Technical Support Document:

Chapter 33
Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for Oklahoma

1. Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (the EPA, we, or us) must designate areas as either “nonattainment,” “attainment,” or “unclassifiable” for the 2010 1-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS) (2010 SO_2 NAAQS). The CAA defines a nonattainment area as an area that does not meet the NAAQS or that contributes to a nearby area that does not meet the NAAQS. An attainment area is defined by the CAA as any area that meets the NAAQS and does not contribute to a nearby area that does not meet the NAAQS. Unclassifiable areas are defined by the CAA as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS. In this action, the EPA has defined a nonattainment area as an area that the EPA has determined violates the 2010 SO_2 NAAQS or contributes to a violation in a nearby area, based on the most recent 3 years of air quality monitoring data, appropriate dispersion modeling 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 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS[1]. An unclassifiable area is defined by the EPA as an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

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

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

issued designations for the 2010 SO_2 NAAQS for selected areas of the country.[2] The EPA is under a December 31, 2017, deadline to designate the areas addressed in this TSD as required by the U.S. District Court for the Northern District of California.[3] We are referring to the set of designations being finalized by the December 31, 2017, deadline as "Round 3" of the designations process for the 2010 SO_2 NAAQS. After the Round 3 designations are completed, the only remaining undesignated areas will be those where a state has installed and timely begun operating a new SO_2 monitoring network meeting EPA specifications referenced in the EPA's Data Requirements Rule (DRR) (80 FR 51052). The EPA is required to designate those remaining undesignated areas by December 31, 2020.

Oklahoma submitted its first recommendation regarding designations for the 2010 1-hour SO_2 NAAQS on May 27, 2011. The State recommended that the EPA designate Tulsa and Muskogee Counties as unclassifiable, and all other counties as attainment, based on monitoring data. Oklahoma did not subsequently update any of its recommendations. In our intended designations, we have considered all the submissions from the State.

For the areas in Oklahoma that are part of the Round 3 designation process, Table 1 identifies the EPA's intended designations and the counties to which they would apply. It also lists Oklahoma's recommendations. The EPA's final designation for these areas will be based on an assessment and characterization of air quality through ambient air quality data, air dispersion modeling, other evidence and supporting information, or a combination of the above, and could change based on changes to this information (or the availability of new information) that alters EPA's assessment and characterization of air quality.

---

[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).

Table 1 – Summary of the EPA's Intended Designations and the Designation Recommendations by Oklahoma

Area/County	Oklahoma's Recommended Area Definition	Oklahoma's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Kay County	Kay County	/Attainment	Kay County	Unclassifiable/ Attainment
Le Flore County)	Le Flore County	Attainment	Le Flore County	Unclassifiable/ Attainment
Rogers County	Rogers County	Attainment	Rogers County	Unclassifiable/ Attainment
Tulsa County	Tulsa County	Unclassifiable	Tulsa County	Unclassifiable/ Attainment
Remaining Undesignated Areas to Be Designated in this Action *	Remaining Counties	Attainment	Each Remaining Undesignated County except for Mayes County, Muskogee County, and Garfield County	Unclassifiable/ Attainment

* Except for areas that are associated with sources for which Oklahoma elected to install and began timely operation of a new SO_2 monitoring network meeting EPA specifications referenced in the EPA's DRR (*see* Table 2), the EPA intends to designate the remaining undesignated counties in Oklahoma as "unclassifiable/attainment" since these areas are not required to be characterized 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 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 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 TSD.

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

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

Area	Source(s)
Mayes	GRDA – Chouteau Coal Fired Complex
Muskogee	OG&E - Muskogee Generating Station -Georgia Pacific - Muskogee Mill
Garfield	Oxbow Calcining LLC - Kremlin Plant

Areas that the EPA previously designated unclassifiable in Round 1 (*see* 78 FR 47191) and Round 2 (*see* 81 FR 45039 and 81 FR 89870) are not affected by the designations in Round 3 unless otherwise noted. No areas in Oklahoma have been previously designated unclassifiable.

2. General Approach and Schedule

Updated designations guidance documents were issued by the EPA through a July 22, 2016, memorandum and a March 20, 2015, memorandum from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Air Division Directors, U.S. EPA Regions I-X. These memoranda supersede earlier designation guidance for the 2010 SO_2 NAAQS, issued on March 24, 2011, and identify factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO_2 NAAQS. The documents also contain the factors that the EPA intends to evaluate in determining the boundaries for designated areas. These factors include: 1) air quality characterization via ambient monitoring or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and topography; and 5) jurisdictional boundaries.

To assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling for sources that emit SO_2, the EPA released its most recent version of a draft document titled, "SO_2 NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) in August 2016.[4]

Readers of this chapter of this TSD should refer to the additional general information for the EPA's Round 3 area designations in Chapter 1 (Background and History of the Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard) and Chapter 2 (Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for States with Sources Not Required to be Characterized).
As specified by the March 2, 2015, court order, the EPA is required to designate by December 31, 2017, all "remaining undesignated areas in which, by January 1, 2017, states have not installed and begun operating a new SO_2 monitoring network meeting EPA specifications referenced in" the EPA's DRR. Pursuant to the DRR, the EPA will designate by December 31, 2017, areas of the country that are not timely operating new, EPA-approved monitoring networks. The Oklahoma areas to be designated by December 31, 2017, include: 1) the areas associated with three sources in Oklahoma meeting DRR emissions criteria that the State has chosen to characterize using air dispersion modeling; 2) the area associated with one source in Oklahoma (Holcim) meeting DRR emissions criteria which took an emission limitation to restrict its SO_2 emissions to less than 2,000 tons per year (tpy) in lieu of modeling or monitoring; and 3) 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. There is also a section for all the remaining counties in the State to be designated in this round.

---

[2] 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 SO_2 monitoring network design, to advise states that have elected to install and begin operation of a new SO_2 monitoring network. *See* Draft SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, February 2016, https://www.epa.gov/sites/production/files/2016-06/documents/SO2monitoringtad.pdf.

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

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

1) 2010 SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 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 SO_2 NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS.
4) Designated unclassifiable/attainment area – an area that either: (1) based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.
5) Designated unclassifiable area – an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.
6) Modeled violation – a violation of the SO_2 NAAQS demonstrated by air dispersion modeling.
7) Recommended attainment area – an area that a state, territory, or tribe has recommended that the EPA designate as attainment.
8) Recommended nonattainment area – an area that a state, territory, or tribe has recommended that the EPA designate as nonattainment.
9) Recommended unclassifiable area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable.
10) Recommended unclassifiable/attainment area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable/attainment.
11) Violating monitor – an ambient air monitor meeting 40 CFR parts 50, 53, and 58 requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.

12) We, our, and us – these refer to the EPA.

3. Technical Analysis for Kay County, Oklahoma

3.1. Introduction

The EPA must designate Kay County, Oklahoma, by December 31, 2017, because no portion of the county has been previously designated and Oklahoma has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Kay County. The State recommended that Kay County be designated attainment.

3.2. Air Quality Monitoring Data for the Kay County, Oklahoma, Area

The State included SO_2 air quality monitoring data in the area of Kay County from the following monitor(s):

- Air Quality System monitor #40-071-0604 is located in Kay County (36.69727 Latitude, -97.08130 Longitude). The Kay County monitor is located 1 km north of the Phillips 66 Company Ponca City Refinery and 3.6 km north of Continental Carbon – Ponca City Plant (Continental Carbon). Although the monitor is impacted by both the refinery and Continental Carbon, according to the state's modeling addressed in the following sections, the monitor is not located in the maximum impact area (see Figure 10). The 2014-2016 monitor design value was 33 ppb.

The EPA confirmed that there is no additional relevant data in AQS that could inform the intended designation action. Please reference the relevant data file posted at https://www.epa.gov/air-trends/air-quality-design-values.

3.3. Air Quality Modeling Analysis for Kay County Addressing Continental Carbon Company – Ponca City Plant

3.3.1. Introduction

This section presents all the available air quality modeling information for the portion of Kay County that includes Continental Carbon and a nearby portion of Noble County. The modeling domain was centered over the facility since it is the largest source of SO_2 emissions located in the area. (This portion of Kay County will often be referred to as "the Kay County area" within this section 3.3). The state included all SO_2 sources within 50 km with emissions greater than 1 tpy. This area contains the following SO_2 sources, including the sources around which Oklahoma is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy:

- The Continental Carbon facility emitted 2,000 tons SO_2 or more annually. Specifically, Continental Carbon emitted 5,893 tons of SO_2 in 2014. This source meets the DRR criteria and therefore is on the SO_2 DRR Source list. Oklahoma has chosen to characterize this facility via modeling.

- The Magellan Pipeline Company, LP, Ponca City Station emitted 0.392 tons of SO_2 in 2014.

- Phillips 66 Company – Ponca City Refinery emitted 106.47 tons of SO_2 in 2014.

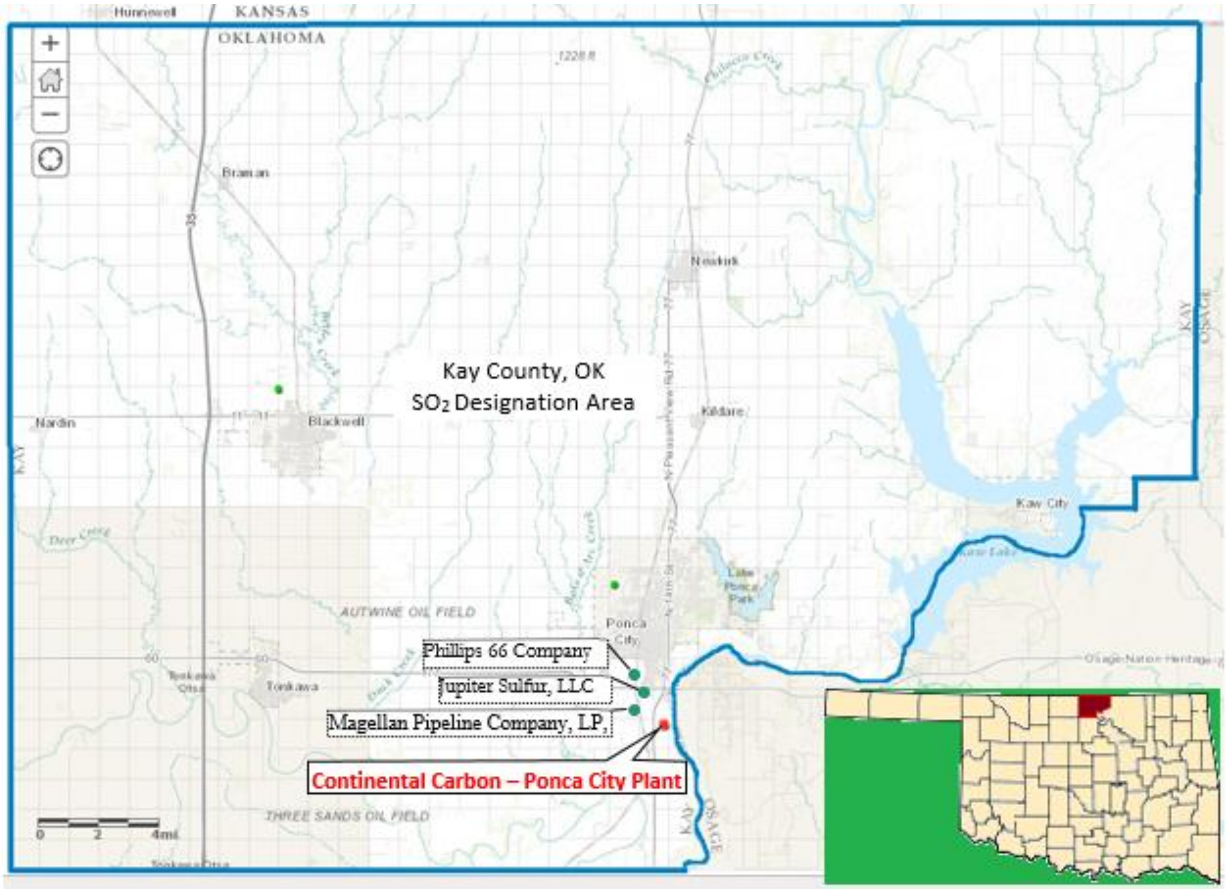
- Jupiter Sulfur, LLC, Nitrogen Sulfur Fertilizer Facility emitted 17.57 tons of SO_2 in 2014.

Oklahoma Gas & Electric, Sooner Generating Station is on the SO_2 DRR Source list and it is located in Noble County which was previously designated in Round 2 of SO_2 designations as unclassifiable/attainment based on modeling available at the time. The boundaries for the unclassifiable/attainment area consisted of the entirety of Noble County which is adjacent to the southern side of Kay County. Sooner Generating Station is included in the modeling domain by the state because it is located approximately 23 km south of Continental Carbon and emitted 14,077 tons SO_2 in 2014.

Because we have available results of air quality modeling in which the above sources are modeled together, the area around this group of sources in Kay County is being addressed with consideration given to the impacts from all these sources. All natural gas-fired sources, including Phillips 66 and Jupiter Sulfur, that were not part of Continental Carbon were excluded from the 2010 1-hour SO_2 NAAQS air quality characterization because they are very small sources and represented via the conservatively high background concentrations and do not cause a concentration gradient nor contribute to a NAAQS violation. To be conservative (i.e., to tend to overestimate concentrations), Oklahoma included the natural gas-fired sources at Continental Carbon in the modeling even though the emissions are very small.

Oklahoma has provided an assessment and characterization of air quality impacts from this facility and other nearby sources that may have a potential impact in the area where the 2010 SO_2 NAAQS may be exceeded. This characterization was performed using AERMOD air dispersion modeling software to analyze the actual emissions. After careful review of the State's assessment, supporting documentation, and all available data, the EPA agrees that the area is meeting the NAAQS and intends to designate the area as unclassifiable/attainment. In its 2011 designations recommendations, the State recommended the use of counties as the basis for designations and recommended Kay county be attainment. The State has not subsequently recommended any specific borders for a designated area around Continental Carbon. The EPA believes that our intended unclassifiable/attainment area, consisting of the entirety of Kay County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area. The EPA's intended unclassifiable/attainment area boundary for the area around Continental Carbon can be seen in Figure 1 below. Our reasoning for this intended designation is explained in a later section of this TSD, after all the available information is presented.

Figure 1. Map of Kay County - the EPA's Intended Designation for Kay County



The State assessed an area within 10 km of Continental Carbon (total grid was 20 km x 20 km centered on Continental Carbon by air quality modeling. Since Continental Carbon is the largest source of SO_2 emissions in the area, with relatively flat terrain, the modeling domain was centered over the facility.

Continental Carbon is located in north-central Oklahoma in the south-central portion of Kay County. The facility is located approximately 5 km south of Ponca City. The area around Continental Carbon can be seen in Figure 2 below.

Included in the figure are other nearby large emitters of SO_2 located in Kay County.[5] These are:

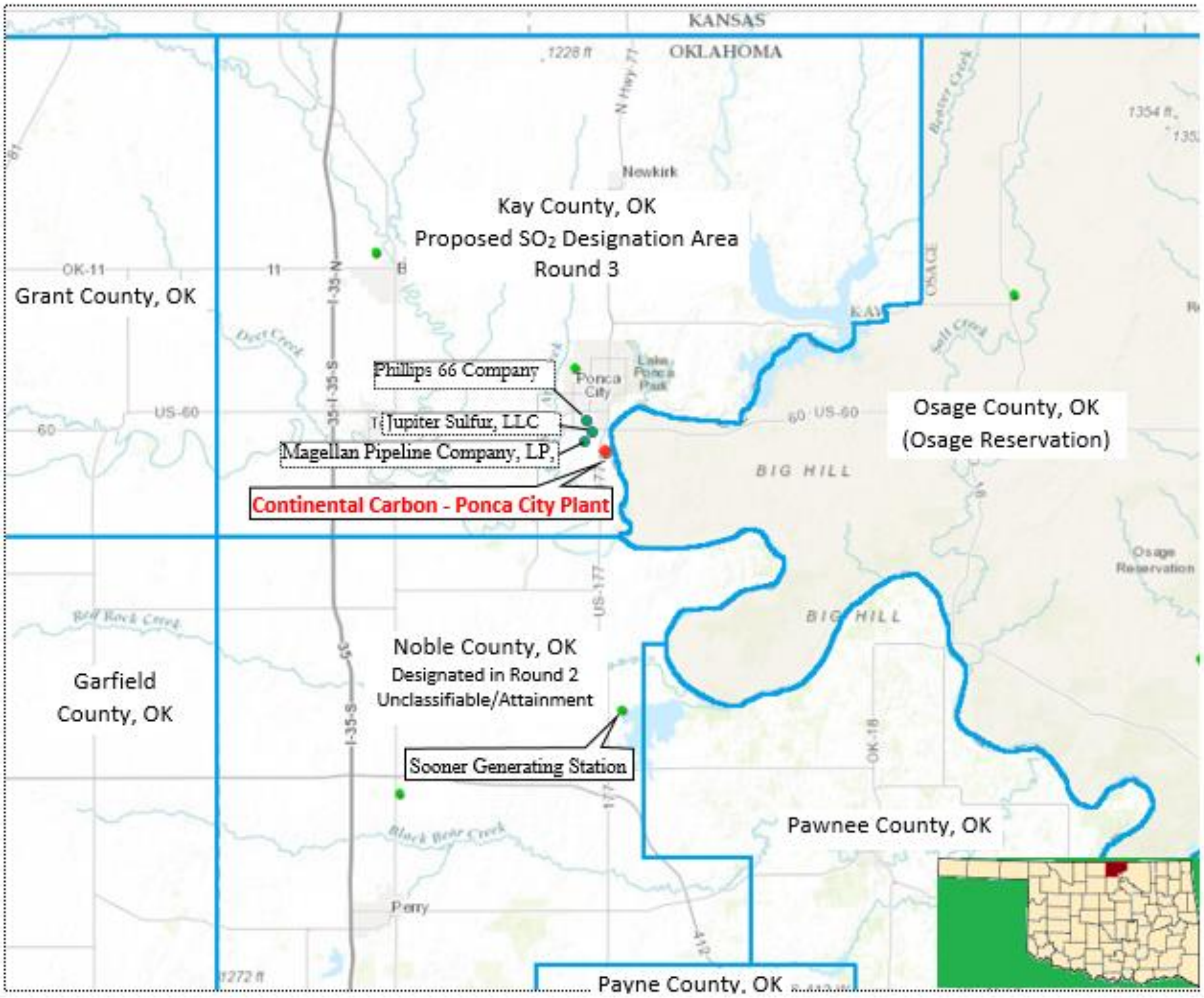
- Magellan Pipeline Company, LP, Ponca City Station;
- Phillips 66 Company – Ponca City Refinery, Ponca City Refinery;
- Jupiter Sulfur, LLC, Nitrogen Sulfur Fertilizer Facility;

Oklahoma Gas & Electric, Sooner Generating Station is located in Noble County and is also shown in Figure 2. Sooner Generating Station was explicitly included in the modeling provided by the State for Continental Carbon so that its impacts near the sources in Kay County would be accounted for, but it is

[5] The state included all SO_2 sources within 50 km with emissions greater than 1 tpy.

beyond the outer edge of the receptor grid. Previously, in Round 2 of the SO_2 designations, the EPA was required to address the area around Sooner Generating Station. The entirety of Noble County, which is immediately adjacent south of Kay County, was designated as unclassifiable/attainment (*see* Figure 2).

Figure 2. Map of Kay County Area and Adjacent Counties Addressing Continental Carbon

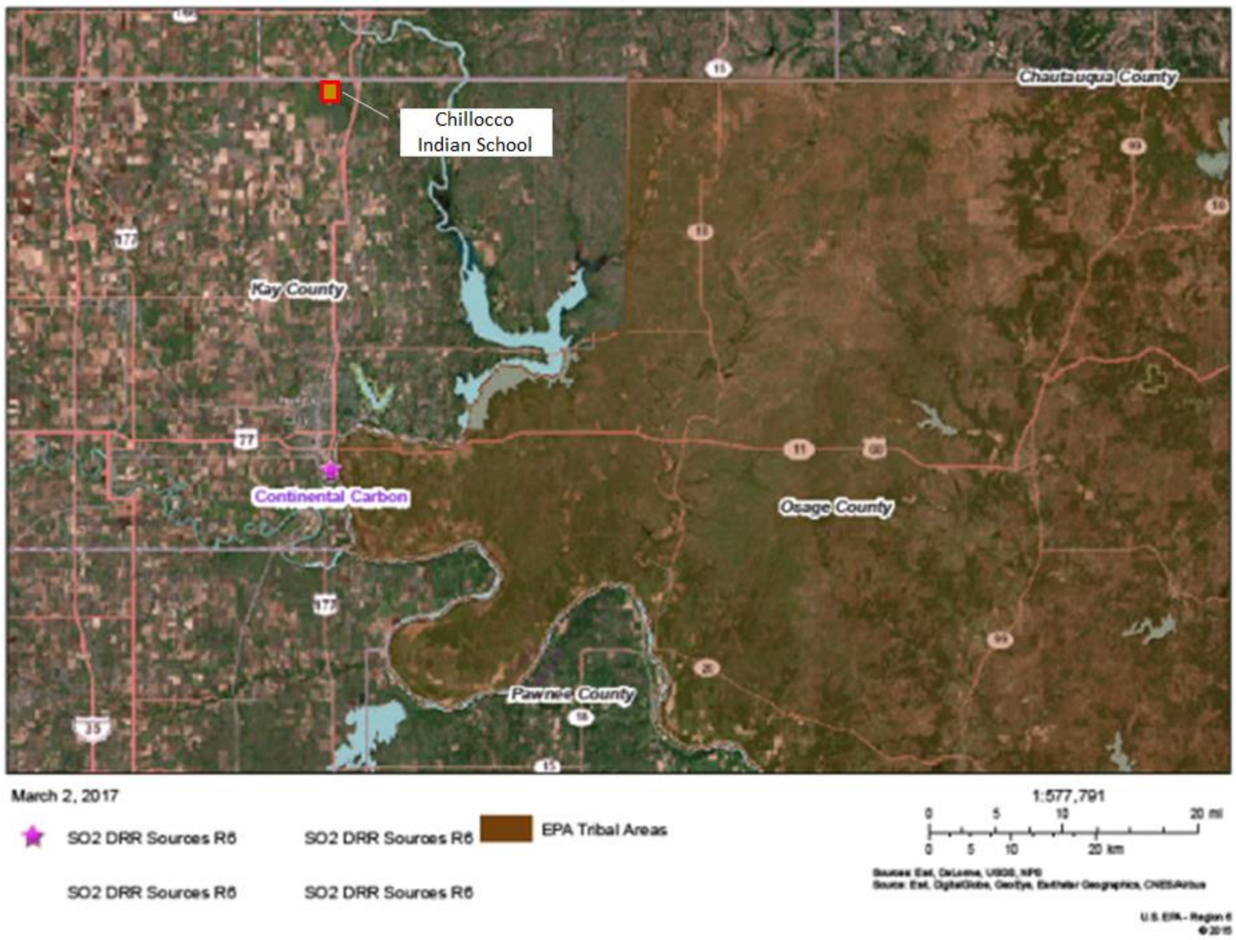


The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered one modeling assessment from the State and no assessments from other parties. It was received on January 11, 2017, and provides an assessment for Continental Carbon located in Kay County, Oklahoma, for the 1-hour SO_2 NAAQS utilizing AERMOD.

Figure 3 shows the Osage Tribal Area in Osage County and a small piece of Cherokee Tribal Area, Chilocco Indian School, in North Central Kay County just west of U.S. 77 and just south of the northern border of Kay County.

Figure 3. Map of Tribal Lands in and near Kay County Area of Analysis



3.3.2. Modeling Analysis Provided by the State

3.3.2.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model (State used Version 15181)
- AERMAP: the terrain processor for AERMOD (State used Version 11103)
- AERMET: the meteorological data processor for AERMOD (State used Version 15181)
- BPIPPRM: the building input processor (State used Version 04724)
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data (State used Version 15272)
- AERSURFACE: the surface characteristics processor for AERMET (State used Version 13016)
- AERSCREEN: a screening version of AERMOD (State did not use this)

The State used AERMOD version 15181 with the default regulatory options and acceptable associated components. On January 17, 2017, the EPA published its revision to Appendix W – Guideline to Air Quality Models.7 Since the publication of Appendix W, AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted here. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate. The EPA finds the AERMOD version and its components to be acceptable for this analysis since the regulatory default options were used with this older 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 SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

For the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model in rural mode. The determination for this domain was based primarily on land-use (the preferred method). An aerial photo showing land use/cover was provided and can be seen in Figure 4 below.

Figure 4. Aerial Map with 3 km Radius Around Continental Carbon

The EPA concludes that using a rural determination was appropriate by the State. When using the land-use method, to be considered urban, 50% or more of the area within the 3 km radius circle should be considered residential or industrial. Since the aerial photo shows that approximately 75% of the land-use within 3 km of the plant does not consist of residential nor industrial, then classifying the area around Continental Carbon as rural is appropriate.

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

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The sources of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. For the Kay County area, the State included all other emitters of SO_2 greater than 1 tpy within 50 km of Continental Carbon in any direction. Many of these sources were large enough to potentially generate impacts (concentration gradients) in Kay County and were not necessarily represented by the background monitor. The State determined that this was the appropriate distance to adequately characterize air quality through modeling. This includes the potential extent of any SO_2 NAAQS violations in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. In addition to Continental Carbon, the other emitters of SO_2 included in the area of analysis were: Magellan Pipeline Company, LP; Phillips 66 Company – Ponca City Refinery, Ponca City Refinery; Jupiter Sulfur, LLC, Nitrogen Sulfur Fertilizer Facility; and Oklahoma Gas & Electric, Sooner Generating Station. No other sources beyond 50 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis. The nearest source greater than 100 tpy is Oxbow Calcining- Kremlin, which is about 70 km distant. We have reviewed and found the use of 50 km for this inventory (greater than 1 tpy) to include all nearby sources that could potentially impact the concentrations in the area of concern in Kay County to be acceptable.

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

A Cartesian receptor grid was generated by spacing the receptors as follows:

- Receptors spaced at 100 m along the fence line of Continental Carbon;
- Receptors spaced at 100 m from the fence line out to 1 km;
- Receptors spaced at 250 m from 1 km out to 2.5 km;
- Receptors spaced at 500 m from 2.5 km to 5 km; and
- Receptors spaced at 1 km from 5 km out to 10 km (the edge of the domain).

Figures 5, 6, and 7, included in the State's submission, show the State's chosen area of analysis surrounding Continental Carbon, as well as the receptor grid for the area of analysis. We note that the State excluded receptors for the facilities to the northwest of the facility (refinery, tank farm, etc.). As discussed below, since the maximum impact from Continental Carbon would typically be expected to occur within 0-2 km from the source stack, a domain extending out 10 km from the facility fence line is expected to be of sufficient size to determine the ambient air impacts including overlapping impacts from other nearby sources. The contour plots confirm this behavior for the impacts of Continental Carbon, and that the maximum impact occurs less than 1 km from the source and the concentrations rapidly decrease in all directions. Consequently, excluding the receptors for the facilities to the northwest should not affect the analysis of whether the area is meeting the NAAQS.

Figure 5. Domain Location (State Level) for Continental Carbon

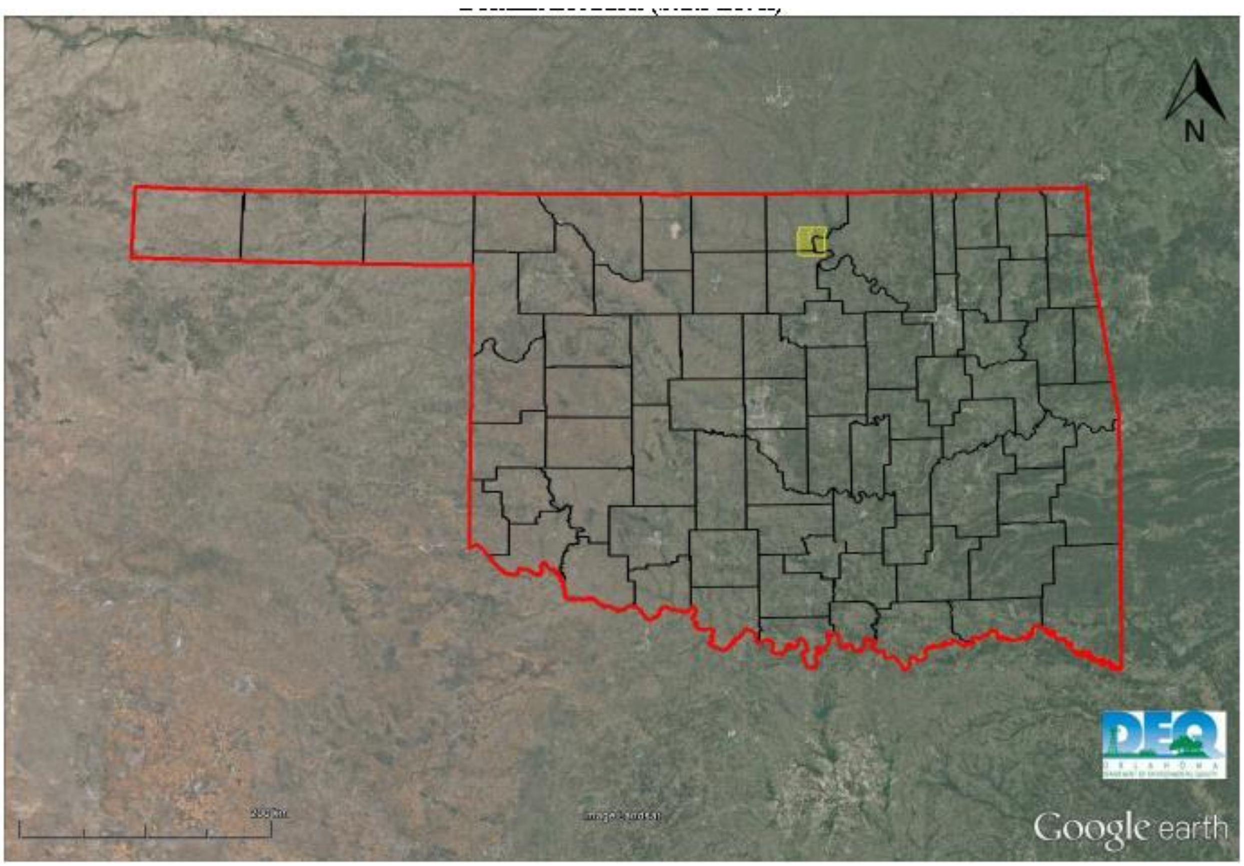
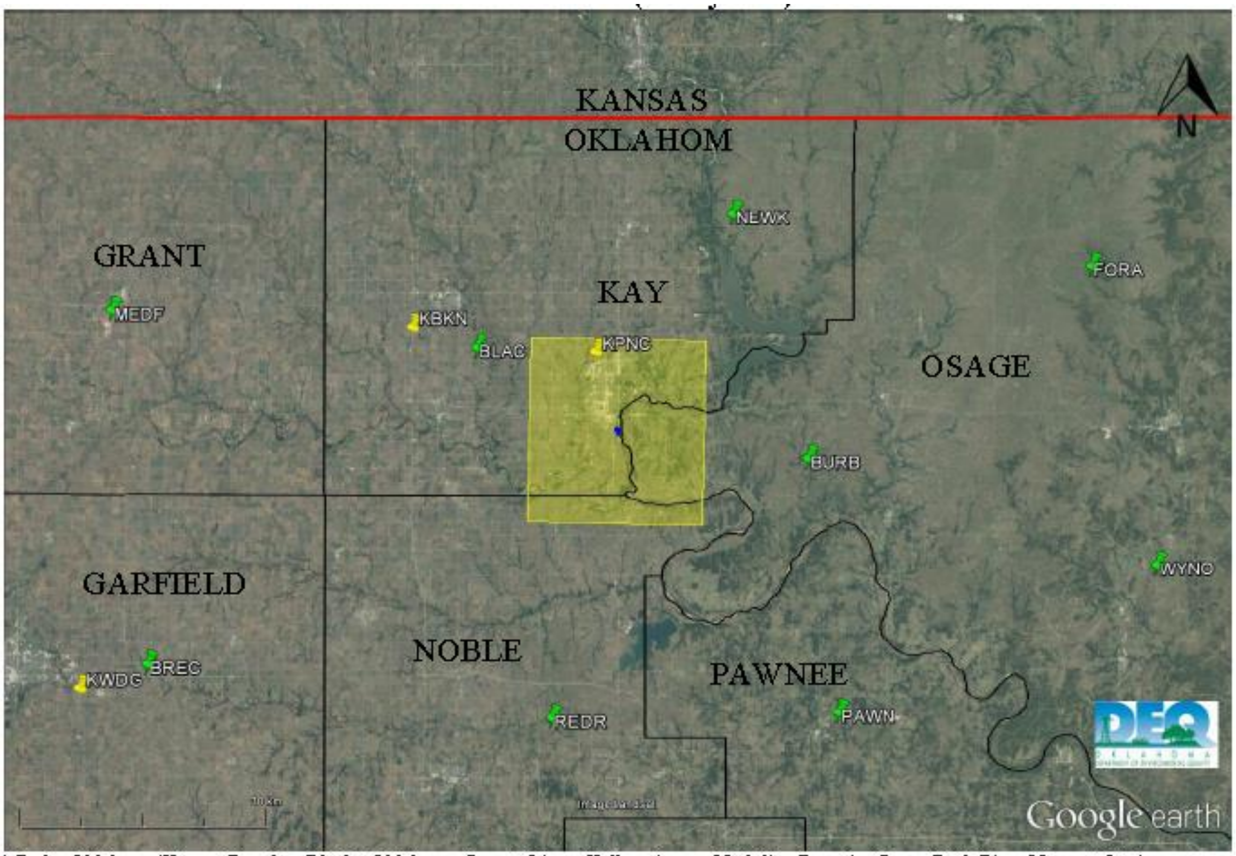
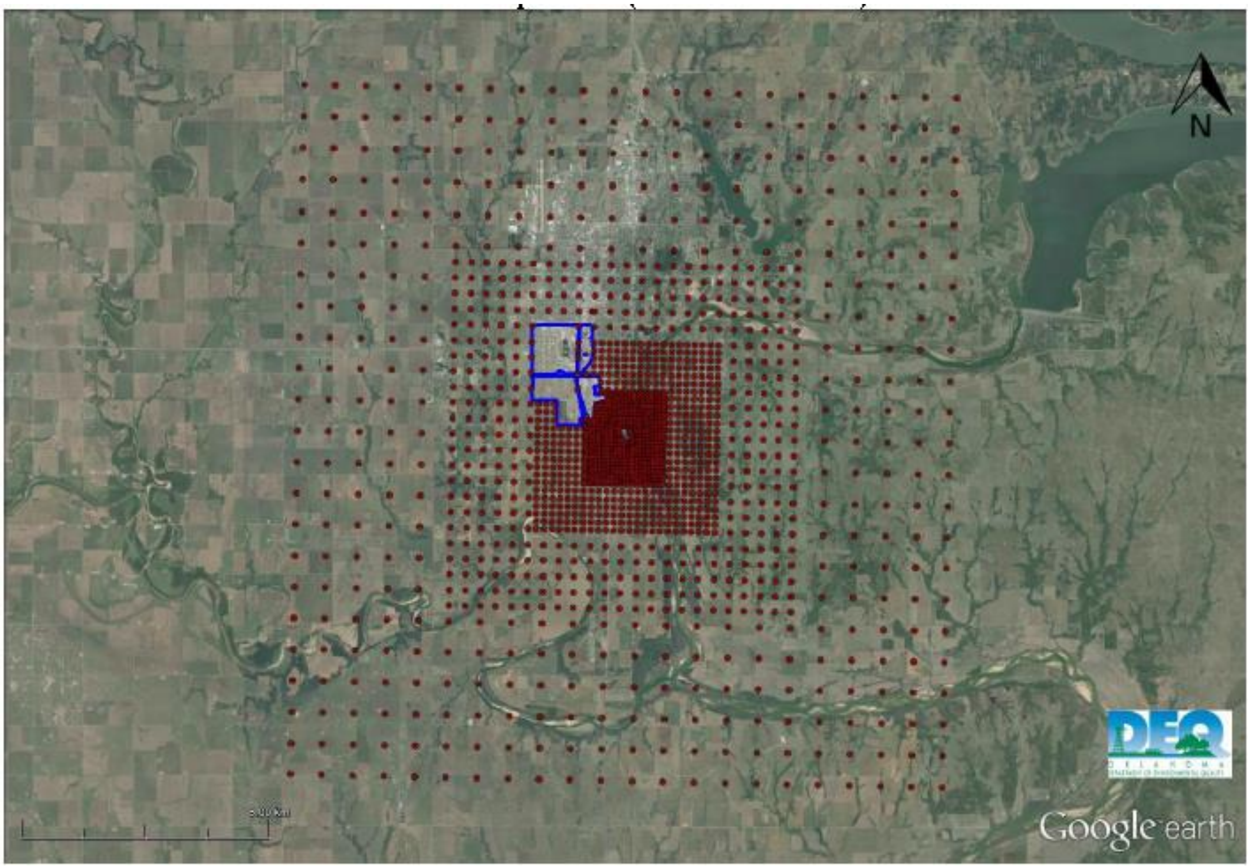


Figure 6. Domain Location (County Level) for Continental Carbon with Weather Stations



* Red – Oklahoma/Kansas Boarder; Black - Oklahoma County Lines; Yellow Area – Modeling Domain; Green Push-Pin – Mesonet Stations; Yellow Push Pins – ISH Stations.

Figure 7. Domain Receptor Grid (10 km from Fence Line) for Continental Carbon



*Blue property boundary identifiesthe property of a nearby refinery, a tank farm, and Jupiter Sulfur LLC, which are fenced and to which access by the general public is restricted. Continental Carbon has a very small property for the facility and it is in the center of the fine grid and is also idedntified and is also adequately fenced and access is restricted to the property. The state confirmed the fencing and adequacy of restricted access to the property.

Continental Carbon is located in an area of relatively flat terrain. The terrain surrounding the Continental Carbon plant was reviewed and was determined to have no hills with an elevation at or above the stack height. Based on EPA guidance, the general guideline for determining the distance between an affected source and where the maximum ground level concentration will occur is generally ten times the stack height in flat terrain. Since the maximum impact is expected to occur 0-2 km from the stack, a domain extending out 10 km from the facility fence line to capture the combined impact of Continental Carbon and other sources is expected to be of sufficient size to determine the ambient air impacts. The contour plots confirm this behavior for the impacts of Continental Carbon, the maximum impact occurs less than 1 km from the source and the concentrations rapidly decrease in all directions.

The State’s modeling was conducted before the revised Modeling TAD (2016) was available. To be fully consistent with the revised Modeling TAD, receptors would be placed in locations that would be considered ambient air with respect to Continental Carbon. The State properly excluded receptors from within the fenceline of Continental Carbon, since this is not ambient air with respect to emissions from Continental Carbon, but also excluded receptors from the property of other nearby sources to the northwest of Continental Carbon on the basis of being infeasible for placement of a monitoring station based on discussions with the state. The State placed receptors along the fence line of Continental Carbon. As further discussed below, even if receptors had been placed on the other properties it would not have resulted in values near the standard as the maximum values are closer to Continental Carbon.

Based on further analysis of modeled impacts at potential receptors on nearby facilities discussed below, there is adequate information provided by the State for the EPA to conclude that the receptor network is sufficient for the purpose of modeling with regard to an SO_2 designation for Continental Carbon. The receptor placement is of sufficient density to provide the resolution needed to detect gradients in the concentrations and maximum impacts from Continental Carbon and surrounding SO_2 sources. Specifically, the receptors placements were stratified with the tightest receptor placement close to the source to detect local gradients and further out they were spaced further apart as the gradients were not as significant. Receptors were also placed at key locations to define what the state asserts is the ambient air boundary at the Continental Carbon plant fence line. As the maximum concentration occurs beyond the boundary, the placement of the fenceline receptors should not be an issue in determining the design value. However, there were no receptors included on neighboring industrial property that would be considered ambient air with respect to Continental Carbon.

3.3.2.4. Modeling Parameter: Source Characterization

In determining which nearby sources should be included in the modeling domain, all sources within 50 km of the applicable source were evaluated. While there are a number of natural gas fired sources in the area, Oklahoma excluded all natural gas fired sources that were not part of Continental Carbon from the 2010 1-hour SO_2 NAAQS air quality characterization because of the following:

- Their emissions are so small (i.e. less than 1 tpy) that they do not cause a concentration gradient;
- They are not expected to cause or contribute to a NAAQS violation; and
- They are represented via the background concentrations.

There are four other nearby facilities that were included in the modeling analysis for Continental Carbon:

- Magellan Pipeline Company, LP, Ponca City Station (2014 emissions 0.39 tpy,1.2km);
- Phillips 66 Company – Ponca City Refinery, Ponca City Refinery (106 tpy, 2.8km);
- Jupiter Sulfur, LLC, Nitrogen Sulfur Fertilizer Facility (17.6 tpy, 1.4km);
- Oklahoma Gas & Electric, Sooner Generating Station (14,077 tpy, 23.8km).

For the 2010 1-hour SO_2 NAAQS air quality characterizations, modeling of sources with intermittent emissions, such as emergency generators and limited intermittent startup/shutdown emissions were not included based on the recommendations in the March 1, 2011, memorandum “Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standards.” In keeping with the guidance, sources that operated less than 100 hours per year were excluded. Diesel-fired generator engines located at Continental Carbon and at the Phillip 66 Company –Ponca City Refinery were excluded from the air quality characterization because they are back-up power units and operate only for short testing cycles and when the power is out. Not including these sources is acceptable to the EPA based on the EPA's guidance and the fact that the emissions are small and infrequent.

The modeling was based on the most recent 3 years of actual emissions data (2012-2014) that was concurrent with the meteorological dataset. At the time the modeling was started in 2015, these years were the most recent for which data were available. CEMS data were used to generate hourly emissions files for the OG&E Sooner Generating Station. Emissions and flow rates for the other sources included in the model were based on actual operational data (annual tpy divided by hours of operation if higher resolution temporal emission data were not available) that were concurrent with the meteorological dataset. Actual stack heights were used rather than following the GEP stack height policy as allowed for SO_2 designations modeling of sources using actual emissions. The stack heights at Continental Carbon were all less than 65 meters (m). The modeling included building downwash for all 47 individual stacks modeled and was implemented using BPIPPRM. Continental Carbon submitted information to the State regarding buildings located on its property and the state had information for the other three sources in Kay County. Those parameters were used as inputs into BPIPRIM to calculate building downwash parameters for input into AERMOD.

The EPA concludes that the State provided adequate information to determine the source configuration and source type for Continental Carbon and other sources included in the modeling. Accurate stack parameters (*see* Table 3) were provided and the physical plant layout was documented suitably for the modeling. Exit temperatures, diameters, and exit velocities reflected the actual emissions being modeled. The stack locations and nearby building dimensions were documented well via aerial images, along with corresponding easting and northing coordinates for each stack. That information provided accurate orientation of the stacks and the input parameters needed for BPIPPRM. Therefore, the building locations and downwash were accurately accounted for.

Table 3 - Modeled Stack Parameters for Contributing Sources in Area of Analysis

CCC Ponca City Plant Source Data

Source ID	Description	Easting	Northing	Elevation	Stk Ht.	Temp.	Velocity	Stk. Dia.	SO_2
		(m)	(m)	(m)	(ft)	(°F)	(fps)	(ft)	(lb/hr)
TO4	Thermal Oxidizer 4	672619.2	4059054.1	293.1	213.3	1599.0	119.8	7.0	447.11
TO12	Thermal Oxidizer 1/2	672443.6	4059084.2	293.6	150.0	1648.0	60.8	11.5	610.46
TO3	Thermal Oxidizer 3	672564.6	4059057.3	293.5	150.0	1574.0	52.8	9.5	339.96

OG&E Sooner Generating Station Source Data

Source ID	Description	Easting	Northing	Elevation	Stk Ht.	Temp.	Velocity	Stk. Dia.	SO_2
		(m)	(m)	(m)	(ft)	(°F)	(fps)	(ft)	(lb/hr)
1	Unit 1	674572.1	4036106.8	286.1	500.0	264.0	60.0	20.0	2012.1
2	Unit 2	674497.9	4036137.0	286.2	500.0	264.0	59.0	20.0	1841.9

Phillips 66 Ponca City Refinery Source Data

Source ID	Description	Easting	Northing	Elevation	Stk Ht.	Temp.	Velocity	Stk. Dia.	SO_2
		(m)	(m)	(m)	(ft)	(°F)	(fps)	(ft)	(lb/hr)
H0001	No. 1 CTU Atm Tower Feed Heater	670836.9	4061657.3	303.6	120.0	557.0	37.6	8.4	0.750
H0003	No. 4 CVU Feed Heater	670905.7	4061669.4	304.6	100.0	769.0	27.5	5.0	0.140
H0004	No. 4 CTU Feed Heater	670886.8	4061677.9	304.4	80.0	714.0	34.6	6.3	0.450
H0005	No. 1 CTU Tar Stripper Feed Heater	670864.6	4061667.5	304.0	82.0	632.0	19.7	6.0	0.260
H0010	Saturate Gas Plant Naphtha Reboiler	670819.0	4061580.0	302.4	92.0	632.0	24.2	4.8	0.200
H0023	No. 5 HDT Heater	671122.7	4061407.7	300.5	105.0	632.0	17.6	3.0	0.040
H0028	No. 7 Coker Heater	671057.5	4061500.4	300.8	165.0	428.0	28.8	7.5	0.260
H0029	No. 7 Coker Heater	671057.5	4061500.4	300.8	165.0	428.0	28.8	7.5	0.130
H0046	No. 2 HDS Feed Heater	671009.4	4061216.1	301.5	60.0	632.0	34.9	3.5	0.120
H0048	No. 2 CRU Heater	671004.5	4061199.7	301.5	171.0	574.0	17.9	11.0	0.510

Phillips 66 Ponca City Refinery Source Data

Source ID	Description	Easting	Northing	Elevation	Stk Ht.	Temp.	Velocity	Stk. Dia.	SO_2
		(m)	(m)	(m)	(ft)	(°F)	(fps)	(ft)	(lb/hr)
H6007	No. 3 CRU Heater	671143.5	4062249.1	302.2	124.0	940.0	30.0	7.5	0.180
H6008	Butane Dryers Regenerator Heater	671255.0	4060896.5	307.2	40.0	632.0	8.3	2.3	0.010
H6012	No. 3 HDS Heater	671154.5	4062242.7	301.6	90.0	632.0	33.6	4.2	0.040
H6013	No. 3 CRU Heater	671165.2	4062244.1	301.4	92.0	632.0	10.7	6.0	0.110
H6014	No. 2 CVU Feed Heater	671157.8	4062249.4	301.8	140.0	635.0	9.1	7.3	0.130
H6015	No. 2 CTU Feed Heater	671239.6	4062201.9	299.2	160.0	658.0	22.7	6.3	0.110
H6151	No. 4 FCCU Feed Preheater	671247.9	4062253.8	300.4	131.0	632.0	27.2	6.0	0.110
H0011	No. 7 HDT Heater	670837.9	4061574.9	302.5	95.0	632.0	13.1	2.8	0.010
NO.4FCC	No. 4 Fluidized Bed Catalytic Cracking Unit Catalyst Regenerator	671277.2	4062246.2	300.7	175.0	423.0	81.3	4.5	1.120
NO.5FCC	No. 5 Fluidized Bed Catalytic Cracking Unit Catalyst Regenerator	671179.4	4060857.6	307.0	175.0	147.0	46.3	8.5	8.240
FLARESP	South Plant Flare	671403.5	4060469.6	301.1	199.0	1832.0	65.3	3.0	1.020
FLARECC	Coker/Combo Alky Flare	670846.4	4061102.2	301.3	150.0	1832.0	65.6	2.5	10.630
FLAREEP	East Plant Flare	671223.6	4062045.4	295.9	245.0	1832.0	65.6	2.5	3.130
H7501	No. 6 HDT Heater	671131.2	4061390.9	300.9	106.0	632.0	33.7	3.4	0.050
H6005	No. 2 CTU Preflash Reboiler Heater	671170.1	4062225.4	301.0	149.0	657.0	18.0	8.3	0.260
H8601	No. 8 HDT Splitter Reboiler Heater	670725.9	4061857.9	302.4	130.0	582.0	16.2	8.5	0.350
H8602	No. 8 HDT Heater	670731.5	4061843.6	302.4	130.0	536.0	14.0	4.0	0.130
H8801/02	No. 1 Hydrogen Plant Reformer Heater	670790.7	4061925.8	304.1	129.0	411.0	64.0	3.8	0.020
FLARECF	Clean Fuels and West Plant Flare	670532.6	4061690.9	301.3	198.0	1832.0	65.3	3.5	0.845
B0008	Main Power Plant Steam Boiler	670867.1	4061766.3	304.6	162.0	336.0	12.6	8.0	1.430
H0016	No. 1 CVU Feed Heater	670832.4	4061582.5	302.5	157.0	818.0	37.1	5.8	0.430
H1001	No. 4 HDT Heater	671060.1	4061237.4	301.7	130.0	933.0	100.1	2.8	0.060
TEMPEQP	Temporary Equipment Operating Emissions (Misc.)	670516.7	4061137.8	305.3	3.0	368.0	342.2	0.2	0.850
B9/B10	Main Power Plant Steam Boiler	670863.5	4061859.5	304.9	89.0	305.0	31.8	11.8	1.850

Phillips 66 Ponca City Refinery Source Data

Source ID	Description	Easting	Northing	Elevation	Stk Ht.	Temp.	Velocity	Stk. Dia.	SO_2
		(m)	(m)	(m)	(ft)	(°F)	(fps)	(ft)	(lb/hr)
H9851	No. 2 Hydrogen Plant Reformer Heater	670740.7	4061922.5	303.3	129.0	431.0	58.4	6.5	0.530
H9901	No. 9 HDT Heater	670730.2	4062002.2	303.7	130.0	635.0	17.6	4.1	0.160
H9902	No. 9 HDT Stripper Reboiler Heater	670729.5	4061991.1	303.6	130.0	671.0	24.0	4.4	0.110
H5002	No. 5 FCC Feed Preheater	671251.9	4060907.0	307.3	167.0	543.0	9.6	6.5	0.205
B0021	Leased Boiler No. 1	670943.2	4061717.9	305.2	33.3	309.0	31.3	3.0	0.030
B0022	Leased Boiler No. 2	670943.6	4061696.8	305.1	33.3	309.0	31.3	3.0	0.030
H0060	Alky Depropanizer Heater	670819.0	4061310.3	301.9	146.0	507.0	20.0	7.5	0.150
H9301	BFU Heater	670867.9	4061907.3	305.0	199.0	691.0	36.6	8.6	0.480

3.3.2.5. Modeling Parameter: Emissions

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

The EPA concludes 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, for a facility that has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

A construction permit was issued on April 25, 2016, for Continental Carbon to complete the activities required by a consent decree, Case No. 5:15-cv-00290 F of the United States District Court for the Western District of Oklahoma. The construction permit authorizes the facility to remove the three thermal oxidizers, which control the four carbon black production units, and replace them with two clean gas and energy cogeneration units (CGEU) which include dry scrubbers for control of SO_2. Continental Carbon will reduce its potential to emit (PTE) to 708 tpy of SO_2 by April 2019. However, since the facility will still have potential and actual emissions of more than 2,000 tpy SO_2 after January 13, 2017, an air quality characterization using modeling was conducted for the area surrounding the facility using actual emissions.

The facilities in the State's modeling analysis and their annual actual SO_2 emissions between 2012 and 2014 are summarized below in Table 4 below. As previously noted, the State included Continental Carbon and four other emitters of SO_2 within 25 km of the area of analysis.

Table 4 – Actual SO_2 Emissions 2012 – 2014 from Facilities in the Kay County Area

Facility Name	SO_2 Emissions (tpy)		
	2012	2013	2014
Magellan Pipeline Company, LP, Ponca City Station	0.34	0.45	0.39
Phillips 66 Company – Ponca City Refinery	160	201	106
Jupiter Sulfur, LLC, Nitrogen Sulfur Fertilizer Facility	0.68	0.78	17.57
Oklahoma Gas & Electric, Sooner Generating Station	15,884	14,380	14,076
Continental Carbon	3,134	4,841	5,893
Total Emissions in the State's Area of Analysis	19,179	19,423	20,093

Actual emission data for input into AERMOD was generated for each modeled source. CEMS data was used to generate hourly emissions files for the OG&E Sooner Generating Station; the EPA verified that the modeled emissions for 2014 agreed with the annual 2014 inventory. Emissions and flow rates for the other sources included in the model were based on actual operational data that were concurrent with the meteorological dataset. There were two approaches taken in accounting for the operational data. For several larger SO_2 sources at the refinery, short-term production data were used to generate hourly emissions. For the rest of the sources, emissions were generated using the reported annual SO_2 emissions divided by the actual annual hours of operation to calculate modeled rates.

The EPA concludes that the 2012-2014 actual emissions used was an appropriate emissions inventory that represents modeling that simulates a monitor. It represents 3 years of recent actual emissions data and coincides well with the meteorological data.

3.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

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

For the area of analysis in Kay County, the State selected the 2012-2014 surface meteorology data from the Blackwell (BLAC) Oklahoma Mesonet surface station used in conjunction with ISHD cloud cover data from the Ponca City Municipal Airport (KPNC).

The Oklahoma Mesonet is a special network of meteorological monitoring stations. Oklahoma Mesonet data is provided courtesy of the Oklahoma Mesonet, a cooperative venture between

Oklahoma State University (OSU) and the University of Oklahoma (OU). The 5-minute observations from the Oklahoma Mesonet were processed into an AERMET acceptable format. Meteorological data from Oklahoma Mesonet sites surrounding Continental Carbon were utilized to evaluate the wind flow patterns in the area. The BLAC Oklahoma Mesonet station (located approximately 19.4 km WNW from Continental Carbon) was determined to be the most representative Oklahoma Mesonet station for the domain.

The ISH data files were downloaded from the NCDC ISHD web site: ftp://ftp.ncdc.noaa.gov/pub/data/noaa. The ISH data was reviewed for completeness by evaluating the number of hours that were recorded and the number of cloud cover values that were recorded. The primary ISH station (KPNC), located approximately 7.5 km NNW from Continental Carbon, was determined to be the most representative site for the domain. Records with missing cloud cover data were substituted with cloud cover data from other records during the same hour. The Blackwell Tonkawa Municipal Airport (KBKN) southeast of Blackwell, Oklahoma, was designated as the secondary ISH station and is located approximately 26.4 km NW from Continental Carbon. The secondary ISH station was used for additional data substitution. Records from KBKN were used to replace hours of KPNC data that were completely missing and to replace missing cloud cover data. From a spatial standpoint, the meteorological data should not be affected by large distance or complex terrain within the area of analysis due to the close proximity of the weather stations and the simple, flat topography.

The State used AERSURFACE version 13016 using land cover data from the 1992 National Land Cover Dataset (NLCD), representative of the BLAC Oklahoma Mesonet site 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 1 spatial sector out to 1 km at a monthly temporal resolution for the observed moisture conditions (wet, dry, or average) relative to the 20-year average.

The monthly rainfall for the Oklahoma Mesonet site was analyzed from the beginning of the establishment of the Oklahoma Mesonet program (approximately 20 years). The surface moisture conditions (Average, Wet, Dry) for each month were then determined using the monthly rainfall amounts compared to the average rainfall. These determinations were based on the guidance contained in the AERSURFACE User’s Guide. The Bowen Ratio was then assigned as either average, dry, or wet based on the monthly surface moisture conditions for the BLAC Oklahoma Mesonet station.

In Figure 6 above, included in the State’s recommendation, the location of these weather stations are shown relative to the area of analysis.

Table 5 below shows a summary of the surface characteristics associated with each NWS station and, for comparison purposes, the Continental Carbon site.

Table 5 – Surface Characteristics for Area of Analysis

Facility Domain Surface Characteristics

CCC	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.18	0.78	0.44	1.79	0.020
Spring	0.16	0.40	0.27	1.05	0.034
Summer	0.18	0.56	0.34	1.41	0.066
Fall	0.18	0.78	0.44	1.79	0.066

Modeling Domain Surface Characteristics

BLAC	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.18	0.74	0.42	1.94	0.017
Spring	0.15	0.32	0.22	1.00	0.035
Summer	0.19	0.54	0.32	1.54	0.145
Fall	0.19	0.74	0.42	1.94	0.145

Modeling Domain Surface Characteristics

KPNC	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.18	0.84	0.48	2.10	0.017
Spring	0.16	0.42	0.29	1.19	0.033
Summer	0.19	0.64	0.38	1.72	0.074
Fall	0.19	0.84	0.48	2.10	0.069

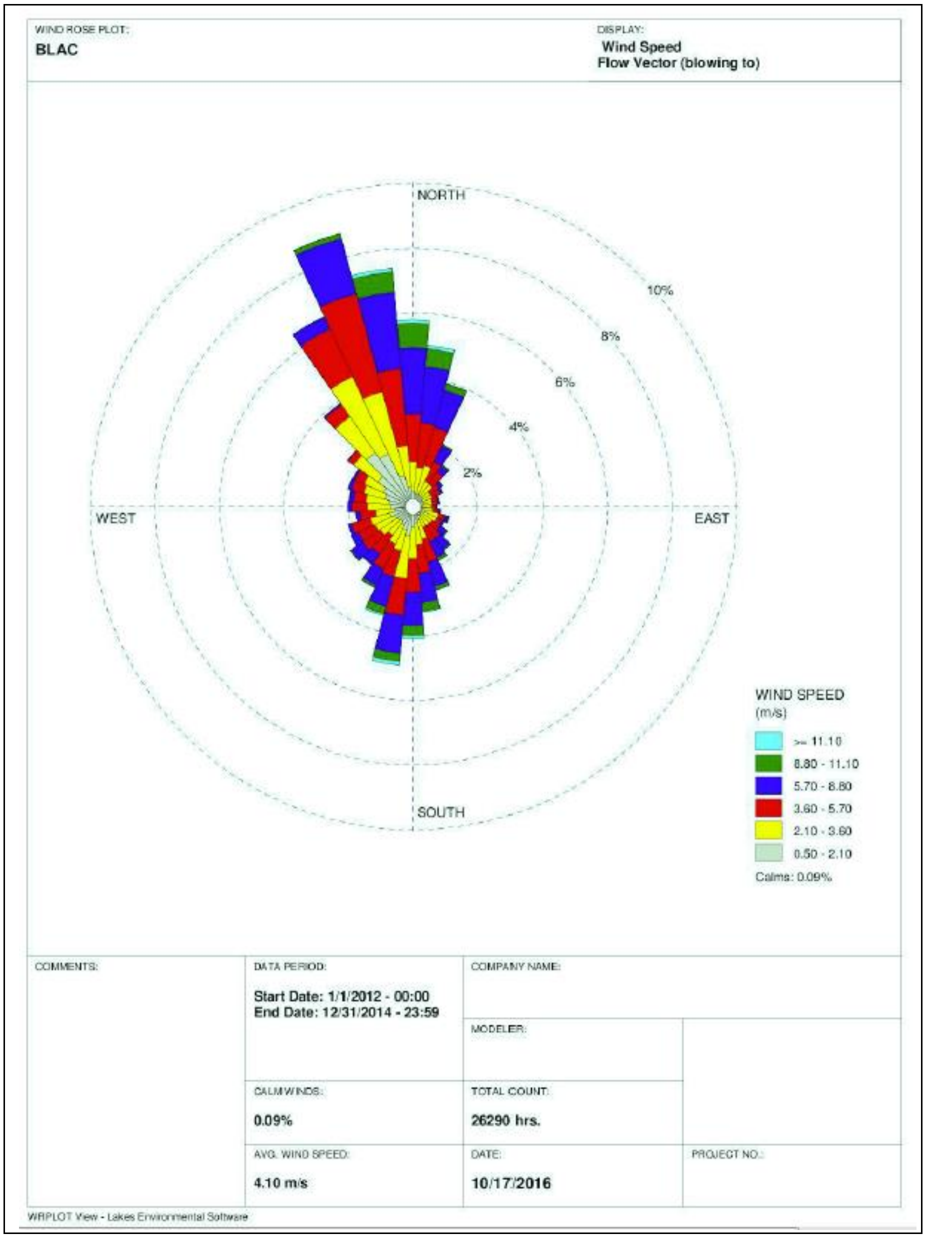
Modeling Domain Moisture Conditions[1]

Year	2012	2013	2014
January	A	W	D
February	W	W	D
March	W	D	A
April	W	A	D
May	D	W	W
June	D	A	W
July	D	W	W
August	D	A	A
September	D	A	A
October	D	A	A
November	A	A	A
December	D	A	A

[1] - Moisture conditions based on rainfall data from the BLAC Oklahoma Mesonet station unless otherwise noted.
A - Average (precipitation in the middle 40th percentile);
D - Dry (precipitation in the lower 30th percentile);
W - Wet (precipitation in the upper 30th percentile).

As part of its recommendation, the State provided the 3-year surface wind rose for the meteorological data used in the modeling. In Figure 8, the frequency, magnitude, speed and direction of the wind are defined in terms of where the wind is blowing from. The station indicates a 4.1 m/s average wind speed that blows predominantly from the northwest.

Figure 8. Kay County Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above 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 User's Guide for the AERMOD Meteorological Data Preprocessor (AERMET) 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 KPNC 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.

Upper air data from the Max Westheimer Airport (OUN) in Norman, Oklahoma (located at approximately 162 km S 12.9°W from the center of the domain) was determined to be the most representative upper air site for the domain. The upper air data from the Dallas-Fort Worth Airport (DFW) in Fort-Worth, Texas was used to substitute missing soundings. The EPA agrees that this station is generally representative of the upper air in Ponca City area as the terrain in both areas and between the areas is similar.

The EPA concludes that the State used appropriate surface characteristics and meteorology in the modeling analysis for Continental Carbon. The selection of the data was appropriate from both a climatological and spatial standpoint. First off, the period of time that the meteorological data was collected coincided well with the 2012-2014 emission data. The proximity of the meteorological monitoring sites to the area of analysis was acceptable, as these sites were both within 30 km located north (KPNC) and northwest (BLAC) of the area of analysis. These locations agree well with the 4.1 m/s average wind speed that blows predominantly from the northwest. The surface characteristics (albedo, surface roughness, Bowen ratio, and moisture conditions) were calculated appropriately using the recommended method in the TAD with the current version of AERSURFACE and the 1992 National Land Cover Data.

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

The terrain in the area of analysis is best described as flat. The terrain surrounding Continental Carbon was reviewed and was determined to have no hills with an elevation at or above the stack height. The AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors.

Terrain data obtained from the United States Geological Survey (USGS) Seamless Data Server at http://viewer.nationalmap.gov/viewer/ was used to determine the receptor base elevation and hill height elevation. The 1/3 arc-second National Elevation Data (NED) was obtained in the GeoTIFF format for use with AERMAP. Interpolation of receptor and source heights from the 1/3 arc-second NED elevation data is based on the current AERMAP guidance in Section 4.4 of the *User's Guide for the AERMOD Terrain Processor (AERMAP)* (EPA-454/B-03-0003, 10/2004). AERMAP uses a distance weighted bilinear interpolation method. This domain falls entirely in UTM Zone 14. All coordinates were based on the North American Datum (NAD) of 1927 (NAD27). The terrain data used in the modeling were appropriate to the modeling analysis.

3.3.2.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99^{th} percentile monitored concentrations by hour of day and season or month. For this area of analysis, the State used a uniform monitored background concentration based on the monitored design values for the 3-year average of the 99th percentile 1-hour daily maximum.

The single value of the background concentration for this area of analysis was determined by the State to be 9.6 micrograms per cubic meter ($\mu g/m^3$), equivalent to 3.67 ppb when expressed in two significant figures,[6] and that value was incorporated into the final AERMOD results. The State chose to use the only SO_2 monitor it currently has that is not impacted by a nearby major point source with SO_2 emissions, the Oklahoma City monitor. This monitor is in the largest urban area in Oklahoma and given the background sources included in this modeling the Oklahoma City monitor is considered a conservative background value (i.e., it likely over estimates the true value) for this analysis. As previously noted, the air quality monitoring located in Kay County is impacted by both the refinery and by Continental Carbon, and its data are not suitable for use as the background concentration.

The EPA concludes that this tier 1 approach is appropriate and in accordance with the Modeling TAD. Even with the conservative estimate factored into the total emissions, the predicted SO_2 concentrations are still below the standard. Therefore, the Oklahoma City monitor is an adequate monitor to use in the modeling to represent the background for purposes of modeling attainment of the 2010 1-hour SO_2 NAAQS.

3.3.2.9. Summary of Modeling Inputs and Results

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

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

Table 6 – Summary of AERMOD Modeling Input Parameters for the Kay County Area

Input Parameter	Value
AERMOD Version	15181 (regulatory options)
Dispersion Characteristics	Rural
Modeled Sources	5
Modeled Stacks	47
Modeled Structures	-
Modeled Fence lines	Yes (*see* Figure 7)
Total receptors	1,911
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Blackwell (BLAC) Oklahoma Mesonet surface station was used in conjunction with ISHD surface data from the Ponca City Municipal Airport (KPNC) in Kay County, Oklahoma, and ESRL UA data from the Max Westheimer Airport (OUN) in Cleveland County, Oklahoma
NWS Station Upper Air Meteorology	Max Westheimer Airport (OUN) in Norman, Oklahoma (located at approximately 162 km S 12.9°W from the center of the domain)
NWS Station for Calculating Surface Characteristics	Seasonal surface characteristics are provided for the CCC Ponca City Plant, BLAC, and KPNC. Moisture conditions are based on BLAC station.
Methodology for Calculating Background SO_2 Concentration	3-year average of 99th Percentile 1-hour daily maximum
Calculated Background SO_2 Concentration	Oklahoma County, AQS ID: 40-109-1037 9.6 $\mu g/m^3$

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

Table 7 – Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Kay County

Averaging Period	Data Period	Receptor Location UTM Zone 14		Maximum 99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM (E)	UTM (N)	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012-2014	4059700.00	672400.00	170.6	196.4*

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

The State's modeling analysis provided an estimate of the 3-year average of the highest fourth highest (H4H) daily maximum impact which is also referred to as the 3-year average of the 99th percentile daily maximum impact in the modeling domain which is 170.6 µg/m^3, equivalent to 65.14 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facilities. Figure 9 below was generated by the EPA as part of our review of the State's modeling analysis, and indicates that the predicted value occurred to the north of the facility and another high value to the west of the facility. The red crosses are modeled sources. The State's receptor grid is also shown in the figure. The software does contours based on the data available and fills in the area without receptors. Since there are no modeled values, this can lead to misleading contours within the area without receptors and the contours in the area without receptors should be ignored.

Figure 9. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Kay County Area of Analysis (not including background). (The second figure is a partial zoom-in of the area around the facility to see the hot spots in the fine grid.)

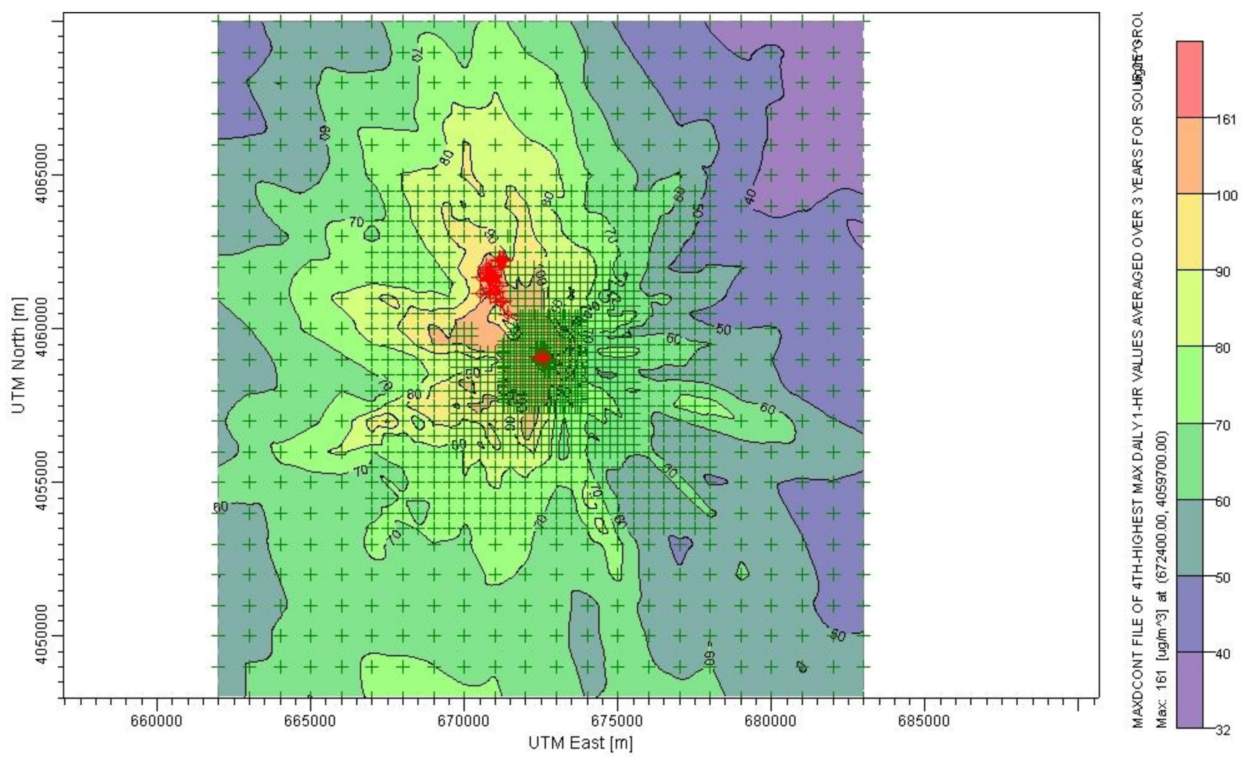
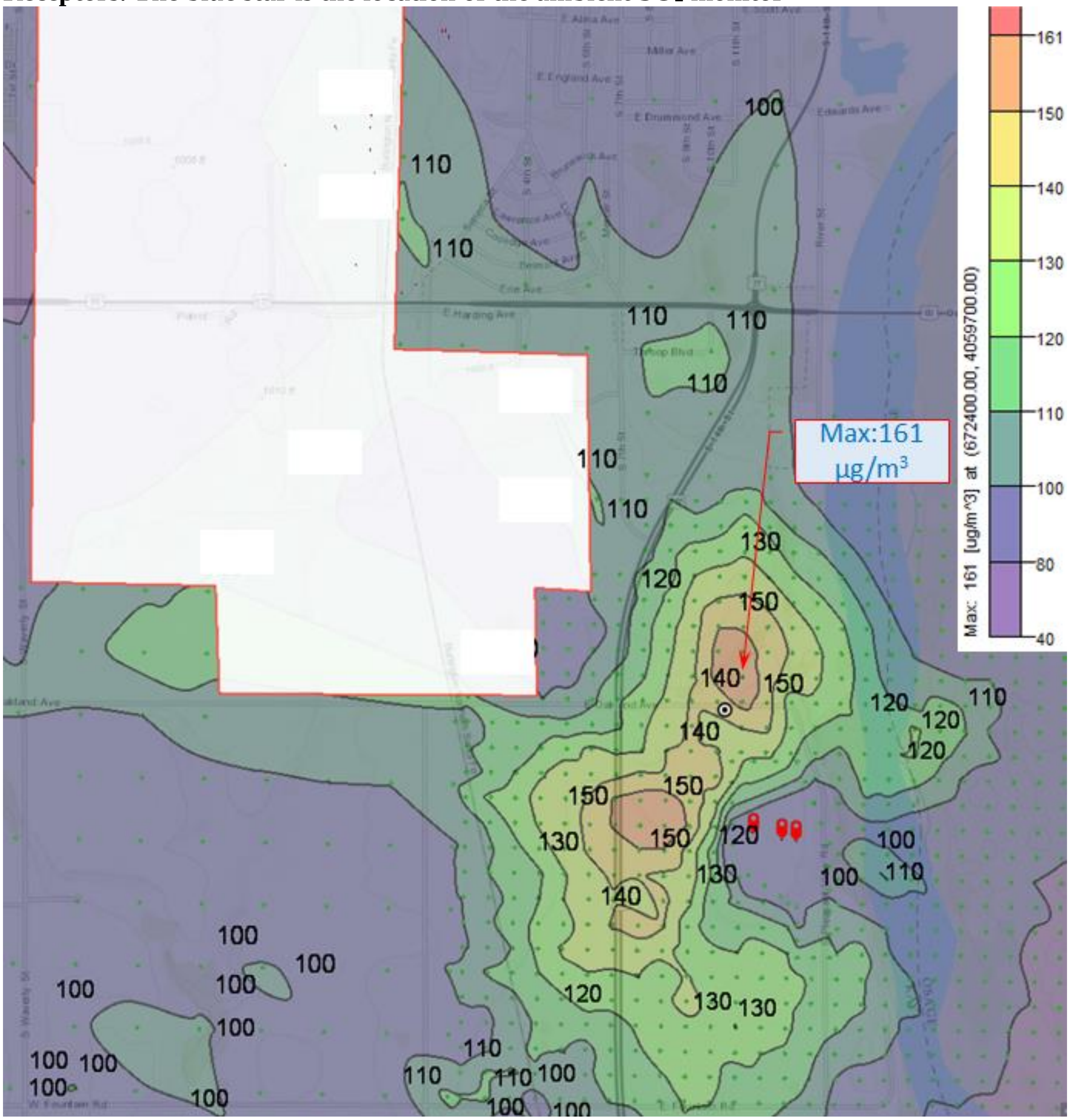


Figure 10 is a more zoomed-in plot of the modeled contours with the area of excluded receptors denoted by a white polygon with red borders, the receptors by green dots, and the Continental Carbon sources denoted by red symbols. The contour levels were chosen to emphasize the gradient in the highest modeled design values. It is apparent that the highest concentrations in the area of analysis are located nearer to the facility than the excluded other facilities' property area. With all sources modeled, the maximum value along the fenceline of the excluded area is 113 $\mu g/m^3$ and with background included would be less than 63% of the standard. The excluded area includes 42 relatively small stacks that were modeled that would not be expected to have a large impact on other property receptors when the winds would carry Continental Carbon emissions and other facilities' emissions (i.e., Magellan – 0.39 tpy, Jupiter – 17.57 tpy) onto the Phillips property. There is no complex terrain near Continental Carbon to influence the pattern of contours, e.g., decreasing with distance after the modeled maximum. Therefore, based on the details of the situation, the EPA believes that the inclusion of receptors in the excluded area would not have changed the maximum design value.

Figure 10. Zoomed-in View of the Modeled 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Kay County Area of Analysis (not including background) Showing the Relationship of the Modeled Contours to the Area of Excluded Receptors. The blue star is the location of the ambient SO_2 monitor



To summarize, the modeling submitted by the State indicates that the 1-hour SO_2 NAAQS is not violated at the receptor with the highest modeled concentration.

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

When evaluating the modeling that came in from the State, no major issues with the State modeling were identified. A potential issue with receptors was investigated and found to have no impact on the modeling including the maximum design value in Kay County. The modeling shows attainment, and the modeling follows the TAD and EPA guidance. There is only one nearby (within 350km) area that was designated in Rounds 1 or 2: Noble County to the south was designated unclassifiable/attainment. The modeling for Noble County included the Kay County sources, and they were shown in this previous modeling to not contribute to a NAAQS violation (no NAAQS violations were modeled in Noble County). The nearest new monitor installed to meet DRR requirements is located 71 km away at Oxbow Calcining in Kremlin, Oklahoma. There are no other nearby counties with large SO_2 sources that could have impacts near the NAAQS Therefore, there is no information to suggest that sources in Kay County contribute to a violation in any nearby area. We came to the decision of choosing the entire area within Kay County as the boundary area for this designation since the modeling domain covers the area within the county with the highest concentrations, other surrounding counties do not have large sources that could impact the county, Sooner Station in Noble County to the south was included in this modeling, and previous modeling of the Sooner Station and Kay County sources for the Noble County designation did not show areas near or above the standard near the Kay County/Noble County line.

3.4. Interplay of Previous Air Quality Modeling Analysis of Area around Sooner Generating Station in Noble County

3.4.1. Introduction

Sooner Generating Station is included in the modeling domain for Continental Carbon because it is located approximately 23 km south of Continental Carbon and emitted 14,077 tons SO_2 in 2014. Sooner Generating Station is on the SO_2 DRR Source list and was earlier designated in Round 2 of the SO_2 designations as unclassifiable/attainment based on modeling. In 2012, the Sooner Generating Station emitted 15,884 tons of SO_2, and had an emissions rate of 0.50 lbs SO_2/MMBtu. The EPA designated the area surrounding the facility in July 2016. For further information on that action, please refer to 81 FR 45039 (published July 12, 2016) and to Docket ID No. EPA–HQ–OAR–2014–0464 for the second round of SO_2 designation technical support documents. The boundaries for the Round 2 unclassifiable/attainment area consisted of the entirety of Noble County, which is adjacent south of Kay County. Because we have available results of air quality modeling in which Continental Carbon and Sooner Station are modeled together, the area around the Sooner Station is being addressed in this section with consideration given to its impacts on Continental Carbon's designation status.

3.4.2. Previous Modeling Analysis Provided by the State in Round 2

Previous modeling of Noble County which also included Kay County sources did not have any modeled violations in Kay County or Noble County; therefore, Continental Carbon is not contributing to a NAAQS violation in Noble County. The more recent modeling for Continental Carbon does not have any modeled violations in Kay County or Noble County. The modeling in both cases shows attainment, and followed EPA guidance including the Modeling TAD with the exception of receptor placements on facilities other than Continental Carbon as discussed above.

3.5. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for Kay County, Oklahoma

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

3.6. Jurisdictional Boundaries in Kay County, Oklahoma

Once the geographic area of analysis associated with Continental Carbon, other nearby sources, and background concentration were determined, the existing jurisdictional boundaries were considered for the purpose of informing the EPA's intended designation action for Kay County, Oklahoma. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable. The counties in Oklahoma are administrative units that are not subdivided into townships or other independent entities.

As shown in Figure 3 above, to the east of Kay County is Osage County which is also a sovereign tribal reservation for Osage Nation. In addition to the Osage Tribal Area in Osage County there is also a small piece of Cherokee Tribal Area (Chiloco) in North Central Kay County just west of U.S. 77 and just south of the northern border of Kay County. Kay County's northern border acts as the border between Oklahoma and Kansas. There are no other sources nearby in the State of Kansas nor in Osage County that contribute to the area of analysis in Kay County. As mentioned previously, Kay County's southern border is shared with Noble County, which was previously designated in its entirety in Round 2 of the SO_2 designations as an unclassifiable/attainment area.

The EPA concludes that our intended unclassifiable/attainment area, consisting of the entirety of Kay County, Oklahoma, will have clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable/attainment area for the 2010 1-hour SO_2 NAAQS.

3.7. The EPA's Assessment of the Available Information for Kay County, Oklahoma

With the exception of Continental Carbon, whose emissions have been modeled to show compliance with the standard, there are no other sources within Kay County that emit at or above 250 tpy, based on 2014 NEI (Phillips is the only source over 100 tpy). One facility located in Noble County, Sooner Generating Station (approximately 23 km south of Continental Carbon in Noble County), has reported emissions of 14,076 tpy, based on data from the 2014 NEI. Historic and current monitored data in the general area of the Kay County facilities, i.e., within 5 km, do not indicate violations of the NAAQS. Specifically, Air Quality Systems ID 40-071-0604 recorded a design value of 38 ppb (2012 – 2014). However, based on the dispersion modeling in this analysis the monitor is not located in the position of maximum air quality impacts, so we are not relying on monitoring data for intended designation.

When evaluating the modeling submitted by the State, no unresolved major issues were identified. We did identify a concern with exclusion of receptors on some facilities but our further analysis supports that this exclusion should not impact this designation. The modeling showed attainment in Kay County, and the modeling followed EPA guidance (other than the excluded receptor issue), including the TAD. The combination of this modeling and previous modeling conducted in connection with the designation of Noble County to the south of Kay County provide sufficient information to determine that none of the sources in Kay County result in modeled violations in surrounding counties. In its 2011 designations recommendations, the State recommended the use of counties as the basis for designations. The State has not subsequently recommended any specific borders for a designated area around Continental Carbon. We intend to designate the entire area within Kay County as a separate unclassifiable/attainment area. Additionally, the EPA confirmed that there were no other sources in Kay County or near its borders that were likely to cause or contribute to a violation of the NAAQS within Kay County.

3.8. Summary of Our Intended Designation for the Kay County, Oklahoma, Area

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA agrees with the state's recommendation and intends to designate the area around Continental Carbon as unclassifiable/attainment for the 2010 SO_2 NAAQS because, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. The remainder of Kay County was not required to be characterized under 40 CFR 51.1203(c) or (d) and EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS. Specifically, the intended designated area is comprised of the entirety of Kay County, Oklahoma. Figure 1 shows the boundary of this intended designated area. Included in this designation is a small piece of Cherokee Tribal Area in North Central Kay County just west of U.S. 77 and just south of the northern border of Kay County that is included in this designation of unclassifiable/attainment.

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

4. Technical Analysis for Rogers County, Oklahoma

4.1. Introduction

The EPA must designate Rogers County, Oklahoma, by December 31, 2017, because no portion of the county has been previously designated and Oklahoma has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Rogers County. The county includes a DRR source (AEP/PSO Northeastern Power Station). The State recommended that Rogers County be designated attainment.

4.2. Air Quality Monitoring Data for Rogers County, Oklahoma

The State included SO_2 air quality monitoring data relevant to Rogers County, Oklahoma, from the following monitor:

- Air Quality System monitor #40-143-1127 is located in Tulsa County (36.2049 Latitude, -95.9765 Longitude). This North Tulsa County monitor is located 35 km southwest of the area of analysis. The North Tulsa County monitor was used to represent background impacts for this air quality characterization since it represents the design concentration of the closest monitoring site to the area of analysis. The 2014-2016 design value was 6 ppb, but the monitor is not in a location where the Northeastern Power Station would be expected to have its maximum impact.

The EPA confirmed that there is no additional relevant data in AQS that could inform the intended designation action. Please reference the relevant data file posted at https://www.epa.gov/air-trends/air-quality-design-values.

4.3. Air Quality Modeling Analysis for Rogers County Addressing AEP/PSO Northeastern Power Station.

4.3.1. Introduction

This section presents all the available air quality modeling information for the portion of Rogers County that includes the AEP/PSO Northeastern Power Station. The modeling domain was centered over the facility since it is the largest source of SO_2 emissions located in the area. The AEP/PSO Northeastern Power Station is the only source in the area around which the state is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy. It emitted 2,000 tons SO_2 or more annually. Specifically, the AEP/PSO Northeastern Power Station emitted 16,963 tons of SO_2 in 2014. This source meets the DRR criteria and therefore is on the SO_2 DRR Source list. Oklahoma has chosen to characterize this facility via modeling.

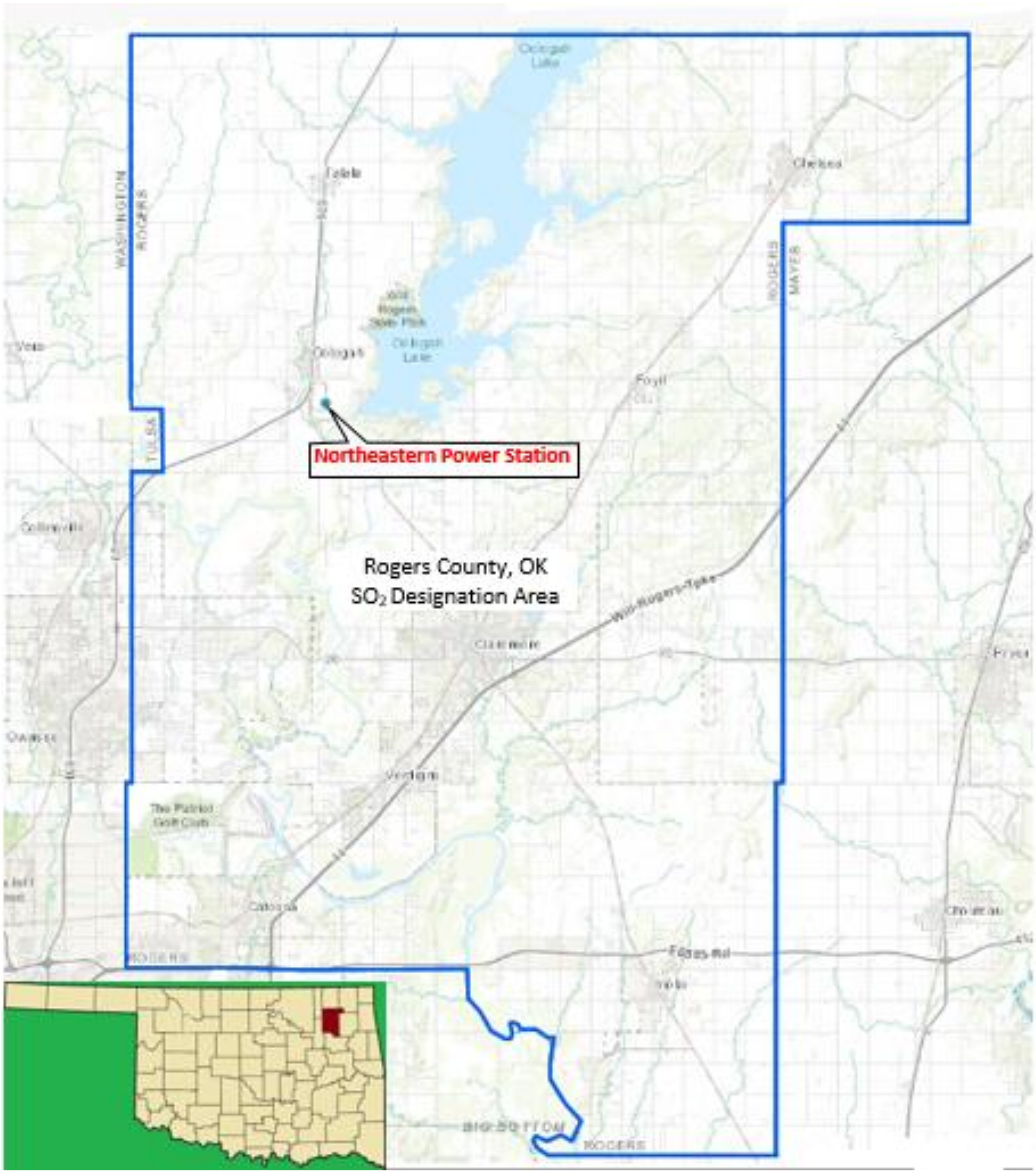
Oklahoma provided two assessments of air quality impacts in the area surrounding the AEP/PSO Northeastern Power Station where the 2010 SO_2 NAAQS may be violated. These two modeling characterizations were performed using AERMOD air dispersion modeling software using two sets of emissions: (1) a hybrid of the actual historical emissions for AEP/PSO Northeastern Power Station Unit 1 and the current PTE emission limit for AEP/PSO Northeastern Power Station Unit 2 from the current Part 70 operating permit (Permit No. 2012-918-TVR2 (M-1)) and (2) current PTE emission limits for all units at the facility from the current Part 70 operating permit. As discussed below, this section summarizes both of these characterizations, but we are relying only on the modeling characterization based on PTE emission limit for all units. The PTE emission limits are federally enforceable as of April 16, 2016.

After careful review of the State's assessment, supporting documentation, and all available data, the EPA intends to designate the area as a separate unclassifiable/attainment area. In its 2011 designations recommendations, the State recommended the use of counties as the basis for designations. The State has not subsequently recommended any specific borders for a designated area around the AEP/PSO Northeastern Power Station. The EPA believes that our intended unclassifiable/attainment area, consisting of the entirety of Rogers County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area consistent with the State's recommendations. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

The State assessed an area with a 20 km by 20 km receptor grid centered on the AEP/PSO Northeastern Power Station with air quality modeling.

The AEP/PSO Northeastern Power Station is located in northeastern Oklahoma in the central portion of Rogers County. The facility is located approximately 1 mile southeast of the Highways 169/88 junction in Oologah, Oklahoma. The EPA's intended unclassifiable/attainment designation county boundary for the area around the AEP/PSO Northeastern Power Station can be seen in Figure 11 below. There are no additional SO_2 emitters above 100 tpy actual emissions (based on 2014 NEI) in the vicinity of the named source.

Figure 11. Map of Rogers County and the EPA's Intended Designation Boundary, Addressing AEP/PSO Northeastern Power Station



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

For this area, the EPA received and considered two modeling assessments from the State. The assessments were identical in method except for the hourly emission inputs. There have been no assessments submitted by other parties. The State's assessments were received on January 11, 2017, and provide assessments utilizing AERMOD.

4.3.2. Modeling Analysis Provided by the State

4.3.2.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model (State used Version 15181)
- AERMAP: the terrain processor for AERMOD (State used Version 11103)
- AERMET: the meteorological data processor for AERMOD (State used Version 15181)
- BPIPPRM: the building input processor (State used Version 04724)
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data (State did not use)
- AERSURFACE: the surface characteristics processor for AERMET (State used Version 13016)
- AERSCREEN: a screening version of AERMOD (State did not use)

The State used AERMOD version 15181 with regulatory options and acceptable associated components. On January 17, 2017, the EPA published its revision to Appendix W – Guideline to Air Quality Models. Since the publication of Appendix W, AERMOD version 16216r has become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted here.

A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate. The EPA finds the AERMOD version and its components to be acceptable for this analysis since the regulatory default options were used with this older version of AERMOD and we would not expect significantly different values if the newer version of the model was utilized.

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. The determination for this domain was based primarily on land-use (the preferred method). An aerial photo showing land use/cover was provided and can be seen in Figure 12 below.

Figure 12. Aerial Map with 3 km Radius Around AEP/PSO Northeastern Power Station

The EPA concludes that using a rural determination by the State was appropriate. When using the land-use method, to be considered urban, 50% or more of the area within the 3 km radius circle should be considered residential or industrial. Since the aerial photo shows that majority of the land-use within 3 km of the plant does not consist of residential or industrial, classifying the AEP/PSO Northeastern Power Station as a rural source is appropriate.

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

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Rogers County area, the State confirmed that there were no other emitters of SO_2 greater than 0.5 tpy within 20 km of the AEP/PSO Northeastern Power Station in any direction. The State determined that this was the appropriate distance to adequately characterize air quality through modeling. This includes the potential extent of any SO_2 NAAQS violations in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis. The state used a 20 km by 20 km receptor grid centered on the facility.

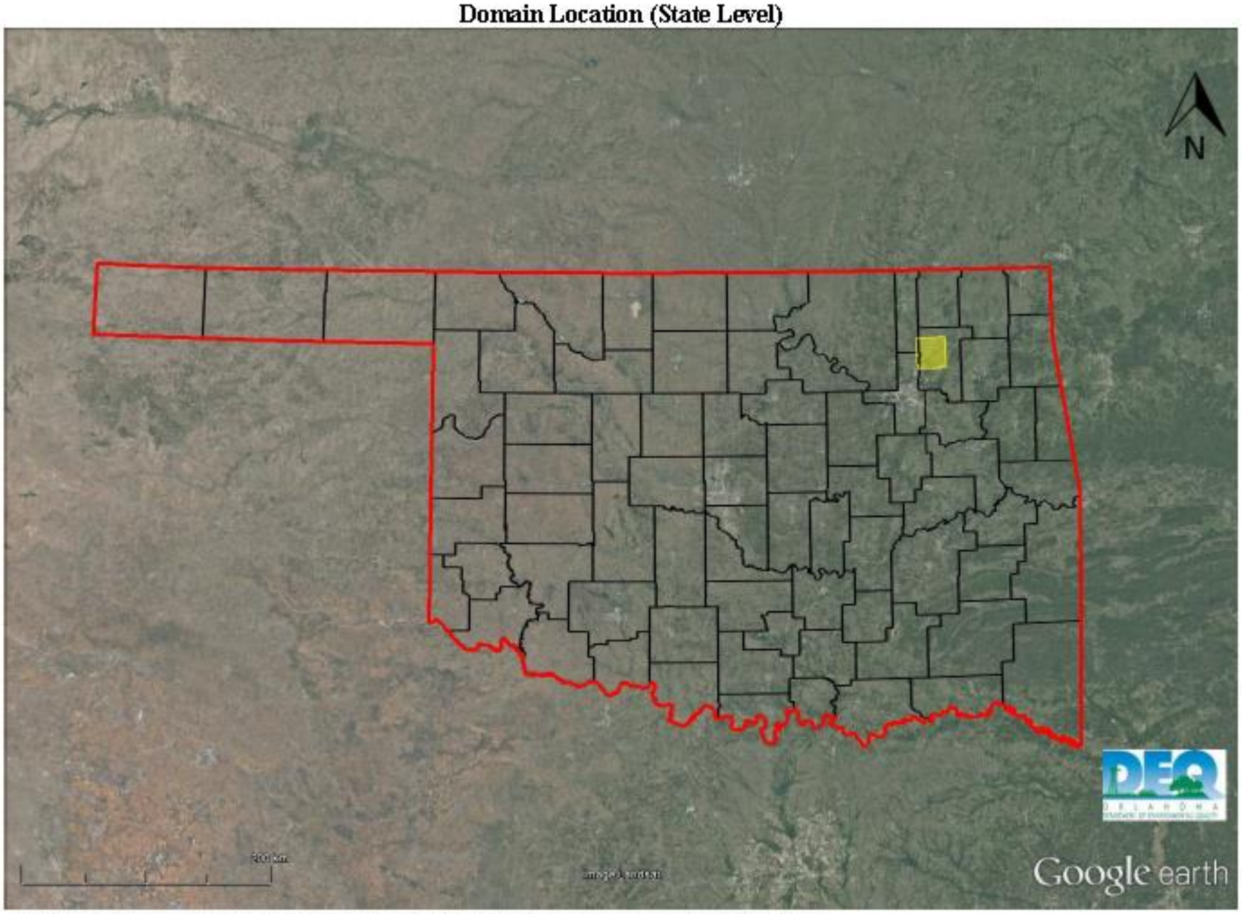
A Cartesian receptor grid spacing for the area of analysis was generated by the State as follows:

- Receptors spaced at 100 m along the fence line of the affected source;
- Receptors spaced at 100 m from the fence line out to 1 km;
- Receptors spaced at 250 m from 1 km out to 2.5 km;
- Receptors spaced at 500 m from 2.5 km to 5 km; and
- Receptors spaced at 1 km from 5 km out to 10 km (the edge of the domain).

Figures 13, 14, and 15 included in the State's submission, show the State's chosen area of analysis surrounding the AEP/PSO Northeastern Power Station, as well as the receptor grid for the area of analysis. Since the maximum impact is generally expected to occur approximately 0-2 km from the stack, a domain extending out 10 km from the facility fence line is expected to be of sufficient size to determine the ambient air impacts. As discussed below, since the maximum impact from Northeastern would typically be expected to occur within 2 km from the source stack (based on the rule of thumb for flat terrain: 10 times the stack height, which is 183 m), a domain extending out 10 km from the facility fence line is expected to be of sufficient size to determine the ambient air impacts including overlapping impacts from other nearby sources. The contour plots confirm this behavior for the impacts of Northeastern, the maximum impact occurs approximately 2 km from the source and the concentrations rapidly decrease in all directions.

Figure 13. Domain Location (State Level) for AEP/PSO Northeastern Power Station

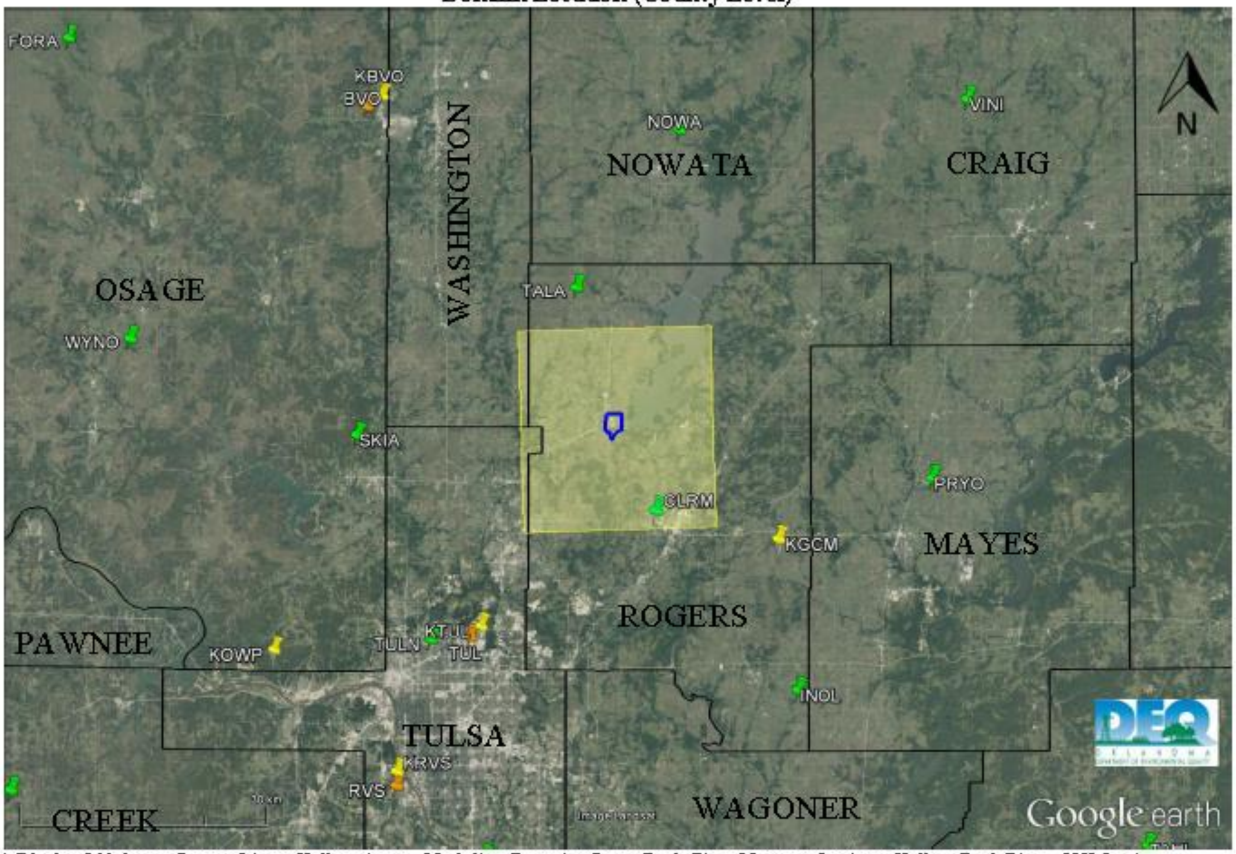
Domain Location (State Level)



* Boundaries: Red – State of Oklahoma; Black - Oklahoma Counties; Yellow – Modeling Domain.

Figure 14. Domain Location (County Level) for AEP/PSO Northeastern Power Station with Weather Stations

Domain Location (County Level)

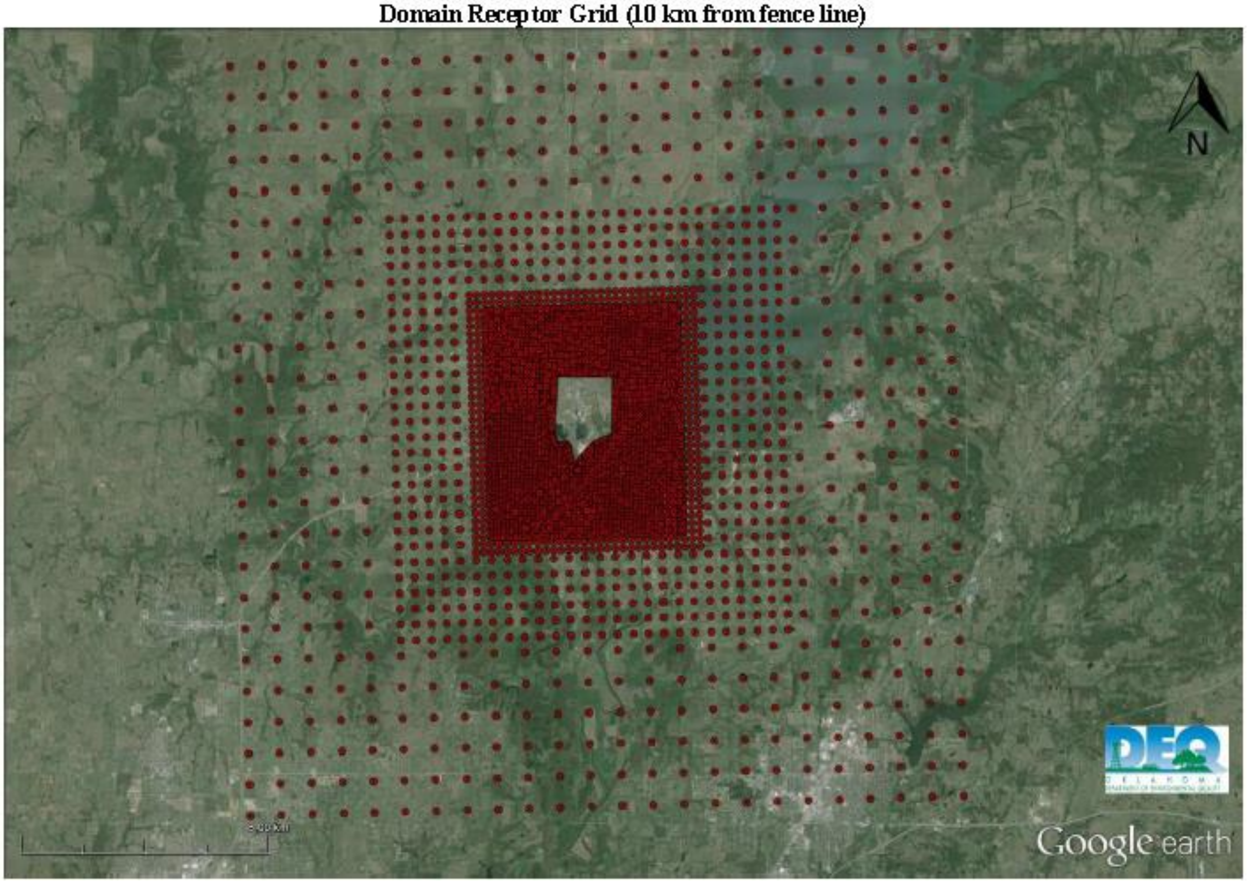


* Black - Oklahoma County Lines; Yellow Area – Modeling Domain; Green Push-Pin – Mesonet Stations; Yellow Push Pins – ISH Stations; Orange Push-Pin – ASOS stations.

** Blue property boundary identifies the PSO Northeastern Power Station.

Figure 15. Domain Receptor Grid (10 km from Fence Line) for AEP/PSO Northeastern Power Station

Domain Receptor Grid (10 km from fence line)



Consistent with the Modeling TAD, the State placed receptors in locations that would be considered ambient air. The State did not screen out receptors based on feasibility of placement for an ambient air monitor. The State excluded receptors within the fence line of AEP/PSO Northeastern Power Station and placed receptors along the fence line of the facility. We conferred with the state and concluded that the facility is appropriately fenced and access by the public is restricted. The State opted to apply a regular grid of receptors without excluding any other receptor locations.

The EPA concludes that the receptor network properly covers the modeling domain and is of sufficient size for the purpose of modeling an SO_2 designation for AEP/PSO Northeastern Power Station. The receptor placement is of sufficient density to provide the resolution needed to detect gradients in the concentrations and maximum impacts. Specifically, the receptors placements were stratified with the tightest receptor placement close to the source to detect local gradients and further out they were spaced further apart as the gradients were not as significant.

4.3.2.4. Modeling Parameter: Source Characterization

The terrain surrounding the AEP/PSO Northeastern Power Station was reviewed by the State and was determined to have no hills with an elevation at or above the stack height. The facility is located in an area of relatively flat terrain. Based on EPA guidance (the Modeling TAD and

Appendix W), the general guideline for determining the distance between an affected source and where the maximum ground level concentration will occur is generally ten times the stack height in flat terrain. The maximum impact is expected to occur approximately 1-2 km from the tallest stack which is 183 m high. A domain extending out 10 km from the facility fence line is expected to be of sufficient size to determine the ambient air impacts from the facility and, as is detailed below, other sources are not expected to contribute to the impacts. Thus the proposed extent of the modeling domain is adequate.

In determining which nearby sources should be included in the modeling domain, all sources within 20 km of the applicable source were evaluated. All natural gas fired sources that were not part of the AEP/PSO Northeastern Power Station were excluded from the 2010 1-hour SO2 NAAQS air quality characterization because of the following:

- Their emissions are so small that they do not cause a concentration gradient so their contributions can be represented through representative background concentrations;
- They are not expected to cause or contribute to a NAAQS violation; and

There were no other facilities that were omitted in the modeling analysis for AEP/PSO Northeastern Power Station that had 2014 emissions greater than 0.5 tpy. The other sources with very small emissions would not cause a concentration gradient within the domain and so can be represented through the background concentration.

For the 2010 1-hour SO_2 NAAQS air quality characterization, modeling of sources with intermittent emissions, such as emergency generators and limited intermittent startup/shutdown emissions were not included based on the recommendations in the March 1, 2011, memorandum "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standards." Consistent with this guidance, sources that operated less than 100 hours per year were excluded. Two diesel-fired generator engines located at the AEP/PSO Northeastern Power Station were excluded from the air quality characterization on this basis. Not including these sources is acceptable to the EPA per the Modeling TAD, as the state determined that they would operate less than 100 hours per year and their emissions are small enough and infrequent enough that they do not need to be included.

Good Engineering Practice (GEP) stack height is the stack height necessary to insure that emissions from the stack do not result in excessive concentrations of an air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, and wakes which may be created by the source itself, nearby structures, or nearby terrain obstacles. Since the height of the stack serving Unit 3 at AEP/PSO Northeastern Power Station (183 m) exceeds 65 m, a GEP stack determination was conducted. The Boiler House height is 73 m. Since Unit 3 was constructed prior to January 12, 1979, the calculated GEP Stack height is 2.5 times the height of the nearby structure. Using this formula, the actual stack height is equal to the GEP stack height. Thus, the same stack height was appropriate for use in the assessment based on current PTE emission limits on which we are relying for purposes of our intended designation.

The modeling included building downwash and was implemented using BPIPPRM. The AEP/PSO Northeastern Power Station submitted information to the State regarding buildings located on its property and those parameters were used as inputs into BPIPPRM to calculate building downwash parameters for input into AERMOD.

The parameters in Table 8 were used for all sources at the facility.

Table 8 – Modeled Stack Parameters in Area of Analysis

Source ID	Description	Easting	Northing	Stk Ht.	Temp.	Velocity	Stk. Dia.	SO_2 Emiss.
		(m)	(m)	(ft)	(°F)	(fps)	(ft)	(lb/hr)
STKPTE	Modeled Unit 3 parameters for NAAQS3 ("PTE") run PTE modeled parameters	257,998.2	4,034,616.3	600	296	53.68	27.00	1910
STACK1A	Turbine 1A	257,857.7	4,035,159.9	150	200	83.56	18.83	1.18
STACK1B	Turbine 1B	257,857.8	4,035,127.8	150	200	83.56	18.83	1.18
STACK2	Gas Fired Boiler	257,862.3	4,035,280.8	183	249	97.21	18.00	2.80
AUX1/2	Gas Fired Boiler	257,848.1	4,035,149.5	169	555	103.02	4.50	0.13
AUX3/4	Gas Fired Boiler	257,908.2	4,034,619.9	40	669 669	39.40	8.00	0.13

The State used PTE emissions for Unit 3 and Unit 4 as well as the other sources. This run was called "PTE" or "NAAQS3" by the State. In this approach, Unit 3 emission inputs for all of 2012-2014 reflected the currently applicable emission limit which is federally enforceable and in effect as of April 16, 2016[7] (which has been met through installation of dry sorbent injection as described in section 4.3.2.5). Unit 3's emission releases through the shared Unit 3-Unit 4 stack were characterized by the stack parameters in Table 8 for source ID STKPTE. Unit 4 was assumed to have no emissions since it was shut down effective April 16, 2016. This approach does follow one of the two acceptable options discussed in the Modeling TAD, the PTE approach. While the PTE approach does not represent what the airshed around the facility experienced in 2012-2014, the limits used are in place and enforceable.

The EPA concludes that the State provided adequate information to determine the source configuration and source type for the AEP/PSO Northeastern Power Station in its PTE model

[7] Facility's Title V permit - Permit No. 2012-918-TVR2 (M-1).

run. Accurate stack parameters (*see* Table 8) were provided and the physical plant layout was documented aptly for the modeling.

The stack locations and nearby building dimensions were documented well via aerial images (Figure 16), along with corresponding easting and northing coordinates for each stack. That information provided accurate orientation of the stacks and the input parameters needed for BPIPPRM. Therefore, the building locations and downwash were accurately accounted for.

Figure 16. Modeled Fence line and Stack Locations in Area of Analysis

American Electric Power Public Service Company of Oklahoma, Northeastern Power Station

* Cyan – Buildings; Blue – Property boundary; Yellow – Point Sources.

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 by the time of final designations.

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, for a facility that has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

After the "Modeling Protocol for Modeling Compliance with the 1-Hour SO_2 NAAQS" dated December 30, 2015, was drafted, AEP/PSO Northeastern Power Station installed an activated carbon dry sorbent injection system on Unit No. 3 and shut down Unit No. 4. The activated carbon dry sorbent injection system was operational on April 16, 2016, as required by the Mercury and Air Toxics Standards (MATS). The shutdown of Unit No. 4 was effective on April 16, 2016. However, since the facility had potential and actual emissions of more than 2,000 tpy SO_2 after January 13, 2017, an air quality characterization using modeling was conducted for the area surrounding the facility.

As noted above, for this area of analysis, the State opted to use, in two separate modeling analyses, 1) a hybrid approach and 2) a PTE approach as described in the previous section. Because the PTE approach more closely follows the Modeling TAD we are relying on this analysis for our designation and that is the run which is discussed in this TSD. Table 9 below includes annual actual emissions between 2012 and 2014 from all the point sources at the AEP/PSO Northeastern Power Station, including Unit No. 4. However, the PTE approach taken by the State simulates the impact of the facility's recent allowable emissions in conformance with the Modeling TAD.

Table 9 – Actual SO_2 Emissions Between 2012-2014 from AEP/PSO Northeastern Power Station

Facility Name	Actual SO_2 Emissions (tons)		
	2012	2013	2014
AEP/PSO Northeastern Power Station	15,495	18,413	16,963

Table 10 below includes emissions at the AEP/PSO Northeastern Power Station based on currently applicable PTE emission limits from the current Part 70 operating permit (Permit No.

2012-918-TVR2 (M-1)). This scenario represents PTE emissions as of April 16, 2016, resulting from the refurbishment of Unit 3 with the addition of the activated carbon dry sorbent injection system and the permanent shutdown of Unit 4. It represents the PTE of sources currently allowed to operate at the facility.

Table 10 – PTE SO_2 Emissions from AEP/PSO Northeastern Power Station Based on PTE

Facility Name	PTE SO_2 Emissions (tpy)
AEP/PSO Northeastern Power Station	8,366

The use of current PTE emissions for all sources at the facility provided hourly emission inputs that corresponded to the limits stated in the operating permit. The intended designation is being based on the modeling run that used the PTE emissions in Table 10. The AEP/PSO Northeastern Power Station is now permitted to emit 8,366 tpy of SO_2. The emission rate modeled for Unit 3, which has a 30-day compliance period in the permit for the facility, was 1,910 lb/hr. We note that this emission limit is based on the boiler maximum firing rate of 4,775 MMBtu/hr multiplied by the 0.4 lb/MMBtu emission rate to yield the 1,910 lb/hr modeled rate. Using the 0.4 lb/MMBtu emission limit, the facility maximum predicted impacts are 75 µg/m^3 without background (112 µg/m^3 with background), so even an 100% increase in maximum impacts would still result in values below the standard.

4.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

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

When conducting air dispersion modeling, the State of Oklahoma utilizes surface meteorological data from the Oklahoma Mesonet (5-Minute Average Surface Data) combined with Integrated Surface Hourly Database (ISHD) Surface Data from the National Centers for Environmental Information (NCEI) and uses Upper Air (UA) data from the Earth System Research Laboratory (ESRL).

For the area of analysis in Rogers County, the State selected the 2012-2014 meteorological data from the Claremore (CLRM) Oklahoma Mesonet surface station was used in conjunction with ISHD surface data from the Claremore Regional Airport (KGCM) in Rogers County, Oklahoma. In addition, ESRL upper air data from the Max Westheimer Airport (OUN) in Cleveland County, Oklahoma, was used for the modeling analysis.

The ISHD surface station (KGCM), located approximately 24.5 km to the southeast from Northeastern Power Station, was determined to be the most representative site for the domain.

The Tulsa International Airport (KTUL) in Tulsa, Oklahoma, was designated as the secondary ISH station and is located approximately 30.0 km to the southwest from facility. The secondary ISH station was used for additional data substitution. Records from KTUL were used to replace hours of KGCM data that were completely missing and to replace missing cloud cover data.

Meteorological data from Oklahoma Mesonet sites surrounding AEP/PSO Northeastern Power Station were utilized to evaluate the wind flow patterns in the area. The CLRM Oklahoma Mesonet station (located approximately 12.6 km S 20.7°E from the center of the domain) was determined to be the most representative Oklahoma Mesonet station for the domain. Although it was the most representative Oklahoma Mesonet station for the domain, it stopped operations on April 30, 2014, and was moved 18 miles north-northeast and renamed the Talala (TALA) Oklahoma Mesonet station (located approximately 16.9 km N 12.4°W from the center of the domain). The TALA Oklahoma Mesonet station did not begin recording data until September 30, 2014. Therefore, data from the Nowata (NOWA) Oklahoma Mesonet station (located at approximately 36.2 km N 14.7°E from the center of the domain) was chosen to be the most representative Oklahoma Mesonet site to use for data substitution for the missing period.

Upper air data from the Max Westheimer Airport (OUN) in Norman, Oklahoma (located at approximately 208 km S 52.4°W from the center of the domain) was determined to be the most representative upper air site for the domain. The ESRL UA stations usually take soundings twice a day. The upper air data from the Dallas-Fort Worth Airport (DFW) in Fort-Worth, Texas was used to substitute missing soundings.

The State used AERSURFACE version 13016 using land cover data from the U.S. Geological Survey (USGS) National Land Cover Data 1992 archives (NLCD92) to estimate the surface characteristics of the area of analysis using 1 km radius and 1 sector. AERSURFACE matches the NLCD92 land cover categories to seasonal values of Albedo (the fraction of solar energy reflected from the earth back into space), Bowen Ratio (the method generally used to calculate heat lost or heat gained in a substance), and Surface Roughness (sometimes referred to as “Zo”) and then calculates the surface characteristics for input into AERMET.

The monthly rainfall for the Oklahoma Mesonet site was analyzed from the beginning of the establishment of the Oklahoma Mesonet program (approximately 20 years). The surface moisture conditions (Average, Wet, Dry) for each month were then determined using the monthly rainfall amounts compared to the average rainfall. These determinations were based on the guidance contained in the AERSURFACE User’s Guide. The Bowen Ratio was then assigned as either average, dry, or wet based on the monthly surface moisture conditions for the CLRM Oklahoma Mesonet station.

In Figure 14 above, the State included in its recommendation the location of the weather stations relative to the area of analysis. Table 11 below shows a summary of the surface characteristics associated with each Mesonet station, the NWS surface station. The facility characteristics are shown for comparison. Table 13 shows the corresponding moisture conditions.

Table 11 – Surface Characteristics for Area of Analysis

Facility Domain Surface Characteristics

PSO NE	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.17	0.61	0.35	1.28	0.049
Spring	0.15	0.32	0.22	0.78	0.086
Summer	0.17	0.41	0.26	0.94	0.148
Fall	0.17	0.61	0.35	1.28	0.148

Modeling Domain Surface Characteristics

CLRM	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.18	0.82	0.43	1.92	0.062
Spring	0.15	0.45	0.28	1.19	0.096
Summer	0.18	0.50	0.31	1.23	0.257
Fall	0.18	0.82	0.43	1.92	0.257

Modeling Domain Surface Characteristics

NOWA	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.18	0.73	0.39	1.66	0.017
Spring	0.15	0.37	0.24	0.97	0.034
Summer	0.18	0.48	0.29	1.18	0.137
Fall	0.18	0.73	0.39	1.66	0.137

Modeling Domain Surface Characteristics

TALA	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.19	0.88	0.46	1.93	0.012
Spring	0.17	0.37	0.27	1.00	0.044
Summer	0.18	0.65	0.35	1.68	0.106
Fall	0.18	0.88	0.46	1.93	0.106

Modeling Domain Surface Characteristics

KGCM	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.18	0.81	0.42	1.88	0.026
Spring	0.16	0.38	0.25	1.03	0.045
Summer	0.18	0.53	0.31	1.36	0.173
Fall	0.18	0.81	0.42	1.88	0.173

Table 12 – Moisture Conditions for Area of Analysis

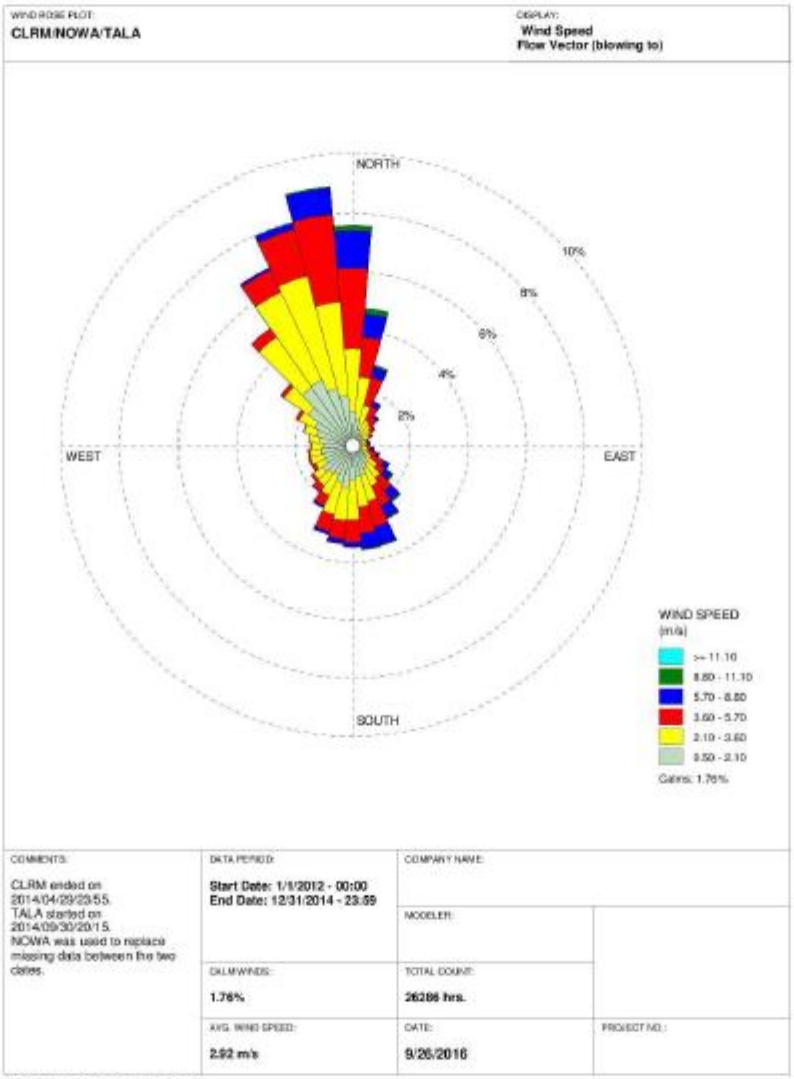
Modeling Domain Moisture Conditions[1]

Year	2012	2013	2014
January	A	A	D
February	A	W	D
March	W	A	A
April	A	A	D
May	D	A	D[2]
June	A	D	W[2]
July	D	W	A[2]
August	A	D	D[2]
September	D	A	A[2]
October	W	A	W[3]
November	A	A	A[3]
December	D	A	A[3]

[1] – Moisture conditions based on rainfall data from the CLRM Oklahoma Mesonet station unless otherwise noted.
[2] – Moisture conditions based on rainfall data from the NOWA Oklahoma Mesonet station.
[3] – Moisture conditions based on rainfall data from the TALA Oklahoma Mesonet station.
A – Average (precipitation in the middle 40th percentile);
D – Dry (precipitation in the lower 30th percentile);
W – Wet (precipitation in the upper 30th percentile).

As part of its recommendation, the State provided the 3-year surface wind rose for the meteorological data utilized. In Figure 17, the frequency, magnitude, speed, and direction of the wind are defined in terms of where the wind is blowing from. The station indicates a 2.92 m/s average wind speed that blows predominantly from the north.

Figure 17. Rogers County Cumulative Annual Wind Rose for Years 2012 – 2014



The EPA concludes that the spatial representativeness of the meteorological data is accurately represented in the area of analysis. The weather stations were well placed for the flat, simple terrain around the plant. There is no complex topographic characteristics, so the stations should denote the meteorological conditions correctly both on the windward and leeward side of the source without adverse effects and with great exposure.

Meteorological data from the above 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 User's Guide for the AERMOD Meteorological Data Preprocessor (AERMET) 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 5-minute duration was provided from the Mesonet stations mentioned above but in a different formatted file to be processed by the State for the hourly data. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data.

The EPA concludes that the State used appropriate surface characteristics and meteorology in the modeling analysis for the AEP/PSO Northeastern Power Station. The selection of the data was appropriate from both a climatological and spatial standpoint. First off, the period of time when the meteorological data was collected was in accord with the 2012-2014 emission data. The proximity of each meteorological monitoring site was suitable to represent the area of analysis. CLRM (12.6 km south) through early 2014 and TALA (16.9 km north) for Sept. 30, 2014 to end of 2014 are both within 20 km of the area of analysis. CLRM was moved to a new location in 2014 (TALA) so the State used another nearby Mesonet station from Nowata, Oklahoma, to fill the downtime (4/30/14 to 9/29/14) and the site is 35 km to the north of the facility. These locations and distances are reliable given the 2.92 m/s average wind speed that blows predominantly from the north. The surface characteristics (albedo, surface roughness, Bowen ratio, and moisture conditions) were calculated appropriately using the recommended method in the TAD with the current version of AERSURFACE and the 1992 National Land Cover Data.

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

The terrain surrounding the AEP/PSO Northeastern Power Station was reviewed and was determined to have no hills with an elevation at or above the stack height. The facility is located in an area of relatively flat terrain. The AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors.

Terrain data obtained from the United States Geological Survey (USGS) Seamless Data Server at http://viewer.nationalmap.gov/viewer/ was used to determine the receptor base elevation and hill height elevation. The 1/3 arc-second National Elevation Data (NED) was obtained in the GeoTIFF format for use with AERMAP. Interpolation of receptor and source heights from the 1/3 arc-second NED elevation data is based on the current AERMAP guidance in Section 4.4 of the *User's Guide for the AERMOD Terrain Processor (AERMAP)* (EPA-454/B-03-0003, 10/2004). AERMAP uses a distance weighted bilinear interpolation method. This domain falls entirely in UTM Zone 15. All coordinates were based on the North American Datum (NAD) of 1983 (NAD83).

The EPA concludes that the State used appropriate surface characteristics and meteorology in the modeling analysis for Northeastern. The selection of the data was appropriate from both a climatological and spatial standpoint. The period of time that the meteorological data was collected coincided well with the 2012-2014 emission data. The proximity of the meteorological monitoring sites to the area of analysis was acceptable, as these sites were both within 36 km located southwest (KGCM) and southeast (CLRM) of the area of analysis. These locations agree well with the 2.9 m/s average wind speed that blows predominantly from the north. The surface characteristics (albedo, surface roughness, Bowen ratio, and moisture conditions) were calculated appropriately using the recommended method in the TAD with the current version of AERSURFACE and the 1992 National Land Cover Data.

4.3.2.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99^{th} percentile monitored concentrations by hour of day and season or month. For this area of analysis, the State used a uniform monitored background concentration based on the monitored design values for the 3-year average of the 99th percentile 1-hour daily maximum.

The single value of the background concentration for this area of analysis, based on the North Tulsa Monitor in nearby Tulsa County, was determined by the State to be 37 $\mu g/m^3$, equivalent to 14 ppb when expressed in two significant figures,[8] and that value was incorporated into the final AERMOD results.

The EPA concludes that this tier 1 approach is appropriate and in accordance with the Modeling TAD. The North Tulsa County monitor is an adequate monitor to use in the modeling to represent the background for purposes of modeling attainment of the 2010 1-hour SO_2 NAAQS as its use is conservative (i.e., not likely to underestimate the background concentrations at Northeastern) due to the higher local SO_2 emissions near the North Tulsa monitor. This monitor also is the closest monitoring site to the area of analysis. The total 2014 SO_2 emissions for Tulsa county were 616 tpy (304 tpy from point sources), while the non-modeled emissions for Rogers County were 199 tpy (102 tpy from point sources).

4.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Rogers County area of analysis are summarized below in Table 13.

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

Table 13 – Summary of AERMOD Modeling Input Parameters for the Rogers County Area Based on PTE Emission Rate

Input Parameter	Value
AERMOD Version	(regulatory options)
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	8
Modeled Structures	-
Modeled Fence lines	Yes (*see* Figure 16)
Total receptors	5,447
Emissions Type	PTE
Emissions Years	2012-2014; PTE based on currently effective emission limits
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Claremore (CLRM) Oklahoma Mesonet surface station was used in conjunction with ISHD surface data from the Claremore Regional Airport (KGCM) in Rogers County, Oklahoma.
NWS Station Upper Air Meteorology	Max Westheimer Airport (OUN) in Cleveland County
NWS Station for Calculating Surface Characteristics	Seasonal surface characteristics are provided for the CLRM, TALA, NOWA, and KGCM. Moisture conditions are based on CLRM Oklahoma Mesonet station.
Methodology for Calculating Background SO_2 Concentration	3-year average of 99th Percentile 1-hour daily maximum
Calculated Background SO_2 Concentration	Tulsa County, AQS ID: 40-143-1127 37 μg/m^3

The results presented below in Table 14 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

Table 14 – Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Rogers County Area of Analysis Based on PTE Emission Rate

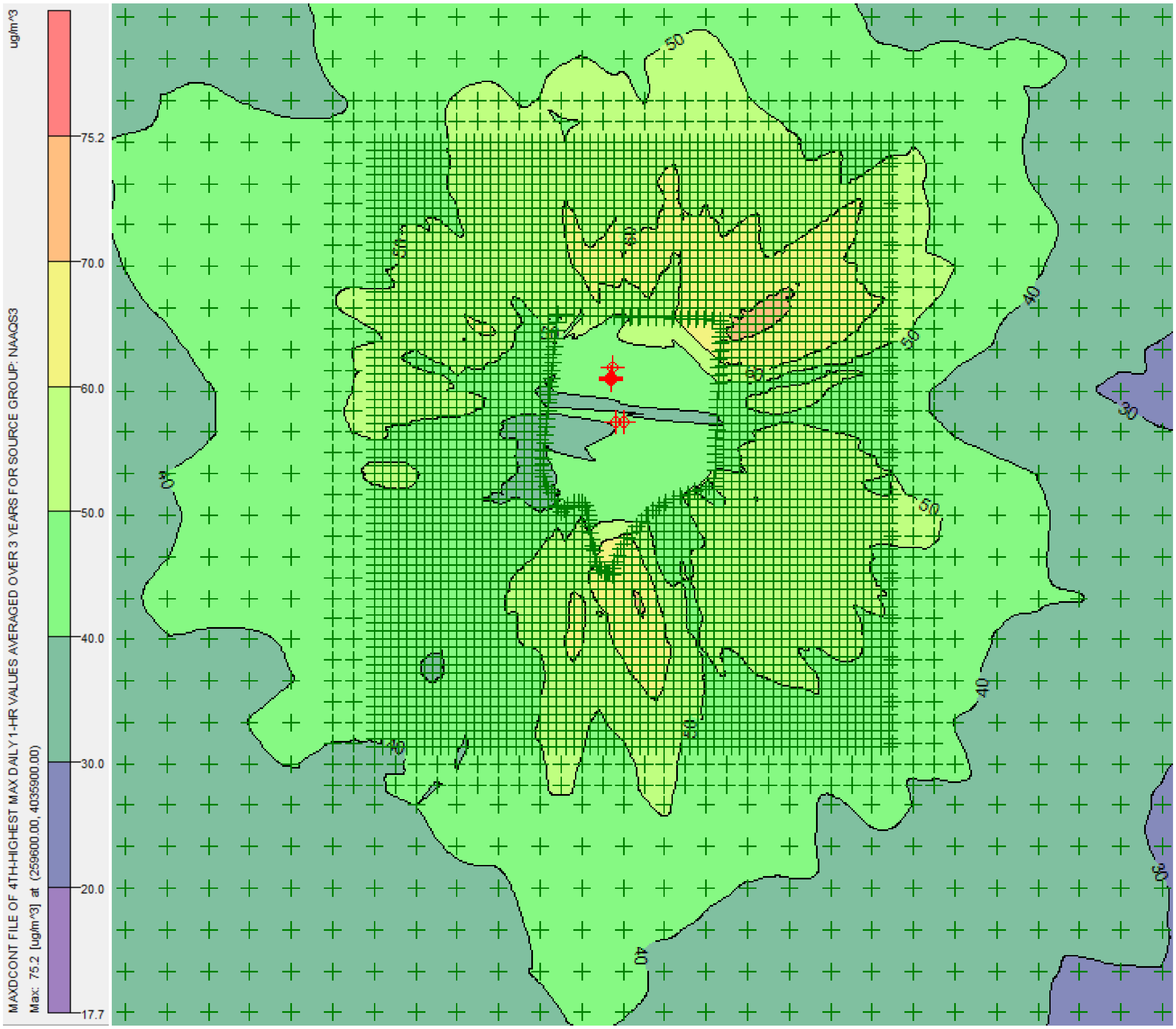
Averaging Period	Data Period	Receptor Location UTM Zone 15		Maximum 99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM (E)	UTM (N)	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012-2014	4035900.00	259600.00	112	196.4*

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

The State's modeling analysis is based on the 3-year average of the highest fourth highest (H4H) daily maximum impact (which is the 3-year average of the 99th percentile daily maximum impact) in the modeling domain which is 112 $\mu g/m^3$, equivalent to 43 ppb. This modeled concentration included the background concentration of SO_2, and is based on PTE emissions from the facility.

Figure 18 below was created by the EPA from the State's modeling files for the PTE approach, and indicates that the predicted value occurred northeast of the facility. This concentration plot does not include the uniform background concentration. The State's receptor grid is also shown in the figure and the red hatches are the emission points modeled.

Figure 18. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Rogers County Area of Analysis Based on PTE Emission Rate (Not Including Background)



The EPA concludes that the modeling submitted by the State based on PTE emission rate indicates that the 1-hour SO_2 NAAQS is not violated at the receptor with the highest modeled concentration.

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

When evaluating the modeling that came in from the State, no major issues with the State's PTE-based modeling run were identified. We did identify that the modeled emission rate was based on maximum hourly firing rate of Unit #3 but used a 30-day average lb/MMBtu emission limit as the hourly emissions input to the modeling. It is our determination that some conservatism is already included by the state in using the maximum firing rate, but some increase to account for short-term emission variation may have been appropriate.

The EPA further investigated two areas from a Weight of Evidence perspective. Upon further investigation the background monitor is influenced by local SO_2 sources in west Tulsa (two refineries) that have installed controls that have lowered the current Design Value for the monitor. The 2012-2014 DV for this monitor is 37 $\mu g/m^3$ and the 2014-2016 monitor DV has dropped since the refineries have installed controls to 15.7 $\mu g/m^3$, a drop of 22 $\mu g/m^3$. The monitor is still influenced by the sources but to a lesser extent and would still be conservative and overestimate concentrations used in this analysis compared to a more representative background monitor. If the newer 2014-2016 DV was considered due to the impacts controls at the refineries have had in the area, the maximum modeled + background DV would decrease to 90 $\mu g/m^3$ (maximum model + background value). This value is still higher and conservative compared to the highest DV monitor in Oklahoma not impacted by local sources which has a 2012-2014 DV of 9.6 $\mu g/m^3$. The other Weight of Evidence component is using the existing modeling and scaling the modeled impacts assuming all emissions sources at Northeastern were increased 60% (a factor in the TAD for estimating short-term emission rate from annual average emission rate value for scrubbed facilities) the resultant modeled value would be 75 $\mu g/m^3$ x 1.6 = 120 $\mu g/m^3$. Since no background sources were included in the modeling all of the impacts modeled are from Northeastern's emissions which makes scaling impacts a decent approximation of the impacts if a higher rate had been modeled to convert the 30-day limit to a 1-hour limit. Using this 60% scaler is overly conservative for Northeastern's emissions because the scaler is for annual to 1-hour for units with a scrubber which would also likely be expected to have more variability in emissions than the DSI controlled Unit #3 or other non-controlled units at Northeastern, so this would result in conservatively overestimating the impacts from Northeastern. Using this conservative scaler approach that is likely overestimating the worst case impacts would result in a concentration of 120 $\mu g/m^3$ which would result in a Maximum DV value of 157 $\mu g/m^3$ using the overly conservative 2012-2014 DV and a value of 135.7 $\mu g/m^3$ using the more recent background DV (2014-2016) that is still conservative. Given that the model results are well below the standard, increasing the modeling results by 60% would not result in values near/above the NAAQS and the Weight of Evidence analysis using the newer background monitor value, we are concluding that the modeling combined with this Weight of Evidence shows attainment, and the modeling follows the Modeling TAD and EPA guidance, except for this variability factor issue that is not consequential in this situation.

As explained above, the hybrid modeling run does not follow either of the approaches recommended in the Modeling TAD, and we are not relying on it in this designation action. We note, however, that it also showed no violations of the NAAQS.

4.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for Rogers County, Oklahoma

These factors were incorporated into the air quality modeling efforts and the results were discussed above. The EPA gave 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 Rogers County, Oklahoma

Once the geographic area of analysis associated with the AEP/PSO Northeastern Power Station, other nearby sources, and background concentration were determined, the existing jurisdictional boundaries were considered for the purpose of informing the EPA's intended designation action for Rogers County, Oklahoma. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable. The counties in Oklahoma are administrative units that are not subdivided into townships or other independent entities.

The EPA concludes that our intended unclassifiable/attainment area, consisting of the entirety of Rogers County, Oklahoma, will have clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable/attainment area for the 2010 1-hour SO_2 NAAQS.

4.6. The EPA's Assessment of the Available Information for Rogers County, Oklahoma

When evaluating the modeling analyses submitted by the State, no major technical issues other than the short-term emission variability issue discussed above were identified. The EPA did evaluate which of the two analyses is most appropriate in determining the attainment status of the area. While both modeling assessments showed attainment, the EPA determined that the analysis using the PTE emissions for all sources was most appropriate. In its 2011 designations recommendations, the State recommended the use of counties as the basis for designations. The State has not subsequently recommended any specific borders for a designated area around the AEP/PSO Northeastern Power Station. We intend to choose the entire area within Rogers County as the designated area. With the exception of the AEP/PSO Northeastern Power Station, whose impacts have been modeled to show compliance with the standard, there are no other sources within Rogers County that emit at or above 100 tpy, based on the 2014 NEI. The EPA confirmed that there were no other sources in Rogers County or near its borders that were likely to cause or contribute to a violation of the NAAQS either within Rogers County or nearby. The nearest DRR source to Rogers County is the Grand River Dam Authority (GRDA) facility with 2014 emissions of 12,254 tpy located in Mayes County 13 km to the east-southeast of Rogers County and 42 km away from Northeastern's facility. The area around the GRDA facility will be designated by December 31, 2020. Mayes County also includes three other major SO_2 sources (all to the east): Soy Isolate Product Plant (130 tpy, 14 km), Pryor Activated Carbon Plant (204 tpy, 13.5 km), and Pryor Cement Facility (1,509 tpy, 19 km). None of the other counties surrounding Rogers County contain a major SO_2 source based on the 2014 NEI, and therefore they are not expected to have any problems with NAAQS compliance. Since winds are from the west less than 2 percent of the time (Figure 17) it is doubtful that Northeastern could contribute to potential violations if they occur in Mayes County. Furthermore, the modeling provided by the State for the GRDA facility and other sources in Mayes county for purposes of siting the new monitor does not indicate values above the standard when winds would be transporting Northeastern's emissions to the area around GRDA and the nearby industrial park sources. Therefore, we can determine that Northeastern would not contribute to violation of the NAAQS in surrounding counties. The EPA also intends to find that Rogers County is a reasonable jurisdictional boundary for the designation.

4.7. Summary of Our Intended Designation for Rogers County, Oklahoma

After careful evaluation of the State's recommendation and supporting information, the EPA's analysis of modeling and Weight of Evidence, as well as all available relevant information, the EPA intends to designate the area around AEP/PSO Northeastern Power Station as unclassifiable/attainment for the 2010 SO_2 NAAQS, because Rogers County does not violate the NAAQS and sources in Rogers County do not contribute to air quality in any nearby area that violates the NAAQS. Specifically, the boundaries of the intended unclassifiable/attainment area are the boundaries of Rogers County, Oklahoma. Figure 11 shows the boundary of this intended designated area.

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

5. Technical Analysis for Le Flore County, Oklahoma

5.1. Introduction

The EPA must designate the Le Flore County, Oklahoma, area by December 31, 2017, because no portion of the county has been previously designated and Oklahoma has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Le Flore County. The State recommended that Le Flore County be designated attainment.

5.2. Air Quality Monitoring Data for Le Flore County, Oklahoma

The State did not submit with its designation recommendation any air quality monitoring data for Le Flore County. The EPA confirmed that there is no relevant data in AQS that could inform the intended designation action.

5.3. Air Quality Modeling Analysis for Le Flore County Addressing Shady Point Cogeneration Plant

5.3.1. Introduction

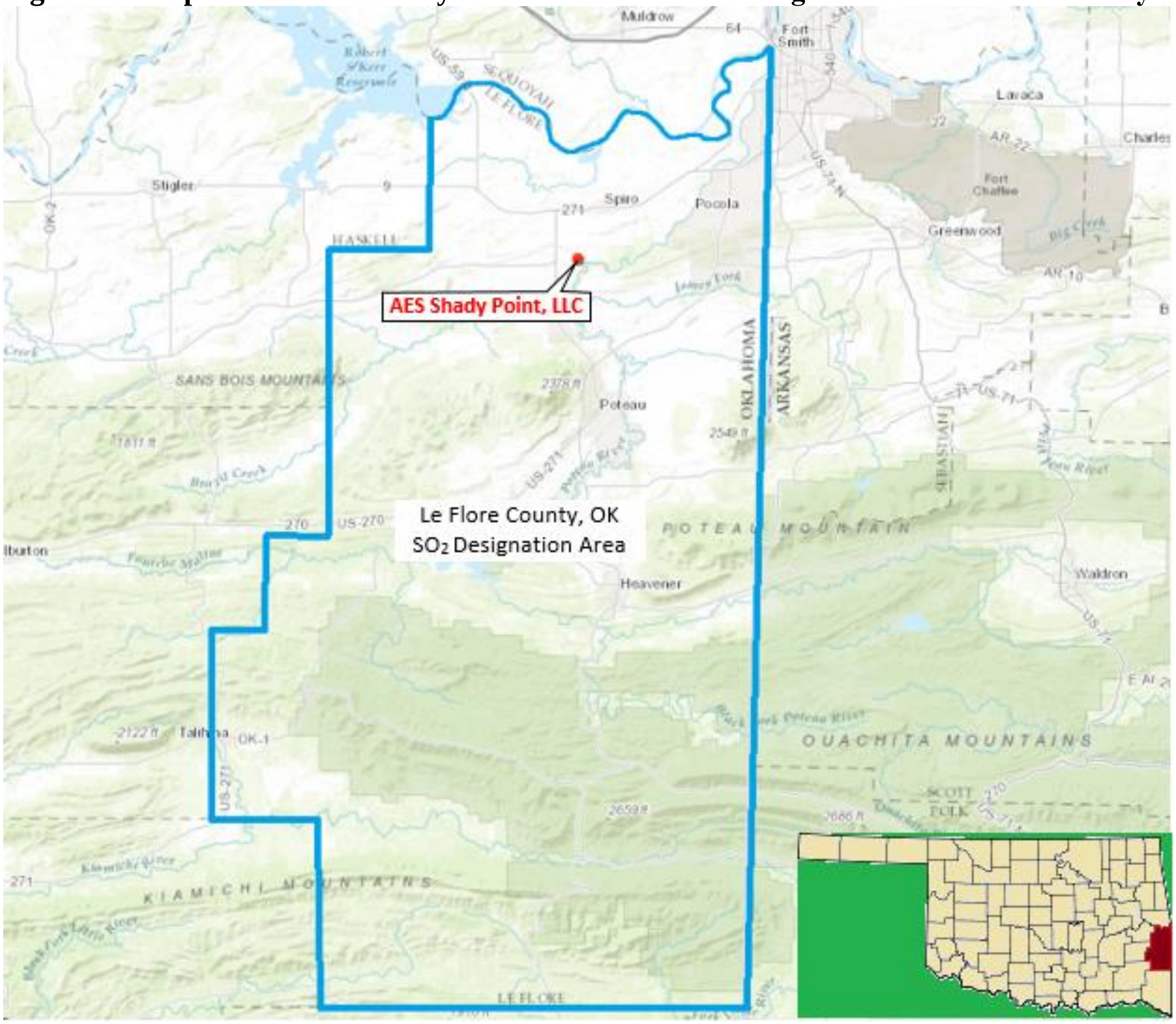
This section presents all the available air quality modeling information for the portion of Le Flore County that includes the AES Shady Point, LLC Cogeneration Plant (AES Shady Point). Steam at AES Shady Point is used primarily for the generation of electricity, and secondarily is used for the production of carbon dioxide from an amine adsorption/steam stripping operation that is not a source of SO_2. The modeling domain was centered over the facility since it is the only source of SO_2 emissions greater than 100 tpy located in the area. The EPA evaluated the 2014 NEI and there are no other sources over 100 tpy within Le Flore County and the only source within 50 km of the county over 100 tpy is over 30 km away in Arkansas and is not large enough to cause concentration gradients in Le Flore County and can be represented through a background monitor. Specifically, St. Gobain is the closest source at 35 km from AES Shady Point and 6.6 km from Le Flore County and is 163 tpy. The AES Shady Point is the only source in this area listed under the DRR, which requires that the State characterize SO_2 air quality in the area around that source, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tpy. It emitted 2,000 tons SO_2 or more annually. Specifically, AES Shady Point emitted 3,934 tons of SO_2 in 2014. This source meets the DRR criteria and therefore is on the SO_2 DRR Source list. Oklahoma has chosen to characterize this facility via modeling.

In its submission, Oklahoma submitted an assessment of air quality impacts in the area surrounding AES Shady Point. The assessment was performed using AERMOD air dispersion modeling software to analyze the actual emissions and did not indicate a NAAQS violation. After careful review of the State's assessment, supporting documentation, and all available data, the EPA agrees with the State's recommendation and intends to designate the area as unclassifiable/attainment. The State did not recommend specific borders for a designated area around AES Shady Point. The EPA intends to designate the entirety of Le Flore County as there are no other SO_2 sources in the county and surrounding counties that could cause a violation in Le Flore County. The EPA believes that our intended unclassifiable/attainment area, consisting of the entirety of Le Flore County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area. Our reasoning for this intended designation is explained in a later section of this TSD, after all the available information is presented.

The State assessed an area within 20 km of AES Shady Point by air quality modeling. Since AES Shady Point is the modeled source of SO_2 emissions in the area, the 20 km by 20 km modeling domain was centered over the facility.

The AES Shady Point is located in eastern Oklahoma in the north-central portion of Le Flore County. The facility is located approximately 3 miles east of Highway 31/59 junction in Panama, Oklahoma. The EPA's intended unclassifiable/attainment area boundary for the area around AES Shady Point follows the boundary of Le Flore County and can be seen in Figure 19 below. There are no additional SO_2 emitters above 1 tpy within 30 km of the named source.

Figure 19. Map of Le Flore County - the EPA's Intended Designation for Le Flore County



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

For this area, the EPA received and considered one modeling assessment from the State and no assessments from other parties. It was received on 1/11/2017 and provides an assessment for AES Shady Point located in Le Flore County, Oklahoma, for the 1-hour SO_2 NAAQS utilizing AERMOD.

5.3.2. Modeling Analysis Provided by the State

5.3.2.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model (State used Version 15181)
- AERMAP: the terrain processor for AERMOD (State used Version 11103)
- AERMET: the meteorological data processor for AERMOD (State used Version 15181)
- BPIPPRM: the building input processor (State used Version 127404724)
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data (State used Version 15272)
- AERSURFACE: the surface characteristics processor for AERMET (State used Version 13016)
- AERSCREEN: a screening version of AERMOD (State did not use this)

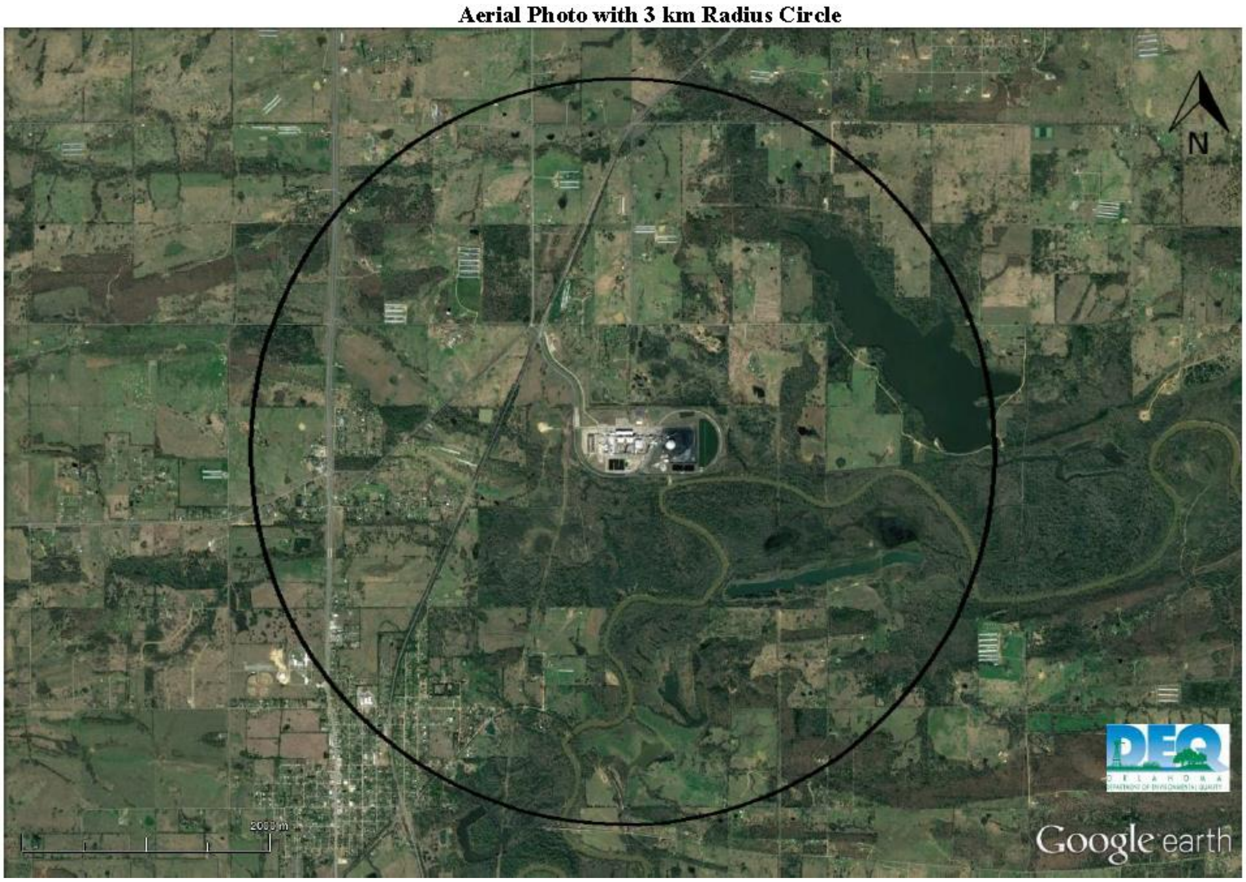
The State used AERMOD version 15181 with regulatory default options and acceptable associated components. On January 17, 2017, EPA published its revision to Appendix W – Guideline to Air Quality Models. Since the publication of Appendix W, AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted here. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate. The EPA found the AERMOD version and its components to be acceptable for this analysis since the regulatory default options were used with this older version of AERMOD and we would not expect different results if remodeled with 16216r model version.

5.3.2.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

For the purpose of performing the modeling for the area of analysis, the State determined that it was most appropriate to run the model in rural mode. The determination for this domain was based primarily on land-use (the preferred method). An aerial photo showing land use/cover was provided and can be seen in Figure 20 below.

Figure 20. Aerial Map with 3 km Radius Around AES Shady Point



The EPA concludes that using a rural determination was appropriate by the State. When using the land-use method, to be considered urban, 50% or more of the area within the 3 km radius circle should be considered residential or industrial. Since the aerial photo shows that majority of the land use within 3 km of the plant does not consist of residential nor industrial, then classifying the area around AES Shady Point as rural is appropriate.

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

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

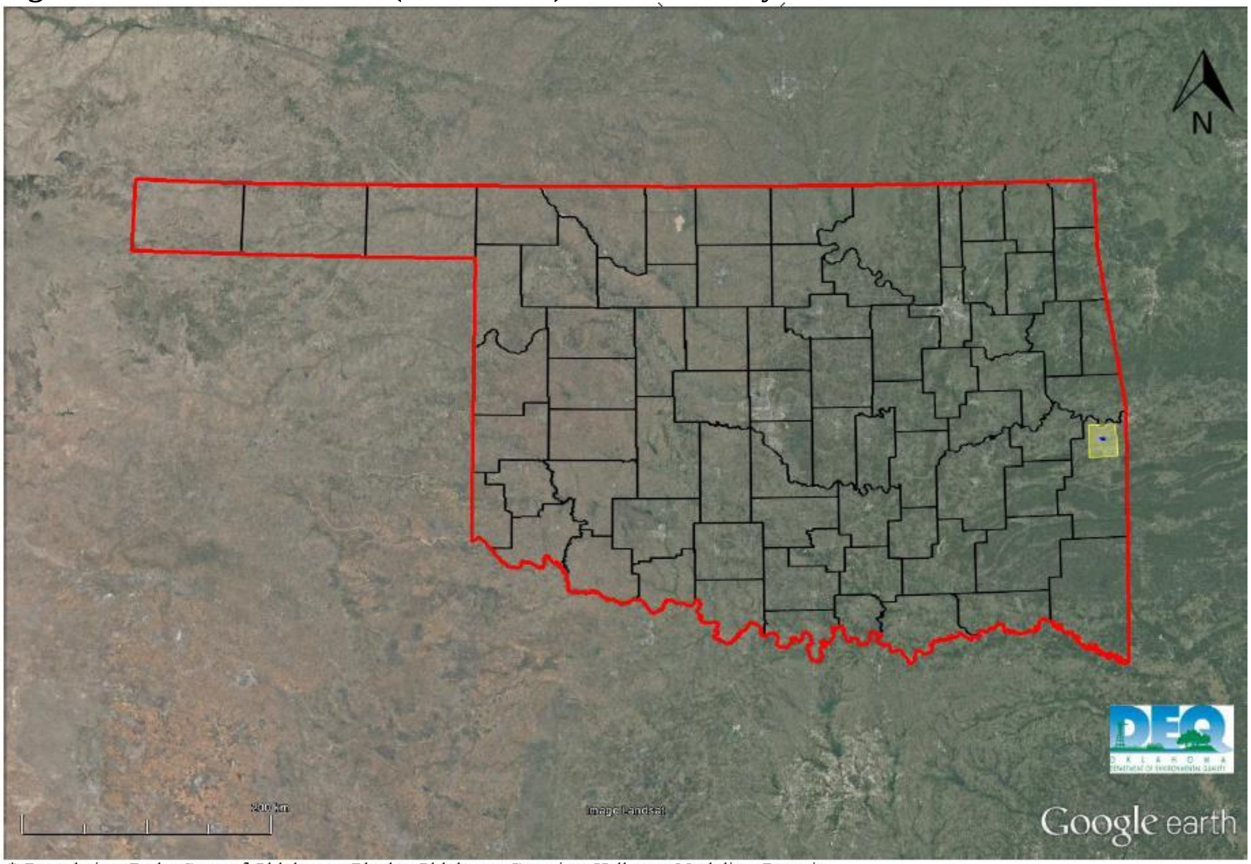
The source of SO_2 emissions subject to the DRR in this area, AES Shady Point, is described in the introduction to this section. For the Le Flore County area, the State evaluated a domain or 20 km around AES Shady Point and found that there were no other facilities located within or near the domain that would cause a concentration gradient within the domain. As discussed previously we evaluated the 2014 NEI for sources and there is only one source within 50 km over 100 tpy, in Arkansas, and it would not be expected to result in concentration gradients in Le Flore County and so can be characterized through a background monitor. The State determined that 20 km was the appropriate distance to adequately characterize air quality through modeling. This includes the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. No other sources beyond 20 km were determined by the State to have the potential to cause concentration gradient impacts within the area of analysis. EPA agrees with this assessment based on the size and distance of the sources.

A Cartesian receptor grid spacing (20 km by 20 km centered around the facility) for the area of analysis was generated by the State as follows:

- Receptors spaced at 100 m along the fence line of the affected source;
- Receptors spaced at 100 m from the fence line out to 1 km;
- Receptors spaced at 250 m from 1 km out to 2.5 km;
- Receptors spaced at 500 m from 2.5 km to 5 km; and
- Receptors spaced at 1 km from 5 km out to 10 km (the edge of the domain).

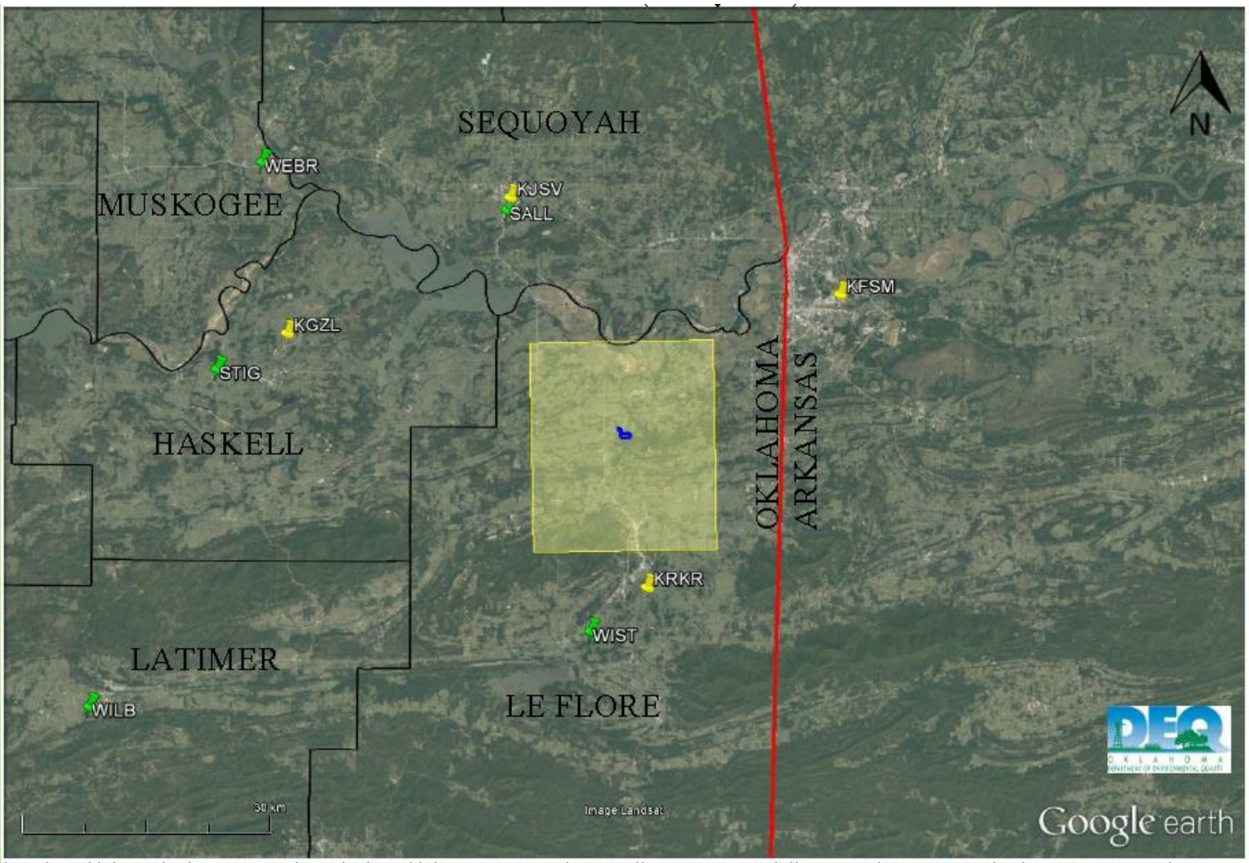
Figures 21, 22, and 23, included in the State's recommendation, show the State's chosen area of analysis surrounding AES Shady Point, as well as the receptor grid for the area of analysis. Since there is no complex terrain in the immediate area around the facility, the maximum impact is typically expected to occur within 12 km from the source, (based on the rule of thumb for flat terrain: 10 times the stack height, which is 106.7 m), a domain extending out 10 km from the facility fence line is expected to be of sufficient size to determine the ambient air impacts. However, the initial receptor grid was modified by extending the 1 km-spaced receptor grid an additional 2 km to the south to take into account terrain that was outside of the initial domain. Also, after initial modeling the State added a fine receptor grid with 100 m spacing to attempt to determine any localized maximum that could occur in an area of significant terrain to the south of the facility.

Figure 21. Domain Location (State Level) for AES Shady Point



* Boundaries: Red – State of Oklahoma; Black - Oklahoma Counties; Yellow – Modeling Domain.

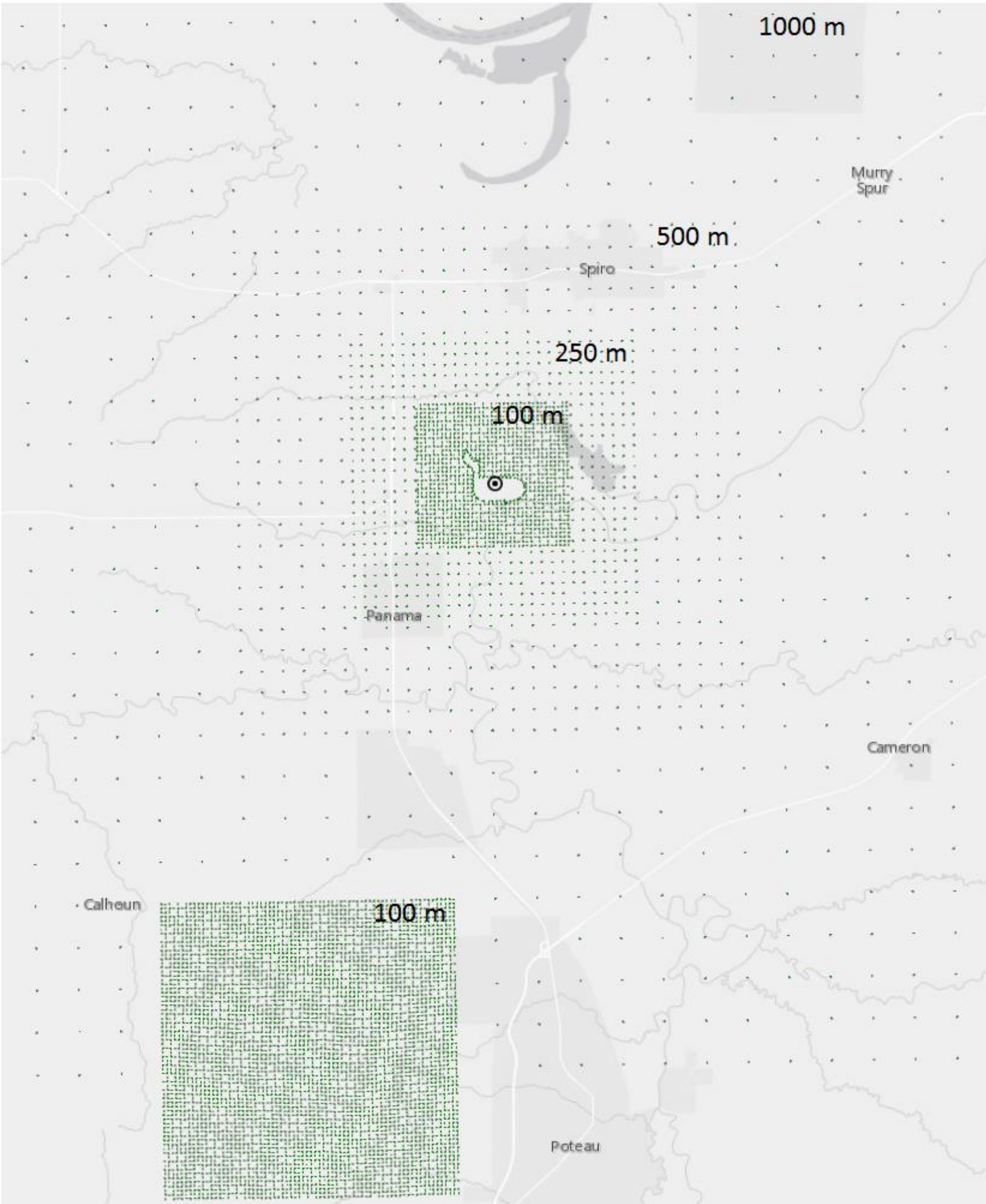
Figure 22. Domain Location (County Level) for AES Shady Point with Weather Stations



* Red – Oklahoma/Arkansas Boarder; Black - Oklahoma County Lines; Yellow Area – Modeling Domain; Green Push-Pin – Mesonet Stations; Yellow Push Pins – ISH Stations.

** Blue property boundary identifies the AES Cogeneration Plant.

Figure 23. Domain Receptor Grid (10 km from Fence Line) for AES Shady Point

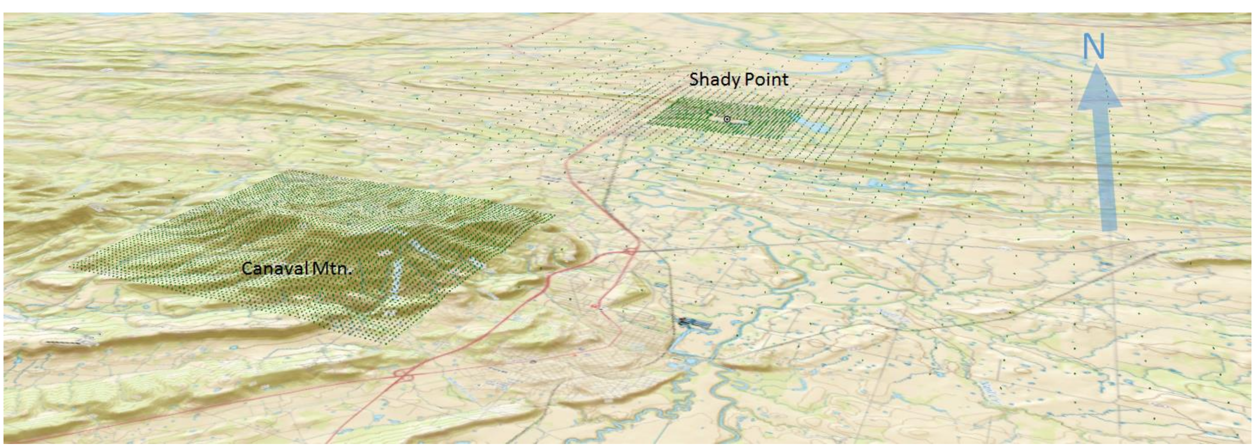


Consistent with the Modeling TAD, the State placed receptors in locations that would be considered ambient air. The State opted to apply a regular grid of receptors without excluding any receptor location on the basis of a location being infeasible for placement of a monitoring station. The State excluded receptors within the fence line of AEP Shady Point and placed receptors along the fence line of the facility. We conferred with the state and concluded that the facility is appropriately fenced and access by the public is restricted

With the additional modeled fine grid areas to address terrain impacts, there is adequate information provided by the State for the EPA to conclude that the receptor network properly covers the modeling domain for the purpose of modeling an SO_2 designation for AES Shady Point and Le Flore County. The receptor placement is of sufficient density to provide the resolution needed to detect significant gradients in the concentrations and the maximum impacts from AES Shady Point. Specifically, the receptors placements were stratified with the tightest receptor placement close to the source to detect local gradients and further out they were spaced further apart as the gradients were not as significant with the exception of the impacts on terrain where the State added a finer grid. Receptors were well-placed at the fence line which will help define concentrations at the line that the state asserted was the ambient air boundary at the AES Shady Point, and the maximum impacts were not near the fenceline.

The terrain surrounding the AES Cogeneration Plant was reviewed and was determined to have some hills with an elevation at or above the stack height. The facility is located in an area of relatively flat terrain with complex terrain located at or near the extents of the domain. Based on EPA guidance, the general guideline for determining the distance between an affected source and where the maximum ground level concentration will occur is generally ten times the stack height (106 m) in flat terrain or within about 1 km. While in flat terrain a domain extending out to 10 km can be adequate the State extended the receptor grid 2 km to the south and placed a fine grid of receptors in the area of high terrain extending beyond the coarse grid was thought to potential based on analysis of the initial modeling results.ly The maximum concentrations found near AES Shady Point were not located near the fenceline and the highest concentrations in the modeling area were located in the complex terrain well to the south. so as to capture any localized concentrations. The fine grid was deployed in the location of the highest terrain in or near the domain. Figure 24 was generated by the EPA and shows the terrain and receptor grids.

Figure 24. The Receptor Grid for Le Flore County showing the modeling domain and the additional fine grid receptors in an area of Complex Terrain. The black dot is AES/Shady Point.



5.3.2.4. Modeling Parameter: Source Characterization

In determining which nearby sources should be included in the modeling domain, the State's protocol indicated that all sizeable sources (greater than 1 tpy) within 20 km of the applicable source would be included in the modeling.

The State determined that there were no other facilities that would cause a concentration gradient within the AES Shady Point domain (no sources with recent actuals greater than 100 tpy). The EPA has reviewed the 2014 NEI and concurs with the State's assessment. We found that there were two sources greater than 40 km distant with emission rates of 12 and 4 tpy and one source located 28 km distant with an emission rate of 1 tpy. There were 5 other smaller sources ranging from 0.001 – 0.084 tpy located within 20 km of AES Shady Point.

For the 2010 1-hour SO_2 NAAQS air quality characterizations, modeling of sources with intermittent emissions, such as emergency generators and limited intermittent startup/shutdown emissions were not included based on the recommendations in the March 1, 2011, memorandum "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standards." In keeping with the EPA guidance, sources that operated less than 100 hours per year were excluded. Under this criteria diesel-fired back-up generator engines located at AES Shady Point were excluded from the air quality characterization because their historical operations are less than 100 hours per year and their continued use is expected to be infrequent such that resulting emissions are small. Not including these sources is acceptable to the EPA based on the infrequent operation and low emissions that matches with the EPA's guidance about when these type sources can be excluded from the modeling.

The modeling was based on the 3 years of actual emissions data (2012-2014) that was concurrent with the meteorological dataset. At the time the modeling was started, these years were the most recent for which data were available. CEMS data were used to generate hourly emissions files for AES Shady Point by utilizing AES stack temperature, velocity, and operational parameters.

Following the Modeling TAD when using actual emissions, the actual physical stack heights were used.

The modeling included building downwash and was implemented using BPIPPRM. The AES Shady Point submitted information to the State regarding buildings located on its property and those parameters were used as inputs into BPIPPRM to calculate building downwash parameters for input into AERMOD.

The EPA concludes that the State provided adequate information to determine the source configuration and source type for AES Shady Point. Accurate stack parameters (*see* Table 15) were provided and the physical plant layout was documented suitably for the modeling. Exit temperatures, diameters, and exit velocities reflected the actual emissions being modeled. The stack locations and nearby building dimensions were documented well via aerial images (Figure 25), along with corresponding easting and northing coordinates for each stack. That information provided accurate orientation of the stacks and the input parameters needed for BPIPPRM. Therefore, the building locations and downwash were accurately accounted for.

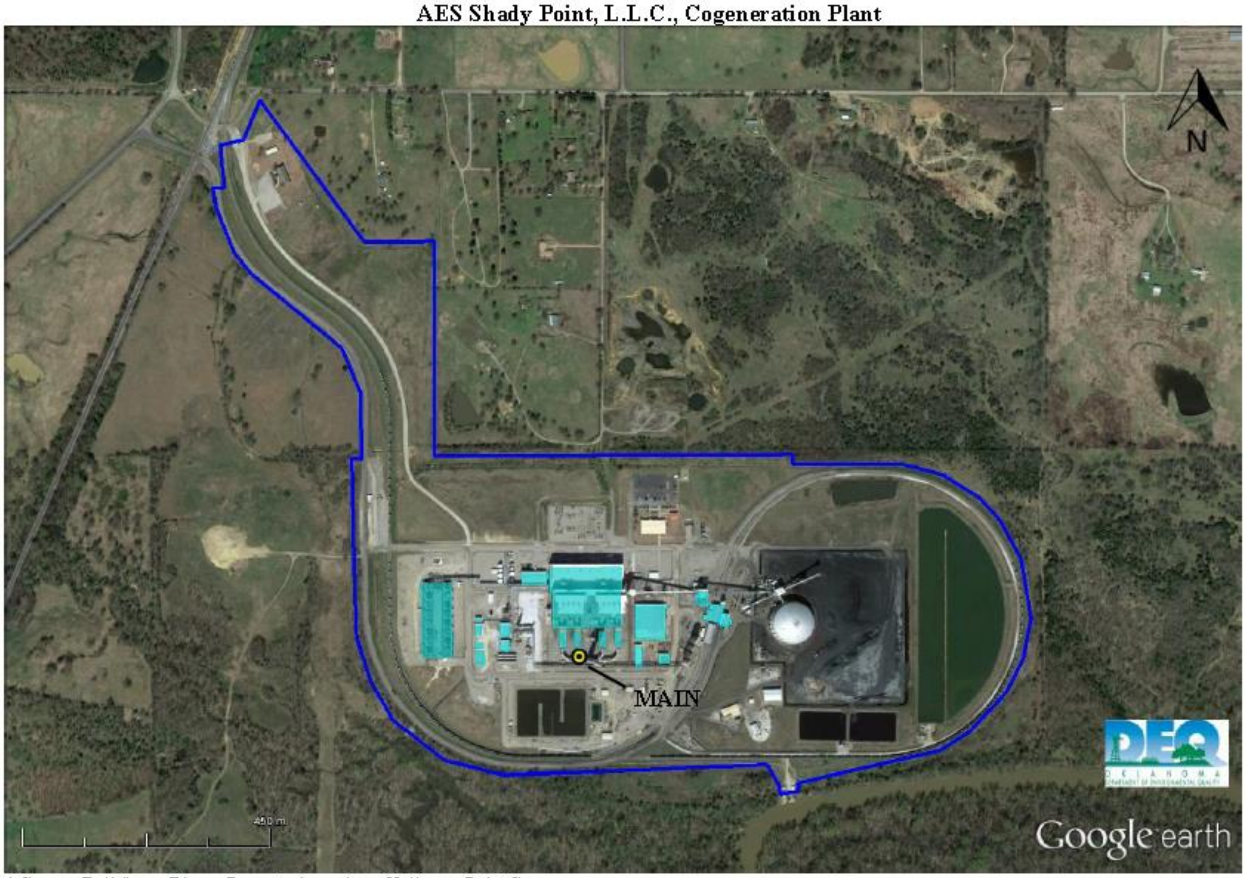
Table 15 – Modeled Stack Parameters in Area of Analysis

AES Cogeneration Plant Source Data

Source ID	Description	Easting	Northing	Elevation	Stk Ht.	Temp.	Velocity	Stk. Dia.	SO_2
		(m)	(m)	(m)	(ft)	(°F)	(fps)	(ft)	(lb/hr)
MAIN	Hourly File Boiler	350040	3895687	131	350	350	92.67	17	1,582.33
UNIT1A	Only 1 Boiler Running	350040	3895687	131	350	350	23.17	17	398.53
UNIT1A2A	Two Boilers Running	350040	3895687	131	350	350	46.33	17	794.50
UNIT1AB2	Three Boilers Running	350040	3895687	131	350	350	69.50	17	1,193.03
MAINA	All Four Boilers	350040	3895687	131	350	350	92.67	17	1,582.33

Figure 25. Modeled Fence line and Stack Locations in Area of Analysis

AES Shady Point, L.L.C., Cogeneration Plant



* Cyan – Buildings; Blue – Property boundary; Yellow – Point Sources.

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 by the time of final designations.

The EPA concludes 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 modeling runs. For example, for a facility that has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

After the "Modeling Protocol for Modeling Compliance with the 1-Hour SO_2 NAAQS" dated December 30, 2015, was drafted, the facility installed an activated carbon dry sorbent injection system and increased the dry lime injection rate to comply with the Mercury and Air Toxics Standards (MATS). The AES Cogeneration Plant has estimated that the facility has reduced its PTE by 25%. However, since the facility had potential and actual emissions of more than 2,000 tpy SO_2 after January 13, 2017, an air quality characterization using modeling was conducted by the state for the area surrounding the facility using actual emissions.

The State's modeling analysis and its actual annual SO_2 emissions between 2012 and 2014 are summarized in Table 16 below. As previously noted, the State only included AES Shady Point and no other emitters of SO_2 within 20 km of the area of analysis.

Table 16 – Actual SO_2 Emissions Between 2012-2014 from AES Shady Point in Le Flore County

Facility Name	SO_2 Emissions (tpy)		
	2012	**2013**	**2014**
AES Shady Point	2,532	3,670	3,934
Total Emissions in the State's Area of Analysis	**2,532**	**3,670**	**3,934**

The State acquired the emission rates for the Shady Point sources from CEMS data furnished by AES. Missing data was replaced based on a review of operating data. The EPA totaled the yearly emissions for Shady Point from the hourly emissions file used for the modeling and found that the emissions agreed closely with the totals in Table 17. The CEMS data could not be verified against CAMD data since the SO_2 emissions from Shady Point are not in the CAMD database. For sources that are reported to CAMD, data contained within CAMD data system are from the Acid Rain Program which has requirements for calibration and biasing of the data reported. Typically, the positive biasing will make a small (up to 5%) increase in the SO_2 emissions rate reported which may not be present in the self-reported CEMS data from AES. The EPA concludes that the 2012-2014 actual emissions used for the modeling was an appropriate emissions inventory. It represents 3 years of recent actual emissions data and coincides well with the meteorological data.

5.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

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

When conducting air dispersion modeling, the State of Oklahoma utilized surface meteorological data from the Oklahoma Mesonet (5-Minute Average Surface Data) combined with Integrated Surface Hourly Database (ISHD) Surface Data from the National Centers for Environmental Information (NCEI) and uses Upper Air (UA) data from the Earth System Research Laboratory (ESRL).

For the area of analysis in Le Flore County, the State selected the 2012-2014 ISHD meteorological data from the Robert S. Kerr Airport (KRKR) in Poteau, Oklahoma, in conjunction with the ESRL Upper Air data from the North Little Rock Municipal Airport (LZK) in Little Rock, Arkansas, for the modeling analysis.

The ISHD surface station (KRKR), located approximately 19.5 km S 7.2°E from the center of the domain, was determined to be the most representative site for the domain. The Fort Smith Regional Airport (KFSM) northeast of Fort Smith, Arkansas, was designated as the secondary ISHD station and is located approximately 30.0 km W 31.5°N from the center of the domain. The secondary ISH station was used for additional data substitution.

Meteorological data from Oklahoma Mesonet sites surrounding AES Cogeneration Plant were utilized to evaluate the wind flow patterns in the area. The WIST Oklahoma Mesonet station (located approximately 23.4 km S 9.1°W from the center of the domain) was the closest Oklahoma Mesonet station. However, it was determined based on the terrain and wind rose that the station was located in a valley and was not representative of the meteorology of the facility domain.

Upper air data from the North Little Rock Municipal Airport (LZK) in Little Rock, Arkansas (located approximately 220 km W 90.9°S from the center of the domain) was determined to be the most representative upper air site for the domain. The ESRL UA stations usually take soundings twice a day. The upper air data from the Springfield-Branson National Airport (SFG) in Springfield, Missouri was used to substitute missing soundings.

The State used AERSURFACE version 13016 using land cover data from the Oklahoma KRKR ISHD site 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 one spatial sector out to 1 km at a monthly temporal resolution for the observed moisture conditions (wet, dry, or average) relative to the 20-year average.

The monthly rainfall for the SALL Oklahoma Mesonet site was analyzed from the beginning of the establishment of the Oklahoma Mesonet program (approximately 20 years). The surface moisture conditions (Average, Wet, Dry) for each month were then determined using the monthly rainfall amounts compared to the average rainfall. These determinations were based on the guidance contained in the AERSURFACE User's Guide. The Bowen Ratio was then assigned as either average, dry, or wet based on the monthly surface moisture conditions for the SALL Oklahoma Mesonet station.

In Figure 22 above, included in the State's recommendation, the location of these weather stations are shown relative to the area of analysis. Table 17 below shows a summary of the surface characteristics associated with the Mesonet and NWS stations and, for comparison purposes, the facility. Table 18 provides the moisture conditions.

Table 17 – Surface Characteristics for Area of Analysis

Facility Domain Surface Characteristics

AES	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.17	0.71	0.37	1.68	0.287
Spring	0.15	0.38	0.22	1.02	0.363
Summer	0.18	0.40	0.25	0.99	0.546
Fall	0.18	0.71	0.37	1.68	0.546

Modeling Domain Surface Characteristics

SALL	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.17	0.73	0.39	1.70	0.045
Spring	0.15	0.41	0.25	1.07	0.063
Summer	0.18	0.42	0.27	1.02	0.173
Fall	0.18	0.73	0.39	1.70	0.172

Modeling Domain Surface Characteristics

WIST	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.17	0.77	0.39	1.85	0.025
Spring	0.15	0.42	0.24	1.13	0.037
Summer	0.18	0.40	0.25	0.99	0.170
Fall	0.18	0.77	0.39	1.85	0.170

Modeling Domain Surface Characteristics

KRKR	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.17	0.77	0.39	1.89	0.032
Spring	0.15	0.41	0.24	1.14	0.048
Summer	0.18	0.42	0.27	1.07	0.195
Fall	0.18	0.77	0.39	1.89	0.195

Modeling Domain Surface Characteristics

KFSM	Albedo	Bowen Ratio (Average)	Bowen Ratio (Wet)	Bowen Ratio (Dry)	Surface Roughness
Winter	0.17	0.78	0.45	1.74	0.028
Spring	0.15	0.53	0.34	1.26	0.037
Summer	0.17	0.55	0.37	1.25	0.075
Fall	0.17	0.78	0.45	1.74	0.070

Table 18 – Moisture Conditions for Area of Analysis

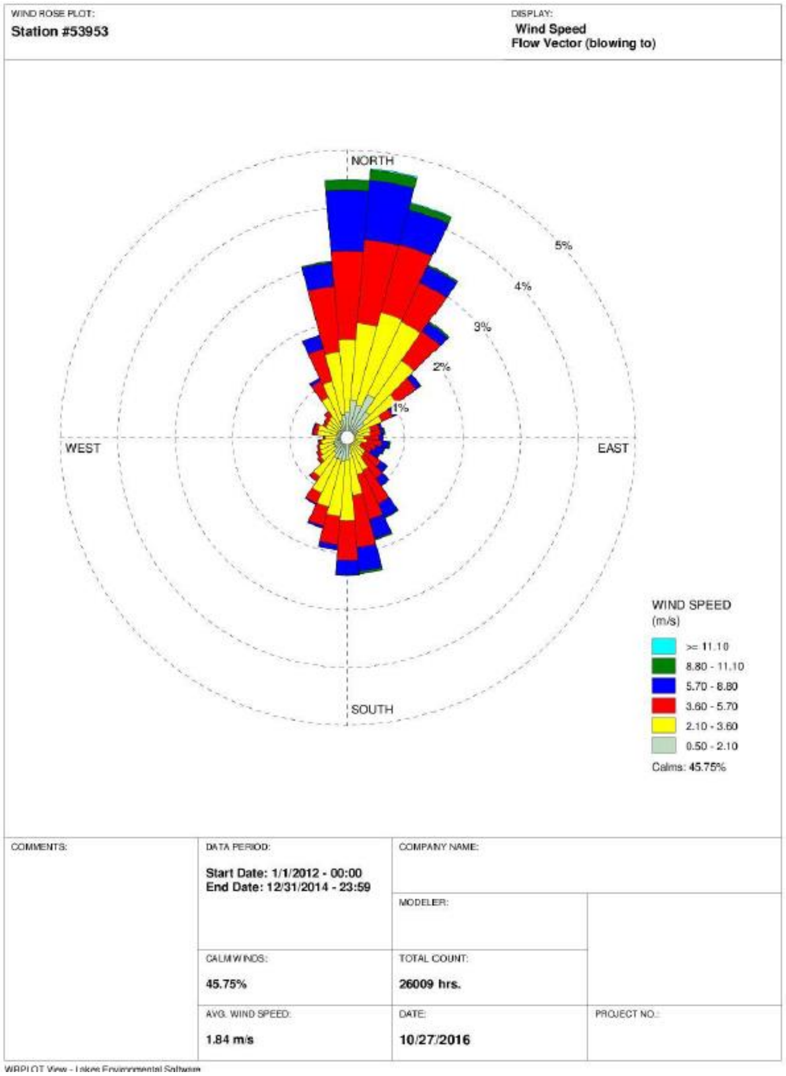
Modeling Domain Moisture Conditions[1]

Year	2012	2013	2014
January	W	A	D
February	A	W	D
March	W	A	A
April	A	A	A
May	D	W	A
June	D	A	A
July	D	W	A
August	A	A	A
September	A	D	W
October	D	A	W
November	D	A	A
December	A	W	A

[1] - Moisture conditions based on rainfall data from the SALL Oklahoma Mesonet station unless otherwise noted.
A - Average (precipitation in the middle 40th percentile);
D - Dry (precipitation in the lower 30th percentile);
W - Wet (precipitation in the upper 30th percentile).

As part of its recommendation, the State provided the 3-year surface wind rose for the meteorological data utilized. In Figure 26, the frequency, magnitude, speed, and direction of the wind are defined in terms of where the wind is blowing from. The station indicates a 1.84 m/s average wind speed that blows predominantly from the north.

Figure 26. Le Flore County Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above 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 User's Guide for the AERMOD Meteorological Data Preprocessor (AERMET) 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. KRKR is not an ASOS site and so does not report sub-hourly wind data. AERMINUTE processing could not be used and so the data used for the modeling may be prone to over-report calm wind conditions. The met data did have a high percentage of calm hours and we discussed this fact with the State. The State evaluated data from 2006-2016 and had found a similar percentage of calm hours. Since the area has terrain that impacts local meteorology, we did not find another suitable surface meteorological station to use.

The EPA concludes that the State used appropriate surface characteristics and meteorology in the modeling analysis for AES Shady Point given the limited availability for adequate local wind data. The selection of the data was appropriate from both a climatological and spatial standpoint. First, the period of time that the meteorological data was collected coincided well with the 2012-2014 emission data. The proximity of the meteorological monitoring sites to the area of analysis was acceptable, as these sites were both within 20 km located south (KRKR) and north (SALL) of the area of analysis. The surface characteristics (albedo, surface roughness, Bowen ratio, and moisture conditions) were calculated appropriately using the recommended method in the TAD with the current version of AERSURFACE and the 1992 National Land Cover Data. Of some concern is that calm winds were measured 45% of the time. The high data availability of 98.9% does not indicate systematic problems with the observations. Hours with calm winds would not normally be considered as being of concern, in the sense of having a high potential to cause concentrations above the NAAQS, for a source such as AES Shady Point with a stack height greater than 100 m and a high buoyancy due to a temperature of 450K, and velocity of 28 m/s.

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

The terrain surrounding the AES Cogeneration Plant was reviewed and was determined to have some hills with an elevation at or above the stack height. The facility is located in an area of relatively flat terrain near the source and some complex terrain a few kilometers from the source located at or near the edge of the coarser receptor domain. The AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors.

Terrain data obtained from the United States Geological Survey (USGS) Seamless Data Server at http://viewer.nationalmap.gov/viewer/ was used to determine the receptor base elevation and hill height elevation. The 1/3 arc-second National Elevation Data (NED) was obtained in the GeoTIFF format for use with AERMAP. Interpolation of receptor and source heights from the 1/3 arc-second NED elevation data is based on the current AERMAP guidance in Section 4.4 of the *User's Guide for the AERMOD Terrain Processor (AERMAP)* (EPA-454/B-03-0003, 10/2004). AERMAP uses a distance weighted bilinear interpolation method. This domain falls entirely in UTM Zone 15. All coordinates were based on the North American Datum (NAD) of 1983 (NAD83).

The EPA concludes that the modeling receptors were well placed for the type of terrain around the plant. While in relatively flat or rolling terrain the maximum impact from a source such as

Shady Point is expected to occur approximately 0-2 km from the stack, the terrain surrounding AES Shady Point was determined to have some hills with an elevation at or above the stack height.

5.3.2.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the State used a uniform monitored background concentration based on the monitored design values for the 3-year average of the 99th percentile 1-hour daily maximum.

The single value of the background concentration for this area of analysis was determined by the State to be 9.6 $\mu g/m^3$, equivalent to 3.67 ppb when expressed in two significant figures,[9] and that value was incorporated into the final AERMOD results. The State chose to use the only SO_2 monitor it currently has that is not impacted by a nearby major point source with SO_2 emissions, the Oklahoma City monitor in Oklahoma County. This monitor is in the largest urban area in Oklahoma and the Oklahoma City monitor is considered a conservative (i.e. likely to overestimate the true background value around Shady Point) background value for this analysis due to the very low SO_2 emissions near Shady Point.

The EPA concludes that this tier 1 approach is appropriate and in accordance with the Modeling TAD. The Oklahoma County monitor is an adequate monitor to use in the modeling to represent the background for purposes of modeling attainment of the 2010 1-hour SO_2 NAAQS.

5.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Le Flore County area of analysis are summarized below in Table 19.

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

Table 19 – Summary of AERMOD Modeling Input Parameters for the Le Flore County Area

Input Parameter	Value
AERMOD Version	15181 (regulatory options)
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	5
Modeled Structures	-
Modeled Fence lines	Yes (*see* Figure 25)
Total receptors	3,155
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
NWS Station for Surface Meteorology	Robert S. Kerr Airport (KRKR)
NWS Station Upper Air Meteorology	North Little Rock Municipal Airport (LZK) in Little Rock, Arkansas
NWS Station for Calculating Surface Characteristics	Seasonal surface characteristics are provided for the KRKR, and KFSM. Surface moisture conditions are based on the SALL Oklahoma Mesonet station
Methodology for Calculating Background SO_2 Concentration	3-year average of 99th Percentile 1-hour daily maximum
Calculated Background SO_2 Concentration	Oklahoma City, AQS ID: 40-109-1037 9.6 $\mu g/m^3$

The results presented below in Table 20 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

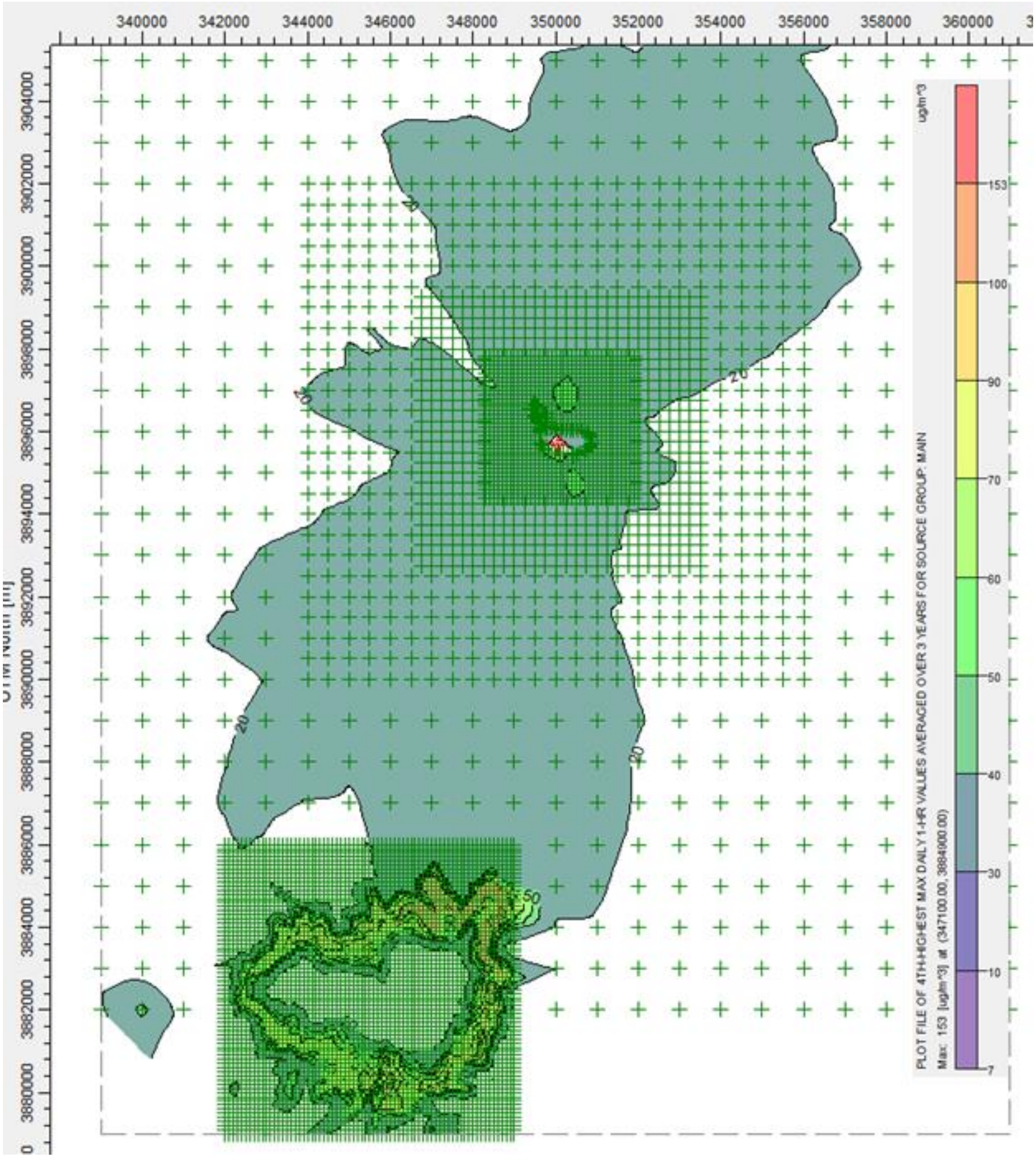
Table 20 – Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Le Flore County Area of Analysis

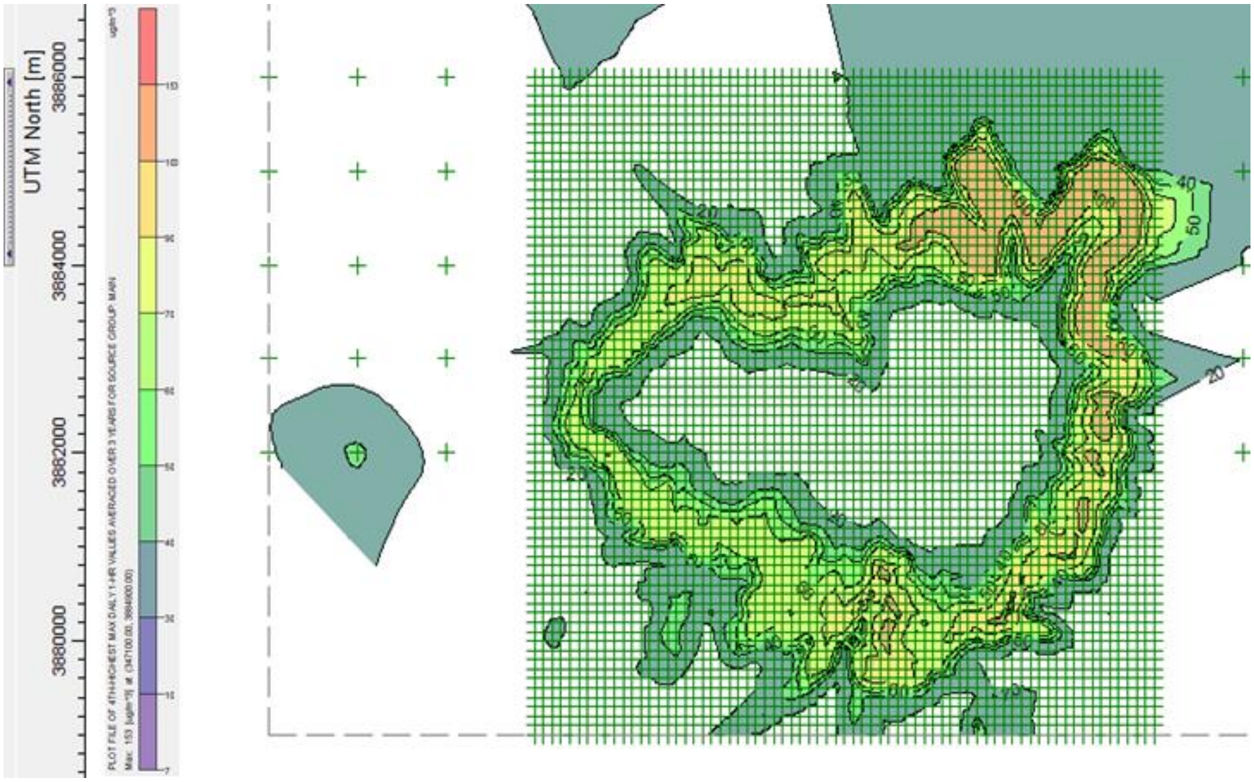
Averaging Period	Data Period	Receptor Location UTM Zone 15		Maximum 99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM (E)	UTM (N)	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012-2014	3884900.00	347100.00	162.7	196.4*

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

The State's modeling analysis provided an estimate of the 3-year average of the highest fourth highest (H4H) daily maximum impact which is also referred to as the 3-year average of the 99^{th} percentile daily maximum impact in the modeling domain which is 162.7 $\mu g/m^3$, equivalent to 62.12 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from AEP Shady Point. Figure 27 below was generated by the EPA using the State's modeling, and indicates that the predicted value occurred to the south of facility where the plume impacted terrain. The State's receptor grid is also shown in the figure.

Figure 27. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Le Flore County Area of Analysis (not including background) . Second graphic is a zoom in of the area around the complex terrain.





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

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

When evaluating the modeling that came in from the State, no major issues with the State modeling were identified. The modeling shows attainment, and the modeling follows the TAD and EPA guidance. An observation about the high prevalence (>45% of the hours) of calm winds in the meteorological data is not of critical concern for a source such as AES Shady Point with its tall stack and high plume buoyancy. The State addressed nearby complex terrain by placing a fine receptor grid in that location.

5.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for Le Flore County, Oklahoma

These factors were incorporated into the air quality modeling efforts and the results were discussed above. The EPA gave 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 Le Flore County, Oklahoma

Once the geographic area of analysis associated with AES Shady Point, other nearby sources, and background concentration were determined, the existing jurisdictional boundaries were considered for the purpose of informing the EPA's intended designation action for Le Flore County, Oklahoma. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable. The counties in Oklahoma are not subdivided into townships or other independent entities and so are an administrative unit.

The EPA concludes that our intended unclassifiable/attainment area, consisting of the entirety of Le Flore County, Oklahoma, will have clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable/attainment area for the 2010 1-hour SO_2 NAAQS.

5.6. The EPA's Assessment of the Available Information for Le Flore County, Oklahoma

When evaluating the modeling submitted by the State, no major issues were identified with the State's modeling. The State's modeling showed attainment, and the modeling followed EPA guidance, including the Modeling TAD. There are no nearby SO_2 monitors. The State did not recommend an area boundary for this round of designations. We intend to designate the entire area within Le Flore County as unclassifiable/attainment, because the county does not violate the NAAQS and sources in the county do not contribute to air quality in any nearby area that violates the NAAQS. Our intended use of the county boundary is consistent with the state's boundary recommendation. With the exception of the AES Shady Point Cogeneration Facility, whose emissions have been modeled to show compliance with the standard, there are no other sources within Le Flore County that emit at or above 100 tpy, based on 2014 NEI. Additionally, the EPA confirmed that there were no other sources in Le Flore County or near its borders that were likely to cause or contribute to a violation of the NAAQS within Le Flore County or nearby. The nearest major SO_2 source is 5.5 km to the northeast of Le Flore County with emissions of 162.78 tpy. Due to the low frequency of winds from the northeast (<2%), this source would rarely influence Le Flore County while the corresponding low occurrence of winds from the southwest limits the frequency of impact of the only major source in Le Flore County, Shady Point, on the area around this source. The next nearest major SO_2 source is 67 km distant. There are no other major sources in the 2014 NEI in the counties surrounding Le Flore County, so based on our analysis there are no surrounding areas outside of Le Flore County where Shady Point could contribute to a violation. The EPA intends to find that Le Flore County is a reasonable jurisdictional boundary for the designation.

5.7. Summary of Our Intended Designation for Le Flore County, Oklahoma

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the area around AES Shady Point as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the intended designated area is comprised of the entirety of Le Flore County, Oklahoma. Figure 19 shows the boundary of this intended designated area.

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

6. Technical Analysis for Certain Remaining Undesignated Areas (Excluding Areas with New Approved SO_2 Monitors)

6.1. Introduction

The State has not installed and begun timely operation of a new, approved SO_2 monitoring network meeting EPA specifications referenced in the EPA's DRR for any sources of SO_2 emissions in the counties identified in Table 22. Accordingly, the EPA must designate these counties by December 31, 2017. At this time, there are no air quality modeling results available to the EPA for these counties. In addition, there is no air quality monitoring data that indicate any violation of the 1-hour SO_2 NAAQS. The EPA is designating the counties in Table 22 as "unclassifiable/attainment" since each area 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.

6.2. Air Quality Monitoring Data for Adair, Muskogee, and Tulsa County

Eight monitors in or close to the counties addressed in this section (these counties are individually listed in Table 22) have sufficient valid data to calculate a design value for 2014-2016 and these data indicate that there was no violation of the 2010 SO_2 NAAQS at those monitoring sites in that period. Oklahoma most recently (in 2011) proposed that Tulsa County, Oklahoma, be designated as unclassifiable. At that time, one or more monitors indicated exceedances of the standard. However, by the time of the Round 1 designations in October 2013 all four monitors in the County indicated no violations of the 2010 SO_2 NAAQS, so there were no nonattainment designations made for Oklahoma in Round 1. The monitor design values for 2014-2016 are given in Table 21 below; all values are below the 75 ppb standard. These data were available to the EPA for consideration in the designations process. However, the EPA does not have information indicating this data is in an area of maximum concentration for each respective area, so this data cannot be used as the basis for designation for these areas.

Table 21 – SO2 Monitor Sites in Oklahoma with Sufficient Data to Calculate a 2014-2016 Design Value

County	State FIPS	County FIPs	Site ID	Address	2014-2016 Design Value (ppb)
Adair	40	001	9009	South Highway 59, RR1, 1795 Dahlonegah Park Road, Stilwell, Oklahoma	15
Kay	40	071	0604	306 E Otoe	33
Muskogee	40	101	0167	3500 Port Place Muskogee, OK 74403	44
Oklahoma	40	109	1037	2501 E. Memorial Rd. (Oklahoma Christian University)	3
Tulsa	40	143	0175	1710 West Charles Page Boulevard	14
Tulsa	40	143	0179	124 North Riverside Drive West, Tulsa OK 74127	7
Tulsa	40	143	0235	2443 South Jackson Avenue	10
Tulsa	40	143	1127	3520 1/2 N. Peoria	6

6.3. Jurisdictional Boundaries in the Remainder of Oklahoma Area

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for city/county/parish. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable. The counties in Oklahoma are administrative units that are not subdivided into townships or other independent entities. The State of Oklahoma has recommended designations for the areas of the State outside the immediate influence of the DRR sources, the recommendations and the areas are contained in Table 22.

6.4. The EPA's Assessment of the Available Information for the Rest of Oklahoma Area

These counties were not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS. These counties therefore meet the definition of an "unclassifiable/attainment" area for this action. Therefore, the EPA intends to designate the areas in Table 22 as separate unclassifiable/attainment areas for the 2010 SO_2 NAAQS.

Table 22 – Other Counties that the EPA Intends to Designate Unclassifiable/Attainment

County	Oklahoma's Recommended Area Definition	Oklahoma's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Adair	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Alfalfa	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Atoka	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Beaver	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Beckham	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Blaine	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Bryan	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Caddo	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Canadian	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Carter	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Cherokee	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Cimarron	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Cleveland	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Coal	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Comanche	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Cotton	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Craig	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Creek	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Custer	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment

County	Oklahoma's Recommended Area Definition	Oklahoma's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Delaware	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Dewey	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Ellis	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Garvin	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Grady	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Grant	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Greer	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Harmon	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Harper	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Haskell	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Hughes	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Jackson	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Jefferson	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Johnston	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Kingfisher	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Kiowa	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Latimer	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Lincoln	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Logan	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Love	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment

County	Oklahoma's Recommended Area Definition	Oklahoma's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
McClain	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
McCurtain	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
McIntosh	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Major	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Marshall	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Murray	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Nowata	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Okfuskee	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Oklahoma	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Okmulgee	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Osage	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Ottawa	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Pawnee	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Payne	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Pittsburg	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Pontotoc	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Pottawatomie	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Pushmataha	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Roger Mills	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Seminole	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment

County	Oklahoma's Recommended Area Definition	Oklahoma's Recommended Designation	EPA's Intended Area Definition	EPA’s Intended Designation
Sequoyah	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Stephens	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Texas	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Tillman	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Tulsa	Entire County	Unclassifiable	Same as State's	Unclassifiable/ Attainment
Wagoner	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Washington	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Washita	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Woods	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment
Woodward	Entire County	Attainment	Same as State's	Unclassifiable/ Attainment

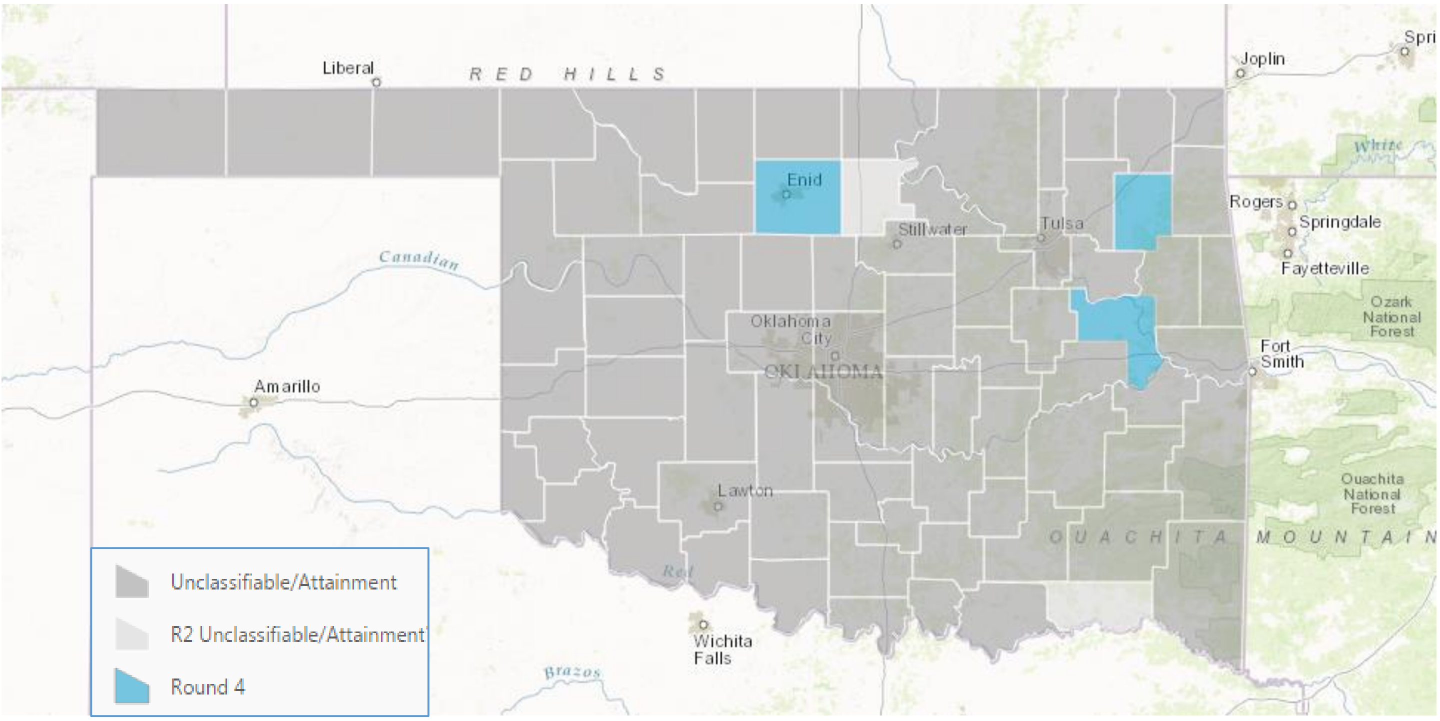
Our intended unclassifiable/attainment areas, are bounded by the county boundaries and thus have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment areas.

6.5. Summary of Our Intended Designation for Certain Remaining Undesignated Areas

After careful evaluation of the state’s recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the 69 counties listed in Table 24 (in addition to Kay, Le Flore, and Rogers Counties) as separate unclassifiable/attainment areas for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the boundaries of the individual counties intended to be so designated (Table 24).

Figure 27 shows the location of these areas within Oklahoma. Kay County, Le Flore, and Rodgers County, which are addressed in other sections of this TSD, are also shaded in Figure 32 as they are also intended to be designated as unclassifiable/attainment areas.

Figure 27. Location of Counties to be Designated as Unclassifiable/Attainment in Oklahoma are denoted in dark gray. The Boundaries of the Unclassifiable/Attainment Areas are the Boundaries of Each County.



For each county, the boundary of the unclassifiable/attainment area is the county boundary.

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