

# Final Technical Support Document

## Nebraska Area Designations for the 2010 SO<sub>2</sub> Primary National Ambient Air Quality Standard

### Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (the EPA, or the Agency) must designate areas as either “unclassifiable,” “attainment,” or “nonattainment” for the 2010 1-hour sulfur dioxide (SO<sub>2</sub>) primary national ambient air quality standard (NAAQS). Section 107(d) of the CAA defines a nonattainment area as one that does not meet the NAAQS or that contributes to a NAAQS violation in a nearby area, an attainment area as any area other than a nonattainment area that meets the NAAQS, and an unclassifiable area as any area that cannot be classified on the basis of available information as meeting or not meeting the NAAQS.

July 2, 2016, is the deadline established by the U.S. District Court for the Northern District of California for the EPA to designate certain areas. This deadline is the first of three deadlines established by the court for the EPA to complete area designations for the 2010 SO<sub>2</sub> NAAQS. This deadline applies to certain areas in Nebraska because three emission sources meet the conditions of the court’s order.

Nebraska submitted updated recommendations on September 18, 2015. Table 1 below lists Nebraska’s recommendations and identifies the counties in Nebraska that the EPA is designating in order to meet the July 2, 2016, court-ordered deadline. These final designations are based on an assessment and characterization of air quality through ambient air quality data, air dispersion modeling, other evidence and supporting information, or a combination of the above.

**Table 1 – Nebraska’s Recommended and the EPA’s Final Designations**

Area	Nebraska’s Recommended Area Definition	Nebraska’s Recommended Designation	the EPA’s Final Area Definition	the EPA’s Final Designation
Nebraska City Station, Nebraska	No Boundaries were defined in the State’s official recommendation	Attainment	Otoe County, Nebraska <sup>1</sup> (Otoe County, NE)	Unclassifiable/ Attainment <sup>2</sup>

<sup>1</sup> The EPA notified the State of Nebraska on February 16, 2016, that our intended area definition consisted of the entirety of Otoe County, Nebraska. Our final area definition is the same as our intended area definition.

<sup>2</sup> The EPA notified the State of Nebraska on February 16, 2016, that our intended designation for the Nebraska City Station area was unclassifiable/attainment. Our final designation is the same as our intended designation.

Gerald Gentleman Station, Nebraska	No Boundaries were defined in the State's official recommendation	Attainment	Lincoln County, Nebraska <sup>3</sup> (Lincoln County, NE)	Unclassifiable/Attainment <sup>4</sup>
Sheldon Station, Nebraska	No Boundaries were defined in the State's official recommendation	Unclassifiable	Lancaster County, Nebraska <sup>5</sup> (Lancaster County, NE)	Unclassifiable <sup>6</sup>

### Background

On June 3, 2010, the EPA revised the primary (health based) SO<sub>2</sub> NAAQS by establishing a new 1-hour standard at a level of 75 parts per billion (ppb) which is met at an ambient air quality monitoring station when the 3-year average of the 99th percentile of 1-hour daily maximum concentrations does not exceed 75 ppb. This NAAQS was published in the *Federal Register* on June 22, 2010 (75 FR 35520), and is codified at 40 CFR 50.17. The EPA determined this is the level necessary to protect public health with an adequate margin of safety, especially for children, the elderly, and those with asthma. These groups are particularly susceptible to the health effects associated with breathing SO<sub>2</sub>. The two prior primary standards of 140 ppb evaluated over 24 hours, and 30 ppb evaluated over an entire year, codified at 40 CFR 50.4, remain applicable.<sup>7</sup> However, the EPA is not currently designating areas on the basis of either of these two primary standards. Similarly, the secondary standard for SO<sub>2</sub>, set at 500 ppb evaluated over 3 hours, codified at 40 CFR 50.5, has not been revised, and the EPA is also not currently designating areas on the basis of the secondary standard.

### General Approach and Schedule

---

<sup>3</sup> The EPA notified the State of Nebraska on February 16, 2016, that our intended area definition consisted of the entirety of Lincoln County, Nebraska. Our final area definition is the same as our intended area definition.

<sup>4</sup> The EPA notified the State of Nebraska on February 16, 2016, that our intended designation for the Gerald Gentleman Station area was unclassifiable/attainment. Our final designation is the same as our intended designation.

<sup>5</sup> The EPA notified the State of Nebraska on February 16, 2016, that our intended area definition consisted of the entirety of Lancaster County, Nebraska. Our final area definition is the same as our intended area definition.

<sup>6</sup> The EPA notified the State of Nebraska on February 16, 2016, that our intended designation for the Sheldon Station area was unclassifiable/attainment. Our final designation is the same as our intended designation.

<sup>7</sup> 40 CFR 50.4(e) provides that the two prior primary NAAQS will no longer apply to an area 1 year after its designation under the 2010 NAAQS, except that for areas designated nonattainment under the prior NAAQS as of August 22, 2010, and areas not meeting the requirements of a SIP Call under the prior NAAQS, the prior NAAQS will apply until that area submits and the EPA approves a SIP providing for attainment of the 2010 NAAQS. No Nebraska areas were designated nonattainment for the prior NAAQS at the time of promulgation of the NAAQS, nor were any not meeting the requirements of a SIP Call under the prior NAAQS.

Section 107(d) of the CAA requires that not later than 1 year after promulgation of a new or revised NAAQS, state governors must submit their recommendations for designations and boundaries to the EPA. Section 107(d) also requires the EPA to provide notification to states no less than 120 days prior to promulgating an initial area designation that is a modification of a state's recommendation. If a state does not submit designation recommendations, the EPA may promulgate the designations that it deems appropriate without prior notification to the state, although it is our intention to provide such notification when possible. If a state or tribe disagrees with the EPA's intended designations, it is given an opportunity within the 120-day period to demonstrate why any proposed modification is inappropriate. The EPA is required to complete designations within 2 years after promulgation of a new or revised NAAQS, unless the EPA determines that sufficient information is not available, in which case the deadline is extended to 3 years. The 3-year deadline for the revised SO<sub>2</sub> NAAQS was June 2, 2013.

On August 5, 2013, the EPA published a final rule establishing air quality designations for 29 areas in the United States for the 2010 SO<sub>2</sub> NAAQS, based on recorded air quality monitoring data from 2009 - 2011 showing violations of the NAAQS (78 FR 47191). In that rulemaking, the EPA committed to address, in separate future actions, the designations for all other areas for which the Agency was not yet prepared to issue designations.

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

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

The last two deadlines for completing remaining designations are December 31, 2017, and December 31, 2020. The EPA has separately promulgated requirements for state and other air agencies to provide additional monitoring or modeling information on a timetable consistent with these designation deadlines. We expect this information to become available in time to help

inform these subsequent designations. These requirements were promulgated on August 21, 2015 (80 FR 51052), in a rule known as the SO<sub>2</sub> Data Requirements Rule (DRR), codified at 40 CFR part 51 subpart BB.

Updated designations guidance was issued by the EPA through a March 20, 2015, memorandum from Stephen D. Page, Director, U.S. the EPA, Office of Air Quality Planning and Standards, to Air Division Directors, U.S. the EPA Regions 1-10. This memorandum supersedes earlier designation guidance for the 2010 SO<sub>2</sub> NAAQS, issued on March 24, 2011, and it identifies factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO<sub>2</sub> NAAQS. The guidance also contains the factors the EPA intends to evaluate in determining the boundaries for all remaining areas in the country, consistent with the court's order and schedule. These factors include: 1) Air quality characterization via ambient monitoring or dispersion modeling results; 2) Emissions-related data; 3) Meteorology; 4) Geography and topography; and 5) Jurisdictional boundaries. This guidance was supplemented by two non-binding technical assistance documents intended to assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling or ambient air quality monitoring for sources that emit SO<sub>2</sub>. Notably, the EPA's documents titled, "SO<sub>2</sub> NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) and "SO<sub>2</sub> NAAQS Designations Source-Oriented Monitoring Technical Assistance Document" (Monitoring TAD), were made available to states and other interested parties. Both of these TADs were most recently updated in February 2016.

Based on complete, quality assured and certified ambient air quality data collected between 2013 and 2015, no violations of the 2010 SO<sub>2</sub> NAAQS have been recorded at ambient air quality monitors in any undesignated part of Nebraska. However, there are three sources in the State meeting the emissions criteria of the consent decree for which the EPA must complete designations by July 2, 2016. In this final technical support document, the EPA discusses its review and technical analysis of Nebraska's updated recommendations for the areas that we must designate. The EPA also discusses any intended and final modifications from the State's recommendation based on all available data before us.

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

- 1) 2010 SO<sub>2</sub> NAAQS – the primary NAAQS for SO<sub>2</sub> 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) Attaining monitor – an ambient air monitor meeting all methods, quality assurance, and siting criteria and requirements whose valid design value is under 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
- 3) 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.
- 4) Designated nonattainment area – an area which the EPA has determined has violated the 2010 SO<sub>2</sub> NAAQS or contributed to a violation in a nearby area. A nonattainment designation reflects considerations of the state's recommendations and all of the information discussed in this document. The EPA's decision is based on all available

information including the most recent 3 years of air quality monitoring data, available modeling analyses, and any other relevant information.

- 5) Designated unclassifiable area – an area for which the EPA cannot determine based on all available information whether or not it meets the 2010 SO<sub>2</sub> NAAQS.
- 6) Designated unclassifiable/attainment area – an area which the EPA has determined to have sufficient evidence to find either is attaining or is likely to be attaining the NAAQS. The EPA’s decision is based on all available information including the most recent 3 years of air quality monitoring data, available modeling analyses, and any other relevant information.
- 7) Modeled violation – a violation based on air dispersion modeling.
- 8) Recommended attainment area – an area a state or tribe has recommended that the EPA designate as attainment.
- 9) Recommended nonattainment area – an area a state or tribe has recommended that the EPA designate as nonattainment.
- 10) Recommended unclassifiable area – an area a state or tribe has recommended that the EPA designate as unclassifiable.
- 11) Recommended unclassifiable/attainment area – an area a state or tribe has recommended that the EPA designate as unclassifiable/attainment.
- 12) Violating monitor – an ambient air monitor meeting all methods, quality assurance, and siting criteria and requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.

## **Technical Analysis for the Nebraska City Station, Nebraska Area**

### Final Designation Summary

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA designates the area around the Nebraska City Station, Nebraska, as unclassifiable/attainment for the 2010 SO<sub>2</sub> NAAQS. Specifically, the boundaries are comprised of the entirety of Otoe County, Nebraska.

The unclassifiable/attainment designation is based on the modeling analysis that the State of Nebraska provided to the EPA.

### Introduction

The Nebraska City Station, Nebraska, area contains a stationary source that, according to the EPA's Air Markets Database, emitted in 2012 either more than 16,000 tons of SO<sub>2</sub> or more than 2,600 tons of SO<sub>2</sub> and had an annual average emission rate of at least 0.45 pounds of SO<sub>2</sub> per one million British thermal units (lbs SO<sub>2</sub>/MMBtu). Specifically, in 2012, the Omaha Public Power District's (OPPD) Nebraska City Station electric generating facility emitted 16,766 tons of SO<sub>2</sub> and had an emissions rate of 0.35 lbs SO<sub>2</sub>/MMBtu. As of March 2, 2015, this stationary source had not met the criteria for being "announced for retirement." Pursuant to the March 2, 2015, court-ordered schedule, the EPA must designate the area surrounding this facility by July 2, 2016.

In its September 18, 2015 submission, Nebraska recommended that the area surrounding Nebraska City Station electric generating facility be designated as attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO<sub>2</sub> are expected. No area (e.g., jurisdictional boundaries) was officially recommended by Nebraska. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions.

On February 16, 2016, the EPA notified Nebraska that we intended to designate the Nebraska City Station, Nebraska, area as unclassifiable/attainment, based on our view that the area was meeting the NAAQS. Additionally, we informed Nebraska that our intended boundaries for the unclassifiable/attainment area consisted of the entirety of Otoe County, Nebraska. Our intended designation and associated boundaries were based on the modeling analysis that the State of Nebraska provided to the EPA for the Nebraska City Station which showed attainment of the NAAQS and used actual emissions from 2012-2014 and followed the recommended the EPA modeling TAD. Detailed rationale, analyses, and other information supporting our intended designation for this area can be found in the preliminary technical support document for Nebraska, and this document along with all others related to this rulemaking can be found in Docket ID the EPA-HQ-OAR-2014-0464.

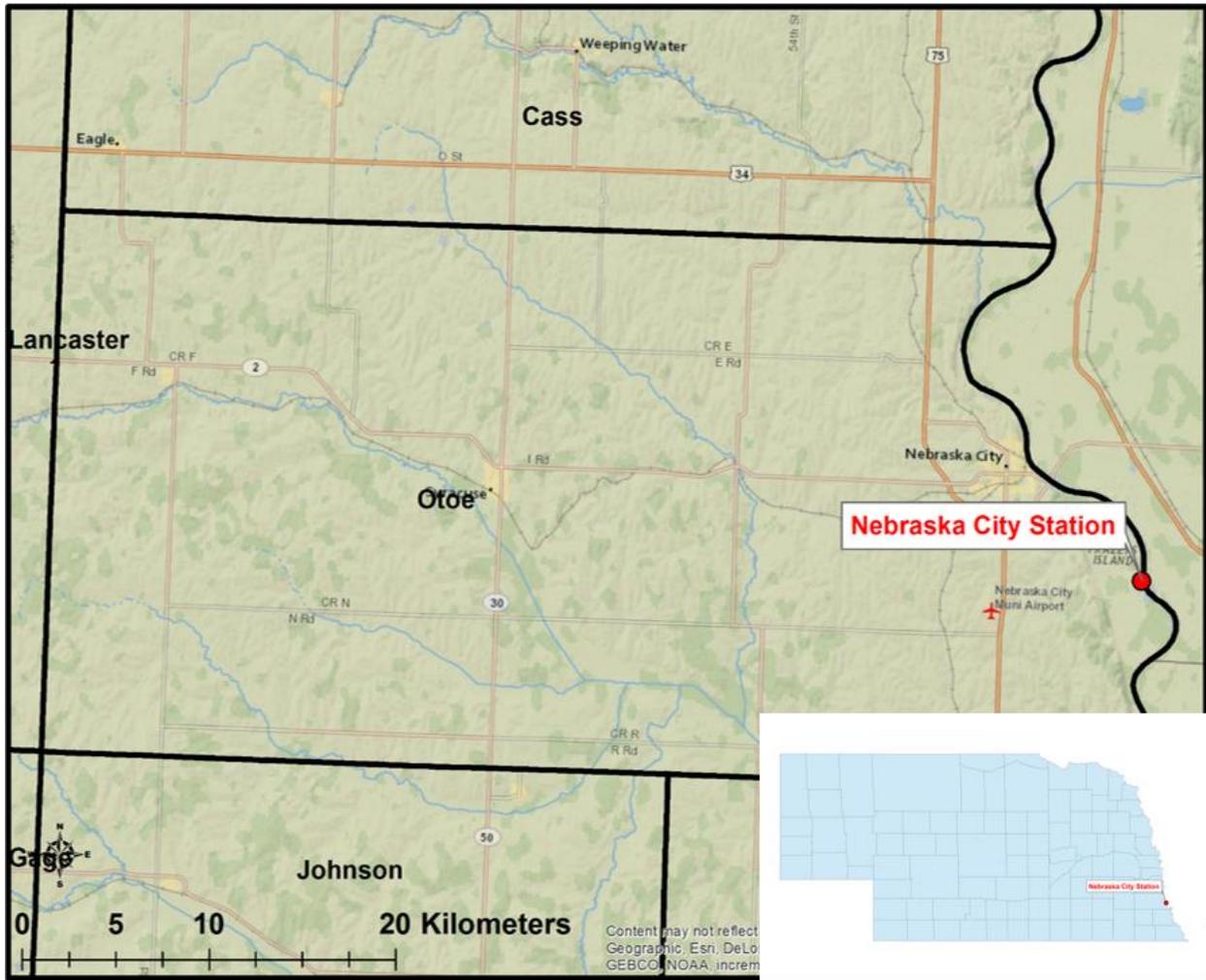
### Assessment and Conclusion

In our February 16, 2016, notification to Nebraska regarding our intended unclassifiable/attainment designation for the Nebraska City Station, Nebraska area, the EPA requested that any additional information that the Agency should consider prior to finalizing the designation should be submitted by April 19, 2016. On March 1, 2016, the EPA also published a notice of availability and public comment period in the *Federal Register*, inviting the public to review and provide input on our intended designations by March 31, 2016 (81 FR 10563).

Subsequent to our February 16, 2016 notification, the EPA did not receive any additional information from Nebraska, nor did we receive any public comments, regarding our intended unclassifiable/attainment designation for the Nebraska City Station, Nebraska area. The EPA is explicitly incorporating and relying upon the analyses and information presented in the preliminary technical support document for the purposes of our final designation for this area, except to the extent that any new information submitted to the EPA or conclusions presented in this final technical support document and our response to comments document (RTC), available in the docket, supersede those found in the preliminary document.

Therefore, based on the information available to the EPA at this time including the analyses performed for the purposes of the preliminary technical support document, the EPA concludes that the area is meeting the 2010 primary SO<sub>2</sub> NAAQS, and therefore is designating the Nebraska City Station, Nebraska, area as unclassifiable/attainment for the 2010 SO<sub>2</sub> NAAQS. The boundaries for this unclassifiable/attainment area consist of the entirety of Otoe County, Nebraska, and are shown in the figure below. There are no other nearby emitters of SO<sub>2</sub> within Otoe County, Nebraska.

**Figure 1: The EPA's final unclassifiable/attainment area: Otoe County, Nebraska.**



At this time, our final designations for the state only apply to this area and the others contained in this final technical support document. Consistent with the court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in Nebraska by either December 31, 2017, or December 31, 2020.

## **Technical Analysis for the Gerald Gentleman Station, Nebraska Area**

### Final Designation Summary

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA designates the area around the Gerald Gentleman Station as unclassifiable/attainment for the 2010 SO<sub>2</sub> NAAQS. Specifically, the boundaries are comprised of the entirety of Lincoln County, Nebraska.

The unclassifiable/attainment designation is based on the modeling analysis that the State of Nebraska provided to the EPA.

### Introduction

The Lincoln County, Nebraska, area contains a stationary source that, according to the EPA's Air Markets Database, emitted in 2012 either more than 16,000 tons of SO<sub>2</sub> or more than 2,600 tons of SO<sub>2</sub> and had an annual average emission rate of at least 0.45 pounds of SO<sub>2</sub> per one million British thermal units (lbs SO<sub>2</sub>/MMBtu). Specifically, in 2012, the Nebraska Public Power District's (NPPD) Gerald Gentleman electric generating facility emitted 16,766 tons of SO<sub>2</sub> and had an emissions rate of 0.59 lbs SO<sub>2</sub>/MMBtu. As of March 2, 2015, this stationary source had not met the criteria for being "announced for retirement." Pursuant to the March 2, 2015, court-ordered schedule, the EPA must designate the area surrounding this facility by July 2, 2016.

In its September 18, 2016 submission, Nebraska recommended that the area surrounding the Gerald Gentleman electric generating facility be designated as attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO<sub>2</sub> are expected. No area (e.g., jurisdictional boundaries) was officially recommended by Nebraska. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions.

On February 16, 2016, the EPA notified Nebraska that we intended to designate the Gerald Gentleman area as unclassifiable/attainment, based on our view that the area was meeting the NAAQS. Additionally, we informed Nebraska that our intended boundaries for the unclassifiable/attainment area consisted of the entirety of Lincoln County, Nebraska. Our intended designation and associated boundaries were based on, among other things, the modeling analysis that the State of Nebraska provided to the EPA. The modeling analysis submitted by Nebraska for the Gerald Gentleman Station using actual emissions from 2012-2014 shows attainment and this modeling followed the recommended the EPA modeling TAD for designation purposes. Detailed rationale, analyses, and other information supporting our intended designation for this area can be found in the preliminary technical support document for Nebraska, and this document along with all others related to this rulemaking can be found in Docket ID the EPA-HQ-OAR-2014-0464.

### Assessment and Conclusion

In our February 16, 2016 notification to Nebraska regarding our intended unclassifiable/attainment designation for the Gerald Gentleman area, the EPA requested that any additional information that the Agency should consider prior to finalizing the designation should be submitted by April 19, 2016. On March 1, 2016, the EPA also published a notice of availability and public comment period in the *Federal Register*, inviting the public to review and provide input on our intended designations by March 31, 2016 (81 FR 10563).

The EPA is explicitly incorporating and relying upon the analyses and information presented in the preliminary technical support document for the purposes of our final designation for this area, except to the extent that any new information submitted to the EPA or conclusions presented in this final technical support document and our response to comments document (RTC), available in the docket, supersede those found in the preliminary document.

The EPA received a comment from the Nebraska Public Power Department requesting a correction to the emission rate from the facility. This comment and our response can be found in the RTC. Therefore, based on the information available to the EPA at this time, including the modeling analysis performed by the State that shows attainment with the NAAQS and follows the modeling TAD, the EPA concludes that the area is meeting the 2010 primary SO<sub>2</sub> NAAQS, and therefore is designating the Gerald Gentleman Station area as unclassifiable/attainment for the 2010 SO<sub>2</sub> NAAQS. The boundaries for this unclassifiable/attainment area consist of the entirety of Lincoln County, Nebraska, and are shown in the figure below. There are no nearby emitters of SO<sub>2</sub> within Lincoln County, Nebraska.

**Figure 2: The EPA's final unclassifiable/attainment area: Lincoln County, Nebraska.**



At this time, our final designations for the state only apply to this area and the others contained in this final technical support document. Consistent with the court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in Nebraska by either December 31, 2017, or December 31, 2020.

## **Technical Analysis for Sheldon Station, Nebraska Area**

### Final Designation Summary

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, the EPA designates the area around Sheldon Station as unclassifiable for the 2010 SO<sub>2</sub> NAAQS. Specifically, the boundaries are comprised of the entirety of Lancaster County, Nebraska.

The unclassifiable designation is based on the EPA determining that the area cannot be classified on the basis of all available information, including all modeling analyses that were submitted by both the state of Nebraska and the Sierra Club, as meeting or not meeting the 2010 SO<sub>2</sub> NAAQS. All modeling analyses that the State conducted relied upon actual emissions from the 2012-2014 timeframe and included future changes to the current Sheldon Station operations that were not in place during the 2012-2014 timeframe. Both modeling analyses submitted by the Sierra Club use a background value that the EPA finds is not representative of the area surrounding the Sheldon Station facility.

### Introduction

The Lancaster County, Nebraska, area contains a stationary source that, according to the EPA's Air Markets Database, emitted in 2012 either more than 16,000 tons of SO<sub>2</sub> or more than 2,600 tons of SO<sub>2</sub> and had an annual average emission rate of at least 0.45 pounds of SO<sub>2</sub> per one million British thermal units (lbs SO<sub>2</sub>/MMBtu). Specifically, in 2012, the Nebraska Public Power District's (NPPD) electric generating facility emitted 2,760 tons of SO<sub>2</sub> and had an emissions rate of 0.46 lbs SO<sub>2</sub>/MMBtu. As of March 2, 2015, this stationary source had not met the criteria for being "announced for retirement." Pursuant to the March 2, 2015, court-ordered schedule, the EPA must designate the area surrounding this facility by July 2, 2016.

In its September 18, 2015 submission, Nebraska recommended that the area surrounding the Sheldon Station electric generating facility be designated as unclassifiable based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO<sub>2</sub> are expected. No area (e.g., jurisdictional boundaries) was officially recommended by Nebraska. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions with future year stack height modifications to Sheldon Station Unit 1 and Unit 2.

On February 16, 2016, the EPA notified Nebraska that we intended to designate the Sheldon Station, Nebraska, area as unclassifiable. Additionally, we informed Nebraska that our intended boundaries for the unclassifiable area consisted of the entirety of Lancaster County, Nebraska. Our intended designation and associated boundaries were based on, among other things, the EPA determining that the modeling analyses that the state and Sierra Club provided to the EPA did not provide a basis to determine whether the area is or is not meeting the 2010 SO<sub>2</sub> NAAQS. Specifically, the State did not use historic actual stack heights when analyzing actual emissions and Sierra Club used a background SO<sub>2</sub> value that is not representative of the area surrounding

the Sheldon Station facility. Detailed rationale, analyses, and other information supporting our intended designation for this area can be found in the preliminary technical support document for Nebraska, and this document along with all others related to this rulemaking can be found in Docket ID the EPA-HQ-OAR-2014-0464.

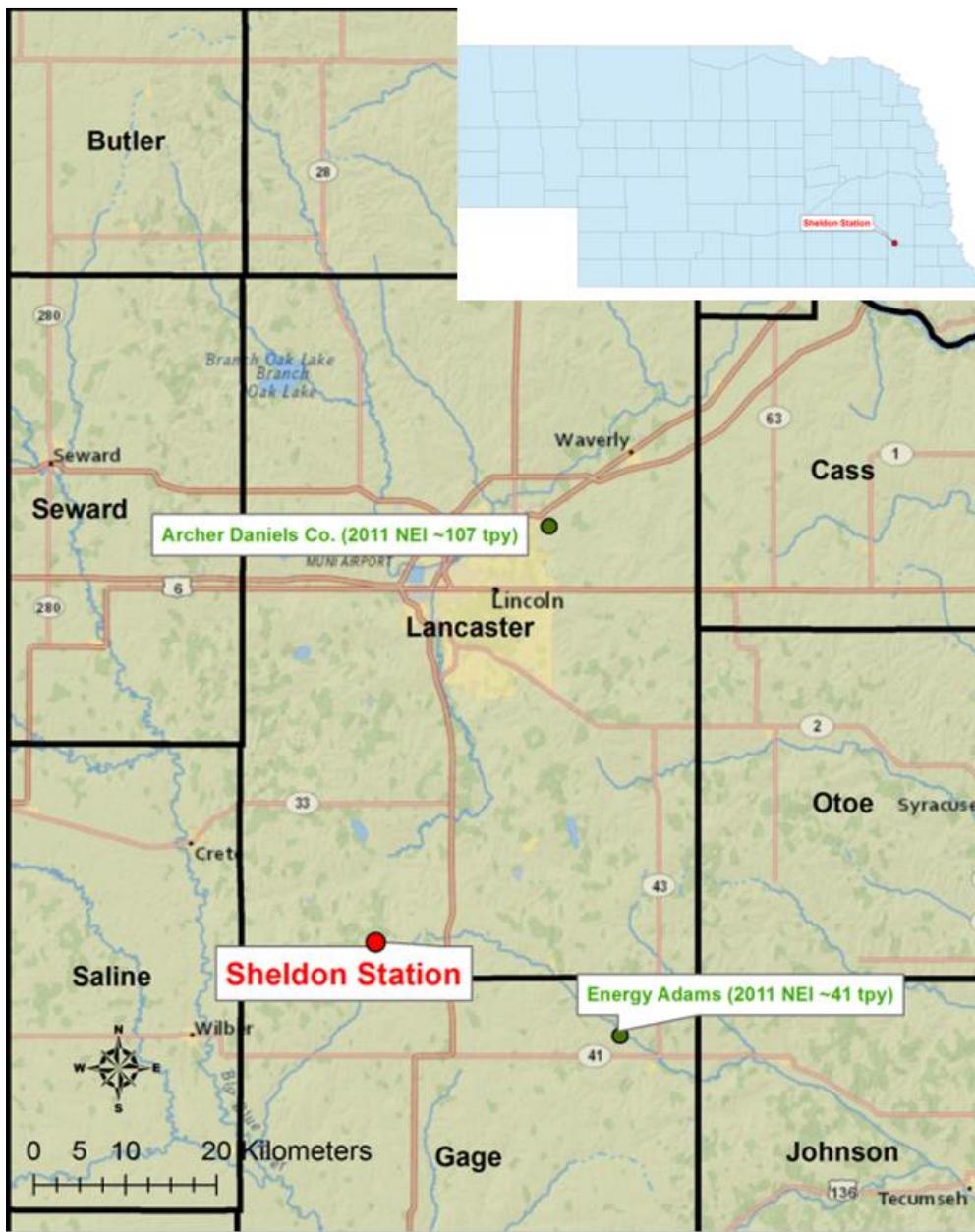
#### Assessment of New Information

In our February 16, 2016, notification to Nebraska regarding our intended unclassifiable designation for the Sheldon Station area, the EPA requested that any additional information that the Agency should consider prior to finalizing the designation should be submitted by April 19, 2016. On March 1, 2016, the EPA also published a notice of availability and public comment period in the *Federal Register*, inviting the public to review and provide input on our intended designations by March 31, 2016 (81 FR 10563).

The EPA is explicitly incorporating and relying upon the analyses and information presented in the preliminary technical support document for the purposes of our final designation for this area, except to the extent that any new information submitted to the EPA or conclusions presented in this final technical support document and our response to comments document (RTC), available in the docket, supersede those found in the preliminary document.

As further detailed below, after carefully considering all available data and information, the EPA concludes that the available information still does not enable the Agency to determine whether the area is meeting or not meeting the 2010 primary SO<sub>2</sub> NAAQS, and therefore is designating the Sheldon Station area as unclassifiable for the 2010 SO<sub>2</sub> NAAQS. The boundaries for this unclassifiable area consist of the entirety of Lancaster County, Nebraska, and are shown in the figure below. Also included in the figure are nearby emitters of SO<sub>2</sub>.

**Figure 3: The EPA's final unclassifiable area: Lancaster County, Nebraska**



The EPA received substantive comments regarding our intended unclassifiable designation for the Sheldon Station area, and a comprehensive summary of the majority of these comments and our responses can be found in the RTC. Specifically, the Nebraska Public Power District submitted a request to correct the SO<sub>2</sub> emission rate from the facility and provided an additional discussion on the appropriateness of the background value used by the State of Nebraska. The EPA concurs with the corrected emission rate and continues to find that the background value used by the State of Nebraska is appropriate.

Also, additional information, specifically air dispersion modeling, was submitted to the EPA during the state and public comment period in order to characterize air quality in the Sheldon

Station area. Notably, Nebraska provided additional air dispersion modeling information during the comment period asserting that the Sheldon Station area of analysis is in compliance with the 1-hour SO<sub>2</sub> NAAQS, taking into consideration recently permitted stack modifications. This information was submitted to support our proposed unclassifiable designation boundaries for the area.

The additional modeling used actual emissions for Sheldon Station Units 1 and 2 from 2012 – 2014 with stack height modifications to each of the two Sheldon boiler stacks that post-dated those years. While the requirements of stack height modifications were incorporated into a modified construction permit for Sheldon Station on April 19, 2016, the stack height increases were not in place during the 2012 – 2014 period. As such, this additional modeling is inconsistent with the EPA's recommended practice for either actual emissions-based modeling or allowable emissions-based modeling in the TAD and could not be relied upon to determine that the area is meeting the NAAQS and designate the Sheldon Station area as unclassifiable/attainment. The discussion and analysis of this new information that follow reference the Modeling TAD, Monitoring TAD, and the factors for evaluation contained in the EPA's March 20, 2015, guidance, as appropriate and applicable.

#### *Model Selection and Modeling Components*

The EPA's Modeling TAD notes that for area designations under the 2010 SO<sub>2</sub> NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. In some instances the recommended model may be a model other than AERMOD, such as the BLP model for buoyant line sources. The AERMOD modeling system contains the following components:

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

The State used AERMOD version 15181, which is the most recent version of AERMOD, and a discussion of the individual components will be referenced in the corresponding discussion that follows, as appropriate.

#### *Modeling Parameter: Rural or Urban Dispersion*

The EPA's recommended procedure for characterizing an area by prevalent land use is based on evaluating the dispersion environment within 3 km of the facility. According to the EPA's modeling guidelines contained in documents such as the Modeling TAD, rural dispersion coefficients are to be used in the dispersion modeling analysis if more than 50% of the area within a 3 km radius of the facility is classified as rural. Conversely, if more than 50% of the area is urban, urban dispersion coefficients should be used in the modeling analysis. When performing the modeling for the area of analysis, the State determined that it was most

appropriate to run the model in rural mode. The rural determination is appropriate based on the land-use characteristics around the facility.

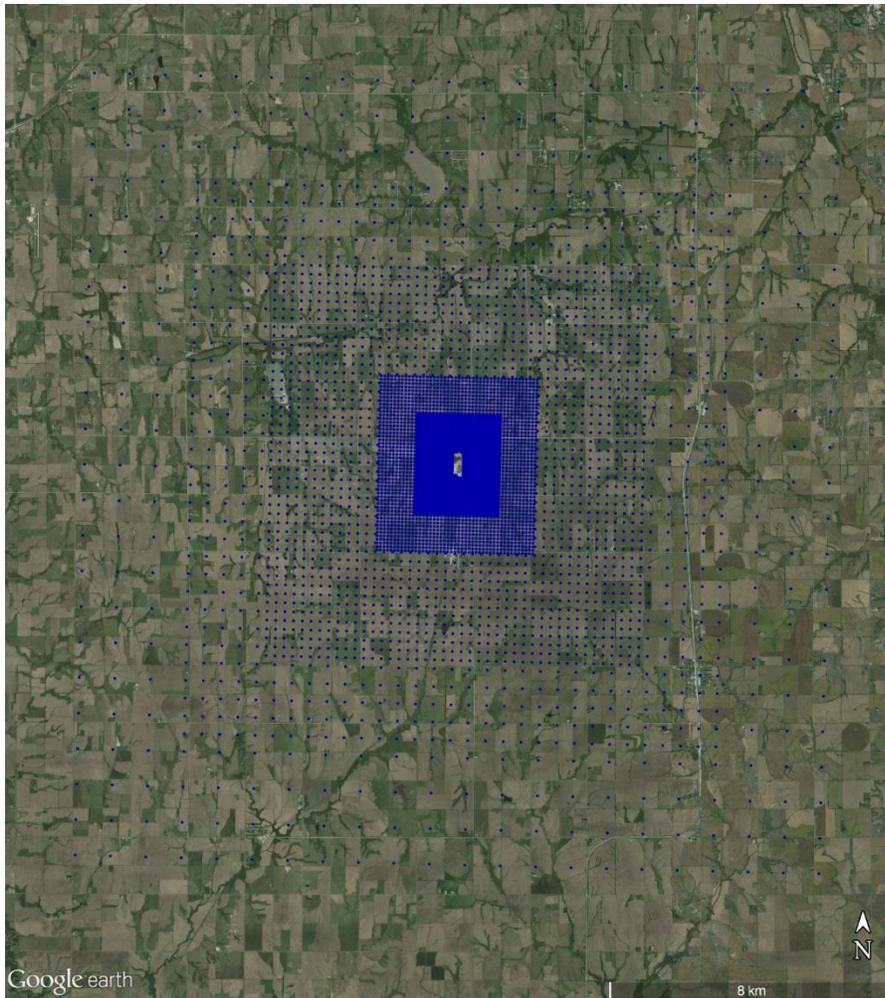
*Modeling Parameter: Area of Analysis (Receptor Grid)*

The EPA's view is that a reasonable first step towards characterization of air quality in the area surrounding the Sheldon Station is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO<sub>2</sub> emission sources or facilities considered for modeling; the extent of significant concentration gradients of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO<sub>2</sub> concentrations. For the Sheldon Station area, the State included no other emitters of SO<sub>2</sub> within its area of analysis. There are no other significant sources of SO<sub>2</sub> within 20 km in any direction of the Sheldon Station according to the 2011 National Emissions Inventory (NEI). Thus, no other emitters of SO<sub>2</sub> would have a potential impact in the area of analysis where maximum concentrations of SO<sub>2</sub> are expected. The grid receptor spacing for the area of analysis chosen by the state is as follows:

- 50 meter spacing on the fence line
- 50 meter spacing from the fence to 1 kilometer from the fence
- 100 meter spacing from 1 kilometer to 2 kilometers from the fence
- 250 meter spacing from 2 kilometer to 5 kilometers from the fence
- 500 meter spacing from 5 kilometer to 7 kilometers from the fence
- 1000 meter spacing from 7 to 10 kilometers from the fence

The receptor network contained 6,668 receptors and covered the southern portion of Lancaster County, Nebraska. Figure 4, which was included in the State's submission during the comment period, shows the chosen area of analysis surrounding the Sheldon Station, as well as the receptor grid for the area of analysis. Consistent with the Modeling TAD, receptors for the purposes of this designation effort were placed only in areas where it would also be feasible to place a monitor and record ambient air impacts. The impacts of the area's geography and topography will be discussed later within this document.

**Figure 4: Receptor Grid for the Sheldon Station Facility Area of Analysis**



#### *Modeling Parameter: Source Characterization*

The State characterized the source within the area of analysis that differed from the best practices outlined in the Modeling TAD. As mentioned previously, the state used actual emissions from 2012 – 2014 with stack height increases at Sheldon Station Units 1 and 2 that did not in fact occur during that period. Because the modeled stack height modifications were not in place in 2012 – 2014, the state did not properly characterize Sheldon Station during this timeframe.

#### *Modeling Parameter: Emissions*

The EPA’s Modeling TAD notes that for the purposes of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD also provides for the flexibility of using allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate.

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

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. Specifically, a facility may have recently adopted a new federally enforceable emissions limit, been subject to a federally enforceable consent decree, or implemented other federally enforceable mechanisms and control technologies to limit SO<sub>2</sub> emissions to a level that indicates compliance with the NAAQS. These new limits or conditions may be used in the application of AERMOD. In these cases, the Modeling TAD notes that the existing SO<sub>2</sub> emissions inventories used for permitting or SIP planning demonstrations should contain the necessary emissions information for designations-related modeling. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, “Guideline on Air Quality Models.”

As previously noted, the State included the 2 units for Sheldon Station and no other emitters of SO<sub>2</sub> within its area of analysis. The State found that these units adequately include the sources which might contribute to the area where the maximum concentrations of SO<sub>2</sub> are expected. No other sources were determined by the State to have the potential to cause significant concentration gradient impacts within the area of analysis. The facility in the area of analysis and its associated annual actual SO<sub>2</sub> emissions from 2012 to 2014 are summarized below.

**Table 2: Actual SO<sub>2</sub> Emissions in 2012 – 2014 from Facilities in the Sheldon Station Area of Analysis**

Facility Name	SO <sub>2</sub> Emissions (tons per year)		
	2012	2013	2014
NPPD Sheldon Station Unit 1	1,241	1,514	1,648
NPPD Sheldon Station Unit 2	1,519	1,321	1,594
Total Emissions From All Facilities in Area of Analysis	2,760	2,835	3,242

For the Sheldon Station area of analysis, the state used actual emissions from 2012 – 2014. CEMS emissions data were used and obtained from the EPA’s Clean Air Markets Division.

As noted previously, the use of actual emissions from 2012 – 2014 with future stack height modifications should not be used to characterize 2012 – 2014 air quality for use in designations. The modeling analysis would need to use either historic stack heights with actual emissions to indicate what a monitor would have measured over this three year period, or a permitted (allowable) emission rate with the stack height modifications, subject to the EPA’s regulations governing dispersion techniques and good engineering practice, to indicate what a monitor would measure after the stack height projects were completed.

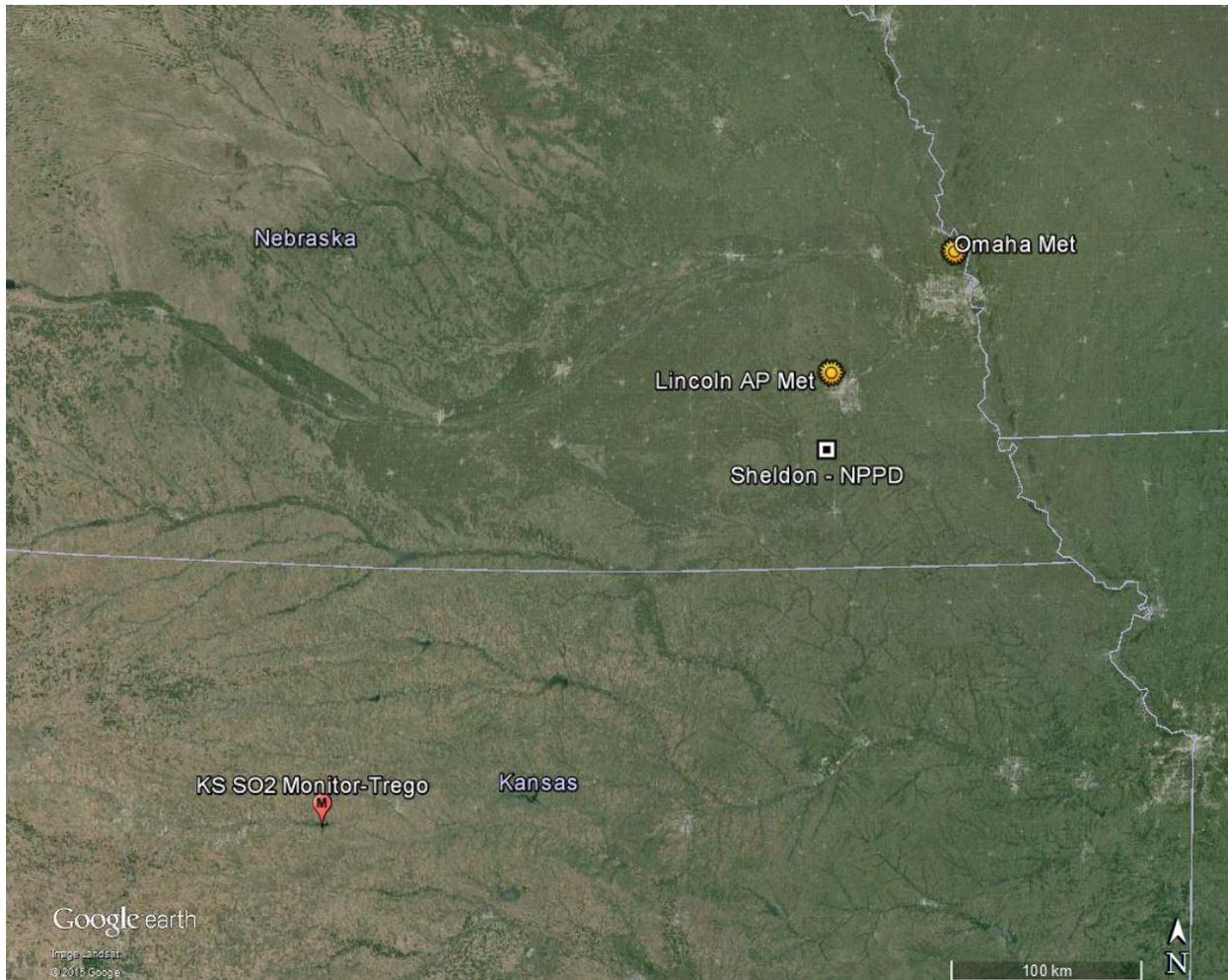
### *Modeling Parameter: Meteorology and Surface Characteristics*

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

For the Sheldon Station area of analysis, surface meteorology from Lincoln, Nebraska, approximately 20 km to the north, and coincident upper air observations from the NWS station in Omaha, Nebraska, 120 km to the northeast were selected as most representative of meteorological conditions within the area of analysis. The location of the meteorological surface and upper air stations are shown in Figure 5.

The state used AERSURFACE version 13016 using data from the NWS station in Lincoln, Nebraska (located at 40.85N, 96.76W) to estimate the surface characteristics of the area of analysis. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as “Z<sub>0</sub>”). In Figure 5 below, which was included in the state’s recommendation, the location of the Lincoln, Nebraska NWS station is shown relative to the Sheldon Station area of analysis.

**Figure 5: Sheldon Station Area of Analysis and the Lincoln, Nebraska NWS site used for surface meteorology, the Omaha, Nebraska NWS site used for upper air meteorology, and the location of the background SO<sub>2</sub> monitor in Trego, Kansas.**



Meteorological data from the Lincoln, Nebraska, surface and Omaha, Nebraska, upper air stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The state followed the methodology and settings presented in the EPA's Modeling TAD in the processing of the raw meteorological data into an AERMOD-ready format and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of one minute duration was provided from the same instrument tower but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less

prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the state set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. This approach is consistent with a March 2013 the EPA memo titled, “Use of ASOS meteorological data in AERMOD dispersion Modeling.” In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the one minute wind data.

*Modeling Parameter: Geography and Terrain*

The terrain in the area of analysis is best described as relatively flat. To account for terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the National Elevation Dataset (NED). The NED data available on-line in 1 arc-second spacing from the US Geological Survey was used in the modeling analysis. The NED data for this analysis was based on North American Datum (NAD) 83 for horizontal locations and NAD88 for elevation.

*Modeling Parameter: Background Concentrations of SO<sub>2</sub>*

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO<sub>2</sub> that are ultimately added to the modeled design values: 1) a “first tier” approach, based on monitored design values, or 2) a temporally varying approach, based on the 99<sup>th</sup> percentile monitored concentrations by hour of day and season or month. For the Sheldon Station area of analysis, the state chose the monitored design value at the Trego, Kansas monitoring location. The background concentration for this area of analysis was determined by the state to be 9 micrograms per cubic meter (µg/m<sup>3</sup>), or 3.4 ppb,<sup>8</sup> and that value was incorporated into the final AERMOD results. The Trego County monitor is located in rural west central Kansas, and like the Sheldon Station, has no significant nearby sources of SO<sub>2</sub>. The EPA finds that the Trego County monitor provides an appropriate representation of the SO<sub>2</sub> background.

*Summary of Modeling Results*

The AERMOD modeling parameters, as supplied by additional information from the state during the comment period for the Sheldon Station area of analysis are summarized below in Table 3.

**Table 3: AERMOD Modeling Parameters for the Sheldon Station, Nebraska Area of Analysis**

Sheldon Station, Nebraska Area of Analysis	
AERMOD Version	15181

<sup>8</sup> The conversion factor for SO<sub>2</sub> (at the standard conditions applied in the ambient SO<sub>2</sub> reference method) is 1ppb = approximately 2.62µg/m<sup>3</sup>.

Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	2
Modeled Structures	13
Modeled Fence lines	1
Total receptors	6,668
Emissions Type	Actuals for Units 1 and 2 with stack height modifications.
Emissions Years	2012-2014
Meteorology Years	2012-2014
Surface Meteorology Station	Lincoln, Nebraska
Upper Air Meteorology Station	Omaha, Nebraska
Methodology for Calculating Background SO <sub>2</sub> Concentration	1 <sup>st</sup> tier
Calculated Background SO <sub>2</sub> Concentration	9 µg/m <sup>3</sup>

The results presented below in Table 4 show the magnitude and geographic location of the highest predicted modeled concentration based on actual emissions and the stack height modifications that did not occur until well after the 2012-2014 period.

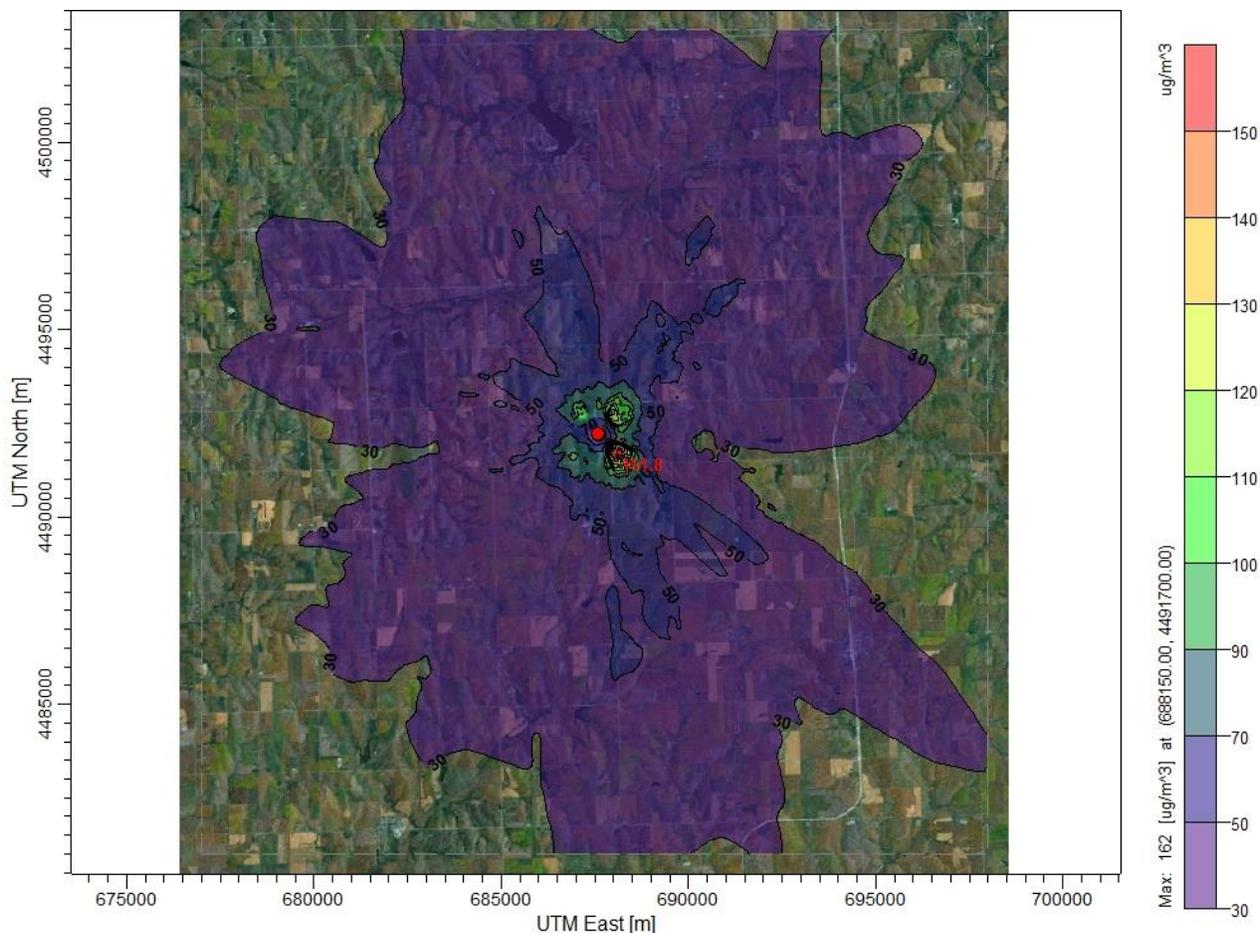
**Table 4: Maximum Predicted 99th Percentile 1-Hour SO<sub>2</sub> Concentration in the Sheldon Station, Nebraska Area of Analysis Based on Actual Emissions and stack height modifications**

Averaging Period	Data Period	Receptor Location		SO <sub>2</sub> Concentration (µg/m <sup>3</sup> )	
		UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	688150	4491700	170.8	196.5*

\*Equivalent to the 2010 SO<sub>2</sub> NAAQS set at 75 ppb

The state’s modeling indicates that the highest predicted 3-year average 99<sup>th</sup> percentile 1-hour average concentration within the chosen modeling domain is 170.8 µg/m<sup>3</sup>, or 65.2 ppb. This modeled concentration included the background concentration of SO<sub>2</sub>, and is based on actual emissions from 2012-2014 but with stack height modifications at the facility that did not occur in this period and therefore could not have realistically influenced the ambient air impacts from 2012-2014. Figure 7 below indicates that the predicted value occurred to the southeast of facility.

**Figure 7: Maximum Predicted 99<sup>th</sup> Percentile 1-Hour SO<sub>2</sub> Concentrations in the Sheldon Station, Nebraska Area of Analysis Based on Actual Emissions and future stack height increases.**



*Jurisdictional Boundaries:*

Existing jurisdictional boundaries are considered for the purpose of informing our final unclassifiable area, specifically with respect to clearly defined legal boundaries. The EPA did not receive any comments regarding the intended boundaries for this area.

The EPA believes that our final unclassifiable area, consisting of the borders of Lancaster County, are comprised of clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our final unclassifiable area.

Conclusion

After careful evaluation of the state’s recommendation, all timely comments and information received during the state and public comment period, and additional relevant information as discussed in this document, the EPA is unable at this time, based on available information, to determine whether the area is meeting or not meeting the NAAQS and is therefore designating the area around Sheldon Station, Nebraska as unclassifiable for the 2010 SO<sub>2</sub> NAAQS. Specifically, the area is comprised of the entirety of Lancaster County, Nebraska.

The unclassifiable designation is based on the modeling analyses that the State of Nebraska provided to the EPA being inconsistent with the modeling TAD in a manner that did not provide

the EPA with information necessary to be able to determine whether the area is complying with the 2010 SO<sub>2</sub> NAAQS. The State provided modeling scenarios that demonstrated compliance with the SO<sub>2</sub> 1-hr NAAQS, but all of the modeling scenarios do not comport with the EPA's recommended practice for either actual emissions-based modeling or allowable emissions-based modeling in the TAD. All modeling scenarios provided by the State use actual emissions but depend on changes to Sheldon Station operations (i.e., increased stack heights, ceasing the combustion of coal at future unknown date), and therefore are not reliable to inform a conclusion about whether the area is meeting the NAAQS and designate the area as unclassifiable/attainment.

No other entity other than the State of Nebraska submitted modeling during the comment period for our intended designation. As discussed in our February 16, 2016 technical support document, the Sierra Club did provide a modeling analysis for Sheldon Station. As we stated in that technical support document, Sierra Club's modeling used actual emissions from 2012-2014 and asserted that there were violations of the 1-hr SO<sub>2</sub> NAAQS. However, we continue to find that the Sierra Club's modeling used a background concentration from a more urban monitoring location that does not appear to represent the rural background of the Sheldon Station location and over-estimated the background emissions, thus resulting in an over-estimated design value as the background value is added to the modeled impacts and this combined value is compared to the NAAQS.

At this time, our final designations for the state only apply to this area and the others contained in this final technical support document. Consistent with the court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in Nebraska by either December 31, 2017, or December 31, 2020. For informational purposes, the EPA notes that this unclassifiable area is one for which the Agency expects the State to conduct additional characterization under the Data Requirements Rule, and that such future analysis may be used in possible future actions addressing the area's air quality status.