Technical Support Document

Wisconsin
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.

Wisconsin 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 Wisconsin's recommendations and identifies the counties or portions of counties in Wisconsin 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: Wisconsin's Recommended Area and EPA's Intended Designation

Area	**Wisconsin's Recommended Area Definition**	**Wisconsin's Recommended Designation**	**EPA's Intended Area Definition**	**EPA's Intended Designation**
Columbia County, Wisconsin	Columbia County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment

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 or tribe disagrees with EPA's intended designations, they are given an opportunity within the 120 day period to demonstrate why any proposed modification is inappropriate.

On August 5, 2013, 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 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

[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. Columbia County is not subject to these exceptions.

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, violations of the 2010 SO_2 NAAQS have been recorded in the Green Bay (Brown County) area.[2] In addition, there is one source 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 Wisconsin's updated recommendations for the areas that we must designate. EPA also discusses any intended modifications from the state's recommendation based on all available data before us.

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

[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 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.

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.

Technical Analysis for the Columbia, Wisconsin Area

Introduction

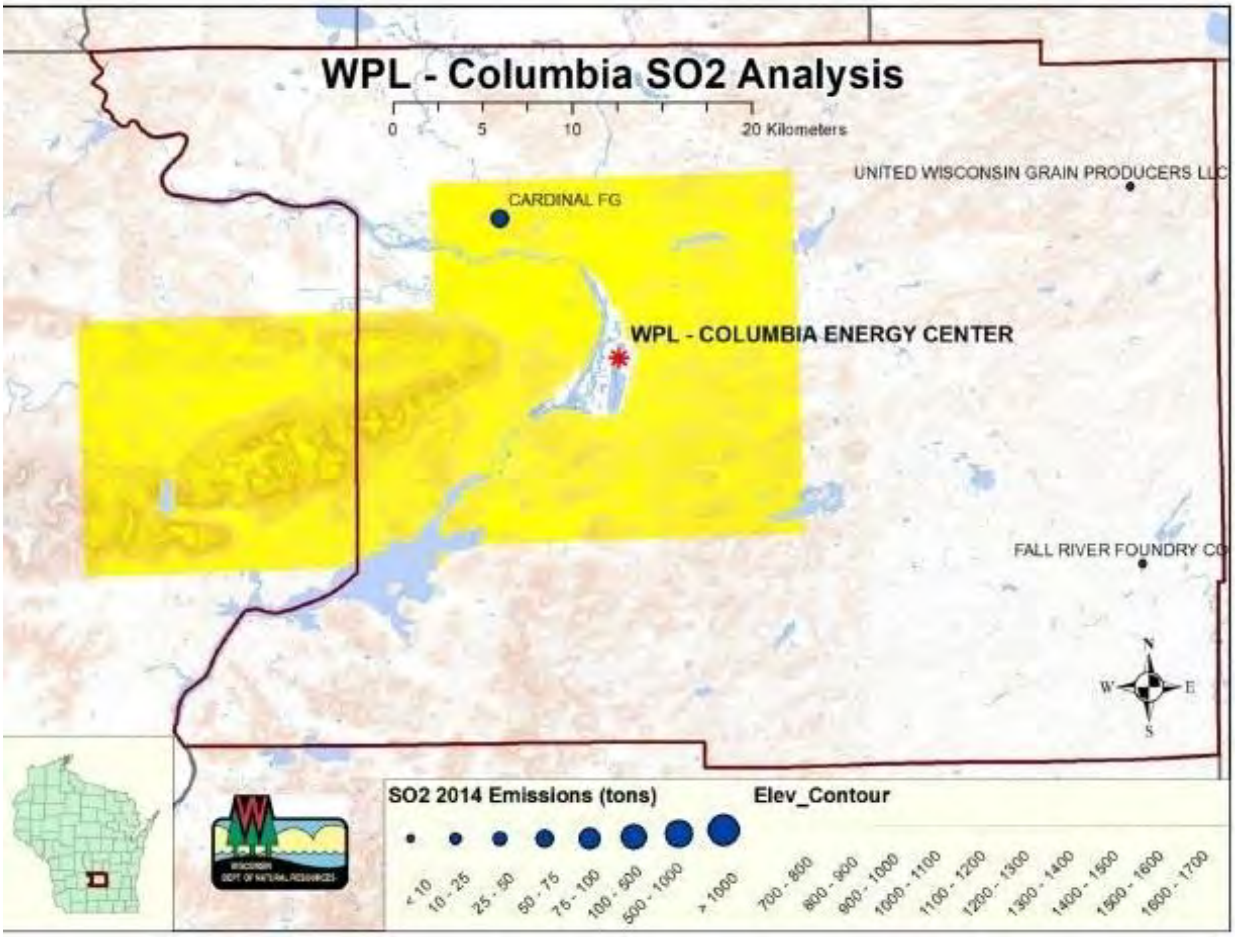
Columbia County, Wisconsin contains a stationary source that according to EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs 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 Wisconsin Power and Light Columbia Energy Center (WPL-Columbia) emitted 24,599 tons of SO_2, and had an emissions rate of 0.60 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.

WPL-Columbia has two coal-fired boilers. As of January 1, 2015, the facility's SO_2 emissions are controlled by dry flue gas desulfurization and the facility is subject to a federally enforceable limit of 3,286 tons per year (tpy) and 0.075 lb/MMBTU on a 30-day rolling average. Wisconsin performed its Columbia County SO_2 analysis with emissions based on these controls and limits.

In its submission, Wisconsin recommended that the area surrounding WPL-Columbia, specifically the entirety of Columbia County, be designated as attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO_2 are expected. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing maximum potential 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 Columbia County as unclassifiable/attainment.

As seen in Figure 1 below, WPL-Columbia is located east of the City of Portage along the Wisconsin River in central Columbia County, in south central Wisconsin. Also included in the figure are nearby emitters of SO_2 and the modeling domain Wisconsin used to support its recommendation for the area.

Figure 1. SO_2 Sources in Columbia County, Wisconsin

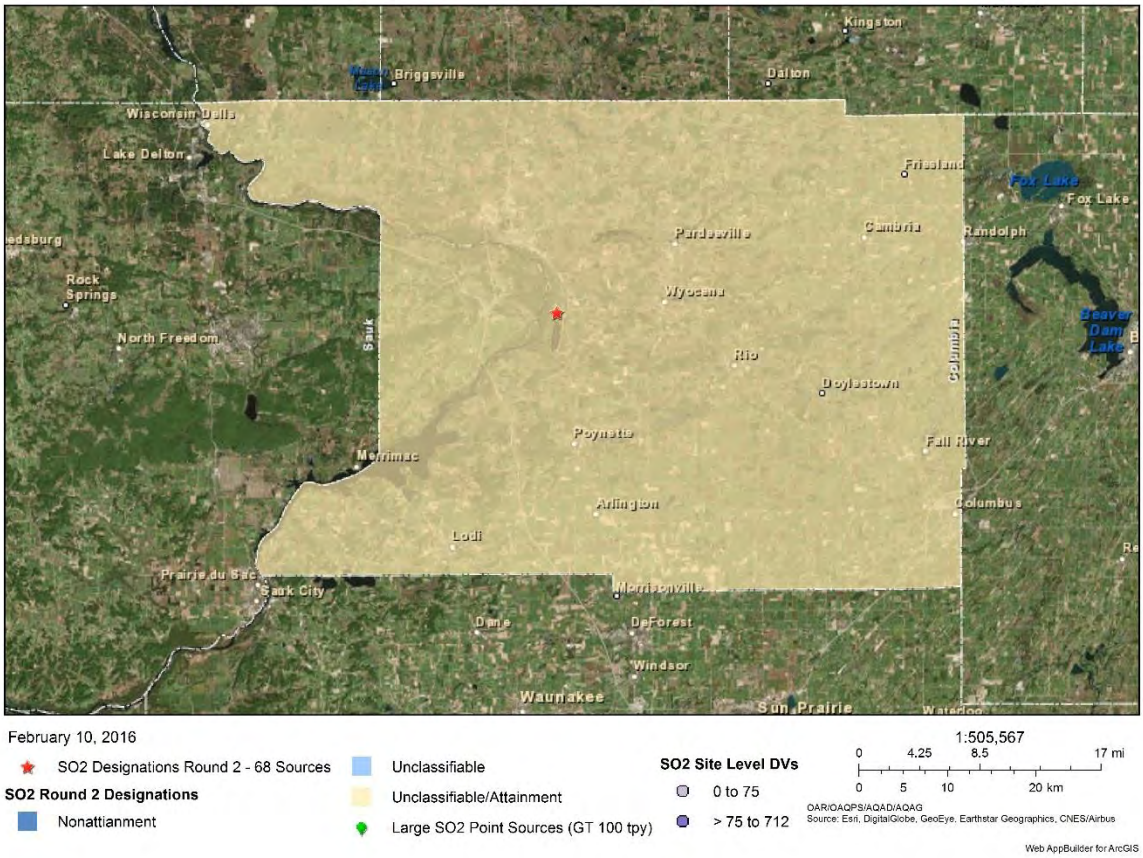


The discussion and analysis that follows below will reference the state's use of the Modeling TAD, EPA's assessment of the state's modeling in accordance with the Modeling TAD, and the factors for evaluation contained in EPA's March 20, 2015 guidance, as appropriate.

Figure 2 shows EPA's intended designation for Columbia County.

Figure 2. EPA's intended designation for Columbia County.

Columbia County, Wisconsin Area



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

Using the land use classification procedure given in Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models," the state determined that less than 50% of the land area within 3 km of WPL-Columbia 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)

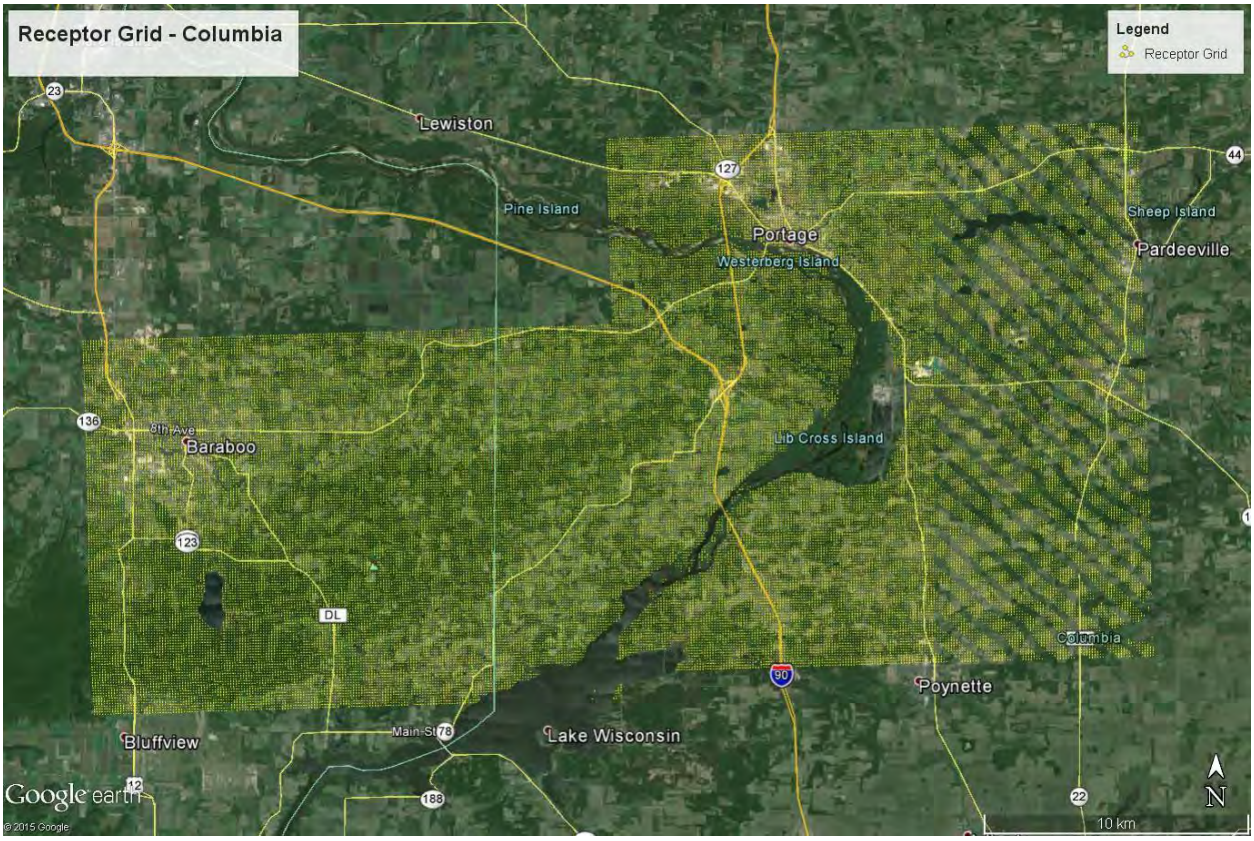
EPA believes that a reasonable first step towards characterization of air quality in the area surrounding WPL-Columbia is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission 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 Columbia County area, the state considered three emitters of SO_2 in Columbia County, and found no other sources with emissions greater than 100 tpy within 50 kilometers (km) of WPL-Columbia. As AERMOD is recommended for use within 50 km of a given emission source, the state 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. In addition to WPL-Columbia, the other emitters of SO_2 found in the area of analysis are Cardinal FG, United Wisconsin Grain Producers, and Fall River Foundry. The grid receptor spacing for the area of analysis chosen by the state is as follows:

- 50 meter spacing to 1000 meters from the stacks
- 100 meter spacing to 10 km
- Additional 100-meter spaced points on the Baraboo Range (west of the facility), extending to 30 km

The receptor network contained 63,877 receptors. Consistent with the Modeling TAD, receptors for the purposes of this designation effort were placed only in areas where it would also be generally feasible to place a monitor and record ambient air impacts. For example, the Wisconsin River and nearby wetlands were excluded.

Figure 3 shows the receptor grid for the area of analysis.

Figure 3: Receptor Grid for the Columbia County, Wisconsin Area of Analysis



Modeling Parameter: Source Characterization

The state characterized WPL-Columbia in accordance with the best practices outlined in the Modeling TAD. The state adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. The AERMOD component BPIPPRIME was used to assist in addressing building downwash. Wisconsin modeled WPL-Columbia's two main boilers in its final analysis. The facility also includes a limited use fuel-oil fired 182 MMBtu/hr auxiliary boiler, which is used for boiler operator training and for general heating. Its maximum emissions are 0.3 lb/hr, venting from a 78m stack. The state performed a screening level modeling analysis to evaluate this auxiliary boiler, using a screening model and determined that its impacts were below the 1-hour SO2 significant impact level (SIL) of 3 ppb. Therefore, the state did not include this source in the final modeling analysis for WPL-Columbia.

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 the most recently permitted (referred to as PTE or allowable) emissions rate.

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."

WPL-Columbia emissions are federally enforceably limited to 0.075 lb/MMBTU as a 30-day average limit, based on Permit #14-POY-174-R1 (based in turn on Consent Decree 13-cv-266 paragraph 83). Review of 2015 data reported to the CAMD database show the facility to be complying with this limit. For WPL-Columbia, the state modeled the facility's emissions at its maximum heat input, using its 2015 emission limits. Wisconsin calculated the modeled emission rate by converting the facility's federally enforceable emission limit to a representative maximum hourly rate. Based on EPA guidance, Wisconsin in its modeling used a conservative adjusted hourly emission rate, 0.45 lb/MMBTU, to correspond to the 30-day average limit value. Actual 2015 facility data was used to determine representative flow rate and stack temperature inputs.

As previously noted, the state evaluated three SO_2 sources located within 50 km of the area of analysis. The state determined that this was the 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 SO2 are expected. No other sources 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 2: SO_2 Emissions for 2012 – 2014 from Facilities in the Columbia County, Wisconsin Area of Analysis

Facility Name	Distance (km)	Actual SO_2 Emissions (tons per year)			Allowable Emissions (tpy)
		2012	2013	2014	
WPL-Columbia (2015 limit: 3,286 tpy)	--	24,599	22,194	26,865 (7,856)[A]	3,286 (as of 2015)
Cardinal FG	10.7	--		61.6	--
United Wisconsin Grain Producers	30.5	--		8.5	--
Fall River Foundry	31			2.3	
Total Emissions From All Facilities in the State's Area of Analysis[B]		24,671.4	22,266.4	7,928.4	--

[A] Emissions according to CAMD database, compared to data Wisconsin reported

[B]Totals assume that 2012 and 2013 emissions from sources other than Columbia equal 2014 emissions.

In evaluating the three additional facilities in the area of analysis, Wisconsin first considered their actual emissions from the 2014 state emissions inventory. All three facilities have very low actual emissions. Given that United Wisconsin Grain Producers and Fall River Foundry both emitted less than 10 tpy in 2014, and both facilities are over 30 km from WPL-Columbia, Wisconsin believed that these two facilities' emissions would not provide a significant concentration gradient in the area surrounding WPL-Columbia. United Wisconsin Grain Producers and Fall River Foundry are both located generally to the east of WPL-Columbia, but are approximately 20 km apart from each other. Winds from the east are infrequent in this area (see Dane County wind rose, Figure 4). For these reasons, the two sources' separate effects on SO_2 concentrations near WPL-Columbia are unlikely to be made significant by combination. Therefore, Wisconsin did not include these two facilities in the final modeling analysis. The Cardinal FG glass factory is much closer to WPL-Columbia than United Wisconsin Grain Producers and Fall River Foundry, and it emits more SO_2, although its total actual emissions are still comparatively low at 62 tpy. Wisconsin separately modeled the Cardinal FG facility using its maximum allowable emissions, and determined that even under this conservative scenario, Cardinal FG's impacts were below the significant impact level of 3 ppb near WPL-Columbia and at all other modeled receptors, except in an area of elevated terrain southwest of the Cardinal FG facility. Even in the elevated terrain, Cardinal FG's maximum impact was 23.6 $\mu g/m^3$. At the highest design value receptor for Columbia's boilers, Cardinal FG's impact was 0.98 $\mu g/m^3$. Neither value, in combination with impacts from WPL-Columbia, would indicate a violation of the 2010 SO_2 NAAQS.

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

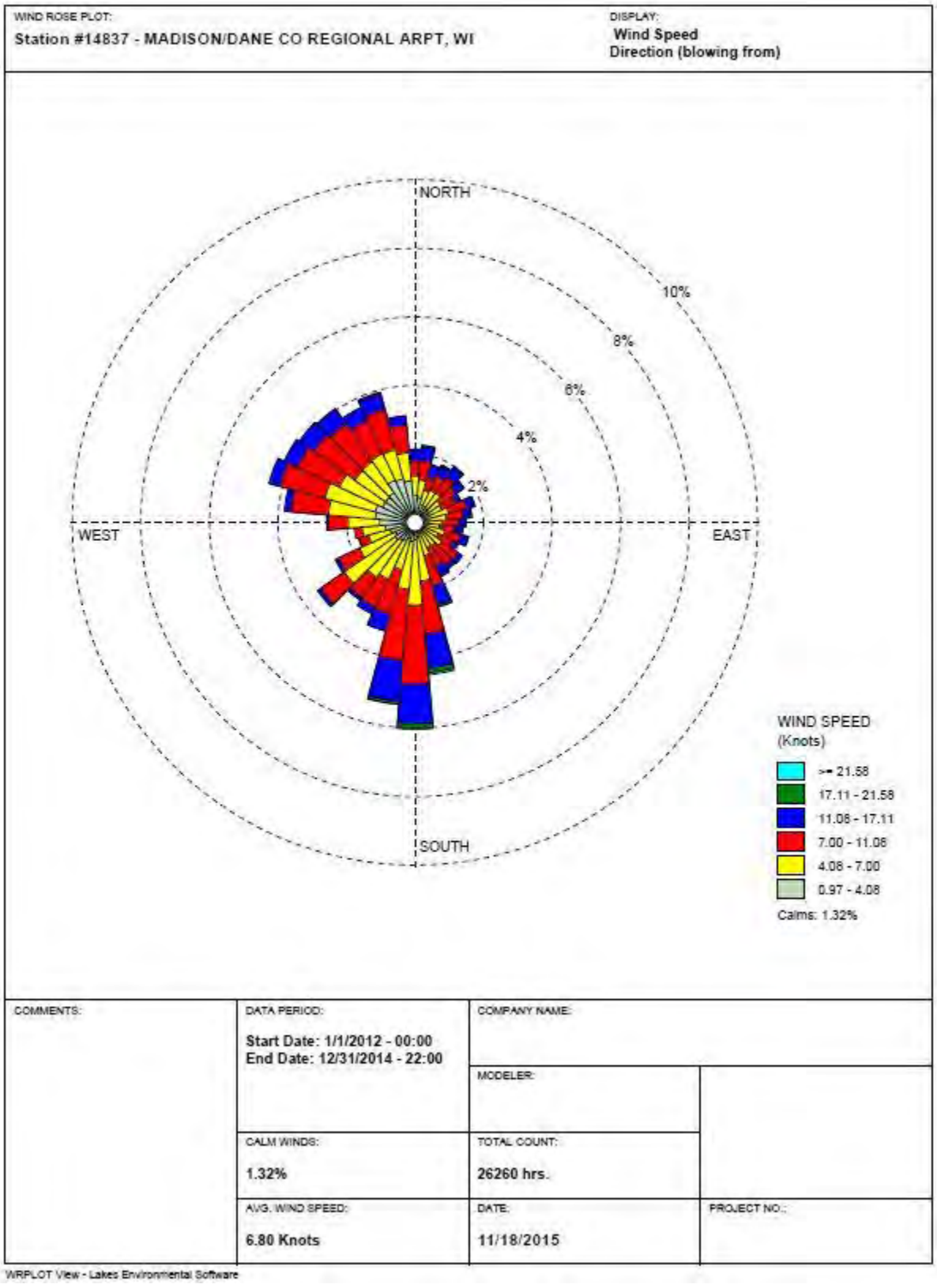
meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

For the Columbia County area of analysis, surface meteorology from the Dane County Regional Airport NWS station, which is near Madison, Wisconsin, 40 km south-southeast of WPL-Columbia, and coincident upper air observations from Green Bay, Wisconsin, 150 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 Dane County 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). AERSURFACE was run for both snow and no-snow conditions, based on the National Operational Hydrologic Remote Sensing Center's National Snow Analysis maps.

Figure 4 shows the 3-year surface wind rose for Dane County, Wisconsin. The frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Winds at this station blow most frequently from the south or the northwest.

Figure 4: Dane County, Wisconsin 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. Wisconsin processed the Dane County 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 Wisconsin 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 generally flat, crossed by a broad shallow river valley. The Baraboo Range covers part of western Columbia County. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Database.

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 Columbia County area of analysis, the state chose to use the design value at the Horicon monitor in Dodge County. This monitor, which is located 65 km east of WPL-Columbia, is the nearest representative SO_2 monitor. The background concentration for the Columbia County analysis was determined by the state to be the 2012-2014 design value for the Horicon monitor, which is 18.3 micrograms per cubic meter ($\mu g/m^3$), or 7 ppb.[3] This value was incorporated into the final AERMOD results.

Summary of Modeling Results

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

Table 3: AERMOD Modeling Parameters for the Columbia County, Wisconsin Area of Analysis

Columbia County, Wisconsin Area of Analysis	
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	1

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

Modeled Stacks	2
Modeled Structures	34
Modeled Fencelines	1
Total receptors	63,877
Emissions Type	PTE
Emissions Years	Emission limit effective 2015
Meteorology Years	2012-2014
Surface Meteorology Station	Dane County Airport, Wisconsin
Upper Air Meteorology Station	Green Bay, Wisconsin
Methodology for Calculating Background SO_2 Concentration	1st tier, 2012-2014 design value
Calculated Background SO_2 Concentration	7 ppb/ 18.3 $\mu g/m^3$

Table 4 below shows the magnitude and geographic location of the modeling results based on allowable emissions at the maximum heat input for WPL-Columbia, with a background concentration of 18.3 $\mu g/m^3$ included.

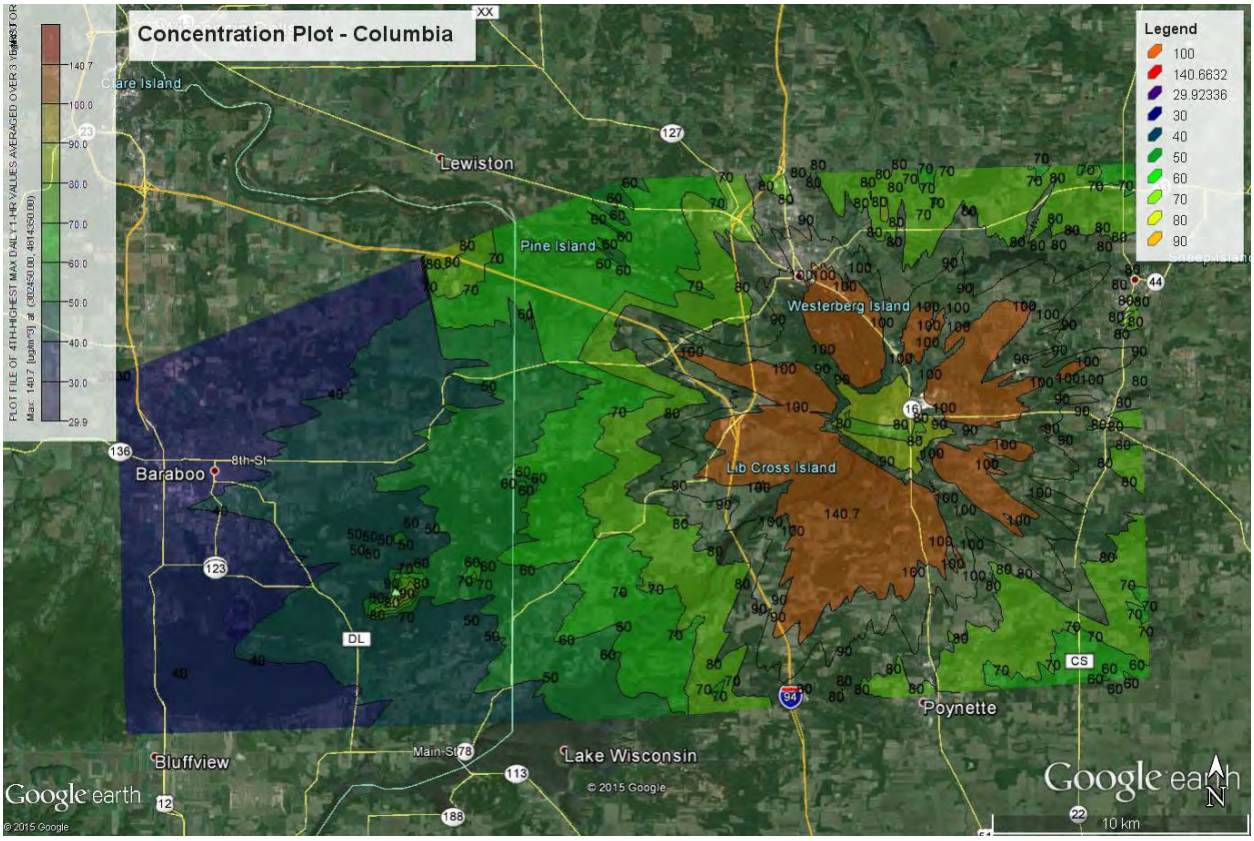
Table 4: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the Columbia County, Wisconsin Area of Analysis Based on Allowable Emissions

Averaging Period	Data Period	Receptor Location		SO_2 Concentration ($\mu g/m^3$)	
		UTM E	UTM N	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	302450	4814350	159.0	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, with a background concentration added, is 159.0 $\mu g/m^3$, or 60.8 ppb. This result, which meets the 2010 SO_2 NAAQS, is based on maximum allowable emissions from WPL-Columbia's two boilers. Figure 5 below was included as part of the state's recommendation, and indicates that the predicted value occurred 3.7 km southwest of WPL-Columbia. The state's receptor grid is also shown in the figure.

Figure 5: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations in the Columbia County, Wisconsin Area of Analysis Based on PTE Emissions



Jurisdictional Boundaries:

Once the geographic area of analysis associated with WPL-Columbia was determined, existing jurisdictional boundaries were considered for the purpose of informing our intended designated area, specifically with respect to clearly defined legal boundaries. The state's recommendation, that the entirety of Columbia County be designated attainment, applies clear, well known, stable and well established boundaries. However, Wisconsin only modeled concentrations within 30 km of WPL-Columbia, and did not model concentrations elsewhere in Columbia County. Thus, review of appropriate boundaries for Columbia County requires a review of the potential for violations of the SO_2 standard elsewhere in Columbia County, based on a review of whether other significant SO_2 sources are located in or near Columbia County.

Wisconsin identified three SO_2 sources other than WPL-Columbia in Columbia County, which are not considered likely to cause or contribute to violations of the 2010 SO_2 NAAQS in Columbia County, based on the state's modeling analysis. There are five SO_2 sources located in neighboring Sauk County, Dane County, and Dodge County which range in emissions from approximately 20 tpy to 60 tpy (2014 NEI). These sources are approximately 20 km from the Columbia County border. Since WPL-Columbia demonstrated attainment of the 2010 SO_2

NAAQS within 4 kilometers, with much higher SO_2 emissions and tall stacks (152 and 198 meters) leading to more distant emissions dispersion, EPA finds it unlikely that emissions from the SO_2 sources identified in neighboring Sauk, Dane, and Dodge Counties would cause or contribute to a violation of the 2010 SO_2 NAAQS within Columbia County. Therefore, the designation of Columbia County as unclassifiable/attainment appears warranted.

Other Relevant Information

EPA did not receive any additional relevant information with respect to the area surrounding the Columbia Energy Center.

Conclusion

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

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