Technical Support Document:

Chapter 22
Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for Missouri

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 (SO_2) 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 the 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 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 SO2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

This technical support document (TSD) addresses designations for nearly all remaining undesignated areas in Missouri 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 timely begun operating a new SO_2 monitoring network meeting 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.

Missouri submitted its first recommendation regarding designations for the 2010 1-hour SO_2 NAAQS on July 19, 2011. The state submitted updated air quality analyses and/or updated recommendations on April 26, 2013, September 25, 2015, April 19, 2016, December 8, 2016, and April 7, 2017. In our intended designations, we have considered all the submissions from the state, except where a recommendation in a later submission regarding a particular area indicates that it replaces an earlier recommendation for that area, we have considered the recommendation in the later submission.

For the areas in Missouri 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 Missouri's current recommendations. The EPA's final designation for these areas will be based on an assessment and characterization of air quality through ambient air quality data, air dispersion modeling, other evidence and supporting information, or a combination of the above.

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

Area/County	Missouri's Recommended Area Definition	Missouri's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Henry County	Henry, County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
St Louis County	Within St. Louis County: The portion of St. Louis County bounded by county and state lines to the South, West and East, and US50	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment

[2] A total of 94 areas throughout the U.S. were previously designated in actions published on August 5, 2013 (78 FR 47191), July 12, 2016 (81 FR 45039), and December 13, 2016 (81 FR 89870).
[3] *Sierra Club v. McCarthy*, No. 3-13-cv-3953 (SI) (N.D. Cal. Mar. 2, 2015).

Area/County	Missouri's Recommended Area Definition	Missouri's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
	and I-55 to the North and West.			
Jasper County	Jasper County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Barton County	Barton County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Randolph County	Randolph County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Greene County	Greene County	Attainment	Same as State's Recommendation	Unclassifiable
Remaining Undesignated Areas to Be Designated in this Action*	Entire counties or remainder of counties, as separately designated areas	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment

* Except for areas that are associated with sources for which Missouri elected to install and began timely operation of a new SO_2 monitoring network meeting 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 Missouri as ""unclassifiable/attainment" as these areas were not required to be characterized by the state and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the areas may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS. These areas that we intend to designate as unclassifiable/attainment (those to which this row of this table is applicable) are identified more specifically in section 8 of this TSD.

Areas for which Missouri 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 Sources

Area	Sources
Iron County	Doe Run Buick Resource Recycling
New Madrid County	AECI New Madrid Power Plant – Marston Noranda Aluminum Inc. – New Madrid

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. The EPA designated portions of Jackson County and Franklin County, among other areas, as unclassifiable in Round 2.

For the Jackson County unclassifiable area, Missouri requested in the December 8, 2016, submittal that the EPA redesignate the portion of Jackson County currently designated unclassifiable to unclassifiable/attainment.

For the Franklin County unclassifiable area, on January 18, 2017, the EPA granted a petition from the Sierra Club requesting that the EPA reconsider the "unclassifiable" designations for portions of Franklin and St. Charles Counties, Missouri, including the Ameren Labadie Energy Center. The EPA plans to evaluate SO_2 air quality monitoring data that will be available for the 2017 – 2019 period and will evaluate the designation for this area by December 31, 2020. Additional information on this action can be found at the following website: https://www.epa.gov/sulfur-dioxide-designations/sulfur-dioxide-designations-regulatory-actions

The EPA will evaluate these requests in a separate action.

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 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 EPA-approved and valid monitoring networks. The areas to be designated by December 31, 2017, include the areas associated with five sources in Missouri meeting DRR emissions criteria that the state has chosen to be characterized using air dispersion modeling, the areas associated with five sources in Missouri for which the Missouri Department of Natural Resources (MDNR) imposed emissions limitations on sources to restrict their SO_2 emissions to less than 2,000 tons per year (tpy), 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 (and one pair of neighboring counties) for which modeling information is available. The remaining to-be-designated counties are then addressed together in section 8.

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 ppb, based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. *See* 40 CFR 50.17.
2) Design Value – a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the NAAQS.
3) Designated nonattainment area – an area that, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has

[2] https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf. In addition to this modeling TAD, 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.

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) Designated unclassifiable area – an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not 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.
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 Henry County Area

3.1. Introduction

The EPA must designate Henry County, Missouri, by December 31, 2017, because no portion of Henry County been previously designated and Missouri has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of the Kansas City Power and Light Co – Montrose Generating Station or any other source in the county.

3.2. Air Quality Monitoring Data for Henry County

The state does not have any existing SO_2 monitoring data in Henry County, Missouri.

3.3. Air Quality Modeling Analysis for the Henry County Area Addressing the Montrose Generating Station

3.3.1. Introduction

This section 3.3 presents all the available air quality modeling information for Henry County with a focus on the Montrose Generating Station. This portion of Henry County will often be referred to as "the Montrose area" or "Henry County area" within this section 3.3. This area contains the following SO_2 source around which Missouri is required by the DRR to characterize SO_2 air quality:

- The Montrose Generating Station facility emits 2,000 tons or more annually. Specifically, Montrose emitted 8,604 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Missouri has chosen to characterize it via modeling.

In its submissions, Missouri recommended that an area that includes the area surrounding the Montrose facility, specifically all of Henry County, be designated as attainment based in part on an assessment and characterization of air quality impacts from this facility and other nearby sources that may have a potential impact in the area. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees with the state's conclusions that the area does not violate the NAAQS and does not contribute to violations in a nearby area, and intends to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained in section 3.7 of this TSD, after all the available information is presented.

The area that the state has assessed via air quality modeling is located in Henry County and also includes portions of Johnson, Cass, Bates, Benton, Hickory, Pettis, Vernon, and St. Clair counties.

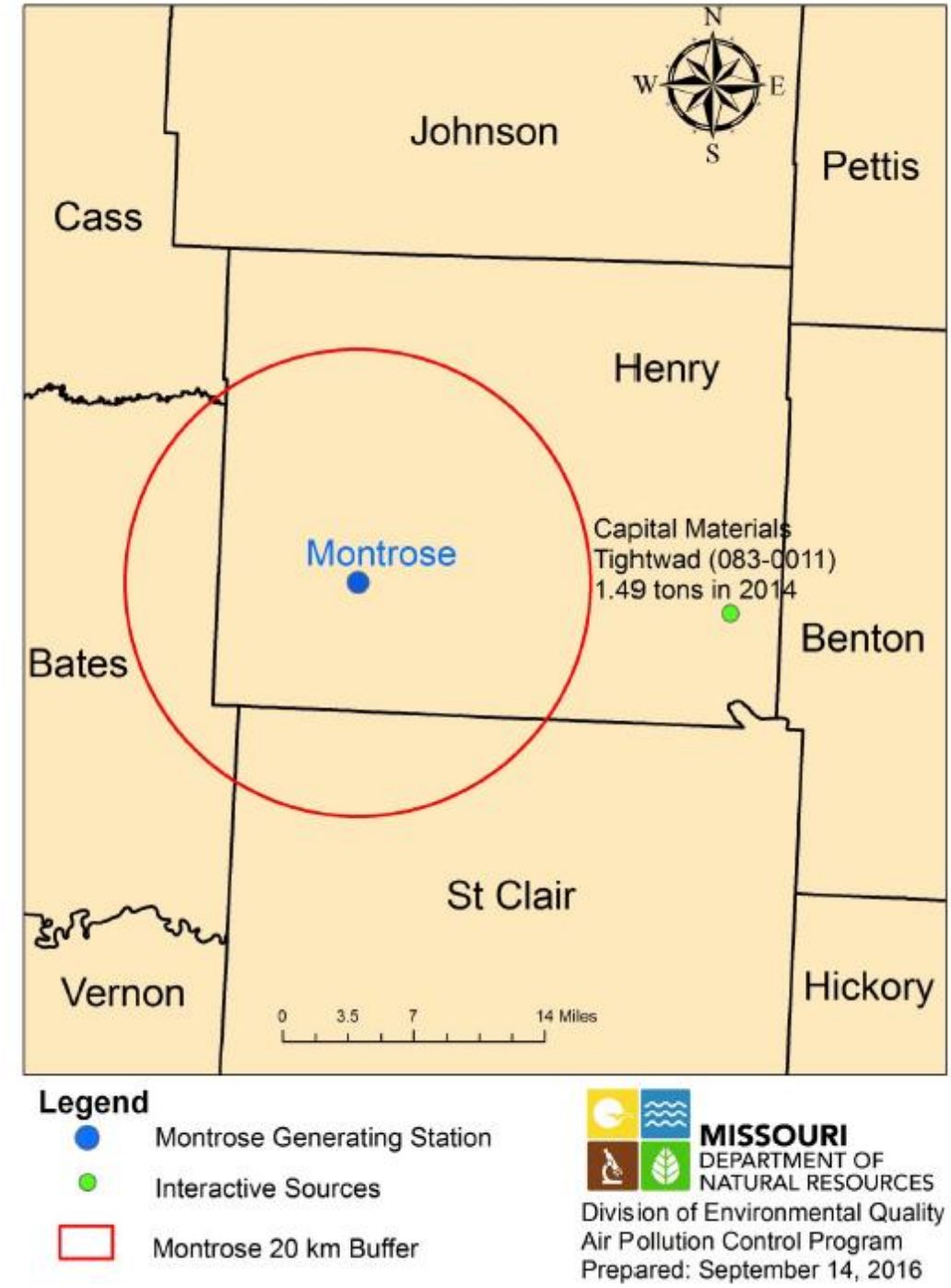
As seen in Figure 1 below, the Montrose facility is located in the southwestern portion of Henry County approximately 53 km SE of Harrisonville, Missouri, and just north of Montrose Lake.

Also included in the figure is another nearby emitter of SO_2.[5] This is Capital Materials Tightwad, which is inside of Henry County and was included in the modeling analysis. Capital Materials Tightwad is east of Montrose, approximately 40 km away.

The state's recommended area for the attainment designation is all of Henry County, Missouri. The EPA's intended unclassifiable/attainment designation boundary for the Henry County area is the boundary of Henry County, which is shown in this figure.

[5] All other SO_2 emitters of 1 tpy or more based on information in the Missouri MOEIS inventory database are shown in Figure 1 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 sources.

Figure 1. Map of the Henry County Area Addressing the Montrose Generating Station



The discussion and analysis that follow 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 MDNR and no assessments from other parties. To avoid confusion in referring to these assessments, Table 3 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. Unless otherwise noted, our discussion of the state's modeling refers to the revised MDNR modeling.

Table 3 – Modeling Assessments for the Henry County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
MDNR	June 28, 2016	MDNR modeling	none
MDNR	April 7, 2017	Revised MDNR modeling	Corrected 2015 hourly emissions

3.3.2. Modeling Analysis Provided by the State

3.3.2.1. 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 16216r, which was the most recent version at the time of its revised modeling submittal to the EPA. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

3.3.2.2. 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.

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 Guideline on Air Quality Models, Appendix W (November 2005) section 7.2.3 instructs users to define the urban or rural classification of the area considering land use and population density. The land use procedure in Appendix W section 7.2.3(c) classifies urban areas based on industrial, commercial, and residential land use over 50% within a 3 km radius of the source. The population density threshold of the 3 km radius surrounding each facility is compared to the urban threshold of 750 people per square kilometer. Both the land use and population density guidelines in Appendix W were used to assess the urban characteristics of the area and it was determined to be rural. The EPA agrees with the state for this component of the state's modeling.

3.3.2.3. 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 Henry County area, the state has included one other emitter of SO_2 within 40 kilometers (km) of Montrose 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 Montrose, the other emitter of SO_2 included in the area of analysis is Capital Materials Tightwad. No other sources beyond 40 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:

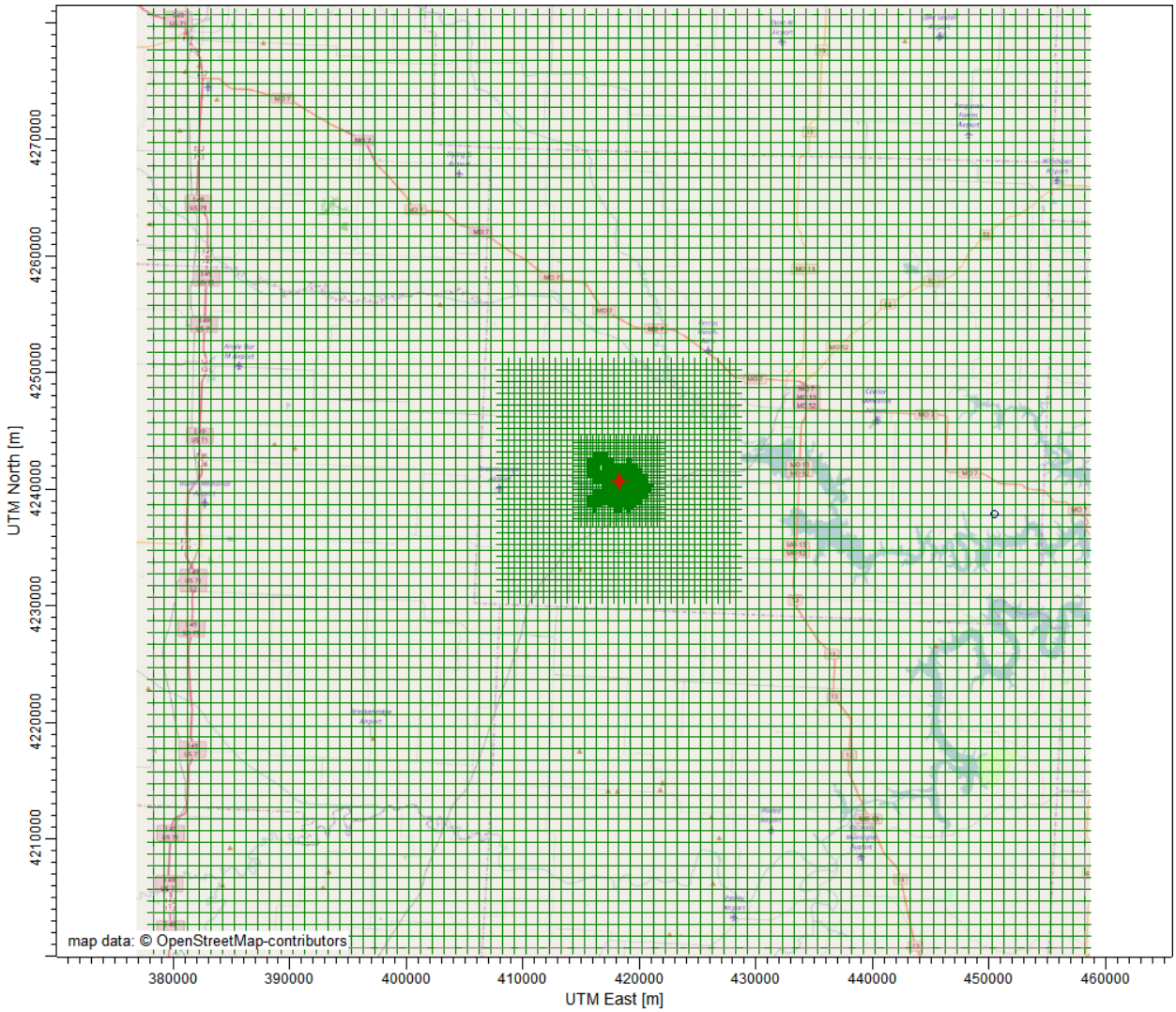
- Center to 1 kilometer (km), receptors placed at 100m intervals
- 1km to 3.5km, receptors placed at 250m intervals
- 3.5km to 10km, receptors placed at 500m intervals
- 10km to 40km, receptors placed at 1000m intervals

The receptor network contained 9,436 receptors, and the network covered all of Henry County and also included portion of Johnson, Cass, Bates, Benton, Hickory, Pettis, Vernon, and St. Clair counties in Missouri.

Figure 2, included in the state's recommendation, shows the state's chosen area of analysis surrounding the Montrose 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 did not exclude receptors over water or in other areas as described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor. The state has excluded receptors within the facility boundary and EPA reviewed aerial and street view imagery for this fenceline/boundary. The facility is in a remote area and limited fencing was visible from the available street view. Although the modeling TAD recommends placing receptors in areas where the public has access and Missouri did not do so, the EPA believes that, due to the fact that the stacks are relatively tall and the modeled design value is about 65% of the standard, the expected modeled concentrations of any receptor placed in these areas would not be above the NAAQS.

Figure 2 Receptor Grid for the Montrose Area



The EPA concludes that the receptors used in the Missouri submittal are appropriate for characterizing the air quality around the Montrose Generating station. Missouri included ambient

receptors extending out 40 km and it did not exclude any receptors over water or on other facilities' property.

3.3.2.4. 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 state included Montrose and all sources within 40 km of the Montrose Generating Station.

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.

The EPA concludes the state has identified and included in the modeling all emissions sources that may contribute to ambient SO_2 concentrations, including all sources located in Henry County, the proposed unclassifiable/attainment area.

3.3.2.5. 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 effective and enforceable.

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 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 Montrose and one other emitter of SO_2 within 40 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 the facilities, the state provided annual actual SO_2 emissions between 2013 and 2015. This information is summarized in Table 4. A description of how the state obtained hourly emission rates is given below this table.

Table 4 Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Henry County Area

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
Montrose	8,391	8,604	4,614
Capital Materials Tightwad	1.5	1.5	1.5
Total Emissions from All Modeled Facilities in the State's Area of Analysis	8,393	8,606	4,616

For Montrose, the actual hourly emissions data were obtained from CEMS as reported to CAMD. For Capital Materials Tightwad the state took the reported 2014 annual emissions from the source, determined an hourly rate based on 8760 hours of operation, and used that as representative for all 3 years. Spreading annual emissions across all hours in a year may not be appropriate in many cases, however in this case, given the low annual reported emissions and the lack of additional temporalization information, this method is acceptable.

3.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

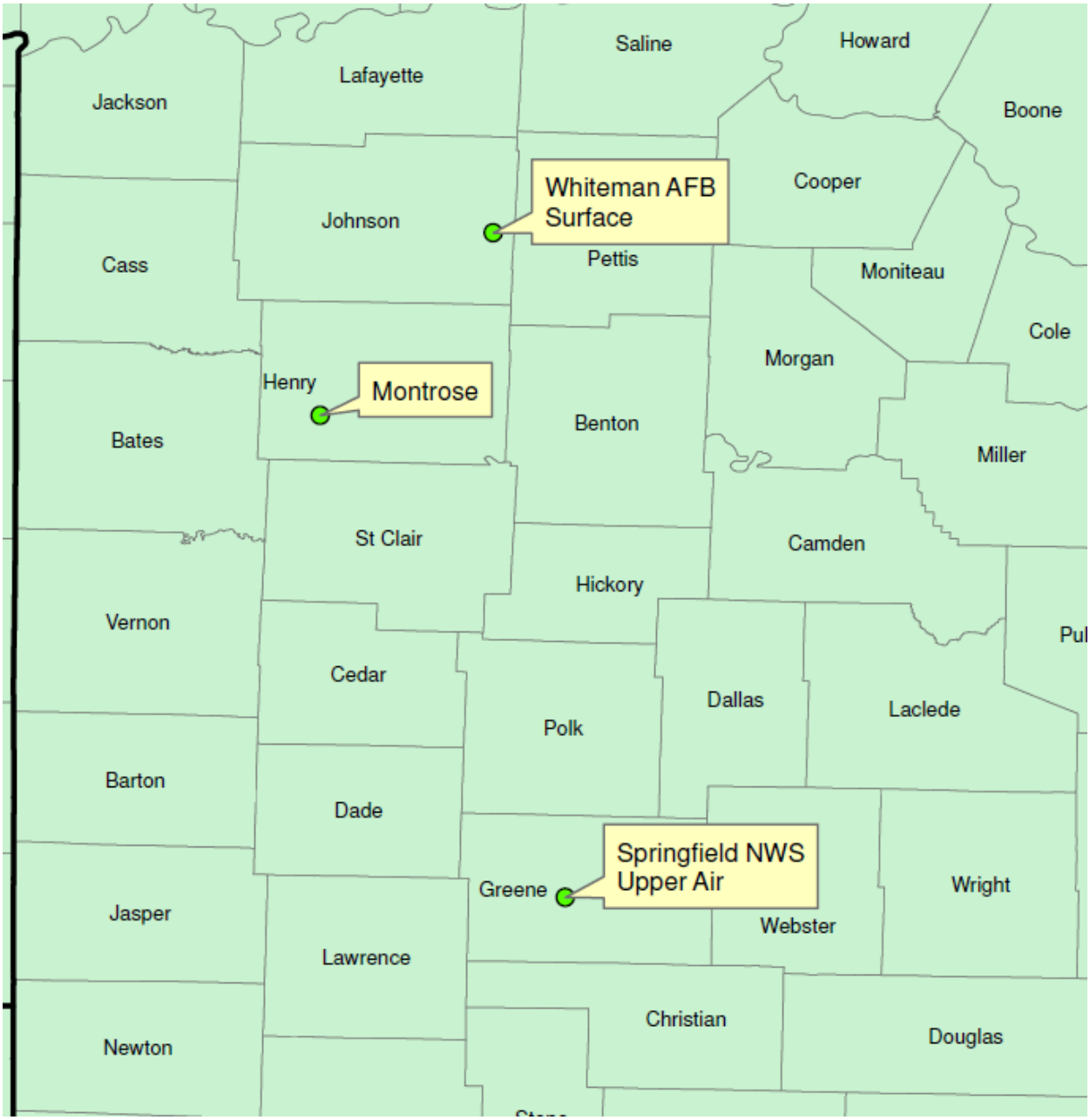
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of 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 Henry County area, the state selected the surface meteorology from the NWS station at Whiteman AFB, located near Knob Noster, Missouri, located at +38.717, -93.550, 56 km to the northeast of the source, and coincident upper air observations from a different NWS station, located in Springfield, Missouri, located at +37.240, -93.390, 128 km to the south-southeast of the source as best representative of meteorological conditions within the area of analysis.

The state used AERSURFACE version 13016 using data from Whiteman AFB to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness (z_o)) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "z_o" The state estimated surface roughness values for 12 spatial sectors out to 1] km at a seasonal temporal resolution for dry, wet, and average conditions.

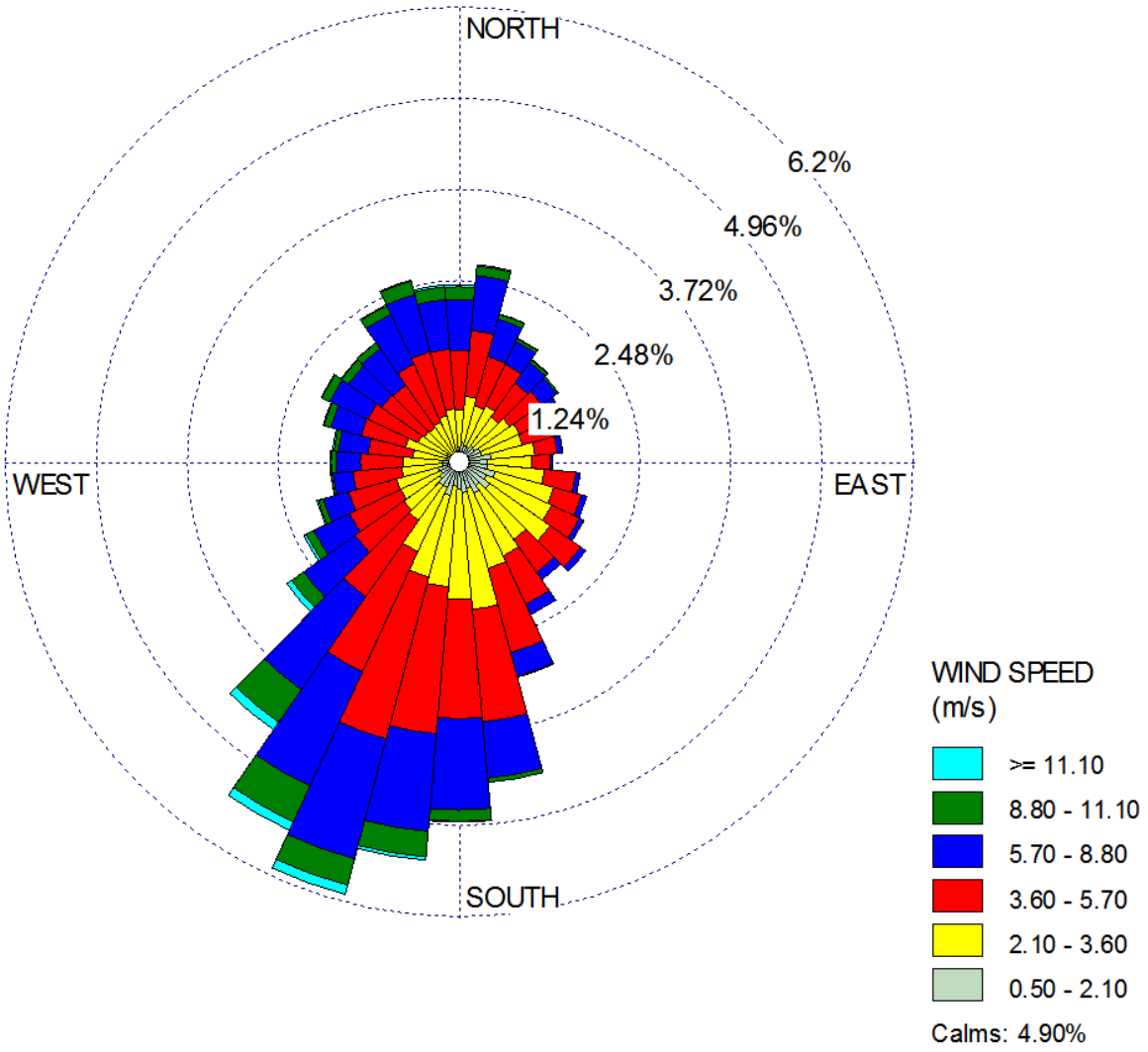
In Figure 3, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 3 Area of Analysis and the NWS stations in the Henry County, Missouri Area



As part of its recommendation, the state provided the 3-year surface data from which the EPA generated a wind rose for the Whiteman AFB. In Figure 4 the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The predominant wind patterns are from the SSW.

Figure 4: Henry 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 state followed the methodology and settings presented in the EPA SO_2 modeling TAD guidance, as outlined in the state's modeling protocol, in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

The EPA concludes the processing of meteorological data follows EPA guidance and is representative of meteorological conditions around Montrose for purposes of designations

modeling. The EPA notes the dataset available at Whiteman AFB does not include 1-minute data, thus no AERMINUTE processing was performed. Whiteman AFB had a 96.6% data availability, with 4.9% calms identified. In addition, there are 883 incomplete or missing records from the total 26,282 hours available. From the wind rose, the EPA concludes hourly impacts will occur in all directions with predominant transport of emissions to the north based on higher frequency of SSW winds.

3.3.2.7. 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 National Elevation Database.

The EPA agrees with Missouri's treatment of terrain within AERMOD and finds it followed established guidance for terrain processing.

3.3.2.8. 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 chose a tier 1 approach using the regional background for rural areas within the state, based off an analysis of the East St. Louis monitor in Illinois. This was the same background methodology used for rural areas in the first round nonattainment and second round of designations. The background concentration for this area of analysis was determined by the state to be 23.6 micrograms per cubic meter ($\mu g/m^3$), equivalent to 9 ppb, when expressed to three significant figures,[6] and that value was incorporated into the final AERMOD results. This value is similar to the Mark Twain State Park monitor (AQS Site ID: 29-137-0001), where the 3-year design value for 2013-2015 is 8 ppb.

The EPA concludes that a background value of 9 ppb is acceptable for this area since no other large SO_2 emitters are near Montrose. The EPA again notes that 9 ppb is similar to the design value of the Mark Twain State Park monitor, which is also located in a rural area in Missouri.

[6] 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 $\mu g/m^3$.

3.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Henry County area of analysis are summarized below in Table 5.

Table 5: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Henry County Area

Input Parameter	Value
AERMOD Version	16216r
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	3 stacks, 1 volume source
Modeled Structures	14
Modeled Fencelines	1
Total receptors	9,436
Emissions Type	Actual hourly for Montrose, actual annual for Capital Materials
Emissions Years	2013-2015 for Montrose, 2014 for Capital Materials
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	Whiteman AFB
NWS Station Upper Air Meteorology	Springfield NWS
NWS Station for Calculating Surface Characteristics	Whiteman AFB
Methodology for Calculating Background SO_2 Concentration	Tier 1 based on design value, for 2013-2015, East St. Louis, IL monitor – Rural representative analysis
Calculated Background SO_2 Concentration	9 ppb

The results presented below in Table 6 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

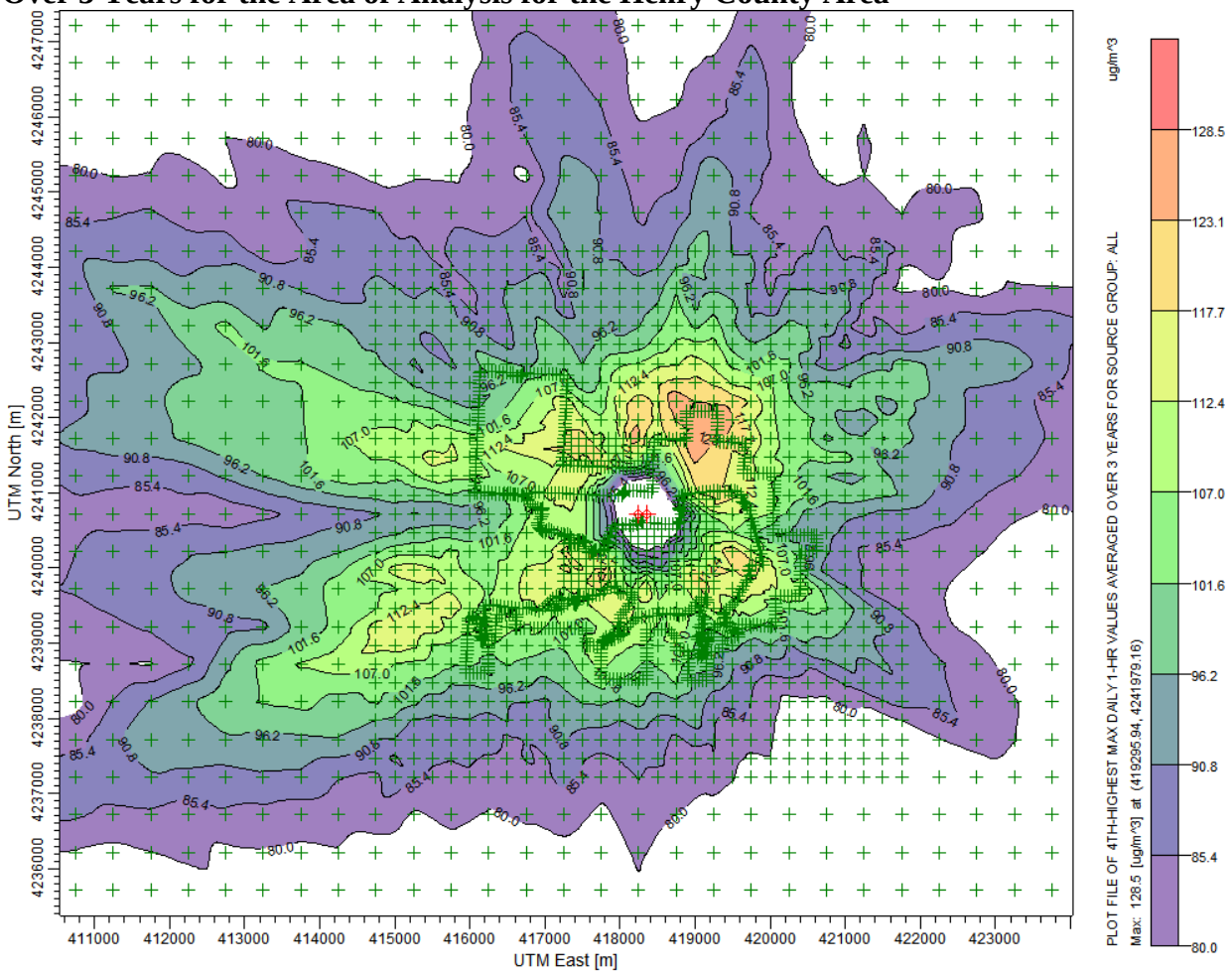
Table 6: Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Area of Analysis for the Henry County Area

		Receptor Location [UTM zone 15]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
Averaging Period	**Data Period**	**UTM**	**UTM**	**Modeled concentration (including background)**	**NAAQS Level**
99th Percentile 1-Hour Average	2013-2015	419295.94	4241979.16	128.5	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 revised modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 128.5 $\mu g/m^3$, equivalent to 49.1 ppb. This revised modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facilities. Figure 5 below was created by EPA from the state' modeling as part of the state's recommendation, and indicates that the highest predicted value occurred along the northeast portion of the Montrose facility fence line, approximately 1,600 meters from the stacks. The state's receptor grid is also shown in the figure.

Figure 5: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Area of Analysis for the Henry 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. The modeled concentrations are decreasing as the edge of the receptor grid is approached. There are no SO_2 sources greater than 2 tons per year within 40 km of Montrose and these results indicate Montrose will not contribute to any violations in nearby areas.

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

The state has performed modeling according to the EPA modeling TAD, using actual hourly emissions and varying stack parameters for exit velocity and temperatures from the Montrose Generating Station along with an acceptable background concentration of 9 ppb. The EPA did not find any departures from the modeling TAD in the modeling the state provided.

3.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for Henry County

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

3.5. Jurisdictional Boundaries in Henry County

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

Missouri has recommended the entirety of Henry County, Missouri, be designated attainment based upon the state's modeling analysis demonstrating attainment within this county and surrounding areas.

3.6. Other Information Relevant to the Designation for Henry County

The EPA has not identified any other information relevant to our designation for this area. No additional 3rd party modeling or analysis was received.

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

The state has submitted modeling demonstrating the entirety of Henry County, Missouri, is meeting the NAAQS and the EPA believes the modeling conforms to the modeling TAD. The state has addressed all sources within and surrounding the area of analysis that would potentially impact the analysis area. MDNR modeling also indicates no sources within Henry County will contribute to violations in nearby counties and no sources in the nearby counties were identified that would together cause a violation in Henry County. The EPA agrees with the state modeling assessment.

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

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

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate Henry County as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Henry County, Missouri.

Figure 6 shows the boundary of this intended designated area.

Figure 6 Boundary of the Intended Henry County Unclassifiable/Attainment Area

At this time, our intended designations for the state only apply to this area 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 Missouri by December 31, 2020.

4. Technical Analysis for a Portion of St. Louis County Near the Ameren Meramec Energy Center

4.1. Introduction

The EPA must designate the St. Louis County, Missouri, area by December 31, 2017, because no portion of the area has been previously designated and Missouri has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of the Ameren Meramec Energy Center (Meramec) or any other source in the county. We intended to designate two separate areas within St. Louis County, both of which would be unclassifiable/attainment. In this section 4, we present our analysis and intended designation for the portion of the county near the Ameren Meramec Energy Center. Section 8 addresses the remainder of the county.

4.2. Air Quality Monitoring Data for the St. Louis County Area

The state does not have any existing SO_2 monitoring data in St. Louis County, Missouri.

4.3. Air Quality Modeling Analysis for the St. Louis County Area Addressing the Ameren Meramec Energy Center

4.3.1. Introduction

This section 4.3 presents all the available air quality modeling information for a portion of St. Louis County that includes the Ameren Meramec Energy Center. (This portion of St. Louis County will often be referred to as "the Meramec area" or "the St. Louis County area" within this section 4.3.) This area contains the following SO_2 source around which Missouri was required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Meramec facility emits 2,000 tons or more annually. Specifically, Meramec emitted 11,702 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Missouri has chosen to characterize it via modeling.

In its submission, Missouri recommended that an area that includes the area surrounding the Meramec facility, specifically a stated portion of St. Louis County,[7] be designated as attainment based in part on an assessment and characterization of air quality impacts from this facility and other nearby sources that may have a potential impact in the area. The state recommended that the remainder of St. Louis County be designated unclassifiable. 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

[7] The portion of St. Louis County bounded by county and state lines to the South, West and East, and US50 and I-55 to the North and West. This description is a clarification of the state's initial description. It was received via an email dated June 5, 2017.

documentation, and all available data, the EPA agrees with the state's conclusions that the stated portion of St. Louis County does not violate the NAAQS and does not contribute to violations in nearby areas, and intends to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained in section 4.7 of this TSD, after all the available information is presented.

The area that the state has assessed via air quality modeling includes a portion of St. Louis County and also includes portions of Jefferson County and St. Louis City in Missouri, along with St. Clair and Monroe Counties in Illinois.

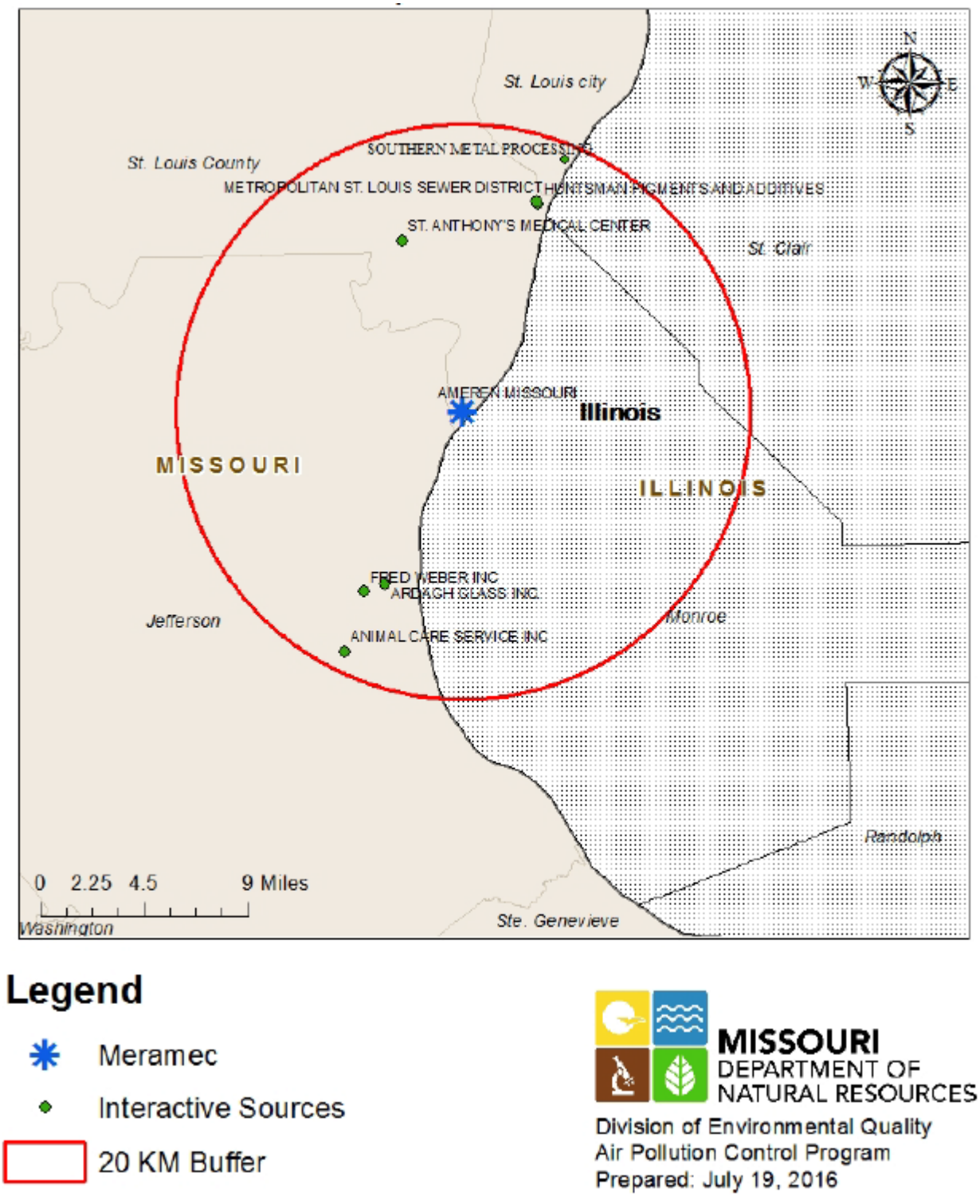
As seen in Figure 7 below, the Meramec facility is located in the southern portion of St. Louis County, approximately 28 km SW of downtown St. Louis, Missouri, along the Mississippi River.

Also included in the figure are other nearby emitters of SO_2.[8] These nearby emitters include Ardagh Glass Inc., Animal Care Service Inc., Huntsman Pigments and Additives, Fred Weber Trautman Asphalt, MSD Lemay WWTP, St. Anthony's Medical Center, and Southern Metal Processing. Note that some of these facilities are not required to report emissions to the NEI as 40 CFR Part 51 Subpart A does not require the reporting of emissions if the facility's PTE is below 100 tpy for criteria pollutants including SO_2.

The state's recommended area for the attainment designation is a portion of St. Louis County, Missouri, specifically the area bounded by county and state lines to the South, West and East, and Interstate 255 and 50 to the North and East. The state recommended that the remainder of St. Louis County be designated unclassifiable. The EPA's intended unclassifiable/attainment designation boundary for the Meramec area is not shown in this figure, but is shown in a figure in section 4.8 below that summarizes our intended designation.

[8] All other SO_2 emitters of 1 tpy or more based on information in the Missouri MOEIS inventory database are shown in Figure 7. 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 sources.

Figure 7. Map of the St. Louis County Area Addressing the Ameren Meramec Energy Center



Legend

- Meramec
- Interactive Sources
- 20 KM Buffer

MISSOURI DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality
Air Pollution Control Program
Prepared: July 19, 2016

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 and no assessments from other parties.

4.3.2. Modeling Analysis Provided by the State

4.3.2.1. 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, which was the most recent version at the time of its submittal to the EPA. On January 17, 2017, EPA published its revision to Appendix W – Guideline to Air Quality Models.7 Since the publication of Appendix W, AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted here.

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 is 16216r. Because the state did not utilize any beta options, including adjusted U*, it is not expected that the modeling results would be significantly different using the current version.

4.3.2.2. 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.

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 a mix of urban and rural modes. Specifically, Meramec along with other sources to the north of Meramec were characterized as urban, with the remaining sources that were including in the modeling characterized as rural.

The Guideline on Air Quality Models, Appendix W (January 2017) section 7.2.1 instructs users to define the urban or rural classification of the area considering land use and population density. The land use procedure in Appendix W section 7.2.1.1(b) classifies urban areas based on industrial, commercial, and residential land use over 50% within a 3 km radius of the source. The population density threshold of the 3 km radius surrounding each facility is compared to the urban threshold of 750 people per square kilometer. Both the land use and population density guidelines in Appendix W were used to assess the urban characteristics of the area and it was determined to be a mix of urban and rural.

The EPA agrees with the state for this component of the state's modeling based on the analysis and explanation the state provided when considering the potential of the urban heat island effect over the entire modeling domain which includes St. Louis to the north, a clearly urbanized area. Note that MDNR did receive comments from Ameren, as documented in its DRR modeling submittal, who argued that Meramec should be characterized as rural. Ameren apparently included modeling in its comments to MDNR that indicated attainment with the NAAQS. This Ameren modeling was not provided to the EPA and we, therefore, did not consider this modeling for this intended designation.

4.3.2.3. 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 St. Louis County area, the state has included seven other emitters of SO_2 within 20 kilometers (km) of Meramec 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 Meramec, the other emitters of SO_2 included in the area of analysis include Ardagh Glass Inc., Animal Care Service Inc., Huntsman Pigments and Additives, Fred Weber Trautman Asphalt, MSD Lemay WWTP, St. Anthony's Medical Center, and Southern Metal Processing. 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:

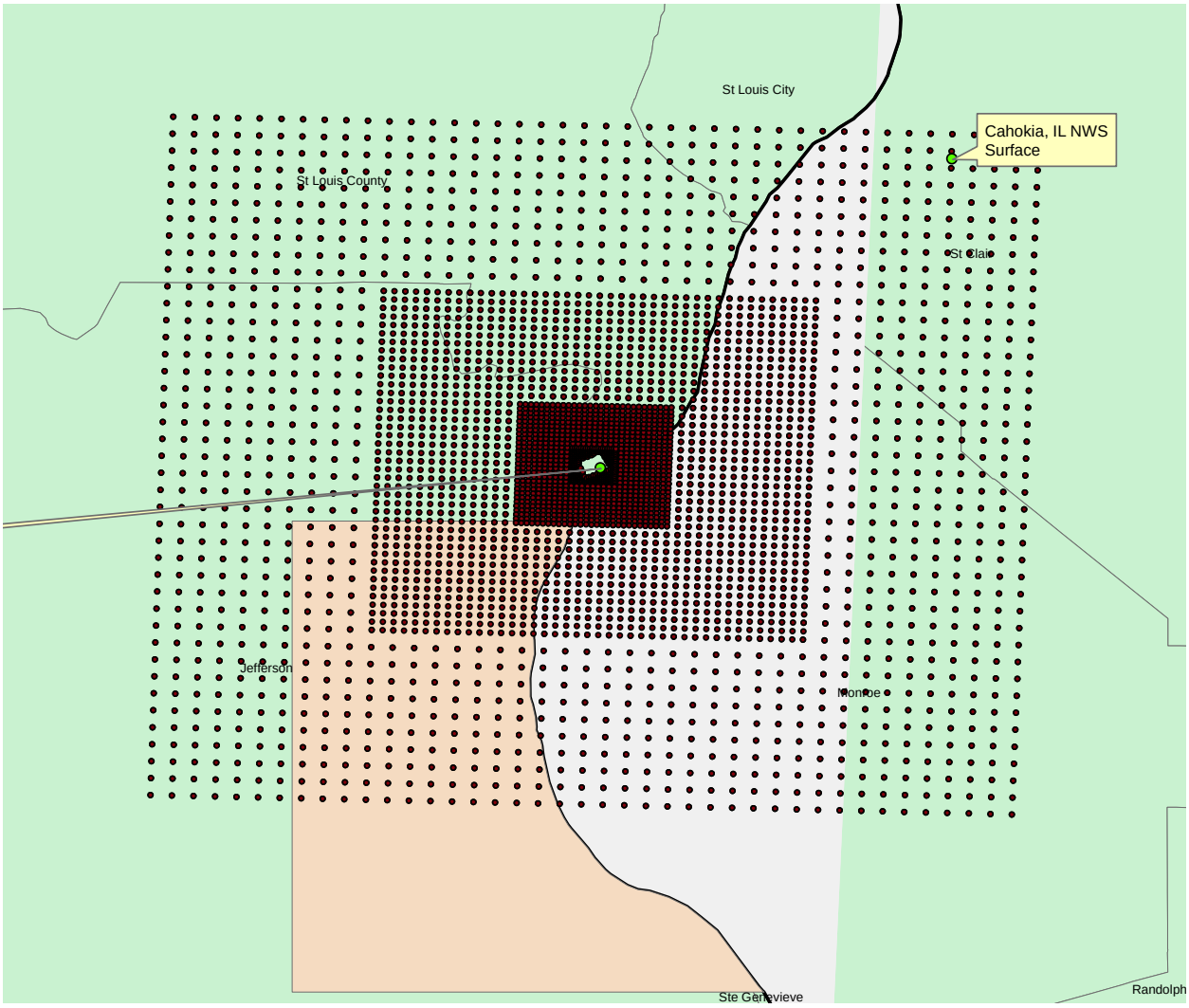
- Center to 1 kilometer (km), receptors placed at 100m intervals
- 1km to 3.5km, receptors placed at 250m intervals
- 3.5km to 10km, receptors placed at 500m intervals
- 10km to 20km, receptors placed at 1000m intervals

The receptor network contained 6,308 receptors, and the network covered a portion of St. Louis County and also includes portions of Jefferson County and St. Louis City in Missouri, along with portions of St. Clair and Monroe Counties in Illinois.

Figure 8 included in the state's recommendation, shows the state's chosen area of analysis surrounding the Meramec 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 Meramec, including other facilities' property. Missouri did not exclude any receptors on other facilities property. The state did not exclude receptors over water or in other areas as described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor. The state has excluded receptors within the facility fenceline and EPA reviewed aerial and street view imagery for this fenceline and believes it is justified to exclude these receptors. The visible street view fence from the main access road is chain-link and it appears this fence exists around the entire fenceline. Much of the boundary would also have limited public access with physical barriers such as the Mississippi River and the Meramec River with no access roads.

Figure 8: Receptor Grid for the Meramec Area. The beige color represents the boundaries of the Round 1 Jefferson County 1-hr SO_2 Nonattainment Area.



The EPA concludes that the receptors used in the Missouri submittal are appropriate for characterizing the air quality around the Ameren Meramec Energy Center.

4.3.2.4. 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 state included Meramec and all sources within 20 km of Ameren Meramec Energy Center.

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 Units 3 and 4. For Units 1 and 2, the state used actual stack heights with allowable emissions. The actual stack heights modeled (76.2 meters for Units 1 and 2) were below the calculated GEP heights (110 and 115 meters, respectively) and thus follow EPA GEP guidance. 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 concludes the state has identified and included in the modeling all emissions sources that may contribute to ambient SO_2 concentrations, including such sources located in St. Louis County, the proposed unclassifiable/attainment area.

4.3.2.5. 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 effective and enforceable.

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 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 Meramec and seven other emitters 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 the facilities, the state provided annual actual SO_2 emissions between 2013 and 2015. This information is summarized in Table 7. A description of how the state obtained hourly emission rates is given below this table.

Table 7. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Meramec Area

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
Meramec	5,962	11,702	5,245
Ardagh Glass Inc.	136.2	42.2	43.8
Animal Care Service Inc.	1.1	1.1	1.1
Huntsman Pigments and Additives	4.5	4.1	4.7
Fred Weber Trautman Asphalt	4.5	4.5	0
MSD Lemay WWTP	1.8	1.9	2.0
St. Anthony's Medical Center	2.2	2.2	2.2
Southern Metal Processing	7.2	7.2	7.2
Total Emissions from All Modeled Facilities in the State's Area of Analysis	6,120	11,765	5,306

For Meramec, the actual hourly emissions data for Units 3 and 4 were obtained from CEMS as reported to CAMD. Units 1 and 2 emitted 6,284 of the 22,908 total tons of SO_2 emitted from Meramec during 2013 – 2015, approximately 27% of the total emissions during this period. However, Meramec Units 1 and 2 were limited to combust natural gas beginning April 16, 2016, as specified in their Title V operating permit #OP2016-040, and were therefore modeled for all 3 years at the emission rates that could occur while combusting natural gas using the permitted limit. For the remaining sources, the state determined the hourly rates used in the modeling by dividing the 2014 annual emissions by 8,760 hours of operation. Spreading annual emissions across all hours in a year may not be appropriate in many cases, however, in this case given the low annual emissions reported and the lack of additional temporalization information, this method is acceptable.

4.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

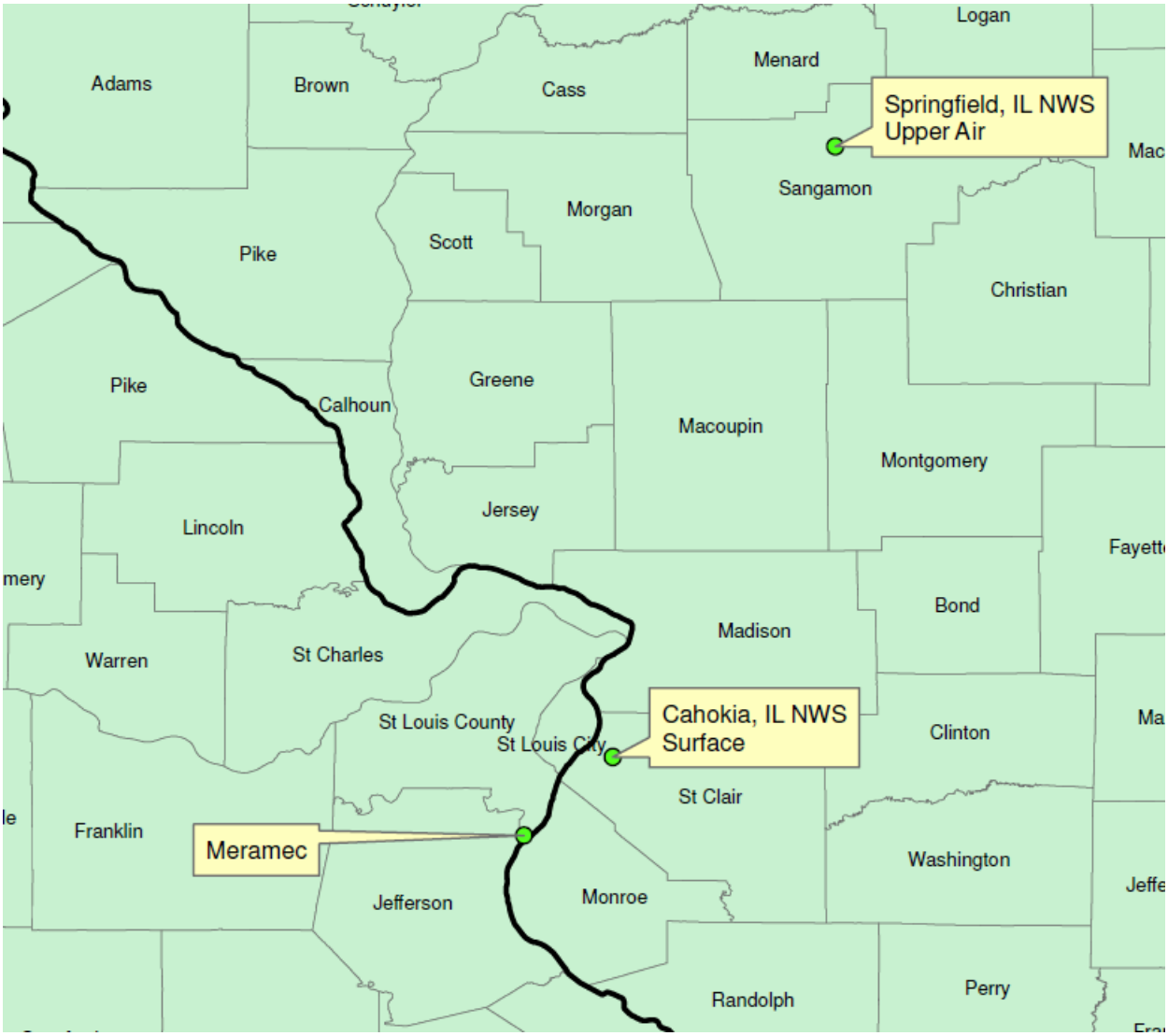
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of 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 St. Louis County area, the state selected the surface meteorology from the NWS station at Cahokia, IL, located south of downtown St. Louis, Missouri, located at 38.5639827, -90.1487069, 24 km to the northeast of the Meramec source, and coincident upper air observations from a different NWS station, Abraham Lincoln Capitol Airport in Springfield, Illinois, located at +39.845 -89.684, 169 km to the northeast of the Meramec source as best representative of meteorological conditions within the area of analysis.

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

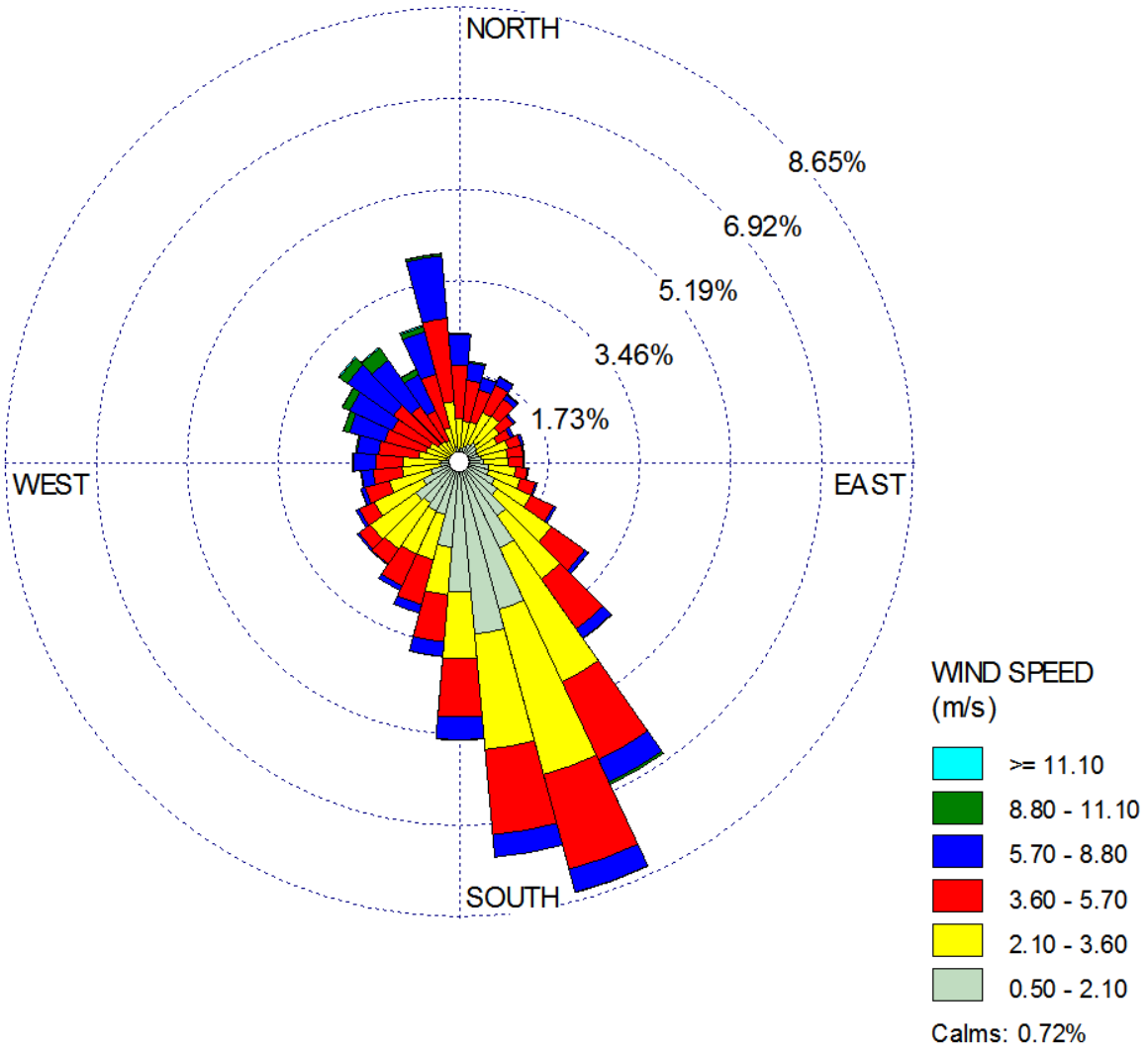
In Figure 9 below, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 9. Area of Analysis and the NWS stations in the St. Louis County Area



As part of its recommendation, the state provided the 3-year surface data from which the EPA generated a wind rose for the Cahokia NWS site. In Figure 10, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The predominant wind patterns are from the SSE.

Figure 10: St. Louis 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 state followed the methodology and settings presented in the EPA SO_2 modeling TAD guidance, as outlined in its modeling protocol, in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

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

The EPA concludes the processing of meteorological data follows EPA guidance and is representative of meteorological conditions around Meramec for purposes of designations modeling based on the description and analysis the state provided which indicate the surface and upper air sites chosen were the best available for them to use From the wind rose, the EPA concludes hourly impacts will occur in all directions with predominant transport of emissions to the north based on higher frequency of SSE winds.

4.3.2.7. 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 National Elevation Database.

The EPA agrees with Missouri's treatment of terrain within AERMOD and finds it followed established guidance for terrain processing.

4.3.2.8. 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 chose a tier 1 approach using the regional background for urban areas within the state that was based off an analysis of the JFK monitor in Kansas City, Kansas. This was the same background methodology used in the 1st round nonattainment SIP development modeling and second round of designations for urban areas. The background concentration for this area of analysis was determined by the state to be 34.0 micrograms per cubic meter ($\mu g/m^3$), equivalent to 13 ppb when expressed to three significant figures,[9] and that value was incorporated into the final AERMOD results.

The EPA concludes a background value of 13 ppb is acceptable for this area as no other large SO_2 emitters are near Meramec that are not specifically included in the modeling analysis, and the MDNR background analysis for an urban area is reasonable for this area which MDNR has, in part, determined to be urban in nature.

[9] 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 $\mu g/m^3$.

4.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the St. Louis County area of analysis are summarized below in Table 8.

Table 8: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the St. Louis County Area

Input Parameter	Value
AERMOD Version	15181
Dispersion Characteristics	Mix of Urban and Rural
Modeled Sources	8
Modeled Stacks	29 stacks
Modeled Structures	22
Modeled Fencelines	1
Total receptors	6,308
Emissions Type	Actual hourly for Meramec units 3 & 4, new permitted allowable for units 1 & 2, actual annual for remaining sources
Emissions Years	2013-2015
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	Downtown/Cahokia, IL
NWS Station Upper Air Meteorology	Abraham Lincoln Capitol Airport in Springfield, Illinois
NWS Station for Calculating Surface Characteristics	Downtown/Cahokia, IL
Methodology for Calculating Background SO_2 Concentration	Tier 1 based on design value, for 2013-2015, JFK Kansas City monitor – Urban representative analysis
Calculated Background SO_2 Concentration	13 ppb

The results presented below in Table 9 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

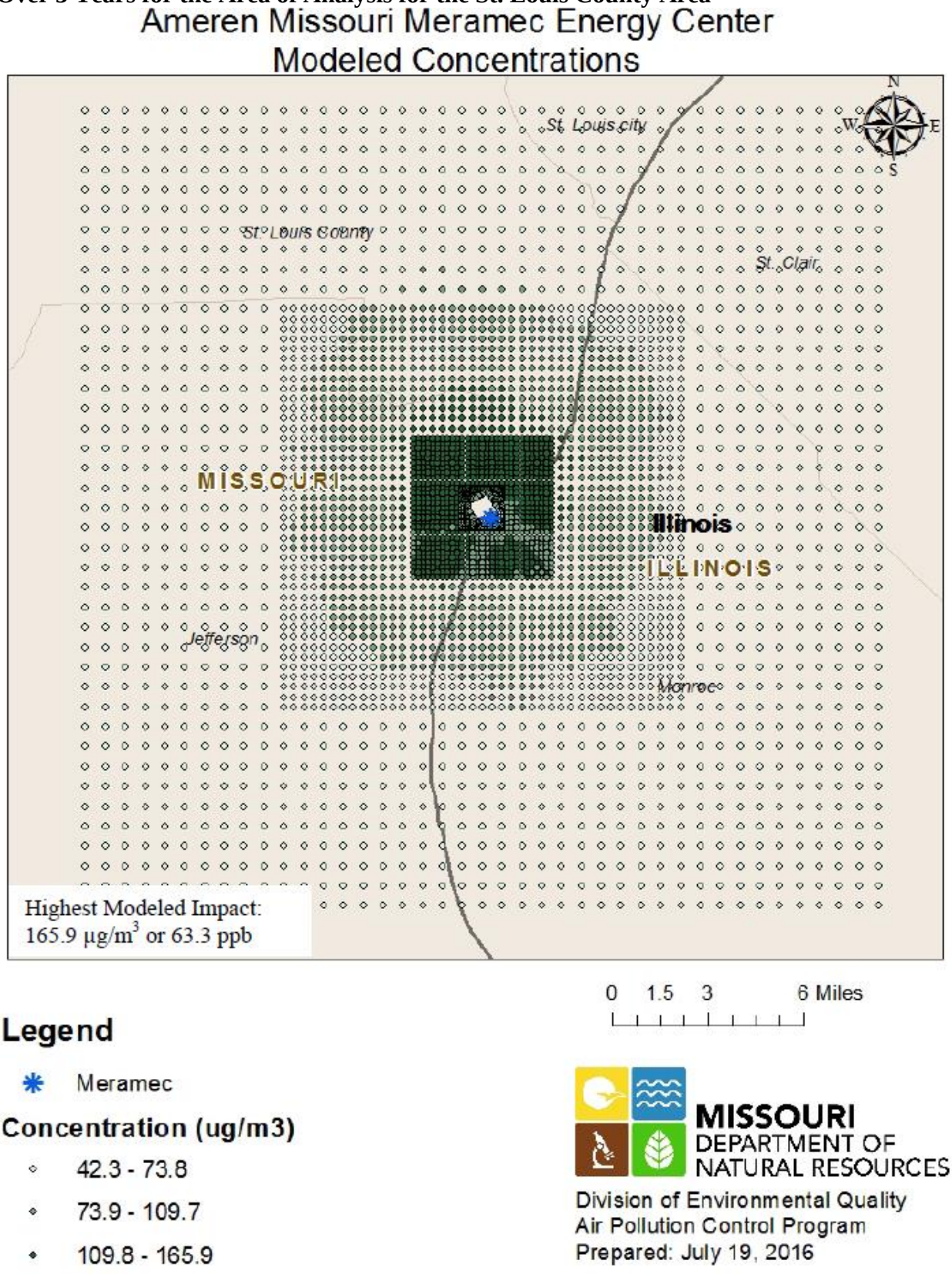
Table 9. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Area of Analysis for the St. Louis County Area

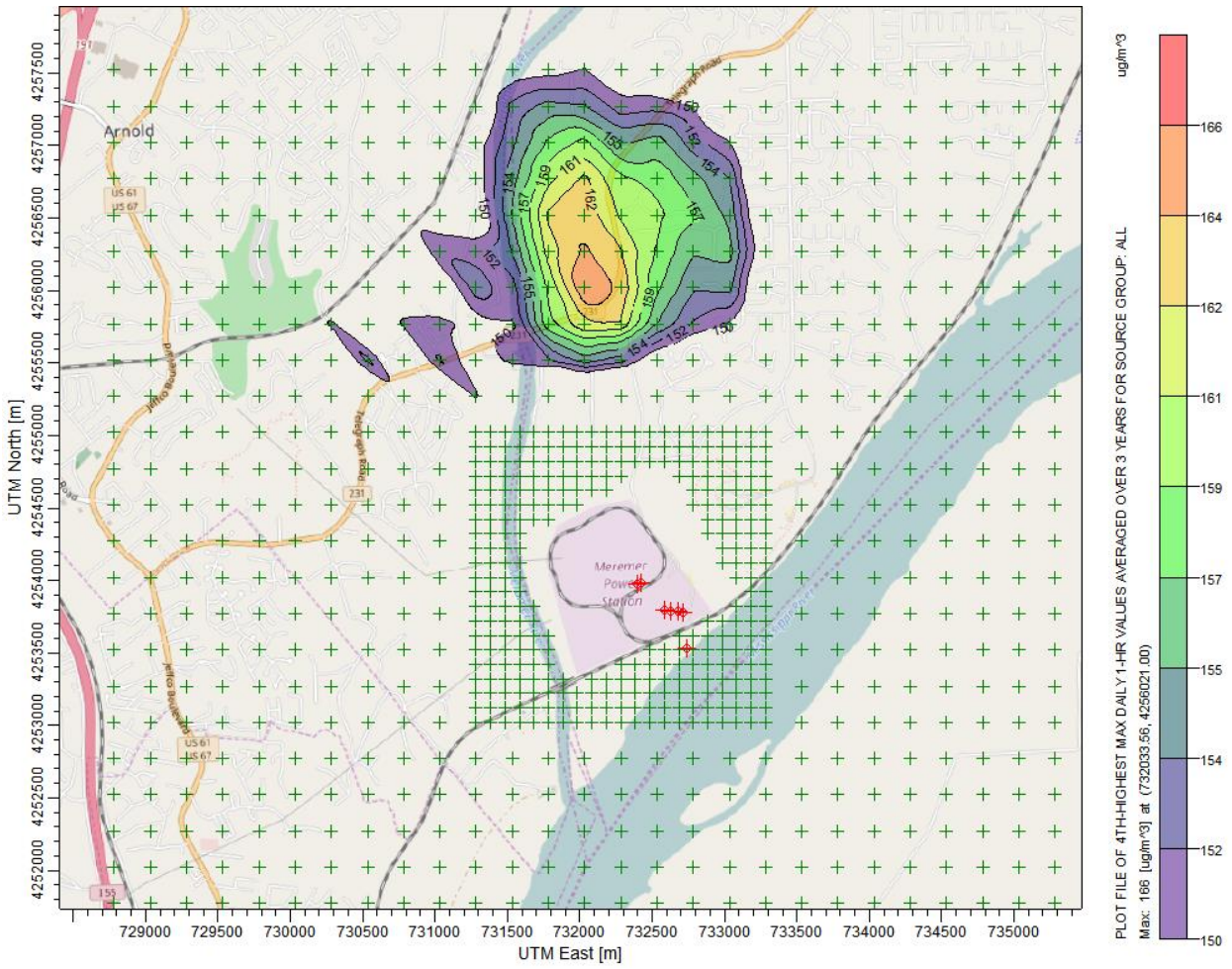
Averaging Period	Data Period	Receptor Location [UTM zone 15]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM	UTM	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2013-2015	732033.56	4256021.00	165.9	196.4*

*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 165.9 $\mu g/m^3$, equivalent to 63.3 ppb. This modeled concentration includes the background concentration of SO_2, and is based on a mixture of actual and allowable emissions from the facilities. Figure 11 below was included as part of the state's recommendation, and indicates that the highest predicted value occurred north of the Meramec facility 2.4 kilometers from the stacks. The state's receptor grid is also shown in the figure.

Figure 11: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Area of Analysis for the St. Louis 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.

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

The state has performed modeling according to the EPA modeling TAD using a mix of actual hourly emissions, estimated actual hourly emissions, and hourly emissions based on allowable emission rates and varying stack parameters for exit velocity and temperatures from the Ameren Meramec Energy Center along with an acceptable background concentration of 13 ppb. For Units 1 and 2, the state used actual stack heights with allowable emissions. The actual stack heights modeled (76.2 meters for Units 1 and 2) were below the calculated GEP heights (110 and 115 meters, respectively) and thus follow EPA GEP guidance and the modeling TAD. The EPA did not find any departures from the modeling TAD in the modeling the state provided.

4.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for St. Louis County

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

4.5. Jurisdictional Boundaries in St. Louis County

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

Missouri has recommended a portion of St. Louis County, Missouri, be designated attainment based upon the states modeling analysis demonstrating attainment within this county and surrounding areas. Our intended unclassifiable/attainment boundary is the same as the state's recommendation, the portion of St. Louis County bounded by county and state lines to the South, West and East, and US50 and I-55 to the North and West.

4.6. Other Information Relevant to the Designation of a Portion of St. Louis County Near the Ameren Meramec Energy Center

The EPA has not identified any other information relevant to our designation for this area. No additional 3rd party modeling or analysis was received.

4.7. The EPA's Assessment of the Available Information for a Portion of St. Louis County Near the Ameren Meramec Energy Center

The state has submitted modeling demonstrating the area surrounding Meramec within St. Louis County, Missouri, is meeting the NAAQS and the EPA believes the modeling conforms to the modeling TAD. The state has addressed all sources within and surrounding the area of analysis that would potentially impact the analysis area. The state has also included receptors within the entire portion of the proposed area as well as receptors outside of the proposed area, including receptors within the northern portion of the current nonattainment boundary in Jefferson County south of Meramec (*see* Figure 8). These modeled receptors all show attainment, thus no contributions to a NAAQS violation in a nearby area have been identified in this modeling. The EPA has also recently published a Federal Register notice proposing to find that the nonattainment area has clean data, i.e., that it has in fact attained the NAAQS. *See* Approval of Missouri Air Quality Implementation Plans; Determination of Attainment for the 2010 1-hour Primary Sulfur Dioxide National Ambient Air Quality Standard; Jefferson County Nonattainment Area, 82 FR 28605 (June 23, 2017), The EPA agrees with the state modeling assessment.

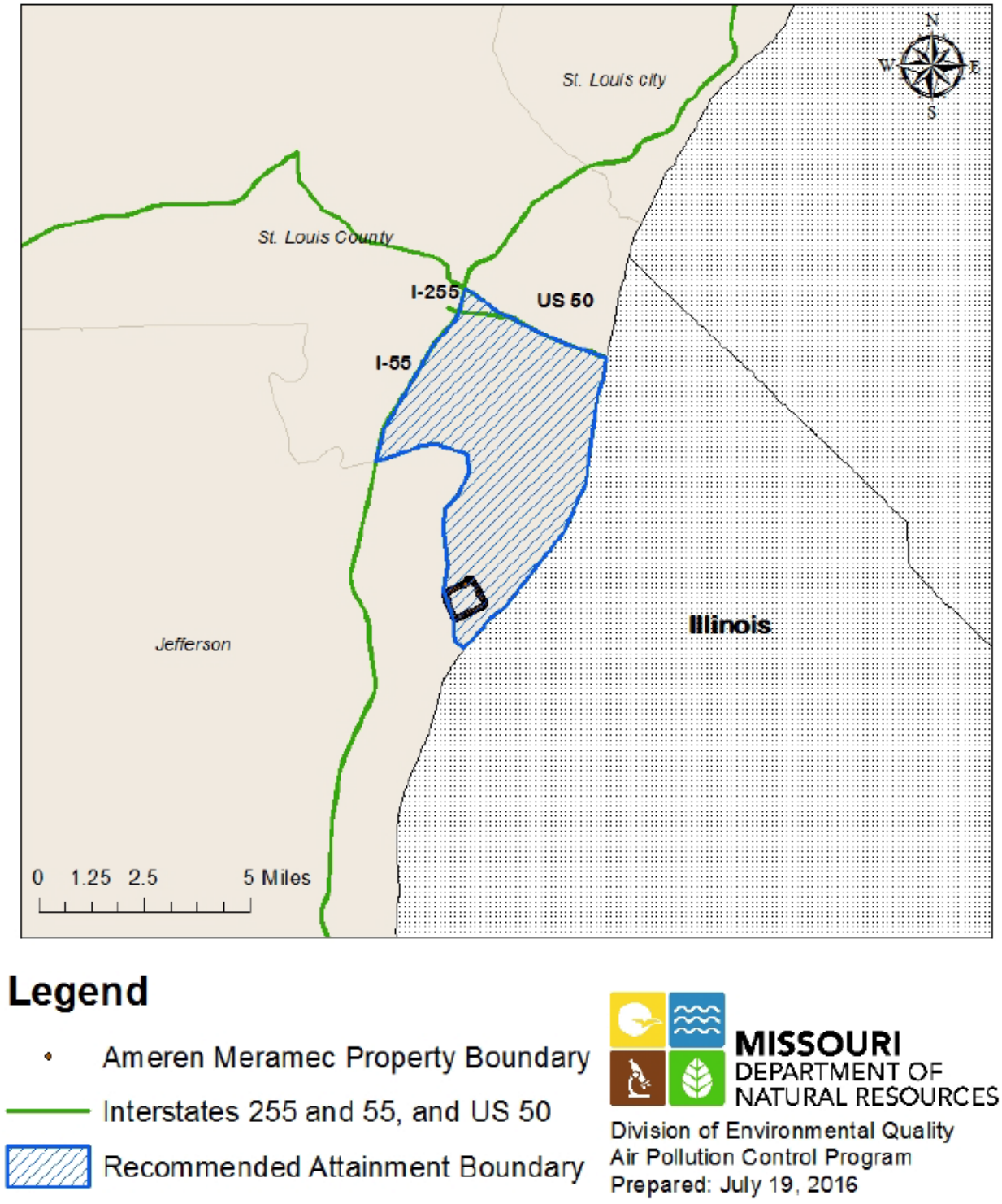
The EPA believes that our intended unclassifiable/attainment area, the portion of St. Louis County bounded by county and state lines to the South, West and East, and US50 and I-55 to the North and West., will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

4.8. Summary of Our Intended Designation for a Portion of St. Louis County Area Near the Ameren Meramec Energy Center

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate a portion of St. Louis County, Missouri, near the Ameren Meramec Energy Center, as unclassifiable/attainment for the 2010 SO_2 NAAQS. This intended designation is appropriate because based on available information including appropriate modeling analyses and/or monitoring data, this area meets the 2010 SO_2 NAAQS, and this does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Specifically, the boundaries are comprised of the portion of St. Louis County bounded by county and state lines to the South, West and East, and US50 and I-55 to the North and West.

Figure 12 shows the boundary of this intended designated area.

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



Section 8 addresses the intended designation for the remainder of St. Louis County.

At this time, our intended designations for the state only apply to this area 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 Missouri by December 31, 2020.

5. Technical Analysis for the Jasper County and Barton County Area

5.1. Introduction

The EPA must designate Jasper County and Barton County, Missouri, by December 31, 2017, because no portion of either of these counties has been previously designated and Missouri has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of the Empire District Electric Company Asbury Plant or any other source. Because the largest source in the two counties is located near the border between the counties, the two counties are evaluated together in this section. Consistent with the state's preference for each county to be designated as a separate area, the EPA intends to designate these two counties as separately designated areas.

5.2. Air Quality Monitoring Data for the Jasper County and Barton County Area

The state does not have any existing SO_2 monitoring data for Jasper County or Barton County, Missouri.

5.3. Air Quality Modeling Analysis for the Jasper County and Barton County Area Addressing the Asbury Plant

5.3.1. Introduction

This section 5.3 presents all the available air quality modeling information for portions of Jasper and Barton Counties that include or are close to Empire District Electric Company Asbury Plant. (These portions of Jasper and Barton Counties will often be referred to as "the Asbury area" or "the Jasper County and Barton County area" within this section 5.3.) This area contains the following SO_2 source around which Missouri was required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Asbury facility emits 2,000 tons or more annually. Specifically, Asbury emitted 6,318 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Missouri has chosen to characterize it via modeling.

In its submission, Missouri recommended that the area surrounding the Asbury facility be designated in the form of two separate attainment areas, specifically all of Jasper County and all of Barton County, based in part on an assessment and characterization of air quality impacts from this facility and other nearby sources that may have a potential impact in the area. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees with the state's conclusions that the areas do not violate the NAAQS and do not contribute to violations in a nearby area, and intends to designate these counties as separate unclassifiable/attainment areas. Our reasoning for this conclusion is explained in section 5.7 of this TSD, after all the available information is presented.

The area that the state has assessed via air quality modeling is located in Jasper and Barton Counties and also includes a portion of Cherokee and Crawford Counties in Kansas.

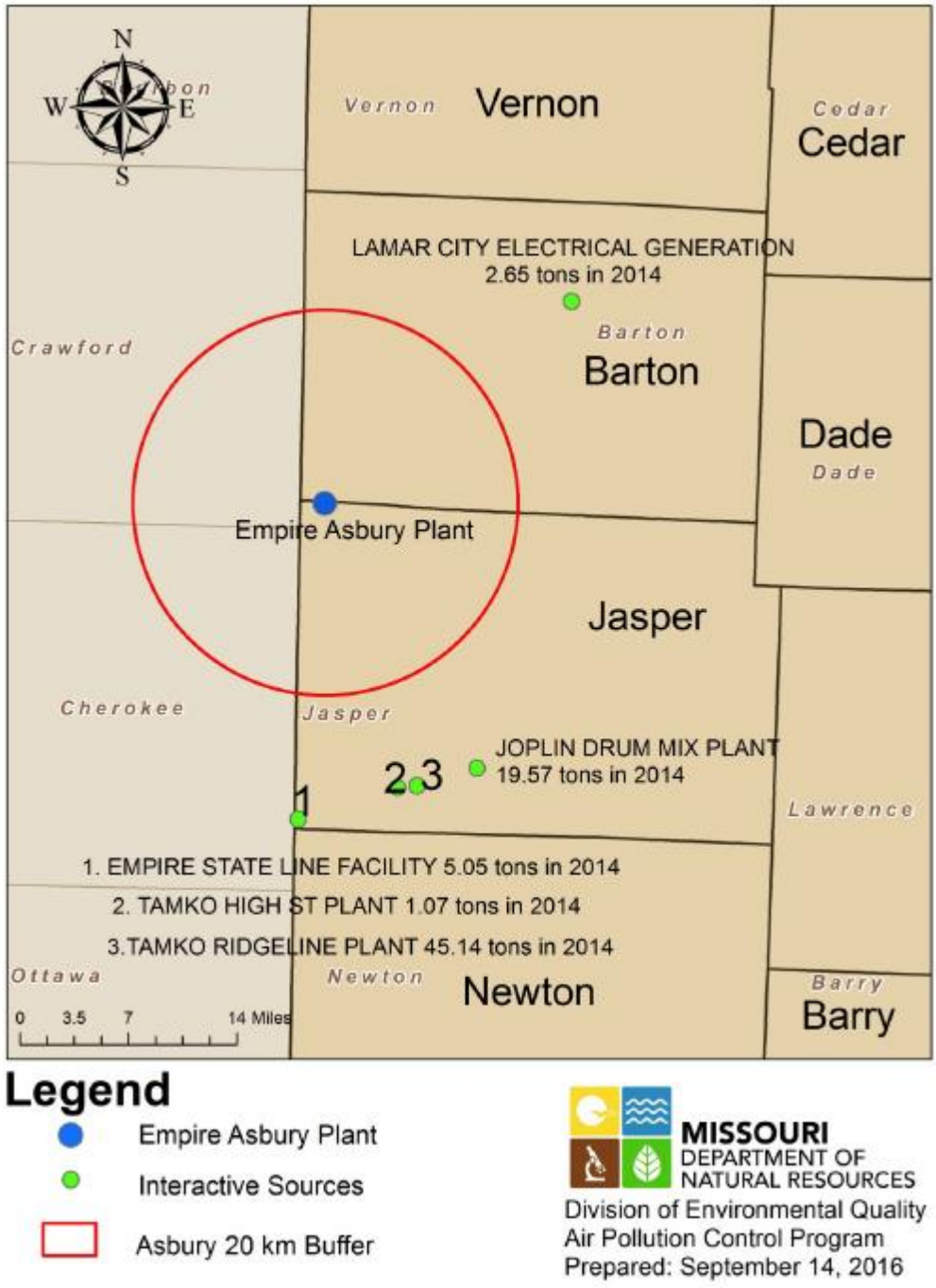
As seen in Figure 13 below, the Asbury facility is located in the northwestern portion of Jasper County approximately 32 km NNW of Joplin, Missouri.

Also included in the figure are other nearby (i.e., within approximately 30 km from Asbury) emitters of SO_2.[10] These include Lamar City Electrical Generation, APAC-Central Joplin Drum Mix Plant, Empire State Line Facility, Tamko Building Products Inc. High St. Plant, and Tamko Building Products Inc. Rangeline Plant, all of which are within Jasper and Barton Counties and, therefore, included in the modeling analysis.

The state's recommended areas for the attainment designations are all of Jasper County and all of Barton County, Missouri. The EPA's intended unclassifiable/attainment designation boundary for each of Jasper County and Barton County areas is the respective county boundary, which is shown in the figure.

[10] All other SO_2 emitters of 1 tpy or more based on information in the Missouri MOEIS inventory database are shown in Figure 13. 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.

Figure 13. Map of the Jasper County and Barton County Area Addressing Asbury 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 and no assessments from other parties.

5.3.2. Modeling Analysis Provided by the State

5.3.2.1. 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, which was the most recent version at the time of its submittal to the EPA. 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 is 16216r. Because the state did not utilize any beta options, including adjusted U*, it is not expected that the modeling results would be significantly different using the current version.

5.3.2.2. 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.

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 Guideline on Air Quality Models, Appendix W (January 2017) section 7.2.1 instructs users to define the urban or rural classification of the area considering land use and population density. The land use procedure in Appendix W section 7.2.1.1(b) classifies urban areas based on industrial, commercial, and residential land use over 50% within a 3 km radius of the source. The population density threshold of the 3 km radius surrounding each facility is compared to the urban threshold of 750 people per square kilometer. Both the land use and population density guidelines in Appendix W were used to assess the urban characteristics of the area and it was determined to be rural.

For the reasons above, the EPA agrees with the state for this component of the state's modeling.

5.3.2.3. 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 Jasper and Barton County area, the state has included five other emitters of SO_2 within 50 kilometers (km) of Asbury 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 Asbury, the other emitters of SO_2 included in the area of analysis include Lamar City Electrical Generation, APAC-Central Joplin Drum Mix Plant, Empire State Line Facility, Tamko Building Products Inc. High St. Plant, and Tamko Building Products Inc. Rangeline Plant. No other sources beyond 50 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:

- Center to 1 kilometer (km), receptors placed at 100m intervals
- 1km to 3.5km, receptors placed at 250m intervals
- 3.5km to 10km, receptors placed at 500m intervals
- 10km to 50km, receptors placed at 1000m intervals

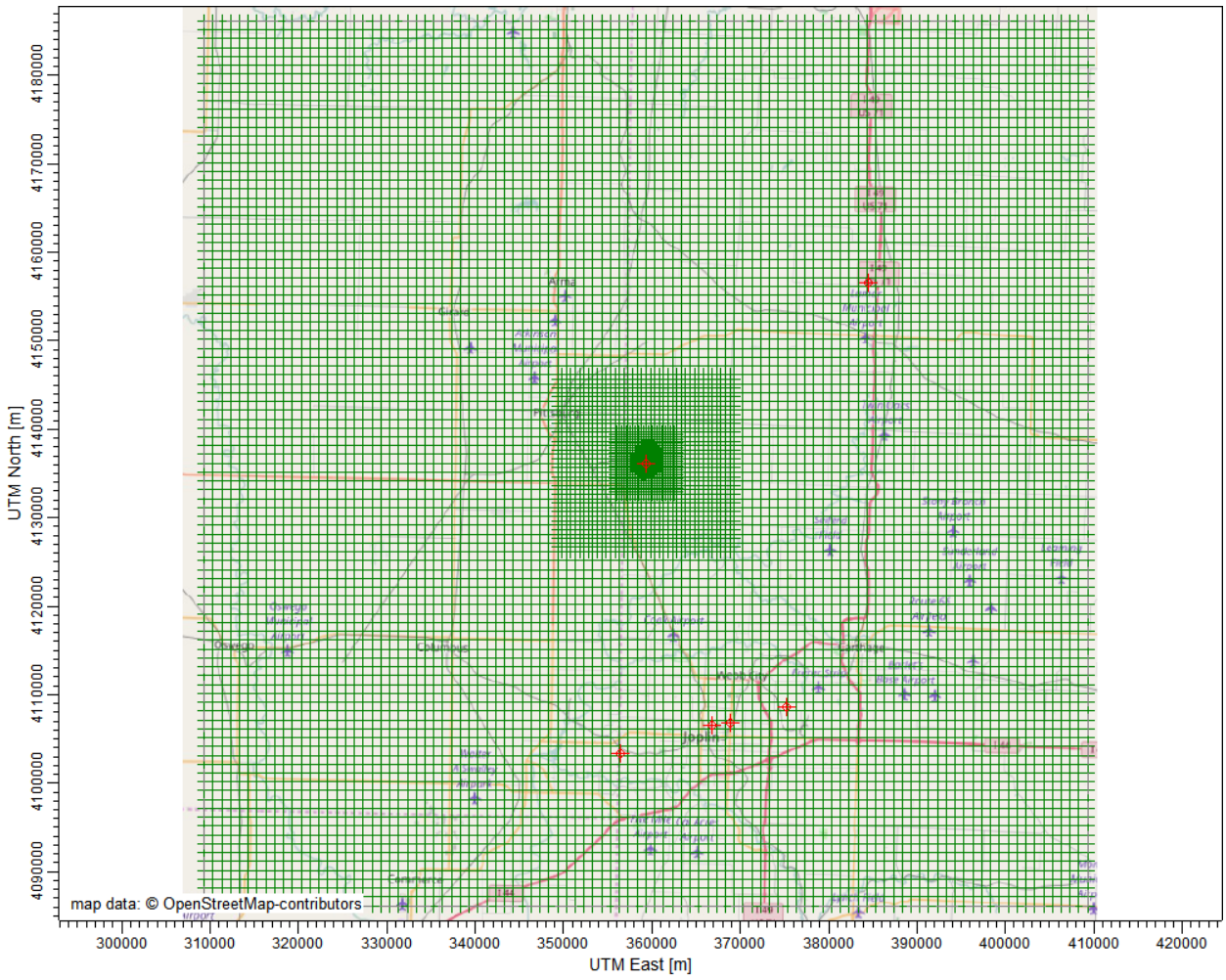
The receptor network contained 12,369 receptors, and the network covered all of Jasper and Barton Counties and a portion of Vernon, Cedar, Dade, Lawrence, and Barry Counties in Missouri. The receptor grid also includes all of Cherokee and Crawford along with portions of Bourbon, Allen, Neosho, Labette, Craig, and Ottawa Counties in Kansas.

Figure 14, included in the state's recommendation, shows the state's chosen area of analysis surrounding the Asbury facility, as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the state placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to the Asbury plant, including other facilities' property. The state did not exclude any receptors over water or on other facilities property. The state did not exclude receptors over water or in other areas as described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor. The state has excluded receptors within the facility fenceline and EPA reviewed aerial and street view imagery for this fenceline. The facility is in a remote area and limited fencing

was visible from the available street view. Although the modeling TAD recommends placing receptors in areas where the public has access and Missouri did not do so, the EPA believes that, due to the fact that the stack is relatively tall and the modeled design value is about 52% of the standard, the expected modeled concentrations of any receptor placed in these areas would not be above the NAAQS.

Figure 14: Receptor Grid for the Jasper County and Barton County Area



The EPA concludes that the receptors used in the Missouri submittal are appropriate for characterizing the air quality around the Asbury Plant.

5.3.2.4. 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 state included Asbury and all sources within 50 km of Asbury Plant.

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. However, the emission rates the state used in the modeling analysis for nearby sources were incorrect. These modeled emission rates are further discussed in Section 5.3.2.5. 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.

5.3.2.5. 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 effective and enforceable.

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 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 Asbury and five other emitters of SO_2 within 50 km in the area of analysis. The facilities in the state's modeling analysis and their associated annual actual SO_2 emissions between 2012 and 2014 are summarized below.

For all the modeled facilities, the state provided annual actual SO_2 emissions between 2012 and 2014. This information is summarized in Table 10. A description of how the state obtained hourly emission rates is given below this table.

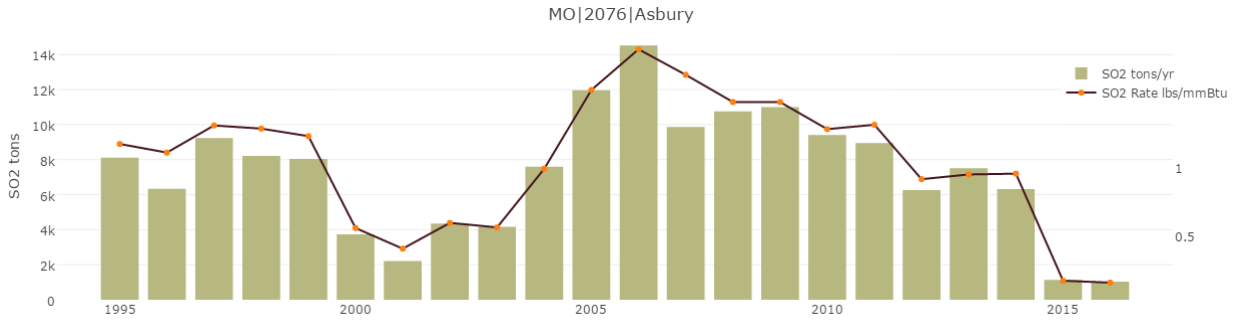
Table 10. Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Jasper County and Barton County Area

Facility Name	SO_2 Emissions (tpy)		
	2012	2013	2014
Empire District Asbury Plant	6,261	7,506	6,318
Lamar City Electrical Generation	1.9	2.9	2.6
APAC-Central Joplin Drum Mix Plant	0	0	19.6
Empire State Line Facility	4.4	4.9	5.1
Tamko Building Products Inc. High St. Plant	1.1	1.0	1.1
Tamko Building Products Inc. Rangeline Plant	47.9	41.6	45.1
Total Emissions from All Modeled Facilities in the State's Area of Analysis	6,316	7,556	6,392

For Asbury, the actual hourly emissions data were obtained from CEMS as reported to CAMD. The EPA notes that the Asbury plant installed a flue gas desulfurization system in 2014 and, as of 2015, the annual SO_2 emissions and hourly emission rate from the Asbury plant have dropped when compared to historic emissions, as shown in Figure 15 below.

For the remaining sources, the state indicated in its December 2016 submittal that the 2014 annual emissions from these sources would be spread over the 2014 hours of operation at each facility to represent the hourly emissions in the modeling. The emissions rates the state ultimately used in the modeling analysis were below the values that would result from the state's approach. However, the EPA has determined that since the emissions of the nearby sources are relatively small (~ 1% of Asbury 2014 emissions) and are located over 30 km away from Asbury; their impacts on the modeled concentrations would not impact NAAQS compliance around Asbury, as the modeled design value for the Asbury facility is 52% of the NAAQS.

Figure 15 Asbury SO_2 emission trend by year, 1995-2016



5.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

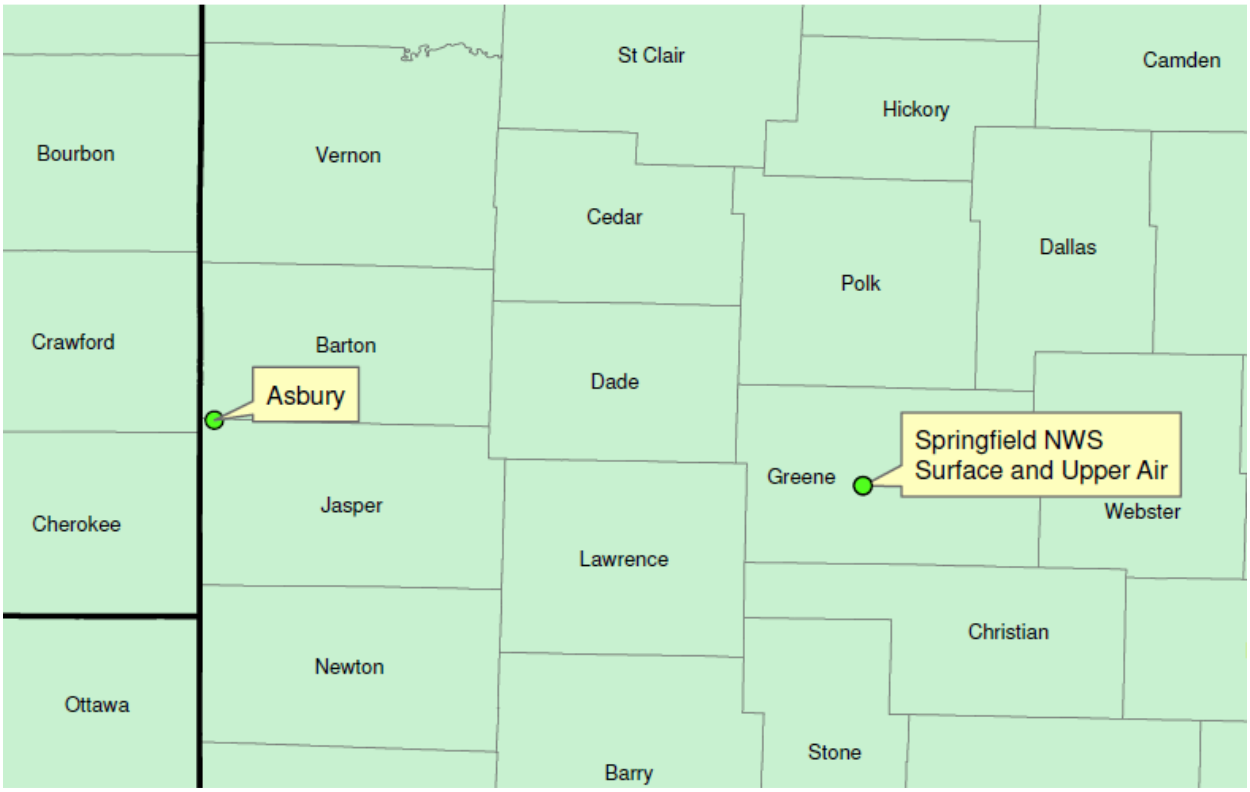
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of 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 Jasper County and Barton County area, the state selected the surface meteorology from the Springfield NWS station, located in Springfield, Missouri, located at 37.2397616, -93.3899533, 107 km to the ESE of the source, and coincident upper air observations from the same NWS station as best representative of meteorological conditions within the area of analysis.

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

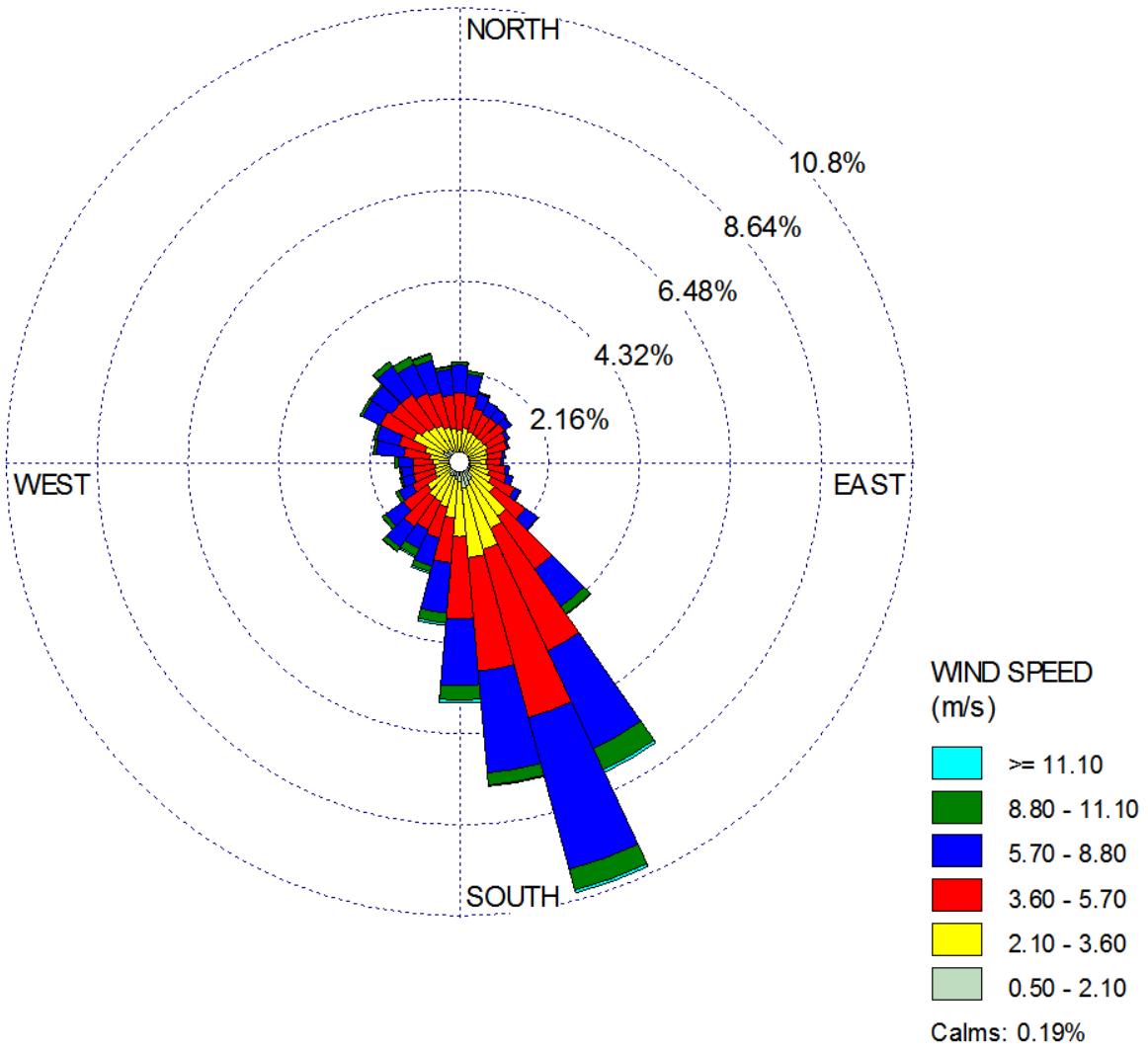
In Figure 16 below, generated by the EPA, the location of this NWS station is shown relative to the area of analysis.

Figure 16. Area of Analysis and the NWS station in the Jasper County and Barton County Area



As part of its recommendation, the state provided the 3-year surface data from which the EPA generated a wind rose for the Springfield NWS station site. In Figure 17, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The predominant wind patterns are from the SSW.

Figure 17: Jasper County and Barton County Area Cumulative Annual Wind Rose for Years 2012 – 2014.



Meteorological data from the above surface and upper air NWS station was 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 SO_2 modeling TAD guidance, as outlined in its modeling protocol, in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

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

The EPA concludes the processing of meteorological data follows the EPA guidance and is representative of meteorological conditions around Asbury for purposes of designations modeling. The Springfield NWS station had a 99.9% data availability, with 0.2% calms identified. In addition, there are 20 incomplete or missing records from the total 26,306 hours available. From the wind rose, the EPA concludes hourly impacts will occur in all directions with predominant transport of emissions to the NNW based on higher frequency of SSE winds.

5.3.2.7. 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 National Elevation Database.

The EPA agrees with Missouri's treatment of terrain within AERMOD and finds it followed established guidance for terrain processing.

5.3.2.8. 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 chose a tier 1 approach using the regional background for rural areas within the state that was based off an analysis of the East St. Louis monitor in Illinois. This was the same background methodology used for rural areas in the 1st round nonattainment and second round of designations. The background concentration for this area of analysis was determined by the state to be 23.6 micrograms per cubic meter ($\mu g/m^3$), equivalent to 9 ppb when expressed to three significant figures,[11] and that value was incorporated into the final AERMOD results. This value is similar to the Mark Twain State Park monitor (AQS Site ID: 29-137-0001) where the 3-year design value for 2013-2015 is 8 ppb.

The EPA concludes a background value of 9 ppb is acceptable for this area as no other large SO_2 emitters are near Asbury. The EPA again notes that 9 ppb is similar to the design value of the Mark Twain State Park monitor, which is also located in a rural area in Missouri.

[11] 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 $\mu g/m^3$.

5.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Jasper and Barton 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 Jasper County and Barton County Area

Input Parameter	Value
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	6
Modeled Stacks	12 stacks
Modeled Structures	30
Modeled Fencelines	1
Total receptors	12,369
Emissions Type	Actual hourly for Asbury
Emissions Years	2012-2014
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Springfield NWS
NWS Station Upper Air Meteorology	Springfield NWS
NWS Station for Calculating Surface Characteristics	Springfield NWS
Methodology for Calculating Background SO_2 Concentration	Tier 1 based on design value, for 2013-2015, East St. Louis, IL monitor – Rural representative analysis
Calculated Background SO_2 Concentration	9 ppb

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

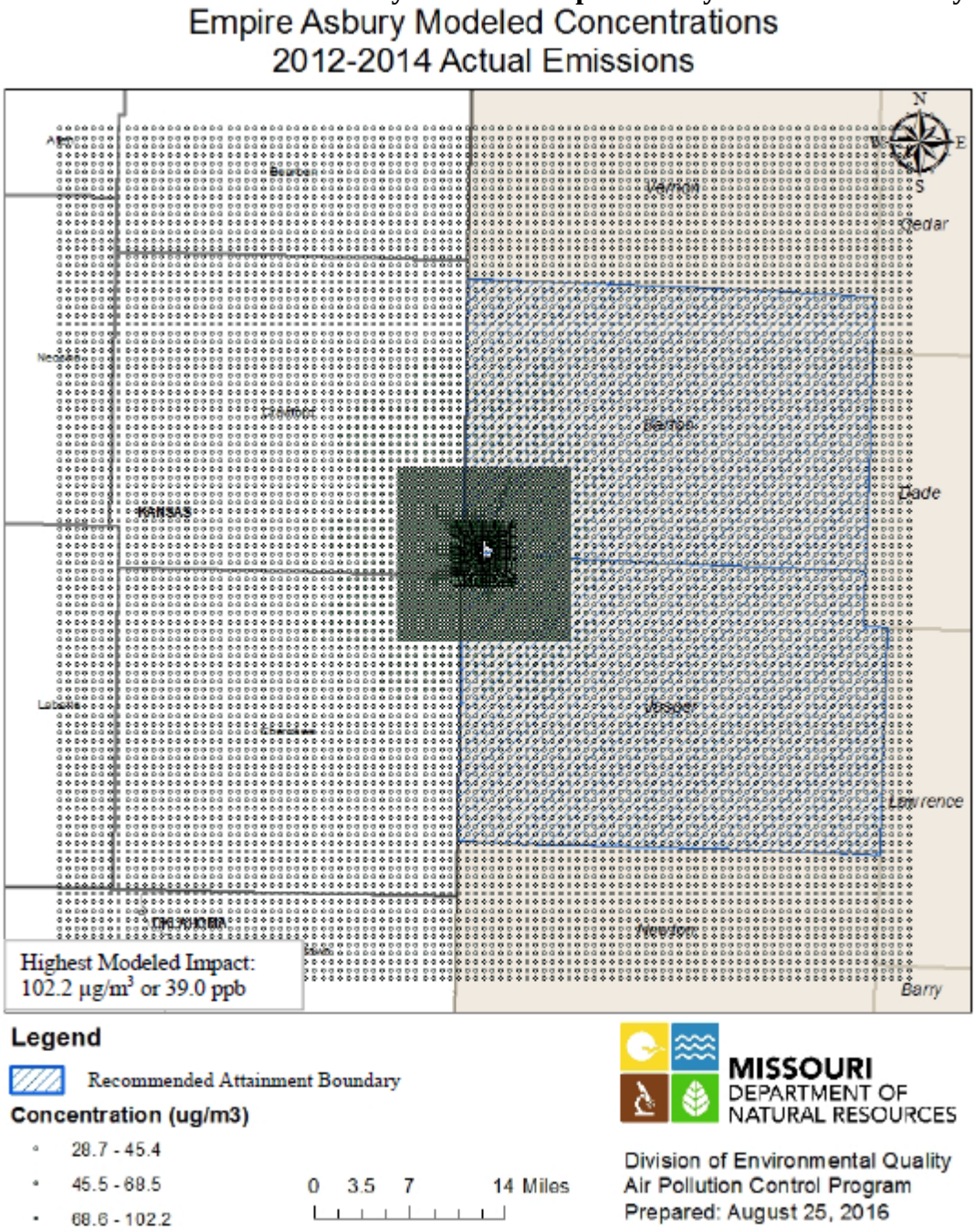
Table 12. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Area of Analysis for the Jasper County and Barton County Area

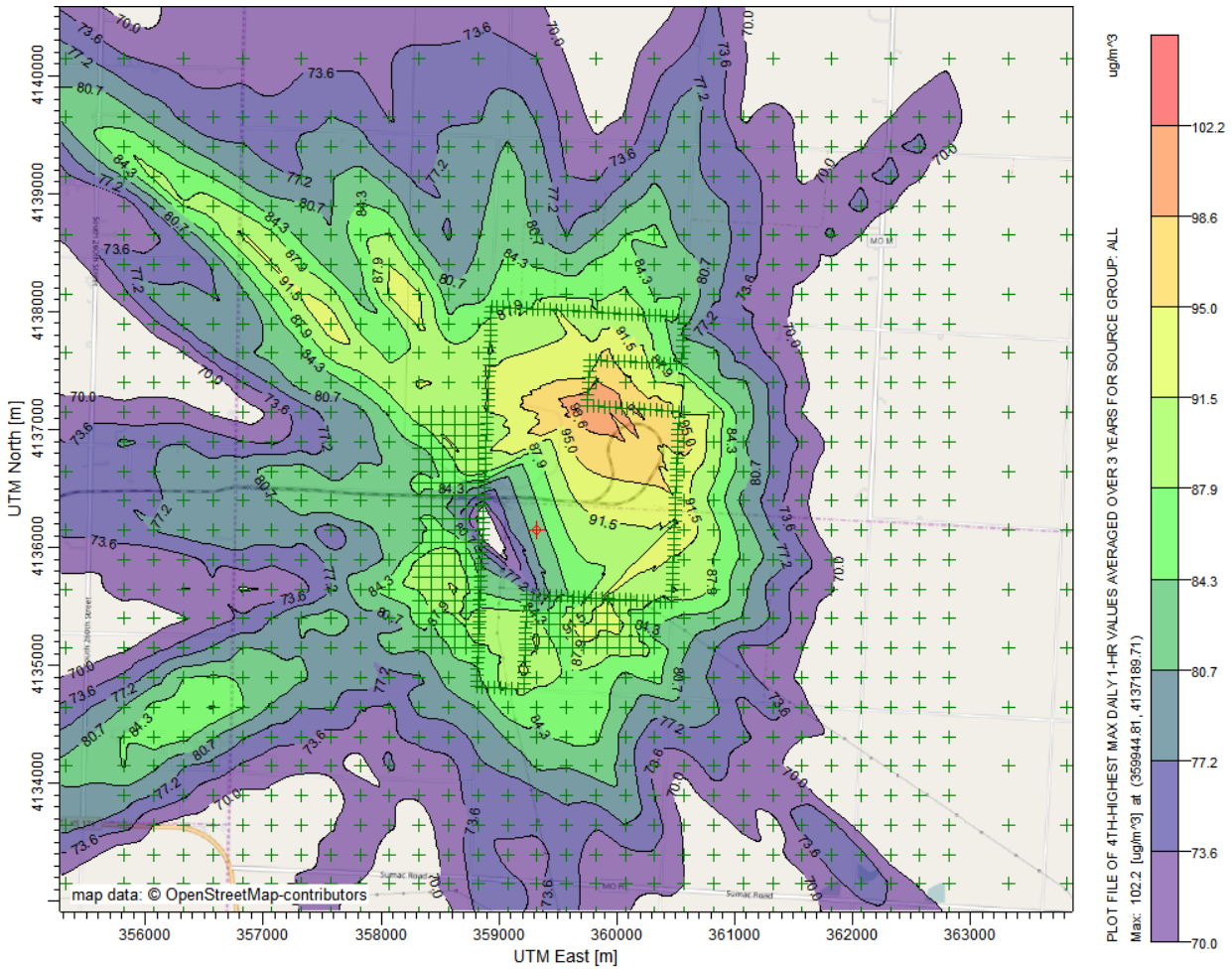
Averaging Period	Data Period	Receptor Location [UTM zone 15]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM	UTM	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012-2014	359944.81	4137189.71	102.2	196.4*

*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 102.2 $\mu g/m^3$, equivalent to 39.0 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from Asbury. Figure 18 below was included as part of the state's recommendation, and indicates that the highest predicted value occurred along the northeast portion of the Asbury facility fence line approximately 1190 meters from the Asbury stack. The state's receptor grid is also shown in the figure.

Figure 18: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Area of Analysis for the Jasper County and Barton 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. The modeled concentrations are decreasing as the edge of the receptor grid is approached. There are no SO_2 sources greater than 50 tons per year within 50 km of Asbury and these results indicate Asbury will not contribute to any violations in nearby areas. Also, all SO_2 sources below 50 tons per year were included in the modeling analysis.

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

The state has performed modeling according to the EPA modeling TAD using actual hourly emissions and varying stack parameters for exit velocity and temperatures from the Asbury Plant along with an acceptable background concentration of 9 ppb. The EPA did not find any departures from the modeling TAD in the modeling the state provided.

5.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for Jasper County and Barton County

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

5.5. Jurisdictional Boundaries in the Jasper County and Barton County Areas

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

Missouri has recommended the entirety of Jasper County and the entirety of Barton County, Missouri, be designated attainment based upon the state's modeling analysis demonstrating attainment within these counties and surrounding areas.

5.6. Other Information Relevant to the Designations for the Jasper and Barton County Area

The EPA has not identified any other information relevant to our designation for this area. No additional 3rd party modeling or analysis was received.

5.7. The EPA's Assessment of the Available Information for the Jasper and Barton County Area

The state has submitted modeling demonstrating the entirety of Jasper and Barton Counties is meeting the NAAQS and the EPA believes the modeling conforms to the modeling TAD, with the emission rates used for nearby sources as previously discussed. The state has addressed all sources within and surrounding the area of analysis that would potentially impact the analysis area. MDNR modeling also indicates no sources within Jasper or Barton Counties will contribute to violations in nearby counties, including Kansas counties to the west, and no sources in the surrounding counties were identified that would together cause a violation in either Jasper or Barton Counties. The EPA agrees with the state modeling assessment.

The EPA believes that our intended separate unclassifiable/attainment areas, bounded by the Jasper County lines and the Barton County lines, 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.

5.8. Summary of Our Intended Designation for the Jasper County Area and the Barton County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate Jasper County and Barton County, Missouri, as separate unclassifiable/attainment areas for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Jasper County and the entirety of Barton County, respectively.

Figure 19 shows the boundaries of these intended designated areas.

Figure 19. Boundaries of the Intended Jasper County and Barton County Unclassifiable/Attainment Areas

At this time, our intended designations for the state only apply to these areas area 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 Missouri by December 31, 2020.

6. Technical Analysis for the Randolph County Area

6.1. Introduction

The EPA must designate the Randolph County, Missouri, area by December 31, 2017, because no portion of the county has been previously designated and Missouri has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of AECI Thomas Hill Energy Center Power Division or any other source.

6.2. Air Quality Monitoring Data for the Randolph County Area

The state does not have any existing SO_2 monitoring data in Randolph County, Missouri.

6.3. Air Quality Modeling Analysis for the Randolph County Area Addressing the Thomas Hill Energy Center

6.3.1. Introduction

This section 6.3 presents all the available air quality modeling information for Randolph County with a focus on the Thomas Hill Energy Center. (This portion of Randolph County will often be referred to as "the Thomas Hill Energy Center area" or "the Randolph County area" within this section 6.3.) This area contains the following SO_2 source around which Missouri was required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Thomas Hill Energy Center facility emits 2,000 tons or more annually. Specifically, the Thomas Hill facility emitted 16,602 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Missouri has chosen to characterize it via modeling.

In its submission, Missouri recommended that an area that includes the area surrounding the Thomas Hill facility, specifically all of Randolph County, be designated as attainment based in part on an assessment and characterization of air quality impacts from this facility and other nearby sources that may have a potential impact in the area. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees with the state's conclusions that the area does not violate the NAAQS and does not contribute to violations in a nearby area, and intends to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained in section 6.7 of this TSD, after all the available information is presented.

The area that the state has assessed via air quality modeling includes Randolph County and also includes portions of Linn, Macon, Shelby, Audrain, Boone, Howard, Saline, and Chariton Counties in Missouri.

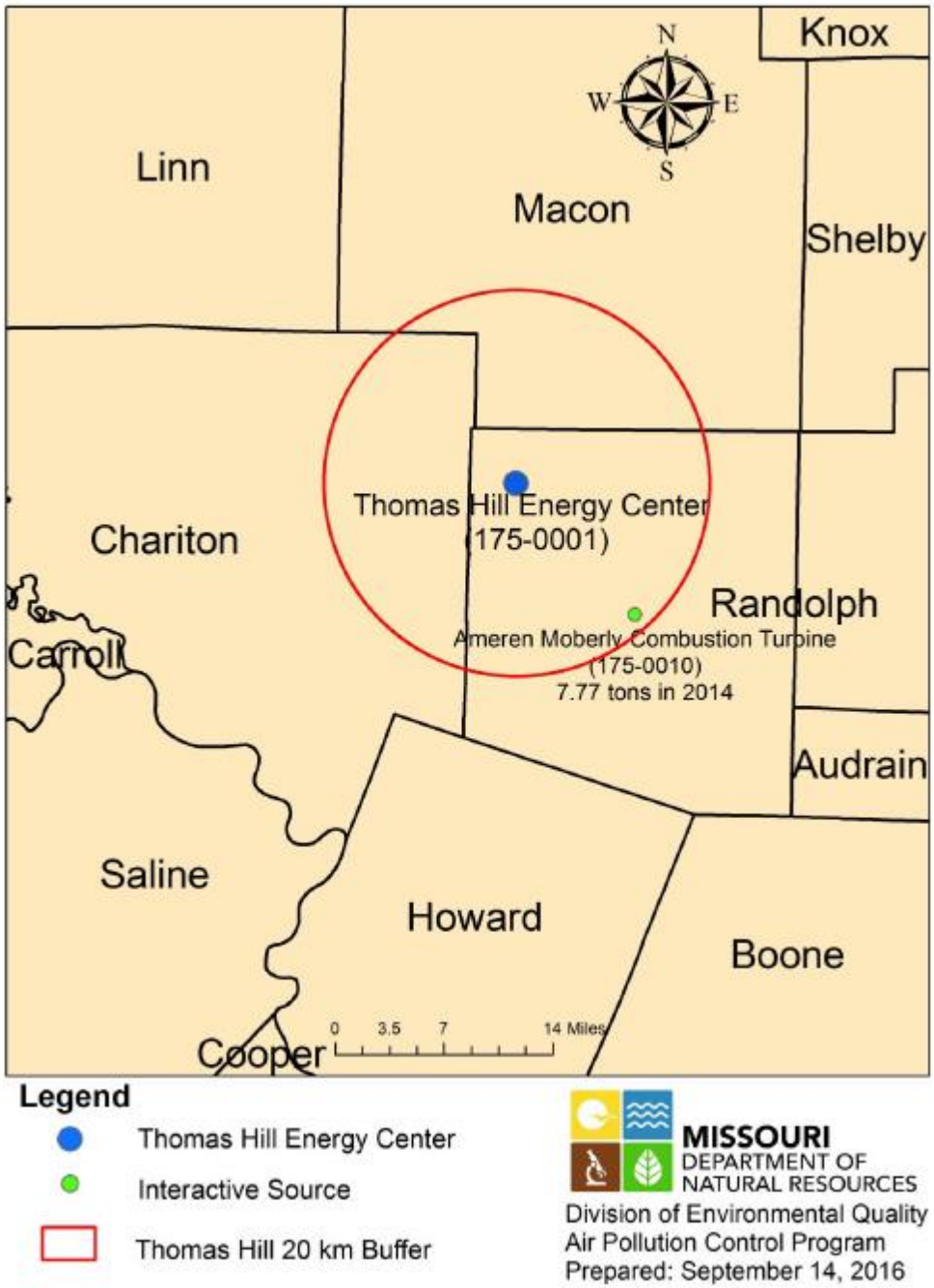
As seen in Figure 20 below, the Thomas Hill facility is located in the northwestern portion of Randolph County approximately 23 km NW of Moberly, Missouri, and just south of the Thomas Hill Reservoir.

Also included in the figure is another nearby emitter of SO_2, specifically Ameren Missouri – Moberly Combustion Turbine .[12] Ameren Missouri – Moberly Combustion Turbine is also located within Randolph County and was therefore included in the modeling analysis. Ameren Moberly Combustion Turbine is SE of Thomas Hill, approximately 19 km away.

The state's recommended area for the attainment designation is all of Randolph County, Missouri. The boundary for the EPA's intended Randolph County unclassifiable/attainment area is the county boundary, which is shown in this figure.

[12] All other SO_2 emitters of 1 tpy or more based on information in the Missouri MOEIS inventory database are shown in Figure 20. 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 sources.

Figure 20. Map of the Randolph County Area Addressing the Thomas Hill Energy Center



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 and no assessments from other parties.

6.3.2. Modeling Analysis Provided by the State

6.3.2.1. 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, which was the most recent version at the time of its submittal to the EPA. 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 is 16216r. Because the state did not utilize any beta options, including adjusted U*, it is not expected that the modeling results would be significantly different using the current version.

6.3.2.2. 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.

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 Guideline on Air Quality Models, Appendix W (January 2017) section 7.2.1 instructs users to define the urban or rural classification of the area considering land use and population density. The land use procedure in Appendix W section 7.2.1.1(b) classifies urban areas based on industrial, commercial, and residential land use over 50% within a 3 km radius of the source. The population density threshold of the 3 km radius surrounding each facility is compared to the urban threshold of 750 people per square kilometer. Both the land use and population density guidelines in Appendix W were used to assess the urban characteristics of the area and it was determined to be rural.

For the reasons above, the EPA agrees with the state for this component of the state's modeling.

6.3.2.3. 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 is described in the introduction to this section. For the Randolph County area, the state included one other emitter of SO_2 within 50 kilometers (km) of Thomas Hill 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 Thomas Hill, the other emitter of SO_2 included in the area of analysis is Ameren Moberly CT. No other sources beyond 50 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:

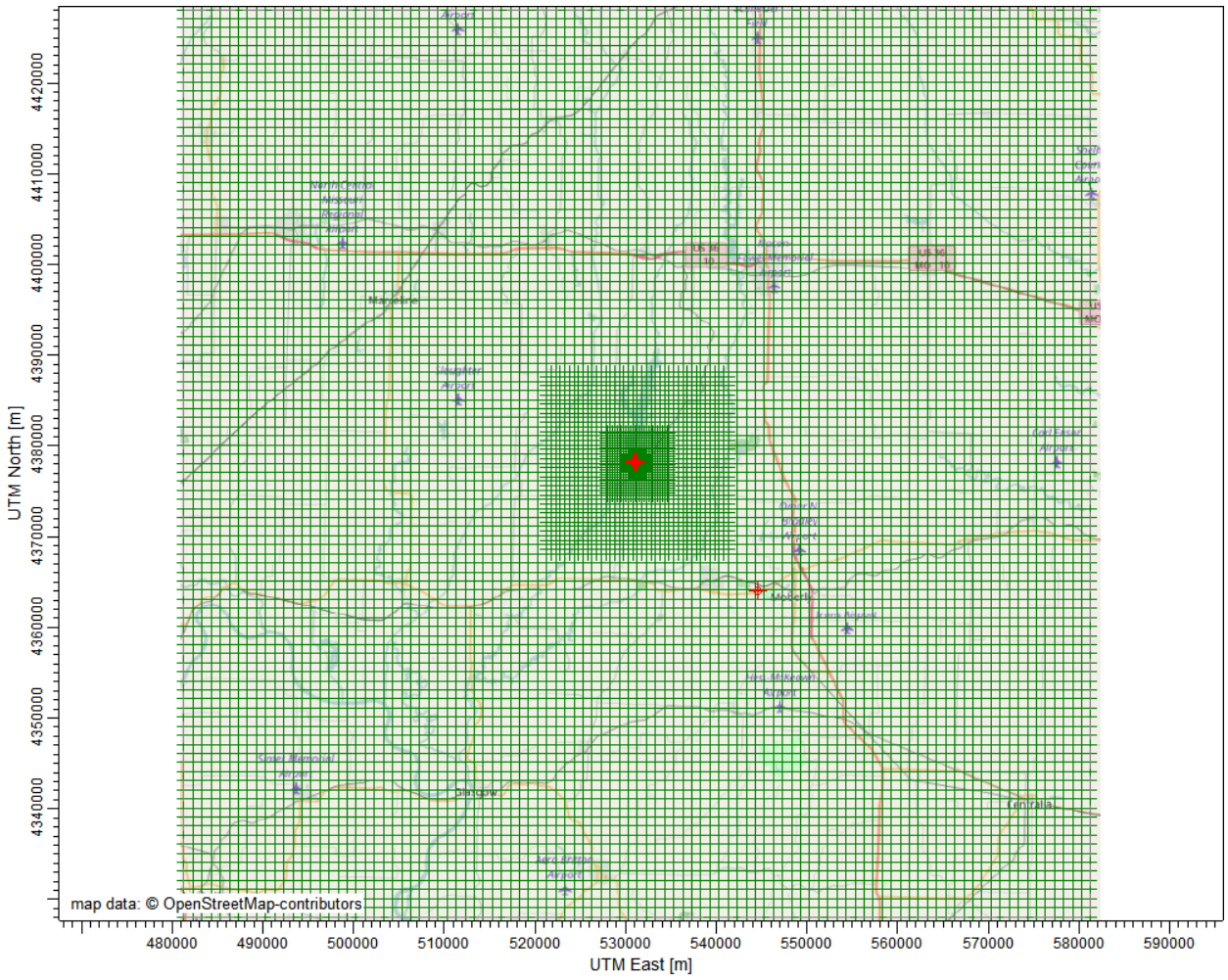
- Center to 1 kilometer (km), receptors placed at 100m intervals
- 1km to 3.5km, receptors placed at 250m intervals
- 3.5km to 10km, receptors placed at 500m intervals
- 10km to 50km, receptors placed at 1000m intervals

The receptor network contained 12,432 receptors, and the network covered all of Randolph County and also included portions of Linn, Macon, Shelby, Audrain, Boone, Howard, Saline, and Chariton counties in Missouri.

Figure 21, included in the state's recommendation, shows the state's chosen area of analysis surrounding the Thomas Hill facility, as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the state placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to the Thomas Hill facility, including other facilities' property. Missouri did not exclude any receptors over other facilities property. The state did not exclude receptors over water or in other areas as described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor. The state has excluded receptors within the facility fenceline and EPA reviewed aerial and street view imagery for this fenceline. The facility is in a remote area and no fencing was visible from the available street view from a distance. The aerial view does appear to show a fence, although the type or nature is not discernable. The EPA believes it is justified to exclude these receptors based on the available information. In addition, the peak maximum modeled concentrations are beyond the outer edge of the area of excluded receptors.

Figure 21: Receptor Grid for the Thomas Hill Area



The EPA concludes that the receptors used in the Missouri submittal are appropriate for characterizing the air quality around the Thomas Hill Energy Center.

6.3.2.4. 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 state included Thomas Hill and all sources within 50 km of Thomas Hill Energy Center.

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.

The EPA concludes the state has identified and included in the modeling all emissions sources that may contribute to ambient SO_2 concentrations, including all relevant sources located in Randolph County, the proposed unclassifiable/attainment area.

6.3.2.5. 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 effective and enforceable.

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 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 Thomas Hill and one other emitter of SO_2 within 50 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 these facilities, the state provided annual actual SO_2 emissions between 2013 and 2015. This information is summarized in Table 13. A description of how the state obtained hourly emission rates is given below this table.

Table 13. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Randolph County Area

Facility Name	SO_2 Emissions (tpy)		
	2013	2014	2015
Thomas Hill	17,437	16,602	15,727
Ameren Moberly Combustion Turbine	2.6	7.8	0.0
Total Emissions from All Modeled Facilities in the State's Area of Analysis	17,440	16,610	15,727

For Thomas Hill, the actual hourly emissions data were obtained from CEMS as reported to CAMD. For Ameren Moberly Combustion Turbine, the state apportioned the reported 2014 annual emissions, the highest of the 3 years, over 8,760 hours and used that rate as representative for all 3 years in the modeling. Spreading annual emissions across all hours in a year may not be appropriate in many cases, however in this case given the low annual emissions reported, and the lack of additional temporalization information, this method is acceptable.

6.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

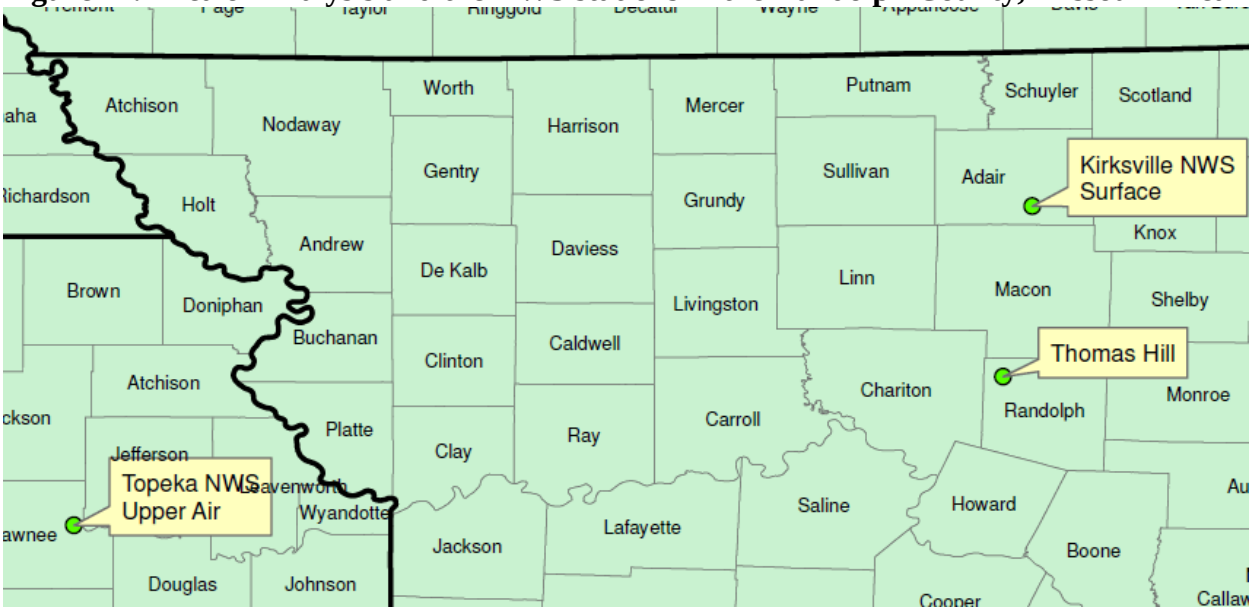
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of 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 Randolph County area, the state selected the surface meteorology from the NWS station at the Kirksville Regional Airport, MO, located south of Kirksville, Missouri, located at 40.0966156, -92.5469565, 61 km to the NNE of the source, and coincident upper air observations from a different NWS station, located in Topeka, Kansas, located at +39.073 -095.626, 262 km to the WSW of the source as best representative of meteorological conditions within the area of analysis.

The state used AERSURFACE version 13016 using data from the Kirksville NWS station to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness (z_o)) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "z_o" The state estimated surface roughness values for 12 spatial sectors out to 1 km at a seasonal temporal resolution for dry, wet, and average] conditions.

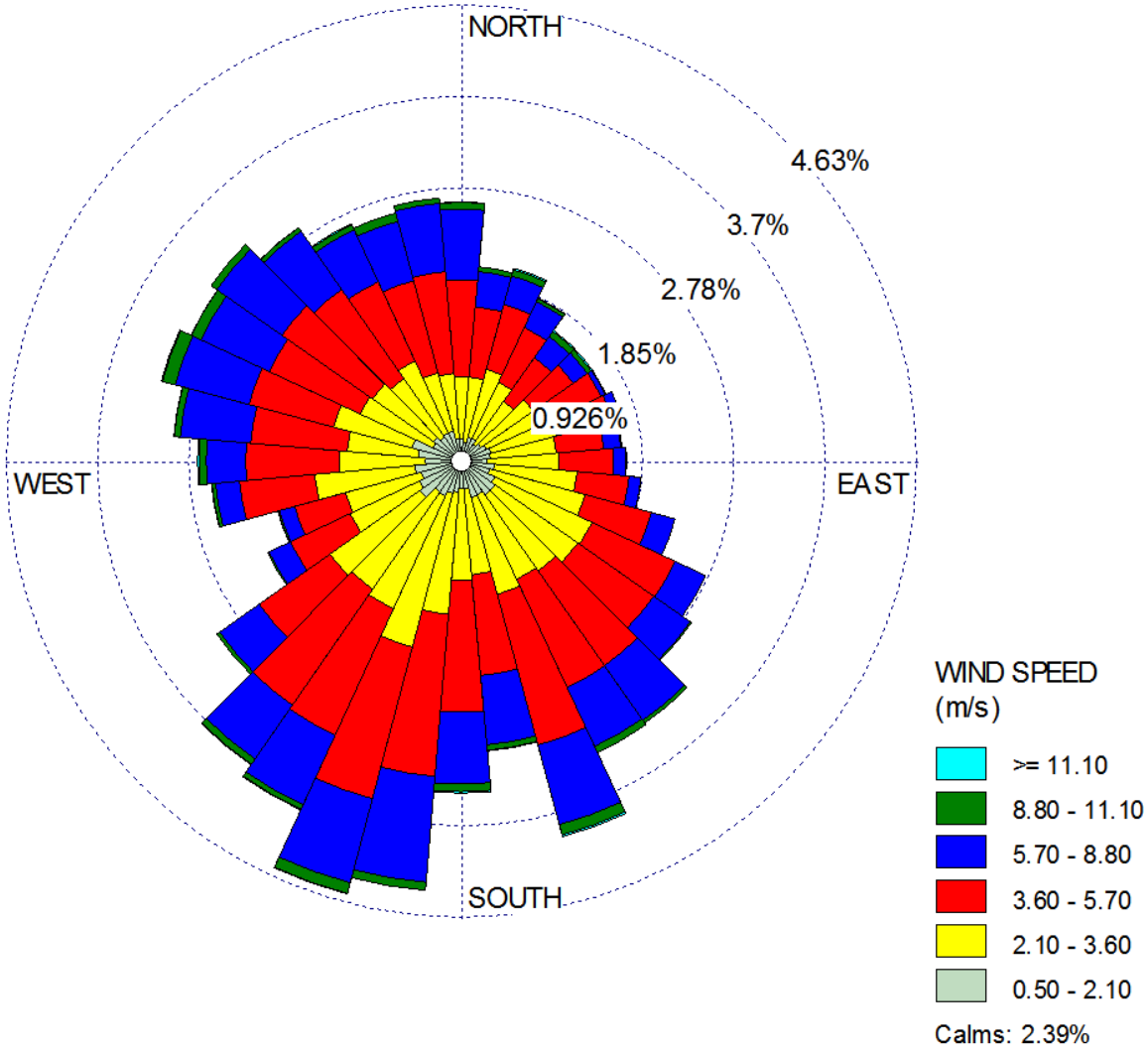
In Figure 22 below, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 22. Area of Analysis and the NWS stations in the Randolph County, Missouri Area



As part of its recommendation, the state provided the 3-year surface data from which the EPA generated a wind rose for the Kirksville NWS station. In Figure 23, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The predominant wind patterns are from the SSW with high frequencies also from the NW and SE.

Figure 23: Randolph County Area Cumulative Annual Wind Rose for Years 2013 – 2015.



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET 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 SO_2 modeling TAD guidance, as outlined in its modeling protocol, in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

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

The EPA concludes the processing of meteorological data follows the EPA guidance and is representative of meteorological conditions around Thomas Hill for purposes of designations modeling. The Kirksville NWS station had a 92.2% data availability, with 2.4% calms identified.

6.3.2.7. 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 National Elevation Database.

The EPA agrees with Missouri's treatment of terrain within AERMOD and finds it followed established guidance for terrain processing.

6.3.2.8. 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 chose a tier 1 approach using the regional background for rural areas within the state that was based off an analysis of the East St. Louis monitor in Illinois. This was the same background methodology used for rural areas in the 1st round nonattainment SIP development modeling and second round of designations. The background concentration for this area of analysis was determined by the state to be 23.6 micrograms per cubic meter ($\mu g/m^3$), equivalent to 9 ppb when expressed to three significant figures,[13] and that value was incorporated into the final AERMOD results. This value is similar to the Mark Twain State Park monitor (AQS Site ID: 29-137-0001) where the 3-year design value for 2013-2015 is 8 ppb.

The EPA concludes a background value of 9 ppb is acceptable for this area as no other large SO_2 emitters are near Thomas Hill. The EPA again notes that 9 ppb is similar to the design value of the Mark Twain State Park monitor, which is also located in a rural area in Missouri.

[13] 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 $\mu g/m^3$.

6.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Randolph County area of analysis are summarized below in Table 14.

Table 14: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Randolph County Area

Input Parameter	Value
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	5 stacks
Modeled Structures	29
Modeled Fencelines	1
Total receptors	12,432
Emissions Type	Actual hourly for Thomas Hill, highest actual annual for Ameren Moberly Combustion Turbine
Emissions Years	2013-2015 for Thomas Hill, 2014 for Ameren Moberly CT
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	Kirksville, MO NWS
NWS Station Upper Air Meteorology	Topeka, KS NWS
NWS Station for Calculating Surface Characteristics	Kirksville NWS
Methodology for Calculating Background SO_2 Concentration	Tier 1 based on design value, for 2013-2015, East St. Louis, IL monitor – Rural representative analysis
Calculated Background SO_2 Concentration	9 ppb

The results presented below in Table 15 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

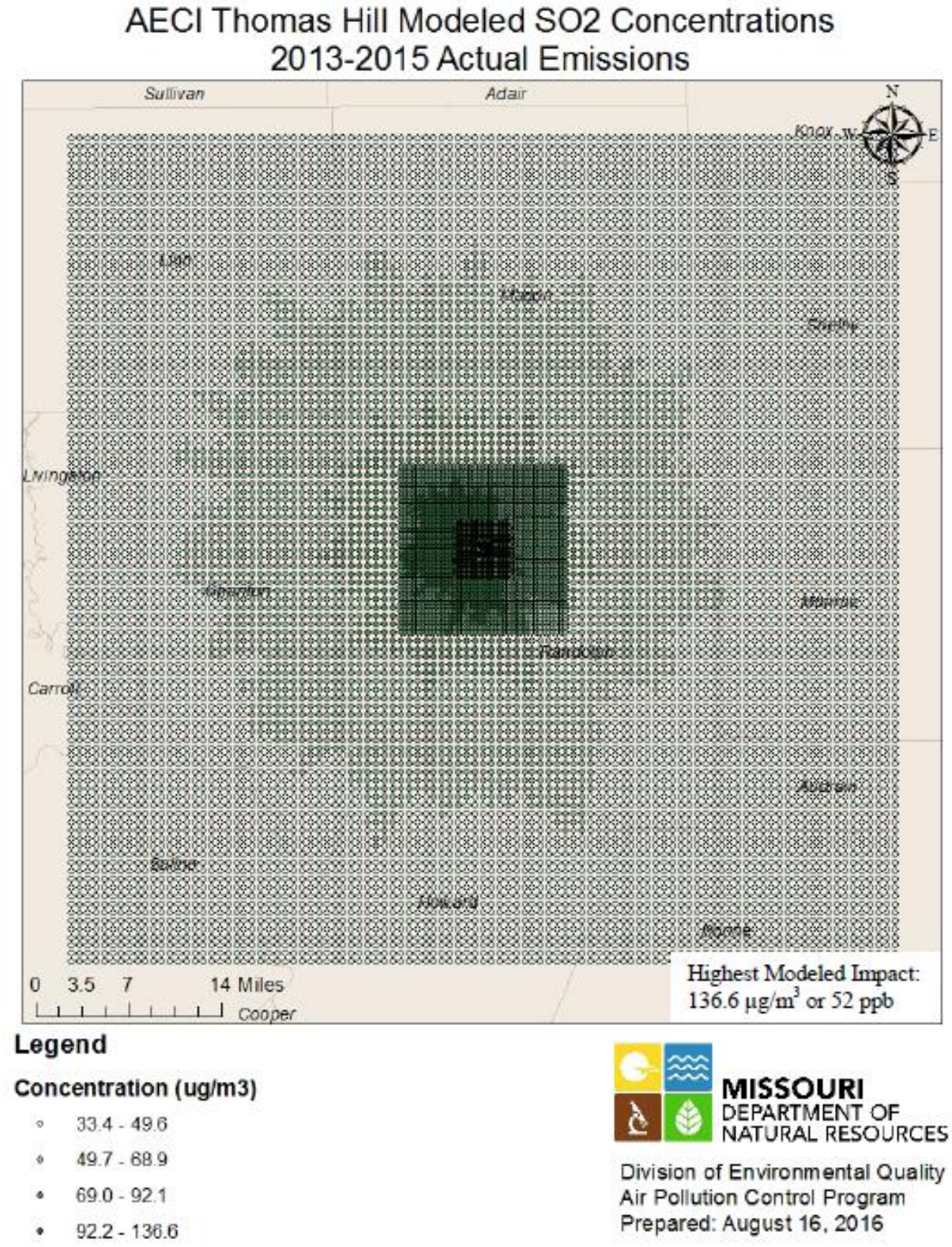
Table 15. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Area of Analysis for the Randolph County Area

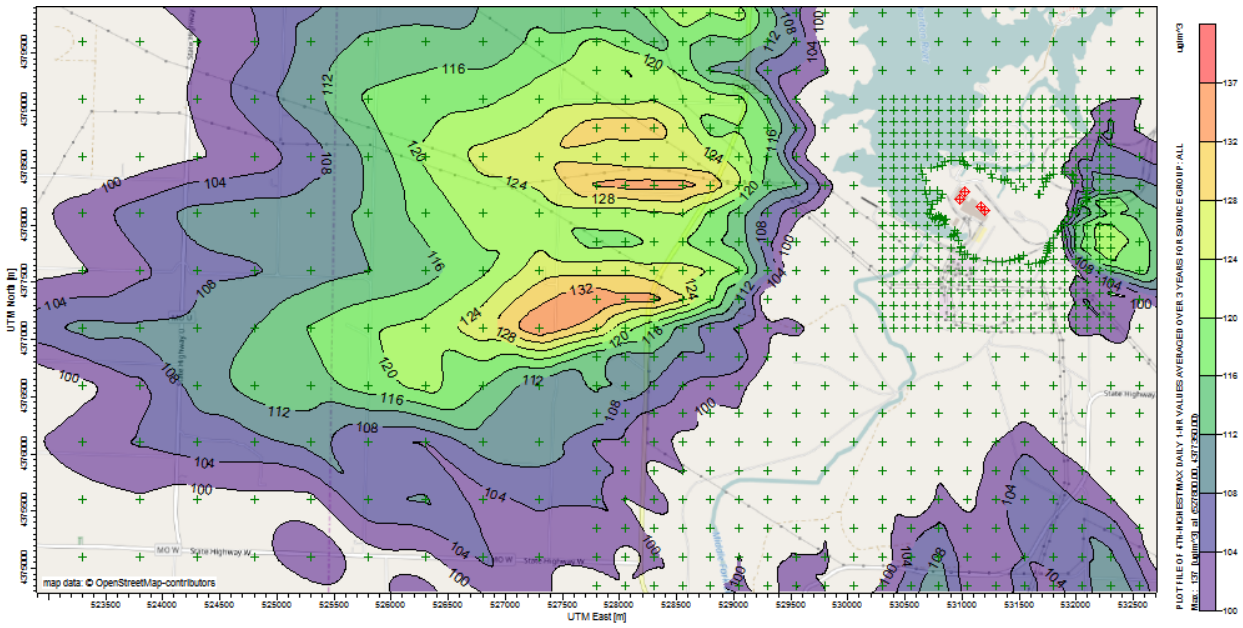
Averaging Period	Data Period	Receptor Location [UTM zone 15]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM	UTM	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2013-2015	527800.00	4377350.00	136.6	196.4*

*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 136.6 $\mu g/m^3$, equivalent to 52.2 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facilities. Figure 24 below was included as part of the state's recommendation, and indicates that the highest predicted value occurred to the WSW of the Thomas Hill facility fence line approximately 3.4 km from the stacks. The state's receptor grid is also shown in the figure.

Figure 24: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Area of Analysis for the Randolph 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. The modeled concentrations are decreasing as the edge of the receptor grid is approached. There are no SO_2 sources greater than 8 tons per year within 50 km of Thomas Hill and the closet greater than 100 tons per year SO_2 source is 72 km away. These results indicate Thomas Hill will not contribute to any violations in nearby areas.

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

The state has performed modeling according to the EPA modeling TAD using actual hourly emissions and varying stack parameters for exit velocity and temperatures from the Thomas Hill Energy Center along with an acceptable background concentration of 9 ppb. The EPA did not find any departures from the modeling TAD in the modeling the state provided.

6.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Randolph County Area

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

6.5. Jurisdictional Boundaries in the Randolph County Area

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

Missouri has recommended the entirety of Randolph County, Missouri, be designated attainment based upon the state's modeling analysis demonstrating attainment within this county and surrounding areas.

6.6. Other Information Relevant to the Designations for the Randolph County Area

The EPA has not identified any other information relevant to our designation for this area. No additional 3rd party modeling or analysis was received.

6.7. The EPA's Assessment of the Available Information for the Randolph County Area

The state has submitted modeling demonstrating the entirety of Randolph County is meeting the NAAQS and the EPA believes the modeling conforms to the modeling TAD. The state has addressed all sources within and surrounding the area of analysis that would potentially impact the analysis area. MDNR modeling also indicates no sources within Randolph County will contribute to violations in nearby counties and no sources in the surrounding counties were identified that would together cause a violation in Randolph County. The EPA agrees with the state modeling assessment.

The EPA believes that our intended unclassifiable/attainment area, bounded by the Randolph County lines, 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.

6.8. Summary of Our Intended Designation for the Randolph County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate Randolph County as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Randolph County, Missouri.

Figure 25 shows the boundary of this intended unclassifiable/attainment area.

Figure 25. Boundary of the Intended Randolph County Unclassifiable/Attainment Area

At this time, our intended designations for the state only apply to this area 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 Missouri by December 31, 2020.

7. Technical Analysis for the Greene County Area

7.1. Introduction

The EPA must designate Greene County, Missouri, area by December 31, 2017, because no portion of the county has been previously designated and Missouri has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of the City Utilities of Springfield – John Twitty Energy Center or any other source.

7.2. Air Quality Monitoring Data for the Greene County Area

The state has indicated that it does not have any existing SO_2 monitoring data in Greene County that would represent maximum impacts from the John Twitty Energy Center. The state has operated two monitors in Greene County historically, 29-077-0026 South Charleston and 29-077-0037 James-River South, both of which have a 2014-2016 design value of 17 ppb. Because the state indicated in its DRR submittal that these monitors were not in an area of expected maximum impact from the John Twitty facility, these monitors have not determined our intended designation for the Greene County area.

7.3. Air Quality Modeling Analysis for the Greene County Area Addressing the John Twitty Energy Center

7.3.1. Introduction

This section 7.3 presents all the available air quality modeling information for Greene County, with a focus on John Twitty Energy Center. (This portion of Greene County will often be referred to as "the John Twitty Energy Center area" or "the Greene County area" within this section 7.3.) This area contains the following SO_2 source around which Missouri was required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The John Twitty Energy Center facility emits 2,000 tons or more annually. Specifically, John Twitty emitted 3,021 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Missouri has chosen to characterize it via modeling.

In its submission, Missouri recommended that an area that includes the area surrounding the John Twitty facility, specifically all of Greene County, be designated as attainment based in part on an assessment and characterization of air quality impacts from this facility and other nearby sources that may have a potential impact in the area. 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 intends to modify the state's recommendation and designate the area as unclassifiable. Our reasoning for this conclusion is explained in section 7.7 of this TSD, after all the available information is presented.

The area that the state has assessed via air quality modeling includes Greene County and also includes portions of Dade, Polk, Dallas, Webster, Christian, Stone, and Lawrence counties in Missouri.

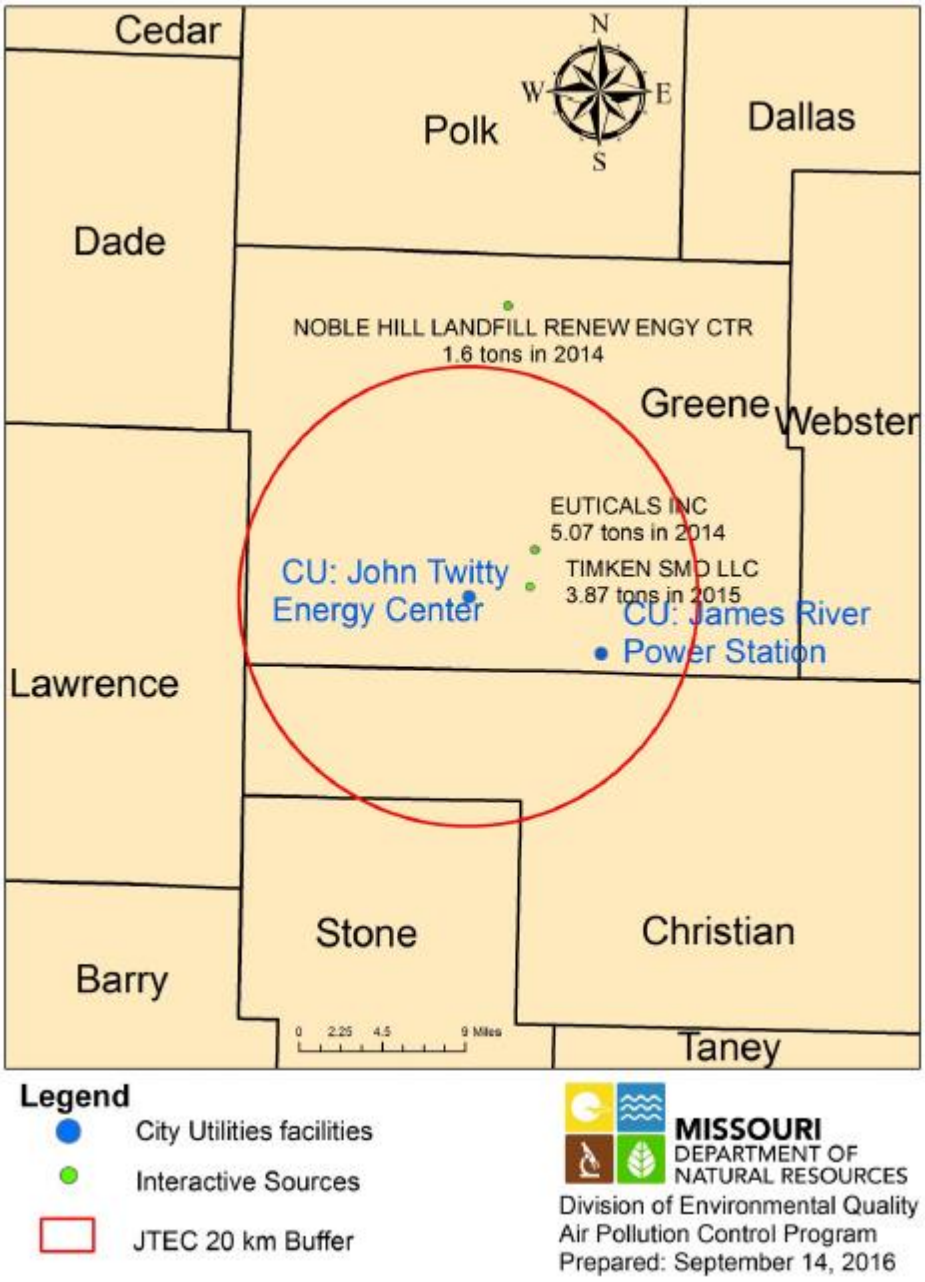
As seen in Figure 26 below, the John Twitty facility is located in the south central portion of Greene County approximately 11 km SW of downtown Springfield, Missouri.

Also included in the figure is another nearby emitter of SO_2, specifically the James River Power Plant.[14] James River and three smaller-emitting sources, Timken SMO LLC, Euticals Inc., and Noble Hill Landfill Renewable Energy Center are also located within Greene County and were therefore included in the modeling analysis. James River is ESE of John Twitty, approximately 12 km away. Note that Timken SMO LLC did not meet the criteria to be required to report emissions to the EPA NEI database and therefore did not report emissions to the NEI in 2014.

The state's recommended area for the attainment designation is all of Greene County, Missouri. The EPA's intended unclassifiable area designation boundary for Greene County is the county boundary, which is shown in the figure.

[14] All other SO_2 emitters of 1 tpy or more based on information in the Missouri MOEIS inventory database are shown in Figure 26. 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 26. Map of the Greene County Area Addressing the John Twitty Energy Center



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 and no assessments from other parties.

7.3.2. Modeling Analysis Provided by the State

7.3.2.1. 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, which was the most recent version at the time of its submittal to the EPA. 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 is 16216r. Because the state did not utilize any beta options, including adjusted U*, it is not expected that the modeling results would be significantly different using the current version.

7.3.2.2. 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.

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 Guideline on Air Quality Models, Appendix W (January 2017) section 7.2.1 instructs users to define the urban or rural classification of the area considering land use and population density. The land use procedure in Appendix W 7.2.1.1(b) classifies urban areas based on industrial, commercial, and residential land use over 50% within a 3 km radius of the source. The population density threshold of the 3 km radius surrounding each facility is compared to the urban threshold of 750 people per square kilometer. Both the land use and population density guidelines in Appendix W were used to assess the urban characteristics of the area and it was determined to be rural.

For the reasons above, the EPA agrees with the state for this component of the state's modeling.

7.3.2.3. 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 Greene County area, the state included four other emitters of SO_2 within 50 kilometers (km) of John Twitty 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 John Twitty, the other emitters of SO_2 included in the area of analysis are James River, Timken SMO LLC, Euticals Inc., and Noble Hill Landfill Renewable Energy Center. No other sources beyond 50 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:

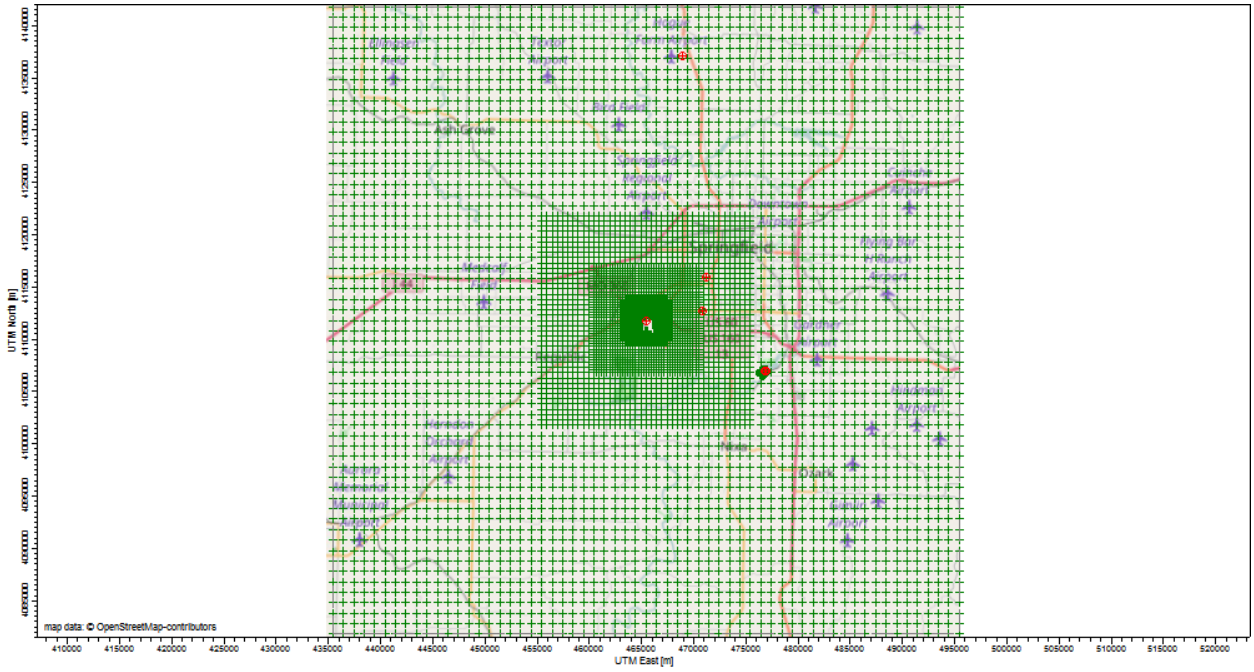
- Center to 1 kilometer (km), receptors placed at 100m intervals
- 1km to 3.5km, receptors placed at 250m intervals
- 3.5km to 10km, receptors placed at 500m intervals
- 10km to 30km, receptors placed at 1000m intervals

The receptor network contained 7,555 receptors, and the network covered all of Greene County and also included portions of Dade, Polk, Dallas, Webster, Christian, Stone, and Lawrence counties in Missouri.

Figure 27, included in the state's recommendation, shows the state's chosen area of analysis surrounding the John Twitty 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 did not exclude receptors over water or in other areas as described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor. The state has excluded receptors within the facility fenceline and EPA reviewed aerial and street view imagery for this fenceline and believes it is justified to exclude these receptors. The fence appears to be a mix of partial chain-link and partial barb wire depending on the location on the fenceline.

Figure 27: Receptor Grid for the John Twitty Area



The EPA concludes that the receptors used in the Missouri submittal are appropriate for characterizing the air quality around the John Twitty Energy Center. Missouri included ambient receptors extending out 30 km and it did not exclude any receptors over water or on other facilities property.

7.3.2.4. 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 state included John Twitty and all sources that emitted greater than 1 ton per year of SO_2 within 50 km of John Twitty Energy Center.

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.

The EPA concludes the state has identified and included in the modeling all emissions sources that may contribute to ambient SO_2 concentrations, including all relevant sources located in Greene County, the proposed unclassifiable area.

7.3.2.5. 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 effective and enforceable.

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. 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 John Twitty and four other emitters of SO_2 within 50 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 the facilities, the state provided annual actual SO_2 emissions between 2013 and 2015. This information is summarized in Table 16. A description of how the state obtained hourly emission rates is given below this table.

Table 16. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Greene County Area

Facility Name	SO_2 Emissions (tpy)		
	2013	2014	2015
John Twitty	2,584	3,021	1,661
James River	1,846	1,793	440
Timken SMO LLC	0.06	0.13	3.87
Euticals Inc.	0.08	5.07	0.93
Noble Hill Landfill REC	1.60	1.60	1.40
Total Emissions from All Modeled Facilities in the State's Area of Analysis	4,432	4,821	2,107

For John Twitty and James River the actual hourly emissions data were obtained from CEMS as reported to CAMD. For the remaining sources the state apportioned the reported highest of the 3 years over 8,760 hours and used that rate as representative for all 3 years in the modeling. Spreading annual emissions across all hours in a year may not be appropriate in many cases, however in this case given the low annual emissions reported, and the lack of additional temporalization information, this method is acceptable.

In April 2017, the state informed the EPA via a phone call that the CEMS data that was used in the modeling for the John Twitty facility was potentially under-reported due to moisture in a probe. Since this phone call, we have noted that CAMD has published a value of 2,672 tpy for 2015 emissions from the John Twitty facility. Due to this issue, the EPA is not able to rely upon the modeling analysis submitted by the state to determine whether the Greene County area is or is not meeting the NAAQS.

7.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

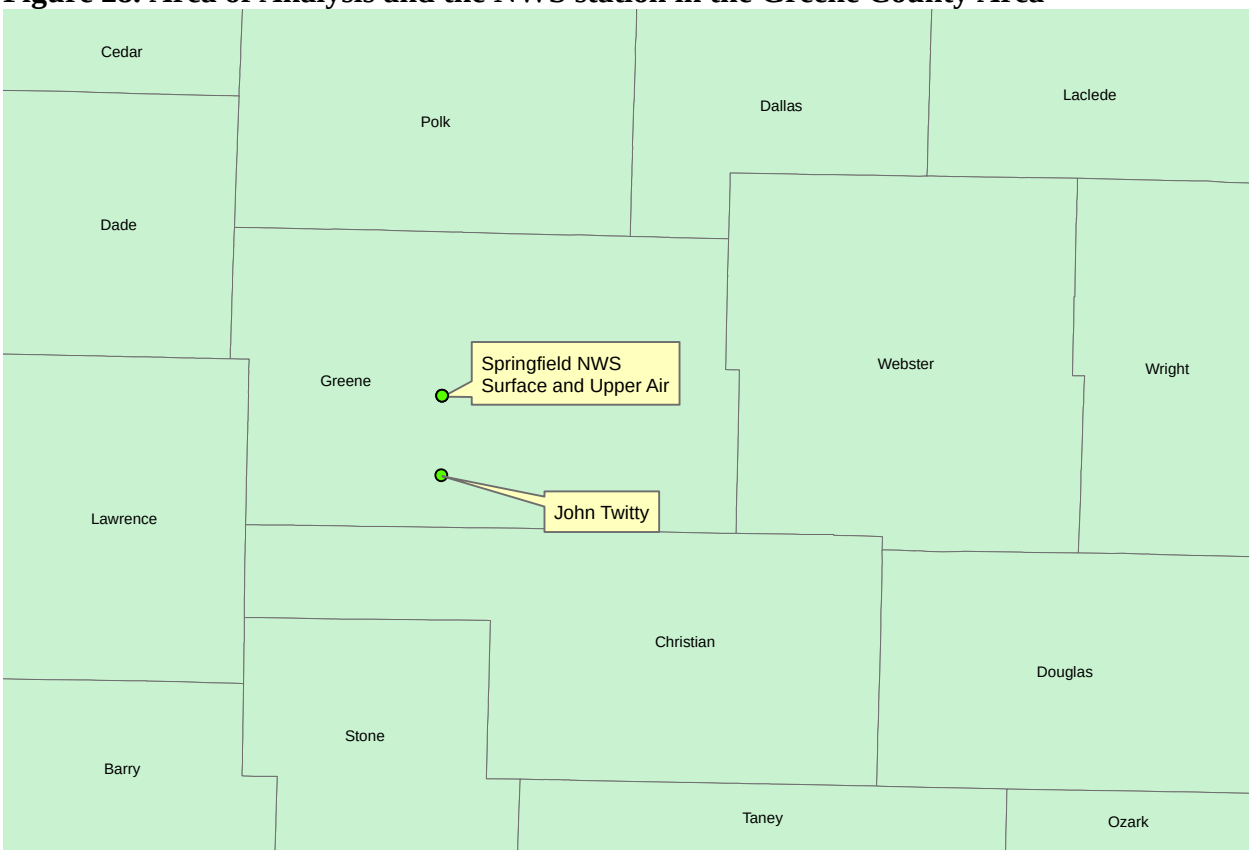
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of 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 Greene County area, the state selected the surface meteorology from the Springfield NWS station, located in Springfield, Missouri, located at 37.2397616, -93.3899533, 10 km to the north of the source, and coincident upper air observations from the same NWS station as best representative of meteorological conditions within the area of analysis.

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

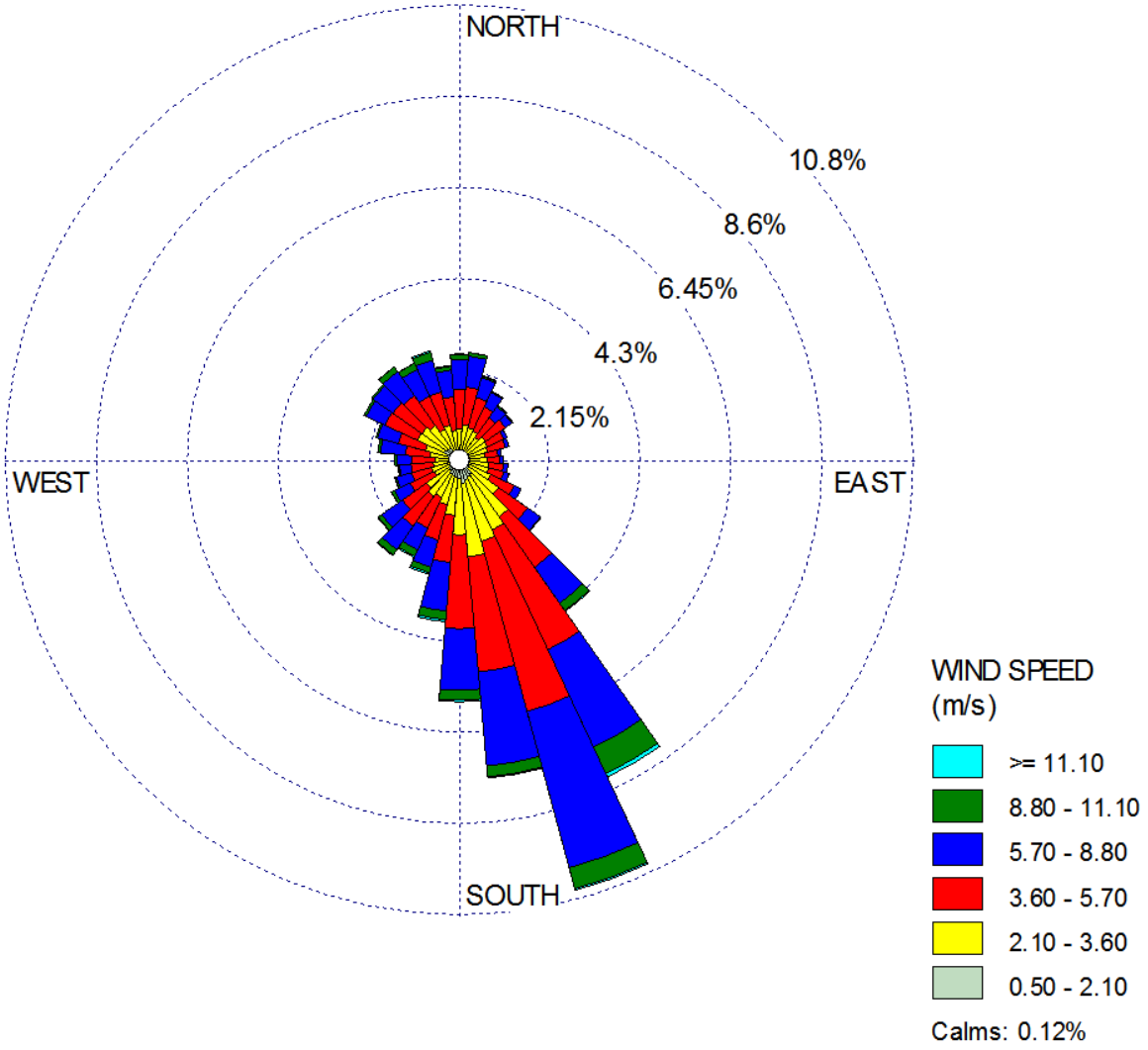
In Figure 28 below, generated by the EPA, the location of this NWS station is shown relative to the area of analysis.

Figure 28. Area of Analysis and the NWS station in the Greene County Area



As part of its recommendation, the state provided the 3-year surface data from which the EPA generated a wind rose for the Springfield NWS station. In Figure 29, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The predominant wind patterns are from the SSW with high frequencies also from the NW and SE.

Figure 29: Greene County Cumulative Annual Wind Rose for Years 2013 – 2015.



Meteorological data from the above surface and upper air NWS station was 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 SO_2 modeling TAD guidance, as outlined in its modeling protocol, in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

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

The EPA concludes the processing of meteorological data follows the EPA guidance and is representative of meteorological conditions around John Twitty for purposes of designations modeling. The Springfield NWS station had a 99.95% data availability, with 0.12% calms identified. In addition, there are 12 incomplete or missing records from the total 26,282 hours available. From the wind rose, the EPA concludes hourly impacts will occur in all directions with predominant transport of emissions to the northwest based on higher frequency of southeasterly winds.

7.3.2.7. 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 National Elevation Database.

The EPA agrees with Missouri's treatment of terrain within AERMOD and finds it followed established guidance for terrain processing.

7.3.2.8. 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 chose a tier 1 approach using the regional background for rural areas within the state that was based off an analysis of the East St. Louis monitor in Illinois. This was the same background methodology used for rural areas in the 1st round nonattainment and second round of designations. The background concentration for this area of analysis was determined by the state to be 23.6 micrograms per cubic meter ($\mu g/m^3$), equivalent to 9 ppb when expressed to three significant figures,[15] and that value was incorporated into the final AERMOD results. This value is similar to the Mark Twain State Park monitor (AQS Site ID: 29-137-0001) where the 3-year design value for 2013-2015 is 8 ppb.

The EPA concludes a background value of 9 ppb is acceptable for this area as no other large SO2 emitters are near John Twitty that are not explicitly included in the modeling. The EPA again notes that 9 ppb is similar to the design value of the Mark Twain State Park monitor, which is also located in a rural area in Missouri.

[15] 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 $\mu g/m^3$.

7.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Greene 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 Greene County Area

Input Parameter	Value
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	5
Modeled Stacks	12 stacks
Modeled Structures	29
Modeled Fencelines	1
Total receptors	7,555
Emissions Type	Actual hourly for John Twitty, highest actual annual for remaining
Emissions Years	2013-2015 for John Twitty and James River, year of highest annual for remaining sources
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	Springfield, MO NWS
NWS Station Upper Air Meteorology	Springfield, MO NWS
NWS Station for Calculating Surface Characteristics	Springfield NWS
Methodology for Calculating Background SO_2 Concentration	Tier 1 based on design value, for 2013-2015, East St. Louis, IL monitor – Rural representative analysis
Calculated Background SO_2 Concentration	9 ppb

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

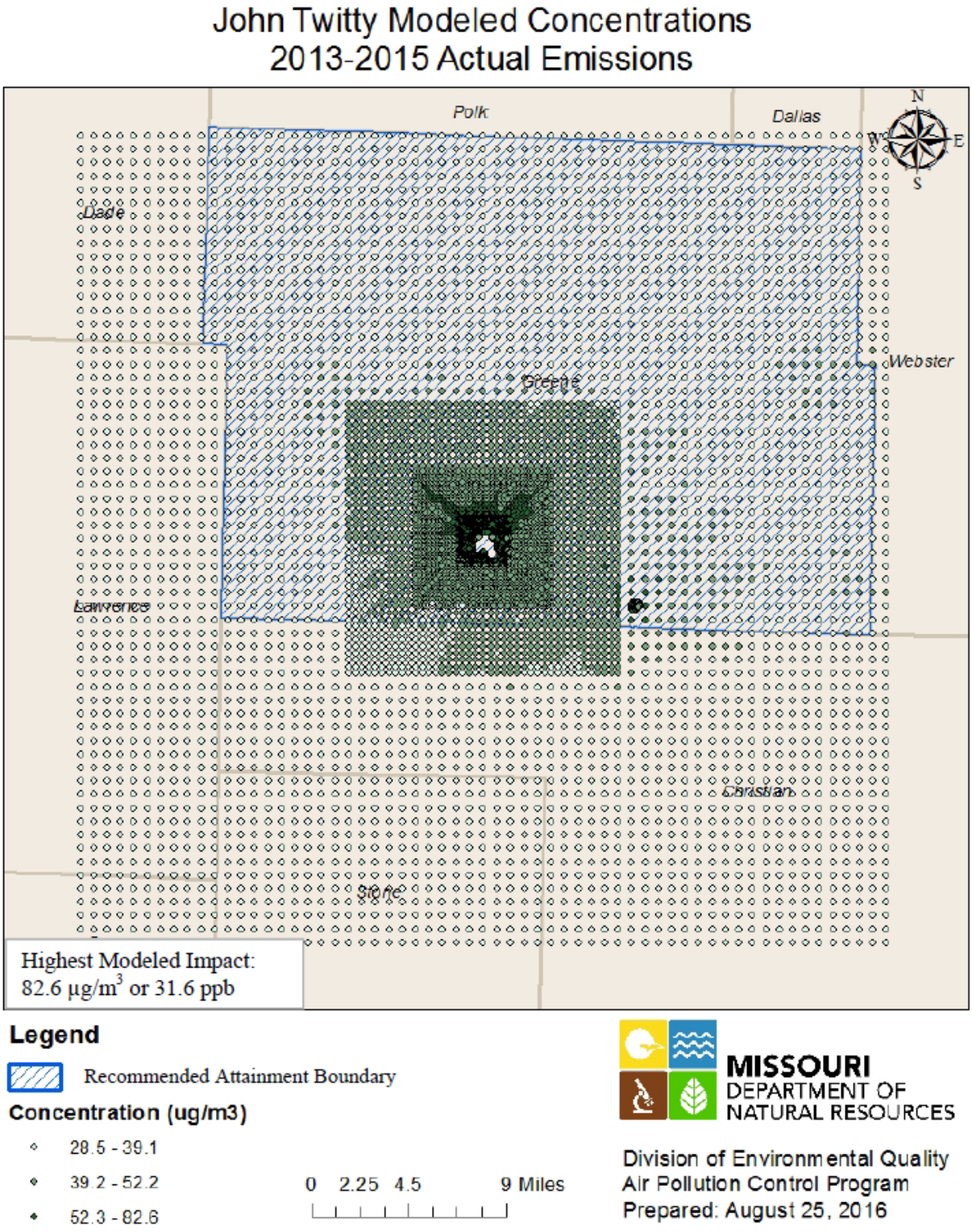
Table 18. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Area of Analysis for the Greene County Area

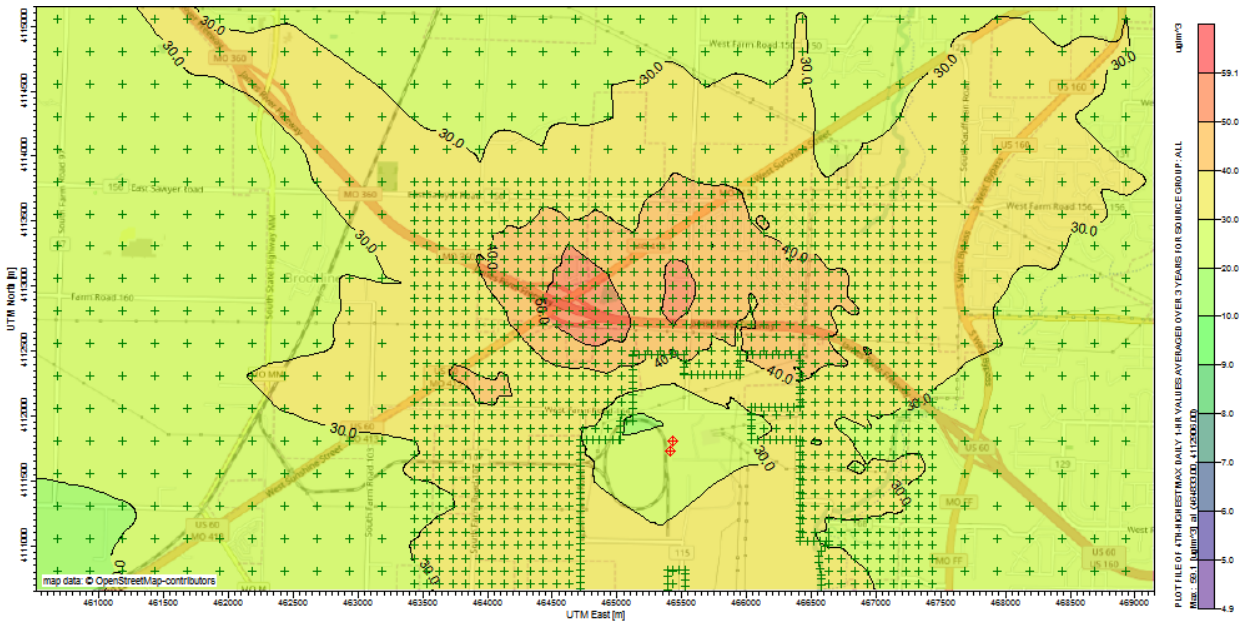
Averaging Period	Data Period	Receptor Location [UTM zone 15]		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM	UTM	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2013-2015	464833.00	4112906.00	82.6	196.4*

*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 82.6 $\mu g/m^3$, equivalent to 31.5 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facilities. Figure 30 below was included as part of the state's recommendation, and indicates that the highest predicted value occurred to the NW of the John Twitty facility fence line approximately 2.1 km from the stacks. The state's receptor grid is also shown in the figure.

Figure 30: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Area of Analysis for the Greene 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. However, as previously indicated, the EPA is unable to rely upon this modeling analysis to determine whether the area is or is not meeting the NAAQS or contributing to a nearby NAAQS violation.

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

The state has performed modeling according to the EPA modeling TAD using actual hourly emissions and varying stack parameters for exit velocity and temperatures from the John Twitty Energy Center along with an acceptable background concentration of 9 ppb. The EPA did not find any departures from the modeling TAD in the modeling the state provided, except for the potential underreporting of emissions which the state pointed out to EPA. We note again the issue of the uncertain accuracy of the emissions data for John Twitty reported to CAMD which impact the reliability of the modeled results for designation purposes.

7.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Greene County Area

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

7.5. Jurisdictional Boundaries in the Greene County Area

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

Missouri has recommended the entirety of Greene County be designated attainment based upon the state's modeling analysis demonstrating attainment within this county and surrounding areas.

7.6. Other Information Relevant to the Designations for the Greene County Area

The EPA was notified by Missouri via a phone call in April 2017 that the CEMS data at the John Twitty facility may be under-reported and in error based on moisture in a probe associated with the CEMS. No additional information was provided by the state or the source to correct the modeling submitted and thus the EPA cannot use the modeling analysis to inform our intended designation. No additional 3rd party modeling or analysis was received.

7.7. The EPA's Assessment of the Available Information for the Greene County Area

The state has submitted modeling demonstrating the entirety of Greene County, Missouri, is meeting the NAAQS and the EPA believes that most aspects of the modeling conforms to the modeling TAD. However, in April 2017, the state informed the EPA that the CEMS data for John Twitty used in the modeling were potentially under-reported due to moisture in a probe, thus the EPA is unable to rely upon the modeling analysis submitted by the state to inform our intended designation. Because the EPA is unable to rely upon the modeling the state submitted, we are also unable to determine whether there is a violation of the NAAQS in Greene County and whether emission sources within Greene County contribute to violations in nearby counties.

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

7.8. Summary of Our Intended Designation for the Greene County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate Greene County as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Greene County, Missouri.

Figure 31 shows the boundary of this intended unclassifiable area.

Figure 31. Boundary of the Intended Greene County Unclassifiable Area

At this time, our intended designations for the state only apply to this area 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 Missouri by December 31, 2020.

8. Technical Analysis for Certain Other Missouri Counties and Portions of Counties

8.1. Introduction

The state has not installed and begun timely operation of a new, approved SO_2 monitoring network meeting EPA specifications referenced in the EPA's SO_2 DRR for any sources of SO_2 emissions in the other counties and portions of counties identified in Table 19. Accordingly, the EPA must designate these counties and portions of counties by December 31, 2017. At this time, there are no air quality modeling results available to the EPA for these counties and portions of counties. In addition, there is no air quality monitoring data that indicate any violation of the 1-hour SO_2 NAAQS. The EPA is designating the counties and portions of counties in Table 19 in the state as "unclassifiable/attainment" since these counties were not required to be characterized 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. (Table 19 does not list Henry, Jasper, Barton, and Randolph Counties, which as described in earlier sections are also intended to be designated as unclassifiable/attainment.)

Table 19. Certain Counties and Portions of Counties that the EPA Intends to Designate Unclassifiable/Attainment

County or Partial County (p)	Missouri's Recommended Area Definition	Missouri's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
ADAIR	ADAIR	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
ANDREW	ANDREW	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
ATCHISON	ATCHISON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
AUDRAIN	AUDRAIN	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
BARRY	BARRY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
BATES	BATES	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
BENTON	BENTON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
BOLLINGER	BOLLINGER	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
BOONE	BOONE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
BUCHANAN	BUCHANAN	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment

County or Partial County (p)	Missouri's Recommended Area Definition	Missouri's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
BUTLER	BUTLER	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CALDWELL	CALDWELL	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CALLAWAY	CALLAWAY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CAMDEN	CAMDEN	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CAPE GIRARDEAU	CAPE GIRARDEAU	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CARROLL	CARROLL	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CARTER	CARTER	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CASS	CASS	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CEDAR	CEDAR	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CHARITON	CHARITON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CHRISTIAN	CHRISTIAN	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CLARK	CLARK	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CLAY	CLAY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CLINTON	CLINTON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
COLE	COLE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
COOPER	COOPER	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
CRAWFORD	CRAWFORD	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
DADE	DADE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
DALLAS	DALLAS	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
DAVIESS	DAVIESS	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
DeKALB	DeKALB	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
DENT	DENT	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment

County or Partial County (p)	Missouri's Recommended Area Definition	Missouri's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
DOUGLAS	DOUGLAS	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
DUNKLIN	DUNKLIN	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
FRANKLIN (p)	FRANKLIN	Unclassifiable	Franklin County except for the portion already designated in Round 2	Unclassifiable/ Attainment
GASCONADE	GASCONADE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
GENTRY	GENTRY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
GRUNDY	GRUNDY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
HARRISON	HARRISON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
HICKORY	HICKORY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
HOLT	HOLT	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
HOWARD	HOWARD	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
HOWELL	HOWELL	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
JACKSON (p)	JACKSON (remainder of county that has not already been designated)	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
JEFFERSON (p)	JEFFERSON (remainder of county that has not already been designated)	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
JOHNSON	JOHNSON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
KNOX	KNOX	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
LACLEDE	LACLEDE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
LAFAYETTE	LAFAYETTE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
LAWRENCE	LAWRENCE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment

County or Partial County (p)	Missouri's Recommended Area Definition	Missouri's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
LEWIS	LEWIS	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
LINCOLN	LINCOLN	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
LINN	LINN	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
LIVINGSTON	LIVINGSTON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
McDONALD	McDONALD	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
MACON	MACON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
MADISON	MADISON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
MARIES	MARIES	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
MARION	MARION	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
MERCER	MERCER	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
MILLER	MILLER	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
MISSISSIPPI	MISSISSIPPI	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
MONITEAU	MONITEAU	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
MONROE	MONROE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
MONTGOMERY	MONTGOMERY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
MORGAN	MORGAN	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
NEWTON	NEWTON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
NODAWAY	NODAWAY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
OREGON	OREGON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
OSAGE	OSAGE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
OZARK	OZARK	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
PEMISCOT	PEMISCOT	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment

County or Partial County (p)	Missouri's Recommended Area Definition	Missouri's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
PERRY	PERRY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
PETTIS	PETTIS	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
PHELPS	PHELPS	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
PIKE	PIKE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
PLATTE	PLATTE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
POLK	POLK	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
PULASKI	PULASKI	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
PUTNAM	PUTNAM	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
RALLS	RALLS	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
RAY	RAY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
REYNOLDS	REYNOLDS	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
RIPLEY	RIPLEY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
ST. CHARLES	ST. CHARLES	Unclassifiable	St. Charles county except Boone Township (which was designated unclassifiable in Round 2)	Unclassifiable/ Attainment
ST. CLAIR	ST. CLAIR	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
ST. FRANCOIS	ST. FRANCOIS	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
STE. GENEVIEVE	STE. GENEVIEVE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
ST. LOUIS (p)	ST. LOUIS (p) – The portion of St. Louis County not recommended for designation as Attainment	Unclassifiable	Same as State's Recommendation: The portion of St. Louis County outside the portion bounded by county and state lines to the South, West and East, and	Unclassifiable/ Attainment

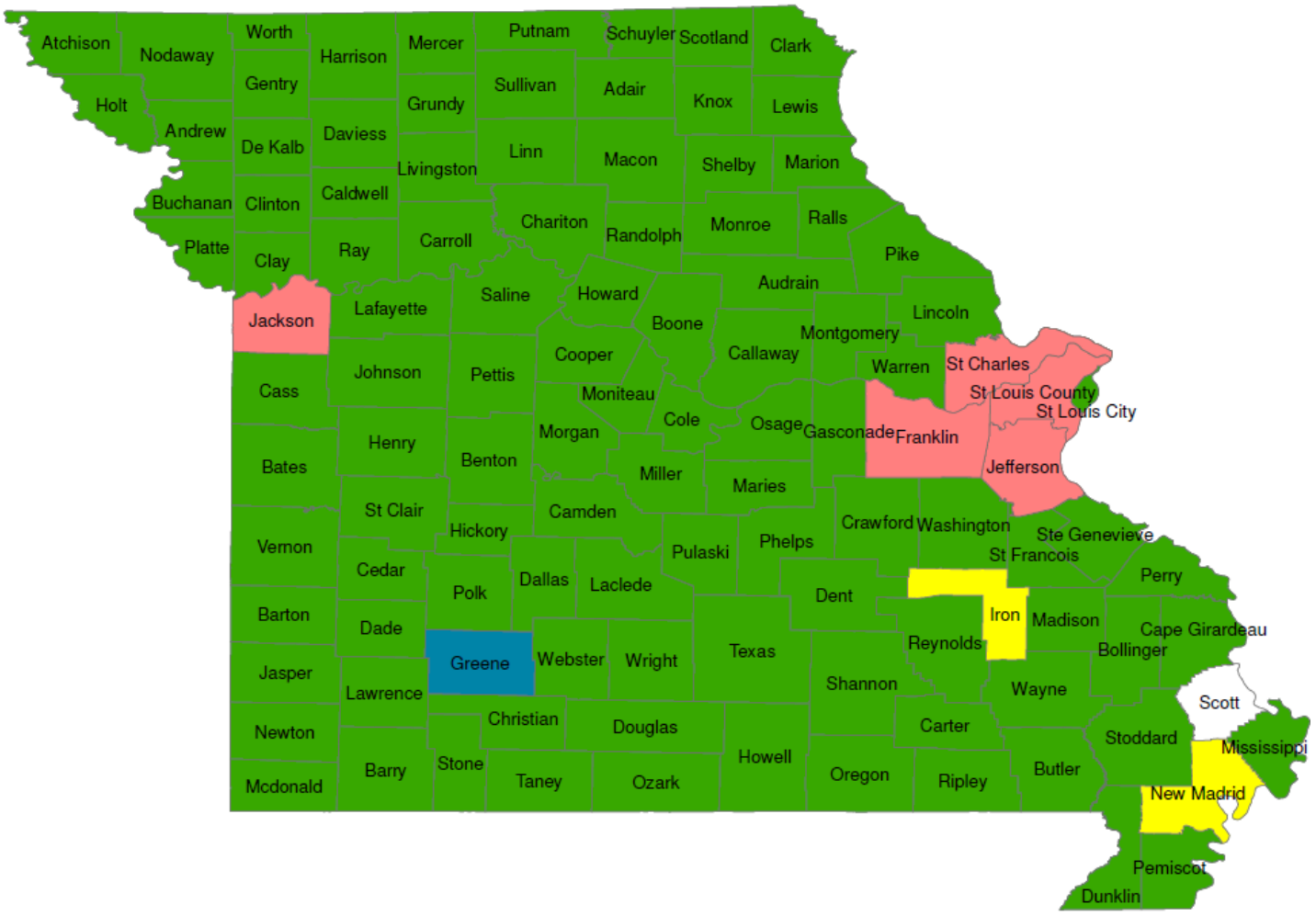
County or Partial County (p)	Missouri's Recommended Area Definition	Missouri's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
			US50 and I-55 to the North and West	
ST. LOUIS CITY	ST. LOUIS CITY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
SALINE	SALINE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
SCHUYLER	SCHUYLER	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
SCOTLAND	SCOTLAND	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
SHANNON	SHANNON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
SHELBY	SHELBY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
STODDARD	STODDARD	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
STONE	STONE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
SULLIVAN	SULLIVAN	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
TANEY	TANEY	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
TEXAS	TEXAS	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
VERNON	VERNON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
WARREN	WARREN	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
WASHINGTON	WASHINGTON	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
WAYNE	WAYNE	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
WEBSTER	WEBSTER	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
WORTH	WORTH	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
WRIGHT	WRIGHT	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment

Table 19 also summarizes Missouri's recommendations for these areas. Specifically, the state recommended that the entirety of the Missouri counties listed in Table 19, or partial counties for Jackson, Jefferson, and St. Louis, be designated as separate unclassifiable areas. The EPA intends to modify the state's recommendation and designate these areas as unclassifiable/attainment. We intend to designated each county or partial county as a separate

area, except that we intend to divide St. Louis County into two separate areas, both of which would be unclassifiable/attainment. Figure 32 shows the locations of these areas within Missouri.

Figure 32. The EPA's Intended Unclassifiable/Attainment Designation(s) for the Missouri Counties Listed in Table 19

White=Previously Designated
Yellow=Will be Designated in Round 4
Green=Unclassifiable/Attainment
Blue=Unclassifiable
Pink=Mixed or Separate Partial County Designations (see individual county maps below for details)



As referenced in the Introduction (*see* Table 2), the areas associated with sources for which Missouri has installed and begun timely operation of a new, approved SO_2 monitoring network

(indicated in yellow in Figure 32) are required to be designated by December 31, 2020, but are not being addressed at this time.

In the December 8, 2016, submittal, Missouri requested that the EPA redesignate the portion of Jackson County currently designated unclassifiable to unclassifiable/attainment. The EPA will evaluate this request in a separate action.

8.2. Air Quality Monitoring Data for Certain Other Missouri Counties and Portions of Counties in the Areas Listed in Table 19

The following AQS monitors in Missouri have sufficient valid data for 2014-2016 and these data indicate that there were no violations of the 2010 SO_2 NAAQS at these monitoring sites in that period: (1) South Charleston (AQS ID #29-077-0026); (2) James River (AQS ID #29-077-0037), (3) Buick NE (AQS ID #29-093-0034; (4) Mark Twain State Park (AQS #29-137-0001); (5) Blair Street (AQS ID #29-510-0085); and (6) Margaretta (AQS ID #29-510-0086). These data do not suggest whether the areas may not be meeting the NAAQS, or contribute to ambient air quality in a nearby area that does not meet the NAAQS, since the monitors have not been shown to be located at sites of expected maximum ambient concentrations.

8.3. Jurisdictional Boundaries in Certain Other Missouri Counties and Portions of Counties

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for each 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.

The state recommended that the entirety of the Missouri counties listed in Table 19 or partial counties for Jackson, Jefferson, and St. Louis, be designated as separate unclassifiable areas. Where partial counties are involved, the state referred to the boundaries already established for adjacent already-designated areas or the state's recommendations for new attainment or nonattainment area designations.

8.4. The EPA's Assessment of the Available Information for Certain Other Missouri Counties and Portions of Counties

These counties and partial counties were not required to be characterized 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. Accordingly, the EPA intends to designate the areas in the above Table 19 as unclassifiable/attainment for the 2010 SO_2 NAAQS.

Our intended unclassifiable/attainment areas, bounded by each of the entire counties' boundaries listed in the table unless otherwise noted, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment areas.

8.5. Summary of Our Intended Designation for Certain Other Missouri Counties and Portions of Counties

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 listed in Table 19 as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of entire counties listed in Table 19 unless otherwise noted as applying to part of a county. Each county or partial county would be a separate unclassifiable/attainment area.

Figure 32 above shows the location of these areas within Missouri.

For the counties listed in Table 19, the boundary of the unclassifiable/attainment area is the county boundary. The boundaries for exceptions to this are described below. Where the description of a partial county refers to a previously designated portion of the county, the exact boundaries of the previously designated portion are given in the notices for our final Round 1 or Round 2 designations.[16]

Figure 33 shows the boundary of intended partial Jackson County unclassifiable/attainment area. Jackson County has a nonattainment area as part of a Round 1 designation with the area shown in red. The portion in blue has already been designated unclassifiable. The remainder of the county, shown in green, is intended to be designated unclassifiable/attainment.

[16] These actions were published on August 5, 2013 (78 FR 47191) and July 12, 2016 (81 FR 45039),

Figure 33. Boundary of the Intended Partial Jackson County Unclassifiable/Attainment Area

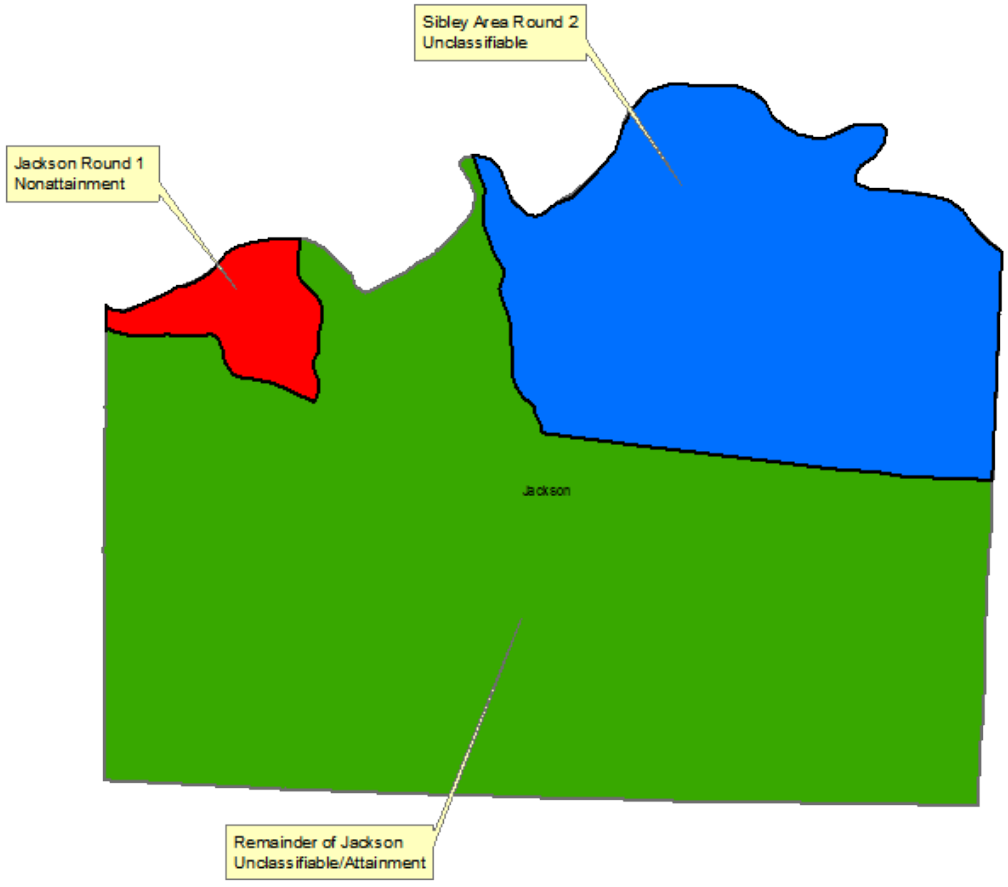


Figure 34 shows the boundaries of the intended two separate St. Louis County unclassifiable/attainment areas. The larger area is addressed in this section. The smaller area, near the Ameren Meramec Energy Center, is addressed in section 5.

Figure 34. Boundaries of the Intended Two Separate St. Louis County Unclassifiable/Attainment Areas.

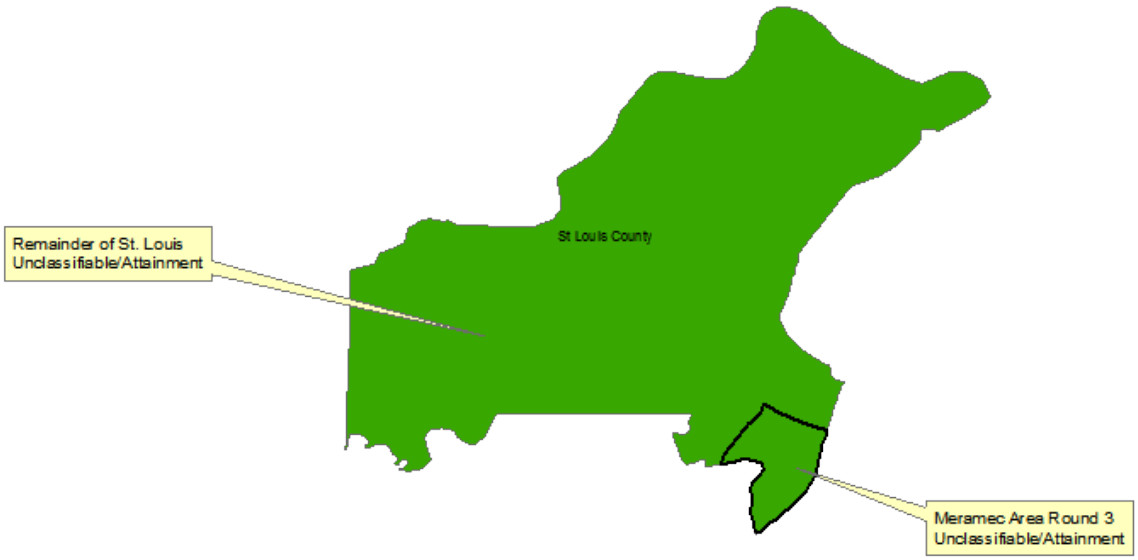


Figure 35 shows the boundary of the intended partial Jefferson County unclassifiable/attainment area.

Figure 35. Boundary of the Intended Portion of Jefferson County Unclassifiable/Attainment Area.

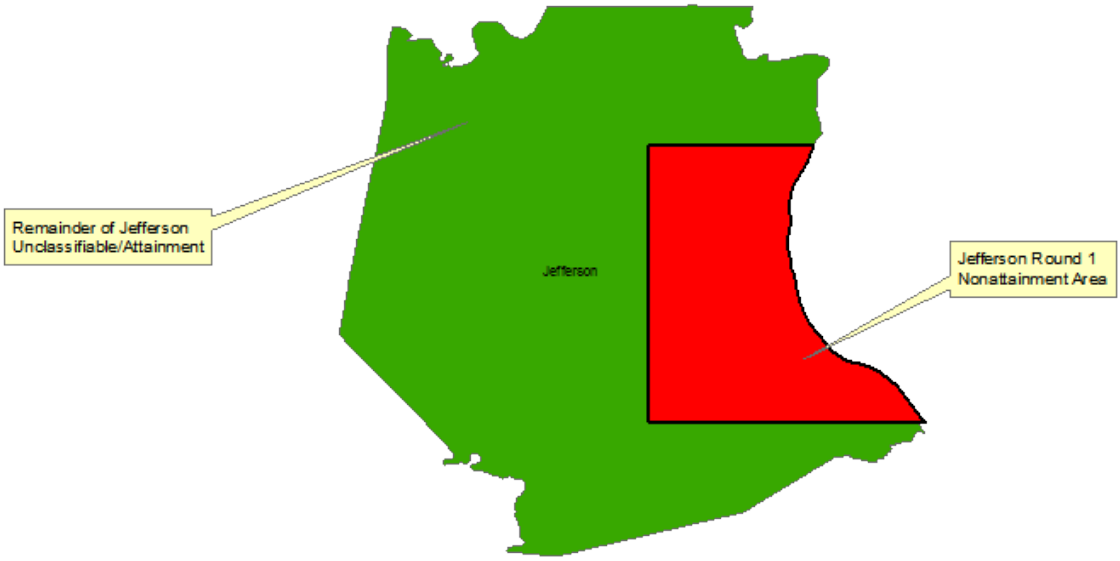
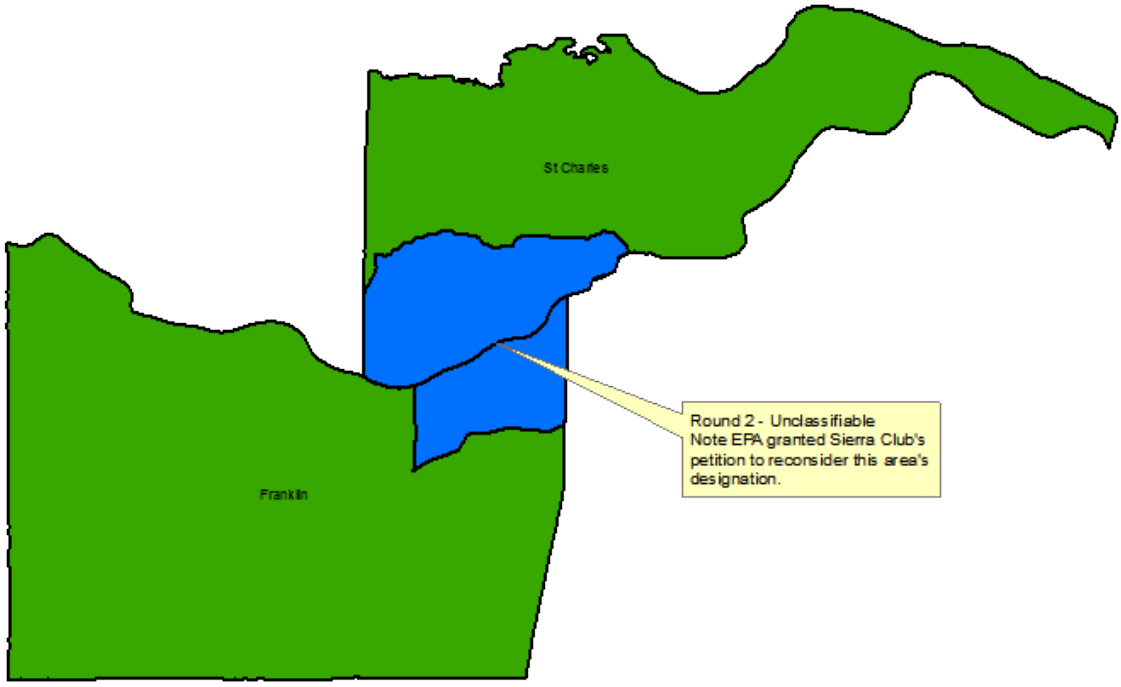


Figure 36 shows the boundaries of intended partial Franklin County unclassifiable area and the partial St. Charles County unclassifiable/attainment area. The blue area was initially designated unclassifiable as part of the Labadie CD designation in Round 2, but EPA has granted a petition to reconsider this designation which will occur in Round 4 by December 31, 2020. Note the current designation of unclassifiable still applies and will remain in effect unless and until it is changed. The green areas are intended to be designated as separate unclassifiable/attainment areas.

Figure 36. Boundary of the Intended Partial Franklin County and St. Charles County Unclassifiable/Attainment Areas



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 Missouri by December 31, 2020.