Draft Technical Support Document

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

Summary

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

Kansas submitted updated recommendations on September 17, 2015, ahead of a July 2, 2016, deadline for the EPA to designate certain areas established by the U.S. District Court for the Northern District of California. This deadline is the first of three deadlines established by the court for the EPA to complete area designations for the 2010 SO_2 NAAQS. Table 1 below lists Kansas' recommendations and identifies the counties or portions of counties in Kansas that the EPA intends to designate by July 2, 2016 based on an assessment and characterization of air quality through ambient air quality data, air dispersion modeling, other evidence and supporting information, or a combination of the above.

Table 1: Kansas' Recommended and EPA's Intended Designations

Area	Kansas' Recommended Area Definition	Kansas' Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Linn County, Kansas	All of Linn County, Kansas	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Wyandotte County, Kansas	All of Wyandotte County, Kansas	Unclassifiable/ Attainment	Same as State's Recommendation	Unclassifiable
Shawnee County, Kansas	All of Shawnee County, Kansas	Unclassifiable	Same as State's Recommendation	Unclassifiable

Background

On June 3, 2010, the EPA revised the primary (health based) SO_2 NAAQS by establishing a new one-hour standard at a level of 75 parts per billion (ppb) which is attained when the three-year average of the 99th percentile of one-hour daily maximum concentrations does not exceed 75

ppb. This NAAQS was published in the Federal Register on June 22, 2010 (75 FR 35520) and is codified at 40 CFR 50.17. The EPA determined this is the level necessary to protect public health with an adequate margin of safety, especially for children, the elderly and those with asthma. These groups are particularly susceptible to the health effects associated with breathing SO_2. The two prior primary standards of 140 ppb evaluated over 24 hours, and 30 ppb evaluated over an entire year, codified at 40 CFR 50.4, remain applicable.[1] However, the EPA is not currently designating areas on the basis of either of these two primary standards. Similarly, the secondary standard for SO_2, set at 500 ppb evaluated over 3 hours has not been revised and the EPA is also not currently designating areas on the basis of the secondary standard.

General Approach and Schedule

Section 107(d) of the Clean Air Act requires that not later than one year after promulgation of a new or revised NAAQS, state governors must submit their recommendations for designations and boundaries to EPA. Section 107(d) also requires the EPA to provide notification to states no less than 120 days prior to promulgating an initial area designation that is a modification of a state's recommendation. If a state does not submit designation recommendations, the EPA will promulgate the designations that it deems appropriate. If a state or tribe disagrees with the EPA's intended designations, they are given an opportunity within the 120 day period to demonstrate why any proposed modification is inappropriate.

On August 5, 2013, the EPA published a final rule establishing air quality designations for 29 areas in the United States for the 2010 SO_2 NAAQS, based on recorded air quality monitoring data from 2009 - 2011 showing violations of the NAAQS (78 FR 47191). In that rulemaking, the EPA committed to address, in separate future actions, the designations for all other areas for which the Agency was not yet prepared to issue designations.

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

According to the court-ordered schedule, the EPA must complete the remaining designations by three specific deadlines. By no later than July 2, 2016 (16 months from the court's order), the EPA must designate two groups of areas: (1) areas that have newly monitored violations of the 2010 SO_2 NAAQS and (2) areas that contain any stationary sources that had not been announced as of March 2, 2015 for retirement and that according to the EPA's Air Markets Database

[1] 40 CFR 50.4(e) provides that the two prior primary NAAQS will no longer apply to an area one year after its designation under the 2010 NAAQS, except that for areas designated nonattainment under the prior NAAQS as of August 22, 2010, and areas not meeting the requirements of a SIP Call under the prior NAAQS, the prior NAAQS will apply until that area submits and EPA approves a SIP providing for attainment of the 2010 NAAQS. No Kansas areas were designated nonattainment for the prior NAAQS at the time of this designation.

emitted in 2012 either (i) more than 16,000 tons of SO_2 or (ii) more than 2,600 tons of SO_2 with an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). Specifically, a stationary source with a coal-fired unit that as of January 1, 2010 had a capacity of over 5 megawatts and otherwise meets the emissions criteria, is excluded from the July 2, 2016 deadline if it had announced through a company public announcement, public utilities commission filing, consent decree, public legal settlement, final state or federal permit filing, or other similar means of communication, by March 2, 2015, that it will cease burning coal at that unit.

The last two deadlines for completing remaining designations are December 31, 2017, and December 31, 2020. The EPA has separately promulgated requirements for states and other air agencies to provide additional monitoring or modeling information on a timetable consistent with these designation deadlines. We expect this information to become available in time to help inform these subsequent designations. These requirements were promulgated on August 21, 2015 (80 FR 51052), in a rule known as the SO_2 Data Requirements Rule (DRR).

Updated designations guidance was issued by the EPA through a March 20, 2015 memorandum from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Air Division Directors, U.S. EPA Regions I-X. This memorandum supersedes earlier designation guidance for the 2010 SO_2 NAAQS, issued on March 24, 2011, and it identifies factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO_2 NAAQS. The guidance also contains the factors the EPA intends to evaluate in determining the boundaries for all remaining areas in the country, consistent with the court's order and schedule. These factors include: 1) Air quality characterization via ambient monitoring or dispersion modeling results; 2) Emissions-related data; 3) Meteorology; 4) Geography and topography; and 5) Jurisdictional boundaries. This guidance was supplemented by two technical assistance documents intended to assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling or ambient air quality monitoring for sources that emit SO_2. Notably, the EPA released its most recent versions of documents titled, "SO_2 NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) and "SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document" (Monitoring TAD) in December 2013.

Based on ambient air quality data collected between 2012 and 2014, no violations of the 2010 SO_2 NAAQS have been recorded in any undesignated part of the state.[2] However, there are three sources in the state meeting the emissions criteria of the consent decree for which the EPA must complete designations by July 2, 2016. In this draft technical support document, the EPA

[2] For designations based on ambient air quality monitoring data that violates the 2010 SO_2 NAAQS, the consent decree directs the EPA to evaluate data collected between 2013 and 2015. Absent complete, quality assured and certified data for 2015, the analyses of applicable areas for the EPA's intended designations will be informed by data collected between 2012 and 2014. States with monitors that have recorded a violation of the 2010 SO_2 NAAQS during these years have the option of submitting complete, quality assured and certified data for calendar year 2015 by April 19, 2016 to the EPA for evaluation. If after our review, the ambient air quality data for the area indicates that no violation of the NAAQS occurred between 2013 and 2015, the consent decree does not obligate the EPA to complete the designation. Instead, we may designate the area and all other previously undesignated areas in the state on a schedule consistent with the prescribed timing of the court order, i.e., by December 31, 2017, or December 31, 2020.

discusses its review and technical analysis of Kansas' updated recommendations for the areas that we must designate. The EPA also discusses any intended modifications from the state's recommendation based on all available data before us.

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

1) 2010 SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 ppb, based on the three year average of the 99th percentile of the annual distribution of daily maximum one-hour average concentrations. See 40 CFR 50.17.
2) Design Value – a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the NAAQS.
3) Designated nonattainment area – an area which the EPA has determined has violated the 2010 SO_2 NAAQS or contributed to a violation in a nearby area. A nonattainment designation reflects considerations of state recommendations and all of the information discussed in this document. The EPA's decision is based on all available information including the most recent 3 years of air quality monitoring data, available modeling analysis, and any other relevant information.
4) Designated unclassifiable area – an area which the EPA cannot determine based on all available information whether or not it meets the 2010 SO_2 NAAQS.
5) Designated unclassifiable/attainment area – an area which the EPA has determined to have sufficient evidence to find either is attaining or is likely to be attaining the NAAQS. The EPA's decision is based on all available information including the most recent 3 years of air quality monitoring data, available modeling analysis, and any other relevant information.
6) Modeled violation – a violation based on air dispersion modeling.
7) Recommended attainment area – an area a state or tribe has recommended that the EPA designate as attainment.
8) Recommended nonattainment area – an area a state or tribe has recommended that the EPA designate as nonattainment.
9) Recommended unclassifiable area – an area a state or tribe has recommended that the EPA designate as unclassifiable.
10) Recommended unclassifiable/attainment area – an area a state or tribe has recommended that the EPA designate as unclassifiable/attainment.
11) Violating monitor – an ambient air monitor meeting all methods, quality assurance and siting criteria and requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.

Technical Analysis for the Linn County, Kansas Area

Proposed Designation Summary

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the area around the La Cygne Generating Station as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Linn County, Kansas.

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

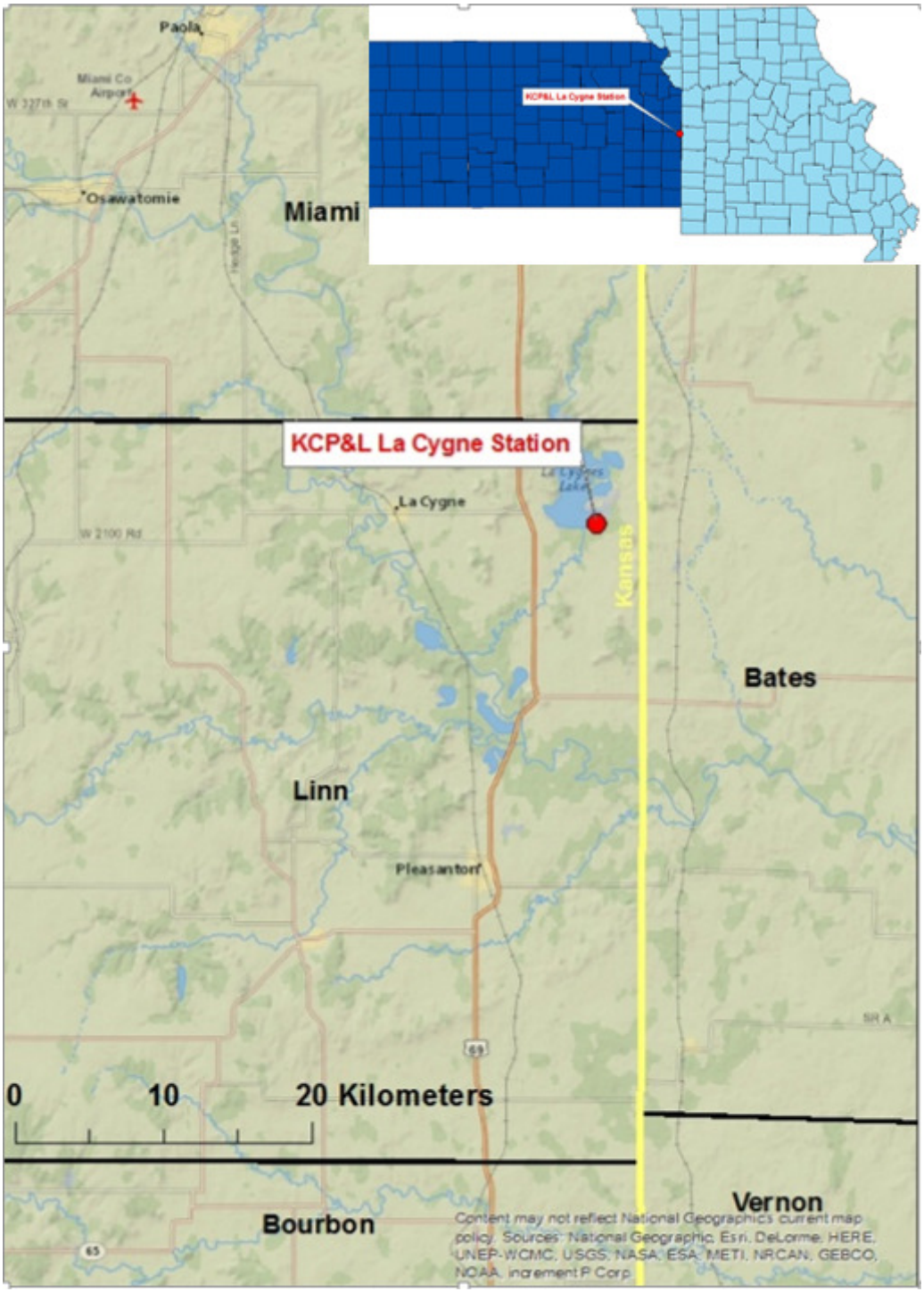
Introduction

The La Cygne, Kansas area contains a stationary source that according to the EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the Kansas City Power & Light's (KCP&L) La Cygne Generating Station emitted 16,235 tons of SO_2 and had an emissions rate of 0.36 lbs SO_2/mmBTU. Pursuant to the March 2, 2015 court-ordered schedule, the EPA must designate the area surrounding the facility by July 2, 2016.

In its submission, Kansas recommended that the area surrounding the La Cygne Generating Station be designated as attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing allowable emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees that the area is attaining the standard, and intends to designate Linn County as unclassifiable/attainment.

The La Cygne Generating Station is located in eastern Kansas in the eastern portion of Linn County near the Kansas-Missouri border. As seen in Figure 1 below, the facility is located approximately 8 km east of the city of La Cygne. The La Cygne Generating Station includes two boiler units and no other significant emitters of SO_2 are located nearby. Also included in the figure is the state's recommended area (the entirety of Linn County) for its attainment designation and the EPA's intended unclassifiable/attainment designation for the area.

Figure 1: The EPA's intended unclassifiable/attainment designation for Linn County, Kansas area, which includes the La Cygne Station. The La Cygne Generating Station is located in the eastern portion of Linn County, along the Kansas-Missouri border.



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

Detailed Assessment

Air Quality Data

This factor considers the SO_2 air quality monitoring data in the area surrounding the KCP&L La Cygne facility. Since no SO_2 ambient monitors are currently located in Linn County, no monitoring data was relied upon in EPA's proposed designation for this area. There was an attaining SO_2 monitor at Mine Creek in Linn County but this monitor was re-located in 2014.

Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. In some instances the recommended model may be a model other than AERMOD, such as the BLP model for buoyant line sources. The AERMOD modeling system contains the following components:

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

The state used AERMOD version 14134, which was the most recent version of AERMOD at the time, and a discussion of the individual components will be referenced in the corresponding discussion that follows, as appropriate.

Modeling Parameter: Rural or Urban Dispersion

The EPA's recommended procedure for characterizing an area by prevalent land use is based on evaluating the dispersion environment within 3 km of the facility. According to the EPA's modeling guidelines, rural dispersion coefficients are to be used in the dispersion modeling analysis if more than 50 percent of the area within a 3 km radius of the facility is classified as rural. Conversely, if more than 50 percent of the area is urban, urban dispersion coefficients should be used in the modeling analysis. When performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in rural mode. This rural determination was made based on the evaluation of the land use around the facility.

Modeling Parameter: Area of Analysis (Receptor Grid)

The EPA believes that a reasonable first step towards characterization of air quality in the area surrounding the La Cygne Generating Station is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations. For the La Cygne Generating Station area, the state has included no other emitters of SO_2 within 10 kilometers (km) of La Cygne Generating Station. EPA has verified there are no significant SO_2 sources within 50 km of La Cygne Generating Station. The state determined that this was the appropriate distance in order to adequately characterize air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. The grid receptor spacing for the area of analysis chosen by the state is as follows:

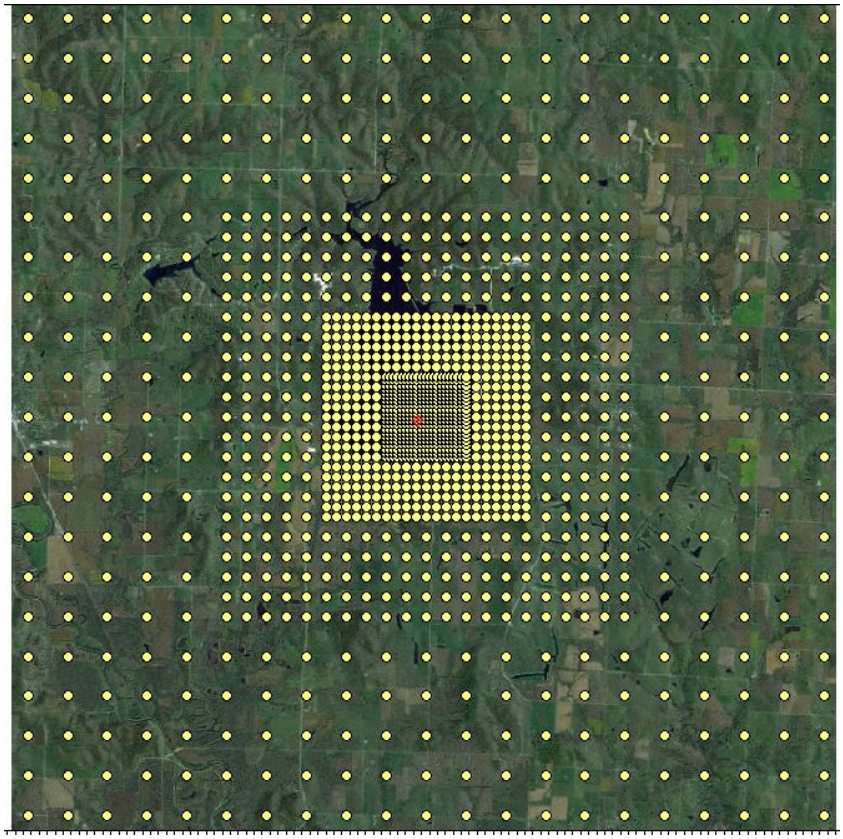
- 100 meter spacing from the facility center to 1 kilometer
- 250 meter spacing from 1 kilometers to 2.5 kilometers
- 500 meter spacing from 2.5 kilometers to 5 kilometers
- 1000 meter spacing from 5 kilometers to 10 kilometers

The receptor network contained 1,441 receptors and covered the eastern portion of Linn County in Kansas.

Figure 2 shows the chosen area of analysis surrounding the La Cygne Station, as well as receptor grid for the area of analysis.

Receptors for the purposes of this designation effort were placed in all areas including those areas where it would not be feasible to place a monitor. The impacts of the area's geography and topography will be discussed later within this document.

Figure 2: Receptor Grid for the La Cygne, Kansas Area of Analysis.



Modeling Parameter: Source Characterization

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

Modeling Parameter: Emissions

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

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information, when it is available, and that these data are available for many electric generating units. In the absence of CEMS data, the EPA's Modeling TAD

highly encourages the use of AERMOD's hourly varying emissions keyword HOUREMIS or through the use of AERMOD's variable emissions factors keyword EMISFACT. When choosing one of these methods, the EPA believes that detailed throughput, operating schedules, and emissions information from the impacted source should be used.

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

As previously noted, the state included the La Cygne Generating Station and no other emitters of SO_2 within 10 km in the area of analysis. This distance and these facilities were selected because the state believes that this area of analysis adequately represents the area where maximum concentrations of SO_2 are expected and adequately includes the sources which might contribute to those concentrations. No other sources beyond 10 km were determined by the state to have the potential to cause significant concentration gradients within the area of analysis. The state has chosen to model the facility using the most recent federally enforceable limits for SO_2. The facility in the state's area of analysis and their associated allowable rates are summarized below.

Table 2: SO_2 Emissions based on Allowable limits from Facilities in the La Cygne, Kansas Area of Analysis.

Facility Name	SO_2 Emissions (tons per year, based on allowables)
KCP&L La Cygne Generating Station Unit 1	7,796.4
KCP&L La Cygne Generating Station Unit 2	6,780.2
Total Emissions From All Facilities in the Area of Analysis	14,576.6

The emission limits for La Cygne Generating Station were based on the installation and upgrades to emission control equipment to comply with the Best Available Retrofit Technology (BART). The new SO_2 controls were operational at Unit 1 in 2015 and Unit 2 in 2014.

KDHE issued an air construction permit for La Cygne Generating Station[3] on May 17, 2011 that included 0.1 lb SO_2/mmBTU 30-day rolling average limits for both Unit 1 and Unit 2. KDHE calculated hourly SO_2 emission rates, on a 30-day rolling average, for each unit based on each units' capacity. The SO_2 permit limits were used to perform an evaluation of these 30-day rolling

[3] KDHE 1070005 KCP&L Stack replacement construction permit # C-9508

average limits to develop a critical 1-hour emission rate which would preserve the variability of the hour-to-hour emission profile with scrubber controls, yet be conservative so as to protect the ambient air quality standard for the attainment demonstration. KDHE used the EPA *Guidance for 1-Hour SO_2 Nonattainment Area State Implementation Plan Submissions* memorandum dated April 23, 2014, as guidance in establishing these critical 1-hour emission rates. Based on that guidance, KDHE used CEMS data for La Cygne Unit 1. For Unit 2, KDHE reviewed a similar KCP&L emission unit (KCP&L Iatan Unit 1) with similar control technology to establish an appropriate critical 1-hour emission rate.

The steps below outline the approach KDHE used to determine the ratio that was applied to the 30-day average emission limit:

1. Collect 5-years of suitable hourly CEMS data.
2. Calculate the 99th percentile 1-hr emission rate over the 5-year period.
3. Calculate the 99th percentile 30-day rolling average over the 5-year period.
4. Calculate the ratio of the 99th percentile 30-day rolling average from Step 3 to the 99th percentile 1-hr value calculated from Step 2.
5. Apply that calculated ratio to the La Cygne Unit 1 and Unit 2 30-day rolling average emission rate.

Based on the procedure outlined above, the ratios for Unit 1 and Unit 2 were approximately 0.522 and 0.475, respectively. The average of the two ratios, 0.497, was divided into the 30-day average rolling limits for Unit 1 and Unit 2 to compute the critical hourly SO_2 emission rates used in the modeling analysis. The critical hourly emission rates used in the modeling are shown in Table 3.

Table 3: Modeled SO_2 Emissions based on 30-day average emissions limits for Unit 1 and Unit 2 in the Linn County, Kansas Area of Analysis

Company ID	Unit Name	SO_2 Emissions (lb/hr), (based on 30-day emission limit variability analysis)
KCP&L	Unit 1	1,780
KCP&L	Unit 2	1,548

Modeling Parameter: Meteorology and Surface Characteristics

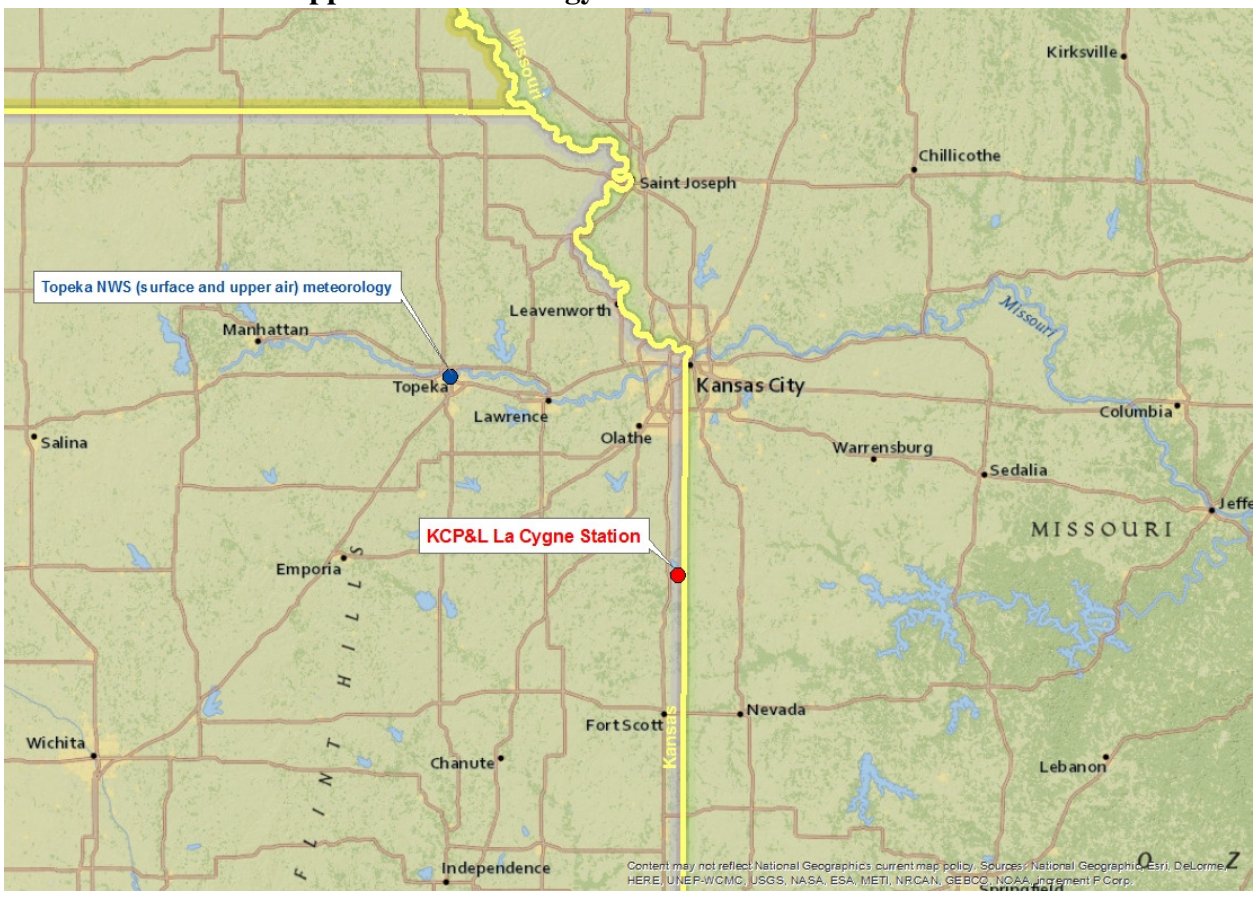
The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of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

data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

For the La Cygne Generating Station area of analysis, surface meteorology from Topeka, Kansas, approximately 160 km to the northwest, and coincident upper air observations from the NWS station in Topeka, Kansas were selected as best representative of meteorological conditions within the area of analysis. The location of the meteorological surface and upper air stations are shown in Figure 3.

The state used AERSURFACE version 13016 using data from the NWS station in Topeka, Kansas (located at 40.06N, 95.60W) to estimate the surface characteristics of the area of analysis. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as "Zo"). In Figure 3, the location of the Topeka, Kansas NWS station is shown relative to the La Cygne area of analysis.

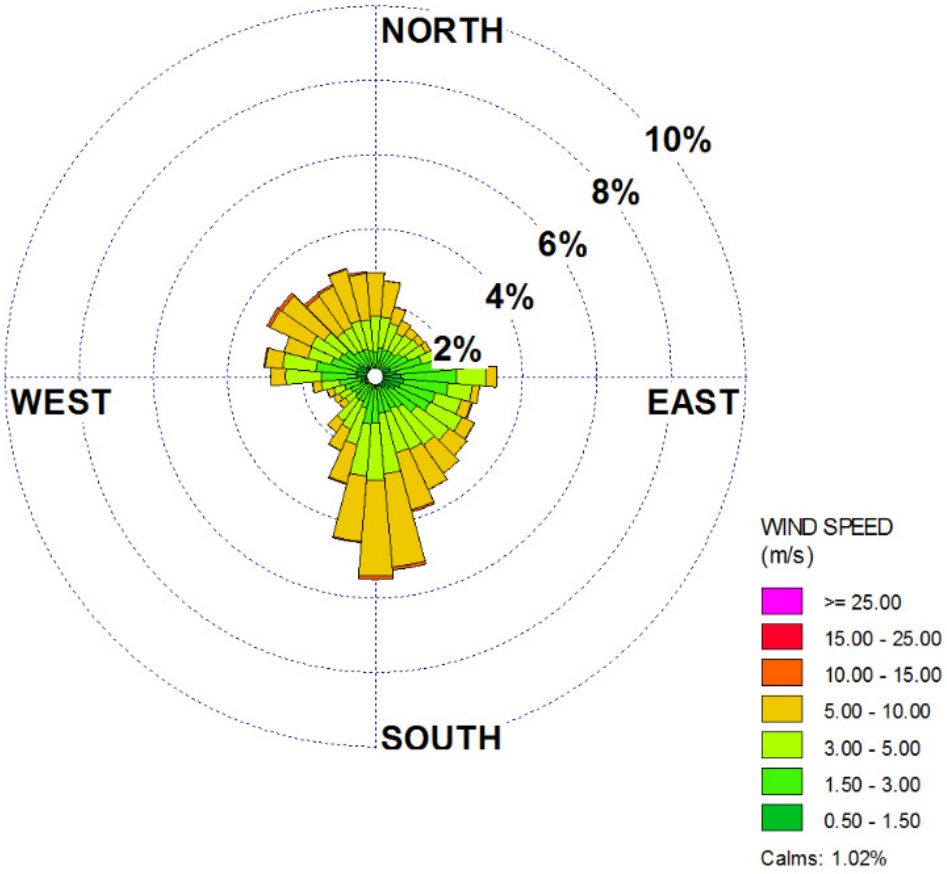
Figure 3: La Cygne Generating Station Area of Analysis and the Topeka, Kansas NWS site used for surface and upper air meteorology.



As part of its recommendation, the state provided the 3-year surface wind rose for Topeka, Kansas. In Figure 4, the frequency and magnitude of wind speed and direction are defined in

terms of from where the wind is blowing. Winds at the Topeka, Kansas location are most often out of the south but there is both a southeast and northwest component.

Figure 4: Topeka, Kansas Cumulative Annual Wind Rose for Years 2012 – 2014



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

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

be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the state set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. This approach is consistent with a March 2013 EPA memo titled, "Use of ASOS meteorological data in AERMOD dispersion Modeling." In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the one minute wind data.

Modeling Parameter: Geography and Terrain

The terrain in the area of analysis is best described as relatively flat. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the National Elevation Dataset (NED). The NED data available on-line in 1/3 arc-second spacing from the US Geological Survey was used in the modeling analysis.

Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For the La Cygne Generating Station area of analysis, the state used the "first tier" approach chose a background concentration to be 18.01 micrograms per cubic meter ($\mu g/m^3$), or 7 ppb,[4] and that value was incorporated into the final AERMOD results. The state indicated that this background concentration was the design value for the Mine Creek monitor for the period 2011-2013. The Mine Creek SO_2 monitor was located in Linn County, Kansas, on County Rd 1103, 0.7 miles south of Hwy K-52, approximately 32 km southwest of La Cygne Generating Station. This SO_2 monitor was relocated in 2014 to a location outside of Linn County.

Summary of Modeling Results

The AERMOD modeling parameters for the La Cygne Generating Station area of analysis are summarized below in Table 4.

Table 4: AERMOD Modeling Parameters for the La Cygne Generating Station Area of Analysis

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

La Cygne Area of Analysis	
AERMOD Version	14134
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	2
Modeled Structures	23
Modeled Fencelines	0
Total receptors	1,441
Emissions Type	Allowable
Emissions Years	Allowable
Meteorology Years	2012-2014
Surface Meteorology Station	Topeka, Kansas
Upper Air Meteorology Station	Topeka, Kansas
Methodology for Calculating Background SO_2 Concentration	1st tier
Calculated Background SO_2 Concentration	18.01 µg/m^3

The results presented below in Table 5 show the magnitude and geographic location of the highest predicted modeled concentration based on allowable emissions. Two modeling scenarios were modeled:

Scenario 1 – High Load -- High load emission rate, temperature and flow rate;

Scenario 2 – Low Load -- High load emission rate, low load temperature and flow rate (deemed "worst case")

Table 5: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the La Cygne Generating Station Area of Analysis Based on Allowable Emissions

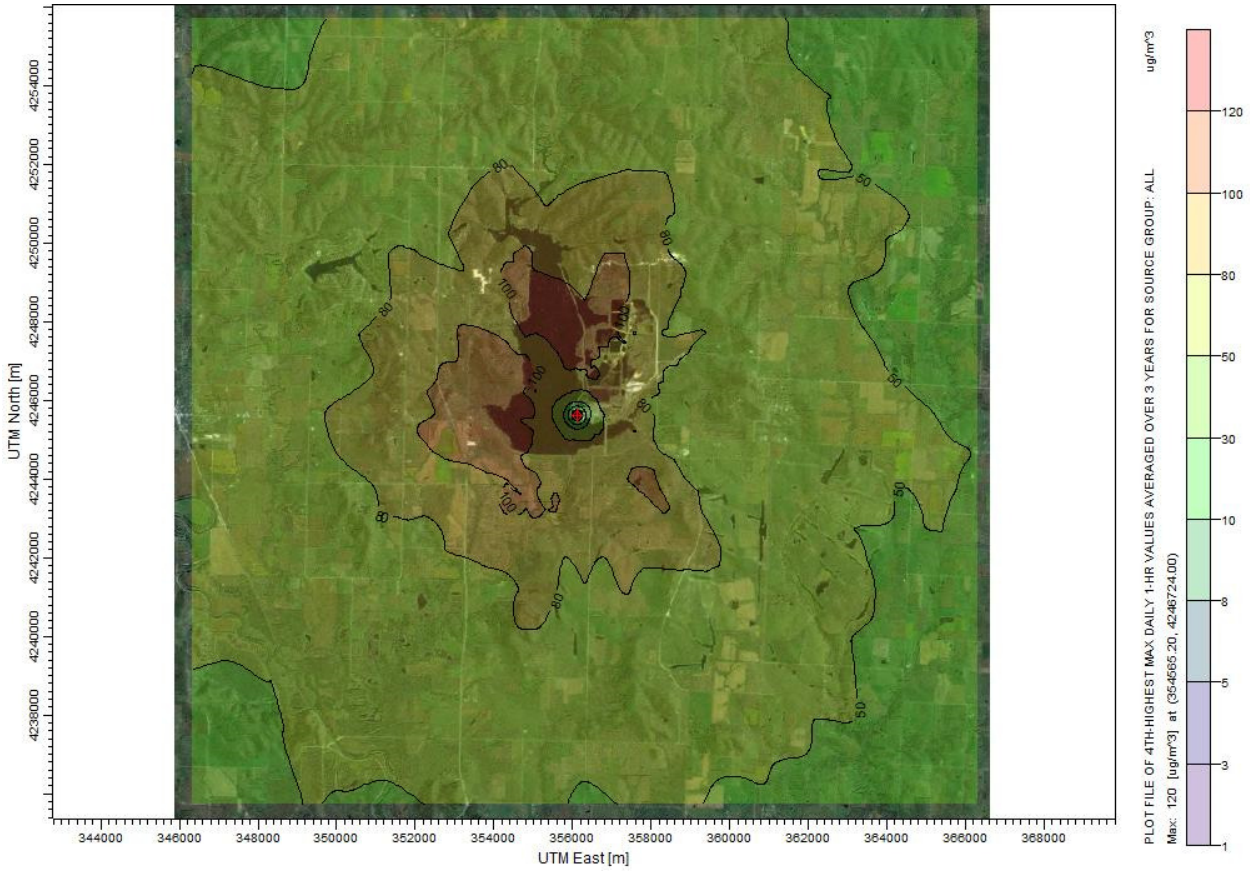
Averaging Period	Modeling Scenario	Data Period	Receptor Location		SO_2 Concentration (µg/m^3)	
			UTM/ Latitude	UTM/ Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	High Load	2012-2014	354381	4244974	126.05	196.5*
	Low Load ("worst case")	2012-2014	354565	4246724	137.82	196.5*

*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The state's modeling of a "worst case" scenario indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 137.82 µg/m^3, or 53 ppb. This modeled concentration included the background concentration of SO_2 and is based on allowable

emissions from the facility. Figure 5 below was included as part of the state's recommendation and indicates that the predicted value occurred northwest of the facility.

Figure 5: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations (120 µg/m^3 without background) in the La Cygne Generating Station Area of Analysis Based on Allowable Emissions.



Jurisdictional Boundaries:

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

The EPA has confirmed that except for the La Cygne Generating Station, which has been modeled to show compliance with the NAAQS, there are no sources within Linn County or any of its neighboring counties that would be likely candidates for future characterization under the DRR. Furthermore, there are no sources in Linn County or any of its neighboring counties that emit above 100 tpy of SO_2, according to the 2011 NEI. Therefore, the EPA does not believe that sources within Linn County or its neighboring counties have the potential to cause or contribute to a violation of the NAAQS within Linn County.

The EPA believes that our intended unclassifiable/attainment area, consisting of the entirety of Linn County, Kansas are comprised of clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable/attainment area.

Other Relevant Information

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

Conclusion

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the area around the La Cygne Generating Station as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Linn County, Kansas.

The unclassifiable/attainment designation is based on modeling analysis that the State of Kansas provided to EPA and our assessment that no other sources in Linn County or its neighbors are likely to cause or contribute to a violation of the NAAQS within Linn County. The modeling uses federally enforceable allowable emissions to show attainment, based on new emission limits put in place in 2014 and 2015. The modeling submitted by the state of Kansas followed the recommended EPA modeling TAD for designation purposes.

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

Technical Analysis for the Wyandotte County, KS Area

Proposed Designation Summary

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Nearman Station area as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Wyandotte County, Kansas.

EPA's proposed designation is based on the modeling analysis that the state of Kansas provided to EPA.

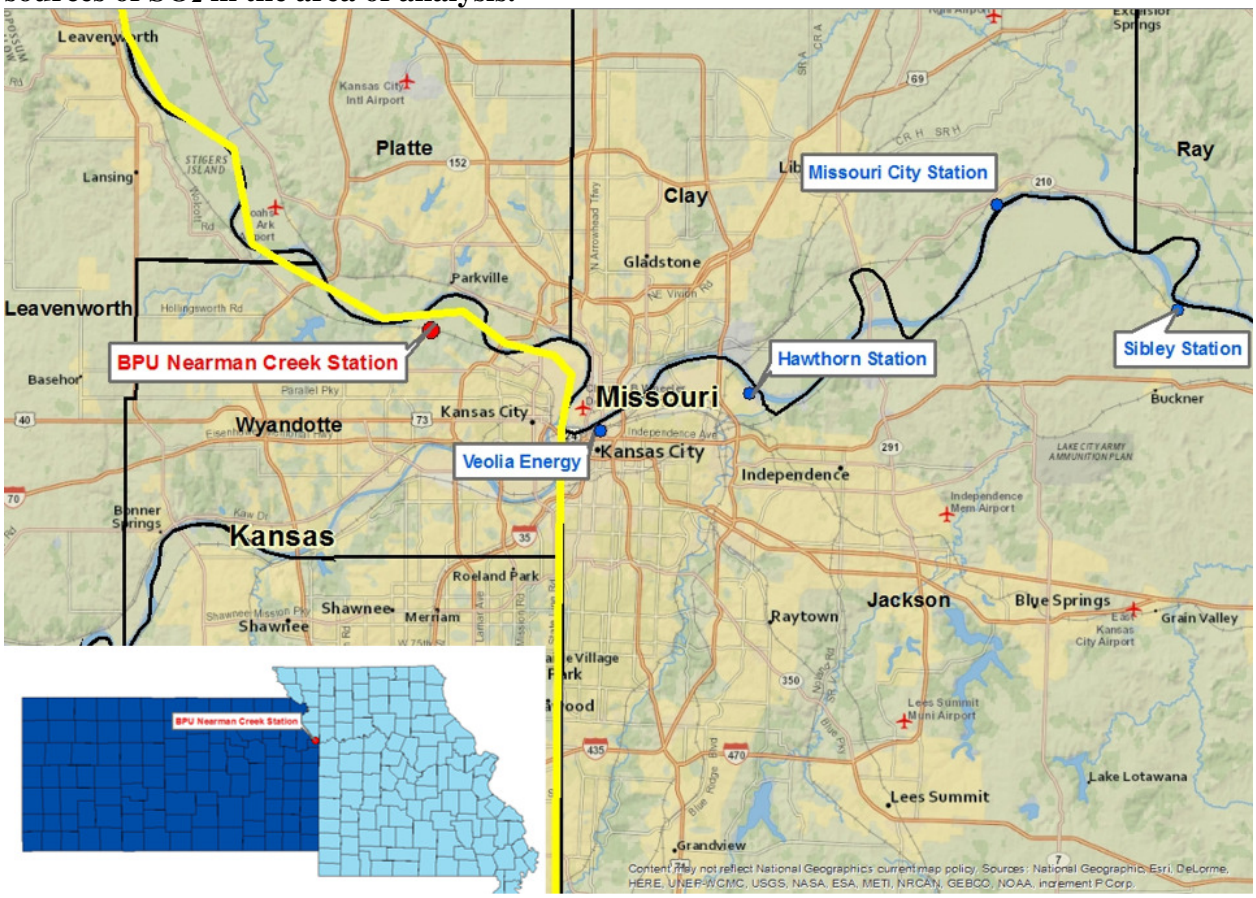
Introduction

The Kansas City, Kansas area, located in Wyandotte County contains a stationary source that according to the EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the Kansas City, Kansas' Board of Public Utilities (BPU) Nearman Creek (Nearman) Station emitted 4,612 tons of SO_2 and had an emissions rate of 0.64 lbs SO_2/mmBTU. Pursuant to the March 2, 2015 court-ordered schedule, the EPA must designate the area surrounding the facility by July 2, 2016.

In its submission, Kansas recommended the Nearman Station area, specifically the entirety of Wyandotte County, be designated as unclassifiable/attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA disagrees with the state's recommendation for the area, and intends to designate the area as unclassifiable. Specifically, our intended unclassifiable area consists of the entirety of Wyandotte County.

The Nearman Station is located in eastern Kansas in the northeast portion of Wyandotte County. As seen in Figure 6, the facility is located approximately 10 km north of the center of Kansas City, Kansas. The Nearman Station lies next to the Missouri River on the Kansas side of the Kansas-Missouri border. No other significant emitters of SO_2 are located nearby within Wyandotte County but Kansas identified 4 other significant sources of SO_2 in nearby Jackson County in the State of Missouri. Also included in Figure 6 are these four nearby SO_2 emitters, the state's recommended area for its unclassifiable/attainment designation (entirety of Wyandotte County), and the EPA's intended unclassifiable designation for the area (also the entirety of Wyandotte County)

Figure 6: The EPA's intended unclassifiable designation for Wyandotte County, Kansas area which includes the Nearman Creek Station. The Nearman Creek Station is located in the northeast portion of Wyandotte County. The blue points represent other modeled sources of SO_2 in the area of analysis.



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

Detailed Assessment

Air Quality Data

This factor considers the SO_2 air quality monitoring data in the area surrounding the BPU Nearman Creek facility. KDHE included in its recommended designation documentation that the JFK NCore monitoring site is located 5 miles southeast of the Kansas City BPU – Nearman site and that the recorded concentrations were below the NAAQS. However, since it is not clear if this monitor is located in an area that represents peak concentrations of SO_2 from BPU – Nearman, the data from this monitor is not being relied upon in the proposed designation for this area.

Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. In some instances the recommended model may be a model other than AERMOD, such as the BLP model for buoyant line sources. The AERMOD modeling system contains the following components:

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

The state used AERMOD version 14134, which was the most recent version of AERMOD at the time, and a discussion of the individual components will be referenced in the corresponding discussion that follows, as appropriate.

Modeling Parameter: Rural or Urban Dispersion

The EPA's recommended procedure for characterizing an area by prevalent land use is based on evaluating the dispersion environment with 3 km of the facility. According to the EPA's modeling guidelines, rural dispersion coefficients are to be used in the dispersion modeling analysis if more than 50 percent of the area within a 3 km radius of the facility is classified as rural. Conversely, if more than 50 percent of the area is urban, urban dispersion coefficients should be used in the modeling analysis. When performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in urban mode. The urban determination was made by the evaluation of land use and population density analysis. While the Nearman Station lies in a sparsely populated area of Wyandotte County north of the center of Kansas City, KS, some of the other significant sources modeled in the demonstration are located in the urban Kansas City metropolitan area. The state of Kansas modeled all sources using the urban option.

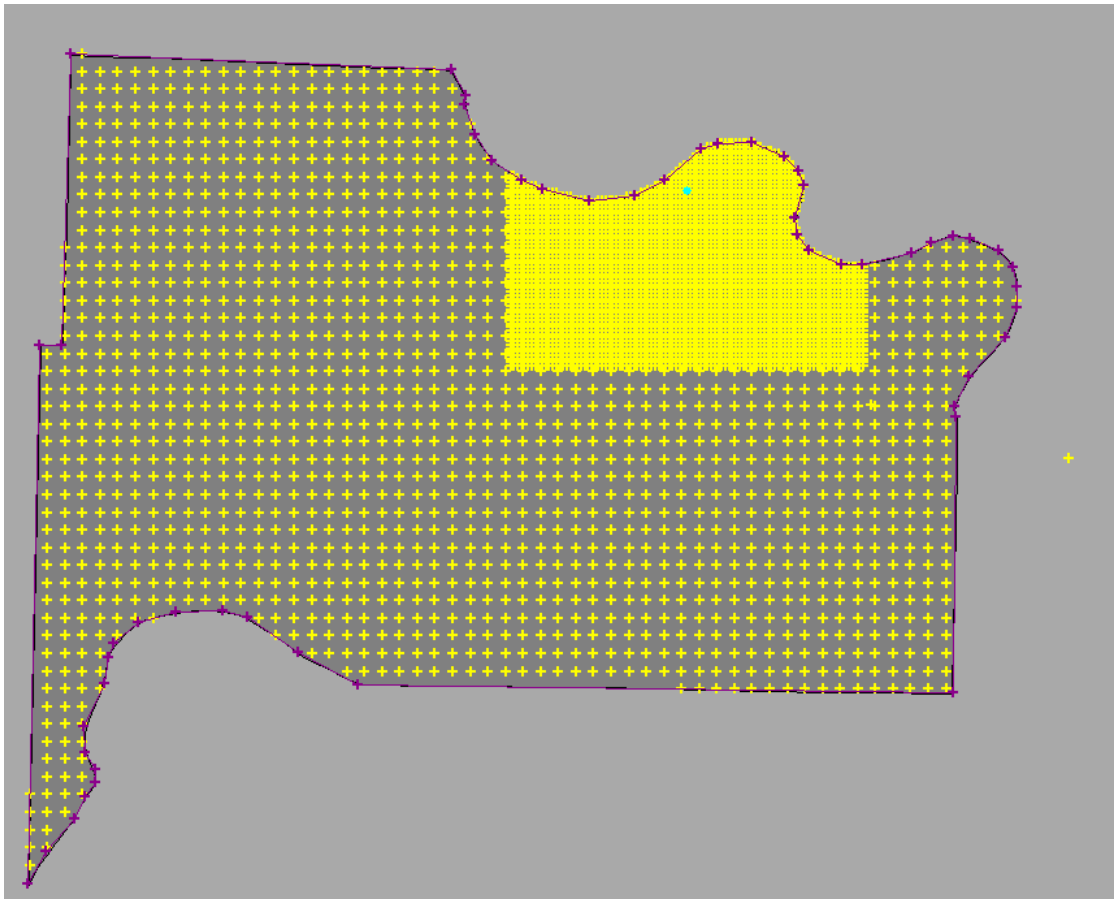
Modeling Parameter: Area of Analysis (Receptor Grid)

The EPA believes that a reasonable first step towards characterization of air quality in the area surrounding the Nearman Station is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations. For the Nearman Station area, the state has included four other emitters of SO_2 within 50 kilometers (km) of the Nearman Station in any direction. The state determined that this was the appropriate distance in order to adequately characterize air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. The grid receptor spacing for the area of analysis chosen by the state is as follows:

- 100 meter spacing from center of Nearman Station to 5 kilometers
- 500 meter spacing from outside of 5 kilometers and within Wyandotte County

The receptor network contained 6,582 receptors and covered all of Wyandotte County. Figure 7 shows the chosen area of analysis surrounding the Nearman Station, as well as the receptor grid for the area of analysis. No receptors were placed on the Missouri side of the Kansas-Missouri border. Therefore, only impacts to the south of Nearman Station can be evaluated. Since there were no receptors placed in Missouri, the receptor grid is inconsistent with the Modeling TAD, as receptors should be placed in areas where it would be feasible to place a monitor and record ambient impacts. It appears that it would be feasible to place monitors to record ambient impacts in the adjacent counties of Platte, Clay and Jackson in Missouri.

Figure 7: Receptor Grid for the Nearman Station Area of Analysis. Receptors encompass all of Wyandotte County. The location of Nearman Station is represented by the green dot. Image courtesy of Kansas Department of Health and Environment.



Modeling Parameter: Source Characterization

Except as discussed elsewhere in this document, the state characterized the source within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the state used actual stack heights in conjunction with actual emissions. The state initially did not adequately characterize the source's building layout and location, as inputs in to BPIPPRIME appeared to be incorrect in relation to the stack. The state corrected the locations in a prior run but left the stack structure for Nearman Station as a building structure input, which is not correct. EPA believes it is very important in a BPIP run to have the structures aligned and defined correctly. EPA is unsure of the overall concentration impact of having the stack remain as a building structure within BPIP.

Modeling Parameter: Emissions

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

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

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

As previously noted, the state included the Nearman Station and four other emitters of SO_2 within 50 km in the area of analysis. The state selected this distance and facilities because the state believes that this area of analysis adequately includes the sources which might contribute to SO_2 concentrations within Wyandotte County. 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 those from other facilities are expressed as allowable rates.

For the Nearman Station area of analysis, the state included annual actual SO_2 emissions between 2012 and 2014. This information is summarized in Table 6 and the emissions data was obtained from CEMS from the EPA's Clean Air Markets Division.

Table 6: Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Wyandotte County, Kansas Area of Analysis

Facility Name	SO_2 Emissions (tons per year)		
	2012	2013	2014
BPU Nearman Creek Unit 1	4,611.8	4,927.9	5,330.9
Total Emissions From All Facilities that used actual emissions in the Area of Analysis	4,611.8	4,927.9	5,330.9

For the following facilities in the area of analysis, the state has chosen to model the facilities using the future and not yet enforceable allowable limits for SO_2. The facilities in the state's area of analysis and their associated future allowable rates are summarized below in Table 7. Of note, the modeled allowable rate at the Veolia Energy Center, the Sibley Station, and Hawthorn Station are to be in place and federally enforceable by January 1, 2017 per State of Missouri Rule 10 CSR 10-6.261, which is past the July 2, 2016 designation deadline. Because the modeling analysis used emission rates that will not be effective by the designation date[5] and therefore cannot be credited to inform a final designation decision, EPA can't rely upon the modeling analysis provided by the state to inform EPA's designation recommendation for the Nearman Station area.

Table 7: SO_2 Emissions based on Future Allowable Limits from Facilities in the Wyandotte County, Kansas Area of Analysis

Facility Name	SO_2 Emissions (tons per year, based on future allowable emissions)
Veolia Energy Unit 1	2.5*
Veolia Energy Unit 2	1,540.9*
Veolia Energy Unit 3	2.5*
Independence Power & Light – Missouri City Unit 5	2,986.7
Independence Power & Light – Missouri City Unit 6	1.3
Kansas City Power & Light – Sibley Station Unit 5A	6,430.6*
Kansas City Power & Light – Sibley Station Unit 5B	6,337.9*
Kansas City Power & Light – Sibley Station Unit 5C	46,568.2*
Kansas City Power & Light – Hawthorn Station Unit 6	3,438.3*
Total Emissions From All Facilities that used allowable limits in the Area of Analysis	67,308.9

not federally enforceable by July 2, 2016

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

EPA notes that the BPU Quindaro Power Plant ceased burning coal and began solely burning natural gas in April 2015. Therefore, although the facility emitted significant amounts of SO_2 from 2012-2014, the facility no longer has significant SO_2 emissions. The SO_2 emissions from the combustion of natural gas are assumed to be included in the background concentration. EPA further notes that Blue Valley Station has three coal fired boilers and is required, in Missouri Rule 10 CSR 10-6.261, to switch to natural gas by January 1, 2017. In addition, Blue Valley is subject to the boiler MACT and has indicated to Missouri they will switch to natural gas by January 21, 2016, well ahead of the July 2, 2016, designation date, therefore this facility was not included in the modeling analysis. It is noted that Missouri Rule 10 CSR 10-6.261 has an initial compliance date after July 2, 2016, and has not yet been adopted into Missouri's SIP. Blue Valley has stated it intends to complete the fuel switch before July 2, 2016, but this requirement is not contained in a federally enforceable document, thus EPA is not accepting the KDHE attainment modeling that relies upon this fuel switch assumption.

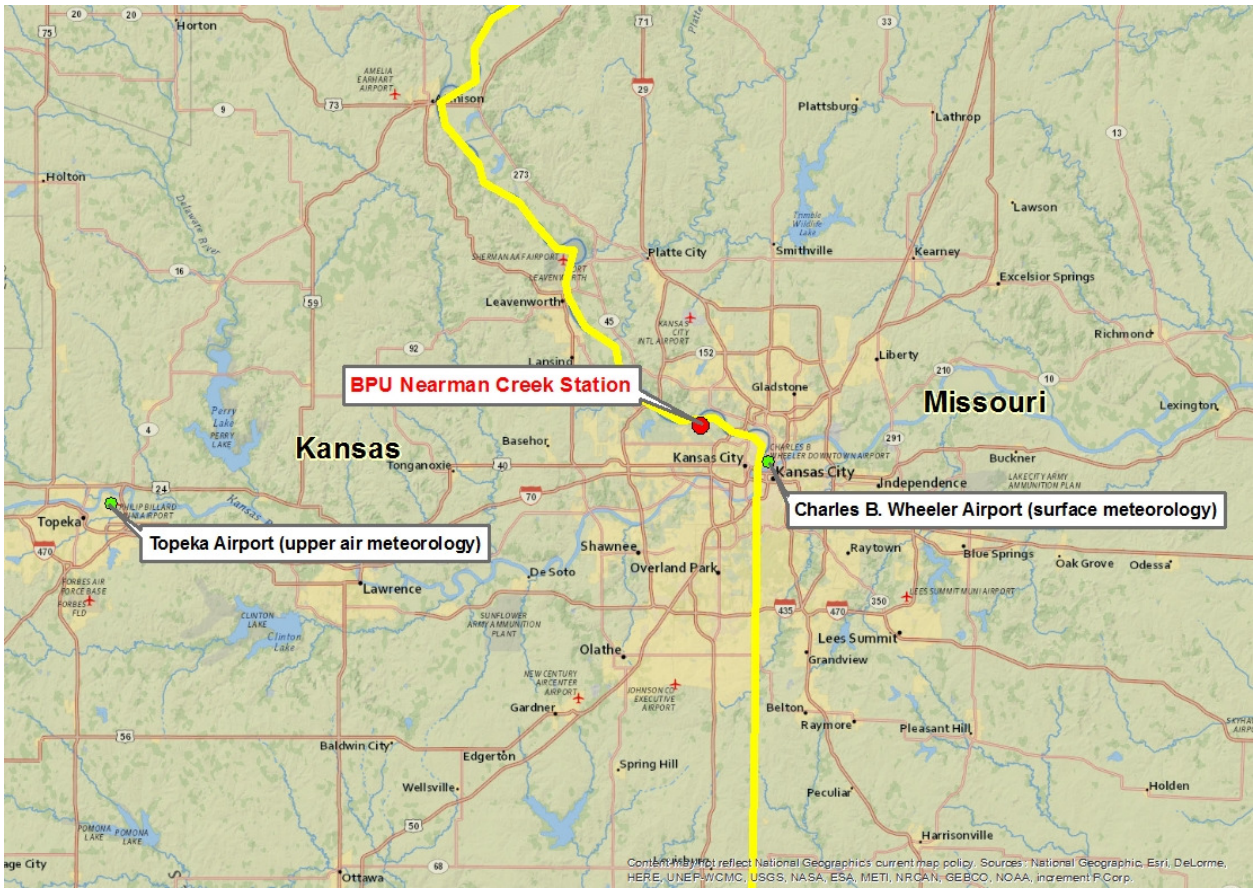
Modeling Parameter: Meteorology and Surface Characteristics

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

For the Kansas City, Kansas area of analysis, surface meteorology from the Charles B. Wheeler Airport site located in downtown Kansas City, Missouri (KMKC) approximately 10 km to the southeast, and coincident upper air observations from the NWS station in Topeka, Kansas, approximately 100 km to the west were selected as best representative of meteorological conditions within the area of analysis. The location of the meteorological surface and upper air stations are shown in Figure 8.

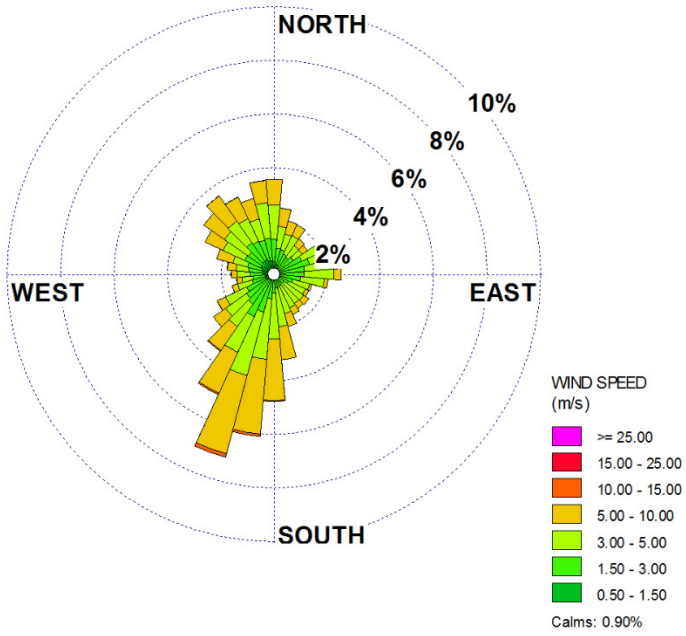
The state used AERSURFACE version 13016 using data from the NWS station KMKC (39.12N, 94.59W) to estimate the surface characteristics of the area of analysis. The state estimated values for 12 spatial sectors out to 1 km at a seasonal temporal resolution for dry, wet, or average conditions for each respective year. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as "Zo"). In Figure 8, the location of the Kansas City, MO surface meteorological station and the Topeka, KS upper air station are shown relative to the Nearman Station area of analysis.

Figure 8: Nearman Station Area of Analysis and the Downtown Kansas City, MO NWS site used for surface meteorology, the Topeka, Kansas NWS site used for upper air meteorology.



As part of its recommendation, the state provided the 3-year surface wind rose for Kansas City, Missouri. In Figure 9, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Winds at the Kansas City, MO location are predominately out of south-southwest, and a secondary component from the northwest.

Figure 9: Charles B. Wheeler Airport site located in downtown Kansas City, Missouri Cumulative Annual Wind Rose for Years 2012 – 2014



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

Hourly surface meteorological data records are read by AERMET and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of one minute duration was provided from the same instrument tower but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the state set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. This approach is consistent with a March 2013 EPA memo titled, "Use of ASOS meteorological data in AERMOD dispersion

Modeling." In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the one minute wind data.

Modeling Parameter: Geography and Terrain

The terrain in the area of analysis is best described as relatively flat. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the National Elevation Dataset (NED). The NED data available on-line in 1/3 arc-second spacing from the US Geological Survey was used in the modeling analysis.

Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For the Nearman Station area of analysis, the state used the first tier approach and chose a background concentration to be 33.57 micrograms per cubic meter ($\mu g/m^3$), or 13 ppb,[6] and that value was incorporated into the final AERMOD results. This background value was from the JFK monitor located in Wyandotte County, Kansas.

Summary of Modeling Results

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

Table 8: AERMOD Modeling Parameters for the Nearman Creek Area of Analysis

Nearman Creek Station Area of Analysis	
AERMOD Version	14134
Dispersion Characteristics	urban
Modeled Sources	5
Modeled Stacks	1
Modeled Structures	14
Modeled Fencelines	0
Total receptors	6,582
Emissions Type	Actual and Future Allowable
Emissions Years	2012-2014 for actual, January 1, 2017 rule for future allowable limits

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

Meteorology Years	2012-2014
Surface Meteorology Station	Kansas City, Missouri – Charles B. Wheeler Airport
Upper Air Meteorology Station	Topeka, Kansas
Methodology for Calculating Background SO_2 Concentration	1st tier
Calculated Background SO_2 Concentration	33.57 μg/m^3

The results presented below in Table 9 show the magnitude and geographic location of the highest predicted modeled concentrations based on the mix of actual and future allowable emissions.

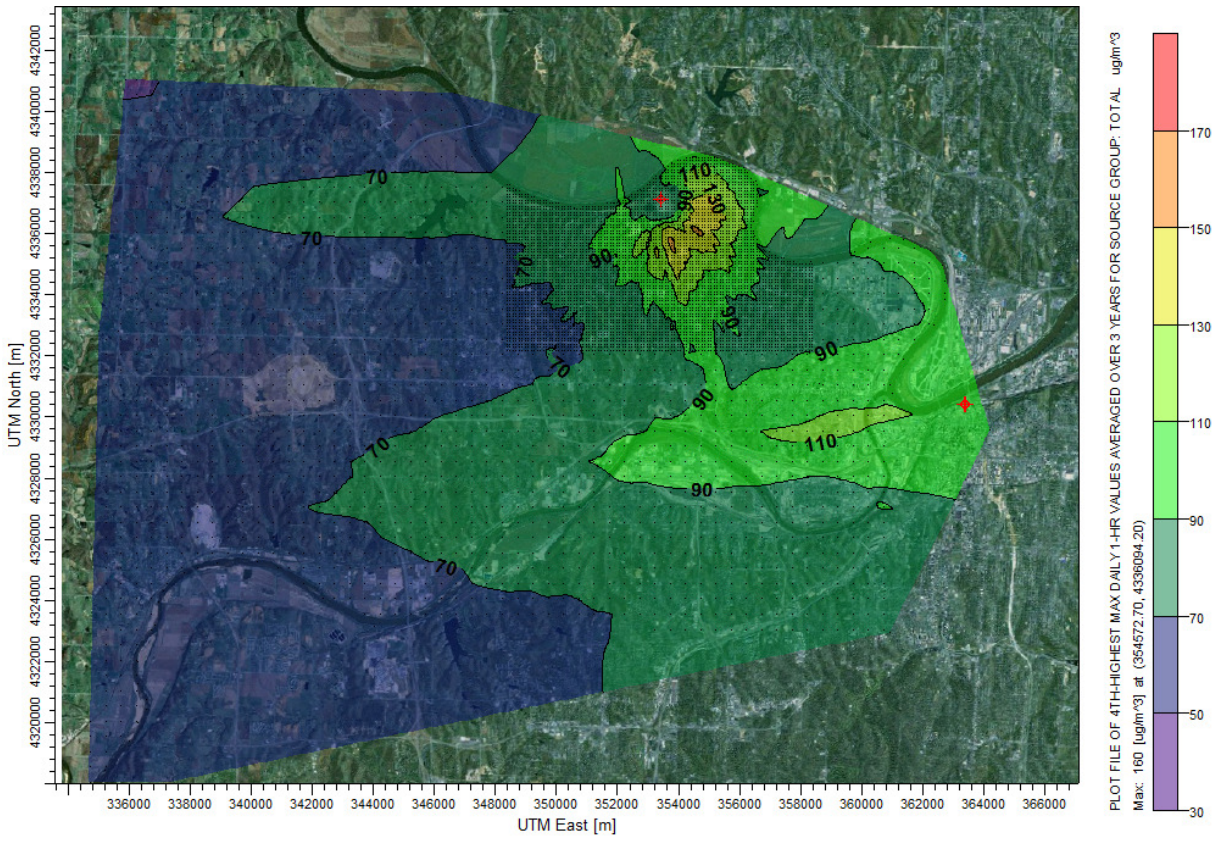
Table 9: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the Wyandotte County, Kansas Area of Analysis Based on Actual and Future Allowable Emissions

		Receptor Location		SO_2 Concentration (μg/m^3)	
Averaging Period	Data Period	UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	353873	4334994	193.17	196.5*

*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The state's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 193.17 μg/m^3, or 73.7 ppb, indicating 1-hr SO_2 NAAQS attainment for all of Wyandotte County. This modeled concentration included the background concentration of SO_2 and is based on actual emissions from the BPU facility and future allowable emissions from other facilities. EPA determined this value based on the modeling input files provided by KDHE. Figure 10 below indicates that the predicted maximum value occurred just to the southeast of the BPU facility. As previously mentioned, no receptors were placed in nearby Missouri Counties, where impacts from the Nearman Station emissions may occur.

Figure 10: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations (159.60 µg/m^3 without background) in the Wyandotte County, Kansas Area of Analysis Based on a mix of Actual Emissions and Future Allowable emissions. Note that receptors, and thus modeled predictions, are only placed in Wyandotte County. Impacts in the State of Missouri cannot be evaluated.



Jurisdictional Boundaries:

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

As mentioned previously, EPA observes that other significant sources within the area of analysis for the Nearman Creek Station were modeled using future allowable emissions limits that will not be federally enforceable by July 2, 2016. Also, another significant source, the Independence Power & Light Blue Valley Station located within the area of analysis was not included in the modeling analysis. Thus, EPA believes the state's modeled evaluation of SO_2 concentrations for Wyandotte County, Kansas does not adequately characterize all the emissions potentially impacting the Nearman Station area of analysis. Therefore, EPA believes that our intended unclassifiable area, consisting of the entirety of Wyandotte County, is comprised of clearly

defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable area.

Other Relevant Information

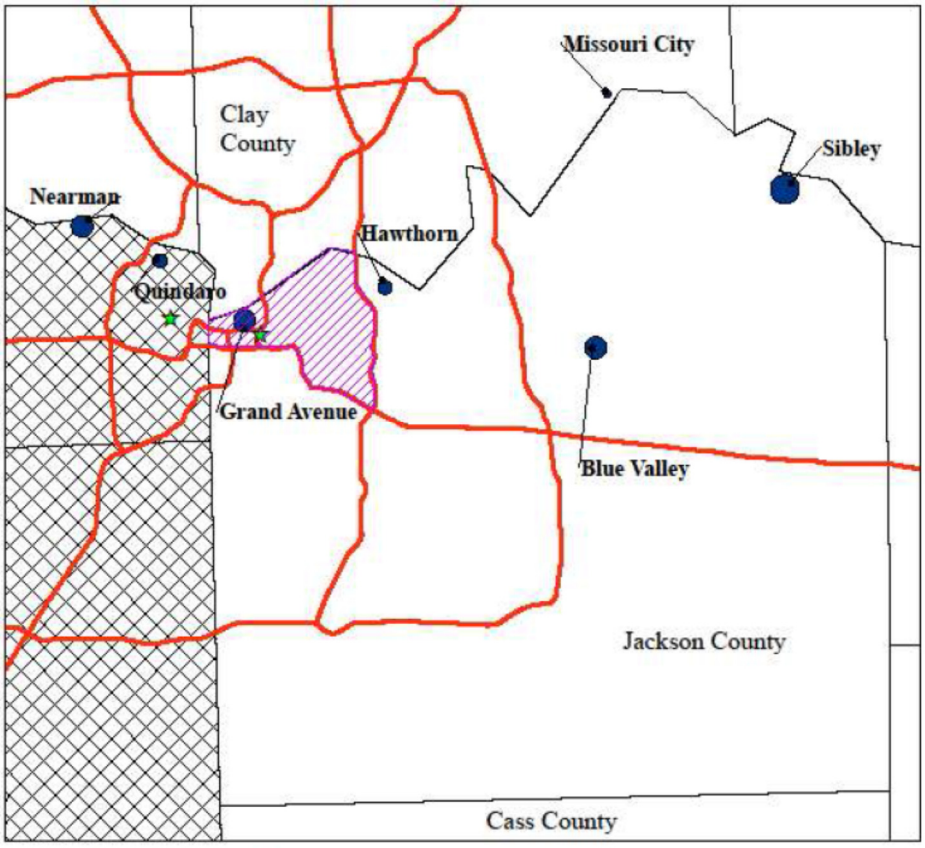
The EPA received air dispersion modeling results from Sierra Club, asserting that SO_2 emissions from the Nearman Station, when considered with other local sources, are contributing to a violation of the NAAQS within or around the existing Jackson County nonattainment area. The modeling Sierra Club provided was for a separate consent decree source and separate area, the Sibley Station in Missouri, in which the Nearman Station (approximately 50 km away from the Sibley Station) was included as an interactive source. Because the Sierra Club modeling contained Nearman, EPA evaluated Sierra Club modeling with respect to this designation area around Nearman and separately the area around Sibley. Two Sierra Club modeling demonstrations were provided, one using actual emissions and another using allowable emissions. Both Sierra Club modeling scenarios show violations of the 1-hr SO_2 NAAQS, although the Sierra Club's modeling scenario using actual emissions indicate modeled violations both in and around the Veolia Energy Center.

Although Sierra Club submitted modeling based on allowable emission rates, we have concerns that the allowable modeling, as presented, does not represent true SO_2 concentrations in the area, and we are unable to reliably determine whether the area is in attainment or nonattainment based on the allowable modeling. While the modeling TAD does not preclude the use of allowable emissions, for designations allowable emissions are generally used in the case where controls and limits have been recently established, and not to establish actual SO_2 concentrations a monitor might record.[7]

The Sierra Club modeling for the Sibley Station used a receptor grid out to 50 km and extending the modeling domain out to 50 km allowed for receptors to be placed in Wyandotte County, Kansas and brought the Nearman Station, as mentioned above, into the Sibley Station analysis as a very distant interactive source. While a 50 km receptor domain is permitted in the AERMOD modeling system, this Sierra Club grid also includes receptors in an existing 1-hr SO_2 nonattainment area in Jackson County MO. As seen in Figure 11, the existing nonattainment area in Jackson County, Missouri is an area approximately 13 km to the southeast of Nearman and 40 km to the southwest of the Sibley Station.

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

Figure 11: Existing Jackson County Missouri SO_2 Nonattainment area (hashed in magenta) with Kansas and Nearman to the West.



The Jackson County, Missouri nonattainment area is being addressed under a separate nonattainment SIP that will require a demonstration that the area demonstrates and maintains compliance with the NAAQS. MDNR submitted the nonattainment SIP for Jackson County to EPA on October 9, 2015, and the agency is currently reviewing this SIP. In establishing the current Jackson County nonattainment area, the emissions from Nearman were considered and it was determined at that time Nearman contributions did not warrant an expanded nonattainment area that would include the Nearman source. Although Sierra Club asserts in their comments significant contributions from Nearman, it is unclear from the Sierra Club modeling analysis what the actual Nearman source contributions are, or where they occur, when predicted exceedances occur in the nonattainment area and the area south of the Sibley Station. Without further description and analysis of both when and where Nearman contributions occur we cannot determine if Nearman should be included in a separate nonattainment area. What is clear from the Sierra Club analysis is no modeled violations appear to exist directly surrounding the Nearman facility.

EPA notes that the Sierra Club provided a table with maximum 99th percentile modeled impacts and individual facility impacts as well as impacts from all facilities combined, but it does not address individual contribution at the time of modeled exceedances. The Sierra Club modeling provided a contribution summary in their modeling report, and the summary indicates that the

area surrounding the Nearman Station, when evaluated alone, complies with the 1-hr SO_2 NAAQS. However, when actual emissions from Veolia Energy Center are included, the NAAQS is exceeded around the Veolia Energy Center. Overall, the Sierra Club model results for the area around the Nearman Station are similar to those from the State of Kansas' modeling and show NAAQS attainment in Wyandotte County.

EPA believes the Sierra Club modeling meets the requirements of the EPA modeling TAD in terms of inputs and model settings, as EPA previously stated. However sources within the existing nonattainment area for the 2010 1-hour SO_2 NAAQS have been evaluated and a plan has been developed by the states of Kansas and Missouri which has been submitted for EPA action. At this time, EPA believes that the Sierra Club did not provide enough information to EPA to determine Nearman's impact on modeled violations both within and outside of the existing Jackson County nonattainment area. Because EPA does not have the maximum daily contributions files (MAXDCONT) as part of the AERMOD modeling outputs from Sierra Club, EPA can't directly determine Sierra Club's assertion that Nearman Station actually does contribute to exceeding concentrations during those periods of modeled violations around the Veolia Energy Center. For these reasons, EPA is not relying upon the Sierra Club modeling for the designation determination in the Nearman Station area.

Conclusion

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Nearman Station area as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Wyandotte County, Kansas.

EPA has two primary concerns with the state's analysis for the Nearman Station. First, the receptor grid used in the modeling analysis is inconsistent with the Modeling TAD. Modeling receptors were only placed within Wyandotte County, Kansas, and not in the nearby Platte County, Missouri, and therefore the modeling did not evaluate impacts from Nearman Station on receptors in Platte County. Second, four other significant sources in the state of Missouri were included in the modeling for the area of analysis. Three of these sources (Veolia Energy, Sibley Station, and Hawthorn Station) were modeled with future allowable emissions that are not currently federally enforceable and will not be by July 2, 2016. We are unable at this time, based on available information, to determine whether the area is meeting or not meeting the NAAQS, and EPA will consider any additional information provided by KDHE addressing the above concerns in making the final designation.

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

Technical Analysis for the Shawnee County, Kansas Area

Proposed Designation Summary

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the area around the Tecumseh Energy Center as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Shawnee County, Kansas.

The unclassifiable designation is based on the information the state of Kansas provided to EPA.

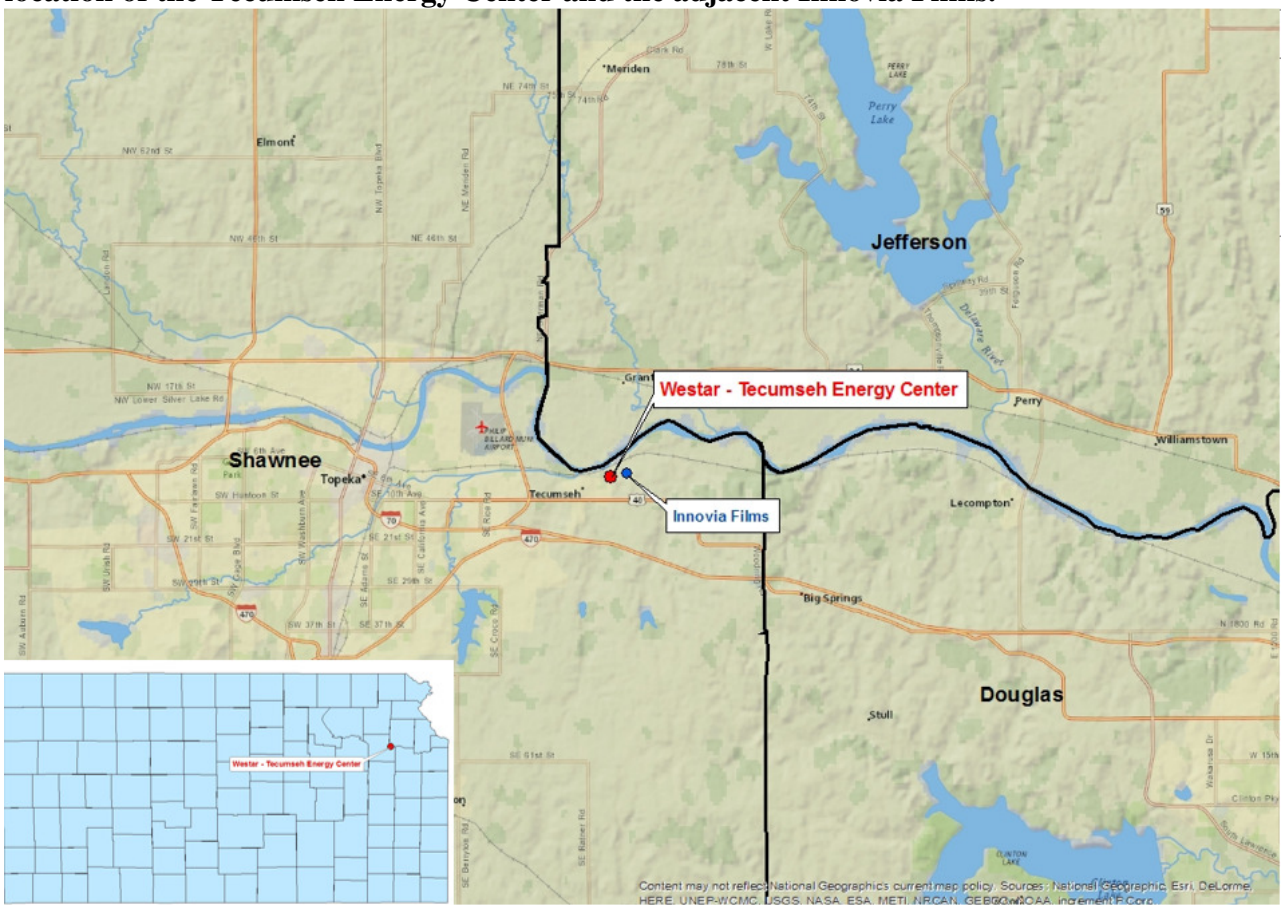
Introduction

The Shawnee, Kansas area contains a stationary source that according to the EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the Westar Energy – Tecumseh Energy Center emitted 3,979 tons of SO_2 and had an emissions rate of 0.58 lbs SO_2/mmBTU. Pursuant to the March 2, 2015 court-ordered schedule, the EPA must designate the area surrounding the facility by July 2, 2016.

In its submission, Kansas recommended that the area surrounding the Tecumseh Energy Center, specifically the entirety of Shawnee County, be designated as unclassifiable based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. This assessment and characterization was based on potential future emission reductions at the Tecumseh Energy Center and an adjacent significant SO_2 source. After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees with the state's recommendation for the area and intends to designate the area as unclassifiable.

The Tecumseh Energy Center is located in eastern Kansas in the northeast portion of Shawnee County. As seen in Figure 12, the facility is located a few kilometers to the east of Topeka. The Tecumseh Energy Center is located just to the south of the Kansas River and lies in the relatively flat terrain within the river basin. Also included in the figure is the adjacent Innovia Films, which is a nearby emitter of SO_2, the state's recommended area for the unclassifiable designation; and, the EPA's intended unclassifiable designation for the area.

Figure 12. The EPA's intended designation for Shawnee County, Kansas. Shown is the location of the Tecumseh Energy Center and the adjacent Innovia Films.



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

Detailed Assessment

Air Quality Data

This factor considers the SO_2 air quality monitoring data in the area surrounding Tecumseh Energy Center. The facility is located in Shawnee County; however, there are no ambient air quality monitors located in this county. The state did not include the most recent 3 years of monitoring data, i.e., 2012 – 2014, in its recommendation for the closest county that has monitoring data, i.e., Wyandotte County, Kansas. The site in Wyandotte County is approximately 100 km to the east of the Tecumseh Energy Center and located in Kansas City, Kansas. This monitoring site best represents air quality within and near the Kansas City metropolitan area, and would not represent the area surrounding Tecumseh Energy Center.

However, the table below shows information related to the monitor located in Wyandotte County, which were confirmed through the EPA's 2014 design value report for SO_2.[8]

Table 10: Available Air Quality Data for the Area Closest to Tecumseh Energy Center

County	State Recommendation	Air Quality Systems (AQS) Monitor ID	Monitor Location	Distance to Tecumseh Energy Center (km)	2012 – 2014 SO_2 Design Value in ppb
Wyandotte	Attainment	20-209-0021	Kansas City, KS	100 km	50

Based on available ambient air quality collected between 2012 and 2014, the closest monitor to Tecumseh does not show a violation of the 2010 SO_2 NAAQS. However, the absence of a violating monitor when considering the distance from the facility is not a sufficient technical justification to rule out that an exceedance of the 2010 SO_2 NAAQS may occur in the immediate vicinity of the facility.

Emissions and Emissions-Related Data

Evidence of SO_2 emissions from the source meeting the emissions criteria of the March 2, 2015 consent decree, i.e., Tecumseh Energy Center, is an important factor for determining whether the immediate area is experiencing elevated levels of SO_2 concentrations. Other considerations for this factor include county level SO_2 emissions data and data for sources located within 50 km.

Kansas did not include any annual emissions data for point sources in Shawnee County, with the exception of the Tecumseh Energy Center consent decree source, nor did the state include any annual emissions data from point sources in neighboring Jefferson and Douglas Counties. The EPA therefore believes that it is reasonable to evaluate data obtained from the 2011 National Emissions Inventory (NEI)[9]. The annual SO_2 emissions data for sources emitting at or above 100 tons per year in Shawnee and neighboring Jefferson and Douglas Counties are summarized below in Table 11. As shown in Table 11, the Innovia Films facility is adjacent to the Tecumseh Energy Center and a significant source of SO_2.

[8] The design value report for SO_2, as well as each of the other NAAQS, can be found at this link: http://www3.epa.gov/airtrends/values.html

[9] Detailed information for the 2011 NEI can be found at this link: http://www3.epa.gov/ttnchie1/net/2011inventory.html

Table 11: 2011 NEI SO_2 Emissions from Other Local Sources near Tecumseh Energy Center

County	Facility Name	Facility Subject to the Emissions Criteria of the March 2, 2015 consent decree?	Distance to Facility that Meets the Consent Decree Criteria in km	Facility Total SO_2 Emissions (tons per year)
Shawnee	Innovia Films	No	0.5 km	1035.12
Douglas	Westar Energy – Lawrence	No	20 km	2792.76

Emissions Controls

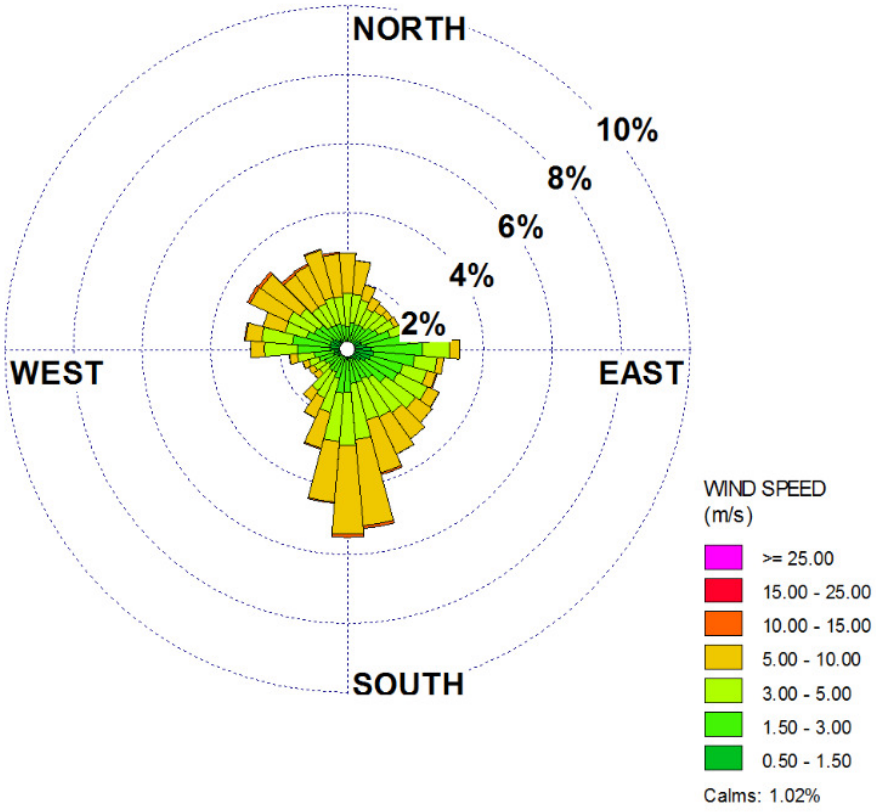
The EPA recognizes that control strategies implemented after the release of the 2011 NEI may not be reflected. Currently, the EPA has not received any additional information on emissions reductions resulting from controls put into place after the date of the emissions inventory data provided in the Table 11. However, Westar has publicly announced that Unit 8/10 at Tecumseh will be retired by the end of calendar year 2015, which would represent approximately a 2/3 reduction in emissions from this facility.[10]

Meteorology (Weather & Transport Patterns)

Evidence of source-receptor relationships between specific emissions sources and high SO_2 concentrations in the surrounding area is another important factor in determining the appropriate extent of the EPA's intended unclassifiable area. As shown in Figure 13, meteorological records for the nearest National Weather Service meteorological station at the Topeka, Kansas Airport indicate winds blow predominantly from the south, but there is both a southeast and northwest component. Figure 13 was produced with data provided as part of the state's recommendation.

[10] http://cjonline.com/news/business/2015-10-13/westar-energy-retire-three-small-generating-units-40-affected

Figure 13: Wind Rose for Shawnee County, Kansas



Geography and Topography (Mountain Ranges or Other Air Basin Boundaries)

As mentioned previously, the Tecumseh Energy Center is located just to the east of Topeka, along the Kansas River. The terrain is relatively flat, as would be expected for a river basin.

Jurisdictional Boundaries

Once the geographic area associated with the immediate area surrounding the Tecumseh Energy Center and any nearby areas which may potentially be contributing to elevated levels of SO_2 around the facility are determined, existing jurisdictional boundaries are considered for the purpose of informing our intended unclassifiable area. Specific attention will be given to clearly defined legal boundaries.

Kansas proposed an unclassifiable area boundary consisting of the entirety of Shawnee County. The two largest sources of SO_2 and only sources with annual SO_2 emissions greater than 100

tons per year within Shawnee County are the Tecumseh Energy Center and the adjacent Innovia Films.

The EPA believes that our intended unclassifiable area, consisting of the entirety of Shawnee County, is comprised of clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our intended unclassifiable area.

Other Relevant Information

EPA did not receive 3rd party information pertaining to the analysis of the 1-hr SO_2 impacts for the Tecumseh Energy Center.

Conclusion

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the area around the Tecumseh Energy Center as unclassifiable for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the entirety of Shawnee County, Kansas.

The unclassifiable designation is based on the information the state of Kansas provided to EPA. No monitoring SO_2 data is available in the vicinity of the Tecumseh Energy Center and no modeling analysis was provided to the EPA to evaluate the Tecumseh's impact on the surrounding area. Therefore, given this lack of monitoring and modeling data, EPA cannot make a technical evaluation of the 1-hr SO_2 impacts from Tecumseh Energy Center by the July 2, 2016 deadline, and we are unable, based on available information, to determine whether the area is meeting or not meeting the NAAQS. EPA will consider any additional information provided by KDHE regarding this area in making the final designation.

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