Final Technical Support Document

Illinois
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 (the EPA, or the Agency) must designate areas as either "unclassifiable," "attainment," or "nonattainment" for the 2010 1-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS). Section 107(d) of the CAA defines a nonattainment area as one that does not meet the NAAQS or that contributes to a NAAQS violation in a nearby area, an attainment area as any area other than a nonattainment area that meets the NAAQS, and an unclassifiable area as any area that cannot be classified on the basis of available information as meeting or not meeting the NAAQS.

July 2, 2016, is the deadline established by the U.S. District Court for the Northern District of California for the EPA to designate certain areas. This deadline is the first of three deadlines established by the court for the EPA to complete area designations for the 2010 SO_2 NAAQS. This deadline applies to five areas in Illinois because five emission sources meet the criteria for applicability of this deadline under the court's order.

Illinois submitted updated recommendations on September 18, 2015. Table 1 below lists Illinois's recommendations and identifies the counties in Illinois that the EPA is designating in order to meet the July 2, 2016, court-ordered deadline. These final designations are 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 – Illinois' Recommended and the EPA's Final Designations

Area	Illinois' Recommended Area Definition	Illinois' Recommended Designation	the EPA's Final Area Definition	the EPA's Final Designation
Jasper County Area, Illinois	Jasper County	Attainment	Same as State's Recommendation (Jasper County, IL)	Unclassifiable/ Attainment
Alton Township Area, Illinois	Within Alton Twp. of Madison Co., Area east of Corporal Belchik Memorial Expressway, south of East Broadway, south	Nonattainment	Same as State's Recommendation (Alton Township, IL)	Nonattainment

	of Route 3, and north of Route 143			
Wood River Township Area, Illinois	Within Madison Co., All of Wood River Township, and the area north of Cahokia Diversion Channel in Chouteau Township.	Attainment	Same as State's Recommendation (Wood River Township, IL)	Unclassifiable/ Attainment
Rest of Madison County, Illinois	Within Madison Co.: Remainder of Madison County.	Unclassifiable	Not applicable	No designation
Massac County Area, Illinois	Massac County	Attainment	Same as State's Recommendation (Massac County, IL)	Unclassifiable/ Attainment
Putnam/Bureau County Area, Illinois	Putnam County and Bureau County	Attainment	Same as State's Recommendation (Putnam/Bureau Counties, IL)	Unclassifiable/ Attainment
Williamson County Area, Illinois	Williamson County	Attainment	Same as State's Recommendation (Williamson County, IL)	Nonattainment

Background

On June 3, 2010, the EPA revised the primary (health based) SO_2 NAAQS by establishing a new 1-hour standard at a level of 75 parts per billion (ppb) which is met at an ambient air quality monitoring site when the 3-year average of the 99th percentile of 1-hour daily maximum concentrations does not exceed 75 ppb. This NAAQS was published in the *Federal Register* on June 22, 2010 (75 FR 35520), and is codified at 40 CFR 50.17. The EPA determined this is the level necessary to protect public health with an adequate margin of safety, especially for children, the elderly, and those with asthma. These groups are particularly susceptible to the health effects associated with breathing SO_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, codified at 40 CFR 50.5, has not been revised, and the EPA is also not currently designating areas on the basis of the secondary standard.

General Approach and Schedule

Section 107(d) of the CAA requires that not later than 1 year after promulgation of a new or revised NAAQS, state governors must submit their recommendations for designations and boundaries to the EPA. Section 107(d) also requires the EPA to provide notification to states no less than 120 days prior to promulgating an initial area designation that is a modification of a state's recommendation. If a state does not submit designation recommendations, the EPA may promulgate the designations that it deems appropriate without prior notification to the state, although it is our intention to provide such notification when possible. If a state or tribe disagrees with the EPA's intended designations, it is given an opportunity within the 120-day period to demonstrate why any proposed modification is inappropriate. The EPA is required to complete designations within 2 years after promulgation of a new or revised NAAQS, unless the EPA determines that sufficient information is not available, in which case the deadline is extended to 3 years. The 3-year deadline for the revised SO_2 NAAQS was June 2, 2013.

On August 5, 2013, the EPA published a final rule establishing air quality designations for 29 areas in the United States for the 2010 SO_2 NAAQS, based on recorded air quality monitoring data from 2009 - 2011 showing violations of the NAAQS (78 FR 47191). In that rulemaking, the EPA committed to address, in future actions, the designations for all other areas for which the Agency was not yet prepared to issue designations. The EPA designated portions of Cook and Will and Peoria and Tazewell Counties in Illinois as nonattainment in this initial set of designations.

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

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

[1] 40 CFR 50.4(e) provides that the two prior primary NAAQS will no longer apply to an area 1 year after its designation under the 2010 NAAQS, except that for areas designated nonattainment under the prior NAAQS as of August 22, 2010, and areas not meeting the requirements of a SIP Call under the prior NAAQS, the prior NAAQS will apply until that area submits and the EPA approves a SIP providing for attainment of the 2010 NAAQS. No areas in Illinois are designated nonattainment or subject to a SIP Call for a prior SO_2 NAAQS.

2010 SO_2 NAAQS, and (2) areas that contain any stationary sources that had not been announced as of March 2, 2015, for retirement and that, according to the EPA's Air Markets Database, emitted in 2012 either (i) more than 16,000 tons of SO_2, or (ii) more than 2,600 tons of SO_2 with an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/mmBTU). Specifically, a stationary source with a coal-fired unit that, as of January 1, 2010, had a capacity of over 5 megawatts and otherwise meets the emissions criteria, is excluded from the July 2, 2016, deadline if it had announced through a company public announcement, public utilities commission filing, consent decree, public legal settlement, final state or federal permit filing, or other similar means of communication, by March 2, 2015, that it will cease burning coal at that unit.

The last two deadlines for completing remaining designations are December 31, 2017, and December 31, 2020. The EPA has separately promulgated requirements for state and other air agencies to provide additional monitoring or modeling information on a timetable consistent with these designation deadlines. We expect this information to become available in time to help inform these subsequent designations. These requirements were promulgated on August 21, 2015 (80 FR 51052), in a rule known as the SO_2 Data Requirements Rule (DRR), codified at 40 CFR part 51 subpart BB.

Updated designations guidance was issued by the EPA through a March 20, 2015, memorandum from Stephen D. Page, Director, U.S. the EPA, Office of Air Quality Planning and Standards, to Air Division Directors, U.S. the EPA Regions 1-10. This memorandum supersedes earlier designation guidance for the 2010 SO_2 NAAQS, issued on March 24, 2011, and it identifies factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO_2 NAAQS. The guidance also contains the factors the EPA intends to evaluate in determining the boundaries for all remaining areas in the country, consistent with the court's order and schedule. These factors include: 1) Air quality characterization via ambient monitoring or dispersion modeling results; 2) Emissions-related data; 3) Meteorology; 4) Geography and topography; and 5) Jurisdictional boundaries. This guidance was supplemented by two non-binding technical assistance documents intended to assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling or ambient air quality monitoring for sources that emit SO_2. Notably, the EPA's 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), were available to states and other interested parties. Both of these TADs were most recently updated in February 2016.

Based on complete, quality assured and certified ambient air quality data collected between 2013 and 2015, no violations of the 2010 SO_2 NAAQS have been recorded at ambient air quality monitors in any undesignated part of Illinois. However, there are five 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 final technical support document, the EPA discusses its review and technical analysis of Illinois's updated recommendations for the areas that we must designate. The EPA also discusses any intended and final modifications from the state's recommendation based on all available data before us.

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

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

Technical Analysis for Jasper County, Illinois

Introduction

Jasper County, Illinois, 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 criteria for being "announced for retirement." Specifically, in 2012, Illinois Power Generating Company's Newton Power Station ("Newton") emitted 16,519 tons of SO_2, and had an emissions rate of 0.590 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 September 18, 2015 submission, Illinois recommended that the area surrounding Newton, specifically the entirety of Jasper County, be designated as attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected.

The State's September 18, 2015, assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions from 2012 through 2014 for Newton. No other sources were included in the modeling. Illinois followed the EPA's Modeling TAD for the purposes of modeling to characterize air quality for use in designations, and used the most recent 3 years of actual emissions data and concurrent meteorological data. Surface meteorology and surface characteristics from the Evansville, Indiana NWS station (123 km southeast of Newton), and coincident upper air observations from Lincoln, Illinois (164 km northwest of Newton), were selected as most representative of meteorological conditions within the area. Illinois chose to use a temporally varying background profile. The background concentrations for this area were determined by the state to range between 1.3 and 6 ppb, and were incorporated into the final AERMOD results. The state's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 138.89 $\mu g/m^3$, or 53.0 ppb, occurring about 3.85 km northeast of Newton.

The Sierra Club also submitted modeling showing violations of the standards from Newton. Sierra Club used actual emissions from CAMD for Newton with fixed temperature and velocity values. Sierra Club also used a fixed background value taken from a monitor in Oglesby, Illinois, which is located further from the modeling domain than Nilwood, Illinois, where the monitor from which the state derived its background profile is located. The higher, less accurate background value used by Sierra Club seems to account for the difference between Sierra Club and Illinois' results.

On February 16, 2016, the EPA notified Illinois that we intended to designate Jasper County as unclassifiable/attainment because based on available information we indicating that the area was meeting the 2010 SO_2 primary NAAQS. Additionally, we informed Illinois that our intended boundaries for this area consisted of the Jasper County boundaries, encompassing the entirety of Jasper County. Our intended designation and associated boundaries were based on, among other things, the results of AERMOD modeling of actual emissions from Newton indicating that this

area is attaining the NAAQS. Detailed rationale, analyses, and other information supporting our intended designation for this area can be found in the technical support for the intended Illinois designations, and this document along with all others related to this rulemaking can be found in Docket ID the EPA-HQ-OAR-2014-0464.

Assessment of New Information

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

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

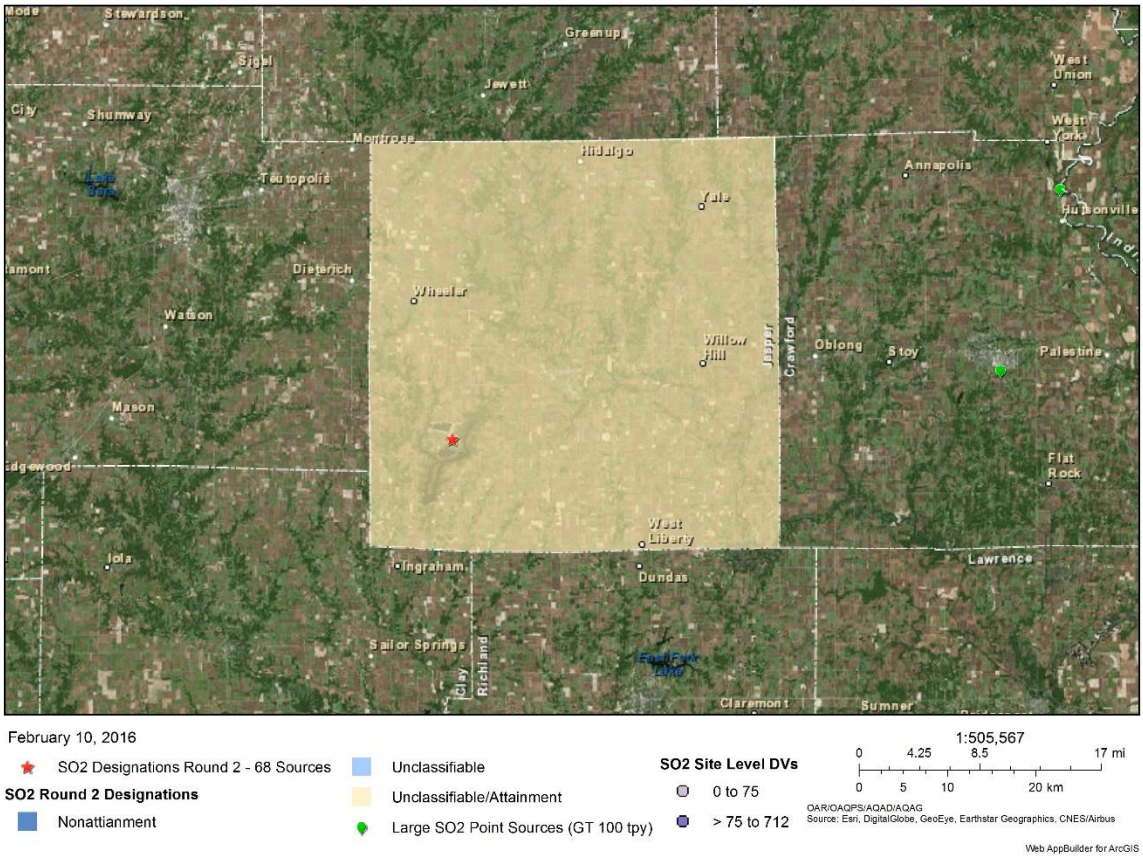
The EPA did not receive any additional information from Illinois, nor did we receive any public comments regarding our intended unclassifiable/attainment designation for Jasper County.

Conclusion

Therefore, based on the information available to the EPA at this time, including the analyses performed for the purposes of the technical support document for our intended designations, and in the absence of any new information that would otherwise lead to a different conclusion regarding air quality in the area or any new information that would otherwise lead to a different conclusion regarding the area boundaries, the EPA concludes that the area is meeting the 2010 SO_2 NAAQS and therefore is designating Jasper County as unclassifiable/attainment for the 2010 SO_2 NAAQS. The boundaries for this unclassifiable/attainment area consist of the Jasper County boundaries, and are shown in Figure 1 below. Also included in the figure are nearby emitters of SO_2.

Figure 1. The EPA's final unclassifiable/attainment area: Jasper County, Illinois

Jasper County, Illinois Area



At this time, our final designations for the state only apply to this area and the others contained in this final technical support document. Consistent with the court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in Illinois by either December 31, 2017, or December 31, 2020.

Technical Analysis for Alton Township and Wood River Township Areas, Illinois

Introduction

Madison County, Illinois, 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 lbs SO_2/MMBTU. As of March 2, 2015, this stationary source had not met the criteria for being "announced for retirement." Specifically, in 2012, the Wood River Power Station ("Wood River") emitted 6,756 tons of SO_2, and had an emissions rate of 0.476 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 September 18, 2016 submission, Illinois recommended that a portion of Madison County be designated as nonattainment for the 2010 1-hour SO_2 NAAQS – specifically, that portion of southern Alton Township that is east of the Corporal Belchik Memorial Expressway, south of East Broadway Street and Illinois Route 3, and north of Illinois Route 143, an area that includes Alton Steel. Illinois also recommended that all of Wood River Township and that portion of Chouteau Township north of the Cahokia Diversion Channel be designated as attainment, an area that includes Wood River. Lastly, Illinois recommended that the remainder of Madison County be designated as unclassifiable. These recommendations were 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.

The State's September 18, 2015, assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions from 2012 through 2014 for Wood River and four additional emitters of SO_2. For Wood River, the state used actual emissions from the most recent 3-year data set, i.e., 2012 – 2014. The state used CEMS SO_2 emissions data provided by Wood River for its boiler stacks, along with temporally varying exit temperature and exit velocity. For WRB Refining LLC, the state used company-provided hourly varying emissions, temperature, and exit velocity. For Alton Steel, Inc., the state constructed a three-year emission profile for the Electric Arc Furnace (EAF) and Ladle Metallurgy Furnace (LMF) using company-provided operating schedule and yearly emissions. The state used a conservative worst-case emissions year for all three years for the two other sources at this facility. For Christ Brothers Products, and National Maintenance and Repair, the state used the worst-case emission year for the entire simulation. For Ameren Missouri Sioux Power Station, the state used hourly CEMS SO_2 emissions data. In instances where seasonal throughput was available, emissions were allocated appropriately via the EMISFACT keyword in AERMOD and applied to the three-year period. For sources lacking hourly varying temperature or exit velocity, replacement values were obtained either from the Illinois the EPA database or from company-provided emission reports. Illinois followed the EPA's Modeling TAD for the purposes of modeling to characterize air quality for use in designations, using the most recent 3 years of actual emissions data or conservative worst-case emissions, and concurrent meteorological data. Surface meteorology and surface characteristics from the St. Louis, Missouri NWS station (27 km southwest from Wood River), and coincident upper air observations from Lincoln, Illinois (158 km northeast from Wood River), were selected as most representative of meteorological conditions within the area. Illinois chose to use a temporally varying background profile. The

background concentrations for this area were determined by the state to range between 3 and 15 ppb, and were incorporated into the final AERMOD results. The state's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 456.40 $\mu g/m^3$, or 174.2 ppb, occurring about 2.5 km northwest of the Wood River main stacks. Illinois performed a culpability analysis which demonstrated that only a small group of receptors exceeded the 2010 SO_2 NAAQS, and these receptors were primarily affected by emissions from Alton Steel, which are greatly influenced by downwash. After reviewing the state's analysis, the EPA agreed that the violations appears to be predominantly impacted by building downwash from Alton Steel's buildings, with minimal impact from Wood River. There was no additional relevant information submitted regarding Wood River or Madison County.

On February 16, 2016, the EPA notified Illinois that we intended to designate the Alton Township Area as nonattainment and the Wood River Township Area as unclassifiable/attainment, based on our assessment that the Alton Township Area was not meeting the NAAQS while the Wood River Township Area was meeting the NAAQS. Additionally, we informed Illinois that our intended boundaries for this area consisted of the boundaries that the state had recommended. That is, we informed Illinois that the EPA's intended Alton Township Area consisted of the area east of Corporal Belchik Memorial Expressway, south of East Broadway, south of Route 3, and north of Route 143 within Alton Township in Madison County, and the EPA's intended Wood River Township Area consisted of Wood River Township and the portion of Chouteau Township north of the Cahokia Diversion Channel, also all in Madison County. Our intended designations and associated boundaries were based on, among other things, the results of AERMOD modeling of actual emissions from Wood River, Alton Steel, and other Madison County facilities indicating that the Alton Township Area is violating the NAAQS and the Wood River Township Area is attaining the NAAQS. Detailed rationale, analyses, and other information supporting our intended designations for these areas can be found in the technical support document for our intended designations for Illinois, and that document along with all others related to this rulemaking can be found in Docket ID EPA-HQ-OAR-2014-0464. Finally, we informed Illinois that we intended to defer action on other portions of Madison County, notably including portions of the county near another source that has been listed and has become subject to requirements for air quality characterization under the DRR.

Assessment of New Information

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

the EPA is explicitly incorporating and relying upon the analyses and information presented in the technical support document for the purposes of our final designation for this area, except to the extent that any new information submitted to the EPA or conclusions presented in this final

technical support document and our RTC, available in the docket, supersede those found in the preliminary document.

The EPA did not receive any additional information from Illinois regarding our intended unclassifiable/attainment designation for relevant portions of Madison County. However, the EPA received public comments objecting to the EPA's proposed action to designate the area around Alton Steel as nonattainment and objecting to various aspects of the modeling analysis performed by Illinois. A comprehensive summary of these comments and our responses can be found in the RTC. In summary, the EPA disagrees with these comments and finds that Illinois' modeling, as discussed in the technical support document for the intended designation for this area, provides an appropriate basis for concluding that the Alton Township Area is not meeting the NAAQS and for designating this area as nonattainment at this time, as recommended by Illinois. Furthermore, given the availability of this information, the EPA's view is that it would be inappropriate to defer action initiating the process for remedying these violations.

Conclusion

Therefore, for reasons described here, in the response to comments document, and in the technical support document for the intended designations, the EPA concludes that the Alton Township Area is not meeting the 2010 SO_2 NAAQS while the Wood River Township Area is meeting the NAAQS, and therefore is designating the Alton Township Area as nonattainment and the Wood River Township Area as unclassifiable/attainment for the 2010 SO_2 NAAQS, respectively. As described above, the nonattainment area consists of the area within Alton Township of Madison County that is east of Corporal Belchik Memorial Expressway, south of East Broadway, south of Route 3, and north of Route 143. As described above, the area within Madison County that the EPA is designating unclassifiable/attainment includes Wood River Township and that portion of Chouteau Township that is north of the Cahokia Diversion Channel. The nonattainment area is shown in Figure 2, and both the nonattainment area and the unclassifiable/attainment area is shown in Figure 3. Also included in these figures are nearby emitters of SO_2.

Figure 2. The EPA's final nonattainment area within Madison County, Illinois

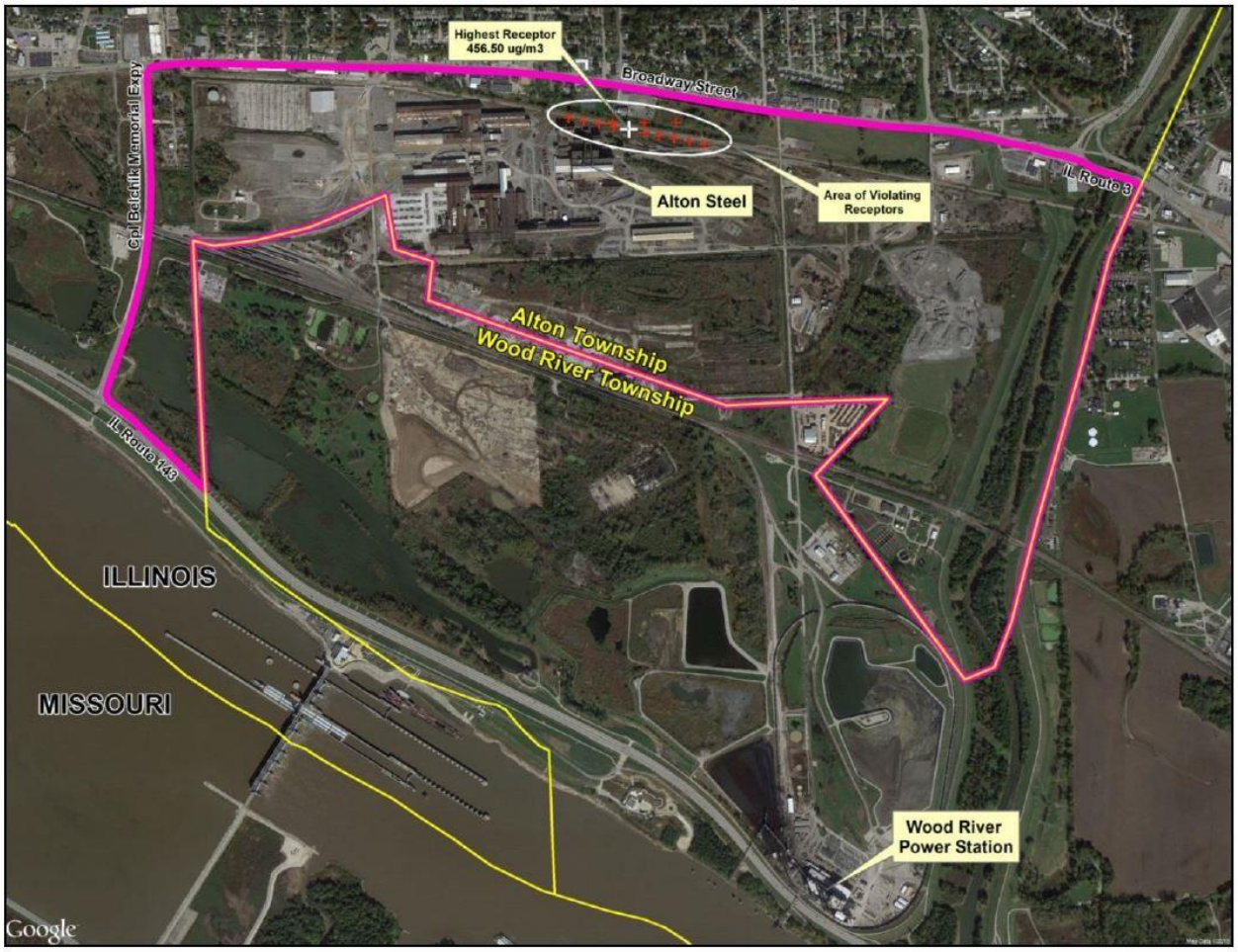
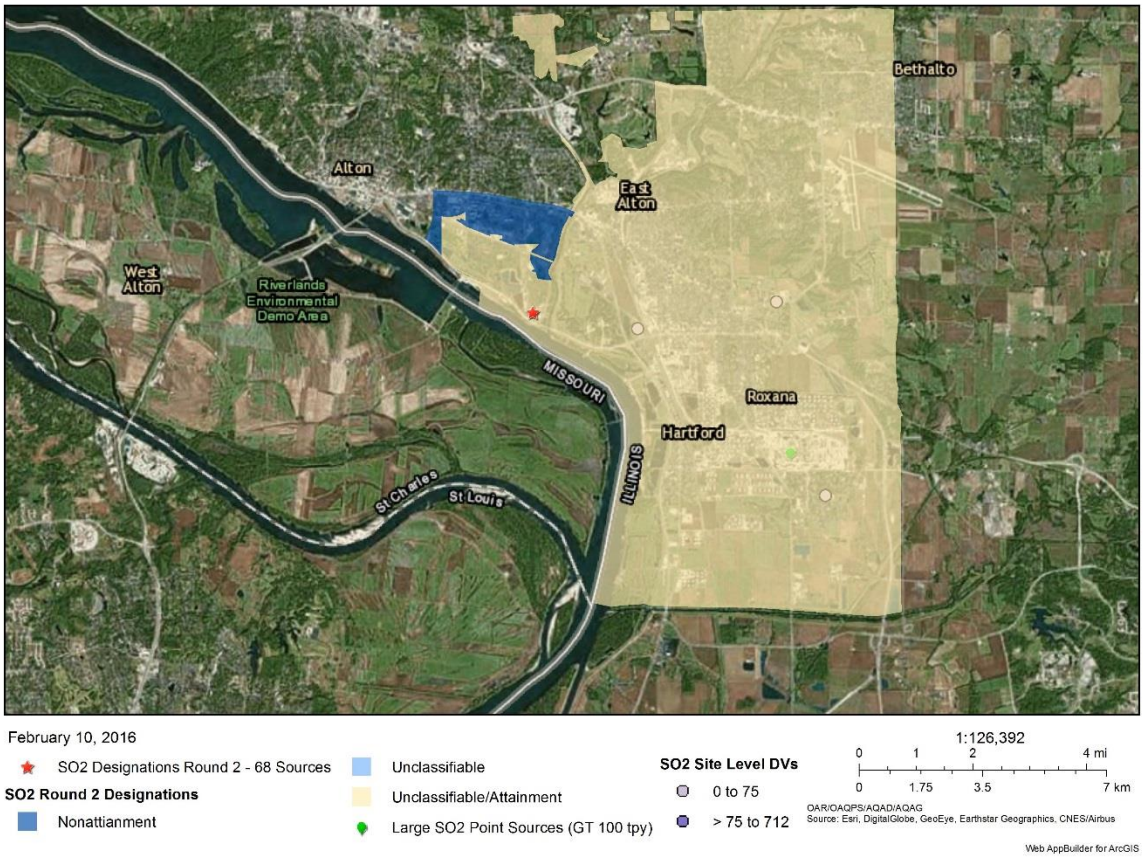


Figure 3. The EPA's final designated areas in Madison County, Illinois, showing unclassifiable/attainment area and nonattainment area

Madison County, Illinois Area



At this time, our final designations for the state only apply to these portions of Madison County and the other areas addressed in this final technical support document. Consistent with the court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in Illinois by either December 31, 2017, or December 31, 2020.

Technical Analysis for Massac County, Illinois

Introduction

Massac County, Illinois, 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 lbs SO_2/MMBTU. As of March 2, 2015, this stationary source had not met the criteria for being "announced for retirement." Specifically, in 2012, the Joppa Power Station ("Joppa") emitted 16,991 tons of SO_2, and had an emissions rate of 0.475 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 September 18, 2016, submission, Illinois recommended that the area surrounding Joppa, specifically the entirety of Massac County, be designated as attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected.

The State's September 18, 2015, assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions from 2012 through 2014 for Joppa and five additional emitters of SO_2. One of the additional sources is located 11km from Joppa and the rest of the additional sources are located within 10 km of Joppa. For Joppa, the state used actual emissions from the most recent 3-year data set, i.e., 2012 – 2014. The state used CEMS SO_2 emissions data provided by the Joppa for its boiler stacks, along with hourly specific exit temperatures and exit velocities. For Lafarge Midwest Inc., the state used company-provided hourly varying emissions, temperature, and exit velocity. For MEPI, the state used company-provided hourly varying emissions. For Trunkline Gas Company, the state used emissions found in the company's Annual Emissions Reports, which included yearly emissions data and seasonal throughput. These seasonal emissions were averaged over three years (2012-2014), multiplied by a scalar (via EMISFACT keyword in AERMOD), and then applied to the three-year modeling period. For Honeywell International Inc., the state constructed a three-year hourly profile based on seasonal throughput. For TVA-Shawnee Boiler Stacks, the state used CEMS data obtained via U.S. the EPA's Clean Air Markets Division (CAMD) database to construct hourly emission rates. For all the sources that lacked CEMS data, the state used constant values for exit temperature and exit velocity, which were obtained either from the Illinois the EPA database or from company-provided emission reports. Illinois followed the EPA's Modeling TAD for the purposes of modeling to characterize air quality for use in designations, and used the most recent 3 years of actual emissions data and concurrent meteorological data. Surface meteorology and surface characteristics from the Paducah, Kentucky NWS station (18 km southeast from Joppa), and coincident upper air observations from Nashville, Tennessee (228 km southeast from Joppa), were selected as most representative of meteorological conditions within the area. Illinois chose to use a temporally varying background profile. The background concentrations for this area were determined by the state to range between 1 and 13 ppb, and were incorporated into the final AERMOD results. The state's modeling indicates that the predicted 99th percentile 1-hour average concentration within the

chosen modeling domain is 168.29 μg/m^3, or 64.2 ppb, occurring about 2.9 km northwest of Joppa's main stacks and 0.4 km northwest of the Lafarge northern fence line.

The Sierra Club also submitted modeling showing violations of the standards from Joppa. Illinois reviewed this information and identified several deviations from recommendations in the Modeling TAD. First, the Sierra Club's analysis used a lower-than-actual stack height. The Sierra Club used a higher, fixed background value, taken from Oglesby, in north central Illinois, whereas Illinois's background data for Joppa came from Paducah, Kentucky, much closer to the Joppa modeling domain. Sierra Club used fixed stack gas temperatures and flow rates, whereas Illinois used hourly varying data for these parameters for Joppa. The EPA found that these differences likely explain why the Sierra Club results were greater than Illinois' modeling results.

On February 16, 2016, the EPA notified Illinois that we intended to designate Massac County as unclassifiable/attainment based on our view that the area was meeting the 2010 SO_2 NAAQS. Additionally, we informed Illinois that our intended boundaries for this area consisted of the Massac County boundaries, encompassing the entirety of Massac County. Our intended designation and associated boundaries were based on, among other things, the results of AERMOD modeling of actual emissions from Joppa indicating that this area is attaining the 2010 SO_2 NAAQS. Detailed rationale, analyses, and other information supporting our intended designation for this area can be found in the technical support document for the intended Illinois designations, and this document along with all others related to this rulemaking can be found in Docket ID the EPA-HQ-OAR-2014-0464.

Assessment of New Information

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

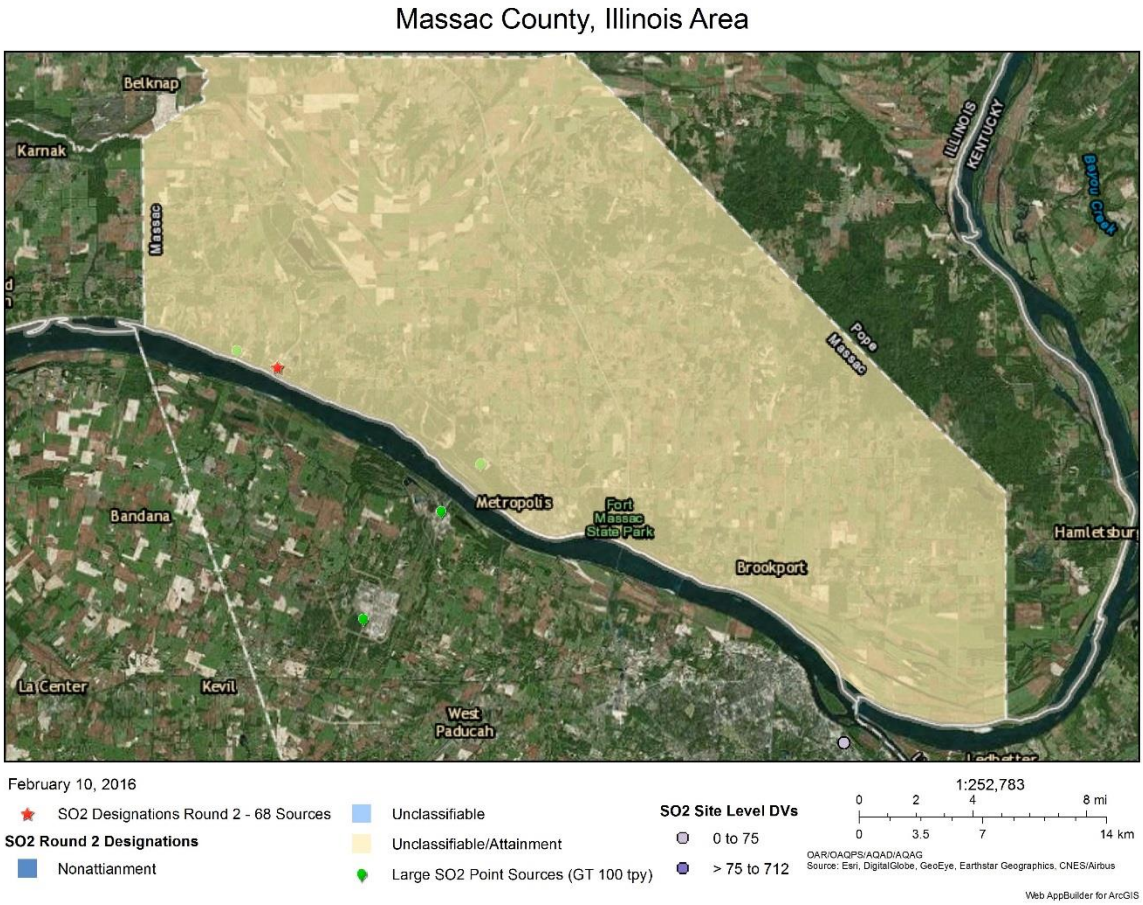
the EPA is explicitly incorporating and relying upon the analyses and information presented in the technical support document for the intended Illinois designations for the purposes of our final designation for this area, except to the extent that any new information submitted to the EPA or conclusions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

The EPA did not receive any additional information from Illinois, nor did we receive any public comments regarding our intended unclassifiable/attainment designation for Massac County.

Conclusion

Therefore, based on the information available to the EPA at this time, including the analyses performed for the purposes of the technical support document for our intended designations, and in the absence of any new information that would otherwise lead to a different conclusion regarding air quality in the area or any new information that would otherwise lead to a different conclusion regarding the area boundaries, the EPA concludes that the area is meeting the 2010 SO_2 NAAQS and therefore is designating Massac County as unclassifiable/attainment for the 2010 SO_2 NAAQS. The boundaries for this unclassifiable/attainment area consist of the Massac County boundaries, and are shown in Figure 4 below. Also included in the figure are nearby emitters of SO_2.

Figure 4. The EPA's final unclassifiable/attainment area: Massac County, Illinois



At this time, our final designations for the state only apply to this area and the others addressed in this final technical support document. Consistent with the court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in Illinois by either December 31, 2017, or December 31, 2020.

Technical Analysis for Putnam/Bureau Counties, Illinois Area

Introduction

Putnam 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 lbs SO_2/MMBTU. As of March 2, 2015, this stationary source had not met the criteria for being "announced for retirement." Specifically, in 2012, the Hennepin Power Station ("Hennepin") emitted 5,906 tons of SO_2, and had an emissions rate of 0.501 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 September 18, 2016 submission, Illinois recommended that the area surrounding Hennepin, specifically Putnam County and neighboring Bureau County, be designated as attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected.

The State's September 18, 2015, assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions from 2012 through 2014 for Hennepin and three other emitters of SO_2 within 10 km, in the area of analysis. The state concluded that no significant sources existed beyond 10 km from Hennepin that warranted inclusion. For Hennepin, the state used actual emissions from the most recent 3-year data set, i.e., 2012 – 2014. The state used CEMS SO_2 emissions data provided by Hennepin, along with hourly-specific exit temperature and exit velocity. For Washington Mills, the state used company-provided hourly varying emissions, temperature, and exit velocities for the largest emitting furnace stack (99.9% of the facility emissions). For the two smaller emitting units, Washington Mills provided operating information that allowed the state to construct an hourly varying emissions rate coupled with constant temperature and exit velocity values. For Advanced Asphalt, the state constructed an hourly profile based on company-provided seasonal throughput. For Marquis Energy, the state used a combination of seasonal emissions factors (EMISFACT) and an hourly emissions profile. Illinois followed the EPA's Modeling TAD for the purposes of modeling to characterize air quality for use in designations, and used the most recent 3 years of actual emissions data and concurrent meteorological data. Surface meteorology and surface characteristics from the Rockford, Illinois NWS station (111 km north from Hennepin), and coincident upper air observations from Davenport, Iowa (110 km northwest from Hennepin), were selected as most representative of meteorological conditions within the area. Illinois chose to use a temporally varying background profile. The background concentrations for this area were determined by the state to range between 0.8 and 5.7 ppb, and were incorporated into the final AERMOD results. The state's modeling indicates that the predicted 99^{th} percentile 1-hour average concentration within the chosen modeling domain is 94.56 $\mu g/m^3$, or 36.1 ppb, occurring about 7.2 km southwest of Hennepin. There was no additional relevant information submitted for Hennepin or Putnam or Bureau Counties.

On February 16, 2016, the EPA notified Illinois that we intended to designate Putnam and Bureau Counties as unclassifiable/attainment based on our view that they were meeting the 2010 SO_2 NAAQS. Additionally, we informed Illinois that our intended boundaries for this area consisted of the Putnam and Bureau County boundaries, encompassing the entirety of these two counties. Our intended designation and associated boundaries were based on, among other things, the results of AERMOD modeling of actual emissions from Hennepin indicating that this area is attaining the NAAQS. Detailed rationale, analyses, and other information supporting our intended designation for this area can be found in the technical support for the intended Illinois designations, and this document along with all others related to this rulemaking can be found in Docket ID the EPA-HQ-OAR-2014-0464.

Assessment of New Information

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

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

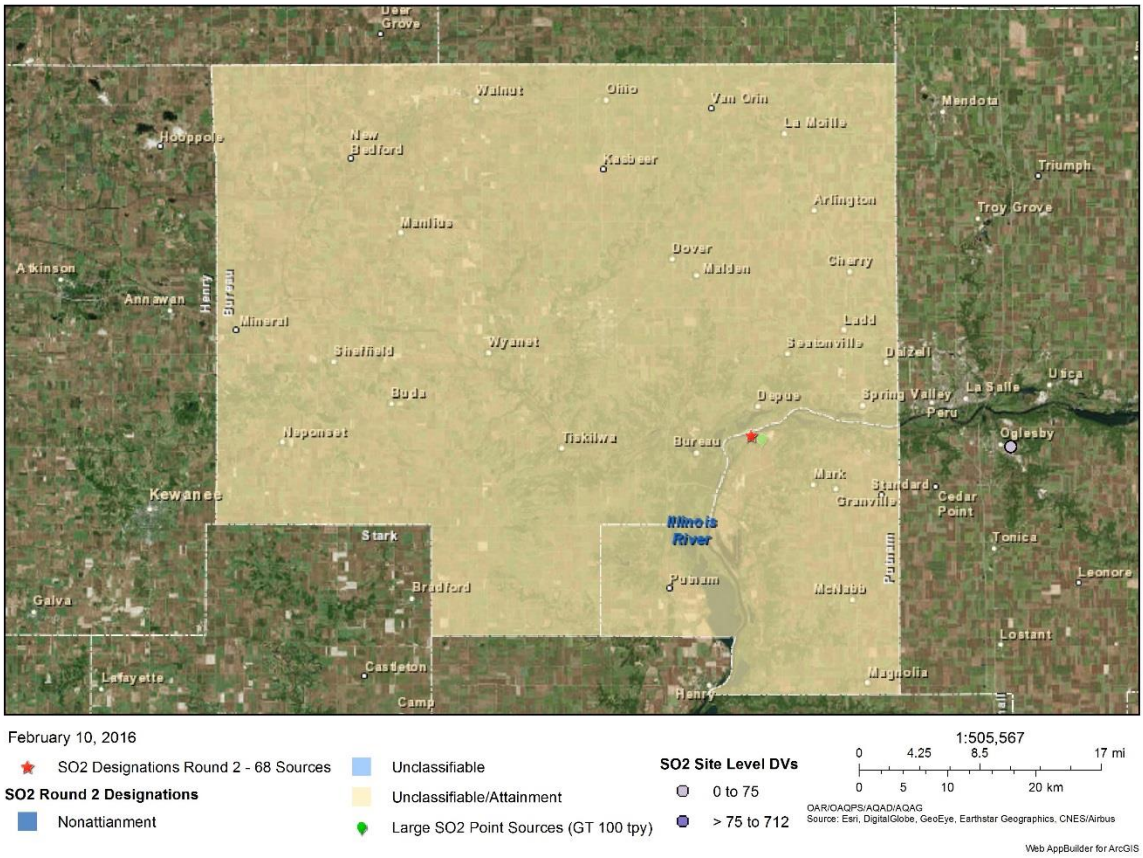
The EPA did not receive any additional information from Illinois, nor did we receive any public comments regarding our intended unclassifiable/attainment designation for Putnam and Bureau Counties.

Conclusion

Therefore, based on the information available to the EPA at this time, including the analyses performed for the purposes of the technical support document for our intended designations, and in the absence of any new information that would otherwise lead to a different conclusion regarding air quality in the area or any new information that would otherwise lead to a different conclusion regarding the area boundaries, the EPA concludes that the area is meeting the 2010 SO_2 NAAQS and therefore is designating Putnam and Bureau Counties as unclassifiable/attainment for the 2010 SO_2 NAAQS. The boundaries for this unclassifiable/attainment area consist of the Putnam and Bureau County boundaries, and are shown in Figure 5 below. Also included in the figure are nearby emitters of SO_2 and Illinois' recommended area.

Figure 5. The EPA's final unclassifiable/attainment area: Putnam and Bureau Counties, Illinois

Putnam/Bureau Counties, Illinois Area



At this time, our final designations for the state only apply to this area and the others addressed in this final technical support document. Consistent with the court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in Illinois by either December 31, 2017, or December 31, 2020.

Technical Analysis for Williamson County, Illinois

Introduction

Williamson 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 lbs SO_2/MMBTU. As of March 2, 2015, this stationary source had not met the criteria for being "announced for retirement." Specifically, in 2012, the Marion Power Station ("Marion"), owned by Southern Illinois Power Cooperative ("SIPCO"), emitted 5,850 tons of SO_2, and had an emissions rate of 0.489 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 September 18, 2015 submission, Illinois recommended that the area surrounding Marion, specifically the entirety of Williamson County, be designated as attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing "maximum actuals expected from [Marion]."

On February 16, 2016, the EPA notified Illinois that we intended to designate Williamson County as nonattainment, based on our view that the area was not meeting the NAAQS. Illinois provided no explanation of its term "maximum actuals expected" from the plant, and Illinois provided no justification that its modeled emission rates were an appropriate basis for judging the attainment status of the area, and the modeled emission rates were substantially lower than the actual emission rates that the facility had reported for the modeled 3-year period (2012-2014). In addition, modeling provided by Sierra Club using actual emission rates at Marion indicated that the area is violating the air quality standard. Finally, we informed Illinois that our intended boundaries for this area consisted of the Williamson County boundaries, encompassing the entirety of Williamson County. Detailed rationale, analyses, and other information supporting our intended designation for this area can be found in the technical support for the intended Illinois designations, and this document along with all others related to this rulemaking can be found in Docket ID the EPA-HQ-OAR-2014-0464.

Assessment of New Information

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

the EPA is explicitly incorporating and relying upon the analyses and information presented in the technical support document for the intended Illinois designations for the purposes of our final designation for this area, except to the extent that any new information submitted to the EPA or

conclusions presented in this final technical support document and our RTC, available in the docket, supersede those found in the prior technical support document.

In response to the EPA's proposal to designate Williamson County as nonattainment, a consultant for the owners of Marion submitted further modeling evaluating air quality in the area. Illinois the EPA responded to the EPA's letter of February 16, 2016, by stating that it concurs with the consultant that the revised modeling demonstrates that the Williamson County is attaining the primary 1-hour SO_2 NAAQS. No other comments or modeling analyses were received.

Modeling provided by the consultant differed in several respects from the modeling provided by Illinois with its September 18, 2015, recommendations. The consultant provided three modeling runs, all using AERMOD but using different modeling approaches. The first run used AERMOD with regulatory default options. The second run used AERMOIST, which the consultant characterizes as providing alternate treatment of plume rise under conditions of high levels of plume moisture. The third run also used AERMOIST and in addition used "beta options" including LOWWIND3 and ADJU*. In each of these three runs, the consultant modeled emissions and meteorological conditions for 2013 to 2015, in place of Illinois' analysis of 2012 to 2014. The consultant used a substantially revised set of receptors, excluding numerous receptors on Lake of Egypt (adjacent to Marion) and on Marion plant property. The consultant modeled stack and building characteristics that differed from those modeled by Illinois, based on updated measurements of the facility. The consultant modeled actual emission rates rather than "maximum actuals expected" from the plant. The following sections of this document provide the EPA's review of these and related features of these modeling runs.

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 consultant, like Illinois, used AERMOD version 15181, the most recent version of AERMOD. However, the consultant conducted three modeling runs, using AERMOD in three different ways. The first run (like Illinois' run) used AERMOD with regulatory default modeling options. The second run used a modeling tool called AERMOIST. The third approach, in conjunction with using AERMOIST, used beta options included in proposed Appendix W

revisions as candidate AERMOD modeling options, in particular LOWWIND3 and ADJU* (see 80 FR 45340, July 29, 2015). The first approach is the regulatory default approach. The second approach, a non-regulatory default, seeks to use an alternate set of plume temperatures in order to prompt the model to calculate the greater plume rise that is asserted to occur in cases with elevated plume moisture (for scrubbed stack gas). This alternate approach for modifying simulated plume behavior is not a recommended approach in the EPA's modeling guidance in 40 CFR 51 Appendix W, and neither the consultant nor Illinois has provided evidence pursuant to Appendix W section 3.2.2 that this alternative approach provides a better assessment of plume characteristics either in general or in this particular case. Although the consultant provided a journal article discussing the general merits of using alternate means of estimating plume rise in cases of moist plumes, this article does not provide adequate justification under Appendix W section 3.2.2 to conclude that this alternate approach to estimating plume rise provides a better simulation of plume behavior either in general or in the particular circumstances near Marion, nor does the consultant or Illinois provide any other justification for use of this approach. Similarly, although the consultant provides a published paper and a submitted paper in support of the use of the AERMOD beta options, the EPA finds that the consultant has not demonstrated that these options provide a better means of assessing air quality either as a general matter or for the particular circumstances near Marion, so that the EPA finds that the criteria in Appendix W section 3.2.2 for use of these beta options are not met. In absence of adequate justifications, these latter two approaches do not provide results that can be relied upon to evaluate whether the area is meeting the NAAQS or that warrant any further consideration in evaluating the appropriate designation for the area near Marion. Therefore, the discussion below only addresses the modeling using AERMOD in its regulatory default mode.

Modeling Parameter: Rural or Urban Dispersion

The consultant used rural dispersion characteristics. This is consistent with the rationale provided by Illinois, which the EPA found in its technical support document for the intended designations to be appropriate and which the EPA continues to find appropriate for characterizing dispersion characteristics in this area.

Modeling Parameter: Area of Analysis (Receptor Grid)

The consultant applied the same area of analysis and mostly used the same receptor grid as Illinois (and similar to the grid used by Sierra Club), except that the consultant removed numerous receptors. Specifically, the consultant removed receptors located on Lake of Egypt, along Lake Egypt Road, and in plant property north of Lake Egypt Road. Figure 6 shows the near-field receptor grid used by the consultant. In this figure, dots represent receptors, and the areas without dots are areas where receptors used by Illinois have been removed.

Figure 6. Consultant's receptor grid near Marion

The EPA's technical assistance document for modeling (the modeling TAD) for purposes of informing SO_2 designations offers the option not to place receptors "where it is not feasible to place a monitor (water bodies, facility property, etc.)." The TAD then clarifies that "the user should place receptors at key locations such as around facility fence lines (*which define the ambient air boundary for a particular* source) . . . ." (emphasis added) That is, receptors should be placed on plant property that is nevertheless ambient air; i.e., such locations are not to be excluded from receptor networks developed for this purpose, and the designations must reflect consideration of air quality in these locations.

A key factor in determining whether plant property is considered ambient air is the degree to which the public has access to the area. The consultant asserts that the plant property north of Lake Egypt Road "is restricted from public access." Neither the consultant nor Illinois provides any further information as to the manner or degree to which public access is restricted.

Figure 7 shows a view northward from Lake Egypt Road. This view, which is representative of the majority of the southern boundary of the northern plant property, shows only a standard, low guard rail and no fence. Thus, the available evidence contradicts the consultant's claim and

illustrates that the public has easy access to most of the northern plant property.[2] As shown in Figure 8, a satellite view indicates that the area has open land and a portion of this area is either groomed or farmed. As a result, the information available to the EPA indicates that the public has sufficient access to most of this property that the area should be considered ambient air. While the consultant excluded receptors based on being on plant property, the consultant provided no counterevidence that placement of monitors in the apparently unfenced part of the property is infeasible, and as noted above, the available evidence indicates that placing a monitor in that area of ambient air is fully feasible.[3] The EPA finds that receptors should have been placed in plant property north of Lake Egypt road.

Figure 7. View North from Lake Egypt Road onto Northern Property of SIPCO, Illustrating Public Access

Figure 8. Satellite Image of Northern SIPCO Property

[2] The EPA is not reaching a judgment as to whether a western segment of the northern plant property should be considered ambient air, insofar as it has a fence with openings.
[3] Furthermore, this area has available power and is suitable for the establishment and support of air monitoring sites.

In addition, while it may be appropriate for these purposes not to place receptors directly on the road, neither the consultant nor Illinois addresses whether the rectangular grid used by Illinois places the receptors directly on the road or why they did not place receptors in near-roadway locations a few meters away. the EPA finds that receptors should have been included at least in the near-roadway locations along Lake Egypt Road, as it is the EPA's view that it is fully feasible to place monitors in these near-roadway, ambient air locations.

Modeling Parameter: Source Characterization

The consultant used somewhat revised building heights, based on additional measurements by Marion's owner. The consultant reports that some building heights were higher and some building heights were lower than the heights used in Illinois' modeling. Illinois has reviewed this information and concurs with the revised information.

The modeling used hourly emissions, temperature, and flow rate data. The consultant reported that a number of hours did not have valid temperature data due to monitoring problems. The consultant substituted a representative stack temperature for the periods without valid data. Available evidence suggests that these input data improved the representation of source characteristics.

Modeling Parameter: Emissions

In the modeling that Illinois submitted with its September 18, 2015, recommendations, Illinois used emission rates that it characterized as "maximum actuals expected" from Marion. The emission rates that Illinois used were substantially below actual emission rates, no identified emission limits required operation at those lower modeled emission rates, and more generally Illinois identified no rationale for characterizing air quality on the basis of these modeled

emission levels. Further discussion of those emission levels is provided in the technical support document for the intended Illinois designations.

The consultant's modeling is based on actual emissions from Marion for 2013 to 2015. These emissions data were obtained from continuous emission monitoring conducted by the facility, using the data reported to the EPA's Clean Air Markets Division. As with Illinois' modeling, the U.S. Penitentiary was also modeled, based on a conservative estimate of actual emissions (in absence of routine emission measurements). Table 2 shows the emissions from these two facilities that were modeled in the consultant's analysis.

Table 2. Actual SO_2 Emissions between 2013 – 2015 from Facilities in the Williamson County, Illinois Area

	Actual SO_2 Emissions (tons per year)		
Facility Name	**2013**	**2014**	**2015**
Marion (SIPCO)	8,357	8,652	4,233
United States Penitentiary	0.18*	0.18*	0.18*
Total Emissions From All Facilities in the State's Area of Analysis	**8,357**	**8652**	**4,233**

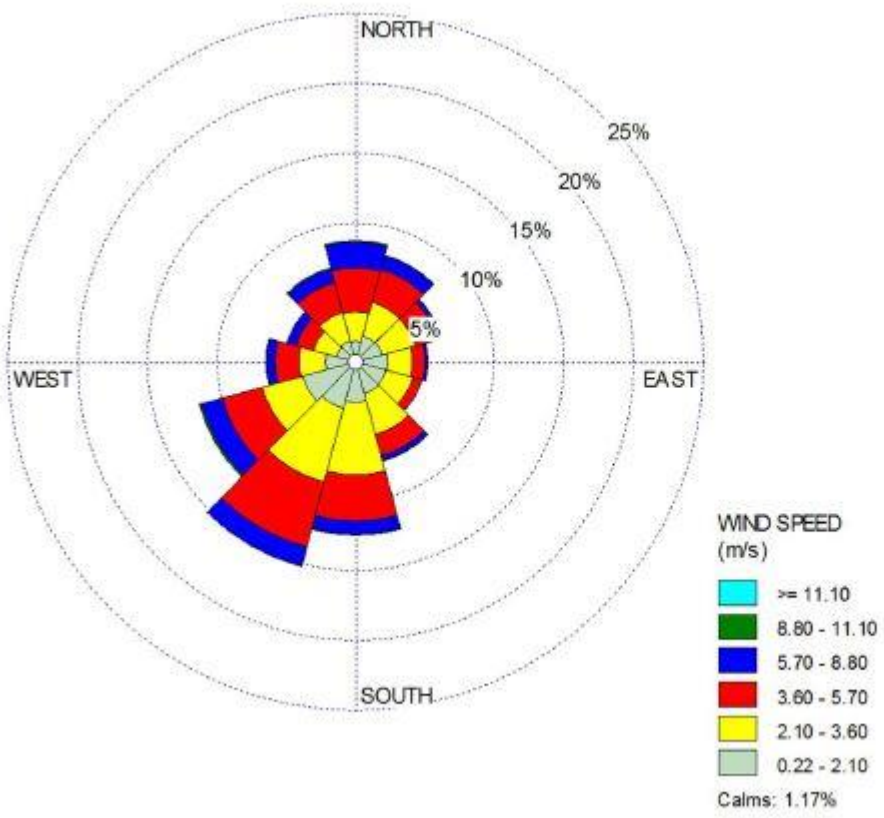
The average emission rate in this analysis, 7,081 tons per year, may be compared to the emission rate modeled by Illinois, 5,512 tons per year, and the average emission rate for 2012 to 2014, 7,620 tons per year.

Modeling Parameter: Meteorology and Surface Characteristics

As with Illinois' prior analysis, the consultant used surface meteorological data from Paducah, KY, and upper air data from Nashville TN. The consultant used more recent meteorological data, using the data from 2013 to 2015, using meteorological data concurrent with the more recent emissions data.

Figure 9 shows a windrose for 2013 to 2015 for Paducah, as provided by the consultant. This windrose is quite similar to the windrose for 2012 to 2014 that is shown in the technical support document for the intended Illinois designations. These data show that peak impacts from Marion may be expected to occur to the north and northeast of the plant. Given the stack heights of the primary emission units at Marion, approximately 120 meters, peak impacts from the facility are highly likely to be occurring in the area north and northeast of the plant where the consultant has removed receptors.

Figure 9. Paducah, Kentucky Cumulative Annual Wind Rose for Years 2013 – 2015



Modeling Parameter: Geography and Terrain

The consultant used the same terrain data as Illinois. Further discussion of these data is provided in the technical support document for the intended Illinois designations.

Modeling Parameter: Background Concentrations of SO_2

The consultant, like Illinois, used monitoring data from a site approximately 94 kilometers northwest of the plant, except that the consultant based its values on 2013 to 2015 data rather than 2012 to 2014 data. The consultant, like Illinois, used values differentiated by hour of day and season of year, in each case using the 99th percentile of the applicable values. The consultant's values on average are about 10 percent lower than the state's values. This approach is consistent with the recommendations of the Modeling TAD.

Summary of Modeling Results

The AERMOD modeling parameters for the consultant are summarized below in Table 3.

Table 3. AERMOD Modeling Parameters for the Marion, Illinois Area

Williamson County Area of Analysis

AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	8
Modeled Structures	8
Modeled Fence lines	1
Total receptors	24,502
Emissions Type	Marion: Actuals US Penitentiary: Maximum Actual
Emissions Years	2013-2015
Meteorology Years	2013-2015
Surface Meteorology Station	Paducah, KY
Upper Air Meteorology Station	Nashville, TN
Methodology for Calculating Background SO_2 Concentration	Variable by hour, season
Calculated Background SO_2 Concentration	1.4 to 12.5 ppb

The results presented below in Table 4 show the magnitude and geographic location of the highest predicted modeled concentration based on actual emissions for the receptor network that the consultant used, along with comparable information obtained from modeling by Illinois and the Sierra Club.

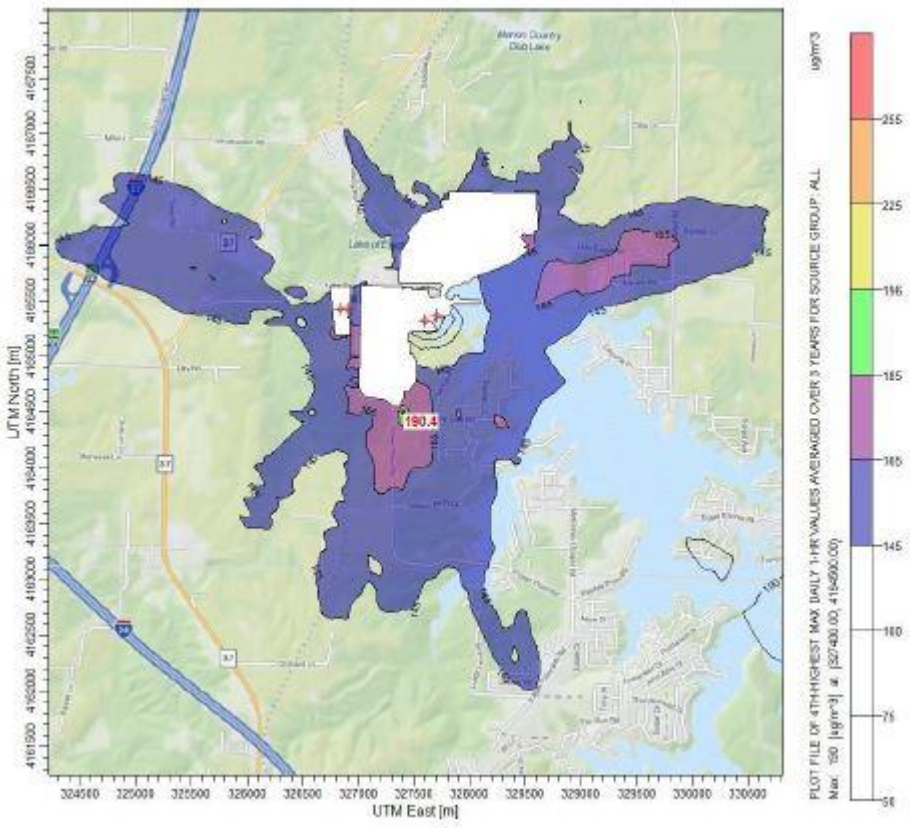
Table 4: Maximum Estimated 99th Percentile 1-Hour SO_2 Concentration in the Williamson County Area of Analysis Based on Actual Emissions

Group	Data Period	Receptor Location		SO_2 Concentration ($\mu g/m^3$)	
		UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
Consultant	2013-2015	4164500	327400	190.4	196.4*
Illinois	2012-2014	4166200	327200	194.48	196.4
Sierra Club	2012-2014	4165746	328049	288.9	196.4

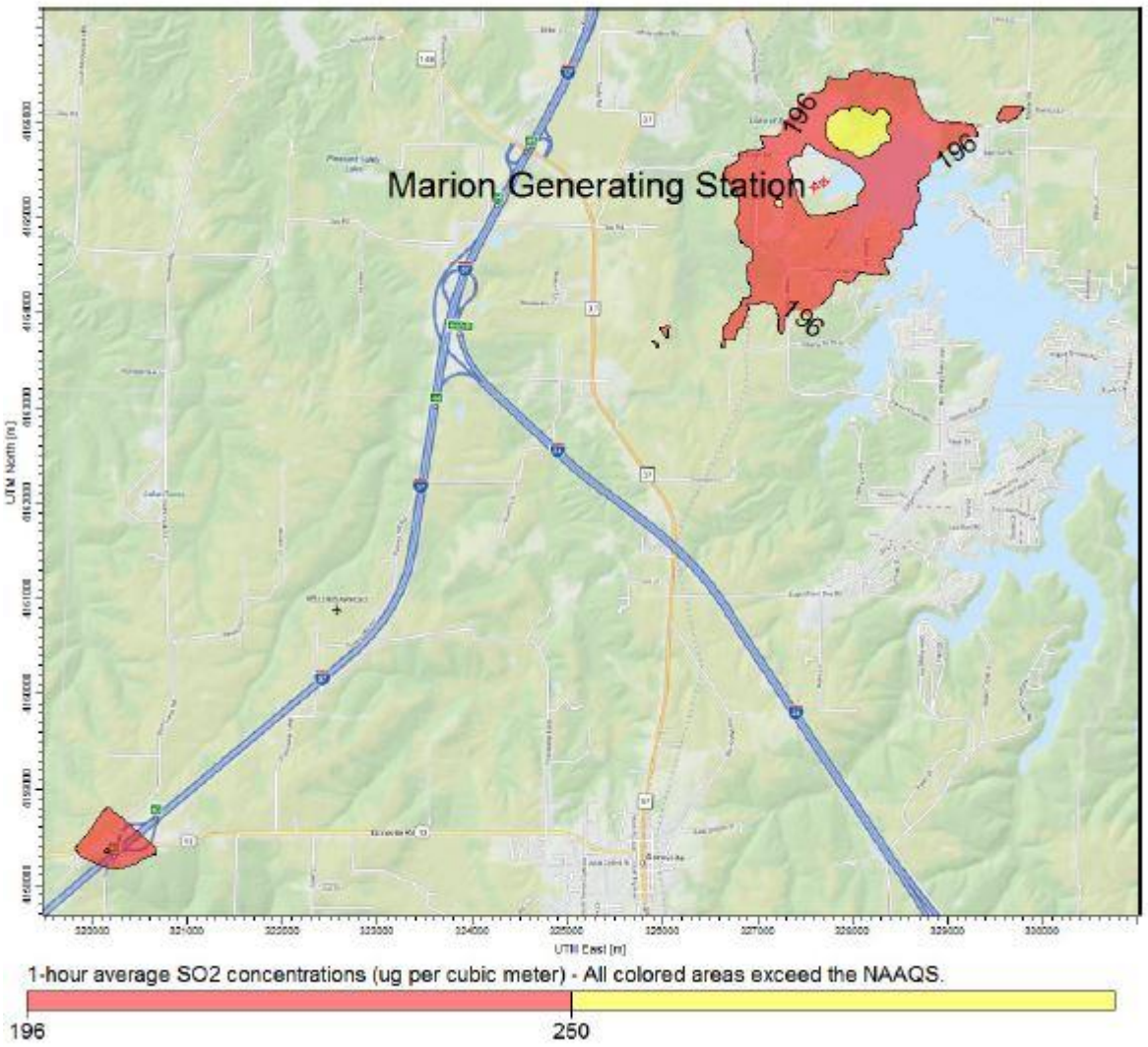
*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The consultant's modeling indicates that the highest predicted 3-year average 99th percentile 1-hour average concentration within the chosen modeling domain is 190.4 $\mu g/m^3$, or 72.7 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from Marion. Figure 10 below was included as part of the consultant's submission and indicates that the predicted value occurred about 900 meters to the south-southwest of the primary stacks at Marion

Figure 10: 99th Percentile Maximum Daily 1-Hour SO_2 Concentrations Estimated by Consultant in the Williamson County Area of Analysis Based on Actual Emissions



For comparison, Illinois, modeling 2012 to 2014 meteorology and emissions 28 percent lower than average 2012 to 2014 emissions, estimated a 99th percentile daily maximum of 194.5 µg/m^3 or 74.3 ppb, found approximately 1.2 kilometers to the northwest, with nearly as high concentrations in the area to the northeast of the primary stacks of the plant. A map of Illinois' estimated concentrations is provided in the technical support document for the intended designations. Sierra Club, modeling 2012 to 2014 meteorology and emissions, estimated a 99th percentile maximum concentration of 288.9 µg/m^3 or 110.3 ppb. This value was found approximately 600 meters northeast of the primary stacks of the plant, i.e. in the area not modeled by the consultant. Figure 11 shows a map of the modeling results provided by Sierra Club.



Neither the consultant nor Illinois has provided a full explanation of the differences among the results of the various runs that the EPA has received. Although the consultant used a different three years of meteorological data than Illinois and Sierra Club, the windrose for the two 3-year periods suggests that the two 3-year periods have similar meteorology. The 3-year average emissions for 2013 to 2015 is about 7 percent lower than the 3-year average emissions for 2012 to 2014, which is much less than the difference between the consultant's results and either Illinois' results (with an estimated adjustment to correct the unjustifiably low modeled emission rate) or Sierra Club's results. It is not clear how significant are the revisions to stack parameters and building heights. Finally, the removal of receptors from the area northeast of the plant may represent the most significant difference between the consultant's modeling and the modeling by Illinois and Sierra Club. Although Illinois estimated the highest concentrations to be north northwest of the plant, and thus in an area where the consultant's modeling places receptors, Illinois also estimated relatively high concentrations in the area northeast of the plant where the consultant placed no receptors.

Indeed, if Illinois' modeling had used actual emission rates for Marion rather than unjustified lower rates, the EPA concludes (based on proportional adjustment by the percentage by which Illinois understated emissions) that Illinois would have estimated concentrations well above the standard not just north northwest of the plant but also northeast of the plant at the receptors excluded by the consultant. For these reasons, we find that neither the September 2015 modeling submitted by the state nor the revised modeling submitted by the consultant justify their declarations that the area is attaining the standard. Sierra Club estimated the highest concentrations directly in the area northeast of the plant where the consultant inappropriately removed receptors, and modeled violations of the standard in this area. We maintain that the Sierra Club results, showing violations, are credible, and that these results are consistent with the results that would likely have been obtained from modeling by the state and by the consultant had these analyses been conducted more in conformance with the Modeling TAD.

In summary, the Sierra Club modeling demonstrates violations in the area. Illinois' modeling suggests that violations would have been identified if the correct emission rates had been used. The consultant's modeling did not identify violations at the modeled receptors, but relatively high concentrations are modeled at the edge of the unmodeled area, and the windrose information and other available evidence regarding expected areas of peak impacts support a judgment that the consultant would also have identified violations if critical receptors had not been inappropriately removed. Therefore, the EPA concludes that modeling from all three parties supports the view that violations of the 1-hour primary SO_2 NAAQS are likely occurring near Marion.

Jurisdictional Boundaries:

Existing jurisdictional boundaries are considered for the purpose of informing our final nonattainment area, specifically with respect to clearly defined legal boundaries. The EPA did not receive any comments regarding the intended boundaries for this area.

the EPA believes that our final nonattainment area, consisting of the entirety of Williamson County, is defined on the basis of clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our final nonattainment area.

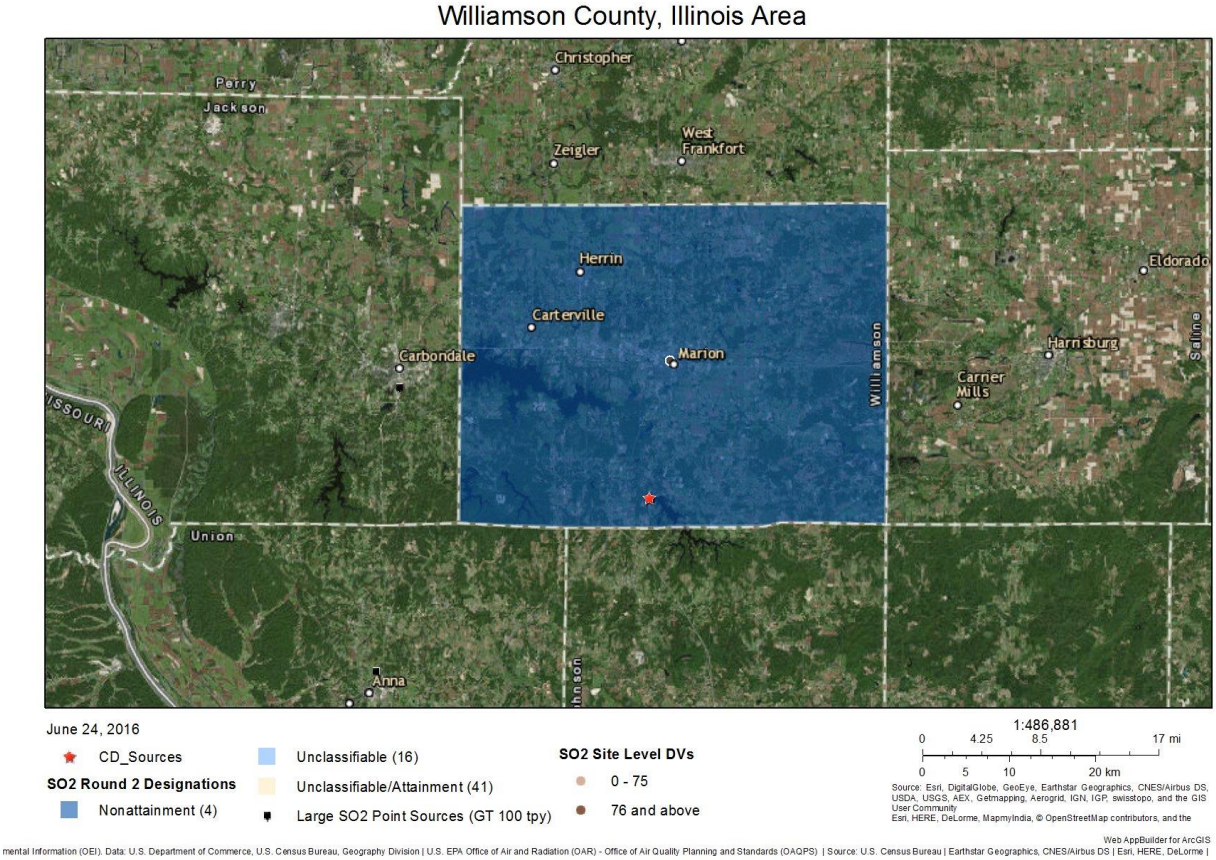
Conclusion

After careful evaluation of the state's recommendation, all timely comments and information received during the state and public comment period, and additional relevant information as discussed in this document, the EPA concludes that the area around Marion is not meeting the NAAQS and therefore is designating the area as nonattainment for the 2010 SO_2 NAAQS. Specifically, the area is comprised of Williamson County. This conclusion is based on the synthesis of available evidence from modeling performed by Sierra Club, Illinois, and a consultant for SIPCO. Sierra Club modeling, conducted consistently with the Modeling TAD, shows substantial violations of the NAAQS. Illinois's modeling in some ways used better information for better representing plume dispersion (e.g., using information on variable flue gas volumes and temperatures that was evidently not available to Sierra Club) but also used an emission rate that without justification was significantly below actual emission rates; the

evidence from this modeling is that use of proper emission rates would have led to a finding of violations. Finally, the consultant's modeling showed attainment in the areas modeled but was incomplete in the sense that an important receptor area was inappropriately excluded from the analysis; available evidence suggests that a more complete analysis would have shown violations in the unmodeled area. Collectively, this leads the EPA to conclude that the area is not meeting the 2010 primary SO_2 NAAQS, and that the asserted information to rebut this conclusion is not sufficiently persuasive to disable our reaching this conclusion or to support the opposite conclusion.

The boundaries for this nonattainment area consist of the Williamson County boundaries, and are shown in Figure 12 below. Also included in the figure are nearby emitters of SO_2.

Figure 12. The EPA's final nonattainment area: Williamson County, Illinois



At this time, our final designations for Illinois only apply to this area and the others addressed in this final technical support document. Consistent with the court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in Illinois by either December 31, 2017, or December 31, 2020.