Technical Support Document

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

Summary

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

Ohio submitted updated recommendations on September 16, 2015, ahead of a July 2, 2016, deadline for EPA to designate certain areas established by the U.S. District Court for the Northern District of California. This deadline is the first of three deadlines established by the court for EPA to complete area designations for the 2010 SO_2 NAAQS. Table 1 below lists Ohio's recommendations and identifies the counties or portions of counties in Ohio that EPA intends to designate by July 2, 2016 based on an assessment and characterization of air quality through ambient air quality data, air dispersion modeling, and other evidence and supporting information.

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

Area	**Ohio's Recommended Area Definition**	**Ohio's Recommended Designation**	**EPA's Intended Area Definition**	**EPA's Intended Designation**
Clermont County, Ohio	Clermont County, excluding Pierce Township	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Gallia County, Ohio	Gallia County and In Meigs County: Bedford, Columbia, Rutland, Salem, Salisbury, and Scipio Townships	Attainment	Same as State's Recommendation	Unclassifiable

Background

On June 3, 2010, EPA revised the primary (health based) SO_2 NAAQS by establishing a new one-hour standard at a level of 75 parts per billion (ppb) which is attained when the three-year average of the 99th percentile of one-hour daily maximum concentrations does not exceed 75 ppb. This NAAQS was published in the Federal Register on June 22, 2010 (75 FR 35520) and is codified at 40 CFR 50.17. 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, EPA is not currently designating areas on the basis of either of these two primary standards. Similarly, the secondary standard for SO_2, set at 500 ppb evaluated over 3 hours has not been revised, and EPA is also not currently designating areas on the basis of the secondary standard.

General Approach and Schedule

Section 107(d) of the Clean Air Act requires that not later than one year after promulgation of a new or revised NAAQS, state governors must submit their recommendations for designations and boundaries to EPA. Section 107(d) also requires 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, EPA will promulgate the designations that it deems appropriate. If a state disagrees with EPA's intended designations, it is given an opportunity within the 120 day period to demonstrate why any proposed modification is inappropriate.

On August 5, 2013, 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, EPA committed to address, in separate future actions, the designations for all other areas for which the Agency was not yet prepared to issue designations.

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

According to the court-ordered schedule, EPA must complete the remaining designations by three specific deadlines. By no later than July 2, 2016 (16 months from the court's order), EPA

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

must designate two groups of areas: (1) areas that have newly monitored violations of the 2010 SO_2 NAAQS and (2) areas that contain any stationary sources that had not been announced as of March 2, 2015 for retirement and that according to 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. EPA has separately promulgated requirements for states and other air agencies to provide additional monitoring or modeling information on a timetable consistent with these designation deadlines. We expect this information to become available in time to help inform these subsequent designations. These requirements were promulgated on August 21, 2015 (80 FR 51052), in a rule known as the SO_2 Data Requirements Rule (DRR).

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

Based on ambient air quality data collected between 2012 and 2014, no violations of the 2010 SO_2 NAAQS have been recorded in any undesignated part of the state.[2] However, there are two

[2] For designations based on ambient air quality monitoring data that violates the 2010 SO_2 NAAQS, the consent decree directs EPA to evaluate data collected between 2013 and 2015. Absent complete, quality assured and certified data for 2015, the analyses of applicable areas for EPA's intended designations will be informed by data collected between 2012 and 2014. States with monitors that have recorded a violation of the 2010 SO_2 NAAQS during these years have the option of submitting complete, quality assured and certified data for calendar year 2015 by April 19, 2016 to EPA for evaluation. If after our review, the ambient air quality data for the area indicates that no violation of the NAAQS occurred between 2013 and 2015, the consent decree does not obligate EPA to complete

sources in the state meeting the emissions criteria of the consent decree for which EPA must complete designations by July 2, 2016. In this draft technical support document, EPA discusses its review and technical analysis of Ohio's updated recommendations for the areas that we must designate. EPA also discusses any intended modifications from the state's recommendations based on all available data before us.

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

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

the designation. Instead, we may designate the area and all other previously undesignated areas in the state on a schedule consistent with the prescribed timing of the court order, i.e., by December 31, 2017, or December 31, 2020.

Technical Analysis for the Clermont County, Ohio Area

Introduction

Clermont County, Ohio contains a stationary source that according to EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/MMBTU). As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the W.H. Zimmer Generating Station (Zimmer) emitted 11,975 tons of SO_2, and had an emissions rate of 0.53 lbs SO_2/MMBTU. Pursuant to the March 2, 2015 court-ordered schedule, EPA must designate the area surrounding the facility by July 2, 2016.

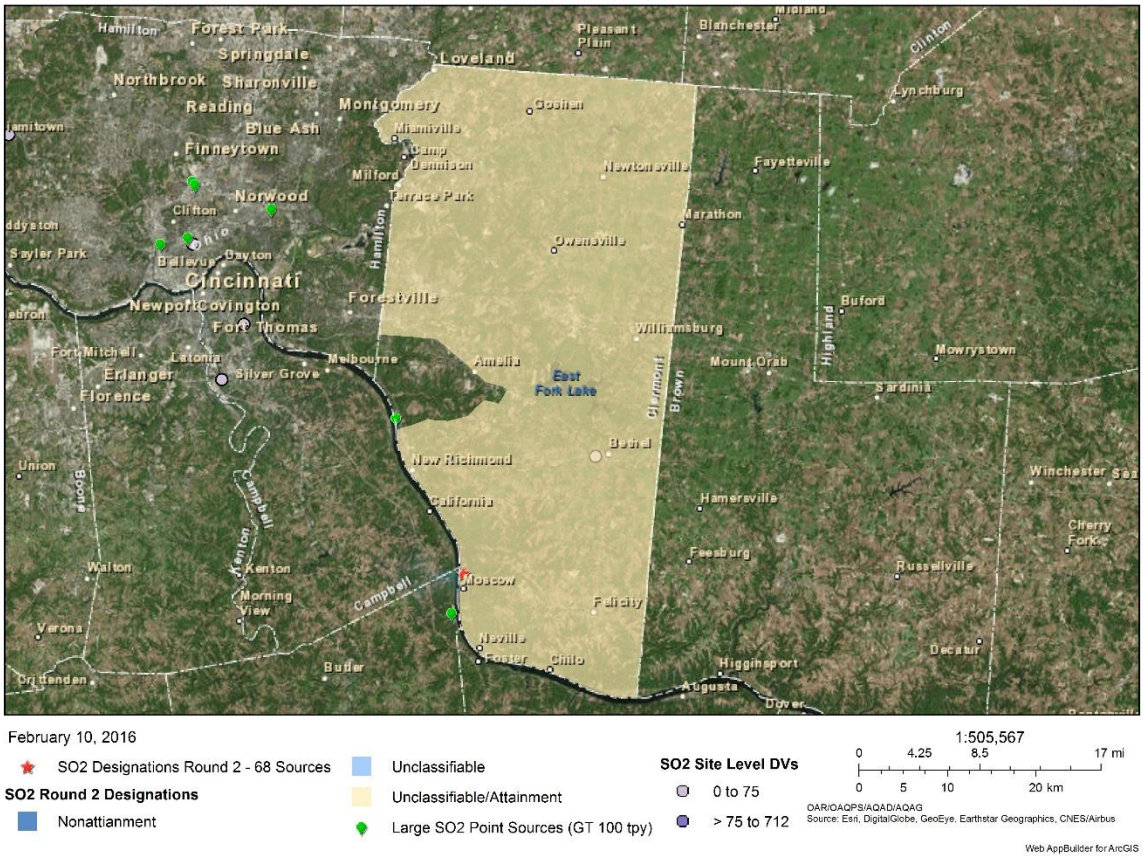
In its submission, Ohio recommended that the area surrounding Zimmer, specifically all townships in Clermont County with the exception of Pierce Township[3], be designated as attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have 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 actual emissions. After careful review of the state's assessment, supporting documentation, and all available data, EPA agrees that the area is attaining the standard, and intends to designate Clermont County (excluding Pierce Township) as unclassifiable/attainment.

As seen in Figure 1 below, Zimmer is located in Moscow, along the Ohio River along the southern border of Clermont County. Clermont County is in southwest Ohio, near Cincinnati. Also included in the figure are nearby emitters of SO_2 and EPA's intended designation for the area.

Figure 1. EPA's intended designation for Clermont County, Ohio

[3] Pierce Township, Clermont County, Ohio was designated nonattainment for the 2010 SO_2 NAAQS on August 5, 2013 (78 FR 47191). This township included a major source (Beckjord Generating Stations) that subsequently shut down. Ohio has addressed this township separately, notably by submitting a redesignation request on August 11, 2015 for this township, and EPA will be addressing this township separately as well.

Clermont County, Ohio Area



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

Detailed Assessment

Model Selection and Modeling Components

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

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

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

The state used AERMOD version 15181, the most recent regulatory version of the model, and a discussion of the individual components will be referenced in the corresponding discussion that follows, as appropriate.

Modeling Parameter: Rural or Urban Dispersion

EPA's recommended procedure for characterizing an area by prevalent land use is based on evaluating the dispersion environment within 3 kilometers (km) of the facility. According to EPA's Guideline on Air Quality Models, rural dispersion coefficients are to be used if more than 50 percent of the area within a 3 km radius of the facility is classified as rural. Conversely, if more than 50 percent of this area is urban, urban dispersion coefficients should be used in the modeling analysis. Using this recommended approach, the state determined that less than 50 percent of the land area within 3 km of Zimmer is industrial, commercial, or dense residential, which indicates that the area is primarily rural. Therefore, the state determined that it was most appropriate to run the model in rural mode.

Modeling Parameter: Area of Analysis (Receptor Grid)

EPA believes that a reasonable first step towards characterization of air quality in the area surrounding Zimmer is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations. As AERMOD is recommended for use within 50 km of a given emission source, the state conservatively determined that 50 km was an appropriate distance to adequately characterize air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. For the Clermont County area, the state considered fifteen other emitters of SO_2 within 50 km of Zimmer. The state found that none of the sources within 50 km were close enough or large enough to cause a significant concentration gradient in the vicinity of Zimmer. The grid receptor spacing for the area of analysis chosen by the state is as follows:

- 50 meter spacing on the fenceline
- 50 meter spacing to 3 km from the stacks
- 100 meter spacing to 5 km
- 500 meter spacing to 10 km
- 1000 meter spacing to 25 km from the facility
- 1000 meter spacing covering the northern portion of Clermont County

- A discrete receptor was placed at the background monitor location.

The receptor network contained 37,702 receptors. For the purposes of this designation effort, the Modeling TAD states that the receptor grid need not include receptors in areas where it would not be feasible to place a monitor and record ambient air impacts, such as bodies of water. In the Clermont County analysis, receptors were not placed on the Ohio River or within facility fencelines in the receptor grid. The receptor grid covered the entirety of Clermont County, a portion of Brown and Hamilton Counties in Ohio, and a portion of Campbell, Pendleton, and Bracken Counties in Kentucky.

Figure 2 below shows the area surrounding the Zimmer plant in southern Clermont County and some of the Hamilton County source locations. The location of the surface NWS station is shown in this figure, in northern Boone County, Kentucky, northwest of Zimmer.

Figure 2: Clermont County, Ohio Area of Analysis

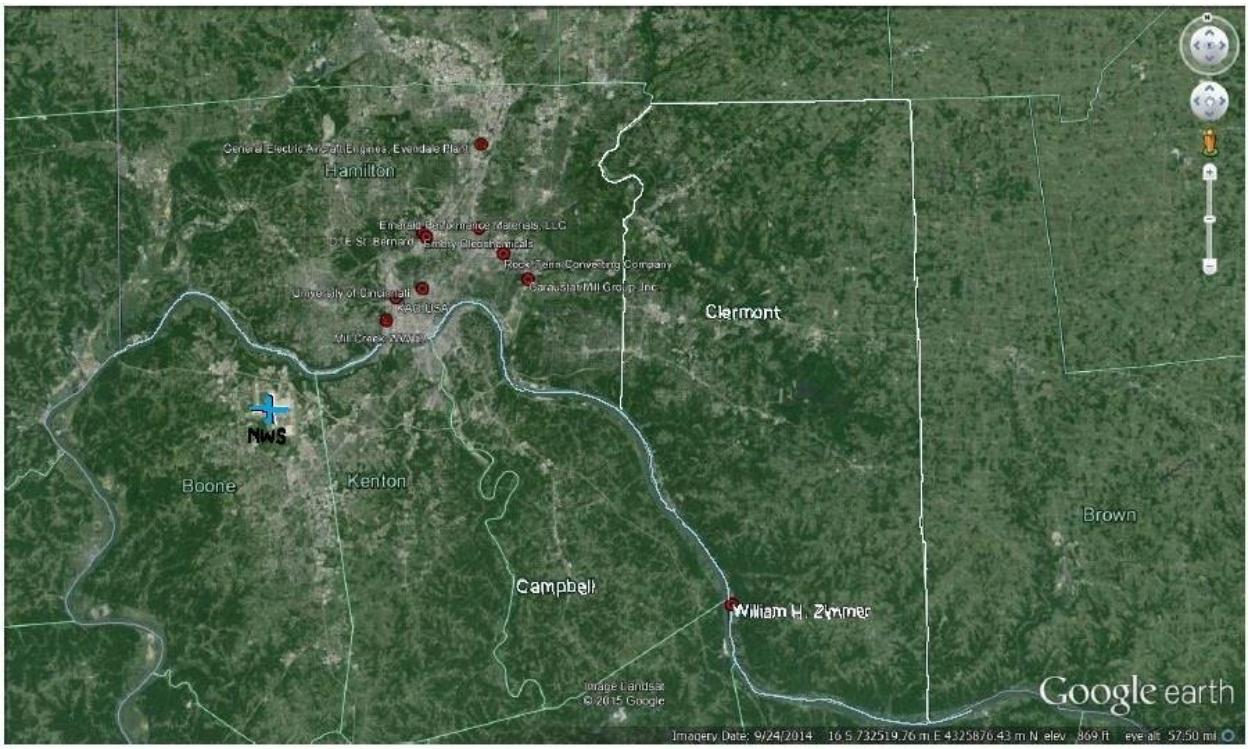
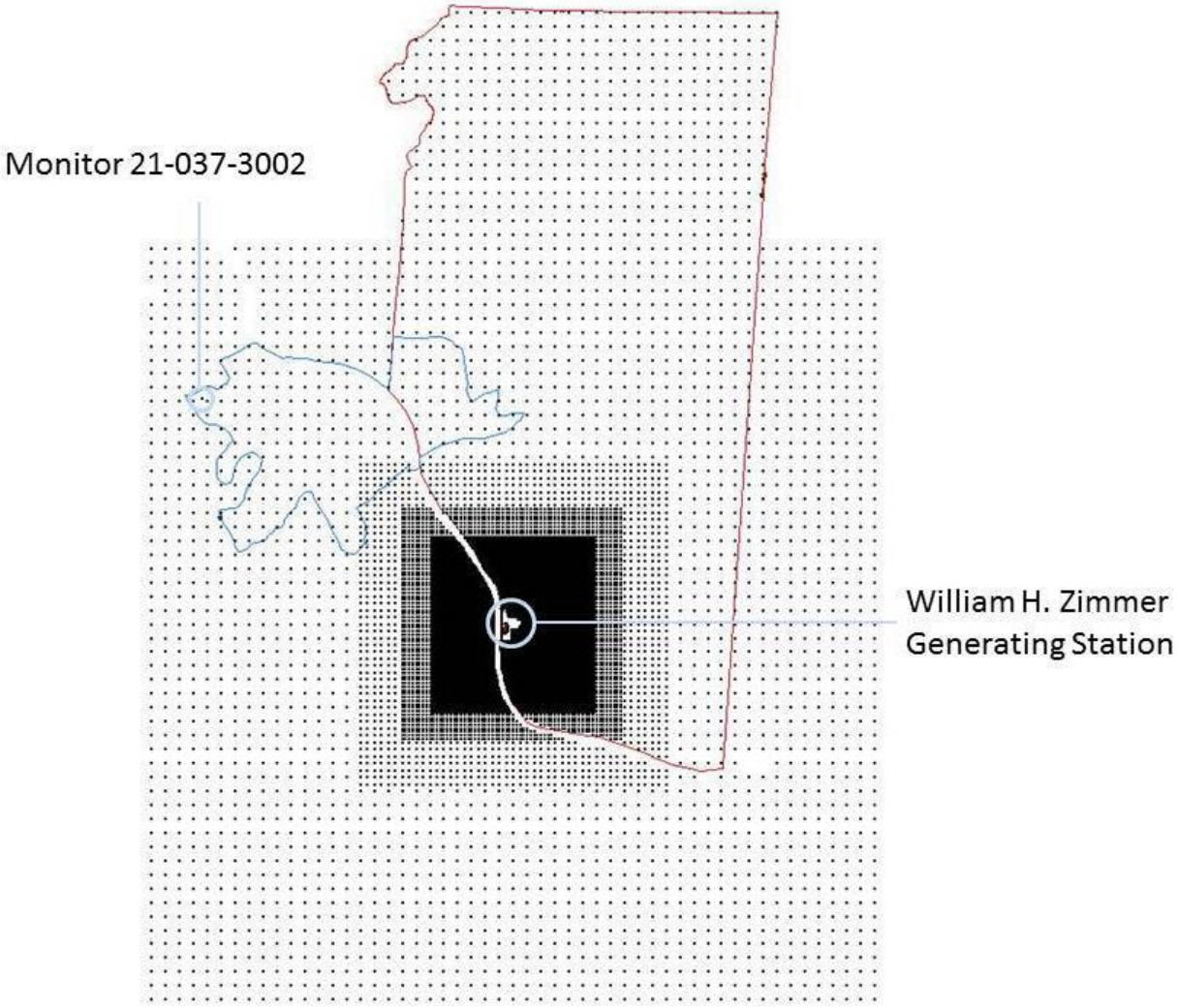


Figure 3, included in the state's recommendation, shows the receptor grid for the area of analysis. In Figure 3, the area outlined in blue to the northwest of the fine receptor grid is the Campbell-Clermont SO_2 nonattainment area, which includes Pierce Township in Clermont County, Ohio, and a portion of Campbell County, Kentucky. Ohio has submitted a request to redesignate the area to attainment.

Figure 3: Receptor Grid for the Clermont County, Ohio Area of Analysis



Modeling Parameter: Emissions

EPA's Modeling TAD notes that for the purposes of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. The Modeling TAD highly encourages the use of the most detailed throughput, operating schedule and emissions information available. Variable emissions, temperature, and flow data can be modeled using AERMOD's hourly varying emissions keyword HOUREMIS or variable emission factor keyword EMISFACT. EPA believes that continuous emissions monitoring systems (CEMS) data provide valuable historical emissions information, when it is available, and that these data are available for many electric generating units. However, the TAD does provide for the flexibility of using allowable emissions in the form of a federally enforceable limit on the emissions rate (referred to as PTE or allowable emissions).

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

As previously noted, the state considered fifteen other SO_2 sources of varying size, located within 50 km of Zimmer. See Table 2. The state chose that distance to ensure a thorough facility search, out to the maximum distance for which AERMOD is considered to be applicable. However, none of these SO_2 sources were determined by the state to have the potential to cause significant concentration gradient impacts within the area of analysis.

Table 2: Actual SO_2 Emissions for 2012 – 2014 from Facilities in the Clermont County, Ohio Area of Analysis

Facility Name	Distance from Zimmer (km)	Actual SO_2 Emissions (tons per year)		
		2012	2013	2014
W.H. Zimmer Generating Station	--	11,975	18,457	13,498
Duke Energy Ohio, Beckjord Station (stopped operating 10/2014)	14.9	67,069	51,900	32,603[A]
Miami Fort Power Station, Hamilton Co OH (Unit 6 closed 6/2015)	57.1	26,407	31,844	28,479
DTE ST. Bernard, LLC, Hamilton Co OH	41.6			1,666
Rock-Tenn Converting, Hamilton Co OH	36.1			179
Duke Energy Kentucky, East Bend Station, Boone Co KY[A]	54.5	1,497	2,198	2,103
Spurlock Station, Mason Co KY [B]	40.9	5,131	4,469	4,689
Carmeuse Lime Pendleton Co KY [C, E]	3.1	614	524	655
Griffin Industries, Pendleton Co KY [C]	21.4			101
KAO Brands	N/A			92
Mill Creek WWTP	N/A			20
University of Cincinnati	N/A			14
TSS Aviation	N/A			10
Emery Oleochemicals	N/A			1
Caraustar Mill	N/A			0.1

Emerald Performance	N/A			0.05
Total Emissions From All Facilities in the State's Area of Analysis		114,776[D]	111,475[D]	84,110

[A] Beckjord Station closed its coal-fired units in October 2014 and no longer emits SO_2. Therefore its 2012-2014 emissions were not included in the Zimmer modeling analysis.
[B] Emissions from EPA's Air Markets Database. Other 2014 data from Ohio's Fee Emission Reports.
[C] Emissions from 2008 NEI.
[D] Totals assume 2014 emissions for facilities without reported 2012 or 2013 data.
[E] See text.

The Walter C. Beckjord power plant (Beckjord) was not included in the modeling because it shut down its coal-fired units in October 2014, and the closure is permanent and enforceable. Its current SO_2 emissions are zero. Therefore, while it would have been contributing significantly to local SO_2 concentrations in the time period Ohio modeled (2012-2014), Beckjord's historical emissions do not represent current (or future) conditions, and therefore are not relevant for determining the appropriate SO_2 designation for the remainder of Clermont County. The Miami Fort Power Station (Miami Fort) permanently stopped using its Unit 6 in June 2015. Although the plant's other SO_2 emitting units still operate, preliminary 2015 data from EPA's Air Markets Database shows that Miami Fort emitted 14,239 tons per year (tpy) in 2015, which is about half of its 2014 emissions. Miami Fort is 57 km from Zimmer and 43 km from the nearest border of Clermont County. With similar SO_2 emissions to Miami Fort's, the Zimmer plant's modeled impacts were less than 100 $\mu g/m^3$ further than 5 km from the source. This suggests that Miami Fort's impacts are likely to be well below the NAAQS in Clermont County. In addition, the prevailing winds in the area, as measured at Cincinnati/Northern Kentucky Airport, blow primarily from the south-southwest, which would not bring Miami Fort's emissions into Clermont County. Ohio determined that given its location, Miami Fort is unlikely to provide a significant concentration gradient near Zimmer or anywhere within Clermont County. DTE St. Bernard, LLC in Hamilton County and the remaining emission sources in Hamilton County would be similarly affected by the prevailing south-southwest winds, and given their distance from the Clermont County border and from Zimmer, they are not expected to cause or contribute to an exceedance of the 2010 SO_2 NAAQS in Clermont County. The background concentration is expected to account for their impacts in the Zimmer analysis. The two Kentucky power plants are located 40 to 54 km from Zimmer, and they have relatively low emissions, so they are not expected to provide significant concentration gradient in Clermont County. Their emissions are expected to be accounted for by the background concentration.

Carmeuse Lime, in Pendleton, KY, was not discussed in Ohio's September 16, 2015 recommendation submittal. Ohio EPA staff informed EPA on November 17, 2015, that they had been unable to obtain modeling input information from Kentucky in time to include it in the Clermont County analysis. Ohio has previously modeled a similar, but larger, Carmeuse facility in Ohio, which had approximately 7 times the SO_2 emissions of the Pendleton, KY facility. By extrapolating from that analysis, Ohio concluded that the Pendleton, KY facility would be unlikely to cause or contribute to modeled concentrations over the standard either in its own vicinity or in Clermont County, nor would the facility have caused or contributed to a modeled exceedance of the NAAQS near Zimmer, had it been included in the Clermont County modeling analysis. Ohio believes that the impacts of the Pendleton facility in Clermont County are adequately covered by the background concentration. EPA agrees that the emissions from this

source are sufficiently small and sufficiently distant from Zimmer and other locations in Clermont County that it may reasonably be accounted for as part of the background concentration and judged not to cause air quality significantly different than that found in Ohio's modeling.

Modeling Parameter: Source Characterization

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

Modeling Parameter: Meteorology and Surface Characteristics

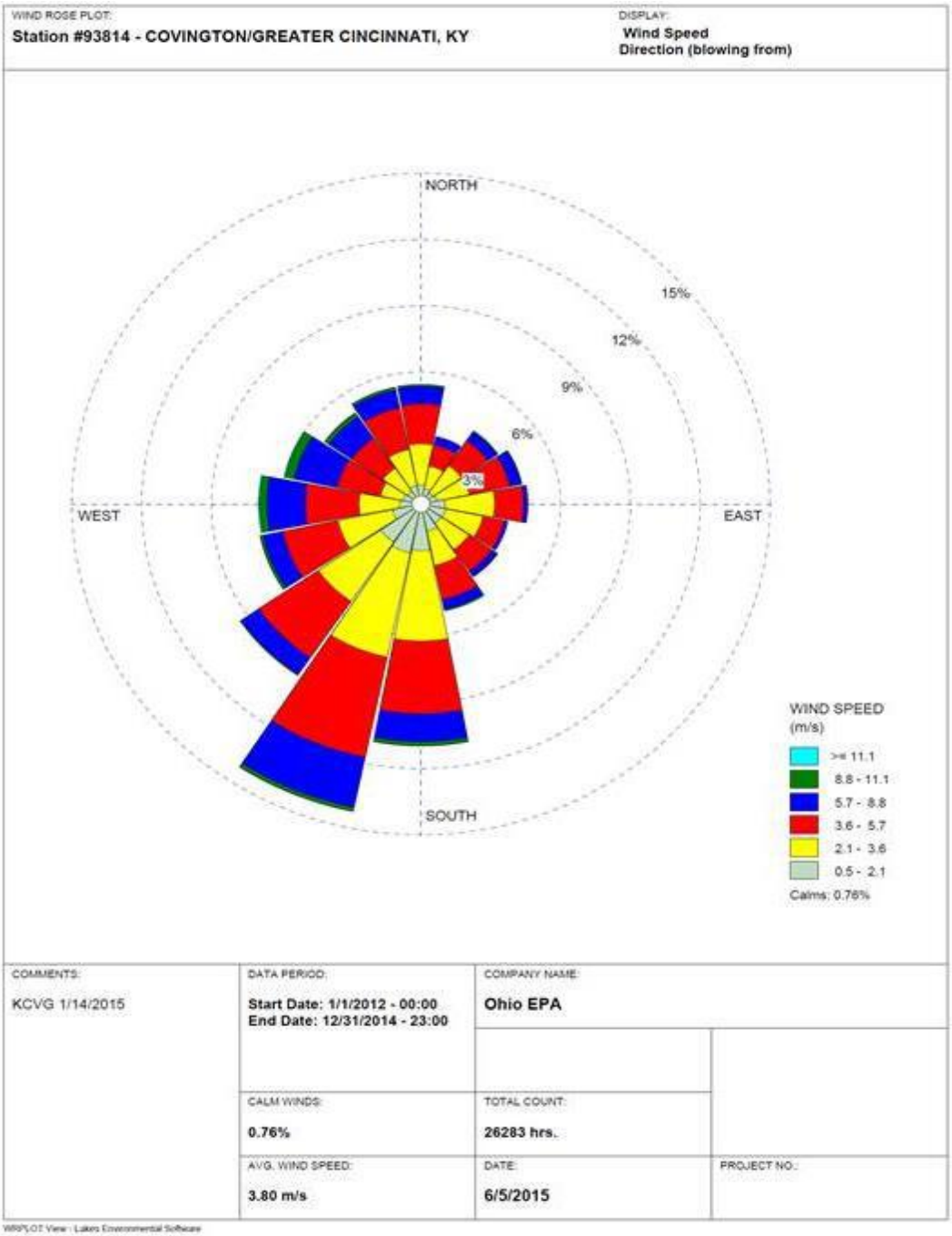
The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of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

For the Clermont County area of analysis, surface meteorology from Cincinnati/Northern Kentucky Airport in Covington, Kentucky, 43 km northwest of Zimmer, and coincident upper air observations from Wilmington, Ohio 74 km to the northeast, were selected as best representative of meteorological conditions within the area of analysis.

The state used AERSURFACE version 13016 to estimate the surface characteristics of the area of analysis. The state developed surface characteristics for 12 spatial sectors at a seasonal temporal resolution at the Cincinnati NWS site. These surface characteristics are the albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (representing the ratio of sensible heat flux to latent heat flux at the ground level), and the surface roughness (representing the influence of ground features such as buildings and vegetation on surface wind flow).

As part of its recommendation, the state provided the 3-year surface wind rose for Cincinnati, Ohio. In Figure 4, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Winds at the Cincinnati airport are predominantly from the southwest.

Figure 4: Cincinnati, Ohio Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The state used AERSURFACE to determine appropriate surface characteristics, and followed EPA guidance in the processing of the raw meteorological data into an AERMOD-ready format. Ohio processed the Cincinnati NWS surface meteorological data using the AERMINUTE preprocessor, which uses one-minute meteorological observations to provide the

most complete and accurate hourly-averaged surface wind data. Then Ohio used AERMET to combine surface and upper air data into input files required by the AERMOD model.

Modeling Parameter: Geography and Terrain

The terrain in the area of analysis is hilly, along the Ohio River valley. The AERMAP terrain program within AERMOD was used to specify elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Dataset.

Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For the Clermont County area of analysis, the state chose to use the SO_2 monitor in northern Campbell County, Kentucky (21-037-3002). This monitor, which is located approximately 28 km northwest of Zimmer, is the nearest representative SO_2 monitor. This monitor is considered to be well representative of other SO_2 sources in the Cincinnati area. It was also impacted by emissions from Beckjord, until the facility permanently shut down its coal-fired boilers in October 2014. For such situations, the Modeling TAD recommends determining background concentrations based on a data set that excludes "concentrations when the source in question is impacting the monitor." Ohio analyzed hourly concentrations at this monitor and correlated the data with wind direction data from the Cincinnati NWS site, processed with AERMINUTE, for January 2012 through February 2015. The data was also correlated with hourly emissions from Beckjord and Zimmer. For the full dataset, maximum concentrations at the monitor appeared to be primarily due to Beckjord. Ohio also analyzed a dataset of the 10,321 hours when Beckjord's SO_2 emissions were zero. No exceedances of the standard occurred during these hours, and the maximum monitored concentrations for this time period came from the west and southwest of the monitor. Ohio determined that a background concentration taken from this data set would account well for any currently operating SO_2 sources which currently affect the Clermont County area. In addition, the background is still conservative because it was likely impacted by the emissions of Unit 6 at the Miami Fort power plant east of Cincinnati, which was operating during 2012-2014, but shut down in June 2015, reducing SO_2 emissions by over 18,000 tons per year. The background concentration which Ohio used for the Clermont County analysis was determined by the state to be the 99th percentile of the values for which Beckjord had zero emissions and the monitor value was nonzero. The resulting value was 28.8 micrograms per cubic meter ($\mu g/m^3$), or 11 ppb.[4] This value was incorporated into the final AERMOD results and is expected to account for the impacts of sources not included in the Clermont County analysis.

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

Since the SO_2 air quality standard reflects the 99th percentile among daily maximum concentrations, the common means of determining a single, "first tier" background value is to determine the 99th percentile among daily maximum background concentrations, i.e. the 99th percentile among a set of daily maximum values in a data set that includes only values that are representative of background concentrations. The common means of determining hourly background concentrations is to determine the 99th percentile among 24 sets of values reflective of background concentrations, where each data set is for a single hour. The average of these 24 hourly 99th percentile background concentrations would be approximately the same as the 99th percentile among the full data set. In this sense, Ohio has applied a single, "first tier" background concentration, but Ohio has determined a level that corresponds approximately to the average of the levels they would have determined had they evaluated hourly background concentrations. In addition, by excluding hours when the monitor recorded zero ppb, Ohio has determined a somewhat conservative approach in determining 99th percentile values. Therefore, Ohio has applied a reasonable background concentration in its analysis, consistent with the recommendations of the Modeling TAD.

Summary of Modeling Results

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

Table 3: AERMOD Modeling Parameters for the Clermont County, Ohio Area of Analysis

Clermont County, Ohio Area of Analysis	
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	2
Modeled Structures	24
Modeled Fencelines	1
Total receptors	37,702
Emissions Type	Actual, temporally varying
Emissions Years	2012-2014
Meteorology Years	2012-2014
Surface Meteorology Station	Cincinnati/Northern Kentucky Airport
Upper Air Meteorology Station	Wilmington, Ohio
Methodology for Calculating Background SO_2 Concentration	99th percentile of monitored hours without influence from now-closed neighboring power plant
Calculated Background SO_2 Concentration	11 ppb/ 28.8 $\mu g/m^3$

The results presented below in Table 4 show the magnitude and geographic location of the highest predicted modeled concentration based on actual emissions from Zimmer and background concentrations.

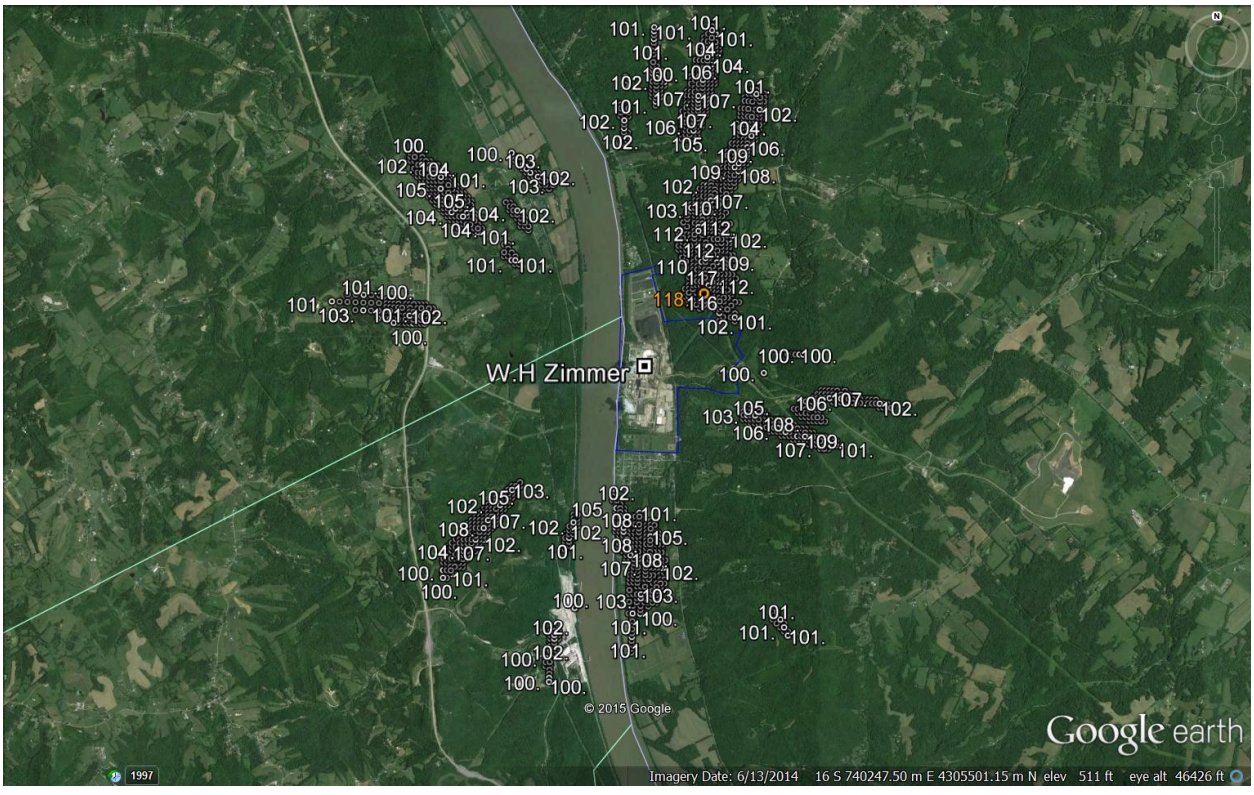
Table 4: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the Clermont County, Ohio Area of Analysis Based on Actual Emissions

		Receptor Location		SO_2 Concentration ($\mu g/m^3$)	
Averaging Period	Data Period	UTM E	UTM N	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	741200	4306850	147.0	196.4*

*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The state's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 147.0 $\mu g/m^3$, or 56.1 ppb. This modeled concentration included the background concentration of SO_2. Figure 5 below was included as part of the state's recommendation, and indicates that the predicted value occurred just to the north of Zimmer.

Figure 5: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations in the Clermont County, Ohio Area of Analysis Based on Actual Emissions



Jurisdictional Boundaries:

Once the geographic area of analysis associated with Zimmer was determined, existing jurisdictional boundaries were considered for the purpose of informing our intended designated area, specifically with respect to clearly defined legal boundaries. Ohio recommended designating all of Clermont County attainment, with the exception of Pierce Township. Pierce Township was designated nonattainment on August 15, 2013. The recommended attainment area for Clermont County consists of the following townships: Batavia, Franklin, Goshen, Jackson, Miami, Monroe, Ohio, Stonelick, Tate, Union, Washington, Wayne, and Williamsburg. This area has clearly defined legal boundaries, and we find this boundary to be a suitably clear basis for defining our intended unclassifiable/attainment area.

Ohio's modeling demonstrated that actual emissions from the Zimmer facility, in addition to background SO_2, would not cause or contribute to a violation of the 2010 SO_2 NAAQS in Clermont County. There are other SO_2-emitting sources located in the Cincinnati area in Hamilton County, which borders Clermont County to the west. Ohio did not model these additional sources to explicitly demonstrate attainment near Clermont County's border with Hamilton County, but EPA believes that the Hamilton County sources are not likely to cause NAAQS violations in Clermont County. The largest SO_2 source in Hamilton County is the Miami Fort Generating Station, but this source, in western Hamilton County, is located about 40 km from the Clermont County border, and almost 60 km from Zimmer, and therefore is unlikely to have a significant concentration gradient in Clermont County. The next largest source in Hamilton County is DTE St. Bernard, which emitted 1,666 tpy in 2014. With its moderate emissions and its location approximately 10 km from the western Clermont County border, it is not expected to cause or contribute to a violation of the NAAQS in Clermont County. The remaining SO_2-emitting facilities in Hamilton County emit less than 200 tpy and are all 10-20 km from the Clermont County border. Although EPA expects further air quality characterization of the SO_2 sources in the Hamilton County area which exceed the DRR threshold of 2,000 tpy, these sources are sufficiently distant, generally 40-50 km from the Clermont County border, that they can be presumed not to be causing or contributing to violations of the NAAQS in Clermont County. In addition, the background monitor Ohio is using for the Clermont County analysis is located near Hamilton County and is expected to be influenced by emissions from Hamilton County SO_2 sources.

Other Relevant Information

On September 16, 2015, the Sierra Club submitted a modeling analysis for the area surrounding Zimmer. This analysis indicated a violation of the NAAQS. In a November 17, 2015 letter to EPA, Ohio commented that the Sierra Club analysis used incomplete and incorrect hourly emissions and stack parameter information for Zimmer, and emissions data which was more conservative than the Modeling TAD requires for two additional modeled sources. These errors can have significant effect on model estimates, rendering the Sierra Club modeling a less reliable analysis of air quality in the area than the state's analysis. The Sierra Club analysis did not provide information refuting the appropriateness of Ohio's analysis of Zimmer and Clermont County for this round of SO_2 designations, and EPA does not find that the Sierra Club analysis

has provided compelling information to designate Clermont County as nonattainment rather than applying the unclassifiable/attainment designation supported by Ohio's analysis.

Conclusion

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, EPA intends to designate Ohio's recommended townships in Clermont County, Ohio as unclassifiable/attainment for the 2010 SO_2 NAAQS.

EPA does not believe that the designation of Clermont County outside of Pierce Township for the 2010 SO_2 NAAQS is affected by the fact that Pierce Township, Clermont County, is currently designated nonattainment for the 2010 SO_2 NAAQS. Pierce Township's designation in August 2013 was based on a NAAQS violation recorded in Campbell County, Kentucky, for the time period 2009-2011. The Beckjord plant was presumed to be the primary contributor to this violation, based on the plant's location, emissions level, and local wind trajectory analyses. The Beckjord plant shut down its coal-fired boilers as of October 2014. On August 11, 2015, Ohio formally requested that EPA redesignate Pierce Township to attainment of the 2010 SO_2 NAAQS, based on the Beckjord plant's shutdown and the improvement in monitored air quality demonstrated at the monitor. As Ohio recommended, EPA will address Pierce Township through a separate process that focuses on Ohio's request for redesignating that Township to attainment. EPA is not in this separate designation pre-judging that future action, which will be based on the agency's review of that administrative record.

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

Technical Analysis for the Gallia County, Ohio Area

Introduction

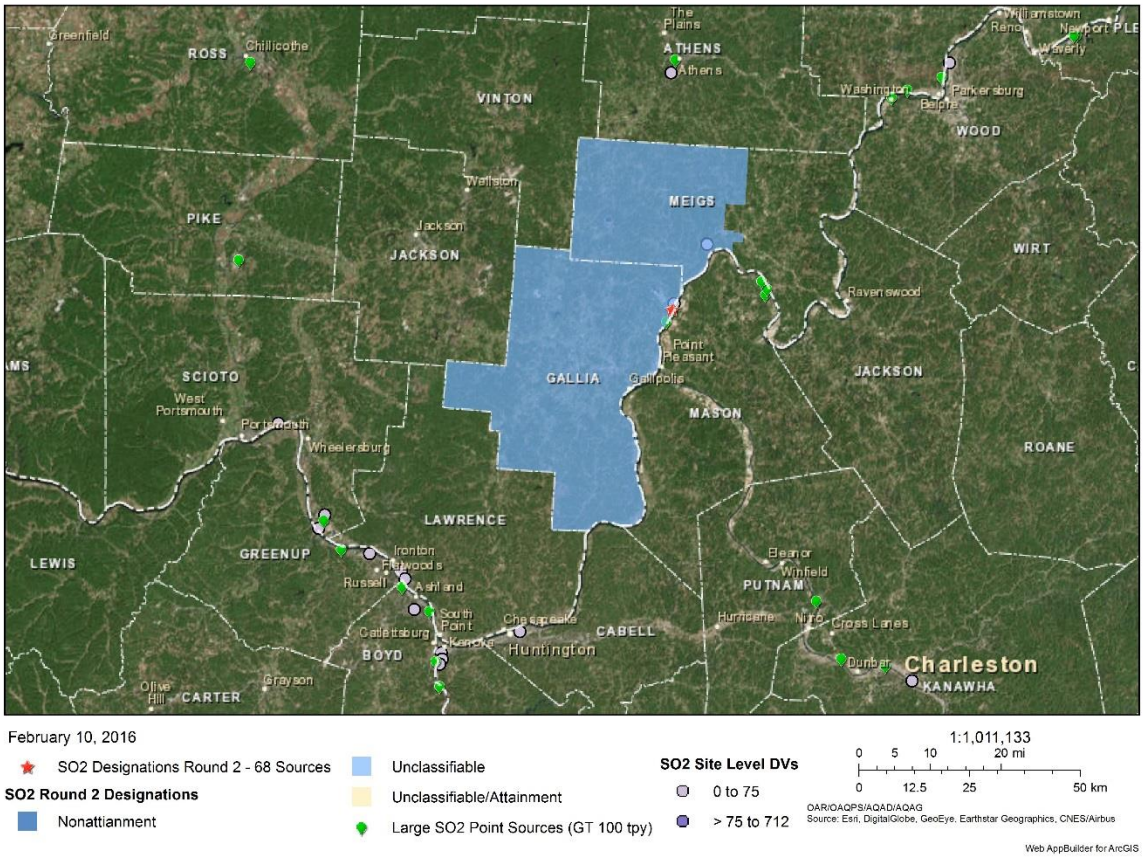
Gallia County in southern Ohio contains a stationary source that according to EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 lbs SO_2/MMBTU. As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the General James M. Gavin Power Plant (Gavin) emitted 31,269 tons of SO_2, and its emissions rate was 0.36 lbs SO_2/MMBTU. Pursuant to the March 2, 2015 court-ordered schedule, EPA must designate the area surrounding the facility by July 2, 2016.

In its submission, Ohio recommended that the area surrounding Gavin, specifically Gallia County and a portion of Meigs County which contains the SO_2 monitor, 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 actual emissions. After careful review of the state's assessment, supporting documentation, and all available data, EPA finds that due to a discrepancy in the state's analysis, the area cannot be designated attainment at this time, but the evidence does not fully support a designation of nonattainment. Therefore, EPA intends to designate Gallia County and a portion of Meigs County as unclassifiable.

As seen in Figure 6 below, Gavin and the nearby Kyger Creek Station are both located south of the village of Cheshire along the Ohio River in northeast Gallia County. The Gavin facility is located approximately 17 km northeast of the county seat of Gallipolis. Also included in the figure are nearby emitters of SO_2, and the boundaries of the state's recommended area.

Figure 6. EPA's intended designation for Gallia County, Ohio

Gallia County, Ohio Area



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

Detailed Assessment

Monitored Data

There are five SO_2 monitors in the Gallia County area. These monitors and their design values (DV) are listed in Table 5. The Meigs County monitor is located to the northeast of Gavin and Kyger Creek. The other monitors, which were sited to capture impacts from other large SO_2 sources, are located approximately 70 km southeast of Gavin and Kyger Creek. The Meigs County monitor was sited to represent impacts from Gavin and Kyger Creek. Its 2012-2014 design value is 30 ppb, well below the 2010 SO_2 NAAQS. Ohio cited this data as evidence that Gallia County is currently attaining the 2010 SO_2 NAAQS, given the current impacts of Gavin and Kyger Creek, along with the low SO_2 concentrations coming into Gallia County from Lawrence and Scioto Counties with the prevailing winds from the southwest. While this monitor

appears not to be located where maximum concentrations would be expected, so that the monitoring data do not provide convincing evidence as to the attainment status of the area, the monitored data do provide some support for the state's conclusion that the area is attaining the standard.

Table 5: Design Values at Monitors Near Gavin Facility

Monitor ID	County	2012-2014 DV (ppb)	Distance from Gavin (km)
39-105-0003	Meigs	30	13
39-087-0012	Lawrence	17	67
39-145-0013	Scioto	9	72
39-145-0020	Scioto	27	71
39-145-0022	Scioto	19	73

Model Selection and Modeling Components

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

In its modeling study to support the Gallia County recommended designation, the state used AERMOD version 15181, the most recent regulatory version of the model. A discussion of the individual components, most notably a discussion of two beta options used in Ohio's analysis, will be referenced in the corresponding discussion that follows, as appropriate.

Modeling Parameter: Rural or Urban Dispersion

When performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in rural mode. Although Ohio did not conduct a formal Auer analysis of the area, clearly less than 50 percent of the land use near the two large sources in Gallia County is industrial, commercial, or dense residential.

Modeling Parameter: Area of Analysis (Receptor Grid)

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

- 50 meter spacing along fencelines and to 2 km from the stacks
- 250 meter spacing to 8 km
- 500 meter spacing to 15 km
- 1000 meter spacing to 25 km
- 2000 meter spacing to 50 km
- Included receptor at monitor location

The receptor network contained 34,225 receptors. For the purposes of this designation effort, the Modeling TAD states that the receptor grid need not include receptors in areas where it would not be feasible to place a monitor and record ambient air impacts, such as bodies of water. Ohio did not seek to identify areas where it might be infeasible to place a monitor, and instead conservatively placed receptors according to the above array without respect to feasibility of monitoring.

Figure 7. Gallia County area of analysis.

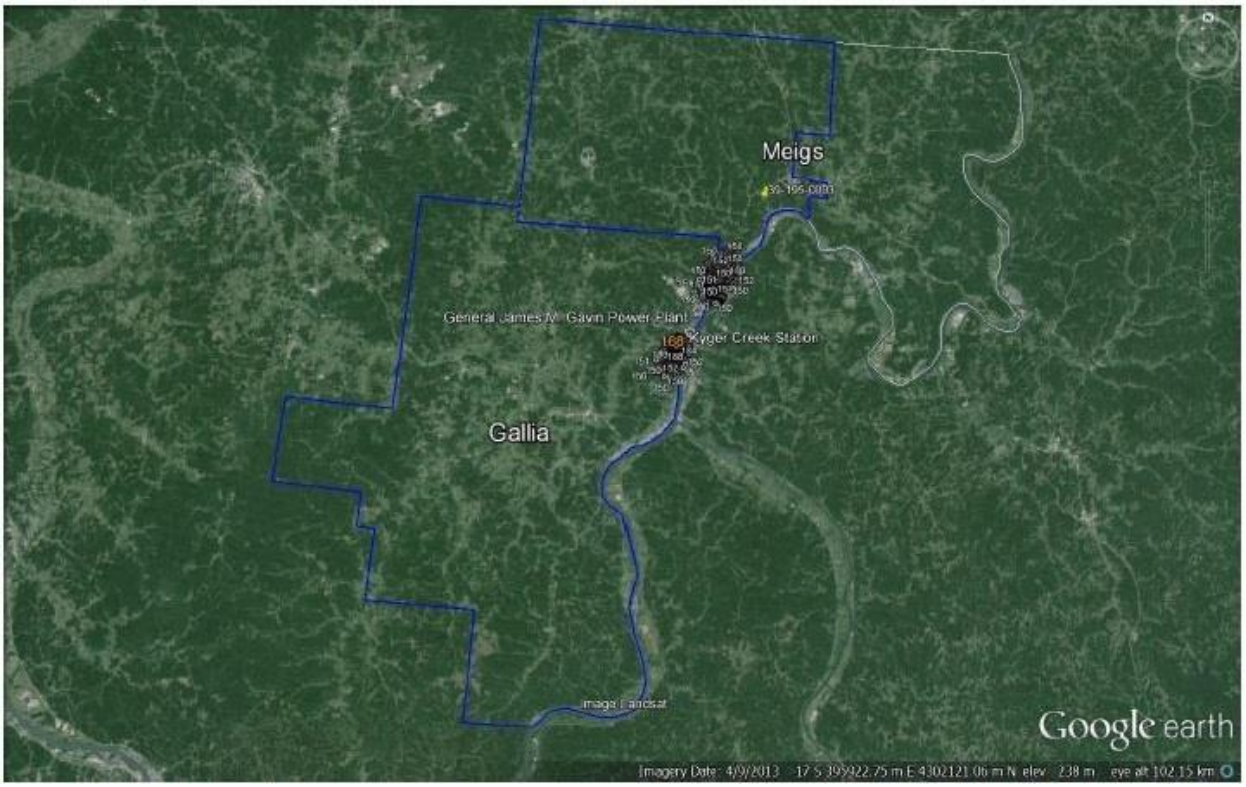


Figure 8, included in the state's recommendation, shows the state's receptor grid for the area of analysis.

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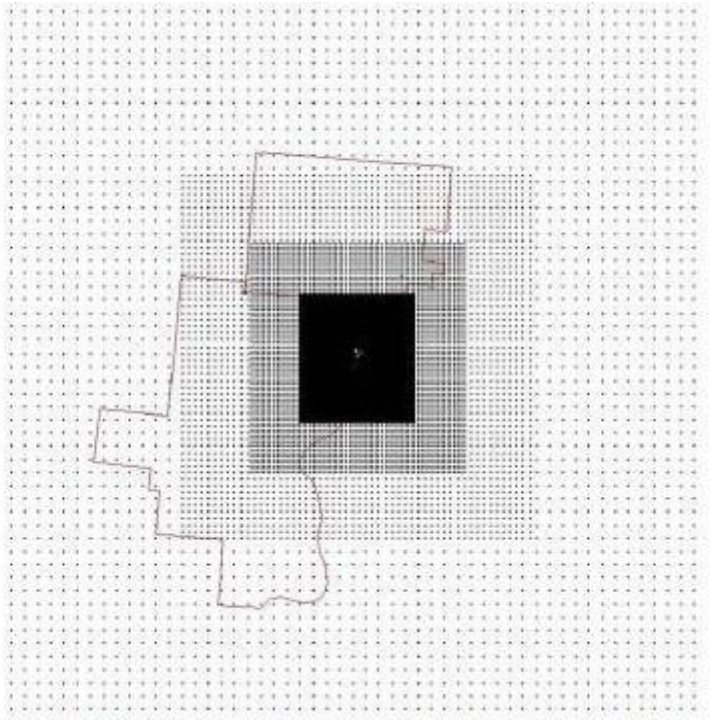
Figure 8: Receptor Grid for the Gallia County, Ohio Area of Analysis



Modeling Parameter: Source Characterization

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

Modeling Parameter: Emissions

EPA's Modeling TAD notes that for the purposes of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. The Modeling TAD highly encourages the use of the most detailed throughput, operating schedule and emissions information available. Variable emissions, temperature, and flow data can be modeled using AERMOD's hourly varying emissions keyword HOUREMIS or variable emission factor keyword EMISFACT. EPA believes that continuous emissions monitoring systems (CEMS) data provide valuable historical emissions information, when it is available, and that these data are available for many electric generating units. However, the TAD does provide for the flexibility of using allowable emissions in the form of a federally enforceable limit on the emissions rate (referred to as PTE or allowable emissions rate.

As previously noted, the state evaluated other SO_2 sources located within 50 km of the area of analysis. The Phillip Sporn power station and the Mountaineer power station in Mason County, WV are located approximately 17 km from Gavin. The Sporn station closed in June 2015. The predominant winds from the southwest, as measured at Huntington, WV, would disperse the emissions of the Mountaineer plant toward the eastern portion of Meigs County (not included in Ohio's designation recommendation). There are no other significant sources of SO_2 in or near Gallia and Meigs Counties. Only Gavin and Kyger Creek were determined by the state to have the potential to cause significant concentration gradient impacts within the area of analysis. The facilities in the area of analysis and their most recently available annual actual SO_2 are summarized below.

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

Facility Name	Distance from Gavin (km)	Actual SO_2 Emissions (tons per year)		
		2012	2013	2014
AEP General James M. Gavin Plant	--	31,269[A]	27,852	36,872
AEP Kyger Creek Station	2.5	4,989	9,434	13,748
Appalachian Power Mountaineer Plant (Mason Co WV)	16.7	1,151	2,903	4,411
Appalachian Power Phillip Sporn Plant (Mason Co WV) closed 6/2015	17.2	8,078	9,032	10,650
Felman Productions-New Haven (Mason Co WV)[B]	17.2			534
Total Emissions From All Facilities in the State's Area of Analysis		46,021[C]	49,755[C]	66,215

[A] Emissions from EPA's Air Markets Database. Other 2014 data from Ohio's Fee Emission Reports.
[B] Emissions from 2011 NEI.
[C] Assumes 534 tons per year from Felman Productions

Modeling Parameter: Meteorology and Surface Characteristics

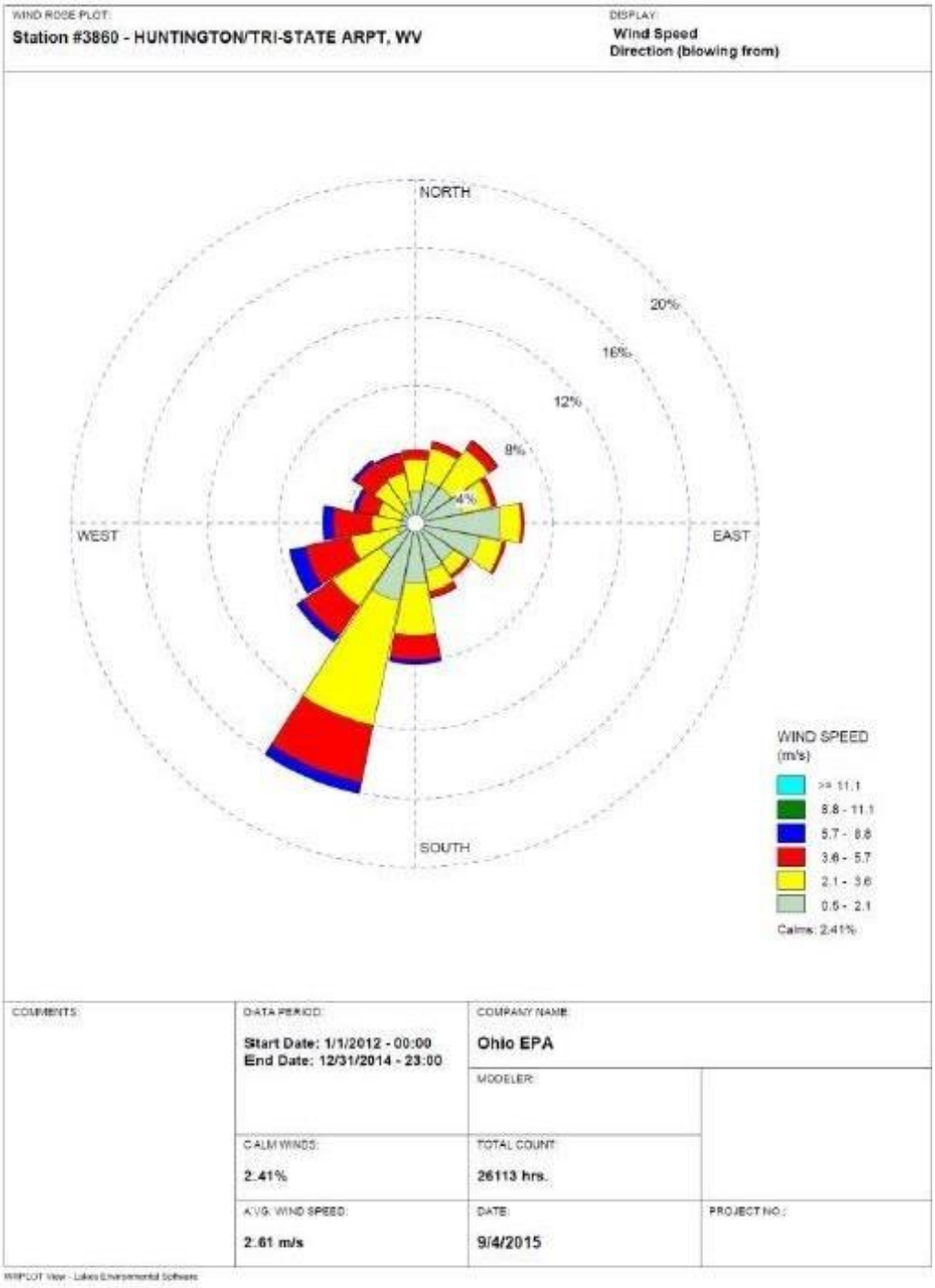
The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of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

For the Gallia County area of analysis, surface meteorology from the Huntington Tri-State Airport in West Virginia, located 65 km south-southeast of Gavin, and coincident upper air observations from the NWS station in Pittsburgh, Pennsylvania, 235 km to the northeast, were selected as best representative of meteorological conditions within the area of analysis.

The state used AERSURFACE version 13016 to estimate the surface characteristics of the area of analysis. The state developed surface characteristics for 12 spatial sectors at a monthly temporal resolution at the Huntington NWS site. These surface characteristics are the albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (representing the ratio of sensible heat flux to latent heat flux at the ground level), and the surface roughness (representing the influence of ground features such as buildings and vegetation on surface wind flow).

As part of its recommendation, the state provided the 3-year surface wind rose for Huntington, WV. In Figure 9, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The winds at Huntington are most frequently from the southwest.

Figure 9: Huntington, WV Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The state used AERSURFACE to determine appropriate surface characteristics, and followed EPA guidance in the processing of the raw meteorological data into an AERMOD-

ready format. Ohio processed the Huntington NWS surface meteorological data using the AERMINUTE preprocessor, which uses one-minute meteorological observations to provide the most complete and accurate hourly-averaged surface wind data. Then Ohio used AERMET to combine surface and upper air data into input files required by the AERMOD model.

In the Gallia County modeling, Ohio used two AERMET/AERMOD beta options, which are not yet part of the regulatory default option in AERMOD: Adjusted U-star, and LOWWIND3. These options adjust AERMOD's performance during low wind speed conditions. Using these options for a regulatory application currently requires EPA approval. Ohio provided a model performance analysis to support their decision to apply the options.

EPA notes that the use of beta options, such as ADJ_U* and LOWWIND3, in AERMOD for any regulatory applications requires adherence with Appendix W, Section 3.2.2. This is further explained in EPA's December 10, 2015 Memorandum titled, "Clarification on the Approval Process for Regulatory Application of the AERMOD Modeling System Beta Options." Among other conditions, the use of beta options requires consultation with the appropriate EPA Regional Offices. Upon concurrence by EPA's Modeling Clearinghouse, EPA Regional Offices may approve the use of these beta options for regulatory applications as an alternative model. However, Ohio performed air dispersion modeling intended to characterize air quality as a result of SO_2 emissions from Gavin and Kyger Creek without prior consultation with and approval from an EPA Regional Office, and therefore has not met the applicable regulatory requirements contained in Appendix W, Section 3.2.2. As a result, EPA does not believe that the air quality modeling results obtained from the use of these beta options can be used as a reliable indicator of attainment status in Gallia County until appropriate alternative model approval is granted or these beta options are promulgated as regulatory options in AERMOD through EPA rulemaking.

Specific to LOWWIND3, this beta option currently has only one reasonable pathway for appropriate EPA Regional Office approval with EPA's Model Clearinghouse concurrence. This pathway, specifically contained as condition number 2 in Appendix W, Section 3.2.2(b), is one in which an application-specific statistical performance evaluation is conducted. In an application-specific statistical performance evaluation, air quality modeling for the particular type of facility in question would have to be evaluated against representative air quality monitors that are appropriately sited for the given application. However, LOWWIND 3 at this time has not yet fully received scientific peer-review (i.e., criterion "i" for condition number 3 of Appendix W, Section 3.2.2(e)), and so this option must meet a more rigorous test for its approval as an alternative model. Through a proposed rulemaking to revise Appendix W and promulgate new regulatory options in AERMOD, we have received a number of public comments specific to the LOWWIND3 beta options and are working to complete our review of those comments and then to finalize appropriate action on the LOWWIND3 option with the necessary peer-reviewed journal articles as part of final Appendix W rulemaking package. Due to the potential changes that may occur prior to finalization of the Appendix W rulemaking package, in conjunction with the fact that, at this time, LOWWIND 3 has not been demonstrated to have statistically improved performance over that of the regulatory default version of AERMOD for the particular type of facility or has not yet fully received scientific peer-review, EPA does not believe that the air

quality modeling results obtained from the use of this beta option can be used at this time as a reliable indicator of attainment status in Gallia County.

Modeling Parameter: Geography and Terrain

The terrain in the area of analysis is hilly, along the Ohio River valley. The AERMAP terrain program within AERMOD was used to specify elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Dataset.

Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For the Gallia County analysis, the state chose to use 2012-2014 data from the monitor at Pomeroy in Meigs County (39-105-0003) as background. This monitor, which is located 15 km north-northeast of Gavin, is the nearest representative SO_2 monitor. The State eliminated all hours in which the winds came from the 30 degree sector influenced by Gavin and Kyger Creek, then took the 3-year average of the 99th percentile of each year's hourly distribution. The background concentration for the Gallia County analysis was determined by the state to be 26.2 micrograms per cubic meter ($\mu g/m^3$), or 10 ppb.[5] This value was incorporated into the final AERMOD results.

Since the SO_2 air quality standard reflects the 99th percentile among daily maximum concentrations, the common means of determining a single, "first tier" background value is to determine the 99th percentile among daily maximum background concentrations, i.e. the 99th percentile among a set of daily maximum values in a data set that includes only values that are representative of background concentrations. The common means of determining hourly background concentrations is to determine the 99th percentile among 24 sets of values reflective of background concentrations, where each data set is for a single hour. The average of these 24 hourly 99th percentile background concentrations would be approximately the same as the 99th percentile among the full data set. In this sense, Ohio has applied a single, "first tier" background concentration, but Ohio has determined a level that corresponds approximately to the average of the levels they would have determined had they evaluated hourly background concentrations. Therefore, Ohio has applied a reasonable background concentration in its analysis, consistent with the recommendations of the modeling TAD.

Summary of Modeling Results

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

The AERMOD modeling parameters for the Gallia County analysis are summarized below in Table 7

Table 7: AERMOD Modeling Parameters for the Gallia County, Ohio Area of Analysis

Gallia County, Ohio Area of Analysis	
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	4
Modeled Structures	47
Modeled Fencelines	2
Total receptors	34,225
Emissions Type	Actual hourly
Emissions Years	2012-2014
Meteorology Years	2012-2014
Surface Meteorology Station	Huntington, WV
Upper Air Meteorology Station	Pittsburgh, PA
Methodology for Calculating Background SO_2 Concentration	99^{th} percentile with large facility emissions omitted
Calculated Background SO_2 Concentration	10 ppb/ 26.2 $\mu g/m^3$

The results presented below in Table 8 show the magnitude and geographic location of the highest predicted modeled concentration based on actual emissions from Gavin, Kyger Creek, and background concentrations.

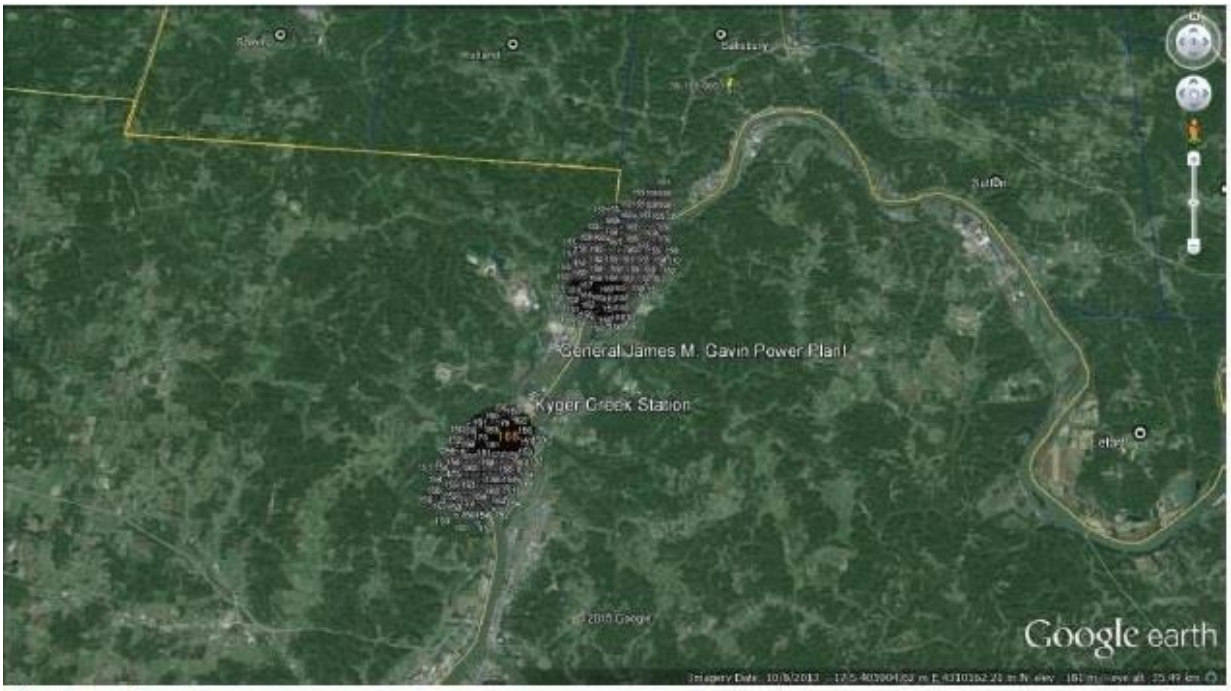
Table 8: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the Gallia County, Ohio Area of Analysis Based on Actual Emissions

		Receptor Location		SO_2 Concentration ($\mu g/m^3$)	
Averaging Period	Data Period	UTM E	UTM N	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	400900	4306700	188.3	196.5*

*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The state's modeling indicates that the predicted 99^{th} percentile 1-hour average concentration within the chosen modeling domain is 188.3 $\mu g/m^3$, or 71.9 ppb. This modeled concentration included the background concentration, and is based on actual emissions from the nearby facilities. Figure 10 below was included as part of the state's recommendation, and indicates that the predicted value occurred 1200 meters from the Kyger Creek fenceline.

Figure 10: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations in the Gallia County, Ohio Area of Analysis Based on Actual Emissions



Other Relevant Information

On September 16, 2015, the Sierra Club submitted a modeling analysis for the area surrounding Gavin. This analysis indicated a violation of the NAAQS. In a November 17, 2015 letter to EPA, Ohio commented that the Sierra Club analysis used an inaccurate stack configuration for Kyger Creek, with incorrect hourly emissions and stack parameter information for both Gavin and Kyger Creek. An additional source was modeled with overly conservative emissions data. These errors have the potential to cause significant misrepresentations of the impacts of these sources, such that EPA does not consider the Sierra Club's modeling to provide a reliable assessment of whether the area is violation the NAAQS. As noted above, EPA also does not consider Ohio's analysis to be a reliable assessment of concentrations in the area. Since the deficiencies in the two analyses are different, the Sierra Club analysis does not provide a reliable indication, even in combination with the state's analysis, as to whether the area is attaining the NAAQS.

Jurisdictional Boundaries:

Once the geographic area of analysis associated with Gavin and Kyger Creek is determined, existing jurisdictional boundaries are considered for the purpose of informing our intended designated area, specifically with respect to clearly defined legal boundaries.

Ohio recommended an attainment designation for all of Gallia County and the western half of Meigs County, which includes Bedford, Columbia, Rutland, Salem, Salisbury, and Scipio Townships. This area has clearly defined legal boundaries, and we find this boundary to be a suitably clear basis for defining our intended designated area.

Ohio's modeling demonstrated that the Gavin and Kyger Creek facilities would not cause or contribute to a violation of the 2010 SO_2 NAAQS in Gallia or Meigs Counties. There are other SO_2-emitting sources in Mason County, West Virginia, to the east of Gavin and Kyger Creek. Ohio did not model these sources, as they were considered to be too distant, given their moderate emission levels, to have a significant contribution in the vicinity of Gavin. They are closest to the eastern half of Meigs County, and it is expected that their impacts would be most significant in that area, based on their location and the prevailing southwest winds. There are several sources with SO_2 emissions between 1000 and 3000 tpy in counties neighboring Gallia and Meigs County: one in Athens County (1,338 tpy, 14.5 km from the Meigs County border; two in Washington County (2,993 tpy, 15 km from the Meigs County border, and 2,593 tpy, 21 km from the Meigs County border); and one in Jackson County West Virginia (2,636 tpy, 25 km from the Meigs County border). Due to their distance from the Meigs County border, these facilities are not expected to cause or contribute to violations of the NAAQS within Meigs County. The impacts of these sources are reasonably considered to be represented as part of the background concentration included in the analysis.

Due to the use of the AERMOD beta option LOWWIND3, which cannot be approved at this time, EPA does not find Ohio's modeled analysis demonstrating attainment in the Gallia County area to be a reliable assessment of whether the area is attaining the standard. While EPA also received an independent modeling analysis from Sierra Club demonstrating nonattainment, EPA finds that this analysis contained incorrect source and plume data and emission inputs which were more conservative than the Modeling TAD recommends. Therefore, EPA finds that this modeling analysis also does not provide a reliable basis on which to determine EPA's designation for this area. Therefore, EPA intends to designate the area recommended by Ohio as unclassifiable. EPA believes that our intended unclassifiable area, consisting of Gallia County and the western half of Meigs County, has clearly defined legal boundaries, and we find this boundary to be a suitably clear basis for defining our intended unclassifiable area.

Conclusion

Because the Ohio modeling analysis used a draft model option which cannot be approved by EPA at this time, EPA has determined that the state's recommended designation of attainment does not provide a reliable assessment of whether the area is attaining the NAAQS. While a monitor that is 13 km from Gavin indicates attainment at its location, this monitor provides little basis for determining whether areas closer to the major facilities in this area are attaining the NAAQS. EPA has also determined that evidence of nonattainment demonstrated by Sierra Club is unreliable as a result of mischaracterization of source and stack gas characteristics and overly

conservative eimission input values. Therefore, EPA does not find that a reliable basis exists for designating the area either as attainment or nonattainment. Instead, after careful evaluation of available relevant information, EPA intends to designate Gallia County and Bedford, Columbia, Rutland, Salem, Salisbury, and Scipio Townships in Meigs County as unclassifiable for the 2010 SO_2 NAAQS.

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