Draft Technical Support Document

Nebraska
Area Designations for the 2010 SO_2 Primary National Ambient Air Quality Standard

Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA, or the Agency) must designate areas as either "unclassifiable," "attainment," or "nonattainment" for the 2010 one-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS). The CAA defines a nonattainment area as one that does not meet the NAAQS or that contributes to a violation in a nearby area. An attainment area is defined as any area other than a nonattainment area that meets the NAAQS. Unclassifiable areas are defined as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS.

Nebraska submitted updated recommendations on September 18, 2015, ahead of a July 2, 2016, deadline for the EPA to designate certain areas established by the U.S. District Court for the Northern District of California. This deadline is the first of three deadlines established by the court for the EPA to complete area designations for the 2010 SO_2 NAAQS. Table 1 below lists Nebraska's recommendations and identifies the counties or portions of counties in Nebraska that the EPA intends to designate by July 2, 2016 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 EPA's Intended Designations

Area	Nebraska's Recommended Area Definition	Nebraska's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Otoe County, Nebraska	No Boundaries were defined in the State's official recommendation	Attainment	Otoe County, Nebraska	Unclassifiable/ Attainment
Lincoln County, Nebraska	No Boundaries were defined in the State's official recommendation	Attainment	Lincoln County, Nebraska	Unclassifiable/ Attainment
Lancaster County, Nebraska	No Boundaries were defined in the State's official recommendation	Unclassifiable	Lancaster County, Nebraska	Unclassifiable

Background

On June 3, 2010, the EPA revised the primary (health based) SO_2 NAAQS by establishing a new one-hour standard at a level of 75 parts per billion (ppb) which is attained when the three-year average of the 99th percentile of one-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_2. 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.[1] However, the EPA is not currently designating areas on the basis of either of these two primary standards. Similarly, the secondary standard for SO_2, set at 500 ppb evaluated over 3 hours has not been revised, and the EPA is also not currently designating areas on the basis of the secondary standard.

General Approach and Schedule

Section 107(d) of the Clean Air Act requires that not later than one year after promulgation of a new or revised NAAQS, state governors must submit their recommendations for designations and boundaries to 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 will promulgate the designations that it deems appropriate. If a state or tribe disagrees with the EPA's intended designations, they are given an opportunity within the 120 day period to demonstrate why any proposed modification is inappropriate.

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_2 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 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.

[1] 40 CFR 50.4(e) provides that the two prior primary NAAQS will no longer apply to an area one 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 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 this designation.

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_2 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_2 or (ii) more than 2,600 tons of SO_2 with an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/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 states 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_2 Data Requirements Rule (DRR).

Updated designations guidance was issued by the EPA through 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 1-10. This memorandum supersedes earlier designation guidance for the 2010 SO_2 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_2 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 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_2. Notably, the EPA released its most recent versions of documents titled, "SO_2 NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) and "SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document" (Monitoring TAD) in December 2013.

Based on ambient air quality data collected between 2012 and 2014, no violations of the 2010 SO_2 NAAQS have been recorded in any undesignated part of the state[2]. However, there are three

[2] For designations based on ambient air quality monitoring data that violates the 2010 SO_2 NAAQS, the consent decree directs the EPA to evaluate data collected between 2013 and 2015. Absent complete, quality assured and certified data for 2015, the analyses of applicable areas for the EPA's intended designations will be informed by data collected between 2012 and 2014. States with monitors that have recorded a violation of the 2010 SO_2 NAAQS during these years have the option of submitting complete, quality assured and certified data for calendar year 2015 by April 19, 2016 to the EPA for evaluation. If after our review, the ambient air quality data for the area indicates that no violation of the NAAQS occurred between 2013 and 2015, the consent decree does not obligate the EPA to

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 draft 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 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_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 ppb, based on the three year average of the 99th percentile of the annual distribution of daily maximum one-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 which the EPA has determined has violated the 2010 SO_2 NAAQS or contributed to a violation in a nearby area. A nonattainment designation reflects considerations of state 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 analysis, and any other relevant information.
4) Designated unclassifiable area – an area which the EPA cannot determine based on all available information whether or not it meets the 2010 SO_2 NAAQS.
5) 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 analysis, and any other relevant information.
6) Modeled violation – a violation based on air dispersion modeling.
7) Recommended attainment area – an area a state or tribe has recommended that the EPA designate as attainment.
8) Recommended nonattainment area – an area a state or tribe has recommended that the EPA designate as nonattainment.
9) Recommended unclassifiable area – an area a state or tribe has recommended that the EPA designate as unclassifiable.
10) Recommended unclassifiable/attainment area – an area a state or tribe has recommended that the EPA designate as unclassifiable/attainment.
11) 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.

complete the designation. Instead, we may designate the area and all other previously undesignated areas in the state on a schedule consistent with the prescribed timing of the court order, i.e., by December 31, 2017, or December 31, 2020.

Technical Analysis for the Nebraska City Station, Nebraska Area

Proposed Designation Summary

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 the Nebraska City Station as unclassifiable/attainment for the 2010 SO_2 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 EPA.

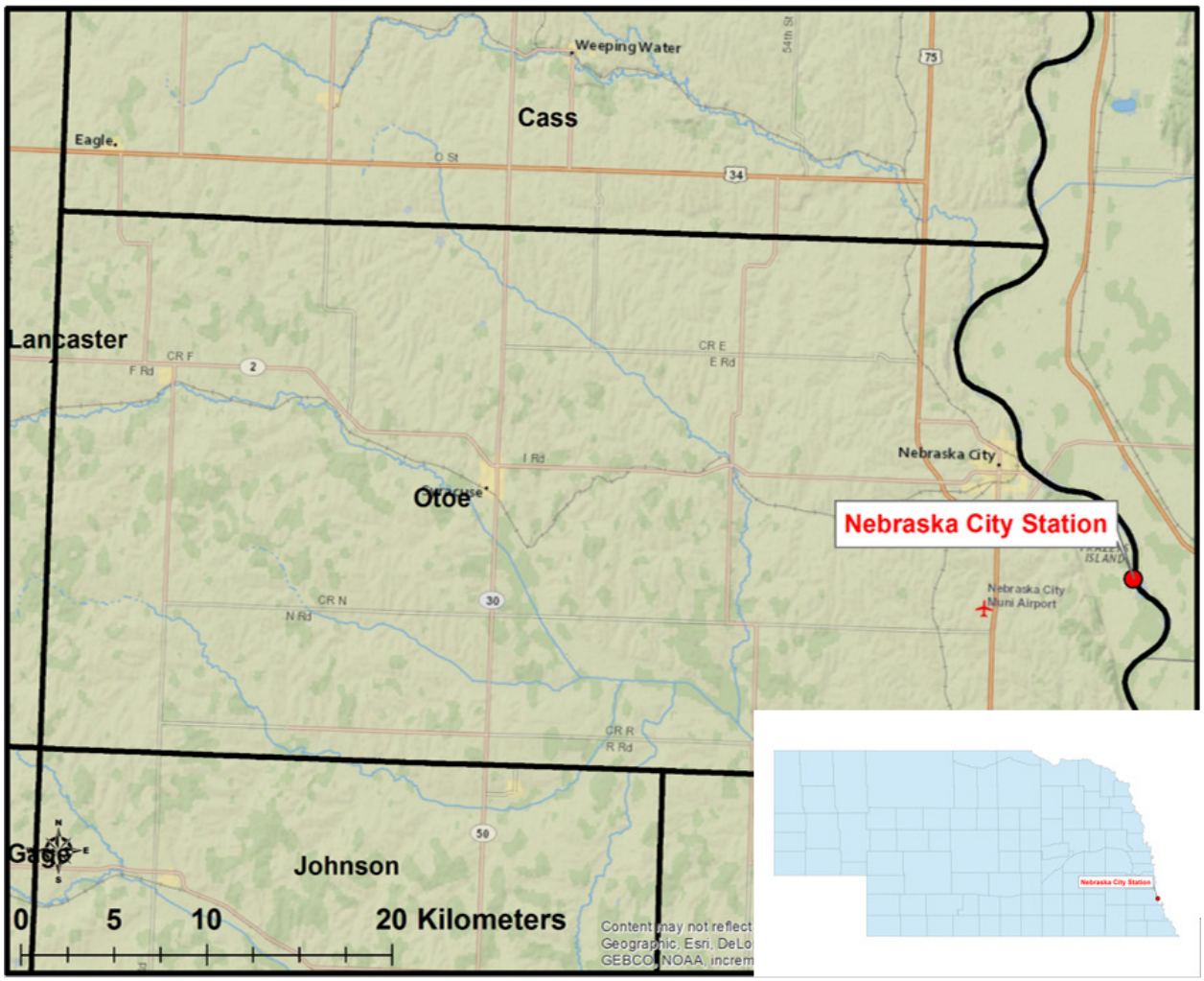
Introduction

The Nebraska City, 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_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the Omaha Public Power District's (OPPD) Nebraska City Station emitted 16,766 tons of SO_2 and had an emissions rate of 0.722 lbs SO_2/mmBTU. Pursuant to the March 2, 2015 court-ordered schedule, the EPA must designate the area surrounding the facility by July 2, 2016.

In its submission, Nebraska recommended that the area surrounding the Nebraska City Station 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_2 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. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees that the area around Nebraska City Station is attaining the standard. Specifically, we intend to designate Otoe County as unclassifiable/attainment.

The Nebraska City Station is located in southeast Nebraska in the eastern portion of Otoe County. As seen in Figure 1 below, the facility is located approximately 10 km southeast of Nebraska City. The Nebraska City Station lies near and within the Missouri River Valley along the Nebraska and Iowa border. The Nebraska City Station includes two coal boiler stacks. No significant emitters of SO_2 are located nearby the Nebraska City Station. The state did not recommend a boundary for its attainment designation for the area. Thus, the EPA's intended unclassifiable/attainment designation for the area will comprise the entirety of Otoe County, Nebraska.

Figure 1: The EPA's intended unclassifiable/attainment designation for Otoe County, Nebraska, which includes the Nebraska City Station. The Nebraska City Station is located in the eastern portion of Otoe County, along the Nebraska-Iowa border within the Missouri River Valley.



The discussion and analysis that follows below will reference the state's use of the Modeling TAD, the EPA's assessment of the state's modeling in accordance with the Modeling TAD, and the factors for evaluation contained in the EPA's March 20, 2015 guidance, as appropriate.

Detailed Assessment

Air Quality Data

This factor considers the SO_2 air quality monitoring data in the area surrounding the Nebraska City facility. Since no SO_2 ambient monitors were located in Otoe County, no monitoring data was relied upon in EPA's proposed designation for this area.

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. 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 14134, which was the most recent version of AERMOD at the time of their submittal, 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 with 3 km of the facility. According to the EPA's modeling guidelines, rural dispersion coefficients are to be used in the dispersion modeling analysis if more than 50% 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. As previously mentioned, the Nebraska City Station is located in the Missouri River valley along the Nebraska-Iowa border, and the rural determination was made based on the land cover around the facility.

Modeling Parameter: Area of Analysis (Receptor Grid)

The EPA believes that a reasonable first step towards characterization of air quality in the area surrounding the Nebraska City 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_2 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_2 concentrations. For the Nebraska City Station area, the state has included no other emitters of SO_2 within its area of analysis. There are no other significant source of SO_2 within 80 km in any direction of the Nebraska City Station according to the 2011 National Emissions Inventory (NEI). Thus, no other emitters of SO_2 would have a potential impact in the area of analysis where maximum concentrations of SO_2 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

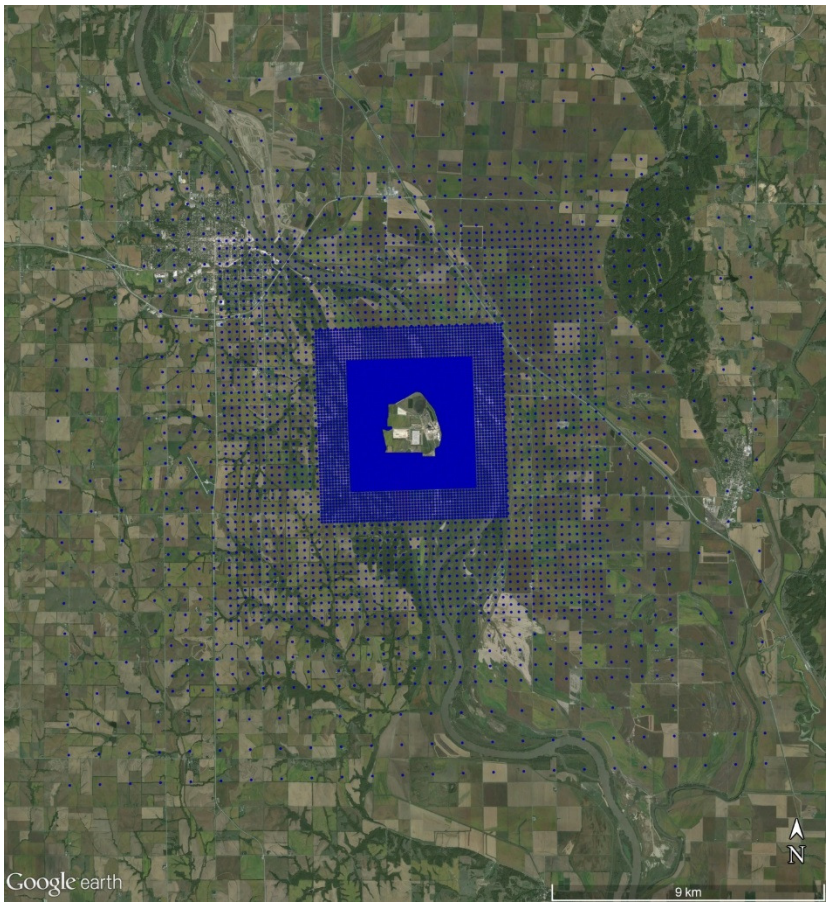
- 50 meter spacing from the fence to 1 kilometer from the fence
- 100 meter spacing from 1 kilometer to 2 kilometers from the fence
- 250 meter spacing from 2 kilometer to 5 kilometers from the fence
- 500 meter spacing from 5 kilometer to 7 kilometers from the fence
- 1000 meter spacing from 7 to 10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

The receptor network contained 10,964 receptors and covered the eastern portion of Otoe County in Nebraska and the western portion of Fremont County in Iowa.

Figure 2, included in the state submittal and reproduced below, shows the chosen area of analysis surrounding the Nebraska City Station, as well as receptor grid for the area of analysis.

Receptors for the purposes of this designation effort were placed over the Missouri River. The Modeling TAD states that since modeling is being utilized to reflect what a monitor would record for the SO_2 designations that will occur prior to July 2, 2016, receptors are not required to be placed over bodies of water since it would not be feasible to place a monitor in those locations. Otherwise, receptor placement followed the Modeling TAD. The impacts of the area's geography and topography will be discussed later within this document.

Figure 2: Receptor Grid for the Nebraska City, Nebraska Area of Analysis. Courtesy of Nebraska DEQ.



Modeling Parameter: Source Characterization

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

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 does provide 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 believes 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 believes 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_2 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_2 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 Nebraska City Station and no other emitters of SO_2 within its area of analysis. The state believes that these units adequately include the sources which might contribute to the area where maximum concentrations of SO_2 are expected. As previously mentioned, there are no other sources located within 80 km of the Nebraska City Station that have the potential to cause significant concentration gradient impacts within the area of analysis. The Nebraska City Station's annual actual SO_2 emissions between 2012 and 2014 are summarized below.

Table 1: Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Nebraska City Station, Nebraska Area of Analysis

Facility Name	SO_2 Emissions (tons per year)		
	2012	2013	2014
OPPD Nebraska City Station Unit 1	14,544	14,696	13,969
OPPD Nebraska City Station Unit 2	2,222	2,214	2,165
Total Emissions From All Facilities in the State's Area of Analysis	16,766	16,910	16,134

For the Nebraska City Station in the area of analysis, the state used actual emissions from the most recent 3-year data set, i.e., 2012 – 2014. CEMS emissions data were used and obtained from the EPA's Clean Air Markets Division.

Modeling Parameter: Meteorology and Surface Characteristics

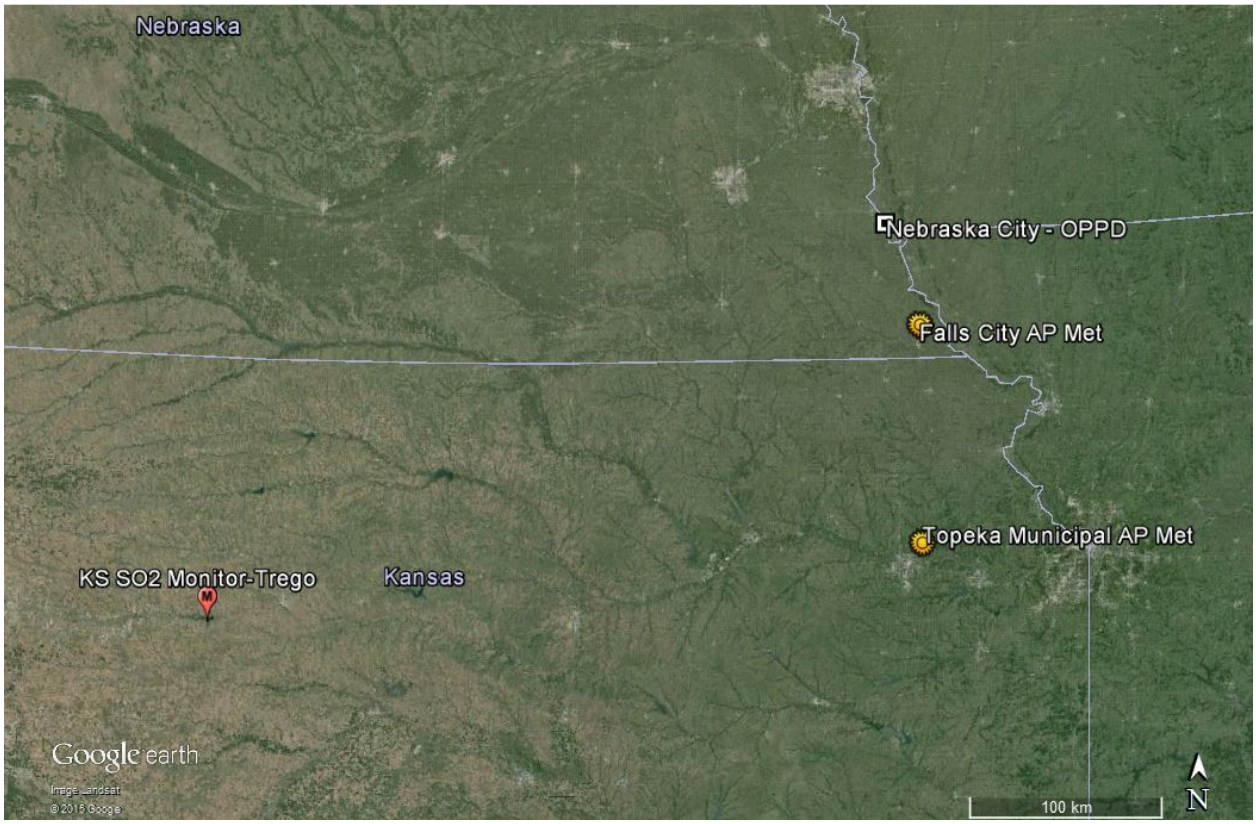
The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness.

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, Federal Aviation Administration (FAA), and military stations.

For the Nebraska City Station area of analysis, surface meteorology from Falls City, Nebraska 85 km to the south, and coincident upper air observations from the NWS station in Topeka, Kansas, 185 km to the south were selected as best representative of meteorological conditions within the area of analysis.

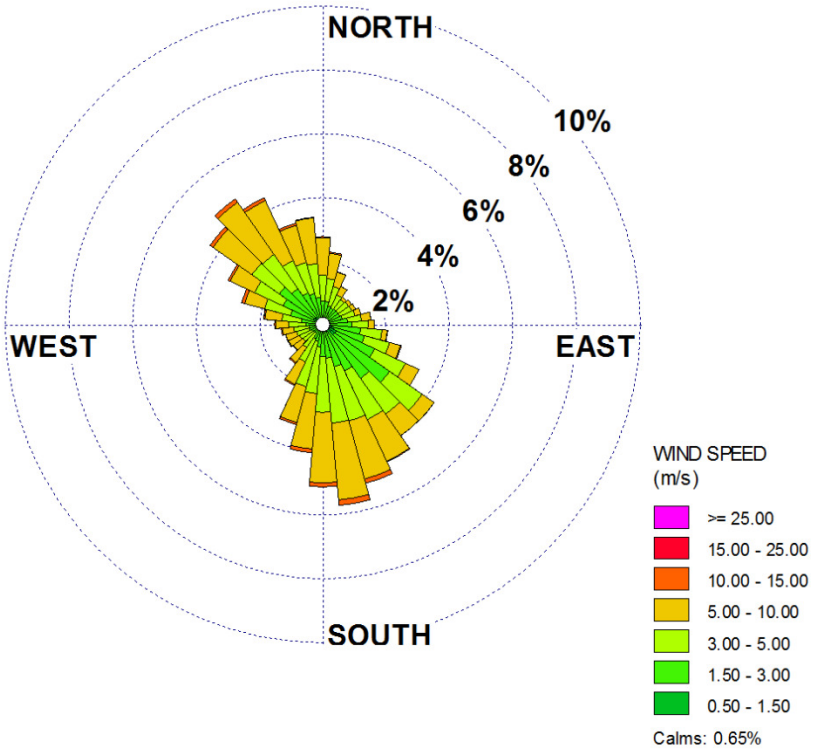
The state used AERSURFACE version 13016 using data from the NWS station in Falls City, Nebraska (located at 40.06N, 95.60W) to estimate the surface characteristics of the area of analysis. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), 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 "Zo"). In Figure 3 below, which was included in the state's recommendation, the location of the Falls City, Nebraska NWS station is shown relative to the Nebraska City area of analysis.

Figure 3: Nebraska City Station Area of Analysis and the Falls City, Nebraska NWS site used for surface meteorology, the Topeka, Kansas NWS site used for upper air meteorology, and the location of the background SO_2 monitor in Trego, Kansas.



As part of its recommendation, the state provided the 3-year surface wind rose for Falls City, Nebraska. In Figure 4, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Winds at the Falls City, Nebraska location are predominately out of south-southeast or northwest, which is consistent with the expected wind climatology of the region.

Figure 4: Falls City, Nebraska Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the Falls City, Nebraska surface and Topeka, KS 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 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 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 within the Missouri River valley with some bluffs and hills above the valley. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the National Elevation 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 elevations.

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 "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For the Nebraska City 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 ($\mu g/m^3$), or 3.4 ppb,[3] and that value was incorporated into the final AERMOD results.

Summary of Modeling Results

The AERMOD modeling parameters for the Nebraska City Station area of analysis are summarized below in Table 2.

Table 2: AERMOD Modeling Parameters for the Nebraska City Station Area of Analysis

Nebraska City Area of Analysis	
AERMOD Version	14134

[3] The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.62$\mu g/m^3$.

Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	2
Modeled Structures	5
Modeled Fencelines	1
Total receptors	10,964
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
Surface Meteorology Station	Falls City, Nebraska
Upper Air Meteorology Station	Topeka, Kansas
Methodology for Calculating Background SO_2 Concentration	1st tier
Calculated Background SO_2 Concentration	9 $\mu g/m^3$

The results presented below in Table 3 show the magnitude and geographic location of the highest predicted modeled concentration based on actual emissions.

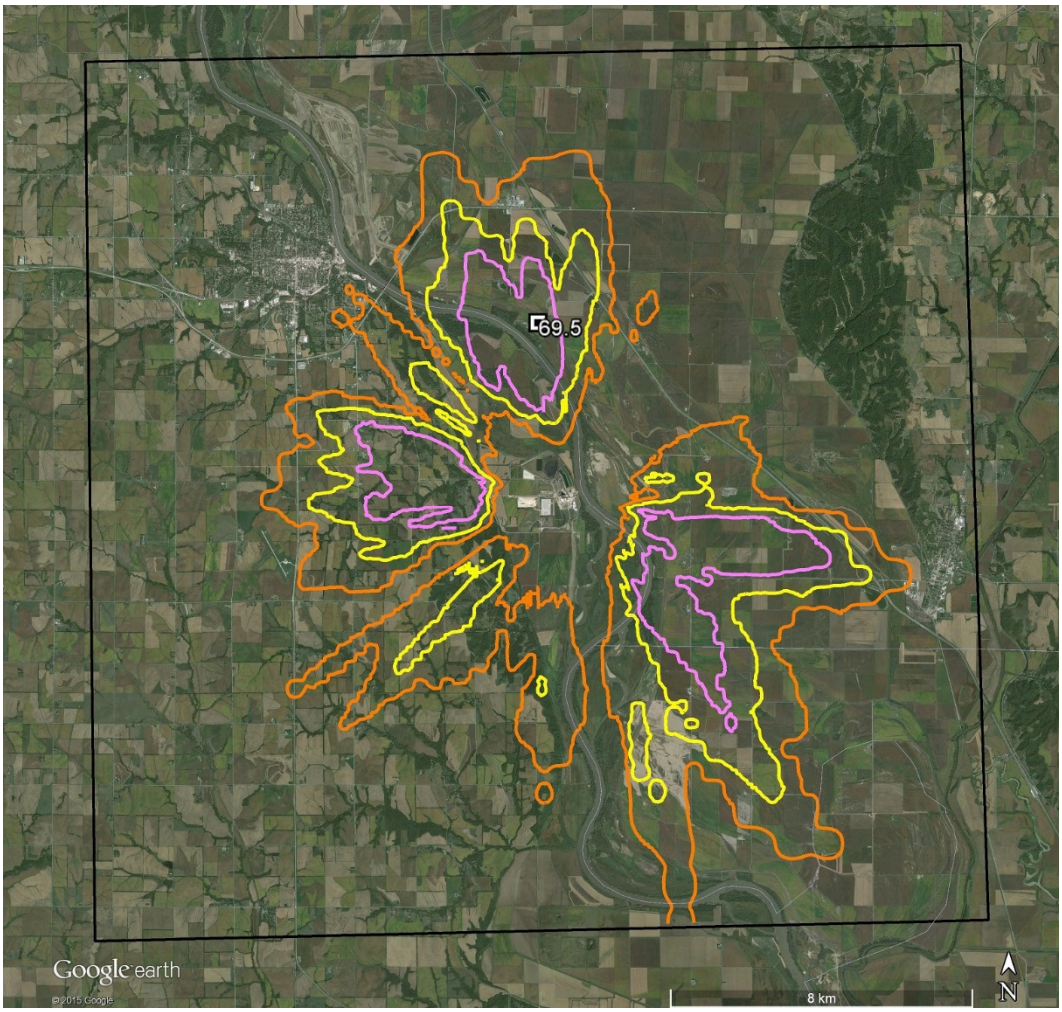
Table 3: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the Nebraska City Station Area of Analysis Based on Actual Emissions

		Receptor Location		SO_2 Concentration ($\mu g/m^3$)	
Averaging Period	Data Period	UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	264750	4505000	78.5	196.5*

*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The state's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 78.5 $\mu g/m^3$, or 32.7 ppb, which is less than the 2010 SO_2 NAAQS of 75 ppb. This modeled concentration included the background concentration of SO_2 and is based on actual emissions from the facility. Figure 5 below was included as part of the state's recommendation and indicates that the predicted value occurred northwest of the facility.

Figure 5: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations (69.5 µg/m^3 without background) in the Nebraska City Station Area of Analysis Based on Actual Emissions.



Jurisdictional Boundaries:

Once the geographic area of analysis associated with the Nebraska City Station and background concentration is determined, existing jurisdictional boundaries are considered for the purpose of informing our intended unclassifiable/attainment area, specifically with respect to clearly defined legal boundaries.

The EPA has confirmed that there are no other sources in Otoe County or within 20 km of its borders, except for the Nebraska City Station which has been modeled to show compliance with the NAAQS. As a result, the EPA does not believe that sources or emissions from Otoe County or near its borders have the potential to cause or contribute to a violation of the NAAQS within Otoe County.

As the state did not recommend specific boundaries for its proposed attainment area for the Nebraska City Station area, the EPA believes that Otoe County comprises a reasonable boundary for our intended unclassifiable/attainment area. Otoe County consists of clearly defined legal boundaries and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable/attainment area.

Other Relevant Information

EPA did not receive 3rd party information pertaining to the analysis of the 1-hr SO_2 impacts for the Nebraska City Station.

Conclusion

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 the Nebraska City Station as unclassifiable/attainment for the 2010 SO_2 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 EPA, and we have confirmed that there are no other sources in Otoe County or near its borders that are likely to cause or contribute to a violation of the NAAQS within Otoe County. The modeling analysis submitted by the Nebraska DEQ for Nebraska City Station using actual emissions from 2012-2014 shows attainment and this modeling followed the recommended EPA modeling TAD for designation purposes.

At this time, our intended designations for the state only apply to this area and the other areas presented in this technical support document. Consistent with the conditions in the March 2, 2015, consent decree, 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

Proposed Designation Summary

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 the Gerald Gentleman Station as unclassifiable/attainment for the 2010 SO_2 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 EPA.

Introduction

The Sutherland, Nebraska area, located in Lincoln County, Nebraska, contains a stationary source that according to the EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the Nebraska Public Power District's (NPPD) Gerald Gentleman Station emitted 26,437 tons of SO_2 and had an emissions rate of 1.05 lbs SO_2/mmBTU. Pursuant to the March 2, 2015 court-ordered schedule, the EPA must designate the area surrounding the facility by July 2, 2016.

In its submission, Nebraska recommended that the general area surrounding the Gerald Gentleman Station 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_2 are expected. No specific 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. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees that the area around Gerald Gentleman Station is attaining the standard. Specifically, we intend to designate Lincoln County as unclassifiable/attainment.

The Gerald Gentleman Station is located in west-central Nebraska in the western portion of Lincoln County. As seen in Figure 6 below, the facility is located approximately 10 km west of North Platte (~pop. 25,000). The Gerald Gentleman Station lies near the small community of Sutherland, Nebraska and near the Platte River Valley. The Gerald Gentleman Station includes two coal boiler stacks. No other significant emitters of SO_2 are located near the Gerald Gentleman Station or within Lincoln County. The state did not recommend a boundary for its attainment designation. The EPA's intended unclassifiable/attainment designation for the area will default to the entirety of Lincoln County, Nebraska.

Figure 6: The EPA's intended unclassifiable/attainment designation for Lincoln County, Nebraska area which includes the Gerald Gentleman Station. The Gerald Gentleman Station is located in the western portion of Lincoln County.

The discussion and analysis that follows below will reference the state's use of the Modeling TAD, the EPA's assessment of the state's modeling in accordance with the Modeling TAD, and the factors for evaluation contained in the EPA's March 20, 2015 guidance, as appropriate.

Detailed Assessment

Air Quality Data

This factor considers the SO_2 air quality monitoring data in the area surrounding the Gerald Gentleman facility. Since no SO_2 ambient monitors were located in Lincoln County, no monitoring data was relied upon in EPA's proposed designation for this area.

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. 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 14134, which was the most recent version of AERMOD at the time, 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 with 3 km of the facility. According to the EPA's modeling guidelines, rural dispersion coefficients are to be used in the dispersion modeling analysis if more than 50% 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. As previously mentioned, the Gerald Gentleman Station is located in rural west-central Nebraska near the Platte River and the rural determination was made based on the land cover around the facility.

Modeling Parameter: Area of Analysis (Receptor Grid)

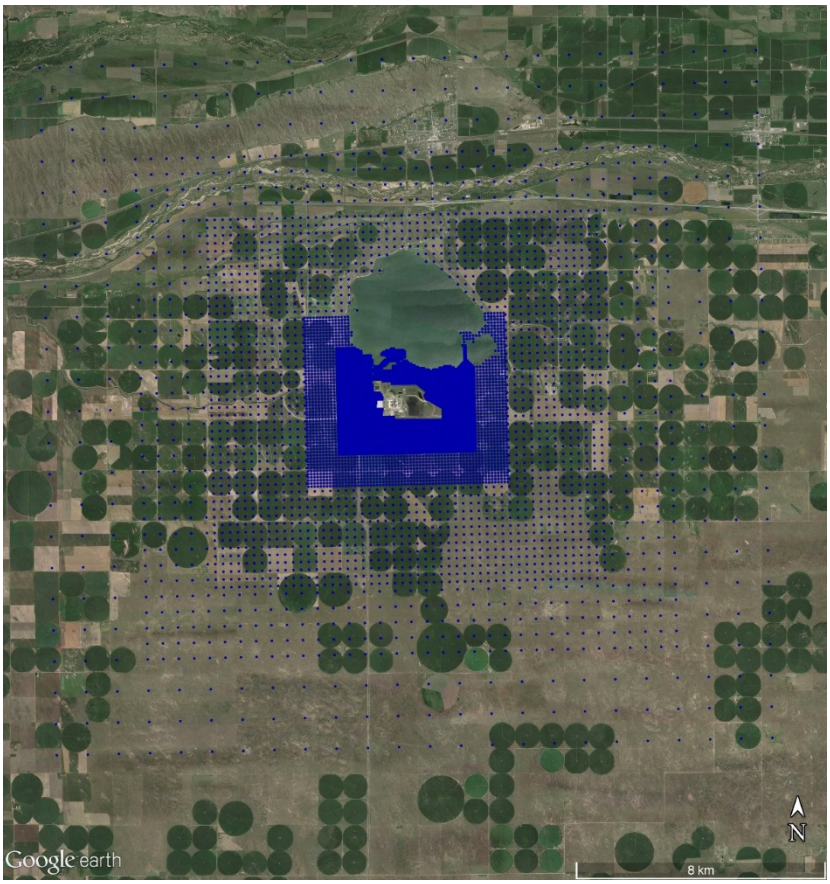
The EPA believes that a reasonable first step towards characterization of air quality in the area surrounding the Gerald Gentleman Station is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 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_2 concentrations. For the Gerald Gentleman Station area, the state has included no other emitters of SO_2 within its area of analysis. There are no other significant source of SO_2 within 200 km in any direction of the Gerald Gentleman Station according to the 2011 National Emissions Inventory (NEI). Thus, no other emitters of SO_2 would have a potential impact in the area of analysis where maximum concentrations of SO_2 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 8,882 receptors and covered the western portion of Lincoln County in Nebraska. Figure 7, which was included in the state's recommendation, shows the chosen area of analysis surrounding the Gerald Gentleman 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 impacts. The impacts of the area's geography and topography will be discussed later within this document.

Figure 7: Receptor Grid for the Gerald Gentleman Station, Nebraska Area of Analysis.



Modeling Parameter: Source Characterization

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

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 Modeling TAD does provide 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 believes 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 believes 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_2 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_2 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 Gerald Gentleman Station and no other emitters of SO_2 within its area of analysis. The state believes that these units adequately include the sources that might contribute to the area where maximum concentrations of SO_2 are expected. As mentioned previously, there are no other sources located within 200 km of the Gerald Gentleman Station that have the potential to cause significant concentration gradient impacts within the area of analysis. The Gerald Gentleman Station's annual actual SO_2 emissions between 2012 and 2014 are summarized below.

Table 4: Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Gerald Gentleman, Nebraska Area of Analysis

Facility Name	SO_2 Emissions (tons per year)		
	2012	2013	2014
NPPD Gerald Gentleman Station Unit 1	14,832	13,047	12,539
NPPD Gerald Gentleman Station Unit 2	11,605	15,383	11,945
Total Emissions From All Facilities in the State's Area of Analysis	26,437	28,430	24,484

For the Gerald Gentleman Station in the area of analysis, the state used actual emissions from the most recent 3-year data set, i.e., 2012 – 2014. CEMS emissions data were used and obtained from the EPA's Clean Air Markets Division.

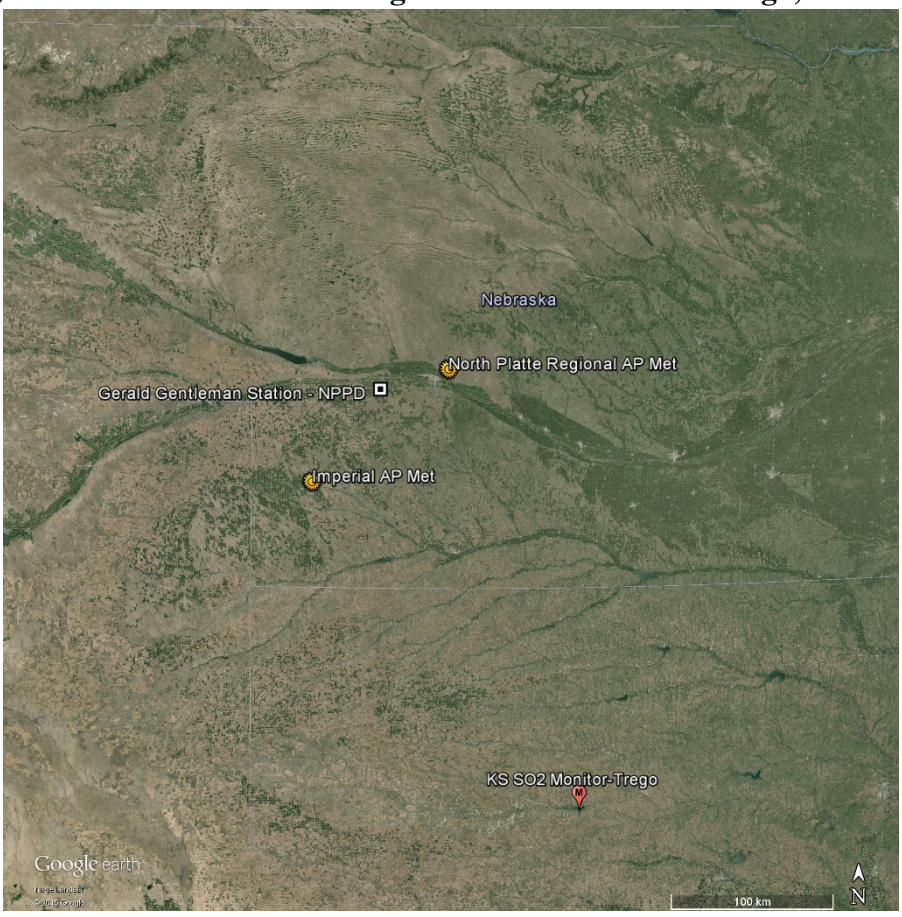
Modeling Parameter: Meteorology and Surface Characteristics

The most recent 3 years of 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 NWS stations, site-specific or onsite data, and other sources such as universities, the FAA, and military stations.

For the Gerald Gentleman Station area of analysis, surface meteorology from Imperial, Nebraska, approximately 60 km to the southwest, and coincident upper air observations from the NWS station in North Platte, Nebraska, 20 km to the east were selected as best representative of meteorological conditions within the area of analysis. The location of the meteorological surface and upper air stations are shown in Figure 8.

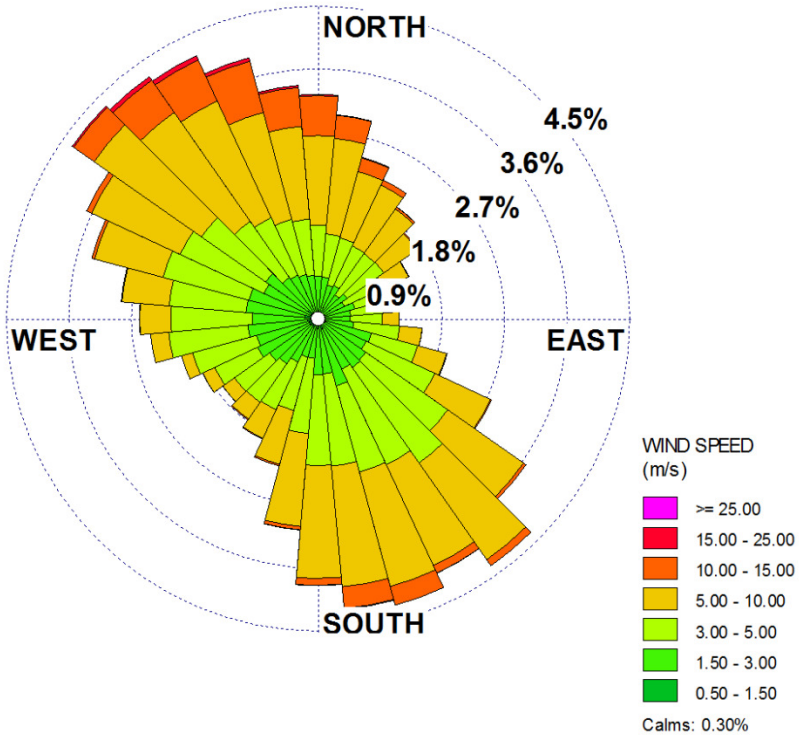
The state used AERSURFACE version 13016 using data from the NWS station in Imperial, Nebraska (located at 40.52N, 101.64W) to estimate the surface characteristics of the area of analysis. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), 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 "Zo"). In Figure 8 below, which was included in the state's recommendation, the location of the Imperial, Nebraska NWS station is shown relative to the Gerald Gentleman Station area of analysis.

Figure 8: Gerald Gentleman Station Area of Analysis and the Imperial, Nebraska NWS site used for surface meteorology, the North Platte, Nebraska NWS site used for upper air meteorology, and the location of the background SO_2 monitor in Trego, Kansas.



As part of its recommendation, the state provided the 3-year surface wind rose for Imperial, Nebraska. In Figure 9, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Winds at the Imperial, Nebraska location are predominately out of south-southeast or northwest, which is consistent with the expected wind climatology for the region.

Figure 9: Imperial, Nebraska Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the Imperial, Nebraska surface and North Platte, 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 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 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 near the Platte River valley with some rolling hills above the valley. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the National Elevation 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_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 "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For the Gerald Gentleman Station area of analysis, the state chose the monitored design value at the Trego, Kansas monitoring location, which is located in rural western Kansas, approximately 300 km to the south of Gerald Gentleman. The Trego County monitor is representative of the Gerald Gentleman area of analysis as there are no significant SO_2 sources near the Trego County monitor. The background concentration for this area of analysis was determined by the state to be 9 micrograms per cubic meter ($\mu g/m^3$), or 3.4 ppb,[4] and that value was incorporated into the final AERMOD results.

Summary of Modeling Results

The AERMOD modeling parameters for the Gerald Gentleman area of analysis are summarized below in Table 5.

Table 5: AERMOD Modeling Parameters for the Gerald Gentleman Station Area of Analysis

Gerald Gentleman Area of Analysis	
AERMOD Version	14134
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	2

[4] The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.62$\mu g/m^3$.

Modeled Structures	12
Modeled Fencelines	1
Total receptors	8,882
Emissions Type	Actual
Emissions Years	2012-2014
Meteorology Years	2012-2014
Surface Meteorology Station	Imperial, Nebraska
Upper Air Meteorology Station	North Platte, Nebraska
Methodology for Calculating Background SO_2 Concentration	1st tier
Calculated Background SO_2 Concentration	9 $\mu g/m^3$

The results presented below in table 6 show the magnitude and geographic location of the highest predicted modeled concentration based on actual emissions.

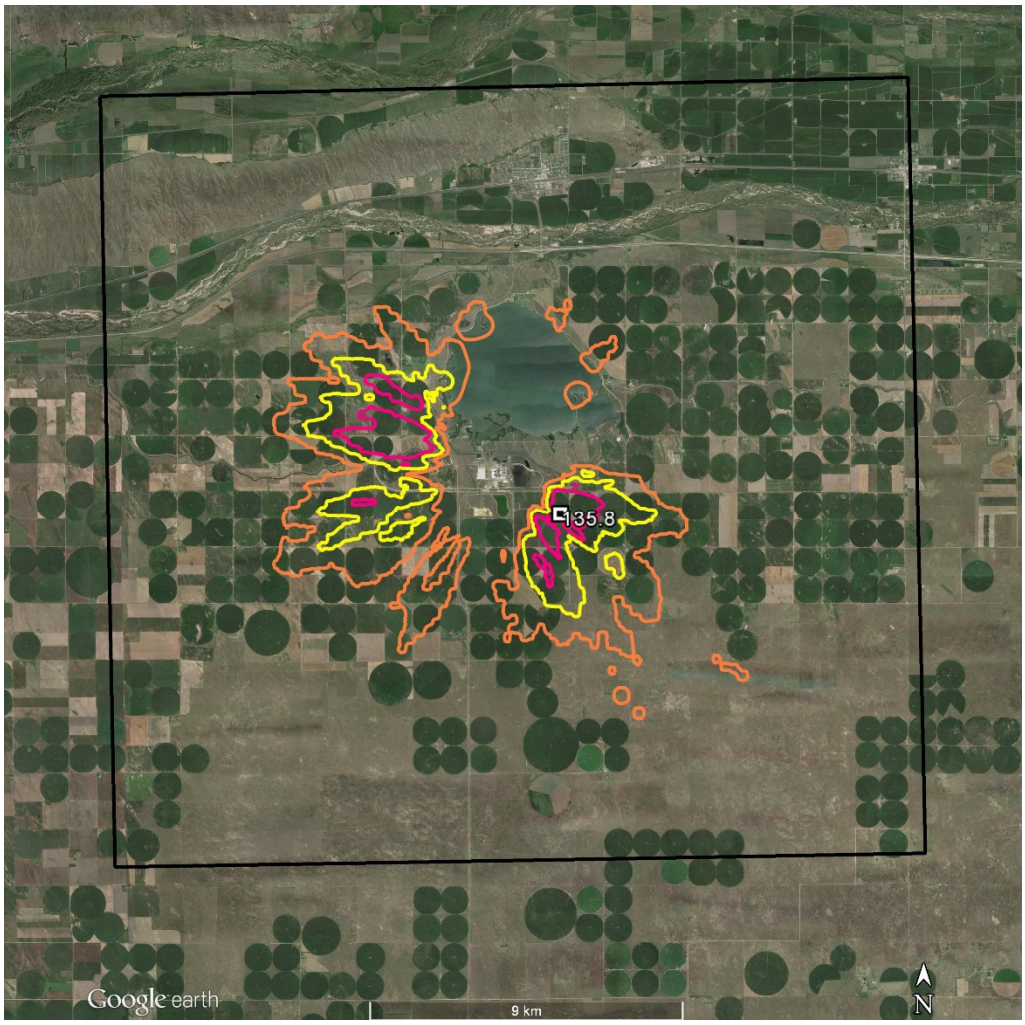
Table 6: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the Gerald Gentleman Station Area of Analysis Based on Actual Emissions

		Receptor Location		SO_2 Concentration ($\mu g/m^3$)	
Averaging Period	Data Period	UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	321900	4548800	144.8	196.5*

*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The state's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 144.8 $\mu g/m^3$ or 55.3 ppb, which is less than the 2010 SO_2 NAAQS of 75 ppb. This modeled concentration included the background concentration of SO_2 and is based on actual emissions from the facilities. Figure 10 below was included as part of the state's recommendation and indicates that the predicted value occurred just to the southeast of the facility.

Figure 10: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations (135.8 µg/m^3 without background) in the Gerald Gentleman Station Area of Analysis Based on Actual Emissions.



Jurisdictional Boundaries:

Once the geographic area of analysis associated with the Gerald Gentleman Station and background concentration is determined, existing jurisdictional boundaries are considered for the purpose of informing our intended unclassifiable/attainment area, specifically with respect to clearly defined legal boundaries.

The EPA has confirmed that there are no other sources in Lincoln County or in any of its neighboring counties, except for Gerald Gentleman Station which has been modeled to show compliance with the NAAQS. As a result, the EPA does not believe that sources or emissions from Lincoln County or any of its neighboring counties have the potential to cause or contribute to a violation of the NAAQS within Lincoln County.

As the state did not recommend specific boundaries for its proposed attainment area for the Gerald Gentleman Station, the EPA believes that Lincoln County comprises a reasonable boundary for our intended unclassifiable/attainment area. Lincoln County consists of clearly defined legal boundaries and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable/attainment area.

Other Relevant Information

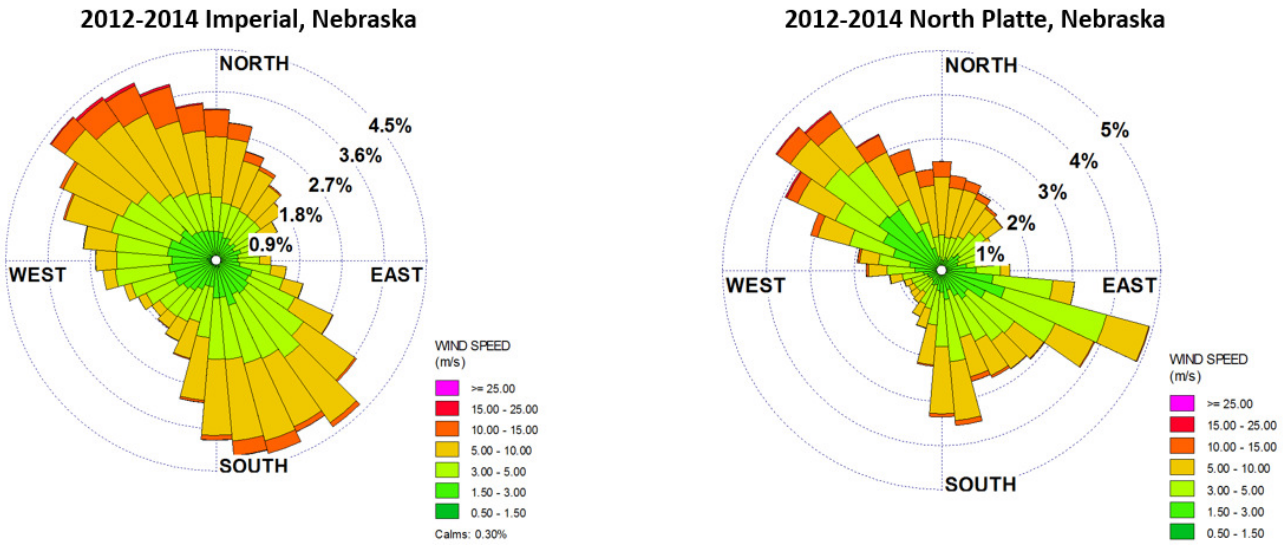
The EPA received air dispersion modeling results from Sierra Club, asserting that SO_2 emissions from Gerald Gentleman Station, when considered alone and without any other local sources, are causing a violation of the NAAQS. A discussion of the modeling performed by Sierra Club follows below and the major differences between the State's and Sierra Club modeling will be highlighted.

Sierra Club provided two modeling demonstrations, one using actual emissions and another using allowable emissions. Both modeling scenarios show violations of the 1-hr SO_2 NAAQS. Sierra Club's modeling that used 2012-2014 actual emissions from CEMS resulted in a 99th percentile 1-hr daily maximum of 217.5 $\mu g/m^3$ or 83 ppb. This is in comparison to the State's modeling that used the same actual emissions from CEMS and which resulted in a 99th percentile 1-hr daily maximum of 144.8 $\mu g/m^3$ or 55.3 ppb.

There are some significant differences between the modeling conducted by the Sierra Club and the State. The Sierra Club did not include the building dimension information and thus did not address the effects of building downwash. Inclusion of downwash often leads to higher concentrations closer to the source but not in all cases. Without actually including downwash in the modeling it is impossible to characterize the design value impacts from downwash for this source.

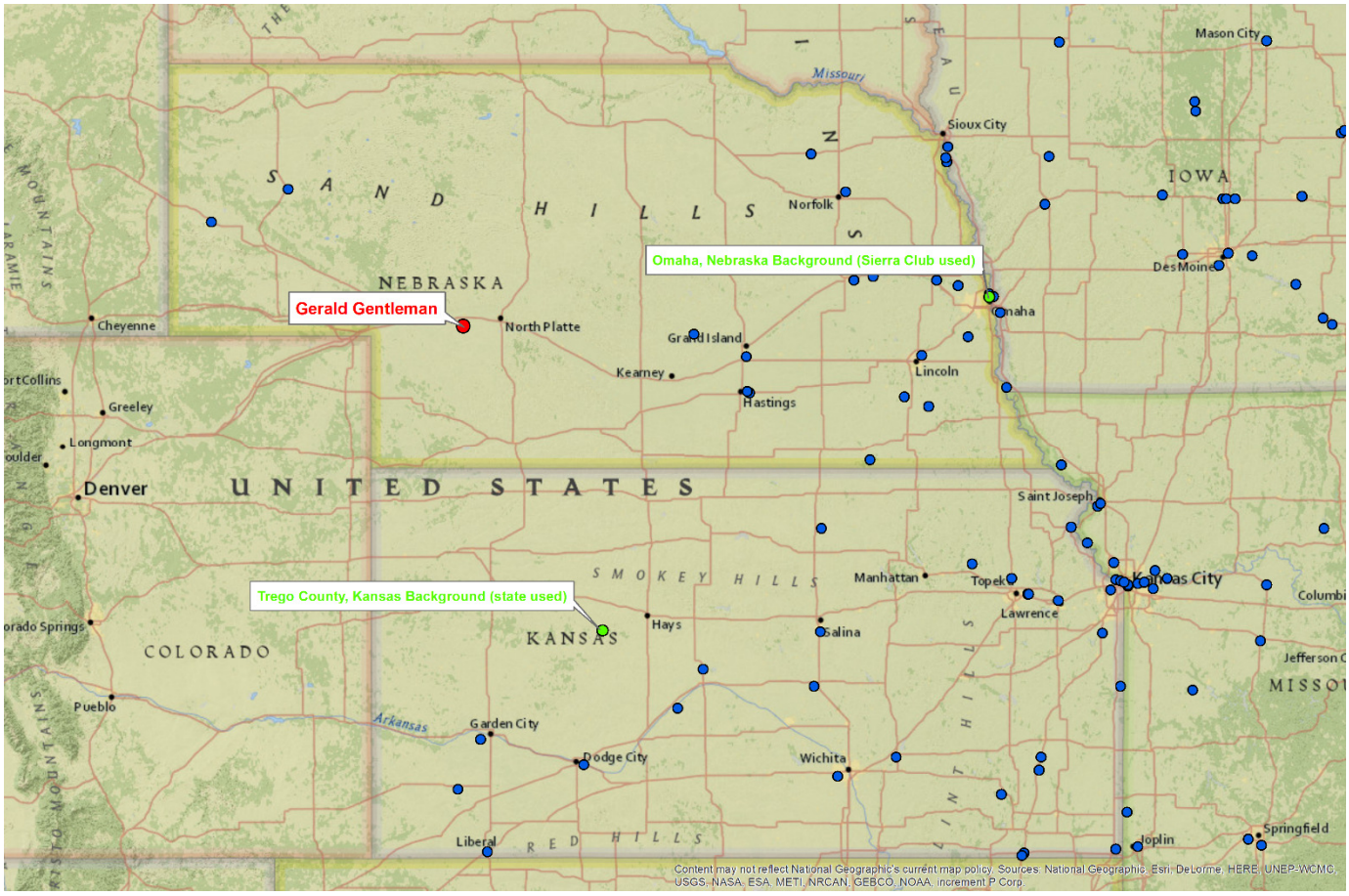
Also, the surface meteorology data used by Sierra Club was obtained from the NWS North Platte, Nebraska site, while the State's modeling used surface meteorology data from the NWS Imperial, Nebraska site. The North Platte NWS is closer to the Imperial NWS site, with North Platte and Imperial sites located 30 km and 60 km from the Gerald Gentleman Station, respectively. Both sites represent the terrain of west central Nebraska and the Gerald Gentleman Station Area. Figure 11 shows the wind rose comparison for the North Platte and Imperial surface meteorological sites for the 2012-2014 period. The winds at each locations are out of the southeast and northwest. The North Platte site does have a more easterly component than that of the Imperial site. EPA believes both the Imperial site used by the state and the North Platte site used by the Sierra Club accurately represent the Gerald Gentleman area. Without a provided modeling analysis that only evaluates the impacts from just the different NWS site inputs, EPA can make no determination on what impact the selection of the surface meteorology station has on predicted model SO_2 concentrations.

Figure 11: Imperial, Nebraska (state used) and North Platte, Nebraska (Sierra Club used) Cumulative Annual Wind Rose for Years 2012 – 2014



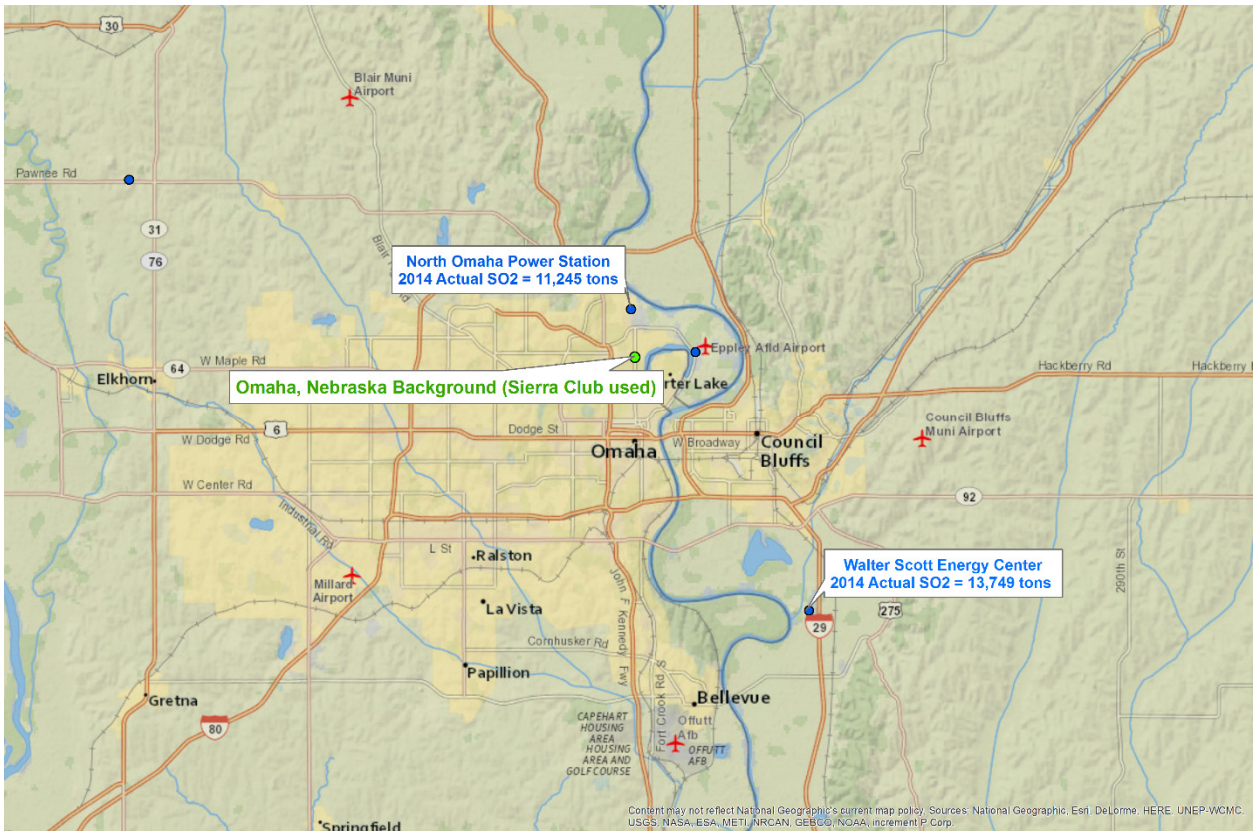
The most significant difference between the Sierra Club and the state's modeling is the chosen location and value of the background SO_2 concentration. The locations of the Omaha, Nebraska monitoring site used by the Sierra Club and the Trego County, Kansas monitoring site are shown in Figure 12. The Sierra Club based it background, 88.9 $\mu g/m^3$, on the lowest measured 2011-2013 1-hr SO_2 design value in the State of Nebraska. There are only two SO_2 monitoring sites located in Nebraska, with both located in urban Omaha, Nebraska. The Omaha site with the lower 2011-2013 design value is sited near the Douglas County Hospital. It is in an urban setting in eastern Nebraska over 450 km from the Gerald Gentleman Station. Figure 13 shows the location Omaha Douglas County Hospital monitor and the large sources of SO_2 within 20 km of its location, most notable the North Omaha Power Station (2014 actual SO_2 emission of 11,245 tons) and the Walter Scott Energy Center (2014 actual emissions of 13,749 tons) in nearby Council Bluffs, Iowa.

Figure 12: Locations of the background monitor used for Gerald Gentleman Station. The Omaha monitoring site used for Sierra Club background concentration and the Trego County, Kansas monitoring site used for the state's background concentration. The blue dots represent the location of sources of SO_2 with emissions greater than 10 tons per year according to the 2011 NEI.



As previously discussed, the state based its background concentration, 9 $\mu g/m^3$, the design value from the monitor located in Trego County, Kansas, approximately 300 km directly south of the Gerald Gentleman Station. The Trego County monitor is located in rural west central Kansas, and like the Gerald Gentleman Station has no significant nearby sources of SO_2. EPA believes the Trego County monitor provides a better representation of the SO_2 background than the Omaha monitor for the Gerald Gentleman Station area of analysis.

Figure 13: Location of the Douglas County Hospital SO_2 monitor and the nearby significant sources of SO_2.



In summary, EPA believes the 9 $\mu g/m^3$ background concentration from the Trego County monitor is more representative of the background SO_2 levels around Gerald Gentleman. EPA will not rely on the chosen background of the Omaha monitor used in Sierra Club modeling because the monitor is influenced by significant local SO_2 sources.

The Sierra Club also provided modeling using allowable emissions based on the 2002 operating permit issued by the regulatory agency. The modeling with allowable emissions resulted in a 99th percentile 1-hr daily maximum of 898.6 $\mu g/m^3$. However, as mentioned previously, 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, and both the State and Sierra Club provided such actual emissions-based modeling. Therefore, the Sierra Club modeling analysis using allowable emissions will not be assessed for designation purposes for the Gerald Gentleman Station.

Conclusion

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 the Gerald

Gentleman Station as unclassifiable/attainment for the 2010 SO_2 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 EPA, and we have confirmed that there are no other sources in Lincoln County or any of its neighboring counties that are likely to cause or contribute to a violation of the NAAQS within Lincoln County. The modeling provided by the state for the Gerald Gentleman Station indicates that when using actual emissions from 2012-2014 from the facility, the modeled maximum concentrations are below the 1-hr SO_2 NAAQS. The modeling performed by the state followed the recommended EPA modeling TAD for designation purposes. The Sierra Club also provided a modeling analysis for Gerald Gentleman. Sierra Club's modeling used actual emissions from 2012-2014 and showed modeled violations of the 1-hr SO_2 NAAQS. However, the Sierra Club's modeling used a background concentration from an urban monitoring location that is influenced by significant local sources. The Sierra Club's chosen background does not represent the rural background of the Gerald Gentleman Station location.

At this time, our intended designations for the state only apply to this area and the other areas presented in this technical support document. Consistent with the conditions in the March 2, 2015, consent decree, 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 Sheldon Station, Nebraska Area

Proposed Designation Summary

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 Sheldon Station as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Lancaster County, Nebraska.

The unclassifiable designation is based on shortcomings from the modeling analyses that were submitted by both the state of Nebraska and the Sierra Club. The two modeling scenarios that the state conducted relied upon changes to the current Sheldon Station operations that would either reduce emissions or enhance dispersion of emissions but do not appear likely to be completed by July 2, 2016. Both modeling scenarios submitted by the Sierra Club use a background value that EPA believes is not representative of the area surrounding the Sheldon Station facility. Therefore the EPA did not have a reliable modeling analysis to designate this area at this time.

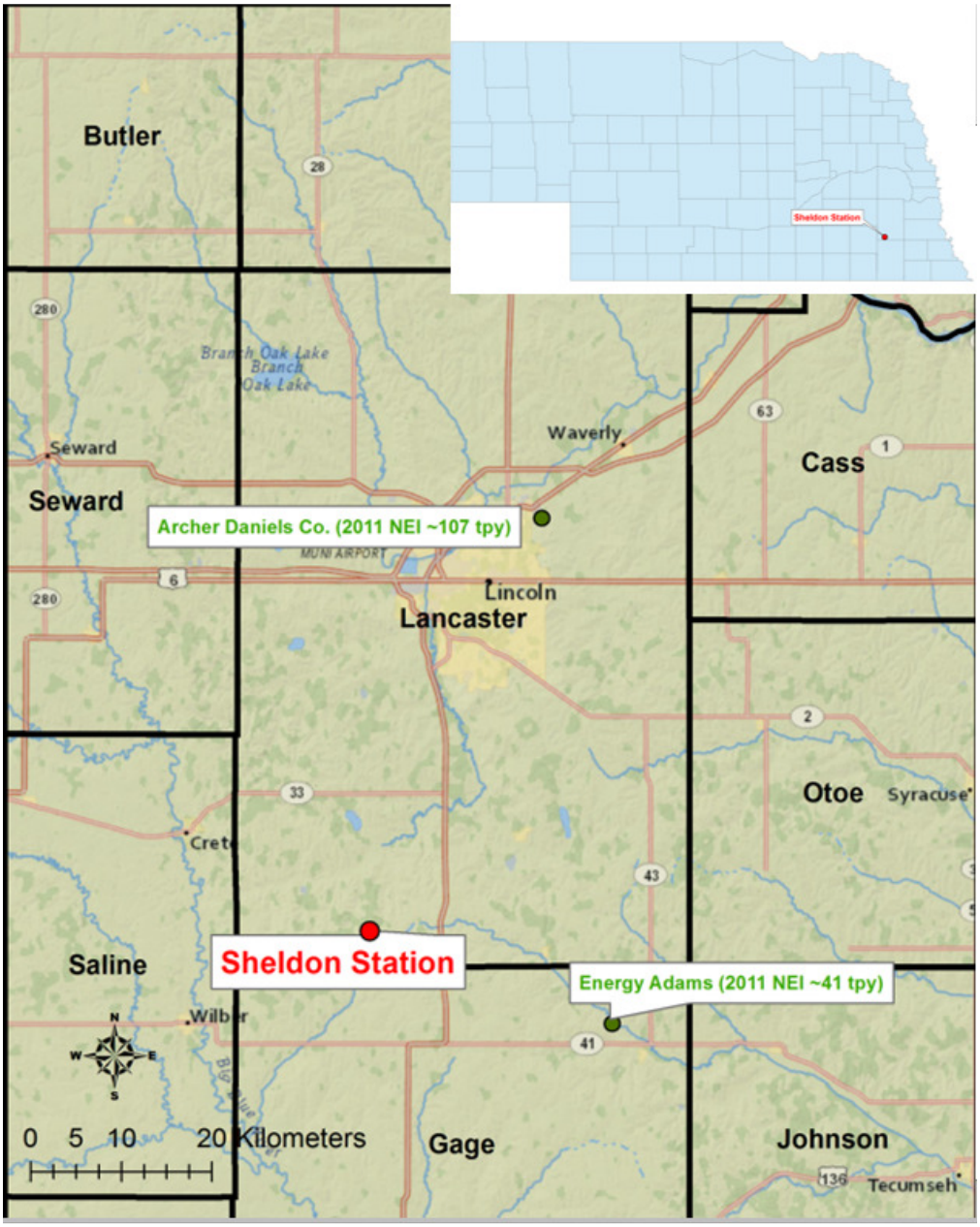
Introduction

The Hallam, Nebraska area located in Lancaster County Nebraska, contains a stationary source that according to the EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the Nebraska Public Power District's (NPPD) Sheldon Station emitted 2,760 tons of SO_2 and had an emissions rate of 0.92 lbs SO_2/mmBTU. Pursuant to the March 2, 2015 court-ordered schedule, the EPA must designate the area surrounding the facility by July 2, 2016.

In its submission, Nebraska recommended that the area around Sheldon Station 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_2 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. The State performed two modeling scenarios that purported to demonstrate compliance with the SO_2 1-hr NAAQS based on actual emissions that would result from changes that would either reduce actual emissions or enhance dispersion of emissions. One modeling scenario relies upon increasing the stack heights for both boiler units (Units 1 and 2) at the Sheldon Station. The second modeling scenario relies upon increasing the stack height for Unit 1 and ceasing the combustion of coal for Unit 2. These two modeling scenarios depend upon changes to the current Sheldon Station operations that, if adopted, would affect actual emissions. The changes for Unit 2 under either scenario do not appear likely to be completed by July 2, 2016. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees with the state's recommendation for the area and intends to designate Lancaster County as unclassifiable.

The Sheldon Station is located in southeastern Nebraska in the southern portion of Lancaster County. As seen in Figure 14 below, the facility is located approximately 2 km north of the community of Hallam, and 20 km south of Lincoln, Nebraska (pop., 250,000). The Sheldon Station includes two coal-fired boilers. Figure 14 shows that there are no other significant emitters of SO_2 within 20 km of the Sheldon Station. The nearby SO_2 sources outside of 20 km include the Energy Adams facility in Gage County, with 41 tpy of SO_2 based on the 2011 NEI and the Archer Daniels Company, with 107 tpy in Lancaster County, over 50 km from Sheldon Station. The state did not recommend a boundary for its unclassifiable designation, and the EPA believes that a reasonable boundary consists of Lancaster County, Nebraska.

Figure 14: The EPA's intended unclassifiable designation for the Lancaster County, Nebraska area which includes the Sheldon Station. The Sheldon Station is located in the southern portion of Lancaster County.



The discussion and analysis that follows below will reference the state's use of the Modeling TAD, the EPA's assessment of the state's modeling in accordance with the Modeling TAD, and the factors for evaluation contained in the EPA's March 20, 2015 guidance, as appropriate.

Detailed Assessment

Air Quality Data

This factor considers the SO_2 air quality monitoring data in the area surrounding the Sheldon Station facility. Since no SO_2 ambient monitors were located in Lancaster County, no monitoring data was relied upon in EPA's proposed designation for this area.

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. 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 14134, which was the most recent version of AERMOD at the time of their submittal, 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 with 3 km of the facility. According to the EPA's modeling guidelines, rural dispersion coefficients are to be used in the dispersion modeling analysis if more than 50% 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 was made based on the land-use characteristics around the facility.

Modeling Parameter: Area of Analysis (Receptor Grid)

The EPA believes that a reasonable first step towards characterization of the 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_2 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_2 concentrations. For the Sheldon Station area, the state has included no other emitters of SO_2 within its area of analysis. There are no other significant source of SO_2 within 20 km in any direction of the

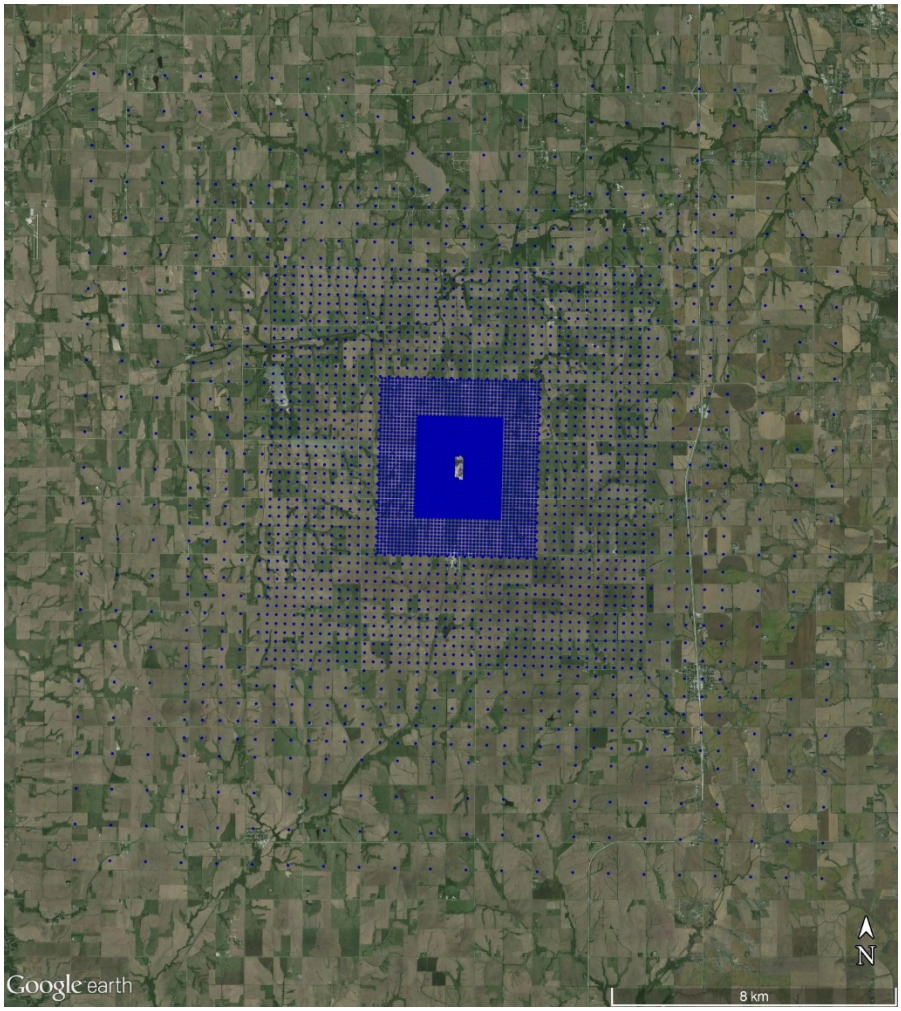
Sheldon Station according to the 2011 National Emissions Inventory (NEI) (Figure 14). Thus, no other emitters of SO_2 would have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. The grid receptor spacing for the area of analysis chosen by the state is as follows:

- 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 in Nebraska. Figure 15, which was included in the state's recommendation, 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 impacts. The impacts of the area's geography and topography will be discussed later within this document.

Figure 15: Receptor Grid for the Sheldon Station, Nebraska 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, one of the state's modeling scenarios for Sheldon Station increased the stack height for Unit 1 & 2. The other modeling scenario increased the stack height for Unit 1 and a shutdown of Unit 2. Neither of these two modeling analysis correctly represent the current source characteristics.

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 does provide 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 believes 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 believes 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_2 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_2 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_2 within its area of analysis. The state believes that these units adequately include the sources which might contribute to the area where the maximum concentrations of SO_2 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 Sheldon Station's annual actual SO_2 emissions between 2012 and 2014 are summarized in Table 7 below.

Table 7: Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Sheldon Station, Nebraska Area of Analysis

Facility Name	SO_2 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 the State's Area of Analysis	2,760	2,835	3,242

For the Sheldon Station in the area of analysis, the state modeled using two separate emission scenarios. First, the state used actual emissions from the most recent 3-year data set, i.e., 2012 – 2014. CEMS emissions data were used and obtained from the EPA's Clean Air Markets Division. This modeling scenario modified the impact of actual emissions by assuming increases to the stack height for both Units 1 and 2. The second modeled scenario includes the most recent 3-year data set of actual emissions for Unit 1 as modified by an assumed stack height increase, and by an assumed elimination of SO_2 emissions from Unit 2 resulting from the cessation of combusting coal.

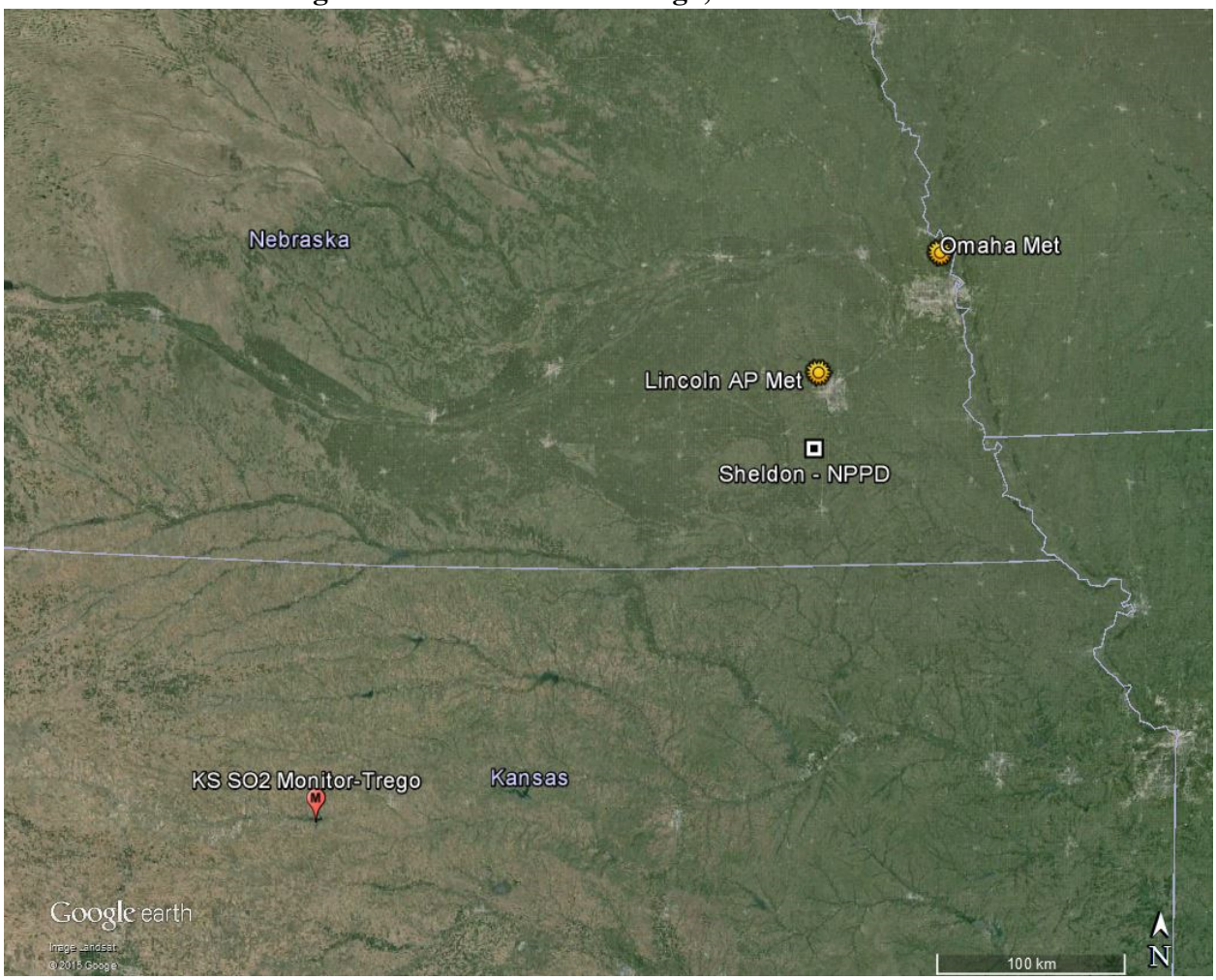
Modeling Parameter: Meteorology and Surface Characteristics

The most recent 3 years of 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 NWS stations, site-specific or onsite data, and other sources such as universities, the 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 best representative of meteorological conditions within the area of analysis. The location of the meteorological surface and upper air stations are shown in Figure 16.

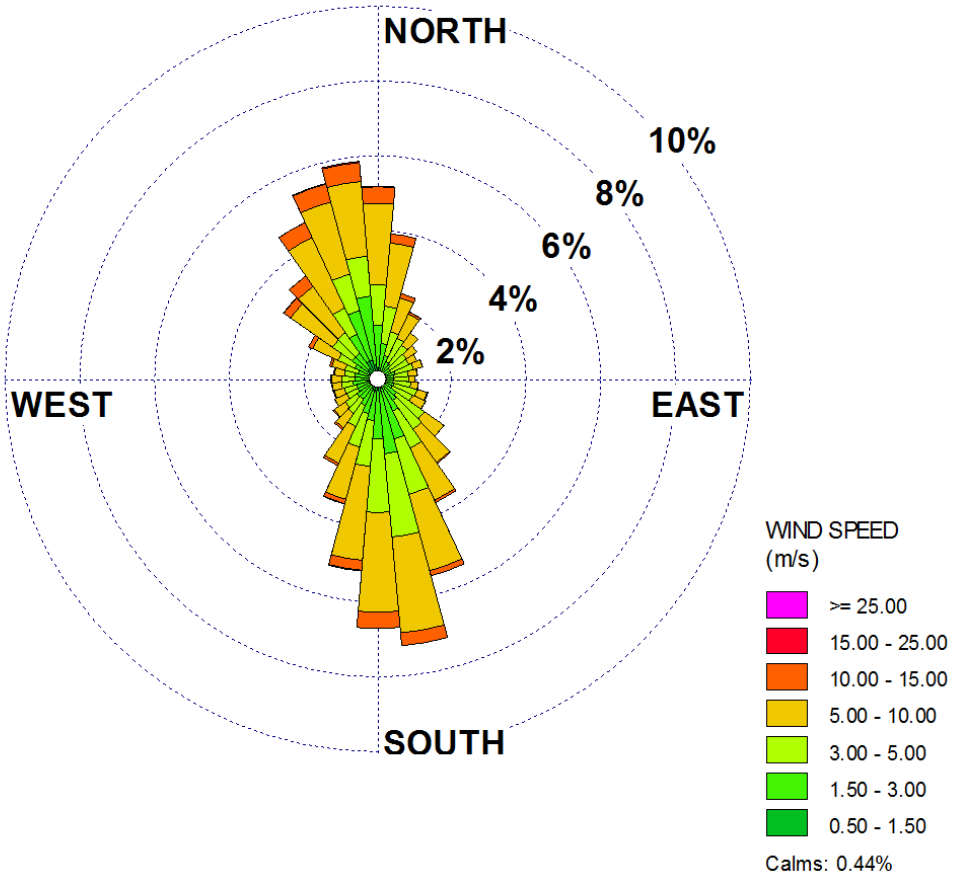
The state used AERSURFACE version 13016 using data from the NWS station in Lincoln, Nebraska (located at 40.85N, 96.76W) to estimate the surface characteristics of the area of analysis. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), 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 “Zo”). In Figure 16 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 16: 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_2 monitor in Trego, Kansas.



As part of its recommendation, the state provided the 3-year surface wind rose for Lincoln, Nebraska. In Figure 17, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Winds at the Lincoln, Nebraska location are predominately out of south-southeast or north-northwest, which is the expected wind climatology for the region.

Figure 17: Lincoln, Nebraska Cumulative Annual Wind Rose for Years 2012 – 2014



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 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 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 these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the National Elevation 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_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 "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th 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, which is located in rural western Kansas. The background concentration for this area of analysis was determined by the state to be 9 micrograms per cubic meter ($\mu g/m^3$), or 3.4 ppb,[5] and that value was incorporated into the final AERMOD results.

Summary of Modeling Results

The AERMOD modeling parameters for the Sheldon Station area of analysis are summarized below in Table 8.

Table 8: AERMOD Modeling Parameters for the Sheldon Station Area of Analysis

Sheldon Station Area of Analysis	
AERMOD Version	14134
Dispersion Characteristics	Rural
Modeled Sources	1

[5] The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.62$\mu g/m^3$.

Modeled Stacks	2
Modeled Structures	13
Modeled Fencelines	1
Total receptors	6,668
Emissions Type	Actual for Unit 1 with proposed stack modifications and actual for two scenarios for Unit 2, one with a stack modification and one assuming no SO_2 emissions as a result of ceasing coal combustion
Emissions Years	2012-2014
Meteorology Years	2012-2014
Surface Meteorology Station	Lincoln, Nebraska
Upper Air Meteorology Station	Omaha, Nebraska
Methodology for Calculating Background SO_2 Concentration	1st tier
Calculated Background SO_2 Concentration	9 $\mu g/m^3$

The results presented below in table 9 show the magnitude and geographic location of the highest predicted modeled concentration based on actual emissions as modified by assuming future actions taken to reduce emissions or enhance dispersion of emissions. The two modeling scenarios are given, e.g.: scenario 1 which depends upon raising the stack heights on both Unit 1 and Unit 2 and scenario 2 which depends upon raising the stack height for Unit 1 and uses and assuming no SO_2 emissions for Unit 2.

Table 9: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the Sheldon Station Area of Analysis Based on Actual Emissions as Modified by Assumed Future Changes

Averaging Period	Data Period	Model Scenario	Receptor Location		SO_2 Concentration ($\mu g/m^3$)	
			UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	Unit 1 & 2 with stack increase	688050	4491750	180.0	196.5*
99th Percentile 1-Hour Average	2012-2014	Unit 1 with stack increase	687950	4491750	185.6	196.5*

		and No Unit 2 emissions				

*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The state's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain would be 180.0 µg/m^3, or 69.2 ppb with both units' stack height increased. The state's modeling indicates that the predicted 99th percentile 1-hour average would be 185.6 µg/m^3, or 71.4 ppb with Unit 1 stack height increased and using no SO_2 emissions for Unit 2. This modeled concentration included the background concentration of SO_2 and is based on modified actual emissions from the facilities. Figures 18 and 19 below were included as part of the state's recommendation and indicate that the predicted value occurred just to the southeast of the facility for both modeling scenarios.

Figure 18: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations (171.0 µg/m^3 without background) in the Sheldon Station Area of Analysis Based on Actual Emissions. This is for the modeling scenario with Unit 1 & 2 with increased stack heights.

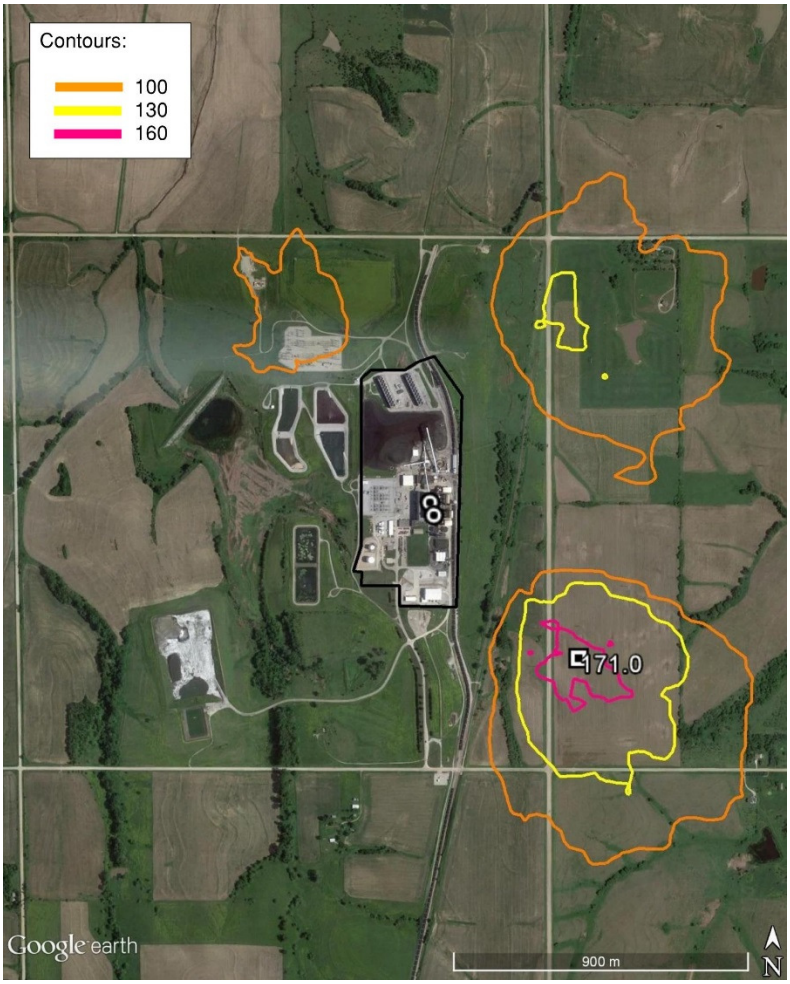
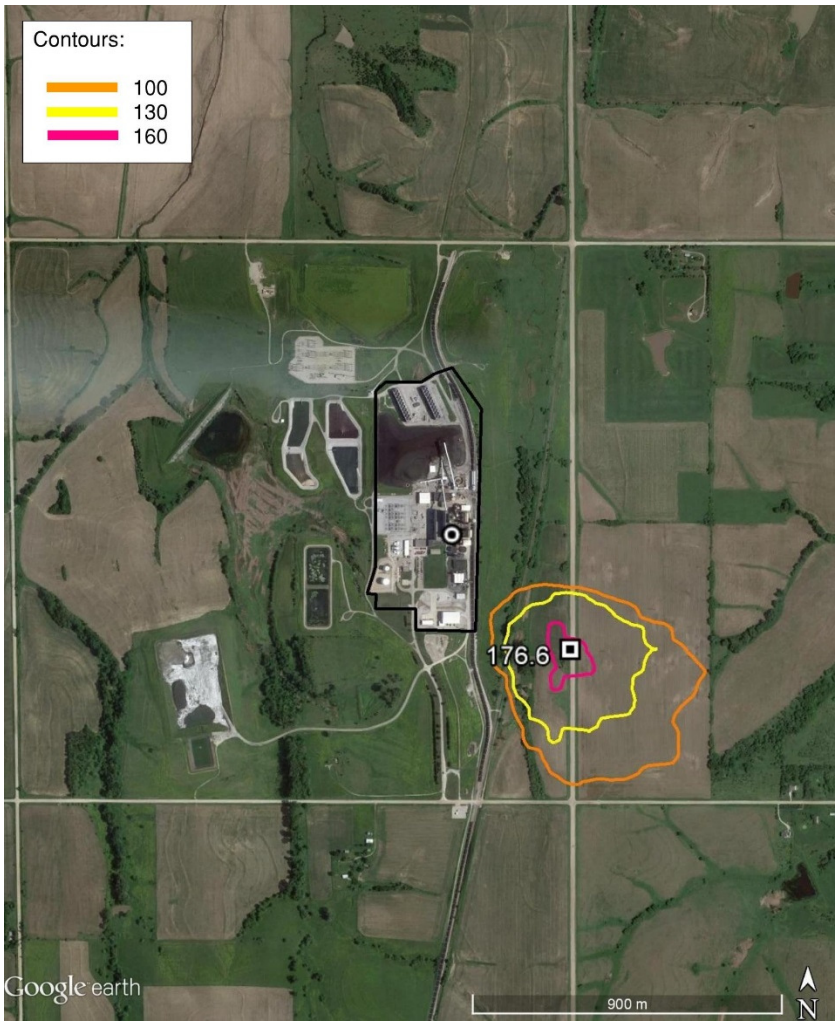


Figure 19: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations (176.6 µg/m^3 without background) in the Sheldon Station Area of Analysis Based on Modified Actual Emissions. This is for the modeling scenario with Unit 1 increased stack height and no SO_2 emissions for Unit 2.



Jurisdictional Boundaries:

Once the geographic area of analysis associated with the Sheldon Station and background concentration is determined, existing jurisdictional boundaries are considered for the purpose of informing our intended unclassifiable area, specifically with respect to clearly defined legal boundaries.

The EPA has confirmed that except for Sheldon Station, the only other source within Lancaster County or within 20 km of its borders that emits at or above 100 tpy is Archer Daniels Midland Co. The reported emissions for this facility according to the 2011 NEI was 106.74 tpy, and it is located approximately 30 km to the northeast of the Sheldon Station and 12 km away from the Lancaster County border. At this time and based on all available information, the EPA is not

prepared to assess the ambient impacts from this facility on air quality in Lancaster County. Instead, we will evaluate its impacts by either December 31, 2017, or December 31, 2020, consistent with the conditions in the consent decree.

The State did not recommend boundaries with its proposed unclassifiable area for Sheldon Station. Based on all available information, the EPA believes that Lancaster County is a reasonable boundary for our intended unclassifiable area. The borders of Lancaster County, Nebraska, are comprised of clearly defined legal boundaries and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable area.

Other Relevant Information

The EPA received air dispersion modeling results from the Sierra Club, asserting that SO_2 emissions from Sheldon Station, when considered alone and without any other local sources, are causing a violation of the NAAQS. A discussion of the modeling performed by the Sierra Club follows below and the major differences between the State's and Sierra Club modeling will be highlighted.

The Sierra Club provided two modeling demonstrations, one using actual emissions and another using allowable emissions. Both modeling scenarios show violations of the 1-hr SO_2 NAAQS. The Sierra Club's modeling that used 2012-2014 actual emissions from CEMS resulted in a 99th percentile 1-hr daily maximum of 208.6 $\mu g/m^3$.

The Sierra Club also provided modeling using allowable emissions based on the 2010 operating permit issued by the regulatory agency. The modeling with allowable emissions resulted in a 99th percentile 1-hr daily maximum of 930.1 $\mu g/m^3$. Although Sierra Club submitted modeling based on allowable emission rates, we have concerns that the allowable modeling, as presented, does not represent true SO_2 concentrations in the area, and we are unable to reliably determine whether the area is in attainment or nonattainment based on the allowable modeling. While the modeling TAD does not preclude the use of allowable emissions, for designations allowable emissions are generally used in the case where controls and limits have been recently established, and not to establish actual SO_2 concentrations a monitor might record.[6]

There are some significant differences between the modeling conducted by the Sierra Club and the state. The Sierra Club used actual emissions with the correct Sheldon Station source characteristics, however the Sierra Club did not include the building dimension information and thus did not address the effects of building downwash. Inclusion of downwash often leads to higher concentrations closer to the source but not in all cases. Without actually including

[6] Designations are intended to address current actual air quality (i.e., modeling simulates a monitor), and, thus, are unlike attainment plan modeling, which must provide assurances that attainment will occur. For the purposes of designations, modeling can be used as a surrogate to ambient monitoring to characterize air quality for the designations process. The EPA recommends modeling the most recent 3 years of actual emissions. Emissions Input section (Page 9)
http://www3.epa.gov/airquality/sulfurdioxide/pdfs/SO2ModelingTAD.pdf

downwash in the modeling it is impossible to characterize the design value impacts from downwash for this source.

The chosen monitor location and, thus, the chosen background SO_2 concentration is another significant difference between the Sierra Club and the state's modeling. The location of Sheldon Station and the location of the Omaha, Nebraska monitoring site used by Sierra Club and the Trego County, Kansas monitoring site used by the state are shown in Figure 20. The Sierra Club based its background, 88.9 $\mu g/m^3$, on the lowest measured 2011-2013 1-hr SO_2 design value in the state of Nebraska. There are only two SO_2 monitoring sites located in Nebraska, with both located in urban Omaha, Nebraska. The Omaha site with the lower 2011-2013 design value is sited near the Douglas County Hospital, which is 100 km to the northeast of the Sheldon Station. As previously discussed, the state based its background concentration, 9 $\mu g/m^3$, on the design value from the monitor located in Trego County, Kansas, approximately 300 km southwest of the Sheldon Station. The monitoring site near the Omaha Douglas County Hospital is closer to the Sheldon Station than the Trego County monitor, however the Omaha Douglas County monitor has large sources of SO_2 within 20 km of its location, most notably the North Omaha Power Station (2014 actual SO_2 emission of 11,245 tons) and the Walter Scott Energy Center (2014 actual emissions of 13,749) in nearby Council Bluffs, Iowa (Figure 21). According to the 2011 NEI, no SO_2 sources with emissions greater than 50 tpy of SO_2 are within 50 km of the Sheldon Station. The Trego County monitor is located in rural west central Kansas, and like the Sheldon Station has no significant nearby sources of SO_2. EPA believes the Trego County monitor provides a better representation of the SO_2 background than the Omaha monitor for the Sheldon Station area of analysis.

Figure 20: Locations of the background monitor used for Sheldon Station. The Omaha monitoring site used for Sierra Club background concentration and the Trego County, Kansas monitoring site used for the state's background concentration. The blue dots represent the location of sources of SO_2 with emissions greater than 10 tons per year according to the 2011 NEI.

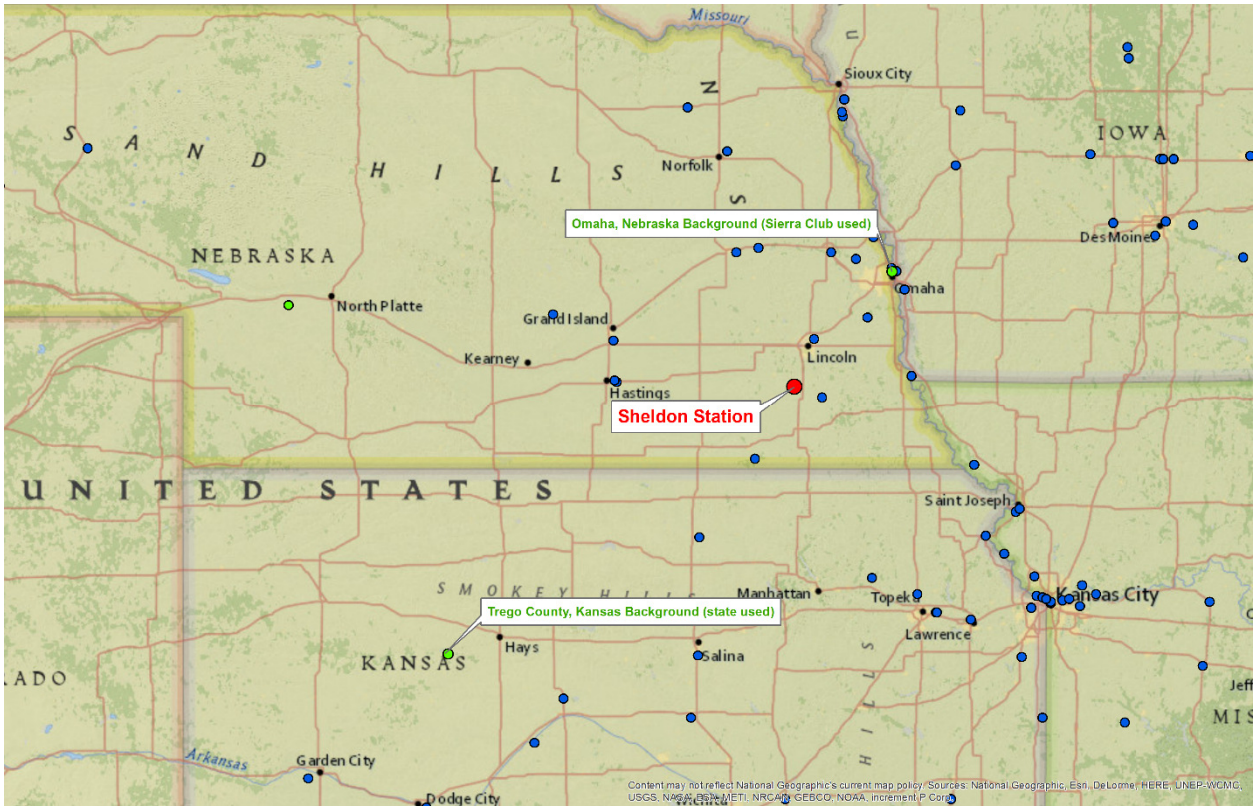
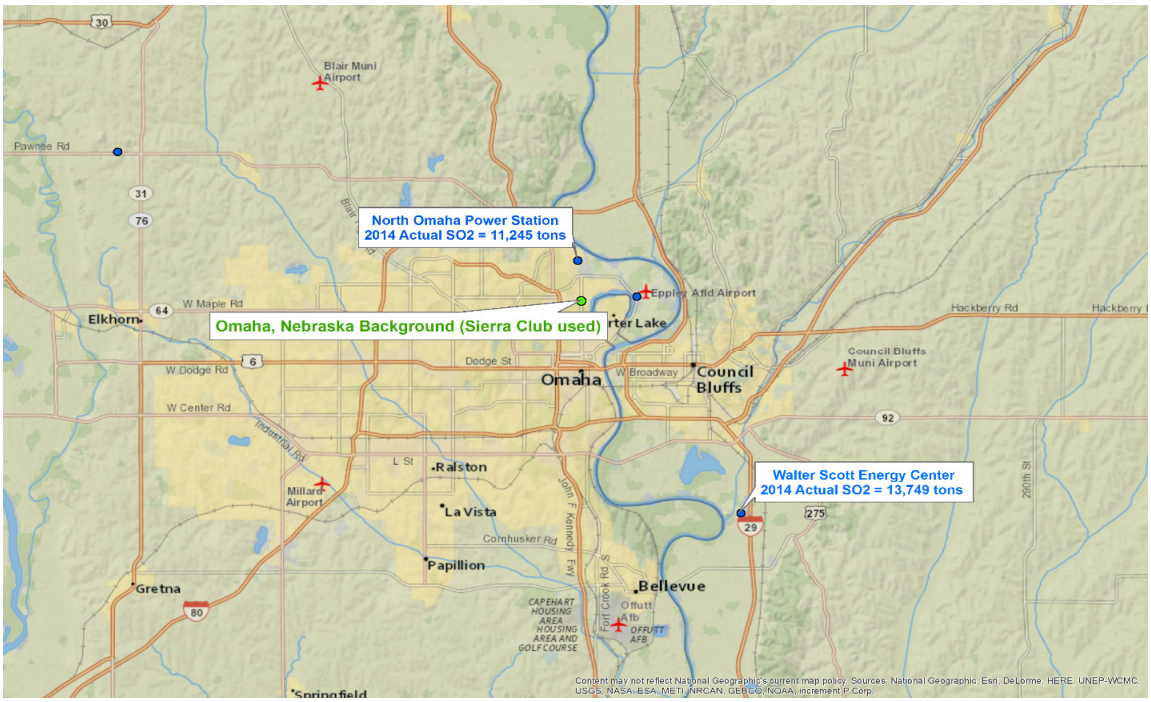


Figure 21: Location of the SO_2 monitor near the Douglas County Hospital and the nearby significant sources of SO_2.



Conclusion

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 Sheldon Station as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Lancaster County, Nebraska.

The unclassifiable designation is based on shortcomings in the modeling analyses that the State of Nebraska and the Sierra Club provided to EPA. As previously described, the State performed two modeling scenarios that demonstrated compliance with the SO_2 1-hr NAAQS, but the use of these scenarios do not comport with EPA's recommended practice for either actual emissions based modeling or allowable emissions based modeling in the TAD. One modeling scenario assumes stack height increases for both boiler units (Units 1 and 2) at the Sheldon Station as modifying impacts of actual emissions. The second modeling scenario assumes a stack height increase to Unit 1 and ceasing the combustion of coal for Unit 2 as modifying such impacts. These two modeling scenarios depend upon changes to the current Sheldon Station operations. The changes for Unit 2 under either scenario do not appear likely to be completed by July 2, 2016, and are therefore not creditable as affecting either 2012-2014 actual emissions or current and future allowable emissions for informing a final designation.

The Sierra Club also provided a modeling analysis for Sheldon Station. Sierra Club's modeling used actual emissions from 2012-2014 and asserted that there were violations of the 1-hr SO_2

NAAQS. However, 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.

For the reasons described above, EPA is unable at this time, based on available information, to determine whether the area is meeting or not meeting the NAAQS.

At this time, our intended designations for the state only apply to this area and the other areas presented in this technical support document. Consistent with the conditions in the March 2, 2015, consent decree, the EPA will evaluate and designate all remaining undesignated areas in Nebraska by either December 31, 2017, or December 31, 2020.