Technical Support Document:

Chapter 14
Proposed Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for Iowa

1. Summary

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

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

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

designations for the 2010 SO_2 NAAQS for selected areas of the country.[2] The EPA is under a December 31, 2017, deadline to designate the areas addressed in this TSD as required by the U.S. District Court for the Northern District of California.[3] We are referring to the set of designations being finalized by the December 31, 2017, deadline as "Round 3" of the designations process for the 2010 SO_2 NAAQS. After the Round 3 designations are completed, the only remaining undesignated areas will be those where a state has timely installed and begun operating a new SO_2 monitoring network meeting EPA specifications referenced in the EPA's Data Requirements Rule (DRR) (80 FR 51052). The EPA is required to designate those remaining undesignated areas by December 31, 2020. For the state of Iowa, no new SO_2 monitoring network was installed. Therefore, all remaining undesignated areas in Iowa will be designated in Round 3.

Iowa submitted its first recommendation regarding designations for the 2010 1-hour SO_2 NAAQS on June 2, 2011. In this June 2, 2011 submittal, Iowa recommended a designation of attainment for Clinton, Linn, Polk, Scott, and Van Buren Counties and a designation of unclassifiable for the remaining counties in Iowa. The state submitted updated air quality analysis and updated recommendations on April 8, 2013, November 4, 2015, January 5, 2017, and April 3, 2017. In these submittals, Iowa recommended a designation of nonattainment for a portion of Muscatine County, attainment for Des Moines, Wapello, and Woodbury Counties, and unclassifiable/attainment for the remaining counties in Iowa that were undesignated. In our intended designations, we have considered all the submissions from the state, except where a recommendation in a later submission regarding a particular area indicates that it replaces an earlier recommendation for that area we have considered the recommendation in the later submission.

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

[2] A total of 94 areas throughout the U.S. were previously designated in actions published on August 5, 2013 (78 FR 47191), July 12, 2016 (81 FR 45039), and December 13, 2016 (81 FR 89870).
[3] *Sierra Club v. McCarthy*, No. 3-13-cv-3953 (SI) (N.D. Cal. Mar. 2, 2015).

Table 1. Summary of the EPA's Intended Designations and the Designation Recommendations by Iowa

Area/County	Iowa's Recommended Area Definition	Iowa's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Linn County	Linn County	Unclassifiable/ Attainment	Same as state's	Unclassifiable
Louisa County	Louisa County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Pottawattamie County	Pottawattamie County	Unclassifiable/ Attainment	Same as state's	Unclassifiable
Remaining Undesignated Areas*	Remaining Undesignated Counties and Partial Counties, as Separately Designated Areas	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment

* Since Iowa did not elect to install and begin timely operation of a new, approved SO_2 monitoring network meeting EPA specifications referenced in the EPA's DRR, the EPA intends to designate the remaining undesignated counties (or portions of counties) in Iowa as "unclassifiable/attainment" as these areas were not required to be characterized by the state under the DRR and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may not be meeting the NAAQS or contribute to ambient air quality in a nearby area that does not meet the NAAQS. These areas that we intend to designate as unclassifiable/attainment (those to which this row of this table is applicable) are identified more specifically in section 6 of this TSD.

Areas in Iowa that the EPA previously designated in Round 1 (*see* 78 FR 47191) and Round 2 (*see* 81 FR 45039 and 81 FR 89870) are not affected by the designations in Round 3. The EPA's previous designations in the state of Iowa include the following: (1) nonattainment for a portion of Muscatine County; (2) unclassifiable for Woodbury County; and (3) unclassifiable/attainment for Wapello and Des Moines Counties.

2. General Approach and Schedule

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

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

Readers of this chapter of this TSD should refer to the additional general information for the EPA's Round 3 area designations in Chapter 1 (Background and History of the Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard) and Chapter 2 (Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for States with Sources Not Required to be Characterized).

As specified by the March 2, 2015, court order, the EPA is required to designate by December 31, 2017, all "remaining undesignated areas in which, by January 1, 2017, states have not installed and begun operating a new SO_2 monitoring network meeting EPA specifications referenced in the EPA's" SO_2 DRR. The EPA will therefore designate by December 31, 2017, areas of the country that are not, pursuant to the DRR, timely operating EPA-approved and valid monitoring networks. The areas to be designated by December 31, 2017, include the areas associated with four sources in Iowa meeting DRR emissions criteria that states have chosen to be characterized using air dispersion modeling, the areas associated with three sources in Iowa for which Iowa imposed emissions limitations to restrict their SO_2 emissions to less than 2,000 tpy, and other areas in Iowa not specifically required to be characterized by the state under the DRR.

Because many of the intended designations have been informed by available modeling analyses, this preliminary TSD is structured based on the availability of such modeling information. There is a section for each county for which modeling information is available. The remaining to-be-designated counties and partial counties are then addressed together in section 6.

[2] https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf. In addition to this TAD on modeling, the EPA also has released a technical assistance document addressing SO_2 monitoring network design, to advise states that have elected to install and begin operation of a new SO_2 monitoring network. *See* Draft SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, February 2016, https://www.epa.gov/sites/production/files/2016-06/documents/so2monitoringtad.pdf.

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

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

1) 2010 SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 ppb, based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. *See* 40 CFR 50.17.
2) Design Value – a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the NAAQS.
3) Designated nonattainment area – an area that, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined either: (1) does not meet the 2010 SO_2 NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS.
4) Designated unclassifiable/attainment area – an area that either: (1) based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.[5]
5) Designated unclassifiable area – an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS..
6) Modeled violation – a violation of the SO_2 NAAQS demonstrated by air dispersion modeling.
7) Recommended attainment area – an area that a state, territory, or tribe has recommended that the EPA designate as attainment.
8) Recommended nonattainment area – an area that a state, territory, or tribe has recommended that the EPA designate as nonattainment.
9) Recommended unclassifiable area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable.
10) Recommended unclassifiable/attainment area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable/attainment.

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

11) Violating monitor – an ambient air monitor meeting 40 CFR parts 50, 53, and 58 requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
12) We, our, and us – these refer to the EPA.

3. Technical Analysis for the Linn County Area

3.1. Introduction

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

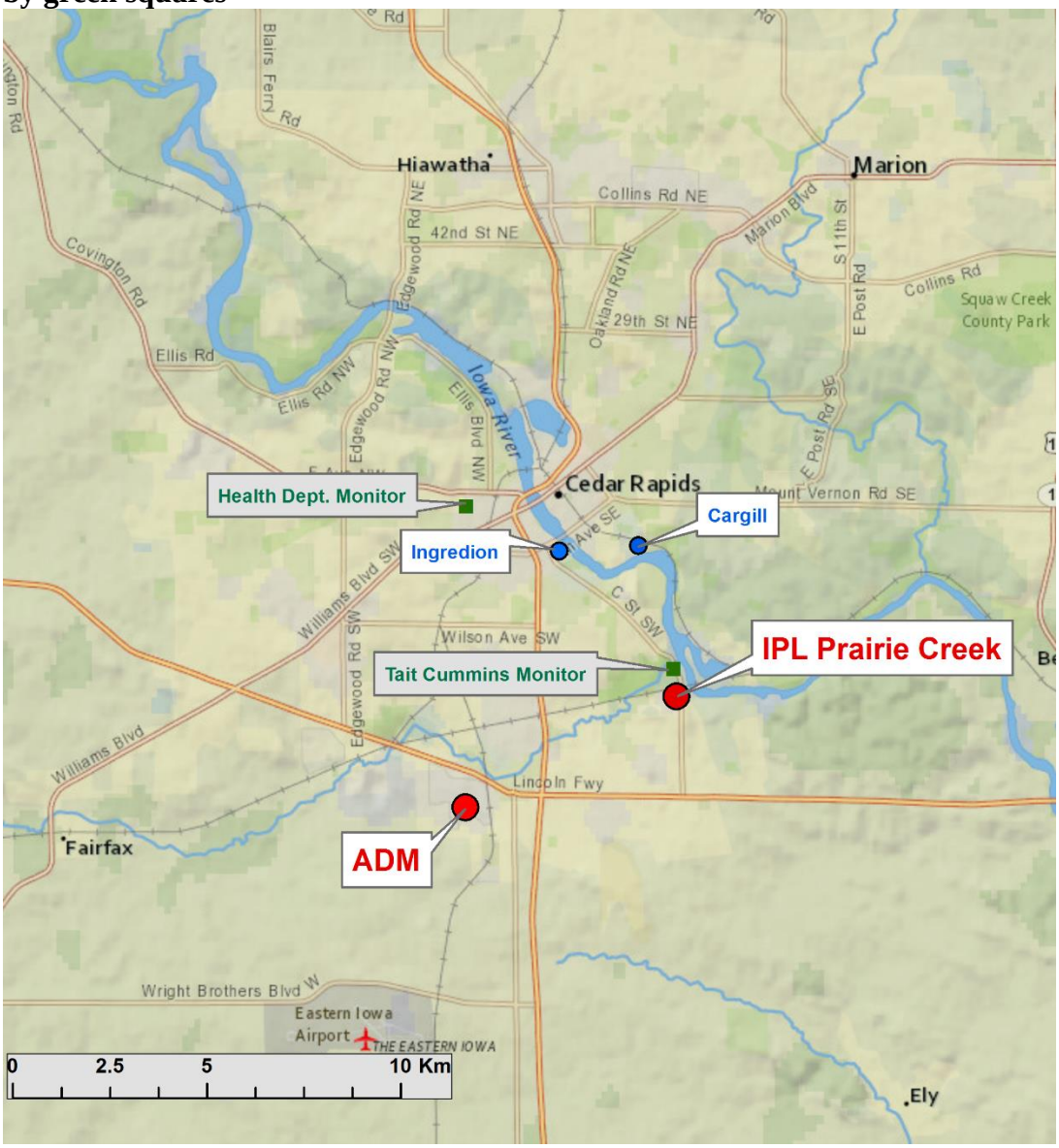
3.2. Air Quality Monitoring Data for the Linn County Area

This factor considers the SO_2 air quality monitoring data in the area of Linn County. The state did not include monitoring data in its updated recommended designations submittal but the following SO_2 monitors exist in Linn County and are shown in Figure 1 along with the locations of the emissions sources subject to the DRR:

- Air Quality System monitor 19-113-0040, designated by the state as the Cedar Rapids Public Health air monitoring site. This monitor is located at 500 11th Street NW near downtown Cedar Rapids in Linn County. It is approximately 5 km to the northwest of the DRR IPL – Prairie Creek source and 6 km to the north of the DRR ADM – Corn Processing source. Data collected at this monitor indicates that the 1-hr SO_2 2014-2016 design value is 16 ppb.

- Air Quality System monitor 19-113-0041, designated by the state as the Cedar Rapids Tait Cummins Park (Prairie Creek) air monitoring site. This monitor is located at 3000 C Street SW in Linn County, and is approximately 1 km to the north of the DRR IPL – Prairie Creek source. It began operating in 2014. Data collected at this monitor indicates that the 1-hr SO_2 2014-2016 design value is 72 ppb.

Figure 1. Map of a Portion of Linn County Addressing ADM Corn Processing (red), IPL – Prairie Creek (red), and Nearby Sources (blue). Location of current monitors are indicated by green squares



As mentioned previously, the state did not provide a discussion of the AQS monitors located in Linn County in its submission. These data were available to EPA for consideration in the designations process, however, since it is unclear if these monitors are located in areas of maximum concentration, it is unclear if the data are representative of the area's actual air quality to determine whether the area is meeting the 2010 SO_2 NAAQS.

3.3. Air Quality Modeling Analysis for the Linn County Area Addressing ADM Corn Processing – Cedar Rapids and IPL – Prairie Creek Station

3.3.1. Introduction

This section 3.3 presents all the available air quality modeling information for Linn County, focusing on an area near ADM Corn Processing – Cedar Rapids and IPL – Prairie Creek Station. This area contains the following SO_2 sources, principally the sources around which Iowa was required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The ADM Corn Processing – Cedar Rapids facility emitted more than 2,000 tons of SO_2 in 2014. Specifically, ADM emitted 3,071 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Iowa has chosen to characterize it via modeling.

- The IPL – Prairie Creek Station electric generating facility emitted more than 2,000 tons of SO_2 in 2014. Specifically, IPL – Prairie Creek emitted 4,033 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Iowa has chosen to characterize it via modeling.

- The Cargill Inc. and Ingredion facilities in Cedar Rapids are not on the SO_2 DRR Source list but were included in the modeling analysis submitted by Iowa. Cargill and Ingredion emitted 76 and 46 tons of SO_2 in 2014, respectively.

Because we have available results of air quality modeling in which these sources are modeled together, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

In its submission, Iowa recommended that an area that includes the area surrounding these facilities, specifically the entirety of Linn County, be designated as unclassifiable/attainment based in part on an assessment and characterization of air quality impacts from these facilities. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing a mixture of actual and allowable emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA is modifying the state's recommendation for the area, and intends to designate the area as unclassifiable. Our reasoning for this conclusion is explained in section 3.7 of this TSD, after all the available information is presented.

The area that the state has assessed via air quality modeling is located in Linn County which is in the East-Central part of the state of Iowa.

As seen in Figure 2 below, the ADM Corn Processing and IPL – Prairie Creek facilities are located in Cedar Rapids in the southern portion Linn County. Prairie Creek is located to the northeast of ADM, and the two sources are approximately 4.5 km apart. Also included in the

figure are other nearby emitters of SO_2.[6] These are Cargill Inc. and Ingredion and are located in Cedar Rapids to the north of Prairie Creek and ADM.

The state's recommended unclassifiable/attainment designation boundary is the boundary of Linn County. The EPA's intended unclassifiable designation boundary is also the boundary of Linn County.

Figure 2. Map of the Linn County Area Addressing ADM Corn Processing and IPL – Prairie Creek

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

[6] All other SO_2 emitters with an average rate above 2 tpy from 2012-2014 (based on information in Iowa's emission inventory reporting system) are shown in Figure 2.

For this area, the EPA received and considered one modeling assessment which was submitted by Iowa.

3.3.2. Modeling Analysis Provided by the State

3.3.2.1. Model Selection and Modeling Components

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

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

The state used AERMOD version 15181, the most up-to-date version at the time the modeling analysis was conducted, using all regulatory default options. AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted here. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

3.3.2.2. Modeling Parameter: Rural or Urban Dispersion

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

For the purpose of performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in rural mode. The rural determination was made based on land cover around the areas of ADM and Prairie Creek. The Guideline on Air Quality Models, Appendix W (November 2005) section 7.2.3 instructs users to define the urban or rural classification of the area considering land use and population density. The land use procedure in Appendix W section 7.2.3(c) classifies urban areas based on industrial, commercial, and residential land use over 50% within a 3 km radius of the source. The population density threshold of the 3 km radius surrounding each facility is compared to the urban threshold of 750 people per square kilometer. Both the land use and population density guidelines in Appendix W were used to assess the urban characteristics of the area and it was determined to be rural. While some residential and industrial areas are located near the two sources, the predominate land

cover is of rural type (e.g., barren fields, farmland). Thus, the EPA agrees with the state that rural mode is appropriate for this analysis.

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

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

The sources of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. For the Linn County area, the state included two other emitters of SO_2 with 2014 emissions greater than 40 tons within 20 km of either ADM Corn Processing or IPL – Prairie Creek in any direction. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. In addition to ADM Corn Processing and IPL – Prairie Creek, the other emitters of SO_2 included in the area of analysis are Cargill Inc. and Ingredion. No other sources beyond 20 km were determined by the state to have the potential to cause concentration gradient impacts within the area of analysis.

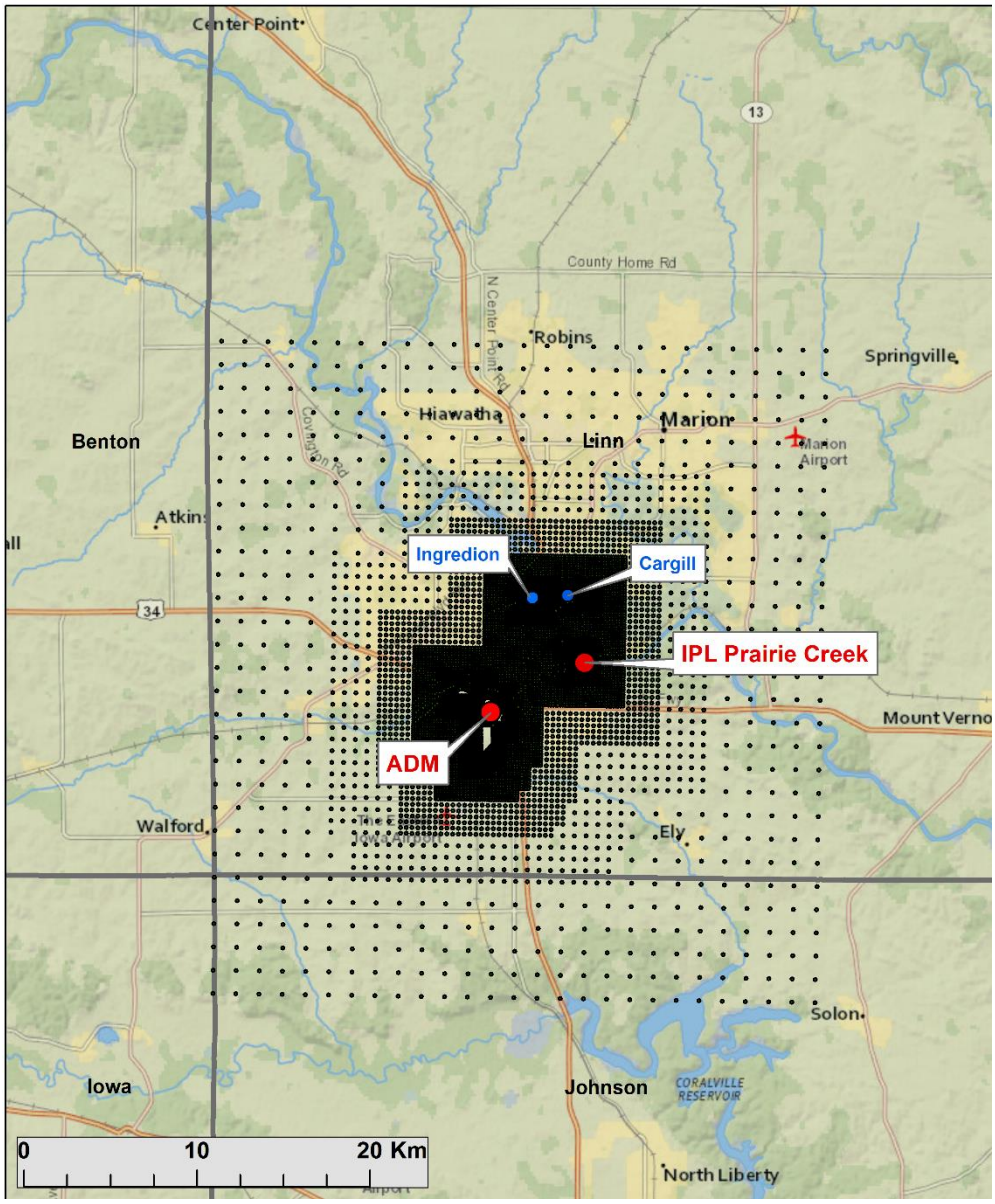
Receptors were sited outside of the fence line boundaries of Prairie Creek, ADM, Ingredion, and Cargill. The grid receptor spacing around each of the four facilities in the area of analysis chosen is as follows:

- 50 meters along the facility fence line
- 50 meters from the fence line to 0.5 km
- 100 meters extending from 0.5 km to 1.5 km
- 250 meters extending from 1.5 km to 3 km
- 500 meters extending from 3 km to 5 km
- 1000 meters extending from 5 km to 10 km

The receptor network contained 16,042 receptors, and the network covered the southwestern portion of Linn County and portions of northern Johnson County. Figure 3, show the state's chosen area of analysis surrounding the ADM Corn Processing and IPL – Prairie Creek facilities, as well as the receptor grid for the area of analysis.

The state placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility. The state did not place receptors in locations that it considered to not be ambient air, including locations inside the fence lines that preclude public access for all four sources that were included in the modeling analysis. Each facility property is ambient air with respect to other facilities, however.

Figure 3. Area of Analysis and Receptor Grid for the Linn County Area



3.3.2.4. Modeling Parameter: Source Characterization

Section 6 of the Modeling TAD offers recommendations on source characterization including source types, use of accurate stack parameters, inclusion of building dimensions for building downwash (if warranted), and the use of actual stack heights with actual emissions or following GEP policy with allowable emissions.

As previously described, Iowa included the following four sources in the modeling analysis: ADM Corn Processing, IPL – Prairie Creek, Cargill Inc., and Ingredion. For Prairie Creek, the state used actual stack heights in conjunction with constant hourly emissions inputs based on the

average of variable actual hourly emissions during certain periods for Units 1, 2, and 3 (*see* below in Figure 4). Unit 4 at Prairie Creek was modeled at a future allowable rate that is further discussed in Section 3.3.2.5.

For ADM, the state modeled over 50 separate SO_2 emission sources. The primary sources of SO_2 emissions at ADM are five coal-fired boilers. The boilers were modeled at actual stack heights and emissions rates that were greater than the actual average emissions. Additional discussion of the emission rates for the boilers at ADM are in Section 3.3.2.5. Four of the facility's emission points were modeled at recently permitted, modified (raised) stack heights. The modified stacks are all less than 30 meters, which is below the 65 meter de minimis GEP stack height. These four emission points were modeled at their permitted allowable emission rate. All other emission points at ADM were modeled using a combination of permitted allowable and actual emissions.

For Cargill and Ingredion, numerous emissions sources were modeled using a combination of permitted allowable and actual emission. Actual stack heights were used as there is no stack height greater than the 65 meter de minimis GEP height.

The state adequately characterized the sources' building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPPRM was used to assist in addressing building downwash.

Based on review of the provided information, the EPA finds the state adequately characterized the modeled sources in the Linn County area of analysis with regard to physical parameters other than the hourly emission inputs, which are discussed in the next section.

3.3.2.5. Modeling Parameter: Emissions

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

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

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, for a facility that has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or

conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, the state included ADM Corn Processing and IPL – Prairie Creek and two other emitters of SO_2 within 20 km in the area of analysis. For this area of analysis, the state has opted to use a hybrid approach for all modeled sources, where emissions from certain emission points were expressed as actual emissions and emissions from other emission points were expressed as PTE rates. The facilities in the state's modeling analysis and their associated actual or PTE rates are summarized below.

For ADM Corn Processing, IPL – Prairie Creek, Cargill Inc., and Ingredion, the state provided annual actual SO_2 emissions between 2012 – 2014. This information is summarized in Table 2. A description of how the state obtained hourly emission rates is given below this table.

Table 2. Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Area of Analysis for the Linn County Area

	SO_2 Emissions (tpy)		
Facility Name	**2012**	**2013**	**2014**
ADM Corn Processing	6,276	3,163	3,071
IPL – Prairie Creek	3,591	2,917	8,066
Cargill Inc.	239	264	76
Ingredion	82	149	46

For ADM Corn Processing, the main SO_2 emission sources include five coal fired boilers. However, there are numerous other potential sources of SO_2 emissions including, but not limited to, dryers, coolers, heaters, and oxidizers. In all, 55 emission points from ADM were included in the modeling analysis.

The hourly emissions data for ADM that were used in the modeling analysis were obtained from various methodologies.[7] While CEMS are installed at the five boilers at ADM, the CEMS-based data was not used in the modeling analysis.[8] It is not clear if the state was provided the CEMS-data from the facility in order to be used in the modeling. The state developed the hourly emission rates used for the five coal-fired boilers from the actual average annual emissions from 2012 through 2014. The boilers were modeled assuming constant operation throughout the 3-year modeling period. The state noted that the average annual emissions provided by ADM to the state for modeling were slightly greater than the actual annual average emissions in the state's

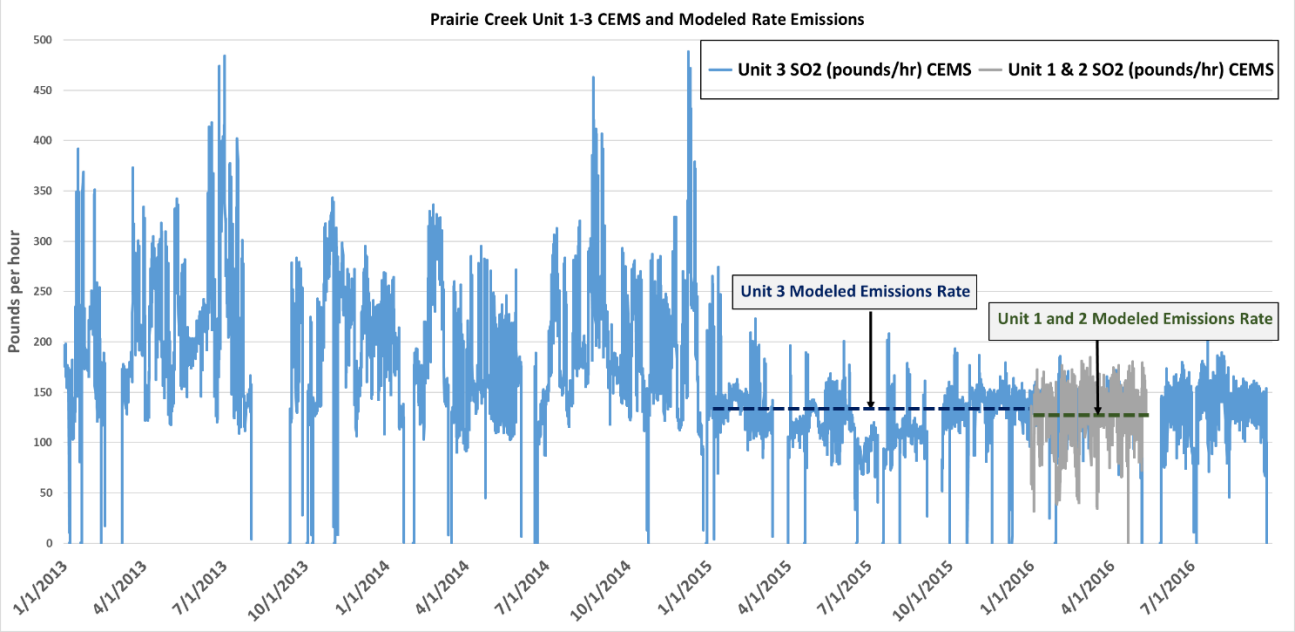
[7] The methodologies are derived from Iowa's Technical Support Document: https://www.epa.gov/sites/production/files/2017-01/documents/iowa_so2_round_3_designation_recommendation_and_drr_submittal.pdf

[8] The CEMS data for these boilers are required to be reported to EPA's Clean Air Markets database.

inventory. For example, the ADM boiler associated with emission point SEP530 was modeled at a constant hourly emissions rate of 257 lb/hr, which corresponds to 1,126 tpy of emissions. The actual emissions of SO_2 in tpy from this boiler were 1,088, 1,085, and 1,101 in 2012, 2013, and 2014, respectively. The average annual emissions of the 3-year period were 1,091 tpy. Thus, the modeled rate (in tpy) for this ADM boiler was about 3% greater than the average actual annual rate in the state's inventory from 2012 through 2014. The other sources at ADM (e.g., dryers, heaters, oxidizers, etc.) were modeled at constant hourly rates based on actual emissions from a stack test or at the unit's permitted allowable rate.

For IPL – Prairie Creek, the hourly emissions data that were used in the modeling analysis were obtained from two methodologies. For boilers #1, #2, and #3, Iowa used an average of the most recent hourly CEMS data (2016 for boilers #1 and #2 and 2015 for boiler #3).[9] The CEMS system for boilers #1 and #2 began operation in January 2016. The CEMS system for boiler #3 was operational during the 2012-2014 timeframe, in addition to the most recent years of 2015 and 2016. The available CEMS data from 2013 through 2016 and the average modeled rates for boilers #1, #2, and #3 are provided in Figure 4. Boiler #3 was modeled at 129 lb/hr based on the average of 2015 CEMS data. As the figure shows, the CEMS indicate that some emission rates in 2013 and 2014 exceeded 400 lb/hr and most hourly emission rates were greater than the average 2015 emission rate used in the modeling. The state indicated that boiler #3 switched to low-sulfur coal in January 2015 and that the CEMS data from 2015 most accurately represents the current and future operations of the boiler. However, IPL – Prairie Creek is not subject to any federally enforceable requirement to combust solely low-sulfur coal and therefore could emit at the rates that occurred in 2013 and 2014.

Figure 4. SO_2 Emission Rates from IPL – Prairie Creek Units 1, 2, and 3 CEMS



[9] The CEMS data for these boilers are required to be reported to EPA's Clean Air Markets database.

Boiler #4 would be required to cease burning coal and burn exclusively natural gas by December 31, 2017, per an Iowa air quality draft permit that completed a public review process on December 31, 2016. In addition, a consent decree between the EPA and Alliant Energy (Case 1:15-cv-00061-EJM Document 14 Filed 09/02/15) requires IPL to either retire or refuel Boiler #4. However, the permit that includes the requirement to refuel Boiler #4 has not been finalized and the consent decree requires the retiring or refueling to occur prior to June 1, 2018, which is after the date that the EPA intends to make a final designation for this area. Iowa used the allowable emission rate that results from the combustion of natural gas in its modeling analysis for Boiler #4.

For Cargill Inc., approximately 25 separate emissions sources were included in the modeling. Twenty of these sources were modeled at their recent (predominately 2014) actual emissions. The actual emissions were assumed to be constant in the modeling analysis. The other five sources at Cargill, Inc. were modeled at the federally enforceable permitted rate.

For Ingredion, approximately 38 separate emissions sources were included in the modeling. Thirty-five of these sources were modeled at their recent (predominately 2014) actual emissions. The actual emissions were assumed to be constant in the modeling analysis. The other three sources at Ingredion were modeled at the federally enforceable permitted rate.

Generally, the state adequately modeled the emission rates at the ADM facility and nearby sources of Ingredion and Cargill with the best available information. For ADM, the facility provided the state with emissions that were greater than the average annual emissions in the state's inventory for the five coal-fired boilers. It is not known if the state had additional information (e.g., CEMS data or the operating schedule for the boilers) that could have been used to temporally vary the annual emissions at ADM. This is also true for the nearby sources Ingredion and Cargill, where it is not known if operational information is available that could be used to temporally vary the average annual actual emissions.

The EPA is not able to rely on the modeling analysis that Iowa submitted to determine if the area is meeting the 1-hour NAAQS because the hourly emission rates used in the modeling analysis for IPL – Prairie Creek boiler #3 are not representative of the hourly emissions over the past 3 years and are not federally enforceable. For boiler #3, the EPA believes that the appropriate emission rate should have been either the most recent 3 years of CEMS data, instead of the average of 2015 CEMS, or an estimate of hourly emissions based on the federally enforceable and effective allowable emissions.

In addition, Iowa used an average emission rate, obtained by newly installed CEMS, over the first 6 months of 2016 for boilers #1 and #2. The use of the average emission rate underestimates the actual hourly emissions during this period for many hours, by a notable amount. In addition, the emission rate used in the modeling analysis for Boiler #4 is not representative of past actual emissions or the expected federally enforceable and effective allowable emission rate at the expected final designation date.

3.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

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

For the area of analysis for the Linn County area, the state selected the surface meteorology from the Cedar Rapids NWS station (KCID) located at [41.883°N, 91.7246°W], 5 km to the south of ADM, and coincident upper air observations from the Davenport NWS station (KDVN) located at [41.61°N, 90.59°W], 100 km to the southeast of Cedar Rapids as best representative of meteorological conditions within the area of analysis.

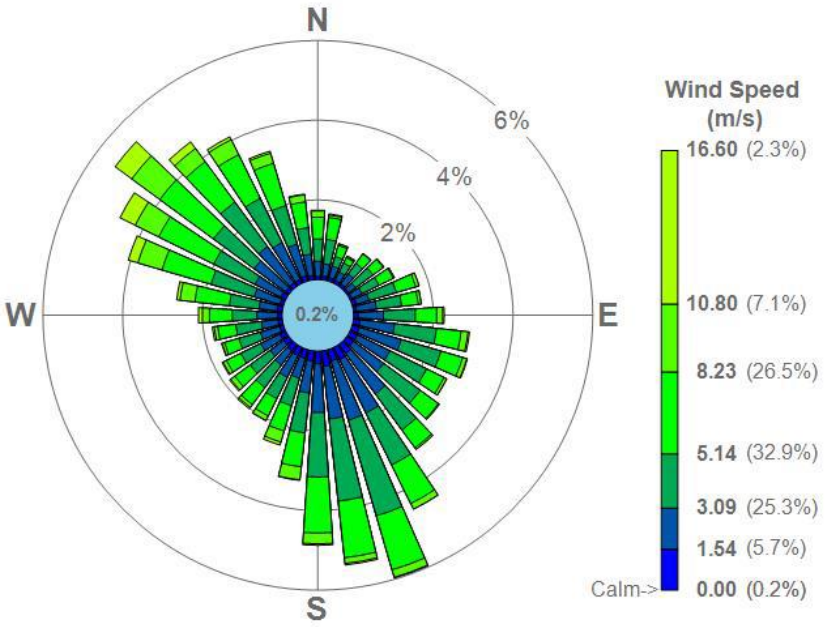
The state used AERSURFACE version 13016 using data from the KCID NWS station to estimate the surface characteristics of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "z_o" The state estimated surface roughness values for 12 spatial sectors out to 1 km at a monthly temporal resolution for dry, average, and wet surface moisture conditions. The output for the individual months from the three runs for moisture conditions are manually combined into one output file for each site based on the moisture conditions determined for each month.

In Figure 5, generated by the EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 5. Area of Analysis and the NWS stations in the Linn County Area

As part of its recommendation, the state provided the 3-year surface wind rose for the Cedar Rapids (KCID) NWS station. In Figure 6, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing from. The wind direction at the KCID NWS station has a predominate south-southeast and northwest component and wind speeds are less than 3 m/s (~7 mph) on 25% of the hours.

Figure 6. Cedar Rapids (KCID) NWS Station Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air NWS 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 section 8.3 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models." in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

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 KCID NWS station site previously mentioned, 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 threshold was specifically applied to the 1-minute wind data.

The EPA believes the NWS stations used are representative for the meteorological conditions in the Linn County area. Overall, the methodology used by the state to process the meteorological data for input in AERMOD follows EPA guidance (e.g., use of AERSURFACE, AERMINUTE, etc.).

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

The terrain in the area of analysis is best described as flat to gently rolling. 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 Dataset data for Linn and Johnson counties and based on the North American Datum 1983 (NAD83).

The EPA agrees with treatment of terrain within AERMOD for the Linn County area and finds it followed established guidance for terrain processing.

3.3.2.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the state used a tier 1 approach. Iowa used the Keosauqua Lake Sugema monitor in Van Buren County, Iowa (AQS site ID # 191770006). The Lake Sugema monitor is approximately 140 km to the south of the Linn County area. The single value of the background concentration for this area of analysis was determined by the state to be 7 micrograms per cubic meter ($\mu g/m^3$), equivalent to 2.7 ppb when expressed in two significant figures,[10] and that value was incorporated into the final AERMOD results.

The area around the Lake Sugema monitor contains only smaller SO_2 emission sources. Iowa included all larger SO_2 emission sources in the modeling analysis and therefore, the EPA believes that the background concentration is acceptable for the Linn County area.

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

3.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Linn County area of analysis are summarized below in Table 3.

Table 3: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Linn County Area

Input Parameter	Value
AERMOD Version	15181 (default options)
Dispersion Characteristics	Rural
Modeled Sources	4
Modeled Stacks	124 emission points (including stacks)
Modeled Structures	702
Modeled Fencelines	4
Total receptors	16,042
Emissions Type	Mixed/Hybrid
Emissions Years	Various
Meteorology Years	2012 – 2014
NWS Station for Surface Meteorology	Cedar Rapids, IA NWS station (KCID)
NWS Station Upper Air Meteorology	Davenport, IA NWS station (KDVN)
NWS Station for Calculating Surface Characteristics	Cedar Rapids, IA NWS station (KCID)
Methodology for Calculating Background SO_2 Concentration	AQS site ID # 191770006, Lake Sugema, Tier 1 based on 2012 – 2014 design value
Calculated Background SO_2 Concentration	7 $\mu g/m^3$

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

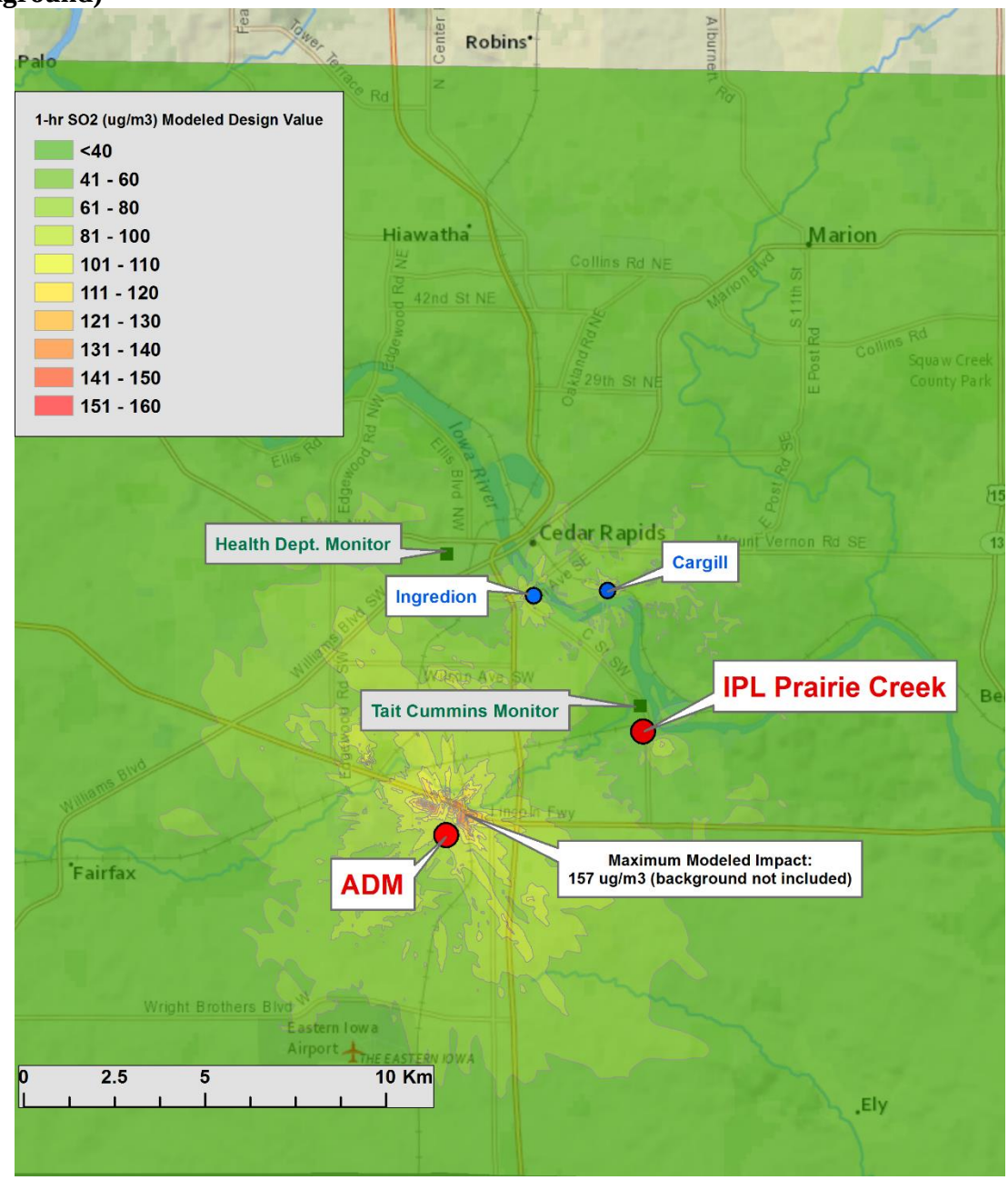
Table 4. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Area of Analysis for the Linn County Area

Averaging Period	Data Period	Receptor Location UTM zone 15		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM	UTM	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012 – 2014	609067.9 E	4642520.9 N	164	196.4*

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

The state's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 164 $\mu g/m^3$, equivalent to 63 ppb. This modeled concentration included the background concentration of SO_2, and is based on a mixture of actual and PTE emissions from the facilities. Figure 7 below was included as part of the state's recommendation and indicates that the predicted value occurred just to the southeast of ADM.

Figure 7. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Area of Analysis for the Linn County Area (not including background)



The modeling submitted by the state does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. However, due to issues that the EPA described earlier in this TSD, the EPA is unable to use the modeling analysis submitted by the state to determine if the area is or is not meeting the NAAQS.

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

Although the modeling analysis submitted by IDNR mostly followed the Modeling TAD and generally accepted modeling techniques, certain emission rates used by Iowa for IPL – Prairie Creek render the analysis unreliable to determine whether the area is or is not meeting the NAAQS. Specifically, Iowa used a fixed, average 2015 emission rate for boiler #3 when hourly values from 2013 through 2015 were available and were generally larger than the 2015 average emission rate. The state also used fixed, average emissions rates for boilers #1 and #2 based on CEMS data. In addition, Iowa used an emission rate for IPL – Prairie Creek boiler #4 that is not representative of past actual emissions or the expected federally enforceable and effective allowable emission rate at the expected final designation date.

3.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for Linn County

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

3.5. Jurisdictional Boundaries in Linn County

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for Linn County. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

Iowa recommended that the entirety of Linn County be designated unclassifiable/attainment. The modeling analysis included all sources of SO_2 above 40 tons per year within Linn County and the EPA believes using the Linn County boundary is appropriate.

3.6. Other Information Relevant to the Designations for the Linn County Area

No other significant information was determined to be relevant for Linn County.

3.7. The EPA's Assessment of the Available Information for Linn County

Based on issues the EPA identified in section 3.3.2.10, the EPA is not able to rely on Iowa's modeling analysis or any other available information, including monitoring results from the existing SO_2 monitors previously referenced, to determine if the area is or is not meeting the NAAQS. Therefore, the EPA intends to designate the area as unclassifiable. The EPA is selecting the boundary of Linn County as the intended boundary.

The intended unclassifiable designation is based consideration of the modeling analysis that the state of Iowa provided to the EPA. Although the state provided a modeling analysis that purported to demonstrate compliance with the NAAQS, the state did not use 3 years of available time varying CEMS data for boiler #3 or the boiler's federally enforceable and effective allowable emission rate. In addition, the state did not model available hourly CEMS data for boilers #1 and #2 or these boilers' federally enforceable and effective allowable emission rates. In addition, Iowa used an emission rate for IPL – Prairie Creek boiler #4 that is not representative of past actual emissions or the expected federally enforceable and effective allowable emission rate at the expected final designation date.

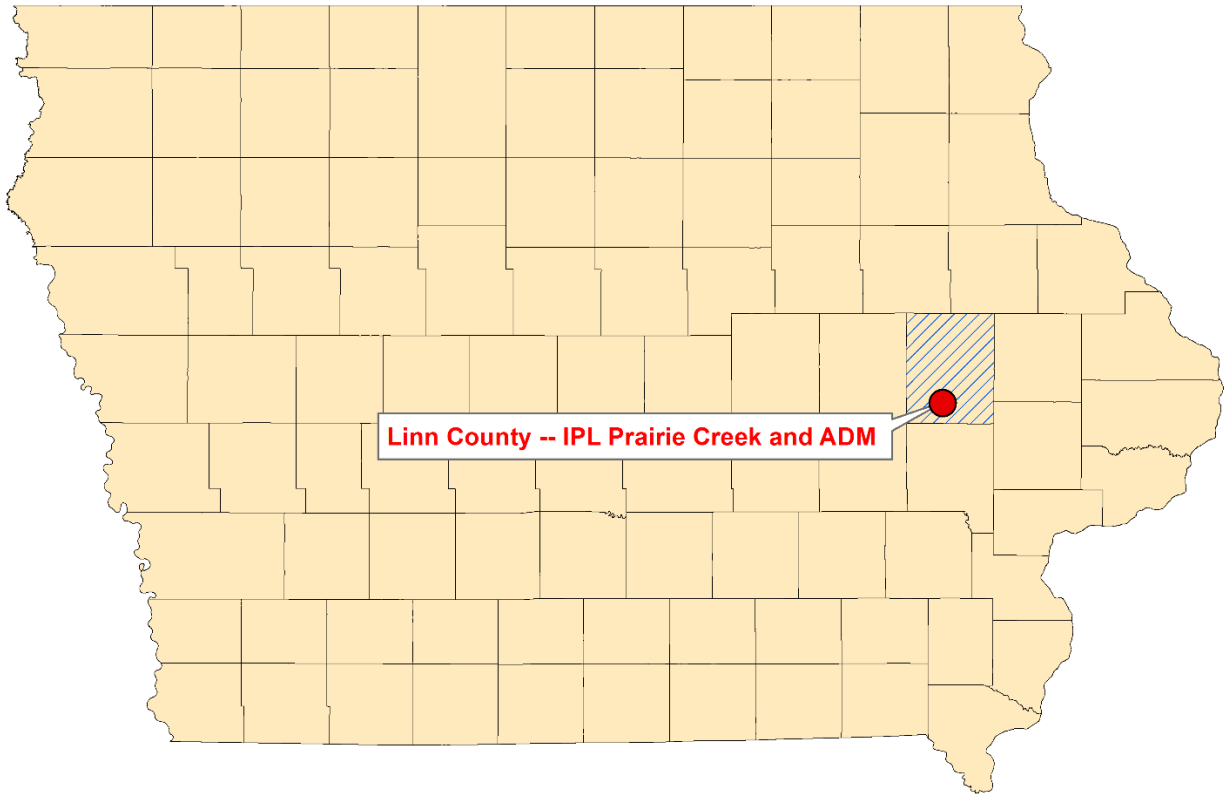
While monitoring data were available to EPA for consideration in the designations process, since it is unclear if these monitors are located in areas of maximum concentration, it is unclear if the data are representative of the area's actual air quality in determining whether the area is meeting the NAAQS.

The EPA believes that our intended unclassifiable area, consisting of the entirety of Linn County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area.

3.8. Summary of Our Intended Designation for the Linn County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Linn County area as unclassifiable for the 2010 SO_2 NAAQS because the area was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS. Specifically, the intended unclassifiable area is comprised of the entirety of Linn County. Figure 8 shows the boundary of this intended designated area.

Figure 8. Boundary of the Intended Linn County Unclassifiable Area



4. Technical Analysis for the Louisa County Area

4.1. Introduction

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

4.2. Air Quality Monitoring Data for the Louisa County Area

This factor considers the SO_2 air quality monitoring data in Louisa County. Although Iowa did not discuss any existing monitoring data in its updated recommended designations submittal, there are three SO_2 monitors that exist in the adjacent Muscatine County, all within 20 km of Louisa Station. All three monitors are located within the Muscatine 1-hour SO_2 NAAQS nonattainment area. Iowa submitted a nonattainment plan to address the Muscatine nonattainment area on May 26, 2016. Below is an assessment of these monitors:

- Air Quality System monitor Muscatine High School East Campus Trailer, AQS ID #191390019. This monitor is located at 1409 Wisconsin, Muscatine, IA [41.40145, -91.06845] in Muscatine County, and is approximately 10 km to the north of the Louisa facility. The 2014-2016 1-hr SO_2 design value at this monitor is 84 ppb.

- Air Quality System monitor Muscatine Greenwood Cemetery, AQS ID #191390016. This monitor is located at Fletcher Street and Kimble Street, Muscatine, IA [41.41943, -91.07098] in Muscatine County, and is approximately 12 km to the north of the Louisa facility. The 2014-2016 1-hr SO_2 design value at this monitor is 77 ppb.

- Air Quality System monitor Muscatine Musser Park, AQS ID #191390020. This monitor is located at Oregon Street and Earl Avenue, Muscatine, IA [41.4069, -91.0616] in Muscatine County, and is approximately 10 km to the north of the Louisa facility. The 2014-2016 1-hr SO_2 design value at this monitor is 113 ppb.

As mentioned previously, the state did not provide discussion of these AQS monitors in its submission. Regardless, the EPA believes that these monitors are not located in the area of expected maximum impact of the MidAmerican – Louisa and will not rely on the AQS data alone to inform its intended designation.

4.3. Air Quality Modeling Analysis for the Louisa County Area Addressing MidAmerican Energy Company – Louisa Station

4.3.1. Introduction

This section 4.3 presents all the available air quality modeling information for the Louisa County area that includes MidAmerican Energy Company – Louisa Station. (This area will often be

referred to as "the Louisa County area" within this section 4.3). This area contains the following SO_2 sources, principally the source around which Iowa was required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The MidAmerican – Louisa facility in Louisa County emitted more than 2,000 tons in 2014. Specifically, MidAmerican – Louisa emitted 8,783 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Iowa has chosen to characterize it via modeling.

- The Grain Processing Corporation (GPC) facility in Muscatine County is not on the SO_2 DRR Source list.

- The Muscatine Power and Water (MPW) facility in Muscatine County is not on the SO_2 DRR Source list.

- The Monsanto facility in Muscatine County is not on the SO_2 DRR Source list.

Because we have available results of air quality modeling in which these sources are modeled together, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

In its submission, Iowa recommended that the entirety of Louisa County which includes the Mid-American Louisa facility, and the remainder of Muscatine County that is not part of the 1-hr SO_2 Muscatine nonattainment area be designated as separate unclassifiable/attainment areas based in part on an assessment and characterization of air quality impacts from these facilities and other nearby sources that may have a potential impact in the area where the 2010 SO_2 NAAQS may be exceeded. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing a mixture of actual and allowable emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees with the state's recommendation for the Louisa County area, and intends to designate Louisa County as unclassifiable/attainment. Our reasoning for this conclusion is explained in section 4.7 of this TSD, after all the available information is presented.

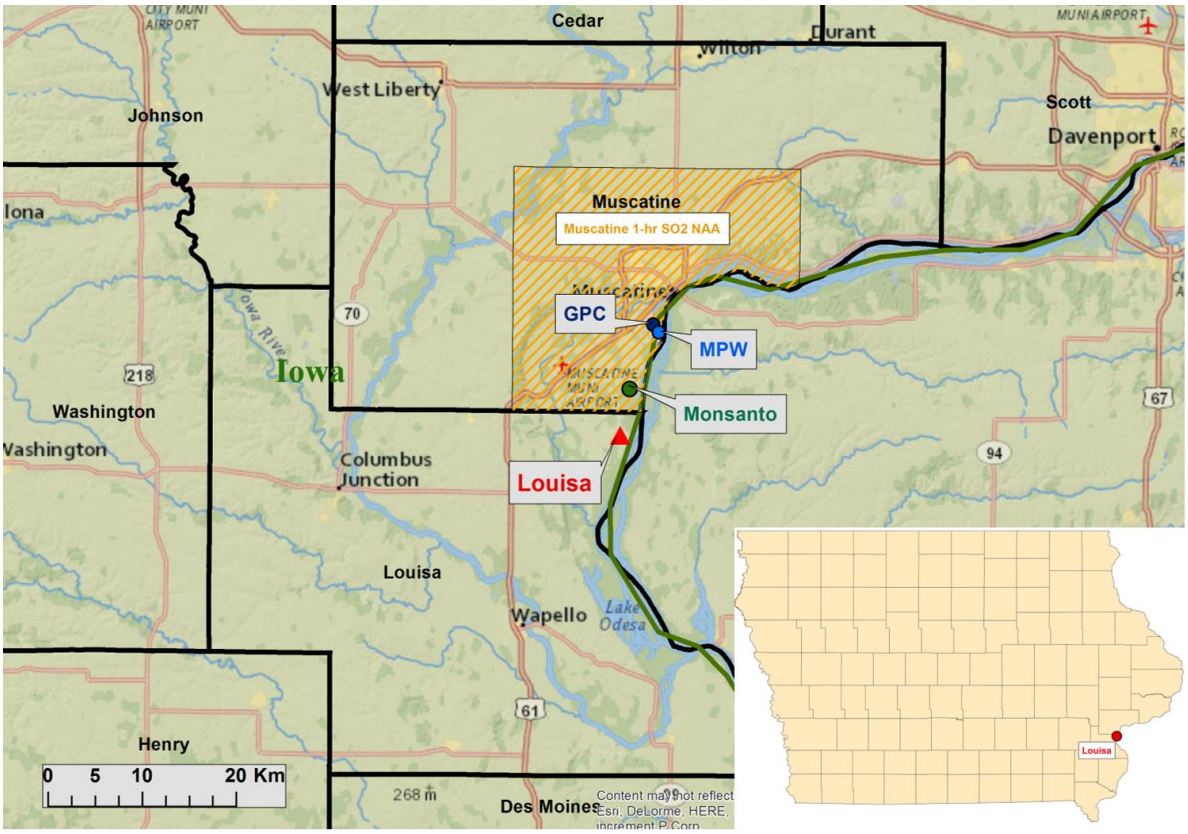
The area that the state has assessed via air quality modeling is located in the southeast corner of Iowa, near the Iowa-Illinois border which consists of the Mississippi River. As seen in Figure 9 below, the MidAmerican – Louisa facility is located in the northeast corner of Louisa County, alongside the Mississippi River.

Also included in the figure are other nearby emitters of SO_2.[11] These are GPC, MPW, and Monsanto. All three of the sources are located to the north of MidAmerican – Louisa in Muscatine County, Iowa, and within the Muscatine 1-hr SO_2 nonattainment area. The figure also

[11] All other large SO_2 emitters in the nearby portion of Muscatine County that is currently designated as nonattainment are shown in Figure 9. The other emitters of SO_2 in the area combined for an average of 0.22 tpy during the period 2012-2014.

includes the state's recommended area for the state's recommended unclassifiable/attainment designation, which consists of the entirety of Louisa County.

Figure 9. Map of Louisa County and Surrounding Area Addressing MidAmerican Energy – Louisa Station



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

For this area, the EPA received and considered one modeling assessment, which was submitted from the state.

4.3.2. Modeling Analysis Provided by the State

4.3.2.1. Model Selection and Modeling Components

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

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD

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

The state used AERMOD version 15181, the most up-to-date version at the time the modeling analysis was conducted, using all regulatory default options. AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that EPA believes would significantly affect the concentrations predicted for this area. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

4.3.2.2. Modeling Parameter: Rural or Urban Dispersion

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

For the purpose of performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in rural mode. The rural determination was made based on land cover surrounding the Louisa facility. The Guideline on Air Quality Models, Appendix W (November 2005) section 7.2.3 instructs users to define the urban or rural classification of the area considering land use and population density. The land use procedure in Appendix W section 7.2.3(c) classifies urban areas based on industrial, commercial, and residential land use over 50% within a 3 km radius of the source. The population density threshold of the 3 km radius surrounding each facility is compared to the urban threshold of 750 people per square kilometer. Both the land use and population density guidelines in Appendix W were used to assess the urban characteristics of the area and it was determined to be rural. The land around the Louisa facility is predominately farmland. Thus, the EPA agrees with the state that rural mode was appropriate for this analysis.

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

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

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Louisa County area, the state included three other emitters of SO_2 within 20 km of MidAmerican – Louisa in any direction. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. In addition to MidAmerican – Louisa, the other emitters of SO_2 included in the area of analysis are: GPC, MPW, and Monsanto. No other sources beyond 20 km were determined by the state to have the potential to cause concentration gradient impacts within the area of analysis, and the EPA agrees with the state's determination given that all other emitters of SO_2 in the area had combined emissions averaging only 0.22 tpy during the period 2012-2014 and are represented in the modeled background value.

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

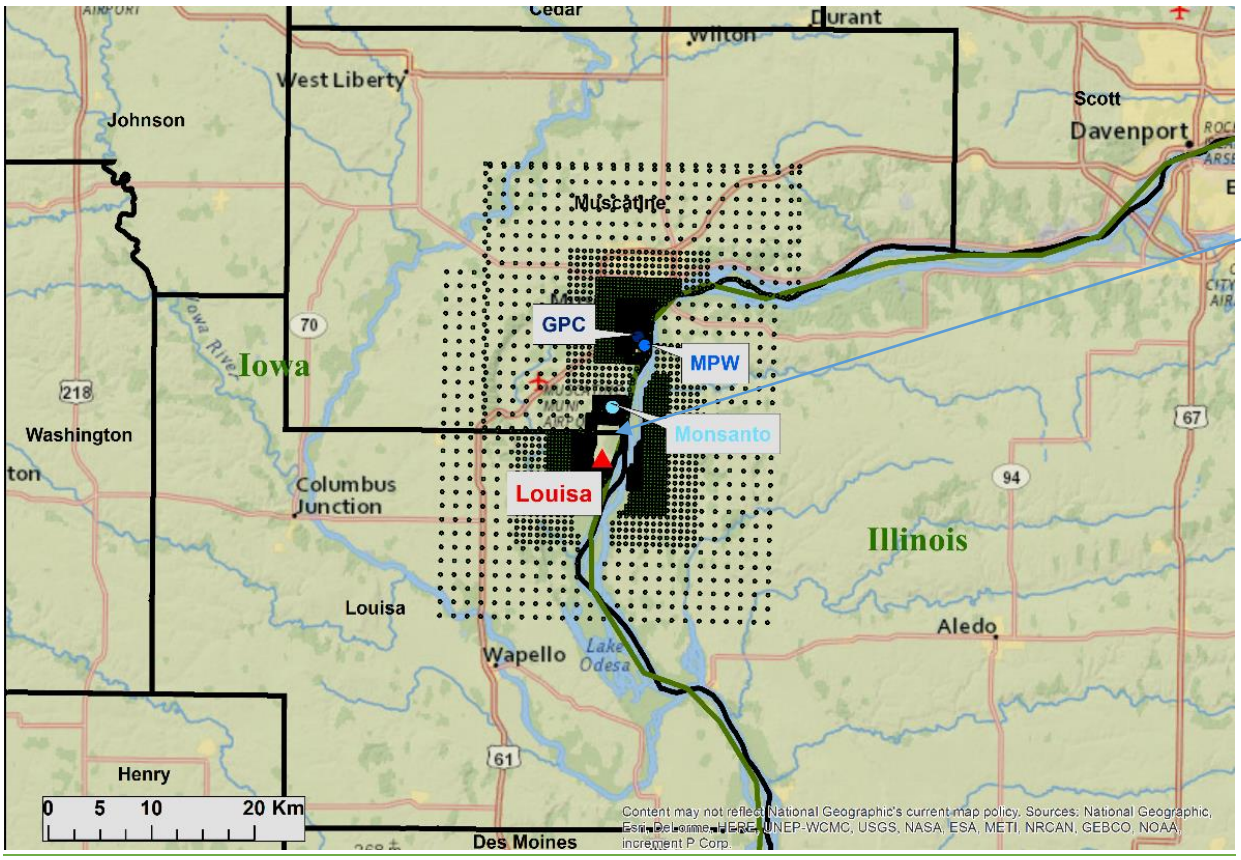
- 50 meters along the facility fence line
- 50 meters from the fence line to 0.5 km
- 100 meters extending from 0.5 km to 1.5 km
- 250 meters extending from 1.5 km to 3 km
- 500 meters extending from 3 km to 5 km
- 1000 meters extending from 5 km to 10 km

The receptor network contained 9,141 receptors, and the network covered the northwestern portion of Louisa County and southern portion of Muscatine County in Iowa, and the northwestern portion of Mercer County and western portion of Rock Island County in Illinois.

Figure 10 shows the state's chosen area of analysis surrounding the MidAmerican – Louisa facility, as well as the receptor grid for the area of analysis.

The state placed receptors for the purposes of this designation effort in locations that it considered to be ambient air with the exceptions of locations it considered as not being feasible locations for placing a monitor. Iowa did not place receptors on the Mississippi River or within the fenceline of any of the four facilities included in the modeling analysis. Each facility property is ambient air with respect to each other facility, however.

Figure 10. Area of Analysis and Modeled Receptor Grid for the Louisa County Area



4.3.2.4. Modeling Parameter: Source Characterization

Section 6 of the Modeling TAD offers recommendations on source characterization including source types, use of accurate stack parameters, inclusion of building dimensions for building downwash (if warranted), and the use of actual stack heights with actual emissions or following GEP policy with allowable emissions.

Based on review of the provided information, the EPA finds the state adequately characterized the modeled sources in the Louisa County area of analysis.

The state explicitly included the DRR source, MidAmerican – Louisa, along with GPC, MPW, and Monsanto because these sources were most likely to impact whether the area is meeting or is not meeting the NAAQS. The state characterized these sources within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the state used actual stack heights in conjunction with actual emissions for certain sources and followed the EPA's good engineering practices (GEP) policy in conjunction with modeled allowable emissions limits for certain other sources. The state also adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity,

location, and diameter. Where appropriate, the AERMOD component BPIPPRM was used to assist in addressing building downwash.

Based on review of the provided information, the EPA finds the state adequately characterized the modeled sources in the Louisa County area of analysis.

4.3.2.5. Modeling Parameter: Emissions

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

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

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

As previously noted, the state included MidAmerican – Louisa and three other emitters of SO_2 within 20 km in the area of analysis. For this area of analysis, the state has opted to use a hybrid approach, where emissions from certain facilities are expressed as actual emissions and emissions from other facilities are expressed as PTE rates. The facilities in the state's modeling analysis and their associated actual or PTE rates are summarized below.

For Monsanto emission point 195 (EP195), which is a coal-fired boiler, the state provided annual actual SO_2 emissions between 2012 and 2014. This information is summarized in Table 5. A description of how the state obtained hourly emission rates is given below this table.

Table 5. Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Area of Analysis for the Louisa County Area

Facility Name	SO_2 Emissions (tpy)		
	2012	2013	2014
Monsanto EP195	543	469	502

For Monsanto EP195, the actual hourly emissions data were obtained from a CEMS.

For MidAmerican – Louisa, GPC, MPW, and Monsanto emission points other than EP195, the state provided PTE values. This information is summarized in Table 6. A description of how the state obtained hourly emission rates is given below this table.

Table 6. SO_2 Emissions based on PTE from Facilities in the Area of Analysis for the Louisa County Area

Facility Name	SO_2 Emissions (tpy, based on PTE)
MidAmerican – Louisa	15,107
GPC	167
MPW	5,051
Monsanto (except EP195)	~0
Total Emissions from Facilities in the Area of Analysis Modeled Based on PTE	20,325

The PTE in tons per year for MidAmerican – Louisa is based on an air quality construction permit (05-A-31-P1) issued on February 14, 2006, that limited SO_2 emissions to 3,449.6 lb/hr (averaged over a 30-day period). Iowa determined the 1-hour emission rate used in the modeling analysis by following the procedures outlined in the EPA's "Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions" memorandum dated April 23, 2014, through the following process:

- Iowa evaluated existing continuous emission monitoring data for the main boiler at Louisa to develop a ratio of 30-day rolling averages to hourly emissions. This ratio was developed using the 99th percentile of hourly emissions from the five-year dataset from 2010 to 2014 for Louisa's main boiler. The resulting ratio of 0.8077 was used to develop an hourly emission rate of 4,271.83 lb/hr using the current 30-day average permit limit of 3,449.6 lb/hr. This 1-hr emission rate of 4,271.83 lb/hr was used in the modeling analysis.

The modeled emission rates for GPC, MPW, and Monsanto (except for EP 195) were based on SO_2 limits in construction permits which were included in the 1-hour Muscatine SO_2 SIP that the state has submitted for EPA review to demonstrate future attainment of the 1-hr SO_2 NAAQS inside the Muscatine nonattainment area. The EPA signed a proposed action to approve Iowa's attainment plan on August 9, 2017. The proposed action is titled "Approval of Iowa's Air Quality Implementation Plan; Muscatine Sulfur Dioxide Nonattainment Area" and will be

published in the Federal Register for a 30-day public comment period. This action will ensure the controls that have brought the nearby Muscatine area into attainment are federally enforceable.

In summary, the state, using allowable emissions for the Louisa facility and either allowable or actual emissions for nearby sources, followed the Modeling TAD in developing the emissions inputs for the Louisa County area of analysis.

4.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

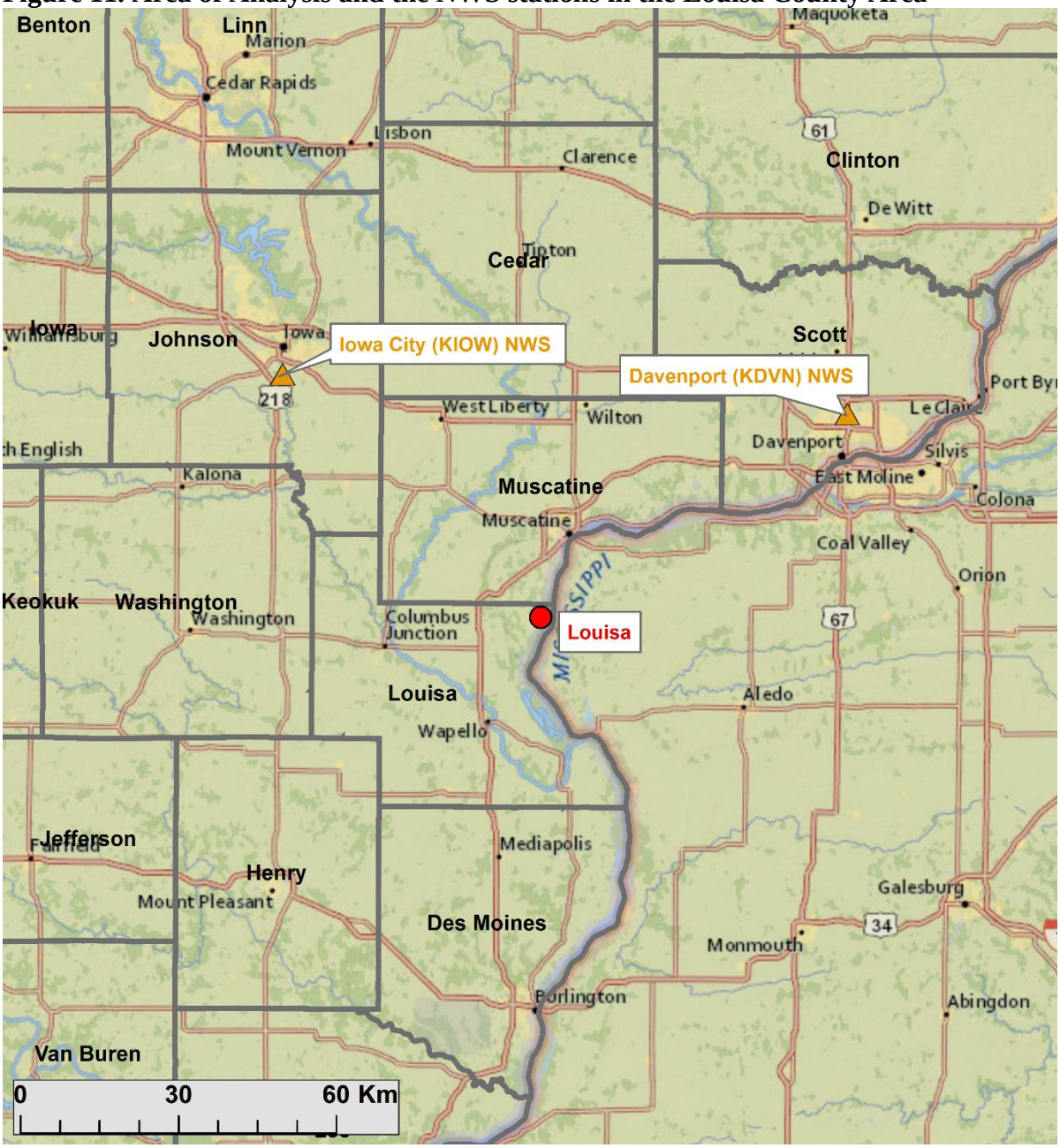
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of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

For the area of analysis for the Louisa Station area, the state selected the surface meteorology from the Iowa City NWS station (KIOW) located at [41.633°N, 91.543°W], 60 km to the northwest of Louisa, and coincident upper air observations from the Davenport NWS station (KDVN) located at [41.63°N, 91.54°W], 80 km to the northeast of Louisa as best representative of meteorological conditions within the area of analysis.

The state used AERSURFACE version 13016 using data from the KIOW NWS station to estimate the surface characteristics of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "z_o" The state estimated surface roughness values for 12 spatial sectors out to 1 km at a monthly temporal resolution for dry, average, and wet surface moisture conditions. The output for the individual months from the three runs for moisture conditions are manually combined into one output file for each site based on the moisture conditions determined for each month.

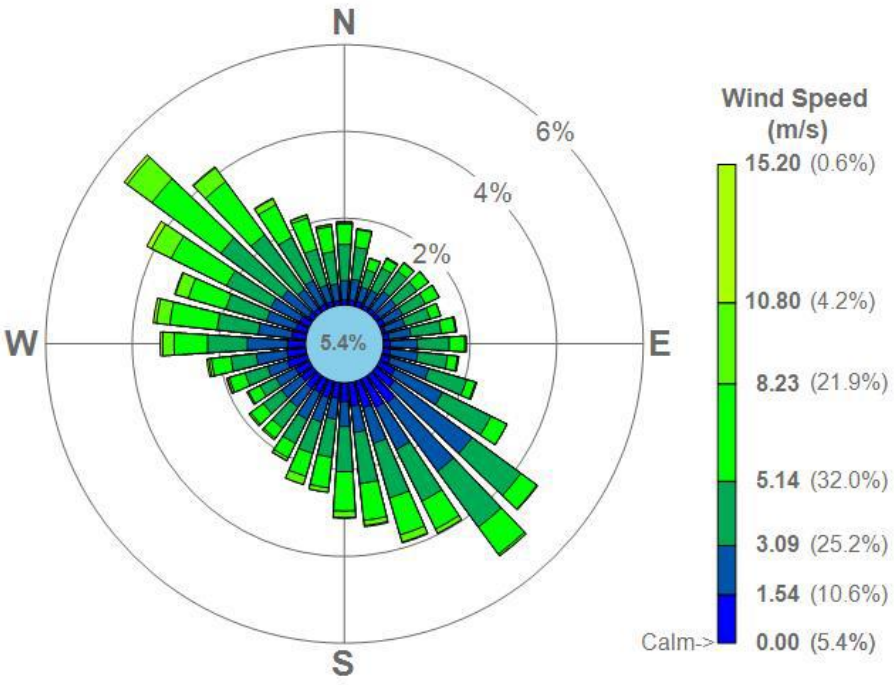
In Figure 11 below, generated by the EPA, the location of these NWS stations are shown relative to the area of analysis.

Figure 11. Area of Analysis and the NWS stations in the Louisa County Area



As part of its recommendation, the state provided the 3-year surface wind rose for the KIOW NWS station. In Figure 12, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing from. The wind direction at the KIOW NWS station has a predominate southeast and northwest component and wind speeds are less than 3 m/s (~7 mph) on 25% of the hours.

Figure 12. Iowa City, IA Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air NWS 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 section 8.3 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models", in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

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 KIOW NWS station, 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 threshold was specifically applied to the 1-minute wind data.

The EPA believes the NWS stations used are representative for the meteorological conditions near the Louisa facility. Overall, the methodology used by the state to process the meteorological data for input in AERMOD follows EPA guidance (e.g., use of AERSURFACE, AERMINUTE, etc.).

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

The terrain in the area of analysis is best described as flat to gently rolling. 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 Dataset data for Louisa and surrounding counties and is based on North American Datum 1983 (NAD83).

The EPA agrees with treatment of terrain within AERMOD for the Louisa County area and finds it followed established guidance for terrain processing.

4.3.2.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the state used a tier 1 approach. Iowa used the Keosauqua Lake Sugema monitor in Van Buren County, Iowa (AQS site ID # 191770006). The Lake Sugema monitor is approximately 100 km to the southwest of the Louisa facility. The single value of the background concentration for this area of analysis was determined by the state to be 7 micrograms per cubic meter ($\mu g/m^3$), equivalent to 2.7 ppb when expressed in two significant figures,[12] and that value was incorporated into the final AERMOD results.

The area around the Lake Sugema monitor contains only smaller SO_2 emission sources. Iowa included all large SO_2 emission sources in the modeling analysis and therefore, the EPA believes that the background concentration is acceptable for the Louisa County area.

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

4.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Louisa County area of analysis are summarized below in Table 7.

Table 7: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Louisa Station Area

Input Parameter	Value
AERMOD Version	15181 (default options)
Dispersion Characteristics	Rural
Modeled Sources	74
Modeled Stacks	70
Modeled Structures	43
Modeled Fencelines	4
Total receptors	9,141
Emissions Type	Mixed actual and allowable
Emissions Years	2012-2014 for actual emissions. PTE limits were effective on various dates.
Meteorology Years	2012 – 2014
NWS Station for Surface Meteorology	Iowa City, IA NWS
NWS Station Upper Air Meteorology	Davenport, IA NWS
NWS Station for Calculating Surface Characteristics	Iowa City, IA NWS
Methodology for Calculating Background SO_2 Concentration	AQS site ID # 191770006, Lake Sugema, Tier 1 based on 2012 – 2014 design value
Calculated Background SO_2 Concentration	7 µg/m^3

The results presented below in Table 8 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

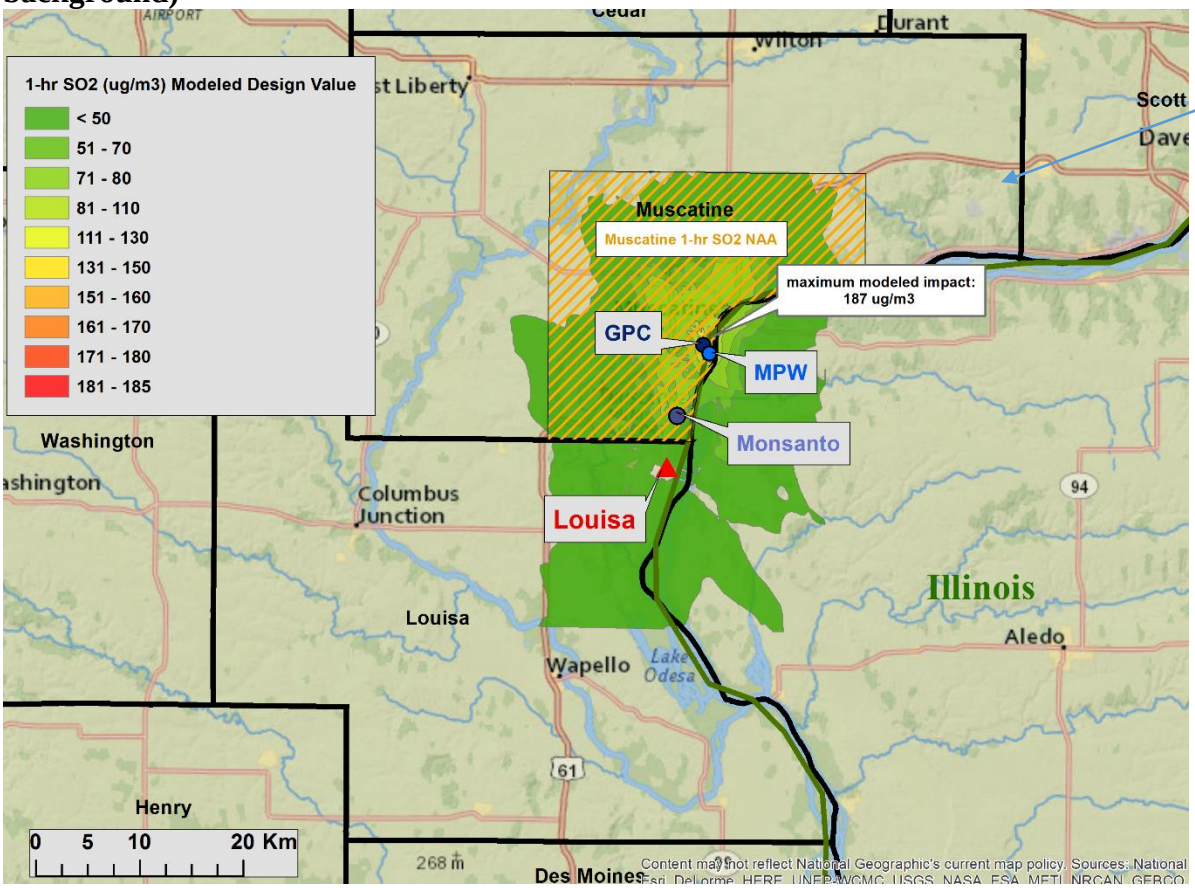
Table 8. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Area of Analysis for the Louisa County Area

Averaging Period	Data Period	Receptor Location UTM zone 15		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM	UTM	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012 – 2014	662219 E	4585008 N	194	196.4*

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

The state's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 194 $\mu g/m^3$, equivalent to 74.1 ppb. This modeled concentration included the background concentration of SO_2, and is based on a mixture of actual and PTE emissions from the facilities. Figure 13 below was included as part of the state's recommendation, and indicates that the predicted value occurred in Muscatine County near the GPC facility. Modeled concentrations in Louisa County are less than 85 $\mu g/m^3$.

Figure 13. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Area of Analysis for the Louisa County Area (not including background)



The modeling submitted by the state indicates that the 1-hour SO_2 NAAQS is being met in Louisa County and the receptor with the highest modeled concentration is in an adjacent county.

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

The modeling analysis mostly followed the EPA's Modeling TAD and is acceptable to rely upon to inform us in making a designation for Louisa County. The Louisa facility was modeled at its current federally enforceable and effective permitted allowable emissions, and the nearby sources, which all reside in the current Muscatine NAA, were modeled at permitted allowables that were included in Iowa's submitted nonattainment plan except for the main Monsanto boiler, which was modeled at actual emissions. The greatest modeled impacts from all combined sources occurred in the Muscatine nonattainment area, while modeled impacts in Louisa County were less than 50% of the NAAQS even with the conservative use of allowable emissions for the MidAmerican Louisa facility.

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

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

4.5. Jurisdictional Boundaries in Louisa County

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for the Louisa County area. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

The state recommended the Louisa County borders as the jurisdictional boundary for this designation. Iowa supported this recommendation by stating that the modeling results predict that neither the SO_2 emissions from Louisa, nor emissions from the sources in the Muscatine County nonattainment area, will cause or contribute to a violation of the 1-hour SO_2 NAAQS in Louisa County. Iowa further asserted that the county boundary provides a clearly defined legal boundary for carrying out the air quality planning and enforcement functions for the area.

4.6. Other Information Relevant to the Designations for the Louisa County Area

The MidAmerican Louisa facility is near the portion of Muscatine County that is designated nonattainment. However, the state has demonstrated and the EPA agrees that the MidAmerican – Louisa facility does not have a significant contribution to the violating monitor.

The EPA's Assessment of the Available Information for the Louisa County The modeling analysis submitted by the state generally follows the procedures contained in the EPA's Modeling TAD. The EPA has determined that this modeling analysis does indicate that the area in Louisa County around the Louisa facility is meeting the NAAQS.

Iowa has developed and submitted to the EPA for approval, on May 26, 2016, an attainment plan for Muscatine County. The attainment plan included a modeling screening analysis which indicated that Louisa Generating Station's actual emissions from 2011-2013 contributed to 2.7% of predicted exceedances during the screening period, with a maximum contribution of 59 $\mu g/m^3$ to at least one predicted modeled exceedance of the NAAQS. The most prevalent contributors to predicted exceedances of the SO_2 NAAQS were GPC (100% of exceedances) and MPW (26% of exceedances), with Monsanto also showing contribution (0.4% of exceedances).

The control strategy portion of the attainment plan included new limits, implemented through state construction permits, on 52 emissions points at the GPC facility (with effective dates for 28 emissions points in 2015, 17 emissions points in 2016, and 7 emissions points in late 2017/early 2018), 4 emissions points at the MPW facility (with effective date of January 1, 2017), and 2 emissions points at the Monsanto facility (with effective date of May 2015).

There has not been an exceedance of the NAAQS at any of the Muscatine monitors since June 7, 2015, as a result of the controls that have already been implemented, and the 3-year design value at the end of 2017 will likely show attainment based on the controls that have already been implemented. The SO_2 emissions limits scheduled to be effective in the coming months will further ensure the area attains and maintains compliance with the NAAQS. The EPA signed a proposed action to approve Iowa's attainment plan on August 9, 2017. The proposed action is titled "Approval of Iowa's Air Quality Implementation Plan; Muscatine Sulfur Dioxide Nonattainment Area" and will be published in the Federal Register for a 30-day public comment period. This action will ensure the controls that have brought the nearby Muscatine area into attainment are federally enforceable.

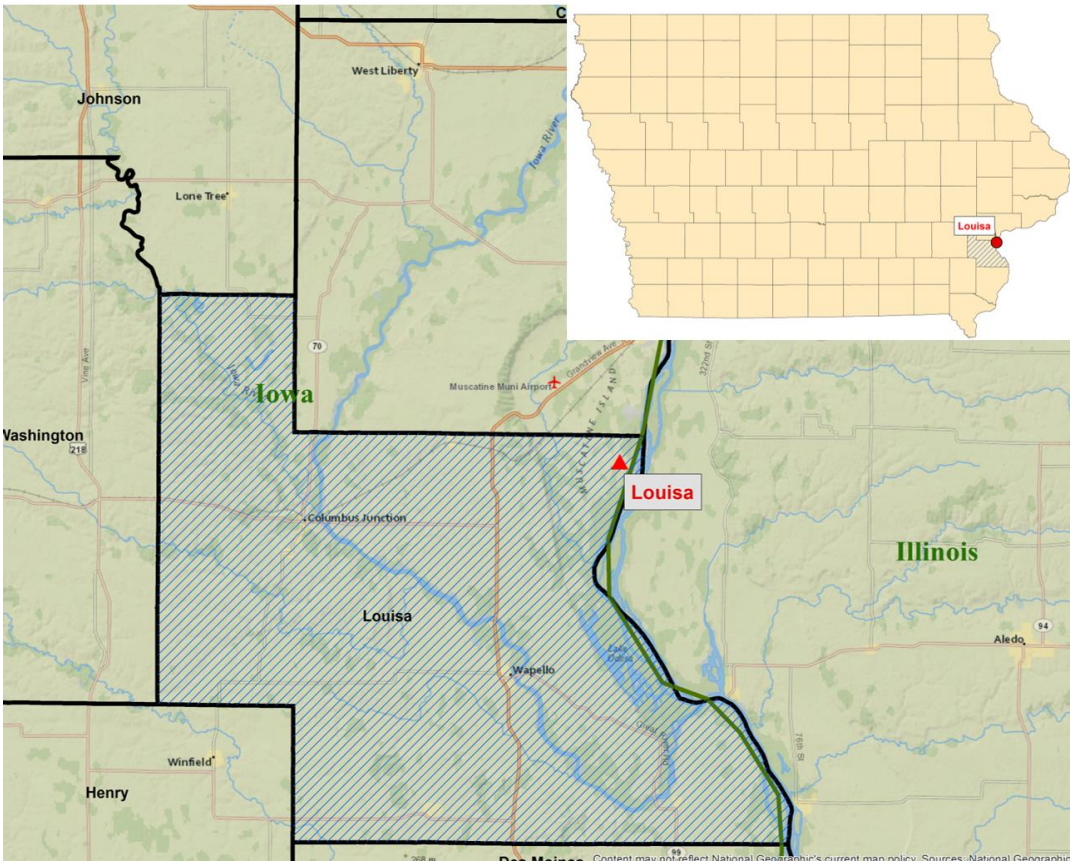
The attainment demonstration modeling for Muscatine shows attainment throughout the area, and accounts for SO_2 emissions from Louisa Generating Station at current permitted allowable levels. Accordingly, the EPA concludes that Louisa Generating Station does not contribute to any nearby area that does not meet the NAAQS. However, if there are any changes in the Muscatine area before the end of the year that indicate the area may not be in attainment with the NAAQS, a change to the intended designation for the area around LGS may be necessary.

The EPA believes that our intended unclassifiable/attainment area, bounded by the Louisa County borders, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

4.7. Summary of Our Intended Designation for the Louisa County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate Louisa County as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the intended unclassifiable/attainment area is comprised of the entirety of Louisa County. Figure 14 shows the boundary of this intended designated area.

Figure 14. Boundary of the Intended Unclassifiable/Attainment Area Consisting of the Entirety of Louisa County



5. Technical Analysis for the Pottawattamie County Area

5.1. Introduction

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

5.2. Air Quality Monitoring Data for the Pottawattamie County Area

This factor considers the SO_2 air quality monitoring data in Pottawattamie County. Although the state did not submit any monitoring data from any nearby monitor, the following monitors exist in the area:

- Air Quality System monitor AQS ID # 310550053 (Site Name Whitmore – Omaha). This monitor is located at 1616 Whitmore, Omaha, NE in Douglas County, and is 18 km to the northwest of the MidAmerican – Walter Scott facility. The Whitmore site, which is primarily impacted by the Omaha Public Power District (OPPD) – North Omaha Facility, is located 2 km to the southeast of OPPD. The design value of this monitor for the years 2014 – 2016 was 59 ppb, approximately 79% of the NAAQS. Although this value is below the NAAQS, the EPA does not have information that would indicate that this monitor is located in an area of expected maximum concentration for this area. Therefore, this monitor is not being used to inform our decision of whether the area is meeting or is not meeting the NAAQS.

- Air Quality System monitor AQS ID # 310550019 (Site Name Omaha NCore). This monitor is located at 4102 Woolworth Street, Omaha, NE in Douglas County, and is 14 km to the northwest of the MidAmerican – Walter Scott facility. The design value of this monitor for the years 2014 – 2016 was 27 ppb, approximately 38% of the NAAQS. Although this value is below the NAAQS, the EPA does not have information that would indicate that this monitor is located in an area of expected maximum concentration for this area. Therefore, this monitor is not being used to inform our decision of whether the area is meeting or is not meeting the NAAQS.

- Air Quality System monitor AQS ID # 310550057 (Site OPPD North Omaha Station). This monitor began operation on 1/1/2017 and is located approximately 1 km from OPPD North Omaha Station. It was sited following the procedures described in 1-hr SO_2 Monitoring TAD and will be used to characterize the air quality around OPPD North Omaha. The area around OPPD North Omaha will be designated by December 31, 2020.

5.3. Air Quality Modeling Analysis for the Pottawattamie County Area Addressing MidAmerican Energy – Walter Scott Jr. Energy Center

5.3.1. Introduction

This section 5.3 presents all the available air quality modeling information for a portion of Pottawattamie County that includes the MidAmerican Energy – Walter Scott facility. (This portion of Pottawattamie County will often be referred to as "the Pottawattamie County area" within this section 5.3). This area contains the following SO_2 sources, principally the source around which Iowa is required by the DRR to characterize SO_2 air quality:

- The MidAmerican – Walter Scott facility emitted more than 2,000 tons in 2014. Specifically, MidAmerican – Walter Scott emitted 13,749 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list and the state has chosen to characterize it via modeling.

- The Omaha Public Power District – North Omaha facility, located approximately 19 km to the northwest of Walter Scott, was on Nebraska's SO_2 DRR Source list since the facility emitted 11,245 tons of SO_2 in 2014. To ensure that the OPPD – North Omaha facility was not causing or contributing to violation of the NAAQS in the area around the MidAmerican – Walter Scott facility, the state included OPPD – North Omaha in the modeling analysis.

Because we have available results of air quality modeling in which these sources are modeled together, the area around the MidAmerican – Walter Scott is being addressed in this section with consideration given to the impacts of all these sources.

In its submission, Iowa recommended that an area that includes the area surrounding the MidAmerican – Walter Scott facility, specifically the entirety of Pottawattamie County, be designated as unclassifiable/attainment based in part on an assessment and characterization of air quality impacts from this facility and other nearby sources that may have a potential impact in the area where the 2010 SO_2 NAAQS may be exceeded. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing a mixture of actual and allowable emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA is modifying the state's recommendation for the area, and intends to designate the area as unclassifiable. Our reasoning for this conclusion is explained in section 5.7 of this TSD, after all the available information is presented.

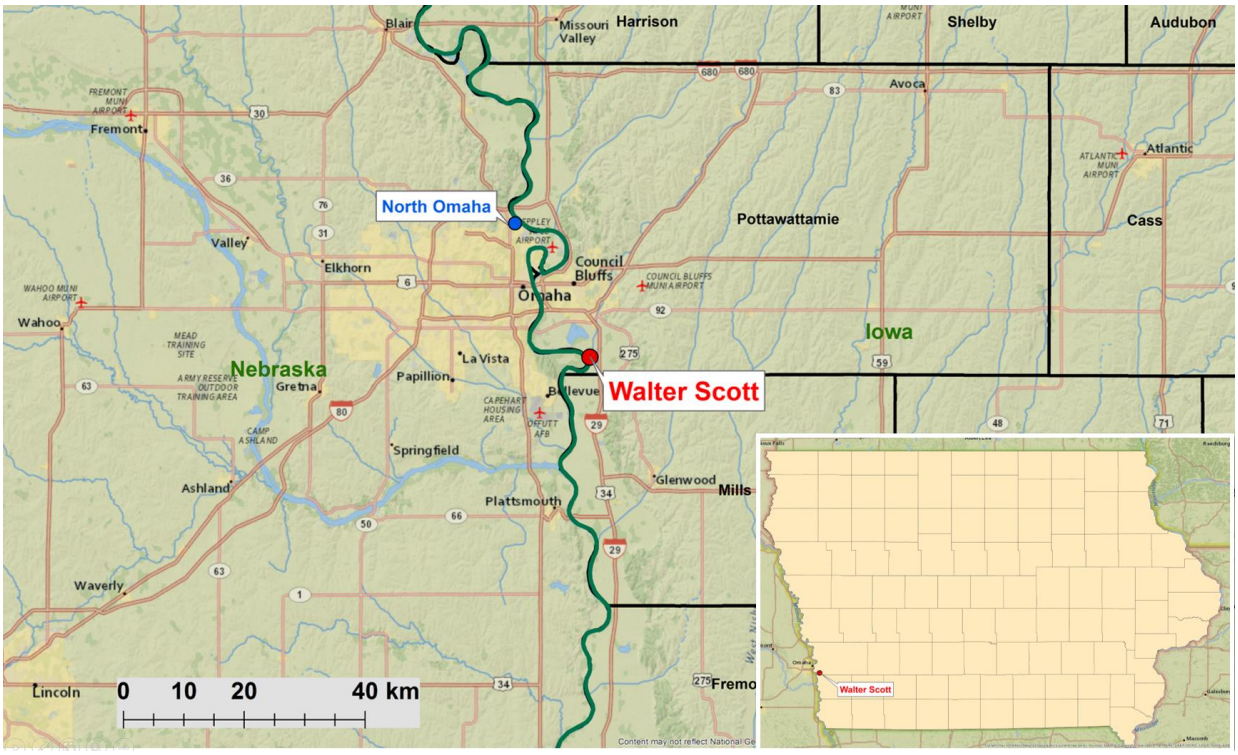
The area that the state has assessed via air quality modeling is located in west-central part of the state, along the Missouri River on the Iowa-Nebraska border.

As seen in Figure 15 below, the MidAmerican – Walter Scott facility is located within the Missouri River Valley approximately 5 km to the south-southwest of Council Bluffs, Iowa, and 10 km to the southeast of Omaha, Nebraska. As mentioned previously, the DRR source of OPPD – North Omaha was included as a nearby emitter in the modeling analysis. OPPD – North

Omaha is located in the northern portion of Omaha, Nebraska, about 19 km to the northwest of Walter Scott. No other nearby emitters of SO_2 were included in the modeling analysis.[13]

The state's recommended area for the unclassifiable/attainment designation is the entirety of Pottawattamie County. The EPA's intended unclassifiable area is also the entirety of Pottawattamie County.

Figure 15. Map of Pottawattamie County and Surrounding Areas Addressing MidAmerican Energy – Walter Scott. OPPD – North Omaha is indicated in blue.



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

For this area, the EPA received and considered one modeling assessment, which was submitted by the state.

[13] All other SO_2 emitters of 37 tpy or more (based on information in the Iowa and Nebraska emission inventories) are shown in Figure 15. If no sources not named previously are shown, there are no additional SO_2 emitters above this emission level in the vicinity of the named source(s).

5.3.2. Modeling Analysis Provided by the State

5.3.2.1. Model Selection and Modeling Components

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

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

The state used AERMOD version 15181, the most up-to-date version at the time the modeling analysis was conducted, using all regulatory default options. AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted here. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

5.3.2.2. Modeling Parameter: Rural or Urban Dispersion

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

For the purpose of performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in rural mode. The Guideline on Air Quality Models, Appendix W (November 2005) section 7.2.3 instructs users to define the urban or rural classification of the area considering land use and population density. The land use procedure in Appendix W section 7.2.3(c) classifies urban areas based on industrial, commercial, and residential land use over 50% within a 3 km radius of the source. The population density threshold of the 3 km radius surrounding each facility is compared to the urban threshold of 750 people per square kilometer. Both the land use and population density guidelines in Appendix W were used to assess the urban characteristics of the area and it was determined to be rural. The land-use within the 3 km radius around Water Scott is comprised primarily of the Missouri River bottom and contains farmland and very little residential or industrial land use types. Thus, the EPA agrees with the state that rural mode is appropriate for this analysis.

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

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

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Pottawattamie County area, the state has included one other emitter of SO_2 within 20 km of MidAmerican – Walter Scott in any direction. In addition to MidAmerican – Walter Scott, the other emitter of SO_2 included in the area of analysis is the OPPD North Omaha facility. No other sources beyond 20 km were determined by the state to have the potential to cause concentration gradient impacts within the area of analysis and the EPA agrees with the state's determination, as all other emitters of SO_2 within 20 km emitted below 37 tpy of SO_2 according to the EPA's 2011 National Emissions Inventory.

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

- 50 meters along the facility fence line
- 50 meters from the fence line to 0.5 km
- 100 meters extending from 0.5 km to 1.5 km
- 250 meters extending from 1.5 km to 3 km
- 500 meters extending from 3 km to 10 km

The state asserted it chose the 10-km grid based on the extent of modeled impacts associated with Walter Scott. The 10-km grid captures the maximum impacts from Walter Scott and the modeled concentrations are consistently decreasing as the edge of modeling domain is approached (*see* Figure 21). Because OPPD North Omaha impacts the 10-km area around Walter Scott, the state included OPPD North Omaha in its modeling analysis, but did not include receptors around OPPD North Omaha. The area surrounding DRR-subject OPPD North Omaha will be characterized through monitoring, and Nebraska has established a SO_2 monitoring network, in accordance with the EPA's Monitoring TAD, that began operation on 1/1/2017.

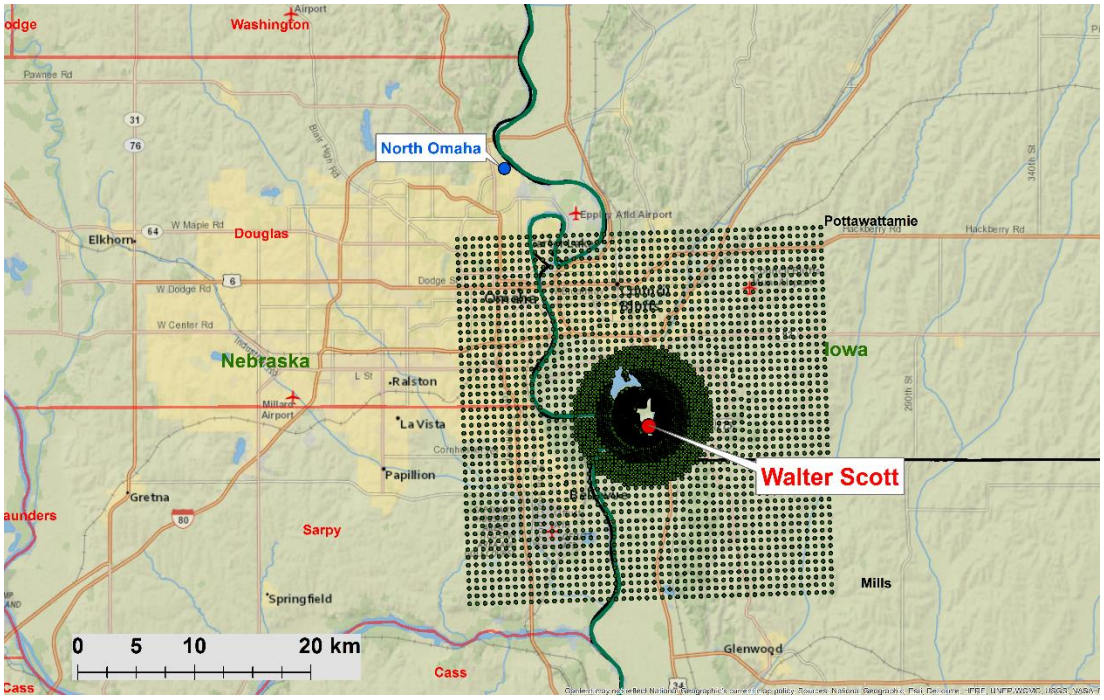
The receptor network contained 8,025 receptors, and the network covered a portion of southeastern of Pottawatomie County, Iowa, a portion of northwestern Mills County, Iowa, a portion of southeast Douglas County, Nebraska, and a portion of northeast Sarpy County, Nebraska.

Figure 16 show the state's chosen area of analysis surrounding the MidAmerican – Walter Scott facility, as well as the receptor grid for the area of analysis.

The state placed receptors for the purposes of this designation effort in locations that would be considered ambient air with the exception of locations described in section 4.2 of the Modeling

TAD as not being feasible locations for placing a monitor. For this modeling analysis, Iowa removed the receptors that would have been placed on the adjacent Missouri River, on the basis that it would be infeasible to place a monitor on a water body. Receptors were excluded within the Walter Scott property, which restricts public access via barbed wire fencing. Overall, the EPA finds the state modeling grid adequately followed the Modeling TAD for the state's chosen area of analysis for Pottawattamie County.

Figure 16. Area of Analysis and Receptor Grid for the Pottawattamie County Area



5.3.2.4. *Modeling Parameter: Source Characterization*

Section 6 of the Modeling TAD offers recommendations on source characterization including source types, use of accurate stack parameters, inclusion of building dimensions for building downwash (if warranted), and the use of actual stack heights with actual emissions or following GEP policy with allowable emissions.

As previously mentioned, the state explicitly modeled the Walter Scott facility along with all sources of SO_2 within 20 km of Walter Scott, including OPPD – North Omaha. The state characterized these sources within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, when modeling using actual emissions, the state used actual stack heights. When modeling using a permitted emission limit (e.g., Walter Scott Unit #4), the state followed the EPA's good engineering practices (GEP) policy. The state also adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPPRM was used to assist in addressing building downwash.

Based on review of the provided information, the EPA finds the state adequately characterized the modeled sources in the Pottawattamie County area of analysis.

5.3.2.5. Modeling Parameter: Emissions

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

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

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

As previously noted, the state included MidAmerican – Walter Scott and one other emitter of SO_2 within 20 km in the area of analysis. For this area of analysis, the state has opted to use a hybrid approach, where emissions from certain units are expressed as actual emissions, and those from other units are expressed as PTE rates. The facilities in the state's modeling analysis and their associated actual or PTE rates are summarized below.

For MidAmerican – Walter Scott Unit #3 and OPPD North Omaha Boilers #4 and #5, the state provided annual actual SO_2 emissions between 2012 – 2014. This information is summarized in Table 9. A description of how the state obtained hourly emission rates is given below this table.

Table 9. Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Area of Analysis for the Pottawattamie County Area

Facility Name	SO_2 Emissions (tpy)		
	2012	2013	2014
MidAmerican – Walter Scott Unit #3	9,335	9,043	9,107
OPPD North Omaha Boilers #4 and #5	6,087	6,136	5,605
Total Emissions from All Facilities in the Area of Analysis Modeled Based on Actual Emissions	15,422	15,179	14,712

For MidAmerican – Walter Scott Unit #3 and OPPD North Omaha Boilers #4 and #5, the actual hourly emissions data were obtained from CEMS.

For MidAmerican – Walter Scott Unit #4, the state provided PTE values. This information is summarized in Table 10. A description of how the state obtained hourly emission rates is given below this table.

Table 10. SO_2 Emissions based on PTE from Facilities in the Area of Analysis for the Pottawattamie County Area

Facility Name	SO_2 Emissions (tpy, based on PTE)
MidAmerican – Walter Scott Unit #4	3,362

The PTE in tons per year for MidAmerican – Walter Scott Unit #4 was determined by the state based on the current permit limit[14] of 0.1 lb/MMBtu for this unit. The 0.1 lb/MMBtu limit is a 30-day rolling average. The rated capacity of Unit #4 is 7,675 MMBtu/hr. Iowa determined the 1-hour emission rate used in the modeling analysis by following the procedures outlined in the EPA's "Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions" memorandum dated April 23, 2014, through the following process:

- Iowa evaluated existing continuous emission monitoring data for Unit #4 at Walter Scott to develop a ratio of 30-day rolling averages to hourly emissions. This ratio was developed using the 99th percentile of hourly emissions from the five-year dataset from 2010 to 2014 for Unit #4. The resulting ratio of 0.8436 was used to develop an hourly emission rate of 909.8 lb/hr using the current 30-day average permit limit (0.1 lb/MMBtu and the rated capacity of Unit #4 is 7,675 MMBtu/hr). This 1-hr emission rate was used in the modeling analysis.

In summary, the state, using a mixture of allowable and actual emissions for the Walter Scott facility and a nearby source, followed the Modeling TAD in developing the emissions inputs Pottawattamie County area of analysis.

[14] State of Iowa construction permit 03-A-425-P3 issued on May 24, 2007.

5.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

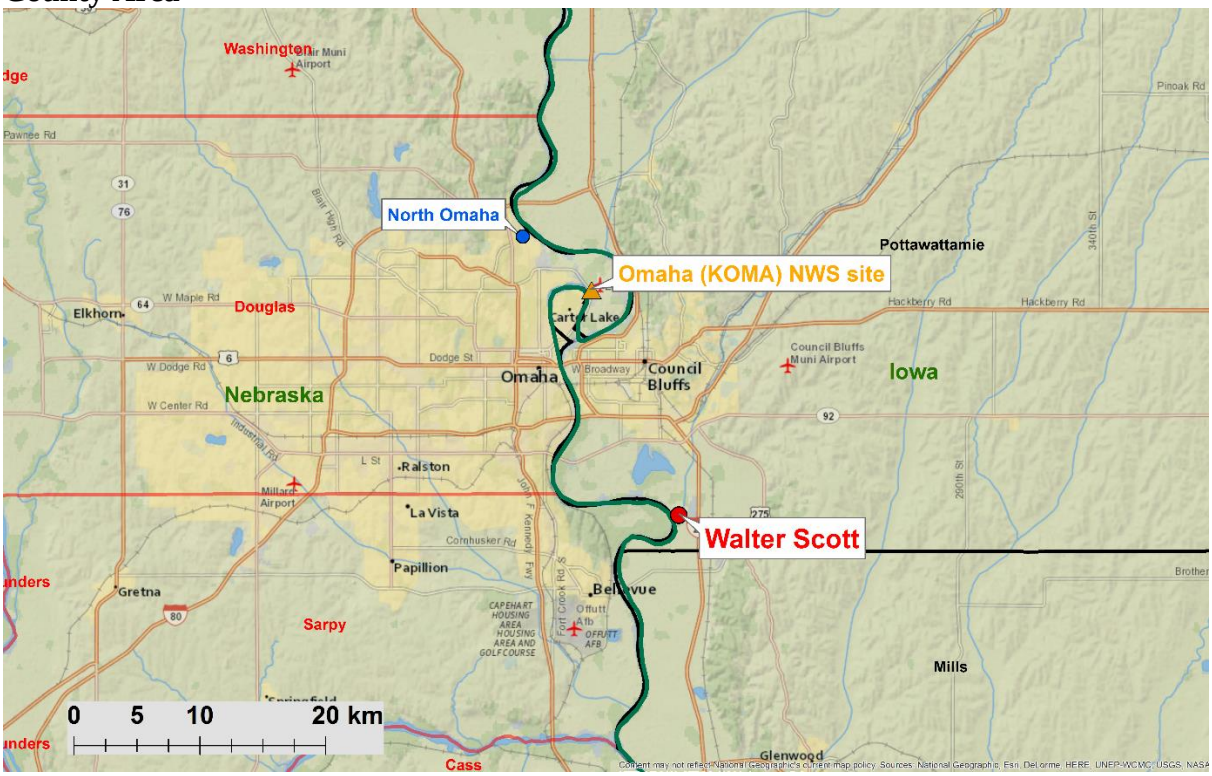
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of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

For the area of analysis for the Pottawattamie County area, the state selected the surface meteorology from the NWS station in Omaha, NE (KOMA) located at [41.31°N, 95.90°W], 16 km to the northwest of Walter Scott, and coincident upper air observations from the same NWS station as best representative of meteorological conditions within the area of analysis.

The state used AERSURFACE version 13016 using data from KOMA NWS station to estimate the surface characteristics of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "z_o" The state estimated surface roughness values for 12 spatial sectors out to 1 km at a monthly temporal resolution for dry, average, and wet surface moisture conditions. The output for the individual months from the three runs for moisture conditions are manually combined into one output file for each site based on the moisture conditions determined for each month.

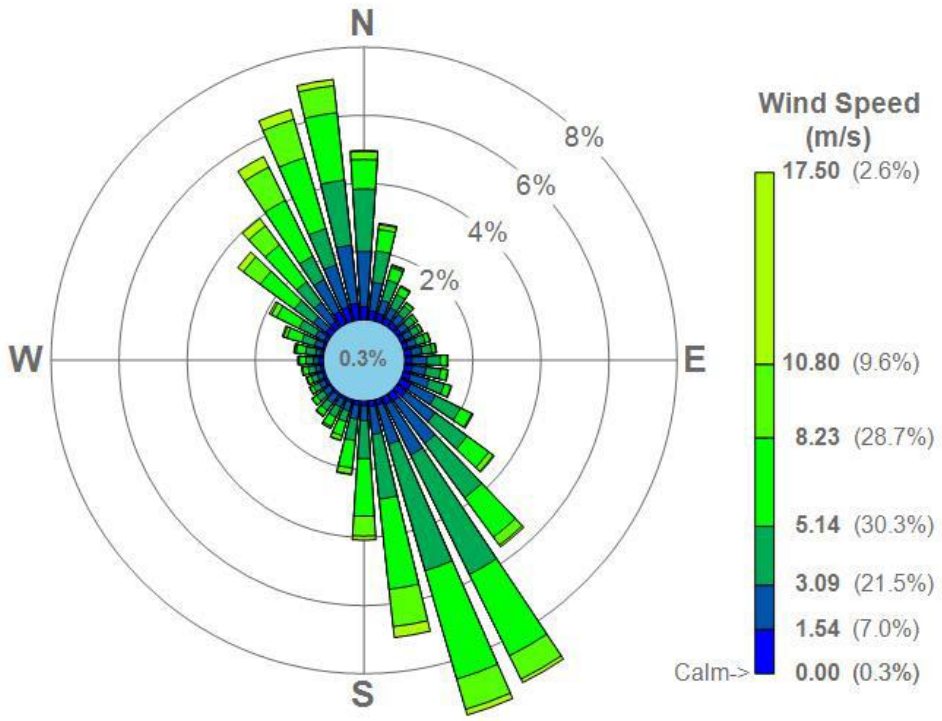
In Figure 17 below, generated by the EPA, the location of this NWS station is shown relative to the area of analysis.

Figure 17. Area of Analysis and the Omaha (KOMA) NWS station in the Pottawattamie County Area



As part of its recommendation, the state provided the 3-year surface wind rose for the NWS station in Omaha, NE. In Figure 18, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The wind direction at the KOMA NWS station has a predominate southeast and north-northwest component and wind speeds are less than 3 m/s (~7 mph) on 20% of the hours.

Figure 18. Omaha, Nebraska NWS Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air NWS station was 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 section 8.3 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models." in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

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 KOMA NWS station, 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 threshold was specifically applied to the 1-minute wind data.

The EPA believes the NWS station used is representative for the meteorological conditions near the Walter Scott facility. Overall, the methodology used by the state to process the meteorological data for input in AERMOD follows EPA guidance (e.g., use of AERSURFACE, AERMINUTE, etc.).

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

The terrain in the area of analysis is best described as flat within the Missouri River Valley with bluffs to the east and west of the river basin. 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 Dataset data for the counties in the area of analysis and is based on the North American Datum 1983 (NAD 83).

The EPA agrees with treatment of terrain within AERMOD for the Pottawattamie County area and finds it followed established guidance for terrain processing.

5.3.2.8. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the state used a tier 1 approach. Iowa used the Keosauqua Lake Sugema monitor in Van Buren County, Iowa (AQS site ID # 191770006). The Lake Sugema monitor is approximately 320 km to the east of the Pottawattamie County area. The single value of the background concentration for this area of analysis was determined by the state to be 7 micrograms per cubic meter ($\mu g/m^3$), equivalent to 2.7 ppb when expressed in two significant figures,[15] and that value was incorporated into the final AERMOD results.

The area around the Lake Sugema monitor contains only small SO_2 emission sources. Iowa included all large SO_2 emission sources in the modeling analysis and therefore, the EPA believes that the background concentration is acceptable for the Pottawattamie County area.

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

5.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Pottawattamie County area of analysis are summarized below in Table 11.

Table 11: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Pottawattamie County Area

Input Parameter	Value
AERMOD Version	15181 (default options)
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	5
Modeled Structures	99
Modeled Fencelines	1
Total receptors	8,025
Emissions Type	Mixed actual and allowable
Emissions Years	2012-2014 for actual emissions at Walter Scott Unit #4 and OPPD North Omaha Units #4 & #5. Permitted limit for Walter Scott Unit #3. Allowable emissions for OPPD North Omaha Units #1, #2, and #3 based on the shutdown of the units.
Meteorology Years	2012 – 2014
NWS Station for Surface Meteorology	Omaha, Nebraska NWS
NWS Station Upper Air Meteorology	Omaha, Nebraska NWS
NWS Station for Calculating Surface Characteristics	Omaha, Nebraska NWS
Methodology for Calculating Background SO_2 Concentration	AQS site ID # 191770006, Lake Sugema, Tier 1 based on 2012 – 2014 design value
Calculated Background SO_2 Concentration	7 µg/m^3

The results presented below in Table 12 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

Table 12. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Area of Analysis for the Pottawattamie County Area

Averaging Period	Data Period	Receptor Location UTM zone 14		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM	UTM	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012 – 2014	265500 E	4556000 N	134	196.4*

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

The state's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 134 $\mu g/m^3$, equivalent to 51.2 ppb. This modeled concentration included the background concentration of SO_2, and is based on a mixture of actual and PTE emissions from the facilities. Figure 19 below was included as part of the state's recommendation, and indicates that the predicted value occurred approximately 7 km to the southeast of the Walter Scott facility. The state's receptor grid is also shown in the figure. The modeling submitted by the state does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

The state provided model impacts for the individual Source Groups (OPPD North Omaha and Walter Scott) from AERMOD. Using the individual Source Groups form AERMOD, the EPA can assess the impacts from each source on the modeled design value.

Figure 20 shows OPPD North Omaha's predicted 99th percentile daily maximum 1-hour SO_2 concentrations averaged over 3 years on the Walter Scott modeling receptor grid. This indicates that the high modeled concentrations located in the northwest section of the modeling domain, shown in Figure 19, are attributable to emissions from OPPD North Omaha when the wind is blowing out of the northwest (from OPPD North Omaha to Walter Scott). Figure 20 also shows that the modeled area of maximum concentration (southeast of Walter Scott) is caused by the OPPD North Omaha plume hitting higher terrain along the Missouri River Valley.

Model results from the AERMOD Source Group that was specific to Walter Scott are shown in Figure 21. Walter Scott's greatest impacts are within 5 km of the facility and are decreasing as the modeling domain edge is approached. Walter Scott's impact on the northwest area of the modeling domain (i.e., when wind is blowing from Walter Scott to OPPD North Omaha) is greater than 40 $\mu g/m^3$. EPA notes that this result is with Walter Scott Unit #4 modeled conservatively using its permitted allowable rate and if actual emissions were modeled, Walter Scott's impact would likely diminish in the northwest portion of the modeling domain. The combination of both OPPD North Omaha and Walter Scott emissions that could potentially result in an exceedance would likely occur further to the north, downwind of both the OPPD North Omaha and Walter Scott and Walter Scott impacts would likely be less than 40 $\mu g/m^3$ and have a smaller concentration gradient. However, since the EPA was not provided a modeling analysis around the North Omaha facility, the EPA is unable to determine the expected SO_2 concentrations in that area and the impacts on that area from the Walter Scott facility.

Figure 19. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Area of Analysis for the Pottawattamie County Area (not including background)

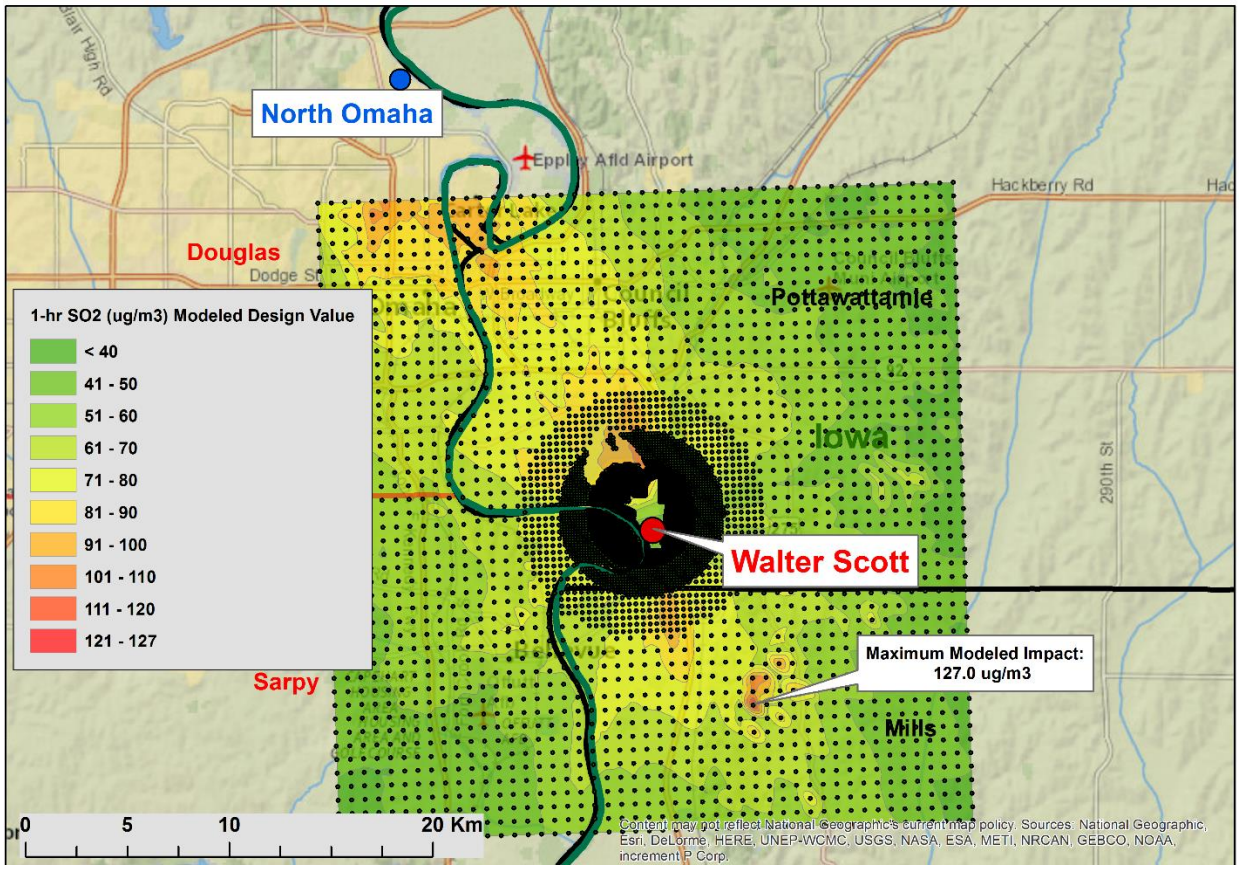


Figure 20. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years (not including background) Due to Emissions from OPPD North Omaha, in the Pottawattamie Modeling Receptor Grid

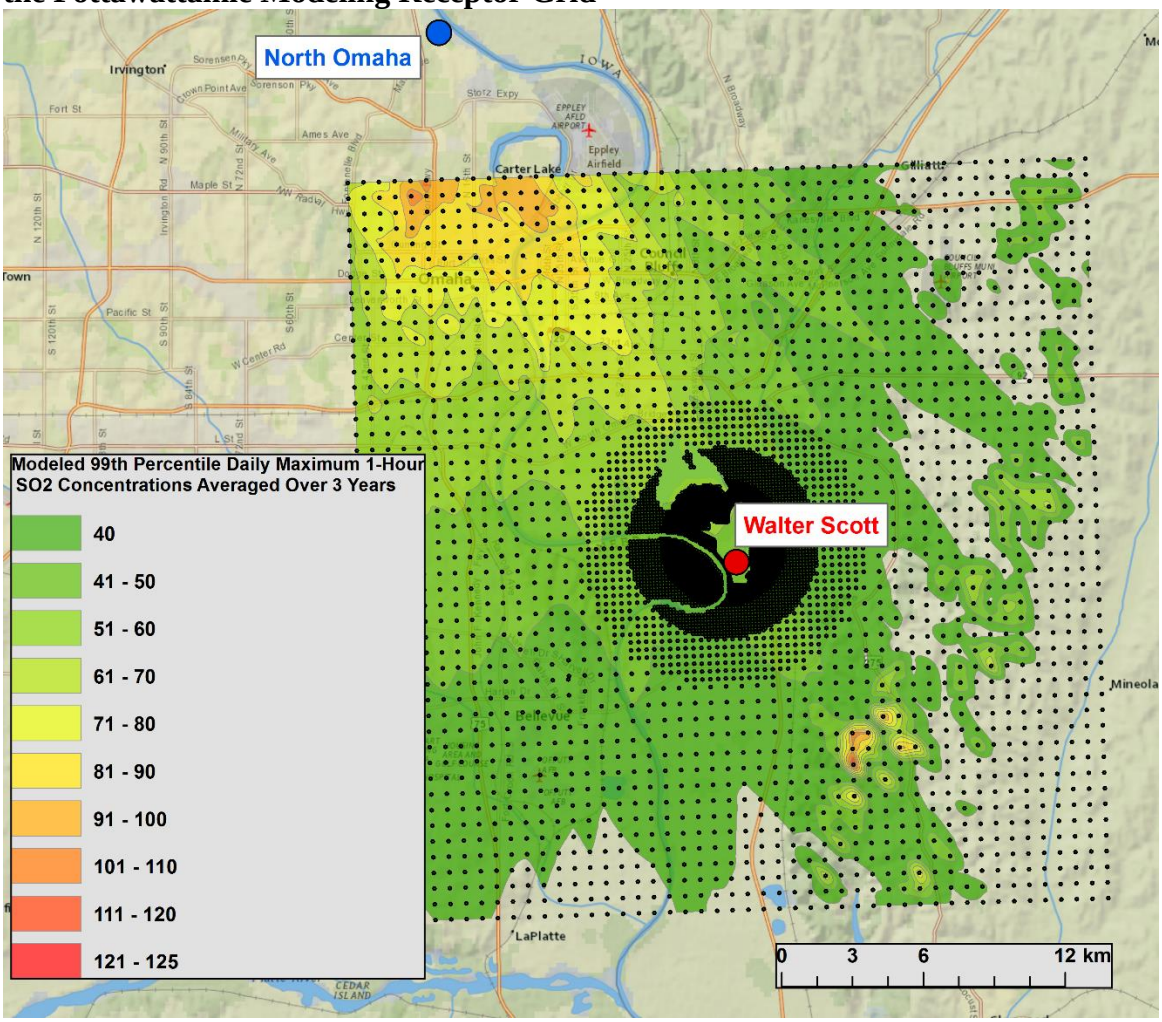
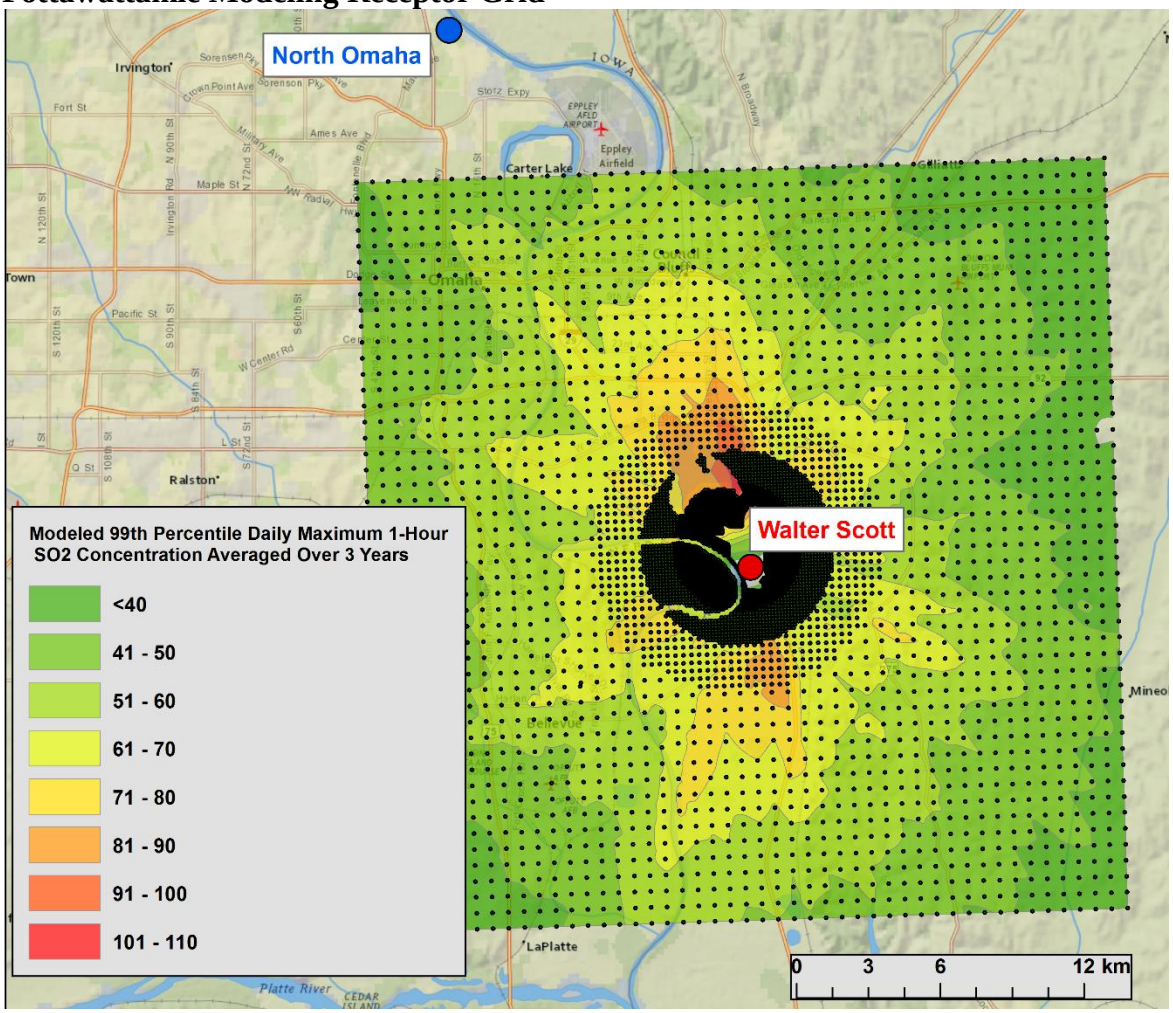


Figure 21. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years (not including background) Due to Emissions from Walter Scott, in the Pottawattamie Modeling Receptor Grid



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

The state's modeling analysis followed the EPA's Modeling TAD and is acceptable to rely upon to inform us as to whether there is a NAAQS violation in Pottawattamie County. The Walter Scott facility was modeled with a mixture of allowable and actual emissions, and the nearby source of OPPD North Omaha was modeled with actual emissions. The greatest modeled impacts occurred to the southeast of Walter Scott in Pottawattamie County, with the modeled 1-hr SO_2 design value of 134.0 $\mu g/m^3$ when the background value is included. However, as discussed in section 5.7, we do not consider the modeling to be sufficient to establish that sources in Pottawattamie County do not contribute to a violation in a nearby area in Nebraska.

5.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for Pottawattamie County

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

5.5. Jurisdictional Boundaries in Pottawattamie County

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for city/county/parish. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

Iowa selected the Pottawattamie County borders as providing a clearly defined legal boundary for carrying out the air quality planning and enforcement functions for the area. Based on these considerations the State is recommending that the entirety of Pottawattamie County be designated unclassifiable/attainment for the 1-hour SO_2 NAAQS.

5.6. Other Information Relevant to the Designations for Pottawattamie County

Three OPPD North Omaha coal-fired units (Units #1, #2 and #3) in Douglas County, Nebraska, were shut down in 2016. Since these units are no longer operating, no emissions from these units were considered in Iowa's modeling analysis. As mentioned previously, the two OPPD North Omaha coal-fired units (Units #4 and #5) that are currently operating were modeled at actual emissions. Nebraska has chosen to install a new monitoring site to characterize the air quality around OPPD North Omaha. The area around OPPD North Omaha will be designated by December 31, 2020.

5.7. The EPA's Assessment of the Available Information for Pottawattamie County

The modeling analysis submitted by Iowa generally follows the procedures contained in the EPA's Modeling TAD. The modeling results provided by Iowa predict that there is no violation of the 1-hour SO_2 NAAQS in the area in Pottawattamie County surrounding Walter Scott. The EPA has determined that this modeling analysis does indicate that the area around the MidAmerican – Walter Scott facility is meeting the NAAQS.

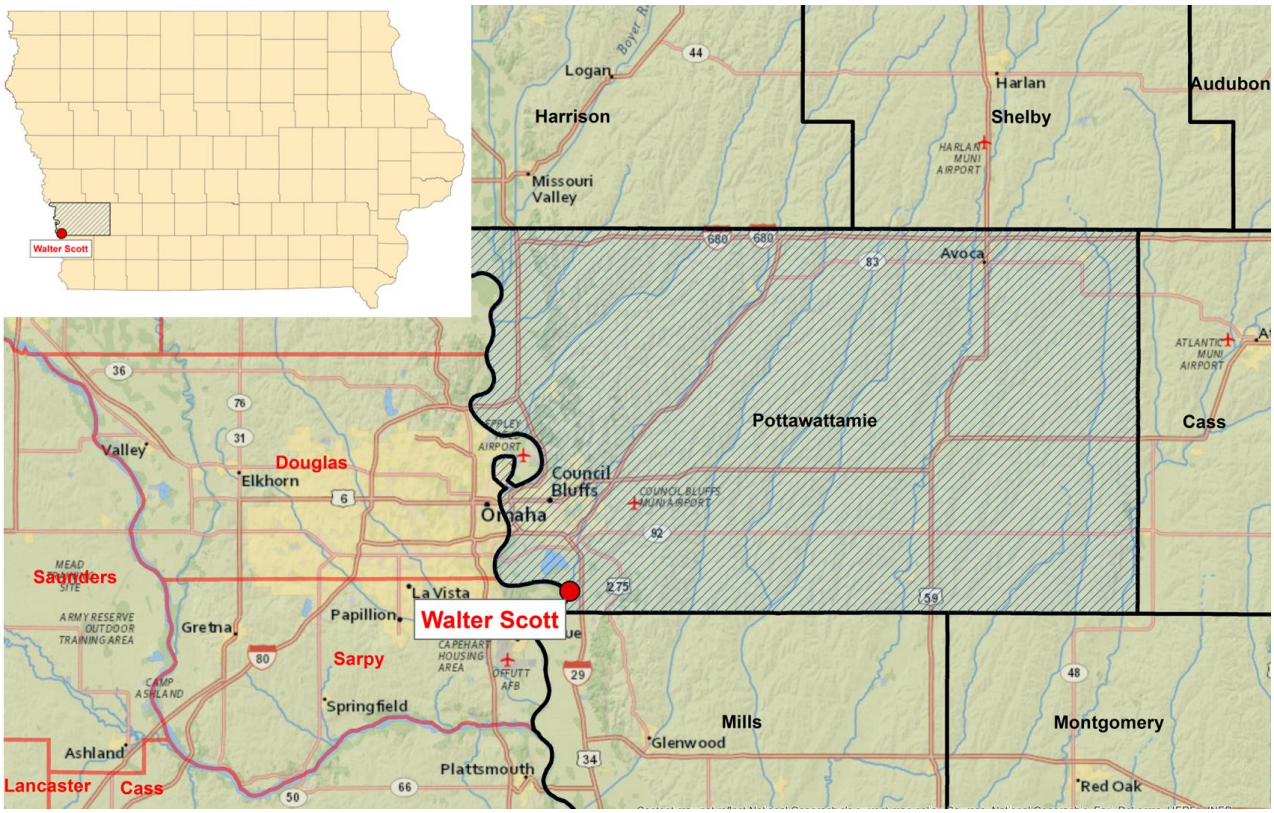
However, the Walter Scott facility is close to another source located nearby in Nebraska for which the state of Nebraska chose to characterize using ambient monitoring and for which designations will not be completed at this time (will occur by December 31, 2020). As described above, the EPA cannot determine at this time based on available information whether the area around Walter Scott is contributing to SO_2 air quality and, possibly, a violation of the SO_2 standard in the area around the North Omaha facility.

The EPA believes that our intended unclassifiable area, bounded by the Pottawattamie County borders, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area.

5.8. Summary of Our Intended Designation for Pottawattamie County

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to modify the state's recommendation and to designate Pottawattamie County as unclassifiable for the 2010 SO_2 NAAQS because the area was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS. Specifically, the boundaries are comprised of the boundaries of Pottawattamie County. Figure 22 shows the boundary of this intended designated area.

Figure 22. Boundary of the Intended Pottawattamie County Unclassifiable Area



.

6. Technical Analysis for All Other Counties in Iowa

6.1. Introduction

The state has not installed and begun operation of a new, approved SO_2 monitoring network meeting EPA specifications referenced in the EPA's DRR for any sources of SO_2 emissions in the counties and portions of counties identified in Table 13. Accordingly, the EPA must designate these counties by December 31, 2017. At this time, there are no air quality modeling results available to the EPA for these counties and portions of counties. In addition, there is no air quality monitoring data that indicate any violation of the 1-hour SO_2 NAAQS. The EPA is designating the counties and portions of counties in Table 13 in the state as separate "unclassifiable/attainment" areas since these counties were not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

Table 13. Counties and Portions of Counties that the EPA Intends to Designate Unclassifiable/Attainment

County or Partial County (p)	Iowa's Recommended Area Definition	Iowa's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Adair	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Adams	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Allamakee	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Appanoose	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Audubon	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Benton	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Black Hawk	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Boone	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Bremer	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Buchanan	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Buena Vista	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment

County or Partial County (p)	Iowa's Recommended Area Definition	Iowa's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Butler	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Calhoun	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Carroll	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Cass	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Cedar	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Cerro Gordo	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Cherokee	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Chickasaw	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Clarke	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Clay	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Clayton	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Clinton	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Crawford	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Dallas	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Davis	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Decatur	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Delaware	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Dickinson	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Dubuque	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Emmet	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Fayette	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment

County or Partial County (p)	Iowa's Recommended Area Definition	Iowa's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Floyd	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Franklin	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Fremont	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Greene	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Grundy	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Guthrie	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Hamilton	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Hancock	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Hardin	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Harrison	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Henry	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Howard	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Humboldt	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Ida	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Iowa	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Jackson	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Jasper	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Jefferson	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Johnson	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Jones	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Keokuk	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment

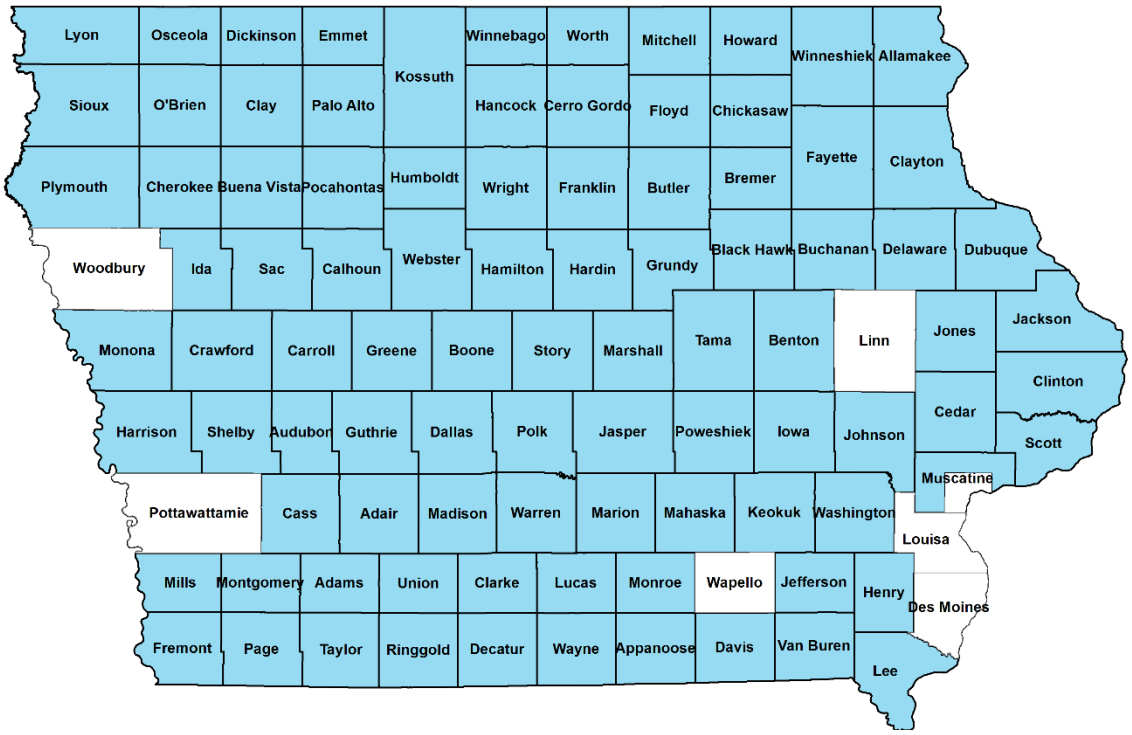
County or Partial County (p)	Iowa's Recommended Area Definition	Iowa's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Kossuth	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Lee	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Lucas	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Lyon	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Madison	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Mahaska	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Marion	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Marshall	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Mills	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Mitchell	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Monona	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Monroe	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Montgomery	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Muscatine (p)	Portion not previously designated	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
O'Brien	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Osceola	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Page	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Palo Alto	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Plymouth	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Pocahontas	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Polk	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment

County or Partial County (p)	Iowa's Recommended Area Definition	Iowa's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Poweshiek	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Ringgold	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Sac	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Scott	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Shelby	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Sioux	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Story	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Tama	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Taylor	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Union	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Van Buren	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Warren	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Washington	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Wayne	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Webster	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Winnebago	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Winneshiek	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Worth	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment
Wright	Entire County	Unclassifiable/ Attainment	Same as state's	Unclassifiable/ Attainment

Table 13 also summarizes Iowa's recommendations for these areas. Specifically, the state recommended that counties listed in the table, be designated as separate unclassifiable/attainment areas. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees with the state's recommendation for these areas, and intends to designate

the areas as separate unclassifiable/attainment areas. Figure 21 shows the locations of these areas within Iowa (areas shaded in blue).

Figure 23. The EPA's Intended Unclassifiable/Attainment Designations for Counties in Iowa Based on Absence of Information



6.2. Air Quality Monitoring Data for All Other Counties in Iowa

The following AQS monitors were located in Iowa and have sufficient valid data for 2014-2016 that indicate that there was no violation of the 2010 SO_2 NAAQS at the monitoring site in that period: Chancy Park (AQS #190450019, Clinton, Clinton County); Health Department (AQS #191530030, Des Moines, Polk County); Jefferson School (AQS #191630015, Davenport, Scott County); Lake Sugema (AQS #191770006, Van Buren County); and George Neal North (AQS #191930020, Sergeant Bluff, Woodbury County). These data were available to EPA for consideration in the designations process, however, since it is unclear if these monitors are located in areas of maximum concentration, it is unclear if the data are representative of the area's actual air quality.

6.3. Jurisdictional Boundaries for All Other Counties in Iowa

Existing jurisdictional boundaries are considered for the purpose of informing the EPA's designation action for all other counties in Iowa. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

The state's recommended boundaries for its unclassifiable/attainment recommended designations are listed in Table 13.

6.4. The EPA's Assessment of the Available Information for All Other Counties in Iowa

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the areas in the above Table 13 as unclassifiable/attainment for the 2010 SO_2 NAAQS.

Our intended unclassifiable/attainment areas, bounded by the associated county boundaries except as noted in Table 13 for Muscatine County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

As these areas were not required to be characterized, the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that these areas may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

6.5. Summary of Our Intended Designation for All Other Counties in Iowa

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the areas listed in Table 13 as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entire county except as noted in Table 13 for Muscatine County.

Figure 23 above shows the location of these areas within Iowa.

For all areas listed in Table 13, the boundary of the unclassifiable/attainment area is the county boundary. The boundary for the exception to this is described below.

Figure 24 shows the boundary of intended Muscatine County unclassifiable/attainment area (shaded in green).

Figure 24. Boundary of the Intended Partial Muscatine County (shaded in green) Unclassifiable/Attainment Area