

## Final Technical Support Document

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

#### Summary

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

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

South Dakota submitted updated recommendations on September 16, 2015. Table 1 below lists South Dakota’s recommendations and identifies the county in South Dakota that the EPA is designating in order to meet the July 2, 2016, court-ordered deadline. This final designation is 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 – South Dakota’s Recommended and the EPA’s Final Designations<sup>1</sup>**

Area	State’s Recommended Area Definition <sup>2</sup>	State’s Recommended Designation	EPA’s Final Area Definition	EPA’s Final Designation
Grant County, South Dakota	Grant County, South Dakota	Attainment	Grant County, South Dakota (Grant County)	Unclassifiable/Attainment

#### Background

On June 3, 2010, the EPA revised the primary (health based) SO<sub>2</sub> NAAQS by establishing a new 1-hour standard at a level of 75 parts per billion (ppb) which is met at an ambient air quality

<sup>1</sup> Although the EPA’s final designation of unclassifiable/attainment differs from our proposed designation of unclassifiable, the area definition, Grant County, South Dakota, is the same as what we proposed.

<sup>2</sup> South Dakota recommended attainment for every county in the state, but EPA is only addressing the State’s recommendation for Grant County at this time.

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

### General Approach and Schedule

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

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

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

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<sup>3</sup> 40 CFR 50.4(e) provides that the two prior primary NAAQS will no longer apply to an area 1 year after its designation under the 2010 NAAQS, except that for areas designated nonattainment under the prior NAAQS as of August 22, 2010, and areas not meeting the requirements of a SIP Call under the prior NAAQS, the prior NAAQS will apply until that area submits and EPA approves a SIP providing for attainment of the 2010 NAAQS. Grant County, South Dakota was neither designated nonattainment under the prior NAAQS as of August 22, 2010, nor failed to meet the requirements of a SIP Call under the prior NAAQS.

consent decree and issued an enforceable order for the EPA to complete the area designations according to the court-ordered schedule.

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

The last two deadlines for completing remaining designations are December 31, 2017, and December 31, 2020. The EPA has separately promulgated requirements for state and other air agencies to provide additional monitoring or modeling information on a timetable consistent with these designation deadlines. We expect this information to become available in time to help inform these subsequent designations. These requirements were promulgated on August 21, 2015 (80 FR 51052), in a rule known as the SO<sub>2</sub> Data Requirements Rule (DRR), codified at 40 CFR part 51 subpart BB.

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

Based on complete, quality assured and certified ambient air quality data collected between 2013 and 2015, no violations of the 2010 SO<sub>2</sub> NAAQS have been recorded at ambient air quality monitors in any undesignated part of South Dakota. However, there is one source in the State

meeting the emissions criteria of the consent decree for which the EPA must complete designations by July 2, 2016. In this final technical support document, the EPA discusses its review and technical analysis of South Dakota's updated recommendations for the area that we must designate. The EPA also discusses any final modifications from the State's recommendation based on all available data before us.

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

- 1) 2010 SO<sub>2</sub> NAAQS – the primary NAAQS for SO<sub>2</sub> promulgated in 2010. This NAAQS is 75 ppb, based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. See 40 CFR 50.17.
- 2) Attaining monitor – an ambient air monitor meeting all methods, quality assurance, and siting criteria and requirements whose valid design value is under 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
- 3) Design Value – a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the NAAQS.
- 4) Designated nonattainment area – an area which the EPA has determined has violated the 2010 SO<sub>2</sub> NAAQS or contributed to a violation in a nearby area. A nonattainment designation reflects considerations of the state's recommendations and all of the information discussed in this document. The EPA's decision is based on all available information including the most recent 3 years of air quality monitoring data, available modeling analyses, and any other relevant information.
- 5) Designated unclassifiable area – an area for which the EPA cannot determine based on all available information whether or not it meets the 2010 SO<sub>2</sub> NAAQS.
- 6) Designated unclassifiable/attainment area – an area which the EPA has determined to have sufficient evidence to find either is attaining or is likely to be attaining the NAAQS. The EPA's decision is based on all available information including the most recent 3 years of air quality monitoring data, available modeling analyses, and any other relevant information.
- 7) Modeled violation – a violation based on air dispersion modeling.
- 8) Recommended attainment area – an area a state or tribe has recommended that the EPA designate as attainment.
- 9) Recommended nonattainment area – an area a state or tribe has recommended that the EPA designate as nonattainment.
- 10) Recommended unclassifiable area – an area a state or tribe has recommended that the EPA designate as unclassifiable.
- 11) Recommended unclassifiable/attainment area – an area a state or tribe has recommended that the EPA designate as unclassifiable/attainment.
- 12) Violating monitor – an ambient air monitor meeting all methods, quality assurance, and siting criteria and requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.

## Technical Analysis for Grant County, South Dakota

### Introduction

The Grant County, South Dakota, area contains one stationary source that according to the EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO<sub>2</sub> or more than 2,600 tons of SO<sub>2</sub> and had an annual average emission rate of at least 0.45 pounds of SO<sub>2</sub> per one million British thermal units (lbs SO<sub>2</sub>/mmBTU). Specifically, in 2012, the Big Stone Power Plant electric generating facility emitted 12,290 tons of SO<sub>2</sub> and had an emissions rate of 0.81 lbs SO<sub>2</sub>/mmBTU. As of March 2, 2015, this stationary source had not met the criteria for being "announced for retirement." Pursuant to the March 2, 2015, court-ordered schedule, the EPA must designate the area surrounding this facility by July 2, 2016.

In its September 16, 2015 submission, South Dakota recommended that the area surrounding the Big Stone Power Plant, specifically the entirety of Grant County, be designated as attainment based on an assessment and characterization of air quality from the facility. This assessment and characterization was performed using historic ambient monitoring from November 2001 to October 2002.

On February 16, 2016, the EPA notified South Dakota that we intended to designate the Grant County area as unclassifiable, based on our view that that available information did not enable a determination regarding whether the area was meeting the NAAQS. Additionally, we informed the State that our intended boundaries for the unclassifiable area consisted of Grant County. EPA's intended designation and associated boundaries for Grant County were based on a lack of information sufficient to conclude that the facility was not causing exceedances of the NAAQS. Detailed rationale, analyses, and other information supporting our intended designation for this area can be found in the preliminary technical support document for South Dakota, and this document along with all others related to this rulemaking can be found in Docket ID EPA-HQ-OAR-2014-0464.

### Assessment of New Information

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

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

As further discussed below, after carefully considering all available data and information, the EPA is designating the Grant County area as unclassifiable/attainment for the 2010 SO<sub>2</sub> NAAQS, based on our view that the area is meeting the NAAQS. The boundaries for this unclassifiable/attainment area consist of the boundaries of Grant County, and are shown in the figure below. The yellow reflects Grant County, South Dakota, and the red star indicates the Big Stone Power Plant.

Figure 1: The EPA's final unclassifiable/attainment area: Grant County, South Dakota



Subsequent to our February 16, 2016, notification, the EPA received comments from the State regarding our intended designation for this area. In these comments, the State re-affirmed its position from its September 16, 2015, recommendation that the combination of historic monitoring near the Big Stone Power Plant,<sup>4</sup> on-going monitoring elsewhere in the State, and the significant SO<sub>2</sub> controls recently installed at the facility justified a conclusion that Grant County is attainment for the 2010 SO<sub>2</sub> NAAQS. The State asserted that all information indicated attainment of this NAAQS in Grant County, making the EPA's intended unclassifiable designation unreasonable.

Additionally, subsequent to our February 16, 2016, notification to the State, the EPA received additional information from the State regarding our intended unclassifiable designation for the

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<sup>4</sup> In its April 7, 2016, submittal of additional information which included these comments, the State noted that "modeling conducted at the time indicated the monitor was located in an area where high concentrations would likely be found." This modeling referenced by the State in support of the monitor's siting was never submitted to the EPA. The EPA was therefore unable to verify this assertion.

Grant County, SD area. Specifically, the State submitted documentation including air dispersion modeling conducted by Burns & McDonnell Engineering Company, Inc., who were contracted by Otter Tail Power Company, to the EPA on April 7, 2016, asserting that the Grant County area should be designated attainment. This information was submitted to support a modification to our proposed designation. The discussion and analysis of this new information that follow reference the Modeling TAD, Monitoring TAD, and the factors for evaluation contained in the EPA's March 20, 2015 guidance, as appropriate and applicable.

### *Model Selection and Modeling Components*

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

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

Burns & McDonnell used the most recent version of AERMOD (version 15181). However, Burns & McDonnell used an older version of AERMET, version 14134 instead of version 15181. The use of the older AERMET version is not expected to have any significant impacts on the model results. Based on the EPA Model Change Bulletin for AERMET version 15181,<sup>5</sup> the changes made among these AERMET versions should primarily impact simulations that use ADJ\_U\* options, which were not used in this case. The EPA has determined that the model selection and components are appropriate. A discussion of the individual components will be referenced in the corresponding discussion that follows, as appropriate.

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

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

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<sup>5</sup> AERMET Model Change Bulletin #6 – Version Date 15181,  
[https://www3.epa.gov/ttn/scram/metobsdata\\_procaccprogs.htm#aermet](https://www3.epa.gov/ttn/scram/metobsdata_procaccprogs.htm#aermet)

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

The EPA's view is that a reasonable first step towards characterization of air quality in the area surrounding the Big Stone Power Plant is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO<sub>2</sub> emission sources or facilities considered for modeling; the extent of significant concentration gradients of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO<sub>2</sub> concentrations. For the area near Big Stone, Burns & McDonnell has not included any other emitters of SO<sub>2</sub> as there are no sources above 5 TPY of SO<sub>2</sub> within 50 kilometers of the power plant. The grid receptor spacing for the area of analysis chosen by the State is as follows:

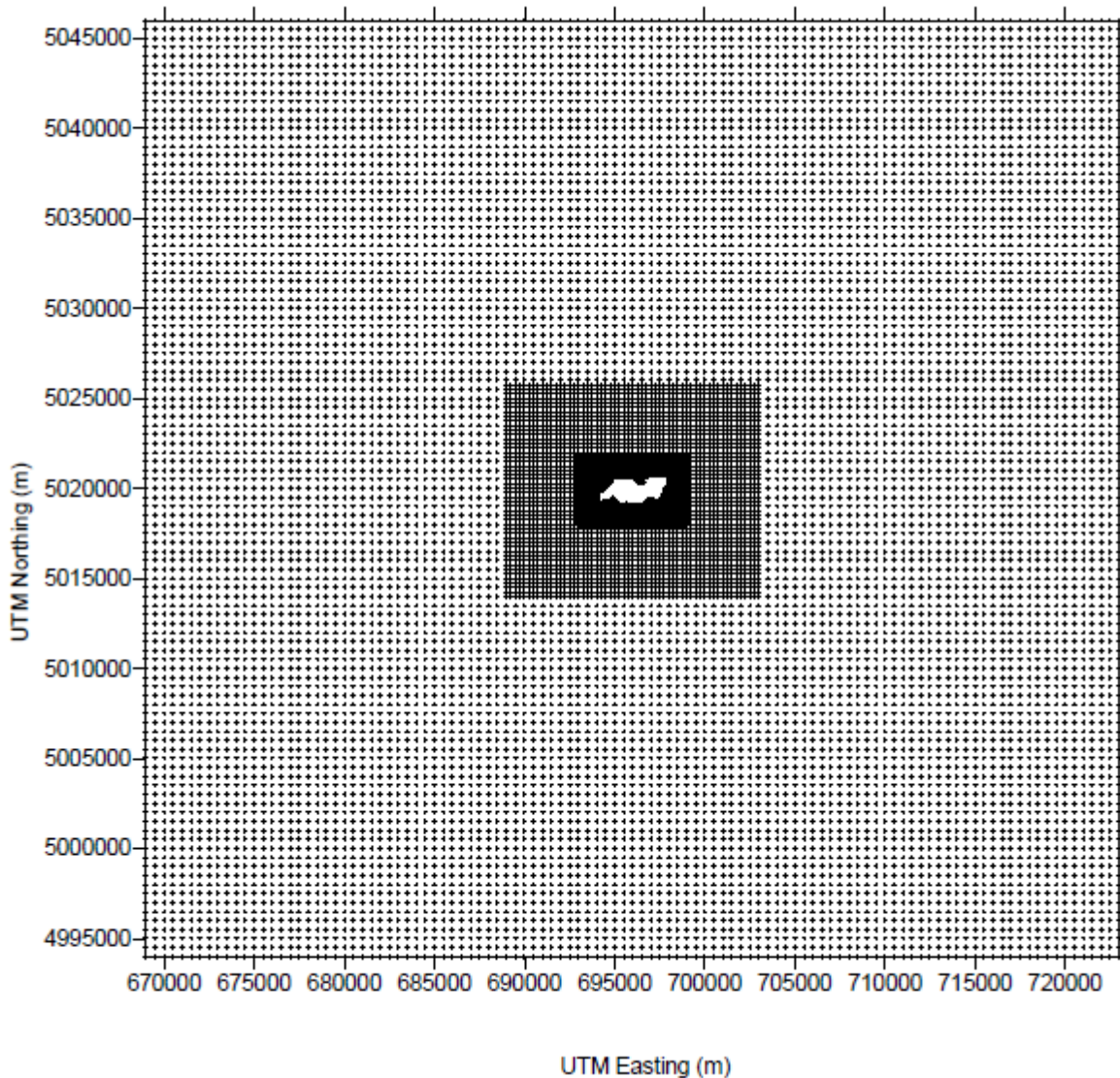
- 0 km to 0.2 km with 50 meters spacing
- 0.2 km to 1 km with 100 meters spacing
- 1 km to 5 km with 250 meters spacing
- 5 km to 25 km with 500 meters spacing
- Receptors were also placed along the fence line boundary at 50 meters spacing

The receptor network contained 15,976 receptors, and the network covered all of the area within 25 km of the fence line of the Big Stone Power Plant.

Figure 2, which was provided by Burns & McDonnell, shows the chosen area of analysis surrounding the Big Stone Power Plant. Burns & McDonnell did not exclude any receptors beyond the facility fence line from its modeling domain. The impacts of the area's geography and topography will be discussed later within this document.

Figure 2: Receptor Grid for the Big Stone Area of Analysis





For the area around Big Stone Power Plant, Burns & McDonnell did not include other emitters of SO<sub>2</sub> because there are no sources with greater than 5 TPY of SO<sub>2</sub> within 50 km of the facility in any direction. The EPA has determined that the area of analysis is appropriate.

*Modeling Parameter: Source Characterization*

Burns & McDonnell characterized the sources within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the State followed the EPA’s good engineering practices (GEP) policy in conjunction with allowable emissions limits. Burns & McDonnell 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. The EPA has determined that the source characterization is appropriate.

*Modeling Parameter: Emissions*

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

The EPA 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<sub>2</sub> emissions to a level that indicates compliance with the NAAQS. These new limits or conditions may be used in the application of AERMOD. In these cases, the Modeling TAD notes that the existing SO<sub>2</sub> emissions inventories used for permitting or SIP planning demonstrations should contain the necessary emissions information for designations-related modeling. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, “Guideline on Air Quality Models.”

As previously noted, the State included only Big Stone Power Plant in its area of analysis. The State has chosen to model the facility using the most recent federally enforceable PTE limits for SO<sub>2</sub>, as summarized below.

Table 2: SO<sub>2</sub> Emissions based on PTE from Facilities in the Grant County, South Dakota Area of Analysis

Facility Name	SO <sub>2</sub> Emissions (tons per year, based on PTE)
Big Stone Power Plant	3,509

The PTE limit for Big Stone Power Plant was the result of new control technology (semi-dry flue gas desulfurization), which was accompanied by a much lower emissions limit (0.09 lbs/MMBtu) that was made federally enforceable via South Dakota permit #28.0801-29-001C. Overall, the EPA has determined that the emissions used are appropriate.

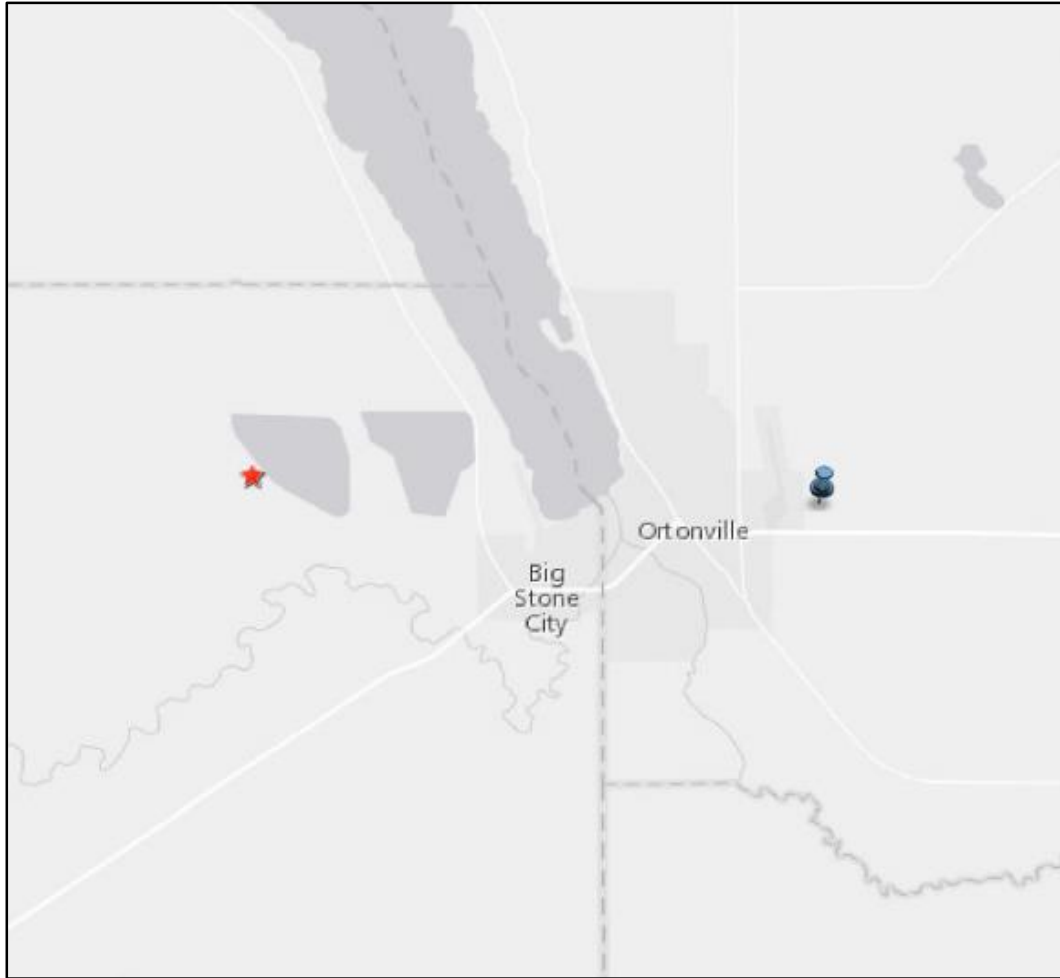
*Modeling Parameter: Meteorology and Surface Characteristics*

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

For the Grant County area of analysis, surface meteorology from the NOAA station in Ortonville, MN, approximately 5 km to the east, and coincident upper air observations from the NOAA station in Aberdeen, SD (Station ID: 14929), approximately 150 km to the west were selected as best representative of meteorological conditions within the area of analysis.

The analysis provided by Burns & McDonnell used AERSURFACE, version 13016, to estimate the surface characteristics of the area of analysis using data from the NOAA station in Ortonville, MN located at 45.300°N, 96.417°W. The analysis also estimated values for 12 spatial sectors out to 1 km at a monthly temporal resolution for average conditions. Further, Burns & McDonnell 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 the figure below, generated by the EPA, the location of the Ortonville, MN NWS station is shown (blue pin) relative to the Big Stone Power Plant (red star) area of analysis.

Figure 3: Big Stone Power Plant Area of Analysis and the Ortonville, MN NWS Station



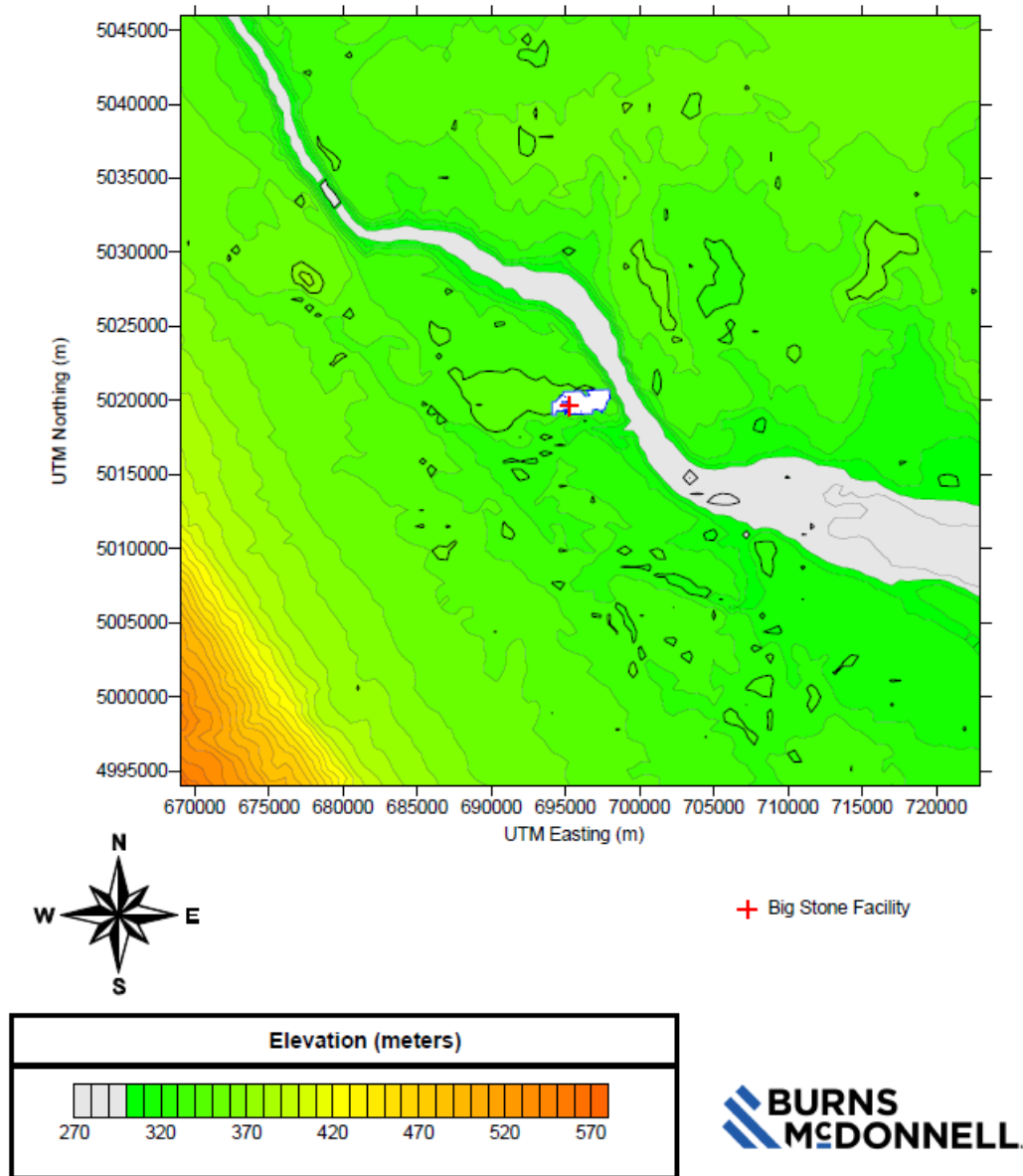
Meteorological data from the above surface and upper air stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. Burns & McDonnell followed the methodology and settings presented in the EPA's SO<sub>2</sub> Modeling TAD and Guideline on Air Quality Models in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics. However, as noted above, an older version of AERMET was used to estimate the surface and upper meteorological conditions. As discussed above, the changes made among these AERMET versions should primarily impact simulations that use ADJ\_U\* options, which were not used in this case. Burns & McDonnell also used five years of meteorological data (2010 to 2014), instead of the most recent three years of data, and did not use AERMINUTE to re-process the actual wind conditions at the meteorological tower to account for calm conditions. The use of five years of meteorological data and the exclusion of AERMINUTE are not anticipated to impact the results or values of the analysis significantly because this area of South Dakota does not have meteorological conditions that would vary substantially temporally or year-by-year, or conditions to which AERMINUTE would be particularly sensitive. For instance, the average of three years would be similar to the average of five years when the

meteorological conditions are fairly consistent year-by-year. Therefore, the selections of these options will not impact the outcome of the analysis or EPA's determinations. EPA has determined that the meteorological and surface characteristics are appropriate.

*Modeling Parameter: Geography and Terrain*

The terrain in the area of analysis is best described as flat, with nearby river valleys and water bodies. To account for these terrain changes, the AERMAP (version 11103) terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model was the USGS National Elevation Database. Figure 4 presents a map of the terrain surrounding the Big Stone Power Plant. The EPA has determined that these geographical assumptions are appropriate.

Figure 4: Map of the Terrain Surrounding the Big Stone Power Plant.



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

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO<sub>2</sub> that are ultimately added to the modeled design values: 1) a “first tier” approach, based on monitored design values, or 2) a temporally varying approach, based on the 99<sup>th</sup> percentile monitored concentrations by hour of day and season or month. For the Big Stone Power Plant area of analysis, Burns & McDonnell chose to use the highest 3-year average among nearby monitors. The background concentration for this area of analysis was determined by Burns & McDonnell to be 28.95 micrograms per cubic meter (µg/m<sup>3</sup>), or 11 ppb,<sup>6</sup> and that value was

<sup>6</sup> The conversion factor for SO<sub>2</sub> (at the standard conditions applied in the ambient SO<sub>2</sub> reference method) is 1ppb = approximately 2.62 µg/m<sup>3</sup>.

incorporated into the final AERMOD results. The EPA has determined that the value of the background concentration is appropriate.

*Summary of Modeling Results*

The AERMOD modeling parameters, as supplied by additional information from Burns & McDonnell during the comment period for the Big Stone Power Plant area of analysis are summarized below in Table 3.

Table 3: AERMOD Modeling Parameters for the Big Stone Power Plant Area of Analysis

Big Stone Power Plant Area of Analysis	
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	2
Modeled Structures	2
Modeled Fence lines	1
Total receptors	15,976
Emissions Type	PTE
Emissions Years	N/A
Meteorology Years	2010-2014
Surface Meteorology Station	Ortonville, MN
Upper Air Meteorology Station	Aberdeen, SD
Methodology for Calculating Background SO <sub>2</sub> Concentration	Highest 3-year average
Calculated Background SO <sub>2</sub> Concentration	28.95 µg/m <sup>3</sup> or 11 ppb

The results presented below in Table 4 show the magnitude and geographic location of the highest predicted modeled concentration based on PTE emissions.

Table 4: Maximum Predicted 99th Percentile 1-Hour SO<sub>2</sub> Concentration in the Big Stone Power Plant Area of Analysis Based on PTE Emissions

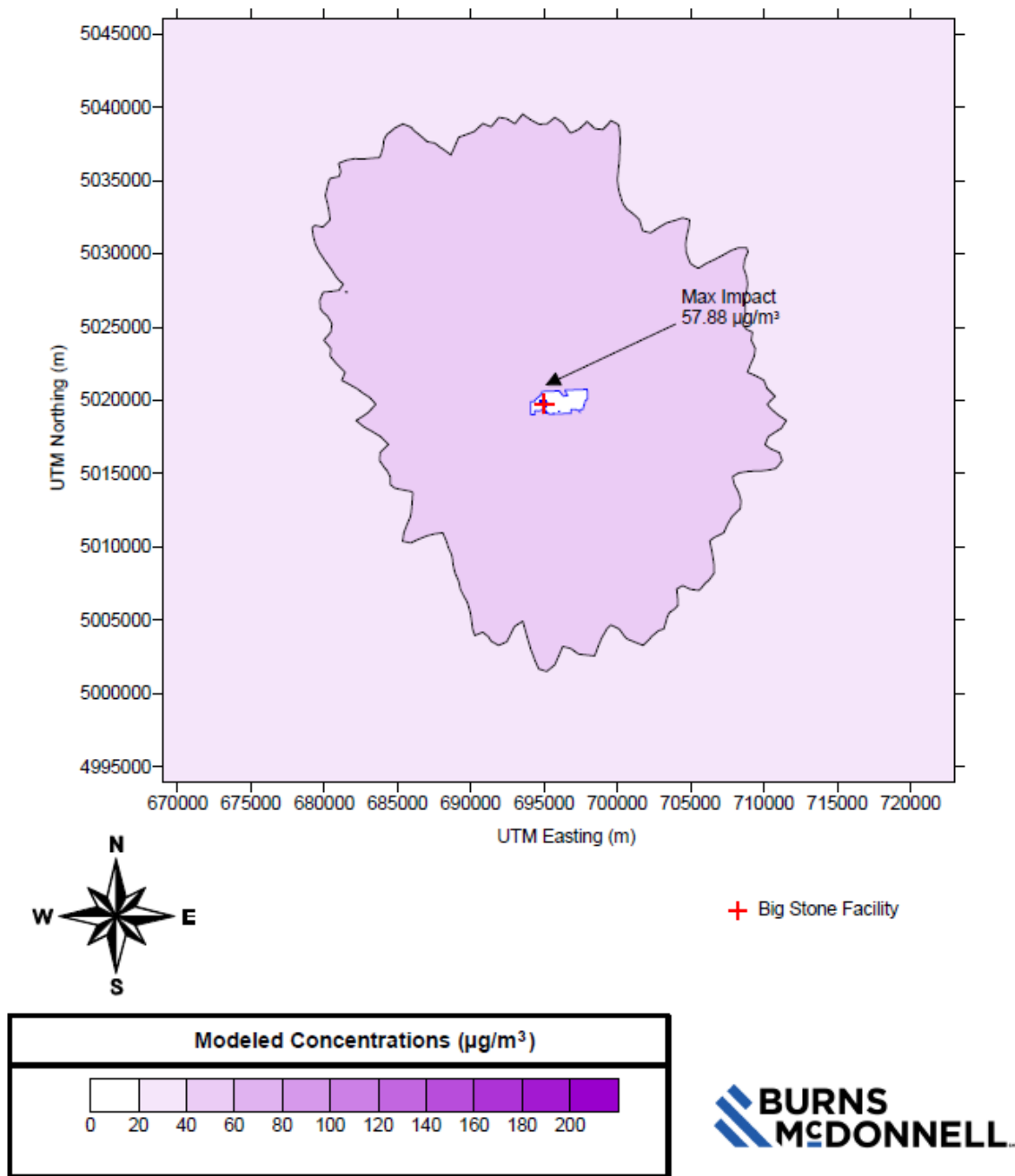
Averaging Period	Data Period	Receptor Location		SO <sub>2</sub> Concentration (µg/m <sup>3</sup> )	
		UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2010-2014	695100.00	5021400.00	57.88	196.5*

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

The State’s modeling indicates that the highest predicted 3-year average 99<sup>th</sup> percentile 1-hour average concentration within the chosen modeling domain is 57.88 µg/m<sup>3</sup>, or 22.09 ppb. This modeled concentration included the background concentration of SO<sub>2</sub>, and is based on PTE

emissions from the Big Stone Power Plant. Figure 5 below was included as part of group's submission and indicates that the predicted value occurred to the north of Big Stone Power Plant.

Figure 5: Maximum Predicted 99<sup>th</sup> Percentile 1-Hour SO<sub>2</sub> Concentrations in the Big Stone Power Plant Area of Analysis Based on Actual PTE Emissions and Background Concentration of 28.95 µg/m<sup>3</sup>.



*Jurisdictional Boundaries:*



Existing jurisdictional boundaries are considered for the purpose of informing our final unclassifiable/attainment area, specifically with respect to clearly defined legal boundaries. Subsequent to our February 16, 2016, notification, the EPA did not receive any comments regarding the intended boundaries for this area.

The EPA finds that our final unclassifiable/attainment area, consisting of Grant County, South Dakota, is comprised of clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our final unclassifiable/attainment area.

### Conclusion

After careful evaluation of the State's recommendation, all timely comments and information received during the state and public comment period, and additional relevant information as discussed in this document, the EPA determines that the area around Big Stone Power Plant is meeting the NAAQS, and therefore is designating the area as unclassifiable/attainment for the 2010 SO<sub>2</sub> NAAQS. Specifically, the area is comprised of Grant County, South Dakota. This designation is based on the modeling received from the State which indicates attainment by a wide margin, discussed above.

At this time, our final designation for the State only applies to this area. Consistent with the court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in South Dakota by either December 31, 2017, or December 31, 2020.