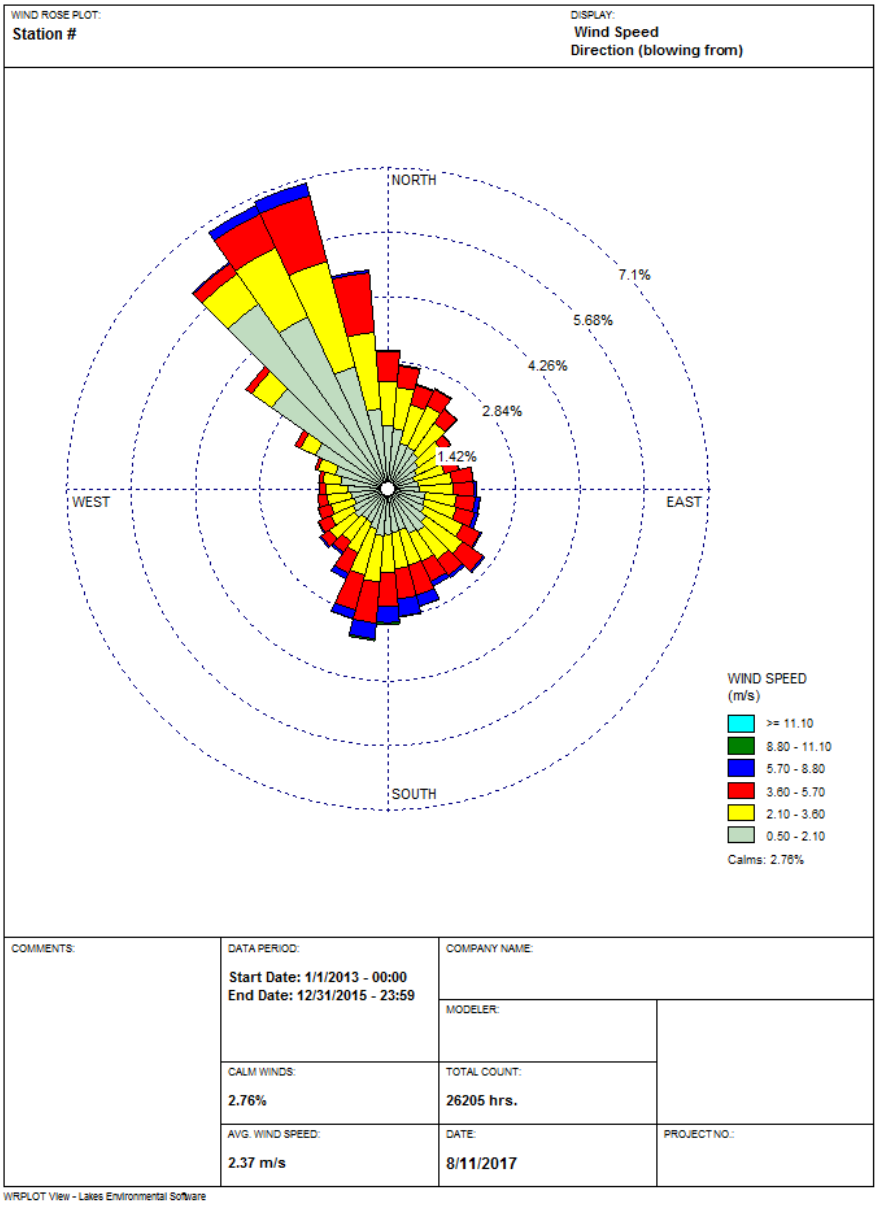
The EPA does not know if AERSURFACE was used. No information was provided to described how the surface characteristics of the area of analysis were developed. The State provided no spatial sectors, distances, or temporal resolution for any conditions. In the figure below, generated by the EPA, the location of this NWS stations is shown relative to the area of analysis.

Figure 21. Area of Analysis and the NWS stations in the Escambia County, Alabama Area



The EPA generated a wind rose for the Evergreen, AL NWS station for the 2013-2015 period. In Figure 22, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The primary wind direction is from the north-west.

Figure 22. Escambia County, Alabama 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 processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. Since the AERMET files were not provided, it is unknown whether the state followed the methodology and settings presented in the EPA's AERMOD Implementation Guidance in the processing of the raw meteorological data into an AERMOD-ready format. Also, the EPA is unsure if the State used AERSURFACE to best represent surface characteristics.

The modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, details regarding how these files were prepared were not provided. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

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

The terrain in the area of analysis is best described as 270 feet above mean sea level (ft-msl). Around the vicinity of the site up to a distance of 15 km, the terrain is gently rolling with elevations changing between approximately 100 ft-msl to approximately 340 ft-msl. To account for these 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 USGS NED. The EPA concurs with the use of terrain elevations for Escambia County, Alabama, AERMOD modeling because the Escambia County, Alabama, area is gently rolling with slopes.

5.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 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 elected to use a "tier 2" approach. Data was obtained for 2013-2015 from the SEARCH network. The data are from the Centreville monitor located in Centreville, AL. The background concentrations for this area of analysis were determined by the State to vary from 2.72 μg/m^3, equivalent to 1.04 ppb when expressed in three significant figures,[17] to 22.91 μg/m^3 (8.75 ppb). with an average value of 9.14 μg/m^3 (3.5 ppb).

Table 16. Centreville SO_2 Background Values for 2013-2015 (ppb)

Hour of Day	Season 1 (Dec-Jan-Feb)	Season 2 (Mar-Apr-May)	Season 3 (Jun-Jul-Aug)	Season 4 (Sep-Oct-Nov)
1	3.6	2.4	1.7	2.0
2	3.9	2.0	2.5	1.7
3	3.1	1.9	2.8	2.1
4	2.6	1.8	2.7	3.6
5	3.3	1.9	2.0	6.4
6	5.0	1.9	3.3	8.2
7	6.7	2.0	5.9	8.3
8	7.5	2.7	7.7	8.8
9	6.8	4.6	7.4	8.7
10	4.1	3.7	4.0	6.2
11	4.5	3.2	5.2	4.2
12	5.6	2.3	2.9	4.6
13	4.4	2.2	3.3	2.3
14	3.9	3.1	3.1	1.9
15	4.0	3.4	2.8	1.8
16	3.9	3.2	2.0	2.0
17	4.1	3.0	2.0	1.3
18	3.5	3.0	2.9	1.3
19	4.2	2.3	2.4	1.2
20	3.4	2.4	2.3	1.0
21	6.0	2.4	2.4	1.7
22	8.9	1.6	1.2	1.7
23	4.2	2.5	1.3	2.1
24	4.5	2.7	1.2	3.1

The EPA reviewed the Centreville SEARCH monitoring information and determined that the monitor is not a regulatory monitor that meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the data is not acceptable for use as

background concentrations in this modeling demonstration. The EPA communicated this issue to Alabama in March 2017[18] and suggested the following options for addressing the issue: 1) demonstrate that the Centreville monitor meets the QA/QC criteria and other requirements in Part 58, Appendix B for PSD monitors, 2) choose a different background monitor that is representative of SO_2 background concentrations in the area around Big Escambia Creek Plant and either use the design value from that monitor or a use a more refined approach of seasonal hourly varying background values from that monitor, or 3) demonstrate that the Centreville SEARCH background value used in the modeling is more conservative (larger) than an alternative background site that would be representative of background in the area of Big Escambia Creek Plant. For this modeling demonstration, if option 3 is chosen, Alabama would need to demonstrate that the Centreville data is higher than the alternate site's data for each hour (96 total values, 4 seasons x 24 hours in each day = 96 values).

Alabama submitted additional information to the EPA[19] to address the issues discussed above. Alabama's supplemental information proposed to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky. For eight of the Alabama DRR sources (including Big Escambia Creek Plant), Alabama's analysis compared the Centreville SEARCH data with the Mammoth Cave data, hour-by-hour, for each of the 96 hours in the "season-by-hour-of-day" option used in the AERMOD modeling. Alabama then found the hour where the Mammoth Cave data is greater than the Centreville data by the greatest amount (which they found to be 3.68 ppb = 9.71 ug/m^3).[20] Alabama added this "adjustment factor" of 9.71 ug/m3 to the final modeling results for each the SO_2 DRR Sources (including Big Escambia Creek Plant).

Alabama's supplemental information justifies use of the Mammoth Cave data by stating that it is "the closest background monitor with sufficient data capture that does not show interference from industrial sources." The EPA does not believe that this is an adequate justification for determining whether Mammoth Cave is a representative background monitor pursuant to the criteria provided in Section 8.2.2(c) of the *Guideline on Air Quality Models* contained in 40 CFR Part 51, Appendix W. The criteria in Appendix W state that an appropriate regional site is "*one that is located away from the area of interest but is impacted by similar natural and distant man-made sources."*

The EPA performed an evaluation to determine if the Mammoth Cave site is an appropriate regional background site for the Big Escambia Creek Plant modeling. The Mammoth Cave

[17] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in μg/m^3. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 μg/m^3.

[18] Email from Beverly Banister, Region 4 Air, Pesticides and Toxics Management (APTMD), Air Director to Ron Gore, ADEM Air Director on March 21, 2017.

[19] Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017

[20] Note that Alabama used a conversion factor of 2.639 to convert the SO_2 background concentration in ppb to ug/m^3. This differs from the EPA's recommended conversion factor of 2.619. Alabama's conversion factor results in a conservatively higher concentration in ug/m^3, so is therefore acceptable

monitor is located in a rural area with very few SO_2 emissions sources nearby. Within 25 km of the Big Escambia Creek Plant there are five SO_2 point sources in the 2014 National Emissions Inventory. Two of the five SO_2 point sources were explicitly included in the Big Escambia Creek Plant modeling as "nearby background sources." Additionally, there are other smaller SO_2 point sources in Escambia County. The 2014 NEI listed 7,829 tpy of SO_2 emissions in Escambia County. The 2014 emissions from the modeled sources are approximately 5,478 tpy, so there are over 2,300 tpy of emissions in Escambia County alone not accounted for in the modeling. In the area around the Mammoth Cave monitor, there are no sources emitting more than 5 tpy of SO_2 within 50 km of the monitor and the total SO_2 emissions in the 3 counties surrounding the monitor are less than 70 tpy, according to the emissions data in the 2014 NEI. The closest major source of SO_2 emissions to the Mammoth Cave monitor is the TVA Paradise power plant (19,654 tpy in 2014) located approximately 75 km from the monitor. The EPA has determined that the SO_2 emissions sources located near the Mammoth Cave monitor are not similar to the sources in the area near Big Escambia Creek Plant. As a result, the Mammoth Cave monitor is not an acceptable regional site to provide background concentrations for this modeling analysis, and Alabama's "adjustment factor" procedure is not acceptable for the Big Escambia Creek Plant modeling.

5.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Escambia County area of analysis are summarized below in Table 17.

Table 17. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Escambia County Area

Input Parameter	Value
AERMOD Version	15181 Default
Dispersion Characteristics	Rural
Modeled Sources	14
Modeled Stacks	14
Modeled Structures	34
Modeled Fencelines	1
Total receptors	4,964
Emissions Type	CEMS, Mixed/Hybrid
Emissions Years	2013-2015
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	Evergreen, AL
NWS Station Upper Air Meteorology	Alabaster, AL
NWS Station for Calculating Surface Characteristics	Evergreen, AL
Methodology for Calculating Background SO_2 Concentration	Tier 2 approach using SEARCH site at Centreville, AL (2013-2015)
Calculated Background SO_2 Concentration	2.72 – 22.91 µg/m^3+ Alabama's "adjustment factor" of 9.71 µg/m3

The results presented below in Table 18 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

Table 18. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for Escambia County Area of Analysis

		Receptor Location [UTM zone 16]		99th percentile daily maximum 1-hour SO_2 Concentration (µg/m^3)	
Averaging Period	**Data Period**	**UTM Easting (m)**	**UTM Northing (m)**	**Modeled concentration (including background)**	**NAAQS Level**
99th Percentile 1-Hour Average	2013-2015	465,104	3,438,129	184.41	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 µg/m^3 conversion factor

The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 174.7 µg/m^3, equivalent to 66.71 ppb. This modeled concentration included the background concentration of SO_2, and is based on a mixture of actual emissions from the facility/facilities. As discussed in Section 5.2.1.8, in response to the EPA's outstanding questions regarding the background concentrations using in their modeling analysis, Alabama added an "adjustment factor" of 3.68 ppb (9.71 µg/m^3) to the final modeling result presented in their modeling report (174.7 + 9.71 = 184.41 µg/m^3). The EPA has determined that Alabama's "adjustment factor" procedure is not acceptable for the Big Escambia Creek Plant modeling because the Mammoth Cave monitor is not an acceptable regional site to provide background concentrations for this modeling analysis. Figures 23 and 24 below were included as part of the State's recommendation, and indicates that the predicted value occurred at the north property boundary. The State's receptor grid is also shown in the figure.

Figure 23. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Escambia County Area Modeled Area. Source: "Air Dispersion Modeling for 1-Hour Average SO_2 NAAQS Area Designation Big Escambia Creek Plant, Escambia County, Alabama" prepared for Alabama, January 2017

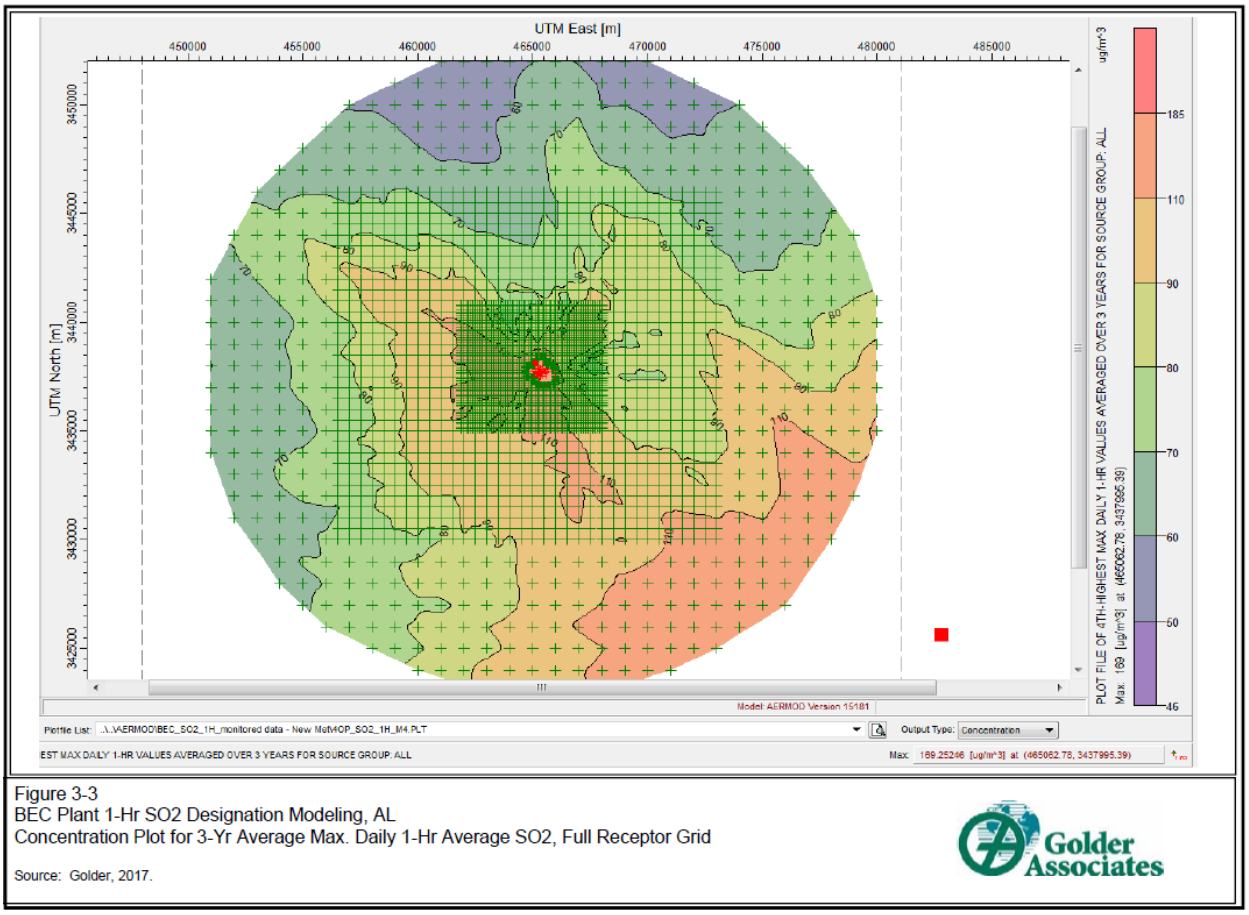


Figure 3-3
BEC Plant 1-Hr SO2 Designation Modeling, AL
Concentration Plot for 3-Yr Average Max. Daily 1-Hr Average SO2, Full Receptor Grid

Source: Golder, 2017.

Figure 24. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Escambia County Area Modeled Area, Near-Field Receptor Grid. Source: "Air Dispersion Modeling for 1-Hour Average SO_2 NAAQS Area Designation Big Escambia Creek Plant, Escambia County, Alabama" prepared for Alabama, January 2017.

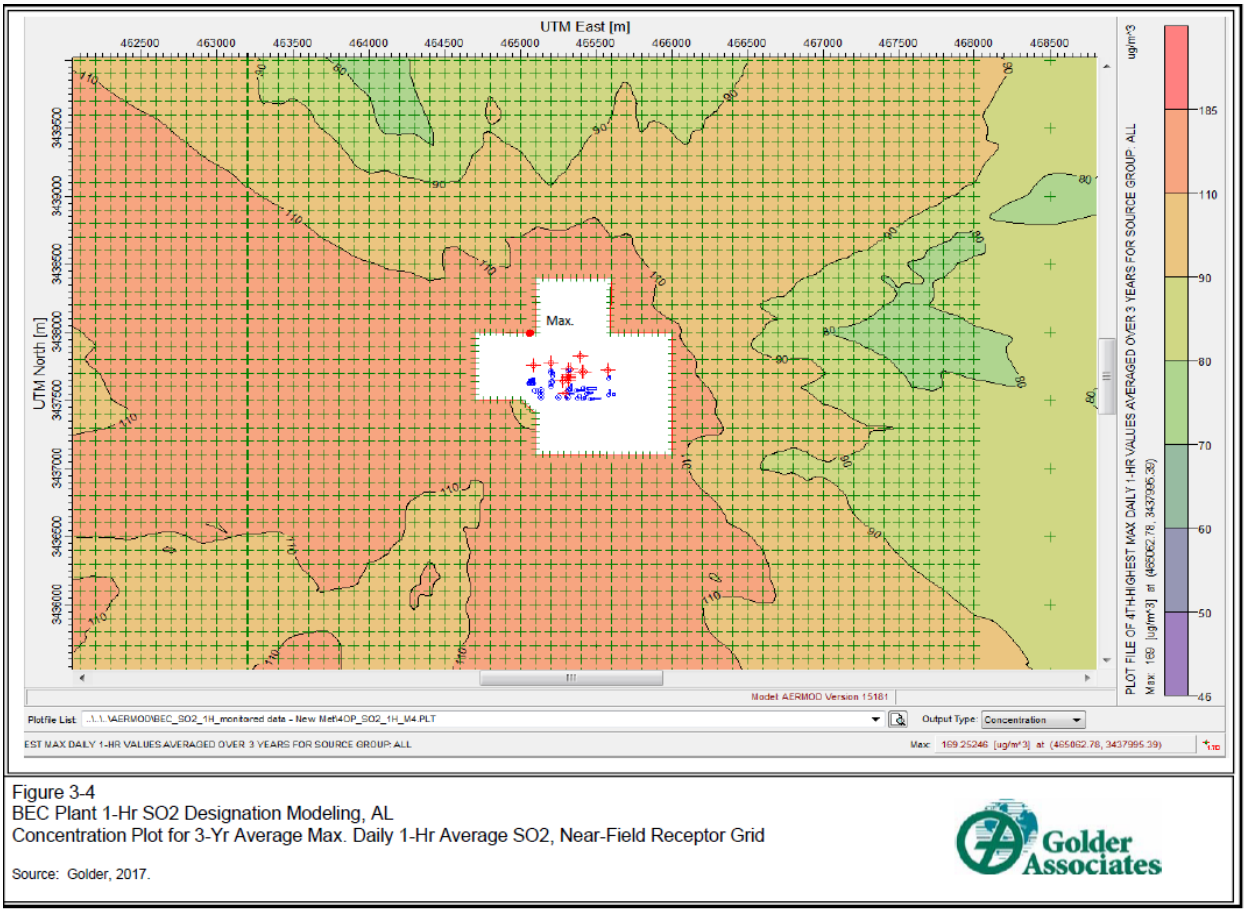


Figure 3-4
BEC Plant 1-Hr SO2 Designation Modeling, AL
Concentration Plot for 3-Yr Average Max. Daily 1-Hr Average SO2, Near-Field Receptor Grid

Source: Golder, 2017.

The modeling submitted by the State, with noted issues, does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

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

The EPA assessment of the 1-hour SO_2 DRR AERMOD modeling for the Big Escambia Creek facility finds that the modeling does not conclusively demonstrate that the area surrounding this DRR source meets the 1-hour SO_2 NAAQS and does not contribute to a nearby area that does not meet the NAAQS. Issues with the modeling include the inappropriate use of the Centreville SEARCH and Mammoth Cave monitors for background concentrations, the lack of documentation demonstrating the use of appropriate meteorology data, the lack of documentation supporting the development of surface characteristics, possible contributions from a nearby source not included in the modeling, and uncertainty about whether appropriate emissions rates were used in the modeling for the Big Escambia Creek facility.

The modeling considered a mix of actual and potential emission rates for Big Escambia Creek and two nearby sources, Breitburn located in Jay (Santa Rosa County), Florida, and Escambia Operating Company. The EPA believes the modeling domain is appropriate to capture predicted maximum impacts in the Escambia County area. The State adequately represented the topography of the area with the model and its preprocessors. The State chose to model actual emissions from Big Escambia Creek during 2013 – 2015 to reflect normal operations.

As mentioned above in section 5.2.1.8 the State used AERMOD version 15181. The current version of AERMOD, version 16216r, includes updates to 40 CFR part 51, Appendix W, "Guideline of Air Quality Models," published on January 17, 2017 (82 FR 5203). This version of AERMOD also includes fixes to glitches that were inadvertently included in version 16216. Alabama did not use the latest version of AERMOD because the State used the regulatory default settings for version 15181 available at the time of its modeling preparation. The modeling did not use any previously alternative modeling options included in version 16216r and the update to Appendix W. The State only included two of the five nearby SO_2 emitting sources located within 25 km of Big Escambia Creek. The EPA believes that the Georgia-Pacific Brewton facility which had 972 tons of SO_2 emissions in 2014 and is located approximately 24 km from the Big Escambia Creek facility could potentially have impacts in the area of analysis and could cause a significant concentration gradient near the Big Escambia Creek facility. The potential impacts from this facility should be further investigated.

Alabama's selection of meteorology and surface characteristics for the area may be appropriate to make a valid modeling demonstration, however, the EPA notes that ADEM did not provide documentation to verify that the AERMET processing was appropriate to generate the surface and upper air meteorology files. Additionally, ADEM did not provide documentation regarding how the surface characteristics of the area of analysis were developed. Additionally, the modeling report does not contain adequate documentation to demonstrate that appropriate SO_2 emissions rates were used in the modeling for the Big Escambia Creek Plant. A comparison of the emissions used in the modeling with the emissions for the facility contained in the 2014 NEI shows a discrepancy therefore, further clarification is needed from state.

Lastly, the EPA does not believe the State's justification for determining that the Centerville SEARCH or the Mammoth Cave SO_2 monitors are representative background monitors for the area around Big Escambia Creek is consistent the criteria in provided in Section 8.2.2(c) of the *Guideline on Air Quality Models* at 40 CFR Part 51, Appendix W, and thus is not appropriate.

The EPA reviewed the Centreville SEARCH monitoring information and determined that the monitor is not a regulatory monitor that meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. The EPA performed an evaluation to determine if the regulatory Mammoth Cave site in Kentucky is an appropriate regional background site for the Big Escambia Creek Plant modeling. The analysis concluded the SO_2 emissions sources located near the Mammoth Cave monitor are not similar to the sources in the area near Big Escambia Creek Plant. Therefore, the Mammoth Cave monitor is not an acceptable regional site to provide background concentrations for this modeling analysis, and Alabama's "adjustment factor" procedure is not acceptable for the Big Escambia Creek Plant modeling. As a result, the EPA finds that the State's modeling analysis for Big Escambia Creek was not performed in a manner consistent with Appendix W and the Modeling TADs and may not accurately represent current air quality in the area. Therefore, the EPA does not have sufficient information to determine whether the area meets or does not meet the 1-hour SO_2 NAAQS or contributes to a nearby area that does not meet the NAAQS.

5.4. Jurisdictional Boundaries in the Escambia County, Alabama Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for city/county/parish. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

Alabama requested the entire State be designated attainment, including Escambia County, based on an assessment and characterization of air quality from the Big Escambia Creek Plant DRR source and other nearby sources. The State did not provide a specific boundary recommendation for the modeled areas around Big Escambia Creek. Escambia County is bounded to the north by Conecuh County, Alabama; to the east by Covington County, Alabama; to the southeast by Okaloosa County, Florida; to the south by Santa Rosa County, Florida; to the west by Baldwin County, Alabama; and to the northwest by Monroe County, Alabama.

ADEM assessed nearby sources within a 25 km area of analysis from the Big Escambia Creek facility in all directions based on Q/D spatial analysis and considered this sufficient to resolve the maximum impacts and any potential impact areas. This area of analysis covers a portion of Escambia County in Alabama and a portion of Santa Rosa County in Florida. Five additional SO_2 sources were identified within the 25 km area of analysis however, only two sources, Breitburn Operating, L.P. and Escambia Operating company were considered as nearby sources in the modeling analysis for Big Escambia Creek. Breitburn located in Jay, Florida (Santa Rosa County) approximately 25 km southeast of Big Escambia Creek emitted 1,327.23 tpy in 2014. Escambia Operating Company in Escambia County is located 21 km from Big Escambia Creek and emitted 412.56 tpy in 2014. The remaining three sources and 2014 emissions within the area of analysis, Georgia-Pacific Brewton LLC (972 tons), Pruet Production Company (193 tons), and Ventex Operating Company (149 tons), each emit more than 100 tpy of SO_2. Additionally, there are other SO_2 sources that emit less than 100 tpy of SO_2 located in Escambia County. The EPA notes three additional SO_2 sources north of Big Escambia Creek in Conecuh County more than 50 km from the DRR source.

The Poarch Creek Band of Indians has three non-contiguous areas of off-reservation trust land in Escambia County, Alabama within the State's area of analysis. There are two small areas of trust land, both approximately 11.5 km west and northwest of the Big Escambia Creek facility. A third area of trust land is located adjacent to the Poarch Creek Indian Reservation. The primary Poarch Creek Indian Reservation is approximately 19 km west-northwest of the Big Escambia Creek facility. There are no SO_2 sources within any of the Poarch Creek tribal land boundaries therefore, no sources on the tribal reservation trust lands were included in the modeling analysis for Big Escambia Creek. The Poarch Band of Creek Indian Nation did not provide a designation recommendation for this round of SO_2 designations.

5.5. The EPA's Assessment of the Available Information for the Escambia County, Alabama Area

After evaluating the 1-hour SO_2 DRR AERMOD modeling and other information for the Big Escambia Creek Plant, the EPA intends to modify the State's recommendation and designate Escambia County unclassifiable for the SO_2 NAAQS. Alabama recommended attainment for the entire state including Autauga County and the area containing Big Escambia Creek based in part on a modeling assessment using AERMOD version 15181 and characterization of air quality impacts from the DRR sources, no other nearby source and background concentration data from the Mammoth Cave monitor in Kentucky. The modeling considered actual emissions for Big Escambia Creek and resulted in a modeled 1-hour value of 184.41 $\mu g/m^3$, equivalent to 70.4 ppb which is below the level of the 2010 SO_2 NAAQS. However, the EPA's assessment finds that the modeling does not provide sufficient information to demonstrate whether the area containing the DRR source meets or does not meet the 1-hour SO_2 NAAQS or contributes to an area that does not meet the standard. Issues with the Big Escambia Creek modeling include:

- Lack of adequate documentation to support the AERMET modeling used to generate the surface and upper air meteorology files; and,
- No documentation regarding how the surface characteristics of the area of analysis were developed; and,
- Possible contribution to SO2 modeled concentrations from a nearby source not included in the modeling; and,
- Lack of adequate documentation to demonstrate that appropriate SO_2 emissions rates were used in the modeling for the Big Escambia Creek Plant; and,
- The inappropriate use of background concentrations from the Centreville SEARCH and Mammoth Cave ambient monitoring sites.

ADEM's modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, the State did not provide details regarding how these files were prepared. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

The modeling report does not contain adequate documentation to demonstrate that appropriate SO_2 emissions rates were used in the modeling for the Big Escambia Creek Plant. A comparison of the emissions used in the modeling with the emissions for the facility contained in the 2014 NEI shows a discrepancy and therefore, further clarification is requested from the state.

As mentioned above in section 5.3.1.8, the EPA does not believe the State's justification for determining that the Mammoth Cave SO_2 monitor is a representative background monitor for the area around Plant Gaston is consistent with the criteria in Appendix W, and thus is not appropriate. The EPA has determined that the magnitude of SO_2 emissions sources located near the Mammoth Cave monitor differ substantially from the magnitude of emission sources in the area near Plant Gaston. As a result, the Mammoth Cave monitor is not an acceptable regional site to provide background concentrations for this modeling analysis.

The EPA believes that the Georgia-Pacific Brewton facility which had 972 tons of SO_2 emissions in 2014 and is located approximately 24 km from the Big Escambia Creek facility could potentially have impacts in the area of analysis and could cause a significant concentration gradient near the Big Escambia Creek facility. The potential impacts from this facility should be further investigated.

ADEM assessed nearby sources within a 25 km area of analysis from the Big Escambia Creek facility in all directions based on Q/D spatial analysis and considered this sufficient to resolve the maximum impacts and any potential significant impact areas. This area of analysis covers a portion of Escambia County in Alabama and a portion of Santa Rosa County in Florida. Escambia County is bounded to the north by Conecuh County, Alabama; to the east by Covington County, Alabama; to the southeast by Okaloosa County, Florida; to the south by Santa Rosa County, Florida; to the west by Baldwin County, Alabama; and to the northwest by Monroe County, Alabama. The EPA agrees that there are no additional sources in the counties bordering Escambia County that would likely cause or contribute to an exceedance of the SO_2 NAAQS in the area of analysis due to their low SO_2 emissions and distance from Big Escambia Creek. The EPA notes that Big Escambia Creek is the only SO_2 emitting source subject to the DRR in Escambia County.

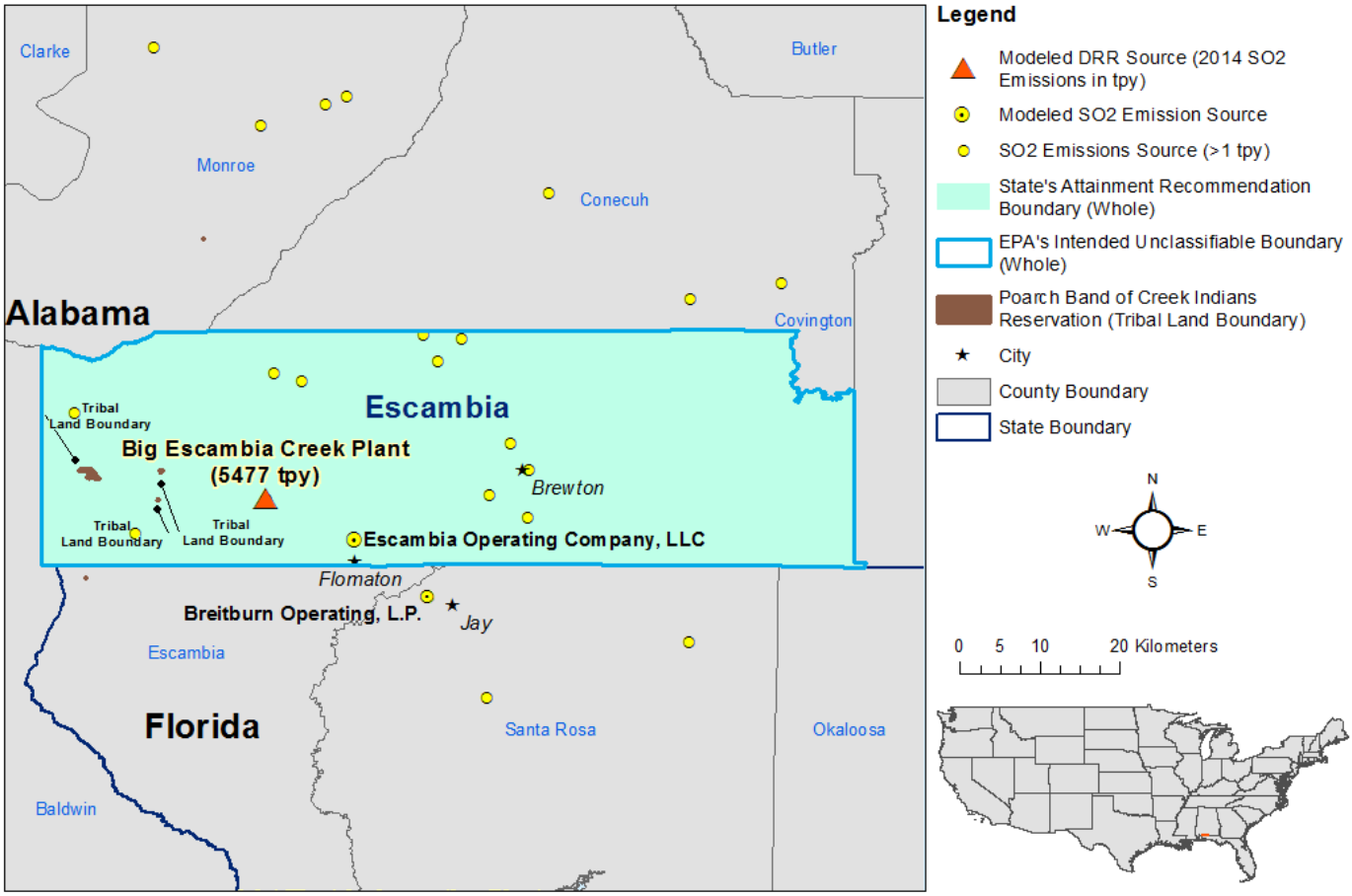
The Poarch Creek Band of Indians has three non-contiguous areas of off-reservation trust land in Escambia County, Alabama within the State's area of analysis. The primary Poarch Creek Indian Reservation is approximately 19 km west-northwest of the Big Escambia Creek facility. There are no SO_2 sources within any of the Poarch Creek tribal land boundaries. The EPA's intended unclassifiable designation for Escambia County includes the Poarch Creek Indian trust lands.

Based on the available information, the EPA has determined that Alabama's modeling analysis for the Big Escambia Creek facility was not performed in a manner consistent with Appendix W and the Modeling TAD and may not accurately represent current air quality in the area. Therefore, the EPA does not have sufficient information to determine whether the area is meeting or not meeting the 1-hour SO_2 NAAQS or is contributing to a nearby area that does not meet the standard.

5.6. Summary of Our Intended Designation for the Escambia County, Alabama Area

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA is modifying the state's recommendation and intends to designate Escambia County unclassifiable for the 2010 SO_2 NAAQS. The EPA's assessment of the 1-hour AERMOD modeling for the Big Escambia Creek facility finds that the modeling is not consistent with the modeling TADs or Appendix W and does not provide sufficient information to determine whether the area around the DRR source meets or does not meet the 1-hour SO_2 NAAQS or contributes to a nearby area that does not meet the NAAQS as discussed in section 5.3. The EPA believes that our intended unclassifiable area, bounded by the Escambia County boundary, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area. Figure 25 shows the boundary of this intended designated area. At this time, our intended designations for the State only apply to this and the other areas presented in this technical support document. There will be no remaining portions of Escambia County that remain to be characterized by December 31, 2020

Figure 25. Boundary of the Intended Escambia County Unclassifiable Area



6. Technical Analysis for the Walker County Area

6.1. Introduction

The EPA must designate the Walker County, Alabama, area by December 31, 2017, because the area has not been previously designated and Alabama has not installed and begun timely operation of a new, approved SO_2 monitoring network meeting the EPA specifications referenced in the EPA's SO_2 DRR for any sources of SO_2 emissions to characterize air quality in the vicinity of any source in Walker County.

6.2. Air Quality Monitoring Analysis for the Walker County Area

This factor considers the SO_2 air quality monitoring data in the area of Walker County. The EPA reviewed the available air quality monitoring data in the AQS database and found no nearby data for Walker County. In reviewing the available air quality monitoring data in AQS, the EPA determined that there is no relevant data in AQS collected in or near Walker County that could inform the intended designation action. The most recent SO_2 design values for all areas of the country are available at https://www.epa.gov/air-trends/air-quality-design-values.

6.3. Air Quality Modeling Analysis for the Walker County Area

6.3.1. Introduction

This section 6.3 presents all the available air quality modeling information for a portion of Walker County that includes Alabama Power Company Gorgas Electric Generating Plant (Plant Gorgas). (This portion of Walker County will often be referred to as "the Walker County area" within this section 6.3) This area contains the following SO_2 sources, principally the sources around which Alabama is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy:

- The Plant Gorgas facility emitted 2,000 tons or more annually. Specifically, Plant Gorgas emitted 2,257 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Alabama has chosen to characterize it via modeling.

- The Alabama Power Company Miller Steam Electric Generating Plant (Plant Miller) facility is not on the SO_2 DRR Source list, but is included in the modeling analysis. Plant Miller is located approximately 13 km east of Plant Gorgas and emitted 937 tons of SO_2 in 2014.

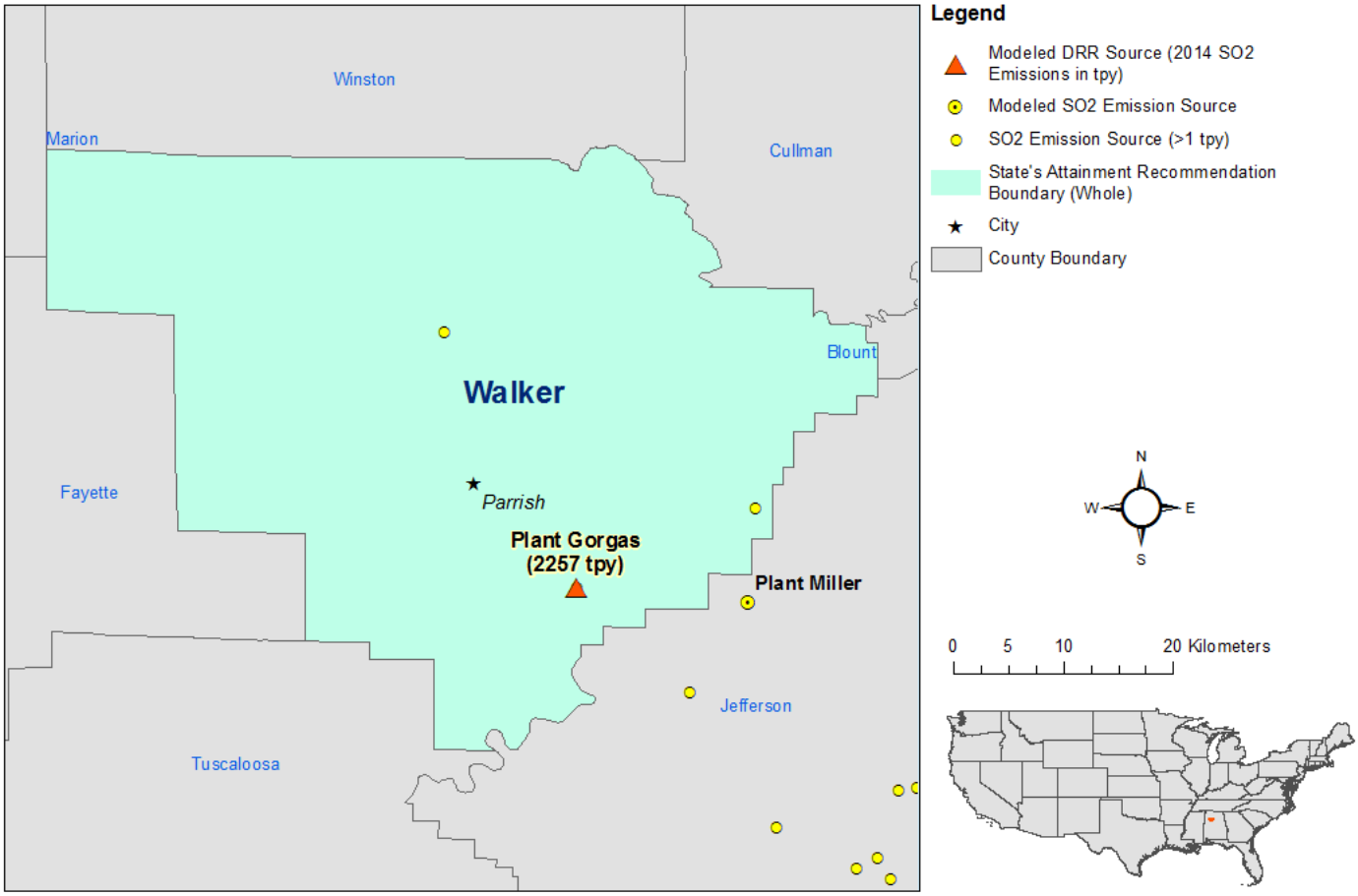
Because we have available results of air quality modeling in which these sources are modeled together, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

Alabama recommended that the entire State be designated attainment including Walker County that contains the Plant Gorgas DRR source based in part on an assessment and characterization of air quality impacts from this source and other nearby sources that may have a potential impact in the area where the 2010 SO_2 NAAQS may be violated. 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 is modifying the state's recommendation and intends to designate the area as unclassifiable. 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 Parrish, Alabama, in Walker County. See Figure 26. Plant Gorgas is located along the Mulberry Fork of the Black Warrior River, approximately 40 km northwest of Birmingham, Alabama. Also included in the figure are other nearby emitters of SO_2[21] including the Alabama Power Company Miller Steam Electric Generating Plant (Plant Miller), which was in included in the modeling analysis. Lastly, Figure 26 shows Alabama's attainment designation for the entire state including Walker County. The EPA's intended unclassifiable designation boundary for the Walker County area is not shown in this figure, but is shown in a figure in the section below that summarizes our intended designation.

[21] All SO_2 emitters meeting the 20D criterion (facilities that met the 2014 actual emissions divided by the distance of greater than 20 within a maximum distance of 20 km from Plant Gorgas) based on information in the emissions inventory provided by Alabama are shown in Figure 27.

Figure 26. Map of the Walker County Area Addressing Plant Gorgas.



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. For this area, the EPA received and considered one modeling assessments provided by a contractor on behalf of the State as well as additional information from the State in response to EPA comments. No assessments were received from other parties. To avoid confusion in referring to these assessments, the following table lists them, indicates when they were received, provides an identifier for the assessment that is used in the discussion of the assessments that follow, and identifies any distinguishing features of the modeling assessments.

Table 19. Modeling Assessments for the Walker County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Alabama*	January 2017	Plant Gorgas Modeling Report	Alabama submittal
Alabama	July 2017	ADEM Response to the EPA DRR Comments	Additional information regarding federal enforceability of Units 6 and 7 at Plant Gorgas

*Alabama submitted modeling assessment by AECOM.

6.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 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, using regulatory default options. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

The current version of AERMOD, version 16216r, includes updates to 40 CFR part 51, Appendix W, "Guideline of Air Quality Models," published on January 17, 2017 (82 FR 5203). This version of AERMOD also includes fixes to glitches that were inadvertently included in version 16216. Alabama is not required to use the latest version of AERMOD because the State is using the regulatory default settings for version 15181 available at the time of its modeling preparation and is not making use of any previously alternative modeling options included in version 16216r and the update to Appendix W.

6.3.1.2. Modeling Parameter: Rural or Urban Dispersion

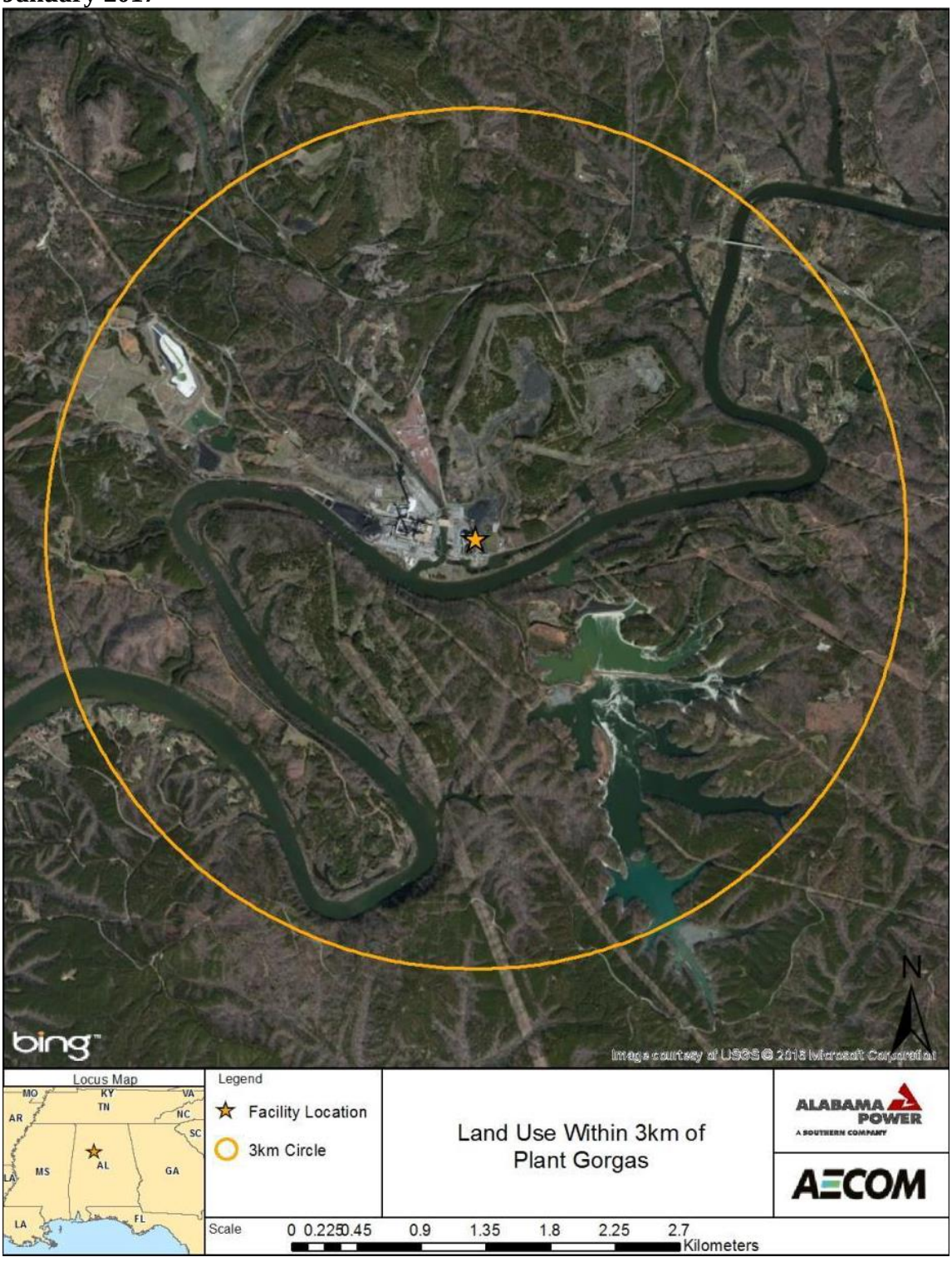
For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 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.

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 km radius of the Plant Gorgas facility using the Auer's land use methodology. For the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model with rural dispersion coefficients or rural mode and the EPA concurs with this assessment.

As shown in Figure 27, the area surrounding Plant Gorgas is predominantly rural, with land use consisting of a mix of mostly residential areas, forested areas, farms, water, and industrial areas. Therefore, the urban source options in AERMOD were not used.

Figure 27. 3 km Land Use Map for Plant Gorgas Area. Source: "Modeling Report Gorgas Steam Electric Generating Plant 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017



6.3.1.3. 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 SO_2 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 SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. ADEM used the Q/D >20 metric within 20 km to determine which background sources should be included in the modeling analysis for Plant Gorgas. The State determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. A Q/D value was determined for all sources within 20 km of the DRR source where Q represents the 2014 actual SO_2 tpy emissions totals, and D represents the distance between the two facilities. If the Q/D metric yielded a value of greater than 20, the facility was retained and additional QA/QC was performed on a unit by unit basis. Using this methodology, Alabama identified one additional nearby background source, Alabama Power Company Miller Steam Electric Generating Plant (Plant Miller) in neighboring Jefferson County that was included in the modeling analysis for Plant Gorgas. Plant Miller, located in Quinton, Alabama is approximately 13 km east of Plant Gorgas and approximately 2.5 km from the Jefferson and Walker County line and emitted 937 tons of SO_2 according to the 2014 NEI. The EPA notes the remaining SO_2 sources within the 20 km area of analysis in Walker and Jefferson County cumulatively emitted 8.5 tons in 2014 and were not included in the modeling analysis for Plant Gorgas based on the Q/D screening method. Additionally, the remaining four SO_2 sources in Walker County emitted a total of 3.3 tons of SO_2 in 2014. The EPA believes these sources would not likely cause or contribute to an exceedance of the SO_2 NAAQS in the area of analysis. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis.

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

- Receptors every 100 m from the center of the plant to 3 km
- Receptors every 250 m from 3 km to 5 km
- Receptors every 500 m from 5 km to 10 km
- Receptors every 1,000 m from 10 km to 20 km

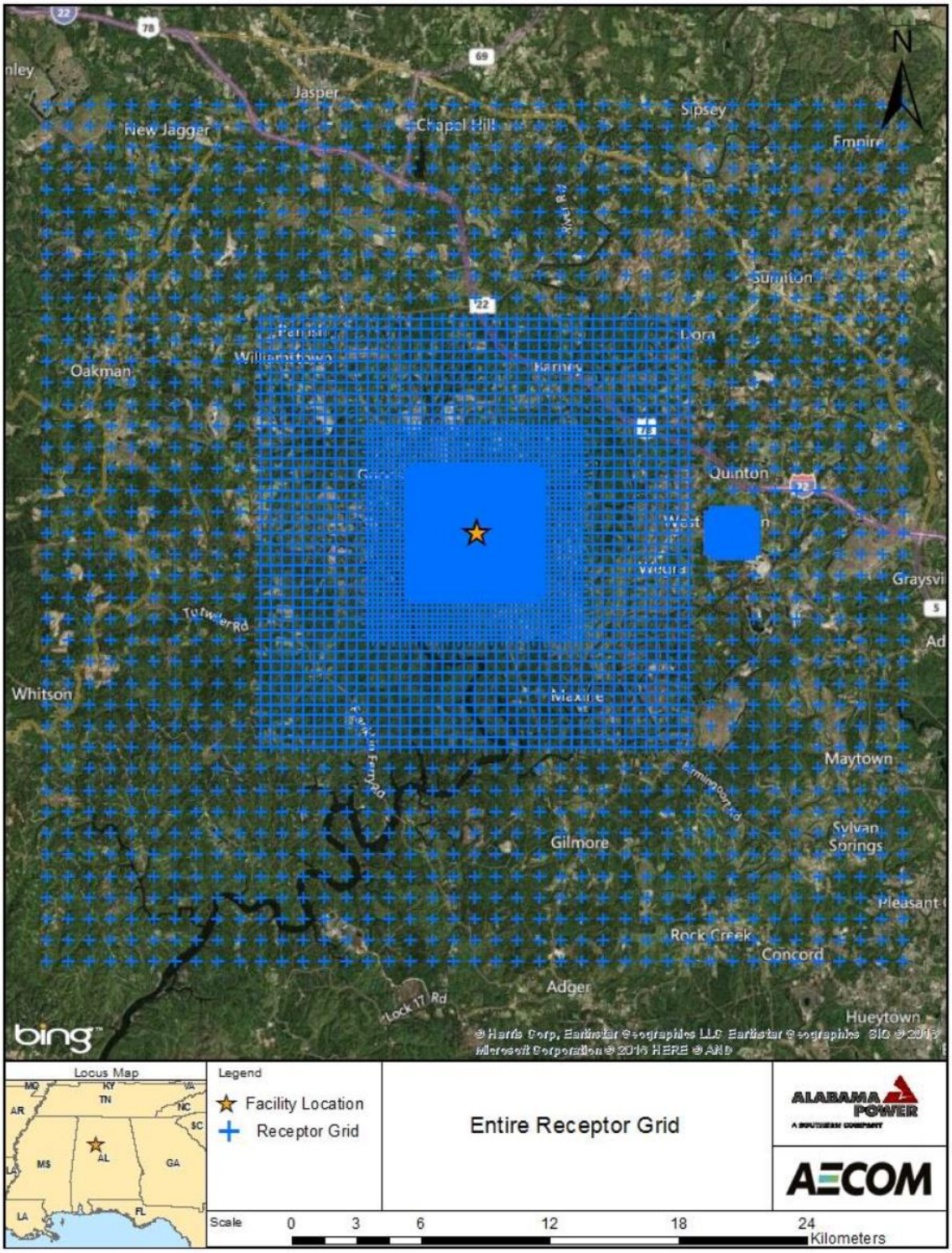
Based on the location of the modeled maximum design concentration determined with the aforementioned receptor grid, additional fine-grid receptors (100-m spacing) were added in the area of maximum impacts to ensure that the maximum design concentration occurred within 100-m resolution spaced receptors.

The receptor network contained 7,698 receptors, and the network covered the southern portion of Walker County, the northwestern portion of Jefferson County, and the northeastern portion of

Tuscaloosa County. Figure 28, included in the State's recommendation, show the State's receptor grid for the area of analysis surrounding the Plant Gorgas.

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 each modeled facility, including other facilities' property. Alabama had the option to exclude locations described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor, and to exclude receptors inside the Plant Gorgas facility potential ambient air boundary with documentation that public access is precluded. As shown below, the modeling assessment included receptors within Plant Gorgas's ambient air boundary and over water bodies to provide for the most conservative air characterization possible. The State cites that including receptors from within Plant Gorgas property had no consequence in the overall conclusion of the modeling analysis because the highest modeled concentrations occurred well away from the Plant Gorgas property.

Figure 28. Receptor Grid for the Walker County Area. Source: "Modeling Report Gorgas Steam Electric Generating Plant 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017.



The EPA agrees with the State on the final receptor grid, which does not exclude any receptors in the 20 km area of analysis, and which meets or exceeds the recommendations in the Modeling TAD. Additionally, the State included a refined receptor grid (100-m spacing) in the area of maximum impacts to ensure that the maximum design concentration occurred within 100-m resolution spaced receptors. The final receptor grid, therefore, can be expected to adequately characterize SO_2 impacts from the Plant Gorgas facility.

6.3.1.4. 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.

Plant Gorgas currently operates three coal-fired electric generating units (EGUs) 8, 9 and 10 with a nominal capacity of 175, 185 and 769 megawatts respectively.[22] Alabama's Q/D metric to screen nearby facilities, identified one source Plant Miller in Jefferson County, AL to include the modeling analysis with Plant Gorgas The sources modeled at Plant Miller include four coal-fired EGUs (Units 1, 2, 3, and 4).

The State characterized these 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 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 BPIPPRM was used to assist in addressing building downwash.

Because actual emissions were used in this modeling analysis, actual stack heights were used to represent the actual ambient air quality conditions as influenced by the source and Plant Miller. The screening approach used justifies the inclusion of Plant Miller. The EPA agrees that this component of the modeling analysis was performed in a manner consistent with the SO_2 Modeling TAD.

6.3.1.5. 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.

[22] On August 27, 2015, Alabama Power informed ADEM that Plant Gorgas units 6 and 7 were permanently retired on August 24, 2015 based on retired unit exemption forms submitted to the EPA Clean Air Market Division. On June 16, 2015, ADEM notified Alabama Power that the portion of the Plant Gorgas title V permit that authorized the operation of these two units were considered void. The retired unit exemption forms are included in the docket.

The EPA believes that 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 SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. Specifically, a facility that has recently adopted a new federally-enforceable emissions limit or implemented other federally-enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS. 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 SO_2 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 Plant Gorgas and one other emitter of SO_2 within 20 km in the area of analysis. The State has chosen to model these facilities using actual emissions. The facilities in the State's modeling analysis and their associated annual actual SO_2 emissions between 2013 and 2015 are summarized below.

For Plant Gorgas and Plant Miller, the State provided annual actual SO_2 emissions between 2013 and 2015. This information is summarized in Table 20. A description of how the State obtained hourly emission rates is given below this table.

Table 20. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Walker County Area

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
Plant Gorgas	647	1,028	898
Plant Miller	818	977	858
Total Emissions from All Modeled Facilities in the State's Area of Analysis	1,465	2,005	1,756

For Plant Gorgas and Plant Miller, the actual hourly emissions data were obtained from CEMS. A comparison was done between CAMD and the emissions used in the modeling run. For Plant Gorgas, the emissions from Units 8, 9, and 10 match what is in CAMD. However, CAMD also

shows emissions for Units 6 and 7 during 2013-2015, specifically 847 tons in 2013, 1,223 tons in 2014, and 291 tons in 2015, respectively. In Alabama's July 1, 2016 submittal to the EPA, Alabama provided correspondence from Alabama Power dated August 27, 2015 notifying the agency that units 6 and 7 at Plant Gorgas were retired on August 25, 2015 according to the retired unit exemption forms submitted to the EPA Clean Air Market Division. On June 16, 2015, ADEM notified Alabama Power that the portion of the Plant Gorgas title V permit that authorized the operation of these two units were considered void. Additionally, on July 18, 2017, the EPA received additional documentation from ADEM justifying the exclusion of Units 6 and 7 from the modeling analysis. ADEM provided Retired Unit Exemption Forms for Units 6 and 7, stating that the Units were formally retired, effective August 24, 2015. The EPA agrees that Alabama has provided sufficient information to demonstrate that Units 6 and 7 have been retired and are permanently shutdown, so they did not need to be included in the modeling.

A comparison was done between CAMD and the emissions used in the modeling for Plant Miller. These values do not match. However, the values that Alabama modeled for Plant Miller are higher than those in CAMD for each of the years. The CAMD values for Plant Miller are as follows: 800 tons in 2013, 932 tons in 2014, and 831 tons in 2015. The EPA suggests Alabama provide clarification on the discrepancy with the emissions data with CAMD, EIS

The EPA has reviewed the emissions data used in the modeling analysis for the Plant Gorgas area and believes that this analysis provides an adequate estimate of SO_2 concentrations in the area. The EPA has compared the sum of the hourly SO_2 emissions modeled for Plant Gorgas and Plant Miller for each year modeled and determined that for the units modeled for Plant Gorgas, the values match what is in CAMD and for Plant Miller, the modeled emissions are higher than what is in CAMD. For Plant Miller, the modeled emissions should be conservative, over-estimate of SO_2 impacts. This component of the modeling analysis was performed in a manner consistent with the SO_2 Modeling TAD.

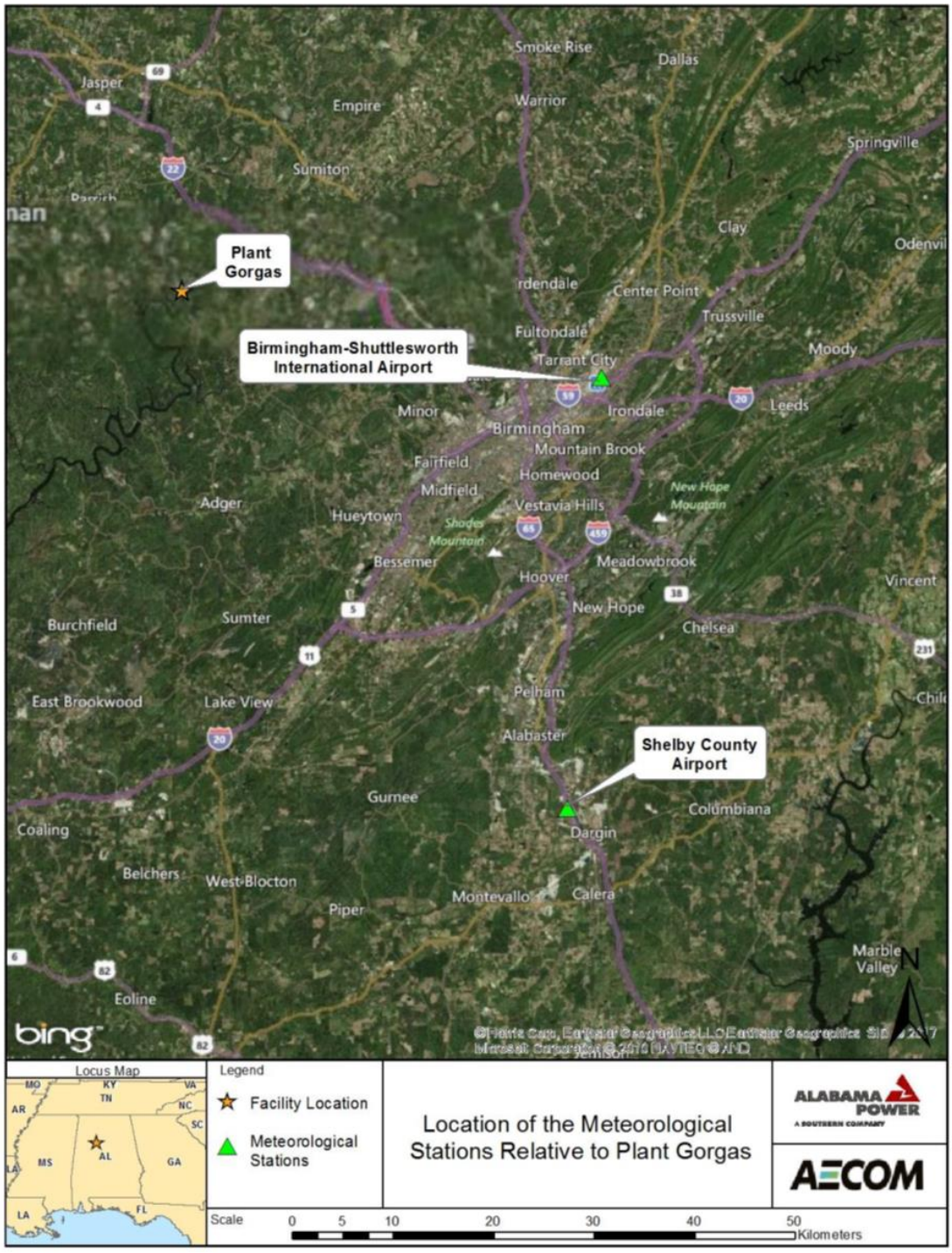
6.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

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 NWS stations, site-specific or onsite data, and other sources such as universities, FAA, and military stations.

For the area of analysis for the Walker County area, the State selected the surface meteorology from Birmingham-Shuttlesworth International Airport NWS station in Birmingham, Alabama, located at 33.5639 N, 86.7523 W, 40 km to the southeast of the source, and coincident upper air observations from Shelby County Airport in Alabaster, Alabama, located at 33.1778 N, 86.7832 W as best representative of meteorological conditions within the area of analysis.

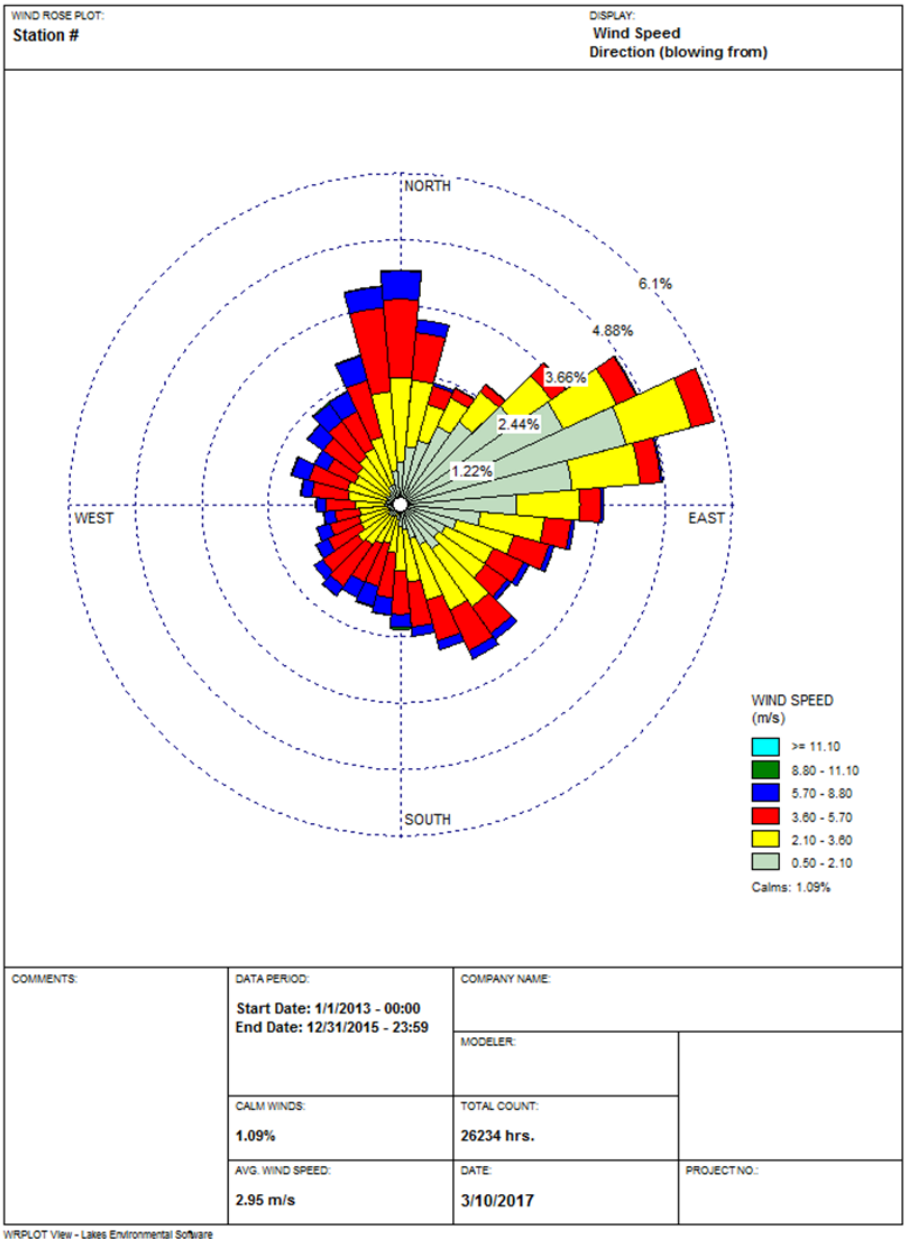
The state did not provide the method used to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness [z_o]) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as “zo”. Therefore, we do not know the values for spatial sectors and temporal resolution for any conditions. In Figure 29 below, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 29. Area of Analysis and the NWS stations in the Walker County Area. Source: "Modeling Report Gorgas Steam Electric Generating Plant 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017



The EPA generated a wind rose for the Birmingham-Shuttlesworth International Airport for the 2013-2015 period. In Figure 30, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Analysis of the NWS data indicate winds predominately blow from the east northeast with a secondary max from the north.

Figure 30. Walker County 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 processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The modeling report indicates that the pre-processed meteorological data (profile and surface files) for use with AERMOD were provided by ADEM and were processed using AERMET. However, details regarding how these files were prepared were not provided. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

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

The terrain in the area of analysis is best described as simple terrain relative to the modeled stacks. To account for these terrain changes, the AERMAP terrain program (version 11103) 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 NED.

The EPA believes that the terrain in the area of analysis is accounted for in a manner consistent with the SO_2 modeling TAD. The stated application of the AERMAP pre-processor should adequately resolve any variations in terrain in the area.

6.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 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 elected to use a "tier 2" approach. Data was obtained for 2013-2015 from the SEARCH network. The data are from the Centreville monitor located approximately 80 km south of Plant Gorgas in Centreville, AL. The background concentrations for this area of analysis were determined by the State to vary from 2.72 μg/m^3, equivalent to 1.0 ppb when expressed in two significant figures, [23]to 23.31 μg/m^3 (8.9 ppb), with an average value of 9.14 μg/m^3 (3.5 ppb).

Table 21. Centreville SO_2 Background Values for 2013-2015 (ppb)

Hour of Day	Season 1 (Dec-Jan-Feb)	Season 2 (Mar-Apr-May)	Season 3 (Jun-Jul-Aug)	Season 4 (Sep-Oct-Nov)
1	3.6	2.4	1.7	2.0
2	3.9	2.0	2.5	1.7
3	3.1	1.9	2.8	2.1
4	2.6	1.8	2.7	3.6
5	3.3	1.9	2.0	6.4
6	5.0	1.9	3.3	8.2
7	6.7	2.0	5.9	8.3
8	7.5	2.7	7.7	8.8
9	6.8	4.6	7.4	8.7
10	4.1	3.7	4.0	6.2
11	4.5	3.2	5.2	4.2
12	5.6	2.3	2.9	4.6
13	4.4	2.2	3.3	2.3
14	3.9	3.1	3.1	1.9
15	4.0	3.4	2.8	1.8
16	3.9	3.2	2.0	2.0
17	4.1	3.0	2.0	1.3
18	3.5	3.0	2.9	1.3
19	4.2	2.3	2.4	1.2
20	3.4	2.4	2.3	1.0
21	6.0	2.4	2.4	1.7
22	8.9	1.6	1.2	1.7
23	4.2	2.5	1.3	2.1
24	4.5	2.7	1.2	3.1

[23] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in μg/m^3. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 μg/m^3.

The EPA reviewed the Centreville SEARCH monitoring information and determined that the monitor is not a regulatory monitor that meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the data is not acceptable for use as background concentrations in this modeling demonstration. The EPA communicated this outstanding issue to Alabama in March 2017[24] and suggested the following options for addressing the issue: 1) demonstrate that the Centreville monitor meets the QA/QC criteria and other requirements in Part 58, Appendix B for PSD monitors, 2) choose a different background monitor that is representative of SO_2 background concentrations in the area around Plant Gorgas and either use the design value from that monitor or a use a more refined approach of seasonal hourly varying background values from that monitor, or 3) demonstrate that the Centreville SEARCH background value used in the modeling is more conservative (larger) than an alternative background site that would be representative of background in the area of Plant Gorgas. For this modeling demonstration, if option 3 is chosen, Alabama would need to demonstrate that the Centreville data is higher than the alternate site's data for each hour (96 total values, 4 seasons x 24 hours in each day = 96 values).

Alabama submitted additional information to the EPA[25] to address the issues discussed above. Alabama's supplemental information proposed to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky. For eight of the Alabama DRR sources (including Plant Gorgas), Alabama's analysis compared the Centreville SEARCH data with the Mammoth Cave data, hour-by-hour, for each of the 96 hours in the "season-by-hour-of-day" option used in the AERMOD modeling. Alabama then found the hour where the Mammoth Cave data is greater than the Centreville data by the greatest amount (which they found to be 3.68 ppb = 9.71 µg/m^3)[26]. Alabama added this "adjustment factor" of 9.71 ug/m^3 to the final modeling results for each the SO_2 DRR Sources (including Plant Gorgas).

Alabama's supplemental information justifies use of the Mammoth Cave data by stating that it is "the closest background monitor with sufficient data capture that does not show interference from industrial sources." The EPA does not believe that this is an adequate justification for determining whether Mammoth Cave is a representative background monitor pursuant to the criteria provided in Section 8.2.2(c) of the *Guideline on Air Quality Models* contained in 40 CFR Part 51, Appendix W. The criteria in Appendix W state that an appropriate regional site is "*one that is located away from the area of interest but is impacted by similar natural and distant man-made sources."*

The EPA performed an evaluation to determine if the Mammoth Cave site is an appropriate regional background site for the Plant Gorgas modeling. Both the Mammoth Cave monitor and Plant Gorgas are located in a rural area. The 2014 NEI listed 2,533 tpy of SO_2 emissions in Walker County. The emissions from the modeled sources were: 2,257 tpy for Plant Gorgas and 937 tpy from Plant Miller in nearby Jefferson County, for a total of 3,194 tpy. Also, there are no

[24] Email from Beverly Banister, Region 4 Air, Pesticides and Toxics Management (APTMD), Air Director to Ron Gore, ADEM Air Director on March 21, 2017.
[25] Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017.
[26] Note that Alabama used a conversion factor of 2.639 to convert the SO_2 background concentration in ppb to ug/m^3. This differs from EPA's recommended conversion factor of 2.619. Alabama's conversion factor results in a conservatively higher concentration in ug/m^3, so is therefore acceptable.

other sources with emissions greater than 10 tpy located within 25 km of Plant Gorgas. In the area around the Mammoth Cave monitor, there are no sources emitting more than 5 tpy of SO_2 within 50 km of the monitor and the total SO_2 emissions in the 3 counties surrounding the monitor are less than 70 tpy, according to the emissions data in the 2014 NEI. The closest major source of SO_2 emissions to the Mammoth Cave monitor is the TVA Paradise power plant (19,654 tpy in 2014) located approximately 75 km from the monitor. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near Plant Gorgas. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis. The EPA has concluded that Alabama's "adjustment factor" procedure provides an acceptable method for substituting data from the Mammoth Cave background monitor for the Centreville monitor data without the need to remodel for this modeling parameter.

6.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Walker County area of analysis are summarized below in Table 22.

Table 22. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Walker County Area

Input Parameter	Value
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	5
Modeled Structures	22
Modeled Fencelines	0
Total receptors	7,698
Emissions Type	Actual
Emissions Years	2013-2015
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	Birmingham, AL
NWS Station Upper Air Meteorology	Alabaster, AL
NWS Station for Calculating Surface Characteristics	Birmingham, AL
Methodology for Calculating Background SO_2 Concentration	Tier 2 approach using SEARCH site at Centreville, AL (2013-2015)
Calculated Background SO_2 Concentration	2.72 – 23.31 $\mu g/m^3$ + Alabama's "adjustment factor" of 9.71 $\mu g/m^3$

The results presented below in Table 23 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

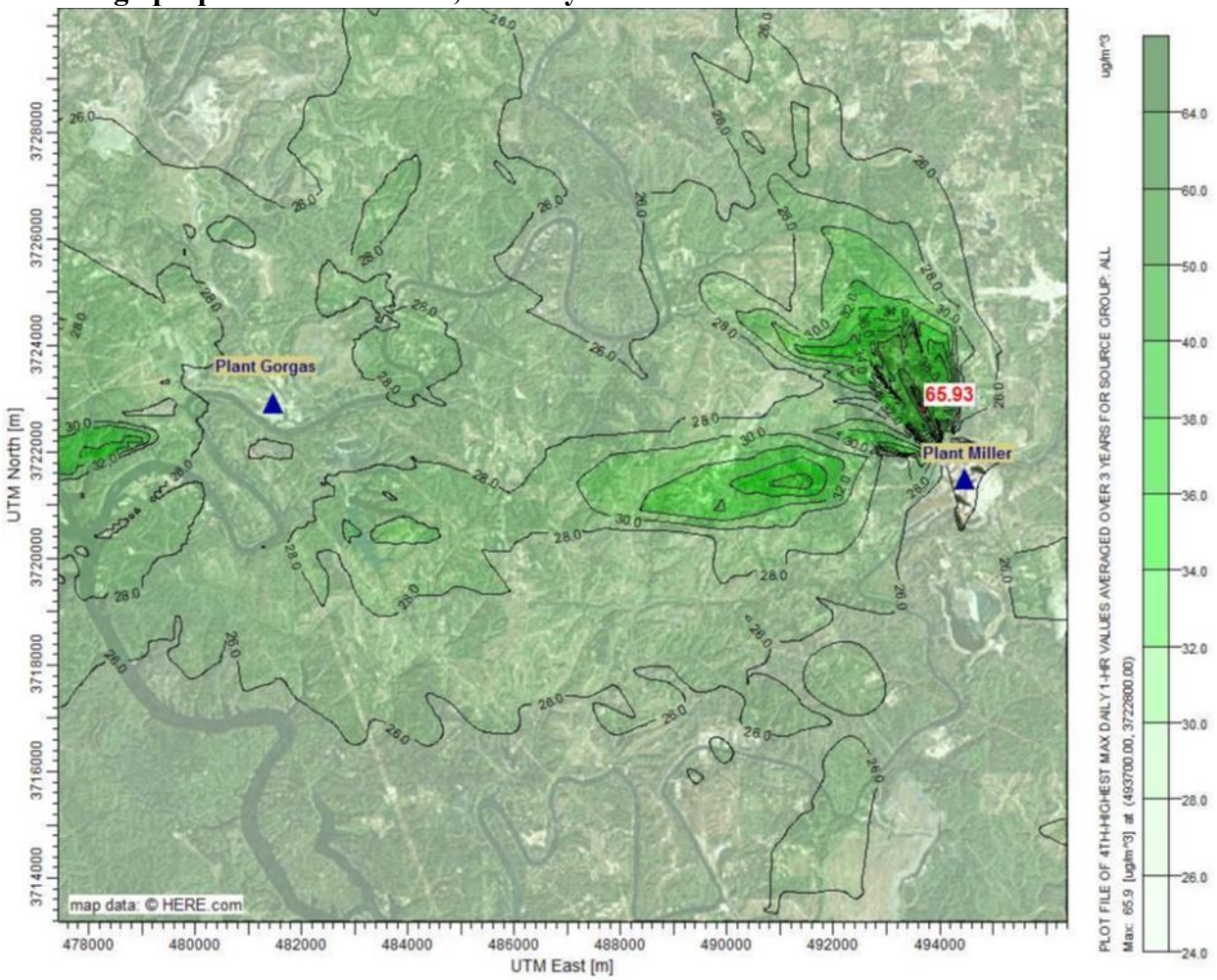
Table 23. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Walker County Area of Analysis.

Averaging Period	Data Period	Receptor Location [UTM zone 16]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM Easting (m)	UTM Northing (m)	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2013-2015	493700	3722800	75.61	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 65.9 $\mu g/m^3$, equivalent to 25.2 ppb. This modeled concentration included the inappropriate background concentration of SO_2, and is based on actual emissions from the facilities. As discussed in Section 6.2.1.8, in response to the EPA's outstanding questions regarding the background concentrations using in their modeling analysis, Alabama added an "adjustment factor" of 3.68 ppb (9.71 $\mu g/m^3$) to the final modeling result presented in their modeling report. This modeled concentration included the background concentration of SO_2 and adjustment factor, and is based on actual emissions from the facility (65.9 + 9.71 = 75.61 $\mu g/m^3$). The EPA has determined that Alabama's "adjustment factor" procedure is acceptable for the Plant Gorgas modeling. Figure 31 below was included as part of the State's recommendation, and indicates that the predicted value occurred approximately 12 km east of Plant Gorgas, near Plant Miller, in the refined receptor grid in Jefferson County, Alabama. The State's receptor grid is also shown in the figure.

Figure 31. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Walker County Area of Analysis Source: "Modeling Report Gorgas Steam Electric Generating Plant 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017



The modeling submitted by the State, with noted issues, does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

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

The EPA assessment of the 1-hour SO_2 DRR AERMOD modeling for Plant Gorgas finds that the modeling does not conclusively demonstrate that the area surrounding this DRR source meets or does not meet the 1-hour SO_2 NAAQS or contributes to a nearby area that does not meet the NAAQS.

The State made use of AERMOD version 15181, the most recent version available at the time the modeling was conducted. The EPA agrees that this model version is appropriate to characterize the area because the State made use of default regulatory options available at the time and is not making use of any previously alternative modeling options included in version 16216r and the update to Appendix W. The State adequately represented the topography of the area with the model and its preprocessors.

The State chose to model two sources in the area, and the EPA agrees with this decision, as supported by Alabama's evaluating nearby sources within 20 km of Plant Gorgas based on the Q/D method. The EPA believes the modeling domain is appropriate to capture predicted maximum impacts in the Walker County area. The State chose to model emissions from Plant Gorgas and Plant Miller during 2013 – 2015. The State chose to use actual emissions to reflect normal operation of Plant Gorgas and the nearby source, Plant Miller. However, the emissions modeled for Plant Gorgas excluded Units 6 and 7 because those units have since retired. Additionally, the emissions modeled for Plant Miller are inconsistent with the annual emissions in CAMD; however, the emissions that Alabama modeled for Plant Miller are higher than those in CAMD for each of the modeled years. We believe these decisions provide conservative (over-estimates) for the purpose of this modeling demonstration.

The EPA determined that Alabama's initially selected background data from the Centreville SEARCH monitor is inconsistent with the Modeling TAD. This monitor is not a regulatory monitor and should not be used to develop background concentrations for this modeling demonstration. On April 18, 2017, Alabama submitted additional information to the EPA to address the use of the Centerville SEARCH monitor by proposing to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky (AQS ID: 21-061-0501). For Sanders Lead, Alabama's analysis substituted the Mammoth Cave 2012-2014 design value (26.2 $\mu g/m^3$) for the Centreville SEARCH 2012-2014 design value (44 $\mu g/m^3$).

The EPA determined that the Mammoth Cave site is an appropriate regional background site for the Plant Gorgas modeling. Both the Mammoth Cave monitor and the Plant Gorgas facility are located in rural areas. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near the Plant Gorgas facility. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis.

However, the EPA notes that ADEM did not provide documentation to support the AERMET modeling used to generate the surface and upper air meteorology files. Additionally, the State did not provide details to determine if AERSURFACE was used to best represent surface characteristics. Therefore, the EPA does not have sufficient information to determine whether the area meets or does not meet the SO_2 NAAQS or whether the area contributes to ambient air quality in a nearby area that does not meet the NAAQS

6.4. Jurisdictional Boundaries in the Walker County, Alabama Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Walker County. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

Alabama requested the entire State be designated attainment. For the Walker County Area, the State's recommendation is based on an assessment and characterization of air quality from the Alabama power Company – Gorgas Steam Electric Plant DRR source and one nearby source. Plant Gorgas is located in Parrish, Walker, Alabama approximately 4 miles north of the Jefferson County line. Walker County is bounded to the north by Winston County; to the northeast by Cullman County; to the east by Blount County; to the southeast by Jefferson County; to the southwest by Tuscaloosa County; to the west by Fayette County; and to the northwest by Marion County.

ADEM assessed nearby sources within a 20 km from the Plant Gorgas facility in all directions using the Q/D method and considered this sufficient to resolve the maximum impacts and any potential significant impact areas. The area of analysis covers portions of Walker, Jefferson, and Tuscaloosa Counties. Based upon the screening methodology conducted by ADEM, one additional source, Plant Miller, in Jefferson County was included in the modeling analysis for Plant Gorgas. Plant Miller, located in Quinton, Alabama, approximately 13 km east of Plant Gorgas and approximately 2.5 km from the Jefferson and Walker County line and emitted 936 tons of SO_2 according to the 2014 NEI. The EPA identified five SO_2 emitting sources in Walker County with a cumulative emissions profile of approximately 5 tpy in 2014 and two SO_2 emitting sources in Walker County with a cumulative emissions profile of approximately 5 tpy in 2015. These sources include Jasper Lumber Co/Southern Wood Chips/BT Shavings and Pineview Landfill (2015 emissions) and additionally Walker County-Bevill Fi (airport), Drummond (airport), and Walker Regional Medical Center (airport) (2014 emissions).
The EPA notes the remaining SO_2 sources within the 20 km area of analysis in Walker and Jefferson County cumulatively emitted 8.5 tons in 2014. No sources were identified in the portion of Tuscaloosa County included in the area of analysis. Additionally, the remaining four SO_2 sources in Walker County emitted a total of 3.3 tons of SO_2 in 2014.

6.5. The EPA's Assessment of the Available Information for the Walker County, Alabama Area

After evaluating the 1-hour SO_2 DRR AERMOD modeling and other information for the Plant Gorgas facility, the EPA intends to modify the State's recommendation and designate Walker County as unclassifiable for the SO_2 NAAQS. Alabama recommended attainment for the entire state including Walker County and the area containing Plant Gorgas based in part on a modeling assessment using AERMOD version 16216, characterization of air quality impacts from the Ascend and one other nearby source Plant Miller, and background concentration data from the Mammoth Cave monitor in Kentucky. For Plant Gorgas and Plant Miller, the State modeled annual actual SO_2 emissions between 2013 and 2015. The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 75.61 $\mu g/m^3$ or 28.8 ppb which is below the level of the 2010 SO_2 NAAQS. However, the EPA's assessment finds that the modeling does not provide sufficient information to demonstrate whether the area containing the DRR source meets or does not meet the 1-hour SO_2 NAAQS or contributes to an area that does not meet the standard. Issues with the modeling include lack of documentation to support the AERMET processing used to generate the surface and upper air meteorology file and no documentation to confirm that AERSURFACE was used to best represent surface characteristics.

The modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, the State did not provide details regarding how these files were prepared. Therefore, EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate. Additionally, the State did not document if AERSURFACE was used to best represent surface characteristics. The State adequately represented the topography of the area with the model and its preprocessors.

The EPA determined that the Mammoth Cave site is an appropriate regional background site for the Plant Gorgas modeling. Both the Mammoth Cave monitor and the Plant Gorgas facility are located in rural areas. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near the Plant Gorgas facility. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis.

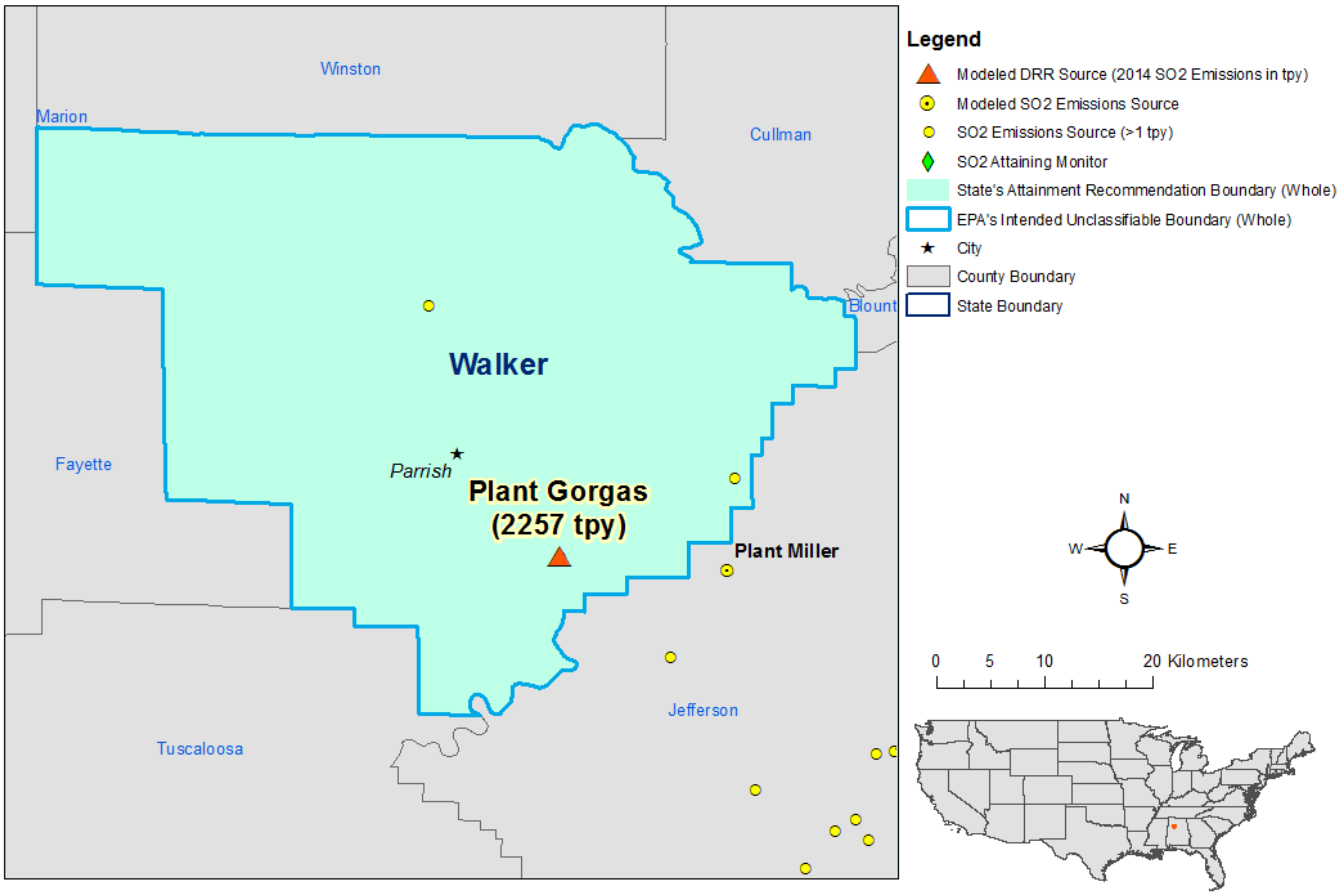
The source of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. ADEM used the Q/D >20 metric within 20 km to determine which background sources should be included in the modeling analysis for Plant Gorgas. The State determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. Using this methodology, Alabama identified one additional nearby background source, Plant Miller in neighboring Jefferson County that was included in the modeling analysis for Plant Gorgas. Plant Miller, located in Quinton, Alabama is approximately 13 km east of Plant Gorgas and approximately 2.5

km from the Jefferson and Walker County line and emitted 937 tons of SO_2 according to the 2014 NEI. The EPA notes the remaining SO_2 sources within the 20 km area of analysis in Walker and Jefferson County cumulatively emitted 8.5 tons in 2014 and were not included in the modeling analysis for Plant Gorgas based on the Q/D screening method. Additionally, the remaining four SO_2 sources in Walker County emitted a total of 3.3 tons of SO_2 in 2014. The EPA believes these sources would not likely cause or contribute to an exceedance of the SO_2 NAAQS in the area of analysis. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis. The EPA notes that Plant Gorgas is the only SO_2 emitting source subject to the DRR in Walker County.

6.6. Summary of Our Intended Designation for the Walker County, Alabama Area

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA is modifying the state's recommendation and intends to designate Walker County unclassifiable for the 2010 SO_2 NAAQS. The EPA's assessment finds that the modeling does not provide sufficient information to demonstrate whether the area containing the DRR source meets or does not meet the 1-hour SO_2 NAAQS or contributes to an area that does not meet the standard. Specifically, the boundaries are comprised of the entirety of Walker County. Figure 32 shows the boundary of this intended designated area. The EPA believes that our intended unclassifiable area, bounded by Walker County in its entirety, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area. At this time, our intended designations for the State only apply to this and the other areas presented in this technical support document. There are no remaining portions of Walker County that remain to be characterized in the EPA's Round 4 of designations in 2020.

Figure 32. Boundary of the Intended Walker County Unclassifiable Area



7. Technical Analysis for the Morgan County Area

7.1. Introduction

The EPA must designate the Morgan County, Alabama, area by December 31, 2017, because the area has not been previously designated and Alabama has not installed and begun timely operation of a new, approved SO_2 monitoring network meeting the EPA specifications referenced in the EPA's SO_2 DRR for any sources of SO_2 emissions in the vicinity Morgan County.

7.2. Air Quality Monitoring Analysis for the Morgan County Area

This factor considers the SO_2 air quality monitoring data in the area of Morgan County. The EPA reviewed the available air quality monitoring data in the AQS database and found no nearby data for Morgan County. In reviewing the available air quality monitoring data in AQS, the EPA determined that there is no relevant data in AQS collected in or near Morgan County that could inform the intended designation action. The most recent SO_2 design values for all areas of the country are available at https://www.epa.gov/air-trends/air-quality-design-values.

7.3. Air Quality Modeling Analysis for the Morgan County Area Addressing Ascend Performance Materials - Decatur Plant

7.3.1. Introduction

This section 7.3 presents all the available air quality modeling information for a portion of Morgan County that includes Ascend Performance Materials – Decatur Plant. (This portion of Morgan County will often be referred to as "the Morgan County area" within this section 7.3). This area contains the following SO_2 sources, principally the sources around which Alabama is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy:

- The Ascend facility emits 2,000 tons or more annually. Specifically, Ascend emitted 2,839 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Alabama has chosen to characterize it via modeling.

- The Nucor Steel Decatur facility is not on the SO_2 DRR Source list, but is included in the modeling analysis. This facility emitted 220 tons in 2014 and is approximately 5.3 km west of the Ascend facility.

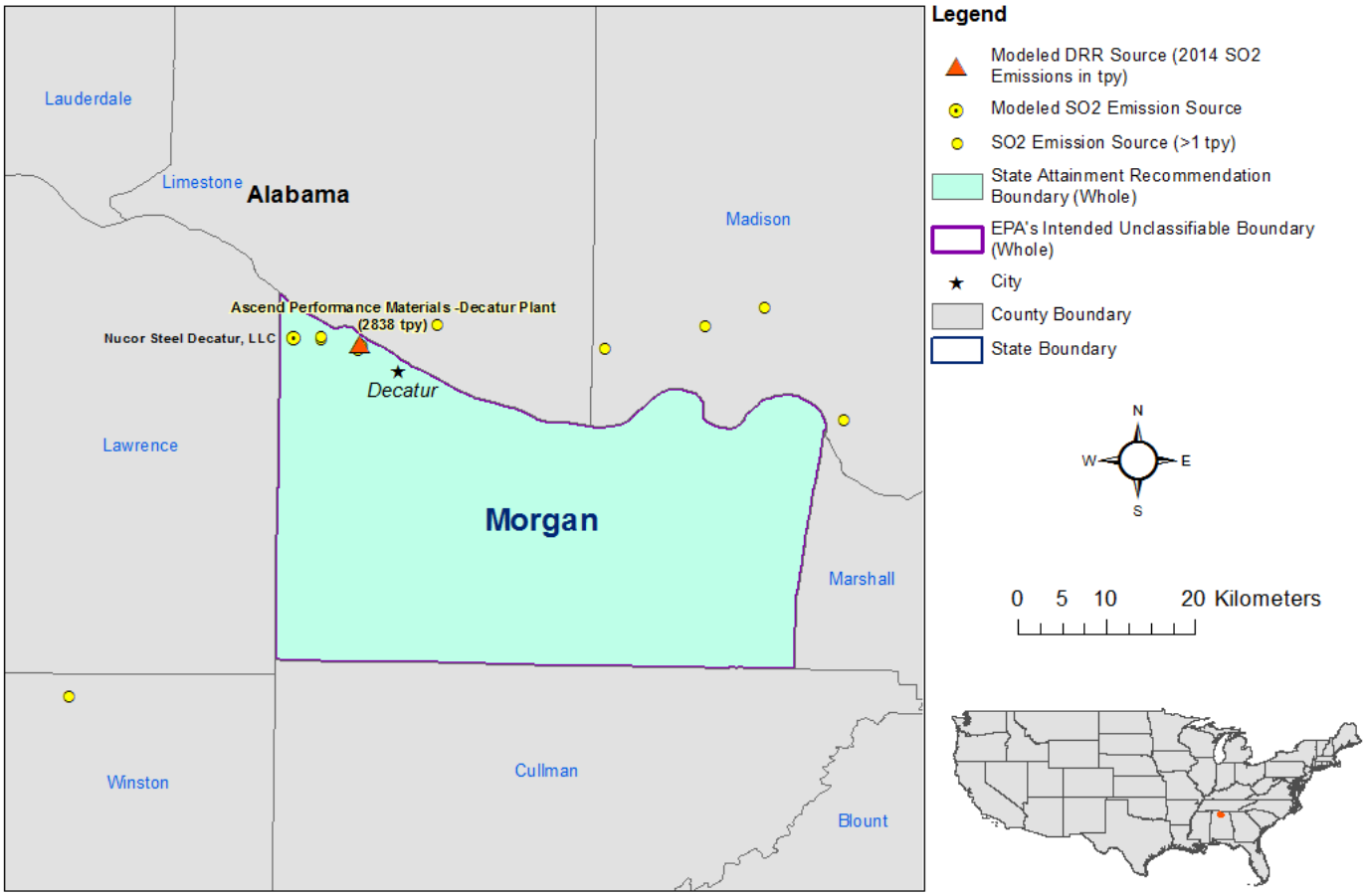
Because we have available results of air quality modeling in which these sources are modeled together, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

Alabama recommended that the entire state be designated attainment for the SO_2 NAAQS including Morgan County and the area containing the Ascend facility based in part on an

assessment and characterization of air quality impacts from the facilities and other nearby sources that may have a potential impact in the area where the 2010 SO_2 NAAQS may be violated 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 is modifying the states recommendation and intends to designate Morgan County unclassifiable or the 2010 SO_2 NAAQS. 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 on the north side of the city of Decatur, Alabama, on a peninsula in Wheeler Lake (see Figure 33.) Also included in Figure 33 are other nearby emitters of SO_2 including Nucor Steel Decatur and the State's attainment designation for the entire state including Morgan County. The EPA's intended unclassifiable designation boundary for the Morgan County area is not shown in this figure, but is shown in a figure in the section below that summarizes our intended designation.

Figure 33. Map of the Morgan County Area Addressing Ascend.



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.

For this area, the EPA received and considered two modeling assessments provided by developed by a contractor on behalf of the State as well as additional information from the State in response to the EPA comments. No assessments were received from other parties. To avoid confusion in referring to these assessments, the following table lists them, indicates when they were received, provides an identifier for the assessment that is used in the discussion of the assessments that follow, and identifies any distinguishing features of the modeling assessments.

Table 24: Modeling Assessments for the Morgan County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
RTP Environmental	December 9, 2016	December 2016 RTP Environmental Modeling Report	Final Modeling Report
RTP Environmental	January 25, 2017	Revised Modeling	Updated modeling with AERMOD version 16216r
Alabama	July 2017	ADEM Response to EPA DRR Comments	Additional information regarding federal enforceability of nearby source

7.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 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

In the Revised Modeling, the State used AERMOD version 16216r with all regulatory default settings. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

The original modeling used AERMOD version 15181 using the unapproved Adjusted U* beta option in the AERMET meteorological processor (version 15181). The current version of AERMOD, version 16216r, includes updates to 40 CFR part 51, Appendix W, "Guideline of Air Quality Models," published on January 17, 2017 (82 FR 5203). This version of AERMOD also includes fixes to glitches that were inadvertently included in version 16216. Alabama in its final January 25, 2017, modeling submission used AERMOD version 16216r with all regulatory default settings. The maximum concentration of 179 $\mu g/m^3$ and the location of the maximum concentration did not change between the two model runs.

7.3.1.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 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.

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 km radius of the Ascend facility using the Auer's land use methodology.

The land use categories classified as urban by Auer represented less than 20 percent of the total land use within the 3 km radius as can be seen in Figure 34 and Table 25. For the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model with rural dispersion coefficients or rural mode and the EPA concurs with this assessment.

Figure 34. Land Use Map for area around the Ascend Facility. Source: "Air Dispersion Modeling for Evaluating Compliance with the 1-Hour SO_2 National Ambient Air Quality Standard at the Ascend Performance Materials Facility in Decatur, Alabama" prepared the State of Alabama, December 2016

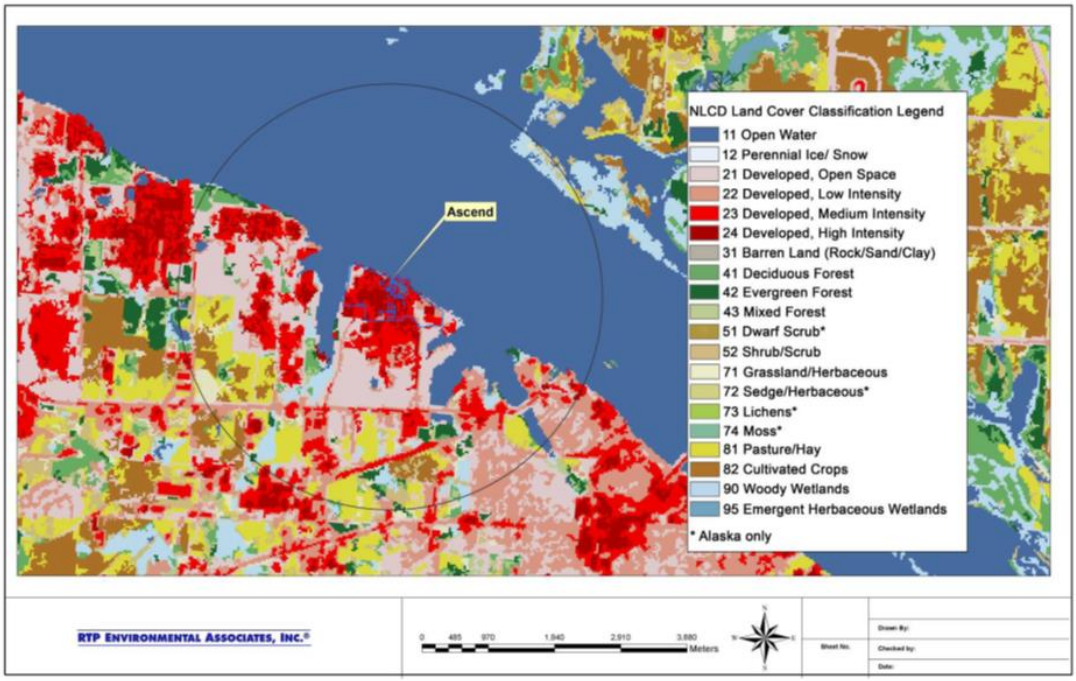


Table 25. Land Use Analysis for area around the Ascend Facility. Source: "Air Dispersion Modeling for Evaluating Compliance with the 1-Hour SO_2 National Ambient Air Quality Standard at the Ascend Performance Materials Facility in Decatur, Alabama" prepared for Alabama, December 2016

2006 NLCD Desc	NLCD Cat	Count #	Total Area (km2) (30mx30m/cell)	Frac Total		
Open Water	11	14704	13.23	0.47		
Perennial Ice/Snow	12	0	0	0		
Developed, Open Space	21	4273	3.85	0.14		
Developed, Low Intensity	22	2228	2.01	0.07		
Developed, Med Intensity	23	3352	3.02	0.11		
Developed, High Intensity	24	1725	1.55	0.05	0.161678	total urban fraction
Barren Land	31	9	0.01	0		
Deciduous Forest	41	474	0.43	0.02		
Evergreen Forest	42	701	0.63	0.02		
Mixed Forest	43	158	0.14	0.01		
Dwarf Scrub	51	0	0	0		
Shrub/Scrub	52	291	0.26	0.01		
Grassland/Herbaceous	71	370	0.33	0.01		
Lichens	73	0	0	0		
Moss	74	0	0	0		
Pasture/Hay	81	1569	1.41	0.05		
Cultivated Crops	82	972	0.87	0.03		
Woody Wetlands	90	574	0.52	0.02		
Emergent Herb Wetlands	95	2	0	0		
No Data	-9999	0	0	0		
			28.26			
total area of 3km radius circle (km2)			28.26			

7.3.1.3. 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 SO_2 emission sources or facilities considered for modeling; the extent of concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

ADEM used the Q/D >20 metric within 20 km to determine which background sources should be included in the modeling analysis for Ascend. A Q/D value was determined for all sources within 20 km of the DRR source where Q represents the 2014 actual SO_2 tpy emissions totals, and D represents the distance between the two facilities. The State determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. Using this methodology, Alabama identified one additional nearby background source, Nucor Steel Decatur in Decatur, Alabama, that was included in the modeling analysis for Ascend. Nucor Steel is approximately 5.3 km west of Ascend and approximately 3 km from the Limestone County line and emitted 220 tons of SO_2 according to the 2014 NEI.

Alabama's 20 km area of analysis around Ascend captures portions of Morgan, Lawrence, and Limestone counties in Alabama. The EPA notes a total of 18 remaining SO_2 sources within the 20 km area of analysis in these counties that cumulatively emitted 17.6 tons in 2014 and were not included in the modeling analysis for Ascend based on the Q/D screening method. Additionally, the remaining four SO_2 sources in Morgan County outside the area of analysis cumulatively emitted less than 1 ton of SO_2 in 2014 and are 24 to 35 km south of Ascend. The EPA believes that these sources are not likely to cause or contribute to an exceedance of the SO_2 NAAQS in the area of analysis. Another major SO_2 emissions source located approximately 28 km north-northwest of Ascend is the International Paper (IP) Company in Courtland, Alabama. This facility emitted 901 tons in 2013 and 0 tons in 2014. Alabama excluded this source from the Ascend modeling analysis. On July 18, 2017, the EPA received additional documentation from ADEM to support the exclusion of the IP-Courtland Mill in the modeling analysis stating the title V operating permit for IP-Courtland Mill was void on June 17, 2017. The EPA agrees that this source does not need to be included in the modeling analysis for the Ascend facility.

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

- Spacing of 100 m out to a distance of 3 km from the facility in all directions
- Spacing of 250 m from 3 km to 7.5 km from the facility
- Spacing of 500 m from 7.5 km to 15 km from the facility

Preliminary modeling results had indicated that the maximum impacts occurred in the complex terrain on Trinity Mountain which is 9 km southeast of the facility, outside of the 3 km grid. Receptors in this area were refined to 100 m.

The receptor network contained 8,748 receptors, and the network covered the northwestern portion of Morgan County, the northeastern portion of Lawrence County, and the southern portion of Limestone County.

Figures 35 thru 39, included in the State's recommendation, show the State's receptor grids for the chosen area of analysis surrounding the Ascend Facility.

Consistent with the Modeling TAD, the State excluded receptors located over water in the modeling analysis as it would not be feasible to place a monitor there. Additional receptors were excluded on adjacent industrial facilities due to the infeasibility of locating an SO_2 monitor on those sites and due to those sites being confined by security barriers which restrict access to both Ascend personnel and the general public as seen in Figure 37. This is inconsistent with Section 4.2 of the Modeling TAD. The State also excluded receptors over the Ascend facility. Figure 38 illustrates the land owned by Ascend that is enclosed with a fence. This figure also identifies a portion of land within the property boundary that Ascend leases to LS Power over which receptors were excluded. Figure 39 shows the other areas on the peninsula that are fenced by other industry, including the Linde facility which is identified as land leased by Ascend. Receptors were excluded over the properties of all the adjacent industrial facilities, including the two facilities that Ascend leases the land to them.

The August 2016 version of the Modeling TAD provides additional clarification regarding areas for receptor placement. The revised language in Section 4.2 states the following, "For SO_2 designations modeling, the areas to consider for receptor placement are those areas that would be considered ambient air relative to each modeled facility, including other facilities' property." The adjacent industrial facilities on the peninsula are considered ambient air relative to the Ascend facility and receptors should be included over those properties. This comment was made to Alabama in the modeling protocol as well as when the final modeling was received. The EPA continues to question the receptor grid that was chosen for the final modeling, as receptors were not included over the adjacent industrial facilities which have ambient air with respect to the Ascend facility's pollution emissions.

Figure 35. Near-field Receptor Grid around the Ascend Facility. Source: "Air Dispersion Modeling for Evaluating Compliance with the 1-Hour SO_2 National Ambient Air Quality Standard at the Ascend Performance Materials Facility in Decatur, Alabama" prepared for the Alabama, December 2016

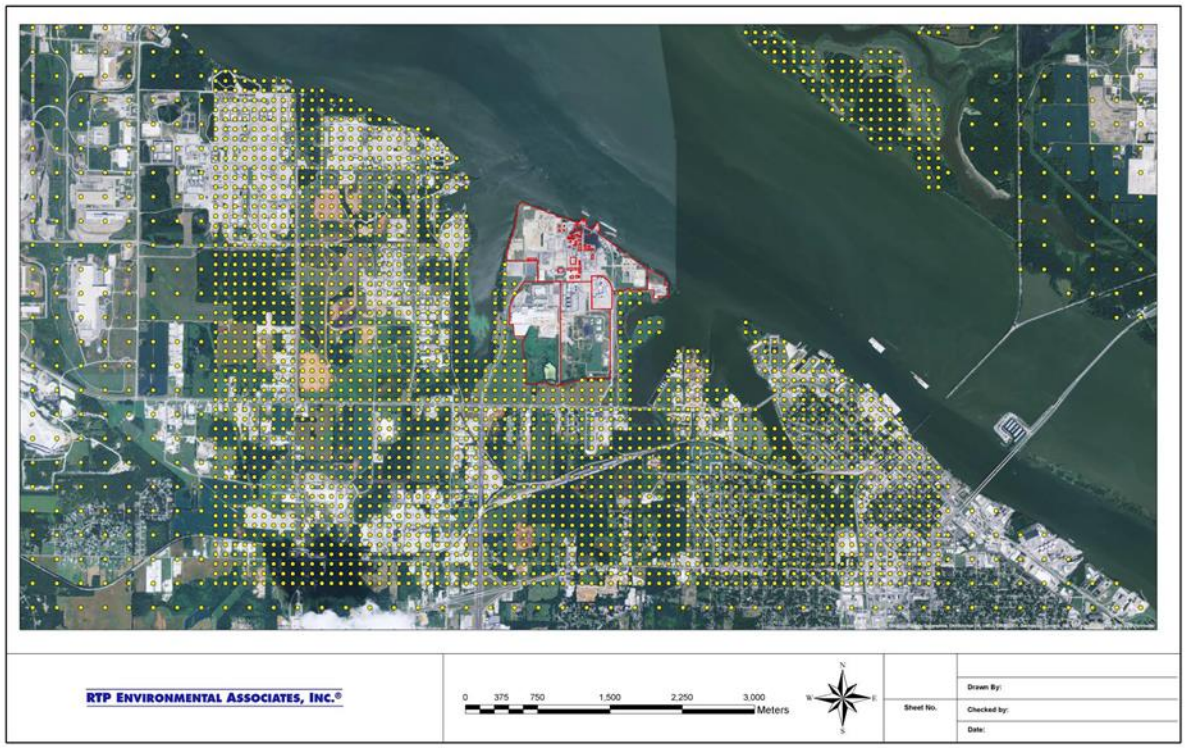


Figure 36. Complete Receptor Grid around the Ascend Facility. Source: "Air Dispersion Modeling for Evaluating Compliance with the 1-Hour SO_2 National Ambient Air Quality Standard at the Ascend Performance Materials Facility in Decatur, Alabama" prepared for Alabama, December 2016

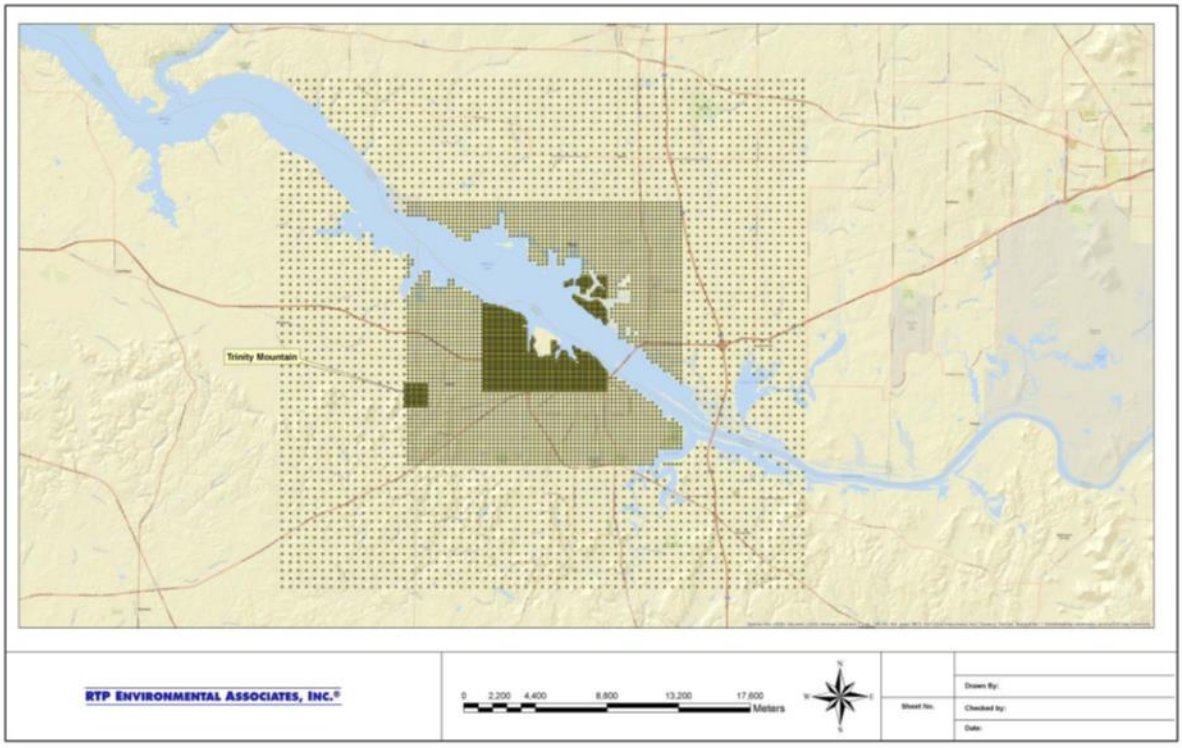


Figure 37. Modified Receptor Grid with Receptors over Roads and Parking Areas around the Ascend Facility. Source: "Air Dispersion Modeling for Evaluating Compliance with the 1-Hour SO_2 National Ambient Air Quality Standard at the Ascend Performance Materials Facility in Decatur, Alabama" prepared for Alabama, December 2016

Figure 38. Ascend Property Boundary. Source: "Air Dispersion Modeling for Evaluating Compliance with the 1-Hour SO_2 National Ambient Air Quality Standard at the Ascend Performance Materials Facility in Decatur, Alabama" prepared for Alabama, December 2016

Figure 39. Areas Fenced by Other Industry. Source: "Air Dispersion Modeling for Evaluating Compliance with the 1-Hour SO_2 National Ambient Air Quality Standard at the Ascend Performance Materials Facility in Decatur, Alabama" prepared for Alabama, December 2016

7.3.1.4. 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.

Ascend has the following major sources of SO_2 at the facility: two coal fired boilers (Boilers Nos. 5 and 6), a natural gas and sulfur free heavy liquid boiler (Boiler No. 7), and two cokers. These account for 99 percent of the total facility emissions. The remaining SO_2 emissions from the facility are from two hydrogen reformers. Boiler No. 7 converted to a sulfur free fuel in March of 2016 and has accepted a federally-enforceable permit condition to restrict SO_2 emissions by January 2017. Ascend was evaluated using actual emissions both with and without Boiler No. 7.

The December 2016 modeling report indicates that Alabama screened for potential nearby sources within a 20 km area surrounding Ascend. A spreadsheet was provided to the facility with the nearby facilities that met the 2014 actual emissions (in tpy) divided by the distance of greater than 20 within a maximum distance of 20 km, including small sources at a very close distance. The Nucor Steel facility, located approximately 5.3 km to the west of Ascend, was the only nearby source included in the modeling analysis.

The State characterized these 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 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 BPIPPRM was used to assist in addressing building downwash.

Because actual emissions were used in this modeling analysis, actual stack heights were used to represent the actual ambient air quality conditions as influenced by the source and Nucor Steel. The screening approach used justifies the inclusion of Nucor Steel. The EPA agrees that this component of the modeling analysis was performed in a manner consistent with the SO_2 Modeling TAD.

7.3.1.5. 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 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 SO_2 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 SO_2 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 Ascend and one other emitter of SO_2 within 20 km in the area of analysis. The State has chosen to model these facilities using actual emissions. The facilities in the State's modeling analysis and their associated annual actual SO_2 emissions between 2013 and 2015 are summarized below.

For Ascend, the State provided annual actual SO_2 emissions between 2013 and 2015. For Nucor Steel, a constant emissions rate of 4.2839 g/s (34 lb/hr) was provided for the two stacks modeled for this facility. This information is summarized in Table 26. A description of how the State obtained hourly emission rates is given below this table.

Table 26. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Morgan County Area

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
Ascend	2,595	2,810	2,596
Nucor Steel	298*	298*	298*
Total Emissions from All Modeled Facilities in the State's Area of Analysis	2,893	3,108	2,894

*Estimated emissions, as explained below.

Ascend contains the following SO_2 sources: two coal fired boilers (boilers 5 and 6), a natural gas and sulfur free heavy liquid boiler (boiler 7), and two cokers. The remainder of the SO_2 from the facility is from two hydrogen reformers (reform 1 and reform 2). For Ascend, the actual hourly emissions data were obtained from CEMS for boiler 7, and from hourly variable rates for boilers 5 and 6 and the cokers. CEMS data are available for boiler 7 for the years modeled. CEMS data is not available for boiler 5 or 6 or the cokers. For the boilers, the hourly exhaust rate, temperature, and steam production rate are available. For the cokers, the hourly temperature and steam production rate are available. These hourly measurements were used to calculate the SO_2 emissions for those units. The hourly emissions calculations were based upon the fraction of the total annual steam flow for each hour and the total annual emissions calculated and reported for each unit. The annual calculations of SO_2 are based on known fuel use quantities and fuel sulfur contents. Hourly emissions were not used for the two hydrogen reformers.

Boiler 7 converted to a sulfur free fuel and accepted a federally-enforceable permit condition to restrict SO_2 emissions by January 2017. In the modeling protocol, Ascend had proposed to

exclude boiler 7 from the modeling analysis; however, the EPA commented that it is not appropriate to mix past actuals from some emissions units with future allowable emissions for other units. Ascend chose to evaluate the facility impacts using actual emissions with and without boiler 7. The modeling results evaluated in this TSD included emissions from boiler 7.

For Nucor Steel, each of the two units were modeled at constant emissions rates of 34 lb/hr. The EPA converted this constant emissions rate to tons per year by assuming 8,760 hours/year of operation. This results in an estimated emission rate of 298 tpy. The EPA's NEI indicates that the actual emissions from Nucor Steel were 220 tpy in 2014. Therefore, the modeled emissions rates are higher than the actual emissions and are acceptable.

The EPA has reviewed the emissions data used in the modeling analysis for the Ascend area and believes that this analysis provides an adequate estimate of SO_2 concentrations in the area. The EPA has compared the sum of the hourly SO_2 emissions modeled for Ascend with the annual emissions reported in the EIS Gateway and determined that for the units modeled for Ascend, the modeled emissions values match what is in the EIS Gateway for 2013, are lower than the EIS Gateway for 2014, and are higher than what is in EIS Gateway for 2015. The hourly emissions modeled only includes boilers 5, 6, and 7 and the cokers, not the hydrogen reformers, which could account for this discrepancy. This component of the modeling analysis was performed in a manner consistent with the SO_2 Modeling TAD.

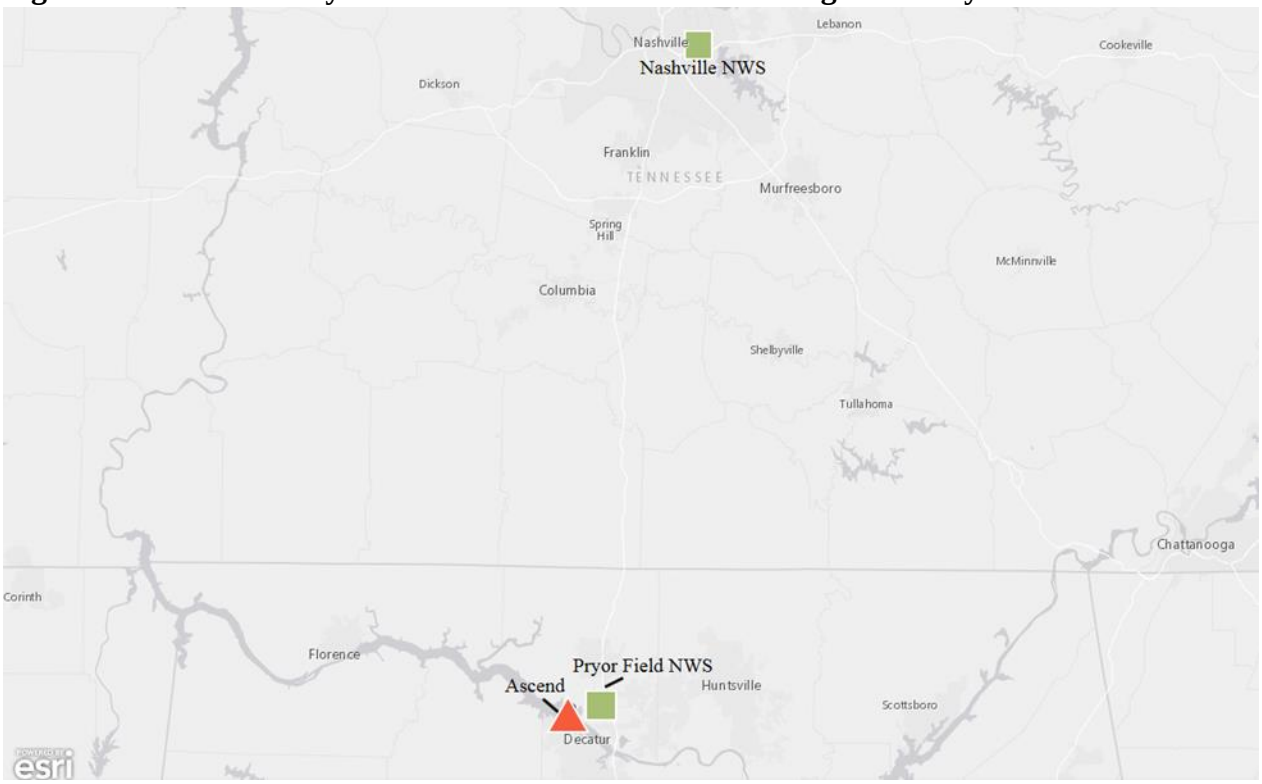
7.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

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 NWS stations, site-specific or onsite data, and other sources such as universities, FAA, and military stations.

For the area of analysis for the Morgan County area, the State selected the surface meteorology from the Pryor Field NWS station in Tanner, AL, located at 34.66°N, 86.94°W, approximately 7 km to the northeast of the source, across Wheeler Lake, and coincident upper air observations from a different NWS station, located in Nashville, TN, located at 36.25°N, 86.57°W, approximately 184 km to the north of the source as best representative of meteorological conditions within the area of analysis.

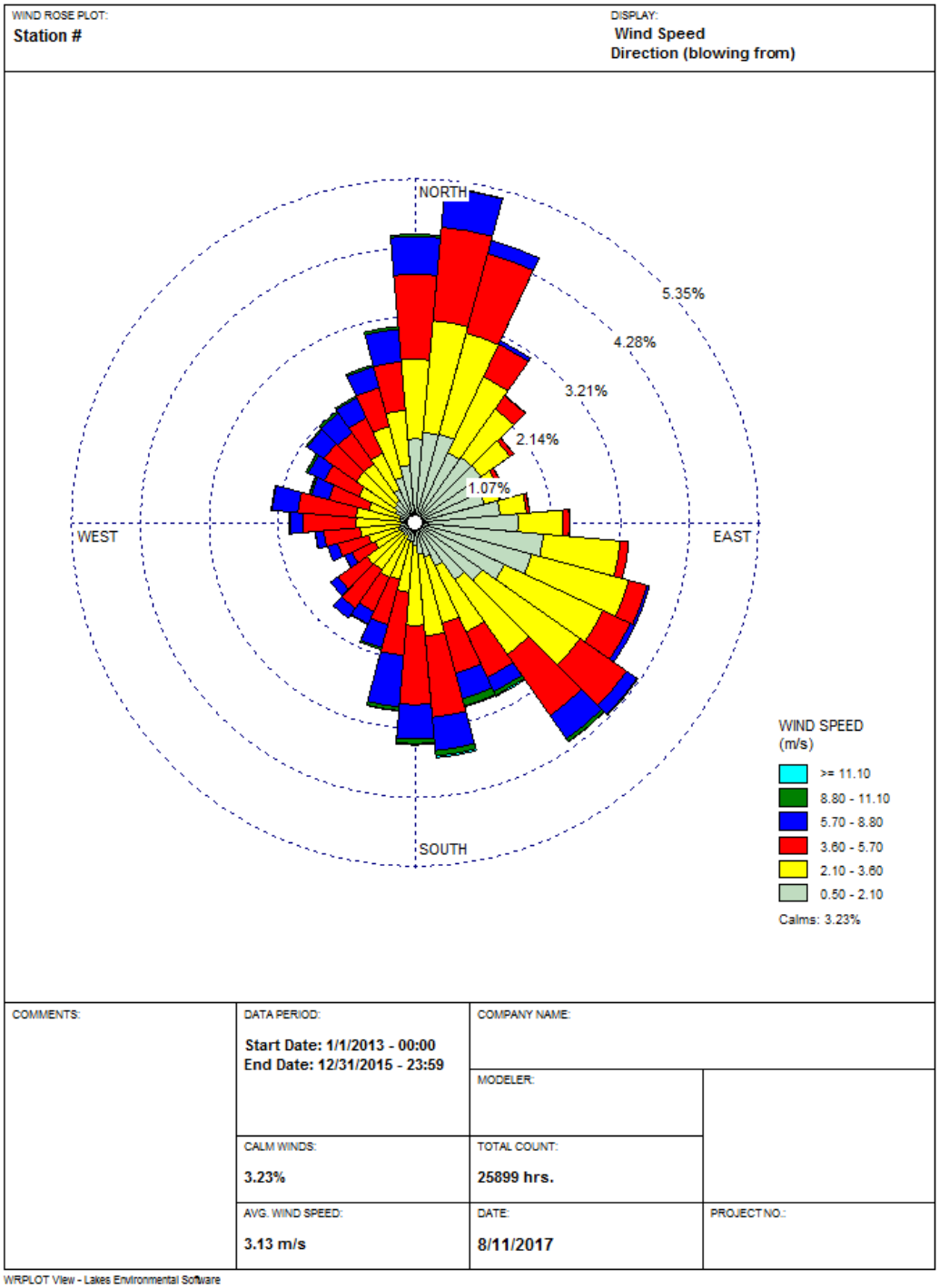
The State used AERSURFACE version 13016 using data from the Pryor Field NWS station to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness [z_o]) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "zo". 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. The State indicated that they used the EPA recommended method to determine the applicable Bowen Ratio moisture tables to use for each year. For this NWS, 2012 was in the "dry" category, 2013 was in the "wet" category, and 2014 was in the "average" category. In the figure below, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 40. Area of Analysis and the NWS station in the Morgan County Area.



The EPA generated a wind rose for the Pryor Field NWS station for 2013-2015. In Figure 41, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Analysis of the NWS data indicate winds predominately blow from the southeast with secondary maxes from the north and south.

Figure 41. Morgan County 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 processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The modeling report indicates that the pre-processed meteorological data were provided by ADEM. However, details regarding how these files were prepared were not provided.

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. "To reduce the number of calms and missing winds in the surface data, archived 1-minute winds for the ASOS stations were used to calculate hourly average wind speed and directions, which were used to supplement the standard archive of hourly observed winds processed in AERMET. The EPA AERMINUTE program (Version 15272) was used for these calculations." 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 (m/s) 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 modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, details regarding how these files were prepared were not provided. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

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

The terrain in the area of analysis is best described as generally flat with the exception of Trinity Mountain, which is 9 km southeast of the facility. To account for these terrain changes, the AERMAP terrain program (version 11103) 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 1/3 arc second NED.

The EPA believes that the terrain in the area of analysis is accounted for in a manner consistent with the SO_2 modeling TAD. The stated application of the AERMAP pre-processor should adequately resolve any variations in terrain in the area.

7.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 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 elected to use a "tier 2" approach. Data was obtained for 2013-2015 from the SEARCH network. The data are from the Centreville monitor, which is located approximately 194 km south of Ascend in Centreville, AL. The background concentrations for this area of analysis were determined by the State to vary from 2.72 μg/m^3, equivalent to 1.0 ppb when expressed in two significant figures,[27] to 22.91 μg/m^3 (8.7 ppb), with an average value of 8.97 μg/m^3 (3.4 ppb). See Table 27 for the temporally varying background concentration by hour of day and season for 2013-2015.

Table 27 Centreville SO_2 Background Values for 2013-2015 (ppb)

Hour	Winter	Spring	Summer	Autumn
1	3.6	2.4	1.7	2.0
2	3.9	2.0	2.5	1.7
3	3.1	1.9	2.8	2.1
4	2.6	1.8	2.7	3.6
5	3.3	1.9	2.0	6.4
6	5.0	1.9	3.3	8.2
7	6.7	2.0	5.9	8.3
8	7.5	2.7	7.7	8.7
9	6.8	4.6	7.4	8.7
10	4.1	3.7	4.0	6.2
11	4.5	3.2	5.2	4.2
12	5.6	2.3	2.9	4.6
13	4.4	2.2	3.3	2.3
14	3.9	3.1	3.1	1.9
15	4.0	3.4	2.8	1.8
16	3.9	3.2	2.0	2.0
17	4.1	3.0	2.0	1.3
18	3.5	3.0	2.9	1.3
19	4.2	2.3	2.4	1.2
20	3.4	2.4	2.3	1.0
21	6.0	2.4	2.4	1.7
22	2.9	1.6	1.2	1.7
23	4.2	2.5	1.3	2.1
24	4.5	2.7	1.2	3.1

The EPA reviewed the Centreville SEARCH monitoring information and determined that the monitor is not a regulatory monitor that meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the data is not acceptable for use as background concentrations in this modeling demonstration. The EPA communicated this outstanding issue to Alabama in March 2017[28] and suggested the following options for addressing the issue: 1) demonstrate that the Centreville monitor meets the QA/QC criteria and other requirements in Part 58, Appendix B for PSD monitors, 2) choose a different background monitor that is representative of SO_2 background concentrations in the area of Ascend and either use the design value from that monitor or a use a more refined approach of seasonal hourly varying background values from that monitor, or 3) demonstrate that the Centreville SEARCH background value used in the modeling is more conservative (larger) than an alternative background site that would be representative of background in the area of Ascend. For this modeling demonstration, if option 3 is chosen, Alabama would need to demonstrate that the Centreville data is higher than the alternate site's data for each hour (96 total values, 4 seasons x 24 hours in each day = 96 values).

Alabama submitted additional information to the EPA[29] to address the issues discussed above. Alabama's supplemental information proposed to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky. For eight of the Alabama DRR sources (including Ascend), Alabama's analysis compared the Centreville SEARCH data with the Mammoth Cave data, hour-by-hour, for each of the 96 hours in the "season-by-hour-of-day" option used in the AERMOD modeling. Alabama then found the hour where the Mammoth Cave data is greater than the Centreville data by the greatest amount (which they found to be 3.68 ppb = 9.71 $\mu g/m^3$)[30]. Alabama added this "adjustment factor" of 9.71 $\mu g/m^3$ to the final modeling results for each the SO_2 DRR Sources (including Ascend).

Alabama's supplemental information justifies use of the Mammoth Cave data by stating that it is "the closest background monitor with sufficient data capture that does not show interference from industrial sources." The EPA does not believe that this is an adequate justification for determining whether Mammoth Cave is a representative background monitor pursuant to the criteria provided in Section 8.2.2(c) of the *Guideline on Air Quality Models* contained in 40 CFR Part 51, Appendix W. The criteria in Appendix W state that an appropriate regional site is "*one that is located away from the area of interest but is impacted by similar natural and distant man-made sources."*

[27] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.

[28] Email from Beverly Banister, Region 4 Air, Pesticides and Toxics Management (APTMD), Air Director to Ron Gore, ADEM Air Director on March 21, 2017.

[29] Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017

[30] Note that Alabama used a conversion factor of 2.639 to convert the SO_2 background concentration in ppb to $\mu g/m^3$. This differs from the EPA's recommended conversion factor of 2.619. Alabama's conversion factor results in a conservatively higher concentration in ug/m^3, so is therefore acceptable.

The EPA performed an evaluation to determine if the Mammoth Cave site is an appropriate regional background site for the Ascend modeling. Both the Mammoth Cave monitor and the Ascend facility are located in rural areas. The 2014 NEI listed 4,230 tpy of SO_2 emissions in Morgan County. The emissions from the modeled sources are approximately 3,108 tpy, so there are over 1,100 tpy of emissions in Morgan County not accounted for in the modeling. In the area around the Mammoth Cave monitor, there are no sources emitting more than 5 tpy of SO_2 within 50 km of the monitor and the total SO_2 emissions in the 3 counties surrounding the monitor are less than 70 tpy, according to the emissions data in the 2014 NEI. The closest major source of SO_2 emissions to the Mammoth Cave monitor is the TVA Paradise power plant (19,654 tpy in 2014) located approximately 75 km from the monitor. The EPA has determined that the SO_2 emissions sources located near the Mammoth Cave monitor are not similar to the sources in the area near the Ascend facility. As a result, the Mammoth Cave monitor is not an acceptable regional site to provide background concentrations for this modeling analysis, and Alabama's "adjustment factor" procedure is not acceptable for the Ascend modeling.

7.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Morgan County area of analysis are summarized below in Table 28

Table 28. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Morgan County Area

Input Parameter	Value
AERMOD Version	16216r
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	7
Modeled Structures	Not available.
Modeled Fencelines	1
Total receptors	8,748
Emissions Type	Actual
Emissions Years	2013-2015
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	Tanner, AL
NWS Station Upper Air Meteorology	Nashville, TN
NWS Station for Calculating Surface Characteristics	Tanner, AL
Methodology for Calculating Background SO_2 Concentration	Tier 2 approach using SEARCH site at Centreville, AL (2013-2015)
Calculated Background SO_2 Concentration	2.72-22.91 µg/m^3 + Alabama's "adjustment factor" of 9.71 µg/m^3

The results presented below in Table 29 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

Table 29. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Morgan County Area

		Receptor Location [UTM zone 16]		99th percentile daily maximum 1-hour SO_2 Concentration (µg/m^3)	
Averaging Period	**Data Period**	**UTM Easting (m)**	**UTM Northing (m)**	**Modeled concentration (including background)**	**NAAQS Level**
99th Percentile 1-Hour Average	2013-2015	497742.30	3832120.70	188.85	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 µg/m^3 conversion factor

The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 179.14 μg/m^3, equivalent to 68 ppb. As discussed in Section 7.2.1.8, in response to the EPA's outstanding questions regarding the background concentrations using in their modeling analysis, Alabama added an "adjustment factor" of 3.68 ppb (9.71 μg/m^3) to the final modeling result presented in their modeling report. This modeled concentration included the background concentration of SO_2 and adjustment factor, and is based on actual emissions from the facilities (179.14 + 9.71 = 188.85 μg/m^3). Figure 42a and 42b below was generated by EPA, and indicates that the predicted value occurred along the western fence line of the facility. The State's receptor grid is also shown in the figure.

Figure 42a and 42b. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Morgan County Area. Source: "Air Dispersion Modeling for Evaluating Compliance with the 1-Hour SO_2 National Ambient Air Quality Standard at the Ascend Performance Materials Facility in Decatur, Alabama" prepared for Alabama, December 2016

The modeling submitted by the State, with noted issues, does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

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

The EPA assessment of the 1-hour SO_2 DRR AERMOD modeling for Ascend finds that the modeling does not conclusively demonstrate that the area surrounding this DRR source meets or does not meet the 1-hour SO_2 NAAQS. Initially, the State used AERMOD version 15181 with the Adjusted U* option. However, Alabama re-ran the modeling analysis using AERMOD version 16216r which contains bug fixes for the Adjusted U* option in version 15181. Use of AERMOD version 16216r resulted in the same maximum concentration compared to the use of AERMOD version 15181. Therefore, Alabama has resolved the issue regarding the version of AERMOD that was used.

The State adequately represented the topography of the area with the model and its preprocessors. The State chose to model emissions from Ascend and Nucor Steel during 2013 – 2015. The State chose to use actual emissions to reflect normal operation of Ascend and the nearby source, Nucor Steel.

The State chose to model two sources in the area, and the EPA agrees with this decision, as supported by Alabama's evaluating nearby sources within 20 km of Ascend. Another major SO_2 emissions source located approximately 28 km north-northwest of Ascend is IP Courtland facility that emitted 901 tons in 2013, 0 tons in 2014, and no emissions reported in 2015. Alabama only evaluated sources within 20 km of the facility, therefore, this source was not included in the modeling. The EPA requested that Alabama provide adequate discussion as to why IP Courtland was not included in the modeling analysis. For instance, if IP Courtland has permanently shutdown, documentation on the shutdown should be provided. On July 18, 2017, ADEM provided additional documentation to support not including IP-Courtland in the modeling analysis. ADEM states that IP-Courtland provided documentation to ADEM on June 17, 2017 that the permit associated with the IP Courtland Mill facility has been returned and is voided. The EPA agrees that this source does not need to be included in the modeling analysis for the Ascend facility.

However, the EPA determined that the SO_2 emissions sources located near the Mammoth Cave monitor are not similar to the sources in the area near the Ascend facility because there are over 1,100 tpy of SO_2 emissions in Morgan County not accounted for by the sources explicitly included in the modeling. As a result, the Mammoth Cave monitor is not an acceptable regional site to provide background concentrations for this modeling analysis, and Alabama's "adjustment factor" procedure is not acceptable for the Ascend modeling.

Alabama's selection of meteorology and surface characteristics for the area may be appropriate to make a valid modeling demonstration, however, the EPA notes that ADEM did not provide documentation to verify that the AERMET processing was appropriate to generate the surface and upper air meteorology files.

The EPA does not believe the receptor grid that was chosen in the final modeling is appropriate. The August 2016 version of the Modeling TAD provides additional clarification regarding areas for receptor placement. The revised language in Section 4.2 states the following, "For SO_2 designations modeling, the areas to consider for receptor placement are those areas that would be considered ambient air relative to each modeled facility, including other facilities' property." The adjacent industrial facilities on the peninsula are considered ambient air relative to the Ascend facility and receptors should be included over those properties. The EPA does not believe the receptor grid that was chosen for the final modeling is appropriate as receptors were not included over the adjacent industrial facilities.

As a result of the issues discussed above, the EPA finds that the State's modeling analysis for this DRR source was not performed in a manner consistent with Appendix W and the Modeling TAD and may not accurately represent current air quality in the area. Therefore, the EPA does not have sufficient information to determine whether the area meets or does not meet the SO_2 NAAQS or whether the area contributes to ambient air quality in a nearby area that does not meet the NAAQS.

7.4. Jurisdictional Boundaries in the Morgan County, Alabama Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Morgan County. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

Alabama requested the entire State be designated attainment including Morgan County and the area containing the DRR source based on an assessment and characterization of air quality from the Ascend Performance Materials, LLC DRR source and one other nearby source. The State did not provide a specific boundary recommendation for the modeled areas around Ascend. Morgan County is bounded to the northeast by Madison County; to the east by Marshall County; to the south by Cullman County; to the west by Lawrence County; and to the northwest by Limestone County. Ascend is located in the northwest corner of Morgan County, on a peninsula, in Wheeler Lake on the north side of the city of Decatur south of Limestone County line.

ADEM assessed nearby sources within a 20 km from the Ascend facility in all directions using the Q/D method and considered this sufficient to resolve the maximum impacts and any potential impact areas. Alabama's area of analysis around Ascend captures portions of Morgan, Lawrence, and Limestone counties in Alabama. Based upon the screening methodology, Alabama identified one additional nearby background source, Nucor Steel Decatur in Decatur, Alabama that was included in the modeling analysis for Ascend. Nucor Steel is approximately 5.3 km west of Ascend and approximately 3 km from the Limestone County line and emitted 220 tons of SO_2 according to the 2014 NEI.

7.5. The EPA's Assessment of the Available Information for the Morgan County, Alabama Area

After evaluating the 1-hour SO_2 DRR AERMOD modeling and other information for the Ascend facility, the EPA intends to modify the State's recommendation and designate Morgan County unclassifiable for the SO_2 NAAQS. Alabama recommended attainment for the entire state including Morgan County and the area containing Sanders Lead based in part on a modeling assessment using AERMOD version 16216r, characterization of air quality impacts from the Ascend and one other nearby source Nucor Steel, and background concentration data from the Mammoth Cave monitor in Kentucky. For Ascend, the State modeled annual actual SO_2 emissions between 2013 and 2015. For Nucor Steel, a constant emissions rate of 4.2839 g/s (34 lb/hr) was modeled. The State's modeling indicates that the highest predicted 99^{th} percentile daily maximum 1-hour concentration within the chosen modeling domain is 188.85 $\mu g/m^3$, equivalent to 71.68 ppb which is below the level of the 2010 SO_2 NAAQS. However, the EPA's assessment finds that the modeling does not provide sufficient information to demonstrate whether the area containing the DRR source meets or does not meet the 1-hour SO_2 NAAQS or contributes to an area that does not meet the standard. Issues with the modeling include: lack of adequate documentation to support the AERMET processing used to generate the surface and upper air meteorology files and an inadequate receptor grid that does not include receptors over the adjacent industrial facilities.

The modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, the State did not provide details regarding how these files were prepared. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

The EPA does not believe the receptor grid that was chosen in the final modeling is appropriate. The August 2016 version of the Modeling TAD provides additional clarification regarding areas for receptor placement. The revised language in Section 4.2 states the following, "For SO_2 designations modeling, the areas to consider for receptor placement are those areas that would be considered ambient air relative to each modeled facility, including other facilities' property." The adjacent industrial facilities on the peninsula are considered ambient air relative to the Ascend facility and receptors should be included over those properties. The EPA does not believe the receptor grid that was chosen for the final modeling is appropriate as receptors were not included over the adjacent industrial facilities.

The EPA determined that the SO_2 emissions sources located near the Mammoth Cave monitor are not similar to the sources in the area near the Ascend facility because there are 32 tpy of SO_2 emissions not accounted for by the sources explicitly included in the modeling. As a result, the Mammoth Cave monitor is not an acceptable regional site to provide background concentrations for this modeling analysis, and Alabama's "adjustment factor" procedure is not acceptable for the Ascend modeling.

The State used the Q/D methodology to assess other nearby sources within 20 km of the Ascend facility. Using this methodology, ADEM identified one additional nearby background source that was included in the modeling analysis for Ascend. The nearby source is Nucor Steel. The EPA

believes that the remaining sources within the area of analysis and in Morgan County are not likely to cause or contribute to an exceedance of the SO_2 NAAQS due to their low SO_2 emissions and distance from Ascend.

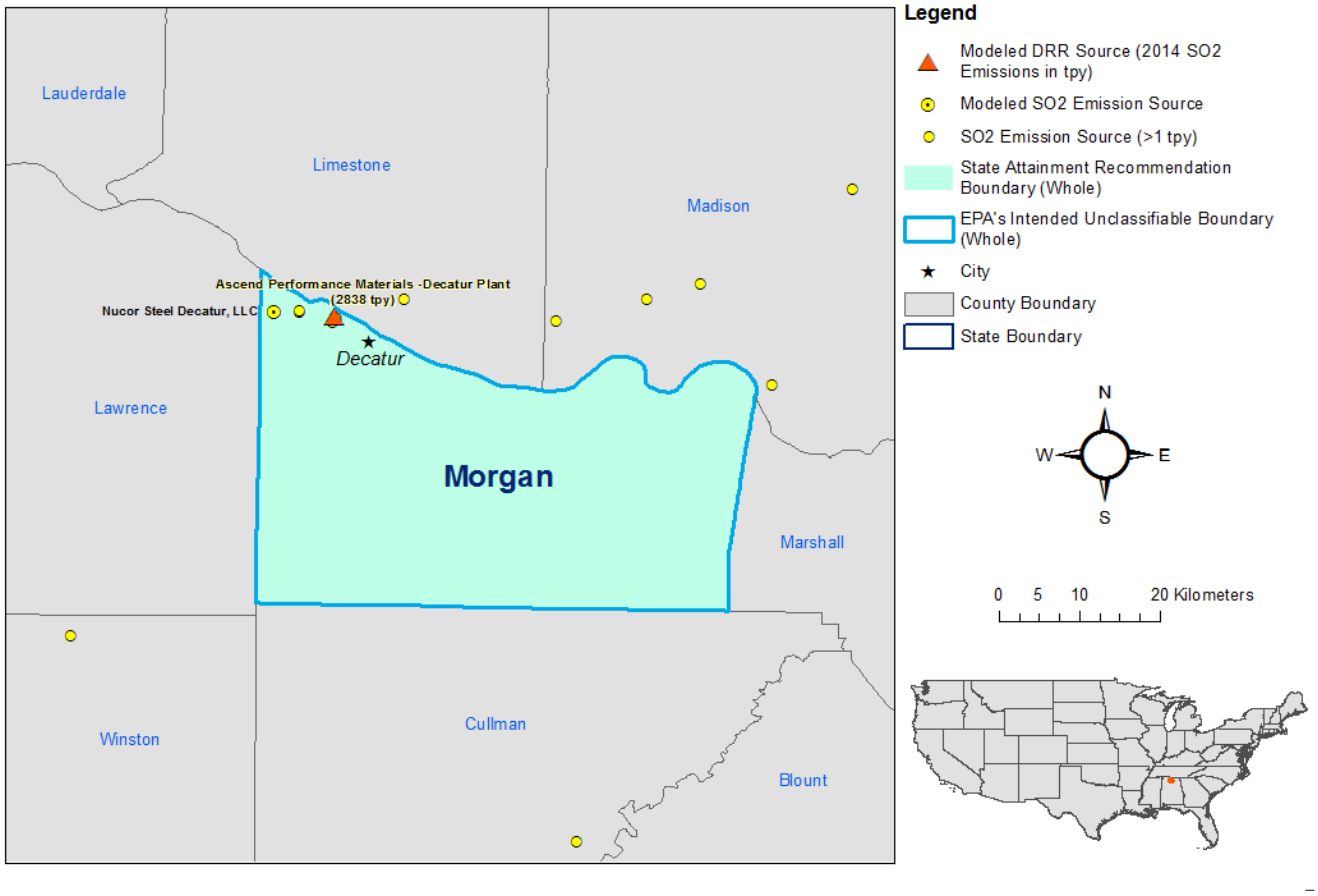
Another SO_2 emissions source, IP-Courtland, is located approximately 28 km north-northwest of Ascend and emitted 901 tons in 2013 and zero emissions in 2014. Alabama did not include IP-Courtland in the modeling analysis because the stated indicated that the source's operating permit had been voided according to documentation provided by ADEM to EPA on July 18, 2017. The EPA anticipates that the other nearby sources in Morgan County as well as the counties bordering Morgan County are not likely to cause or contribute to a violation of the SO_2 NAAQS in the area of analysis due to their low SO_2 emissions and distance from Ascend. The EPA notes that Ascend is the only SO_2 emitting source subject to the DRR in Morgan County.

As a result of the issues identified above, the EPA finds that the State's modeling analysis for the was not performed in a manner consistent with Appendix W and the Modeling TAD and may not accurately represent current air quality in the area. Therefore, the EPA does not have sufficient information to determine whether the area is meeting or not meeting the SO_2 NAAQS or if it contributes to a nearby area that does not meet standard.

7.6. Summary of Our Intended Designation for the Morgan County, Alabama Area

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA is modifying the state's recommendation and intends to designate the area around Ascend as unclassifiable for the 2010 SO_2 NAAQS. The EPA's assessment of the 1-hour SO_2 DRR AERMOD modeling for the Ascend facility finds that the modeling does not demonstrate that the area meets the 1-hour SO_2 NAAQS and is not contributing to a nearby area that may not meet the NAAQS. Specifically, the boundaries are comprised of the entirety of Morgan County. Figure 43 shows the boundary of this intended designated area. The EPA believes that our intended unclassifiable area, bounded by Morgan County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area. At this time, our intended designations for the State only apply to this and the other areas presented in this technical support document.

Figure 43. Boundary of the Intended Morgan County Unclassifiable Area



8. Technical Analysis for the Pike County Area

8.1. Introduction

The EPA must designate the Pike County, Alabama, area by December 31, 2017, because the area has not been previously designated and Alabama has not installed and begun timely operation of a new, approved SO_2 monitoring network meeting the EPA specifications referenced in the EPA's SO_2 DRR for any sources of SO_2 emissions in the vicinity of any source in Pike County.

8.2. Air Quality Monitoring Data for the Pike County Area

This factor considers the SO_2 air quality monitoring data in the area of Pike County. The EPA reviewed the available air quality monitoring data in the AQS database and found no nearby data for Pike County. In reviewing the available air quality monitoring data in AQS, the EPA determined that there is no relevant data in AQS collected in or near Pike County that could inform the intended designation action. The most recent SO_2 design values for all areas of the country are available at https://www.epa.gov/air-trends/air-quality-design-values.

8.3. Air Quality Modeling Analysis for the Pike County Area Addressing Sanders Lead Company

8.3.1. Introduction

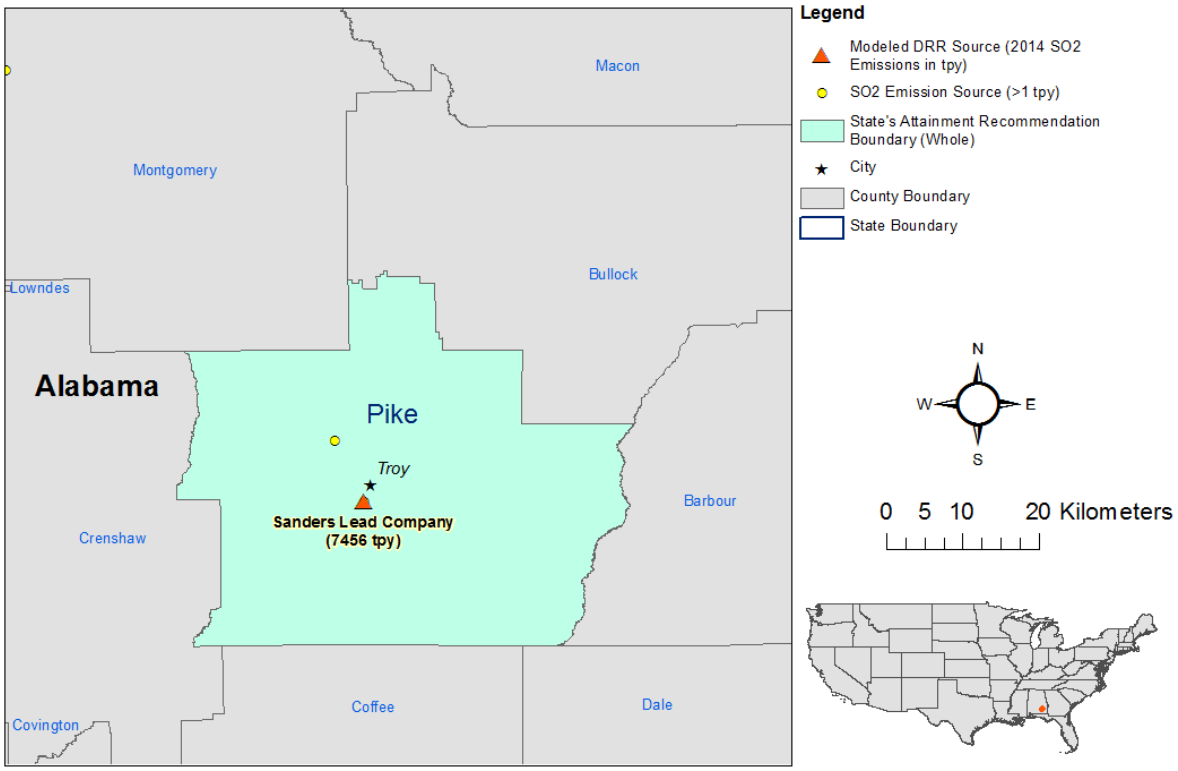
This section 8.3 presents all the available air quality modeling information for a portion of Pike County that includes Sanders Lead Company, Inc. (This portion of Pike County will often be referred to as "the Pike County area" within this section 8.3). This area contains the following SO_2 sources, principally the sources around which Alabama is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy:

- The Sanders Lead facility emitted 2,000 tons or more annually. Specifically, Sanders Lead emitted 7,456 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Alabama has chosen to characterize it via modeling.

Alabama recommended attainment for the entire state including Pike County and the area containing the Sanders Lead facility 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 is modifying the state's recommendation for the area and intends to designate Pike County as unclassifiable for the SO_2 NAAQS. 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 Troy, Alabama approximately 70 km southeast of Montgomery. See Figure 44. ADEM did not identify additional nearby SO_2 sources. Also, Figure 44 shows Alabama's attainment designation for the entire state including Russell County. The EPA's intended unclassifiable designation boundary for the Russell County area is not shown in this figure, but is shown in a figure in the section below that summarizes our intended designation.

Figure 44. Map of the Pike County Area Addressing Sanders Lead.



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.

For this area, the EPA received and considered two modeling assessments from the State. No assessments from other parties were considered. To avoid confusion in referring to these assessments, the following table lists them, indicates when they were received, provides an identifier for the assessment that is used in the discussion of the assessments that follow, and identifies any distinguishing features of the modeling assessments.

Table 30. Modeling Assessments for the Pike County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Alabama*	January 2017	Sanders Lead Modeling Report	Alabama Submittal
Alabama	May 2017	Revised modeling Report for Sanders Lead	

*Alabama submitted modeling assessment prepared by AECOM.

8.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 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 January 2017 Sanders Lead Modeling Report indicates that AERMOD Version 15181 was used for the modeling. However, the AERMOD output file provided with the modeling documentation indicated AERMOD version 14134 was used. The EPA provided comments to ADEM that version 14134 is an outdated version of the model and is not acceptable. On May 12, 2017, ADEM provided revised modeling results using AERMOD version 16216r.[31] A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

8.3.1.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 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. 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. 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 with rural mode.

The approximate UTM coordinates of Sanders Lead are NAD27 Zone 16, 596.744 km east and 3517.284 km north, at an elevation of approximately 160 m above mean sea level. Based on area classification systems recognized by the EPA, the facility is located in a rural section of the State. The EPA guidance shows two alternative procedures to determine whether the character of an area is predominately urban or rural: (1) land use typing or (2) population density. The area classification system as described by Auer in the Journal of Applied Meteorology, Vol. 17, pg. 636-643, 1978, Correlation of Land Use and Cover with Meteorological Anomalies, is frequently used to classify the area. The ADEM requires an Auer land use analysis which uses USGS maps

[31] May 12, 2017, email from Jim Owen (ADEM) to Rick Gillam (EPA Region 4).

to make a rural/urban determination. From this review it was apparent the area within a 3-km radius of the facility is rural using Auer techniques. To confirm this conclusion, Alabama used the AERSURFACE program to also confirm what the USGS maps indicated. That is that the area surrounding the facility is largely rural in nature with greater than 50 percent of the area made up of trees and vegetation. For the land use analysis, Alabama used a 3 km distance to evaluate surface roughness. ADEM understands that for developing surface boundary layer parameters for AERMET processing (stage 3) a one km distance is required. Results using a one km radius has been presented in a recent land use protocol submittal to the ADEM. The State determined that it was most appropriate to run the model with rural dispersion coefficients or in rural mode. The EPA agrees that the rural option is acceptable for the 1-hour SO_2 DRR AERMOD modeling for Sanders Lead.

8.3.1.3. 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 SO_2 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 SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. For the Pike County area, the State included no other emitters of SO_2 within 20 km of Sanders Lead in any direction. The State determined that 20 km was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS violations in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas.

ADEM used the Q/D >20 metric within 20 km to determine which background sources should be included in the modeling analysis for Ascend. A Q/D value was determined for all sources within 20 km of the DRR source where Q represents the 2014 actual SO_2 tpy emissions totals, and D represents the distance between the two facilities. Using this methodology, no additional nearby background sources were identified for inclusion in the Sander's Lead modeling analysis. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis.

The grid receptor spacing for the area of analysis chosen by the State is as follows:
A Cartesian receptor grid system was used to adequately assess air quality impacts in all directions from the Sanders Lead fence line to a distance of 10 km from the site. The grid system utilized the Universal Transverse Mercator (UTM) coordinate system. Discrete receptors were placed along the property grid fence line at 100-m spacing. In addition, receptors extended outward from the fence line at 100-m grid spacing at 5,000-meter distance; 250-m grid spacing at 7,000-m distance and 500-m grid spacing at 10,000-m distance.

The receptor network contained 16,376 receptors, and the network covered the Pike County area.

Figures 45 and 46, included in the State's recommendation, show the State's chosen area of analysis surrounding the Sanders Lead 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 each modeled facility, including other facilities' property with the exception of locations described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor. The State also did not place receptors in other locations that it considered to not be ambient air relative to each modeled facility and so excluded receptors within the Sanders Lead fence line. The Modeling Report provides a figure showing the fence line boundary (Figure 46 below). However, no information was provided to document that public access to the facility property is prevented by a fence or some other physical barrier. Therefore, the EPA finds that ADEM's receptor grid for Pike County Area and Sanders Lead is not adequate to assess potential impacts in ambient air locations.

Figure 45. Receptor Grid for the Pike County Area. Source: "Sanders Lead Company, Inc. Troy, Alabama 1-hour SO_2 Modeling Report – Analysis of Results" prepared by AECOM for Alabama, January 2017

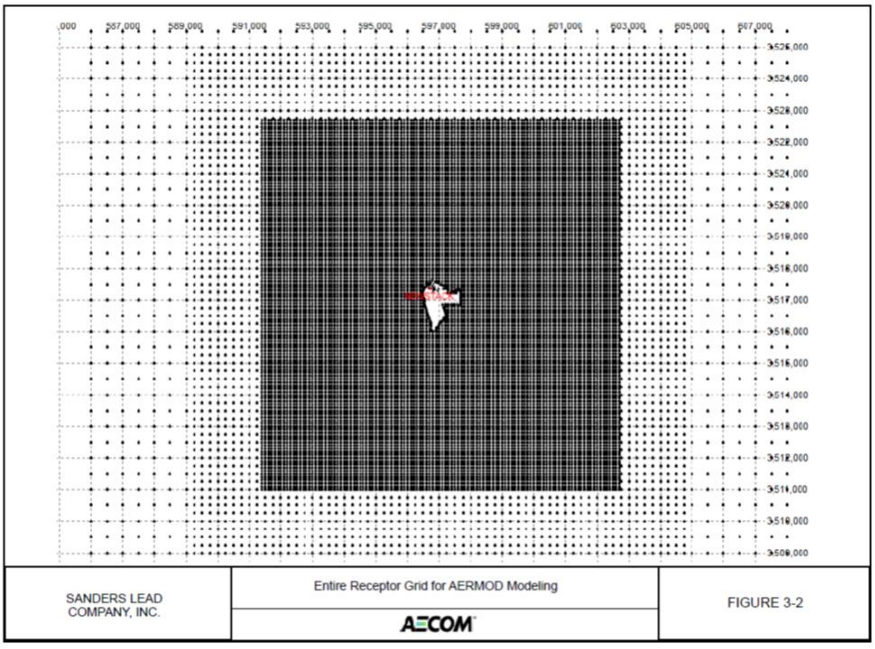
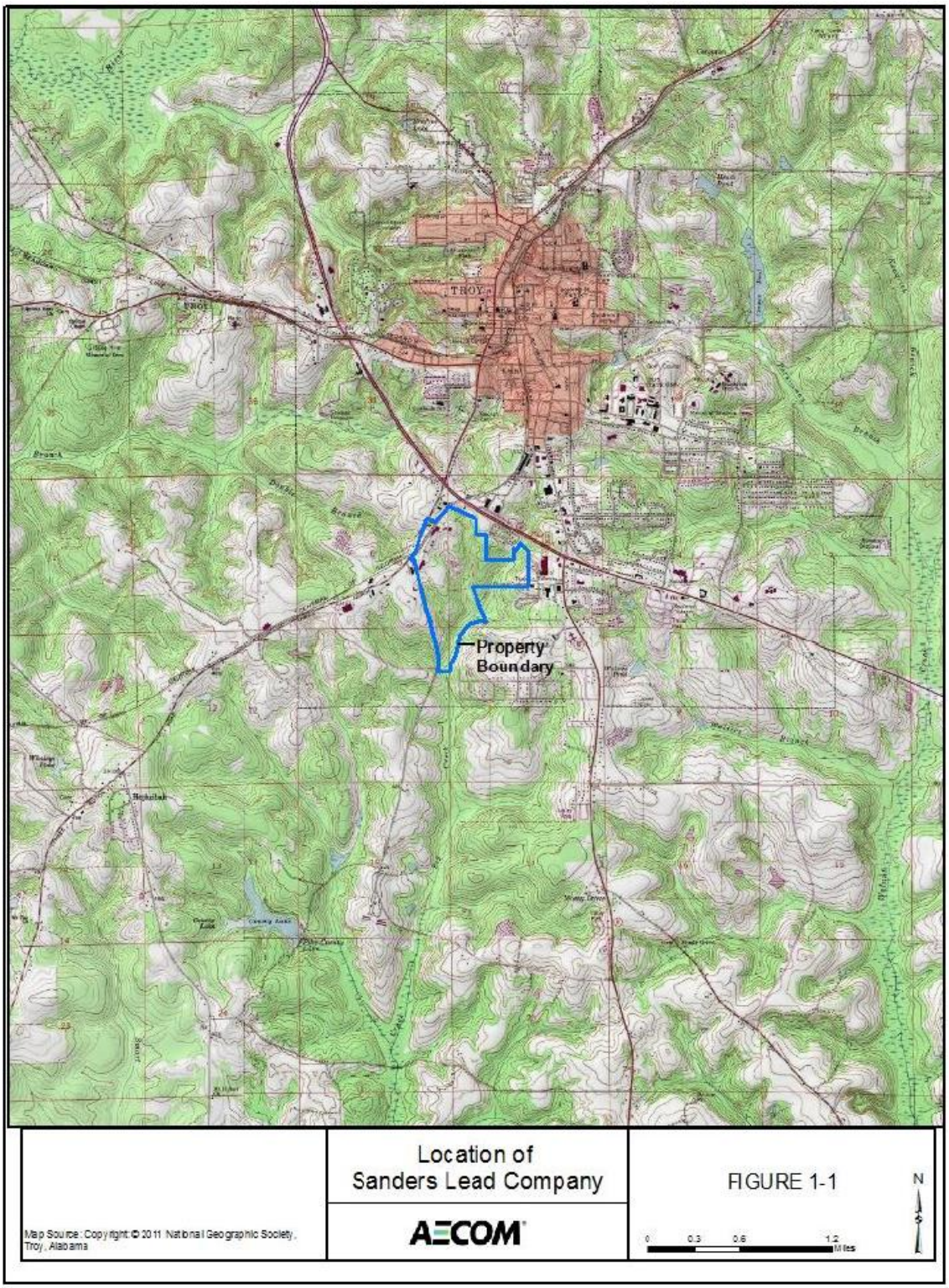


Figure 46. Sanders Lead Property Boundary. Source: "Sanders Lead Company, Inc. Troy, Alabama 1-hour SO_2 Modeling Report – Analysis of Results" prepared for Alabama, January 2017



8.3.1.4. 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.

The Sanders Lead facility operates four (4) lead smelting blast furnaces and an occasionally used agglomeration furnace. There are no other sources of SO_2 emissions from the facility. The January 2017 modeling report indicates that the Sanders Lead facility committed to install, prior to the ambient SO_2 compliance deadline, a wet scrubber system that will have sufficient capacity to handle the flow from both of the existing stacks. The new scrubber will be installed downstream of the existing baghouses and will employ ammonia injection as the reagent to reduce SO_2 emissions. The stack exit will be 180 feet above grade with an exit diameter of 8 feet, 11 inches. A new allowable SO_2 emissions limit of 315 lb/hr from the new scrubber stack was used in the modeling provided by Sanders Lead and ADEM. The EPA has communicated to ADEM that Sanders Lead must be complying with the new allowable emissions limit prior to the final designation and that the limit must be federally-enforceable and effective. The EPA notes ADEM has not provided documentation to verify that Sanders Lead is complying with the new allowable limit or that the limit is permanent and federally enforceable and effective.

The January 2017 modeling report indicates that Alabama screened for potential nearby sources within a 20 km area surrounding Sanders Lead. A spreadsheet was provided to the facility with the nearby facilities that met the 2014 actual emissions (in tpy) divided by the distance of greater than 20 within a maximum distance of 20 km, including small sources at a very close distance. Results of this analysis showed that no additional sources meet these criteria; therefore, additional sources were not used in the modeling.

The State characterized the Sanders Lead source within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the State used Good Engineering Practice (GEP) stack height in conjunction with allowable 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 BPIPPRM was used to assist in addressing building downwash.

The EPA found that the State source characterization and BPIPPRM results were developed according to the EPA's Modeling TAD and were acceptable.

8.3.1.5. 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 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 SO_2 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 SO_2 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 discussed in Section 8.2.1.4 above, the modeling was performed with a new allowable emissions limit of 315 lb/hr. This information is summarized in Table 31. A description of how the State obtained hourly emission rates is given below this table.

Table 31. SO_2 Emissions based on PTE from Facilities in the Pike County Area

Facility Name	SO_2 Emissions (tpy, allowable)
Sanders Lead	1,380
Total Emissions from All Modeled Facilities in the Area of Analysis	1,380

The allowable emissions in tpy for Sanders Lead was determined by the EPA based on Sanders Lead future allowable emissions limit of 315 lb/hr assuming continuous operation of the facility for the entire year (315 lb/hr x 8760 hrs/yr x (1 lb/2000 tons) = 1,380 tpy). To date, ADEM has not provided documentation to verify that the proposed hourly allowable emission rate of 315 lb/hr is currently federally enforceable and effective. Therefore, the modeling cannot be relied upon to conclusively demonstrate that the area is meeting the NAAQS.

8.3.1.6. 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 NWS stations, site-specific or onsite data, and other sources such as universities, FAA, and military stations.

For the area of analysis for the Pike County area, the State selected the surface meteorology from Evergreen, AL NWS station, and coincident upper air observations Alabaster, Alabama, as best representative of meteorological conditions within the area of analysis.

The State used AERSURFACE version 13016 using data from Evergreen, AL 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 "zo". The state estimated surface roughness values for 12 spatial sectors out to 1 km at a monthly temporal resolution for dry and average conditions. In the figure below, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis. The EPA generated a wind rose for the Evergreen, AL NWS station for the 2012-14 period. In Figure 48, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Analysis of the NWS data indicate winds predominately blow from the northwest direction.

Figure 47. Area of Analysis and the NWS stations in the Pike County Area

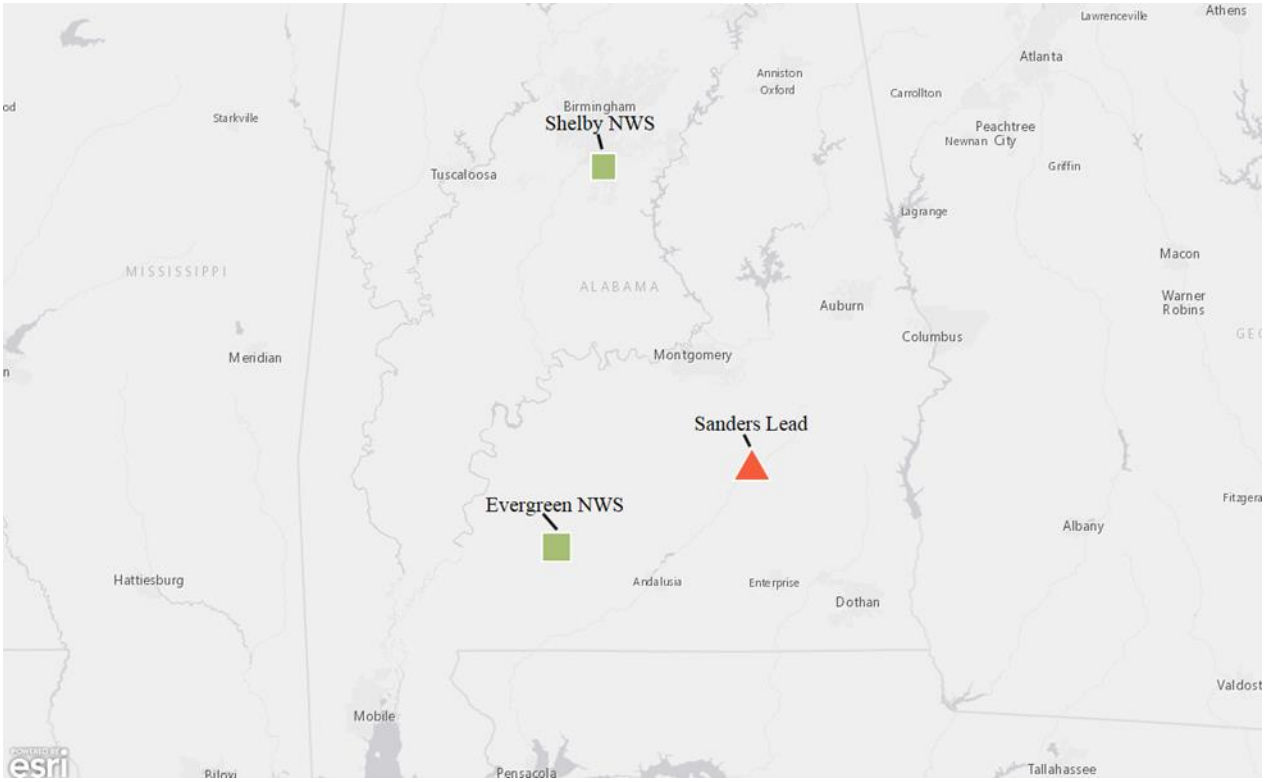
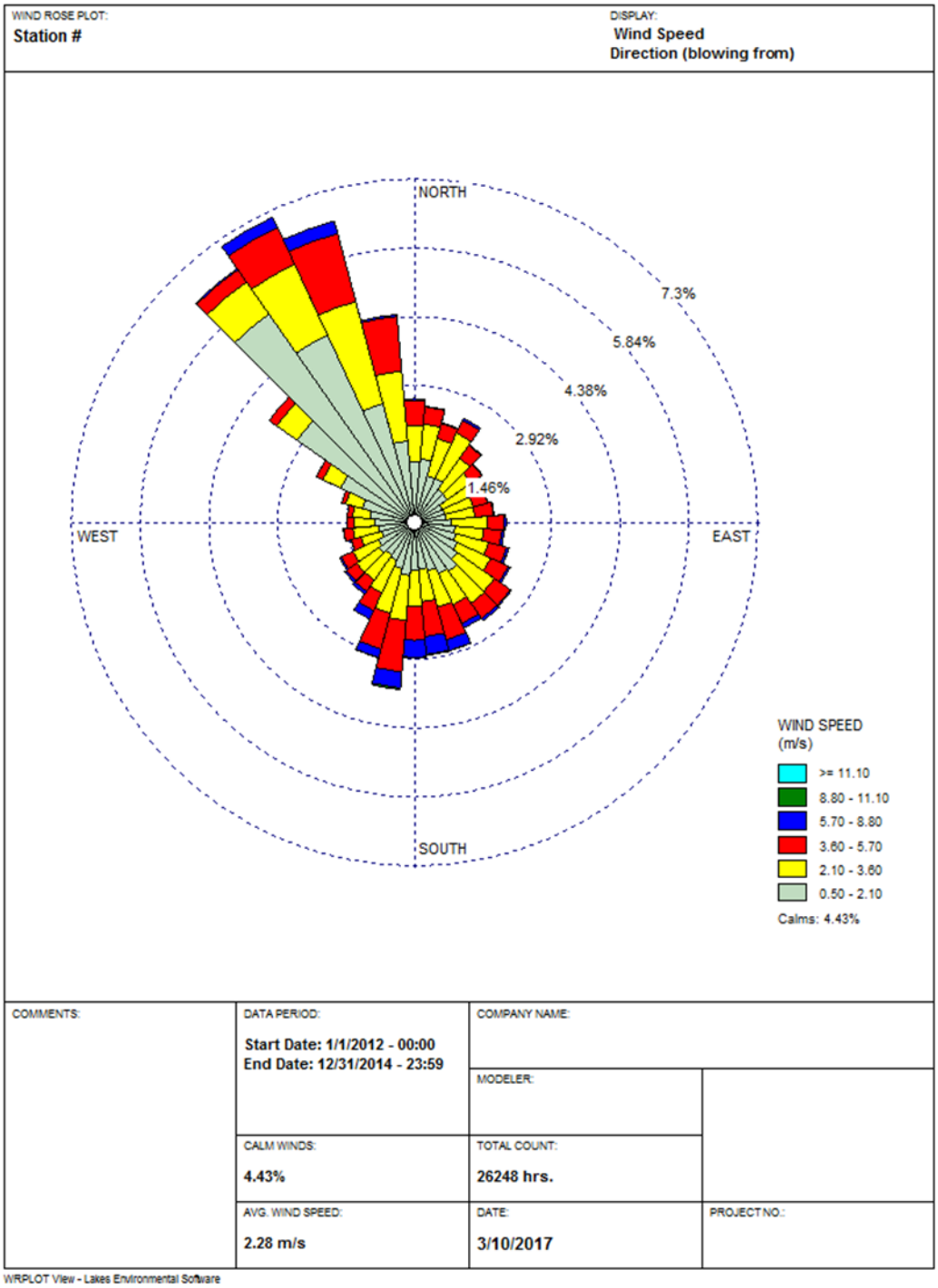


Figure 48. Evergreen, AL Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air NWS 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 State followed the methodology and settings presented in the EPA's 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 Evergreen, Alabama, 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 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 m/s 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's assessment of the State's AERSURFACE, AERMET, and AERMINUTE files are that the files were generated following the EPA's Modeling TAD and are acceptable. The EPA also made a wind rose for Evergreen, Alabama, to show that the primary wind was northwesterly.

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

The terrain in the area of analysis is best described as gently rolling in this area of Alabama with no local topographic features. To account for these 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 National Elevation Data.

The EPA concludes that the State followed the EPA's Modeling TAD by correctly using AERMAP to develop terrain elevations for the Sanders Lead location.

8.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 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 used "tier 1" only. Data was obtained from 2012-2014 for the Centreville monitor, located in Centreville, Alabama, which is 169.16 km to the northwest of Sanders Lead. The single value of the background concentration for this area of analysis was determined by the State to be 44 $\mu g/m^3$, equivalent to 17 ppb when expressed in 2 significant figures,[32] and that value was incorporated into the final AERMOD results.

The EPA reviewed the Centreville SEARCH monitoring information and determined that the monitor is not a regulatory monitor that meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the data is not acceptable for use as background concentrations in this modeling demonstration. The EPA communicated this outstanding issue to Alabama in March 2017[33] and suggested the following options for addressing the issue: 1) demonstrate that the Centreville monitor meets the QA/QC criteria and other requirements in Part 58, Appendix B for PSD monitors, 2) choose a different background monitor that is representative of SO_2 background concentrations in the area of Continental Carbon and either use the design value from that monitor or a use a more refined approach of seasonal hourly varying background values from that monitor, or 3) demonstrate that the Centreville SEARCH background value used in the modeling is more conservative (larger) than an alternative background site that would be representative of background in the area of Continental Carbon.

Alabama submitted additional information to the EPA[34] to address the issues discussed above. Alabama's supplemental information proposed to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky. For two of the Alabama DRR sources (including the Sanders Lead facility), Alabama's analysis substituted the Mammoth Cave 2012-2014 design value (26.2 $\mu g/m^3$) for the Centreville SEARCH 2012-2014 design value (44 $\mu g/m^3$).

Alabama's supplemental information justifies use of the Mammoth Cave data by stating that it is "the closest background monitor with sufficient data capture that does not show interference from industrial sources." The EPA does not believe that this is an adequate justification for determining whether Mammoth Cave is a representative background monitor pursuant to the criteria provided in Section 8.2.2(c) of the *Guideline on Air Quality Models* contained in 40 CFR Part 51, Appendix W. The criteria in Appendix W state that an appropriate regional site is "*one*

[32] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.
[33] Email from Beverly Banister, Region 4 Air, Pesticides and Toxics Management (APTMD), Air Director to Ron Gore, ADEM Air Director on March 21, 2017.
[34] Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017

that is located away from the area of interest but is impacted by similar natural and distant man-made sources."

The EPA performed an evaluation to determine if the Mammoth Cave site is an appropriate regional background site for the Sanders Lead modeling. Both the Mammoth Cave monitor and the Sanders Lead facility are located in rural areas. The 2014 NEI listed 7,779 tpy of SO_2 emissions in Pike County. The 2014 actual emissions from Sanders Lead were 7,456 tpy, so there are approximately 15 tpy of emissions in Pike County not accounted for in the modeling. In the area around the Mammoth Cave monitor, there are no sources emitting more than 5 tpy of SO_2 within 50 km of the monitor and the total SO_2 emissions in the 3 counties surrounding the monitor are approximately 70 tpy, according to the emissions data in the 2014 NEI. The closest major source of SO_2 emissions to the Mammoth Cave monitor is the TVA Paradise power plant (19,654 tpy in 2014) located approximately 75 km from the monitor. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near the Sanders Lead facility. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis.

8.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Pike County area of analysis are summarized below in Table 32

Table 32. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Pike County Area

Input Parameter	Value
AERMOD Version	16216r
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	1
Modeled Structures	unknown
Modeled Fencelines	1
Total receptors	16,376
Emissions Type	PTE allowable
Emissions Years	PTE no effective date
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Evergreen, AL
NWS Station Upper Air Meteorology	Alabaster, AL
NWS Station for Calculating Surface Characteristics	Evergreen, AL
Methodology for Calculating Background SO_2 Concentration	Tier 1 approach using design value at Mammoth Cave, KY site (2012-2014)
Calculated Background SO_2 Concentration	26.2 $\mu g/m^3$

The results presented below in Table 33 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

Table 33. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Pike County Area

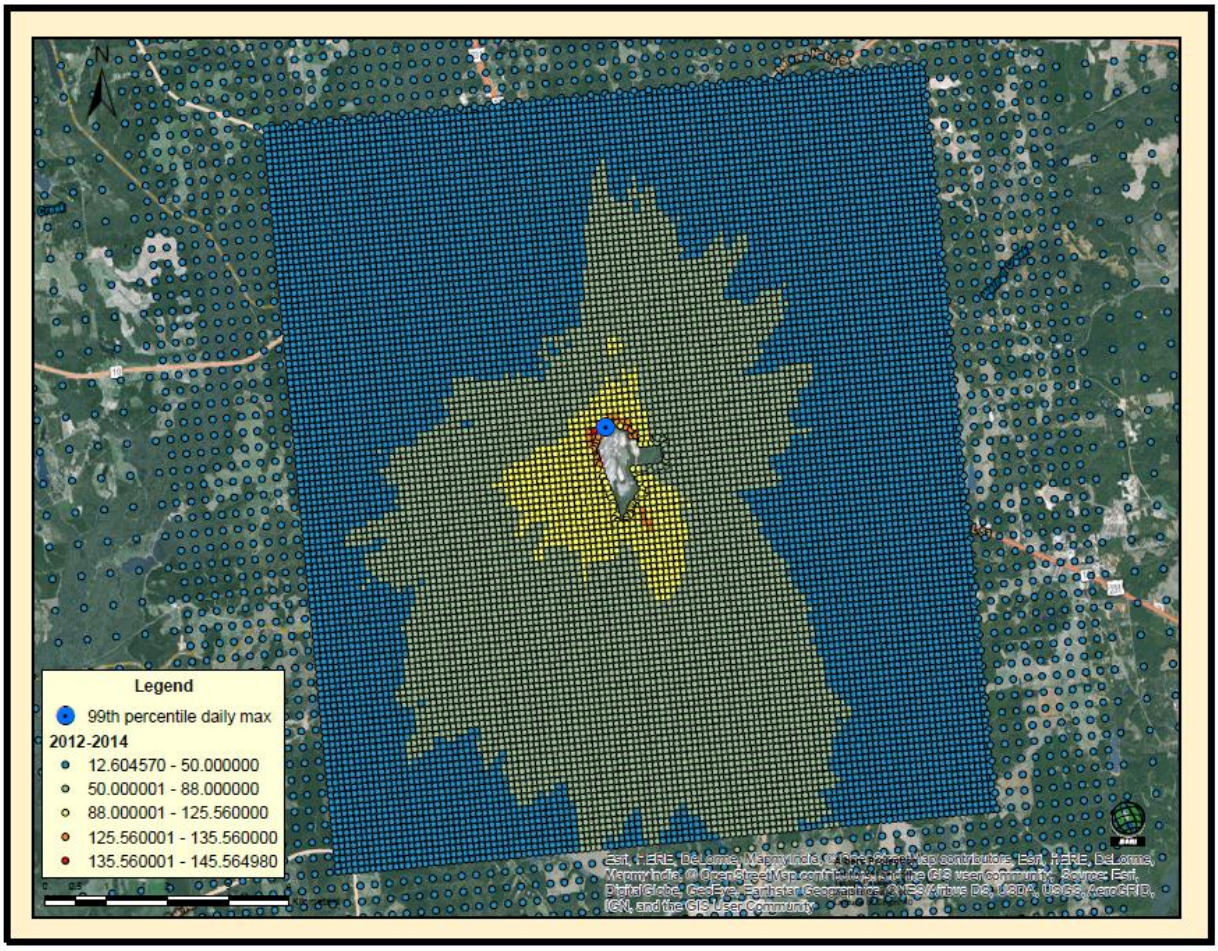
Averaging Period	Data Period	Receptor Location [UTM zone 16]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM Easting (m)	UTM Northing (m)	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012-2014	596613	3517522	171.76	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 145.56 $\mu g/m^3$, equivalent to 55.6 ppb. As discussed in Section 8.2.1.8, in response to the EPA's outstanding questions regarding the background concentrations using in their modeling analysis, Alabama submitted an analysis that substituted the Mammoth Cave 2012-2014 design value (26.2 $\mu g/m^3$) for the Centreville SEARCH 2012-2014 design value (44 $\mu g/m^3$). This modeled concentration in the above table includes the Mammoth Cave background concentration of SO_2, and is based on allowable emissions from the facility (145.56 + 26.2 = 171.76 $\mu g/m^3$). Figure 49 below was generated by the EPA, and indicates that the predicted value occurred west-northwest of the center of Sanders Lead location.

Figure 49. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Pike County Area

(a)



(b)

The modeling submitted by the State, with noted issues, does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

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

The EPA assessment of the 1-hour SO_2 DRR AERMOD modeling for Sanders Lead finds that the modeling does not conclusively demonstrate that the area surrounding this DRR source meets the 1-hour SO_2 NAAQS and does not contribute to a nearby area that does not meet the NAAQS. ADEM has not provided documentation to confirm that Sander Lead's new allowable emission limit is permanent and federally enforceable. Also, the model report does not adequately document that modeling receptors were included in all areas classified as ambient air.

The State made use of AERMOD version 16216r, the most recent version available at the time the modeling was conducted. The EPA agrees that this model version is appropriate to characterize the area.

The EPA determined that Alabama's initially selected background data from the Centreville SEARCH monitor is inconsistent with the Modeling TAD. This monitor is not a regulatory monitor and therefore should not be used to develop background concentrations for this modeling demonstration. On April 18, 2017, Alabama submitted additional information to the EPA[35] to address the use of the Centerville SEARCH monitor by proposing to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky (AQS ID: 21-061-0501). For Sanders Lead, Alabama's analysis substituted the Mammoth Cave 2012-2014 design value (26.2 $\mu g/m^3$) for the Centreville SEARCH 2012-2014 design value (44 $\mu g/m^3$).

The EPA determined that the Mammoth Cave site is an appropriate regional background site for the Sanders Lead modeling. Both the Mammoth Cave monitor and the Sanders Lead facility are located in rural areas. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near the Sanders Lead facility. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis.

The EPA believes the modeling domain is not appropriate to capture predicted maximum impacts in the Pike County area. The State did not include receptors in locations that it considered to not be ambient air relative to each modeled facility and so excluded receptors within the Sanders Lead fence line. The Modeling Report provides a figure showing the fence line boundary (Figure 46). However, no information was provided to document that public access to the facility property is prevented by a fence or some other physical barrier. Therefore, the EPA finds that ADEM's receptor grid for Pike County Area and Sanders Lead is not adequate to assess potential impacts in ambient air locations.

Alabama's selection of meteorology and surface characteristics for the area are appropriate to make a valid modeling demonstration. The State adequately represented the topography of the area with the model and its preprocessors. The State chose to model a future allowable emissions limit of 315 lb/hr for Sanders Lead. The EPA has communicated to ADEM that Sanders Lead must be complying with the new allowable emissions limit prior the final designation of the Pike County area and that the limit must be federally enforceable and effective. The EPA notes, ADEM has not provided documentation to verify that Sanders Lead is complying with the new allowable limit or that the limit is permanent and federally enforceable and effective. Therefore, the EPA does not have sufficient information to determine whether the area meets or does not meet the SO_2 NAAQS or contributes to a nearby area that does not meet the SO_2 NAAQS.

[35] Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017

8.4. Jurisdictional Boundaries in the Pike County, Alabama Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Pike County. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

Alabama recommended attainment for the entire State including Pike County, based on an assessment and characterization of air quality from the Sanders Lead Company, Inc. DRR source and other nearby sources. The State did not provide a specific boundary recommendation for the modeled areas around Sanders Lead. Pike County is bounded to the northeast by Bullock County; to the east by Barbour County; to the southeast by Dale County; to the south by Coffee County; to the west by Crenshaw County; and to the northwest by Montgomery County. No additional sources were included in the modeling analysis.

ADEM used the Q/D >20 metric within 20 km to determine which background sources should be included in the modeling analysis for Ascend. Using this methodology, no additional nearby background source was identified for inclusion in the Sander's Lead modeling analysis. The source of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. For the Pike County area, the State included no other emitters of SO_2 within 20 km of Sanders Lead in any direction. The State determined that 20 km was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS violations in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis.

8.5. The EPA's Assessment of the Available Information for the Pike County, Alabama Area

After evaluating the 1-hour SO_2 DRR AERMOD modeling and other information for the Sanders Lead facility, the EPA intends to modify the State's recommendation and designate Pike County unclassifiable for the SO_2 NAAQS. Alabama recommended attainment for the entire state including Pike County and the area containing Sanders Lead based in part on a modeling assessment using AERMOD version 16216r and characterization of air quality impacts from the Sanders Lead facility, no other nearby source and background concentration data from the Mammoth Cave monitor in Kentucky. ADEM modeled a new allowable limit for Sanders Lead which resulted in a modeled 1-hour design value of 171.76 $\mu g/m^3$, equivalent to 65.6 ppb which is below the level of the 2010 SO_2 NAAQS. However, the EPA's assessment finds that the modeling does not provide sufficient information to demonstrate whether the area containing the DRR source meets or does not meet the 1-hour SO_2 NAAQS or contributes to an area that does not meet the standard. The EPA notes that Alabama did not provide documentation proving the new allowable SO_2 emission limit for Sanders Lead is permanent and federally-enforceable and effective. Additionally, the model report does not adequately document that modeling receptors were included in all areas classified as ambient air.

The State chose to model a new allowable emissions limit of 315 lb/hr for Sanders Lead. The EPA has communicated to ADEM that Sanders Lead must be complying with the new allowable emissions limit prior the final designation of the Pike County area and that the limit must be federally-enforceable. ADEM has not provided documentation to verify that Sanders Lead is complying with the new allowable limit or that the limit is permanent and federally enforceable. Therefore, the EPA does not have sufficient information to determine whether the area meets or does not meet the SO_2 NAAQS. Consistent with past interpretations of legal requirements, control measures, emission limits and other curtailments need to be installed, operational and federally enforceable when informing final designation decisions. Therefore, EPA requests ADEM provide documentation that the 315 lb/hr future allowable limit for Sanders Lead is in effect, permanent, federally enforceable and if applicable, include a longer term average limit that is comparatively stringent to a 1-hour limit at the critical emission value pursuant to the EPA's April 23, 2014 1-hour SO_2 nonattainment guidance.[36]

The EPA notes that Alabama did not include receptors in locations that it considered to not be ambient air relative to each modeled facility and so excluded receptors within the Sanders Lead fence line. The Modeling Report provides a figure showing the fence line boundary (Figure 46). However, no information was provided to document that public access to the facility property is prevented by a fence or some other physical barrier. Therefore, the EPA finds that ADEM's receptor grid for Pike County Area and Sanders Lead is not adequate to assess potential impacts in ambient air locations. The State used the Q/D methodology to assess other nearby sources within 20 km of the Sanders Lead facility. Using this methodology, ADEM did not identify additional nearby background SO_2 emitting sources to include in the modeling analysis for Sanders Lead.

The EPA determined that the Mammoth Cave site is an appropriate regional background site for the Sanders Lead modeling. Both the Mammoth Cave monitor and the Sanders Lead facility are located in rural areas. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near Sanders Lead Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis. The EPA has concluded that Alabama's "adjustment factor" procedure provides an acceptable method for substituting data from the Mammoth Cave background monitor for the Centreville monitor data without the need to remodel.

As a result of the issues identified above, the EPA finds that the State's modeling analysis for the Sanders Lead was not performed in a manner consistent with Appendix W and the Modeling TAD and may not accurately represent current air quality in the area. Therefore, the EPA does not have sufficient information to determine whether the area is meeting or not meeting the SO_2 NAAQS or if it contributes to a nearby area that does not meet standard.

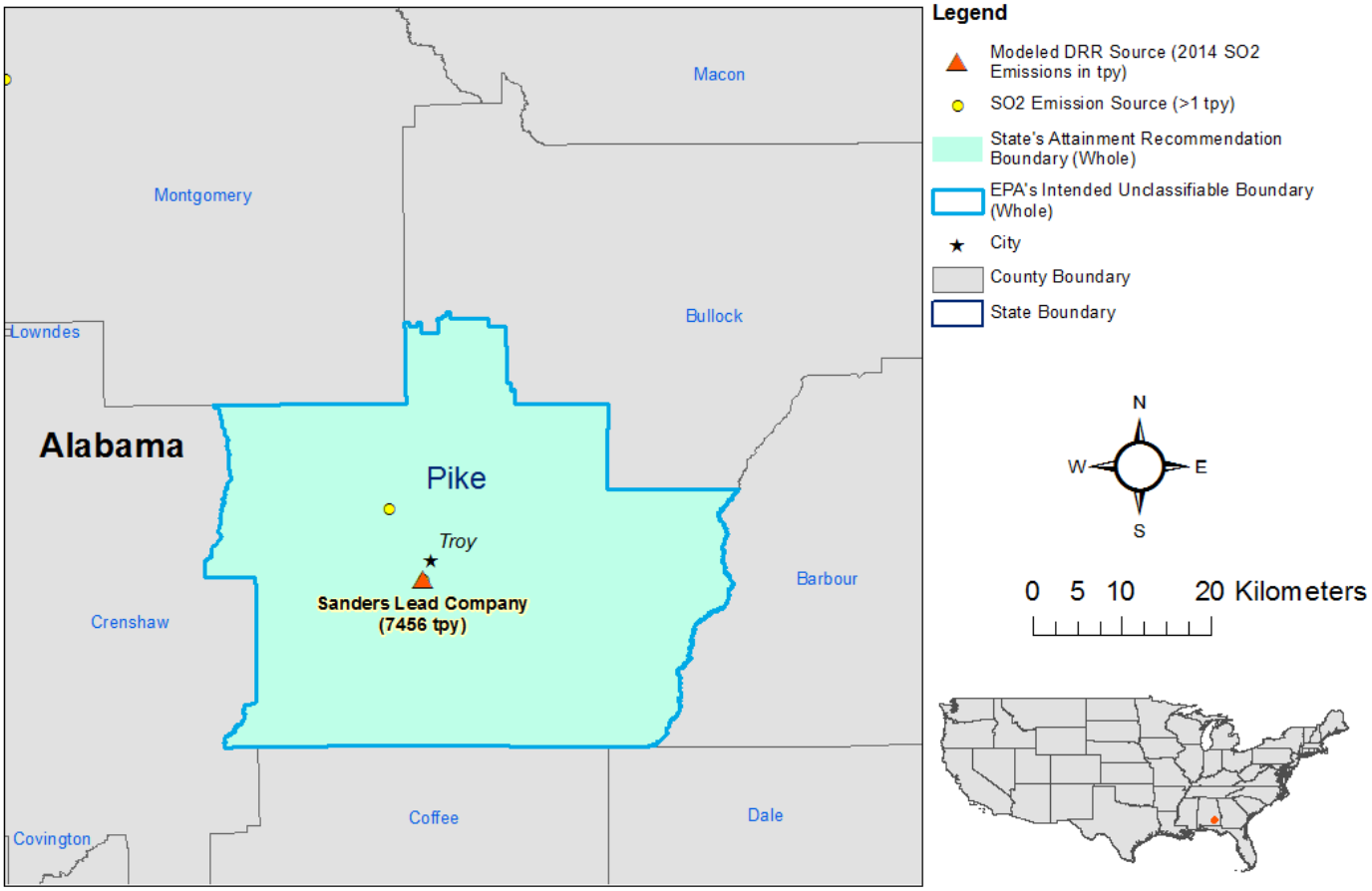
[36] The EPA's April 23, 2014 memorandum entitled "Guidance for the 1-Hour SO_2 Nonattainment Area SIP Submissions."

8.6. Summary of Our Intended Designation for the Pike County, Alabama Area

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 and designate Pike County unclassifiable for the SO_2 NAAQS. The EPA's assessment of the 1-hour SO_2 DRR AERMOD modeling for Sanders Lead finds that the modeling does not demonstrate that the area meets the 1-hour SO_2 NAAQS and is not contributing to a nearby area that may not meet the NAAQS. Specifically, the boundaries are comprised of the entirety of Pike County. Figure 78 shows the boundary of this intended designated area.

At this time, our intended designations for the State only apply to this and the other areas presented in this technical support document. The EPA believes that our intended unclassifiable area, bounded by the Pike County boundary, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area.

Figure 50. Boundary of the Intended Pike County Unclassifiable Area



9. Technical Analysis for the Russell County Area

9.1. Introduction

The EPA must designate the Russell County, Alabama, area by December 31, 2017, because the area has not been previously designated and Alabama has not installed and begun timely operation of a new, approved SO_2 monitoring network meeting the EPA specifications referenced in the EPA's SO_2 DRR for any sources of SO_2 emissions in the vicinity of Russell County.

9.2. Air Quality Monitoring Data for the Russell County Area

This factor considers the SO_2 air quality monitoring data in the area of Russell County. The EPA reviewed the available air quality monitoring data in the AQS database and found no nearby data for Russell County. In reviewing the available air quality monitoring data in AQS, the EPA determined that there is no relevant data in AQS collected in or near Russell County that could inform the intended designation action. The most recent SO_2 design values for all areas of the country are available at https://www.epa.gov/air-trends/air-quality-design-values.

9.3. Air Quality Modeling Analysis for the Russell County Area Addressing Continental Carbon Company- Phenix City Plant

9.3.1. Introduction

This section 9.2 presents all the available air quality modeling information for a portion of Russell County that includes Continental Carbon Company – Phenix City Plant. (This portion of Russell County will often be referred to as "the Russell County area" within this section 9.3.) This area contains the following SO_2 sources, principally the sources around which Alabama is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy:

- The Continental Carbon facility emits 2,000 tons or more annually. Specifically, Continental Carbon emitted 3,071 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Alabama has chosen to characterize it via modeling.

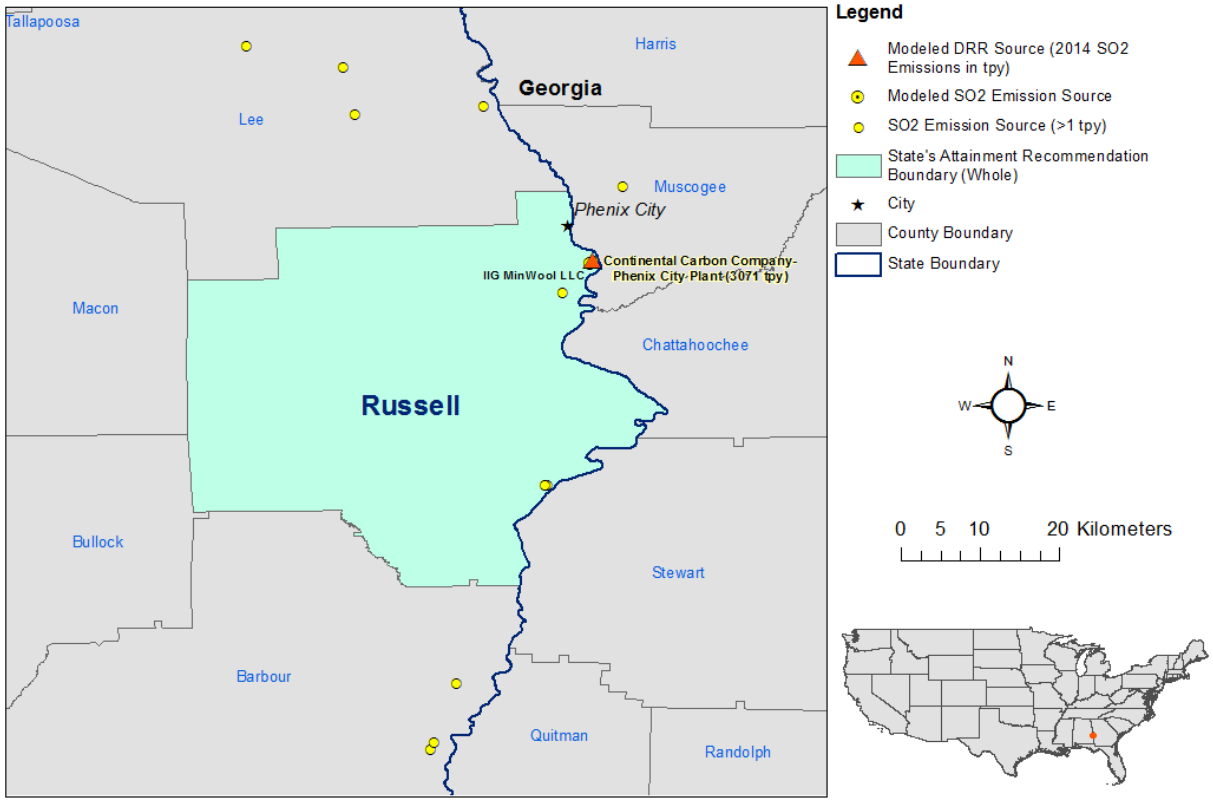
- The IIG MinWool LLC facility is not on the SO_2 DRR Source list, but is included in the modeling analysis. This facility emitted 34 tons in 2014 and is located approximately 0.5 km west of Continental Carbon.

Because we have available results of air quality modeling in which these sources are modeled together, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

Alabama recommended attainment for the entire state including Alabama recommended attainment for the entire state which includes Russell County and an area around the Continental Carbon facility, based in part on an assessment and characterization of air quality impacts from these facilities and other nearby sources that may have a potential impact in the area where the 2010 SO_2 NAAQS may be violated. 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 is modifying the state's recommendation for the area and intends to designate the area as unclassifiable. 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 Phenix City, Alabama in Russell County, along the Chattahoochee River, just south of downtown Columbus, GA. See Figure 51. One other source, IIG MinWool LLC, is included in the modeling analysis.
Lastly, Figure 51 shows Alabama's attainment designation for the entire state including Russell County. The EPA's intended unclassifiable designation boundary for the Russell County area is not shown in this figure, but is shown in a figure in the section below that summarizes our intended designation.

Figure 51. Map of the Russell County Area Addressing Continental Carbon.



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.

For this area, the EPA received and considered one modeling assessment from the State. No assessments from other parties were considered. To avoid confusion in referring to these assessments, the following table lists them, indicates when they were received, provides an identifier for the assessment that is used in the discussion of the assessments that follow, and identifies any distinguishing features of the modeling assessments.

Table 34. Modeling Assessments for the Russell County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Alabama	July 1, 2016	June 2016 Enviro Clean Cardinal Modeling Protocol	
Alabama*	January 13, 2017	December 2016 Enviro Clean Cardinal Modeling Report or Final Modeling Report	

*Alabama submitted modeling assessment by Enviro Clean Cardinal.

9.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 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, using regulatory default options. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

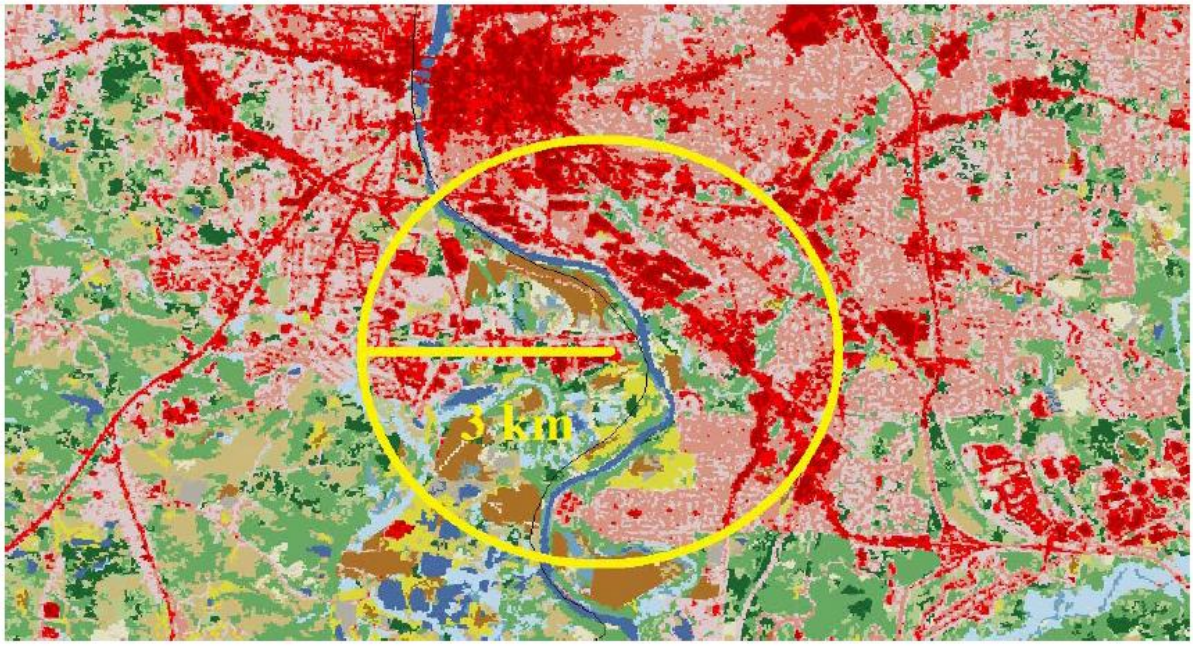
The current version of AERMOD, version 16216r, includes updates to 40 CFR part 51, Appendix W, "Guideline of Air Quality Models," published on January 17, 2017 (82 FR 5203). This version of AERMOD also includes fixes to glitches that were inadvertently included in version 16216. Alabama is not required to use the latest version of AERMOD because the State is using the regulatory default settings for version 15181 available at the time of its modeling preparation and is not making use of any previously alternative modeling options included in version 16216r and the update to Appendix W.

9.3.1.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 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.

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. 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. The State analyzed the land use types within a 3 km radius of the Continental Carbon facility using the Auer's land use methodology as seen in Figure 52 and Table 35. The land use analysis showed that 36.8 percent of the modeling domain was urban. Therefore, 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 dispersion coefficients or in rural mode and the EPA concurs with this assessment.

Figure 52. Land Use Map for Continental Carbon Facility. Source: "Air Dispersion Modeling Report Air Quality 1-Hr SO_2 Compliance Demonstration Phenix City Plant Continental Carbon Company Russell County Phenix City, Alabama" prepared for Alabama, December 2016



ENVIRO CLEAN CARDINAL 1015 N. BROADYWAY AVE SUITE 300 OKLAHOMA CITY, OK 73102 www.envirocleanps.com	FIGURE TITLE **FACILITY LAND USE LAND COVER MAP**	DATE	11/11/2016
		SCALE	NTS
		DESIGNED BY	AD
	DOCUMENT TITLE 1-HR SO2 MODELING	APPROVED BY	LWL
		DRAWN BY	AD
	CLIENT CONTINENTAL CARBON COMPANY	PROJECT NUMBER	
	LOCATION PHENIX CITY PLANT	ATTACHMENT NUMBER	
		3-5	

Table 35. Summary of AERSURFACE Land Counts for Phenix City Plant. Source: "Air Dispersion Modeling Report Air Quality 1-Hr SO_2 Compliance Demonstration Phenix City Plant Continental Carbon Company Russell County Phenix City, Alabama" prepared Alabama, December 2016

Land Cover Counts: Surface Roughness			
	SECTOR:	1	
	Starting Direction:	0	
0	Missing, Out-of-Bounds, or Undefined:	0	
11	Open Water:	1263	
12	Perennial Ice/Snow:	0	
21	Low Intensity Residential:	5032	
22	High Intensity Residential:	1951	
23	Commercial/Industrial/Transp:	4543	36.8%
31	Bare Rock/Sand/Clay:	0	
32	Quarries/Strip Mines/Gravel:	177	
33	Transitional:	284	
41	Deciduous Forest:	8093	
42	Evergreen Forest:	747	
43	Mixed Forest:	3275	
51	Shrubland:	0	
61	Orchards/Vineyard/Other:	0	
71	Grasslands/Herbaceous:	0	
81	Pasture/Hay:	2560	
82	Row Crops:	1221	
83	Small Grains:	0	
84	Fallow:	0	
85	Urban/Recreational Grasses:	950	
91	Woody Wetlands:	837	
92	Emergent Herbaceous Wetlands:	429	
	Total:	31362	

9.3.1.3. 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 SO_2 emission sources or facilities considered for modeling; the extent of concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Russell County area, the State included one other emitter of SO_2 within 20 km of Continental Carbon in any direction. ADEM used the Q/D >20 methodology within 20 km to determine which background sources should be included in the modeling analysis for Continental Carbon. The state determined that 20 km was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. A Q/D value was determined for all sources within 20 km of the DRR source where Q represents the 2014 actual SO_2 tpy emissions totals, and D represents the distance between the two facilities. If the Q/D metric yielded a value of greater than 20, the facility was retained and additional QA/QC was performed on a unit by unit basis.

Using this methodology, one additional source, IIG MinWool LLC, was included in the modeling analysis. IIG MinWool is located approximately 0.5 km from Continental Carbon and emitted 34 tons according to the 2014 NEI. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis. The EPA identified 8 SO_2 emitting sources in Russell County with a cumulative emissions profile of approximately 245 tpy in 2014. These sources include WestRock Coated Board, LLC. - Mahrt Mill, Boral Bricks, West Rock Coated Board, LLC, Phenix Lumber Company, Southern Natural Gas Company, and Boral Bricks, Mead Coated Board (airport), Flying C S Plantation (airport), and Finkley Farm (airport). Continental Carbon is the only SO_2 emitting source subject to the DRR in Russell County. The EPA does not believe that these SO_2 sources would cause significant concentration gradient impacts within the area of analysis.

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

- Spacing of 50 m along the facility fence line
- Spacing of 100 m out to 3 km
- Spacing of 250 m out to 5 km
- Spacing of 500 m out to 7.5 km
- Spacing of 750 m out to 10 km

The receptor network contained 6,485 receptors, and the network covered the northeastern portion of Russell County in Alabama, the southeastern portion of Lee County in Alabama, the southwestern portion of Muscogee County in Georgia, and the northwestern portion of Chattahoochee County in Georgia.

Figures 53 thru 57, included in the State's recommendation, show the State's chosen area of analysis surrounding the Continental Carbon 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 each modeled facility, including other facilities' property. The State opted to apply a regular grid of receptors without excluding selected receptor locations where it would not be feasible to place a monitor. The only receptors excluded from the receptor network were those located within the fence line

of the Continental Carbon facility. The fence line is shown in Figure 57 and consists of a 6-foot chain link fence with 3 strand barb wire on top. The only openings in the fence line are gated drives which are monitored self-closing and the railroad tracks, which also have a gate, all of which require a company issues passcode. Continental Carbon owns more property to the north and south, but the southern portion is leased for farming so it was treated as outside the fence line. The maximum concentrations presented in this TSD do not occur in receptors which potentially could have been omitted but were retained. Two sets of model runs were provided with the modeling files that were submitted. One model run included the emissions of IIG MinWool and excluded receptors over that facility's property and Continental Carbon's property. Another model run only modeled emissions from Continental Carbon and included receptors over the IIG MinWool facility. The maximum concentration for both model runs occurs in the same locations.

Figure 53. Tight Receptor Grid for the Russell County Area. Source: "Air Dispersion Modeling Report Air Quality 1-Hr SO_2 Compliance Demonstration Phenix City Plant Continental Carbon Company Russell County Phenix City, Alabama" prepared for Alabama, December 2016.

Figure 54. Fine Receptor Grid for the Russell County Area. Source: "Air Dispersion Modeling Report Air Quality 1-Hr SO_2 Compliance Demonstration Phenix City Plant Continental Carbon Company Russell County Phenix City, Alabama" prepared for Alabama, December 2016

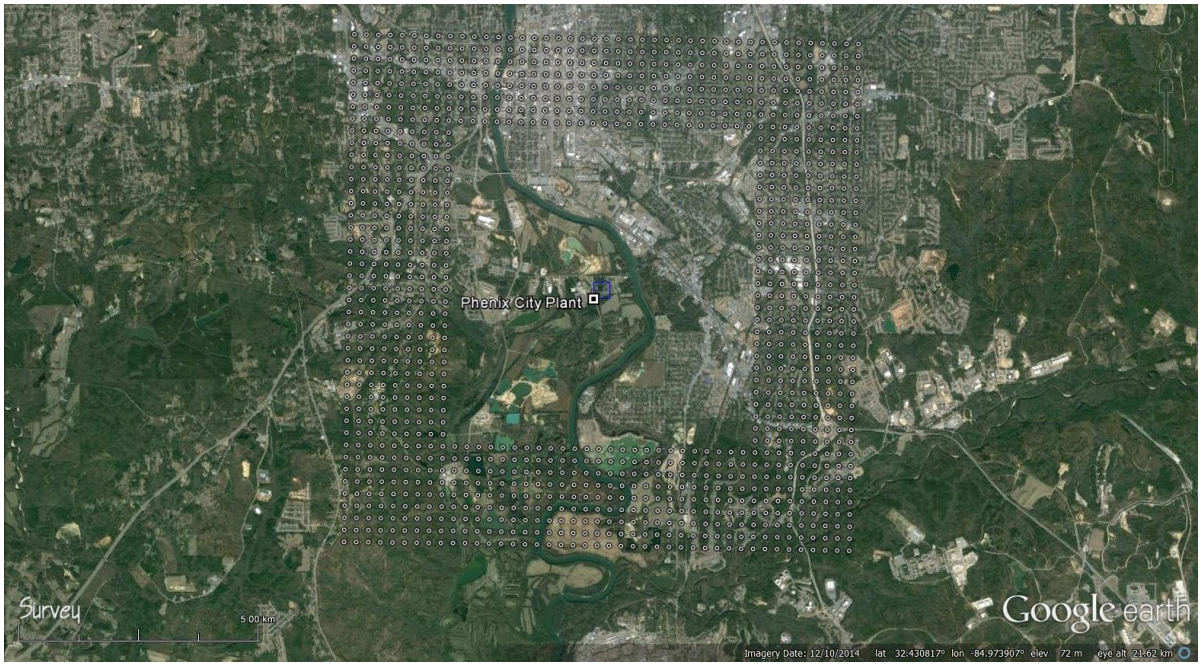
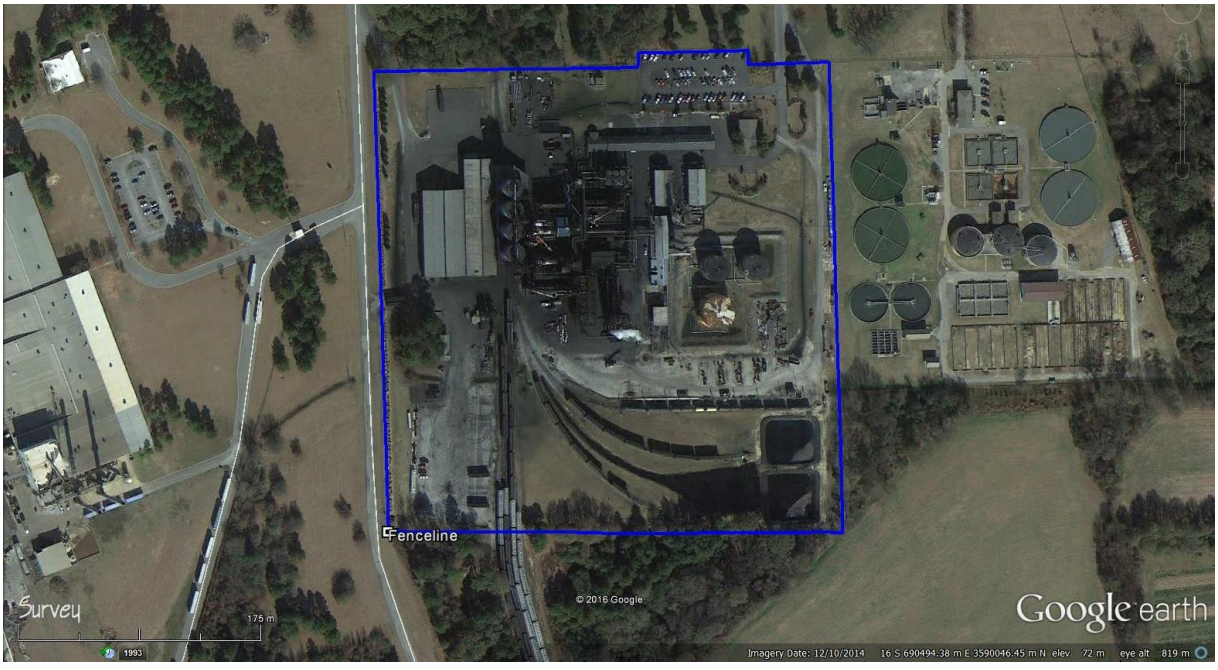


Figure 55. Medium Receptor Grid for the Russell County Area. Source: "Air Dispersion Modeling Report Air Quality 1-Hr SO_2 Compliance Demonstration Phenix City Plant Continental Carbon Company Russell County Phenix City, Alabama" prepared by for Alabama, December 2016

Figure 56. Coarse Receptor Grid for the Russell County Area. Source: "Air Dispersion Modeling Report Air Quality 1-Hr SO_2 Compliance Demonstration Phenix City Plant Continental Carbon Company Russell County Phenix City, Alabama" prepared Alabama, December 2016

Figure 57. Continental Carbon Facility Fence Line. Source: "Air Dispersion Modeling Report Air Quality 1-Hr SO_2 Compliance Demonstration Phenix City Plant Continental Carbon Company Russell County Phenix City, Alabama" prepared for Alabama, December 2016



The EPA agrees with the State on the final receptor grid. Adequate information was provided for the receptors that were excluded from the Continental Carbon property. The final receptor grid, therefore, can be expected to adequately characterize SO_2 impacts from the Continental Carbon facility.

9.3.1.4. 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.

Continental Carbon Company owns and operates the Phenix City Plant, which is a carbon black manufacturing plant. For the modeling analysis, the only source of SO_2 emissions at the facility is one thermal oxidizer. The December 2016 modeling report indicates that Alabama screened for potential nearby sources within a 20 km area surrounding Continental Carbon. A spreadsheet was provided to the facility with the nearby facilities that met the 2014 actual emissions (in tpy) divided by the distance of greater than 20 within a maximum distance of 20 km, including small sources at a very close distance. The IIG MinWool facility, located approximately 0.5 km to the west of Continental Carbon, was included in the modeling analysis.

The State characterized these 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 followed the EPA's GEP policy in conjunction with allowable emissions limits. For Continental Carbon, the stack height is below GEP stack height, so the actual stack height was used in the modeling analysis which is consistent with the Modeling TAD. 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 BPIPPRM was used to assist in addressing building downwash.

Continental Carbon was modeled with allowable emission limits; however, the stack height is below GEP stack height so actual stack heights were used to represent the actual ambient air quality conditions as influenced by the source for Continental Carbon and IIG MinWool. The screening approach used justifies the inclusion of IIG MinWool. The EPA agrees that this component of the modeling analysis was performed in a manner consistent with the SO_2 Modeling TAD.

9.3.1.5. 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 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 SO_2 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 SO_2 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 Continental Carbon and one other emitter of SO_2 within 20 km in the area of analysis. For this area of analysis, the State has opted to use a hybrid approach, where emissions from certain facilities are expressed as actual emissions, and those from other facilities are expressed as PTE rates. The facilities in the State's modeling analysis and their associated actual or PTE rates are summarized below.

For IIG MinWool, a constant emissions rate of 0.9727 g/s (7.72 lb/hr) was provided for this facility.

Table 36. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Area of Analysis for the Russell County Area

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
IIG MinWool	33.81	33.81	33.81
Total Emissions from All Facilities in the Area of Analysis Modeled Based on Actual Emissions	33.81	33.81	33.81

For IIG MinWool, a constant emissions rate of 0.9727 g/s or 7.72 lb/hr was used in the modeling. The EPA converted this constant emissions rate to tons per year by assuming 8,760 hours/year of operation. This results in an estimated emission rate of 33.81 tpy. The EPA's NEI indicates that the actual emissions from IIG MinWool were 34.35 tpy in 2014. The modeled emissions are slightly lower than the actual emissions.

For Continental Carbon, the State provided PTE values. This information is summarized in Table 37. A description of how the State obtained hourly emission rates is given below this table.

Table 37. SO_2 Emissions based on PTE from Facilities in the Area of Analysis for the Russell County Area

Facility Name	SO_2 Emissions (tpy, based on PTE)
Continental Carbon	9,553
Total Emissions from Facilities in the Area of Analysis Modeled Based on PTE	9,553

The PTE in tpy for Continental Carbon was determined by the EPA by multiplying the Alabama-provided 2,181 lbs/hr emission rate by 0.0005 tons/lb and by 8,760 hours in a year.

The modeling report indicates that for Continental Carbon, sources with intermittent emissions, such as emergency generators and limited intermittent startup/shutdown emissions were not included in the modeling analysis. The EPA has asked for additional justification to be provided to demonstrate that these sources do not have emissions that could impact the annual distribution of 1-hr maximum values.

A constant emissions rate was provided for IIG MinWool and a PTE emissions rate was provided for Continental Carbon. Additional information was not provided on how the emissions rates were calculated. The EPA has requested additional information from ADEM regarding how the emissions rates were calculated for IIG MinWool and Continental Carbon. Without additional documentation, the EPA is unable to confirm that the emissions rates provided are appropriate.

9.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

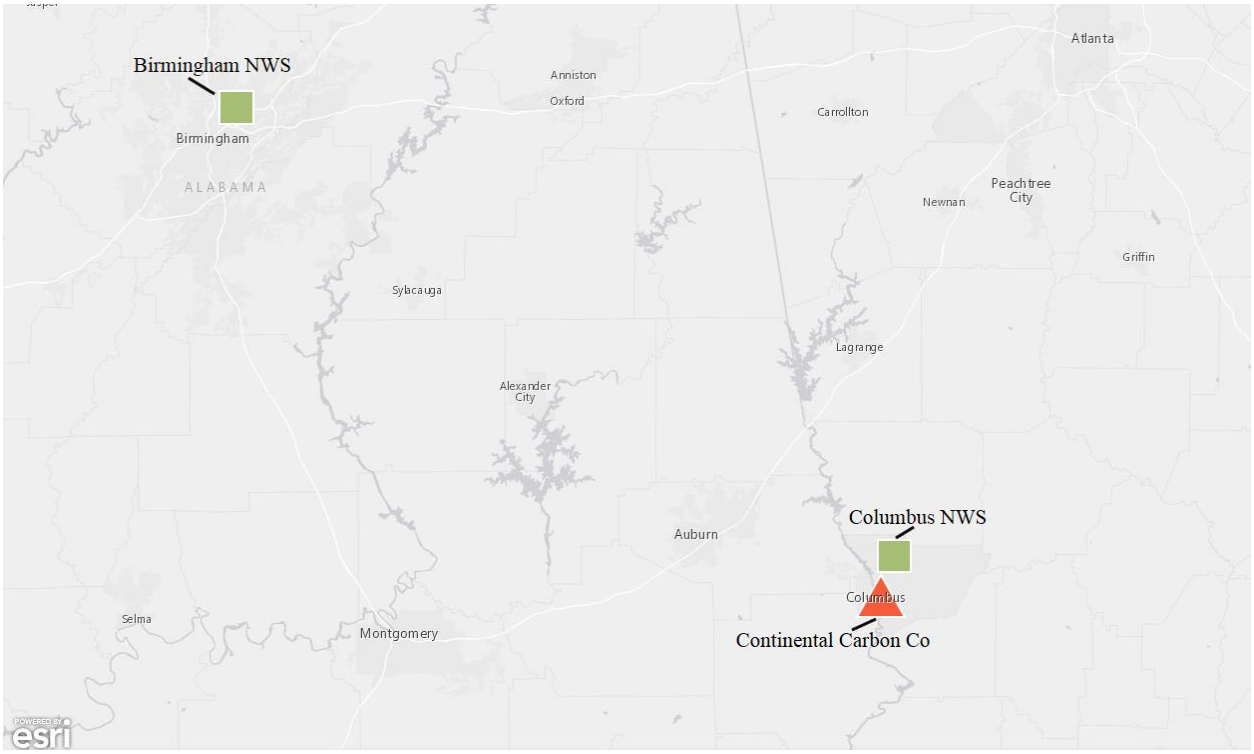
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of 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 NWS stations, site-specific or onsite data, and other sources such as universities, FAA, and military stations.

For the area of analysis for the Russell County area, the State selected the surface meteorology from Columbus Metropolitan Airport in Muscogee County, Georgia, located at 32.516°N 84.942°W, approximately 10 km to the northeast of the source, and coincident upper air observations from Birmingham Shelby Airport in Jefferson County, Alabama, located at 33.100°N 86.700°W, 188 km to the northwest of the source as best representative of meteorological conditions within the area of analysis.

The State used AERSURFACE version 13016 using data from Columbus Metropolitan Airport 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 “zo”. The state estimated surface roughness values for 12 spatial sectors out to 1 km at a seasonal temporal resolution for dry (2010, 2012, and 2014), wet (2011), and average (2013) conditions.

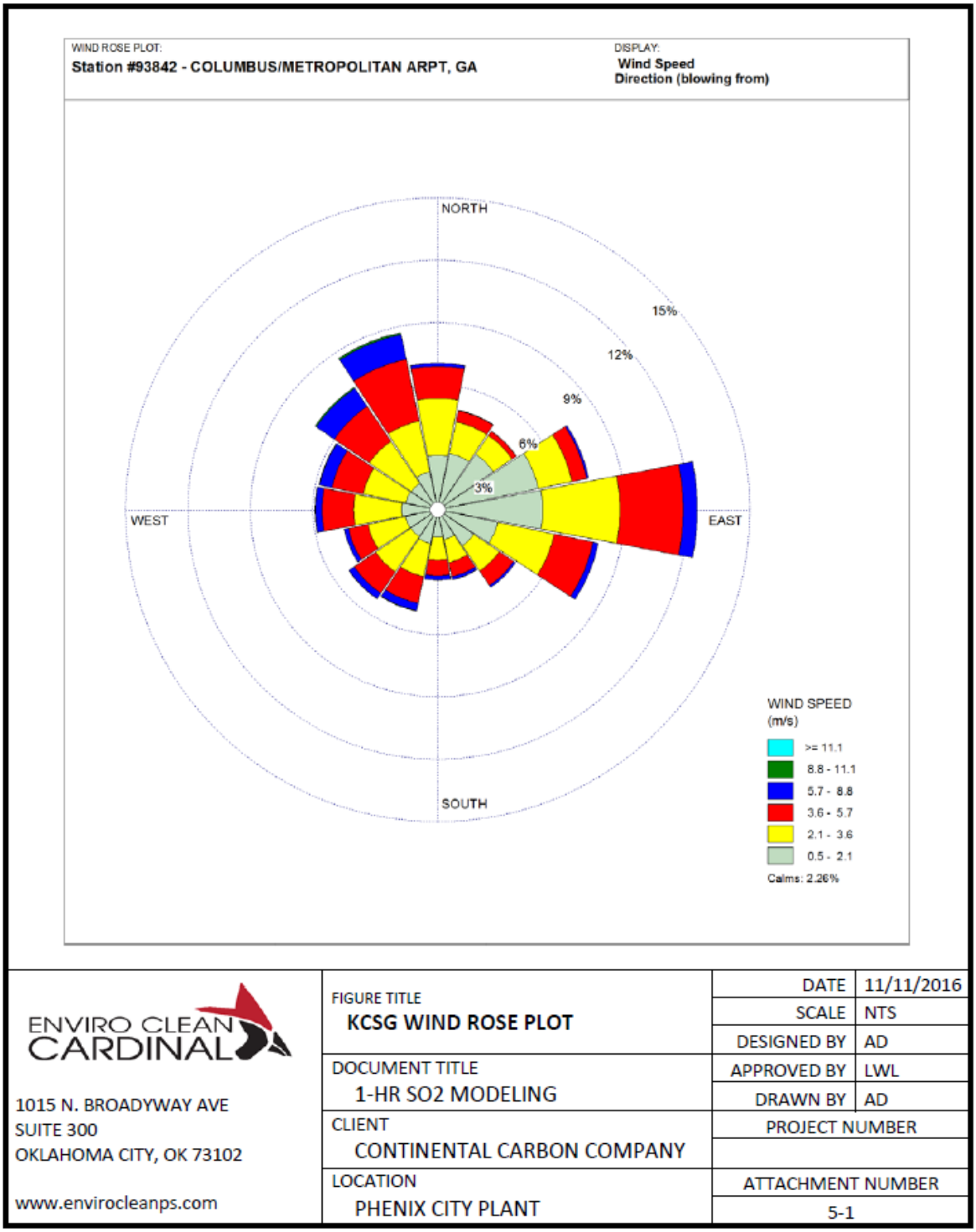
In the figure below, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 58. Area of Analysis and the NWS stations in the Russell County Area



As part of its recommendation, the State provided the 3-year surface wind rose for the Columbus Metropolitan Airport NWS station. In Figure 59, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Analysis of the NWS data indicate winds predominately blow from the east with a secondary max from the north northwest direction.

Figure 59. Russell County Cumulative Annual Wind Rose for Years 2013 – 2015. Source: "Air Dispersion Modeling Report Air Quality 1-Hr SO_2 Compliance Demonstration Phenix City Plant Continental Carbon Company Russell County Phenix City, Alabama" prepared for Alabama, December 2016.



Meteorological data from the above surface and upper air NWS 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 State provided the facility with the meteorological data for the years from 2010-2014 for the modeling analysis. The State obtained the surface data from the National Centers for Environmental Impact and the upper air data from the Earth System Research Laboratory Global Systems Division. The State processed the raw data using AERMET. Since the AERMET files were not provided, it is unknown whether the State followed the methodology and settings presented in the EPA's AERMOD Implementation Guidance in the processing of the raw meteorological data into an AERMOD-ready format.

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 Columbus Metropolitan Airport, 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 m/s 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 modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, details regarding how these files were prepared were not provided. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

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

The terrain in the area of analysis is best described as gently rolling. The sources and structures are approximately 70 m above mean sea level. The receptors range from approximately 54 m - 175 m above mean sea level. To account for these 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 USGS 1/3 arc second NED. The EPA agrees that this component of the modeling analysis was performed in a manner consistent with the SO_2 Modeling TAD.

9.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 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 elected to use a "tier 1" approach. Data was obtained from 2012-2014 for the Centreville monitor, located in Centreville, Alabama, which is 219 km to the northwest of Continental Carbon. The single value of the background concentration for this area of analysis was determined by the State to be 44 μg/m^3, equivalent to 17 ppb when expressed in 2 significant figures,[37] and that value was incorporated into the final AERMOD results.

The EPA reviewed the Centreville SEARCH monitoring information and determined that the monitor is not a regulatory monitor that meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the data is not acceptable for use as background concentrations in this modeling demonstration. The EPA communicated this outstanding issue to Alabama in March 2017[38] and suggested the following options for addressing the issue: 1) demonstrate that the Centreville monitor meets the QA/QC criteria and other requirements in Part 58, Appendix B for PSD monitors, 2) choose a different background monitor that is representative of SO_2 background concentrations in the area of Continental Carbon and either use the design value from that monitor or a use a more refined approach of seasonal hourly varying background values from that monitor, or 3) demonstrate that the Centreville SEARCH background value used in the modeling is more conservative (larger) than an alternative background site that would be representative of background in the area of Continental Carbon.

[37] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in μg/m^3. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 μg/m^3.

[38] Email from Beverly Banister, Region 4 Air, Pesticides and Toxics Management (APTMD), Air Director to Ron Gore, ADEM Air Director on March 21, 2017.

Alabama submitted additional information to the EPA[39] to address the issues discussed above. Alabama's supplemental information proposed to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky. For two of the Alabama DRR sources including the Continental Carbon facility), Alabama's analysis substituted the Mammoth Cave 2012-2014 design value (26.2 µg/m^3) for the Centreville SEARCH 2012-2014 design value (44 µg/m^3).

Alabama's supplemental information justifies use of the Mammoth Cave data by stating that it is "the closest background monitor with sufficient data capture that does not show interference from industrial sources." The EPA does not believe that this is an adequate justification for determining whether Mammoth Cave is a representative background monitor pursuant to the criteria provided in Section 8.2.2(c) of the *Guideline on Air Quality Models* contained in 40 CFR Part 51, Appendix W. The criteria in Appendix W state that an appropriate regional site is "*one that is located away from the area of interest but is impacted by similar natural and distant man-made sources."*

The EPA performed an evaluation to determine if the Mammoth Cave site is an appropriate regional background site for the Continental Carbon modeling. Both the Mammoth Cave monitor and the Continental Carbon facility are located in rural areas. The 2014 NEI listed 3,999 tpy of SO_2 emissions in Russell County. The 2014 actual emissions from Continental Carbon were 3,071 tpy and 34 tpy from IIG MinWool. However, there are no other sources that were not included in the modeling with emissions greater than 1 tpy located within 25 km of Continental Carbon. In the area around the Mammoth Cave monitor, there are no sources emitting more than 5 tpy of SO_2 within 50 km of the monitor and the total SO_2 emissions in the 3 counties surrounding the monitor are approximately 70 tpy, according to the emissions data in the 2014 NEI. The closest major source of SO_2 emissions to the Mammoth Cave monitor is the TVA Paradise power plant (19,654 tpy in 2014) located approximately 75 km from the monitor. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near the Continental Carbon facility. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis.

[39] Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017

9.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Russell County area of analysis are summarized below in Table 38.

Table 38. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Russell County Area

Input Parameter	Value
AERMOD Version	15181 (regulatory default)
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	2
Modeled Structures	14
Modeled Fencelines	1
Total receptors	6,485
Emissions Type	Mixed/Hybrid
Emissions Years	IIG MinWool – emission rate provided; PTE for Continental Carbon
Meteorology Years	2010-2014
NWS Station for Surface Meteorology	Columbus, GA
NWS Station Upper Air Meteorology	Alabaster, AL
NWS Station for Calculating Surface Characteristics	Columbus, GA
Methodology for Calculating Background SO_2 Concentration	Tier 1 approach using design value at Mammoth Cave, KY site (2012-2014)
Calculated Background SO_2 Concentration	26.2 $\mu g/m^3$

The results presented below in Table 39 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

Table 39. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Russell County Area

		Receptor Location [UTM zone 16]		99th percentile daily maximum 1-hour SO_2 Concentration (µg/m^3)	
Averaging Period	**Data Period**	**UTM Easting (m)**	**UTM Northing (m)**	**Modeled concentration (including background)**	**NAAQS Level**
99th Percentile 1-Hour Average	2010-2014	690800	3589400	158.8	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 µg/m^3 conversion factor

The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 132.59 µg/m^3, equivalent to 50.6 ppb. As discussed in Section 9.2.1.8, in response to the EPA's outstanding questions regarding the background concentrations using in their modeling analysis, Alabama submitted an analysis that substituted the Mammoth Cave 2012-2014 design value (26.2 µg/m^3) for the Centreville SEARCH 2012-2014 design value (44 µg/m^3). This modeled concentration in the above table includes the Mammoth Cave background concentration of SO_2, and is based on a mixture of actual and PTE emissions from the facilities (132.59 + 26.2 = 158.8 µg/m^3). Figure 60 below was generated by the EPA from the modeling results, and indicates that the predicted value occurred approximately 0.5 km south of the southern edge of the Continental Carbon fence line. The State's receptor grid is also shown in the figure.

Figure 60. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Russell County Area

The modeling submitted by the State, with noted issues, does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

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

The EPA assessment of the 1-hour SO_2 DRR AERMOD modeling for Continental Carbon finds that the modeling does not conclusively demonstrate that the area meets the 1-hour SO_2 NAAQS and does not contribute to a nearby area that does not meet the NAAQS.

The State made use of AERMOD version 15181, the most recent version available at the time the modeling was conducted. The EPA agrees that this model version is appropriate to characterize the area because the State made use of default regulatory options available at the time and is not making use of any previous alternative modeling options included in version 16216r and the update to Appendix W. The EPA determined that Alabama's initial selected background data from the Centreville SEARCH monitor is inconsistent with the Modeling TAD. This monitor is not a regulatory monitor and therefore should not be used to develop background concentrations for this modeling demonstration.

On April 18, 2017, Alabama submitted additional information to the EPA[40] to address the use of the Centerville SEARCH monitor by proposing to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky (AQS ID: 21-061-0501). For Continental Carbon, Alabama's analysis substituted the Mammoth Cave 2012-2014 design value (26.2 $\mu g/m^3$) for the Centreville SEARCH 2012-2014 design value (44 $\mu g/m^3$).

The EPA determined that the Mammoth Cave site is an appropriate regional background site for the Continental Carbon modeling. Both the Mammoth Cave monitor and the Continental Carbon facility are located in rural areas. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near the Continental Carbon facility. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis.

The State chose to model two sources in the area, and the EPA agrees with this decision, as supported by Alabama's evaluating nearby sources within 20 km of Continental Carbon. The EPA believes the modeling domain is appropriate to capture predicted maximum impacts in the Russell County area. The State adequately represented the topography of the area with the model and its preprocessors. Alabama's selection of meteorology and surface characteristics for the area are appropriate to make a valid modeling demonstration. The modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, details regarding how these files were prepared were not provided. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

The State chose to model PTE emissions for Continental Carbon and provided an hourly emission rate for IIG MinWool. Additional information was not provided on how the emissions rates were calculated. The EPA has requested additional information from ADEM regarding how the emissions rates were calculated for IGG MinWool and Continental Carbon. Without additional documentation, the EPA is unable to confirm that the emissions rates provided are appropriate.

[40]Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017

9.4. Jurisdictional Boundaries in the Russell County, Alabama Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Russell County. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

Alabama requested that the entire state be designated attainment, including Russell County, based on an assessment and characterization of air quality from the Continental Carbon Company DRR source and other nearby sources. The State did not provide a specific boundary recommendation for the modeled areas around Continental Carbon. Russell County is bounded to the north by Lee County, Alabama; to the northeast by Muscogee County, Georgia; to the east by Chattahoochee County, Georgia; to the southeast by Stewart County, Georgia; to the south by Barbour County, Alabama; to the southwest by Bullock County, Alabama; and to the northwest by Macon County, Alabama.

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Russell County area, the State included one other emitter of SO_2 within 20 km of Continental Carbon in any direction. The State determined that 20 km was an appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. ADEM used the Q/D >20 metric within 20 km of Continental Carbon to determine which background sources should be included in the modeling analysis. Based on this methodology, one additional source, IIG MinWool LLC, was included in the modeling analysis. IIG MinWool is located approximately 0.5 km from Continental Carbon and emitted 34 tons according to the 2014 NEI. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis.

9.5. The EPA's Assessment of the Available Information for the Russell County, Alabama Area

After evaluating the 1-hour SO_2 DRR AERMOD modeling and other information for the Lowman facility, the EPA intends to modify the State's recommendation and designate Russell County unclassifiable for the 1-hour SO_2 NAAQS. EPA is modifying the state's recommendation because the EPA finds that the modeling analysis as discussed in section 9.3, does not demonstrate that the area meets the 1-hour SO_2 NAAQS and is not contributing to a nearby area that does not meet the NAAQS.

Alabama recommended attainment for the entire state including Russell County and the area around Continental Carbon based in part on an assessment and characterization of air quality impacts from the DRR source, one other nearby source, IIG MinWool and background concentration data from the Mammoth Cave monitor in Kentucky. Based on these factors, the modeled 1-hour design value is 158.80 $\mu g/m^3$, equivalent to 60.6 ppb which is below the level of the 2010 SO_2 NAAQS. However, the EPA's assessment finds that the modeling does not provide

sufficient information to demonstrate whether the area around Continental Carbon meets or does not meet the 1-hour SO_2 NAAQS or contribute to an area that does not meet the standard. As summarized below, the issues identified with the modeling for Continental Carbon include lack of adequate documentation to support the AERMET processing used to generate the surface and upper air meteorology files and information to verify that the emission rates for Continental Carbon and IIG MinWool are appropriate.

The modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, the State did not provide details regarding how these files were prepared. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

The State chose to model PTE emissions for Continental Carbon and provided an hourly emission rate for IIG MinWool. Additional information was not provided on how the emissions rates were calculated. The EPA has requested additional information from ADEM regarding how the emissions rates were calculated for IGG MinWool and Continental Carbon. Without additional documentation, the EPA is unable to confirm that the emissions rates provided are appropriate.

The EPA determined that the Mammoth Cave site is an appropriate regional background site for the Continental Carbon modeling. Both the Mammoth Cave monitor and the Continental Carbon facility are located in rural areas. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near Continental Carbon. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis. The EPA has concluded that Alabama's provided an acceptable method for substituting data from the Mammoth Cave background monitor for the Centreville monitor data without the need to remodel.

The State used the Q/D > 20 methodology to assess other nearby sources within 20 km of the Continental Carbon facility. Using this methodology, ADEM identified one additional nearby background source to be included in the modeling analysis for Continental Carbon. The source is IIG MinWool LLC. The EPA notes that there are no additional sources in the counties bordering Russell County that would likely cause or contribute to an exceedance of the SO_2 NAAQS in the area of analysis due to their low SO_2 emissions and distance from Continental Carbon. The EPA identified 8 SO_2 emitting sources in Russell County with a cumulative emissions profile of approximately 245 tpy in 2014. These sources include WestRock Coated Board, LLC. - Mahrt Mill, Boral Bricks, West Rock Coated Board, LLC, Phenix Lumber Company, Southern Natural Gas Company, and Boral Bricks, Mead Coated Board (airport), Flying C S Plantation (airport), and Finkley Farm (airport). Continental Carbon is the only SO_2 emitting source subject to the DRR in Russell County.

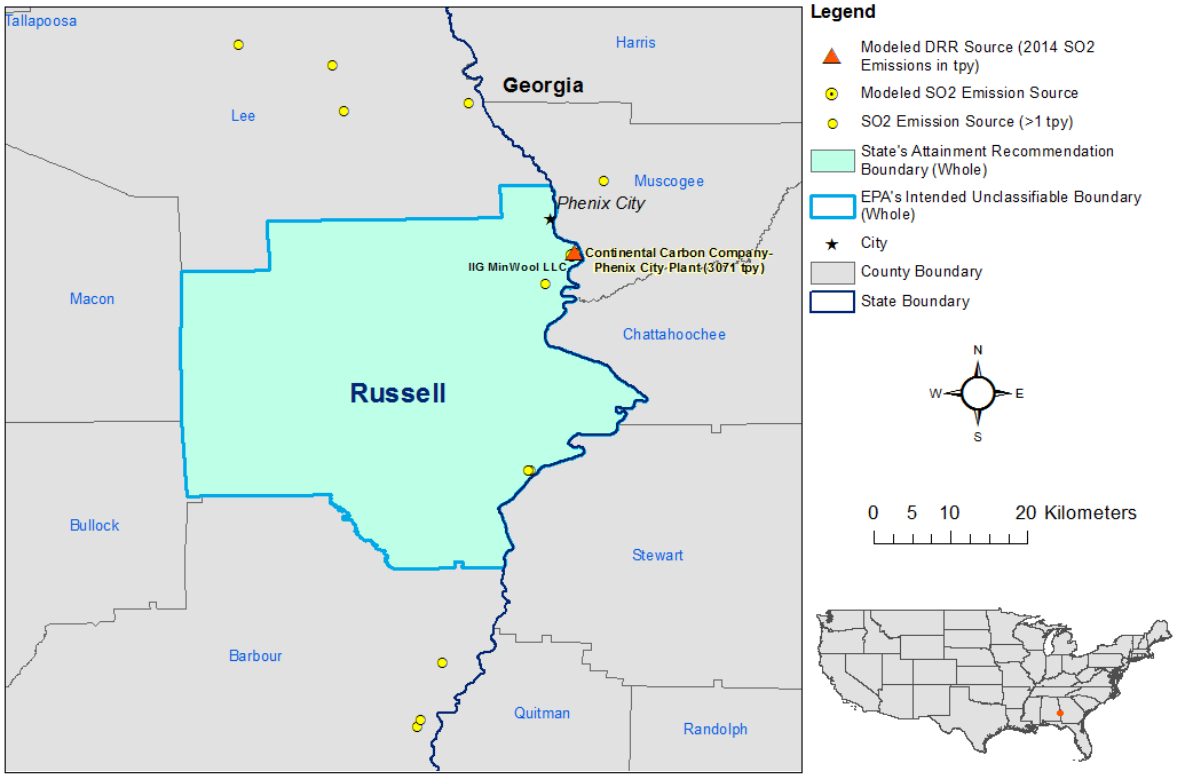
As a result of the issues identified above, the EPA finds that the State's modeling analysis for the Continental DRR source was not performed in a manner consistent with Appendix W and the Modeling TAD and may not accurately represent current air quality in the area. Therefore, the

EPA does not have sufficient information to determine whether the area is meeting or not meeting the SO_2 NAAQS or if it contributes to a nearby area that does not meet standard.

9.6. Summary of Our Intended Designation for the Russell County, Alabama Area

After careful evaluation of the State's recommendation and supporting information, the EPA is modifying the state's recommendation and intends to designate Russell County as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundary is comprised of the entirety of Russell County. The EPA believes that our intended unclassifiable area will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area. Figure 61 shows the boundary of this intended designated area. At this time, our intended designations for the State only apply to this and the other areas presented in this technical support document. There are no remaining portions of Russell County that will remain to be characterized by December 31, 2020.

Figure 61. Boundary of the Intended Russell County Unclassifiable Area



10. Technical Analysis for the Washington County Area

10.1. Introduction

The EPA must designate the Washington County, Alabama, area by December 31, 2017, because the area has not been previously designated and Alabama has not installed and begun timely operation of a new, approved SO_2 monitoring network meeting the EPA specifications referenced in the EPA's SO_2 DRR for any sources of SO_2 emissions in the vicinity of Washington County.

10.2. Air Quality Monitoring Data for the Washington County Area

This factor considers the SO_2 air quality monitoring data in the area of Washington County. The EPA reviewed the available air quality monitoring data in the AQS database and found no nearby data for Washington County. In reviewing the available air quality monitoring data in AQS, the EPA determined that there is no relevant data in AQS collected in or near Washington County that could inform the intended designation action. The most recent SO_2 design values for all areas of the country are available at https://www.epa.gov/air-trends/air-quality-design-values.

10.3. Air Quality Modeling Analysis for the Washington County Area Addressing PowerSouth Energy Cooperative - Charles R. Lowman Power Plant

10.3.1. Introduction

This section 10.3 presents all the available air quality modeling information for a portion of Washington County that includes PowerSouth Energy Cooperative – Charles R. Lowman Power Plant (Lowman). (This portion of Washington County will often be referred to as "the Washington County area" within this section 10.2). This area contains the following SO_2 sources, principally the sources around which Alabama is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy:

- The Lowman facility emits 2,000 tons or more annually. Specifically, Lowman emitted 4,546 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Alabama has chosen to characterize it via modeling.

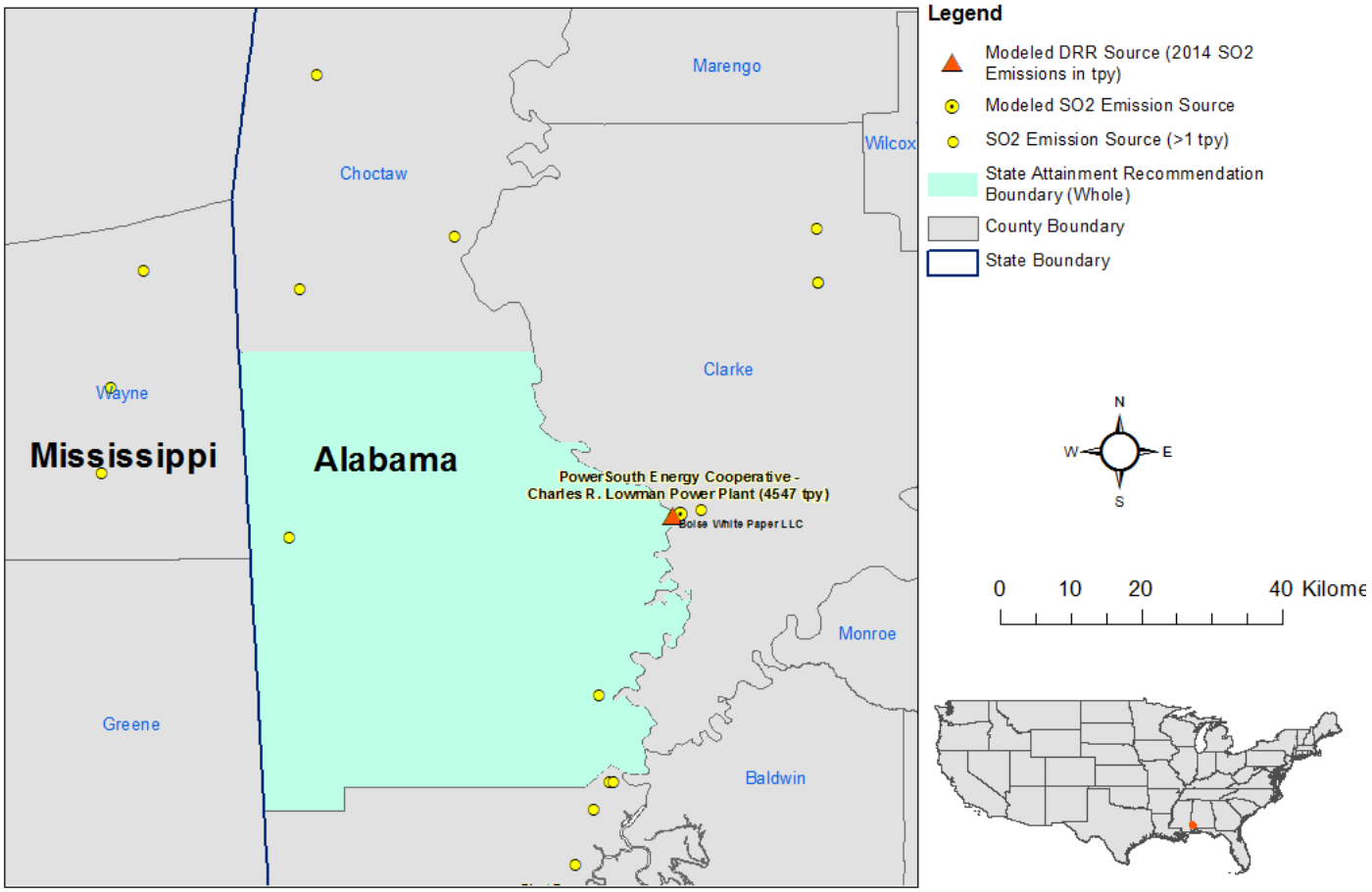
- The Boise White Paper facility is not on the SO_2 DRR Source list, but is included in the modeling analysis. This facility emitted 91 tons in 2014 and is located less than 1 km to the east of Lowman.

Because we have available results of air quality modeling in which these sources are modeled together, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

Alabama recommended attainment for the entire state which includes Washington County and an area around the Lowman facility, based in part on an assessment and characterization of air quality impacts from these facilities and other nearby sources that may have a potential impact in the area where the 2010 SO_2 NAAQS may be violating. 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 is modifying the state's recommendation and intends to designate the area as unclassifiable. 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 in Leroy, Alabama, on the eastern border of Washington County, along the Tombigbee River less than 1 km cross from the Clarke County line. See Figure 62. Also included in the figure are other nearby emitters of SO_2. One other source, Boise White Paper Mill, is included in the modeling analysis. Lastly, Figure 70 shows Alabama's attainment designation for the entire state including Washington County. The EPA's intended unclassifiable designation boundary for the Washington County area is not shown in this figure, but is shown in a figure in the section below that summarizes our intended designation.

Figure 62. Map of the Washington County Area Addressing Lowman.



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.

For this area, the EPA received and considered one modeling assessment from the State. No assessments from other parties were considered. To avoid confusion in referring to these assessments, the following table lists them, indicates when they were received, provides an identifier for the assessment that is used in the discussion of the assessments that follow, and identifies any distinguishing features of the modeling assessments.

Table 40. Modeling Assessments for the Washington County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Alabama*	January 2017	PowerSouth Charles R. Lowman Power Plant Modeling Report	Alabama Submittal
Alabama	July 2017	ADEM Response to the EPA DRR Comments	Additional information regarding federal enforceability of Unit 1 at PowerSouth

*Alabama submitted modeling assessment prepared by Black & Veatch

10.3.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 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, using regulatory default options. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

The current version of AERMOD, version 16216r, includes updates to 40 CFR part 51, Appendix W, "Guideline of Air Quality Models," published on January 17, 2017 (82 FR 5203).

This version of AERMOD also includes fixes to glitches that were inadvertently included in version 16216. Alabama is not required to use the latest version of AERMOD because the State is using the regulatory default settings for version 15181 available at the time of its modeling preparation and is not making use of any previously alternative modeling options included in version 16216r and the update to Appendix W.

10.3.1.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 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.

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. The State analyzed the land use types within a 3 km radius of the Lowman facility using the Auer's land use methodology. The land use analysis indicates that urban land use accounts for well below 50 percent of the total area. Therefore, for the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model with rural dispersion coefficients or rural mode and the EPA concurs with this assessment.

10.3.1.3. 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 SO_2 emission sources or facilities considered for modeling; the extent of concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

ADEM used the Q/D >20 methodology within 20 km to determine which background sources should be included in the modeling analysis for Plant Gaston. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. A Q/D value was determined for all sources within 20 km of the DRR source where Q represents the 2014 actual SO_2 tpy emissions totals, and D represents the distance between the two facilities. Using this methodology, Alabama identified one additional nearby background source, Boise White Paper Mill (Boise) located in Jackson, Clarke County, Alabama across the Tombigbee River. Boise is located less than 1 km east of Lowman and emitted 91 tpy according to the 2014 NEI. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis. The EPA notes that two other major sources of SO_2 within a 50 km radius of Lowman should be considered for inclusion in the modeling: GP Cellulose

Alabama River Cellulose (115 tons in 2014), which is approximately 42 km east-northeast of Lowman, and American Midstream Chatom, LCC (1141 tons in 2014), which is approximately 46 km west of Lowman. The State did not evaluate these additional sources and did not provide a rationale as to why they were excluded from the modeling analysis. Upon receiving the final modeling report, the EPA informed the State that an explanation as to why these sources were not included in the modeling needs to be provided. The EPA notes Alabama has not provided additional information at this time. Based upon a further analysis of the emissions and distance of the GP Cellulose Alabama River Cellulose facility, the EPA believe that this facility is unlikely to cause a significant concentration gradient in the area near the Lowman facility. Therefore, Alabama's exclusion of this nearby source from the modeling is acceptable. However, based upon the high level of emissions from the American Midstream Chatom facility (1,141 tons in 2014), the potential impacts from this facility should be further investigated. The EPA identified additional sources based on a review of the 2014 NEI and determined excluding Lowman and American Midstream Chatom, a total of 7 sources in Washington County cumulatively emitted 3.5 tons of SO_2 in 2014. Additionally, 7 total sources in neighboring Clarke County, excluding Boise, emitted a total of 17 tons of SO_2 in 2014. The EPA does not believe that these SO_2 sources would cause a concentration gradient impacts within the area of analysis.

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

- Spacing of 100 m from the fence line out to a distance of 2 km
- Spacing of 250 m from 2 km to 5 km
- Spacing of 500 m from 5 km to 8 km
- Spacing of 1,000 m from 8 km to 40 km

A denser spacing was done around the Lowman and Boise Paper Mill fence lines.

The receptor network contained 9,998 receptors, and the network covered the central and eastern portion of Washington County, the central and southern portion of Clarke County, the southwestern corner of Wilcox County, the western portion of Monroe County, the northwestern portion of Escambia County, the northern portion of Baldwin County, and the northeastern corner of Mobile County.

Figure 63 included in the State's recommendation, show the State's chosen area of analysis surrounding the Lowman Facility, as well as the receptor grid for the area of analysis.

The State opted to apply a regular grid of receptors without excluding selected receptor locations where it would not be feasible to place a monitor (with the exception that receptors were excluded from the property of a nearby facility as discussed below). The max concentrations presented in this TSD do not occur in receptors which potentially could have been omitted but were retained. Receptors were excluded from the Lowman Facility potential ambient air boundary as illustrated in Figure 64. The potential ambient air boundary follows along the facility's property line and is defined on the north and west by dense forest and swamp lands and by the Tombigbee River along the east and southern edges. Additionally, the modeling report indicates that no trespassing signs are placed along the boundary bordered by the river, heavily forested areas, and the swamp lands. No trespassing signs are not adequate for demonstrating

that the general public does not have access to the areas within the potential ambient air boundary.

The EPA has raised this issue to the State and asked for additional justification on the potential ambient air boundary. Receptors were also excluded from a portion of the Boise Paper Mill facility. Figure 65 indicates the Boise Paper Mill property line as well as the modeled property line. The August 2016 version of the Modeling TAD provides additional clarification regarding areas for receptor placement. The revised language in Section 4.2 states the following, "For SO_2 designations modeling, the areas to consider for receptor placement are those areas that would be considered ambient air relative to each modeled facility, including other facilities' property." Boise Paper Mill is considered ambient air relative to the Lowman facility and receptors should be included over that property. This issue has also been raised to the State.

With regards to the receptor grid that was chosen for the final modeling, the EPA noted that receptors were not included over the Boise Paper Mill facility and thus believes the potential ambient air boundary justification for Lowman was not sufficient to demonstrate that the general public does not have access to the property.

Figure 63. Receptor Grid for the Washington County Area. Source: "Air Quality Characterization for Source Area: Air Dispersion Modeling Charles R. Lowman Power Plant SO_2 1-Hour NAAQS Data Requirements Rule" prepared for Alabama, December 2016

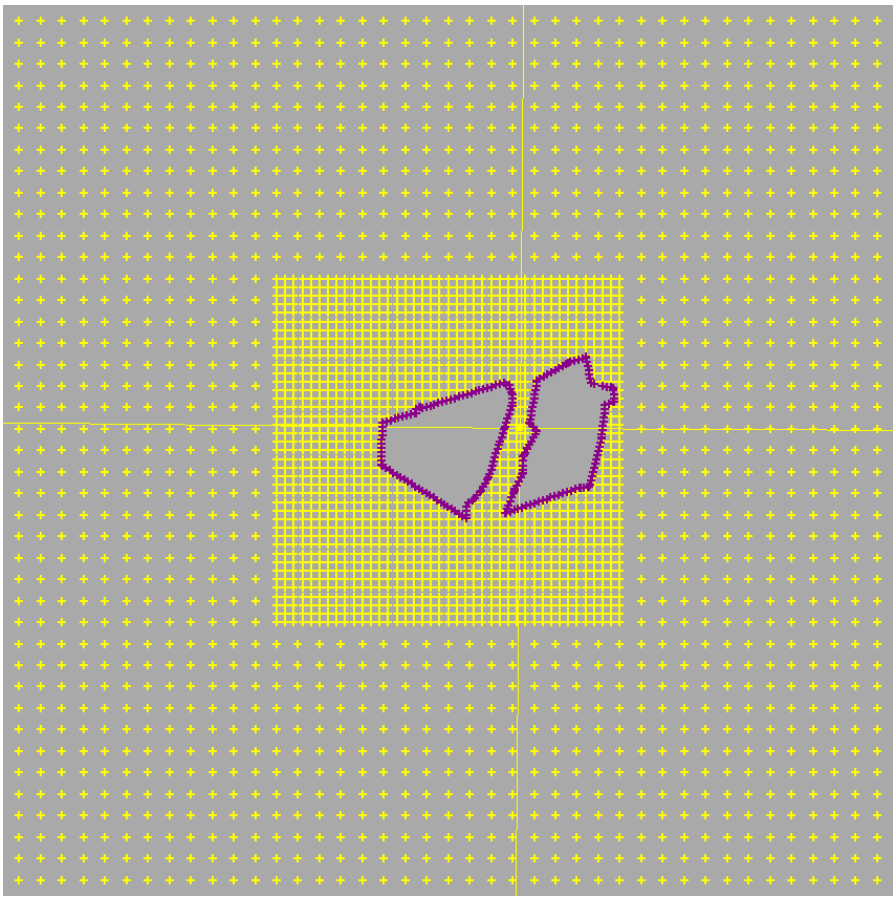
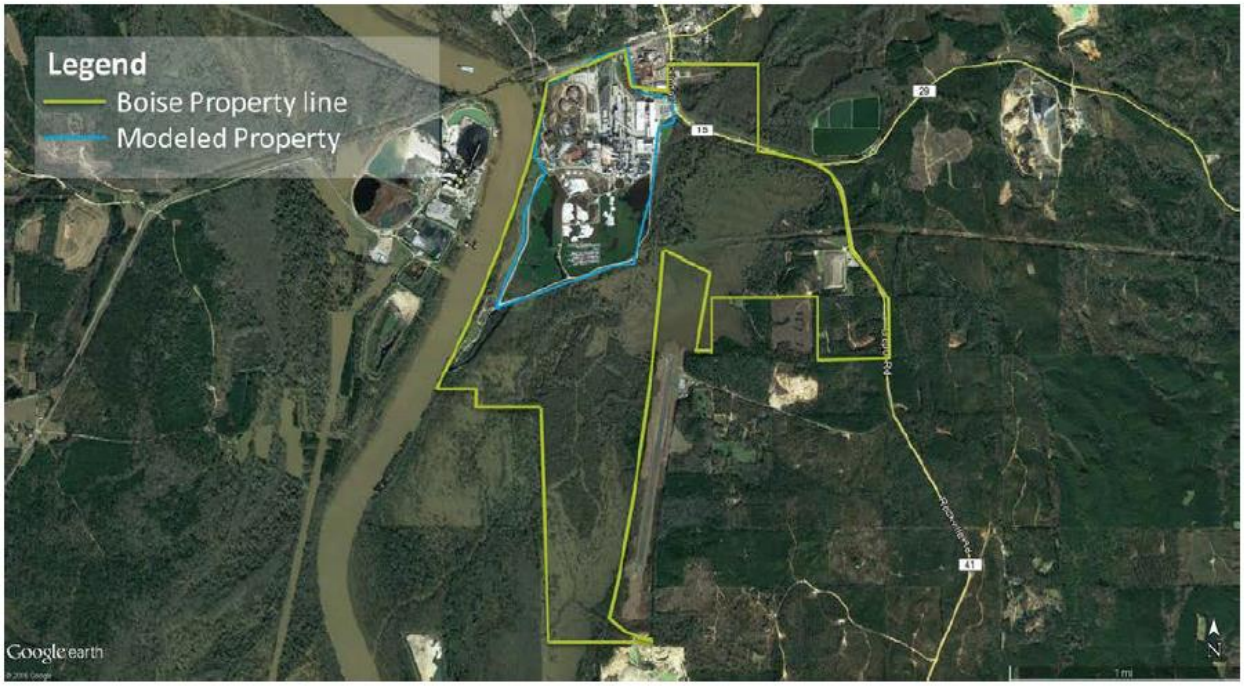


Figure 64. Lowman Facility Fence Line. Source: "Air Quality Characterization for Source Area: Air Dispersion Modeling Charles R. Lowman Power Plant SO_2 1-Hour NAAQS Data Requirements Rule" prepared for Alabama, December 2016.

Figure 65. Boise White Paper Facility Boundary Fence Line. Source: "Air Quality Characterization for Source Area: Air Dispersion Modeling Charles R. Lowman Power Plant SO_2 1-Hour NAAQS Data Requirements Rule" prepared for Alabama, December 2016.



10.3.1.4. 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. Specifically, the State used actual stack heights in conjunction with actual emissions for both Lowman and Boise White Paper. 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. The AERMOD component BPIPPRM was used to assist in addressing building downwash.

The modeling report contains the following description of existing operations at Lowman:

> The significant sources of air pollutants at this facility are one dry bottom wall-fired power boiler (Unit 1) that burns coal and fuel oil with a nominal input of 905 mmBtu/hr; two dry bottom opposed wall-fired power boilers (Units 2 and 3) that burn coal and fuel oil with a nominal input of 2,500 mmBtu/hr each; material handling systems; and four emergency generators. Each unit is equipped with an electrostatic precipitator (ESP) for control of particulate matter emissions. Units 1 and 2 share a flue gas desulfurization (FGD) system for the control of SO_2 which vents to the common stack (CS004). Unit 2 is also equipped with a selective catalytic reduction (SCR) system for control of nitrogen oxides (NO_X). In addition to the ESP for particulate matter emissions control, Unit 3 is equipped with a SCR system for control of NO_X and FGD system for control of SO_2.

> Unit 3 emissions exhaust through one chimney that houses two flues (MS03C and MS03D). Although PowerSouth has emergency generators onsite, ADEM agrees that the emergency nature of the engines deems it unnecessary to model them for this characterization analysis.

The final modeling report includes the following information on changes the facility has undergone:

> In 2016, PowerSouth installed a permanent damper within the Unit 1 exhaust duct to prevent Unit 1 from exhausting to MS001 (also known as the bypass stack). As such, the exhaust gases from Unit 1 flow through the common air quality control equipment shared with Unit 2 and exhaust through stack CS004. Because Unit 1 no longer utilizes the MS001 stack, and could not remove the permanent damper without authorization, the most accurate representation of relevant emissions from Unit 1 is exhausting through stack CS004. Accordingly, the emissions data was adjusted to reflect this scenario.

The December 21, 2016, modeling report indicates that Alabama screened for potential nearby sources within a 20 km area surrounding Lowman. A spreadsheet was provided to the facility with the nearby facilities that met the 2014 actual emissions (in tpy) divided by the distance of greater than 20 within a maximum distance of 20 km, including small sources at a very close distance. The Boise White Paper facility, located less than 1 km to the east of Lowman, across the Tombigbee River, in Clarke County, AL, was included in the modeling analysis.

The State did not appropriately characterize the Lowman facility in accordance with the best practices outlined in the Modeling TAD. This was identified in the EPA's comments on the modeling protocol, but was not adequately addressed in the final modeling report. Modeling the units in the current configuration while using three years of past actual emissions is inappropriate. Since three years of past actual emissions were used for the modeling, they must reflect the actual configuration at the time the emissions occurred from 2012-2014. If Lowman wanted to model the new operational configuration that will be in place from 2016 into the future, then potential or allowable emissions associated with this new configuration would need to be modeled. If Lowman was to use allowable emissions for Unit 1, allowable emissions must be used for Unit 2 since they emit through the same stack, CS004. The State characterized Boise White Paper in accordance with the best practices outlined in the Modeling TAD.

10.3.1.5. 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 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 SO_2 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 SO_2 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 Lowman and one other emitter of SO_2 within 20 km in the area of analysis. The State has chosen to model these facilities using actual emissions. The facilities in the State's modeling analysis and their associated annual actual SO_2 emissions between 2012 and 2014 are summarized below.

For Lowman and Boise White Paper, the State provided annual actual SO_2 emissions between 2012 and 2014. This information is summarized in Table 41. A description of how the State obtained hourly emission rates is given below this table.

Table 41. Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Washington County Area

	SO_2 Emissions (tpy)		
Facility Name	**2012**	**2013**	**2014**
Lowman	3,532.34	3,738.61	2,743.74
Boise White Paper	127.46	60.67	68.96
Total Emissions from All Modeled Facilities in the State's Area of Analysis	3,659.80	3,799.28	2,817.7

For Lowman, the actual hourly emissions data were obtained from CEMS data for the three coal fired boilers. As mentioned in Section 10.3.1.4, Lowman installed a permanent damper on Unit 1 in 2016 to prevent Unit 1 from exhausting to MS001, the bypass stack. The exhaust gases from Unit 1 now flow through the control equipment shared with Unit 2 and exhaust through stack CS004. The facility indicates that because Uni1 1 does not utilize the MS001 stack anymore, the most accurate representation of the emissions form Unit 1 is exhausting through stack CS004. The emissions data was adjusted to reflect this current configuration. Modeling the units in the current configuration while using three years of past actual emissions is inappropriate. Since three years of past actual emissions were used for the modeling, they must reflect the actual configuration at the time the emissions occurred from 2012-2014. On July 18, 2017, the EPA

received additional documentation from ADEM to support the modeling configuration used for Lowman. ADEM states that PowerSouth provided documentation to ADEM on April 19, 2017 associated with the cessation of the use of Unit 1 Stack at the Lowman Plant. The modeling report indicates that "In addition to the hourly emission rate, the temperature and exhaust gas velocity for each stack was processed and an hourly emissions file was generated for input into the AERMOD model." An hourly emissions file was provided with the final modeling, but the name on that file does not match the name of the hourly emissions file from the AERMOD run. The EPA has asked Alabama to provide the hourly emissions file indicated in the AERMOD run. The hourly emissions file contains constant values for exhaust temperature for each of the Lowman units. In the modeling protocol, the EPA commented that if CEMS data for exhaust temperature is available, it should be used. This comment was not addressed in the final modeling and the EPA has followed up with the State asking Alabama to indicate why constant values were used for exhaust temperature for those units. Additionally, the modeling report indicates that emissions associated with the four emergency generators were not included in the modeling analysis. The EPA commented on this in the modeling protocol and requested that additional justification be provided to demonstrate that these sources do not have significant emissions that could impact the annual distribution of maximum 1-hr concentrations.

For Boise White Paper, the actual hourly emissions data were derived from hourly production rates and trade organization specific emission factors, site specific emissions factors, or CEMS data. Boise White Paper has three units that were included in the modeling analysis: the Lime Kiln, the No. 2 Recovery Furnace north and south stack, and the Combination Fuel Boiler. CEMS data was used for the Lime Kiln for years 2013 and 2014. CEMS was not installed on the unit until 2012, so for 2012, the emissions calculations were derived from the pulp & paper trade organization specific emission factors from the National Council for Air and Steam Improvement. For the No. 2 Recovery Furnace North & South Stack, the hourly emissions calculations were derived from a site specific emission factor that was produced from an emission test that was performed on the boiler in March 2006. For the Combination Fuel Boiler, CEMS data is available for 2012 to 2014.

The EPA does not believe the emissions data used in the modeling analysis for Lowman is appropriate. Modeling the units in the current configuration while using three years of past actual emissions is inappropriate. Since three years of past actual emissions were used for the modeling, they must reflect the actual configuration at the time the emissions occurred from 2012-2014. Additional information has been requested from the State regarding the exclusion of intermittent sources and why constant values were used for exhaust temperature for the Lowman units. The EPA has compared the sum of the hourly SO_2 emissions modeled for Lowman and Boise White Paper with the annual emissions reported in the EIS Gateway, or in CAMD when available, and determined that the emissions values do not match. For Lowman, the emissions for Unit 3 (MS03C and MS03D) that were used in the modeling (2012: 1,630 tons, 2013: 2,211 tons, and 2014: 1,878 tons) do match the emissions in CAMD (2012: 1,629 tons, 2013: 2,209 tons, and 2014: 1,877 tons). However, the emissions from the other units at Lowman do not match what is in CAMD and EIS Gateway. Specifically, emissions for Units 1 and 2 used in the modeling were 1,902 tons in 2012, 1,528 in 2013 and 865 in 2014. On the contrary, CEMs reported data for these units were 1,990 tons in 2012, 1,684 in 2013 and 2,670 in 2014. The emission values for Boise White Paper that were modeled (2012: 127 tons, 2013: 61 tons, and 2014: 69 tons) do not

match those values that are in the EIS Gateway (2012: 121 tons, 2013: 77 tons, and 2014: 91 tons). This component of the modeling analysis was not performed in a manner consistent with the SO_2 Modeling TAD, especially with the regards to modeling the current configuration of the Lowman units while using three years of past actual emissions. Emissions for Lowman have decreased in 2015 (2,506 tons) and 2016 (1,241 tons). Emissions for Boise White Paper have increased in 2015 (106 tons). If modeled to accurately reflect the configuration of the units and the emissions from Lowman for 2012-2014, modeling these years would likely be conservative since emissions have decreased at Lowman in 2015 and 2016 and emissions at Boise White Paper have only slightly increased in 2015.

10.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

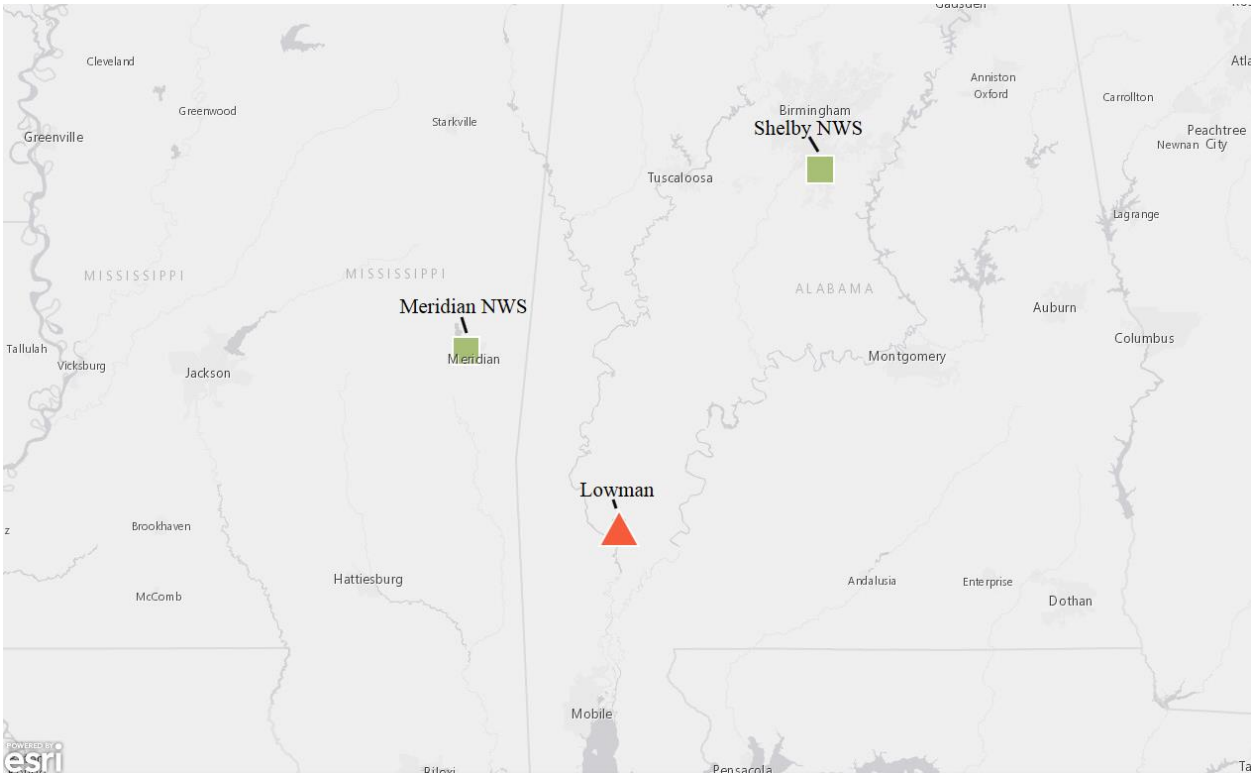
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of 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 NWS stations, site-specific or onsite data, and other sources such as universities, FAA, and military stations.

For the area of analysis for the Washington County area, the State selected the surface meteorology from a regional airport in Meridian, MS, located at 32.333N, 88.750W, approximately 123 km to the northwest of the source, and coincident upper air observations from Alabaster, AL, located at 33.18 N, 86.78 W, approximately 216 km to the north-northeast of the source as best representative of meteorological conditions within the area of analysis.

The State used AERSURFACE version 13016 using data from the regional airport in Meridian, MS 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 "zo". The modeling report indicates that the state determined the annually averaged surface parameters for both Lowman and the Meridian, MS NWS station. The modeling report did not indicate the number of spatial sectors or what distance the sectors went out to, but did indicate that the surface roughness values were estimated at an annual temporal resolution for wet (2012, 2013) and average (2014) conditions.

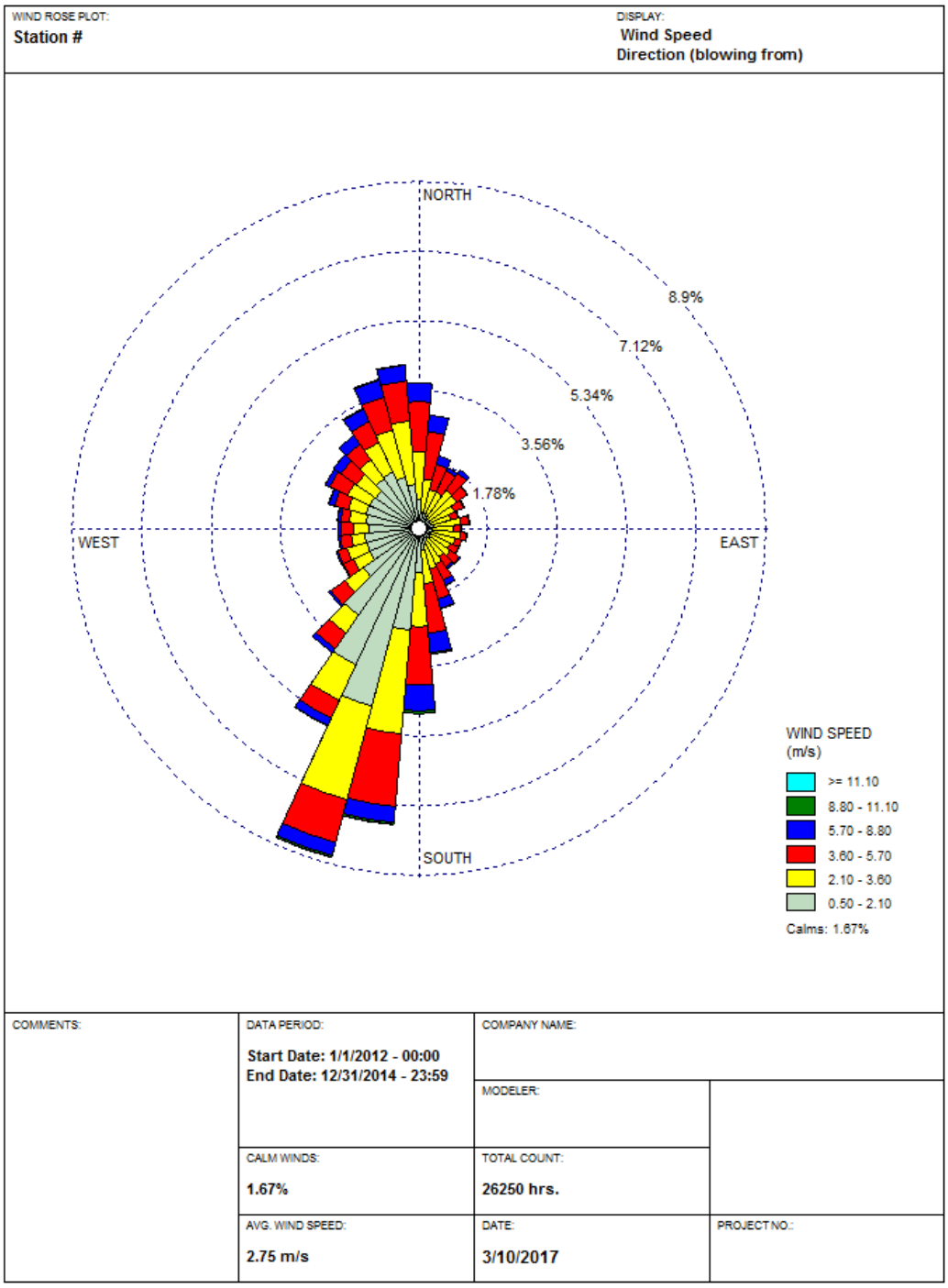
In the figure below, generated by the EPA, the locations of these NWS stations is shown relative to the area of analysis.

Figure 66. Area of Analysis and the NWS stations in the Washington County Area. Source: "Air Quality Characterization for Source Area: Air Dispersion Modeling Charles R. Lowman Power Plant SO_2 1-Hour NAAQS Data Requirements Rule" prepared for Alabama, December 2016.



The EPA generated a wind rose for the Meridian, MS NWS station for the 2012-2014 period. In Figure 67, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Analysis of the NWS data indicate winds predominately blow from the south-southwest direction.

Figure 67. Meridian, MS NWS Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air NWS 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 State provided the facility with the meteorological data for the years from 2010-2014 for the modeling analysis. The State processed the raw data using the most updated version of AERMET at the time (version 15181). Since the AERMET files were not provided, it is unknown whether the State followed the methodology and settings presented in the EPA's AERMOD Implementation Guidance in the processing of the raw meteorological data into an AERMOD-ready format. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

10.3.1.7. 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 terrain program (version 11103) within AERMOD was used to specify terrain elevations for all the receptors. AERMAP was also used to generate the hill height scales for AERMOD. To calculate the hill height scale, the National Elevation Dataset array and the domain boundary must include all the features that exceed a 10 percent elevation slope from any given receptor. The source of the elevation data incorporated into the model is from the USGS NED. The modeling report indicates that "The course grid was extended from the modeling protocol to account for terrain to the northeast of Lowman on the extent of the original 20 km grid." The EPA agrees that this component of the modeling analysis was performed in a manner consistent with the SO_2 Modeling TAD.

10.3.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 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 elected to use a "tier 2" approach. Data was obtained for 2012-2014 from the SEARCH network. The data are from the Centreville monitor located approximately 169 km northeast of Lowman in Centreville, Alabama. Background data was provided to the facility from Alabama. The facility used the following fill-in technique for missing data: for a single hour, the concentrations for the hour before and after were averaged and the missing single hour was filled-in with the average value. For data gaps spanning multiple hours, the maximum concentration for each hour for each season was determined for the dataset and the specific hour that was missing was filled in with the maximum seasonal hourly value. The background concentrations for this area of analysis were determined by the State to vary from 3.25 $\mu g/m^3$, equivalent to 1.24 ppb when expressed in 3 significant figures, to 28.06 $\mu g/m^3$ (10.7 ppb), with an average value of 8.61 $\mu g/m^3$ (3.29 ppb). See Table 42 for the temporally varying background concentration by hour of day and season for 2012-2014.

Table 42. Centreville SO_2 Background Values for 2012-2014 (ppb)

Hour	Winter	Spring	Summer	Autumn
1	3.24	2.13	1.74	1.51
2	2.89	2.33	2.58	1.99
3	2.98	1.91	2.80	2.65
4	2.21	1.92	2.55	3.85
5	2.92	1.50	2.32	6.51
6	3.31	1.65	3.23	7.79
7	2.99	1.88	5.58	7.73
8	4.18	2.73	7.59	8.77
9	4.64	5.50	7.39	9.78
10	2.94	3.83	5.78	10.71
11	4.05	3.15	6.53	4.93
12	4.71	2.65	2.67	3.50
13	2.84	2.67	3.21	4.11
14	2.77	3.08	3.00	2.77
15	3.22	3.26	2.47	1.96
16	3.31	2.79	1.81	2.05
17	3.73	2.88	1.48	2.51
18	2.28	2.99	1.74	2.89
19	2.37	2.63	1.87	2.56
20	2.63	2.35	1.91	1.91
21	2.62	2.33	2.40	2.11
22	3.37	1.89	2.36	1.95
23	3.67	2.68	1.73	2.31
24	3.21	2.59	1.24	2.34

The EPA reviewed the Centreville SEARCH monitoring information and determined that the monitor is not a regulatory monitor that meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the data is not acceptable for use as background concentrations in this modeling demonstration. The EPA communicated this outstanding issue to Alabama in March 2017[41] and suggested the following options for addressing the issue: 1) demonstrate that the Centreville monitor meets the QA/QC criteria and other requirements in Part 58, Appendix B for PSD monitors, 2) choose a different background monitor that is representative of SO_2 background concentrations in the area of Lowman and either use the design value from that monitor or a use a more refined approach of seasonal hourly varying background values from that monitor, or 3) demonstrate that the Centreville SEARCH background value used in the modeling is more conservative (larger) than an alternative background site that would be representative of background in the area of Lowman. For this modeling demonstration, if option 3 is chosen, Alabama would need to demonstrate that the Centreville data is higher than the alternate site's data for each hour (96 total values, 4 seasons x 24 hours in each day = 96 values).

Alabama submitted additional information to the EPA[42] to address the issues discussed above. Alabama's supplemental information proposed to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky. For eight of the Alabama DRR sources (including the Lowman facility), Alabama's analysis compared the Centreville SEARCH data with the Mammoth Cave data, hour-by-hour, for each of the 96 hours in the "season-by-hour-of-day" option used in the AERMOD modeling. Alabama then found the hour where the Mammoth Cave data is greater than the Centreville data by the greatest amount (which they found to be 3.68 ppb = 9.71 ug/m3)[43]. Alabama added this "adjustment factor" of 9.71 $\mu g/m^3$ to the final modeling results for each the SO_2 DRR Sources (including Lowman).

Alabama's supplemental information justifies use of the Mammoth Cave data by stating that it is "the closest background monitor with sufficient data capture that does not show interference from industrial sources." The EPA does not believe that this is an adequate justification for determining whether Mammoth Cave is a representative background monitor pursuant to the criteria provided in Section 8.2.2(c) of the *Guideline on Air Quality Models* contained in 40 CFR Part 51, Appendix W. The criteria in Appendix W state that an appropriate regional site is "*one that is located away from the area of interest but is impacted by similar natural and distant man-made sources."*

[41] Email from Beverly Banister, Region 4 Air, Pesticides and Toxics Management (APTMD), Air Director to Ron Gore, ADEM Air Director on March 21, 2017.
[42] Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017
[43] Note that Alabama used a conversion factor of 2.639 to convert the SO_2 background concentration in ppb to ug/m^3. This differs from EPA's recommended conversion factor of 2.619. Alabama's conversion factor results in a conservatively higher concentration in ug/m^3, so is therefore acceptable.

The EPA performed an evaluation to determine if the Mammoth Cave site is an appropriate regional background site for the Lowman modeling. Both the Mammoth Cave monitor and the Lowman facility are located in rural areas. The 2014 NEI listed 6,013 tpy of SO_2 emissions in Washington County. The 2014 actual emissions from Lowman were 4,547 tpy and 69 tpy from Boise White Paper. However, there are no other sources with emissions greater than 1 tpy located within 40 km of Lowman. The other large SO_2 emissions source in Washington County is American Midstream Chatom, LLC, located approximately 46 km west of Lowman and had 1,141 tpy SO_2 emissions in 2014. The combined emissions from Lowman and American Midstream Chatom account for all but approximately 325 tpy in Washington County. In the area around the Mammoth Cave monitor, there are no sources emitting more than 5 tpy of SO_2 within 50 km of the monitor and the total SO_2 emissions in the 3 counties surrounding the monitor are approximately 70 tpy, according to the emissions data in the 2014 NEI. The closest major source of SO_2 emissions to the Mammoth Cave monitor is the TVA Paradise power plant (19,654 tpy in 2014) located approximately 75 km from the monitor. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near Lowman. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis. The EPA has concluded that Alabama's "adjustment factor" procedure provides an acceptable method for substituting data from the Mammoth Cave background monitor for the Centreville monitor data without the need to remodel.

10.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Washington County area of analysis are summarized below in Table 43.

Table 43. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Washington County Area

Input Parameter	Value
AERMOD Version	15181 (regulatory default)
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	8
Modeled Structures	89
Modeled Fencelines	2
Total receptors	9,998
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Meridian, MS
NWS Station Upper Air Meteorology	Alabaster, AL
NWS Station for Calculating Surface Characteristics	Meridian, MS
Methodology for Calculating Background SO_2 Concentration	Tier 2 approach using SEARCH site at Centreville, AL (2012-2014)
Calculated Background SO_2 Concentration	3.25-28.06 $\mu g/m^3$ + Alabama's "adjustment factor" of 9.71 $\mu g/m^3$

The results presented below in Table 44 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

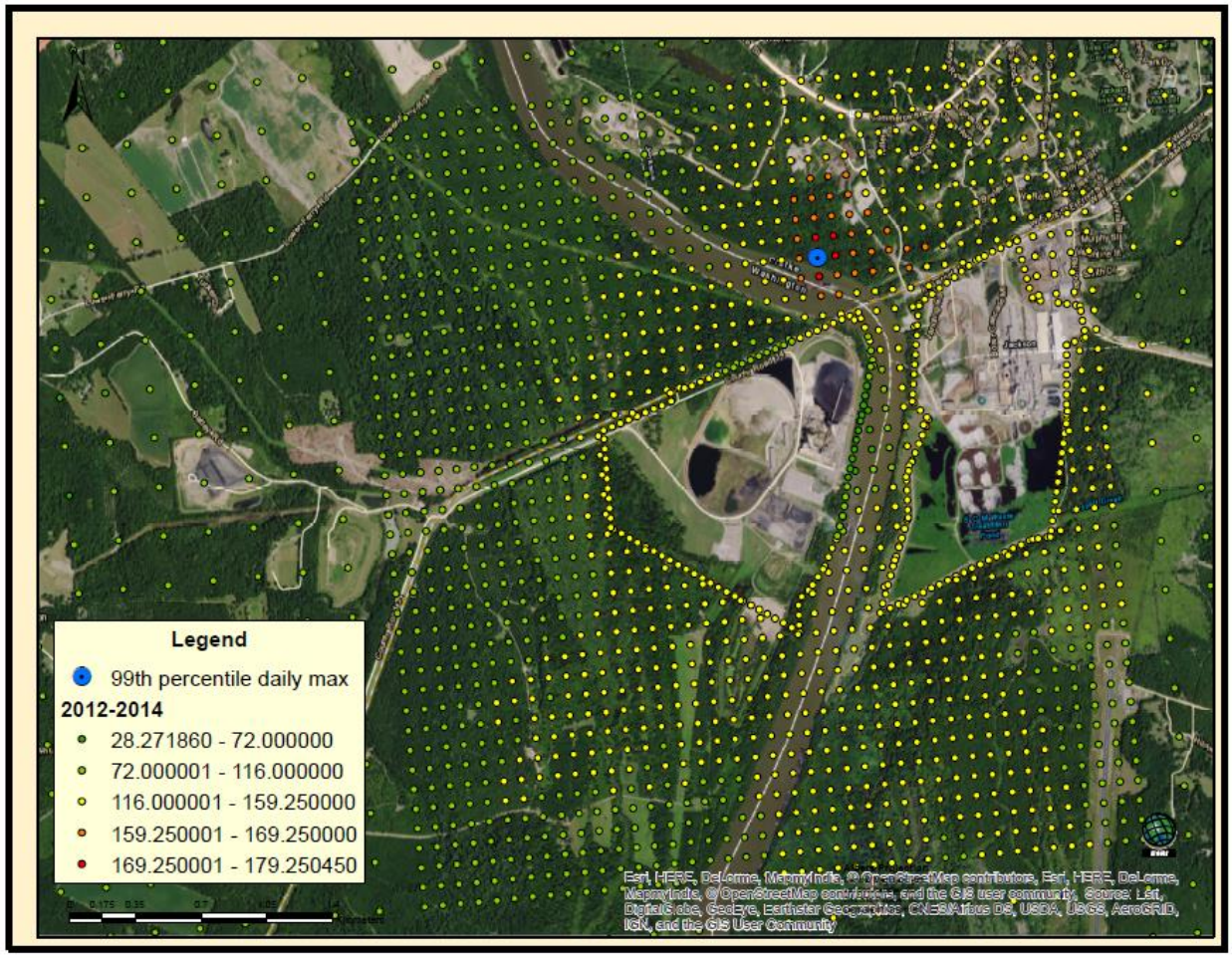
Table 44. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Washington County Area

		Receptor Location [UTM zone 16]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
Averaging Period	**Data Period**	**UTM Easting (m)**	**UTM Northing (m)**	**Modeled concentration (including background)**	**NAAQS Level**
99th Percentile 1-Hour Average	2012-2014	413,606.7	3,485,033.6	188.96	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 179.25 $\mu g/m^3$, equivalent to 68 ppb. As discussed in Section 10.2.1.8, in response to the EPA's outstanding questions regarding the background concentrations using in their modeling analysis, Alabama added an "adjustment factor" of 3.68 ppb (9.71 $\mu g/m^3$) to the final modeling result presented in their modeling report. This modeled concentration included the background concentration of SO_2 and adjustment factor, and is based on actual emissions from the facilities (179.25 + 9.71 = 188.96 $\mu g/m^3$). Figure 68 below was generated by the EPA from the modeling results, and indicates that the predicted value occurred just north of the Lowman facility, on the northern shore of the Tombigbee River in Clarke County.

Figure 68. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Washington County Area.



The modeling submitted by the State, with noted issues, does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

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

The EPA assessment of the 1-hour SO_2 DRR AERMOD modeling for Lowman finds that the modeling does not conclusively demonstrate whether the area meets the 1-hour SO_2 NAAQS and does not contribute to a nearby area that does not meet the NAAQS.

The State made use of AERMOD version 15181, the most recent version available at the time the modeling was conducted. The EPA agrees that this model version is appropriate to characterize the area because the State made use of default regulatory options available at the time and is not making use of any previously alternative modeling options included in version 16216r and the update to Appendix W.

The EPA determined that Alabama's initial selected background data from the Centreville SEARCH monitor is inconsistent with the Modeling TAD. This monitor is not a regulatory monitor and therefore should not be used to develop background concentrations for this modeling demonstration.

On April 18, 2017, Alabama submitted additional information to the EPA[44] to address the use of the Centerville SEARCH monitor by proposing to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky (AQS ID: 21-061-0501). Alabama's analysis compared the Centreville SEARCH data with the Mammoth Cave data, hour-by-hour, for each of the 96 hours in the "season-by-hour-of-day" option used in the AERMOD modeling. Alabama then found the hour where the Mammoth Cave data is greater than the Centreville data by the greatest amount and added this "adjustment factor" of 9.71 $\mu g/m^3$ to the final modeling results for Lowman.

The EPA determined that the Mammoth Cave site is an appropriate regional background site for the Lowman modeling. Both the Mammoth Cave monitor and the Lowman facility are located in rural areas. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near the Lowman facility. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis.

The EPA does not believe the Alabama's modeling to characterize SO_2 impacts in the Washington County area is appropriate. The State chose to model two sources in the area, Lowman, and a nearby source within 20 km, Boise White Paper. The EPA has requested additional justification for excluding two other nearby sources, GP Cellulose Alabama River Cellulose, which is approximately 42 km east-northeast of Lowman, and American Midstream Chatom, which is approximately 46 km west of Lowman. Based upon a further analysis of the emissions and distance of the GP Cellulose Alabama River Cellulose facility, the EPA believe that this facility is unlikely to cause a significant concentration gradient in the area near the Lowman facility. Therefore, Alabama's exclusion of this nearby source from the modeling is acceptable. However, based upon the high level of emissions from the American Midstream Chatom facility (1,141 tons in 2014), the potential impacts from this facility should be further investigated.

[44] Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017

The EPA does not believe the receptor grid that was chosen in the final modeling is appropriate. The August 2016 version of the Modeling TAD provides additional clarification regarding areas for receptor placement. The revised language in Section 4.2 states the following, "For SO_2 designations modeling, the areas to consider for receptor placement are those areas that would be considered ambient air relative to each modeled facility, including other facilities' property." Boise Paper Mill is considered ambient air relative to the Lowman facility and receptors should be included over that property. This issue has been raised to the State. Additionally, the ambient air boundary demonstration for Lowman was not sufficient to demonstrate that the general public does not have access to the property. Additional justification from the State has been requested. The State adequately represented the topography of the area with the model and its preprocessors.

The State chose to model actual emissions from Lowman and Boise White Paper during 2012 – 2014. The EPA does not believe the emissions data used in the modeling analysis for Lowman is appropriate. Modeling the units in the current configuration while using three years of past actual emissions is inappropriate. Since three years of past actual emissions were used for the modeling, they must reflect the actual configuration at the time the emissions occurred from 2012-2014. On July 18, 2017, the EPA received additional documentation from ADEM to support the modeling configuration used for Lowman. ADEM states that PowerSouth provided documentation to ADEM on April 19, 2017, associated with the cessation of the use of Unit 1 Stack at the Lowman Plant. This information is still being assessed by the EPA. Additional information has been requested from the State regarding the exclusion of intermittent sources and why constant values were used for exhaust temperature for the Lowman units. The modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, the State did not provide details regarding how these files were prepared. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

As a result of modeling issues identified above, the EPA finds that the State's modeling analysis for Lowman was not performed in a manner consistent with Appendix W and the Modeling TAD and may not accurately represent current air quality in the area. Therefore, the EPA does not have sufficient information to determine whether the area is meeting or not meeting the SO_2 NAAQS and does not contribute to a nearby area that does not meet the NAAQS.

10.4. Jurisdictional Boundaries in the Washington County, Alabama Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Washington County. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

The Charles R. Lowman Power facility is located on the eastern border of Washington County, along the Tombigbee River less than 1 km cross from the Clarke County line. Washington

County is bounded to the north by Choctaw County; to the south by Mobile County; to the east by Clarke County and to the west by Wayne and Green Counties in Mississippi. Alabama recommended attainment for the entire state which include the area around Lowman based on an assessment and characterization of air quality from the DRR source and one additional nearby source. The EPA notes that Alabama did not provide a specific boundary recommendation for the modeled area around Lowman.

ADEM assessed nearby sources within a 20 km area of analysis from the Lowman facility in all directions and considered this sufficient to resolve the maximum impacts and any potential impact areas. This area of analysis covers portions of Washington, Clarke, Wilcox, Monroe, Escambia, Baldwin, and Mobile Counties. Based upon screening methodology conducted by ADEM, one additional source, Boise White Paper, was included in the modeling analysis for Lowman. EPA notes that one other major source of SO_2 within a 50 km radius of Lowman should be considered for inclusion in the modeling, American Midstream Chatom (1,141 tpy), which is approximately 46 km west of Lowman. The State did not evaluate these additional sources and a rationale was not provided explaining why these sources were excluded from the modeling analysis for Continental Carbon. Upon receiving the final modeling report, the EPA informed the State that an explanation as to why these sources were not included in the modeling needs to be provided. The EPA notes Alabama has not provided additional information at this time.

10.5. The EPA's Assessment of the Available Information for the Washington County, Alabama Area

After evaluating the 1-hour SO_2 DRR AERMOD modeling and other information for the Lowman facility, the EPA intends to modify the State's recommendation and designate Washington County unclassifiable for the SO_2 NAAQS. EPA is modifying the State's recommendation because the EPA finds that the modeling analysis as discussed in section 10.3, does not demonstrate that the area meets the 1-hour SO_2 NAAQS and is not contributing to a nearby area that does not meet the NAAQS.

Alabama recommended attainment for the entire state including Washington County and the area around Plant Gaston based in part on an assessment and characterization of air quality impacts from the DRR source, one other nearby source, Boise Paper Mill and background concentration data from the Mammoth Cave monitor in Kentucky. Based on these factors, the modeled 1-hour design value is 188.96 $\mu g/m^3$, equivalent to 72.15 ppb which is below the level of the 2010 SO_2 NAAQS. However, the EPA's assessment finds that the modeling does not provide sufficient information to demonstrate whether the area around Lowman meets or does not meet the 1-hour SO_2 NAAQS or contribute to an area that does not meet the standard. As summarized below, the EPA identified the following issues in the modeling for Lowman:

- Lack of adequate documentation to support the AERMET processing used to generate the surface and upper air meteorology files; and,
- The receptor grid that was chosen for the final modeling as receptors was not appropriate as it did not include receptors over the Boise Paper Mill facility; and,
- The ambient air boundary demonstration for Lowman was not sufficient to demonstrate that the general public does not have access to the property; and,
- Inappropriate emissions data used in the modeling analysis for Lowman; and,
- Lack of information to support the exclusion of one nearby source American Midstream Chatom (1,141 tons of SO_2 in 2014), from the modeling analysis.

The modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, the State did not provide details regarding how these files were prepared. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

The EPA does not believe the receptor grid that was chosen in the final modeling is appropriate. The August 2016 version of the Modeling TAD provides additional clarification regarding areas for receptor placement. The revised language in Section 4.2 states the following, "For SO_2 designations modeling, the areas to consider for receptor placement are those areas that would be considered ambient air relative to each modeled facility, including other facilities' property." Boise Paper Mill is considered ambient air relative to the Lowman facility and receptors should be included over that property. Additionally, the ambient air boundary demonstration for Lowman was not sufficient to demonstrate that the general public does not have access to the property. Additional justification from the State has been requested.

The State chose to model actual emissions from Lowman and Boise White Paper during 2012 – 2014. The EPA does not believe the emissions data used in the modeling analysis for Lowman is appropriate. Modeling the units in the current configuration while using three years of past actual emissions is inappropriate. Since three years of past actual emissions were used for the modeling, they must reflect the actual configuration at the time the emissions occurred from 2012-2014. On July 18, 2017, the EPA received additional documentation from ADEM to support the modeling configuration used for Lowman. ADEM states that PowerSouth provided documentation to ADEM on April 19, 2017, associated with the cessation of the use of Unit 1 Stack at the Lowman Plant. Additional information has been requested from the State regarding the exclusion of intermittent sources and why constant values were used for exhaust temperature for the Lowman units.

The State used the Q/D > 20 methodology to assess other nearby sources within 20 km of the Lowman facility. Using this methodology, ADEM identified one additional nearby background source to be included in the modeling analysis for Lowman. The nearby source is Boise White Paper. The EPA notes that the one additional source in the county bordering Washington County that would likely cause or contribute to an exceedance of the SO_2 NAAQS in the area of analysis, Boise Paper Mill, was included in the modeling analysis. EPA notes there are two other major sources of SO_2 within a 50 km radius of Lowman that the state should have considered: GP Cellulose Alabama River Cellulose, which is approximately 42 km east-northeast of Lowman in Monroe County, and American Midstream Chatom, LLC(1,141), which is approximately 46 km west of Lowman in Washington County. The State did not evaluate these additional sources and did not provide a rationale as to why they were excluded from the modeling analysis. Upon receiving the final modeling report, the EPA informed the State that an explanation as to why these sources were not included in the modeling needs to be provided. Based upon a further analysis of the emissions and distance of the GP Cellulose Alabama River Cellulose facility, the EPA believe that this facility is unlikely to cause a significant concentration gradient in the area near the Lowman facility. Therefore, Alabama's exclusion of this nearby source from the modeling is acceptable. However, based upon the high level of emissions from the American Midstream Chatom facility (1,141 tons in 2014), the potential impacts from this facility should be further investigated.

The EPA identified an additional 7 SO_2 emitting sources in Washington County excluding Lowman (4547) and the American Midstream Chatom, LLC source (1,141), with a cumulative emissions profile of approximately 3.5 tpy in 2014. The EPA does not believe that these SO_2 sources would cause a concentration gradient impacts within the area of analysis.

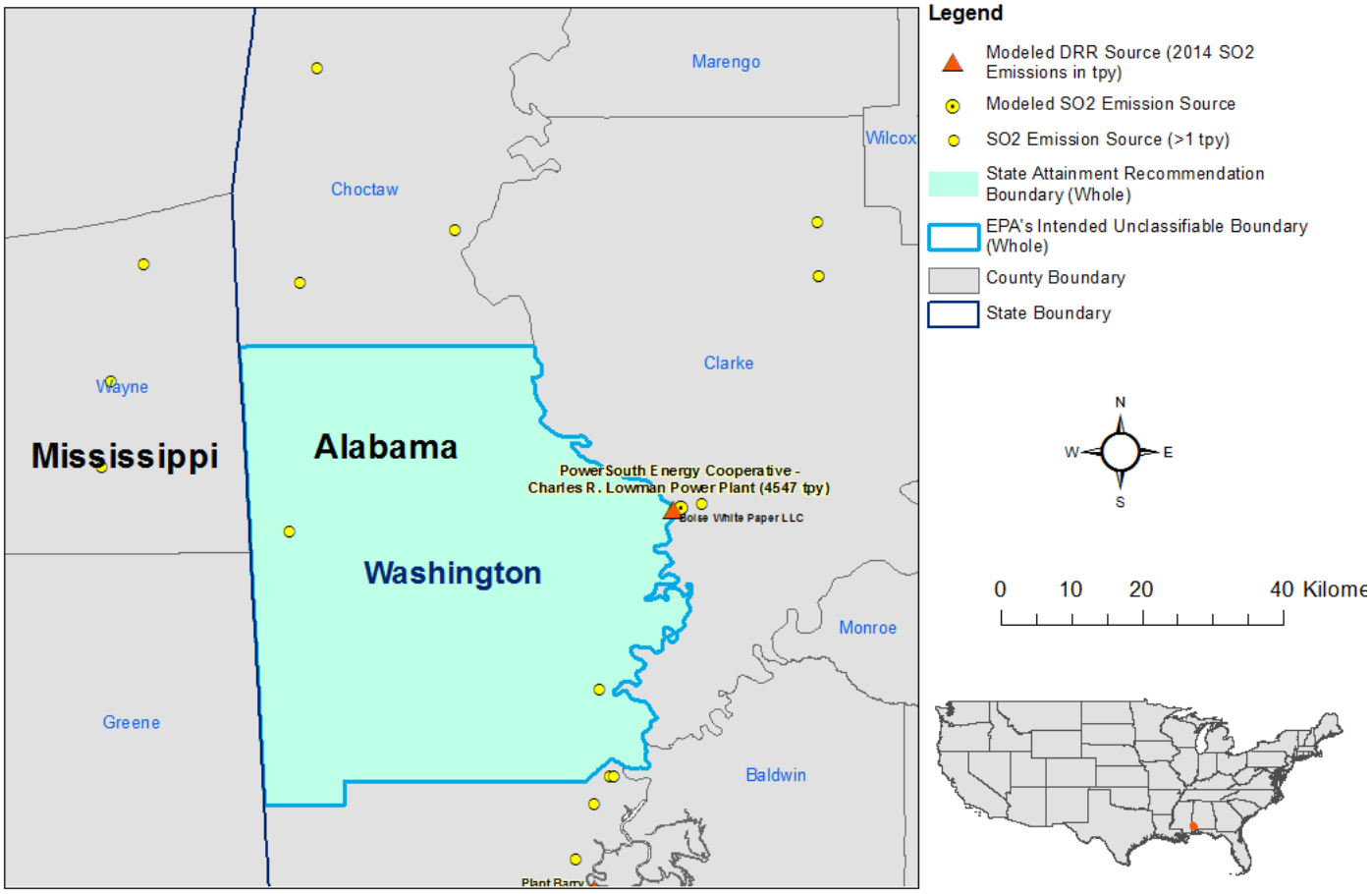
The EPA determined that the Mammoth Cave site is an appropriate regional background site for the Lowman modeling. Both the Mammoth Cave monitor and the Lowman facility are located in rural areas. The EPA determined that the natural and man-made SO_2 emissions sources located near the Mammoth Cave monitor are similar to the sources in the area near Lowman. Additionally, the Mammoth Cave monitor meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the Mammoth Cave monitor is an acceptable regional site to provide background concentrations for this modeling analysis. The EPA has concluded that Alabama's "adjustment factor" procedure provides an acceptable method for substituting data from the Mammoth Cave background monitor for the Centreville monitor data without the need to remodel.

Based on the issues addressed above, the EPA finds that the State's modeling analysis for the Lowman facility was not performed in a manner consistent with Appendix W and the Modeling TAD and may not accurately represent current air quality in the area. Therefore, EPA intends to modify the state's recommendation and designate Washington County, in its entirety as unclassifiable for the 2010 SO_2 NAAQS.

10.6. Summary of Our Intended Designation for the Washington County, Alabama Area

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA is modifying the state's recommendation and intends to designate Washington County as unclassifiable for the 2010 SO_2 NAAQS because the EPA does not have sufficient information to determine whether the area around the DRR source meets or does meet the 1-hour SO_2 standard or is contributing to a nearby area that does not meet the standard. Specifically, the boundaries are comprised of the entirety of Washington County. Figure 69 shows the boundary of this intended designated area. At this time, our intended designations for the State only apply to this and the other areas presented in this technical support document. There are no remaining portions of Washington County that will remain to be characterized by December 31, 2020.

Figure 69. Boundary of the Intended Washington County Unclassifiable Area



At this time, our intended designations for the State only apply to this and the other areas presented in this technical support document. The EPA intends in a separate action to evaluate and designate all remaining undesignated areas in Alabama by December 31, 2020.

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

11. Technical Analysis for the Shelby County Area

11.1. Introduction

The EPA must designate the Shelby County, Alabama, area by December 31, 2017, because the area has not been previously designated and Alabama has installed and begun timely operation of a new, approved SO_2 monitoring network meeting the EPA specifications referenced in the EPA's SO_2 DRR for any sources of SO_2 emissions in the vicinity of Shelby County.

11.2. Air Quality Modeling Analysis for the Shelby County Area Addressing Alabama Power Company – Ernest C. Gaston Electric Generating Plant

11.2.1. Introduction

This section presents all the available air quality modeling information for a portion of Shelby County that includes the Alabama Power Company – Ernest C. Gaston Electric Generating Plant (Plant Gaston) (this portion of will often be referred to as "the Shelby County area" within this section). This area contains the following SO_2 sources, principally the sources around which Alabama is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy:

- The Plant Gaston facility emits 2,000 tons or more annually. Specifically, Plant Gaston emitted 34,554 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Alabama has chosen to characterize it via modeling.

- The Resolute Coosa Pines facility is not on the SO_2 DRR Source list, but has been included in the modeling analysis. The source is located 13 km from Gaston and emitted 348 tons of SO_2 in 2014 according to the NEI.

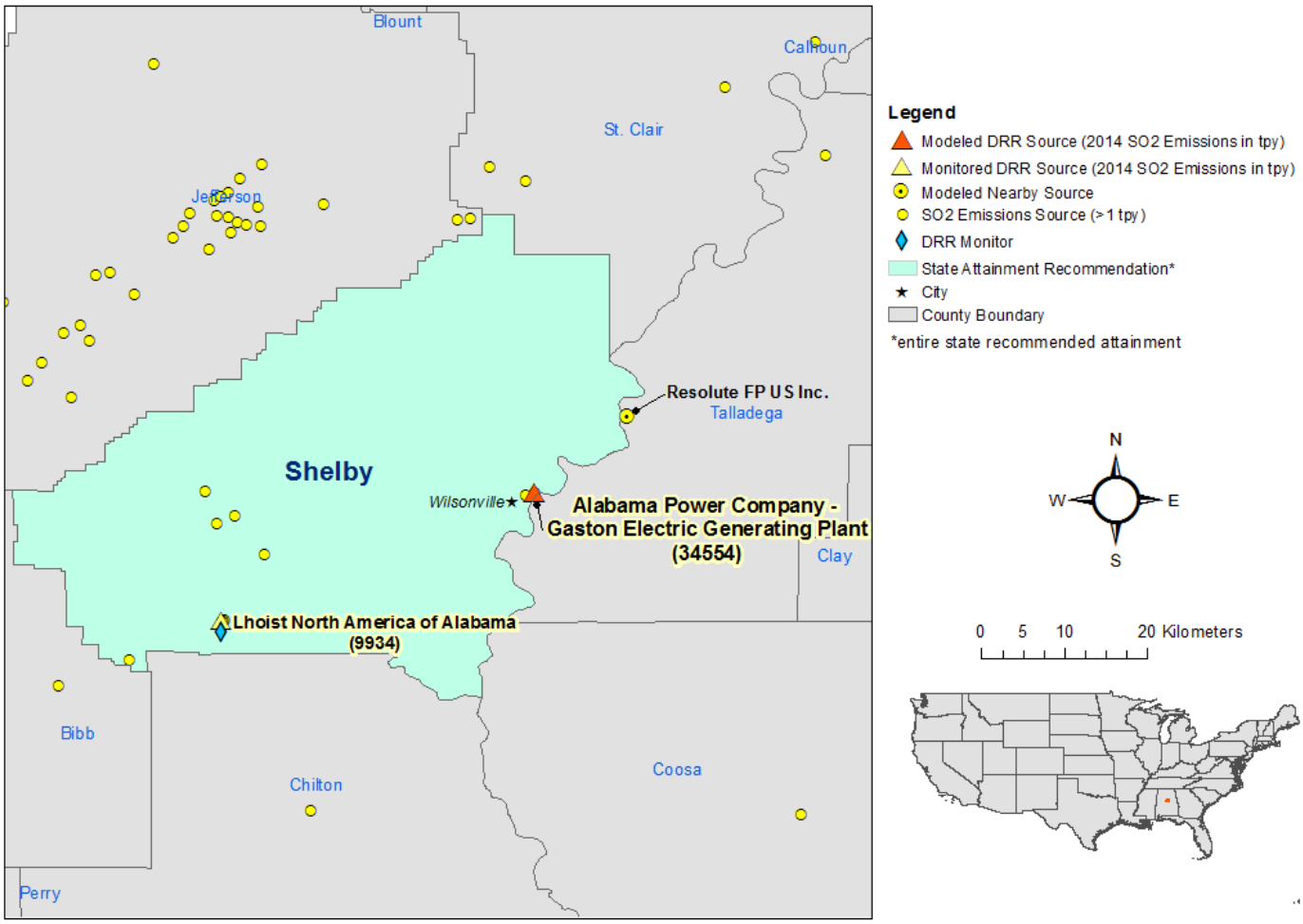
- The L'hoist North America of Alabama (L'hoist) is a second DRR source in Shelby County located approximately 35 km west of Plant Gaston that emitted 9,934 tons of SO_2 in 2014. Alabama chose to characterize this source based on air quality monitoring data. The state has installed and begun timely operation of a new SO_2 monitoring network meeting EPA specifications referenced in EPA's SO_2 Data Requirements Rule (80 FR 51052). Therefore, the EPA must designate the area around this new monitor by December 31, 2020.

Alabama recommended that the entire state be designated attainment. This would include the area surrounding the Alabama Power Company – Ernest C. Gaston Electric Generating Plant (Plant Gaston), in Shelby County, based in part on an assessment and characterization of air quality impacts from these facilities. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual and PTE emissions. After careful review of the State's assessment, supporting documentation, and all available data, the EPA is modifying the State's recommendation, and intends to designate an area around Plant

Gaston as unclassifiable.[45] The remaining portion of Shelby County will be designated by December 31, 2020. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

As seen in Figure 70 below, the Plant Gaston facility is located in Wilsonville, Alabama in Shelby County less than 1 km from the Talladega County line. Also included in the figure are other nearby emitters of SO_2. Including modeled non-DRR source Resolute Coosa Pines facility located in Talladega County. Lastly, Figure 70 shows Alabama's attainment designation for the entire state including Shelby County. The EPA's intended unclassifiable designation boundary for the Shelby County area is not shown in this figure, but is shown in a figure in the section below that summarizes our intended designation.

Figure 70. Map of the Shelby County Area Addressing Plant Gaston.



[45] The boundary is comprised of a portion of Shelby County contained within the 2016 U. S Census Block Groups 011170308001 and 011170308002.

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.

For this area, the EPA received and considered one modeling assessment.

Table 45. Modeling Assessments for the Shelby County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Alabama*	January 2017	Plant Gaston Modeling Report	Final Modeling Report

*Alabama submitted modeling assessment prepared by AECOM.

11.2.1.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 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. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

The current version of AERMOD, version 16216r, includes updates to 40 CFR part 51, Appendix W, "Guideline of Air Quality Models," published on January 17, 2017 (82 FR 5203). This version of AERMOD also includes fixes to glitches that were inadvertently included in version 16216. Alabama is not required to use the latest version of AERMOD because the State is using the regulatory default settings for version 15181 available at the time of its modeling preparation and is not making use of any previously alternative modeling options included in version 16216r and the update to Appendix W.

11.2.1.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 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.

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 km radius of the Plant Gaston facility using the Auer's land use methodology. For the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model with rural dispersion coefficients or rural mode and the EPA concurs with this assessment.

Figure 71. Land Use Map for Plant Gaston. Source: "Modeling Report Gaston Steam Electric Generating Plant 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017.

11.2.1.3. 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 SO_2 emission sources or facilities considered for modeling; the extent of concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

ADEM used the Q/D >20 methodology within 20 km to determine which background sources should be included in the modeling analysis for Plant Gaston. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. A Q/D value was determined for all sources within 20 km of the DRR source where Q represents the 2014 actual SO_2 tpy emissions totals, and D represents the distance between the two facilities. Using this methodology, Alabama identified one additional nearby background source, Resolute Coosa Pines (Resolute), located near Harpersville, Alabama, in Talladega County. Resolute is located less than 1 km east of Plant Gaston and emitted 348 tpy according to the 2014 NEI. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis.

A second DRR source, L'hoist North America of Alabama, LLC., in Shelby County is also subject to the DRR and Alabama chose to deploy a new air quality monitor to characterize the area around the DRR source to inform the December 31, 2020 designations. L'hoist is approximately 35 km west of Plant Gaston and emitted 9,934 tons of SO_2 in 2014. The EPA notes there are two additional L'hoist North America sources in Shelby County both located over 25 km west of Plant Gaston and are not subject to the DRR. The second L'hoist facility approximately 28 km west of Plant Gaston emitted 235 tons in 2014. The third L'hoist facility, approximately 33 km west of Plant Gaston and 16 km north of L'hoist DRR source emitted 89 tons in 2014. The EPA identified additional sources in Shelby County including Carmeuse Lime & Stone (307 tpy), Cheney Lime & Cement Co (192 tpy), Unimin Lime Corporation (39), Argos Cement, LLC (39), Southern Company (19) and Stella-Jones Corporation (3) and a total of 11 sources that cumulatively emitted less than 1 ton in 2014.

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

A comprehensive Cartesian receptor grid extending to approximately 15 km from Plant Gaston was used in the AERMOD modeling to assess ground-level SO_2 concentrations. The 15-km receptor grid was sufficient to resolve the maximum impacts and any potential impact area(s). The Cartesian receptor grid consisted of the following receptor spacing:

- From the center of the plant (UTM northing = 3,678,300 m and UTM easting = 550,000 m) out to a distance of 3,000 m at 100-m increments;
- Beyond 3,000 m to 5,000 m at 250-m increments;
- Beyond 5,000 m to 10,000 m at 500-m increments;

- Beyond 10,000 m to 15,000 m at 1,000-m increments.

Receptors were placed at a minimum of 100-m intervals along the ambient air boundary. The receptor network contained 6,339 receptors, and the network covered Plant Gaston area.

Figures 72, 73 and 74, included in the State's recommendation, show the State's chosen area of analysis surrounding Plant Gaston, 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 each 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. The State also did not place receptors in other locations that it considered to not be ambient air relative to each modeled facility. Receptors were only excluded from within the fence line of the Plant Gaston facility. The State's modeling boundary consisting of natural barriers and controlled and/or patrolled areas. The State's description of the various segments of the potential ambient air boundary for the plant site is as follows:

Segment 1 Runs along the river shore line from a point southeast of the coal pile to the southeast property boundary corner. River banking is very high (50+ feet) on the northern end of the segment (#1a) with a marsh and heavy vegetation on the southern end (#1b). Segment 1 has a road along the shore line, and is patrolled and not fenced.

Segment 2 Starting from the southern end point of Segment 1, following west along the southern property boundary. At the southwest property corner, turn north following a route to the railroad. The southern property section has heavy vegetation with road access. There is a road adjacent to the long north-south section of the segment. Segment 2 is patrolled and fenced. Segment 3 From the northern end of Segment 2 following northeast along the railroad to a point where the northern railroad spur approaches.

Segment 3 has a road adjacent to the entire segment with "Private Property, No Trespassing" signage. Segment 3 is patrolled and not fenced. Segment 4 Starting from the northeast end of Segment 3 following north along the west side of the railroad spur to a point approximately 400 feet from Highway 25. This railroad spur is dedicated to plant activities. A road runs adjacent to this segment.

Segment 4 is patrolled and fenced. Segment 5 Starting from the end of Segment 4 on to the property boundary along Highway 25. There is a large earthen embankment along the southern-most section of this segment that adjoins to Segment 4 (#5a). Once reaching Highway 25, the segment follows the highway northeast passing the front entrance to the plant, then turning south along the property line for approximately 300 feet. Then turn east along the property line for approximately 1,000 feet. Aside from the main entrance, there is a plant contractor's entrance on this segment with both roads having appropriate signage (#5b). The transmission line right-of-way that crosses the boundary near where Segment 6 begins has a cable wire barrier (#5c). The remainder of the northern part of Segment 5 has heavy vegetation with "Private Property, No trespassing" signage (#5d). Segment 5 is patrolled and not fenced.

Segment 6 Starting from the northeast end point of Segment 5 following the property boundary east turning north, east then north again) then along Highway 25 to the end of the gypsum pond. Segment 6 has vegetation barriers, is patrolled and fenced. Segment 7 Starting from the end of Segment 6 following the property boundary southeast to Yellowleaf Creek. Follow the creek shore line property boundaries to a point near the plant parking area. Segment 7 has vegetation and marsh areas.

Segment 7 has roads to the shore line, is patrolled and is not fenced.

Segment 8 Starting from the end of Segment 7 following the creek shore line. At a point approximately halfway the length of the peninsula between the creek and the river, cut south across the peninsula to the river shore line. Follow the river shore line southwest to the beginning of Segment 1. The entire length of Segment 8 has adjacent road access, is patrolled and fenced. The modeling boundary has excellent road accessibility and is patrolled at a frequency rate of 15+ times per day.

The State's AERMAP domain corresponds to a 1.5-km buffer beyond the receptor grid and provides sufficient resolution of the hill height scale required for each receptor. A larger buffer was not necessary as there are no significant terrain features just beyond this distance.

Figure 72. Ambient Air Boundary for Plant Gaston. Source: "Modeling Report Gaston Steam Electric Generating Plant 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017.

Figure 73. Far-Field View Receptor Grid for the Shelby County Area. Source: "Modeling Report Gaston Steam Electric Generating Plant 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017

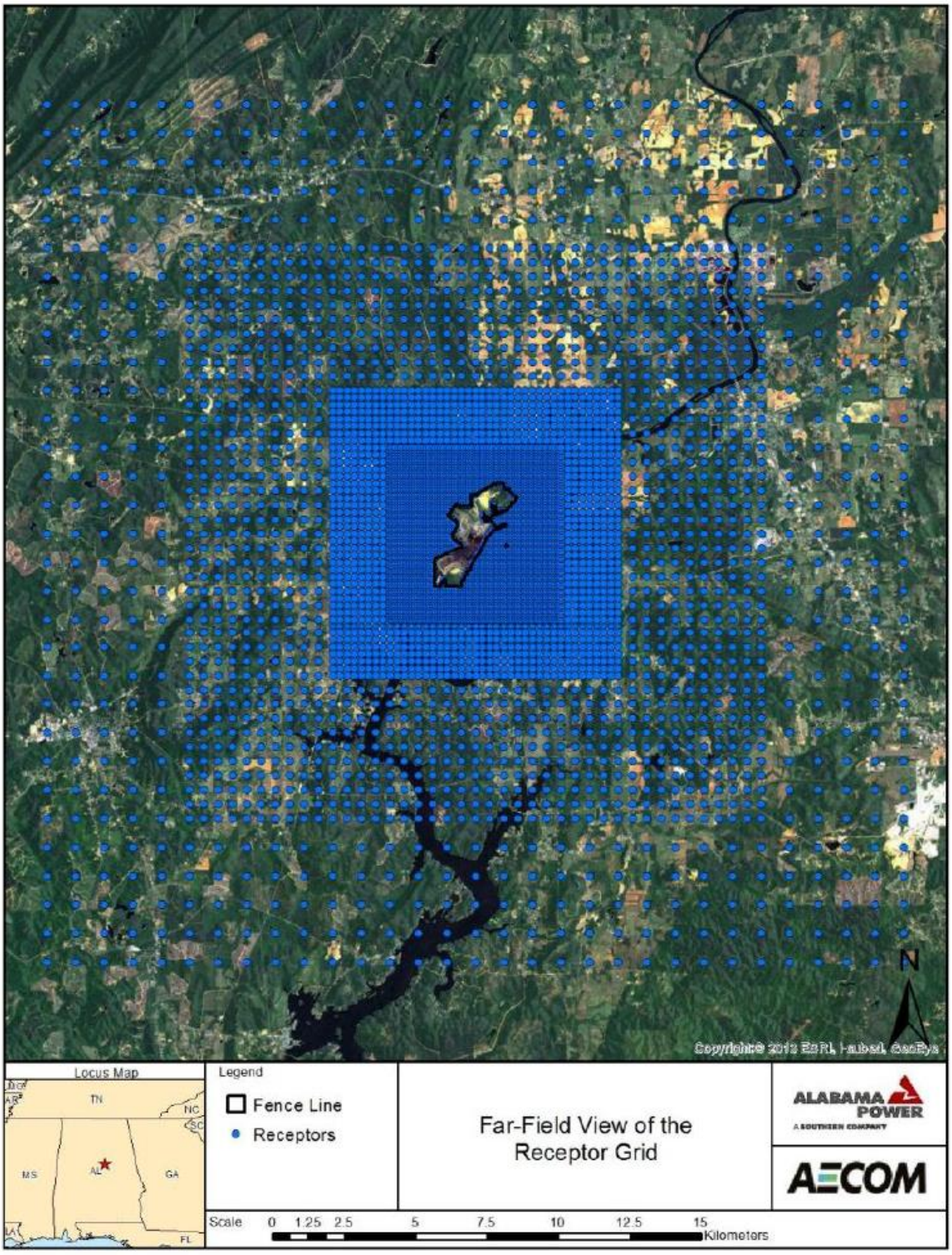
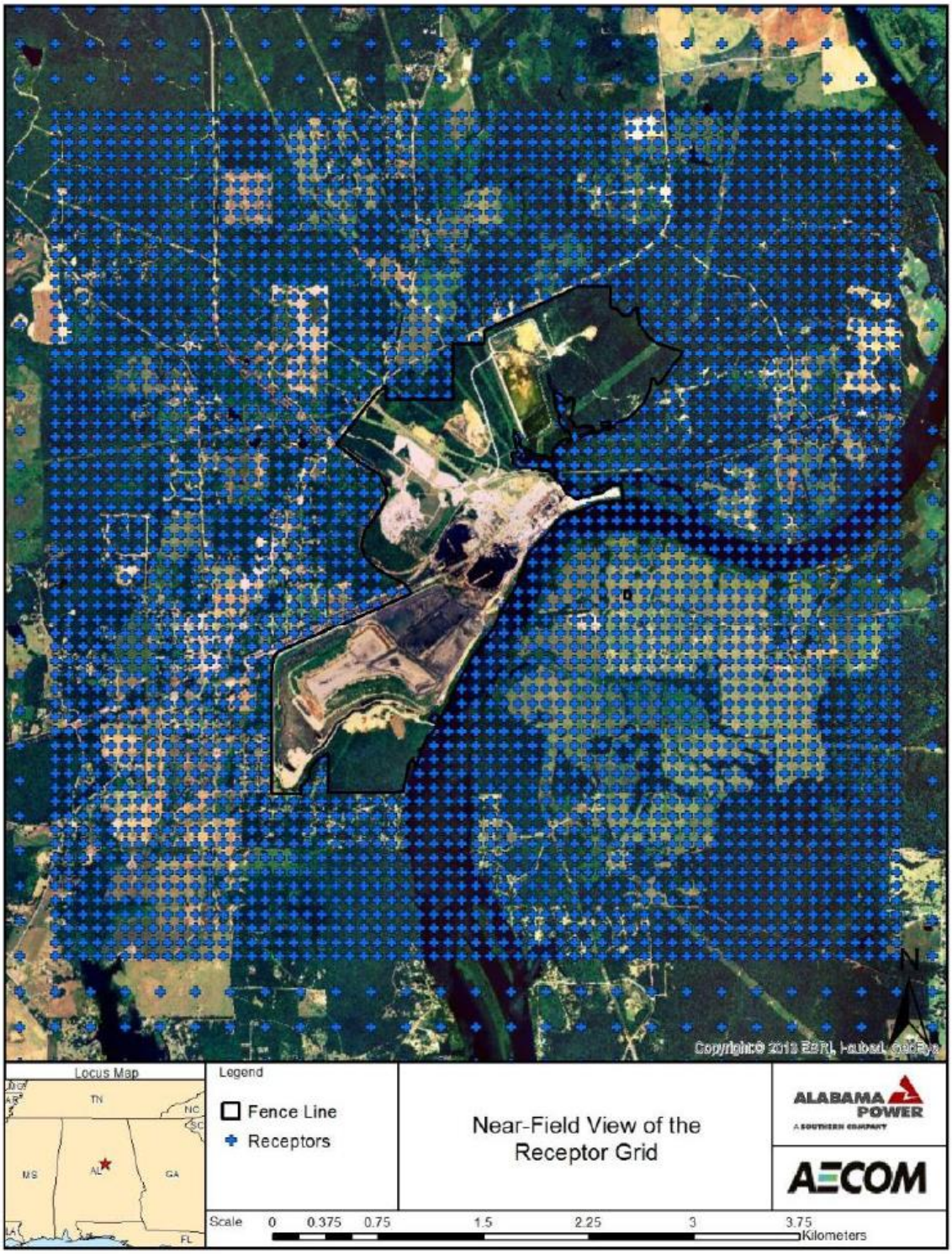


Figure 74. Near-Field View Receptor Grid for the Shelby County Area. Source: "Modeling Report Gaston Steam Electric Generating Plant 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017.



The EPA concurs that the State's Plant Gaston property boundary was properly evaluated for ambient air issues. Consequently, the Plant Gaston AERMOD modeling receptors were properly placed for the State's compliance assessment.

11.2.1.4. Modeling Parameter: Source Characterization

ADEM evaluated sources within a 20 km area surrounding Plant Gaston who elected to following the modeling pathway for compliance under the SO_2 1-hour Data Requirements Rule. ADEM believes that this is a reasonable starting point for evaluation of sources and does not preclude sources from choosing alternate screening criteria that include/exclude sources. Again, the metric ADEM used to develop the preliminary additional source(s) to be evaluated for inclusion in the modeling for the Plant Gaston DRR source choosing to model is as follows: ADEM Metric: Q/D > 20 within 20 km. First, Alabama identified all sources within 20 km of Plant Gaston. Next, a Q/D value was developed for each facility on the list, where Q represents the 2014 actual SO_2 tpy emissions totals, and D represents the distance between the two facilities,1-hour SO_2 NAAQS Modeling Report. Based on this screening method, ADEM identified one additional facility Resolute in Talladega County to be included as a background source in the Plant Gaston 1-hour SO_2 modeling. The State characterized this source within the area of analysis in accordance with the best practices outlined in the Modeling TAD. The State followed the EPA's GEP policy in conjunction with allowable emissions limits. 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 BPIPPRIME was used to assist in addressing building downwash. The EPA finds that the State's methodology for source characterization, BPIPPRM modeling, and GEP acceptable. However, not enough information is available for the EPA to determine if the Plant Gaston facility is contributing or not contributing to ambient air quality in a nearby area that does not meet the 2010 SO_2 NAAQS due to the fact that the modeling domain does not capture the area surrounding the L'hoist DRR facility that is operating a newly-sited DRR monitor so will not be designated until 2020.

11.2.1.5. 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 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 SO_2 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 SO_2 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 Plant Gaston and one other emitter of SO_2 within 20 km in the area of analysis. The State has chosen to model these facilities using a mixture of actual emissions and allowable PTE emissions. The facilities in the State's modeling analysis and their associated annual actual SO_2 emissions between 2012 and 2014 are summarized below.
For Plant Gaston the State provided annual actual SO_2 emissions between 2012 and 2014. This information is summarized in Table 46. A description of how the State obtained hourly emission rates is given below this table.

Table 46. Actual and PTE SO_2 Emissions Between 2012 – 2014 from Facilities in the Shelby County Area

	SO_2 Emissions (tpy)		
Facility Name	**2012**	**2013**	**2014**
Plant Gaston Unit 5 and Combustion Turbine (CT)	8,321	3,218	5,270
Total Emissions from All Modeled Facilities in the State's Area of Analysis	8,321	3,218	5,270

For Plant Gaston the actual hourly emissions data were obtained from CEMS for the Unit 5 coal fired boiler. For the oil-fired CT, recordkeeping was utilized for times of operation, fuel consumption along with laboratory analysis for fuel BTU value and sulfur content to calculate emission rates. As previously noted, the State included Plant Gaston and one other emitter of SO_2 within 20 km in the area of analysis. The State has chosen to model Plant Gaston's Units 1-4 natural gas fired boilers using the most recent federally-enforceable PTE limits for SO_2 emissions. For nearby source Resolute Coosa Pines, the State provided PTE emissions. This information is summarized in Table insert 47. A description of how the State obtained hourly emission rates is given below this table.

Table 47. SO_2 Emissions based on PTE from Facilities in the Shelby County Area

Facility Name	SO_2 Emissions (tpy, based on PTE)
Plant Gaston Units 1-4 natural gas fired boilers	28.4
Resolute Coosa Pines	349
Total Emissions from All Modeled Facilities in the Area of Analysis	377.4

According to the Plant Gaston Modeling Report, the emissions rates for the Plant Gaston Units 1-4 natural gas fired boilers are based on potential emission rates and engineering estimates used to develop their air permit limits. The modeled emission rate for Units 1-4 is 0.818 g/s, equivalent to 6.49 lb/hr. The EPA has calculated an annual emissions rate of 28.4 tpy, assuming 8,760 hours of operation per year. The EPA has compared the emissions rates used in the modeling to the emissions in the CAMD database. CAMD shows that Units 1-4 emitted a total of 49,511 tons in 2012, 30,106 tons in 2013, 29,274 tons in 2014, 17,225 tons in 2015, and 1,806 tons of SO_2 in 2016. While there is definite a downward trend in emissions and the emissions have decreased substantially in 2015 and 2016, these values are much higher than the modeled PTE rate of 28.4 tpy that is based upon firing natural gas. It is also important to note that these units switched their listed primary fuel type to natural gas starting in 2016 (coincident with significant reductions in emissions from previous years); however, coal is still listed as a secondary fuel type and is clearly still being used at times. When using allowable, PTE emissions in the modeling, the emissions rate should reflect the maximum hourly allowable emissions limit. The emissions rate used in the modeling for Units 1-4 appears to be inappropriate and therefore causes uncertainty in the modeling results and conclusions.

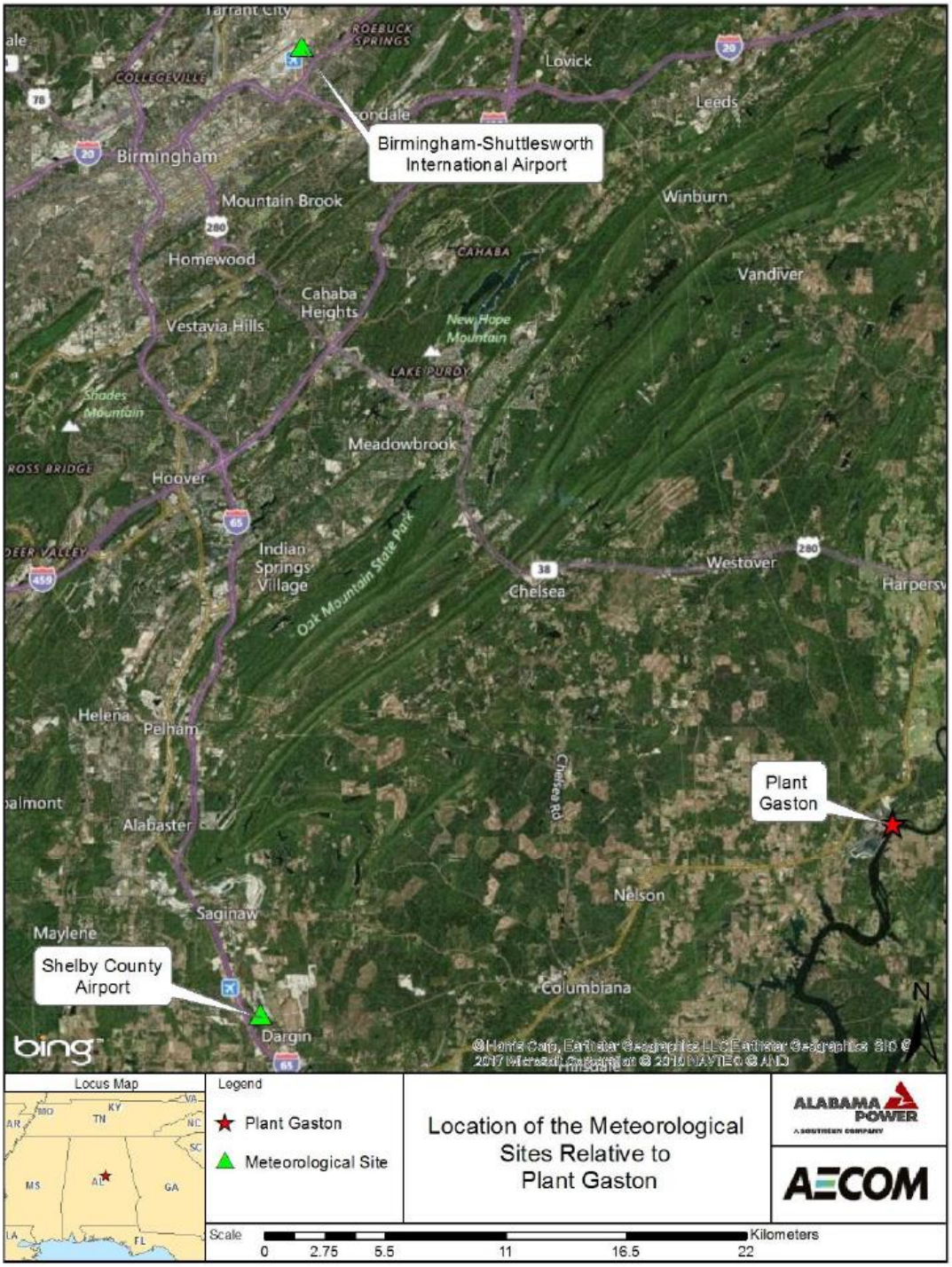
The PTE in tpy for Resolute Coosa Pines was provided by ADEM. Emissions were assumed to be the same in each modeled year. The EPA requested that ADEM provide documentation to verify the PTE emissions for the Resolute Coosa Pines facility. The Plant Gaston emissions were appropriately used in the modeling. The EPA does not have enough information to verify that the PTE for Resolute Coosa Pines are appropriate. Additionally, the EPA notes that the L'hoist DRR facility emitted 9,934 tons of SO_2 in 2014 and is located approximately 35 km west of Plant Gaston. Alabama has not provided any analysis to explain whether the L'hoist facility could impact modeled SO_2 concentrations or cause any significant concentration gradients near Plant Gaston.

11.2.1.6. 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 NWS stations, site-specific or onsite data, and other sources such as universities, FAA, and military stations.

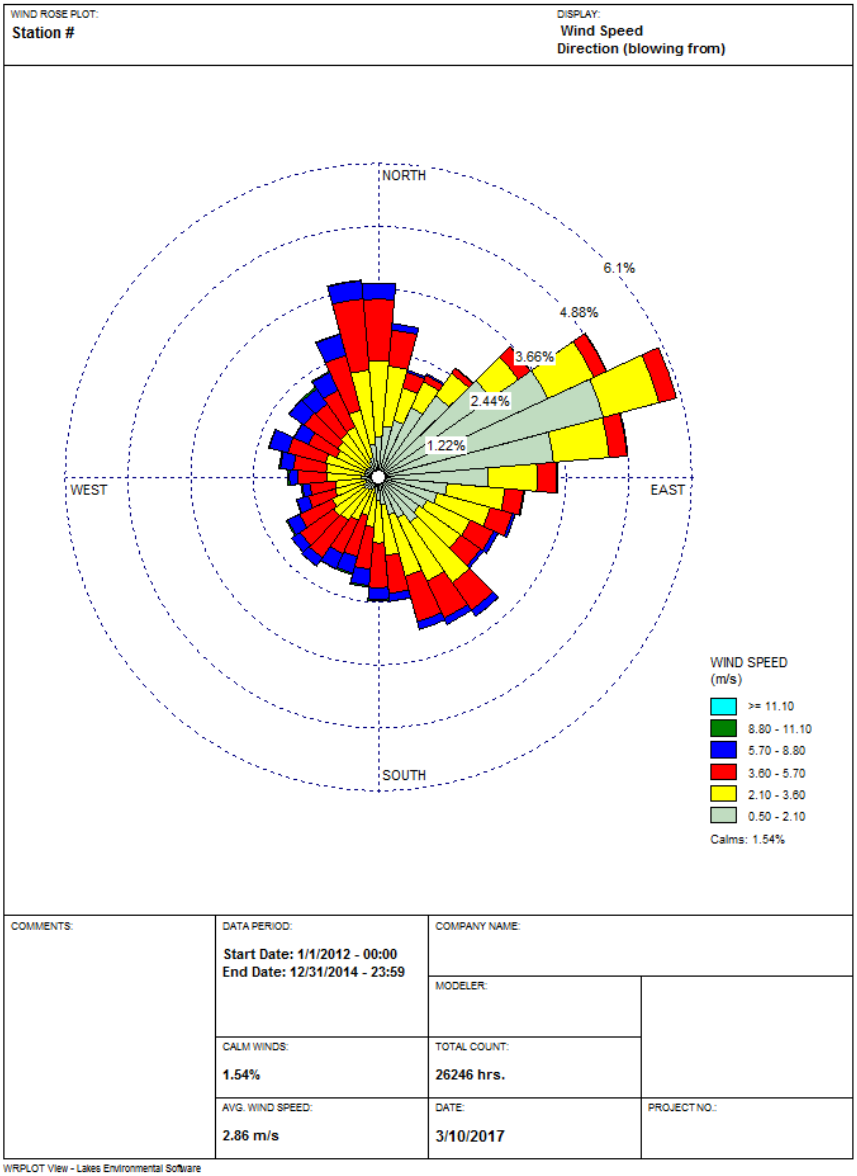
For the area of analysis for the Shelby County area, the State selected the surface meteorology from Birmingham-Shuttlesworth International Airport, located at 33.5639 N, 86.7523 W and coincident upper air observations from Shelby County Airport as best representative of meteorological conditions within the area of analysis. The state did not provide the method used 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 "zo". Therefore, we do not know the values for spatial sectors and temporal resolution for any condition. In the figure below, included in the State's recommendation, the locations of these NWS stations are shown relative to the area of analysis.

Figure 75. Area of Analysis and the NWS stations in the Shelby County Area. Source: "Modeling Report Gaston Steam Electric Generating Plant 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017



The EPA generated a windrose for the Birmingham-Shuttlesworth International Airport for the 2012-14 period. In Figure 76, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Analysis of the NWS data indicate winds predominately blow from the east-northeast direction.

Figure 76. Birmingham-Shuttlesworth International Airport Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air NWS 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. Since the AERMET files were not provided, it is unknown whether the State followed the methodology and settings presented in the EPA's AERMOD Implementation Guidance in the processing of the raw meteorological data into an AERMOD-ready format. Also, the EPA is unsure if the State used AERSURFACE to best represent surface characteristics. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

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

The terrain in the area of analysis is best described as gently rolling. To account for these 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 USGS NED. The EPA concludes that the State used the AERMAP terrain program appropriately to develop elevation heights for their receptors used in their Shelby County AERMOD compliance modeling.

11.2.1.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 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 used "tier 2" to calculate background concentrations. Data was obtained for 2012-2014 from the SEARCH network. The data are from the Centreville monitor located approximately 70 km southwest of Plant Gaston in Centreville, Alabama. The background concentrations for this area of analysis were determined by the state to vary from 3.25 $\mu g/m^3$, equivalent to 1.24 ppb when expressed in three significant figures[46], to 28.06 $\mu g/m^3$ (10.71 ppb), with an average value of 8.90 $\mu g/m^3$ (3.40 ppb). See Table 48 for the hourly values modeled and sorted by season.

[46] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.

Table 48. Centreville SO_2 Background Values for 2012-2014 (ppb)

Hour of Day	Season 1	Season 2	Season 3	Season 4
	(Dec-Jan-Feb)	(Mar-Apr-May)	(Jun-Jul-Aug)	(Sep-Oct-Nov)
1	3.4	2.1	1.7	1.5
2	4.0	2.3	2.6	2.0
3	3.0	1.9	2.8	2.6
4	2.5	1.9	2.5	3.9
5	3.5	1.5	2.3	6.5
6	5.1	1.7	3.2	7.8
7	6.9	1.9	5.4	7.7
8	6.2	2.7	7.6	8.8
9	5.5	5.5	7.4	9.8
10	3.5	3.8	5.8	10.7
11	4.0	3.1	6.5	4.9
12	4.7	2.6	2.7	3.5
13	3.1	2.4	3.2	4.1
14	2.9	3.1	3.0	2.4
15	3.2	3.3	2.5	2.0
16	3.3	2.8	1.8	2.0
17	3.7	2.9	1.5	2.5
18	2.7	3.0	1.7	2.9
19	3.3	2.6	1.9	2.6
20	2.3	2.3	1.9	1.9
21	2.5	2.3	2.4	2.1
22	2.8	1.8	1.5	1.9
23	3.7	2.7	1.7	2.3
24	3.4	2.6	1.2	2.3

The EPA reviewed the Centreville SEARCH monitoring information and determined that the monitor is not a regulatory monitor that meets the QA/QC criteria and other requirements in 40 CFR Part 58, Appendix B for PSD monitors. Therefore, the data is not acceptable for use as background concentrations in this modeling demonstration. The EPA communicated this outstanding issue to Alabama in March 2017[47] and suggested the following options for addressing the issue: 1) demonstrate that the Centreville monitor meets the QA/QC criteria and other requirements in Part 58, Appendix B for PSD monitors, 2) choose a different background monitor that is representative of SO_2 background concentrations in the area around Plant Gaston and either use the design value from that monitor or a use a more refined approach of seasonal hourly varying background values from that monitor, or 3) demonstrate that the Centreville SEARCH background value used in the modeling is more conservative (larger) than an alternative background site that would be representative of background in the area of Plant Gaston. For this modeling demonstration, if option 3 is chosen, Alabama would need to

[47]Email from Beverly Banister, Region 4 Air, Pesticides and Toxics Management (APTMD), Air Director to Ron Gore, ADEM Air Director on March 21, 2017.

demonstrate that the Centreville data is higher than the alternate site's data for each hour (96 total values, 4 seasons x 24 hours in each day = 96 values).

Alabama submitted additional information to the EPA[48] to address the issues discussed above. Alabama's supplemental information proposed to use background concentrations from a regulatory monitor located in Mammoth Cave, Kentucky. For eight of the Alabama DRR sources (including Plant Gaston), Alabama's analysis compared the Centreville SEARCH data with the Mammoth Cave data, hour-by-hour, for each of the 96 hours in the "season-by-hour-of-day" option used in the AERMOD modeling. Alabama then found the hour where the Mammoth Cave data is greater than the Centreville data by the greatest amount (which they found to be 3.68 ppb = 9.71 ug/m^3).[49] Alabama added this "adjustment factor" of 9.71 ug/m3 to the final modeling results for each the SO_2 DRR Sources (including Plant Gaston).

Alabama's supplemental information justifies use of the Mammoth Cave data by stating that it is "the closest background monitor with sufficient data capture that does not show interference from industrial sources." The EPA does not believe that this is an adequate justification for determining whether Mammoth Cave is a representative background monitor pursuant to the criteria provided in Section 8.2.2(c) of the *Guideline on Air Quality Models* contained in 40 CFR Part 51, Appendix W. The criteria in Appendix W state that an appropriate regional site is "*one that is located away from the area of interest but is impacted by similar natural and distant man-made sources."*

[48] Email from Ron Gore, ADEM Air Director to Beverly Banister, Region 4 APTMD, Air Director dated April 18, 2017.

[49] Note that Alabama used a conversion factor of 2.639 to convert the SO_2 background concentration in ppb to ug/m^3. This differs from the EPA's recommended conversion factor of 2.619. Alabama's conversion factor results in a conservatively higher concentration in ug/m^3, so is therefore acceptable.

The EPA performed an evaluation to determine if the Mammoth Cave site is an appropriate regional background site for the Plant Gaston modeling. The Mammoth Cave monitor is located in a rural area versus the highly populated Birmingham urban area near Plant Gaston. There are SO_2 emissions sources in the Birmingham area that were not explicitly included in the Plant Gaston modeling as "nearby background sources." The 2014 NEI listed 45,414 tpy of SO_2 emissions in Shelby County. The 2014 emissions from Plant Gaston and Resolute in nearby Talladega County area 34,554 tpy and 348 tpy respectively for a total of 34,902 tpy. So, there are 10,512 tpy of emissions in Shelby County not accounted for in the modeling. According to the 2014 NEI, 9,934 tons of the emissions not accounted for in the modeling are from the L'hoist facility located approximately 35 km west of Plant Gaston. In the area around the Mammoth Cave monitor, there are no sources emitting more than 5 tpy of SO_2 within 50 km of the monitor and the total SO_2 emissions in the 3 counties surrounding the monitor are less than 70 tpy, according to the emissions data in the 2014 NEI. The closest major source of SO_2 emissions to the Mammoth Cave monitor is the TVA Paradise power plant (19,654 tpy in 2014) located approximately 75 km from the monitor. The EPA has determined that the SO_2 emissions sources located near the Mammoth Cave monitor are not similar to the sources in the area near Plant Gaston. As a result, the Mammoth Cave monitor is not an acceptable regional site to provide background concentrations for this modeling analysis, and Alabama's "adjustment factor" procedure is not acceptable for the Plant Gaston modeling.

11.2.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Shelby County area of analysis are summarized below in Table 49

Table 49. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Shelby County Area

Input Parameter	Value
AERMOD Version	15181 Default
Dispersion Characteristics	Rural
Modeled Sources	5
Modeled Stacks	5
Modeled Structures	9
Modeled Fencelines	1
Total receptors	6,339
Emissions Type	Actual and PTE
Emissions Years	2012-2014 for actuals. Plant Gaston PTE effective date of June 30 2010. Resolute Coosa Pines PTE unknown effective date
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Birmingham-Shuttlesworth International Airport
NWS Station Upper Air Meteorology	Shelby County Airport
NWS Station for Calculating Surface Characteristics	Unknown
Methodology for Calculating Background SO_2 Concentration	Centreville SEARCH monitor The time periods used in temporally varying approach
Calculated Background SO_2 Concentration	1.2 ppb to 10.7 ppb + Alabama's "adjustment factor" of 3.68 ppb

The results presented below in Table 50 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

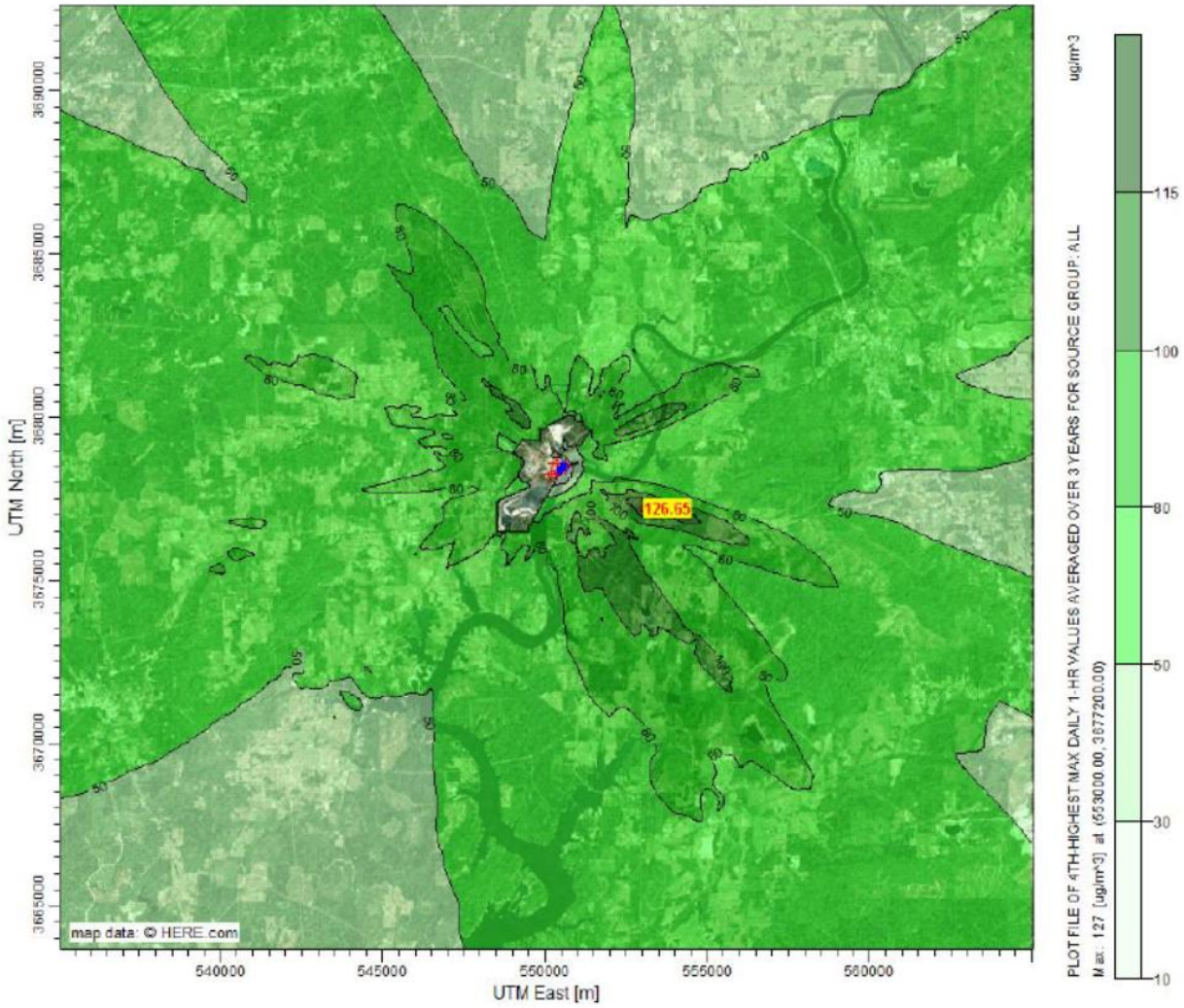
Table 50. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Shelby County Area

		Receptor Location [UTM zone 16]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
Averaging Period	**Data Period**	**UTM Easting (m)**	**UTM Northing (m)**	**Modeled concentration (including background)**	**NAAQS Level**
99th Percentile 1-Hour Average	2012-2014	553000	3677200	136.36	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 126.65 $\mu g/m^3$, equivalent to 48.36 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual and PTE emissions from the facility/facilities. As discussed in Section 11.2.1.8, in response to the EPA's outstanding questions regarding the background concentrations used in their modeling analysis, Alabama added an "adjustment factor" of 3.68 ppb (9.71 µg/m3) to the final modeling result presented in their modeling report. The EPA has determined that Alabama's "adjustment factor" procedure is not acceptable for the Plant Gaston modeling (126.65 + 9.71 = 136.36 $\mu g/m^3$). Figure 77 below was included as part of the State's recommendation, and indicates that the predicted value occurred to the east-southeast of Plant Gaston. The State's receptor grid is also shown in the figure.

Figure 77. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Shelby County Area. Source: "Modeling Report Gaston Steam Electric Generating Plant 1-Hour SO_2 NAAQS Modeling" prepared for Alabama, January 2017



The modeling submitted by the State, with noted issues, does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. Although a modeling assessment for the area was provided by the State, not enough information is available for the EPA to determine if the area is contributing or not contributing to ambient air quality in a nearby area that does not meet the SO_2 NAAQS. The modeling provided by Alabama is showing no violations of the NAAQS in the area surrounding the Plant Gaston facility, but because the modeling domain does not capture the area surrounding the L'hoist facility that is operating a newly sited DRR monitor, not enough information is available to determine if these are contributing or not contributing to ambient air quality in a nearby area that may not meet the SO_2 NAAQS.

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

The EPA assessment of the 1-hour SO_2 DRR AERMOD modeling for Plant Gaston finds that the modeling does not demonstrate that the area meets the 1-hour SO_2 NAAQS and is not contributing to a nearby area that does not meet the NAAQS. The State made use of AERMOD version 15181, the most recent version available at the time the modeling was conducted. The EPA agrees that this model version is appropriate to characterize the area because the State made use of default regulatory options available at the time and is not making use of any previously alternative modeling options included in version 16216r and the update to Appendix W.

The State chose to model two sources in the area, and the EPA agrees that Plant Gaston and Resolute sources should be included in the modeling. However, Alabama has not provided any analysis to explain whether the L'hoist facility could impact modeled SO_2 concentrations or cause any significant concentration gradients near Plant Gaston. The State chose to model emissions from Plant Gaston during 2012 – 2014. The State chose to use actual emissions to reflect normal operation of the coal fired Unit 5 boiler and the oil fired combustion turbine at Plant Gaston. For the natural gas fired boilers 1-4 at Plant Gaston and the nearby facility, Resolute Coosa Pines, PTE emissions were used in the modeling. Based upon a comparison of the actual emissions from Plant Gaston Units 1-4 in 2014 and 2015, reported to the EPA's CAMD database, to the allowable PTE emissions limit used in the modeling for these sources, it appears that the emissions rate used in the modeling for Units 1-4 is inappropriate and therefore causes uncertainty in the modeling results and conclusions. Additionally, the EPA has requested that ADEM provide documentation to verify that the PTE emissions used for the Resolute Coosa Pines nearby source are correct. To date, ADEM has not provided the requested information.

The EPA notes that ADEM did not provide documentation to support the AERMET modeling used to generate the surface and upper air meteorology files. Additionally, the State did not provide details to determine if AERSURFACE was used to best represent surface characteristics. The State adequately represented the topography of the area with the model and its preprocessors. As mentioned above in section 6.2.1.8, the EPA does not believe the State's justification for determining that the Centerville SEARCH or the Mammoth Cave SO_2 monitors are a representative background monitors for the area around Plant Gaston is consistent with the criteria in Appendix W, and thus is not appropriate.

Lastly, the modeling provided by Alabama is showing no violations of the NAAQS in the area surrounding the Plant Gaston facility, but because the modeling domain does not capture the area surrounding the L'hoist facility that is operating a newly sited DRR monitor, not enough information is available to determine if these are contributing or not contributing to ambient air quality in a nearby area that may not meet the NAAQS. As a result of the issues identified above, the EPA finds that the State's modeling analysis for this DRR source was not performed in a manner consistent with Appendix W and the Modeling TAD and may not accurately represent current air quality in the area. Therefore, the EPA does not have sufficient information to determine whether the area is meeting or not meeting the SO_2 NAAQS or whether it is contributing to a nearby area that does not meet the NAAQS.

11.3. Jurisdictional Boundaries in the Shelby County, Alabama Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Shelby County. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

The Alabama Power Gaston facility is located in the eastern portion of Shelby County, Alabama, less than 1 km from the Talladega County line. Shelby County is bounded to the northeast by St. Clair County; to the east by Talladega County; to the southeast by Coosa County; to the south by Chilton County; to the southwest by Bibb County; and to the northwest by Jefferson County. Alabama recommended attainment for the entire state which would include the area around Plant Gaston based on an assessment and characterization of air quality from the DRR source and one additional nearby source. The EPA notes that Alabama did not provide a specific boundary recommendation for the modeled areas around Plant Gaston.

As previously noted, the State assessed nearby sources within 20 km of Plant Gaston based on the Q/D> 20 screening method and identified one other emitter of SO_2, Resolute Coosa Pines, that was included in modeling analysis. The state determined that 20 km was an appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. Resolute is located less than 1 km east of Plant Gaston in Talladega County and emitted 348 tpy according to the 2014 NEI. Alabama modeled Resolute based on allowable PTE and assumed to be constant for each modeled year. However, the state did not provide specific details regarding how the PTE was calculated. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis.

A second DRR source, L'hoist North America of Alabama, LLC., in Shelby County is also subject to the DRR and Alabama chose to deploy a new air quality monitor to characterize the area around the DRR source to inform December 31, 2020 designations. L'hoist is approximately 35 km west of Plant Gaston and emitted 9,934 tons of SO2 in 2014. The EPA notes there are two additional North America sources in Shelby County both located over 25 km west of Plant Gaston. The second L'hoist facility approximately 28 km west of Plant Gaston

emitted 235 tons in 2014. The third L'hoist facility, approximately 33 km west of Plant Gaston and 16 km north of L'hoist DRR source emitted 89 tons in 2014.

Although a modeling assessment for the area was provided by the State, not enough information is available for the EPA to determine if the area is contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS. The modeling provided by Alabama is showing no violations of the SO_2 NAAQS in the area surrounding the Plant Gaston facility, but because the modeling domain does not capture the area surrounding the DRR L'hoist facility that is operating a newly sited monitor, not enough information is available to determine if these are contributing or not contributing to ambient air quality in a nearby area that may not meet the NAAQS. Based on the EPA's assessment of the 1-hour SO_2 DRR AERMOD modeling for Plant Gaston, the EPA intends to modify the State's recommendation and designate a portion of Shelby County around Plant Gaston unclassifiable (based on census block groups). The remaining portion of Shelby County including the L'hoist facility the DRR monitor will be designated by December 31, 2020.

11.4. The EPA's Assessment of the Available Information for the Shelby County, Alabama Area

After evaluating the 1-hour SO_2 DRR AERMOD modeling for Plant Gaston, the EPA intends to modify the State's recommendation and designate a portion of Shelby County unclassifiable around Plant Gaston (based on census block groups). The unclassifiable boundary is comprised of a portion of Shelby County contained within the 2016 U. S Census Block Groups 011170308001 and 011170308002. The rest of Shelby County will be designated by December 31, 2020, based on data from the air quality DRR monitor near the L'hoist DRR source. The EPA is modifying the state's recommendation because the EPA finds that the modeling analysis does not demonstrate that the area meets the 1-hour SO_2 NAAQS and is not contributing to a nearby area that may not meet the NAAQS, particularly the area around L'hoist North America Alabama facility.

Alabama recommended attainment for the entire state including Shelby County and the area around Plant Gaston based in part on an assessment and characterization of air quality impacts from the DRR source, one other nearby source, Resolute Coosa Pins and background concentration data from the Mammoth Cave monitor in Kentucky. Based on these factors, the 1-hour modeled design value is 136.36 $\mu g/m^3$ or 52.0 ppb which is below the level of the 2010 SO_2 NAAQS. However, the EPA's assessment finds that the modeling does not provide sufficient information to demonstrate whether the area containing these two DRR sources meet or does not meet the 1-hour SO_2 NAAQS. As summarized below, the EPA identified the following issues in the modeling for Plant Gaston:

- No documentation was provided to support the AERMET inputs used to generate the surface and upper air meteorology files; and,
- No documentation that the State used AERSURFACE to best represent surface characteristics; and,

- The inappropriate use of background concentrations from the Centreville SEARCH and Mammoth Cave ambient monitoring sites (Section 11.2.18); and,
- Inappropriate use of the allowable PTE limit for firing natural gas in the Plant Gaston Units 1-4; and,
- No documentation regarding how the allowable emission rate was calculated for the Resolute Coosa Pines nearby source (Section 11.2.1.5).

The modeling report indicates that pre-processed AERMET surface and upper air meteorological files were used in the modeling analysis. However, the State did not provide details regarding how these files were prepared. Therefore, the EPA is unable to confirm that the procedures used for the processing of the meteorology are appropriate.

According to the Plant Gaston Modeling Report, the emissions rates for the Plant Gaston Units 1-4 natural gas fired boilers are based on potential emission rates and engineering estimates used to develop their air permit limits. The modeled emission rate for Units 1-4 is 0.818 g/s, equivalent to 6.49 lb/hr. The EPA has calculated an annual emissions rate of 28.4 tpy, assuming 8,760 hours of operation per year. The EPA has compared the emissions rates used in the modeling to the emissions in the CAMD database. CAMD shows that Units 1-4 emitted a total of 49,511 tons in 2012, 30,106 tons in 2013, 29,274 tons in 2014, 17,225 tons in 2015, and 1,806 tons of SO_2 in 2016. While there appears to be a downward trend in emissions and the emissions have decreased substantially in 2015 and 2016, after the units switched to natural gas as the primary fuel, these values are much higher than the modeled PTE rate of 28.4 tpy that is based upon firing only natural gas. It is also important to note that these units switched their listed primary fuel type to natural gas starting in 2016; however, coal is still listed as a secondary fuel type and is clearly still being used at times. When using allowable, PTE emissions in the modeling, the emissions rate should reflect the maximum hourly allowable emissions limit. The emissions rate used in the modeling for Units 1-4 appears to be inappropriate and therefore causes uncertainty in the modeling results and conclusions.

As mentioned above in section 11.2.1.8, the EPA does not believe the State's justification for determining that the Mammoth Cave SO_2 monitor is a representative background monitor for the area around Plant Gaston is not consistent with the criteria in Appendix W, and thus is not appropriate. The EPA has determined that the magnitude of SO_2 emissions sources located near the Mammoth Cave monitor differ substantially from the magnitude of emission sources in the area near Plant Gaston. As a result, the Mammoth Cave monitor is not an acceptable regional site to provide background concentrations for this modeling analysis.

Also based on the State's screening method for background sources, Alabama identified Resolute Coosa Pines, in Talladega County as the only modeled nearby source. Resolute is located less than 1 km east of Plant Gaston and emitted 348 tpy according to the 2014 NEI. Alabama modeled Resolute based on allowable PTE and assumed the emission rate to be constant for each modeled year. However, the state did not provide specific details regarding how the PTE was calculated.

As a result of the issues identified above, the EPA finds that the State's modeling analysis for this DRR source was not performed in a manner consistent with Appendix W and the Modeling

TAD and may not accurately represent current air quality in the area. Therefore, the EPA does not have sufficient information to determine whether the area is meeting or not meeting the SO_2 NAAQS.

The EPA notes there are two DRR sources in Shelby County, Alabama, Plant Gaston and the L'hoist North America Alabama facility located approximately 35 km apart. For these two DRR sources, Alabama chose different pathways to characterize the SO_2 impacts in Shelby County. For L'hoist, Alabama chose to deploy a new SO_2 air quality monitor in the maximum area of concentration to informing SO_2 designations by December 31, 2020. For Plant Gaston, air dispersion modeling was chosen to characterize SO_2 impacts to inform final designations by December 31, 2017. Alabama's modeling analysis for Plant Gaston included 2012-2014 actual emissions for the DRR source and allowable PTE emissions for the nearby non-DRR source Resolute Coosa Pines in neighboring Talladega County. The EPA concurs with Alabama's decision to model the nearby source Resolute with Plant Gaston. However, Alabama has not provided any analysis to explain whether the L'hoist facility could impact modeled SO_2 concentrations near Plant Gaston. Additionally, the EPA notes that the modeling provided by Alabama is showing no violations of the SO_2 NAAQS in the area surrounding the Plant Gaston facility, but because the modeling domain does not capture the area surrounding the L'hoist facility that is operating a newly sited DRR monitor, not enough information is available to determine if Plant Gaston is contributing or not contributing to ambient air quality in a nearby area that may not meet the NAAQS, particularly the area around the L'hoist facility.

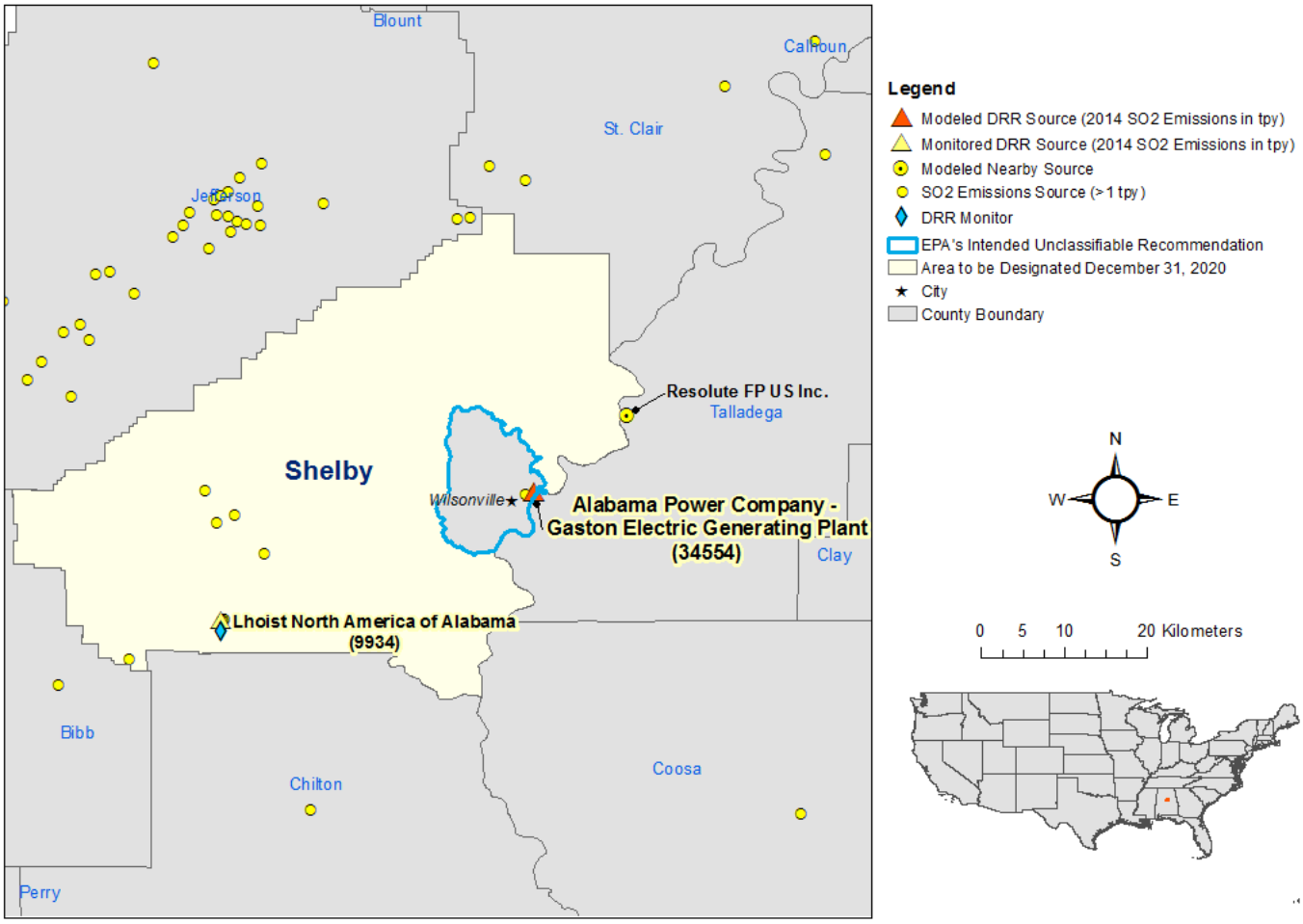
Based on the EPA's assessment of the 1-hour SO_2 DRR AERMOD modeling for Plant Gaston, the EPA finds that the State's modeling analysis was not performed in a manner consistent with Appendix W and the Modeling TAD and may not accurately represent current air quality in the area. Therefore, the EPA is modifying the state's recommendation and intends to designate a portion of Shelby County that contains Plant Gaston as unclassifiable. The unclassifiable boundary is comprised of a portion of Shelby County contained within the 2016 U. S Census Block Groups 011170308001 and 011170308002. The remaining portion of Shelby County including the L'hoist facility the DRR monitor will be designated by December 31, 2020. The EPA may reconsider its intended designation for the area around Plant Gaston if Alabama provides information to address the specific modeling issues discussed above; demonstrates that the modeled area around Plant Gaston does not contribute to potential violations of the 2010 SO_2 NAAQS in the area near the L'hoist facility and shows that the L'hoist facility does not impact modeled SO_2 concentrations near Plant Gaston.

11.5. Summary of Our Intended Designation for the Shelby County, Alabama Area

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 and designate a portion of Shelby County around Plant Gaston unclassifiable. The remaining portion of Shelby County including the L'hoist facility the DRR monitor will be designated by December 31, 2020. The EPA assessment of the 1-hour SO_2 DRR AERMOD modeling for Plant Gaston finds that the modeling does not demonstrate that the area meets the 1-hour SO_2 NAAQS or contributes to a nearby area that may not meet the NAAQS, particularly the area around the

L'hoist facility. The EPA believes that our intended unclassifiable area, bounded by the Shelby County boundary, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area. Figure 78 shows the boundary of this intended designated area. At this time, our intended designations for the State only apply to this and the other areas presented in this technical support document. The EPA intends in a separate action to evaluate and designate all remaining undesignated areas in Alabama by December 31, 2020.

Figure 78. Boundary of the Intended Shelby County (Gaston) Unclassifiable Area



12. Technical Analysis for the Remaining Areas in Alabama

12.1. Introduction

In their June 2, 2011 SO_2 designation submittal, ADEM recommended the entire state be designated attainment. After careful review of the State's assessment, supporting documentation, and all available data, the EPA intends to designate the remaining counties in the State as unclassifiable/attainment because each area was not required to be characterized by the state under 40 CFR 51.1203(c) or (d) and 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. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented and is based an analysis of emissions and air quality monitoring data in the remaining counties. At this time, there are no air quality modeling results available for the remaining areas in the State. In addition, there are no SLAMS air quality monitors that indicate any violation of the 1-hour SO_2 NAAQS in the State. Therefore, the EPA is intending to designate the remaining counties in Table 51 in the State as unclassifiable/attainment.

Alabama installed and begun operation of one new, approved SO_2 monitoring network by January 1, 2017, for one DRR source (see Table 2). Accordingly, the EPA must designate the other remaining counties by December 31, 2017. The EPA notes that three DRR sources in Alabama elected to restrict their emissions to below 2,000 tpy in lieu of modeling or monitoring and one DRR source officially shutdown prior to January 13, 2017. See Table 51.

Table 51. Counties and Portions of Counties that the EPA Intends to Designate Unclassifiable/Attainment

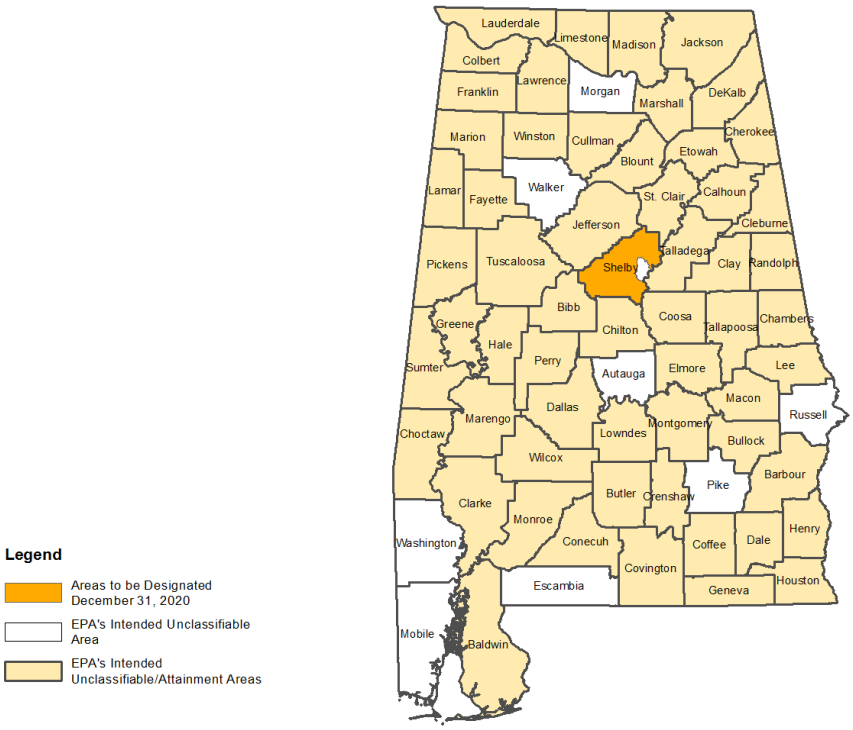
County	Alabama Recommended Area Definition	Alabama Recommended Designation	The EPA's Intended Area Definition	The EPA's Intended Designation
Baldwin	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Barbour	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Bibb	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Blount	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Bullock	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Butler	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Calhoun	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Chambers	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Cherokee	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Chilton	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Choctaw	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Clarke	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Clay	Entire County	Attainment	Same as State	Unclassifiable/Attainment

County	Alabama Recommended Area Definition	Alabama Recommended Designation	The EPA's Intended Area Definition	The EPA's Intended Designation
Cleburne	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Coffee	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Colbert	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Conecuh	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Coosa	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Covington	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Crenshaw	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Cullman	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Dale	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Dallas	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Dekalb	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Elmore	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Etowah	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Fayette	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Franklin	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Geneva	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Greene	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Hale	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Henry	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Houston	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Jackson	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Jefferson	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Lamar	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Lauderdale	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Lawrence	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Lee	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Limestone	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Lowndes	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Macon	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Madison	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Marengo	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Marion	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Marshall	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Monroe	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Montgomery	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Perry	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Pickens	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Randolph	Entire County	Attainment	Same as State	Unclassifiable/Attainment
St. Clair	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Sumter	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Talladega	Entire County	Attainment	Same as State	Unclassifiable/Attainment

County	Alabama Recommended Area Definition	Alabama Recommended Designation	The EPA's Intended Area Definition	The EPA's Intended Designation
Tallapoosa	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Tuscaloosa	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Wilcox	Entire County	Attainment	Same as State	Unclassifiable/Attainment
Winston	Entire County	Attainment	Same as State	Unclassifiable/Attainment

Specifically, the State recommended that the entire state be designated attainment. After careful review of the State's assessment, supporting documentation, and all available data, the EPA intends to designate the areas as unclassifiable/attainment. Figure 79 shows the locations of these areas within Alabama.

Figure 79. The EPA's Intended Designation for Remaining Areas in North Carolina.



As referenced in the Introduction (see Table 2), the county associated with the source for which Alabama has installed and begun timely operation of a new, approved SO_2 monitoring network are required to be designated by December 31, 2020. The EPA notes that there are no counties or portions of counties in Alabama that were previously designated in Round 1 (*see* 78 *Federal Register* 4719) or Round 2 (*see* 81 *Federal Register* 45039).

12.2. Air Quality Monitoring Data for the Remaining Areas in Alabama

AQS monitors identified in Table 52 located in three of the remaining undesignated counties in have complete and valid data for 2014-2016 period and these data indicate no violation of the 2010 SO_2 NAAQS at the monitoring site in that period. Additionally, no DRR sources are located near these monitors. 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. The most recent SO_2 design values for all areas in the country are available at: https://www.epa.gov/air-trends/air-quality-design-values.

Table 52. Monitoring Data for Counties in Alabama the EPA Intends to Designate Unclassifiable/Attainment

AQS ID #	Location	County	Design Value 2013-2015 (ppb)	Design Value 2014-2016 (ppb)
01-073-0023	33.55, -86.81	Jefferson	38*	44
01-073-1003	33.49, -86.92	Jefferson	18	15

*Design value not valid due to incomplete data.

In reviewing the available air quality monitoring data in AQS, the EPA determined that other than the data described above, there are no additional relevant data in AQS collected in Alabama that could inform the intended designation action. The most recent SO_2 design values for all areas of the State are available at: https://www.epa.gov/air-trends/air-quality-design-values. Since these areas 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 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, the EPA believes that the designation of unclassifiable/attainment is appropriate for these remaining townships in North Carolina.

12.3. Jurisdictional Boundaries in the Remaining Areas in Alabama

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for counties in the state. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable. Alabama recommended the entire state be designated attainment. Given the information provided by the State and the information obtained by the EPA, we believe that the jurisdictional boundaries for this unclassifiable/attainment designation will be bounded by the county lines of those areas being designated completely. All counties and portions of counties being designated this round are identified in the different sections of this technical support document. For those counties and portions of counties being designated by December 31, 2017, based on air quality modeling, please refer to previous sections of this document. For those remaining counties required to be designated by December 31, 2017, refer to Table 51 of this section. For those counties where air quality monitors were deployed to characterize SO_2 emitting sources for designations by December 31, 2020, please refer to Table 2 of this document.

12.4. The EPA's Assessment of the Available Information for the Remaining Areas in Alabama

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the areas in the above Table 51 as unclassifiable/attainment for the 2010 SO_2 NAAQS. These areas 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 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.

Our intended unclassifiable/attainment area, 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. For other counties or portions of counties designated this round please refer to the different sections of this document. The areas required to be designated by December 31, 2020, are identified in Table 2 including for the remaining portions of Shelby County which include the L'hoist North America of Alabama Montevallo Plant and DRR monitor. For all other county designations please refer to the different sections of this technical support document.

12.5. Summary of Our Intended Designation for the remaining areas in Alabama

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the counties and portions of counties identified in Table 31 as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the identified counties. At this time, our intended designations for the State only apply to these areas and the other areas presented in this technical

support document. The EPA intends to evaluate and designate all remaining undesignated areas in Alabama by December 31, 2020.