

Technical Support Document:

Chapter 38

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

1. Summary

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

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.

designations for the 2010 SO₂ NAAQS for selected areas of the country.² The EPA is under a December 31, 2017, deadline to designate the areas addressed in this TSD as required by the U.S. District Court for the Northern District of California.³ We are referring to the set of designations being finalized by the December 31, 2017 deadline as “Round 3” of the designations process for the 2010 SO₂ NAAQS. After the Round 3 designations are completed, the only remaining undesignated areas will be those where a state has timely installed and begun operating a new SO₂ monitoring network meeting the EPA specifications referenced in the EPA’s SO₂ Data Requirements Rule (DRR) (80 FR 51052). The EPA is required to designate those remaining undesignated areas by December 31, 2020.

The Tennessee Department of Environmental Conservation (TDEC) Air Pollution Control submitted its first recommendation regarding designations for the 2010 1-hour SO₂ NAAQS on May 26, 2011, recommending that Sullivan County and portions of Bradley and McMinn Counties be designated nonattainment, while suggesting that the rest of the state and the remaining portions of Bradley and McMinn Counties be designated unclassifiable. On January 28, 2013, Tennessee submitted an updated recommendation, which suggested to only designate Sullivan County nonattainment, while suggesting to designate the rest of the state unclassifiable, including the portions of Bradley and McMinn Counties previously suggested to be designated nonattainment. Once again, in September 16, 2015, Tennessee revised its recommendation to say that Sumner County, as well as portions of Cannon, Cheatham, Davidson, DeKalb, Macon, Robertson, Rutherford, Smith, Trousdale, Williamson, and Wilson Counties be designated attainment. As part of this round of designations, the State submitted updated recommendations once again on January 13, 2017, recommending unclassifiable/attainment for the entire state, except for those areas previously designated.⁴ 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 Tennessee 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 Tennessee’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.

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

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

⁴ In round 1 of designations, the EPA designated a portion of Sullivan County “nonattainment” for the 2010 1-hour SO₂ NAAQS. This nonattainment portion of Sullivan County encompasses a 3-km radius centered at Eastman Chemical’s B-253 power house, located at 36.5186 N. 82.5350 S. In Round 2 of designations, the EPA designated Sumner County “unclassifiable” for the 2010 1-hour SO₂ NAAQS in its entirety.

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

Area/County	Tennessee’s Recommended Area Definition⁵	Tennessee’s Recommended Designation	The EPA’s Intended Area Definition	The EPA’s Intended Designation
Humphreys County Area	Entire State	Unclassifiable/Attainment	Humphreys County	Unclassifiable /Attainment
Shelby County Area	Entire State	Unclassifiable/Attainment	Shelby County	Unclassifiable /Attainment
Stewart County Area	Entire State	Unclassifiable/Attainment	Stewart County	Unclassifiable /Attainment
Rest of the State*	Entire State	Unclassifiable/Attainment	Rest of the state not previously designated Same as State’s recommendation (Refer to section 6 for full list of counties)	Unclassifiable /Attainment

*The EPA intends to designate the remaining undesignated counties (or portions of counties) in Tennessee as “unclassifiable/attainment” as these areas were not required to be characterized by the state under the DRR 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 6 of this chapter.

2. General Approach and Schedule

Updated designations guidance documents were issued by the EPA through a July 22, 2016, memorandum and a March 20, 2015, memorandum from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Air Division Directors, U.S. EPA Regions I-X. These memoranda supersede earlier designation guidance for the 2010 SO₂ NAAQS, issued on March 24, 2011, and identify factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO₂ NAAQS. The documents also contain the factors that the EPA intends to evaluate in determining the boundaries for designated areas. These factors

⁵ In their January 13, 2017, recommendation letter, Tennessee recommended that the EPA designate the entire state as unclassifiable/attainment, with the exception of the portion of Sullivan County that is already designated as nonattainment for the 2010 1-hour SO₂ NAAQS

include: 1) air quality characterization via ambient monitoring or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and topography; and 5) jurisdictional boundaries.

To assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling for sources that emit SO₂, the EPA released its most recent version of a draft document titled, “SO₂ NAAQS Designations Modeling Technical Assistance Document” (Modeling TAD) in August 2016.⁶

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

As specified by the March 2, 2015, court order, the EPA is required to designate by December 31, 2017, all “remaining undesignated areas in which, by January 1, 2017, states have not installed and begun operating a new SO₂ monitoring network meeting EPA specifications referenced in EPA’s” DRR. The EPA will therefore designate by December 31, 2017, areas of the country that are not, pursuant to the DRR, timely operating the EPA-approved and valid monitoring networks. The areas to be designated by December 31, 2017, include the areas associated with three sources in Tennessee meeting DRR emissions criteria that states has chosen to be characterized using air dispersion modeling, the areas associated with one source in Tennessee for which air agencies imposed emissions limitations on sources to restrict their SO₂ emissions to less than 2,000 tons per year (tpy), sources that met the DRR requirements by demonstrating shut down of the source (none of which are in Tennessee), areas for which the states chose monitoring for the DRR but did not timely meet the approval and operating deadline (none of which are in Tennessee), and other areas not specifically required to be characterized by the state under the DRR.

Because many of the intended designations have been informed by available modeling analyses, this preliminary TSD is structured based on the availability of such modeling information. There is a section for each county for which modeling information is available. The EPA reviewed the most recent available SO₂ air quality monitoring data in the Air Quality System (AQS) database for all areas for which modeling analyses are available. For the area where air quality monitoring data are available in the county or nearby, a subsection in each DRR source’s section discussing air quality monitoring data relevant to the area is included. For all other areas, air quality monitoring data was not available in or near the county, and this subsection is not included.⁷

⁶ <https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf>. In addition to this TAD on modeling, the EPA also has released a technical assistance document addressing SO₂ monitoring network design, to advise states that have elected to install and begin operation of a new SO₂ monitoring network. See Draft SO₂ NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, February 2016, <https://www.epa.gov/sites/production/files/2016-06/documents/so2monitoringtad.pdf>.

⁷ Tennessee uploads industry-collected monitoring data into AQS. These monitors are not operating under an approved QAPP and the State does not provide quality assurance/quality control over the data. Therefore, these data do not meet quality assurance requirements and cannot be used for regulatory decision making.

Some sections address counties for which no air quality modeling information is available but for which available air quality monitoring data indicate a NAAQS violation. In some cases, such as the case of Tennessee, this section is not applicable since there are no violating monitors in the state⁸ and TDEC has chosen to characterize their DRR sources through modeling or an SO₂ emission restriction. The remaining to-be-designated counties are then addressed together in section 6.

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

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

- 1) 2010 SO₂ NAAQS – The primary NAAQS for SO₂ promulgated in 2010. This NAAQS is 75 parts per billion (ppb), based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. See 40 CFR 50.17.
- 2) Design Value - a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the NAAQS.
- 3) Designated nonattainment area – an area that, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined either: (1) does not meet the 2010 SO₂ NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS.
- 4) Designated unclassifiable/attainment area – an area that either: (1) based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined (i) meets the 2010 SO₂ NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.⁹
- 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 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.

⁸ The only violating monitors in Tennessee are located in the partial-county SO₂ nonattainment area in Sullivan County, Tennessee, that was designated in the Round 1 designations, August 2013.

⁹ The term “designated attainment area” is not used in this document because the EPA uses that term only to refer to a previous nonattainment area that has been redesignated to attainment as a result of the EPA’s approval of a state-submitted maintenance plan

- 6) Modeled violation – a violation of the SO₂ NAAQS demonstrated by air dispersion modeling.
- 7) Recommended attainment area – an area that a state, territory, or tribe has recommended that the EPA designate as attainment.
- 8) Recommended nonattainment area – an area that a state, territory, or tribe has recommended that the EPA designate as nonattainment.
- 9) Recommended unclassifiable area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable.
- 10) Recommended unclassifiable/attainment area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable/attainment.
- 11) Violating monitor – an ambient air monitor meeting 40 CFR parts 50, 53, and 58 requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
- 12) We, our, and us – these refer to the EPA.

3. Technical Analysis for the Humphreys County, Tennessee Area

3.1. Introduction

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

3.2. Air Quality Monitoring Data for Humphreys County

The state does not have any existing SO₂ monitoring data in Humphreys County, Tennessee.

3.3. Air Quality Modeling Analysis for the Humphreys County, Tennessee Area Addressing the Tennessee Valley Authority (TVA) – Johnsonville Fossil Plant

3.3.1. Introduction

This section presents all the available air quality modeling information for a portion of Humphreys County (hereinafter referred to as the “Humphreys County area”), that includes the Tennessee Valley Authority – Johnsonville Fossil Plant (hereafter referred to as the “Johnsonville Fossil Plant” or “JOF” or “TVA Johnsonville”). This area contains the following SO₂ sources, principally the sources around which Tennessee is required by the DRR to characterize SO₂ air quality, or alternatively to establish an SO₂ emissions limitation of less than 2,000 tpy:

- The TVA – Johnsonville Fossil Plant facility emitted 2,000 tons or more annually. Specifically, Johnsonville emitted 17,517 tons of SO₂ in 2014. This source meets the DRR criteria and thus is on the SO₂ DRR Source list. Tennessee has chosen to characterize it via modeling.
- In addition, several sources from the DuPont Titanium Technologies facility (also referred to as Chemours) and the Hood Container Corporation facility are not on the SO₂ DRR Source list but were included in the modeling analysis. These facilities emitted 60 and 53 tons of SO₂ in 2014, respectively.

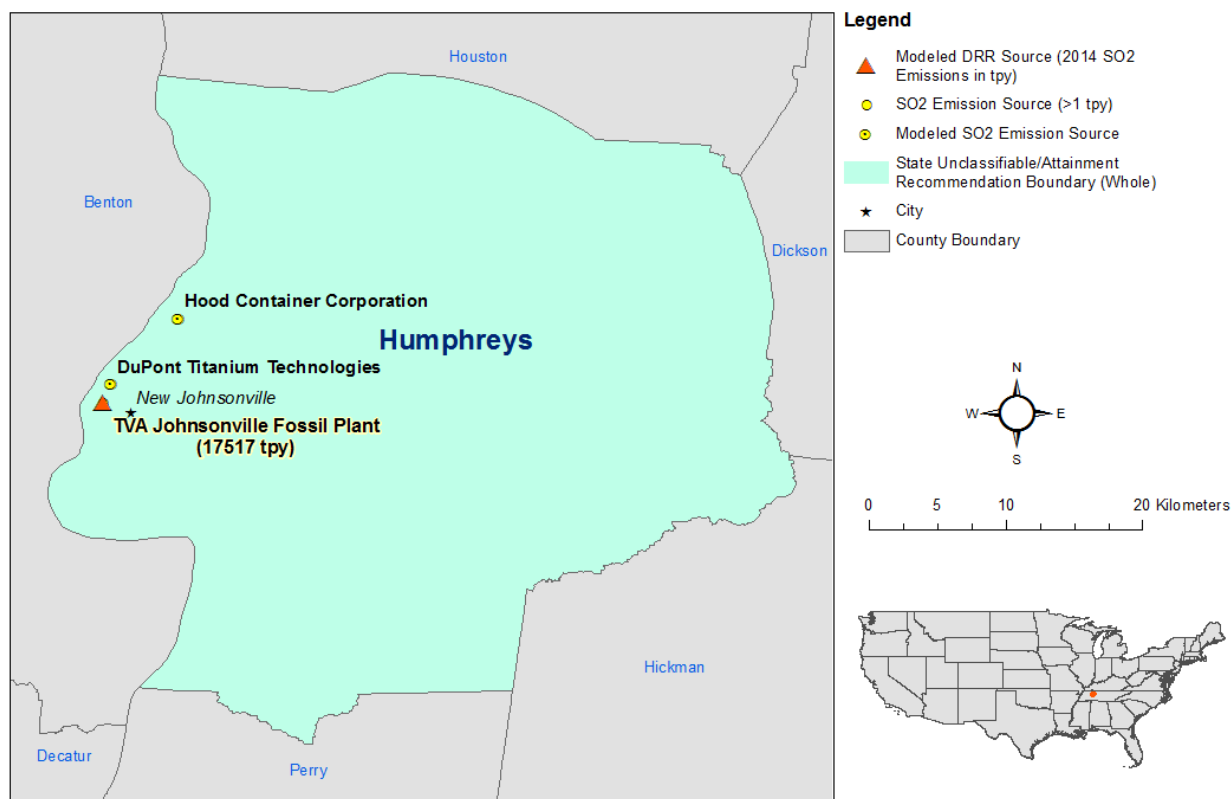
Because we have available results of air quality modeling in which these sources are modeled together, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

In its submission, Tennessee recommended the entire state be designated unclassifiable/attainment, including Humphreys County, based in part on an assessment and characterization of air quality impacts from these facilities. The State used air dispersion modeling software, i.e., AERMOD, analyzing actual hourly emissions from the period of 2012 to 2014 to assess and characterize air quality impacts from the Johnsonville Fossil Plant. After careful review of the State's assessment, supporting documentation, and all available data, the

EPA agrees with the State’s recommended designation for the area. The EPA intends to designate the area, specifically the entirety of Humphreys County, as unclassifiable/attainment. Our reasoning for this conclusion is explained in a later section, after all the available information is presented.

As seen in Figure 1 below, generated by the EPA, the TVA – Johnsonville Fossil Plant facility is located in New Johnsonville, TN, along the eastern shore of Kentucky Lake (Tennessee River) north of Highway 70. Figure 1 includes nearby SO₂ emitters¹⁰ Chemours and Hood Container Corporation facilities. Lastly, Figure 1 provides the State’s recommended area for the unclassifiable/attainment designation.¹¹ The EPA’s intended unclassifiable/attainment designation boundary for the Humphreys County Area is not shown in this figure, but is in a figure in the section below that summarizes our intended designation.

Figure 1. Map of the Humphreys County Area Addressing Tennessee Valley Authority – Johnsonville Fossil Plant



¹⁰ According to Tennessee’s report, all other SO₂ emitters within 10 kilometers (km), with emissions of 1 tpy or more (based on emissions inventories provided by TDEC) and sources located between 10 km and 50 km with a Q/D (annual emission in tons/distance in km) greater than 20, were considered for the modeling and are shown in Figure 2. If no sources not named previously are shown, there are no additional SO₂ emitters above this emission level in the vicinity of the named source (s).

¹¹ Tennessee’s designation recommendation excludes the portion of Sullivan County designated nonattainment for the 2010 SO₂ NAAQS in 2013 (Round 1 designations).

The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA’s July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered one modeling assessment from the State. No modeling assessments were used from other parties or conducted by the EPA. The Table below indicates when this assessment was received, provides an identifier for the assessment, and identifies any distinguishing features of the modeling assessment.

Table 2. Modeling Assessments for the Humphreys County, Tennessee Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Tennessee*	October 12, 2016	TVA - Johnsonville Fossil Plant (JOF) Final Report	N/A

*The modeling assessment for TVA Johnsonville was developed by TVA and transmitted to the State on October 5, 2016. Tennessee submitted the modeling analysis to the EPA on October 12, 2016.

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 SO₂ NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

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

The State used AERMOD version 15181. A discussion of the State’s approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

The most current approved version of AERMOD, version 16216r, which was published January 17, 2017 (*see* 82 FR 5203), includes updates to the 15181 version as well as bug fixes that were on the previous version 16216. The updates to 15181 include the addition of settings that were previously considered as alternative modeling options. Tennessee chose not to use the 16216r

version because they used the default regulatory setting of the most current version at the time of modeling (15181), which does not use the alternative modeling options added to version 16216r of AERMOD. Using the older 15181 version of AERMOD with its default regulatory settings, likely produces the same results as the newer 16216r. For this reason, the EPA believes it is appropriate for the State to use the 15181 version of AERMOD.

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 SO₂ modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO₂ sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

The EPA’s recommended procedure for characterizing an area by prevalent land use is based on evaluating the dispersion environment within 3 km of the facility. According to the EPA’s modeling guidelines, rural dispersion coefficients are to be used in the dispersion modeling analysis if more than 50 percent of the area within a 3 km radius of the facility is classified as rural. Conversely, if more than 50 percent of the area is urban, urban dispersion coefficients should be used in the modeling analysis. For the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model in rural mode. To make the determination of using rural mode, the State analyzed land use in the area using the Auer method with a 3 km radius centered on the JOF stack. Data from the 2011 National Land Cover Database (NLCD) was used to determine land cover in the area and a 30 meters (m) by 30 m data cell size was used. The results of the land use status analysis using Auer’s methodology indicated that approximately 7 percent of surrounding land was urban and 93 percent was rural. Given these results and that the methodology used is consistent with the Modeling TAD the State determined that it was most appropriate to run the model with rural dispersion coefficients or in rural mode. The EPA concurs with the determination that the area surrounding the source should be classified as rural.

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 SO₂ emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO₂ concentrations.

The source of SO₂ emissions subject to the DRR in this area is described in the introduction to this section. For the Humphreys County area, the State also assessed emitters of SO₂ within 50 km of the Johnsonville Fossil Plant in all directions. The State determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO₂ NAAQS exceedances in the area of analysis and any potential impact on SO₂ air quality from other sources in nearby areas. This area of analysis for nearby sources

covered all of Humphreys County, as well as portions of Dickson, Hickman, Perry, Decatur, Henderson, Benton, Carroll, Henry, and Stewart counties. The area captures approximately four additional sources in the Humphreys County area.

The State relied on criteria to determine if nearby sources should be considered in the modeling analysis for JOF, including: 1) sources located within 10 km of the JOF that emitted more than 1 tpy; or 2) sources located between 10 km and 50 km within the JOF and have a Q/D (annual emissions in tons/distance in km) greater than 20.¹² Based on these criteria, two of the four sources were determined to be included in the modeling including Chemours and Hood Container Corporation. The Chemours facility is located approximately 1.24 km from the Johnsonville Fossil plant and emitted 59.72 tpy of SO₂ in 2014 according to the National Emissions Inventory (NEI) the Hood Container facility is located approximately 7.11 km from the Johnsonville Fossil Plant and emitted 52.71 tpy of SO₂ in 2014 according to the NEI. According to Tennessee, the remaining nearby sources not included in the modeling analysis, were accounted for in the background concentrations. Given that all other sources in the 50 km area emitted less than 1 tpy according to the 2014 NEI, the EPA believes that these sources will not contribute to a violation of the 2010 1-hour SO₂ NAAQS, and any possible impacts from these sources are captured in the background concentrations of SO₂.

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

A Cartesian grid that extended 10 km in each direction and was centered at the JOF facility was used. The 10 km extension was chosen because it captured the nearby sources that were included in the modeling analysis and that could cause a concentration gradient variation near the site, as well as captured the predicted maximum from the TVA Johnsonville Fossil Plant.

As seen in Table 3, the spacing for the receptors was adjusted based on the distance from the facility, creating nested grids within the 10 km limit. In addition, boundary receptors were placed along the perimeter of the fenced area of the facility and these were spaced 50 m apart. These boundary receptors were placed along a permanent fence surrounding the property.

Table 3. Receptor Grid Size and Spacing for the Humphreys County Area

Receptor Spacing (m)	Grid Size (km)	Grid Origin (km south and west of site)
50	Fenceline	0
100	6 x 6	3
250	10 x 10	5
500	20 x 20	10

The receptor network contained 5,996 receptors, and the network covered western Humphreys and eastern Benton counties in Tennessee.

¹² The State performed an analysis of emissions data and spatial proximity for all nearby sources to determine which sources to include in the modeling demonstration using the screening tool known as 20D. (EPA’s “Screening Threshold” Method for PSD Modeling Memo, 1985.)

Figures 2 and 3, included in the State's modeling report, show the State's chosen area of analysis surrounding the TVA Johnsonville 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 from areas where it would not be feasible to place a monitor, even though the receptor grid area contains bodies of water, and opted to apply a regular grid of receptors for the area. In accordance with section 4.2 of the Modeling TAD, the State also included elevation data from the National Elevation Dataset (NED), using the AERMP terrain processor of AERMOD.

The State of Tennessee did not place receptors within the fence line of the Johnsonville Facility. The DRR Modeling Report states that a permanent fence surrounds the entire Johnsonville Facility property. Receptors were placed within the property boundaries of the other facilities included in the modeling analysis.

Figure 2. Area of Analysis for the Humphreys County Area. Source: Johnsonville Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, September 2016

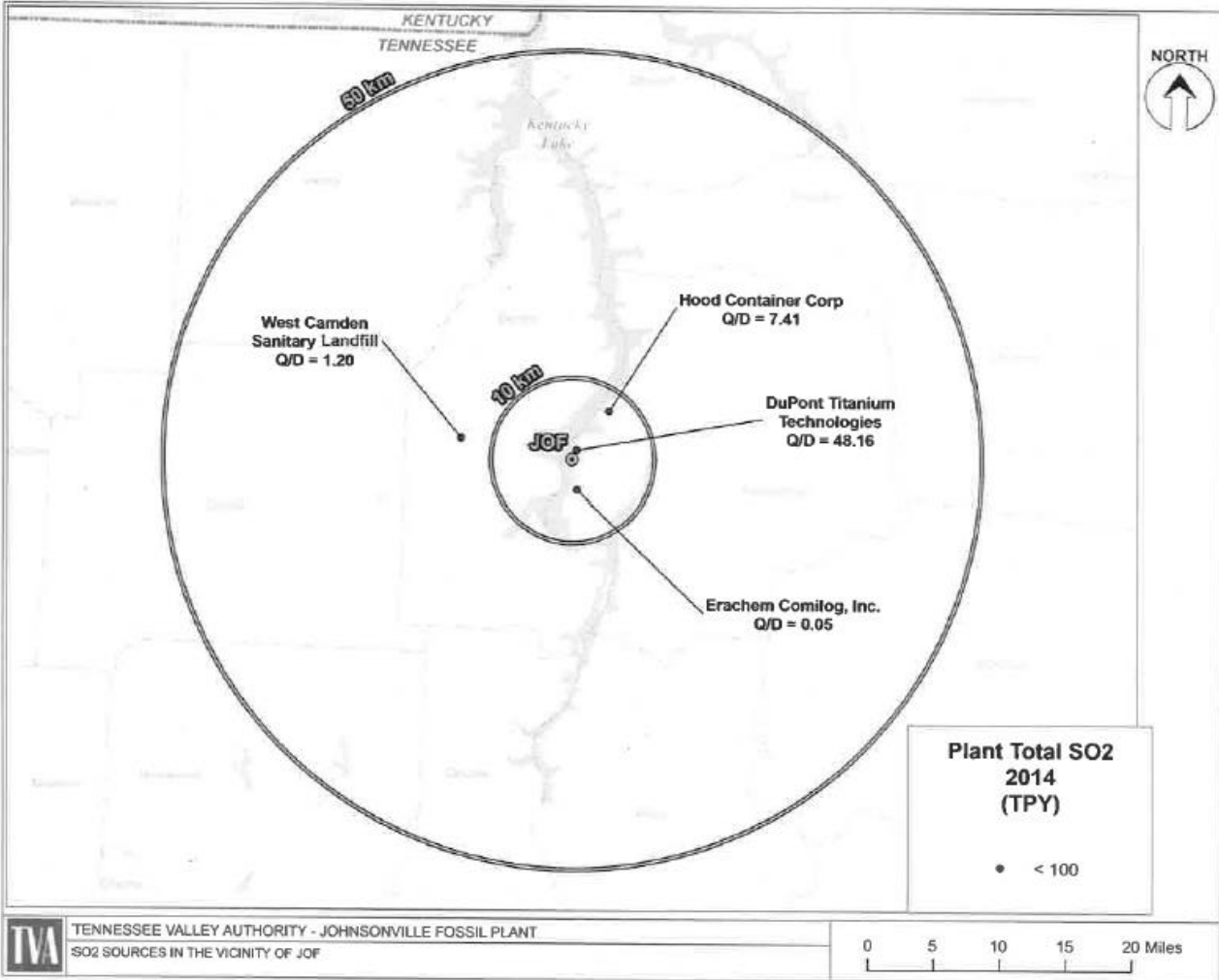
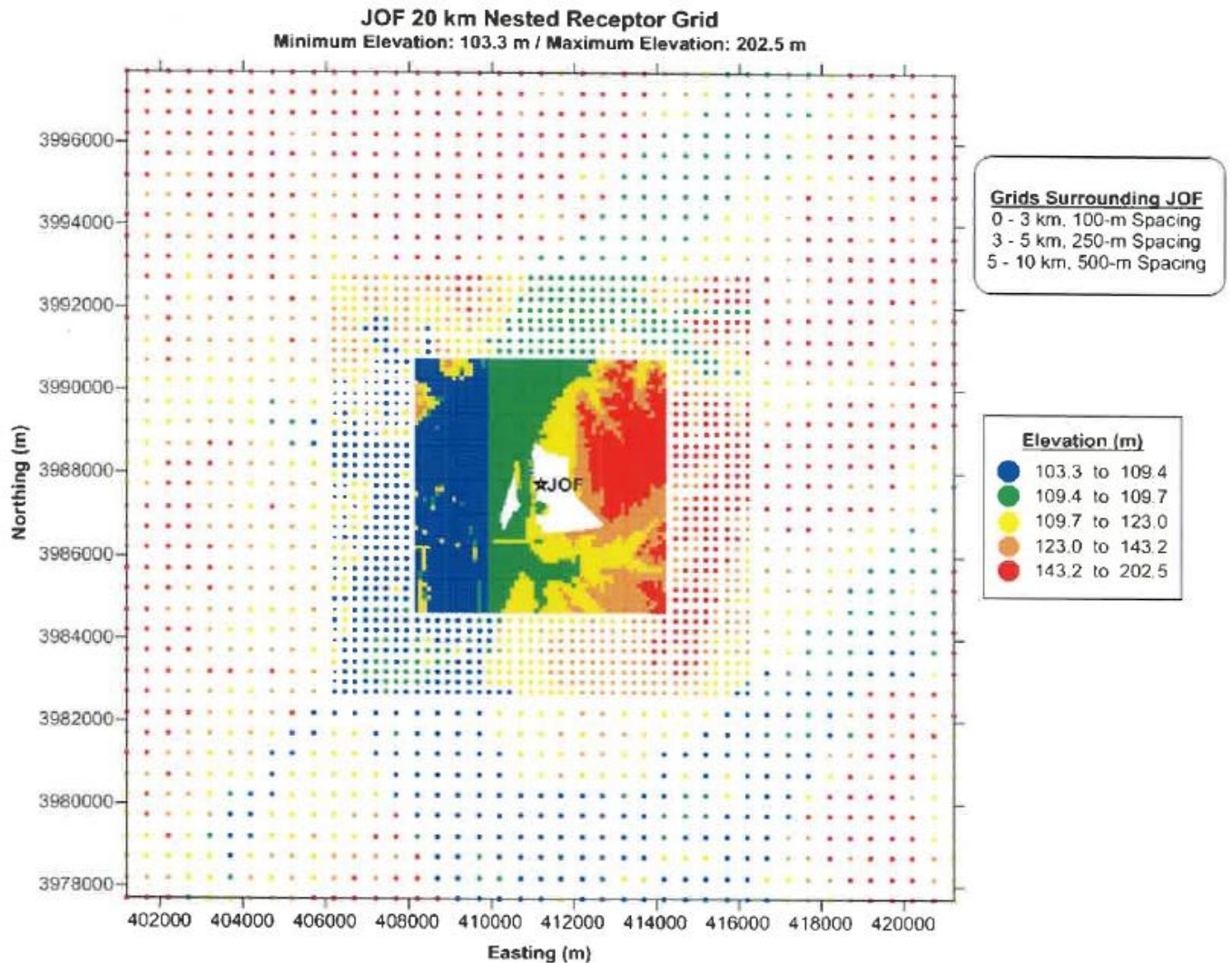


Figure 3. Receptor Grid for the Humphreys County, Tennessee Area. Source: Johnsonville Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, September 2016



Based on the information provided in Tennessee’s recommendation, the EPA agrees with the area excluded from the modeling because it does not represent ambient air for the purposes of SO₂ modeling, and agrees that the grid selected by the State is adequate. Therefore, the EPA believes that Tennessee’s receptor grid is appropriate for the characterization of the area, considering the impact of SO₂ from the Johnsonville Fossil Plant.

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.

As described in section 3.2.1, Tennessee utilized two additional sources in their modeling for the Johnsonville Fossil Plant facility area. According to the Johnsonville Fossil Plant modeling report, all other SO₂ emitters within 10 km, with emissions of 1 tpy or more (based on information from the 2014 emission inventory provided by the TDEC and sources located 10 km to 50 km with a Q/D¹³ (annual emission in tons/distance in km) greater than 20, were considered for the modeling. These included two facilities within 10 km, Chemours and the Hood Container Corporation, and no other sources within 50 km.

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 BPIPFRM was used to assist in addressing building downwash.

The EPA agrees that Tennessee has appropriately characterized the area surrounding the Johnsonville Fossil Plant. Given the criteria for selecting nearby sources, we believe that the decision to include two additional sources, the Chemours and the Hood Container facilities, in the modeling analysis was correct. Also, the State has appropriately used the actual emissions and stack heights for both facilities and correctly accounted for the building downwash using BPIPFRM for AERMOD.

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 potential to emit (PTE) or allowable) emissions rate that is federally enforceable and effective.

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

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

¹³ The State performed an analysis of emissions data and spatial proximity for all nearby sources to determine which sources to include in the modeling demonstration using the screening tool known as 20D. (EPA's "Screening Threshold" Method for PSD Modeling Memo, 1985.)

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

As previously noted, the State included the Johnsonville Fossil Plant and two other emitters of SO₂ 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 SO₂ emissions between 2012 and 2014 are summarized below. 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 SO₂ Emissions Between 2012 – 2014 from Facilities in the Humphreys County Area

Facility Name	SO ₂ Emissions (tpy)		
	2012	2013	2014
Johnsonville Fossil Plant (Units 1-4 and CTs)	11,599	9,672	17,519
Hood Container Corporation	129.2	92	52.7
DuPont Titanium Technologies (Chemours)	5.2	56.9	59.7
Total Emissions from All Modeled Facilities in the State’s Area of Analysis	11,734	9,821	17,631

The TVA Johnsonville Fossil Plant previously consisted of 10 coal fired boilers (Units 1-10). Under a Federal Facilities Compliance Agreement,¹⁴ Units 5-10 shut down in December of 2015 and were not included in the modeling analysis. Under the same Compliance Agreement, the remaining coal-fired units (Units 1-4) will be shut down by December of 2017. Emissions from the years 2012-14 were utilized in this modeling analysis. The EPA’s Clean Air Markets Division (CAMD) emissions database indicates that 2015 emissions from the facility were 29,631 tons which is substantially higher than any of the years during the 2012-14 period. However, the 2016 emissions were 9,210 tpy which reflect the shutdown of Units 5-10 in December 2015. The 2012-14 emissions were the latest available at the time the modeling protocol was developed and submitted. The EPA notes 2016 emissions are less than any of the years from 2012-2014. Therefore, use of the 2012-2014 emissions in the modeling provides a conservative, over-estimate of impacts. In addition, the remaining 4 coal fired units will shut down by the end of 2017 under the referenced Compliance Agreement. For these reasons, the EPA concurs with the use of 2012-14 emissions data.

Actual hourly emissions data was obtained from CEMs for the years 2012-14 for the 4 remaining coal-fired boilers from the EPA’s CAMD and 4 of the 20 natural gas/oil fired combustion turbines. Only four of the 20 turbines (JCT 17-20) have CEMs. The other 16 combustion

¹⁴ Federal Facilities Compliance Agreement Docket No. CAA-04-2010-1760.

turbines are not subject to the CEMS requirement in 40 CFR part 75, and therefore, emissions were over-estimated for these units by basing emissions on annual fuel oil analysis and oil-fired operations at maximum heat-input capacity. The State used the worst case emission rates for every hour of the three-year period. The facility also has four emergency diesel engines that emitted 0.00004 tpy of SO₂ in 2014, and four natural gas-fired fuel heaters that emitted 0.002 tpy of SO₂ in 2014. These units were excluded from the modeling in accordance with section 5.5 of the Modeling TAD, which states “emission scenarios that are continuous enough or frequent enough to contribute significantly to the annual distribution of maximum daily 1-hour concentrations.” The two emergency diesel engines operated less than 1 percent of the year and the natural gas-fired heaters operated less than 10 percent of the year. As mentioned above, these units produce very low SO₂ emissions.

In the case of the DuPont Titanium Technologies (Chemours) facility, the State used actual emission data for the same time period of 2012 to 2014 but only provided 2014 annual emissions in their final modeling report. The report does specify that the data was obtained from the emissions inventory provided by TDEC. Since state and local agencies are required to report emissions to the EPA in accordance with thresholds set in the Air Emissions Reporting Requirements (AERR) located at Subpart A to 40 CFR Part 51, EPA was able to verify this data using EPA’s Emission Inventory System (EIS) and determined that the information was correctly used.

The EPA agrees that this aspect of the modeling analysis was performed in a manner consistent with the Modeling TAD and is representative of actual emissions in the area. Even though the most recent emissions data was not used in this modeling analysis, use of the 2012-2014 emissions in the modeling provides a conservative, over-estimate of impacts for the reasons explained above.

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 available at the time the modeling was performed) 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.

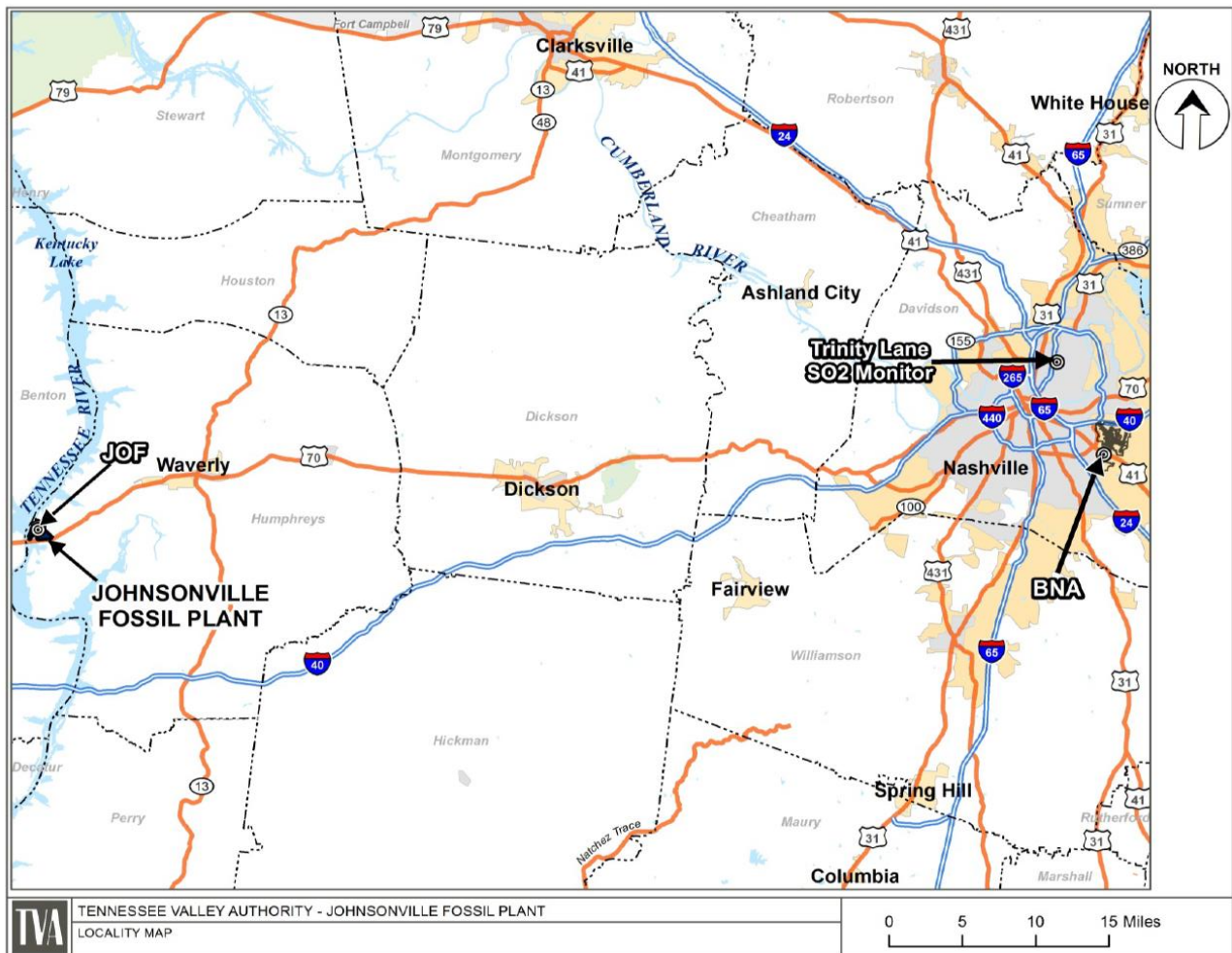
For the area of analysis for the Humphreys County, Tennessee, area, the State selected the surface meteorology from the NWS station at the Nashville International Airport (BNA), located at Latitude - 36.1105, Longitude -86.6881 about 116 km east of the facility. Also taken from the BNA NWS station were twice daily soundings for the upper air data. Both data sets were taken for the same time period of 2012 - 2014 and were chosen as best representative of meteorological conditions within the area of analysis. Two sets of meteorology were modeled, one set using

surface characteristics from BNA and another set using surface characteristics from the Johnsonville site. Both sets of meteorological data were applied in the AERMOD modeling and the results of model predictions from both sets of modeling are presented in the report submitted by the State. Section 3.2.2.9 of this TSD reports results from the higher of the two sets of runs.

The State used AERSURFACE version 13016 using data from the BNA NWS station to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness [zo]) of the area of analysis. AERSURFACE was also applied using data from the Johnsonville site to estimate surface characteristics. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as “zo”. The state estimated surface roughness values for 12 spatial sectors out to 1 km at an annual temporal resolution for dry, wet, or average conditions, as appropriate, based on a comparison of actual annual precipitation totals for both the Nashville and the Johnsonville sites for the years modeled compared to 30-year precipitation normals. “Average” was used for any year where the observed total precipitation was within the upper or lower 30th percentile of the 30-year climatological record. “Wet” or “dry” was used for any year where the total actual precipitation was above the upper 30th percentile, or below the lower 30th percentile, respectively. Two separate and distinct sets of meteorological data were developed based on surface characteristics from the areas around both, 1) the facility (on-site) and 2) the NWS BNA station. Results from the two modeling runs utilizing each respective and distinct set of meteorological data are included in the report from the State.

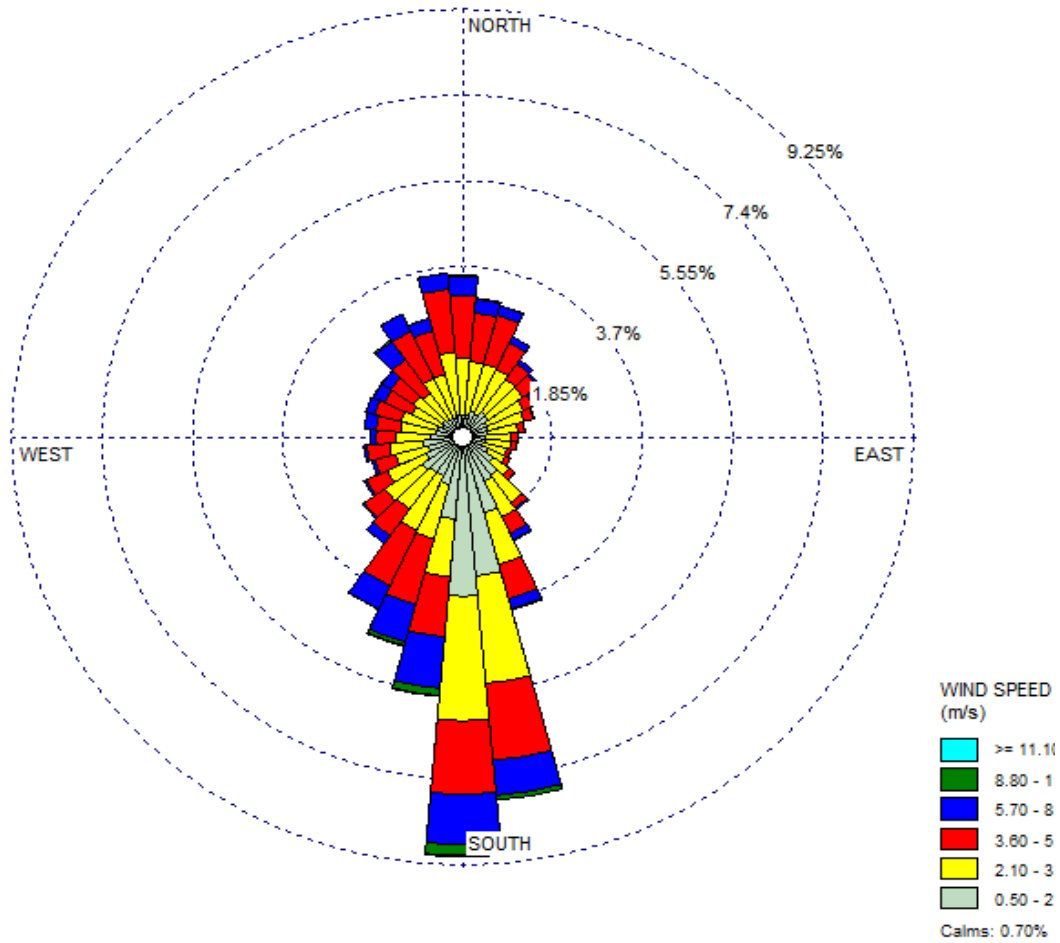
In Figure 4 below, included in the State’s modeling report, the location of this NWS station is shown relative to the area of analysis.

Figure 4. Area of Analysis and the NWS station in the Humphreys County, Tennessee Area. Source: Johnsonville Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, September 2016



As part of its recommendation, the State did not provide a 3-year surface wind rose for the BNA NWS station, but the EPA generated a wind rose with the “WRPLOTS View” utility program using the State’s submitted pre-processed AERMET surface meteorology data for the NWS station. In Figure 5, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The wind is predominantly blowing from the south with an average wind speed of 3.19 meters per second (m/s).

Figure 5. Humphreys County Cumulative Annual Wind Rose for Years 2012 – 2014



TS:	DATA PERIOD: Start Date: 1/1/2012 - 00:00 End Date: 12/31/2014 - 23:59	COMPANY NAME:	
		MODELER:	
	CALM WINDS: 0.70%	TOTAL COUNT: 26285 hrs.	
AVG. WIND SPEED:	DATE:	PROJECT NO.:	

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 SO₂ Modeling TAD in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration was provided from the BNA NWS station, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. Since the 2012-2014 data was flagged by AERMINUTE as non-calm, the State did not set a minimum wind speed threshold in AERMET.

The EPA agrees with the meteorological and surface data that the State used for the modeling of Johnsonville Fossil Plant in the Humphreys County, Tennessee, area. The data used properly represents meteorological conditions in the area and allows for the proper simulation of SO₂ emissions from the TVA Johnsonville facility and nearby sources. The State also used appropriate data from a nearby NWS station.

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 gently rolling with no significant elevation changes near the facility. The facility is also bounded on west by the Kentucky Lake. To account for 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 U.S. Geological Survey (USGS) National Elevation Dataset (NED).

The State's final modeling report does not offer any information on the terrain of the area, however, based on a review of the topography of the area surrounding the Johnsonville Fossil Plant, the EPA believes that the area has no complex terrain. The EPA agrees with the State's use of the USGS NED database and AERMAP terrain processor (version 11103) for AERMOD to account for the slight changes in elevation of the area to obtain a more accurate modeling result.

3.3.2.8. *Modeling Parameter: Background Concentrations of SO₂*

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO₂ that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the State elected to use a "tier 1" approach by utilizing the 3-year average of the 99th percentile of the daily maximum 1-hour SO₂ concentration to obtain the 2012-2014 design value. Data was obtained from the EPA AQS for the time period of 2012 to 2014 from the Mammoth Cave monitor (AQS Site: 21-061-0501), located in the Mammoth Cave National Park in Kentucky, located over 200 km (128 miles) northeast of the Johnsonville Fossil Plant. This monitor was selected after an assessment of several nearby monitors. Four of the five monitors located within 129 km (80 miles) of the facility did not comply with data completeness criteria for the 2012-2014 period. The one monitor located within 129 km of the Johnsonville facility that did have complete data for the 2012-14 period was the Powell Street monitor near Paducah, Kentucky. However, this monitor was potentially influenced by two DRR sources (TVA Shawnee and Electric Energy) located 20-30 km (12-19 miles) northwest of the monitor. Use of data from this monitor as background would falsely inflate the modeling results as there are no similar sources located 20-30 km from TVA Johnsonville. Two other monitors are located within 209 km (130 miles) of the facility, including the Mammoth Cave monitor in Kentucky and the Shelby Farms NCORE site near Memphis. However, the NCORE site was not suitable for use as a background site in the modeling due to its proximity to large nearby SO₂ sources including TVA Allen located approximately 30 km (19 miles) southwest of the monitor. Again, since there are no similar sources located within a similar proximity to the TVA Johnsonville site, the NCORE site is not suitable as it would likely falsely inflate the modeling results. Thus, the Mammoth Cave site was selected because it has SO₂ emissions within 50 km that are similar to SO₂ emissions within 50 km of the Johnsonville facility. Due to the distance of the monitor from the Johnsonville Fossil Plant and other SO₂ sources, no wind directions were excluded.

The single value of the background concentration for this area of analysis was determined by the State to be 26.98 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), equivalent to 10.30 ppb when expressed in 2 significant figures,¹⁵ and that value was incorporated into the final AERMOD results.

The EPA agrees that the Mammoth Cave monitor is representative of the background concentrations in the area around the Johnsonville Fossil Plant. The modeling analysis includes two other SO₂ emissions sources located nearby the facility. Because the Mammoth Cave monitor has SO₂ emissions within 50 km that are similar to SO₂ emissions within 50 km of the Johnsonville facility, the design value concentration from the Mammoth Cave monitor is appropriate to represent the ambient SO₂ background concentration for this modeling analysis.

3.3.2.9. *Summary of Modeling Inputs and Results*

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

Table 5. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Humphreys County Area

Input Parameter	Value
AERMOD Version	15181 (regulatory options)
Dispersion Characteristics	Rural
Modeled Sources	3
Modeled Stacks	35
Modeled Structures	39
Modeled Fencelines	1
Total receptors	5,996
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Nashville, TN (KBNA)
NWS Station Upper Air Meteorology	Nashville, TN (KBNA)
NWS Station for Calculating Surface Characteristics	Nashville, TN (KBNA) ¹⁶
Methodology for Calculating Background SO ₂ Concentration	Tier 1 approach based on 2012 – 2014 design value from AQS site: 21-061-0501.
Calculated Background SO ₂ Concentration	10.3 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 SO₂ Concentrations Averaged Over Three Years for the Area of Analysis for the Humphreys County, Tennessee Area

Averaging Period	Data Period	Receptor Location UTM zone 16		99 th percentile daily maximum 1-hour SO ₂ Concentration (µg/m ³)	
		UTM Easting (m)	UTM Northing (m)	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012-2014	413594	3988302	127.55	196.4*

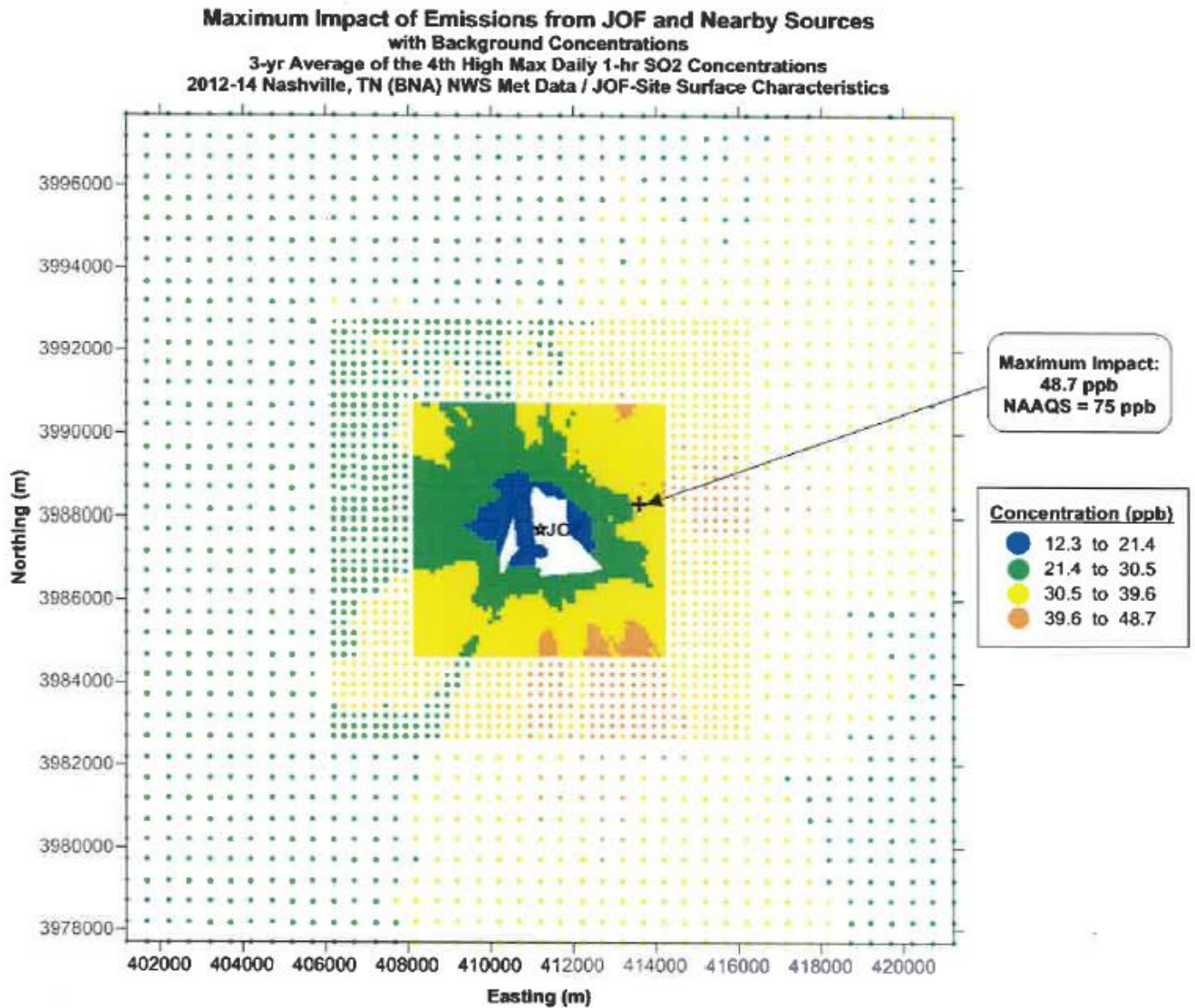
Equivalent to the 2010 SO₂ NAAQS of 75 ppb using a 2.619 µg/m³ conversion factor

The State’s modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 127.55 µg/m³, equivalent to 48.7 ppb. This modeled concentration included the background concentration of SO₂, and is based on actual emissions from the facilities modeled. Figure 6 below was included as part of the State’s recommendation, and indicates that the predicted value occurred northeast of the facility. The State’s receptor grid is also shown in the figure. It should be noted that two sets of meteorological data were modeled, one utilizing surface characteristics from the TVA Johnsonville site and one utilizing the NWS site in Nashville. Use of surface characteristics from the TVA Johnsonville site resulted in the highest modeled impacts and this is the basis of the maximum concentration reported in the table above. The modeling submitted by the State does not indicate that the 1-hour SO₂ NAAQS is violated at the receptor with the highest modeled concentration.

¹⁵ The SO₂ NAAQS level is expressed in ppb but AERMOD gives results in µg/m³. The conversion factor for SO₂ (at the standard conditions applied in the ambient SO₂ reference method) is 1ppb = approximately 2.619 µg/m³.

¹⁶ It should be noted that two separate and distinct sets of meteorological data were used in this analysis. One set of meteorological data was developed using surface characteristics from the Nashville NWS site and a separate set of meteorological data was developed using surface characteristics from the Johnsonville site. AERMOD was run using both sets of meteorological data and the data set using the Johnsonville surface characteristics resulted in the highest ambient SO₂ concentrations as reported in this Section.

Figure 6. Predicted 99th Percentile Daily Maximum 1-Hour SO₂ Concentrations Averaged Over Three Years for the Area of Analysis for the Humphreys County, Tennessee Area. Source: Johnsonville Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, September 2016



3.3.2.10. *The EPA's Assessment of the Modeling Information Provided by the State*
 The EPA agrees with the modeling information provided by the State for the analysis of the Humphreys County Area affected by the Johnsonville Fossil Plant and other nearby sources. After establishing criteria for inclusion, the State modeled three sources source, including the Johnsonville Fossil Plant, and two other nearby sources, the DuPont Titanium Technologies facility (Chemours) and the Hood Container Corporation facility. The State also chose an appropriate modeling domain that shows the maximum impact from the facility in the

Humphreys County area. In regards to background concentrations, the State did not choose the closest monitor available but the EPA agrees with this decision because of the limited availability of monitors in the nearby area of the facility. The chosen monitor is appropriate to account for impacts from other nearby sources in the area that were not included in the modeling.

The State used AERMOD version 15181. The most current approved version of AERMOD, version 16216r, which was published January 17, 2017 (*see* 82 FR 5203), includes updates to the 15181 version as well as bug fixes that were on the previous version 16216. Tennessee did not use the 16216r version because they used the default regulatory setting of the most current version at the time of modeling (15181), which does not use the alternative modeling options added to version 16216r of AERMOD. Using the older 15181 version of AERMOD with its default regulatory settings likely produces the same results as the newer 16216r version. For this reason, the EPA believes it is appropriate for the State to use the 15181 version of AERMOD.

For the modeling emissions data, the State chose to use 2012-2014 data instead of the most current data available at the time. Even though the most recent emissions data was not used in this modeling analysis, the emissions period used was the most recently available at the time the modeling protocol was developed and submitted to the State. As discussed in Section 3.2.2.5, emissions increased significantly in 2015, but decreased to below the 2012-2014 levels in 2015 after Johnsonville's Units 5-10 were shutdown pursuant to a Federal Facilities Compliance Agreement.¹⁷ For these reasons, the EPA concurs with the use of the 2012-2014 emissions data.

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

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

3.5. Jurisdictional Boundaries in the Humphreys County, Tennessee Area

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

The Johnsonville Fossil Plant is located on the western portion of Humphreys County, on the edge of the Tennessee River. The modeling domain used for the State's report utilized a 10 km grid that extends in each direction of the facility. Because of the location of the Johnsonville Fossil Plant, this modeling grid encompasses only a part of Humphreys County but also covers

¹⁷ Federal Facilities Compliance Agreement Docket No. CAA-04-2010-1760.

part of Brenton County located west of the facility. The State did not recommend a specific boundary but instead suggested to designate the entire State unclassifiable/attainment. JOF is located on the western portion of Humphreys County less than 2 km from the Benton County line. According to the State, there are no other major SO₂ emitting sources in Humphreys or Benton County that would likely cause or contribute to a violation of the 1-hour SO₂ NAAQS in the area of analysis. Apart from those sources already accounted for in the modeling for JOF, the remaining six sources in Humphreys County cumulatively emitted approximately 1 ton of SO₂ according to the 2014 NEI. Also, there are four sources in neighboring Benton County, that emitted approximately 16.6 tpy in 2014. More detail is given about the intended designation for the Humphreys County in section 3.7 of this documents.

3.6. The EPA's Assessment of the Available Information for the Humphreys County Area

After evaluating the data from the modeling report for the Johnsonville Fossil Plant, the EPA intends to designate the entire Humphreys County Area as unclassifiable/attainment for the 2010 SO₂ NAAQS. The State's modeling results indicated that the maximum impact from the Johnsonville Fossil Plant, including nearby sources and background concentrations, did not violate the 2010 SO₂ NAAQS or contribute to a violation of a nearby area. Since the facility is not located near any SO₂ nonattainment area, it does not contribute to any nearby nonattainment area. The State modeled the Johnsonville Fossil plant together with background concentration data from the Mammoth Cave monitoring site, and obtained a maximum 1-hour average of 48.7 ppb, which demonstrate compliance that is well below the 75 ppb 2010 SO₂ NAAQS. Neither the State or the EPA used 3rd party for additional modeling information. Apart from those sources already accounted for in the modeling for JOF, the remaining nearby sources in Humphreys and Benton Counties cumulatively emitted less than 18 tpy in 2014 and the EPA expects that these sources would not likely cause or contribute to an exceedance of the SO₂ NAAQS in the receptor grid.

For the modeling emissions data, the State chose to use 2012-2014 data instead of the most current data available at the time. Even though the most recent emissions data was not used in this modeling analysis, the emissions period used was the most recently available at the time the modeling protocol was developed and submitted to the State. As discussed in Section 3.2.2.5, emissions increased significantly in 2015, but decreased to below the 2012-2014 levels in 2015 after Johnsonville's Units 5-10 were shutdown pursuant to a Federal Facilities Compliance Agreement.¹⁸ For these reasons, the EPA concurs with the use of the 2012-2014 emissions data.

In its submission, Tennessee did not give a specific recommendation for the designation area, but did suggest that the entire State be designated as unclassifiable/attainment based in part on an assessment and characterization of air quality impacts from these facilities. The EPA notes that Johnsonville Fossil Plant is the only SO₂ emitting source subject to the DRR in Humphreys County. Based on the modeling results provided by the state, including background levels of SO₂

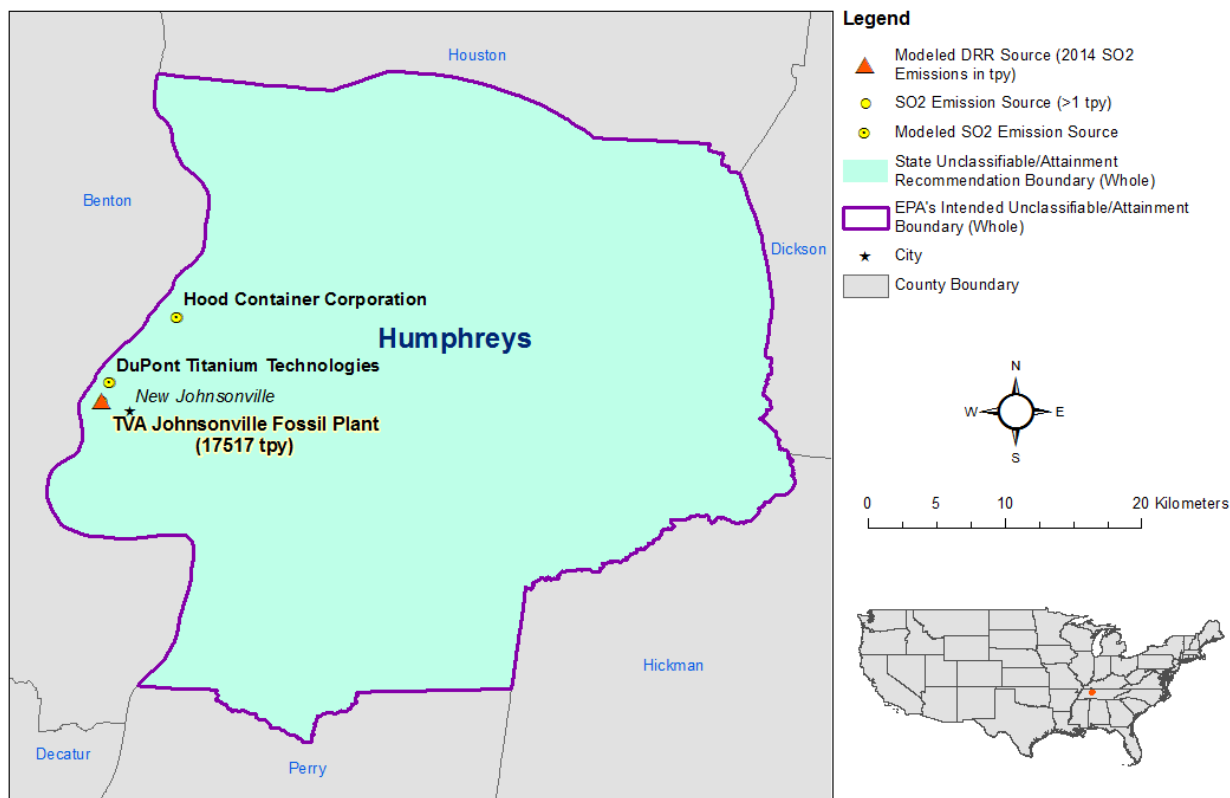
¹⁸ Federal Facilities Compliance Agreement Docket No. CAA-04-2010-1760.

and SO₂ emissions within Humphreys County, the EPA intends to designate, in its entirety, Jackson County as unclassifiable/attainment for the 1-hour SO₂ NAAQS. The EPA believes that our intended unclassifiable/attainment area, bounded by Humphreys County, in its entirety, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

3.7. Summary of Our Intended Designation for the Humphreys County, Tennessee Area

After careful evaluation of the State’s recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Humphreys County, Tennessee, area as unclassifiable/attainment for the 2010 SO₂ NAAQS because based on the available information, including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined that this area meets the 2010 SO₂ NAAQS, and does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Specifically, the boundaries for this unclassifiable/attainment area are comprised of the entire Humphreys County. Figure 7 shows the boundary of this intended designated area.

Figure 7. Boundary of the Intended Humphreys County, Tennessee 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 to designate all remaining undesignated areas in Tennessee during this round of designations. All other previously undesignated areas in the State are discussed in separate sections of this document.

4. Technical Analysis for the Shelby County Area

4.1. Introduction

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

The Shelby County area contains two sources, the TVA Allen Fossil Plant and the Cargill Corn Milling Company, Inc. (Cargill) facility, both subject to the DRR. Tennessee chose to characterize the Allen Fossil Plant, through air dispersion modeling using 2012.204 actual SO₂ emissions. For Cargill, the State chose to limit the source's SO₂ emission limits to below 2,000 tpy (based on a combination of operational shutdowns, unit modifications and a natural gas fuel restriction). These sources are located approximately 1.6 km apart and Cargill was not included in the modeling analysis for the Allen Fossil Plant.

Counties previously designated unclassifiable in Round 1 (*See 78 Federal Register 4719*) and Round 2 (*See 81 Federal Register 45039*) will remain unchanged unless otherwise noted.

4.2. Air Quality Monitoring Data for the Shelby County Area

This factor considers the SO₂ air quality monitoring data in the area of Shelby County.

The EPA reviewed the available air quality monitoring data in AQS and found the following nearby data:

- The Shelby Farms NCore SO₂ monitor (AQS ID: 47-157-0075). This monitor is located at 35.151699, -89.850249 in Shelby County, and is located in Memphis, Tennessee. The monitor is 17 miles northeast from the Cargill Corn Milling, Inc. and 18 miles northeast of the Allen Fossil Plant. The data collected by this monitor are comparable to the NAAQS, and indicate that the most recent SO₂ levels are below the 2010 1-hr SO₂ NAAQS. The most recent three years of complete, quality-assured, certified data from this monitor (2014-2016) indicate a 1-hr SO₂ design value of 8 ppb. However, this data alone is not sufficient to support a conclusion that there is no NAAQS violation in any other portion of the area, or that the area immediately around the monitoring site is not contributing to a violation in a nearby area, because the monitor was not located to characterize the maximum 1-hr SO₂ concentrations near the Cargill Corn Milling, Inc., Allen Fossil Plant, or the area. Tennessee provided an air quality modeling analysis to characterize the maximum 1-hr SO₂ concentrations in the area (see Section 4.3 below).

In reviewing the available air quality monitoring data in AQS, the EPA determined that other than the data described above, there are no additional relevant data in AQS collected in or near

Shelby County that could inform the intended designation action. The most recent SO₂ design values for all areas of the country are available at <https://www.epa.gov/air-trends/air-quality-design-values>.

4.3. Air Quality Modeling Analysis for the Shelby County Area Addressing the Tennessee Valley Authority – Allen Fossil Plant

4.3.1. Introduction

Section 4.3 presents all the available air quality modeling information for a portion of Shelby County (hereinafter referred to as the Shelby County area), that includes the Tennessee Valley Authority – Allen Fossil Plant (Also referred to as the “Allen Fossil Plant” or “AFP”). This area contains the following SO₂ sources around which Tennessee is required by the DRR to characterize SO₂ air quality, or alternatively to establish an SO₂ emissions limitation of less than 2,000 tpy:

- The Allen Fossil Plant facility emitted 2,000 tons or more annually. Specifically, the Allen Fossil Plant emitted 9,750 tons of SO₂ in 2014. This source meets the DRR criteria and thus is on the SO₂ DRR Source list, and Tennessee has chosen to characterize it via modeling.
- The Nucor Steel Memphis facility is not on the SO₂ DRR Source list but was included in the modeling analysis based on criteria established by the State. The Nucor Steel Memphis facility emitted 175 tons of SO₂ in 2014.
- The Cargill Corn Milling Company, Inc. (Cargill) emitted 2,000 tons or more annually. Specifically, it emitted 3,375 tpy of SO₂ in 2014 and falls under the DRR source list for the area but was not included in the modeling analysis for the Allen Fossil Plant. The State chose to limit SO₂ emissions to below 2,000 tpy in lieu of modeling or monitoring to characterize this source. Cargill is located approximately 1.6 km northeast of the Allen Fossil Plant. The facility implemented a limit through a combination of operational shutdowns, unit modifications, and a natural gas fuel restriction. The state accounted for Cargill’s impacts through the addition of the SO₂ background concentration added to the modeled results. Cargill retired most of its SO₂ emitting units within the facility. In addition, it converted its largest SO₂ emitting units from coal to natural gas in February 2015 and established the exclusive burning of natural gas in their remaining boilers as a federally enforceable limit. This combination of actions resulted in a decrease in emissions from Cargill to a level well below the 2,000 tpy threshold.

Because we have available results of air quality modeling and emission reduction information regarding these sources, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

Tennessee recommended the entire state be designated unclassifiable/attainment including Shelby County based in part on an assessment and characterization of air quality impacts from these facilities. The State used air dispersion modeling software, i.e., AERMOD, analyzing actual hourly emissions from the period of 2012 to 2014 to assess and characterize air quality

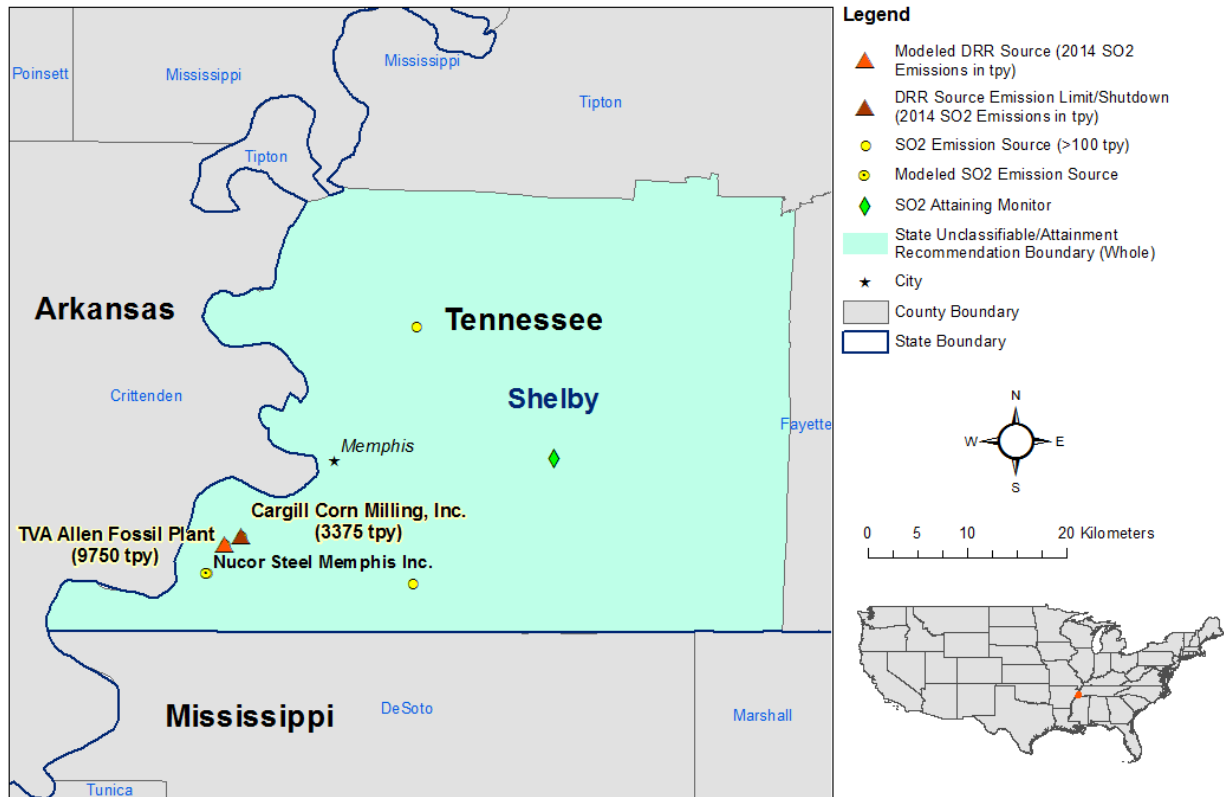
impacts from the Allen Fossil Plant. After careful review of the State's assessment, supporting documentation, and all available data, the EPA agrees with the State's recommended designation for the area. The EPA intends to designate the area, specifically the entire Shelby County, as unclassifiable/attainment. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

As seen in Figure 8 below, the Allen Fossil Plant facility is located in Memphis, Tennessee, approximately 16 km west of the Memphis International Airport (MEM). Included in Figure 8 are other nearby emitters of SO₂ including Nucor Steel Memphis (included in the modeling analysis for Allen Fossil Plant) and Cargill Corn Milling, Inc.¹⁹ Lastly, Figure 8 provides the State's recommended area for the unclassifiable/attainment designation.²⁰

¹⁹ According to the Allen Fossil Plant modeling report, all other SO₂ emitters within 10 km, with emissions of 100 tpy or more (based on information from the 2014 emission inventory provided by the Tennessee Department of Environmental Conservation or TDEC and the Memphis Shelby County Health Department or MSCHD) and sources located 10 km to 50 km with a Q/D (annual emission in tons/distance in km) greater than 20, were considered for the modeling and are shown in Figure 9. If no sources not named previously are shown, there are no additional SO₂ emitters above this emission level in the vicinity of the named source(s). (EPA's "Screening Threshold" Method for PSD Modeling Memo, 1985.)

²⁰ Tennessee's designation recommendation excludes the portion of Sullivan County designated nonattainment for the 2010 SO₂ NAAQS in 2013 (Round 1 designations).

Figure 8. Map of the Shelby County Area Addressing Tennessee Valley Authority - Allen Fossil Plant.



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA’s July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered one modeling assessment from the State. No other modeling assessments were used from other parties. The table below indicates when this assessment was received, provides an identifier for the assessment, and identifies any distinguishing features of the modeling assessment.

Table 7. Modeling Assessments for the Shelby County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Tennessee*	November 2, 2016	TVA – Allen Fossil Plant (AFP) Final Report	N/A

*Tennessee forwarded the assessment prepared by the TVA who submitted it to the TDEC on October 31, 2016.

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 SO₂ NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified.

The AERMOD modeling system contains the following components:

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

The State used AERMOD version 15181. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

The most current approved version of AERMOD, version 16216r, which was published January 17, 2017 (*see* 82 FR 5203), includes updates to the 15181 version as well as bug fixes that were on the previous version 16216. The updates to 15181 include the addition of settings that were previously considered an alternative modeling option. Tennessee did not use the 16216r version because they used the default regulatory setting of the most current version at the time of modeling (15181), which does not use the alternative modeling options added to version 16216r of AERMOD. Using the older 15181 version of AERMOD with its default regulatory settings, likely produces the same results as the newer 16216r. For this reason, EPA believes it is appropriate for the State to use the 15181 version of AERMOD.

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 SO₂ modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO₂ sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

For the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model in rural mode. To make the determination of using rural mode the State analyzed land use in the area using the Auer method with a 3 km radius centered on one of the Allen Fossil Plant stacks. Data from the 2011 NLCD was used to determine land cover in the area and a 30 m by 30 m data cell size was used. The results of the land use status analysis using Auer's methodology indicated that approximately 9 percent of surrounding land was urban and 91 percent was rural. Given these results and that the methodology used is consistent with one available method in Section 6.3 of the Modeling TAD, the EPA agrees with the determination that the area surrounding the source should be classified as rural.

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 SO₂ emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO₂ concentrations.

The sources of SO₂ emissions subject to the DRR in this area are described in the introduction to this section. For the Shelby County area, the State also assessed sources within a 50 km area of analysis using the Q/D method.²¹ The State determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO₂ NAAQS exceedances in the area of analysis and any potential impact on SO₂ air quality from other sources in nearby areas. This area of analysis for nearby sources covered the majority of Shelby County and portions of Fayette and Tipton Counties in Tennessee. In addition, the area covered portions of DeSoto, Tate, Tunica, and Marshall Counties in Mississippi; and Crittenden, Mississippi, Pointsett, Cross, St. Francis, and Lee Counties in Arkansas. The area captures approximately eight additional sources in the Shelby County area, but no sources in Mississippi or Arkansas.

The State utilized the Q/D method to determine which nearby sources should be included in the modeling analysis for Allen Fossil Plant, including: 1) sources located within 10 km of the AFP that emitted more than 100 tpy; or 2) sources located between 10 km and 50 km within the AFP and have a Q/D (annual emissions in tons/distance in km) greater than 20. Based on this assessment, two of the eight sources captured within the area of analysis, Nucor Steel Memphis facility and the Cargill Corn Milling facility were found to meet the State's criteria. The Nucor Steel facility, located approximately 3 km southwest of the Allen Fossil plant emitted 175 tpy of SO₂ in 2014 according to the NEI and was included in the modeling analysis for AFP.

²¹ The State performed an analysis of emissions data and spatial proximity for all nearby sources to determine which sources to include in the modeling for the Allen Fossil Plant. All other SO₂ emitters within 10 km, with emissions of 100 tpy or more (based on information from the 2014 emission inventory provided by the Tennessee Department of Environmental Conservation or TDEC and the Memphis Shelby County Health Department or MSCHD) and sources located 10 km to 50 km with a Q/D (annual emission in tons/distance in km) greater than 20, were considered for the modeling and are shown in Figure 9. (EPA's "Screening Threshold" Method for PSD Modeling Memo, 1985.)

The Cargill Corn Milling is subject to the DRR, is located approximately 1.6 km northeast of the Allen Fossil Plant, but the state did not include this source in the modeling for the Allen Fossil Plant because the source had undergone plant modifications that significantly reduced SO₂ emissions. Tennessee chose to limit Cargill's SO₂ emissions to below 2,000 tpy based on a combination of operational shutdowns, unit modifications, and restricting remaining emission units to only burn natural gas. In 2015, Cargill conducted a series of modifications including 1) converting its stoker and pulverized coal-fired boilers to natural gas units (units 8001 and 8301);²² 2) limiting these two units to burn only natural gas; and (3) permanently shutting down the corn milling operations which resulted in the removal of an additional 255 tons of allowable SO₂ emissions from the facility. These modifications became enforceable and effective when incorporated into Cargill's Title V permit modification issued November 1, 2016.²³ These combined modifications resulted in a facility wide SO₂ PTE of 0.70 tpy.

All other nearby sources that were not included in the modeling analysis, were accounted for in the background concentrations as discussed in Section 4.3.2.8. Given that all other sources in the 10 km area emitted less than 100 tpy according to the 2014 NEI and sources between 10 km and 50 km of the facility had a Q/D of less than 20, the EPA believes that these sources will not cause or contribute to a violation of the 2010 1-hour SO₂ NAAQS, and any possible impacts are captured in the background concentrations of SO₂.

For the grid receptor spacing for the area of analysis chosen by the State, here are the details for the actual modeling area of analysis:

A Cartesian grid that extended 10 km in each direction and was centered at the Allen Fossil Plant facility was used. The 10 km distance was chosen because it captured the nearby sources that were included in the modeling analysis and that could cause a concentration gradient variation near the site, as well as captured the predicted maximum from the TVA Allen Fossil Plant.

As seen in Table 8, the spacing for the receptors was adjusted based on the distance from the facility, creating nested grids within the 10 km limit. In addition, boundary receptors were placed along the perimeter of the fenced area of the facility and these were spaced 50 m apart. These boundary receptors were placed along a permanent fence surrounding the property.

Table 8. Receptor Grid Size and Spacing for the Shelby County Area

Receptor Spacing (m)	Grid Size (km)	Grid Origin (km south and west of site)
50	Fenceline	0
100	6 x 6	3
250	10 x 10	5
500	20 x 20	10

²² This conversion permanently ceased the burning of coal at the facility.

²³ Cargill Title V Permit No. 0045-01TV, November 1, 2016.

The receptor network contained 6,060 receptors, and the network covered a Southwestern portion of Shelby County, Tennessee; Southeastern portions of Crittenden County in Arkansas; and a small Northern portion of DeSoto County in Mississippi.

Figures 9 and 10, included in the State's modeling report, show the State's chosen area of analysis surrounding the Allen Fossil Plant, 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 from areas where it would not be feasible to place a monitor, even though the receptor grid area contains bodies of water, and opted to apply a regular grid of receptors for the area. In accordance with Section 4.2 of the Modeling TAD, the State also included elevation data from the NED, using the AERMP terrain processor of AERMOD. The State did not place receptors in other locations that it considered not to be ambient air relative to each modeled facility. In particular, Tennessee did not place receptors within the fence line of the Allen Fossil Plant facility. Boundary receptors were placed along the perimeter of the fenced area of the facility. These boundary receptors correspond to a permanent fence surrounding the property. Areas within this fenced area are not considered ambient air and the EPA concurs with this determination.

Figure 9. Area of Analysis for the Shelby County Area. Source: Allen Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, October 2016

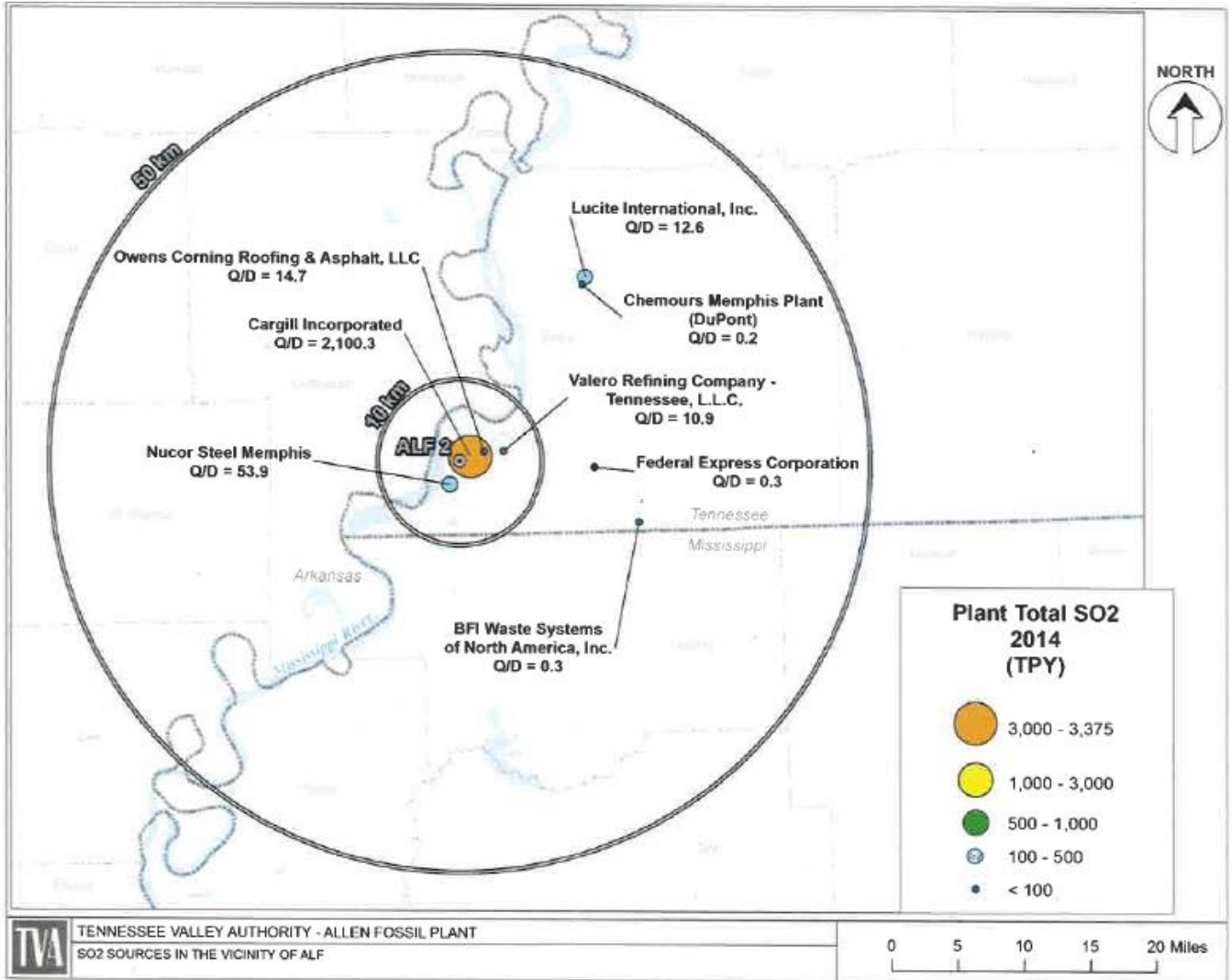
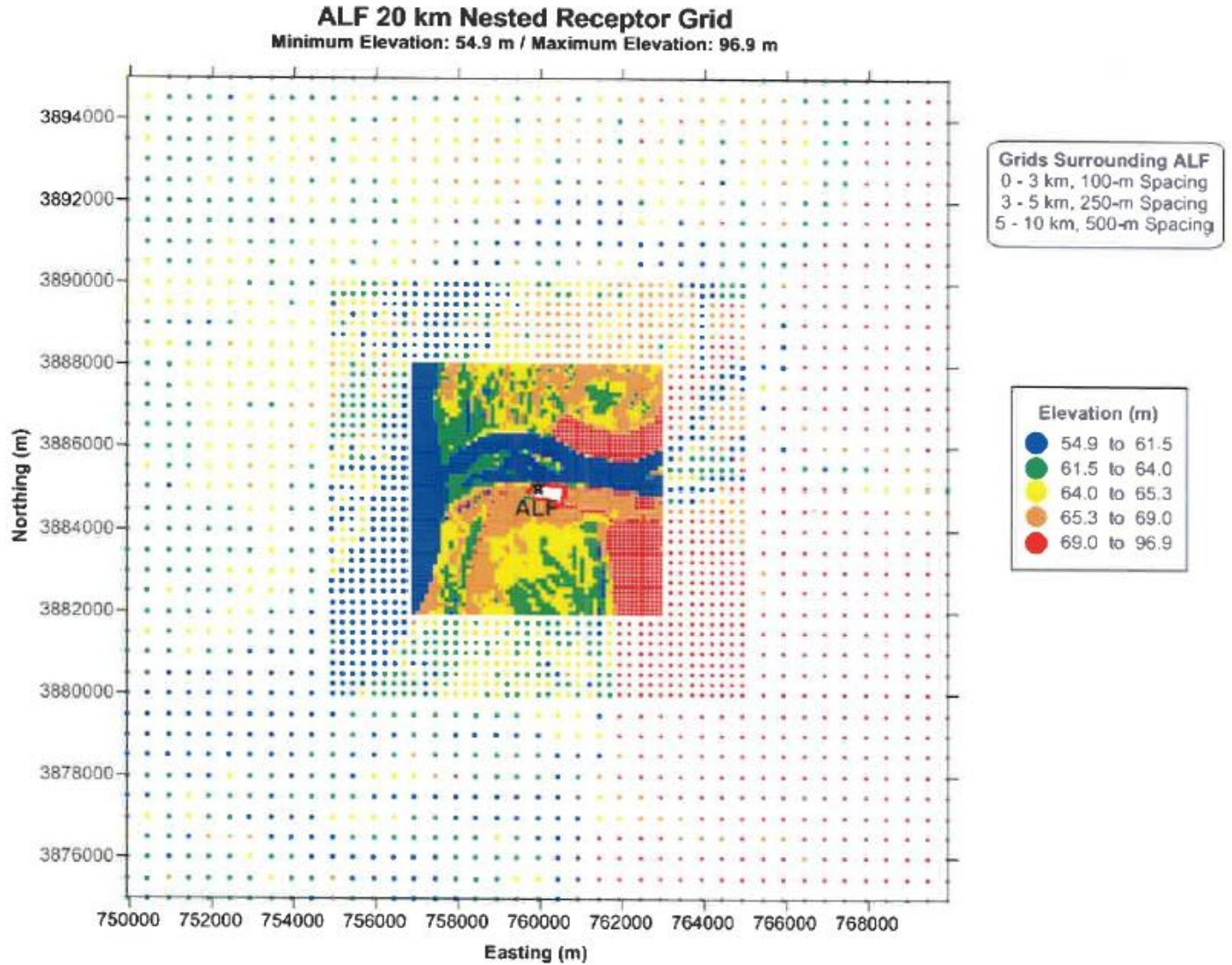


Figure 10. Receptor Grid for the Shelby County Area. Source: Allen Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, October 2016



Based on the information provided in Tennessee’s recommendation, the EPA agrees with the area excluded from the modeling because it does not represent ambient air for the purposes of SO₂ modeling, and agrees that the grid selected by the State is adequate. Therefore, the EPA believes that Tennessee’s receptor grid is appropriate for the characterization of the area, considering the impact of SO₂ from the facility and modeled nearby sources.

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.

As described in section 4.3.1, Tennessee utilized one additional source in their modeling for the Allen Fossil Plant facility area. According to the Allen Fossil Plant modeling report, all other SO₂ emitters within 10 km, with emissions of 100 tpy or more (based on information from the 2014 emission inventory provided by the Tennessee Department of Environmental Conservation or TDEC and the Memphis Shelby County Health Department or MSCHD) and sources located 10 km to 50 km with a Q/D (annual emission in tons/distance in km) greater than 20, were considered for the modeling. These sources included only one facility within 10 km, the Nucor Steel Memphis facility, and had no sources within 50 km that exceeded to 20 Q/d threshold.

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 agrees that Tennessee has appropriately characterized the area surrounding the Allen Fossil Plant. Given the criteria for selecting nearby sources, we believe that the decision to only include one additional source, the Nucor Steel Memphis facility, in the modeling analysis was correct. Also, the State has appropriately used the actual emissions and stack heights for both facilities and correctly accounted for building downwash for TVA Allen using BPIPPrM for AERMOD.

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 enforceable and effective.

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

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

find the necessary emissions information for designations-related modeling in the existing SO₂ emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, “Guideline on Air Quality Models.”

As previously noted, the State included Allen Fossil Plant and one other emitter of SO₂ 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 SO₂ emissions between 2012 and 2014 are summarized below.

For the Allen Fossil Plant and the Nucor Steel Memphis facility, the State provided annual actual SO₂ emissions between 2012 and 2014. This information is summarized in Table 9. A description of how the State obtained hourly emission rates is given below this table.

Table 9. Actual SO₂ Emissions Between 2012 – 2014 from Facilities in the Shelby County Area

Facility Name	SO ₂ Emissions (tpy)		
	2012	2013	2014
Allen Fossil Plant	9,651	10,026	9,781
Nucor Steel Memphis	201	201	201
Total Emissions from All Modeled Facilities in the State’s Area of Analysis	9,838	10,201	9,956

For the Allen Fossil Plant, actual hourly emissions data was obtained from the CEMs for the three coal-fired boilers and from the EPA’s CAMD for four (ACT17-20) of the twenty continuously operating turbines. The other 16 continuously operated turbines are not subject to the Continuous Monitoring requirement in 40 CFR Part 75 and so emissions were conservatively high based on oil-fired operations at maximum heat-input capacity. They used the worst case emission rates for every hour of the three-year period. This is conservative because the turbines can fire either natural gas or oil and it was assumed that they were firing oil which has higher SO₂ emissions than firing natural gas. The facility also includes two black-start diesel engines and one natural gas-fired auxiliary boiler but these were excluded from the modeling in accordance with Section 5.5 of the Modeling TAD, which states that you should use “emission scenarios that are continuous enough or frequent enough to contribute significantly to the annual distribution of maximum daily 1-hour concentrations.” The two black-start diesel engines operated less than 2 percent of the year and the natural gas-fired auxiliary boiler is only allowed to operate up to 23 percent of the year and produces minimal amounts of SO₂.

In the case of the Nucor Steel Memphis facility, the State used actual emission data for the same time period of 2012 to 2014 but only provided 2014 annual emissions in their final modeling report. The report does specify that the data was obtained from emissions inventories provided by TDEC and MSCHD. Since state and local agencies are required to report emissions to the EPA in accordance with thresholds set in the AERR located at Subpart A to 40 CFR Part 51, we were able to verify this data using the EPA's EIS.

Given the data provided by the State and their explanation of omitted emission, the EPA agrees that the emission data used for modeling was appropriate, comports with the EPA's Modeling TAD, and is representative of actual emission and possible impact to the attainment of the 2010 SO₂ NAAQS in the area. For the modeling assessment of the Shelby County area the State used 2012-2014 data even when 2015 data was available. The EPA believes that this was an acceptable approach since the 2015 and 2016 preliminary data for the Allen Fossil Plant show that emissions continue to be lower than those used in the modeling. This shows that the impact from the Allen Fossil Plant utilizing 2015 or 2016 emissions would likely be lower than what was modeled.

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

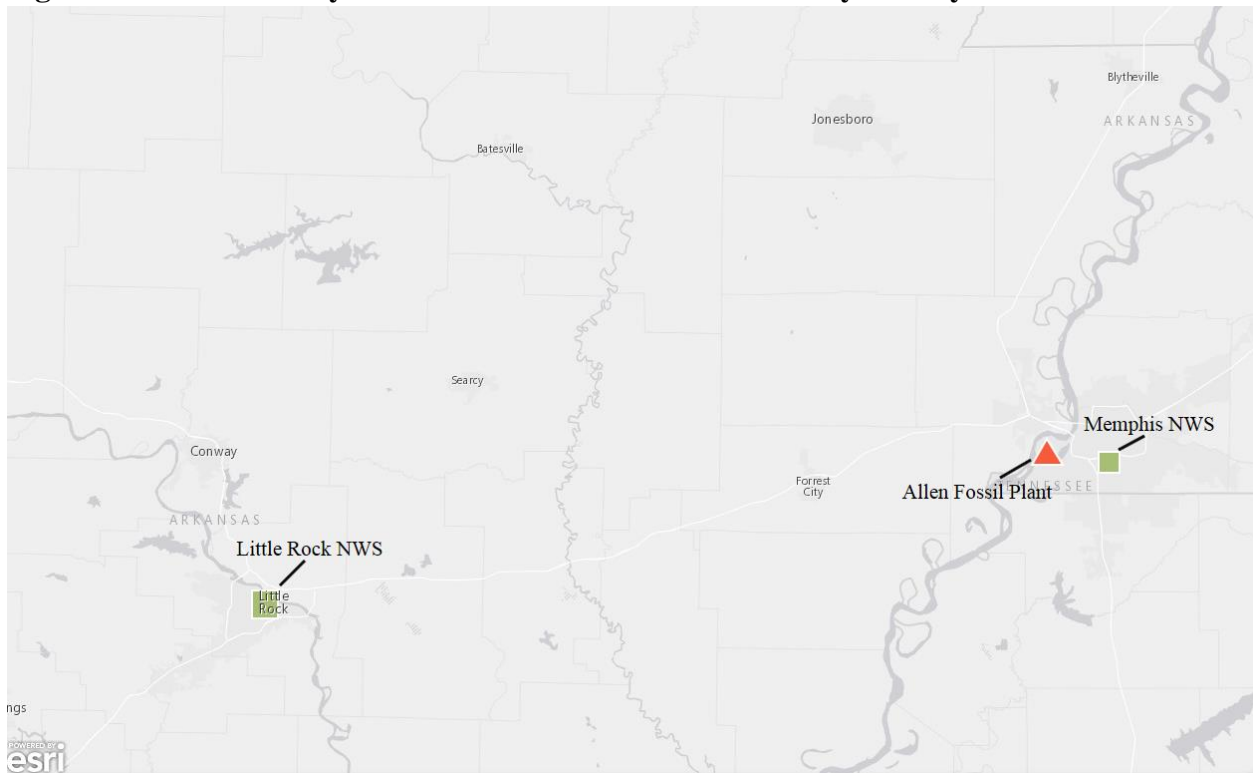
For the area of analysis for the Shelby County area, the State selected the surface meteorological data for the same time period of 2012 to 2014 from the NWS station in the MEM in Memphis, TN. The station is located at 35.0564 N, 89.9865 W, approximately 16 km east of the Allen Fossil Plant facility. For upper air observation data, the State used the North Little Rock airport (LZK) station in Little Rock, Arkansas. The station is located at 34.73 N, 92.34 W, approximately 194 km from the Allen Fossil Plant facility.

The State used AERSURFACE version 13016 using data from the MEM NWS station to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness z_0) 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_0 ” The state estimated surface roughness values for 12 spatial sectors out to 1 km at a seasonal temporal resolution for dry, wet, or average conditions, as appropriate, by comparing precipitation for the period of data to be processed to the 30-year climatological record, selecting “wet” conditions if precipitation is in the upper 30th percentile, “dry” conditions if precipitation is in the lower 30th percentile, and “average” conditions if precipitation is in the middle 40th percentile .

The State modeled two set of meteorology in order to get the most representative results possible. One set was modeled using onsite surface characteristics of the facility and another set was modeled using the surface characteristics of the MEM NWS station mentioned above.

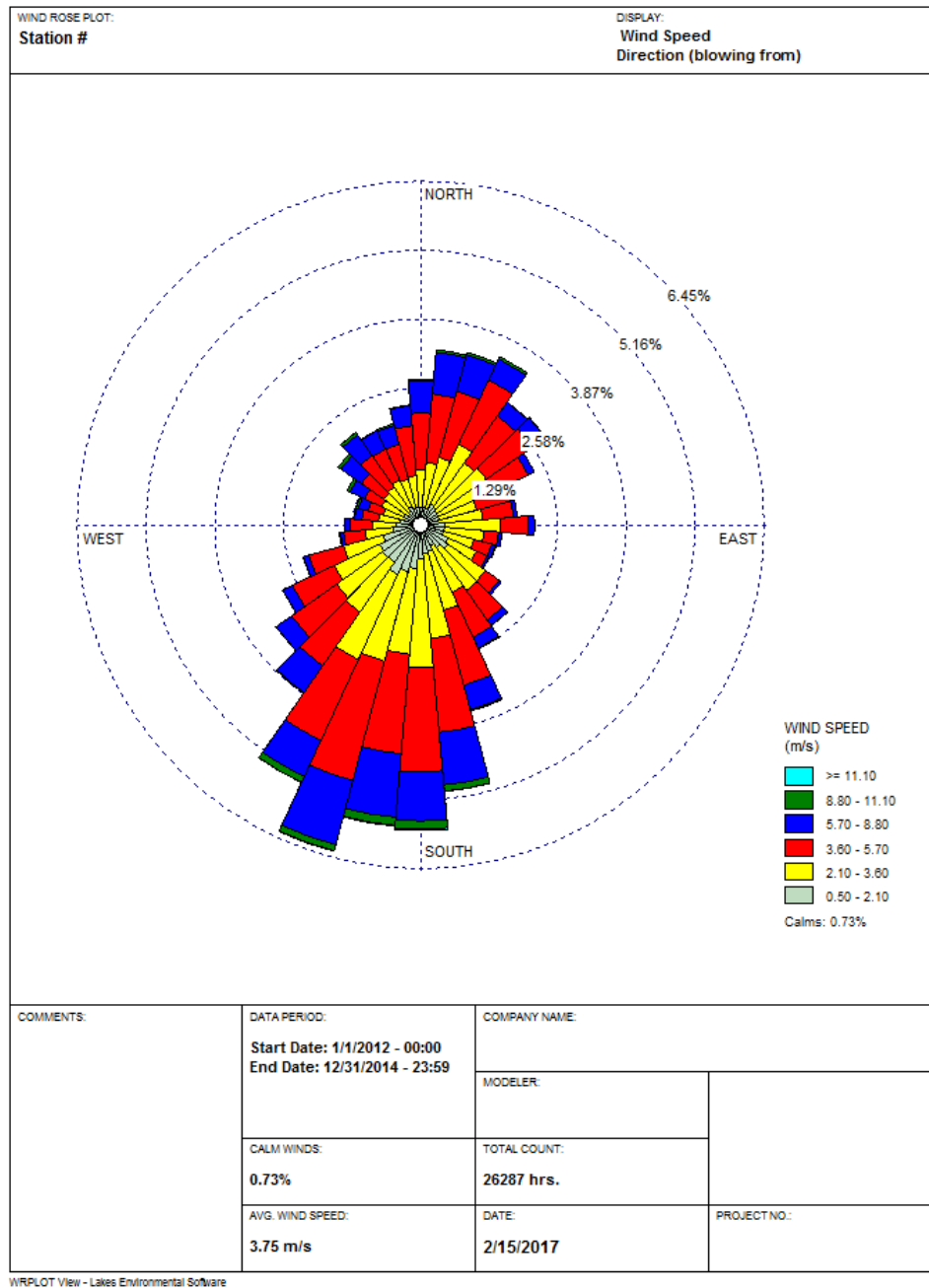
In the figure below, generated by the EPA, the location of the MEM and LZK NWS stations in reference to the Allen Fossil Plant are shown.

Figure 11. Area of Analysis and the NWS station in the Shelby County Area



The EPA generated wind rose plots with “WRPLOTS View” utility program using State submitted pre-processed AERMET surface meteorology data for the MEM NWS site. In Figure 12, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The wind is predominantly blowing from the south and southwest of the NWS station, with an average wind speed of 3.75 m/s. The wind patterns are from the south for just over 5 percent and from the southwest for over 20 percent of the time.

Figure 12. Memphis International Airport NWS Cumulative Annual Wind Rose for Years 2012 – 2014.



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The State followed the methodology and settings presented in EPA’s 2004 user guide for AERMOD Meteorological Preprocessor (AERMET) and the 2015 addendum to the guide 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 MEM NWS station, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. Since the 2012-2014 data was flagged by AERMINUTE as non-calm, the State did not set a minimum wind speed threshold in AERMET.

The EPA agrees with the meteorological data that the State used for the modeling of the Shelby County area in regards to the Allen Fossil Plant facility. The information used does capture the correct impact from SO₂ emission from the facility and nearby sources. The State used appropriate site specific data from a nearby NWS monitor when possible and used another valid NWS monitor for upper air data. From the information provided, and the wind rose created by the EPA, we can expect that the biggest impact from the facility emissions will be seen to the north of the facility's location.

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. The facility does have a State park to the southeast of its location, which has some elevation changes but the rest of the surround area is considered flat or slightly inclining towards sea level. The facility is also bound by two bodies of water, with the Mississippi river to the west and by lake McKellar to the north. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS NED.

The State's final modeling report does not offer any information on the terrain of the area, but based on a review of the topography of the area surrounding the Allen Fossil Plant, the EPA believes that the area has no complex terrain. The EPA agrees with the State's use of the USGS NED database and AERMAP terrain processor (version 11103) for AERMOD to account for the slight changes in elevation of the area to obtain a more accurate modeling result.

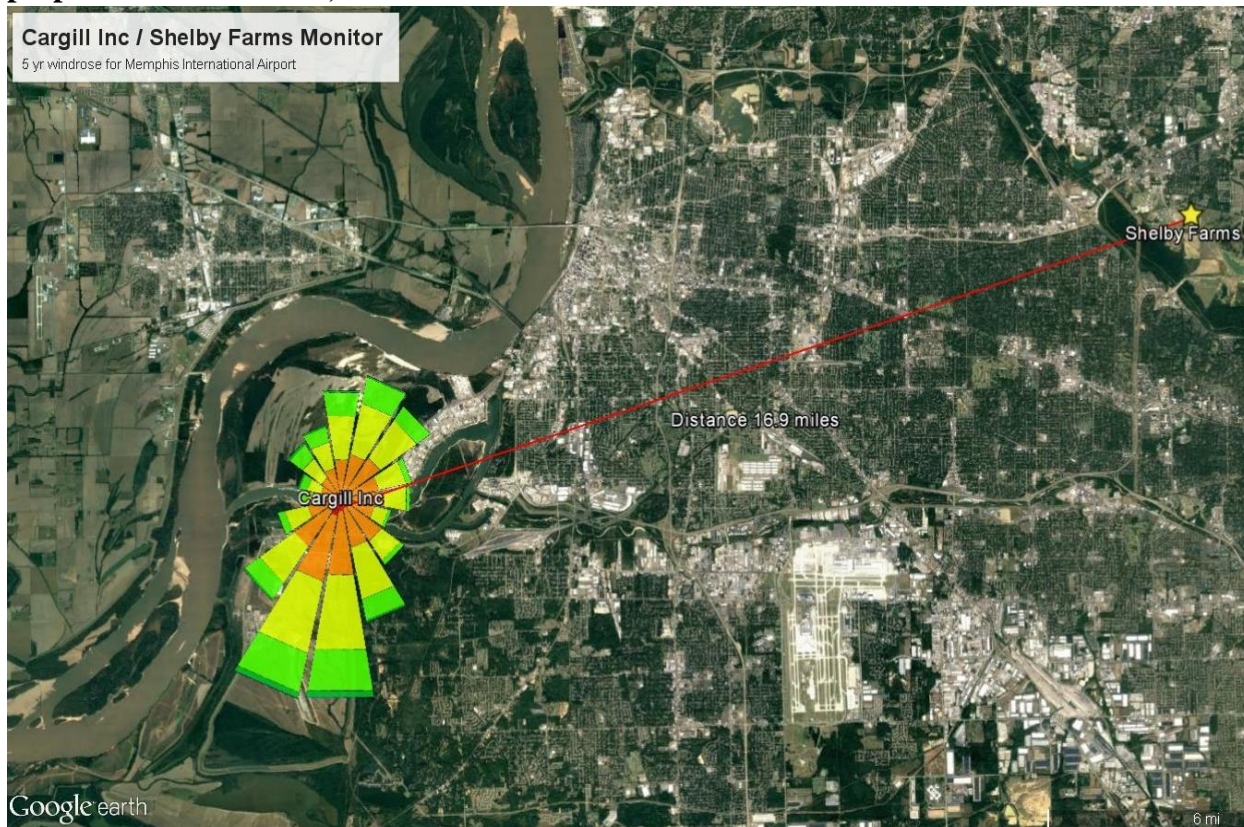
4.3.2.8. *Modeling Parameter: Background Concentrations of SO₂*

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO₂ that are ultimately added to the modeled design values: 1) a “tier 1” approach, based on a monitored design value, or 2) a temporally varying “tier 2” approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the State elected to use a “tier 1” approach. Data was obtained for the same time period of 2012 to 2014 from the Shelby Farms NCore monitoring site, located in Shelby Farms, TN, approximately 17 miles northeast of the Allen Fossil Plant. No wind directions were excluded to remove impacts of the Allen Fossil Plant on the monitor. The monitor is located in an area that is impacted by other sources that were explicitly included in the modeling analysis, which could lead to a possible “double counting” of the impact from the modeled sources. In addition, the monitor is located within 30 km of many of the sources excluded from explicit modeling as discussed in Section 4.3.2.3 of this TSD and should account for the impact of those sources. The single value of the background concentration for this area of analysis was determined by the State to be 24.46 µg/m³, equivalent to 9.3 ppb when expressed in 2 significant figures,²⁴ and that value was incorporated into the final AERMOD results.

The NCore monitor should also account for the impacts of the nearby Cargill facility which was excluded from the modeling because of the source’s enforceable reductions in SO₂ emissions. Notably, the background monitoring data accounts for impacts during the 2012-2014 time period which was prior to the SO₂ emissions reductions at the Cargill facility. Therefore, the background concentration represents higher SO₂ emissions from Cargill than the facility is currently emitting (based on reduced SO₂ emission modifications). Figure 13 below, provided by the State, shows the distance of the Shelby Farms monitor from the Cargill facility and includes a Wind Rose to show the wind patterns near the facility.

²⁴ The SO₂ NAAQS level is expressed in ppb but AERMOD gives results in µg/m³. The conversion factor for SO₂ (at the standard conditions applied in the ambient SO₂ reference method) is 1ppb = approximately 2.619 µg/m³.

Figure 13. Location of NCore Site and Cargill Corn Milling with Windrose for NWS Memphis. Source: Allen Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, October 2016



The EPA agrees that the use of the Shelby Farms NCore monitor for background concentrations is appropriate because it is near the Allen Fossil Plant, therefore it captures the impact from all nearby sources that were not included in the modeling assessment. Due to the location of the monitor and the fact that the State did not make adjustments to the monitoring data, the background concentration likely conservatively “double counted” impacts from the facilities explicitly included in the modeling. Lastly, the monitoring data is appropriate because it meets the data completeness requirements for the time period being analyzed of 2012 to 2014.

4.3.2.9. *Summary of Modeling Inputs and Results*

The AERMOD modeling input parameters for the Shelby County area of analysis are summarized below in Table 10.

Table 10. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Shelby County Area

Input Parameter	Value
AERMOD Version	15181 (regulatory options)
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	25
Modeled Structures	40
Modeled Fence lines	1
Total receptors	6,060
Emissions Type	Actual Emissions
Emissions Years	2012-2014
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Memphis International Airport. Memphis, TN
NWS Station Upper Air Meteorology	North Little Rock Airport. Little Rock, AK
NWS Station for Calculating Surface Characteristics	Memphis International Airport. Memphis, TN
Methodology for Calculating Background SO ₂ Concentration	Tier 1 approach based on 2012 – 2014 design value for the Shelby Farm, TN NCore site.
Calculated Background SO ₂ Concentration	9.3 ppb

The results presented below in Table 11 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

Table 11. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO₂ Concentrations Averaged Over Three Years for the Area of Analysis for the Shelby County Area

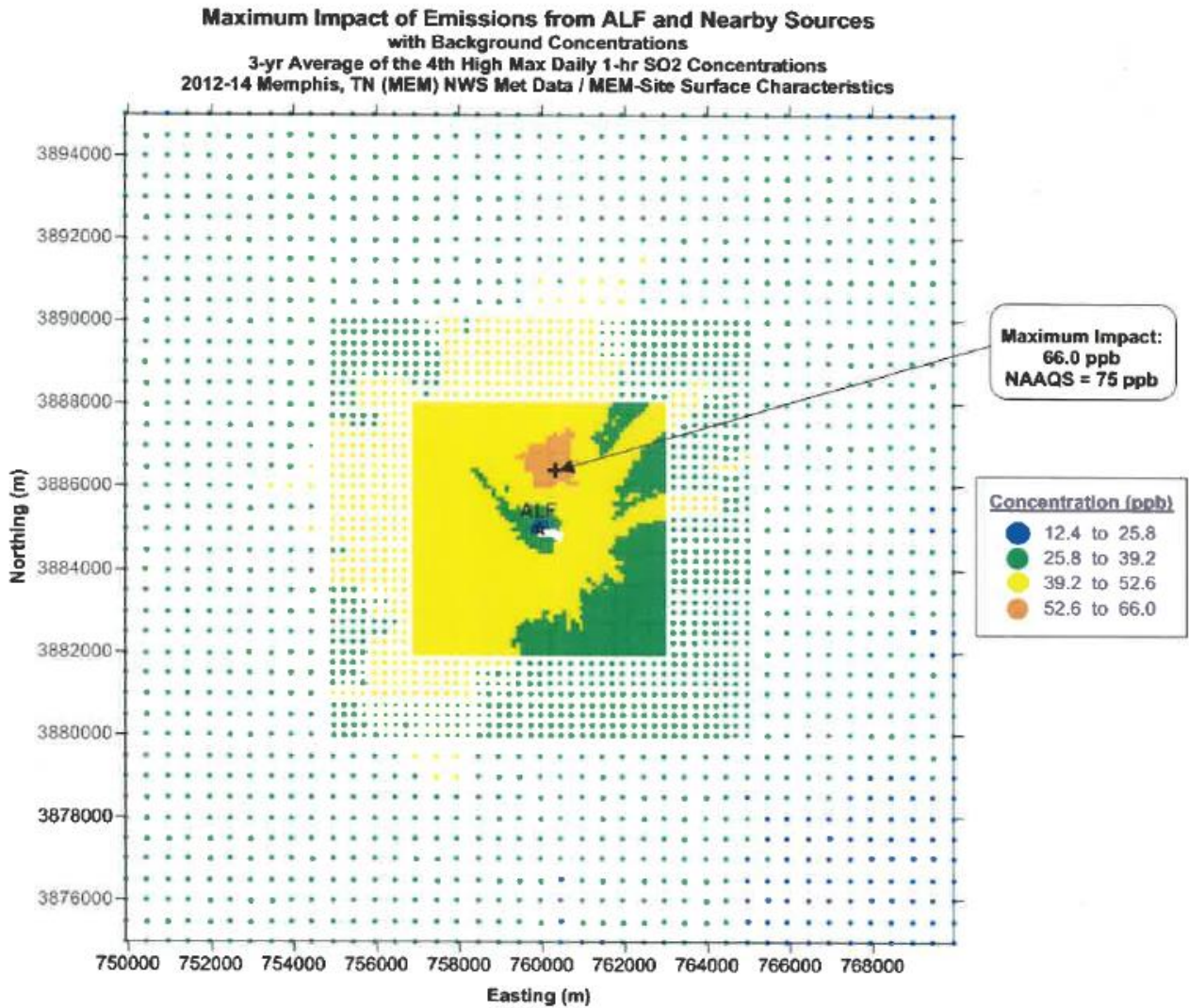
Averaging Period	Data Period	Receptor Location UTM zone 15		99th percentile daily maximum 1-hour SO₂ Concentration (µg/m³)	
		UTM Easting (m)	UTM Northing (m)	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012-2014	760329	3886391	172.85	196.4*

*Equivalent to the 2010 SO₂ NAAQS of 75 ppb using a 2.619 µg/m³ conversion factor

The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 172.85 $\mu\text{g}/\text{m}^3$, equivalent to 66 ppb. This modeled concentration included the background concentration of SO_2 , and is based on actual emissions from the facilities included in the modeling analysis. Figure 14 below was included as part of the State's recommendation, and indicates that the predicted value occurred just north of the Allen Fossil Plant, approximately 1.5 km away. The State's receptor grid is also shown in the figure.

It should be noted that modeling was performed using meteorological data based on surface characteristics from both the facility and the Memphis NWS. The highest concentrations were predicted based on use of surface characteristics from the Memphis NWS and are the basis of the concentrations reported in the table above.

Figure 14. Predicted 99th Percentile Daily Maximum 1-Hour SO₂ Concentrations Averaged Over Three Years for the Area of Analysis for the Shelby County Area. Source: Allen Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, October 2016



The modeling submitted by the State does not indicate that the 1-hour SO₂ NAAQS is violated at the receptor with the highest modeled concentration. As expected from the meteorological data, the receptor with the highest modeled concentration was located just north of the facility but it did not violate the 2010 1-hour SO₂ NAAQS. Since the State used two sets of meteorological data in the modeling, they obtained two values for the maximum impact but they were both located in the same general area but neither of them violated the NAAQS. Using the onsite surface characteristics of the facility, the modeling result gave a maximum impact of 60.8 ppb, while using the MEM NWS surface characteristic gave a maximum impact of 66.0 ppb. From these result, we can see that the highest modeled impact of 66 ppb did not violate the NAAQS and is well below the standard of 75 ppb for the 2010 1-hour SO₂ NAAQS.

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

The EPA agrees with the modeling information provided by the State for the analysis of the Shelby County Area affected by the Allen Fossil Plant and other nearby sources. Based on the state's screening criteria for nearby sources, the State modeled only one additional source the Nucor Steel Memphis facility. The State did not include the Cargill, Inc., also a DRR source, facility, in the modeling for Allen because of the source's enforceable reductions in SO₂ emissions

The EPA agrees with the rationale for not including Cargill in the analysis because the facility has since shutdown their corn milling operations, converted their two coal-fired boilers to natural gas units (units 8001 and 8301) and established an enforceable natural gas fuel restriction for these two units all of which resulted in a facility wide SO₂ PTE of 0.70 tpy. Given that the Allen Fossil Plant modeling results demonstrate attainment for the SO₂ NAAQS, and the background monitor is both "double counting" impacts from Allen and accounting for impacts from Cargill prior to the emission reductions, the EPA agrees with Tennessee's rationale for excluding Cargill from the modeling analysis. The EPA notes that the Shelby Farms NCore background monitor accounts for the impacts of the nearby Cargill during the 2012-2014 time period which was prior to the SO₂ emissions reductions at the facility. Therefore, the background concentration represents higher SO₂ emissions from Cargill than the facility's current operation configuration (based on reduced SO₂ emission modifications). See Figure 14.

The State also chose an appropriate modeling domain that should resolve the maximum impact from the facility in the Shelby County area. In terms of background concentrations, the State did not adjust the data to remove impacts from the Allen Fossil Plant and other sources included in the modeling, potentially resulting in "double counting" of the impact from sources explicitly modeled in the area. The EPA agrees with this decision because it is a conservative approach that includes all sources in the area and the modeling results still show that the area is not violating the NAAQS.

The State used AERMOD version 15181. The most current approved version of AERMOD, version 16216r, which was published January 17, 2017 (*see* 82 FR 5203), includes updates to the 15181 version as well as bug fixes that were on the previous version 16216. Tennessee did not use the 16216r version because they used the default regulatory setting of the most current version at the time of modeling (15181), which does not use the alternative modeling options added to version 16216r of AERMOD.

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

These factors have been incorporated into the air quality modeling efforts and results discussed above. Although the State did not provide information on the Geography and Topography of the area, the EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

4.5. Jurisdictional Boundaries in the Shelby County Area

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

The Allen Fossil Plant is located in the southwest corner of the State of Tennessee, near the Mississippi River and Lake McKellar. It is located approximately 3.5 km from the Arkansas border and 8.9 km away from the Mississippi border. Within the State, Shelby County is bounded by Tipton County to the north and by Fayette County to the east. Because of its location, the modeling grid encompasses portions of southwestern Shelby County, southeastern Crittenden County, Arkansas and northern DeSoto County, Mississippi. The State did not recommend a specific boundary for the area around the Allen Steam plant but instead recommended EPA designate the entire state unclassifiable/attainment. The EPA considered all the information available to determine the correct boundaries for the designation. More detail is given about the intended designation for the Stewart County in section 4.8 of this documents.

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

The Shelby County area contains two sources, the TVA Allen Fossil Plant and the Cargill Corn Milling Company, Inc. (Cargill) facility, both subject to the DRR. Tennessee chose to characterize the Allen Fossil Plant, through air dispersion modeling using 2012.204 actual SO₂ emissions. For Cargill, the State chose to limit the source's SO₂ emission limits to below 2,000 tpy (based on a combination of operational shutdowns, unit modifications and an enforceable natural gas fuel restriction. These sources are located approximately 1.6 km apart and Cargill was not included in the modeling analysis for the Allen Fossil Plant because as under an enforceable and effective Title V permit modification²⁵ issued on November 1, 2016, Cargill underwent enforceable SO₂ emission reductions which resulted in a facility wide SO₂ PTE of 0.70 tpy. The Cargill facility emitted 3,375 tons of SO₂ in 2014 but in 2015 the source underwent a series of physical and operational modifications including:

- Converting its stoker and pulverized coal-fired boilers to natural gas (Emission Units 8001 and 8301) using the existing gas burners associated with each of these units.
- Establishing a natural gas fuel restriction as an enforceable limit for emission units 8001 and 8301 in July 7, 2015.²⁶
- Shutting down the corn milling operations and removing these units and processes associated with the shutdown from their Title V operating permit. (See footnote 25.)

²⁵ Cargill Title V Permit No. 0045-01TV, November 1, 2016.

²⁶ Coal burning at the Cargill facility permanently ceased in February 2015.

These modifications were incorporated into Cargill's title V permit issue November 1, 2016.²⁷ Prior to all 2015 modifications, the combined allowable emissions from the two coal-fired boilers at Cargill (now converted to natural gas) was 4,009 tpy of SO₂ and actually emitted a combined 2,444 tpy in 2013 and 3,376 tpy in 2014. Due to the conversion to natural gas, natural gas fuel restriction and the shutdown of their corn milling operations (which removed an additional 255 tpy of SO₂) the source currently has a SO₂ PTE of 0.70 tpy.

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

After evaluating the data from the modeling report for the Allen Fossil Plant, the EPA intends to designate the entire Shelby County area as unclassifiable/attainment for the 2010 SO₂ NAAQS. The State's modeling results indicated that the maximum impact from the Allen Fossil Plant, including nearby sources and background concentrations, meets the 2010 SO₂ NAAQS and the area does not contribute to an area that does not meet the standard. Specifically, there are no existing nonattainment areas or undesignated areas with new monitors within 100 km to support that Shelby County does not cause or contribute to violations in any nearby areas. The State modeled the Allen Fossil plant, together with the Nucor Steel Memphis facility and background concentration data from the Shelby Farms NCore monitoring site, and obtained a maximum 1-hour average of 66 ppb, which demonstrates compliance with the 75 ppb 2010 SO₂ NAAQS. The monitoring data were available to EPA for consideration in the designations process, however, since it is unclear if these monitors are located in areas of maximum concentration, it is unclear if the data are representative of the area's actual air quality.

The area also includes the Cargill Corn Milling DRR source that is approximately 1.6 km from the Allen Fossil Plant and which the state chose to limit SO₂ emissions to below 2,000 tpy. Tennessee did not include Cargill in the modeling analysis for the Allen Fossil Plant because of enforceable modifications including operational shutdowns, unit modifications, and a natural gas fuel restriction that significantly reduced SO₂ emissions at the facility in 2015²⁸ and resulted in a facility wide SO₂ PTE of 0.70 tpy.

In terms of the SO₂ background concentrations, the Shelby Farms NCore monitor accounts for the Cargill emissions in the Allen Fossil Plant modeling based on the 2012-2014 time period which was prior to the SO₂ emissions reductions at the facility. Therefore, the background concentration represents higher SO₂ emissions from Cargill than the facility's current operation configuration (based on reduced SO₂ emission modifications). See Figure 14. The State did not adjust the data to remove impacts from the Allen Fossil Plant and other sources included in the modeling, potentially resulting in "double counting" of the impact from sources explicitly

²⁷ Cargill Title V Permit No. 0045-01TV

²⁸ These modifications were incorporated into Cargill's title V permit issue November 1, 2016 (Permit No. 0045-01TV).

modeled in the area. The EPA agrees with this decision because it is a conservative approach that includes all sources in the area and the modeling results still show that the area is not violating the NAAQS.²⁹ Given that the Allen Fossil Plant modeling results show that the area is attaining the NAAQS, and that the background concentration is both “double counting” impacts from Allen and including the emissions from Cargill prior to the significant emission reductions mentioned above, the EPA believes that Cargill will not cause or contribute to an exceedance of the 1-hour SO₂ NAAQS. Therefore, the EPA agrees with Tennessee’s rationale for excluding Cargill and believes the modeling analysis for AFP appropriately reflects the air quality conditions in the area. Furthermore, the EPA believes the remaining SO₂ emitting sources located in Shelby County within the area of analysis for AFP are also accounted for in the background concentration including Nucor Steel which was explicitly modeled with AFP.

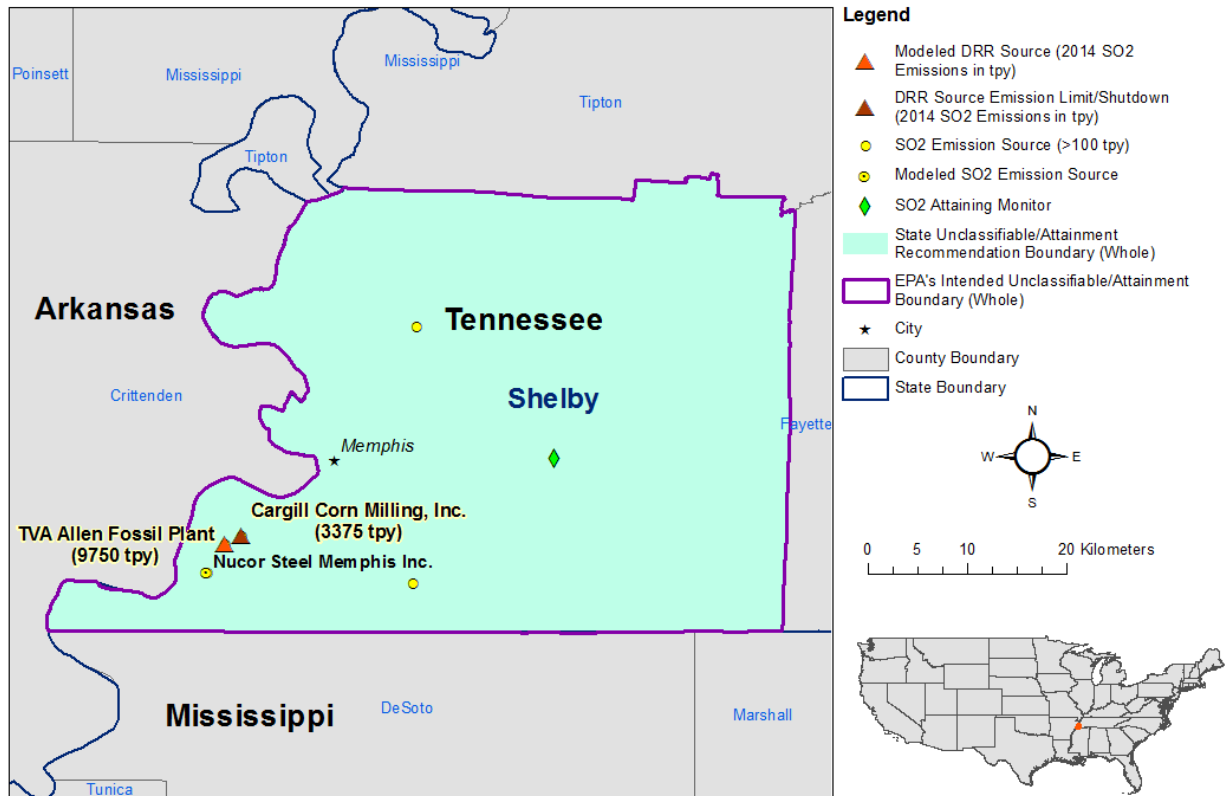
In its submission, Tennessee did not give a specific recommendation for the designation area, but did suggest that the entire state be designated as unclassifiable/attainment based in part on an assessment and characterization of air quality impacts from these facilities. After careful evaluations of the state’s information, including background levels of SO₂ and SO₂ emissions within Shelby County, the EPA intends to designate, in its entirety, Shelby County including the Allen Fossil plant and the Cargill facility as unclassifiable/attainment for the 1-hour SO₂ NAAQS. Therefore, the EPA agrees with the State’s recommended designation for the area because emissions from these facilities meets the 2010 SO₂ NAAQS and does not contribute to an area not meeting the standard. The EPA believes that our intended unclassifiable/attainment area, bounded by Steward County, in its entirety, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

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

After careful evaluation of the State’s recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Shelby County area, which includes the Allen Fossil plant and the Cargill facility, as unclassifiable/attainment for the 2010 SO₂ NAAQS because based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, EPA has determined that the area: (i) meets the 2010 SO₂ NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Specifically, the boundaries are comprised of the entire Shelby County. Figure 15, generated by the EPA, shows the boundary of this intended designated area.

²⁹ Refer to Sections 4.3.2.3 and 4.6 of this Technical Support Document for more details on the Cargill, Inc. facility.

Figure 15. Boundary of the Intended Shelby 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 to designate all remaining undesignated areas in Tennessee during this Round 3 of designations. All other previously undesignated areas in the State are discussed in separate sections of this document.

5. Technical Analysis for the Stewart County Area

5.1. Introduction

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

5.2. Air Quality Monitoring Data for Stewart County

The state does not have any existing SO₂ monitoring data in Stewart County, Tennessee.

5.3. Air Quality Modeling Analysis for the Stewart County Area Addressing the TVA – Cumberland Fossil Plant

5.3.1. Introduction

This section 5.2 presents all the available air quality modeling information for a portion of Stewart County (hereinafter referred to as the “Stewart County area”). that includes the TVA – Cumberland Fossil Plant (also referred to as the “Cumberland Fossil Plant” or “CUF”). This area contains the following SO₂ source around which Tennessee is required by the DRR to characterize SO₂ air quality, or alternatively to establish an SO₂ emissions limitation of less than 2,000 tpy:

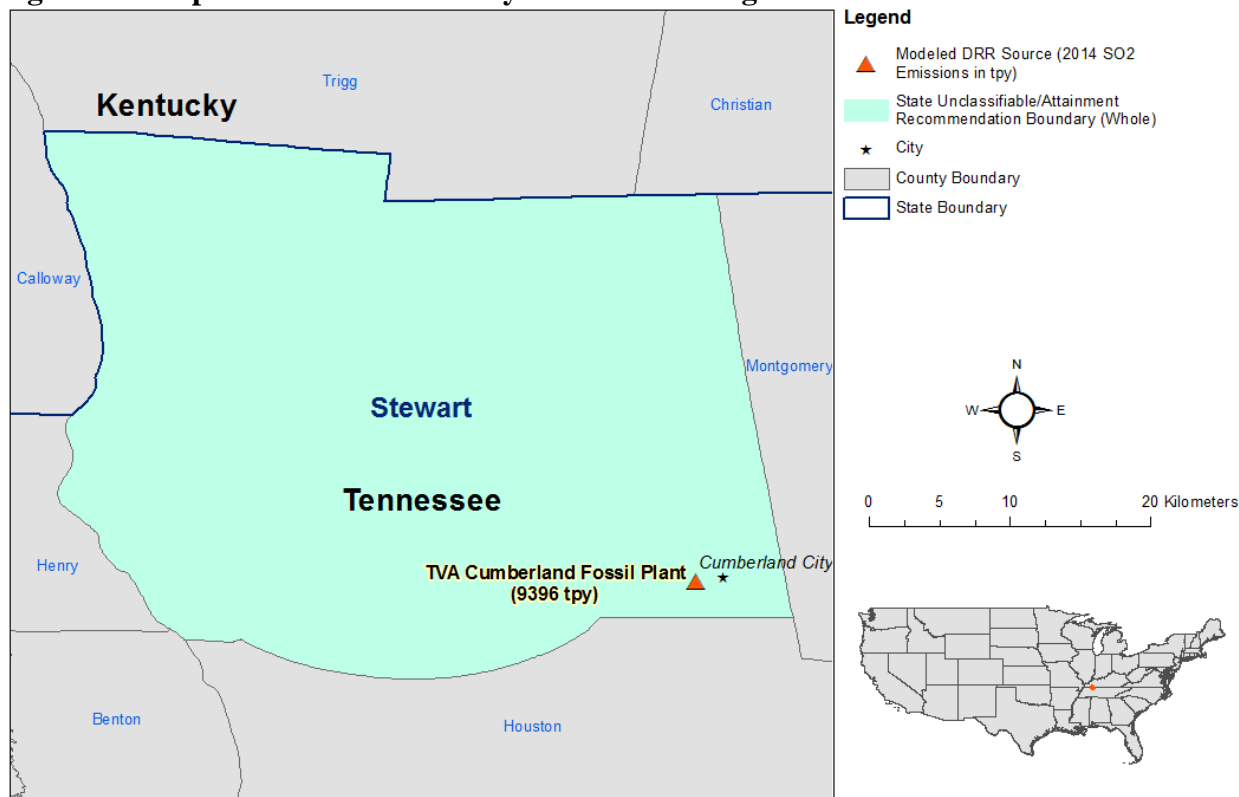
- The Cumberland Fossil Plant facility emitted 2,000 tons or more annually. Specifically, Cumberland Fossil Plant emitted 9,396 tons of SO₂ in 2014. This source meets the DRR criteria and thus is on the SO₂ DRR Source list, and Tennessee has chosen to characterize it via modeling.

In its submission, Tennessee did not give a specific recommendation for the designation area, but did suggest that the entire state be designated unclassifiable/attainment based in part on an assessment and characterization of air quality impacts from this facility. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. After careful review of the State's assessment, supporting documentation, and all available data, the EPA agrees with the State's recommended designation for the area. The EPA intends to designate the area, specifically the entire Stewart County, as unclassifiable/attainment. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

As seen in Figure 16 below, generated by EPA, the Cumberland Fossil Plant facility is located approximately one mile west of Cumberland City, Tennessee. Also included in Figure 16 are other nearby emitters of SO₂. None of these sources were included in the modeling analysis because they did not meet the screening criteria established by the State for considering nearby

sources but were accounted for in the background concentration.³⁰ Lastly, Figure 16 provides the State’s recommended area for the unclassifiable/attainment designation.³¹ The EPA’s intended unclassifiable/attainment designation boundary for the Stewart County area is not shown in the figure either, but is shown in a figure in the section below that summarizes our intended designation.

Figure 16. Map of the Stewart County Area Addressing Cumberland Fossil Plant.



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA’s July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered one modeling assessment from the State. No modeling assessments were used from other parties or conducted by the EPA. The Table below indicates when this assessment was received, provides an identifier for the assessment, and identifies any distinguishing features of the modeling assessment.

³⁰ According to the Cumberland Fossil Plant modeling report, all other SO₂ emitters within 10 km, with emissions of one tpy or more (based on information from the 2014 emissions inventory provided by the Tennessee Department of Environmental Conservation or TDEC) and sources between 10 km to 50 km with a Q/D (annual emission in tons/distance in km) greater than 20, were considered for the modeling and are shown in Figure 17. If no sources not named previously are shown, there are no additional SO₂ emitters above this emission level in the vicinity of the named source(s). (EPA’s “Screening Threshold” Method for PSD Modeling Memo, 1985.)

³¹ Tennessee’s designation recommendation excludes the portion of Sullivan County designated nonattainment for the 2010 SO₂ NAAQS in 2013(Round 1 designations).

Table 12. Modeling Assessments for the Stewart County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Tennessee*	September 21, 2016	TVA – Cumberland Fossil Plant (CUF) Final Report	None.

* Tennessee forwarded the assessment prepared by the TVA who submitted it to the TDEC on August 31, 2016.

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 SO₂ NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

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

The State used AERMOD version 15181. A discussion of the State’s approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

The most current approved version of AERMOD, version 16216r, which was published January 17, 2017 (*see* 82 FR 5203), includes updates to the 15181 version as well as bug fixes that were on the previous version 16216. The updates to 15181 include the addition of settings that were previously considered an alternative modeling option. Tennessee chose not to use the 16216r version because they used the default regulatory setting of the most current version at the time of modeling (15181), which does not use the alternative modeling options added to version 16216r of AERMOD. Using the older 15181 version of AERMOD with its default regulatory settings, likely produces the same results as the newer 16216r. For this reason, EPA believes it is appropriate for the State to use the 15181 version of AERMOD.

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 SO₂ modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO₂ sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

For the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model in rural mode. To make the determination of using rural mode the State analyzed land use in the area using the Auer method with a 3 km radius centered on one of the Cumberland Fossil Plant stacks. Data from the 2011 NLCD was used to determine land cover in the area and a 30 m by 30 m data cell size was used. The results of the land use status analysis using Auer's methodology indicated that approximately 3 percent of surrounding land was urban and 97 percent was rural. Given these results and that the methodology used is consistent with one available method in Section 6.3 of the Modeling TAD, the EPA agrees with the determination that the area surrounding the source should be classified as rural.

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 SO₂ emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO₂ concentrations.

The sources of SO₂ emissions subject to the DRR in this area are described in the introduction to this section. For the Stewart County area, the State also assessed sources within a 50 km area of analysis in all directions that emitted one tpy or more. The State determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO₂ NAAQS exceedances in the area of analysis and any potential impact on SO₂ air quality from other sources in nearby areas. This area of analysis for nearby sources covered all of Stewart County and portions of Cheatham, Robertson, Montgomery, Dickson, Hickman, Humphreys, Benton and Henry Counties in Tennessee. In addition, the area covered portions of Calloway, Trigg, Christian, and Todd Counties in Kentucky. The area captured approximately three additional sources in Montgomery County, but no sources were identified in Kentucky.

The State utilized the Q/D method to determine which nearby sources should be included in the modeling analysis for CUF including: 1) sources located within 10 km of the CFP that emitted more than 1 tpy; or 2) sources located between 10 km and 50 km within the CFP and have a Q/D (annual emissions in tons/distance in km) greater than 20.³² Of these three sources, none met the criteria for inclusion in the modeling and therefore were not included in the modeling analysis for the area. Given that there are no other sources within 10 km of the facility according to the 2014 NEI and any possible impacts from the sources between 10 km and 50 km of the facility

³² The State performed an analysis of emissions data and spatial for all nearby sources to determine which sources to include in the modeling demonstration. According to the Cumberland Fossil Plant modeling report, all other SO₂ emitters within 10 km, with emissions of 100 tpy or more (based on information from the 2014 emission inventory provided by the TDEC and sources located 10 km to 50 km with a Q/D (annual emission in tons/distance in km) greater than 20, were considered for the modeling and are shown in Figure 17. (EPA's "Screening Threshold" Method for PSD Modeling Memo, 1985.)

are captured in the background concentrations of SO₂, the EPA believes that these sources will not cause or contribute to a violation of the 2010 1-hour SO₂ NAAQS. Specifically, the two sources located between 10 km and 50 km from CUF are located 25 km and 40 km to the northeast of CUF and reported emissions of approximately 250 tons and 100 tons in 2014, respectively. Given the distance and level of emissions as incorporated through the Q/D analysis, and that these sources are not located so that they would likely be frequently upwind, it is not likely that these sources would materially affect the maximum impact in the CUF area.

For the grid receptor spacing for the area of analysis chosen by the State, here are the details for the actual modeling area of analysis:

A Cartesian grid that extended 10 km in each direction and was centered at the Cumberland Fossil Plant facility was used. As seen on table 13, the spacing for the receptors was adjusted based on the distance from the facility, creating nested grids within the 10 km limit. In addition, boundary receptors were placed along the perimeter of the fenced area of the facility and these were spaced 50 m apart. These boundary receptors were placed along a permanent fence surrounding the property.

Table 13. Receptor Grid Size and Spacing for the Stewart County Area

Receptor Spacing (m)	Grid Size (km)	Grid Origin (km south and west of site)
50	Fenceline	0
100	6 x 6	3
250	10 x 10	5
500	20 x 20	10

The receptor network contained 5,968 receptors, and the network covered portions of several counties in Tennessee, in particular it covered a southeastern portion of Stewart County, a northwestern section of Houston County and a southwestern portion of Montgomery County.

Figures 17 and 18, included in the State’s recommendation, show the State’s chosen area of analysis surrounding the Cumberland Fossil Plant, 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 all locations that would be considered ambient air relative to the TVA Cumberland facility. The State did not exclude receptors from areas where it would not be feasible to place a monitor, even though the receptor grid area contains some bodies of water, and opted to apply a regular grid of receptors for the area. In accordance with Section 4.2 of the Modeling TAD, the State also included elevation data from the NED, using the AERMPS terrain processor of AERMOD. Tennessee did not place receptors within the fence line of the Cumberland Fossil Plant facility. Since the facility has a permanent fence surrounding the property, the fenced portion of facility property is not considered to be ambient air for purposes of SO₂ modeling.

Figure 17. Area of Analysis for the Stewart County Area: Cumberland Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared by TVA, August 2016. Source: Cumberland Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, August 2016.

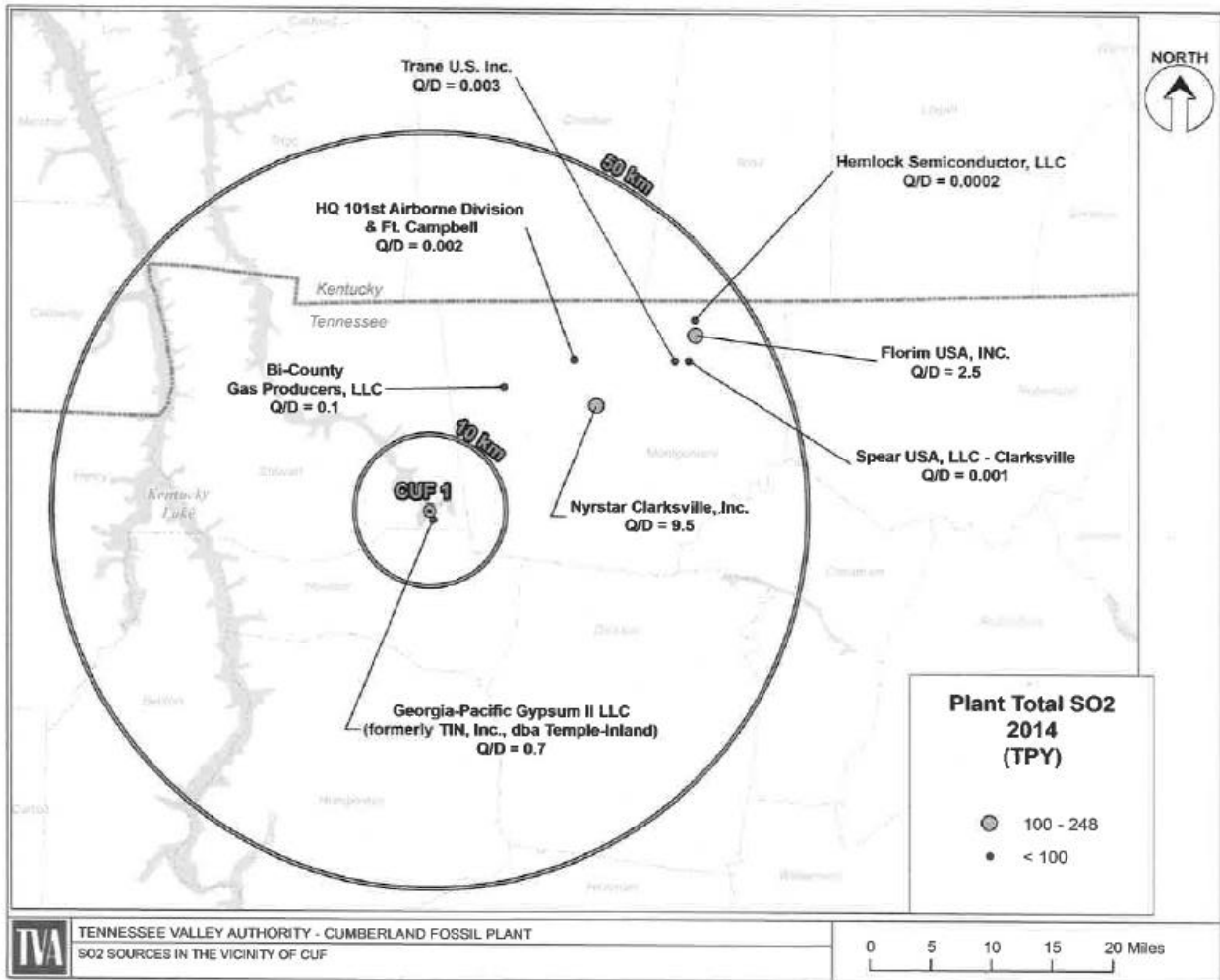
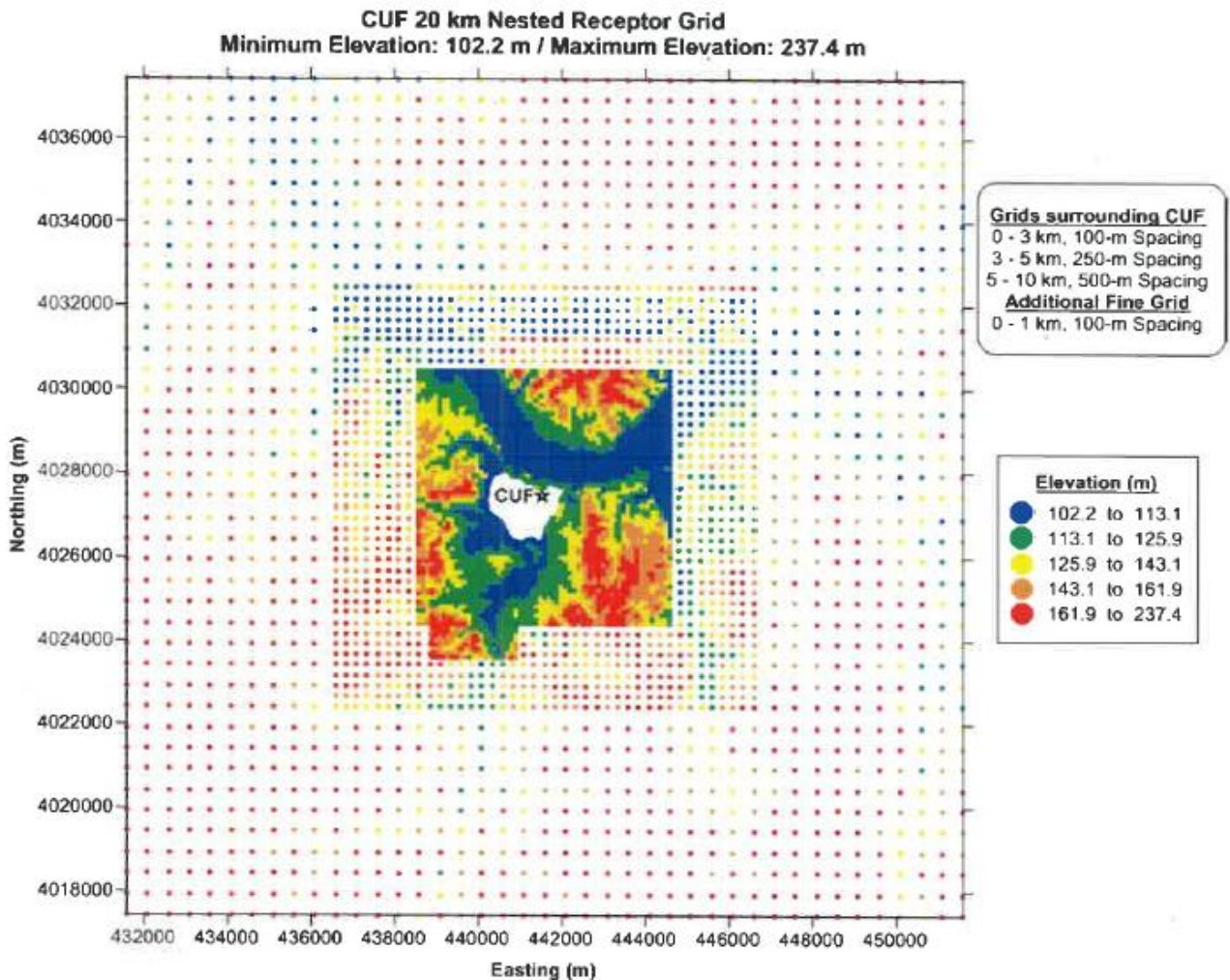


Figure 18. Receptor Grid for the Stewart County Area. Source: Cumberland Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, August 2016.



Based on the information provided in Tennessee’s recommendation, the EPA agrees with the area excluded from the modeling because these areas do not represent ambient air for the purposes of SO₂ modeling. The EPA also agrees that the grid selected by the State is adequate. Therefore, the EPA believes that Tennessee’s receptor grid is appropriate for the characterization of the area, considering the impact of SO₂ from this facility.

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 good engineering practice (GEP) policy with allowable emissions.

As described in Section 5.2.1 and Section 5.2.2.3, Tennessee did not include any additional sources in their modeling for the Cumberland Fossil Plant area based on the criteria established by the State. Nevertheless, all nearby sources were indirectly accounted for in the background concentrations of the area. Given that no sources in the 10 km area emitted more than 1 tpy according to the 2014 NEI, and no sources between 10 km and 50 km of the facility had a Q/d larger than 20, the EPA believes that these sources will not contribute to a violation of the 2010 1-hour SO₂ NAAQS, and any possible impacts are captured in the background concentrations of SO₂.

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

The EPA agrees that Tennessee has appropriately characterized the area surrounding the Cumberland Fossil Plant. Given the criteria for selecting nearby sources, we agree with the decision to only include the Cumberland Fossil Plant in the modeling analysis. Also, the State has appropriately used the actual emissions and stack heights for TVA Cumberland and correctly accounted for the building downwash using BPIPFRM for AERMOD.

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 enforceable and effective.

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

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

emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, “Guideline on Air Quality Models.”

As previously noted, the State included the Cumberland Fossil Plant and no other emitters of SO₂ within 50 km in the area of analysis. The State has chosen to model this facility using actual emissions. The facility in the State’s modeling analysis and their associated annual actual SO₂ emissions between 2012 and 2014 are summarized below.

For Cumberland Fossil Plant, the State provided annual actual SO₂ emissions between 2012 and 2014. This information is summarized in Table 14. A description of how the State obtained hourly emission rates is given below this table.

Table 14. Actual SO₂ Emissions Between 2012 – 2014 from Facilities in the Stewart County Area

Facility Name	SO ₂ Emissions (tpy)		
	2012	2013	2014
Cumberland Fossil Plant	10,101	7,963	9,396
Total Emissions from All Modeled Facilities in the State’s Area of Analysis	10,101	7,963	9,396

For Cumberland Fossil Plant, the actual hourly emissions data were obtained from the CEMs data for the two coal-fired boilers. The EPA summed the hourly values modeled for the two units for each year and they match the values from the CAMD. One emergency diesel engine and two auxiliary boilers were excluded from the modeling in accordance with Section 5.5 of the Modeling TAD, which states that you should use “emission scenarios that are continuous enough or frequent enough to contribute significantly to the annual distribution of maximum daily 1-hour concentrations.” Because these three extra sources operated infrequently, they have very low emissions of SO₂, and therefore are not expected to contribute to the daily maximum 1-hour SO₂ concentrations in the area. Specifically, the diesel engine emitted 0.0000417 ton of SO₂ in 2014 and the two auxiliary boilers emitted a combined 0.0291 tons of SO₂ in 2014.

Given the data provided by the State and their explanation of omitted emission sources, the EPA agrees that the emission data used for modeling was appropriate, complies with the EPA’s Modeling TAD, and is representative of actual emissions and possible impact on the attainment of the 2010 SO₂ NAAQS in the area. For the modeling assessment of the Stewart county area, the State used 2012-2014 emissions data for the Cumberland Fossil plant even though 2015 data was available at the time. The EPA agrees with the years modeled because according to the EPA’s CAMD, the Cumberland Fossil Plant emitted 8,849 tons of SO₂ in 2015, which shows that emissions continue to be lower than those used in the modeling.

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

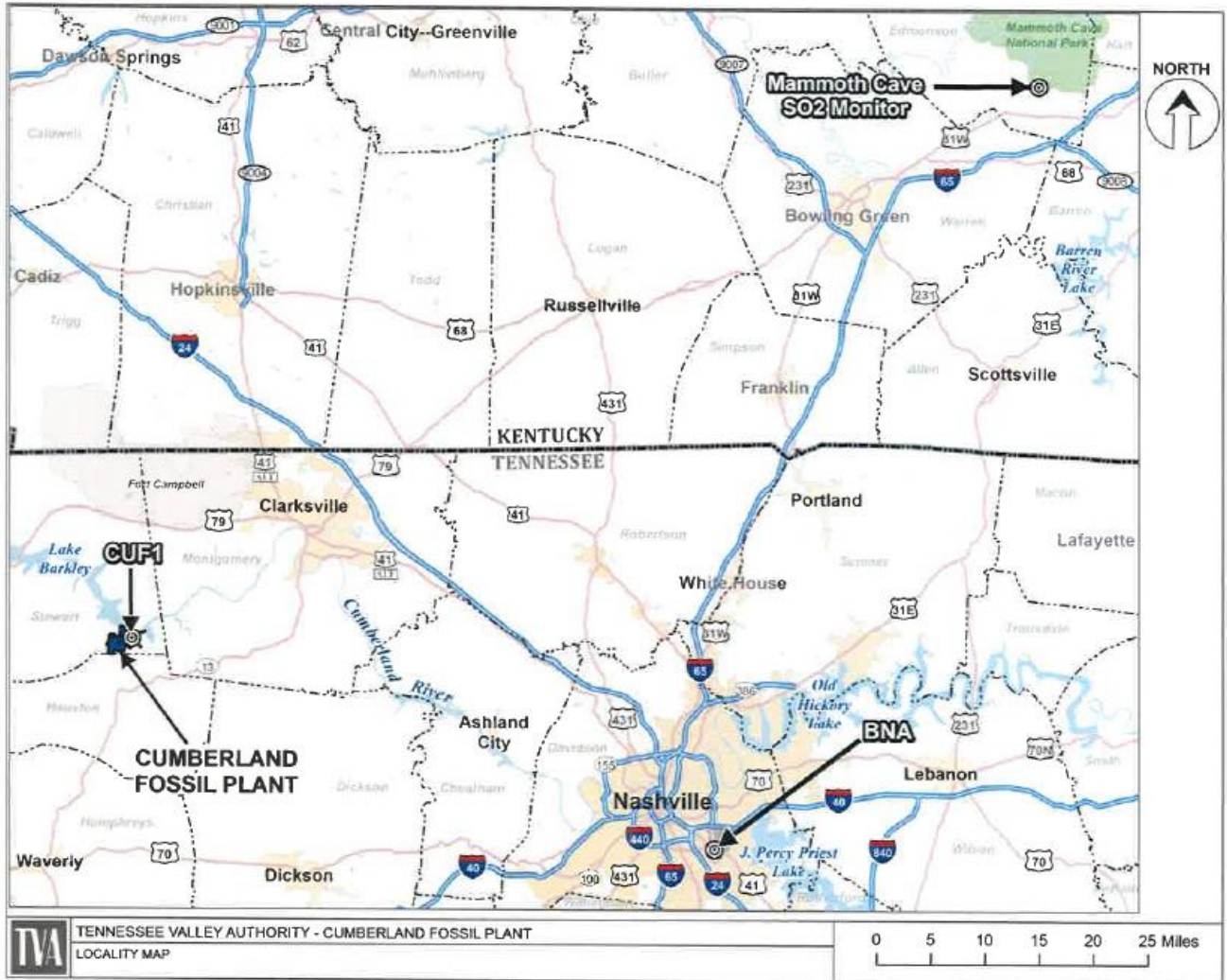
For the area of analysis for the Stewart County area, the State selected the surface meteorological data for the same time period of 2012 to 2014 from the NWS station in the Nashville International Airport (BNA) in Nashville, TN located at 36.1105 N, 86.6881 W, approximately 92 km southeast of the Cumberland Fossil Plant facility. For upper air observations, the State used data for the same time period and 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 BNA NWS station to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness [zo]) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as “zo”. The state estimated surface roughness values for 12 spatial sectors out to 1 km at a seasonal temporal resolution for dry, wet, or average conditions, as appropriate, by comparing precipitation for the period of data to be processed to the 30-year climatological record, selecting “wet” conditions if precipitation is in the upper 30th percentile, “dry” conditions if precipitation is in the lower 30th percentile, and “average” conditions if precipitation is in the middle 40th percentile.

The State modeled two separate and distinct sets of meteorology in this modeling analysis. One set was modeled using onsite surface characteristics of the facility and another set was modeled using the surface characteristics of the BNA NWS station. From these two sets of modeling runs, the state used the highest result to demonstrate that the area is in compliance with the 2010 1-hour SO₂ NAAQS.

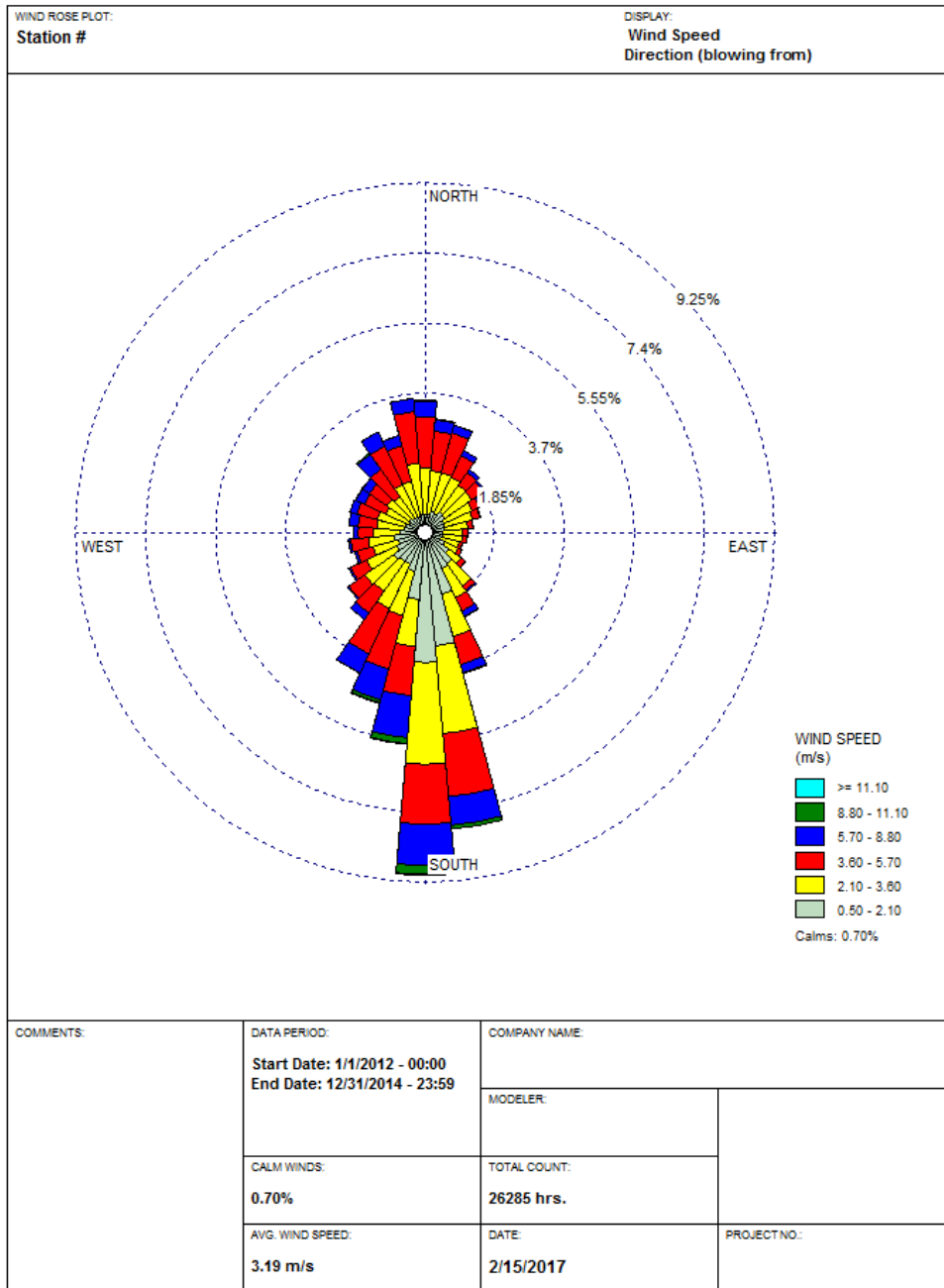
In the figure below, included in the modeling report for the Cumberland facility, the location of this NWS station is shown relative to the area of analysis.

Figure 19. Area of Analysis and the NWS station in the Stewart County Area. Source: Cumberland Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, August 2016.



The EPA generated wind rose plots with “WRPLOTS View” utility program using State submitted pre-processed AERMET surface meteorology data for the BNA NWS site. In Figure 20, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The wind is predominantly blowing from the south of the BNA NWS station, with an average wind speed of 3.19 m/s.

Figure 20. Nashville International Airport (BNA) NWS Cumulative Annual Wind Rose for Years 2012 – 2014



WRPLOT View - Lakes Environmental Software

Meteorological data from the above mentioned 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's 2004 user guide for AERMET and the 2015 addendum to the guide, 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 BNA NWS station mentioned above, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. Since the 2012-2014 data was flagged by AERMINUTE as non-calm, the State did not set a minimum wind speed threshold in AERMET.

The EPA agrees with the meteorological and surface data that the State used for the modeling of the Stewart County area in regards to the Cumberland Fossil Plant facility. The information used does capture the correct impact from SO₂ emission from the facility and nearby sources. The State used appropriate data from a nearby NWS monitor when possible and used another valid NWS monitor at BNA for supplemental information such as upper air data.

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 hilly. The facility is near some small ridges but slowly lowers to sea level as it approaches the Cumberland River that borders the northern part of the area. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS NED.

The State's final modeling report does not offer any information on the terrain of the area, but based on a review of the topography of the area surrounding the Cumberland Fossil Plant, the EPA believes that the areas have no complex terrain. The EPA agrees with the State's use of the USGS NED database and AERMAP terrain processor (version 11103) for AERMOD to account for the slight changes in elevation of the area to obtain a more accurate modeling result.

5.3.2.8. *Modeling Parameter: Background Concentrations of SO₂*

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO₂ that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the State elected to use a "tier 1" approach.

Data was obtained for the same time period of 2012 to 2014 from the Mammoth Cave Monitor (AQS Site: 21-061-0501), located in Mammoth Cave National Park in Kentucky, approximately 98 miles from the Cumberland Fossil Plant. No wind directions were excluded. Four monitors were located within 50 miles of the facility but none of them met the criteria for data completeness for the 2012 to 2014 time period. Three other monitors were within 150 miles of the facility, including the Mammoth Cave monitor, but two were not suitable for modeling due to their proximity to large nearby SO₂ sources. Consequently, Mammoth Cave was chosen as the most appropriate monitor for background concentrations. Due to the distance of the monitor from the Cumberland Fossil Plant, no wind directions were excluded. The single value of the background concentration for this area of analysis was determined by the State to be 26.98 µg/m³, equivalent to 10.3 ppb when expressed in 3 significant figures, and that value was incorporated into the final AERMOD results.

The EPA agrees that Tennessee has appropriately chosen the background concentration in accordance with the Modeling TAD. The State has not chosen the nearest monitor, but due to limited availability of nearby monitors that were adequate for modeling purposes, the EPA believes that the chosen concentration is representative of the area and captures possible impacts from other nearby sources.

5.3.2.9. *Summary of Modeling Inputs and Results*

The AERMOD modeling input parameters for the Stewart County area of analysis are summarized below in Table 15.

Table 15. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Stewart County Area

Input Parameter	Value
AERMOD Version	15181 (regulatory options)
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	2
Modeled Structures	22
Modeled Fencelines	1
Total receptors	5,968
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Nashville International Airport (BNA), TN
NWS Station Upper Air Meteorology	Nashville International Airport (BNA), TN
NWS Station for Calculating Surface Characteristics	Onsite Characteristics ³³
Methodology for Calculating Background SO ₂ Concentration	Tier 1 approach based on 2012 – 2014 design value from AQS site: 21-061-0501.
Calculated Background SO ₂ Concentration	10.3 ppb

The results presented below in Table 16 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

³³ It should be noted that two separate and distinct sets of meteorological data were used in this analysis. One set of meteorological data was developed using surface characteristics from the Nashville NWS site and a separate set of meteorological data was developed using surface characteristics from the Cumberland site. AERMOD was run using both sets of meteorological data and the data set using the Cumberland surface characteristics resulted in the highest ambient SO₂ concentrations as reported in this Section.

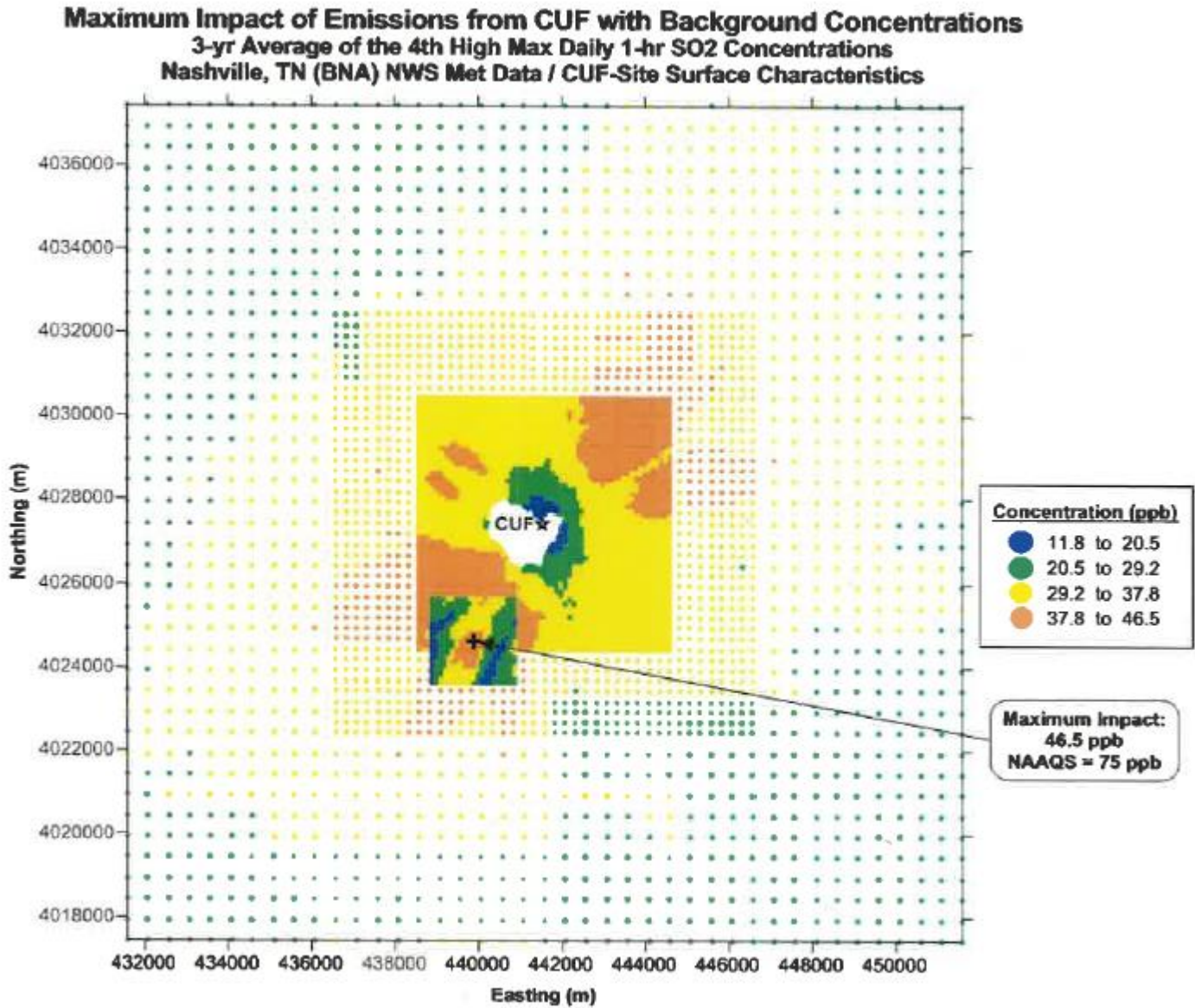
Table 16. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO₂ Concentrations Averaged Over Three Years for the Area of Analysis for the Stewart County Area

Averaging Period	Data Period	Receptor Location UTM zone 16		99 th percentile daily maximum 1-hour SO ₂ Concentration (µg/m ³)	
		UTM Easting (m)	UTM Northing (m)	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012-2014	439886	4024627	121.78	196.4*

*Equivalent to the 2010 SO₂ NAAQS of 75 ppb using a 2.619 µg/m³ conversion factor

The State’s modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 121.78 µg/m³, equivalent to 46.5 ppb. This modeled concentration included the background concentration of SO₂, and is based on actual emissions from the facility. Figure 21 below was included as part of the State’s recommendation, and indicates that the predicted value occurred southeast of the Cumberland Fossil Plant facility, approximately 3.28 km away. In addition, since the maximum predicted concentration occurred at the edge of the receptor grid, an additional round of modeling was carried out using a one km-by-one km refined receptor grid that was centered on the maximum concentration spot. The State’s receptor grid is also shown in the figure.

Figure 21. Predicted 99th Percentile Daily Maximum 1-Hour SO₂ Concentrations Averaged Over Three Years for the Area of Analysis for the Stewart County Area. Source: Cumberland Fossil Plant 1-Hour SO₂ NAAQS Designation Modeling Report prepared for Tennessee, August 2016.



The modeling submitted by the State does not indicate that the 1-hour SO₂ NAAQS is violated at the receptor with the highest modeled concentration. Since the State used two sets of meteorological data in the modeling, they obtained two values for the maximum impact but neither of them violated the NAAQS. Using the onsite surface characteristics of the facility, the modeling result gave a maximum impact of 46.5 ppb, while using the BNA NWS surface characteristic gave a maximum impact of 40.4 ppb. From these results, the highest modeled impact of 46.5 ppb did not violate the NAAQS and is well below the standard of 75 ppb for the 2010 1-hour SO₂ NAAQS.

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

The EPA agrees with the modeling information provided by the State for the analysis of the Stewart County Area affected by the Cumberland Fossil Plant and other nearby sources. Tennessee's screening criteria for nearby sources, yielded no other nearby sources for inclusion in the modeling analysis for the Cumberland Fossil Plant. The State also chose an appropriate modeling domain that shows the maximum impact from the facility in the Stewart County area. In regards to background concentrations, the State did not choose the closest monitor available but the EPA agrees with this decision because monitors in the nearby area were not appropriate for modeling purposes due to not having the data completeness requirements or being affected by a nearby large source of SO₂. The chosen monitor is appropriate to account for impacts from other nearby sources in the area that were not included in the modeling.

The State used AERMOD version 15181. The most current approved version of AERMOD, version 16216r, which was published January 17, 2017 (*see* 82 FR 5203), includes updates to the 15181 version as well as bug fixes that were on the previous version 16216. Tennessee did not use the 16216r version because they used the default regulatory setting of the most current version at the time of modeling (15181), which does not use the alternative modeling options added to version 16216r of AERMOD.

5.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Stewart County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. Although the State did not provide information on the Geography and Topography of the area, 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 Stewart County Area

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

The Cumberland Fossil Plant is located in the southeast corner of the Stewart County, which is in the northwest of the State of Tennessee. Stewart County is bounded by Montgomery County to the east, Houston County to the south and the Kentucky state line to the north including Trigg and Christian County, Kentucky west. Cumberland Fossil Plant is approximately 28 km south of the Kentucky state line. This area of analysis for nearby sources covered all of Stewart County and portions of Cheatham, Robertson, Montgomery, Dickson, Hickman, Humphreys, Benton and Henry Counties in Tennessee. In addition, the area covered portions of Calloway, Trigg, Christian, and Todd Counties in Kentucky. The State did not recommend a specific boundary in their recommendation letter but instead suggested to designate the entire State unclassifiable/attainment. The EPA considered all the information available to determine the correct boundaries for the designation. More detail is given about the intended designation for the Stewart county in section 5.7 of this documents.

5.6. Other Information Relevant to the Designations for the Stewart County Area

No other relevant information is available for the Stewart County area.

5.7. The EPA's Assessment of the Available Information for the Stewart County Area

After evaluating the data from the modeling report for the Cumberland Fossil Plant, the EPA intends to designate the entire Stewart County area as unclassifiable/attainment for the 2010 SO₂ NAAQS. The State's modeling results indicated that the maximum impact from the Cumberland Fossil Plant, including nearby sources and background concentrations, did not violate the 2010 SO₂ NAAQS. The modeling results also show that the emissions from the Cumberland Fossil Plant do not contribute to ambient air quality in any nearby area that does not meet the NAAQS as there are no nearby nonattainment areas nor Round 4 sources. The State modeled the Cumberland Fossil plant together with background concentration data from the Mammoth Cave monitoring site, and obtained a maximum 1-hour average of 46.5 ppb, which demonstrate compliance that is well below the 75 ppb 2010 SO₂ NAAQS. Neither the State or the EPA use any 3rd party for additional modeling information. Tennessee did not include any additional nearby sources in the Cumberland Fossil Plant modeling based on their screening criteria discussed in section 5.2.2.3 and the EPA concurs with this determination. Given that there are no other sources within 10 km of the facility according to the 2014 NEI and sources between 10 km and 50 km of the facility had a Q/D of less than 20, the EPA believes that these sources will not cause or contribute to a violation of the 2010 1-hour SO₂ NAAQS, and any possible impacts from these sources are captured in the background concentrations of SO₂. For the modeling emissions data, the State chose to use 2012-2014 data instead of the most current data available at the time. More recent information obtained from CAMD shows that emissions in 2015 were at 8,849 tons of SO₂, which are lower than those modeled for the Cumberland Fossil Plant so the EPA believes the State used a conservative approach and agrees with the choice of time period.

In its submission, Tennessee did not give a specific recommendation for the designation area, but did suggest that the entire state be designated as unclassifiable/attainment based in part on an assessment and characterization of air quality impacts from these facilities.

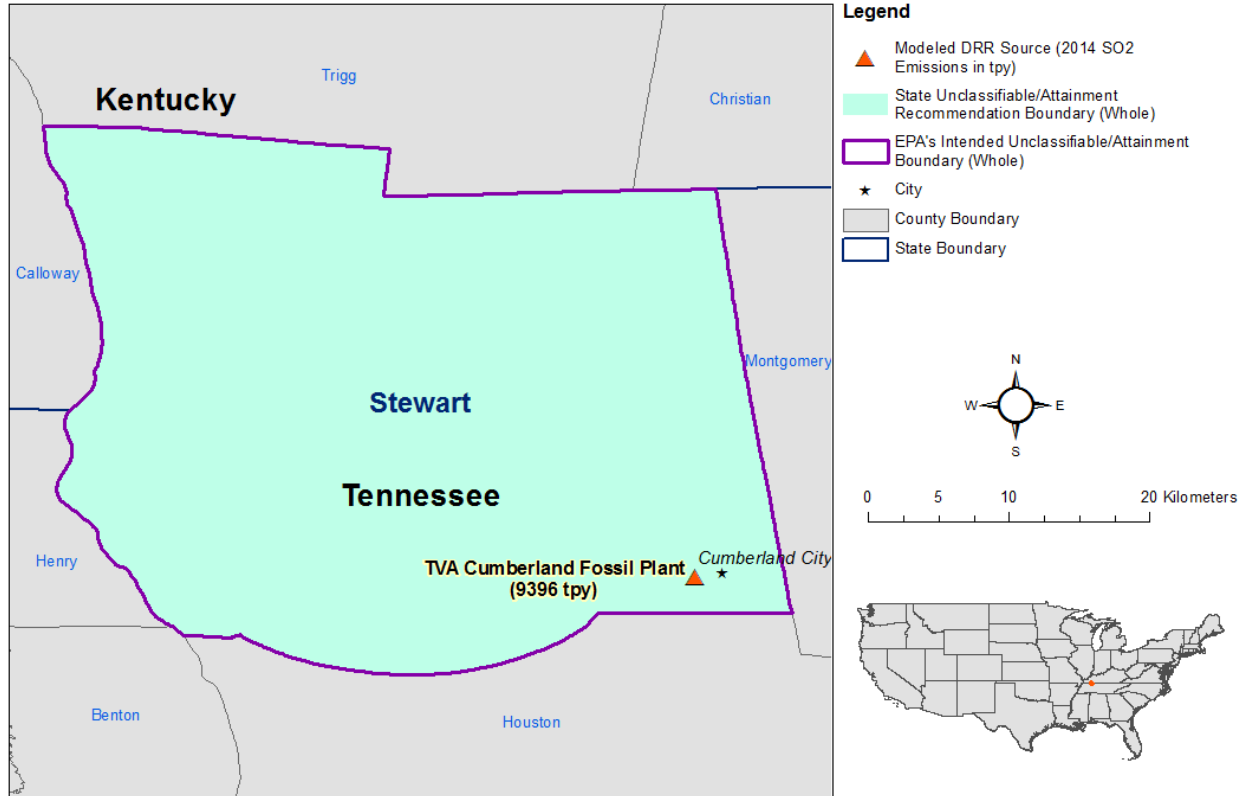
After careful evaluations, the EPA agrees with the State's recommended designation for the area and intends to designate the entire Stewart County as unclassifiable/attainment for the 1-hour SO₂ NAAQS because emissions from these facilities meets the 2010 SO₂ NAAQS and does not contribute to an area not meeting the standard. The EPA believes that our intended unclassifiable/attainment area, bounded by Stewart County, in its entirety, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

5.8. Summary of Our Intended Designation for the Stewart County Area

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Stewart County area as unclassifiable/attainment for the 2010 SO₂ NAAQS because based on the available information, including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined that this area (i) meets the 2010 SO₂ NAAQS, and (ii) does not contribute to ambient

air quality in a nearby area that does not meet the NAAQS. Specifically, the boundaries are comprised of the entire Stewart County. Figure 22, generated by the EPA, shows the boundary of this intended designated area.

Figure 22. Boundary of the Intended Stewart 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 to designate all remaining undesignated areas in Tennessee during this round of designations. All other previously undesignated areas in the State are discussed in a separate section of this document.

6. Technical Analysis for the Remaining Areas in Tennessee

Introduction

The state has not timely installed and begun operation of a new, approved SO₂ monitoring network meeting EPA specifications referenced in the EPA's SO₂ DRR for any sources of SO₂ emissions in the counties and portions of counties identified in Table 17. Accordingly, the EPA must designate these counties by December 31, 2017. At this time, there are no air quality modeling results available to the EPA for these counties and portions of counties. In addition, there is no air quality monitoring data that indicate any violation of the 1-hour SO₂ NAAQS. The EPA is designating the counties and portions of counties in Table 17 in the state as "unclassifiable/attainment" since these counties were not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

Table 17 also summarizes Tennessee's recommendations for these areas. Specifically, Tennessee recommended that the entire state be designated as unclassifiable/attainment, with the exception of the portions of Sullivan County already designated in Round 1 of designations. At this time, there are no air quality modeling results available to the EPA for these counties. In addition, there is no evidence of violations of the 1-hour SO₂ NAAQS in these remaining counties except for the 3-km radius existing nonattainment area in Sullivan County. The EPA believes that sources in the remaining undesignated portions of Sullivan County and neighboring counties in the state and portions of Virginia that surround Sullivan County, are not contributing to the existing Sullivan County nonattainment area (NAA) because elevated terrain in the area that serve as a barrier to transport of SO₂ emissions from these sources into the Sullivan County NAA.

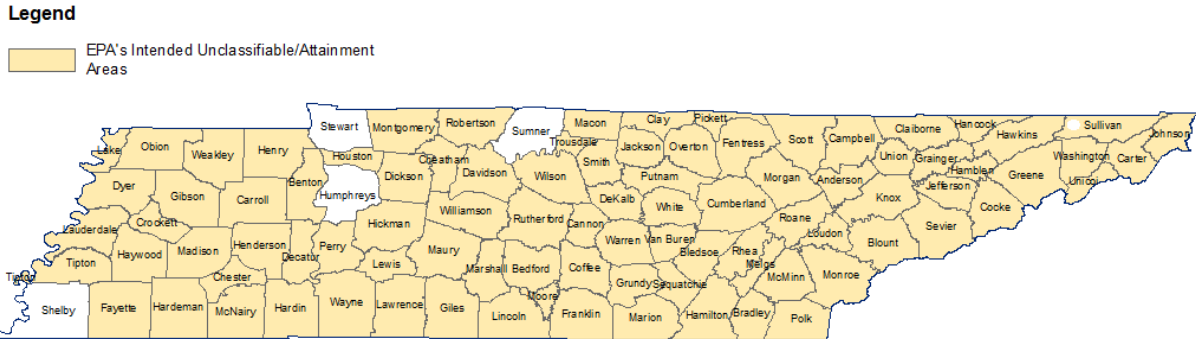
Table 17. Counties the EPA Intends to Designate Unclassifiable/Attainment

County or Partial County (p)	Tennessee's Recommended Area Definition	Tennessee's Recommended Designation	The EPA's Intended Area Definition	The EPA's Intended Designation
Sullivan (p)	Entire State	Unclassifiable/Attainment	Sullivan (p)	Unclassifiable/Attainment
Anderson	Entire State	Unclassifiable/Attainment	Anderson	Unclassifiable/Attainment
Bedford	Entire State	Unclassifiable/Attainment	Bedford	Unclassifiable/Attainment
Benton	Entire State	Unclassifiable/Attainment	Benton	Unclassifiable/Attainment
Bledsoe	Entire State	Unclassifiable/Attainment	Bledsoe	Unclassifiable/Attainment
Blount	Entire State	Unclassifiable/Attainment	Blount	Unclassifiable/Attainment
Bradley	Entire State	Unclassifiable/Attainment	Bradley	Unclassifiable/Attainment
Campbell	Entire State	Unclassifiable/Attainment	Campbell	Unclassifiable/Attainment
Cannon	Entire State	Unclassifiable/Attainment	Cannon	Unclassifiable/Attainment
Carrol	Entire State	Unclassifiable/Attainment	Carrol	Unclassifiable/Attainment
Carter	Entire State	Unclassifiable/Attainment	Carter	Unclassifiable/Attainment
Cheatham	Entire State	Unclassifiable/Attainment	Cheatham	Unclassifiable/Attainment
Chester	Entire State	Unclassifiable/Attainment	Chester	Unclassifiable/Attainment
Claiborne	Entire State	Unclassifiable/Attainment	Claiborne	Unclassifiable/Attainment
Clay	Entire State	Unclassifiable/Attainment	Clay	Unclassifiable/Attainment
Cocke	Entire State	Unclassifiable/Attainment	Cocke	Unclassifiable/Attainment
Coffee	Entire State	Unclassifiable/Attainment	Coffee	Unclassifiable/Attainment
Crockett	Entire State	Unclassifiable/Attainment	Crockett	Unclassifiable/Attainment
Cumberland	Entire State	Unclassifiable/Attainment	Cumberland	Unclassifiable/Attainment
Davidson	Entire State	Unclassifiable/Attainment	Davidson	Unclassifiable/Attainment
Decatur	Entire State	Unclassifiable/Attainment	Decatur	Unclassifiable/Attainment
DeKalb	Entire State	Unclassifiable/Attainment	DeKalb	Unclassifiable/Attainment
Dickson	Entire State	Unclassifiable/Attainment	Dickson	Unclassifiable/Attainment
Dyer	Entire State	Unclassifiable/Attainment	Dyer	Unclassifiable/Attainment
Fayette	Entire State	Unclassifiable/Attainment	Fayette	Unclassifiable/Attainment
Fentress	Entire State	Unclassifiable/Attainment	Fentress	Unclassifiable/Attainment
Franklin	Entire State	Unclassifiable/Attainment	Franklin	Unclassifiable/Attainment
Gibson	Entire State	Unclassifiable/Attainment	Gibson	Unclassifiable/Attainment
Giles	Entire State	Unclassifiable/Attainment	Giles	Unclassifiable/Attainment
Grainger	Entire State	Unclassifiable/Attainment	Grainger	Unclassifiable/Attainment
Greene	Entire State	Unclassifiable/Attainment	Greene	Unclassifiable/Attainment
Grundy	Entire State	Unclassifiable/Attainment	Grundy	Unclassifiable/Attainment
Hamblen	Entire State	Unclassifiable/Attainment	Hamblen	Unclassifiable/Attainment
Hamilton	Entire State	Unclassifiable/Attainment	Hamilton	Unclassifiable/Attainment
Hancock	Entire State	Unclassifiable/Attainment	Hancock	Unclassifiable/Attainment
Hardeman	Entire State	Unclassifiable/Attainment	Hardeman	Unclassifiable/Attainment
Hardin	Entire State	Unclassifiable/Attainment	Hardin	Unclassifiable/Attainment
Hawkins	Entire State	Unclassifiable/Attainment	Hawkins	Unclassifiable/Attainment
Haywood	Entire State	Unclassifiable/Attainment	Haywood	Unclassifiable/Attainment
Henderson	Entire State	Unclassifiable/Attainment	Henderson	Unclassifiable/Attainment
Henry	Entire State	Unclassifiable/Attainment	Henry	Unclassifiable/Attainment

County or Partial County (p)	Tennessee's Recommended Area Definition	Tennessee's Recommended Designation	The EPA's Intended Area Definition	The EPA's Intended Designation
Hickman	Entire State	Unclassifiable/Attainment	Hickman	Unclassifiable/Attainment
Houston	Entire State	Unclassifiable/Attainment	Houston	Unclassifiable/Attainment
Jackson	Entire State	Unclassifiable/Attainment	Jackson	Unclassifiable/Attainment
Jefferson	Entire State	Unclassifiable/Attainment	Jefferson	Unclassifiable/Attainment
Johnson	Entire State	Unclassifiable/Attainment	Johnson	Unclassifiable/Attainment
Knox	Entire State	Unclassifiable/Attainment	Knox	Unclassifiable/Attainment
Lake	Entire State	Unclassifiable/Attainment	Lake	Unclassifiable/Attainment
Lauderdale	Entire State	Unclassifiable/Attainment	Lauderdale	Unclassifiable/Attainment
Lawrence	Entire State	Unclassifiable/Attainment	Lawrence	Unclassifiable/Attainment
Lewis	Entire State	Unclassifiable/Attainment	Lewis	Unclassifiable/Attainment
Lincoln	Entire State	Unclassifiable/Attainment	Lincoln	Unclassifiable/Attainment
Loudon	Entire State	Unclassifiable/Attainment	Loudon	Unclassifiable/Attainment
McMinn	Entire State	Unclassifiable/Attainment	McMinn	Unclassifiable/Attainment
McNairy	Entire State	Unclassifiable/Attainment	McNairy	Unclassifiable/Attainment
Macon	Entire State	Unclassifiable/Attainment	Macon	Unclassifiable/Attainment
Madison	Entire State	Unclassifiable/Attainment	Madison	Unclassifiable/Attainment
Marion	Entire State	Unclassifiable/Attainment	Marion	Unclassifiable/Attainment
Marshall	Entire State	Unclassifiable/Attainment	Marshall	Unclassifiable/Attainment
Mauzy	Entire State	Unclassifiable/Attainment	Mauzy	Unclassifiable/Attainment
Meigs	Entire State	Unclassifiable/Attainment	Meigs	Unclassifiable/Attainment
Monroe	Entire State	Unclassifiable/Attainment	Monroe	Unclassifiable/Attainment
Montgomery	Entire State	Unclassifiable/Attainment	Montgomery	Unclassifiable/Attainment
Moore	Entire State	Unclassifiable/Attainment	Moore	Unclassifiable/Attainment
Morgan	Entire State	Unclassifiable/Attainment	Morgan	Unclassifiable/Attainment
Onion	Entire State	Unclassifiable/Attainment	Onion	Unclassifiable/Attainment
Overton	Entire State	Unclassifiable/Attainment	Overton	Unclassifiable/Attainment
Perry	Entire State	Unclassifiable/Attainment	Perry	Unclassifiable/Attainment
Picket	Entire State	Unclassifiable/Attainment	Picket	Unclassifiable/Attainment
Polk	Entire State	Unclassifiable/Attainment	Polk	Unclassifiable/Attainment
Putman	Entire State	Unclassifiable/Attainment	Putman	Unclassifiable/Attainment
Rhea	Entire State	Unclassifiable/Attainment	Rhea	Unclassifiable/Attainment
Roane	Entire State	Unclassifiable/Attainment	Roane	Unclassifiable/Attainment
Robertson	Entire State	Unclassifiable/Attainment	Robertson	Unclassifiable/Attainment
Rutherford	Entire State	Unclassifiable/Attainment	Rutherford	Unclassifiable/Attainment
Scott	Entire State	Unclassifiable/Attainment	Scott	Unclassifiable/Attainment
Sequatchie	Entire State	Unclassifiable/Attainment	Sequatchie	Unclassifiable/Attainment
Sevier	Entire State	Unclassifiable/Attainment	Sevier	Unclassifiable/Attainment
Smith	Entire State	Unclassifiable/Attainment	Smith	Unclassifiable/Attainment
Tipton	Entire State	Unclassifiable/Attainment	Tipton	Unclassifiable/Attainment
Trousdale	Entire State	Unclassifiable/Attainment	Trousdale	Unclassifiable/Attainment
Unicoi	Entire State	Unclassifiable/Attainment	Unicoi	Unclassifiable/Attainment

County or Partial County (p)	Tennessee's Recommended Area Definition	Tennessee's Recommended Designation	The EPA's Intended Area Definition	The EPA's Intended Designation
Union	Entire State	Unclassifiable/Attainment	Union	Unclassifiable/Attainment
Van Buren	Entire State	Unclassifiable/Attainment	Van Buren	Unclassifiable/Attainment
Warren	Entire State	Unclassifiable/Attainment	Warren	Unclassifiable/Attainment
Washington	Entire State	Unclassifiable/Attainment	Washington	Unclassifiable/Attainment
Wayne	Entire State	Unclassifiable/Attainment	Wayne	Unclassifiable/Attainment
Weakley	Entire State	Unclassifiable/Attainment	Weakley	Unclassifiable/Attainment
White	Entire State	Unclassifiable/Attainment	White	Unclassifiable/Attainment
Williamson	Entire State	Unclassifiable/Attainment	Williamson	Unclassifiable/Attainment
Wilson	Entire State	Unclassifiable/Attainment	Wilson	Unclassifiable/Attainment

Figure 23. The EPA's Intended Unclassifiable/Attainment Designation(s) for Counties in Tennessee



Counties previously designated unclassifiable in Round 1 (*see 78 Federal Register 4719*) and Round 2 (*see 81 Federal Register 45039*) will remain unchanged unless otherwise noted.

6.1. Air Quality Monitoring Data for the Remaining Areas in Tennessee

AQS monitors located in some of the counties identified above have sufficient valid data for the 2014-2016 time period and these data indicate that there was no violation of the 2010 SO₂ NAAQS at the monitoring site during that period. However, these data alone are not sufficient to support a conclusion that there is no NAAQS violation in any other portion of the area without sufficient information indicating that the monitors are located in the maximum concentration for the area. The State did not provide this information but the EPA has found the following monitors in the area:

Table 18. Other Monitors Available in Tennessee*

AQS ID #	Location	County	Design Value 2014-2016 (ppb) ³⁴
47-001-0101	35.96522, -84.22316	Anderson	6
47-009-0101	35.63348, -83.941606	Blount	3**
47-037-0011	36.20505, -86.744719	Davidson	7

*This table does not include monitors located in Sullivan County, since they are included in the existing nonattainment area.

** The 2014-2016 design value from the Blount County monitor is not valid due to incomplete data

These monitors do not indicate that there is a violation of the NAAQS, however no information has been submitted to support that these monitors are located where maximum concentration for the area are expected, thus the EPA is not relying on these monitors as the basis for designation of the areas surrounding these monitors.

6.2. Jurisdictional Boundaries for the Remaining Areas in Tennessee

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for city/county/parish. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable (see Figure 23).

³⁴ The most recent SO₂ design values for all areas of the country are available at <https://www.epa.gov/air-trends/air-quality-design-values>.

The State did not recommend any specific boundary in their recommendation letter but instead suggested to designate the entire state unclassifiable/attainment except for the partial-county existing nonattainment area in Sullivan County.

In 2013, the EPA designated a portion of Sullivan County, TN nonattainment for the 2010- 1-hour SO₂ NAAQS based on air quality monitoring data (for round 1 designations). The existing nonattainment area encompasses a 3-km radius centered at the Eastman Chemical Company's B-253 power house, (located at 36.5186 N. 82.5350 S). This NAA also includes one additional nearby SO₂ point source, EnviraGlass, LLC (formerly Heritage Glass), Holston Army Ammunition Plant which is being evaluated as part of state's attainment planning for the area. Sullivan County is bounded by Hawkins County to west, Washington and Carter counties to the south, Johnson County to the east and the Virginia state line (Scott and Washington Counties) to the north.

Outside of the Sullivan County NAA, there are 16 additional SO₂ emitting sources, according to the 2014 NEI, that cumulatively emitted approximately 35 tons of SO₂. The closest SO₂ emitting source, Brendels, is less than 0.5 km from the NAA and emitted 0.0013 tons in 2014. Domtar Paper Company, located 0.80 km north of the NAA, emitted 29.2 tons of SO₂ in 2014 and is being addressed as part of the state's attaining planning for the NAA. The EPA believes these remaining sources in the undesignated portions of Sullivan County are not contributing to the existing NAA because of their low SO₂ emissions and their distance from the Sullivan County NAA. Notably, only one other nearby source outside the NAA is being addressed as part of the state's attainment planning (Domtar Paper). Three neighboring Tennessee counties Washington, Johnson and Carter in Tennessee have a total of 14 sources that cumulatively emitted less than 8 tons in 2014. Scott and Washington counties, VA have no major sources of SO₂

The EPA notes that most of Sullivan County is situated in the Ridge and Valley Geographic Region and topography consists of long linear ridges with elevations of 1,100 to 1,500 feet, and parallel lowland valleys, where the elevations vary from 700 to 1000 feet. The ridges and valleys are typically oriented from northeast to southwest. Generally, the ridges and valleys have a higher elevation in the northern part of the region and are slightly less elevated in the south. Hawkins County, west of Sullivan County and the NAA has two sources, Holston Army Ammunition Plant and AGC Industries (Greenland Plant) that emitted over 100 tpy, and are approximately 7.10 and 19 km west of the NAA, respectively. However, Hawkins and Sullivan County are separated by mountain ridges with elevations over 2,000 feet. These elevated terrain features serve as a barrier to transport of SO₂ emissions from these sources into the Sullivan County NAA.

In 2016 (Round 2 designation), the EPA designated Sumner County, Tennessee, unclassifiable because the agency did not have enough information to determine whether the area was meeting the 2010 1-hour SO₂ NAAQS or contributing to an area not meeting the standard.

The EPA will take all the information available to determine the correct boundaries for the designation. Given the information provided by the State and the information obtained by the EPA, we believe that the jurisdictional boundaries for this unclassifiable/attainment designation will be bounded by the county lines of those counties identified in Table 17, with the exception of the existing nonattainment area in a portion of Sullivan County. The EPA's intended unclassifiable/attainment designation for the rest of the areas in Tennessee include the Mississippi Band of Choctaw Indian Trust lands.

6.3. The EPA's Assessment of the Available Information for Remaining Areas in Tennessee

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. These counties therefore meet the definition of an "unclassifiable/attainment" area.

After careful evaluation of the state's recommendation and supporting the EPA believes that sources in the remaining undesignated portions of Sullivan County, and neighboring counties in Tennessee and Virginia are not contributing to violations of the SO₂ NAAQS in the existing Sullivan County NAA for the following reasons: (1) low levels of SO₂ emissions (2) the sources' distance from the NAA, and (3) elevated terrain in the area that serve as a barrier to transport of SO₂ emissions from these sources into the Sullivan County NAA.

Our intended unclassifiable/attainment areas, bounded by the county lines of the counties identified in Table 17, with the exception of the existing partial nonattainment area in Sullivan County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area (see Figure 23). For other county designations, please refer to the different sections of this technical support document. At this time, available information does not indicate that the air quality in the remaining counties in the State exceeds the 2010 SO₂ NAAQS.

6.4. Summary of Our Intended Designation for the Remaining Areas in Tennessee

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the counties identified in Table 17 as unclassifiable/attainment for the 2010 SO₂ NAAQS. Specifically, the boundaries are generally comprised of the entire counties, and the remaining undesignated portions of Sullivan County (excluding the 3 km existing nonattainment area). The EPA's intended unclassifiable/attainment

designation for the rest of the areas in Tennessee include the Mississippi Band of Choctaw Indian Trust lands.

The EPA believes that sources in the remaining undesignated portions of Sullivan County, and neighboring counties in Tennessee and Virginia are not contributing to violations of the SO₂ NAAQS in the existing Sullivan County NAA for the following reasons: (1) low levels of SO₂ emissions (2) the sources' distance from the NAA, and (3) elevated terrain in the area that serve as a barrier to transport of SO₂ emissions from these sources into the Sullivan County NAA. Therefore, the EPA intends to designate the remaining undesignated portions of Sullivan County unclassifiable/attainment for the 1-hour SO₂ NAAQS. Furthermore, at this time, EPA does not have additional information that suggests the existing Sullivan County SO₂ nonattainment area is contributing to any other portion of Tennessee or the neighboring counties in the Commonwealth of Virginia.

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 to evaluate and designate all remaining undesignated areas in Tennessee during this round of designations. All other previously undesignated areas in the State are discussed in separate sections of this document.