Draft Technical Support Document

Iowa
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 1-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.

July 2, 2016, is the 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. This deadline applies to certain areas in Iowa because three emission sources meet the conditions of the court's order.

Iowa submitted updated recommendations on September 18, 2015. Table 1 below lists the Iowa recommendations and identifies the counties in Iowa 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: Iowa's Recommended and the EPA's Intended Designations

Area	Iowa's Recommended Area Definition	Iowa's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Woodbury County, Iowa	Woodbury County	Attainment	Same as State's Recommendation	Unclassifiable
Wapello County, Iowa	Wapello County	Attainment	Same as State's Recommendation	Unclassifiable
Des Moines County, Iowa	Des Moines County	Attainment	Same as State's Recommendation	Unclassifiable

Background

On June 3, 2010, the EPA revised the primary (health based) SO_2 NAAQS by establishing a new 1-hour standard at a level of 75 parts per billion (ppb) which is attained 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_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 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_2 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_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. The EPA designated a portion of Muscatine County, Iowa as nonattainment in this set of designations.

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

[1] 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. No Iowa areas were designated nonattainment for the prior NAAQS as of August 22, 2010.

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 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_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 Iowa.[2] However, there are three

[2] For designations based on ambient air quality monitoring data that violate 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 has been 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

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 Iowa'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 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. See 40 CFR 50.17.
2) Design Value – a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the NAAQS.
3) Designated nonattainment area – an area 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 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 analysis, and any other relevant information.
4) Designated unclassifiable area – an area for 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.

that no violation of the NAAQS occurred between 2013 and 2015, the consent decree does not obligate the EPA to 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 MidAmerican – George Neal South Area (Woodbury County, Iowa)

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 an area around MidAmerican Energy George Neal South Generating Facility as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the area is comprised of the entirety of Woodbury County, Iowa.

The unclassifiable designation is based on the fact that although IDNR provided modeling to the EPA that demonstrated attainment for the area, some emission limits used by IDNR in this modeling analysis are not currently federally enforceable.[3]

Introduction

The Woodbury County, Iowa, 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). Specifically, in 2012, the MidAmerican Energy Company's George Neal South electric generating facility emitted 14,272 tons of SO_2 and had an emissions rate of 0.638 lbs SO_2/mmBTU. As of March 2, 2015, this stationary source had not met the specific requirements 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.

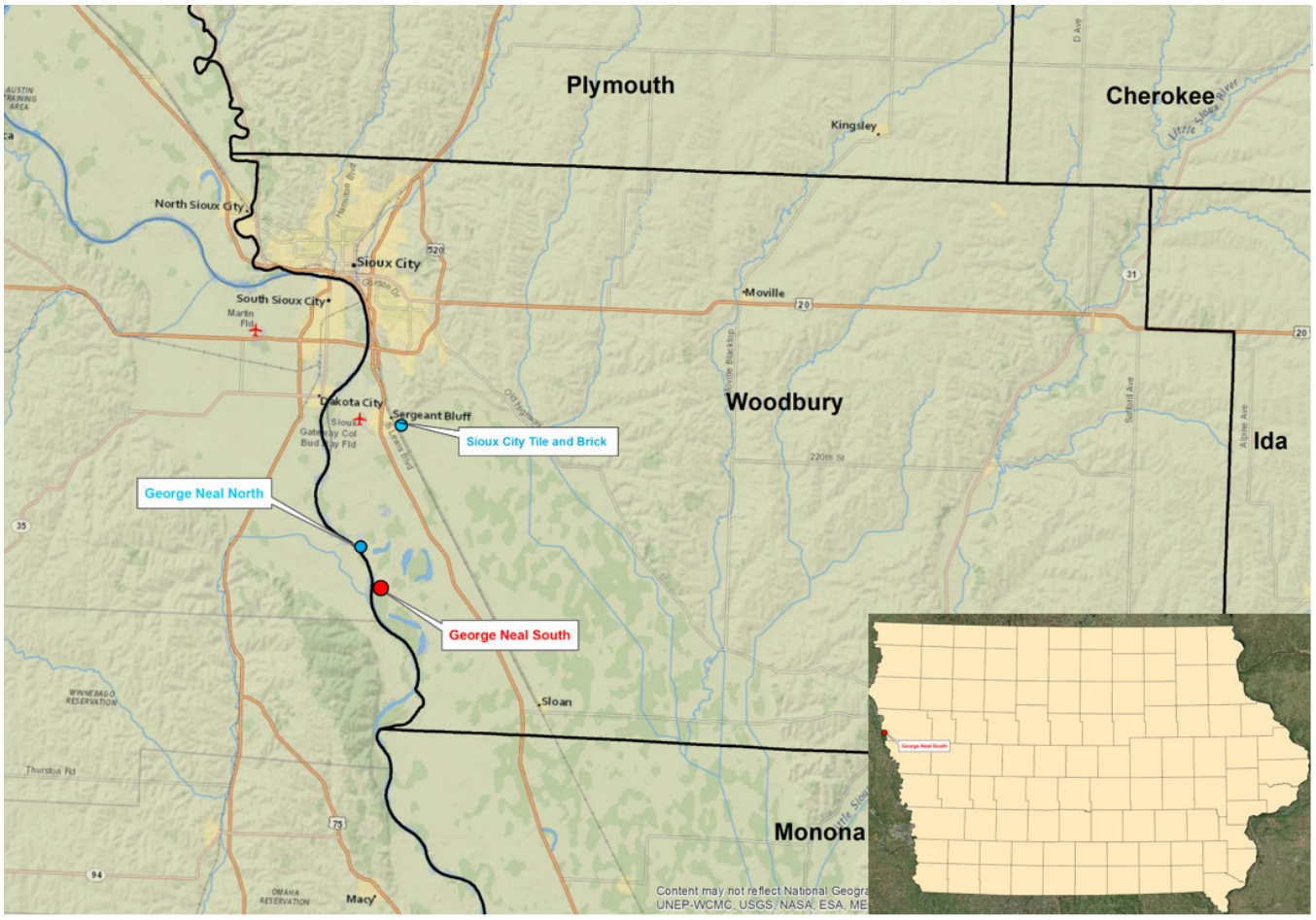
In its submission, the Iowa Department of Natural Resources (IDNR) recommended that the area surrounding MidAmerican Energy Company's George Neal South electric generating facility, specifically the entirety of Woodbury County, be designated as attainment based on an assessment and characterization of 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. This assessment and characterization was performed using air dispersion modeling software, specifically using AERMOD, analyzing allowable emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA does not agree with the state's recommendation for the area and intends to designate the area, i.e., Woodbury County, as unclassifiable.

The George Neal South facility is operated by MidAmerican Energy Company and is located in western Iowa in the western portion of Woodbury County. In addition to George Neal South, MidAmerican also operates the nearby George Neal North facility. As seen in Figure 1, the George Neal North and South facilities are located approximately 15 km south of the Sioux City, Iowa, area. The facility is located along the Missouri River on the Iowa side of the Nebraska-

[3] See Attachment 2 of the March 20, 2015, document titled "Updated Guidance for Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard" from Stephen D. Page, Director of the Office of Air Quality Planning and Standards.

Iowa state border. Figure 1 shows nearby emitters of SO_2 the boundaries of Woodbury County, the state's recommended area for the attainment designation and the EPA's intended area for the unclassifiable designation.

Figure 1: Location of the MidAmerican George Neal South Facility. The boundaries of Woodbury County, Iowa, the area EPA intends to designate as unclassifiable. The location of the MidAmerican George Neal South Facility is labeled in red and the nearby MidAmerican George Neal North Facility is labeled in blue. Also, the Sioux City Tile and Brick Facility is labeled in blue.



The discussion and analysis that follows references 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 MidAmerican George Neal South facility. IDNR stated in their designation recommendation

document that while an SO_2 monitor is located in Woodbury County, it is not sited to assess the maximum 1-hr impacts from George Neal South and has not been in operation long enough to produce a (three-year) design value. Therefore this monitoring information was not relied upon in EPA's proposed designation of 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, the most recent version available at the time of modeling analysis. 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 percent of the area within a 3 km radius of the facility is classified as rural. Conversely, if more than 50 percent of the area is urban, urban dispersion coefficients should be used in the modeling analysis. 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 facility 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 George Neal South 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 George Neal South Facility 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.

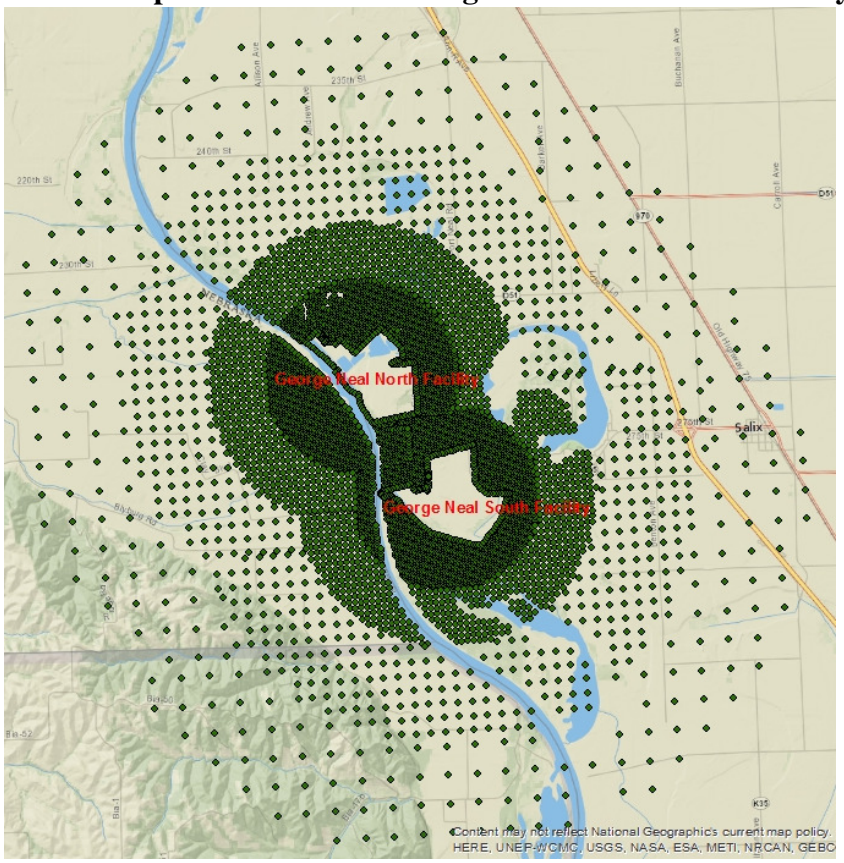
The grid receptor spacing for the area of analysis chosen by the state is as follows:

- 50 meters along the George Neal South and North Facilities fenceline
- 50 meters from the fenceline to 0.5 km
- 100 meters extending from 0.5 km to 1.5 km
- 250 meters extending from 1.5 km to 3.0 km
- 500 meters extending from 3.0 km to 5.0 km

The receptor network contained 10,014 receptors and covered the western portion of Woodbury County in Iowa and the eastern portion of Dakota County in Nebraska.

Figure 2 shows the state's chosen area of analysis surrounding the George Neal South Facility, as well as the receptor grid for the area of analysis. Consistent with the Modeling TAD, receptors for the purposes of this designation effort were placed only in areas where it would also be feasible to place a monitor and record ambient air impacts. The impacts of the area's geography and topography will be discussed later within this document.

Figure 2: Receptor Grid for the George Neal South Area of Analysis



The state performed an analysis to locate any additional major sources of SO_2 within 20 km of the George Neal South Facility. The state determined that this 20 km was the appropriate distance in order to adequately characterize 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. For the George Neal South area, the state included one other significant emitter of SO_2 within 20 km of the George Neal South Facility in any direction. In addition to the George Neal South Facility, the other significant emitter of SO_2 included in the area of analysis is the George Neal North Generating Facility, located less than 5 km to the northwest, and which includes three emission units and a natural gas auxiliary boiler.

As previously noted in this section, the state used a modeling grid extending out to 5.0 km, which is less than the 20 km area of analysis used to evaluate nearby sources. While no additional SO_2 sources beyond 5 km were identified, the modeling results from Figure 5 indicate that elevated levels of SO_2 occur near the edge of the receptor grid to the northwest of the George Neal Facility. Without extending the receptor grid beyond 5 km, EPA has concerns that areas outside of the current modeling grid have the potential to exceed the NAAQS in the vicinity of George Neal, and is therefore recommending an unclassifiable designation for Woodbury County, Iowa based on this uncertainty and other issues identified in this TSD.

Modeling Parameter: Source Characterization

The state characterized the sources within the area of analysis in accordance with the practices outlined as acceptable in the Modeling TAD. Specifically, the state used actual stack heights in conjunction with allowable emissions limits. Actual stack heights were modeled with allowable emission limits in this case since the actual stack heights were below the GEP stack height. The state also adequately characterized the George Neal South and North 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(s) 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 George Neal South Facility and the three emission units from George Neal North and the natural gas auxiliary boiler which were within 20 km in the area of analysis. One other SO_2 source (Sioux City Brick and Tile – average SO_2 emissions of 73.97 tpy) between 10 km and 20 km was identified by the state in its analysis of nearby sources within 20 km. Sioux City Tile and Brick was evaluated by the state. The state compared the emissions from this source to the total emissions in the analysis area, and determined that the emissions from Sioux City were significantly lower than the overall emissions in the area and therefore unlikely to alter the predicted maximum concentrations of SO_2. Emissions from Sioux City Brick and Tile are adequately represented by the background concentration. This 20 km distance and these emission units were selected because the state believes that the area of analysis, previously described, adequately includes the sources which might contribute to those concentrations.

Table 2 lists the actual emissions from the four coal-fired George Neal facilities from 2012-2014. The emissions data were obtained from EPA's Clean Air Markets Division for the purposes of this TSD. The state, however, has chosen to model these facilities based on methodologies that are described in the following paragraphs. The natural gas auxiliary boiler emissions of SO_2 are not significant in comparison and are not shown in Table 2.

Table 2: Actual SO_2 Emissions in 2012 – 2014 from Facilities in the George Neal Facility Area of Analysis

Facility Name	SO_2 Emissions (tons per year)		
	2012	2013	2014
George Neal South Unit 4	14,272	10,049	6,813
George Neal North Unit 1	1,018	874	841
George Neal North Unit 2	2,091	2,491	2,890
George Neal North Unit 3	5,868	5,055	2,769
Total Emissions	23,249	18,469	13,313

The first approach was used for George Neal South Unit 4 and George Neal North Unit 3. In 2014, MidAmerican installed SO_2 scrubbers on George Neal South Unit 4 and George Neal North Unit 3 (note the reduced emissions in 2014 in Table 2). The corresponding permitted emission limit after the installation of the scrubber technology was based on a 30-day rolling

average of 2,760 lb/hr[4] and 2,200 lb/hr[5] for George Neal South Unit 4 and George Neal North Unit 3, respectively. IDNR performed an evaluation of these 30-day average rolling permit limits for both emission units to develop a critical 1-hour emission rate which would preserve the variability of the hour-to-hour emission profile with scrubber controls, yet be conservative so as to protect the ambient air quality standard for the attainment demonstration. IDNR used the EPA *Guidance for 1-Hour SO_2 Nonattainment Area State Implementation Plan Submissions* memorandum dated April 23, 2014, as guidance in establishing these critical 1-houremission rates. Based on that guidance, IDNR reviewed CEMS data for similar MidAmerican emission units with similar control technology to establish an appropriate emission rate for modeling George Neal South Unit 4 and George Neal North Unit 3. IDNR stated that surrogate units must be used since George Neal South Unit 4 and George Neal North Unit 3 do not have 3 years of corresponding SO_2 CEMS data after the 2014 installation of the scrubber controls.

INDR used Walter Scott, Jr. Energy Center Unit 3 and Louisa Generating Station coal-fired boilers as surrogate units to George Neal South Unit 4 and George Neal North Unit 3. Walter Scott, Jr. Energy Center Unit 3 and Louisa Generating Station have CEMS data available that reflect scrubber operation. The steps below outline the approach IDNR used to determine the ratio that was applied to the 30-day average emission limit:

1. Collect 5-years of suitable hourly CEMS data from Walter Scott and Louisa.
2. Calculate the 99th percentile 1-hr emission rate over the 5-year period.
3. Calculate the 99th percentile 30-day rolling average over the 5-year period.
4. Calculate the ratio of the 99th percentile 30-day rolling average from Step 3 to the 99th percentile 1-hr value calculated from Step 2.
5. Apply that calculated ratio to the George Neal South Unit 4 and George Neal Unit 3 30-day average rolling limit that does not have corresponding CEMS data to back-calculate the corresponding critical hourly emission rate to model (the permitted 30-day average rolling limit divided by the calculated ratio).

Based on the procedure outlined above, the ratios at Walter Scott, Jr. Energy Center Unit 3 and Louisa Generating Station are approximately 0.817 and 0.808, respectively. The average of the two ratios, 0.81255, was divided into the 30-day average rolling limits for George Neal South Unit 4 and George Neal North Unit 3 to compute the critical hourly SO_2 emission rates used in the modeling analysis. The critical hourly emission rates used in the modeling are shown in Table 3.

The second approach was used for George Neal North Units 1 & 2. IDNR used PTE limits for SO_2 based on a consent decree[6] between MidAmerican and the Sierra Club that requires the two units to cease combusting coal and switch to natural gas only by April 16, 2016. However, the

[4] IDNR permit 05-A-655-P3 issued on April 2, 2012.
[5] IDNR permit 95-A-313-P7 issued on October 23, 2014.
[6] Consent Decree between Sierra Club and MidAmerican Energy, United States District Court, Southern District of Iowa, Case No. 13-CV-21, filed on January 22, 2013.

consent agreement between MidAmerican and the Sierra Club is not federally enforceable.[7] In addition, for the George Neal North natural gas auxiliary boiler which was scheduled to become operational in the fall of 2015, IDNR based the PTE on federally enforceable limits for SO_2. The facilities in the state's area of analysis and their associated PTE rates (lb/hr) as described in this paragraph are listed in Table 4.

Table 3: Modeled SO_2 Emissions based on 30-day average emissions limits from new controls from George Neal South Unit 4 and North Unit 3 in the Woodbury County, Iowa Area of Analysis

Company ID	Facility Name	SO_2 Emissions (lb/hr), (based on 30-day emission limit variability analysis)
MidAmerican	George Neal South Unit 4	3,396.7
MidAmerican	George Neal North Unit 3	2,707.6

Table 4: Modeled SO_2 Emissions based on PTE from Facilities in the Woodbury Co, Iowa Area of Analysis

Company ID	Facility Name	SO_2 Emissions (lb/hr), based on PTE
Mid-American	George Neal North Unit 1	0.8018
Mid-American	George Neal North Unit 2	1.812
Mid-American	George Neal North Unit Auxiliary Boiler	0.03

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

[7] See Attachment 2 of the March 20, 2015 document titled "Updated Guidance for Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard" from Stephen D. Page, Director of the Office of Air Quality Planning and Standards.

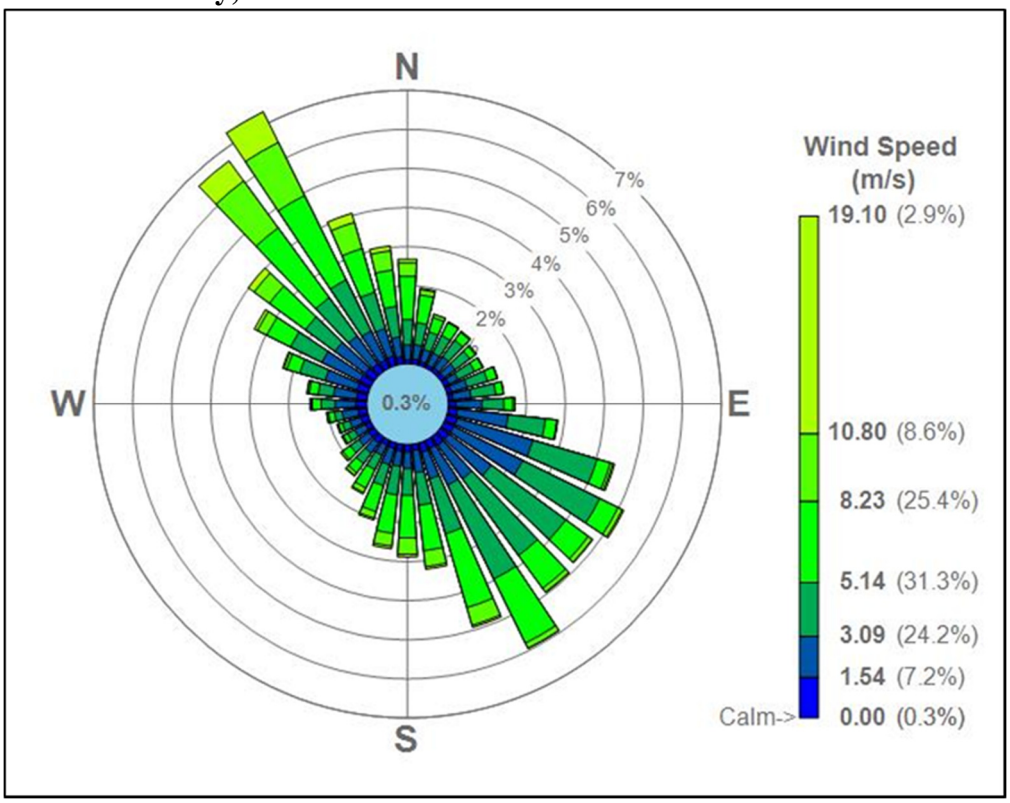
For the George Neal area of analysis, surface meteorology from the NWS station in Sioux City, Iowa, approximately 15 km to the north, and coincident upper air observations from the NWS station in Omaha, Nebraska, approximately 150 km to the south were selected as best representative of meteorological conditions within the area of analysis (Figure 3).

The state used AERSURFACE version 13016 using data from the NWS station in Sioux City, Iowa located at 42.40N, 96.38W to estimate the surface characteristics of the area of analysis. The state estimated values for 12 spatial sectors at a monthly temporal resolution. AERSURFACE was processed three times, once each for dry, average, and wet surface moisture conditions. The output for the individual months from the three AERSURFACE runs were then manually combined into one output file. 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 the figure below generated by the EPA, the location of the Sioux City, Iowa NWS station and Omaha, NE upper air station is shown relative to the George Neal area of analysis.

Figure 3: George Neal South Area of Analysis and the Sioux City, Iowa NWS and Omaha, NE NWS upper air locations.

As part of its recommendation, the state provided the 3-year surface wind rose for Sioux City, Iowa. In Figure 4, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Winds are predominately from the northwest and southeast.

Figure 4: Sioux City, Iowa Cumulative Annual Wind Rose for Years 2012 – 2014



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. The state followed the methodology and settings presented in EPA's Modeling TAD for area designations under the 2010 SO_2 NAAQS in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1 minute duration was provided from the 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 1-minute wind data.

Modeling Parameter: Geography and Terrain

The terrain in the area of analysis is best described as relatively flat since the George Neal facility lies in the Missouri River Valley. This especially true for the terrain on the Iowa side of the border. To the west of the facility lies the Missouri River along with rolling hills in eastern Nebraska. 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 was the USGS National Elevation Database.

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 George Neal area of analysis, IDNR chose the "first tier" approach but derived a statewide default background concentration using an average of the concentrations of four monitors using 2009-2011 data. The derived average background concentration was based on monitors from the following four cities in Iowa: Cedar Rapids, Davenport, Des Moines, and Keosauqua. While the averaging of multiple monitors is not outlined in the Modeling TAD, EPA Region 7 believes that this methodology provides a conservative background concentration for the George Neal area, which is located in rural northwest Iowa. In contrast, the four monitors used in the average background concentration are located near higher populated areas and other sources of SO_2 emissions. In fact, IDNR no longer uses this averaging technique for sources in rural areas for this reason. IDNR is now using the Lake Sugema monitor for sources in rural areas since this monitor is located in a rural area. The Lake Sugema monitor has a design value of 7 $\mu g/m^3$, which is much lower than the background design value proposed in this analysis[8].

In summary, the background concentration for this area of analysis was determined by the state using the described "first tier" multiple monitor averaging technique to be 32 micrograms per cubic meter ($\mu g/m^3$), or 12.2 ppb,[9] and that value was incorporated into the final AERMOD results.

[8] http://www.iowadnr.gov/Portals/idnr/uploads/air/dispmodel/background_concentrations_tsd.pdf

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

Summary of Modeling Results

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

Table 5: AERMOD Modeling Parameters for the George Neal, Iowa Area of Analysis

George Neal, Iowa Area of Analysis	
AERMOD Version	14134
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	5
Modeled Structures	119
Modeled Fencelines	2
Total receptors	10,014
Emissions Type	PTE
Emissions Years	Emission limits were effective in 2014 for George Neal South Unit 4 and George Neal North Unit 3. Emission limits are to be effective in 2016 for George Neal North Units 1 & 2
Meteorology Years	2012-2014
Surface Meteorology Station	Sioux City, Iowa
Upper Air Meteorology Station	Omaha, Nebraska
Methodology for Calculating Background SO_2 Concentration	Statewide default from monitors
Calculated Background SO_2 Concentration	32 $\mu g/m^3$

The results presented below in Table 6 show the magnitude and geographic location of the highest predicted modeled concentration based, in part, on emission limits from a consent decree between MidAmerican Energy and the Sierra Club.

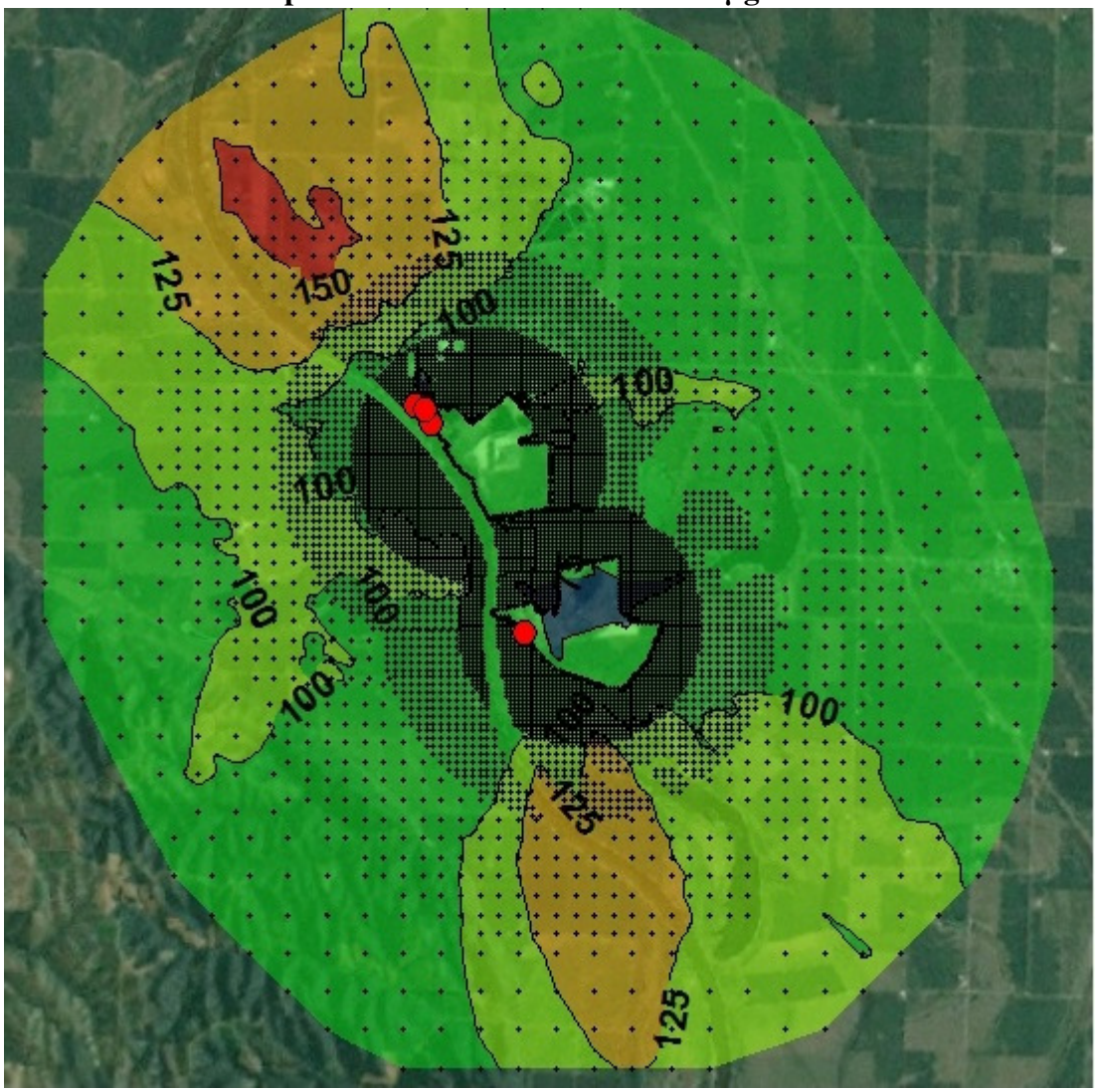
Table 6: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the George Neal, Iowa, Area of Analysis Based on PTE Emissions

		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	219814.9	4693460.2	194.8	196.5*

*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The state's modeling indicates that the highest predicted 3-year average 99th percentile 1-hour average concentration within the chosen modeling domain is 194.8 µg/m^3, or 74.4 ppb. This modeled concentration included the background concentration of SO_2, and is based, in part, on emission limits from a consent decree between MidAmerican Energy and the Sierra Club. Figure 5 below indicates that the predicted value occurred to the northwest of the George Neal facility. The state's receptor grid is also shown in the figure.

Figure 5: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations in the George Neal South Area of Analysis Based on PTE Emission. The location of the George Neal emission units are shown by the red circles. The maximum predicted 99th percentile 1-hour SO_2 concentration is 162.8 µg/m^3 located to the northwest of the George Neal North Facility. With the addition of the 32 µg/m^3 background concentration, the maximum predicted concentration is 194.8 µg/m^3.



Jurisdictional Boundaries:

Once the geographic area of analysis associated with the George Neal South Generating Facility 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.

IDNR recommended an attainment area boundary consisting of the entirety of Woodbury County. The EPA has confirmed that except for the George Neal North and George Neal South facilities which have been included in the state's modeling analysis, there are no additional sources within Woodbury County that emit 100 tpy or more of SO_2. There are two other Title V[10] sources within the county. As previously mentioned, emissions from Sioux City Brick and Tile Company were analyzed and determined to be insignificant due to the amount of SO_2 emissions (<100 tpy). Thus, Sioux City Brick and Tile Company was not included in the modeling analysis and the SO_2 emissions from this facility are accounted for in the background concentration. The other source, not mentioned by the state, is Cargill Inc. – Sioux City, which reported less than 1 ton of SO_2 in 2014. Based on available information, the EPA does not have reason to believe that either Sioux City Brick and Tile or Cargill Inc. – Sioux City are likely to cause or contribute to a violation of the NAAQS anywhere within Woodbury County.

The EPA believes that our intended unclassifiable area, consisting of all of Woodbury County in Iowa, 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 did not receive any additional information about the area in the immediate vicinity of George Neal South.

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 MidAmerican Energy George Neal South Generating Facility as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the area is comprised of the entirety of Woodbury County, Iowa.

The unclassifiable designation is based on the fact that although IDNR provided modeling to the EPA that demonstrated attainment for the area, some emission limits used by IDNR in this modeling analysis are not currently federally enforceable.[11] The emission limits assumed for George Neal North Unit 1 and 2 are based on a consent decree between MidAmerican and the Sierra Club. This agreement requires MidAmerican to cease burning coal in Unit 1 and 2 by April 16, 2016. The limits in this agreement are not yet federally enforceable and therefore cannot be relied upon in the modeling analysis, or credited to inform a final designation. However, if these limits, which are adequately protective of the 1-hour NAAQS, become

[10] Title V refers to the 40 CFR Part 70 and Part 71, Operating Permit programs.

[11] See Attachment 2 of the March 20, 2015 document titled "Updated Guidance for Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard" from Stephen D. Page, Director of the Office of Air Quality Planning and Standards.

federally enforceable adequately in advance of the EPA's promulgation of final designations, and if all other conditions are still representative of those contained in this document and the state adequately addresses the receptor grid distance, the EPA anticipates designating Woodbury County as unclassifiable/attainment. Notably, the state followed the Modeling TAD in its analysis indicating compliance with the NAAQS using the consent decree emission limits, and we do not have information leading us to believe that any other sources in Woodbury County cause or contribute to a violation of the NAAQS.

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 Iowa by either December 31, 2017, or December 31, 2020.

Technical Analysis for the IPL – Burlington Generating Station Area
(Des Moines County, Iowa)

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 IPL Burlington Generating Facility as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the area is comprised of the entirety of Des Moines County, Iowa.

The unclassifiable designation is based on the uncertain timing of proposed allowable emission limits on the IPL Burlington Generating Facility's main boiler, specifically the lack of indication that the limits will be federally enforceable by the July 2, 2016, court-ordered deadline to designate the area.

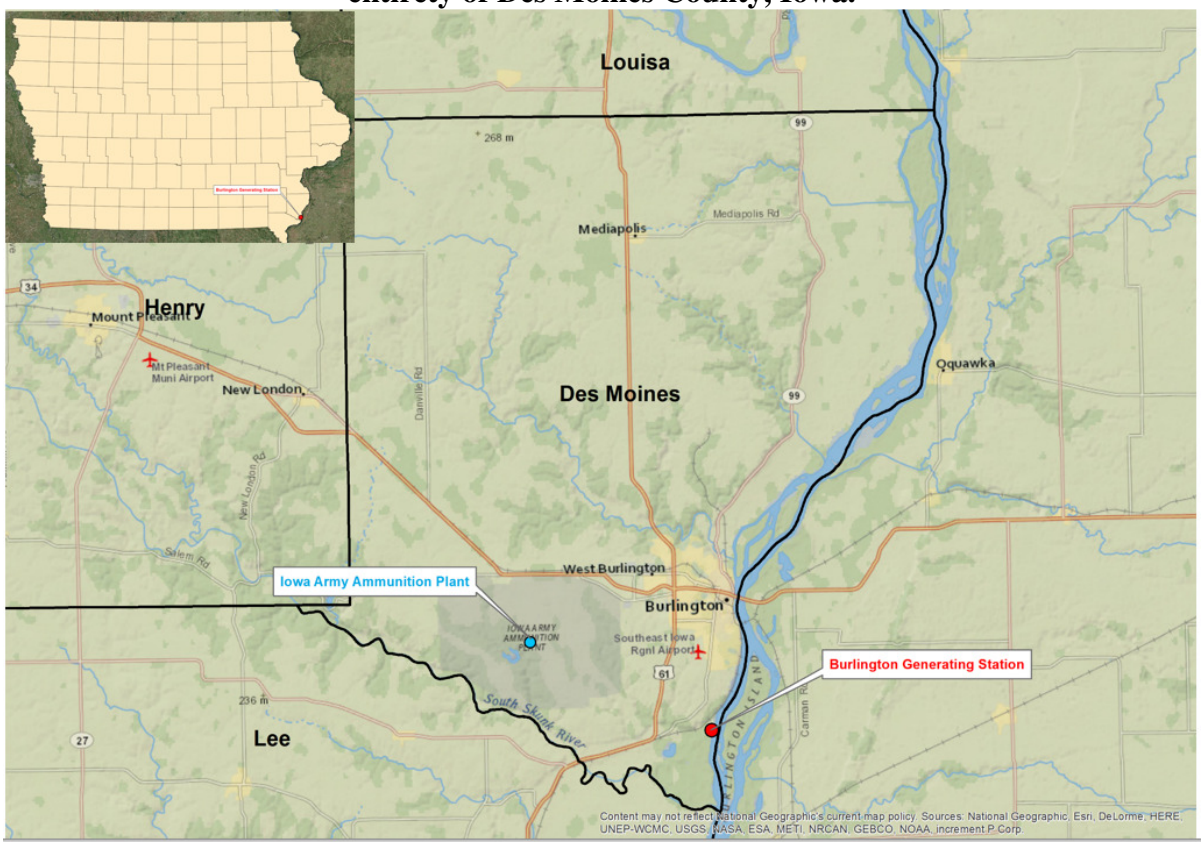
Introduction

The Des Moines County, Iowa, 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). Specifically, in 2012, the Interstate Power & Light (IPL) Burlington electric generating facility emitted 4,697 tons of SO_2 and had an emissions rate of 0.672 lb SO_2/mmBTU. As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." 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, IDNR recommended that the area surrounding IPL Burlington electric generating facility, specifically the entirety of Des Moines County, 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. This assessment and characterization was performed using air dispersion modeling software, specifically AERMOD, analyzing allowable emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA does not agree with the state's recommendation for the area, and intends to designate the area as unclassifiable based on the fact that emission limits used in the IPL Burlington modeling analysis are not currently federally enforceable and there is no indication in the IDNR submittal that the limits will be federally enforceable by July 2, 2016.

The IPL Burlington facility is located in southeastern Iowa in the southeast portion of Des Moines County. As seen in Figure 6, the IPL Burlington facility is located approximately 5 km south of the community of Burlington, Iowa (pop. ~25,000). The facility is along the Mississippi River, located on the Iowa side of the Iowa-Illinois state border. Figure 6 also shows nearby emitters of SO_2 and the boundaries of Des Moines County, the area that the EPA intends to designate as unclassifiable.

Figure 6: Location of the IPL Burlington Facility labeled in red and the nearby Iowa Army Ammunition Plant labeled in blue. The EPA's intended unclassifiable designation is for the entirety of Des Moines County, Iowa.



The discussion and analysis that follows below references 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 IPL Burlington facility. Since no SO_2 ambient monitors were located in Des Moines 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, the most recent version available at the time of the modeling analysis. 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 percent of the area within a 3 km radius of the facility is classified as rural. Conversely, if more than 50 percent of the area is urban, urban dispersion coefficients should be used in the modeling analysis. 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 facility is located in the Mississippi River valley along the Iowa-Illinois border and the rural determination was made based on the land cover around the IPL Burlington 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 IPL Burlington Facility 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.

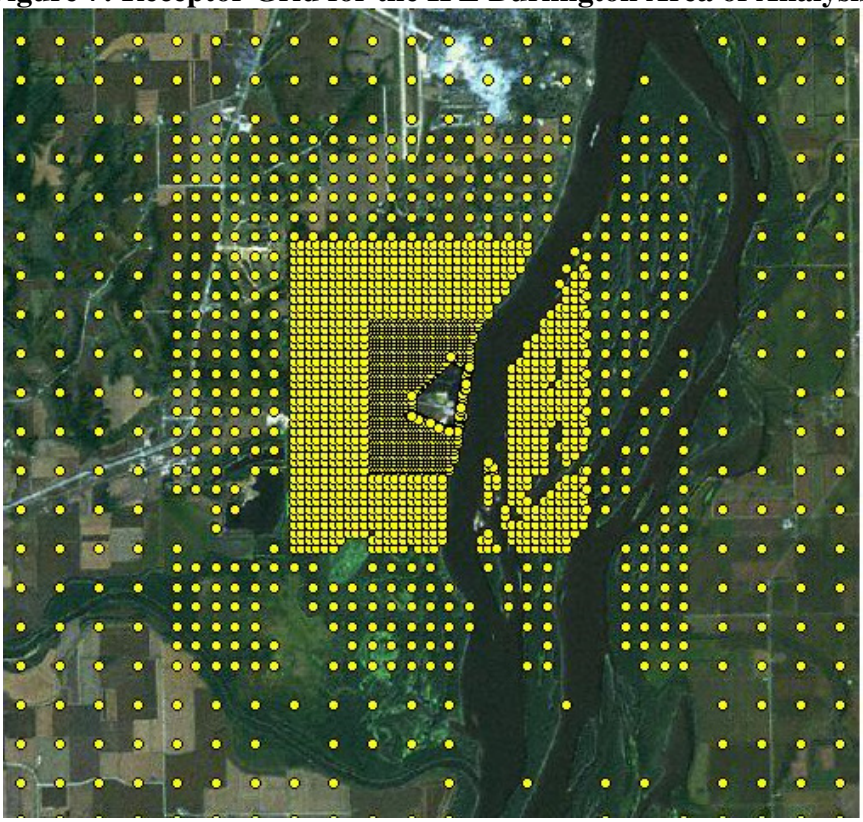
The grid receptor spacing for the area of analysis chosen by the state is as follows:
- 50 meters along the IPL Burlington Facility fenceline
- 50 meters from the fenceline to 0.5 km
- 100 meters extending from 0.5 km to 1.5 km
- 250 meters extending from 1.5 km to 3.0 km
- 500 meters extending from 3.0 km to 5.0 km

The receptor network contained 2,486 receptors and covered the eastern part of Des Moines County in Iowa and the western portion of Henderson County in Illinois.

Figure 7, included in the state's recommendation, shows the state's chosen area of analysis surrounding the IPL Burlington facility, as well as the receptor grid for the area of analysis. Consistent with the Modeling TAD, receptors for the purposes of this designation effort were

placed only in areas where it would also be feasible to place a monitor and record ambient air impacts. Therefore receptors were removed on the adjacent Mississippi River. The impacts of the area's geography and topography will be discussed later within this document.

Figure 7: Receptor Grid for the IPL Burlington Area of Analysis.



The state performed an analysis to locate any additional major sources of SO_2 within 20 km of IPL Burlington. For the area of analysis, the state did identify the Iowa Army Ammunition Plant (IAAP), with a maximum SO_2 emissions rate of 753.26 tpy during the 2012-2014 period, as a possible significant SO_2 contributor within 20 km of the IPL Burlington facility. The IAAP is located approximately 15 km to the northwest of the Burlington Facility. It has two coal-fired boilers that vent through a common stack. IDNR performed a single point source modeling analysis for this facility to determine the plant's impact within the IPL Burlington modeling analysis area. Although excluding IAAP as an interactive source for the IPL Burlington analysis and modeling the source separately does not follow the Modeling TAD and is not recommended, Region 7 believes the results likely give a conservative estimation for this analysis since the highest modeled impact from IAAP was added to the highest modeled impact from IPL Burlington. INDR modeling indicated that the highest 4th highest predicted concentration (corresponding to the 99th percentile) averaged over three years attributed to the emissions from the IAAP was 21.3 µg/m^3. IDNR stated that this modeled concentration for the IAAP, along with the inclusion of the modeled IPL Burlington results and background value, is below the 1-hr SO_2 NAAQS.

As previously noted in this section, the state used a modeling grid extending out to 5.0 km, which is less than the 20 km area of analysis used to evaluate nearby sources. The impacts of the one additional SO_2 source (IAAP) was model separately. EPA does have concerns with the relative small size of the 5 km receptor grid, although modeling results for IPL Burlington shown in Figure 10 indicate that this 5 km grid likely contains the area of maximum concentrations. However, based on this uncertainty and other issues identified in this TSD, EPA is recommending an unclassifiable designation for Des Moines County, Iowa.

Modeling Parameter: Source Characterization

The state characterized the sources within the area of analysis in accordance with the practices outlined in the Modeling TAD as acceptable. Specifically, the state used actual stack heights in conjunction with allowable emissions limits. Actual stack heights were modeled with allowable emission limits in this case since the actual stack heights were below the GEP stack height. The state also adequately characterized the IPL Burlington 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(s) 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 IPL Burlington and one other emitter of SO_2 within 20 km in the area of analysis. This SO_2 source (IAAP) was evaluated individually in the state's modeling analysis. The state determined that the emissions from this source would not lead to exceedances of the 1-hr SO_2 NAAQS when added to the IPL Burlington modeled impacts and the background value. The 20 km distance was selected because the state believes that this distance adequately includes the sources which might contribute to concentrations in the area of analysis.

Table 7 lists the actual emissions from the IPL Burlington Facility from 2012-2014. The emissions data were obtained from EPA's Clean Air Markets Division for the purposes of this TSD. The state, however, has chosen to model the facility based on PTE that will reflect the new allowable emission limit. The new proposed emission limit for the main IPL Burlington coal utilization boiler is shown in Table 8. In addition, IDNR states that "Construction permit modifications will be made to enforce the new emission limits once EPA approves the modeling results". EPA Region 7 has discussed the timing of the issuance of this permit modification with IDNR but the permit modification has not yet been issued and it is not clear if the new emission limit will be effective by July 2, 2016.

Table 7: Actual SO_2 Emissions in 2012 – 2014 from the IPL Burlington Facility

Facility Name	SO_2 Emissions (tons per year)		
	2012	2013	2014
Burlington Generating Station	4,697	3,941	3,657

Table 8: SO_2 Emissions based on proposed PTE from Facilities in the Des Moines County, Iowa, Area of Analysis.

Company ID	Facility Name	SO_2 Emissions (lb/hr), based on Proposed emission limit
IPL	Burlington Generating Station (Main Boiler)	2,077

Modeling Parameter: Meteorology and Surface Characteristics

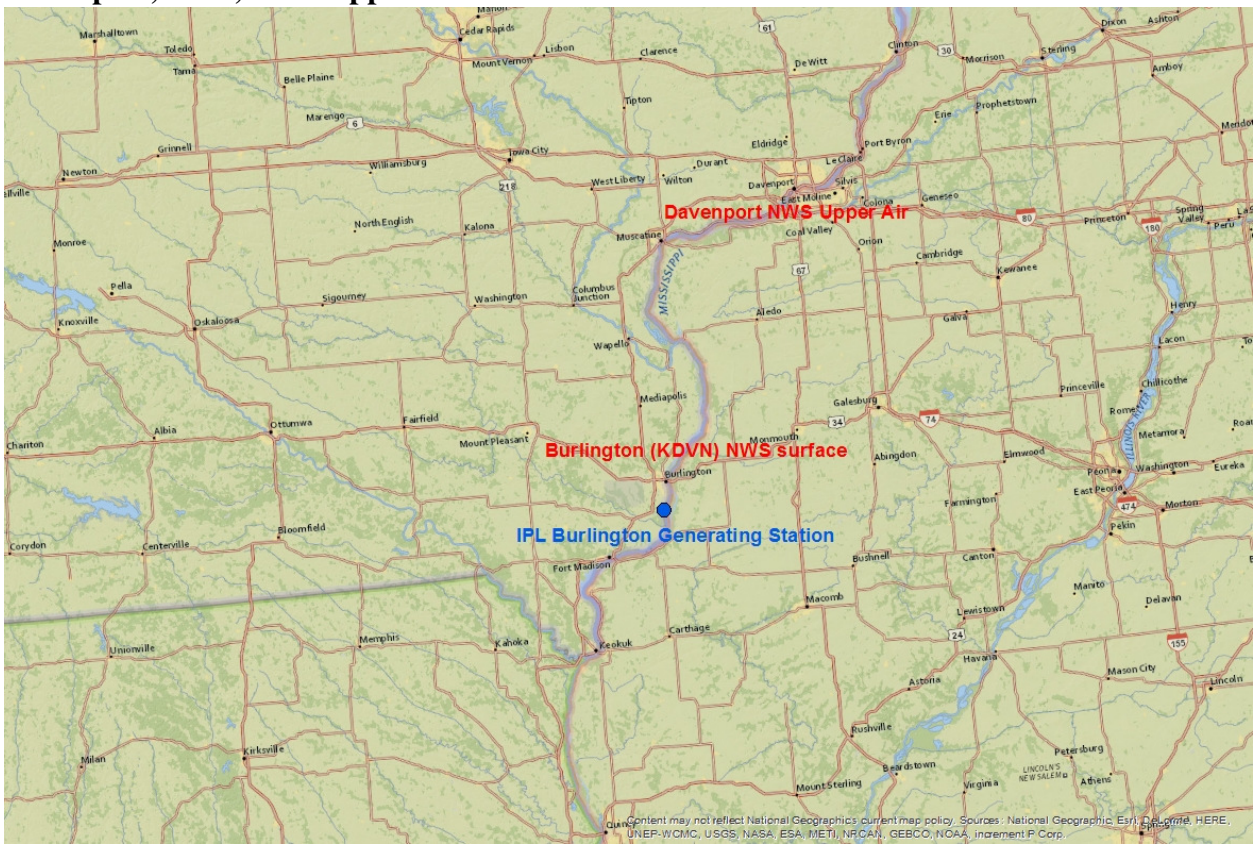
The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of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

For the IPL Burlington area of analysis, surface meteorology from the NWS station in Burlington, Iowa, 5 km to the north, and coincident upper air observations from the NWS station in Davenport, Iowa, approximately 120 km to the northeast were selected as best representative of meteorological conditions within the area of analysis (Figure 8).

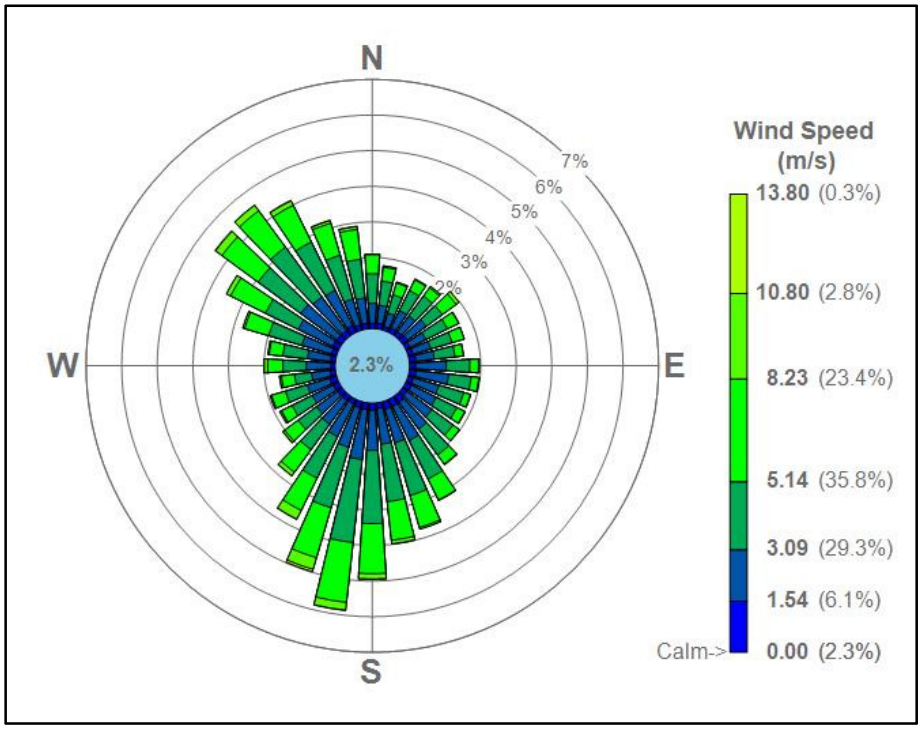
The state used AERSURFACE version 13016 using data from the NWS station in Burlington, Iowa, located at 40.77N, 91.13W to estimate the surface characteristics of the area of analysis. The state estimated values for 12 spatial sectors at a monthly temporal resolution. AERSURFACE was processed three times, once each for dry, average, and wet surface moisture conditions. The output for the individual months from the three AERSURFACE runs were then manually combined into one output file. 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 the figure below generated by the EPA, the locations of the Burlington, Iowa, NWS station and Davenport, Iowa, upper air station are shown relative to the IPL Burlington area of analysis.

Figure 8: IPL Burlington Area of Analysis and the Burlington, Iowa, NWS surface site and Davenport, Iowa, NWS upper air location



As part of its recommendation, the state provided the 3-year surface wind rose for Burlington, Iowa. In Figure 9, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Winds are predominately from the northwest and south southwest.

Figure 9: Burlington, Iowa, Cumulative Annual Wind Rose for Years 2012 – 2014



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. The state followed the methodology and settings presented in EPA's Modeling TAD for area designations under the 2010 SO_2 NAAQS 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. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This approach is consistent with a March 2013 EPA memo titled, "Use of ASOS meteorological data in AERMOD dispersion Modeling." 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 as the IPL Burlington facility lies along the Mississippi River Valley. There are, however, rolling hills to the northwest of the facility. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Database.

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 IPL Burlington area of analysis, IDNR chose the "first tier" approach but derived a statewide default background concentration using an average of the concentrations of four monitors using 2009-2011 data. The derived average background concentration was based on monitors from the following four cities in Iowa: Cedar Rapids, Davenport, Des Moines, and Keosauqua. While the averaging of multiple monitors is not outlined in the Modeling TAD, EPA Region 7 believes that this methodology provides a conservative background concentration for the IPL Burlington area, which is located in rural southeast Iowa. In contrast, the four monitors used in the average background concentration are located near higher populated areas and other sources of SO_2 emissions. In fact, IDNR no longer uses this averaging technique for sources in rural areas for this reason. IDNR is now using the Lake Sugema monitor for sources in rural areas since this monitor is located in a rural area. The Lake Sugema monitor has a design value of 7 $\mu g/m^3$, which is much lower than the background design value proposed in this analysis[12].

In summary, the background concentration for this area of analysis was determined by the state using the described "first tier" multiple monitor averaging technique to be 32 micrograms per

[12] http://www.iowadnr.gov/Portals/idnr/uploads/air/dispmodel/background_concentrations_tsd.pdf

cubic meter (μg/m^3), or 12.2 ppb,[13] and that value was incorporated into the final AERMOD results.

Summary of Modeling Results

The AERMOD modeling parameters for the IPL Burlington area of analysis are summarized below in Table 9.

Table 9: AERMOD Modeling Parameters for the IPL Burlington, Iowa, Area of Analysis

IPL Burlington, Iowa, Area of Analysis	
AERMOD Version	14134
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	1
Modeled Structures	N/A
Modeled Fencelines	1
Total receptors	2,486
Emissions Type	PTE based on proposed emission limits
Emissions Years	EPA inferred that new proposed limits on the IPL Burlington main boiler will likely take effect in 2016. However, in a December 23, 2015 updated recommendation from the state, the emission limits will not be included in a permit.
Meteorology Years	2012-2014
Surface Meteorology Station	Burlington, Iowa
Upper Air Meteorology Station	Davenport, Iowa
Methodology for Calculating Background SO_2 Concentration	Statewide default from monitors
Calculated Background SO_2 Concentration	32 μg/m^3

The results presented below in Table 10 show the magnitude and geographic location of the highest predicted modeled concentration based on proposed PTE emissions.

Table 10: Maximum Predicted 99th Percentile 1-Hour SO_2

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

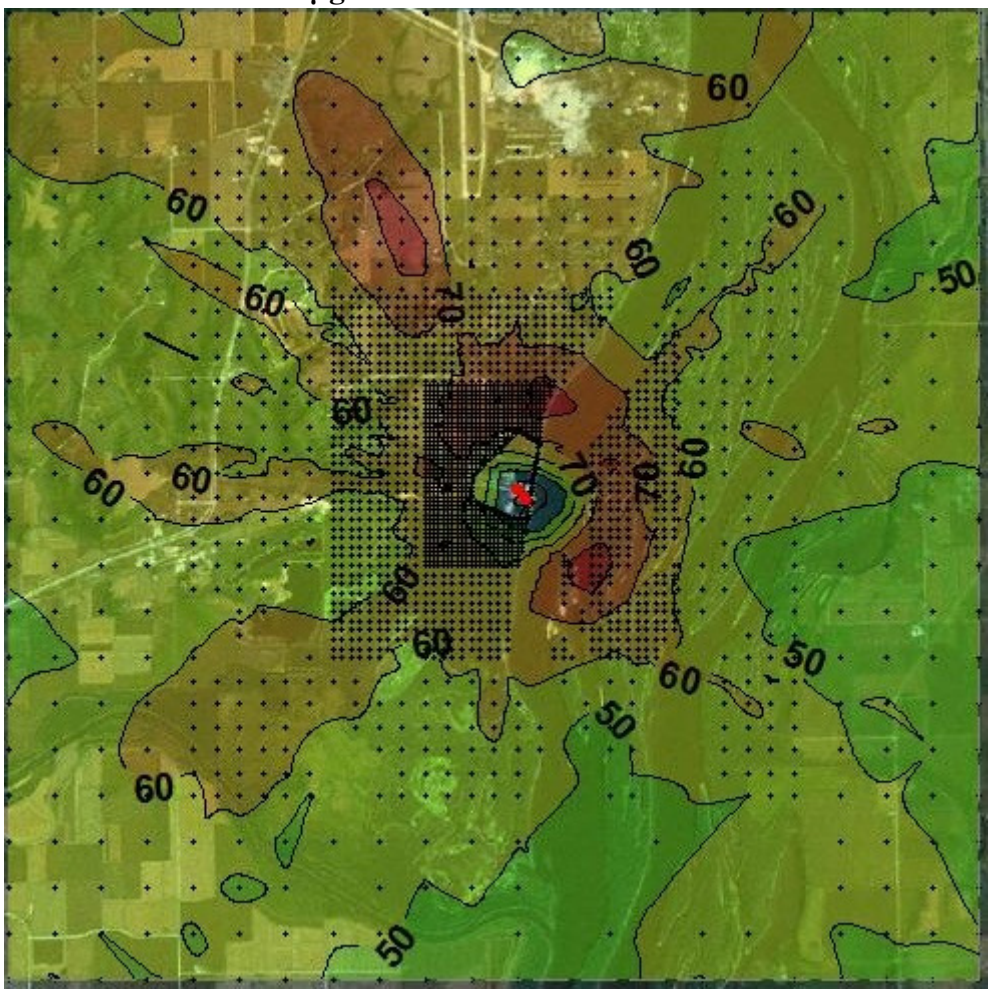
Concentration in the IPL Burlington, Iowa, Area of Analysis Based on proposed PTE Emissions

		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	657672.4	4514455.5	116.5	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 116.5 $\mu g/m^3$, or 44.8 ppb. This modeled concentration includes the background concentration of SO_2 and is based on proposed PTE emissions from the facility. When the modeled impact for the IAAP is combined with the separate modeling analysis for IPL Burlington, the results are below the 1-hr SO_2 NAAQS (maximum concentration of 137.79 $\mu g/m^3$). Figure 10 below was included as part of the state's recommendation and indicates that the predicted value occurred to the northwest of the IPL Burlington facility. The state's receptor grid is also shown in the figure.

Figure 10: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations in the IPL Burlington Area of Analysis Based on Proposed PTE Emissions. Location of Burlington emission units are shown by red circles. The maximum Predicted 99th Percentile 1-Hour is 84.5 µg/m^3 located just to the north of the IPL Burlington Facility. With the addition of the 32 µg/m^3 background concentration, the maximum predicted concentration is 116.5 µg/m^3.



Jurisdictional Boundaries

Once the geographic area of analysis associated with the IPL Burlington Facility is determined, existing jurisdictional boundaries are considered for the purpose of informing our intended unclassifiable area, specifically with respect to clearly defined legal boundaries.

IDNR recommended an attainment area boundary consisting of the entirety of Des Moines County. The IAAP is located in Des Moines County and is the only source within 20 km. As previously discussed, the EPA believes that it is unlikely for the emissions from this facility, if controlled to the proposed PTE levels, to cause or contribute to a violation of the NAAQS within Des Moines County.

There are two additional Title V sources within the county. Big River Resources West Burlington reported 68 tpy of SO_2 emissions in 2014. Natural Gas Pipeline Co. of America – Station 204 reported less than 1 ton of SO_2 in 2014. All non-Title V sources in this rural county are believed to be adequately represented by the background concentration used in the modeling. There are no other sources within Des Moines County or within 20 km of its borders that emit at or above 100 tpy of SO_2, according to the 2011 NEI.

The EPA believes that our intended designated area, consisting of all of Des Moines County in Iowa, has clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our intended designated area.

Other Relevant Information

The EPA did not receive any additional information about the area in the immediate vicinity of IPL Burlington.

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 IPL Burlington Generating Facility as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the area is comprised of entirety of Des Moines County, Iowa.

The unclassifiable designation is based on the uncertain timing of proposed allowable emission limits on the IPL Burlington Generating Facility's main boiler, specifically the lack of indication that the emission limits will be federally enforceable by the July 2, 2016, court-ordered deadline to designate the area. The modeling provided by IDNR using the proposed emission limits shows attainment. The modeling performed by IDNR followed the recommended EPA modeling TAD for designation purposes. However, since the proposed emission rates that were used in IDNR's modeling analysis are not federally enforceable, IPL Burlington could emit at a rate that was higher than the rate that was modeled and that could affect the resulting modeled concentrations. Therefore, EPA is proposing an unclassifiable designation. Should IDNR submit additional information documenting that the limits used in the modeling represent federally enforceable limits and adequately address the receptor grid distance, EPA believes the modeling would support an unclassifiable/attainment designation.

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 Iowa by either December 31, 2017, or December 31, 2020.

Technical Analysis for the IPL – Ottumwa Generating Station Area
(Wapello County, Iowa)

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 IPL Ottumwa Generating Facility as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the area is comprised of the entirety of Wapello County, Iowa.

The unclassifiable designation is based on the uncertain timing of proposed allowable emission limits on the IPL Ottumwa Generating Facility's main boiler, specifically the lack of indication that the limits will be federally enforceable by the July 2, 2016, court-ordered deadline to designate the area.

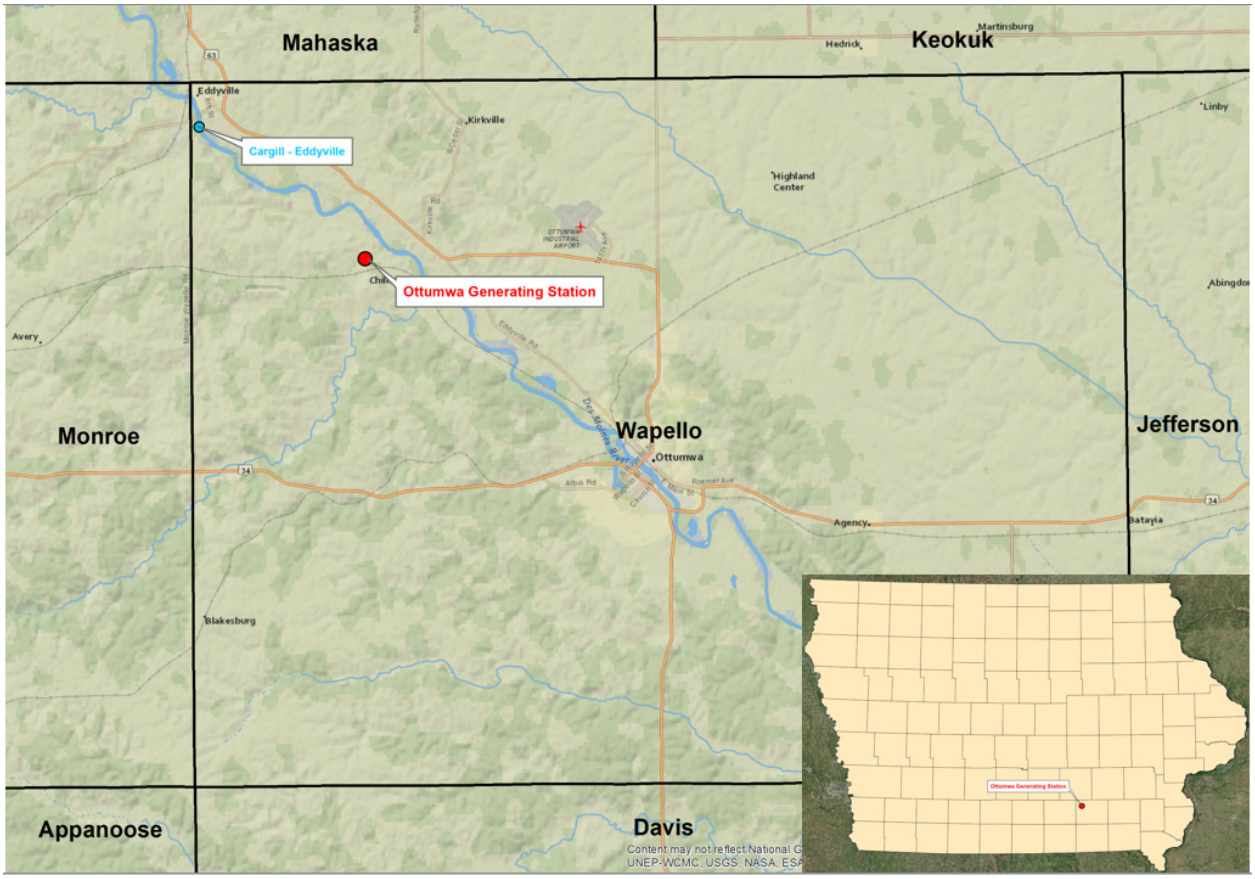
Introduction

The Wapello County, Iowa, 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). Specifically, in 2012, the IPL Ottumwa electric generating facility emitted 11,985 tons of SO_2 and had an emissions rate of 0.666 lb SO_2/mmBTU. As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." 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, IDNR recommended that the area surrounding the IPL Ottumwa Electric Generating Facility, specifically the entirety of Wapello County, 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. This assessment and characterization was performed using air dispersion modeling software, specifically AERMOD, analyzing allowable emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA does not agree with the state's recommendation for the area and intends to designate the area as unclassifiable, based on the timing of new proposed emission limits used in IDNR's IPL Ottumwa modeling analysis.

The IPL Ottumwa Facility is located in southeastern Iowa in the northwest portion of Wapello County. As seen in Figure 11, the IPL Ottumwa facility is located along the Des Moines River approximately 8 km northwest of the community of Ottumwa, Iowa (pop. ~25,000). Also, Figure 11 shows the state's recommended area for the attainment designation and the EPA's intended unclassifiable designation for the area.

Figure 11: Location of the IPL Ottumwa Facility labeled in red and the nearby Cargill-Eddyville Facility labeled in blue.



The discussion and analysis that follows below references 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 IPL Ottumwa facility. Since no SO_2 ambient monitors were located in Wapello 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, the most recent version available at the time of modeling analysis. 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 percent of the area within a 3 km radius of the facility is classified as rural. Conversely, if more than 50 percent of the area is urban, urban dispersion coefficients should be used in the modeling analysis. 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 facility is located along the Des Moines River and the rural determination was made based on the land cover around the IPL Ottumwa 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 IPL Ottumwa Facility 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.

The state performed an analysis to locate any additional major sources of SO_2 within 20 km of IPL Ottumwa. For the IPL Ottumwa area, the state evaluated one additional emitter of SO_2 that is within 20 km of IPL Ottumwa Facility in any direction (Cargill - Eddyville). The state did not include Cargill – Eddyville in its modeling analysis of IPL Ottumwa, and further discussion of this source is provided in the *Modeling Parameter: Emissions* Section of this TSD.

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

- 50 meters along the IPL Ottumwa Facility fenceline
- 50 meters from the fenceline to 0.5 km
- 100 meters extending from 0.5 km to 1.5 km
- 250 meters extending from 1.5 km to 3.0 km

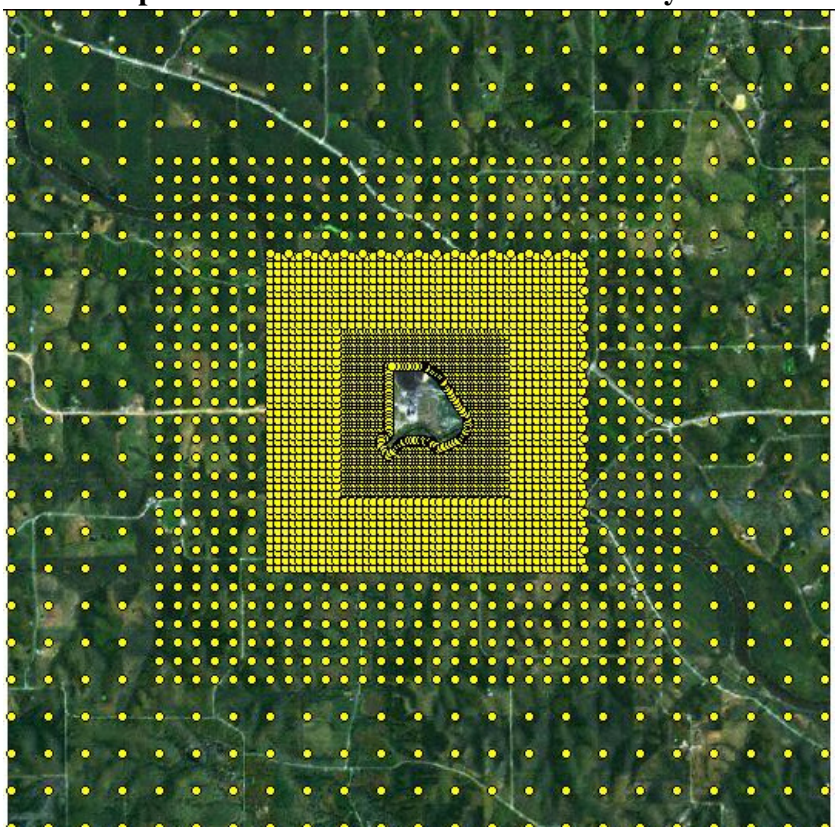
- 500 meters extending from 3.0 km to 5.0 km

The receptor network contained 3,955 receptors and covered the western portion of Wapello County in Iowa.

Figure 12, included in the state's recommendation, shows the state's chosen area of analysis surrounding the IPL Ottumwa Facility, as well as the receptor grid for the area of analysis. Consistent with the Modeling TAD, receptors for the purposes of this designation effort were placed only in areas where it would also be feasible to place a monitor and record ambient air impacts. The impacts of the area's geography and topography will be discussed within this document.

As previously noted in this Section, the state used a modeling grid extending out to 5.0 km, which is less than the 20 km area of analysis used to evaluate nearby sources. No other significant SO_2 sources were modeled. EPA does have concerns with the relative small size of the 5 km receptor grid, although modeling results for IPL Ottumwa shown in Figure 15 indicate that this 5 km grid likely contains the area of maximum concentrations. However, based on this uncertainty and other issues identified in this TSD, EPA is recommending an unclassifiable designation for Wapello County, Iowa.

Figure 12: Receptor Grid for the IPL Ottumwa Facility Area of Analysis



Modeling Parameter: Source Characterization

The state characterized the sources within the area of analysis in accordance with the practices outlined in the Modeling TAD as acceptable. Specifically, the state used actual stack heights in conjunction with allowable emissions limits. Actual stack heights were modeled with allowable emission limits in this case since the actual stack heights were below the GEP stack height. The state also adequately characterized the IPL Ottumwa Facility 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(s) 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 IPL Ottumwa and one other significant emitter of SO_2 within 20 km in the area of analysis. The state deemed this 20 km distance appropriate because the state believes that the area of analysis described above adequately includes the sources which might contribute to those concentrations.

The other nearby SO_2 source, Cargill – Eddyville, is approximately 15 km to the northeast of IPL Ottumwa. Cargill – Eddyville had SO_2 emissions greater than 1,500 tons each year from 2012-

2014. IDNR states that the Cargill – Eddyville facility replaced its coal-fired boilers with natural gas boilers in 2015, thus reducing SO_2 emissions from this facility by over 99%. Therefore, IDNR did not include Cargill – Eddyville in it modeling analysis.

Table 11 lists the actual emissions from the IPL Ottumwa Facility from 2012-2014. The emissions data were obtained from EPA's Clean Air Markets Division for the purposes of this TSD. The state, however, has chosen to model the facility based on PTE that reflect new allowable emission limits that are not currently federally enforceable. The proposed emission limit for the main IPL Ottumwa coal utilization boiler is listed in Table 12. In addition, IDNR states that "Construction permit modifications will be made to enforce the new emission limits once EPA approves the modeling results". EPA Region 7 has discussed the timing of the issuance of this permit modification with IDNR but the permit modification has not yet been issued and it is not clear if the new emission limit will be effective by July 2, 2016.

Table 11: Actual SO_2 Emissions in 2012 – 2014 from Facilities in the IPL Ottumwa Facility Area of Analysis

Facility Name	SO_2 Emissions (tons per year)		
	2012	2013	2014
IPL Ottumwa Generating Station	11,985	13,126	9,227
Cargill – Eddyville	1,627	1,772	1,577
Total Emissions	13,612	14,898	10,804

Table 12: SO_2 Emissions based on proposed PTE for IPL Ottumwa Generating Station in the Wapello County, Iowa, Area of Analysis

Company ID	Facility Name	SO_2 Emissions (lb/hr), based on PTEs
IPL	Ottumwa Facility (Main Boiler)	1,734

Modeling Parameter: Meteorology and Surface Characteristics

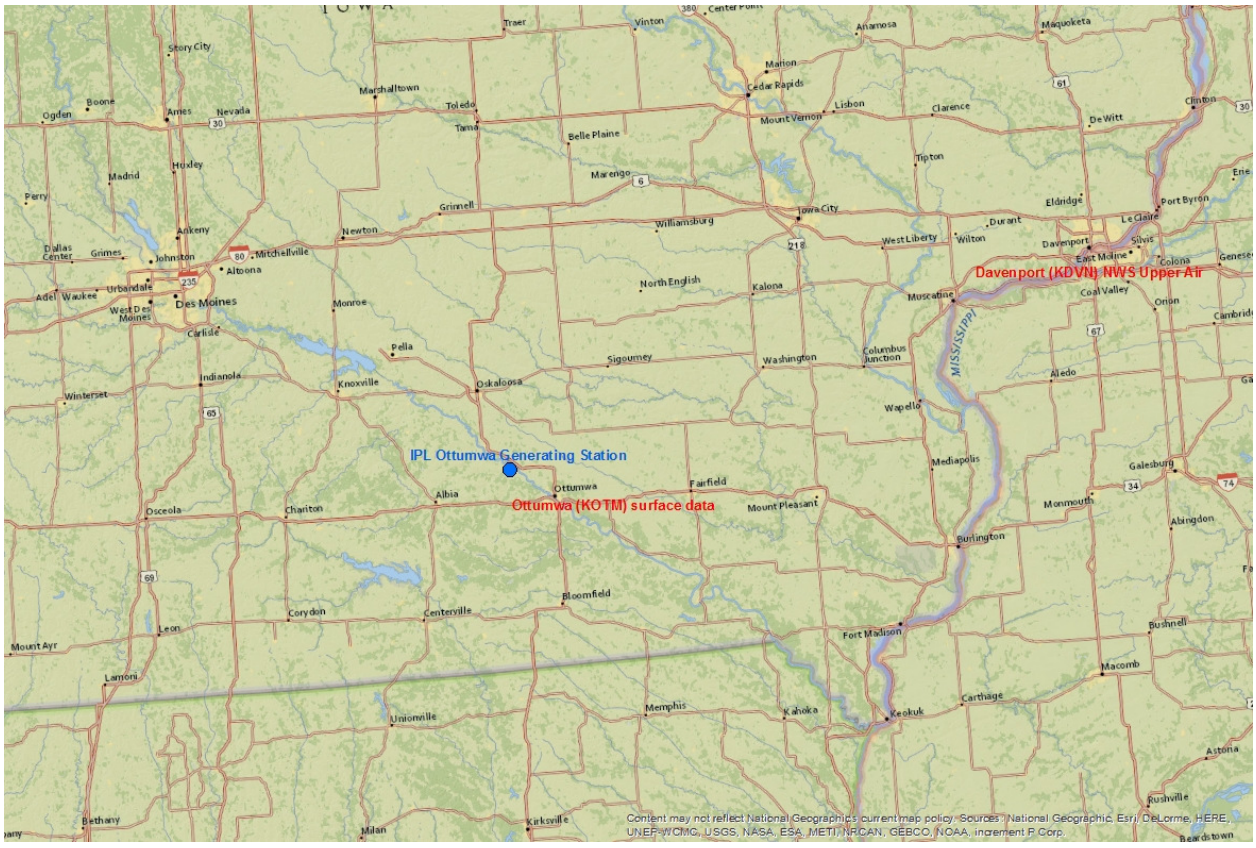
The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data if actual emissions are used) should be used in designations efforts. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness.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

For the IPL Ottumwa area of analysis, surface meteorology from the NWS station in Ottumwa, Iowa, approximately 8 km to the southeast, and coincident upper air observations from the NWS

station in Davenport, Iowa, approximately 120 km to the northeast were selected as best representative of meteorological conditions within the area of analysis (Figure 13).

The state used AERSURFACE version 13016 using data from the NWS station in Ottumwa, Iowa, located at 41.11N, 92.45W to estimate the surface characteristics of the area of analysis. The state estimated values for 12 spatial sectors at a monthly temporal resolution. AERSURFACE was processed three times, once each for dry, average, and wet surface moisture conditions. The output for the individual months from the three AERSURFACE runs were then manually combined into one output file. 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 the figure below, generated by the EPA, the location of the Ottumwa, Iowa, NWS station and Davenport, Iowa, upper air station is shown relative to the IPL Ottumwa area of analysis.

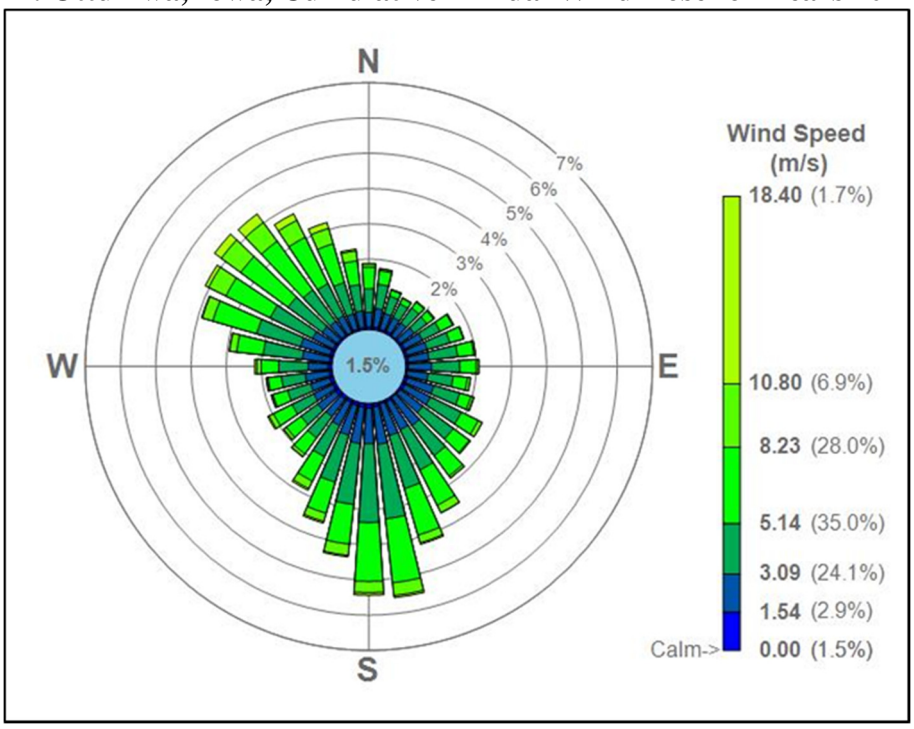
Figure 13: IPL Ottumwa Area of Analysis and the Ottumwa, Iowa, surface site and Davenport, Iowa, NWS upper air location



As part of its recommendation, the state provided the 3-year surface wind rose for Ottumwa, Iowa. In Figure 14, the frequency and magnitude of wind speed and direction are defined in

terms of from where the wind is blowing. Winds at the Ottumwa NWS site are predominately from the northwest and south.

Figure 14: Ottumwa, Iowa, Cumulative Annual Wind Rose for Years 2012 – 2014



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. The state followed the methodology and settings presented in EPA's Modeling TAD for area designations under the 2010 SO_2 NAAQS 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 as the IPL Ottumwa facility lies along the Des Moines River in southeast Iowa. 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 the USGS National Elevation Database.

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 IPL Ottumwa area of analysis, IDNR chose the "first tier" approach but derived a statewide default background concentration using an average of the concentrations of four monitors using 2009-2011 data. The derived average background concentration was based on monitors from the following four cities in Iowa: Cedar Rapids, Davenport, Des Moines, and Keosauqua. While the averaging of multiple monitors is not outlined in the Modeling TAD, EPA Region 7 believes that this methodology provides a conservative background concentration for the IPL Ottumwa area, which is located in rural south central Iowa. In contrast, the four monitors used in the average background concentration are located near higher populated areas and other sources of SO_2 emissions. In fact, IDNR no longer uses this averaging technique for sources in rural areas for this reason. IDNR is now using the Lake Sugema monitor for sources in rural areas since this monitor is located in a rural area. The Lake Sugema monitor has a design value of 7 $\mu g/m^3$, which is much lower than the background design value proposed in this analysis[14].

In summary, the background concentration for this area of analysis was determined by the state using the described "first tier" multiple monitor averaging technique to be 32 micrograms per cubic meter ($\mu g/m^3$), or 12.2 ppb,[15] and that value was incorporated into the final AERMOD results.

Summary of Modeling Results

[14] http://www.iowadnr.gov/Portals/idnr/uploads/air/dispmodel/background_concentrations_tsd.pdf

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

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

Table 13: AERMOD Modeling Parameters for the IPL Ottumwa, Iowa, Area of Analysis

Ottumwa, Iowa, Area of Analysis	
AERMOD Version	14134
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	1
Modeled Structures	N/A
Modeled Fencelines	1
Total receptors	3,955
Emissions Type	PTE based on proposed emission limits
Emissions Years	EPA inferred that new proposed limits on the IPL Ottumwa main boiler will likely take effect in 2016. However, in a December 23, 2015 updated recommendation from the state, the emission limits will not be included in a permit.
Meteorology Years	2012-2014
Surface Meteorology Station	Ottumwa, Iowa
Upper Air Meteorology Station	Davenport, Iowa
Methodology for Calculating Background SO_2 Concentration	Statewide default from monitors
Calculated Background SO_2 Concentration	32 $\mu g/m^3$

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

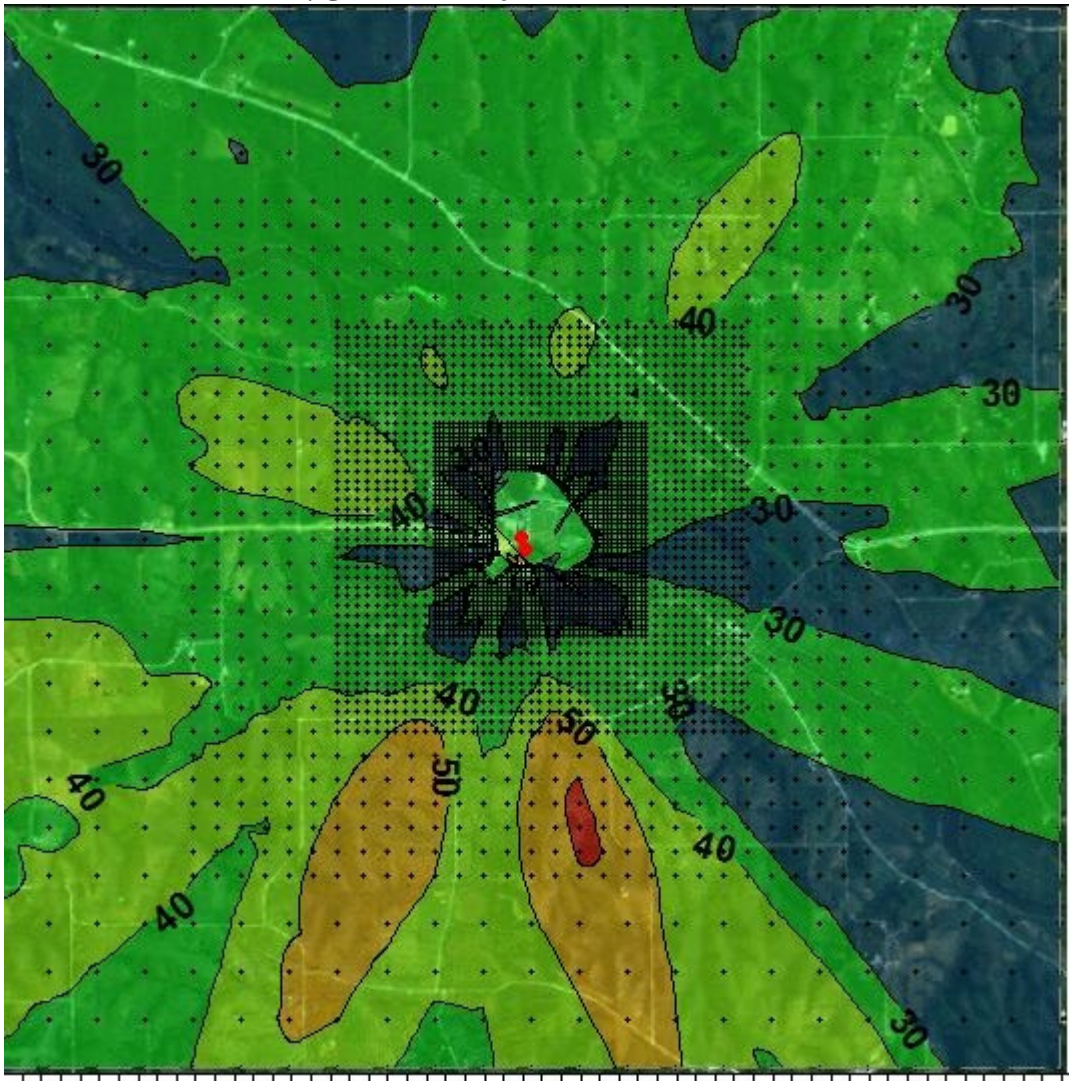
Table 14: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the IPL Ottumwa, Iowa, Area of Analysis Based on PTE Emissions

		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	537343.2	4549206.1	89.7	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 89.7 µg/m^3, or 34.5 ppb. This modeled concentration includes the background concentration of SO_2, includes the emissions from Cargill – Eddyville combusting natural gas, and is based on the proposed PTE emissions from the facility. Figure 15 below was included as part of the state's recommendation and indicates that the predicted value occurred to the south of the IPL Ottumwa facility. The state's receptor grid is also shown in the figure.

Figure 15: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations in the IPL Ottumwa Area of Analysis Based on proposed PTE Emission. Location of the Ottumwa emission units are shown by the red circles. The maximum Predicted 99th Percentile 1-Hour is 89.7 µg/m^3 located just to the west of the IPL Ottumwa Facility.



Jurisdictional Boundaries:

Once the geographic area of analysis associated with the IPL Ottumwa Facility is determined, existing jurisdictional boundaries are considered for the purpose of informing our intended unclassifiable area, specifically with respect to clearly defined legal boundaries.

IDNR recommended an attainment area boundary consisting of the entirety of Wapello County. There are only three additional Title V sources within the county, none of which emit more than 12 tpy of SO_2. All minor sources in this rural county are believed to be adequately represented by the background concentration used in the modeling.

The EPA believes that our intended unclassifiable area, consisting of all of Wapello County in Iowa, has 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 did not receive any additional information for the area in the immediate vicinity of IPL Ottumwa.

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 IPL Ottumwa Generating Facility as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of entirety of Wapello County, Iowa.

The unclassifiable designation is based on the uncertain timing of proposed allowable emission limits on the IPL Ottumwa Generating Facility's main boiler, specifically the lack of indication that the emission limits will be federally enforceable by the July 2, 2016, court-ordered deadline to designate the area. The modeling provided by IDNR using the proposed emission limits shows attainment. The modeling performed by IDNR followed the recommended EPA modeling TAD for designation purposes. However, since the proposed emission rates that were used in IDNR's modeling analysis are not federally enforceable, IPL Ottumwa could emit at a rate that was higher than the rate that was modeled and that could affect the resulting modeled concentrations. Therefore, EPA is proposing an unclassifiable designation. Should IDNR submit additional information documenting that the limits used in the modeling represent federally enforceable limits and adequately address the receptor grid distance, EPA believes the modeling would support an unclassifiable/attainment designation.

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 Iowa by either December 31, 2017, or December 31, 2020.