

Technical Support Document:

Chapter 12

Final Round 3 Area Designations for the 2010 1-Hour SO₂ Primary National Ambient Air Quality Standard for Illinois

1. Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (the EPA, we, or us) must designate areas as either “nonattainment,” “attainment,” or “unclassifiable” for the 2010 1-hour sulfur dioxide (SO₂) primary national ambient air quality standard (NAAQS) (2010 SO₂ NAAQS). Our Notice of Availability (NOA)¹ and our Technical Support Document² for our intended designations for the round of designations we are required to complete by December 31, 2017, provided background on the relevant CAA definitions and the history of the designations for this NAAQS. Chapter 1 of this TSD for the final designations explains the definitions we are applying in these final designations. The TSD for the intended Round 3 area designations also described Illinois’ recommended designations, assessed the available relevant monitoring, modeling, and any other information, and provided our intended designations.

Illinois made no changes in its recommendations since we communicated our intended designations, and the TSD for the intended designations provided an assessment of all information that was available at the time the EPA issued its “120-day letter” informing Illinois of its intended designations. Illinois did provide additional information pertinent to Madison County after the 120-day letter, which the EPA reviews below. An affected source in Lake County submitted a clarifying comment, which is addressed in the response to comments document associated with this final action. No other party submitted information since publication of the NOA.

This TSD does not repeat information contained in the TSD for our intended designations except as needed to explain our assessment of the newer information and to make clear the final action we are taking and its basis, but that information is incorporated as part of our final designations. If our assessment of the information already considered in our TSD for our intended designations has changed based on new information and we are finalizing a designation based on such change in our assessment, this TSD also explains that change. For areas of Illinois not explicitly addressed in this chapter, we are finalizing the designations described in our 120-day letters and

¹ EPA Responses to Certain State Designation Recommendations for the 2010 Sulfur Dioxide Primary National Ambient Air Quality Standard: Notification of Availability and Public Comment Period, September 5, 2017 (82 FR 41903)

² Technical Support Document: Intended Round 3 Area Designations for the 2010 1-Hour SO₂ Primary National Ambient Air Quality Standard, August 2017. <https://www.epa.gov/sulfur-dioxide-designations/initial-technical-support-documents-area-designations-round-3>

the TSD for the intended Round 3 area designations as explained in those documents. All the final designations are listed in Table 1 below.

The EPA received no new modeling analyses regarding any area addressed in the TSD for our intended designations, either from Illinois or from any other party. However, Illinois provided new information pertinent to the Madison County area, addressing the EPA concerns regarding the existence and timely enforceability of limitations affecting the Amsted Rail facility. Section 2 below reviews this new information.

For the areas in Illinois that are part of the Round 3 designations process, Table 1 identifies EPA's final designations and the counties or portions of counties to which they apply. It also lists Illinois' current recommendations. The EPA's final designations for these areas 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. Summary of the EPA’s Final Designations and the Designation Recommendations by Illinois

Area/County	Illinois’ Recommended Area Definition	Illinois’ Recommended Designation	EPA’s Intended Designation	EPA’s Final Area Definition	EPA’s Final Designation³
Christian County	Christian, Macoupin, Montgomery, and Sangamon Counties	Attainment	Unclassifiable/Attainment	Same as State’s Recommendation	Attainment/Unclassifiable
Crawford County	Crawford County	Attainment	Unclassifiable/Attainment	Same as State’s Recommendation	Attainment/Unclassifiable
Lake County	Lake County	Attainment	Unclassifiable/Attainment	Same as State’s Recommendation	Attainment/Unclassifiable
Randolph County	Monroe, Randolph, and St. Clair Counties	Attainment	Unclassifiable/Attainment	Same as State’s Recommendation	Attainment/Unclassifiable
Washington County	Perry and Washington Counties	Attainment	Unclassifiable/Attainment	Same as State’s Recommendation	Attainment/Unclassifiable
Madison County	Chouteau (part), Nameoki, Granite City, and Venice Townships	Attainment	Unclassifiable	All currently undesignated portions of Madison County	Attainment/Unclassifiable
Remaining Undesignated Areas to Be Designated in this Action*	All other counties except for Macon County and those portions of counties already designated by the EPA	Attainment	Unclassifiable/Attainment	Same as State’s Recommendation	Attainment/Unclassifiable

* Except for areas that are associated with sources for which Illinois elected to install and began timely operation of a new SO₂ monitoring network meeting EPA specifications referenced in EPA’s SO₂ DRR (i.e., Macon County; see Table 2 below), the EPA is designating the remaining undesignated counties (or portions of counties) in Illinois as “attainment/unclassifiable.” These areas that we are designating as attainment/unclassifiable (those to which this row of this table is applicable) are identified more specifically in section 8 of Chapter 12 (addressing Illinois) of the TSD for our intended designations.

³ Refer to Chapter 1 of Technical Support Document: Final Round 3 Area Designations for the 2010 1-Hour SO₂ Primary National Ambient Air Quality Standard for definitions of the designation categories and the terminology change from Unclassifiable/Attainment to Attainment/Unclassifiable.

Areas for which Illinois elected to install and began operation of a new, approved SO₂ monitoring network are listed in Table 2. The EPA is required to designate these areas, pursuant to a court ordered schedule, by December 31, 2020. Table 2 also lists the SO₂ emissions sources around which each new, approved monitoring network has been established.

Table 2. Undesignated Areas Which the EPA Is Not Addressing in this Round of Designations, and Associated Sources

Area	Source(s)
Macon County	Archer Daniels Midland Company/Tate & Lyle Ingredients Americas LLC

2. Technical Analysis of New Information for the Madison County Area

2.1. Introduction

In Round 2 of its SO₂ designations, the EPA designated a portion of Madison County in Alton Township as nonattainment and designated Wood River Township and portions of Cahokia Township as unclassifiable/attainment. The remainder of Madison County is currently undesignated for the 2010 SO₂ standard. The EPA must designate these remaining undesignated portions of Madison County by December 31, 2017, because the area has not been previously designated and Illinois has not installed and begun timely operation of a new, approved SO₂ monitoring network to characterize air quality in the vicinity of any source in Madison County.

Madison County includes facilities owned by U.S. Steel Corporation and Gateway Energy & Coke Company LLC, which Illinois treats as a single source for permitting purposes, and which Illinois therefore listed as a single source for DRR characterization purposes. According to the 2014 NEI, the U.S. Steel portion of this source emitted 1,335 tons of SO₂ in 2014, and the Gateway Energy & Coke portion of this source emitted 1,180 tons of SO₂ in 2014, so that the combined source emitted 2,415 tons of SO₂ in 2014. As a result, this source met the DRR listing criteria and is on the SO₂ DRR Source list, and Illinois chose to characterize the source via modeling. Illinois provided modeling for this area on July 6, 2017, which the EPA reviewed in detail in the TSD for the intended Round 3 designations. For convenience, the portions of Madison County that were included in Illinois' analysis, which exclude areas already designated, will be identified in this document as the Madison County area.

With the exception of one input, the EPA concurred with Illinois' modeling analysis. The exception pertained to the emission release characteristics at one source, Amsted Rail, for which the modeling relied on a mandated revision that was not characteristic of the source during the modeled period, and which appeared not to be fully enforceable and in effect until June 2018. For this reason, the EPA's intended designation for the Madison County area was unclassifiable. However, the EPA noted information from Illinois that work on this redirection of emissions had begun and that the revised emission release characteristics would be federally enforceable and in effect once the work was complete. The EPA then noted the possibility that if emission release

characteristics for Amsted Rail as reflected in Illinois’ modeling were to become federally enforceable and in effect by the time of final designations, the modeling would support designating this area unclassifiable/attainment.

On September 29, 2017, Illinois responded to the EPA’s 120-day letter by providing evidence that the revision to the emission release characteristics was completed and that the redirection of emissions was now permanent and enforceable. Further discussion of this evidence is provided below.

2.2. Summary of Information Reviewed in the TSD for the Intended Round 3 Area Designations Regarding the Madison County Area

In the 120-day letter notification to the governor of Illinois and further explained in Chapter 12 of the TSD for the intended Round 3 area designations, the EPA proposed a designation of unclassifiable for the Madison County area based on all available information, including modeling information and all relevant monitoring information.

The EPA received one modeling analysis for this area, from Illinois. This analysis is described in Table 3. This analysis was evaluated for the 120-day letters and discussed in the TSD for the Intended Round 3 Area Designations. Additional details can be found in the TSD for the Intended Round 3 Area Designations, Chapter 12, though most of these details are repeated below.

Table 3 – Modeling Assessment Evaluated in the TSD for the Intended Designation for the Madison County Area

Organization Submitting Assessment	Date of the Assessment	Identifier used in the TSD for the Intended Round 3 Area Designations, Chapter 12	Distinguishing or Otherwise Key Features
Illinois	July 6, 2017	Illinois analysis	Includes US Steel-Granite City/Gateway Energy & Coke and Amsted Rail

The EPA considered all available information for the Madison County area. The EPA considered data from two monitoring sites, but the EPA did not have information as to how well placed the area monitors are for indicating peak concentrations in the area. Thus, the primary basis for evaluating air quality in this area was the Illinois modeling analysis identified above.

A key element of Illinois’ analysis was the emission release characteristics for Electric Arc Furnace Number 2 at Amsted Rail. For the three-year period that Illinois modeled, these emissions were released horizontally, but Illinois modeled the emissions as being released vertically (or upward). Illinois issued a permit requiring the company to revise the pertinent structure to release these emissions upward, but such revisions had not occurred by the time the EPA issued its intended designations, and Illinois’ permit did not require these revisions to be completed before June 2018. For this reason, the EPA concluded that the modeling for Amsted

Rail used inappropriate release characteristics, and that the modeling did not provide reliable evidence as to whether the 1-hour SO₂ NAAQS is currently being attained near this facility. The EPA was unable to determine whether correction of this model input would result in modeled violations. Therefore, the EPA proposed to designate the area as unclassifiable. However, the EPA also noted that Amsted Rail was beginning work on the redirection of its emissions, and the EPA noted the possibility that once this work was completed, the redirection of the emissions would be a mandatory and permanent feature of the facility thereafter. Based on this scenario, the EPA noted the possibility that the work would be completed and would be found to be enforceable and in effect before the EPA promulgated the final designation for the area, in which case the EPA anticipated concluding that the state's modeling supported a final designation of unclassifiable/attainment for the area.

2.3. Assessment of New Air Quality Monitoring Data for the Madison County Area

This factor considers the SO₂ air quality monitoring data in the Madison County area. Our TSD for the intended area designations considered available data through 2016 for two monitoring sites. We do not have certified data for any additional complete calendar years at any site and we have no new relevant monitoring information of any other type, so no revision of our prior analysis of available monitoring data is warranted.

2.4. Assessment of New Air Quality Modeling Analysis for the Madison County Area Addressing US Steel-Granite City/Gateway Energy & Coke

2.4.1. Introduction

As noted above, neither Illinois nor any other party submitted new modeling for Madison County. Instead, Illinois submitted evidence that the redirection of emissions at Amsted Rail was complete, permanent, and enforceable.

Section 6.3.4 of the Illinois chapter of the TSD for our intended designations, addressing the source characteristics of sources that Illinois modeled, noted that the redirection of emissions at Amsted Rail was not in place and could not be considered permanent and enforceable at the time the EPA issued its intended designations, such that the modeling could not at the time be considered to provide an appropriate assessment of the impacts of this source. Similarly, Section 6.3.10, describing the EPA's assessment of Illinois' modeling information, noted that the mismatch between the then current stack configuration and the modeled stack configuration resulted in the EPA being unable to determine air quality in the Madison County area, necessitating that the EPA propose to designate the Madison County area as unclassifiable. On the other hand, these sections noted the prospect that information indicating the existence, permanence, and enforceability of the redirection of the pertinent emissions could support a final designation of unclassifiable/attainment.

A complete analysis for these sections are provided below, addressing the EPA's current view of the appropriateness of the source characterizations that Illinois modeled and the overall suitability of Illinois' modeling analysis, respectively, in the current context of Illinois having

provided new evidence as to source characteristics at Amsted Rail. The new information is found below in section 2.4.5, Modeling Parameter: Source Characterization. The remainder of the modeling analysis assessment below is the same as was presented in the TSD for our intended designations, but is included here as well for convenience.

2.4.2. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO₂ NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

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

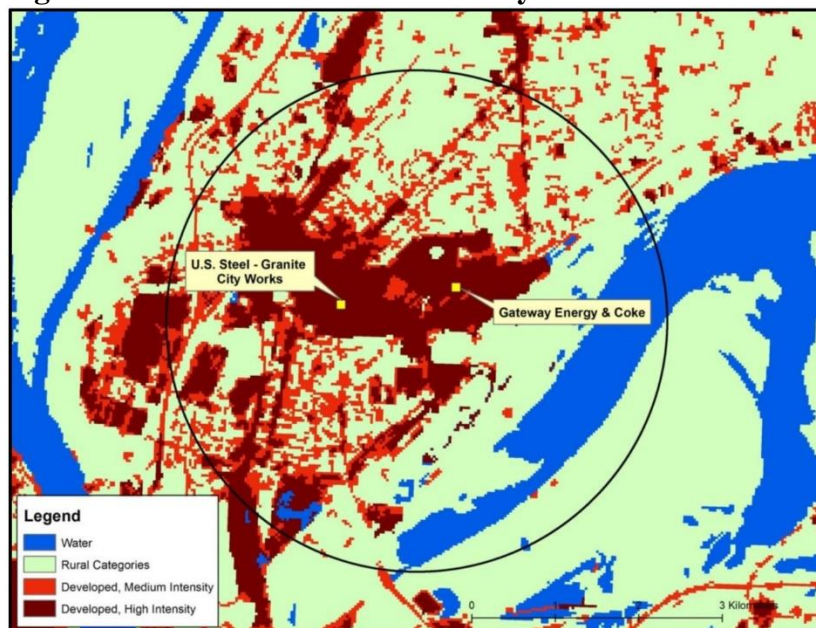
The state used AERMOD version 15181 with default regulatory options. The non-default surface friction velocity option (ADJ_U*) was not used for this modeling analysis. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

2.4.3. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the determination of whether a source is in an "urban" or "rural" area is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO₂ modeling, the urban/rural determination is also important because AERMOD invokes a 4-hour half-life for urban SO₂ sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

For the purpose of performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in rural mode. Illinois conducted an Auer's land use analysis to determine that the rural mode was appropriate. Figure 1 shows the results of Illinois' analysis. The area of analysis within a 3 km radius from the Granite City sources was determined to be 61 percent rural. The EPA agrees with Illinois' analysis and decision to run the model in rural mode.

Figure 1. Land Use in the Granite City Area



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

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to the location of the SO₂ emission sources or facilities considered for modeling, the extent of significant concentration gradients due to the influence of nearby sources, and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO₂ concentrations.

The sources of SO₂ emissions subject to the DRR in this area are described in the introduction to this section. For the Madison County area, the state selected a domain extending 15 km from the Granite City sources. As noted above, this area included no other sources emitting over 100 tons of SO₂ per year but included five facilities with SO₂ emissions emitting under 100 tons per year that Illinois modeled. This area is shown in Figure 21 above. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO₂ NAAQS exceedances in the area of analysis and any potential impact on SO₂ air quality from other sources in nearby areas. Further discussion of the additional sources in the area is provided in section 6.2.6 below. No other sources beyond 15 km were determined by the state to have the potential to cause concentration gradient impacts within the area of analysis. The EPA agrees with the state's selection of sources within the area of analysis.

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

- 50 meters along the fence lines of the modeled sources
- 100 meters from the Granite City source fence lines out to a distance of approximately 4 km

- 500 meters from 4 km out to a distance of approximately 20 km from the Granite City source.

The receptor network contained 10,073 receptors, and the network encompasses portions of Madison and St. Clair Counties. Figure 2, included in the state's submittal, shows the state's receptor grid for the area of analysis.

Figure 2. Illinois' Receptor Grid for the Madison County Area



As recommended in the Modeling TAD, the state placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility with the exception of locations described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor. Per the recommendations of the Modeling TAD, the state did not place receptors on large bodies of water (Mississippi River, Horseshoe Lake, and Canteen Lake). The state also did not place receptors in other locations that it considered to not be ambient air relative to each modeled facility. However, potentially inconsistent with the Modeling TAD, the state removed receptors located inside the fence lines of the modeled facilities. While the Modeling TAD recommends including receptors within the fence line of secondary sources, for purposes of assessing whether other facilities are causing violations within that area, the EPA has adequate evidence that no violations are being caused by any source in this area on the property of any other source. The concentration gradients in the modeled area overall are such that in examining the spatial distribution of impacts, it appears that inclusion of receptors inside the fence lines would not have shown SO₂ violations attributable to the primary Granite City sources. Specifically, due to the low release characteristics of the modeled sources, the highest impacts of each source are primarily at its own fence line and estimated concentrations decline sufficiently with distance from the source to support the conclusion that impacts on other sources' properties are well below the standard. Therefore, despite the potential inconsistency with the Modeling TAD, the EPA finds that the removal of these receptors does not prevent us from being able to use these technical data and modeling

results to assess air quality in the modeled area of analysis.

The EPA has assessed Illinois' receptor grid for the Madison County area of analysis and agrees that the receptor grid provides for adequate assessment of air quality in the area, given the availability of evidence that areas within the fence lines of modeled facilities would not be expected to show violations caused by other facilities.

2.4.5. Modeling Parameter: Source Characterization

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

The Granite City sources and five other sources, listed in Table 17 of the Illinois Chapter of the TSD for our intended designations, were explicitly included in the model. Of particular interest are the release characteristics modeled for Amsted Rail. For most of the modeled period, the release of emissions from the two primary emission units at this facility was horizontal. However, a permit issued on June 30, 2017, provides for "converting the ductwork from the baghouse that controls the arc furnace [Arc Furnace 2] from a horizontal discharge to a vertical discharge." Illinois' modeling uses release characteristics that reflect vertical discharge from this unit. Illinois modeled the other primary emission unit, Arc Furnace 1, as having horizontal discharge.

The compliance date for this conversion for Arc Furnace 2 requires completion no later than June 30, 2018. At the time the EPA issued its 120-day letter and intended designations, this conversion had not yet been implemented, and the work was not required to be completed prior to the EPA's final designations. Therefore, at that time, the revision to the stack configuration at this arc furnace could not be considered as representative when evaluating current air quality for the purpose of designations. The Modeling TAD recommends that allowable emissions may be considered in lieu of actual emissions only so long as the reduction of emissions is required adequately in advance of the date by which the designation decision is made, so that the reduced emissions can be argued to be more determinative of current air quality than emissions during the prior three years. By similar reasoning, a requirement for revisions to stack characteristics that had not been made and was not mandated until June 30, 2018, could not be considered when assessing current air quality for a final action EPA must complete by December 31, 2017.

However, in its response to the EPA's 120-day letter, Illinois provided evidence that the redirection of emissions from Amsted Rail's Arc Furnace 2 has been completed and is now permanent and enforceable. In particular, Illinois provided a letter from Amsted Rail stating that the modification of the stack, providing for upward vertical discharge, was completed on August 14, 2017. Under the terms of the permit that authorized the stack modifications and redirection of emissions, Amsted Rail is prohibited from revising the configuration of this stack in a manner that would reduce dispersion.⁴ Thus, the revised configuration is now in place and may be

⁴ See Docket ID: EPA-HQ-OAR-2017-0003-0514.

considered permanent and enforceable.

The modeling analysis that Illinois submitted on July 6, 2017, reflected the emissions from Amsted Rail's Electric Arc Furnace 2 being discharged vertically. The redirection of these emissions to discharge vertically upward is now in fact permanent and enforceable, consistent with Illinois' modeling analysis. Therefore, the release of these emissions are now modeled in accordance with the guidance in the Modeling TAD.

In the Illinois Chapter of the TSD for our intended designations, the EPA found that for other sources, the state characterized these sources within the area of analysis in accordance with the best practices outlined in the Modeling TAD. The EPA received no comments or additional evidence regarding this finding, and the EPA continues to believe that these other sources were characterized properly. Specifically, for other sources, the state used actual stack heights in conjunction with actual emissions. The state also adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPFRM version 04274 was used to assist in addressing building downwash.

In the TSD for our intended designations, the EPA anticipated the possibility that the permitted redirection of emissions from Electric Arc Furnace 2 of Amsted Rail would become permanent and enforceable once completed, and stated that under these circumstances, we would find the stack characteristics that Illinois used in its modeling analysis to be appropriate. Illinois has supported this conclusion, specifically that the redirection of these emissions have in fact been made permanent and enforceable, in a manner consistent with its modeling. More generally, the EPA now finds that the modeling that Illinois has provided reflects an appropriate treatment of source characteristics for all sources in this area.

2.4.6. Modeling Parameter: Emissions

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

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

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, where a facility has recently adopted a new federally enforceable emissions limit or implemented other federally

enforceable mechanisms and control technologies to limit SO₂ emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO₂ emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, “Guideline on Air Quality Models.”

As previously noted, the state included the Granite City sources and five other emitters of SO₂ within 15 km in the area of analysis. The state has chosen to model these facilities using actual emissions. The facilities in the state’s modeling analysis and their associated annual actual SO₂ emissions between 2013 and 2015 are summarized below in Table 4. A description of how the state obtained hourly emission rates is given below this table.

Table 4. Actual SO₂ Emissions Between 2013 – 2015 from Facilities in the Madison County Area

Facility Name	SO ₂ Emissions (tpy)		
	2013	2014	2015
U.S. Steel – Granite City	864	961	828
Gateway Energy & Coke	1,128	1,241	1,188
Abengoa Bioenergy	7	8	8
Amsted Rail	3	5	6
Afton Chemicals	102	97	98
Milam Recycling & Disposal	29	29	18
Chain of Rocks Recycling & Disposal	5	5	5
Total Emissions from All Modeled Facilities in the State’s Area of Analysis	2,137	2,345	2,150

For U.S. Steel – Granite City, the company provided monthly emission information including data on fuel used and operational data. Emissions from units burning natural gas or rarely used emergency equipment were found to have negligible emissions. Since steelmaking is a 24 hour per day operation, hourly emission estimates were then obtained by dividing monthly emissions by the total number of operating hours in the month. Fixed, representative values were used for stack temperatures and exit velocities.

Similarly, for Gateway Energy and Coke, monthly emission rates were obtained, which were used to estimate hourly average emission rates. Exhaust temperatures and exit velocities were identified on a monthly basis. Estimates of bypass stack emissions were based on a May 2010 stack test and adjusted according to data on the number of malfunction hours and hours of maintenance in each year.

Notably, these emission estimates for U.S. Steel – Granite City and Gateway Energy & Coke

differ from the emission estimates for these facilities in the 2014 NEI. While the emission estimates in the 2014 NEI were adequate for purposes of deciding to list the facilities as subject to DRR requirements, Illinois conducted a more thorough assessment of the emissions of these facilities for purposes of its analysis of nearby air quality. Thus, while the 2014 NEI indicates that 2014 SO₂ emissions from these facilities were 1,334.9 tons and 1,180.1 tons, respectively, a more careful review finds the 2014 emission totals above, namely 961 tons and 1,241 tons, respectively. The EPA considers the emission estimates in Table 17, which Illinois used in its analysis, to be a more reliable basis for assessing current air quality in the Madison County area.

For Amsted Rail, the emission rate used in Illinois' modeling analysis is about half the emission rate reflected in the 2014 NEI. The revised emission estimates were based on recent stack testing conducted at the facility. For other facilities, emission estimates are comparable to the estimates in the 2014 NEI.

The EPA has assessed Illinois' characterization of emission rates for the sources modeled in the analysis and concludes that the modeled emissions are appropriate.

2.4.7. Modeling Parameter: Meteorology and Surface Characteristics

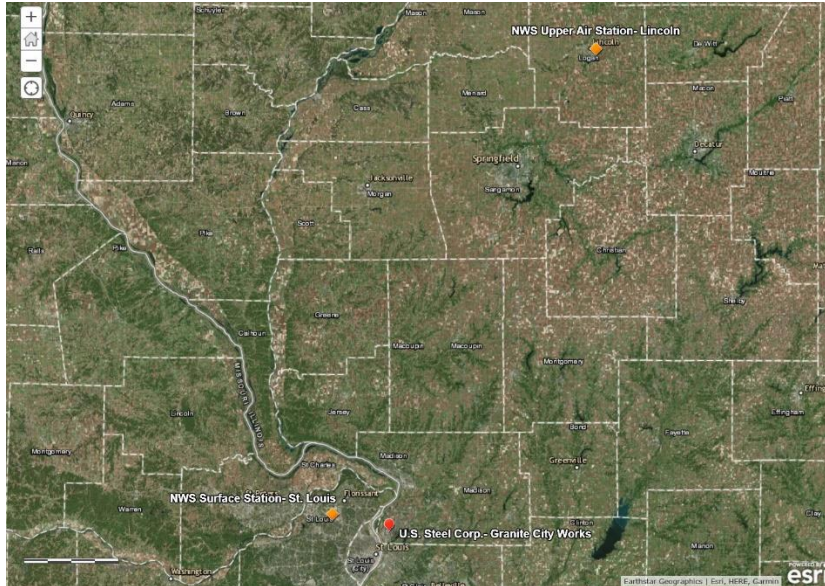
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of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

For the Madison County area of analysis, the state selected the surface meteorology from the NWS station in St. Louis, Missouri, located 21 km to the northwest of the sources, and coincident upper air observations from the NWS station in Lincoln, Illinois, located 171 miles to the north-northeast of the sources, as best representative of meteorological conditions within the area of analysis.

The state used AERSURFACE version 13016 using data from the St. Louis, Missouri, station to estimate the surface characteristics (albedo, Bowen ratio, and surface roughness (z_o)) of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as " z_o ." The state estimated surface roughness values for 12 spatial sectors out to one km at a monthly temporal resolution for dry, wet, and average moisture conditions.

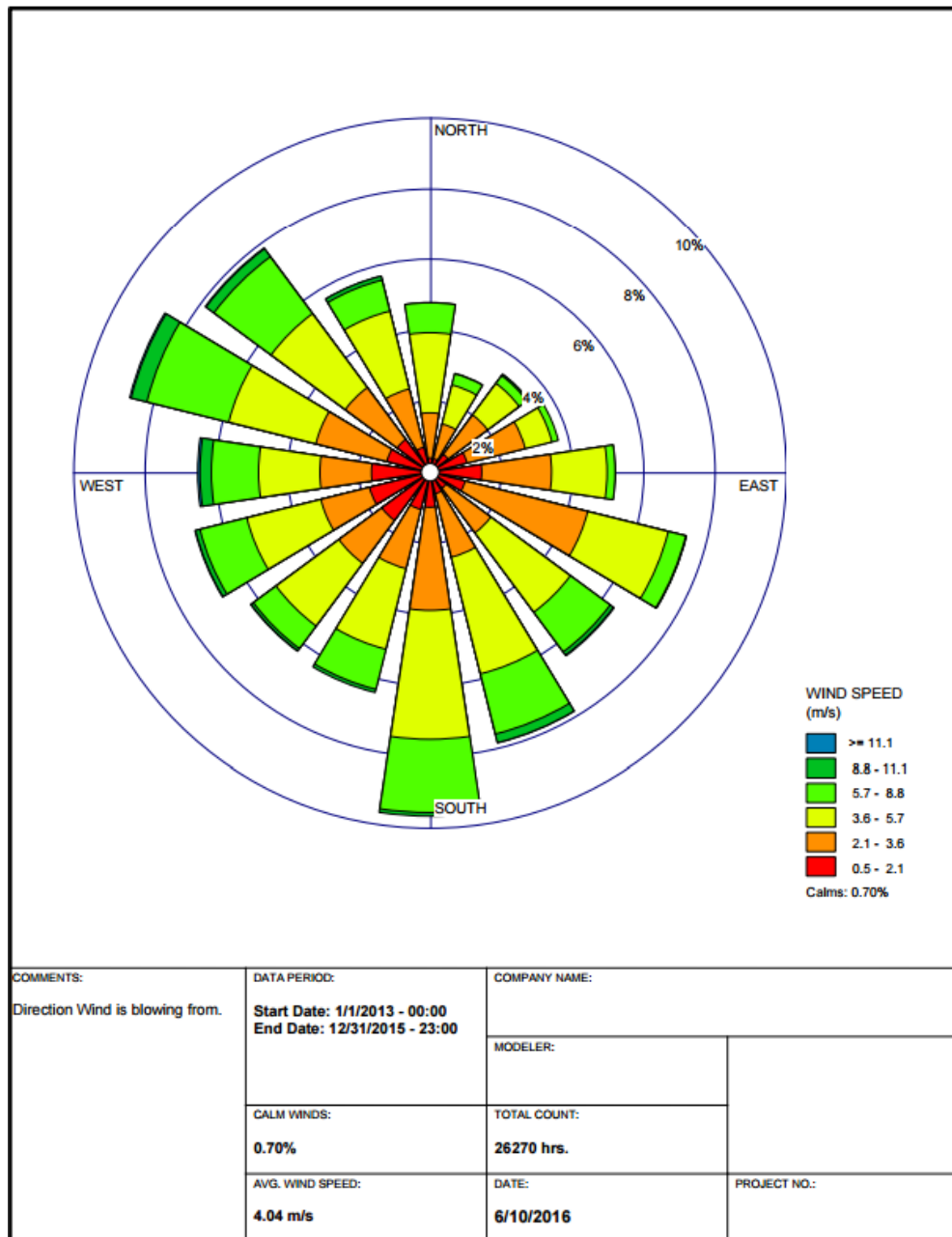
In the figure below, generated by the EPA, the locations of the NWS stations are shown relative to the area of analysis.

Figure 3. Area of Analysis and the NWS station near the Madison County Area



As part of its recommendation, the state provided the 3-year surface wind rose for Lambert – St. Louis International Airport, Missouri. In Figure 4, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. According to Illinois’ analysis, the most common wind direction during the three-year time period represented in the modeling is from the south, occurring approximately 9.6% of the time. The highest percentage wind speed range, occurring 34.6% of the time period, was in the 3.6 – 5.7 m/s range.

Figure 4: Madison County, Illinois Cumulative Annual Wind Rose for Years 2013 – 2015



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET processor version 15181. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The state followed the methodology and settings presented in *Regional Meteorological Data Processing Protocol, EPA Region 5 and States*⁵ in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best

⁵ Draft – Regional Meteorological Data Processing Protocol. EPA Region 5 and States. August 2014.

represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration was provided from the St. Louis, Missouri NWS station, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE version 15272. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the state set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data.

The EPA has assessed the meteorological and surface characterization in Illinois' modeling, including the conclusions Illinois has drawn from the wind rose above, and concludes that this component of Illinois' modeling is appropriate.

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

The terrain in the area of analysis is best described as flat to gently rolling. To account for these terrain changes, the AERMAP terrain program version 11103 within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the 1999 USGS National Elevation Database.

The EPA has assessed this component of the state's modeling and concludes that Illinois has appropriately addressed terrain in this area.

2.4.9. Modeling Parameter: Background Concentrations of SO₂

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO₂ that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the state chose to use the tier 2 approach. Illinois incorporated temporally-varying background one-hour concentrations developed from the East St. Louis monitor (AQS site ID#: 17-163-0010), which is located in northwestern St. Clair County, approximately 16 km south of the study area. The background concentrations for this area of analysis were determined by the state to vary from 7.07 µg/m³, equivalent to 2.70 ppb, to 34.29 µg/m³ (13.09 ppb), with an average value of 15.84 µg/m³ (6.05 ppb). A table showing all 96 background SO₂ values is included below.

Table 5. East St. Louis, Illinois Monitor* Seasonally and Hourly Varying Background SO₂**

Hour of Day	SO ₂ Concentration (µg/m ³)			
	Winter	Spring	Summer	Fall
1	21.73	14.57	7.50	10.56
2	17.28	11.87	18.32	11.08
3	9.60	13.26	17.63	14.40
4	11.26	17.36	12.91	12.13
5	12.13	22.34	13.79	11.43
6	10.38	13.44	10.30	9.25
7	9.60	17.71	11.69	11.43
8	12.83	15.53	19.98	21.81
9	14.48	16.93	31.85	22.95
10	19.98	23.12	27.05	34.29
11	28.53	27.75	24.78	25.83
12	23.03	19.54	19.54	19.89
13	31.32	16.40	18.67	16.23
14	24.26	15.97	17.10	19.98
15	19.02	16.75	15.01	15.71
16	18.15	13.79	17.71	14.22
17	17.89	17.63	12.91	13.79
18	18.06	14.40	13.52	14.57
19	15.71	14.57	10.64	12.48
20	10.38	12.22	9.51	9.16
21	10.56	10.47	14.57	7.07
22	14.83	9.51	9.34	9.86
23	17.54	9.95	8.29	7.24
24	28.10	13.87	8.81	7.94

* Monitor Latitude/Longitude Coordinates: (+38.61203 -90.16048)

** Seasons defined as: Winter (Dec, Jan, Feb), Spring (Mar, Apr, May), Summer (Jun, Jul, Aug), Fall (Sep, Oct, Nov)

The EPA has assessed Illinois' characterization of background values and concludes that this component of the modeling is appropriate.

2.4.10. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Madison County area of analysis are summarized below in Table 6.

Table 6. Summary of AERMOD Modeling Input Parameters for the Madison County Area of Analysis

Input Parameter	Value
AERMOD Version	15181 (default)
Dispersion Characteristics	Rural
Modeled Sources	7
Modeled Stacks	61 stacks, 52 volume releases
Modeled Structures	409
Modeled Fence lines	7
Total receptors	10,073
Emissions Type	Actual
Emissions Years	2013-2015
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	St. Louis, Missouri
NWS Station Upper Air Meteorology	Lincoln, Illinois
NWS Station for Calculating Surface Characteristics	St. Louis, Missouri
Methodology for Calculating Background SO ₂ Concentration	Tier 2: temporally varying using 2013-2015 monitored values from East St. Louis monitor in St. Clair County (AQS ID #: 17-163-0010)
Calculated Background SO ₂ Concentration	7.07 – 34.29 µg/m ³

The results presented below in Table 7 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

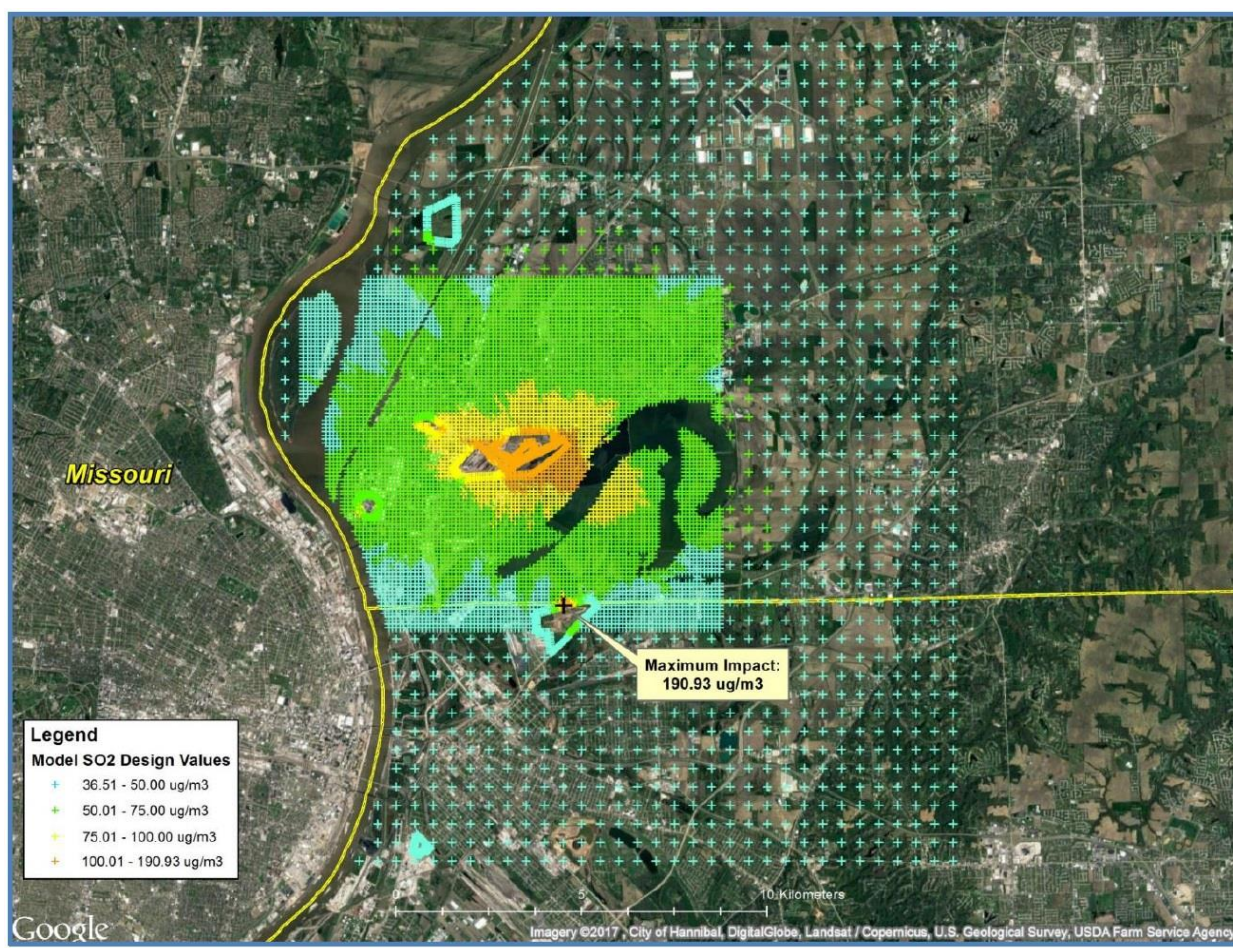
Table 7. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO₂ Concentration Averaged Over Three Years for the Area of Analysis for the Madison County Area

Averaging Period	Data Period	Receptor Location (UTM zone 16)		99th percentile daily maximum 1-hour SO₂ Concentration (µg/m³)	
		UTM Easting	UTM Northing	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2013-2015	750513 m	4282895 m	190.9	196.4*

*Equivalent to the 2010 SO₂ NAAQS of 75 ppb

The state’s modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 190.9 $\mu\text{g}/\text{m}^3$, equivalent to 72.9 ppb. This modeled concentration included the background concentration of SO_2 , and is based on actual emissions from the facilities. Figure 5 below was included as part of the state’s recommendation, and indicates that the predicted value occurred on the northern fence line of Milam Recycling, located 4 km south of the Granite City source. The highest concentration near the Granite City source is 177.8 $\mu\text{g}/\text{m}^3$, or 67.9 ppb, estimated on the northwest fence line of the source, and the highest concentration near Amsted Rail is 142.6 $\mu\text{g}/\text{m}^3$, or 54.5 ppb, estimated on the south-southeast fence line of that facility. The state’s receptor grid is also shown in the figure.

Figure 5: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Madison County Area



The modeling submitted by the state indicates that the 1-hour SO_2 NAAQS is attained at all receptors in the area.

2.4.11. The EPA’s Assessment of the Modeling Information Provided by the State

Illinois’ modeling for the Madison County area follows the recommendations in the Modeling TAD. At the time the EPA proposed designations, we found that the vertical release of selected

emissions from Amsted Rail was not consistent with either actual conditions or a federally enforceable and in effect requirement. However, Illinois has now provided evidence that the redirection of emissions to releasing vertically has since been completed and is therefore currently in effect, permanent, and federally enforceable. The EPA continues to believe that the models used, meteorology, emission estimates, nearby sources modeled, and background concentrations, adequately comply with the Modeling TAD and with Appendix W for the same reasons articulated above.

As discussed above and in the Illinois Chapter of the TSD for our intended designations, the highest impacts attributable to each facility were predicted to occur on or near to the facility's fence line with a significant decrease in impacts as distance from the facility increased. This supports the finding that no facility is causing or contributing to violations on the property of any other facility, and also supports the finding that the modeled facilities are not contributing to violations in any nearby areas not attaining the NAAQS. This may be attributed to the primarily low release characteristics and localized impacts of the modeled sources.

Therefore, the EPA now finds that Illinois' modeling demonstrates that the modeled area in Madison County is attaining the SO₂ standard.

2.5. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Madison County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above and in more detail in the Illinois Chapter to the TSD for our intended designations. The EPA gave consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

2.6. Jurisdictional Boundaries in the Madison County Area

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

In its submission, Illinois recommended that specific, previously undesignated townships and portions of townships within Madison County be designated as attainment based in part on an assessment and characterization of air quality impacts from the Granite City source and from other nearby sources that may have a potential impact in the area where the 2010 SO₂ NAAQS may be exceeded. County and township boundaries in Illinois are well established and well known, so that these boundaries provide a good basis for defining the area being designated.

2.7. Other Additional Information Relevant to the Designations for Madison County

Portions of Madison County were designated during “Round 2” of SO₂ designations, promulgated on July 12, 2016. *See* 81 FR 45039 et seq. Specifically, the EPA promulgated a nonattainment designation for a portion of Alton Township, and the EPA promulgated an unclassifiable/attainment designation for Wood River Township and a portion of Chouteau Township. For Round 3, in its recommendations of July 6, 2017, Illinois recommended an attainment designation for Venice, Granite City, and Nameoki Townships, and the currently undesignated portion of Chouteau Township (that portion of the township south of the Cahokia Diversion Channel).

In the Illinois Chapter of the TSD for our intended Round 3 designations, the EPA found that the remainder of Madison County included no areas known or expected to be violating the SO₂ standard, no sources subject to Data Requirements Rule obligations for air quality characterization, and no evidence of sources that contribute to violations of the SO₂ standard in any nearby areas that do not meet the NAAQS. On this basis, the EPA proposed to designate this remainder of Madison County as unclassifiable/attainment of the SO₂ standard.

Illinois has not recommended any revisions to the existing designations in Madison County, and the EPA is taking no action to revise these designations. As discussed above, the EPA now finds that the area addressed in Illinois’ recommendations dated July 6, 2017, (as addressed also in Illinois’ comments dated September 29, 2017) warrants being designated attainment/unclassifiable. As is also discussed above, the EPA finds that the remaining undesignated portions of Madison County also warrant being designated attainment/unclassifiable.

2.8. The EPA’s Assessment of the Available Information for Madison County

After careful review of the state’s assessment, supporting documentation, and all available data, the EPA finds the modeling submitted by the state may now be considered to demonstrate that the 1-hour SO₂ NAAQS is currently being attained in applicable portions of this area. Available information also indicates that the remaining undesignated portions of Madison County include no areas known or expected to be violating the SO₂ standard, no sources subject to Data Requirements Rule obligations for air quality characterization, and no evidence of sources that contribute to violations of the SO₂ standard, and thus also warrant being designated attainment/unclassifiable.

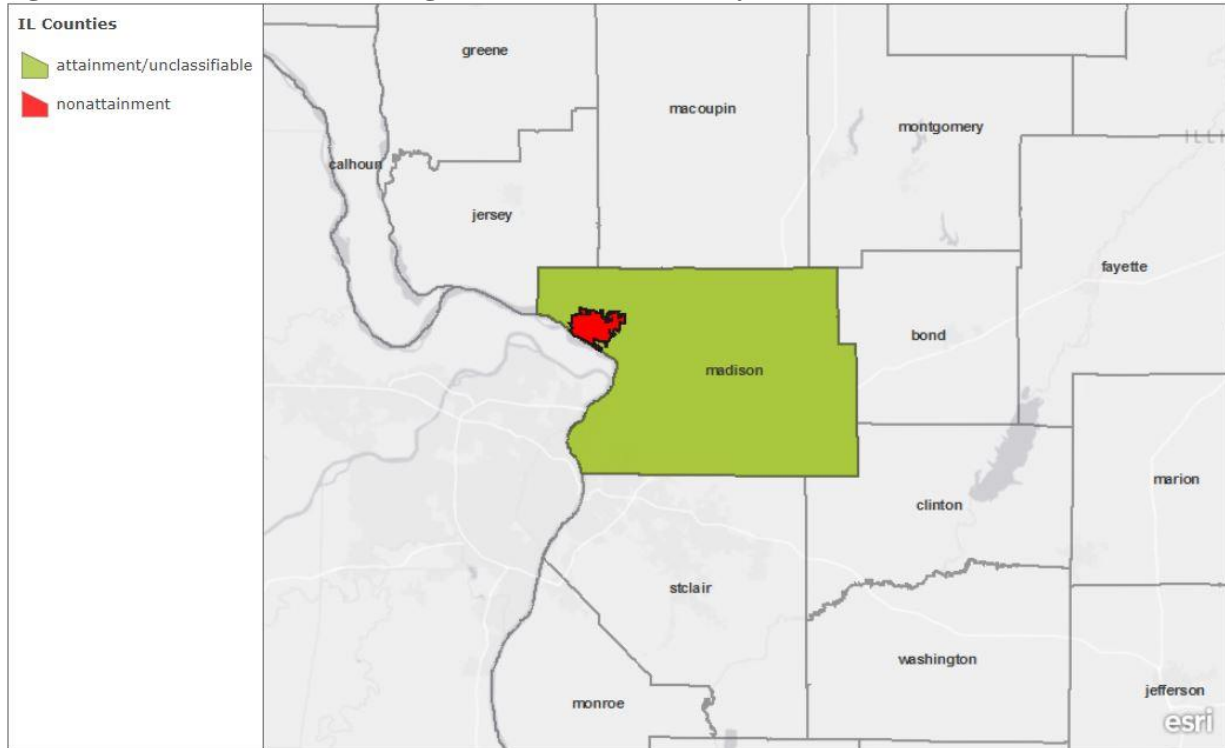
The EPA believes that this attainment/unclassifiable area, as described in the above paragraphs, will have clearly defined legal boundaries, and we find these boundaries to be a suitable basis for defining an attainment/unclassifiable area.

2.9. Summary of Our Final Designation for Madison County

After careful evaluation of the state’s recommendation and supporting information, as well as all available relevant information, the EPA is designating all portions of Madison County, that have

not previously been designated for the 2010 SO₂ standard, as attainment/unclassifiable because the EPA has determined the available information indicates the area meets the NAAQS and does not indicate the area contributes to ambient air quality in a nearby area that does not meet the NAAQS. Figure 6 shows this final designated area.

Figure 6. The EPA’s Final Designated Madison County Attainment/Unclassifiable Area*



Esri, HERE, NPS | Esri, HERE, Garmin, NGA, USGS, NPS

*The green area on the map does not distinguish the area already designated as unclassifiable/attainment in Round 2 from the area being designated attainment/unclassifiable in this action even though they are separate areas.

At this time, our final designations for the state only apply to this area and the other areas presented in the TSD for our intended designations and as finalized above in Table 1. The EPA intends in a separate action to evaluate and designate all remaining undesignated areas in Illinois by December 31, 2020.