

Technical Support Document

MISSOURI Area Designations For the 2010 SO₂ Primary National Ambient Air Quality Standard

Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), EPA must designate areas as either “nonattainment,” “attainment,” or “unclassifiable” for the 2010 1-hour sulfur dioxide (SO₂) 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 poor air quality in a nearby area that does not meet the NAAQS. Table 1 below identifies the counties or portions of counties (or Indian Country) in Missouri that EPA is initially designating “nonattainment” based on monitored violations. EPA is not yet prepared to designate other areas in Missouri, and will address those areas in future final designations actions.

Table 1. Nonattainment Area Designations for Missouri

Area	Missouri’s Recommendation of Areas/Counties	EPA’s Designated Nonattainment Areas/Counties
Jackson County Jackson County (partial)	Nonattainment	Nonattainment
Jefferson County Jefferson County (partial)	Nonattainment	Nonattainment

Background

On June 2, 2010, EPA revised the primary SO₂ NAAQS (75 FR 35520, June 22, 2010) by establishing a new 1-hour standard at a level of 75 parts per billion (ppb) which is met at an ambient air quality monitoring site when the 3-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations does not exceed 75 ppb, as determined in accordance with Appendix T of 40 CFR part 50. 40 CFR 50.17(a)-(b). EPA has determined that this is the level necessary to provide protection of 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 SO₂. The Agency is revoking the two prior primary standards of 140 ppb evaluated over 24-hours, and 30 ppb evaluated over an entire year because the standards will not add additional public health protection given a 1-hour standard at 75 ppb. Accordingly, EPA is not designating areas in this process on the basis of either of these two prior primary standards. Similarly, the secondary standard for SO₂ has not been revised, so EPA is not designating areas in this process on the basis of the secondary standard. On February 15, 2013, EPA requested public comment on our proposal to designate two areas in Missouri as nonattainment for the 2010 1-hr SO₂ NAAQS (see 78 FR 11124). In response to our proposal, EPA received no comments. This proposal was developed in accordance with EPA’s 2010 revision of the SO₂ primary NAAQS.

EPA's SO₂ Designation Approach

Section 107(d) of the CAA provides that not later than 1 year after promulgation of a new or revised NAAQS, state Governors may submit their recommendations for designations and boundaries to EPA. This deadline was June, 3 2011. Section 107(d) also requires EPA to provide a notification to states of no less than 120-days prior to promulgating an initial area designation that is a modification of a state's recommendation. EPA has reviewed the State's recommendations and has notified the State Commissioner through a letter signed by the Regional Administrator of any intended modifications. While language in section 107 specifically addresses states, we intend to follow the same process for tribes, pursuant to section 301(d) of the CAA and Tribal Authority Rule (40 CFR Part 49). Therefore, we intend to designate areas of Indian Country, in consultation with the tribes, on the same schedule as state designations. If a state or tribal government does not submit designation recommendations, EPA will promulgate the designations that it deems appropriate. If a state or tribal government disagrees with EPA's intended area designations, it has an opportunity to demonstrate why any proposed modification is inappropriate.

Designations guidance was issued by EPA through a March 24, 2011, 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 identifies factors EPA intends to evaluate in determining boundaries for areas designated nonattainment. These 5 factors include: 1) air quality data; 2) emissions and emissions-related data (location of sources and potential contribution to ambient SO₂ concentrations); 3) meteorology (weather/transport patterns); 4) geography/topography (mountain ranges or other air basin boundaries); and 5) jurisdictional boundaries (e.g., counties, air districts, pre-existing nonattainment areas, reservations, metropolitan planning organization), among any other information deemed relevant to establishing appropriate area designations and boundaries for the 1-hour SO₂ NAAQS.

The March 24, 2011, guidance memo recommended that area boundaries be defaulted to the county boundary unless additional provided information justifies a larger or smaller boundary than that of the county. EPA believes it is appropriate to evaluate each potential area on a case-by-case basis, and to recognize that area-specific analyses conducted by states, tribal government and/or EPA may support a different boundary than a default county boundary.

In this TSD, EPA discusses its review and technical analysis of the recommendations submitted by the State of Missouri for designations of the 1-hour SO₂ standard and any modifications from these recommendations.

Definition of important terms used in this document:

1) **Designated "nonattainment" area** – an area which EPA has determined, based on a state recommendation and/or on the technical analysis included in this document, has violated the 2010 SO₂ NAAQS, based on the most recent three years of air quality monitoring data, or contributes to a violation in a nearby area.

- 2) **Recommended nonattainment area** – an area that a state or tribal government has recommended to EPA to be designated as nonattainment.
- 3) **Violating monitor** – an ambient air monitor meeting all methods, quality assurance and citing criteria and requirements whose valid design value exceeds 75 ppb, as described in Appendix T of 40 CFR part 50.
- 4) **2010 SO₂ NAAQS** - 75 ppb, national ambient air quality standard for SO₂ promulgated in 2010. Based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations
- 5) **Design Value** – a statistic that describes the air quality status of a given area relative to the level of the NAAQS.

Nonattainment Designations

Introduction

This technical analysis for the State of Missouri identifies the counties with a monitor(s) that violate the 2010 SO₂ NAAQS based on 2009-2011 as well as 2008-2010 data, and evaluates nearby counties for contributions to SO₂ concentrations in the area. In Missouri's designation recommendation letter to EPA, dated July 11, 2011, Sara Parker Pauley, Director of the Missouri Department of Natural Resources (MDNR), recommended that portions of Greene, Jackson and Jefferson counties be designated as nonattainment for the 2010 SO₂ NAAQS based on monitored air quality data from 2007-2009. Additionally, MDNR has recently certified the most recent data from the Greene County monitors for the year ending in 2012, and informed EPA Region 7 (in a letter dated January 11, 2013) that they intend to revise their nonattainment recommendations to not include Greene County, Missouri because the monitors in Greene County are no longer recording a violation of the 2010 1-hr SO₂ NAAQS. EPA agrees that the most recent certified air quality monitoring data for Greene County indicate that the monitors are no longer recording violations of the 2010 1-hr SO₂ NAAQS, and therefore is not including Greene County as part of the technical analysis for areas with violating monitors for this NAAQS. We will further address Greene County in a future final designation action. We note that following our proposal MDNR notified EPA Region 7 through a letter dated April 26, 2013 that they officially revised their SO₂ nonattainment boundary recommendation (which required approval by the Missouri Air Conservation Commission) to remove Greene County. Based on EPA's technical analysis, EPA is designating two areas as nonattainment (Table 1).

The Jackson County, MO Nonattainment Area includes a part of Jackson County which consists of the area North of I-70/I-670, West of I-435, East of the state line with Kansas and South of the Missouri River.

The Jefferson County, MO Nonattainment Area includes a part of Jefferson County which consists of both Herculaneum and Festus townships and those portions of Valmeyer and Selma townships directly to the East that separate Herculaneum and Festus townships from the Mississippi River.

EPA has evaluated these counties and nearby counties based on the weight of evidence of the factors recommended in the March 24, 2011, EPA guidance.

The 5 factors were used to analyze the nonattainment areas for 1-hour SO₂ designations:

1. Air quality data. We reviewed SO₂ air quality monitoring data from EPA's Air Trends website (see <http://www.epa.gov/airtrends/values.html>), including the design value calculated for each monitor in the area for the most recent 3-year period. A monitor's design value indicates whether that monitor attains a specified air quality standard. The 2010 SO₂ NAAQS is met at a monitoring site when the identified design value is valid and less than or equal to 75 ppb as described in Appendix T of 40 CFR part 50. An ambient air monitor whose valid design value exceeds 75 ppb, as described in Appendix T of 40 CFR part 50 is deemed a violating monitor. A design value is only valid if minimum data completeness criteria are met. An SO₂ design value that meets the NAAQS is generally considered valid if it encompasses 3 years of complete data. A year is complete when all 4 quarters are complete. A quarter is complete when 75% of the days are complete. A day is complete when it has 75% of its hours. Data substitution tests are described in Appendix T of 40 CFR part 50. Areas where monitoring data indicate a violation of the 1-hour, 75 ppb primary SO₂ standard will be designated as nonattainment. Source-oriented modeling may also be used to assess air quality in a particular location. Attachment 3 of the March 24, 2011 EPA memo provides further guidance on using refined dispersion modeling for this type of assessment.
2. Emissions and emissions-related data (location of sources and potential contribution to ambient SO₂ concentrations). We reviewed data from the 2008 National Emissions Inventory (NEI), version 3 (NEI08V3), which was the most current version of the national inventory available in 2011 when these data were compiled for the designations process, (see <http://www.epa.gov/ttn/chief/net/2008inventory.html>) or other relevant sources of data, such as state inventories or inventories from other federal sources. EPA recognizes that there might be no new information on any changes in emissions that may have occurred after 2008, but would consider more recent years if available. For example, certain large sources of emissions in or near an area may have installed emission controls or otherwise significantly reduced emissions since 2008. Two source categories from the 2008 NEI were examined: the point source inventory and the nonpoint source inventory. Generally, the point source inventory represents the bulk of the SO₂ emissions in Region 7.
3. Meteorology (weather/transport patterns). We evaluated meteorological data to help determine how weather conditions, including wind speed and direction, affect the plume of sources contributing to ambient SO₂ concentrations. The National Weather Service maintains surface and upper air monitoring sites across the United States. Automated Surface Observing System (ASOS) (<http://www.weather.gov/asos>) sites collect hourly averaged wind measurements including wind direction and wind speed.
4. Geography/topography (mountain ranges or other air basin boundaries). We examined the physical features of the land that might affect the distribution of SO₂ over an area. River Valleys, Escarpments, or other physical features may affect the distribution of emissions, and may help define boundaries. Satellite images depicting River Valleys and

point sources were constructed and evaluated to determine the effects of the topography on point source emissions.

5. Jurisdictional boundaries (e.g., counties, air districts, pre-existing nonattainment areas, reservations, metropolitan planning organizations). Once the geographic area associated with the area violating the SO₂ standard and the nearby area contributing to violations were determined, we considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary for carrying out the air quality planning and enforcement functions for the nonattainment area. If an existing jurisdictional boundary is used to help define the nonattainment area, it encompasses all of the area that has been identified as meeting the nonattainment definition. These existing boundaries may include an existing nonattainment or maintenance area boundary, a county or township boundary, a metropolitan area boundary, an air management district, or an urban planning boundary established for coordinating business development or transportation activities. Where existing jurisdictional boundaries are not adequate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates are used.

MDNR recommended a partial county boundary for their nonattainment area boundaries, which was not the default boundary as per EPA's March 24, 2011 designations guidance. EPA evaluated MDNR's recommendations and analysis in assessing whether a partial county boundary was warranted considering the analysis supplied. We utilized the March 24, 2011 designation guidance and the five factor analysis described above to assess whether MDNR's nonattainment boundary recommendations met the criteria outlined in the March 2011 guidance.

Nonattainment Designation Technical Analysis for Jackson County, Missouri

Introduction

This technical analysis for Jackson County, Missouri identifies the part of the county with a monitor that violates the 2010 SO₂ NAAQS based on 2009-2011 data and evaluates sources in nearby counties in Missouri and the state of Kansas for contributions to the violating monitor in the Jackson county area. EPA has evaluated this county and nearby counties based on the weight of evidence of the factors recommended in the March 24, 2011, EPA guidance. Figure 1 depicts the initial nonattainment boundary and area that EPA is finalizing for Jackson County, Missouri. The figure also depicts the two monitors currently operating in the area, as well as SO₂ sources emitting greater than 1000 tons of SO₂ per year.

Figure 1: Map of Intended Nonattainment Area for Jackson County, MO

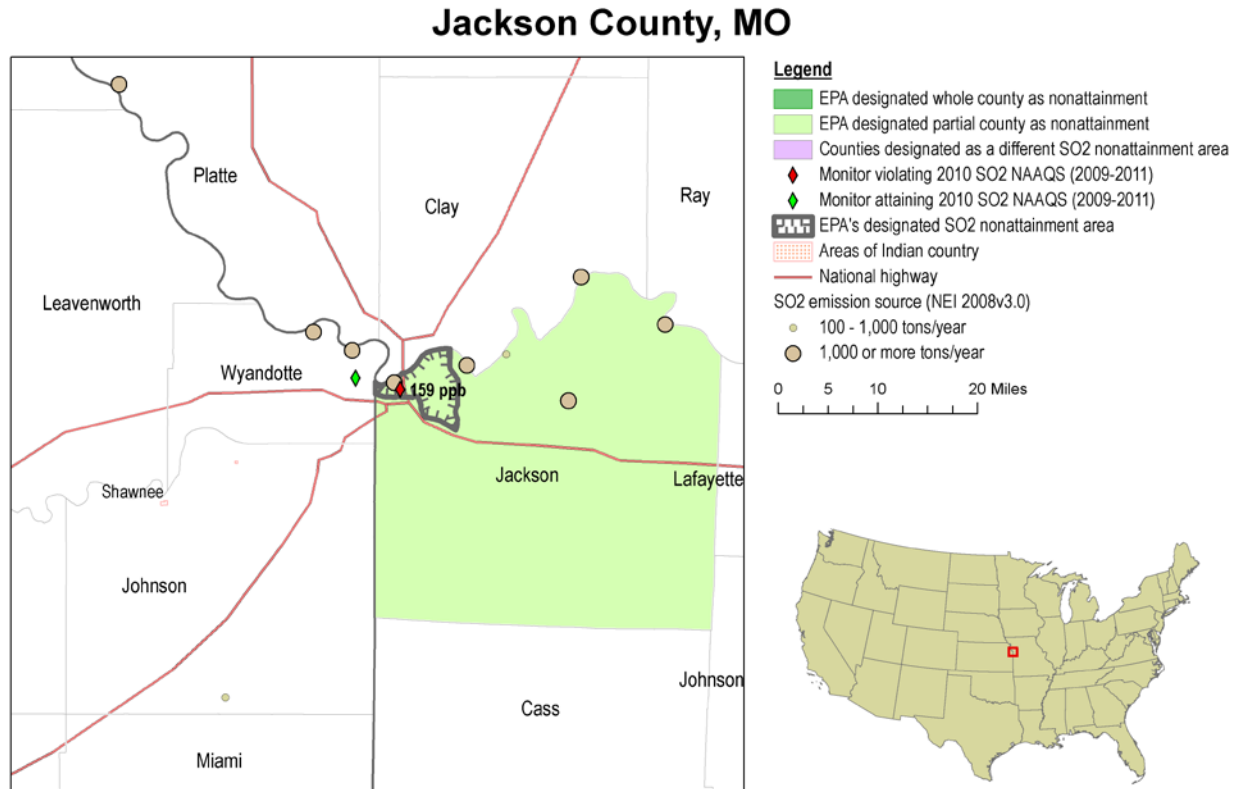
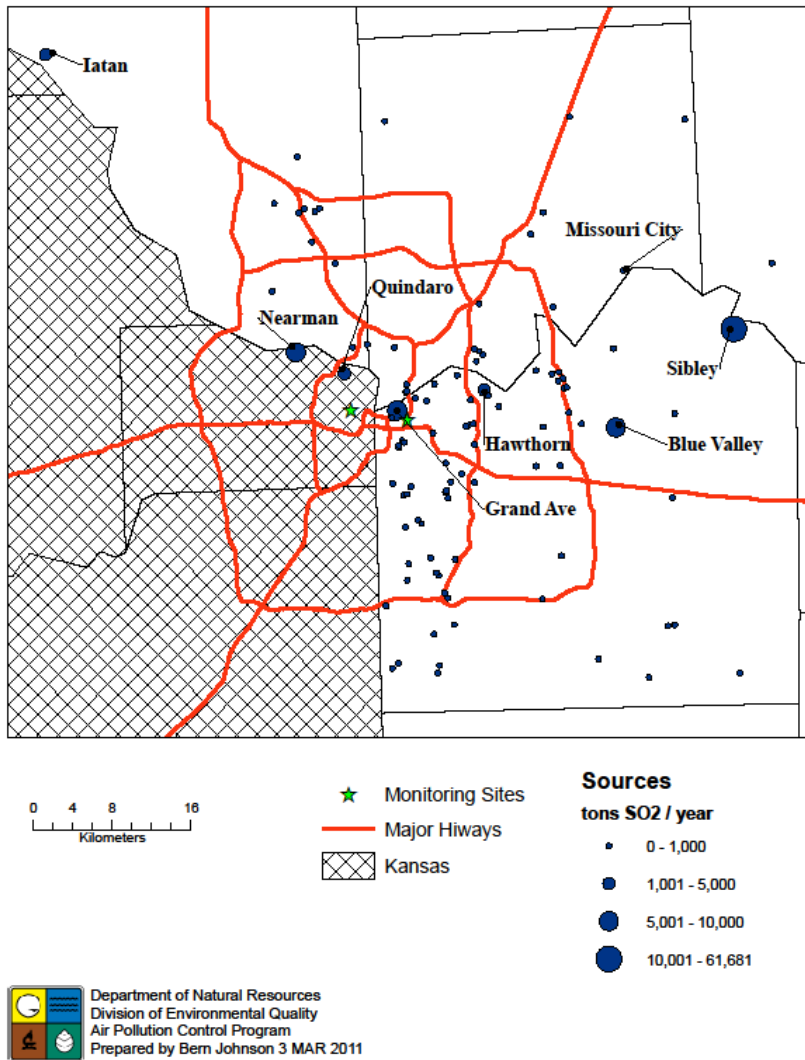


Figure 2 below depicts The Kansas City Metro Area with the state of Kansas shaded, SO₂ emitting sources in the NEI, the two monitoring locations (Troost in Missouri which is the violating monitor, and JFK on the KS side), and major highways.

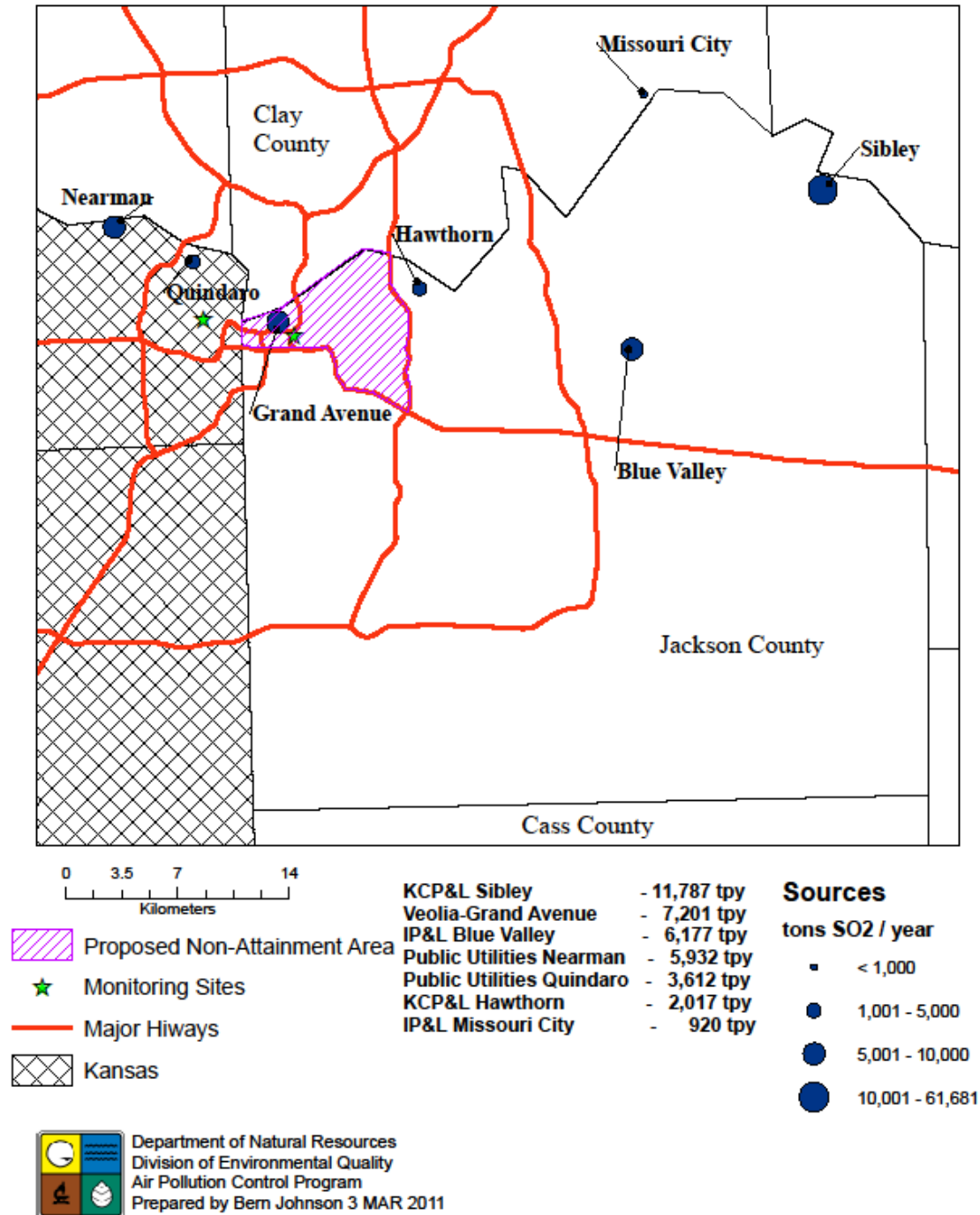
Figure 2: KC Metro Area Emission Sources and Monitoring Sites



In July of 2011, the Missouri Department of Natural Resource (MDNR) recommended that a portion of Jackson County, MO be designated as nonattainment for the 2010 SO₂ NAAQS based on monitored air quality data from 2007-2009.

Figure 3 depicts the Kansas City Metro Area showing the major sources of SO₂ emissions, monitoring locations, major roads, and the MDNR recommended nonattainment area for Jackson County, Missouri (shaded), which contains the violating monitor represented by a green star.

Figure 3: Missouri's Recommended Nonattainment Area for Jackson County



Based on EPA's technical analysis described below, EPA is initially designating a portion of Jackson County, Missouri as nonattainment for the 2010 SO₂ NAAQS based upon currently available information.

Detailed Assessment

Air Quality Data

This factor considers the SO₂ air quality monitoring data, including the design values (in ppb) calculated for all air quality monitors in both Jackson County, MO and Wyandotte County, KS (and the surrounding area) based on data for the 2009-2011 period.

MDNR's recommendation was based on data collected from monitor(s) located in the Kansas City, Missouri metropolitan area meeting the specifications of a Federal Reference Method (FRM) or Federal Equivalent Method (FEM) in accordance with 40 CFR Part 53 (see letter from Sara Parker Pauley Director of MDNR to Karl Brooks Region Administrator EPA Region 7 dated July 19, 2011) .

The 3 year design values ('09-'11) for the monitors in Jackson County, MO and Wyandotte County, KS, are shown in Table 2.

Table 2: Air Quality Data for Nonattainment Designation in Jackson County, Missouri

County	State Recommended Nonattainment?	Monitor Name	Monitor Air Quality System ID	Monitor Location	SO ₂ Design Value, 2009-2011 (ppb)
Jackson, Missouri	Yes	Troost	290950034	Jackson Co, MO	159
Wyandotte, KS	No	JFK		Wyandotte Co, KS	47

Jackson County, Missouri's Troost monitor shows a violation of the 2010 SO₂ primary NAAQS. Therefore, some area in Jackson County must be designated nonattainment. The absence of a violating monitor alone is not a sufficient reason to eliminate nearby counties as candidates for inclusion in a nonattainment area. Each area has been evaluated based on the weight of evidence of the five factors and other relevant information.

Of the two monitors in Kansas City Metro Area, only the Troost monitor has a design value in excess of the 1-hr SO₂ primary NAAQS. Due to the comparatively lower concentrations of ambient SO₂ recorded at the JFK monitor in KS (and the proximity of the JFK monitor to the two highest emitting sources in Wyandotte Co, KS, as well as the alignment of these sources with the Veolia/Trigen source in Missouri, and the Troost monitor) it is believed that the source most responsible for the monitored reading in excess of the NAAQS at the Troost monitor is the Veolia/Trigen source located in Jackson County, Missouri, and is encompassed by the nonattainment boundary recommended by MDNR. Veolia/Trigen provides steam and heat to the downtown area of Kansas City, Missouri, and currently operates with no pollution control equipment to capture or reduce its SO₂ emissions. Based on the information submitted to EPA by MDNR, and a careful evaluation of: 1) the location of monitors recording exceedances in the area; 2) the weather conditions during the times the area monitor[s] recorded exceedances (and/or high recorded measurements); and, 3) the location and size of sources emitting SO₂ in

and around the Kansas City Metro Area monitors for the years 2007 thru 2011, EPA believes the boundary recommended by MDNR for Jackson County, Missouri properly bounds the area of the county (and the source most likely to be primarily responsible for the area) not attaining the 2010 SO₂ primary NAAQS. We are not yet prepared to conclude that sources outside of this area contribute to the violating monitor or to other possible violations, and will further address these sources and their areas in a future final designations action.

Emissions and Emissions-Related Data

Evidence of SO₂ emissions sources in the vicinity of a violating monitor is an important factor for determining whether a nearby area is contributing to a monitored violation. For this factor, EPA evaluated county level emissions data for SO₂ and any growth in SO₂ emitting activities since the date represented by those emissions data.

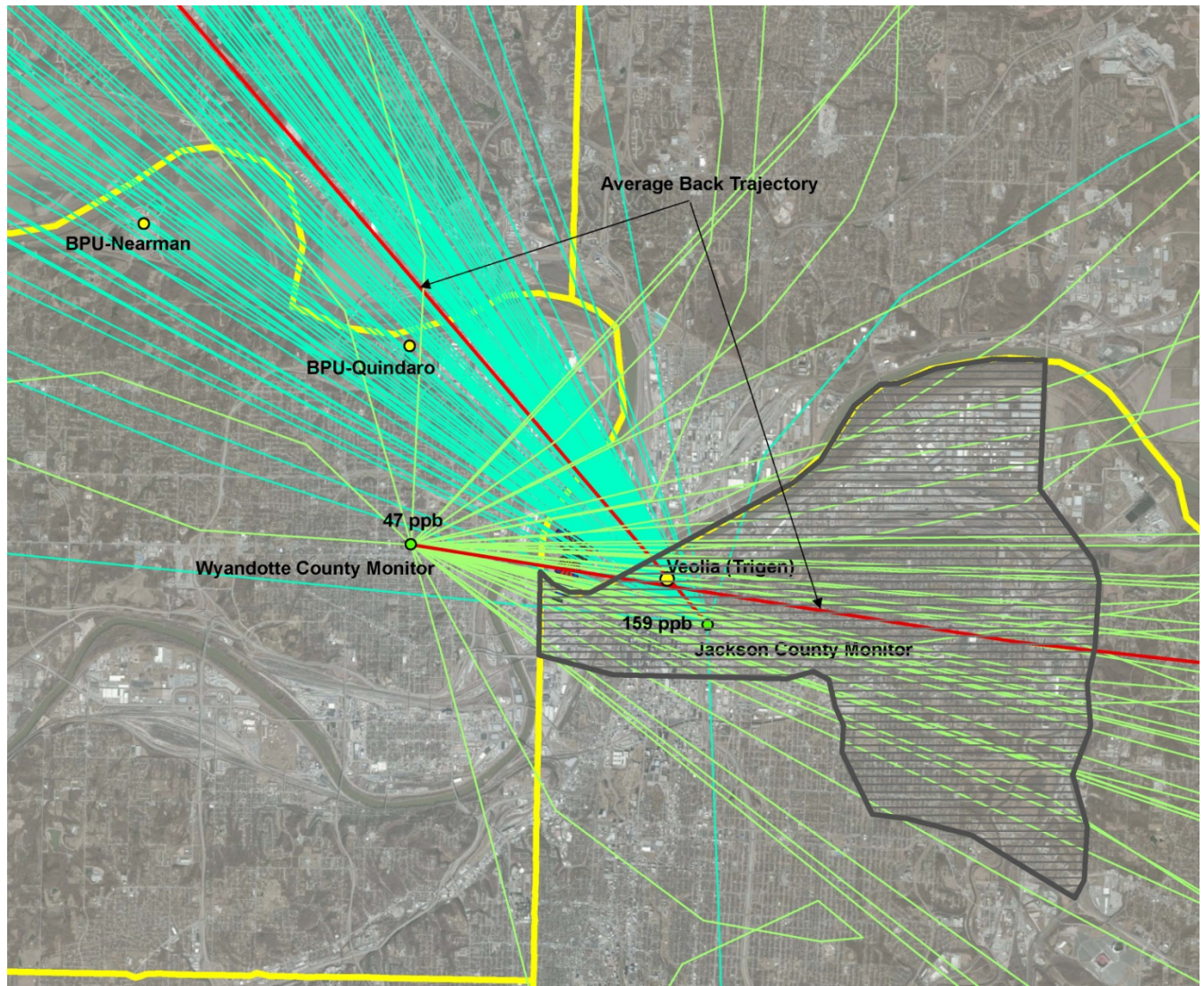
Emissions

The Kansas City Metropolitan Area (KC Metro Area) is composed of five counties in two states. The predominant counties of the metro area are Jackson County, MO and Wyandotte County, KS which lie in the heart of the area. In Jackson County, MO there are 66 NEI listed point sources of SO₂. In Wyandotte County, KS there are 21 NEI listed point sources of SO₂. The majority of the NEI listed sources in both counties emit much less than 100 tons of SO₂ per year. The largest sources of SO₂ in Wyandotte, KS are the Nearman and Quindaro Power Plants operated by the Board of Public Utilities. In the entire KC Metro Area there are 8 sources of SO₂ that emit over 1000 tons of per year, and are the focus of the analysis of Jackson County, Missouri. Of all the sources in KC Metro Area emitting over 1000 tons per year all but one are located on the Missouri River, with the remaining facility being located on the Kansas River.

It is important to note the location of the 2nd largest source of SO₂ emissions in the KC Metro Area which is the Grand Avenue (Veolia/Trigen) steam plant located approximately 3.2 miles upwind from the violating Troost monitor in Jackson County, MO, and the two largest sources of SO₂ emissions in Wyandotte County, KS, which are closer to the JFK monitor located in Wyandotte County, KS. BPU-Quindaro is approximately 1.3 miles from the non-violating Wyandotte County, KS monitor and 4.9 miles from the violating Jackson County, MO monitor. BPU-Nearman is approximately 4.8 miles from the non-violating Wyandotte County, KS monitor, and 8.2 miles from the violating Jackson County, MO monitor. Additionally, the two sources in Kansas and the Veolia/Trigen source in Missouri are fairly well aligned with the Troost monitor. This alignment of the KS sources, the Veolia/Trigen source in MO and Troost monitor obfuscates the limited contribution from the Kansas sources on the violating monitor in Jackson County, MO from the overwhelming contribution of the Trigen source on the monitor in Missouri. To assess the contribution of the Kansas sources on the violating monitor in Missouri, we prepared and analyzed back trajectories for the times in which both monitors (the Missouri Troost monitor and the Kansas JFK monitor) violated the standard or recorded high measurements. We found that both monitor's design values are being driven by the emissions from the Veolia/Trigen source in Jackson County, MO. The trajectories for the JFK monitor in Kansas show that when the monitor recorded its highest readings the winds are out of the east carrying emissions from the Veolia/Trigen to the monitor. Similarly, when the Troost monitor in Missouri records violations, the winds are out of the northwest carrying emissions from the

Veolia/Trigen source to the monitor driving the design value. Figure 4 shows the back trajectories analyzed for the 1-hr violations recorded at both the Troost and JFK monitors. The blue lines represent individual trajectories over an 8 hr period prior to the violation being recorded, and the red lines represent composites of all the blue lines for each monitor. These trajectories demonstrate that the Grand Avenue - Veolia/Trigen source is consistently the source most responsible for the 1-hr violations recorded at both the Troost monitor in Missouri, and the highest hourly readings recorded at the JFK monitor in Kansas.

Figure 4: Backtrajectories for the both the Troost and JFK monitors



Overall SO₂ emissions in Kansas City Metro Area were down about 35% in the year 2009 from 2007. This reduction was primarily due to scrubber controls installed at Kansas City Power & Light's (KCP&L) Iatan Plant in Platte County, Missouri and to a lesser degree related to reductions in electricity demand that was a result of a mild winter and summer seasons between the years 2008 and 2009. The largest source of SO₂ emissions in Jackson County, MO is the

Sibley power plant operated by KCP&L, however our analysis described above suggests there is a lesser impact from the direction of the Sibley source, likely due to the fact that the prevailing winds rarely blow from east to west and the plant is located approximately 20 miles east of the Troost monitor. The same holds for the other sources of SO₂ in the area (Hawthorn, Blue Valley and Clay County Power plants), which are east of the violating Troost monitor (i.e., against the prevailing winds) and at a distance that likely limits their impact on the concentrations being detected at the Troost monitor. There are also a significant number of minor sources scattered throughout the city limits of Kansas City and Independence, MO; however these sources have emissions below 10 tpy. For these sources that appear to have a lesser impact, EPA is not yet prepared to conclude that they contribute to the monitored violation or to other possible violations, and we will further address these sources and their areas in a future final designation action.

EPA recognizes that there may be important new information on emissions levels for the period after 2009, and would consider more recent information if available. MDNR provided emissions information for large sources of SO₂ in an around the three counties recommended for nonattainment for the years 2007 through 2009. During our review of MDNR's boundary recommendation, we relied on the 2008 National Emissions Inventory (NEI) as well as the emissions data supplied by the Missouri for the year 2009. The NEI is updated every three years (e.g., 2008, 2011, etc.) and provides a snapshot of the emissions from the identified sources for the update year. Additional emissions information was provided by the state of Missouri from state emission databases. We do not have emissions data on Quindaro and Nearman for the year 2007. The emission data for Jackson County and the KC area we relied on during our review is included in table 3 below. Table 3 shows total emissions of SO₂ (given in tons per year) for violating and potentially contributing counties in and around Jackson County, including Wyandotte County, KS for all sources emitting greater than 1000 tons of SO₂ per year.

Emissions Controls

The emissions data used by EPA in this technical analysis and provided below represent real emissions levels occurring at the sources and thus take into account any control strategies implemented on the stationary sources in Jackson County up to and including the year 2009. EPA received additional information on emissions reductions resulting from state and federally enforceable controls put into place up to 2010.

Table 3: Large Sources of SO₂ Emissions in and around Jackson County, Missouri

SO ₂ emissions (tpy)			
Facility	2007	2008	2009
Jackson County, MO			
KCP&L – Sibley	11,796	9,181	11,787
Veolia – Grand Ave	6,077	6,295	7,201
IP&L – Blue Valley	9,185	10,658	6,177
KCP&L – Hawthorn	1,923	1,725	2,017
Platte County, MO			
KCP&L- Iataan	14,290	15,077	1,923
Clay County, MO			
IP&L- Missouri City	5,040	2,952	920
MO Total	48,311	45,528	30,569
Wyandotte County, KS			
BPU – Nearman	NA	5,992	5,923
BPU- Quindaro	NA	3,901	3,612
KS Total	NA	9,893	9,535
Area Total	48,311*	55,421	39,569

*The total emissions in 2007 for the KC area does not include sources in Wyandotte, County KS and does not represent an increase in emissions between 2007 and 2008.

Also included in MDNR’s boundary recommendation technical support document is an assessment of the impact of federal regulations scheduled to become enforceable in the future. This information is not relevant to EPA’s nonattainment boundary analysis.

Meteorology (weather/transport patterns)

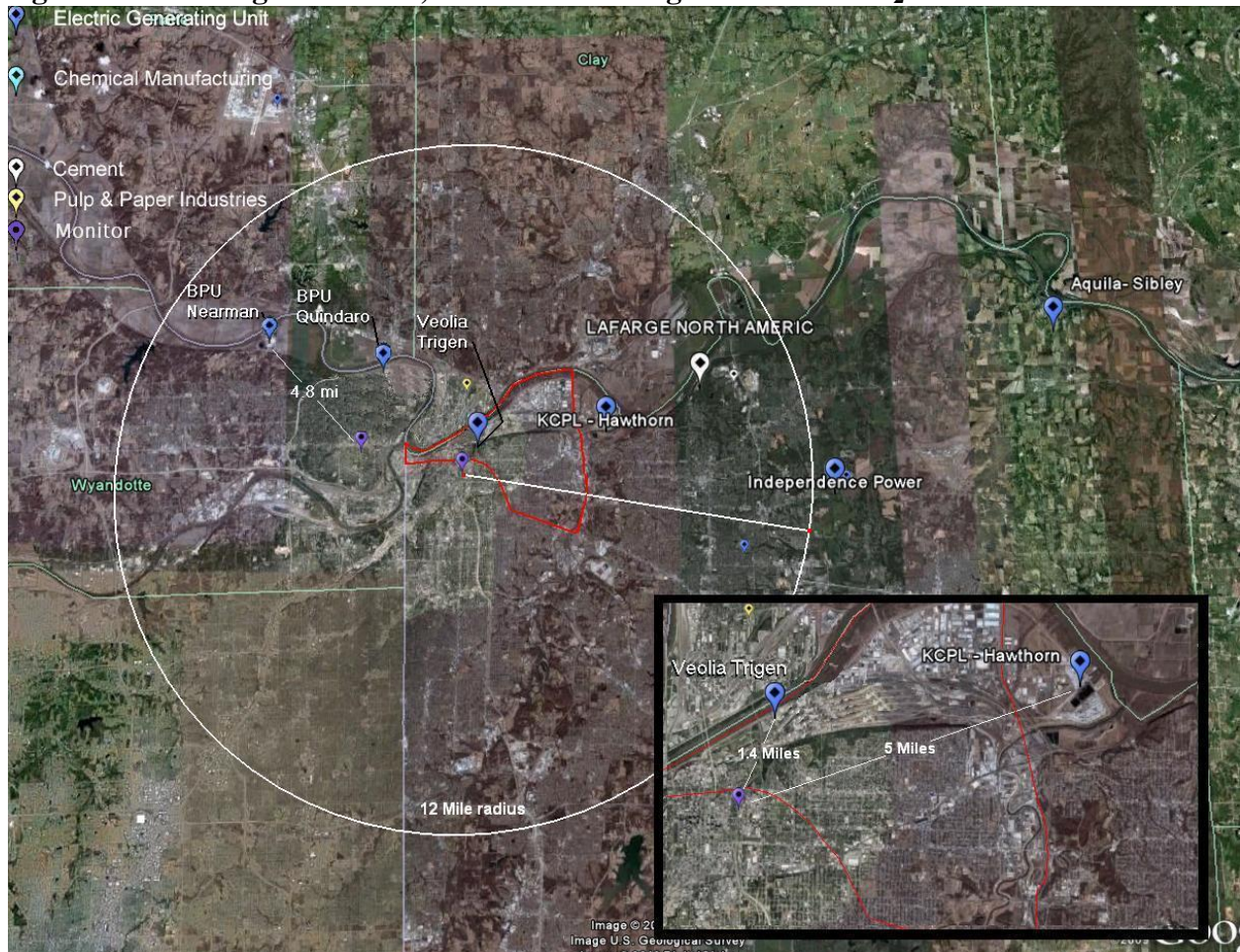
Evidence of source-receptor relationships between specific emissions sources and high SO₂ values at violating monitors is another important factor in determining the appropriate contributing sources and the appropriate extent of the nonattainment area boundary. For this factor, EPA considered recent hourly or sub-hourly meteorological data from the metrological site(s) nearest to the violating monitor to determine which wind vectors were associated with 1-hour SO₂ exceedances. For the nonattainment areas recommended by MDNR, the general meteorological data used in MDNR’s analysis were from the years 2005 and 2007. Additionally, MDNR utilized highly specific meteorological data for the days and hours proceeding high

monitored readings recorded by the violating monitor in Jackson County (this data used for HYSPLIT modeling and analysis discussed more fully in a later section). The meteorological stations this data was collected from are operated by National Weather Service (NWS) for the purposes of cataloging representative weather conditions in the area. The NWS meteorological stations used in both EPA's and MDNR's analysis are the stations in closest proximity to the violating monitor. In the case of Jackson County, Missouri, the meteorological station is 2.8 km (1.74 miles) from the Troost monitor. EPA believes that the meteorological analysis and data used by MDNR properly represents the meteorological conditions that impact SO₂ concentrations in the area of the violating monitor. In our review of MDNR's analysis, EPA used the same meteorological station as MDNR for each of the monitors, but considered differing years to assess the general conditions that exist in Jackson County. In this analysis, we reviewed MDNR's conclusions:

MDNR's Assessment of wind conditions in Missouri and Jackson County concludes that winds in the state of Missouri predominantly come from the Southeast and Northwest, and that, in general, winds from the Northeast are rare throughout the year. MDNR concludes that the greatest wind direction deviation in the county from the predominant wind pattern in the state routinely occurs in the 3rd quarter of the year and is representative when the winds predominantly come out of the Southwest.

Figure 5 shows a map of the meteorological data location with respect to the SO₂ monitors (small purple balloons), large SO₂ sources (large blue balloons) in the Jackson County, Missouri area, as well as the MDNR recommended nonattainment boundary outlined in red. Additionally, the meteorological station is located on the map and represented as a small white balloon.

Figure 5: Metrological Station, Monitor and Large Sources of SO₂

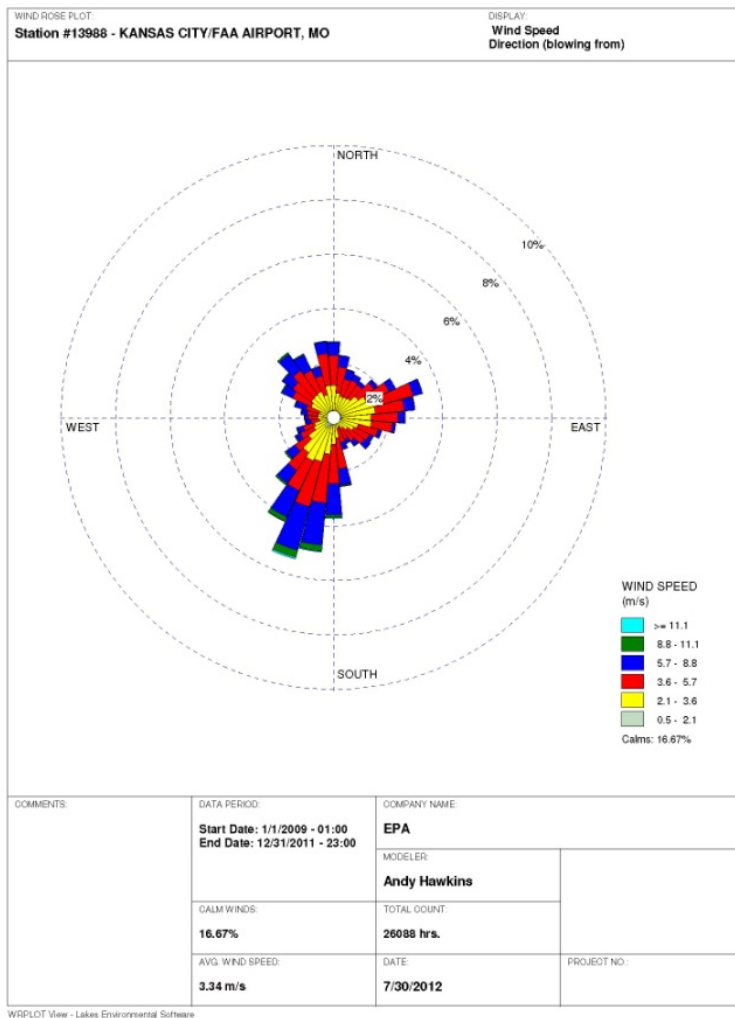


EPA's qualitative assessment of the quarterly wind rose analysis supplied by MDNR concludes that winds, monitored in Jackson Co, MO, blow with the greatest velocity and frequency out of the East - Northeast and to a lesser extent from the South, Southeast and Southwest. Please see the docket to review MDNR's wind rose analysis submitted to EPA. Due to this wind pattern sources North and South of the monitor (and within a distance that the source could impact the monitor) would have the greatest effect on the SO₂ concentrations recorded by the monitor on a regular basis. In the case of the Jackson County monitor this would suggest that the Veolia steam plant is the SO₂ source in the area that is most likely responsible for the SO₂ concentrations recorded at the Troost monitor and ambient SO₂ conditions existing in west central Jackson County, Missouri. As a result of the variation in elevations surrounding the confluence of the Kansas and Missouri River channels and the location of the Troost monitor in close proximity to the confluence, sources not in the immediate vicinity of the violating monitor may have a reduced impact due to the effects of wind channeling.

EPA performed a wind rose analysis for the years 2009 through 2011 (Figure 6), and the results show that winds in Jackson County predominantly blow out of the South-Southwest with the greatest frequency and intensity. However, winds also blow regularly out of the Northwest with

sufficient frequency and intensity to impact the monitor on a regular basis. This is not inconsistent with the results of MDNR’s analysis for the year 2005. The result suggest that sources to the South would have a greater impact on the monitor, but there are no sources to the South of the violating monitor that we are prepared to conclude are of sufficient size or within a sufficient range to likely impact the concentrations being recorded at the monitor. This leaves only the Veolia source which is located northwest of the monitor as the source most likely impacting the monitor. The winds out of the Northwest (i.e., Veolia) would blow emissions from this source in a direct line to the monitor and considering the source’s size and proximity to the monitor, the impact would be substantial.

Figure 6: EPA Wind Rose Analysis 2009-2011



MDNR submitted back trajectory analysis derived from the Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) model. EPA is not yet prepared to rely upon modeling in this first round of designations based on monitored violations, but for informational purposes we summarize MDNR's analysis here, and observe that it is not inconsistent with the rest of the analysis for this action. Back trajectory modeling assesses the path an air parcel travels during the previous 24 hours to arrive at particular time and location. For this modeling MDNR used meteorological data corresponding to the 4 highest monitored readings at the violating monitors in Jackson County, MO. MDNR submitted to EPA back trajectory analysis derived from the HYSPLIT model. Back trajectory modeling assesses the path an air parcel travels during the previous 24 hours to arrive at particular time and location. For this modeling MDNR used meteorological data corresponding to the 4 highest hourly monitored readings recorded at the violating monitor in Jackson County, MO. A summary of the analysis results from MDNR is discussed below. Please see the docket to review MDNR's HYSPLIT plots for Jackson County, MO which is summarized below.

Jackson County, Missouri HYSPLIT Analysis Summary

MDNR performed 12 composite trajectory analyses on days of recorded violations at the violating Troost Monitor. Eight of these trajectories come out of the northwest from the direction of the predominate source in the area (Grand Avenue/Veolia/Trigen). Those eight trajectories also align with two additional sources in Kansas (Nearman, and Quindaro plants) but due to the distance of these plants from the violating monitor, we are uncertain what contribution they make to the concentrations observed at the Troost monitor. We note that the four remaining trajectories originate from vectors which would not be conducive to KS emission contributions to the violating Troost monitor. In analyzing these trajectories, the Veolia/Trigen source remains the primary source of the violations based on the MO HYSPLIT analysis.

In addition to the above information, EPA notes two important points. First, EPA conducted a site-specific SO₂ source spatial observation analysis (found in the docket) that indicates the Veolia/Trigen plant is most likely to have the predominant impact on the violating Troost monitor due to its close proximity. Second, a review of the back trajectories for the high recorded concentration days at the Wyandotte County, KS monitor shows that on these "high" SO₂ days, the back trajectory most frequently implicates the MO Veolia/Trigen plant as the culpable, predominant contributor to these concentrations. Therefore, we conclude that (based on the MO HYSPLIT and EPA observations) the contribution of the Veolia/Trigen plant's emissions on the "high" value days at the nonviolating JFK monitor in KS, and the contribution of the Veolia/Trigen plant's emissions on the exceedance days at the violating Troost monitor are the predominant contributions compared to all other SO₂ sources in the area. For other sources outside of the area, we are not yet prepared to conclude that their emissions contribute to the monitored violation or to other possible violations, and we will further address these sources and areas in a future final designations action.

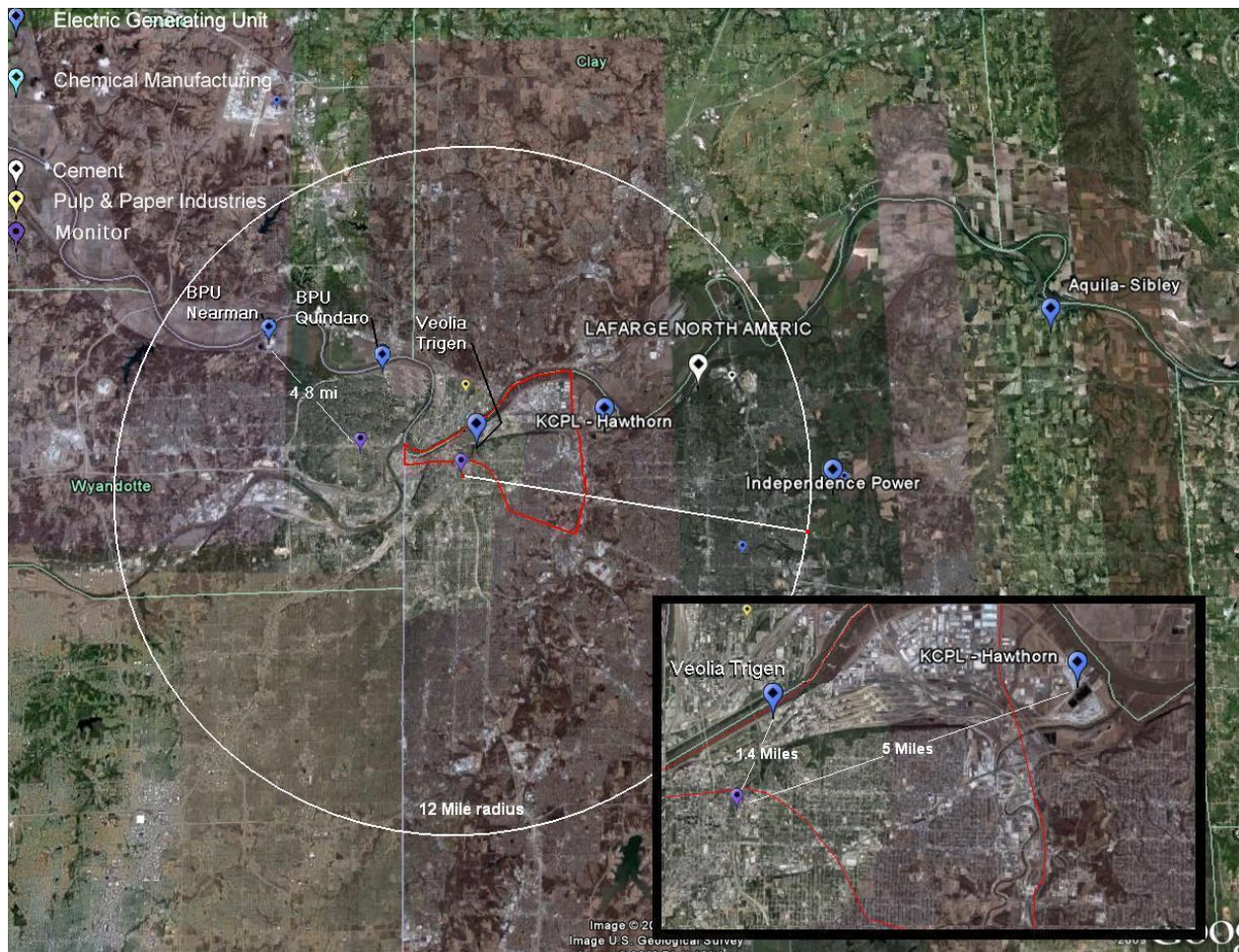
Geography/Topography (mountain ranges or other air basin boundaries)

In general, the Northern part of Missouri consists of open plains and contains few features that impede, restrict, or channel air speed and direction. The major geological features that can have

small localized effects on wind direction and inversion are the Mississippi and Missouri River valleys. Generally, the effects of the river valleys are to channel localized air movement in a North-South (Mississippi) or East-West (Missouri) wind direction. The effect is not expected to affect the concentrations of SO₂ observed at Jackson County monitoring location directly, but may result in limiting a sources impact on the Troost monitor. This is because of the location of the river valley relative to the location of the violating monitor in Jackson County, MO.

Figure 7 is a satellite image of the KC metro Area showing a 12 mile radius around the violating monitor, major SO₂ sources in the area, the MDNR recommended nonattainment area boundary (in red) and the land use and rivers surrounding the area.

Figure 7: Satellite Image Missouri's Recommended Nonattainment Boundary Jackson County



Jurisdictional Boundaries

The MDNR recommended nonattainment area includes the portion of Jackson County North of I-70/I-670 and West of I-435 bounded on the West by the state line with Kansas and on the North by the Missouri River. The boundaries of the nonattainment area contain the violating monitor in the county (the Troost Monitor) and the 2nd largest source of SO₂ emissions in the county – Veolia’s Grand Avenue facility.

The nonattainment boundaries recommended by MDNR include the following easily defined features – state, county or township boundaries, and large immovable features (rivers and highways). They are reasonable as they include the area surrounding the violating monitor, the source most likely contributing to the violating monitor, and are easily recognizable by the public.

Other Relevant Information

The existing information reviewed by EPA can be used to satisfactorily establish a nonattainment area boundary for the area.

Conclusion

The air quality monitor in Jackson County, Missouri shows a violation of the 2010 SO₂ NAAQS, based on 2009-2011 air quality data. Based on the consideration of all the relevant and available information, as described above, EPA is establishing the area described herein as the initial nonattainment area for the 2010 SO₂ NAAQS.

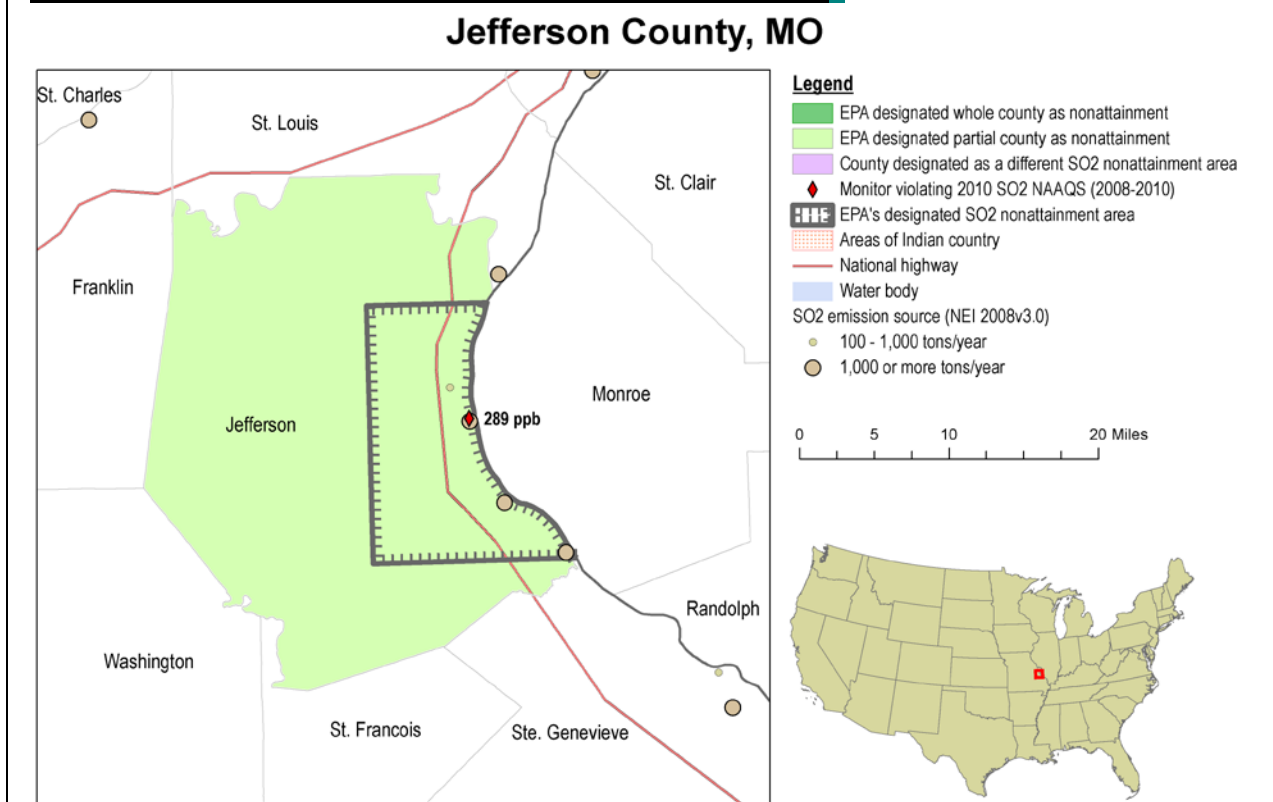
Areas and sources that we are not yet prepared to conclude are contributing to the monitored violation or other possible violations are not included in this initial nonattainment area. In a subsequent round of designations, we will further address such areas and sources and make final designations decisions for areas that are not currently included in the nonattainment areas addressed in this TSD.

Nonattainment Designations Technical analysis for Jefferson County, Missouri

Introduction

This technical analysis for Jefferson County, Missouri identifies the parts of the county with a monitor that violates the 2010 SO₂ NAAQS based on 2008-2010 data, and evaluates nearby counties for contributions to SO₂ concentrations in the area. EPA has evaluated the remainder of the county and nearby counties based on the weight of evidence of the factors recommended in the March 24, 2011, issued EPA guidance. Figure 8 depicts the initial nonattainment boundary and area that EPA is finalizing for Jefferson County, MO. The figure also depicts the two monitors currently recording design values exceeding the primary SO₂ NAAQS, as well as SO₂ sources emitting greater than 1000 tons of SO₂ per year.

Figure 8: Jefferson County, MO Nonattainment Boundary*

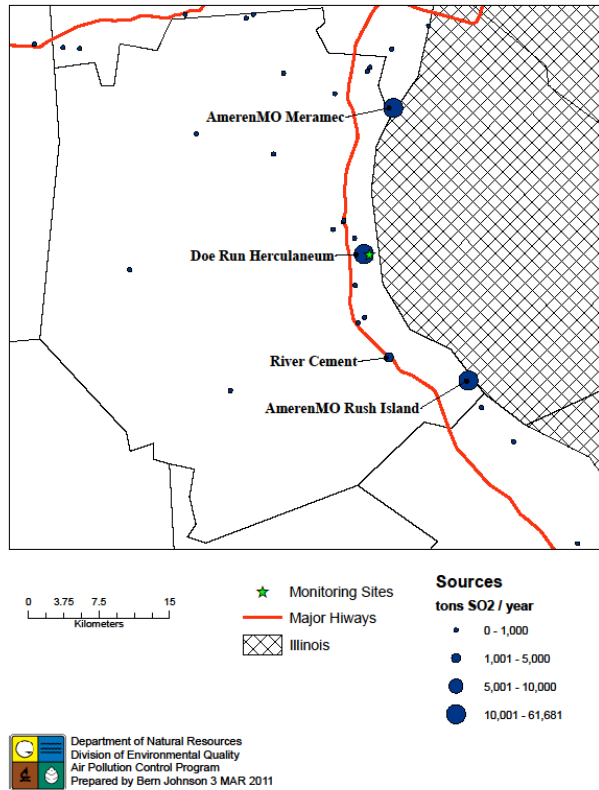


(*Note: Figure 15 in the EPA's draft TSD displayed inaccurate information for the Jefferson County area with respect to monitors and design values being used for the proposed nonattainment designation and boundary. Table 8 of the EPA's draft TSD contained the accurate design value that the EPA based its proposed nonattainment designation upon, and Figure 8 of this TSD has been revised accordingly.)

Figure 9 below depicts the Jefferson County area and includes sources of SO₂ emissions in Jefferson and surrounding counties, the violating monitor, as well as major highways. It is valuable to note that the largest single source of SO₂ emissions in the area consists of Doe Run Lead Smelter and it is located in East-Central Jefferson County in the township of Herculanum.

The Doe Run Lead Smelter is also the single largest source of SO₂ emissions in the state Missouri.

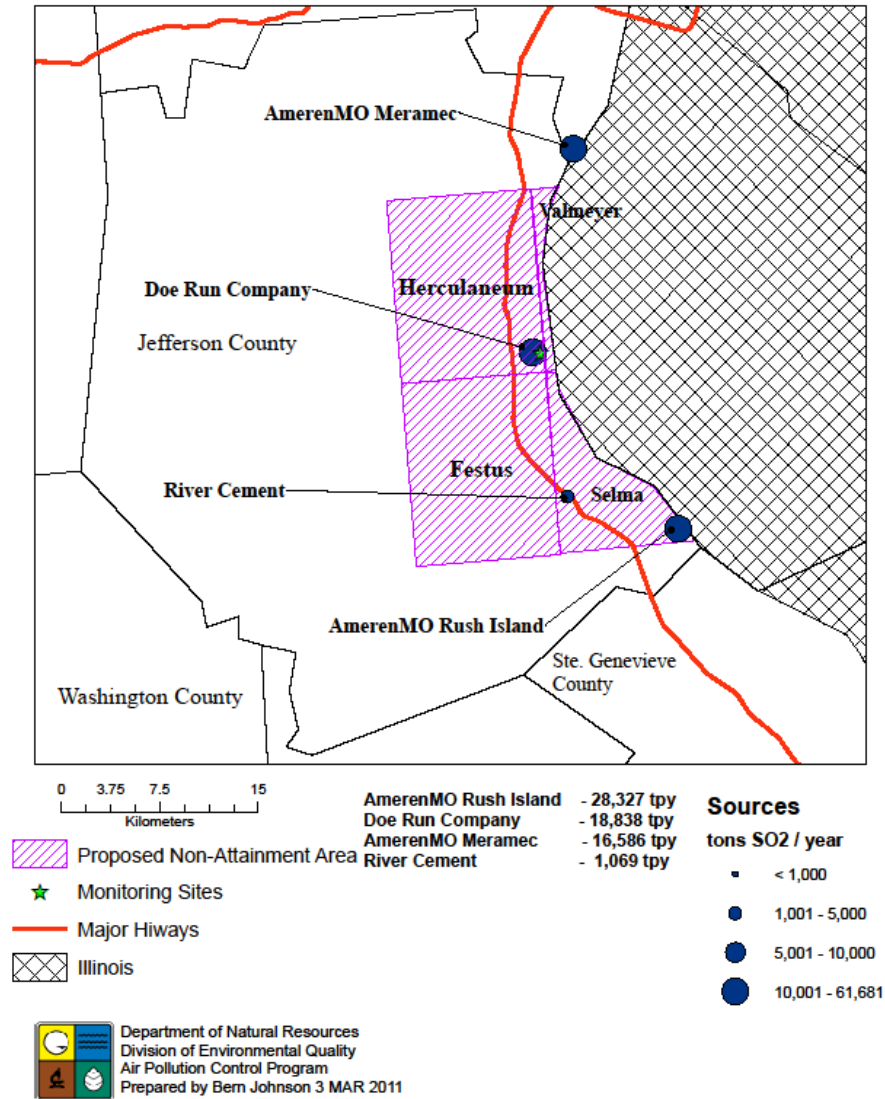
Figure 9: Jefferson Co, Missouri Emission Sources and Monitoring Sites



In July of 2011, the Missouri Department of Natural Resource (MDNR) recommended that part of Jefferson county be designated as nonattainment for the 2010 SO₂ NAAQS based on monitored air quality data from 2007-2009.

Figure 10 depicts the area of nonattainment recommended by MDNR, the location of the significant sources in the nonattainment area, the violating monitor, and the township boundaries in Jefferson County included in the area of nonattainment.

Figure 10: Missouri's Recommended Nonattainment Boundary for Jefferson County



Based on EPA's technical analysis described below, EPA is initially designating a portion of Jefferson County, Missouri as nonattainment for the 2010 SO₂ NAAQS based upon currently available information.

Detailed Assessment

Air Quality Data

This factor considers the SO₂ air quality monitoring data, including the design value (in ppb) calculated for all air quality monitors in Jefferson Counties Missouri, and the surrounding area based on data for the 2008-2010 period.

MDNR's recommendation was based on data collected from monitor(s) located in the state meeting the specifications of a Federal Reference Method (FRM) or Federal Equivalent Method (FEM) in accordance with 40 CFR Part 53 (see letter from Sara Parker Pauley Director of MDNR to Karl Brooks Region Administrator EPA Region 7 dated July 19, 2011) .

The 3-year design value for 2008-2010 for the SO₂ NAAQS for Jefferson County, MO is shown below in table 4.

Table 4: Air Quality Data for Nonattainment Designations in Missouri

County	State Recommended Nonattainment?	Monitor Name	Monitor Air Quality System ID	Monitor Location	3 yr SO ₂ Design Value (ppb) '08 thru '10
Jefferson, MO	Yes	Herculaneum Main Street	290990004	Jefferson Co, MO	289
Jefferson, MO	Yes	Herculaneum Mott Street*	290990027	Jefferson Co, MO	NA

*Mott Street monitor was relocated from Main Street in 2011

** Data for Mott and Main Street monitor locations is incomplete in 2011. The monitor was shutdown during for an extended period.

EPA was unable to establish a valid design for Jefferson County, Missouri for years 2009 to 2011 due to incomplete monitoring data for 2011. However, the valid design value for Jefferson County, Missouri for the years 2008 to 2010 shows a violation of the 2010 SO₂ primary NAAQS. In response to the incomplete data for 2011, EPA elected to use the 2008 through 2010 data to establish a valid design value because the monitored results are representative of the ambient conditions that exist in the area. As a result of the violating design value for 2008 through 2010, some area in this county must be designated nonattainment. The absence of a violating monitor alone is not a sufficient reason to eliminate nearby counties as candidates for inclusion in a nonattainment area. Each area has been evaluated based on the weight of evidence of the five factors and other relevant information.

The monitor in Jefferson Co, MO recording ambient air concentrations of SO₂ is showing a concentration substantially in excess of the 1-hr SO₂ primary NAAQS. The location of the monitor, the surrounding terrain, and the meteorological conditions that exist during the recorded violations suggest that the source of the SO₂ in the area is the Doe Run Lead Smelter. The nonattainment boundary recommended by MDNR appropriately captures the Doe Run sources and properly bounds the area of nonattainment considering these factors.

The design value establishing Jefferson County, Missouri as nonattainment for the 2010 1-hr primary SO₂ NAAQS is based on data collected between 2008 – 2010 rather than 2009 – 2011. This is because the original monitor, the Herculaneum Main Street Monitor (AQS ID 290990004) was shutdown and moved to a new location less than 1 block from the previous location on May 23, 2011. The monitor was restarted on June 15, 2011 in its new location on Mott Street (AQS ID 290990027), but the due to the period of shutdown, the data set for 2011

was no longer complete for purposes of establishing a design value for the 2010 1-hr primary SO₂ NAAQS.

The monitor was relocated because the property where it was located on Main Street (previously owned by the City of Herculaneum) was purchased by the ownership of the Doe Run Lead Smelter, and MDNR no longer had access to operate the monitor by the new property owner.

EPA believes that the new monitoring location (on Mott Street) is in close enough proximity to the previous (main Street) location that the data for ambient concentrations of SO₂ could be combined (and a review of the data show consistent SO₂ concentration measurements before and after the move); however, the lack of data collection between May 23, 2011, and June 15, 2011 caused the data to be incomplete under the provisions of 40 CFR Part 50 Appendix T, and therefore could not be used to establish a design value directly. Using data from both monitor locations and combining for the years 2009-2011, and using a conservative method of replacing missing data with zeros, the design value would be 164ppb, which is a violation of the 2010 SO₂ primary NAAQS. In response to this situation, EPA elected to establish the design value in support of the nonattainment boundary designation based on 2008 – 2010 data from the Main Street monitor, as that data is complete and continues to represent the ambient concentrations of SO₂ that exist in the area at the present time.

Emissions and Emissions-Related Data

Evidence of SO₂ emissions sources in the vicinity of a violating monitor is an important factor for determining whether a nearby area is contributing to a monitored violation. For this factor, EPA evaluated county level emissions data for SO₂ and any growth in SO₂ emitting activities since the date represented by those emissions data.

Emissions

There are 14 sources of SO₂ listed in the NEI in operation in Jefferson County. Of these sources only 4 have emissions of greater than 1000 tons of SO₂ per year, and are considered significant sources of SO₂ in the Jefferson County area. All major SO₂ sources in Jefferson County are located along the Mississippi River. Overall SO₂ emissions were down about 24% from 2007-08. This was due to a new, more accurate method of measurement at the Doe Run's Herculaneum smelter (which resulted in a correction of almost minus 50%), and reductions in electricity demand due to the recession and a mild summer. There are no significant sources west of Interstate 55 in the Jefferson County area.

EPA recognizes that there may be important new information on emissions levels for the period after 2008, and would consider more recent information if available. MDNR provided emissions information for large sources of SO₂ in an around the counties recommended for nonattainment for the years 2007 through 2009 as shown in Table 5. During our review of MDNR's boundary recommendation, we relied on the 2008 National Emissions Inventory (NEI) as well as the emissions data supplied by the Missouri for the year 2009. The emission data for each county we relied on during our review is included in table 5 below. The table shows total emissions of

SO₂ (given in tons per year) for violating and potentially contributing counties in and around Jefferson County, including all sources emitting greater than 1000 tons per year of SO₂.

Emissions Controls

The emissions data used by EPA in this technical analysis and provided below represent real emissions levels occurring at the sources and thus take into account any control strategies implemented on the stationary sources in Jefferson County up to and including the year 2009.

Table 5: Large Sources of SO₂ Emissions in and around Jefferson County, Missouri

Facility	SO ₂ emissions (tpy)		
	2007	2008	2009
Jefferson County			
Ameren MO - Rush Island	22,058	29,593	28,327
Doe Run – Herculaneum	32,904	35,998	18,842
River Cement – Selma	3,018	2,758	1,069
St. Louis County			
Ameren MO – Meramec	22,769	20,827	16,856
Total	80,749	89,176	65,094

EPA received additional information on emissions reductions resulting from state and federally enforceable controls put into place up to 2010.

Also included in MDNR’s boundary recommendation technical support document is an assessment of the impact of federal regulations scheduled to become enforceable in the future. This information is not relevant to EPA’s nonattainment boundary analysis.

Meteorology (weather/transport patterns)

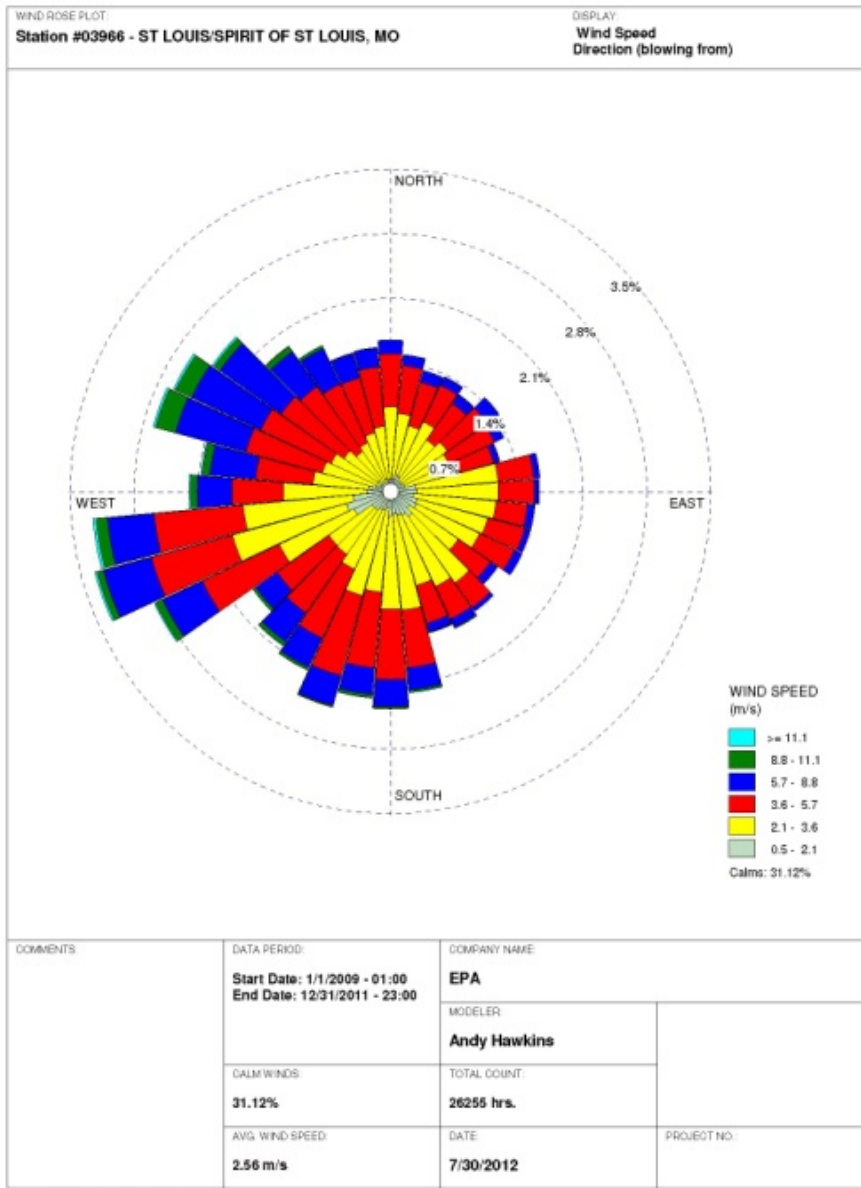
Evidence of source-receptor relationships between specific emissions sources and high SO₂ values at violating monitors is another important factor in determining the appropriate contributing areas and the appropriate extent of the nonattainment area boundary. For this factor, EPA considered recent hourly or sub-hourly meteorological data from the metrological site(s) nearest to the violating monitor(s) to determine which wind vectors were associated with 1-hour SO₂ exceedances. For the nonattainment areas recommended by MDNR, the general meteorological data used in MDNR’s analysis were from the years 2005 and 2007. Additionally, MDNR utilized highly specific meteorological data for the days and hours proceeding high monitored readings recorded by the violating monitors in Jefferson County (this data used for HYSPLIT modeling and analysis discussed more fully in a later section). The meteorological

stations this data was collected from are operated by National Weather Service (NWS) for the purposes of cataloging representative weather conditions in the area. The NWS meteorological stations used in both EPA's and MDNR's analysis are the stations in closest proximity to the violating monitor – in the case of Jefferson County analysis the nearest MWS station is located in St Louis, MO at the Spirit of St. Louis Airport approximately 50.0 km (32 miles) away from the violating monitor in Jefferson County . EPA believes that the meteorological analysis and data used by MDNR properly represents the meteorological conditions that impact SO₂ concentrations in the area of the violating monitor. In our review of MDNR's analysis, EPA used the same meteorological station as MDNR for each of the monitors, but considered differing years to assess the general conditions that exist in Jefferson County. In this analysis we confirmed MDNR's conclusions for Jefferson County, MO: Winds in the state of Missouri predominantly come from the Southeast and Northwest. Winds from the Northeast are rare throughout the year. The greatest wind direction deviation in Jefferson County from the predominant wind patten in the state routinely occurs in the 2nd quarter of the year and is representative when the wind predominantly comes out of an area that varies equally from Southeast to Northwest.

MDNR supplied Wind Rose Data for Jefferson County, Missouri. Please see the docket to review MDNR's wind rose analysis submitted to EPA. EPA's qualitative assessment of the quarterly wind rose data for Jefferson county concludes that winds in the area blow consistently from all directions, but more consistently from headings that fall within an arc from the North through the West to the East. This pattern suggests that sources both North and South of the violating monitor may influence the concentrations detected at the monitor. However, because the source's – north and south of the violating monitor - location on the Mississippi River and the violating monitor's location higher in elevation East of the Mississippi river, and the propensity of the localized topography of the river valley to disperse the emission along the river valley, EPA is not yet prepared to conclude that the sources North of the violating monitor are having an impact on the violating monitor. We will further address these sources in a future final designations action. This leaves the Doe Run Lead Smelter in closest proximity to the violating monitor and Rush Island, which is south of the violating monitor, as having the most likely significant impact.

EPA performed a wind rose analysis for the years 2009 through 2011 (Figure 11) the results show that winds in Jefferson County predominantly blow out of the West-Southwest with the greatest frequency and intensity. However, winds also blow regularly out of the West-Northwest and South with sufficient frequency and intensity to impact the monitor on a regular basis. This is not inconsistent with the results of MDNR's analysis for the year 2005. The result suggest that sources to the South and North-Northwest would have a greater impact on the monitor, which would include both the Rush Island Power Plant and the Doe Run Lead Smelter.

Figure 11: EPA Wind Rose Analysis 2009-2011



In addition to the meteorological wind rose analysis MDNR submitted back trajectory analysis derived from the Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) model. EPA is not yet prepared to rely upon modeling in this first round of designations based on monitored violations, but for informational purposes we summarize MDNR's analysis here, and observe that it is not inconsistent with the rest of the analysis for this action. Back trajectory modeling assesses the path an air parcel travels during the previous 24 hours to arrive at particular time and location. For this modeling MDNR used meteorological data corresponding

to the 4 highest monitored readings at each of the violating monitors in the state (i.e., in Jackson and Jefferson Counties, MO) The results of this analysis for can be found in the final recommendations submitted by MDNR to EPA in the Docket for this action.

Jefferson County, Missouri Summary of HYSPLIT Analysis

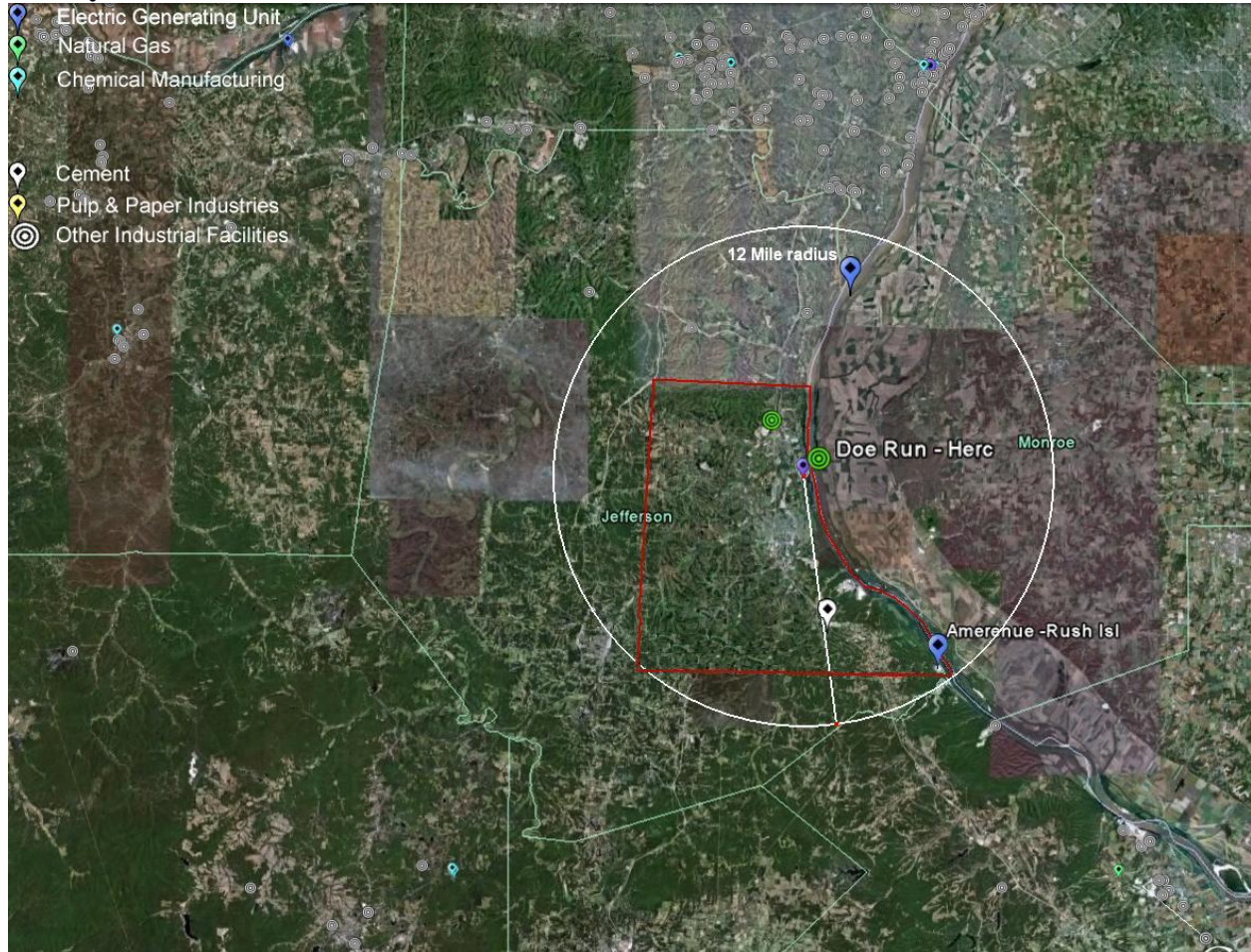
MDNR performed 12 composite trajectory analyses on days of recorded violations, and eleven of the trajectories come from the South moving up the Mississippi River Valley. The 12th trajectory comes from the West. The result of these trajectories suggest the primary source of SO₂ concentrations observed at the Herculaneum Main Street monitor is from a heading slightly South from the direction of the Mississippi River Valley. This would strongly suggest that most significant source of SO₂ emissions in the area of the violating monitor in Herculaneum is Doe Run Smelter. The nonattainment boundary recommended by MDNR properly includes the sources of SO₂ emissions and the area where the SO₂ concentration in the ambient air violates the NAAQS.

Geography/Topography (mountain ranges or other air basin boundaries)

In general, the Northern part of Missouri consists of open plains and contains few features that impede, restrict, or channel air speed and direction. The major geological features that can have small localized effects on wind direction and inversion are the Mississippi and Missouri River valleys. Generally, the effects of the river valleys are to channel localized air movement in a North-South (Mississippi) or East-West (Missouri) wind direction. The effect is not expected to affect the concentrations of SO₂ observed at the monitoring locations (because there are no SO₂ sources directly East or west of the violating monitor), but could result in limiting the sources that impact a particular monitor. The channeling effect of the Mississippi River valley is expected to be limiting the affect that both the Meramec and Rush Island power plants have on the violating monitor in Herculaneum township. The monitors location adjacent to the Doe Run Lead Smelter (the largest source of SO₂ emissions in Missouri) as well as the consistently high concentrations recorded by the monitor on days of varying wind direction leads EPA to conclude that the Doe Run Smelter is the primary contributor of ambient SO₂ concentrations recorded at the Herculaneum monitor and that one of the two power plants in closest proximity is having a measureable impact on the monitor.

Figure 12 shows the Jefferson County Area including the location of the violating monitor (purple balloon), a 12 mile radius around the violating monitor (white balloon) and major sources of SO₂ in the area (blue balloons), as well as the MDNR recommended nonattainment area (outlined in red).

Figure 12: Satellite Image Missouri's Recommended Nonattainment Boundary Jefferson County



Jurisdictional Boundaries

The Jefferson County, MO Nonattainment Area includes a part of Jefferson County which consists of both Herculaneum and Festus townships as the Western, Northern, and Southern boundary of the nonattainment area, and those portions of Valmeyer and Selma townships directly to the East that separate Herculaneum and Festus townships from the Mississippi River as the Eastern boundary of the nonattainment area. This area includes the Doe Run Lead Smelter nearly at its center and includes the Ameren power plant (approximately 15 km) South of the violating monitor (Rush Island Power Plant), but does not include the Ameren plant to the North

The nonattainment boundaries recommended by MDNR include the easily defined features – the township boundaries, as well as a large immovable feature (the Mississippi Rivers). They are reasonable as they include the area surrounding the violating monitor, the source(s) most likely contributing to the violating monitor, and are easily recognizable by the public.

Other Relevant Information

The existing information reviewed by EPA can be used to satisfactorily establish a nonattainment area boundary for the area.

Conclusion

The air quality monitor in Jefferson County shows a violation of the 2010 SO₂ NAAQS, based on 2008-2010 air quality data. Based upon the consideration of all relevant and available information, as described above, EPA is initially establishing the area described herein as nonattainment for the 2010 SO₂ NAAQS.

Areas and sources that we are not yet prepared to conclude are contributing to the monitored violation or other possible violations are not included in this initial nonattainment area. In a subsequent round of designations, we will further address such areas and sources and make final designations decisions for areas that are not currently included in the nonattainment areas addressed in this TSD.