Technical Support Document:

Chapter 43
Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for West Virginia

1. Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (the EPA, we, or us) must designate areas as either “nonattainment,” “attainment,” or “unclassifiable” for the 2010 1-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS) (2010 SO_2 NAAQS). The CAA defines a nonattainment area as an area that does not meet the NAAQS or that contributes to a nearby area that does not meet the NAAQS. An attainment area is defined by the CAA as any area that meets the NAAQS and does not contribute to a nearby area that does not meet the NAAQS. Unclassifiable areas are defined by the CAA as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS. In this action, the EPA has defined a nonattainment area as an area that the EPA has determined violates the 2010 SO_2 NAAQS or contributes to a violation in a nearby area, based on the most recent 3 years of air quality monitoring data, appropriate dispersion modeling analysis, and any other relevant information. An unclassifiable/attainment area is defined by the EPA as an area that either: (1) based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS[1]. An unclassifiable area is defined by EPA as an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

[1] The term “designated attainment area” is not used in this document because the EPA uses that term only to refer to a previous nonattainment area that has been redesignated to attainment as a result of the EPA’s approval of a state-submitted maintenance plan.

This technical support document (TSD) addresses designations for nearly all remaining undesignated areas in West Virginia for the 2010 SO_2 NAAQS. In previous final actions, the EPA has issued designations for the 2010 SO_2 NAAQS for selected areas of the country.[2] The EPA is under a December 31, 2017, deadline to designate the areas addressed in this TSD as required by the U.S. District Court for the Northern District of California.[3] We are referring to the set of designations being finalized by the December 31, 2017 deadline as "Round 3" of the designations process for the 2010 SO_2 NAAQS. After the Round 3 designations are completed, the only remaining undesignated areas will be those where a state has timely installed and begun operation of a new SO_2 monitoring network meeting EPA specifications referenced in EPA's SO_2 Data Requirements Rule (DRR) (80 FR 51052). The EPA is required to designate those remaining undesignated areas by December 31, 2020.

West Virginia submitted its first recommendation regarding designations for the 2010 1-hour SO_2 NAAQS on May 23, 2011. In this submittal, West Virginia recommended 34 counties be designated attainment, 16 counties be designated unclassifiable, and 5 counties be designated nonattainment. On January 22, 2013, the state submitted updated their recommendations and recommended attainment for 3 counties, Hancock, Monongalia, and Wood Counties, which were previously recommended as nonattainment. On April 5, 2013, West Virginia again updated their recommendations for Brooke and Marshall Counties and recommended that these counties be partial nonattainment. In our intended designations, we have considered all the submissions from the state, except where a recommendation in a later submission regarding a particular area indicates that it completely replaces an earlier recommendation for that area we have considered the recommendation in the later submission.

For the areas in West Virginia that are part of the Round 3 designations process, Table 1 identifies EPA's intended designations and the counties or portions of counties to which they would apply. It also lists West Virginia's current recommendations. The EPA's final designation for these areas will be based on an assessment and characterization of air quality through ambient air quality data, air dispersion modeling, other evidence and supporting information, or a combination of the above, and could change based on changes to this information (or the availability of new information) that alters EPA's assessment and characterization of air quality.

Table 1. Summary of the EPA's Intended Designations and the Designation Recommendations by West Virginia

County	West Virginia Recommended Area Definition	West Virginia's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Grant	Grant County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Harrison	Harrison County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment

[2] A total of 94 areas throughout the U.S. were previously designated in actions published on August 5, 2013 (78 FR 47191), July 12, 2016 (81 FR 45039), and December 13, 2016 (81 FR 89870).
[3] *Sierra Club v. McCarthy*, No. 3-13-cv-3953 (SI) (N.D. Cal. Mar. 2, 2015).

County	West Virginia Recommended Area Definition	West Virginia's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Mason	Mason County	Unclassifiable	Differs from State's Recommendation	Unclassifiable/ Attainment or Unclassifiable (see Section 5 for details)
Monongalia	Monongalia County	Attainment/ Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Pleasants	Pleasants County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Putnam	Putnam County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Wood	Wood County	Attainment/ Unclassifiable	Same as State's Recommendation	Unclassifiable
Remaining Undesignated Areas to Be Designated in this Action*	County Boundary or Tax Districts	Attainment or Attainment/ Unclassifiable or Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment

* Except for areas that are associated with sources for which Maryland elected to install and began operation of a new, approved SO_2 monitoring network meeting EPA specifications referenced in the EPA's SO_2 DRR (*see* Table 2), the EPA intends to designate the remaining undesignated counties (or portions of counties) in West Virginia as "unclassifiable/attainment" as these areas were not required to be characterized by the state under the DRR and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the areas may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS. These areas that we intend to designate as unclassifiable/attainment (those to which this row of this table is applicable) are identified more specifically in section 10 of this TSD.

The area for which Maryland elected to install and began timely operation of a new, approved SO_2 monitoring network is listed in Table 2. For further information, Mineral County, West Virginia, is addressed in Section 10.5 of this document. The EPA is required to designate these areas, pursuant to a court ordered schedule, by December 31, 2020. Table 2 also lists the SO_2 emissions sources around which each new, approved monitoring network has been established.

Table 2 – Undesignated Areas Which the EPA Is Not Addressing in this Round of Designations and Associated Source

Area	Source
Mineral County	Verso Luke Paper Company (Maryland Source)

Areas that the EPA previously designated in Round 1 (*see* 78 FR 47191) and Round 2 (*see* 81 FR 45039 and 81 FR 89870) are not affected by the designations in Round 3 unless otherwise noted. In Round 1, a portion of Brooke County and a portion of Marshall County, West Virginia were designated nonattainment. No areas in West Virginia were designated in Round 2.

2. General Approach and Schedule

Updated designations guidance documents were issued by the EPA through a July 22, 2016, memorandum and 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. These memoranda supersede earlier designation guidance for the 2010 SO_2 NAAQS, issued on March 24, 2011, and identify factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO_2 NAAQS. The documents also contain the factors that the EPA intends to evaluate in determining the boundaries for designated areas. 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.

Readers of this chapter of this TSD should refer to the additional general information for the EPA's Round 3 area designations in Chapter 1 (Background and History of the Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard) and Chapter 2 (Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for States with Sources Not Required to be Characterized).

To assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling for sources that emit SO_2, the EPA released its most recent version of a draft document titled, "SO_2 NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) in August 2016.[4]

As specified by the March 2, 2015, court order, the EPA is required to designate by December 31, 2017, all "remaining undesignated areas in which, by January 1, 2017, states have not installed and begun operating a new SO_2 monitoring network meeting EPA specifications referenced in EPA's" DRR. The EPA will therefore designate by December 31, 2017, areas of the country that are not, pursuant to the DRR, timely operating EPA-approved and valid monitoring networks. The areas to be designated by December 31, 2017, include the areas associated with seven sources in West Virginia meeting DRR emissions criteria that states have chosen to be characterized using air dispersion modeling, the areas associated with one source in West Virginia for which air agencies imposed emissions limitations on sources to restrict their SO_2 emissions to less than 2,000 tpy, sources that met the DRR requirements by demonstrating shut down of the source (two of which are in West Virginia), and other areas not specifically required to be characterized by the DRR.

Because many of the intended designations have been informed by available modeling analyses, this preliminary TSD is structured based on the availability of such modeling information. There

[4] https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf. The EPA also has released a technical assistance document addressing SO_2 monitoring network design, to advise states that have elected to install and begin operation of a new SO_2 monitoring network. See Draft SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, February 2016, https://www.epa.gov/sites/production/files/2016-06/documents/so2monitoringtad.pdf.

is a section for each county for which modeling information is available. The remaining to-be-designated counties are then addressed together in Section 10.

The EPA does not plan to revise this TSD after consideration of state and public comment on our intended designation. A separate TSD will be prepared as necessary to document how we have addressed such comments in the final designations.

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

1) 2010 SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 ppb, based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. *See* 40 CFR 50.17.
2) 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 that, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, EPA has determined either: (1) does not meet the 2010 SO_2 NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS.
4) Designated unclassifiable/attainment area – an area that either: (1) based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, EPA has determined (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.
5) Designated unclassifiable area – an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.
6) Modeled violation – a violation of the SO_2 NAAQS demonstrated by air dispersion modeling.
7) Recommended attainment area – an area that a state, territory, or tribe has recommended that the EPA designate as attainment.
8) Recommended nonattainment area – an area that a state, territory, or tribe has recommended that the EPA designate as nonattainment.
9) Recommended unclassifiable area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable.
10) Recommended unclassifiable/attainment area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable/attainment.

11) Violating monitor – an ambient air monitor meeting 40 CFR parts 50, 53, and 58 requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
12) We, our, and us – these refer to the EPA.

3. Technical Analysis for the Grant County, West Virginia Area

3.1. Introduction

The EPA must designate the Grant County, West Virginia, area by December 31, 2017, because the area has not been previously designated and West Virginia has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Grant County. Pursuant to the Data Requirements Rule (*see* 40 CFR part 51, subpart BB), states had the option to characterize large sources of SO_2 by either monitoring, modeling, or limiting emissions below 2,000 tons of SO_2 per year. Because West Virginia has a large SO_2 source (the Mt. Storm Power Station), the state elected to conduct modeling for the Mt. Storm Power Station that emits more than 2,000 tons of SO_2 per year.

3.2. Air Quality Monitoring Data for the Grant County Area

There are no air quality monitors located in the Grant County, West Virginia, area.

3.3. Air Quality Modeling Analysis for Grant County Area Addressing the Mount Storm Power Station

3.3.1. Introduction

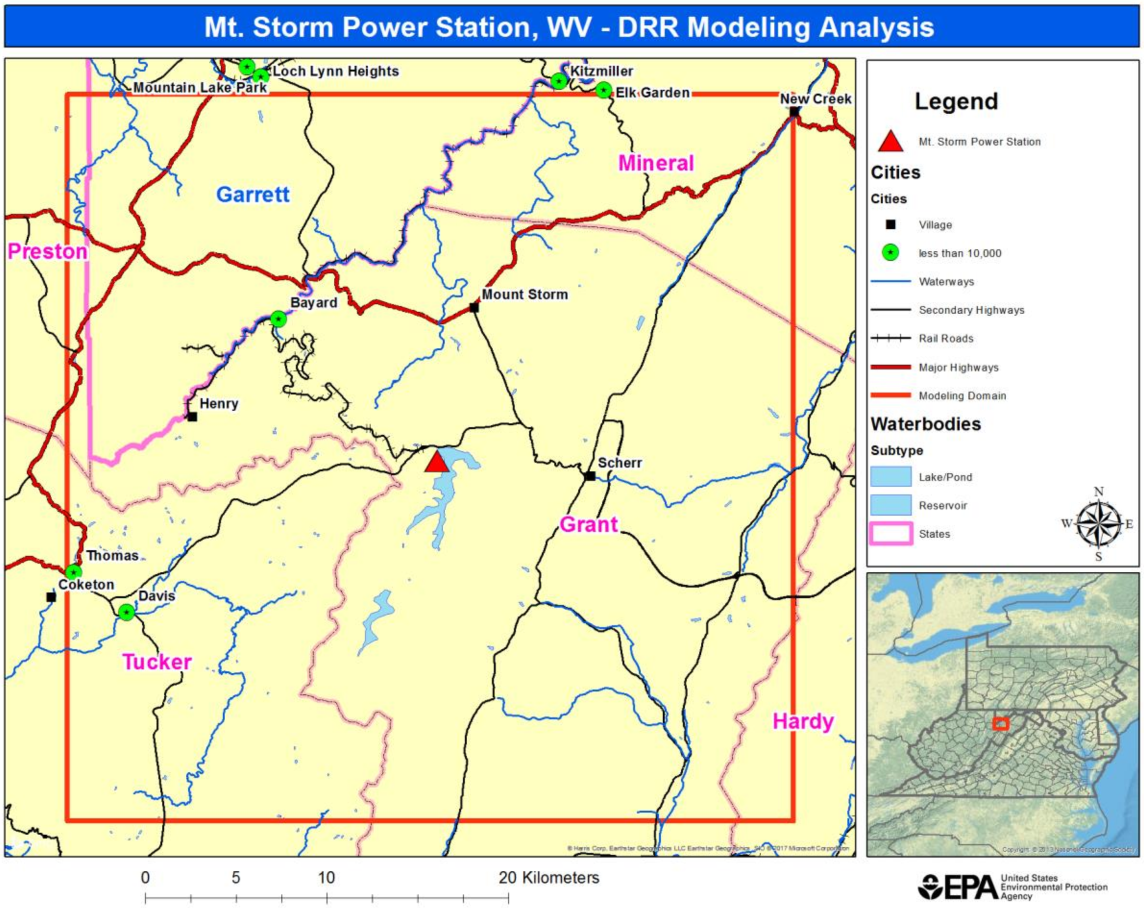
This section presents all the available air quality modeling information for a portion of Grant County that includes the Dominion Energy Mount Storm Power Station (the Mt. Storm Power Station). This area contains the following SO_2 source, principally the sources around which West Virginia is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Mt. Storm Power Station facility emits 2,000 tons or more annually. Specifically, the Mt. Storm Power Station emitted approximately 3,970 tons of SO_2 according to the 2014 NEI. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and West Virginia has chosen to characterize it via modeling.

In West Virginia's original submission on May 23, 2011, West Virginia recommended that Grant County, be designated as unclassifiable. On January 12, 2017, West Virginia submitted modeling for the Mt. Storm Power Station but did not update their recommendations. This modeling 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, the EPA intends to modify the state's designation and to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

The area that the state has assessed via air quality modeling is located in Grant County. This area, located in northeast West Virginia, includes portions of the following counties: Grant, Hardy, Mineral, Preston, and Tucker Counties in West Virginia and portions of Garrett County in Maryland.

Figure 3A. Map of the Grant County Area Addressing the Mt. Storm Power Station



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered only West Virginia's modeling assessment.

3.3.2. Modeling Analysis Provided by the State

3.3.2.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model

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

The state used AERMOD version 15181 in regulatory default mode, which was the current version at the time of submittal. On January 17, 2017, EPA published its revision to Appendix W – Guideline to Air Quality Models.[5] Since the publication of Appendix W, AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted here. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

3.3.2.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

For the purpose of performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in rural mode. This was based on a characterization of the local (within 3 kilometers) dispersion environment as either urban or rural, based on a USEPA-recommended procedure (commonly referred to as the Auer Method) that characterizes an area by prevalent land use. This land use approach classifies an area according to 12 land use types. In this scheme, areas of industrial, commercial, and compact residential land use are designated urban. According to US EPA modeling guidelines, if more than 50% of an area within a 3-km radius of the facility is classified as rural, then rural dispersion coefficients are to be used in the dispersion modeling analysis. Conversely, if more than 50% of the area is urban, then the area is classified as urban. A visual inspection of the 3-km area surrounding the Mt. Storm Power Station clearly shows the area is rural. EPA agrees with this assessment.

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

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not

[5] https://www.federalregister.gov/documents/2015/07/29/2015-18075/revision-to-the-guideline-on-air-quality-models-enhancements-to-the-aermod-dispersion-modeling

limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Grant County area, the state has included no other emitters of SO_2 within 20 kilometers of the Mt. Storm Power Station in any direction; the 2014 NEI indicates there are no sources within the modeling domain with SO_2 emission > 1 tpy. No other sources beyond 20 km were determined by the state to have the potential to cause concentration gradient impacts within the area of analysis. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas.

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

- 25-m spaced fence line receptors. The fence line is approximately 4.7 km in length
- a 100 m Cartesian receptor grid extending out 3 km from the Mt. Storm Power Station's ambient boundary
- a 250 m Cartesian receptor grid extending out 3 to 5 km from the Mt. Storm Power Station boundary
- a 500 m Cartesian receptor grid extending from 5 to 10 km from the Mt. Storm Power Station boundary
- a 1,000 m Cartesian receptor grid extending from 10 to 20 km from the Mt. Storm Power Station boundary
- A 5 by 5 50-m spaced Cartesian receptor grid located approximately 2 km north of the Mt. Storm Power Station Stack MS00 (North Grid) to better resolve the model peak in the main grid
- A 5 by 5 50-m spaced Cartesian receptor grid located approximately 2.2 km east of the Mt. Storm Power Station Stack MS00 (East Grid) to better resolve the model peak in the main grid

The receptor network contained 7,432 receptors, and the network covered portions of Grant, Hardy, Mineral, Preston, and Tucker Counties in West Virginia and portions of Garrett County in Maryland.

Figures 3B and 3C, included in the state's recommendation, show the state's chosen area of analysis surrounding the Mt. Storm Power Station as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the state placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility, including other facilities' property. Despite flexibility under Section 4.2 of the Modeling TAD, the state elected to retain all model receptors outside the Mt. Storm Power Station's ambient boundary, including those over large water bodies such as the New Stony River Reservoir, which is a large body of water that serves as the plant's cooling pond directly east of the facility. Fence line positions were generally verified using overhead images through GIS software.

Figure 3B. Nearfield Receptor Grid for the Area of Analysis for the Grant County Area

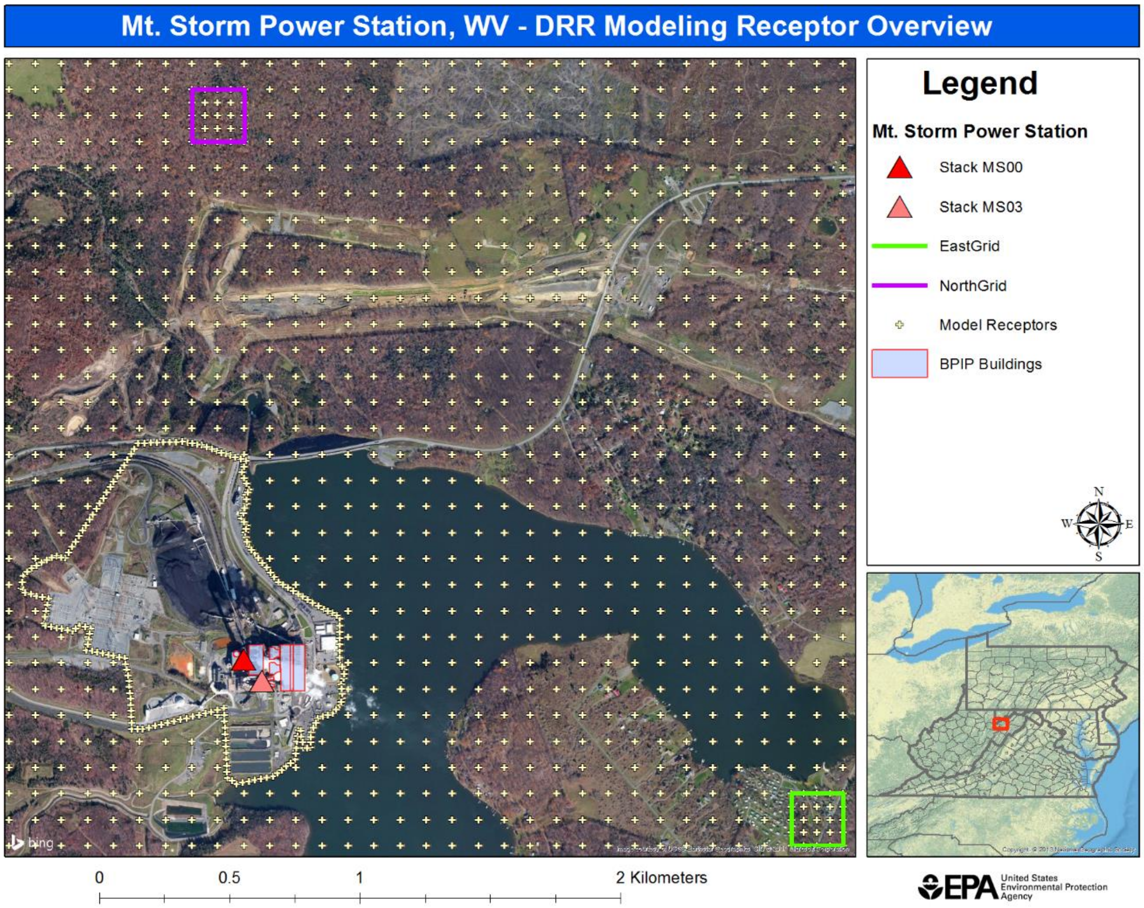
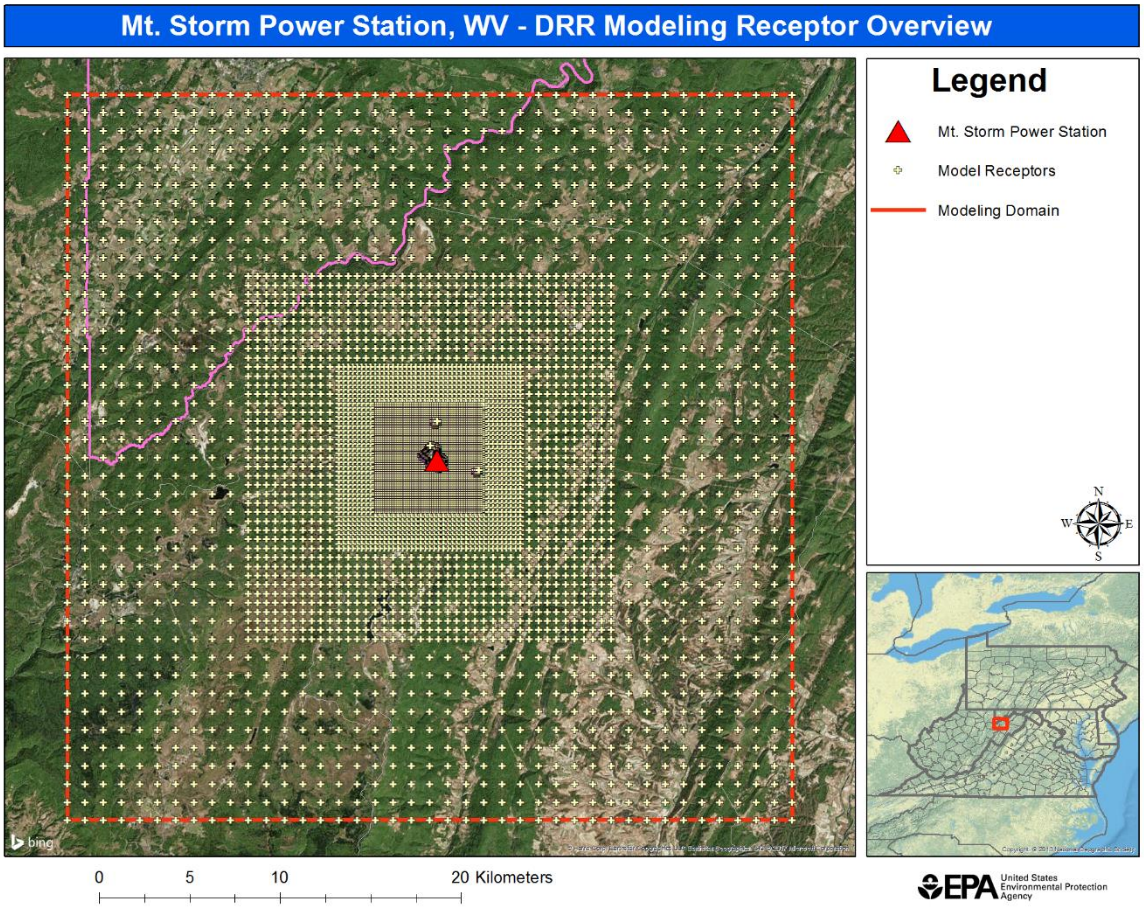


Figure 3C. Receptor Grid for the Grant County Area



EPA concludes that the model receptor grid surrounding the Mt. Storm Power Station is adequately designed to capture the maximum impacts from the facility's SO_2 emissions.

3.3.2.4. Modeling Parameter: Source Characterization

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

There are three (3) primary SO_2 emission points at the Mt. Storm Power Station that were included in the modeling analysis. These are the three (3) pulverized coal-fired boilers, which are currently controlled with wet limestone flue gas desulfurization (FGD) systems. There are other small sources of SO_2 at the Mt. Storm Power Station including: an auxiliary fuel-oil fired boiler, a combustion turbine, two (2) diesel-fired emergency generators, six (6) propane-fired emergency generators and two (2) diesel-fired fire pumps. Each of these small sources are emergency in nature, will not operate routinely and have very low actual SO_2 emissions (combined emissions from these small sources are < 4 tpy). In either case, the impact of these potential small sources of SO_2, are not expected to have an impact on the 1-hour SO_2 modeling. Based on the current stack configurations, Unit 1 and Unit 2 exhaust through a common single flue 743-foot stack (MS00). Unit 3 exhausts through a separate 579-foot stack (MS03). The NAAQS modeling was performed with the actual stack heights in accordance with recommendations in the DRR and TAD.

EPA examined the Mt. Storm Power Station's stack locations and BPIP building analysis for accuracy using GIS software. Both emission stacks appear to be in the proper location. Final building corners appear to be slightly off (~5 m) when compared with the locations on the overhead base maps. These errors may be due to differences in the building coordinate systems (NAD83 vs. NAD27). Either way, building location errors of this magnitude will probably have little or no impact on final model concentrations given the height of the Mt. Storm Power Station's stacks; downwash impacts generally decrease with distance and peak concentrations are several kilometers from the plant. EPA's determination is that these possible errors in building corner locations will not significantly impact final model concentrations.

Plant stack temperatures and velocities also varied according to CEM measurements. A quick survey of the modeled stack velocities indicated that the coal unit values were within expected ranges for these types of units. Hourly stack temperatures, on occasion, neared 400 K for both stacks. These values seem on the high end for FGD units, which typically have temperatures in the 325 K range. Stack temperatures also occasionally dropped below 273 K, which is unusual for coal-fired boilers. A quick survey of the hourly stack temperatures indicated that unusually low temperatures typically occurred when the coal-unit emissions were zero (0). In one instance a stack temperature value was listed as 255.37 K while the unit was operating indicating that this value may have been missing or otherwise invalid for this particular hour. It is not thought that these unusual stack parameters would contributed to the controlling model concentration.

3.3.2.5. Modeling Parameter: Emissions

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

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

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, where a facility has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, “Guideline on Air Quality Models.”

As previously noted, the state included emission only from the Mt. Storm Power Station in its modeling analysis. No other large emitters of SO_2 were identified within 20 km of this facility. The state has chosen to model this facility using actual emissions. The facility in the state’s modeling analysis and their associated annual actual SO_2 emissions between 2013 and 2015 are summarized below.

For the Mt. Storm Power Station, the state provided annual actual SO_2 emissions between 2013 to 2015. This information is summarized in Table 3D. A description of how the state obtained hourly emission rates is given below this table.

Table 3D. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Grant County Area

Modeled Emissions

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
Mt. Storm Power Station Stack 00	2,866.4	2,664.0	3,721.0
Mt. Storm Power Station Stack 03	936.9	1,306.5	1,103.7
Total Emissions from All Modeled Facilities in the State’s Area of Analysis	3,803.3	3,970.5	4,824.6

CAMD Emissions

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
Mt. Storm Power Station Unit 1	1,349.4	1,493.1	1,941.3
Mt. Storm Power Station Unit 2	1,517.0	1,170.9	1,779.6
Mt. Storm Power Station Unit 3	936.5	1,306.3	1,103.7
Total Emissions from All Modeled Facilities in the State’s Area of Analysis	3,802.9	3,970.3	4,824.6

2014 NEI Emissions

Facility	2014 NEI SO_2 Emissions (tpy)
Mt. Storm Power Station	3,970.48

For the Mt. Storm Power Station, the actual hourly SO_2 emissions data were obtained from CEM data provided by the facility and used in the West Virginia modeling analysis. In addition to this data, EPA also constructed actual hourly emissions available from EPA's Clean Air Markets Data (CAMD) website[6] and emissions from the 2014 NEI for comparison. As noted previously, Units 1 and 2 emit from a common stack (MS00) while Unit 3 emits from a separate stack (MS03). To compare hourly emission rates the modeled emission rate from Stack MS00 is compared to the combined CAMD emission rates for Units 1 and 2 while the hourly modeled emission rate from Stack MS03 is compared with the hourly CAMD emission rate for Unit 3. A table showing the difference between the hourly modeled emission rates and the hourly CAMD emission rates for the Mt. Storm Power Station are shown in Table 3E. The table shows modeled hourly emission rates were almost entirely within +/- 250 lbs/hr of the hourly rates recorded in CAMD. Based on this information it appears that actual hourly emission rates were properly input into the modeling analysis.

Table 3E. Table showing the difference between modeled and CAMD hourly emission rates (pounds per hour) for the Mt. Storm Power Station's two (2) stacks.

Stack MS00 (Units 1 & 2)		Stack MS03 (Unit 3)	
Bin	Frequency	Bin	Frequency
-500	0	-500	0
-250	0	-250	0
0	15,517	0	16,068
250	10,763	250	10,211
500	0	500	1
750	0	750	0
More	0	More	0

[6] https://ampd.epa.gov/ampd/

3.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

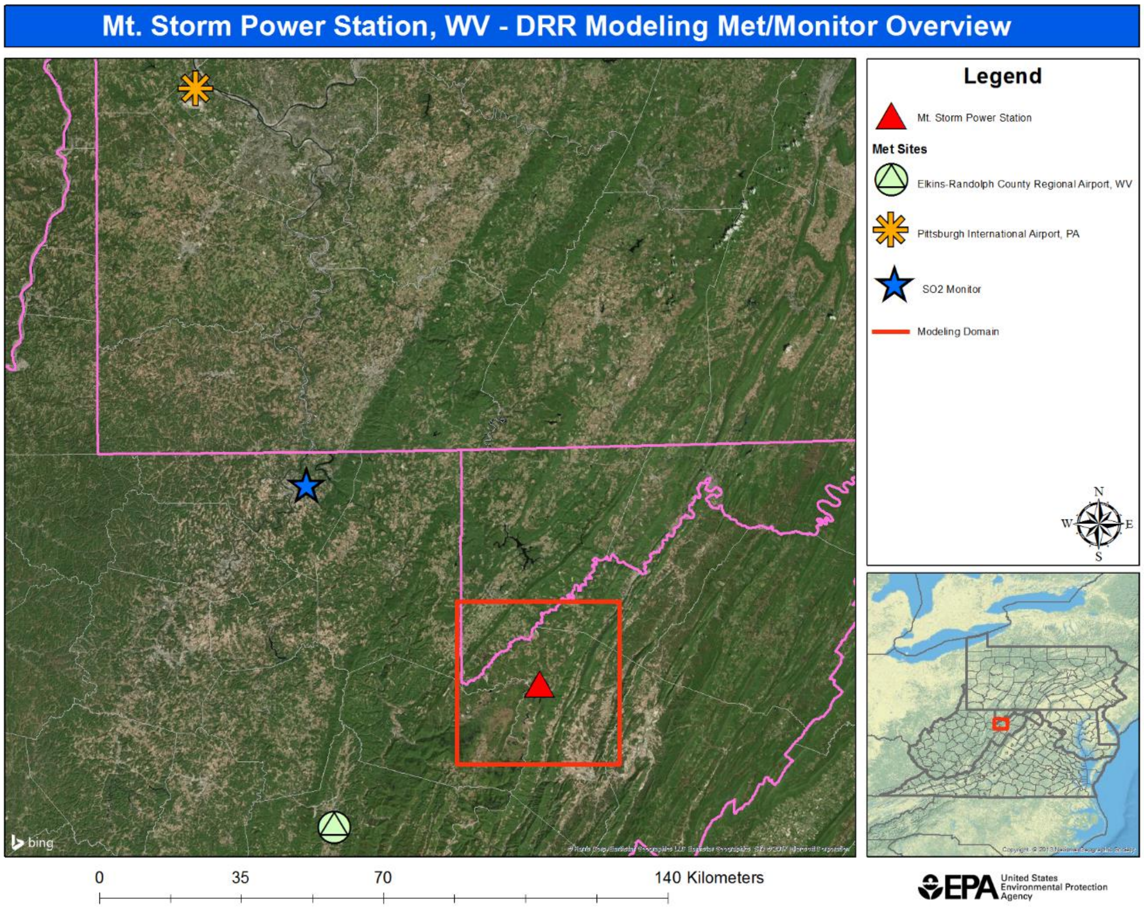
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of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

For the area of analysis for the Grant County area, the state selected the surface meteorology from Elkins-Randolph County Regional Airport in Randolph County, WV, and coincident upper air observations from Pittsburgh International Airport in Allegheny County, PA, as best representative of meteorological conditions within the area of analysis. These sites are located approximately 61.6 km southwest and 169.1 km northwest (respectfully) from the Mt. Storm Power Station. Both sites lie outside the modeling domain. The modeled anemometer height for the Elkins-Randolph County Regional Airport was confirmed as correct.

The state used AERSURFACE version 13016 using data from both the Mt. Storm Power Station and the Elkins-Randolph County Regional Airport. EPA used the AERSURFACE surface characteristics for the Elkins-Randolph County Regional Airport site, in accordance with Section 3.3 of the AERSURFACE Users Guide for its analysis. The state estimated values for four (4) spatial sectors out to 1.0 km at a monthly temporal resolution for dry, wet, average conditions based on the 30-year precipitation data set from the Elkins-Randolph County Regional Airport. Non-default settings were used for the monthly varying surface conditions. Seasons were shortened to reflect to shorter growing seasons in the vicinity of the Mt. Storm Power Station. Continuous monthly snow cover was present in March of 2013, January and February of 2014, and February of 2015. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as "Zo").

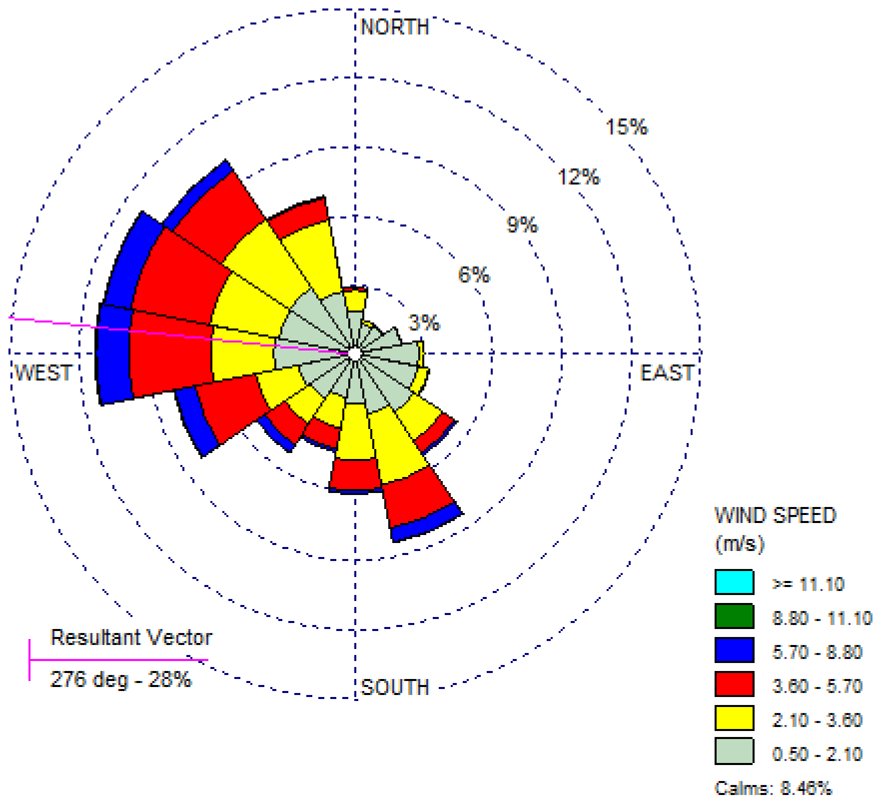
In the figure below, generated by the EPA, the location of the NWS stations are shown relative to the area of analysis.

Figure 3F. Area of Analysis and the NWS Stations in the Grant County Area



As part of its recommendation, the state provided the 3-year surface wind rose for the Elkins-Randolph County Regional Airport site for 2013-15. In Figure 3G, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The wind rose was produced using the final processed AERMET sfc file in Lakes Environmental's WRPLOT program. Winds were generally from the west to northwest with a resultant wind vector of all hours generally from a westerly direction.

Figure 3G. Elkins-Randolph County Regional Airport Cumulative Annual Wind Rose for Years 2013 – 2015



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The state followed the methodology and settings presented in Modeling TAD and associated guidance in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE (Elkins-Randolph County Regional Airport) to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute and 5-minute duration was provided from Elkins-Randolph County Regional Airport, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the state set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute and 5-minute wind data.

EPA has determined that the meteorological data was generally processed correctly. No documentation was provided to ensure that continuous monthly snow cover was properly input into the modeling analysis. Given Mt. Storm Power Station's base elevation (3,200 feet), winter-time snow cover is expected during most years.

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

The terrain in the area of analysis is best described as hilly though local relief is not very stark. Mt. Storm Power Station, at 3,200 feet elevation, is located in some of the highest terrain in the West Virginia portion of the Appalachian Mountains and resides along a man-made reservoir formed from the Stoney River. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The dataset was downloaded from the USGS website (http://viewer.nationalmap.gov/viewer/) and consisted of 1/3 arc second (~10 m resolution) NED. As per the AERMAP User's Guide (USEPA, 2004), the domain was sufficient to ensure all significant nodes are included such that all terrain features exceeding a 10% elevation slope from any given receptor, are considered. EPA concludes that the receptor grid information was properly processed.

3.3.2.8. 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 "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99^{th} percentile monitored concentrations by hour of day and season or month. For this area of analysis, the state used a "tier 1" approach, the 2013-15 design value, for the Morgantown monitor (Site ID: 54-061-0003) located approximately 75 kilometers northwest of the Mt. Storm Power Station in Monongalia County, WV. This monitoring site is located near several other coal-fired power plants (Fort Martin and Longview) that may affect monitor concentrations; these source's impacts within the modeling domain itself are probably minimal due to distance from the Mt Storm Power Station. This monitor would probably provide a conservative (higher) estimate of background concentrations in the Mt. Storm Power Station area.

The single value of the background concentration for this area of analysis was determined by the state to be 39 micrograms per cubic meter (μg/m^3), equivalent to 15 ppb when expressed in 2 significant figures,[7] and that value was incorporated into the final AERMOD results.

As noted previously, the background monitoring site used in the Mt. Storm Power Station's final modeling analysis is probably impacted by several nearby SO_2 sources, which would not impact the modeling domain because they are over 50 km away. This means the background monitor is probably a conservative estimate of true background concentrations in the vicinity of the Mt. Storm Power Station.

3.3.2.9. Summary of Modeling Inputs and Results

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

Table 3H. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Grant County Area

Input Parameter	Value
AERMOD Version	15181 Default
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	2
Modeled Structures	10
Modeled Fencelines	1, Mt. Storm Power Station
Total receptors	7,432
Emissions Type	Actual
Emissions Years	2013-2015
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	Elkins-Randolph County Regional Airport
NWS Station Upper Air Meteorology	Pittsburgh International Airport
NWS Station for Calculating Surface Characteristics	Elkins-Randolph County Regional Airport
Methodology for Calculating Background SO_2 Concentration	Tier 1 (Design Value)
Calculated Background SO_2 Concentration	15 ppb (39 μg/m^3)

[7] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in μg/m^3. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 μg/m^3.

The results presented below in Table 3I show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

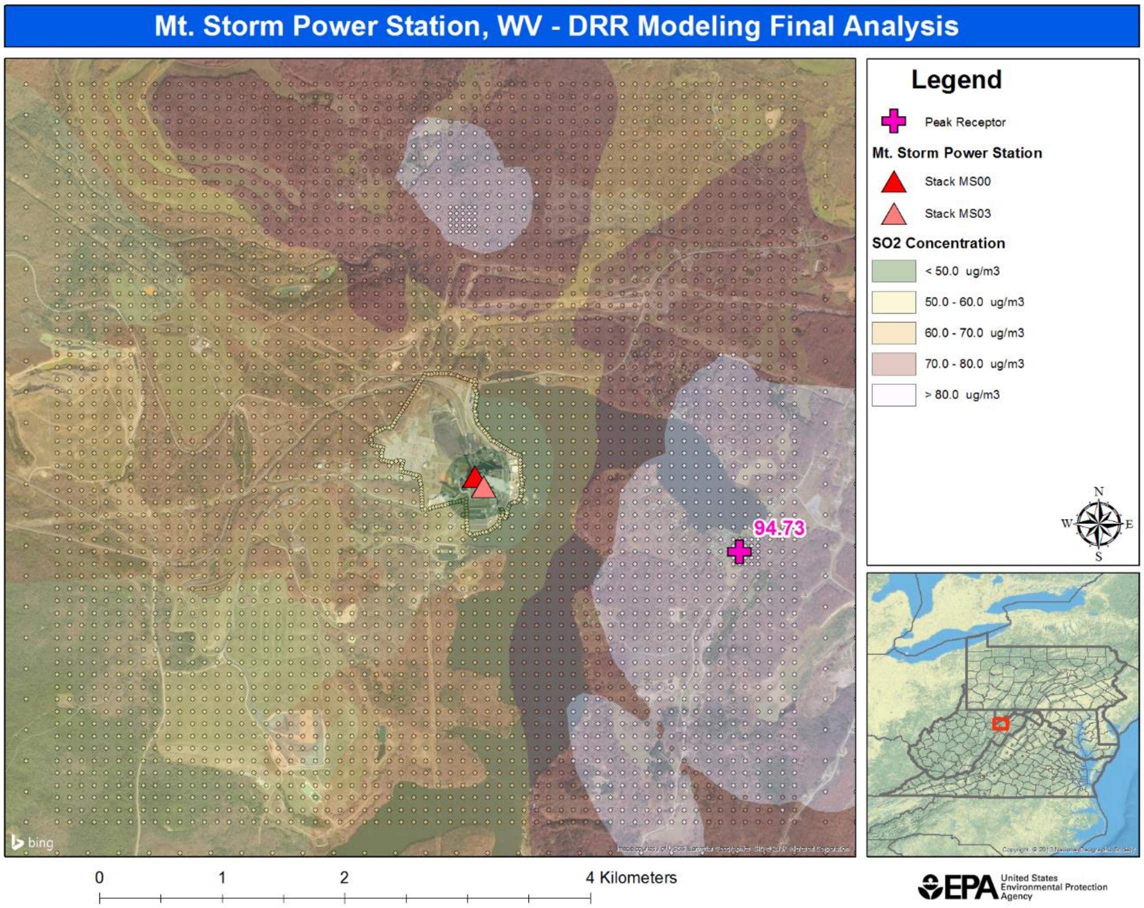
Table 3I. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Grant County Area

Averaging Period	Data Period	Receptor Location UTM Zone 17		99th Percentile Daily Maximum 1-Hour SO_2 Concentration ($\mu g/m^3$)	
		UTM/Latitude	UTM/Longitude	Modeled Concentration (Including Background)	NAAQS Level
99th Percentile 1-Hour Average	2013-15	4339900	4339900	55.73 + 39. = 94.73	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The state's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain 94.73 $\mu g/m^3$, equivalent to 36.2 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facility. Figure 3J below and indicates that the predicted peak value occurred east southeast of the Mt. Storm Power Station, which aligns with the predominant wind direction. The state's receptor grid is also shown in the figure.

Figure 3J. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Grant County Area



The modeling submitted by the state does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. The peak model concentrations occur within the east 50-m receptor grid that is located approximately 2.7 km east-southeast of the two (2) stacks for the Mt. Storm Power Station.

3.3.2.10. The EPA's Assessment of the Modeling Information Provided by the State

West Virginia's modeling analysis for the Mt. Storm Power Station indicates that model concentrations in the vicinity of the plant do not violate the SO_2 NAAQS. This result was based on actual modeled emissions that closely resemble hourly emissions reported to EPA's CAMD website. A conservative estimate of the background concentration was added to the final modeled result. Peak model concentrations for the area near Mt. Storm Power Station were 94.73 $\mu g/m^3$, which is approximately 48% of the 1-hour SO_2 NAAQS.

Our review did not uncover any substantial issues with West Virginia's modeling analysis other than some unusually high stack temperatures, which should not influence final model concentrations substantially (peak model concentrations were approximately half of the 1-hour SO_2 NAAQS). We therefore conclude that the modeling analysis supports West Virginia's finding that emissions from the Mt. Storm Power Station do not cause violations of the 1-hr SO_2 NAAQS in this area.

3.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Grant County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

3.5. Jurisdictional Boundaries in the Grant County Area

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

West Virginia did not update their unclassifiable recommendation for Grant County since their May 23, 2011, submittal.

3.6. Other Information Relevant to the Designations for the Grant County Area

There are no designated nonattainment areas or areas intended to be designated as nonattainment neighboring any of the counties modeled in the Grant County area of analysis.

3.7. The EPA's Assessment of the Available Information for the Grant County Area

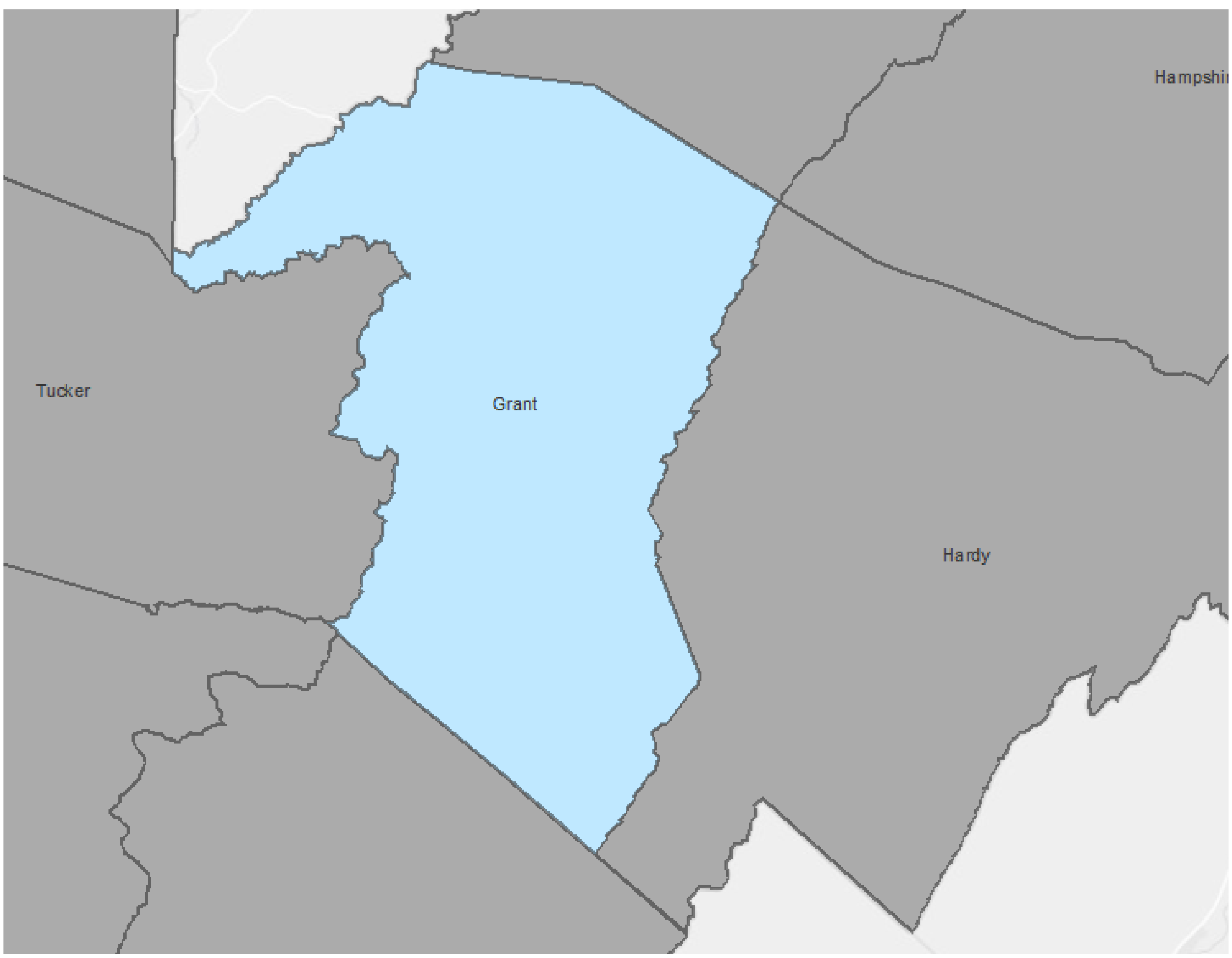
The EPA finds that available air dispersion modeling results show that the Grant County area of analysis is not violating the 1-hour SO_2 NAAQS and is not contributing to NAAQS violations in nearby areas. There are no nonattainment areas for the 1-hour SO_2 NAAQS within 50 km, which is the typical extent of dispersion modeling for SO_2. Additionally, emissions from the Mt. Storm Power Station are not expected to impact Mineral County because peak model concentrations are localized to Grant County. Mineral County is approximately 17 km away and will be evaluated by December 31, 2020.

West Virginia's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 94.73 $\mu g/m^3$, equivalent to 36.2 ppb, which is approximately 48% of the 1-hour SO_2 NAAQS. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facility. EPA's review did not uncover any substantial issues with West Virginia's modeling analysis other than some unusually high stack temperatures, which shouldn't influence final model concentrations substantially (peak model concentrations were approximately half of the 1-hour SO_2 NAAQS). Therefore, EPA finds that emissions from the Mt. Storm Power Station do not cause, or contribute to nearby, violations of the 1-hr SO_2 NAAQS.

3.8. Summary of Our Intended Designation for the Grant County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate Grant County as unclassifiable/attainment, for the 2010 SO_2 NAAQS because, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined the area (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Figure 3K shows the boundary of this intended designated area.

Figure 3K. Boundary of the Intended Grant County Unclassifiable/Attainment Area



4. Technical Analysis for the Harrison County, West Virginia Area

4.1. Introduction

The EPA must designate the Harrison County, West Virginia, area by December 31, 2017, because the area has not been previously designated and West Virginia has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Harrison County. Pursuant to the Data Requirements Rule (*see* 40 CFR part 51, subpart BB), states had the option to characterize large sources of SO_2 by either monitoring, modeling or limiting emissions below 2000 tons of SO_2 per year. Because West Virginia has a large SO_2 source (the Harrison Power Plant), the state elected to conduct modeling for the Harrison Power Plant that emits more than 2000 tons of SO_2 per year.

4.2. Air Quality Monitoring Data for the Harrison County, West Virginia Area

There are no air quality monitors located in the Harrison County, West Virginia, area.

4.3. Air Quality Modeling Analysis for the Harrison County, West Virginia Area Addressing the First Energy Harrison Power Plant

4.3.1. Introduction

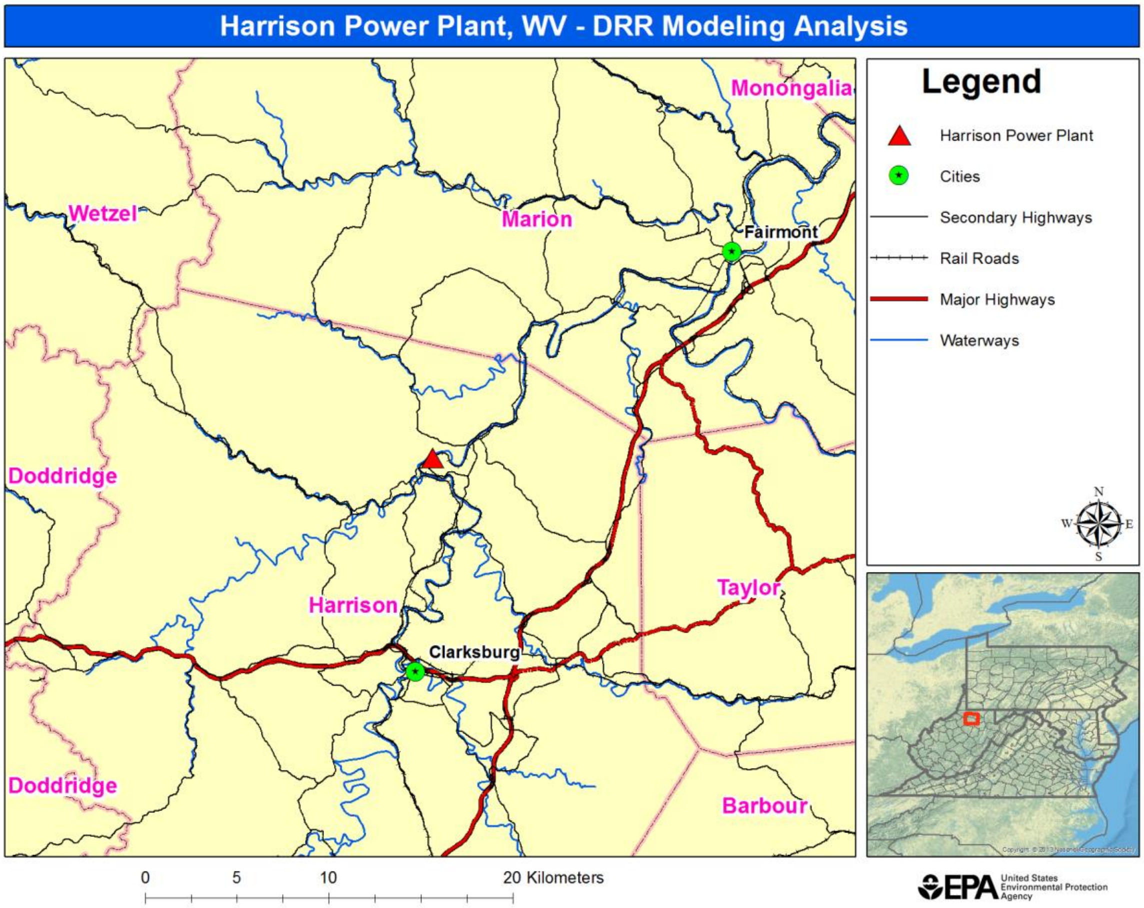
This section presents all the available air quality modeling information for a portion of Harrison County, West Virginia, that includes FirstEnergy Harrison Power Plant (the Harrison Power Plant). This area contains the following SO_2 source, for which West Virginia is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Harrison Power Plant facility emits 2,000 tons or more annually. Specifically, the Harrison Power Plant emitted approximately 16,323 tons of SO_2 according to the 2014 NEI. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and West Virginia has chosen to characterize it via modeling.

In West Virginia's original submission on May 23, 2011, West Virginia recommended that Harrison County, West Virginia, be designated as unclassifiable. On January 12, 2017, West Virginia submitted modeling for the Harrison Power Plant but did not update their recommendations. This modeling 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, the EPA intends to modify the state's designation and to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

The area that the state has assessed via air quality modeling is located north-central West Virginia and includes portions of the following counties: Barbour, Doddridge, Harrison, Marion, Taylor, and Wetzel Counties. As seen in Figure 4A below, the Harrison Power Plant facility is located in the town of Haywood, Harrison County, West Virginia, along the West Fork River.

Figure 4A. Map of the Harrison County Area Addressing the Harrison Power Plant



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered only West Virginia's modeling assessment.

4.3.2. Modeling Analysis Provided by the State

4.3.2.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the

AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

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

The state used AERMOD version 15181 in regulatory default mode, which was the current version at the time of original submittal. On January 17, 2017, EPA published its revision to Appendix W – Guideline to Air Quality Models.[8] Since the publication of Appendix W, AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted here.

The EPA noted a significant discrepancy with the emission file originally submitted by West Virginia. The original modeling analysis appeared to be missing SO_2 emissions from two (2) of three (3) units at the Harrison Power Plant. This discrepancy was communicated to West Virginia in March. West Virginia subsequently remodeled using the hourly emission files pulled from EPA's CAMD website. Final modeling concentrations using the hourly CAMD data increased less than 1%. Only the hourly emission file was changed in the resubmitted modeling analysis. All other preprocessing steps were identical to the original analysis submitted by West Virginia. EPA is basing the final designation on West Virginia's resubmitted modeling analysis results from June 2017. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

4.3.2.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

The Auer land use method is the recommended approach for determining characteristics surrounding the Harrison Power Plant. This method classifies land use within an area circumscribed by a circle, centered on the source, having a radius of 3 km. If land use types for heavy industrial, light-moderate industrial, commercial, and compact residential (i.e., Auer land use types I1, I2, C1, R2, and R3) collectively account for 50% or more of the land use within 3

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[8] https://www.federalregister.gov/documents/2015/07/29/2015-18075/revision-to-the-guideline-on-air-quality-models-enhancements-to-the-aermod-dispersion-modeling

km of the source, then the modeling regime is considered urban. A cursory review by the state of land-use within the 3 km radius area surrounding the Harrison Power Plant from Google Earth imagery found that the area is predominantly rural based on the above criteria and therefore rural dispersion coefficients were used in the modeling analysis. The EPA's assessment agrees with this conclusion.

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

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Harrison County area, there are no other emitters of SO_2 greater than 100 tpy within 20 kilometers (km) of Harrison Power Plant in any direction; hence, the state has included no other emitters explicitly in the modeling. No other sources beyond 20 km were determined by the state to have the potential to cause concentration gradient impacts within the area of analysis. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas.

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

- Unevenly spaced fence line receptors were defined in this analysis. Maximum distance between receptors was approximately 50 m. The fence line is approximately 3.6 km in length
- a 50 m Cartesian receptor grid extending out 1 km from the Harrison Power Plant boundary
- a 100 m Cartesian receptor grid extending out 1 to 5 km from the Harrison Power Plant boundary
- a 250 m Cartesian receptor grid extending from 5 to 10 km from the Harrison Power Plant boundary
- a 500 m Cartesian receptor grid extending from 10 to 20 km from the Harrison Power Plant boundary

The receptor network contained 21,133 receptors, and the network covered and area 20 km by 20 km centered on the site of the Harrison Power Plant.

Figures 4B and 4C, show the state's chosen area of analysis surrounding the Harrison Power Plant as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the state placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility, including other facilities' property. All receptor locations outside of the Harrison Power Plant's ambient air boundary, which was generally confirmed using GIS software, were retained. No model receptors were removed from significant water bodies such as the West Fork River, which the Harrison Power Plant sits beside.

Figure 4B. Area of Analysis for the Harrison County Area

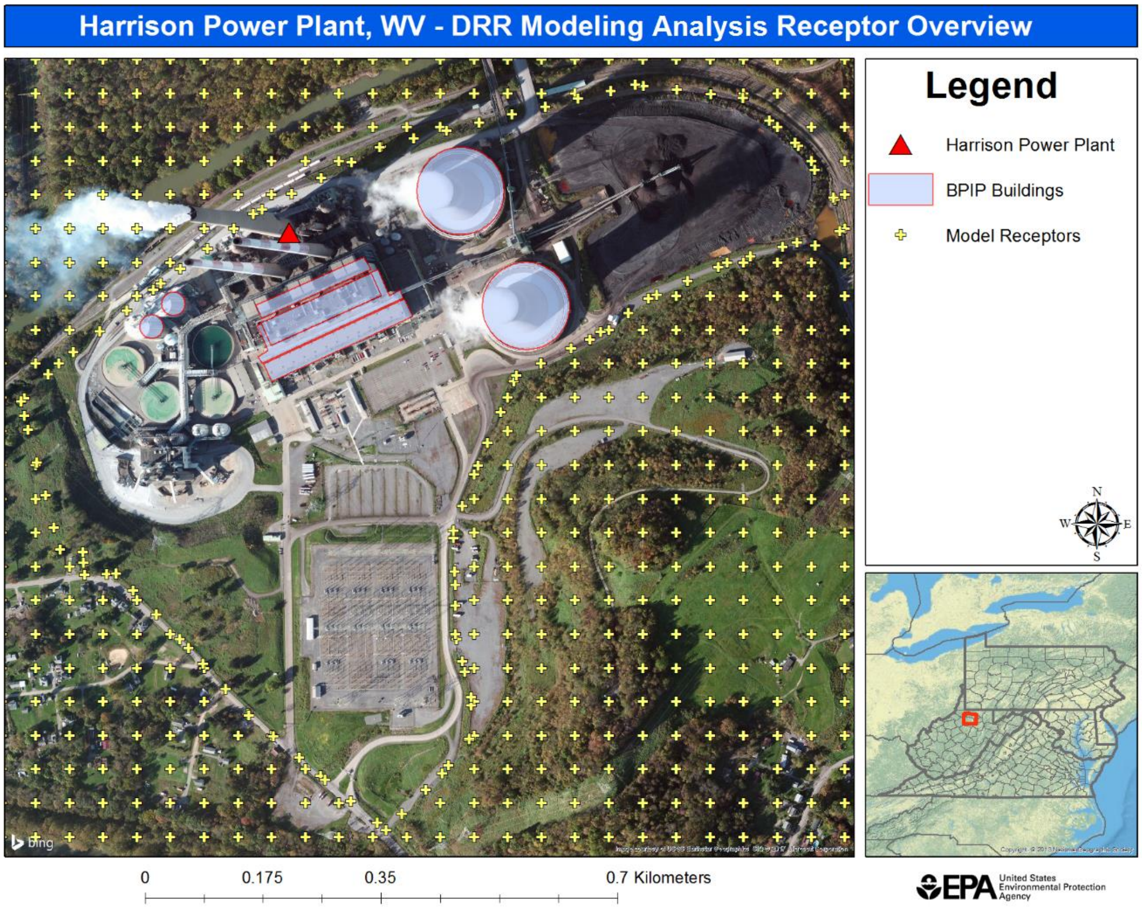
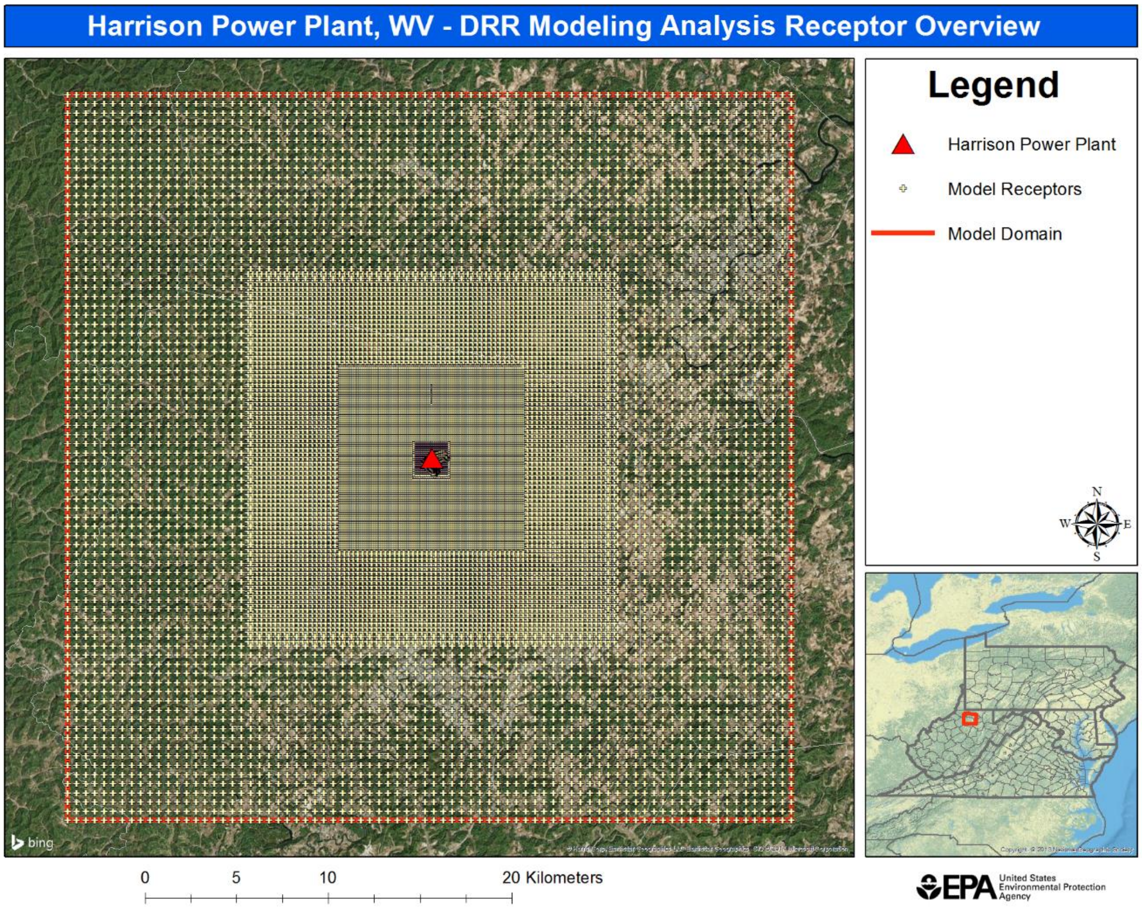


Figure 4C. Receptor Grid for the Harrison County Area



EPA concludes that the model receptor grid surrounding the Harrison Power Plant is adequate to capture the maximum impacts from the facility's SO_2 emissions.

4.3.2.4. Modeling Parameter: Source Characterization

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

The Harrison Power Plant is equipped with three (3) identical opposed fired, pulverized coal dry bottom boilers, along with a dedicated flue gas desulfurization (FGD) SO_2 emissions control system. The system is configured with the three (3) boilers exhausting through separate flues in a common 1000-foot stack. The stack has a continuous emissions monitoring system (CEMS) that records hourly average exhaust flow rate, temperature, and SO_2 emissions. Modeling of the coal boilers reflected a merged flue configuration using the actual hourly CEMS data recorded for 2013-15. A quick review of the modeled stack temperatures and velocities indicated multiple hours in which stack temperatures were less than 273 K, which seems unlikely for a coal fired boiler. Unusually low stack temperatures appeared mostly during hours in which the coal units were not operating; a value of 255.1 K appears to occur during operating hours but may be an indication that the stack temperature was missing for that hour. Stack temperatures in excess of 400 K, unusual for wet scrubbers, appear valid but may reflect hours when the control device was not fully functional.

In addition to the Harrison Power Plant coal fired boilers, the plant emission inventory also includes two (2) auxiliary boilers and three (3) emergency engines. The natural gas fuel auxiliary boilers and emergency generators are limited use units with no appreciable SO_2 emissions (< 1 tpy). Therefore, emissions from these units were not included in the final modeling analysis.

The state characterized this source 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 BPIPPRM was used to assist in addressing building downwash.

EPA examined the Harrison Power Plant's stack location and BPIP building analysis for accuracy using GIS software. The main stack as well as all of the major buildings appear to be located in the correct locations. BPIP footprints of the two (2) cooling towers appear to be slightly larger than they actually are. These cooling towers are the highest structures included in the BPIP analysis. Given the height of the main stack (304.8 m) and the distance between the main stack and the peak model concentration (4.3 km) it's unlikely that the cooling towers are having significant downwash impacts on the final modeled concentrations. Therefore, any exaggeration of the areal extent of the cooling towers is likely not important in the final model analysis. EPA has determined that the characterization of the Harrison Power Plant is adequate to determine compliance with the 1-hr SO_2 NAAQS.

4.3.2.5. Modeling Parameter: Emissions

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

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

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, a facility that has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

The state included the Harrison Power Plant as the only emitter above 100 tons per year of SO_2 within the modeling domain. The state has chosen to model this facility using actual emissions. The facility in the state's modeling analysis and its associated annual actual SO_2 emissions between 2013 and 2015 are summarized below.

For the Harrison Power Plant, the state provided annual actual SO_2 emissions between 2013 and 2015. This information is summarized in Table 4D. A description of how the state obtained hourly emission rates is given below this table.

Table 4D. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Harrison County Area

Modeled Emissions (June 2017 Resubmittal)

Facility Name	SO_2 Emissions (tpy)		
	2013	2014	2015
Harrison Power Plant (Main Stack)	19,265.7	16,246.7	8,719.2
Total Emissions from All Modeled Facilities in the State's Area of Analysis	19,265.7	16,246.7	8,719.2

CAMD Emissions

Facility Name	SO_2 Emissions (tpy)		
	2013	2014	2015
Harrison Power Plant Unit 1	7,120.4	5,976.0	2,828.9
Harrison Power Plant Unit 2	5,476.7	4,572.6	2,953.1
Harrison Power Plant Unit 3	6,668.8	5,773.8	2,923.2
Total Emissions from All Modeled Facilities in the State's Area of Analysis	19,265.9	16,322.4	8,705.2

2014 NEI Emissions

Facility	2014 NEI SO_2 Emissions (tpy)
Harrison Power Plant	16,322.5

For the Harrison Power Plant, the actual hourly SO_2 emissions data were obtained from CEM data provided by the facility and used in the West Virginia modeling analysis. In addition to this data, EPA also constructed actual hourly emissions available from EPA's Clean Air Markets Data (CAMD) website[9] and emissions from the 2014 NEI for comparison. As noted previously, West Virginia's original submittal contained significant omissions from the first half of 2013. West Virginia resubmitted their modeling analysis using hourly emissions from CAMD (for 2013 through 2015). Model emission files are nearly identical to CAMD and reflect reported actual emissions for the simulation period. NEI emissions for 2014 match the model emission totals from CAMD and those used in the resubmitted modeling analysis.

The Harrison Power Plant's hourly emission rates varied according to CEM collected values to reflect actual hourly emissions from the facility. Hourly modeled emissions for the Harrison Power Plant's main stack were compared with hourly rates extracted from CAMD. Table 4E shows the difference between the modeled hourly emissions and the CAMD hourly emissions for the Harrison Power Plant. Nearly all of the modeled hourly emissions were within +/- 250 lbs/hr of the hourly CAMD emissions indicating the resubmitted modeling analysis reflects actual emissions for the 2013-15 simulation period.

Table 4E. Table showing the difference between remodeled and CAMD hourly emission rates (pounds per hour) for the Harrison Power Plant's main stack.

Harrison Power Plant	
Bin	**Frequency**
-500	0
-250	5
0	22,565
250	3,666
500	12
750	7
More	25

4.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data is determined based on: 1) the proximity of the meteorological

[9] https://ampd.epa.gov/ampd/

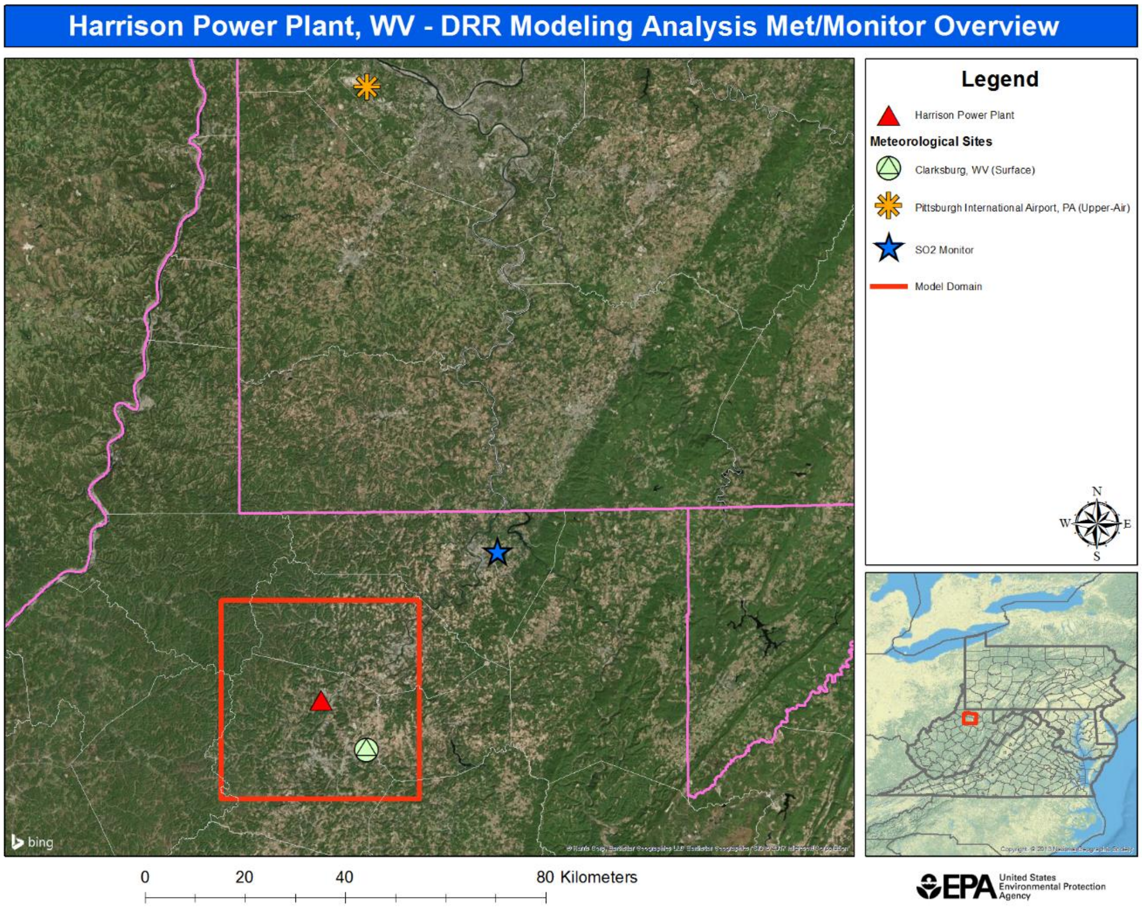
monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

For the area of analysis for the Harrison Power Plant, the state selected the surface meteorology from North Central West Virginia Airport (Clarksburg) ASOS based surface data, paired with Pittsburgh Upper Air Data as best representative of meteorological conditions within the area of analysis. These sites are located approximately 13.4 km southeast and 122.6 km north (respectfully) from the Harrison Power Plant. The Clarksburg ASOS site, located in Harrison County, WV, lies within the modeling domain. A review of the ASOS tower heights identified that the modeling analysis used an anemometer height of 10 m in its modeling analysis while the actual anemometer height is listed as 7.92 m (26 feet). This discrepancy should not overly influence final model concentrations.

The state used AERSURFACE version 13016 using data from the Clarksburg ASOS site to estimate the surface characteristics of the area of analysis. The ASOS location included in the modeling files appears to be incorrect. Proper surface characteristics determination would need the correct ASOS location used in AERSURFACE. The state estimated values for 12 spatial sectors out to 1.0 km using default seasons for the temporal resolution. Dry, wet, average conditions were based on the 30-year average precipitation data for West Virginia Climate Region 2. Due to a lack of readily available snow cover information at three (3) NWS stations located in WV, a seasonal determination of continuous seasonal snow cover (defined as 1 inch or more reported on >45 days in Dec-Jan-Feb) was made based on Pittsburgh, PA, local climatological data along with use of graphical snow cover information. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as "Zo") for both the Clarksburg ASOS site and the Harrison Power Plant. EPA used the AERSURFACE surface characteristics for the Clarksburg ASOS site, in accordance with Section 3.3 of the AERSURFACE Users Guide for its analysis.

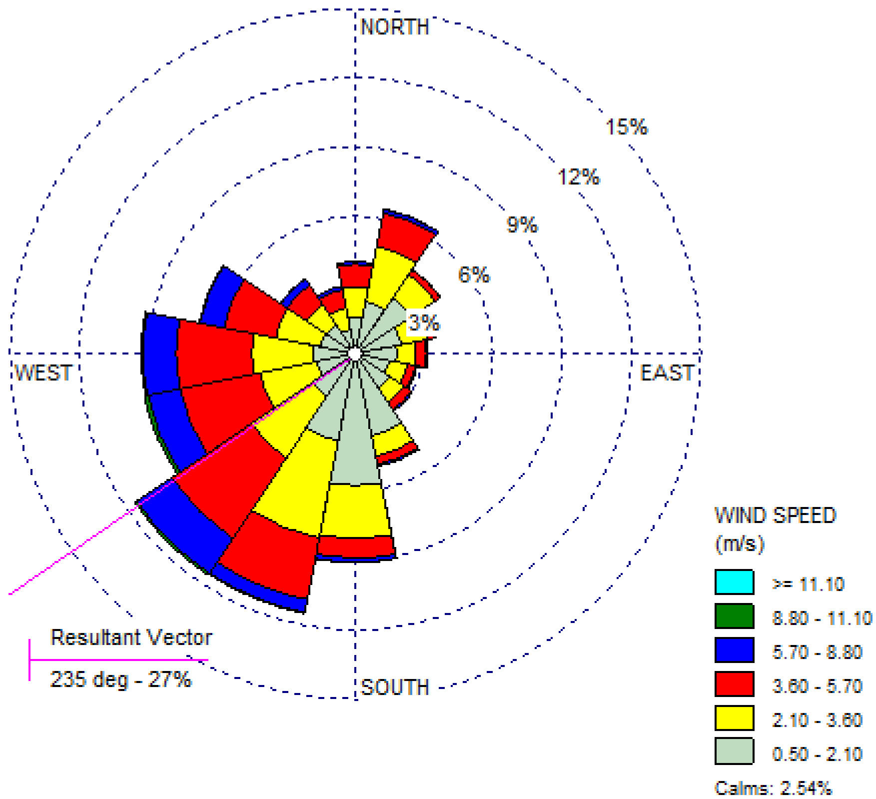
In the figure below, generated by the EPA, the locations of the NWS stations are shown relative to the area of analysis.

Figure 4F. Area of Analysis and the NWS Stations in the Harrison County Area



As part of its recommendation, the state provided the 3-year surface wind rose for the Clarksburg ASOS site for 2013-15. In Figure 4G, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The wind rose constructed from the 2013-15 wind fields indicate predominant winds are from the southwest.

Figure 4G. Clarksburg, West Virginia Cumulative Annual Wind Rose for Years 2013 – 2015



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The state followed the methodology and settings presented in Modeling TAD and associated guidance in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE (Clarksburg ASOS site) to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute and 5-minute duration was provided from the Clarksburg ASOS site but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the state set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute and 5-minute wind data.

EPA noted a slight discrepancy in the anemometer height used for the Clarksburg ASOS site and the location of the ASOS tower in the AERSURFACE processing. Utilizing Pittsburgh snow cover data may not be fully representative of winter conditions in this portion of West Virginia. These factors are not expected to significantly influence the final modeling analysis.

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

The terrain in the area of analysis is best described as hilly. The modeling domain is located in the Allegheny Plateau physiographic province of the Appalachian Mountain system. Various river valleys are interspersed amongst the hilly terrain. Higher elevations lie just to the east of the modeling domain. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. Terrain elevation data was taken from the Multi-Resolution Land Characterization (MRLC) consortium website for the National Elevation Dataset (NED) for this domain (1/3 arc-second (10 meter) resolution). EPA concludes that the receptor grid information was properly processed.

4.3.2.8. 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 "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99^{th} percentile monitored concentrations by hour of day and season or month. For this area of analysis, the state used a seasonally varying hourly background concentration (tier 2) from the Monongalia County SO_2 monitor (AQS ID: 54-061-0003). This monitor is located approximately 46 km northeast of the Harrison Power Plant. The background concentrations for this area of analysis were determined by the state to vary from 55 micrograms per cubic meter ($\mu g/m^3$), equivalent to 21 ppb when expressed in 2 significant figures,[10] to 8.6 $\mu g/m^3$ (3.3 ppb), with an average value of 18.8 $\mu g/m^3$ (7.2 ppb).

[10] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.

EPA has determined this monitor will yield a regionally representative background concentration for the state's modeling analysis. This is the same background used in the Harrison County section of the TSD. EPA noted that this monitor is influenced by several local sources and probably represents a higher background concentration than would be actually measured in the area of the Harrison Power Plant.

4.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Harrison Power Plant area of analysis are summarized below in Table 4H.

Table 4H. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Harrison County Area

Input Parameter	Value
AERMOD Version	15181 Default
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	1
Modeled Structures	8
Modeled Fencelines	1, Harrison Power Plant Ambient Boundary
Total receptors	21,133
Emissions Type	Actual
Emissions Years	2013-2015
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	Clarksburg Airport
NWS Station Upper Air Meteorology	Pittsburgh International Airport
NWS Station for Calculating Surface Characteristics	Clarksburg Airport
Methodology for Calculating Background SO_2 Concentration	Temporal Varying; Seasonal, Hourly Varying
Calculated Background SO_2 Concentration	Background Range: 3.3 - 21 ppb

The results presented below in Table 4I show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

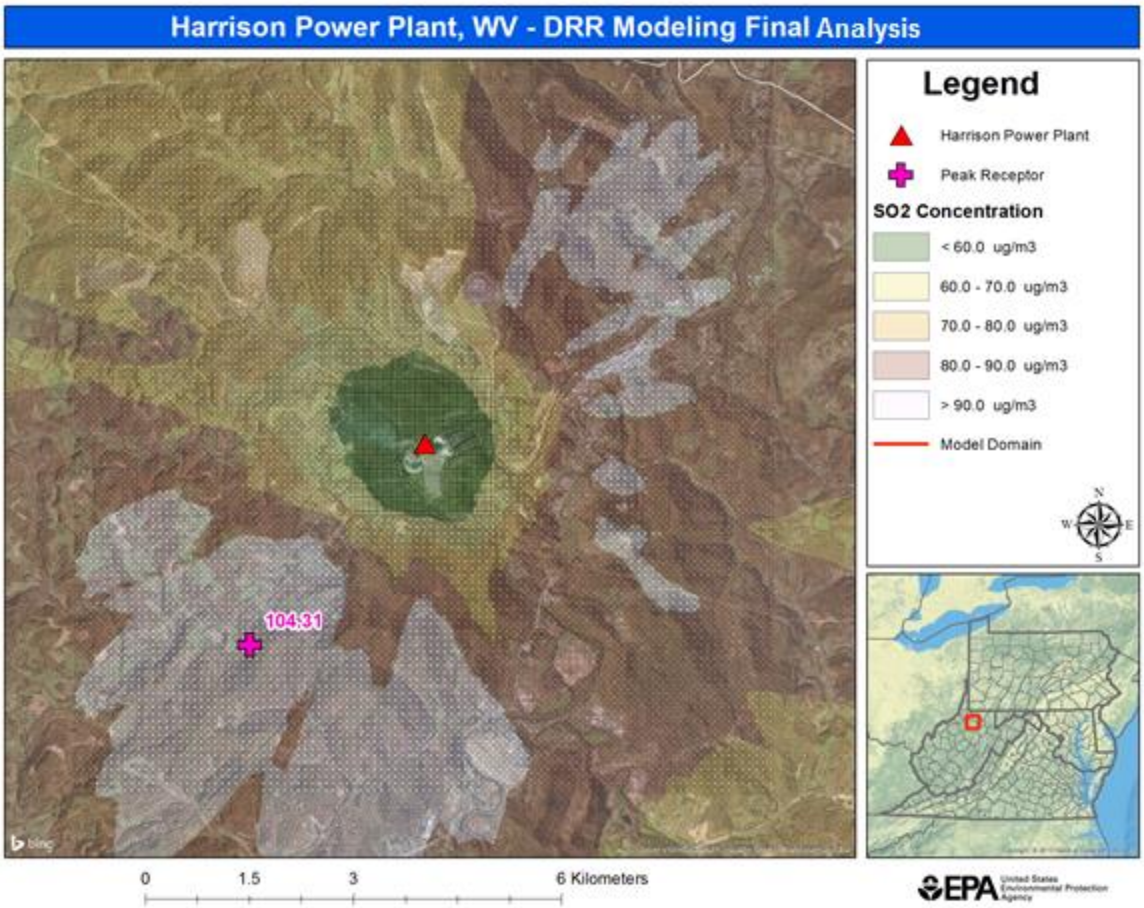
Table 4I. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Harrison County Area

Averaging Period	Data Period	Receptor Location UTM Zone 17		99th Percentile Daily Maximum 1-Hour SO_2 Concentration ($\mu g/m^3$)	
		UTM Easting	UTM Northing	Modeled Concentration (Including Background)	NAAQS Level
99th Percentile 1-Hour Average	2013-15	554893	4356870	104.31	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The state's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain (from its resubmittal) is 104.31 $\mu g/m^3$, equivalent to 39.8 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facility. Figure 4J below was included as part of the state's recommendation, and indicates that the predicted peak model value occurred approximately 3.8 km southwest of the Harrison Power Plant's main stack. This distance to the peak model receptor is about twice the distance typically seen in most modeling analyses and is probably the result of the Harrison Power Plant's relatively tall stack (304.8 m). Note this peak location is actually upwind of the predominant wind direction. The state's receptor grid is also shown in the figure.

Figure 4J. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Harrison County Area



The modeling resubmitted by the state, which reflects actual hourly emissions reported to CAMD, does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. Modeled peak concentrations occur within the 100-meter spaced receptor grid indicating the maximum model concentration –albeit of under-inclusive emissions– is probably reproduced in the modeling analysis.

4.3.2.10. The EPA's Assessment of the Modeling Information Provided by the State

West Virginia's resubmitted (June 2017) modeling analysis for the Harrison Power Plant indicates that model concentrations in the vicinity of the facility do not exceed the SO_2 NAAQS.

4.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Harrison County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

4.5. Jurisdictional Boundaries in the Harrison County Area

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

West Virginia did not update their unclassifiable recommendation for Harrison County since their May 23, 2011, submittal.

4.6. Other Information Relevant to the Designations for the Harrison County Area

There are no designated nonattainment areas or areas intended to be designated as nonattainment neighboring any of the counties modeled in the Harrison County area of analysis.

4.7. The EPA's Assessment of the Available Information for the Harrison County Area

The EPA finds that available air dispersion modeling results show that the Harrison County area of analysis is meeting the 1-hour SO_2 NAAQS and is not contributing to a nearby area that does not meet the NAAQS. There are no nonattainment areas for the 1-hour SO_2 NAAQS within 50 km, which is the typical extent of SO_2 dispersion modeling. Additionally, there are no nearby undesignated areas that will not be addressed in this round of designations.

West Virginia's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 104.31 $\mu g/m^3$, equivalent to 39.8 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the Harrison Power Plant. The modeling submitted by the state does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. West Virginia's modeling analysis for the Harrison Power Plant does indicate that model concentrations in the vicinity do not exceed the SO_2 NAAQS.

4.8. Summary of Our Intended Designation for the Harrison County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate Harrison County as unclassifiable/attainment for the 2010 SO_2 NAAQS because, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined the area (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Figure 4K shows the boundary of this intended designated area.

Figure 4K. Boundary of the Intended Harrison County Unclassifiable/Attainment Area

5. Technical Analysis for the Mason County, West Virginia Area

5.1. Introduction

The EPA must designate the Mason County, West Virginia, area by December 31, 2017, because the area has not been previously designated and West Virginia has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Mason County. Pursuant to the Data Requirements Rule (*see* 40 CFR part 51, subpart BB), states had the option to characterize large sources of SO_2 by either monitoring, modeling, or limiting emissions below 2000 tons of SO_2 per year. Because West Virginia has a large SO_2 source (the American Electric Power Mountaineer Power Plant), the state elected to conduct modeling for the American Electric Power Mountaineer Power Plant that emits more than 2000 tons of SO_2 per year. However, adjacent to Mason County, WV, Ohio elected to install a SO_2 monitoring network, which included placing a SO_2 monitor in Mason County, West Virginia.

5.2. Air Quality Monitoring Data for the Mason County Area

As permitted by the DRR, EPA is evaluating the modeling analysis in the designation process for Mason County, West Virginia. A monitor was installed in Mason County (AQS ID: 54-053-0001) by Ohio pursuant to the requirements of the DRR (*see* 40 CFR part 51, subpart BB) and does not yet have the required three years of SO_2 monitoring data. Because Ohio installed a monitor in Mason County and West Virginia chose to model, EPA is basing the designations analysis for Mason County on the modeling provided by West Virginia.

5.3. Air Quality Modeling Analysis for the Mason County Area Addressing the American Electric Power Mountaineer Power Plant

5.3.1. Introduction

This section presents all the available air quality modeling information for a portion of Mason County, West Virginia, that includes the American Electric Power Mountaineer Power Plant (the Mountaineer Power Plant). This area contains the following SO_2 source which West Virginia is required by the DRR to characterize SO_2 air quality by either monitoring or modeling, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Mountaineer Power Plant facility emits 2,000 tons or more annually. Specifically, the Mountaineer Power Plant emitted approximately 4,411 tons of SO_2 according to the 2014 NEI. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and West Virginia has chosen to characterize it via modeling.
- The Philip Sporn Plant emits 2,000 tons or more annually. Specifically, the Philip Sporn Plant emitted approximately 10,649 tons of SO_2 according to the 2014 NEI. This source meets the DRR criteria and thus is on the SO_2 DRR Source list. On November 30, 2016, West Virginia granted American Electric Power (AEP)'s request for the Philip Sporn

Plant to be placed inactive. The Title V operating permit for this facility is considered to be surrendered, meaning that the permit cannot be used by AEP nor any other entity which may purchase the facility or equipment. If operations were to be restarted in the future, the facility would have to complete the permitting process as a new facility.

In West Virginia's original submission on May 23, 2011, West Virginia recommended Mason County, be designated as unclassifiable. On January 12, 2017, West Virginia submitted modeling for the Mountaineer Power Plant but did not update their recommendations.

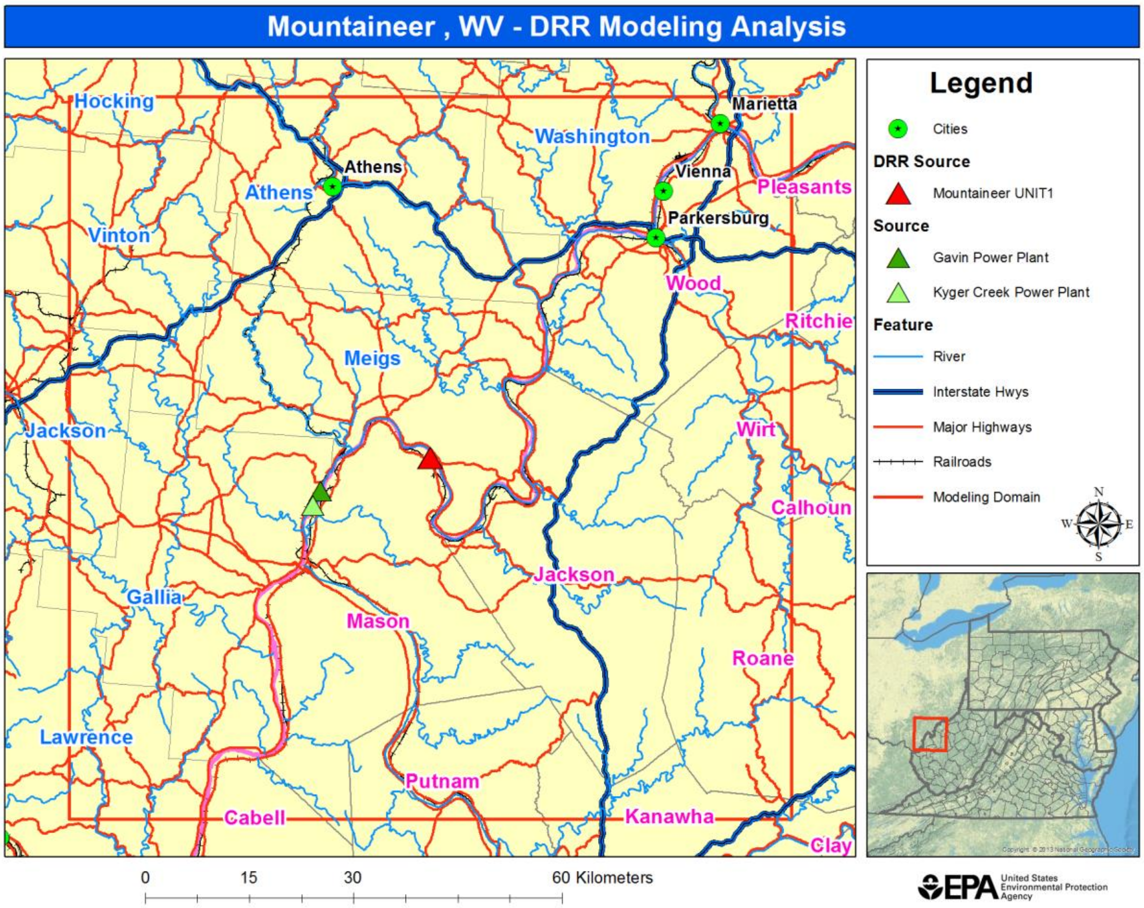
This modeling assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions. After careful review of the state's assessment, supporting documentation, and all available data, the EPA intends to modify the state's recommendation for the area, and intends to designate a portion of Mason County, including where the Mountaineer Power Plant is located, as unclassifiable and the remaining portion of the county as unclassifiable /attainment. Our reasoning for this conclusion is explained below.

The area that the state has assessed via air quality modeling is located in all of Jackson and Mason Counties and portions of Cabell, Kanawha, Putnam, Roane, Wirt, and Wood Counties in West Virginia. Also, the model receptor grid also covers portions of the state of Ohio including all of Meigs County and portions of Athens, Gallia, Hocking, Jackson, Lawrence, Vinton, and Washington Counties.

As seen in Figure 5A below, the Mountaineer Power Plant is located on the Ohio River in Mason County, West Virginia, approximately 15 kilometers west northwest of Ravenswood, West Virginia. Also included in the figure are other nearby emitters of SO_2.[11] These are General James M. Gavin Power Plant and Kyger Creek Plant in Ohio. These plants are located approximately 16.5 km and 18 km west-southwest (respectively) from the Mountaineer Power Plant but were not included in West Virginia's modeling analysis.

[11] All other SO_2 emitters of 2,000 tpy or more (based on information in the 2014 NEI data) are shown in Figure 5A. If no sources not named previously are shown, there are no additional SO_2 emitters above this emission level in the vicinity of the named source(s).

Figure 5A. Map of the Mason County Area of Analysis Addressing the Mountaineer Power Plant and Other Sources



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered only West Virginia's modeling assessment.

5.3.2. Modeling Analysis Provided by the State

West Virginia submitted a modeling analysis for the regions surrounding the Mountaineer Power Plant on January 12, 2017. The modeling was developed by the Mountaineer Power Plant's consultant, American Electric Power Service Corporation (AEPSC) on behalf of the American Electric Power (AEP) subsidiary Appalachian Power Company. A modeling protocol was established to outline procedures to follow for the final modeling analysis. The modeling protocol was developed based on relevant guidance outlined in EPA's Modeling TAD at the time of its preparation.

5.3.2.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

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

The state used AERMOD version 15181 in regulatory default mode, which was the current version at the time of submittal. On January 17, 2017, EPA published its revision to Appendix W – Guideline to Air Quality Models[12]. Since the publication of Appendix W, AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted here. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

5.3.2.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

For the purpose of performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in rural mode. This was based on an analysis of 1992 land-use land-cover (LULC) data within 3 km of the facility. LULC data showed over 50% of the land use classifications were either forested land or open grassland or farm land. Developed land, including low density residential and industrial areas represent less than 20% of the area with the only fully developed areas being the Mountaineer Power Plant site and the adjacent now retired Philip Sporn Plant site. EPA agrees that this analysis fully supports using AERMOD's rural dispersion coefficients.

[12] https://www.federalregister.gov/documents/2015/07/29/2015-18075/revision-to-the-guideline-on-air-quality-models-enhancements-to-the-aermod-dispersion-modeling

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

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

For the Mason County area, West Virginia, the Mountaineer Power Plant is the only SO_2 source subject to the DRR. The state determined that this was appropriate to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. However, EPA notes that there are two (2) other sources in close proximity to the Mountaineer Plant. These are the Gavin Power Plant and Kyger Creek Power Plant both located in Gallia County, OH. These plants are located approximately 16.5 km and 18 km west-southwest (respectively) from the Mountaineer Power Plant. In addition, the Mountaineer Power Plant was not included in the modeling analysis used to site monitors measuring maximum impacts from the Gavin and Kyger Creek Power Plants. One of the SO_2 monitoring sites is located in Mason County near the Lakin Correctional Facility in West Virginia. This monitor is located approximately 2 km northeast of the Gavin Power Plant.

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

- No fenceline receptors were defined in this analysis so model receptors within the Mountaineer Power Plant were not excluded. Site access does appear to be controlled.
- a 100 m Cartesian receptor grid extending out 4 km from the Mountaineer Power Plant
- a 250 m Cartesian receptor grid extending from 4 to 9 km from the Mountaineer Power Plant
- a 500 m Cartesian receptor grid extending from 9 to 16 km from the Mountaineer Power Plant
- a 1,000 m Cartesian receptor grid extending from 16 to 26 km from the Mountaineer Power Plant
- a 2,000 m Cartesian receptor grid extending from 26 to 52 km from the Mountaineer Power Plant

The receptor network contained 17,445 receptors, and the network covered a 52 km by 52 km area centered around the Mountaineer Power Plant that extends into the state of Ohio. Figures 5B and 5C, included in the state's recommendation, show the state's chosen area of analysis surrounding the Mountaineer Power Plant as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the state placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility, including other facilities' property. The model receptor grid is roughly divided from southwest to northeast by the Ohio River. Receptors cover all of Jackson and Mason Counties and portions of Cabell, Kanawha, Putnam, Roane, Wirt, and Wood Counties in West Virginia.

As noted previously, the model receptor grid also covers portions of the state of Ohio including all of Meigs County and portions of Athens, Gallia, Hocking, Jackson, Lawrence, Vinton, and Washington Counties. The state also did not exclude model receptors from any areas within the modeling domain.

Figure 5B. Area of Analysis for the Mason County Area

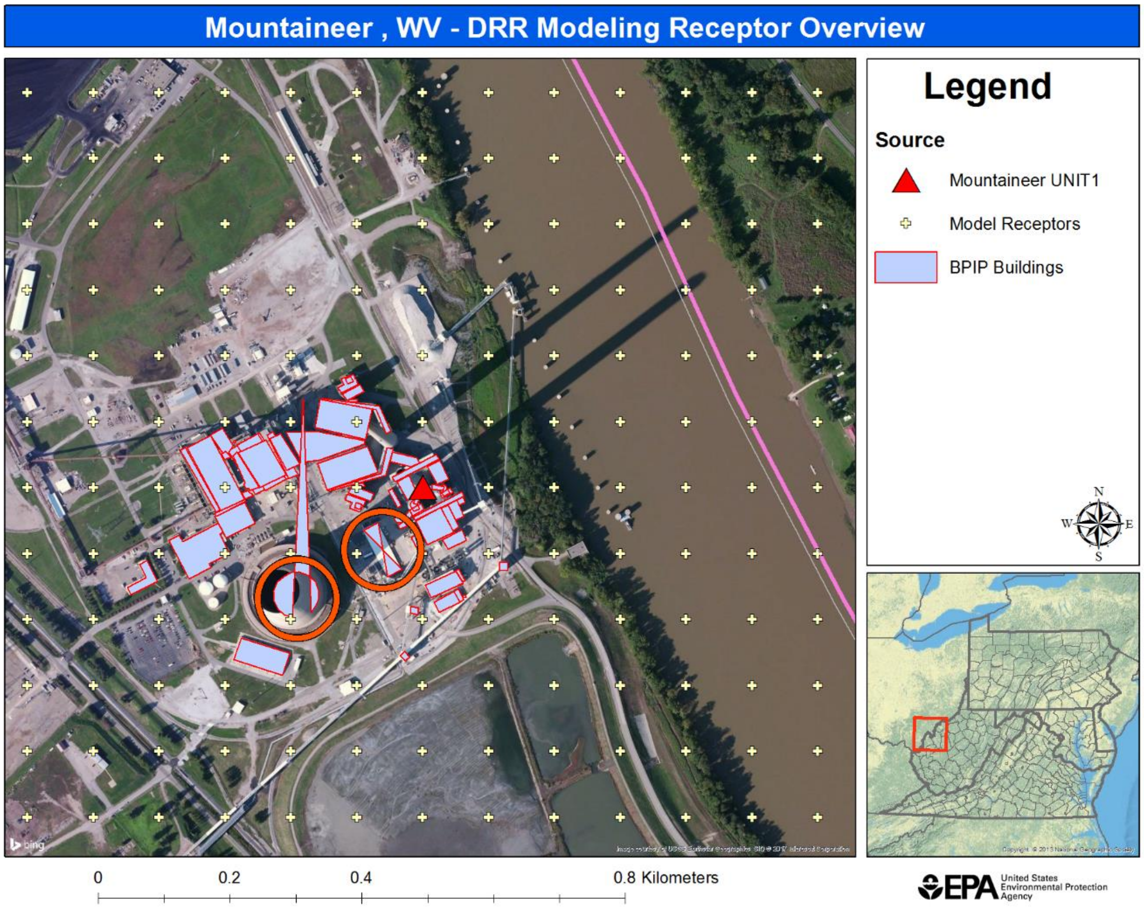
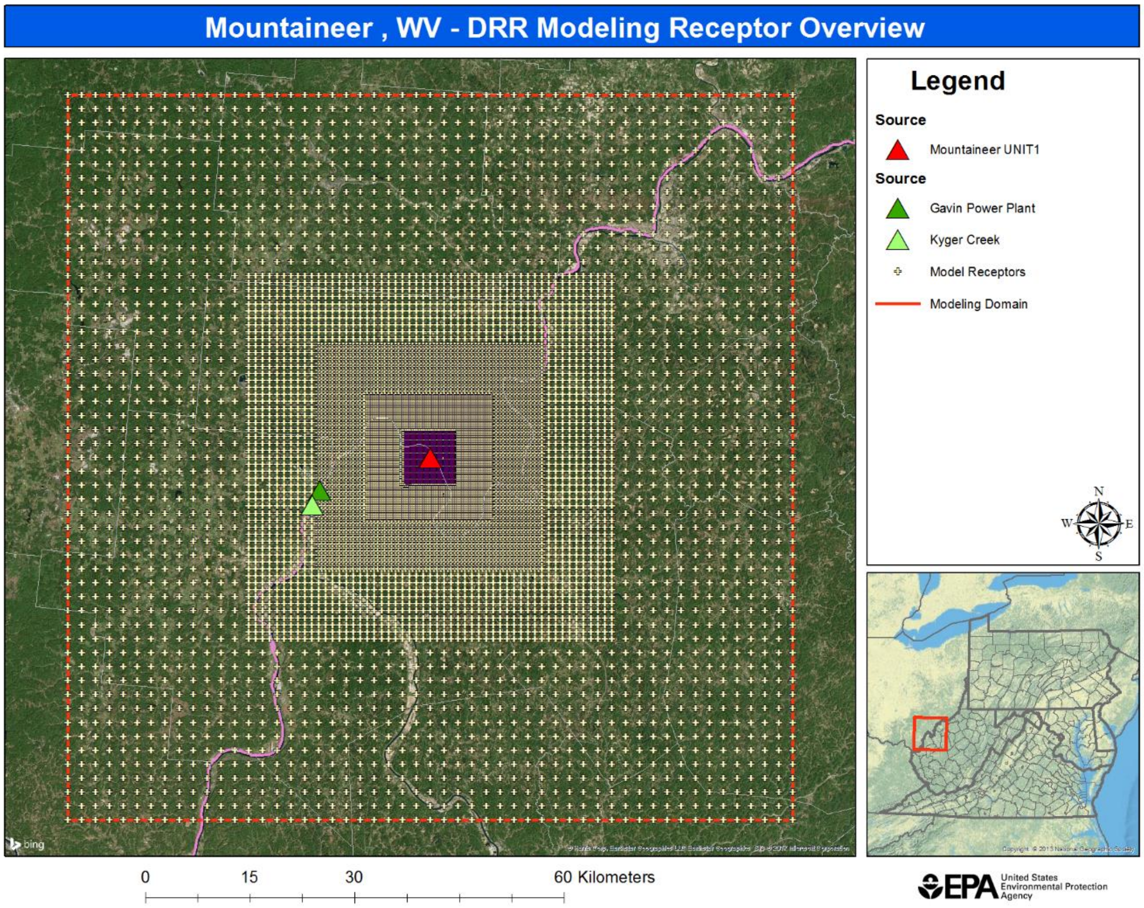


Figure 5C. Receptor Grid for the Mason County Area



The modeling receptor grid was developed using less refined principles since no areas were excluded from model receptor placement; the analysis did not remove receptors within the Mountaineer Power Plant's apparent ambient air boundary as would be allowed by EPA's Modeling TAD.

5.3.2.4. Modeling Parameter: Source Characterization

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

Mountaineer Power Plant was the only source included in the modeling analysis and contains the main coal fired steam generator serving the generating unit and two #2 fuel oil fired auxiliary boilers that are used for unit startup and for building heating purposes when the generating unit is out of service. These two (2) auxiliary boilers are classified as Limited Use Boilers under the IB MACT and consume ultralow sulfur #2 fuel oil. Additionally, there are two coping power emergency generators commissioned in 2015 for use in a loss of power event that are classified as emergency generators under the RICE MACT. SO_2 emissions from the auxiliary boilers and emergency generators are reported in the annual emission statement filed with the WV DEP and generally total less than 5 tpy. Additionally, there are two diesel driven emergency fire pumps at the plant that operate only for testing purposes and in the event of an emergency and one diesel driven Emergency Quench Pump on the flue gas desulfurization (FGD) system for use in the event of a unit trip with full loss of site power to protect the FGD absorbers and downstream ductwork and flue from high temperatures that would be experienced in a black shutdown situation (no external power available). The emissions from the fire pump engines are not reported as part of the annual emissions statements due to their low annual operation levels and classification as emergency engines under the RICE MACT. The emissions from the Emergency Quench Pump engine are calculated, but are less than 0.01 tons per year. This engine is classified as an emergency engine under the RICE MACT and operates only for routine testing and maintenance and emergency events. Only emissions from the main coal boiler were included in the final modeling analysis. The other on-site emissions are expected to be small and were excluded from the final analysis consistent with EPA's March 1, 2011, Clarification Memo and Modeling TAD.

The Mountaineer Power Plant was originally permitted in the mid-1970's and is subject to the Good Engineering Practice (GEP) Stack Height Rules that were in effect at that time. Based on the GEP Rules in effect when Mountaineer Power Plant was permitted, it was determined to have a GEP Stack Height of 838.6 feet based on the height of the natural draft cooling tower. Even though Mountaineer Power Plant is subject to the GEP Stack Height Rules, the original stack constructed at Mountaineer Power Plant was 1,100 feet tall. The original stack was replaced with a 1,000-foot-tall stack as part of the installation of the FGD system that was commissioned in 2007. The current actual stack height (304.8 m) was used in the modeling analysis.

In regards to this parameter of the modeling for the source modeled, the state characterized the Mountaineer Power Plant mostly 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 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 BPIPPRM was used to assist in addressing building downwash.

EPA examined the Mountaineer Power Plant's stack location and BPIP building analysis for accuracy using GIS software. The main stack appears to be located in the correct position but it appears that the BPIP file may have included incorrected building information. Building "WRHSE" appears to have its corners flipped and one of the projection points for the Hyperbolic tower seems to be incorrect. There is also a large (inactive) stack that was not included in the BPIP analysis (this may not contribute to any downwash and it's not the general practice to include the stacks themselves in a downwash analysis). Given the stack height (304.8 m) and the final distance to the peak model receptor, it doesn't appear that these BPIP errors would have had significant impacts in the final modeling concentrations.

5.3.2.5. Modeling Parameter: Emissions

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

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

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, a facility that has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR part 51 titled, "Guideline on Air Quality Models."

The only emitter of SO_2 the state included within the modeling domain was the Mountaineer Power Plant. As discussed previously, emissions from the Gavin and Kyger Creek Power Plants were not included in this modeling analysis.

For the Mountaineer Power Plant, the state provided annual actual SO_2 emissions between 2012 and 2014. This information is summarized in Table 5D. A description of how the state obtained hourly emission rates is given below this table.

Table 5D. Actual SO_2 Emissions Between 2012 – 2014 from the AEP Mountaineer Power Plant in the Mason County Area

Modeled Emissions

Facility Name	SO_2 Emissions (tpy)		
	2012	**2013**	**2014**
Mountaineer Unit 1	1,160.0	2,903.6	4,411.0
Total Emissions from All Modeled Facilities in the State's Area of Analysis	1,160.0	2,903.6	4,411.0

CAMD Emissions

Facility Name	SO_2 Emissions (tpy)		
	2012	**2013**	**2014**
Mountaineer Unit 1	1,151.3	2,903.0	4,410.2
Total Emissions from All Modeled Facilities in the State's Area of Analysis	1,151.3	2,903.0	4,410.2

2014 NEI Emissions

Facility	2014 NEI SO_2 Emissions (tpy)
Mountaineer Plant	4,410.88

For the Mountaineer Power Plant, the actual hourly SO_2 emissions data were obtained from CEM data provided by the facility and used in the West Virginia modeling analysis. In addition to this data, EPA also constructed actual hourly emissions available from EPA's Clean Air Markets Data (CAMD) website[13] and emissions from the 2014 NEI for comparison. As shown in the previous tables, the annual modeled emissions for the Mountaineer Power Plant are very similar to totals from EPA's CAMD website and the 2014 NEI.

The Mountaineer Power Plant has Continuous Emissions Monitoring Systems (CEMS) installed and operated under 40 CFR part 75 that measure SO_2, flow, temperature, and other parameters as specified in 40 CFR part 75. This data was then processed and reported to EPA's CAMD in units of ppm SO_2, lb/hr SO_2, and wet-standard cubic feet per hour for flow. Temperature is used in the derivation of the reported flow, but is not reported to CAMD; the CAMD reporting protocols do not allow for the explicit reporting of the temperature data. Certain hours may also be impacted by data substitution requirements and other data management requirements found in 40 CFR part 75. These hours may require manual editing prior to the data being truly representative of the actual operating conditions present.

[13] https://ampd.epa.gov/ampd/

The Mountaineer Power Plant's hourly emission rates varied according to CEM collected values to reflect actual hourly emissions from the facility. Hourly modeled emissions for the Mountaineer Plant's main unit were compared with hourly rates extracted from CAMD. Modeled hourly rates were very close to the rates from CAMD. A table showing the difference between hourly modeled and the hourly CAMD emission rates for the Mountaineer Power Plant's main unit are shown in Table 5E. The table shows modeled hourly emission rates were nearly all within +/- 250 lbs/hr of the hourly rates recorded in CAMD.

Table 5E. Table showing the difference between modeled and CAMD hourly emission rates for the Mountaineer Power Plant's main unit.

AEP Mountaineer Power Plant Main Unit	
Bin	**Frequency**
-500	0
-250	0
0	15,987
250	10,315
500	1
750	1
More	0

5.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

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

For the area of analysis for the Mountaineer Power Plant area, the state selected the surface meteorology from Huntington, West Virginia, Tri-State Airport ASOS based surface data, paired with Pittsburgh Upper Air Data as processed by Ohio EPA for use in the Gavin/Kyger Creek Plant 1-Hour SO_2 SIP Modeling submitted to the EPA as part of the response to the 120-Day

Letter on April 19, 2016.[14] This data set is a revised version of the data set used in the original filing to support the recommended designation dated September 2015.[15]

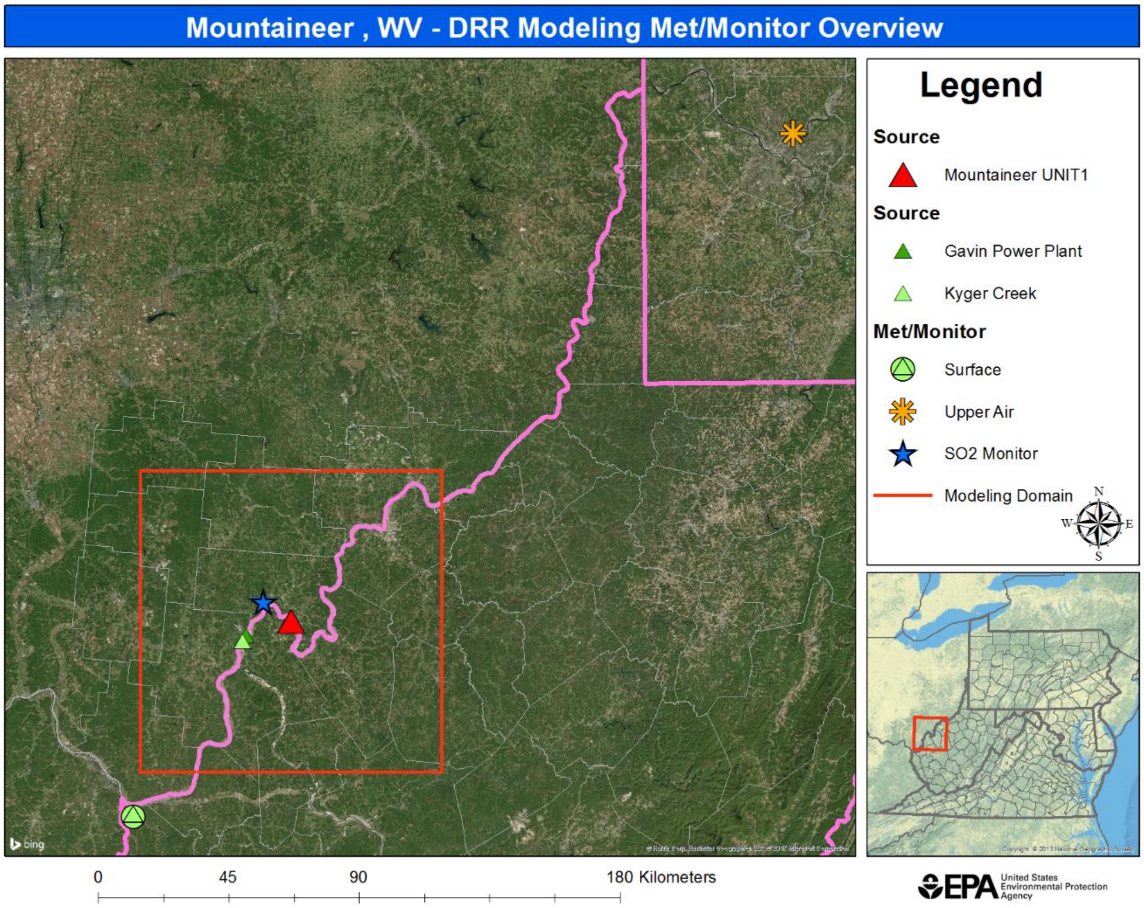
West Virginia submitted the final processed meteorological data sets for 2012-2014. Processing information was not included in the final reports submitted. Elevation and anemometer height information was checked via the final AERMET surface file. The anemometer height was confirmed and the surface station elevation was found to be off by a few meters, which is not expected to impact the final modeling analysis.

The report included with the modeling analysis noted that the surface meteorological data was altered to resolve an issue discovered with the cloud cover data for the Huntington Tri-State Airport data. For 2014, unrealistic calculations of mixing heights were noted during periods when a large number of noncontiguous hours were being substituted by AERMET or there were apparent errors in the reported cloud cover data based on a review of other available sky cover data in the region. The substitution performed by Ohio EPA resolved the unrealistic mixing height calculations observed in the surface methodological data set.

In the figure below, generated by the EPA, the locations of the NWS stations used in the final modeling analysis is shown relative to the area of analysis.

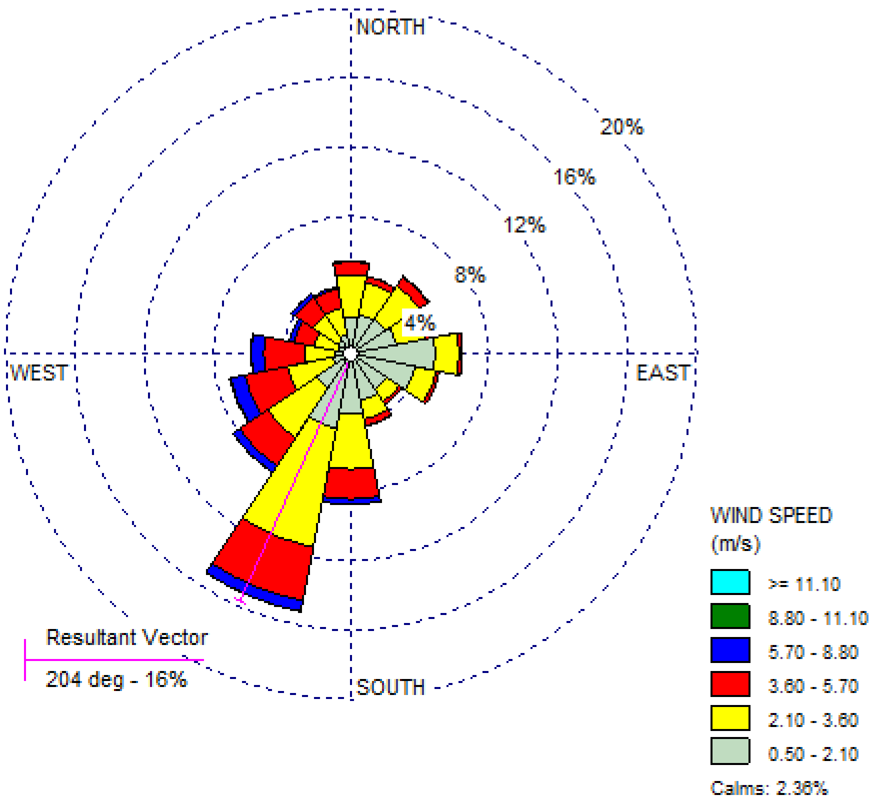
[14] Ohio Environmental Protection Agency, *Dispersion Modeling Analysis for General James M. Gavin Source Area: 2010 SO_2 NAAQS: Technical Support Document for the General James M. Gavin/Kyger Creek Station Power Plant Source Area*, April 19, 2016, pages 2-4.
[15] Ohio Environmental Protection Agency, *State of Ohio 2010 Revised Sulfur Dioxide National Ambient Air Quality Standard Recommended Source Area Designation: General James M Gavin and Kyger Creek Station Power Plants*, September 2015, Appendix A, page 2.

Figure 5F. Area of Analysis and the NWS Stations in the Mason County Area



As part of its recommendation, the state provided the 3-year surface wind rose for the Huntington Tri-State Airport. In Figure 5G the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Predominant wind directions were from the south-southwest. Periods of relatively low wind speeds were also present from an easterly direction. Given these wind fields, emissions are generally pushed into Meigs County, OH.

Figure 5G. Huntington Tri-State Airport Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air NWS 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. Raw meteorological files were not included in the modeling analysis. The final processed meteorological data was taken from a previous analysis for the Gavin/Kyger Creek analysis done by the OH EPA. These two (2) power plant are approximately 16 to 18 kilometers southwest of the Mountaineer Power Plant located downstream along the Ohio River in Gallia County, OH.

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

As noted previously in this section, only the final processed meteorological data was included in the modeling analysis. The final processed meteorological data was lifted from an earlier modeling analysis completed by the OH EPA for the Gavin and Kyger Creek power plants located downstream from the Mountaineer Power Plant in Gallia County, OH, along the Ohio River. This data should be representative of wind patterns near the Mountaineer Power Plant.

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

The terrain in the area of analysis is best described as generally hilly. The Mountaineer Power Plant sits along the Ohio River near New Haven, WV. Terrain rises approximately 80 meters as one moves away from the river. Similar terrain is also located across the Ohio River in Meigs County, OH.

To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The receptor grid for the study used DEM data sourced from the Multi-Resolution Land Characterization (MRLC) System at a 1/3 arc second resolution in geo tiff format and processed through AERMAP Version 11103. EPA concludes that the receptor grid was developed properly and should capture the maximum impacts of the Mountaineer Power Plant and allow the assessment of impacts of the Mountaineer Power Plant's emissions near the Gavin/Kyger Creek Power Plant area, including where DRR SO_2 monitors have been placed for those listed sources.

5.3.2.8. 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 "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99^{th} percentile monitored concentrations by hour of day and season or month.

The nearest SO_2 monitor to the Mountaineer Power Plant is located in Meigs County, Ohio (AQS ID: 39-105-0003) near the town of Pomeroy, approximately 11.5 kilometers to the northwest of the Mountaineer Power Plant. Based on the selected meteorological data and an examination of the data capture at the Meigs County SO_2 monitor, this monitor is well sited to examine ambient impacts from the General James M. Gavin and Kyger Creek Power Plants. However, impacts to this monitor from the Mountaineer Power Plant would be infrequent due to the lack of winds blowing from the southeast (see previous section's wind rose).

For this analysis, the initial background value of 10 ppb developed by Ohio EPA for the initial modeling of the Gavin and Kyger Creek area that was described in the 2015 Ohio EPA TSD[16] submitted with the initial modeling submitted for these sources was used as described in the protocol dated June 30, 2016. The single value of the background concentration for this area of analysis was determined by the state to be 26.19 micrograms per cubic meter ($\mu g/m^3$), equivalent to 10 ppb, when expressed 4 significant figures,[17] and that value was incorporated into the final AERMOD results.

5.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Mason County area of analysis are summarized below in Table 5H.

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[16] Ohio Environmental Protection Agency, *State of Ohio 2010 Revised Sulfur Dioxide National Ambient Air Quality Standard Recommended Source Area Designation: General James M. Gavin and Kyger Creek Station Power Plants*, September 2015, Appendix A, page 2.
[17] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1 ppb = approximately 2.619 $\mu g/m^3$.

Table 5H. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Mason County Area

Input Parameter	Value
AERMOD Version	15181 Default
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	1
Modeled Structures	47
Modeled Fencelines	0
Total receptors	17,445
Emissions Type	Actual
Emissions Years	2012-14
Meteorology Years	2012-14
NWS Station for Surface Meteorology	Huntington Tri-State Airport, WV
NWS Station Upper Air Meteorology	Pittsburgh International Airport, PA
NWS Station for Calculating Surface Characteristics	Huntington Tri-State Airport, WV
Methodology for Calculating Background SO_2 Concentration	Background Developed for Gavin/Kyger Creek Modeling by Ohio EPA
Calculated Background SO_2 Concentration	10 ppb

The results presented below in Table 5I show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

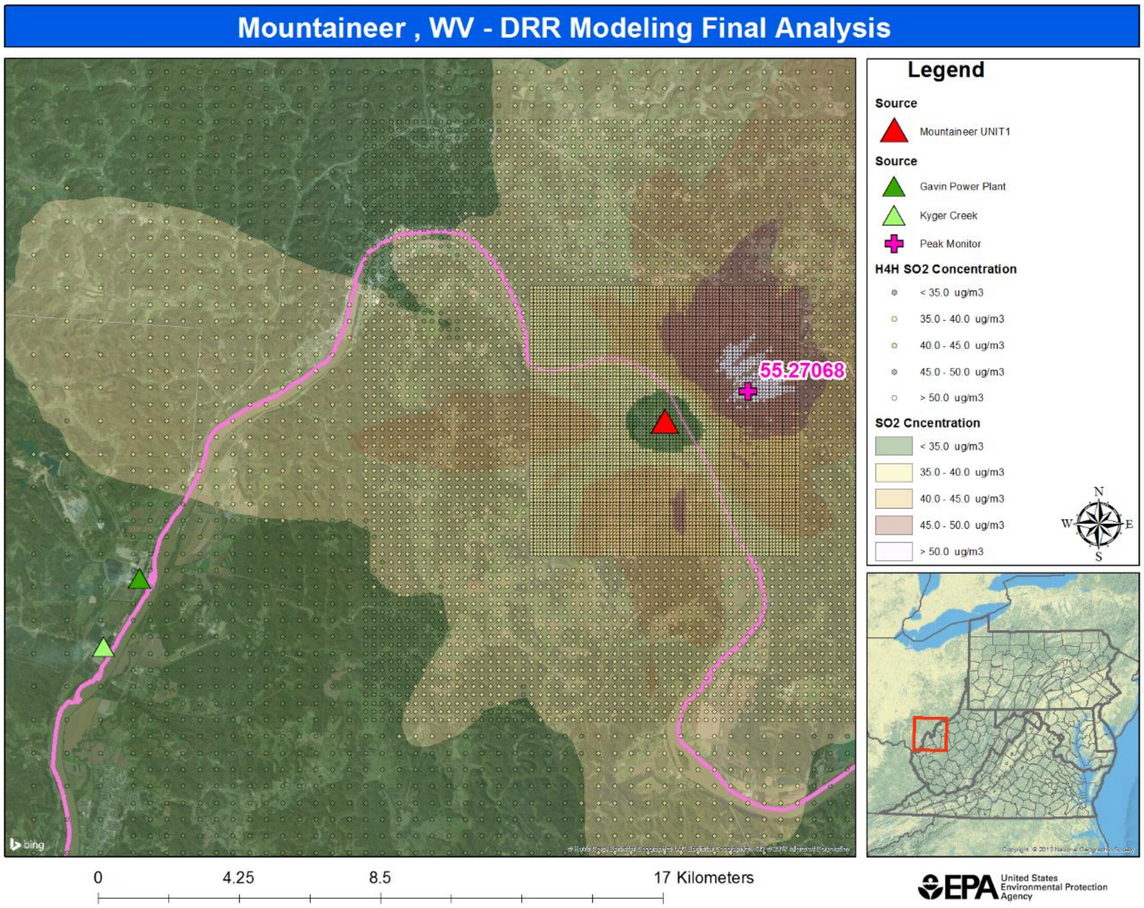
Table 5I. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Mason County Area

		Receptor Location UTM Zone 17		99th Percentile Daily Maximum 1-Hour SO_2 Concentration ($\mu g/m^3$)	
Averaging Period	Data Period	UTM/Latitude	UTM/Longitude	Modeled Concentration (Including Background)	NAAQS Level
99th Percentile 1-Hour Average	2012-14	421603	4315758	55.27	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The state's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 55.27 μg/m^3, equivalent to 21 ppb. This modeled concentration included the background concentration of SO_2, and is based on 2012-14 actual emissions from the Mountaineer Power Plant. Figure 5J below was included as part of the state's recommendation, and indicates that the predicted value occurred approximately 2.6 km east-northeast of the Mountaineer Power Plant in Meigs County, OH. The state's receptor grid is also shown in the figure.

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

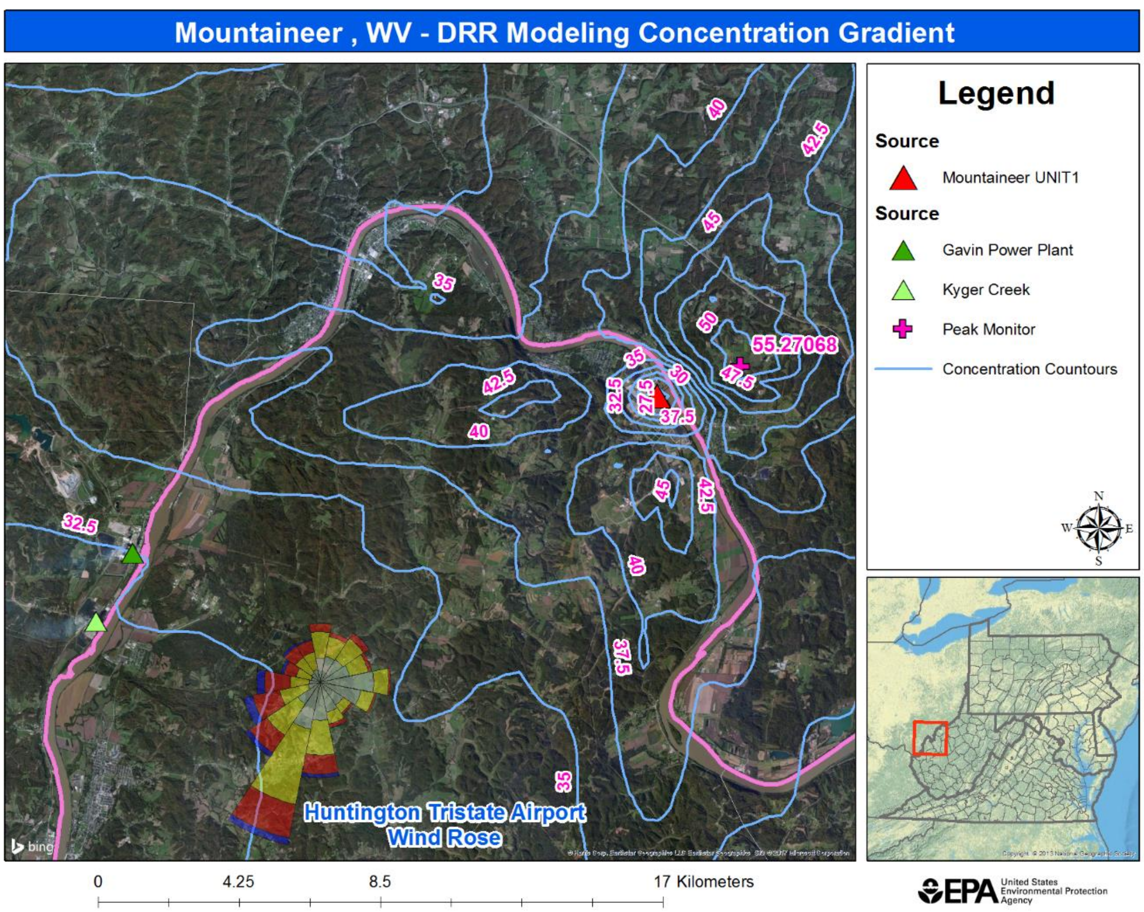


The modeling submitted by the state does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. Peak model concentrations occurred approximately 2.6 km east-northeast of the Mountaineer Power Plant across the Ohio River in Meigs County, OH. The Mountaineer Power Plant's 304.8 m stack probably contributed to the peak model concentration being located several kilometers away instead of closer to the facility. The peak modeled concentration occurred in terrain below stack top.

As noted previously, the Mountaineer Power Plant is located close to the Gavin and Kyger Creek Power Plants, which are located in Gallia County, OH, downstream along the Ohio River. Ohio elected to establish a SO_2 monitoring network to meet DRR air quality characterization requirements. A modeling analysis was performed for the Gavin and Kyger Creek power plants in accordance with the EPA's Monitoring TAD to help the placement of the SO_2 monitoring sites. The Mountaineer Power Plant was not included in this analysis (and the Gavin and Kyger Creek Power Plants were not included in the Mountaineer Power Plant's modeling analysis).

The modeling completed for the Mountaineer Power Plant was used to construct the modeled concentration gradient in the vicinity of the Gavin and Kyger Creek Power plants. Concentration gradients can be used to determine what nearby sources should be included in a modeling analysis (see Section 8.2.2 of Appendix W – Guideline on Air Quality Models, 2017). Figure 5K shows that the modeled concentration gradient near the Gavin and Kyger Creek power plants, which includes a background concentration, is relatively flat compared to areas within 5 km of Mountaineer Power Plant. This suggests the impacts from the Mountaineer Power Plant are minor near the Gavin and Kyger Creek plants. Predominant wind directions also indicate emissions from the Mountaineer Power Plant would rarely impact the area around the Gavin/ Kyger Creek. Thus inclusion of the Mountaineer Power Plant would probably have had little impact on the siting of the SO_2 monitoring network around Gavin/Kyger Creek; model peaks from those power plants would have probably been located within a few kilometers of these sources and would probably have not been unduly influenced by emissions from the Mountaineer Power Plant.

Figure 5K. The Mountaineer Power Plant's Modeled Concentration Gradient Near the Gavin and Kyger Creek Power Plants



5.3.2.10. The EPA's Assessment of the Modeling Information Provided by the State

EPA has reviewed the modeling West Virginia submitted for the Mountaineer Power Plant located in Mason County, WV. Peak modeling concentrations are well below the 1-hr SO_2 NAAQS using actual hourly emissions from the 2012-2014 time period. Peak model concentrations are located approximately 2.6 km east-northeast of the Mountaineer Power Plant in Meigs County, OH. Emissions were controlled using a wet limestone flue gas desulfurization unit during this period.

The state's modeling omitted analysis of impacts of the Gavin and Kyger Creek Power Plants in the area. These sources are less than 20 km from the Mountaineer Power Plant and should have been addressed in the analysis. Additionally, the background concentration of 10 ppb used by West Virginia also does not address the Gavin and Kyger Creek Power Plants.

The SO_2 monitoring network was developed based on monitor siting for the Gavin and Kyger Creek Power Plants in accordance with EPA's DRR. However, Ohio's monitoring network design did not consider emissions from the Mountaineer Power Plant, and the modeling done for the Mountaineer Power Plant did not include emissions from the Gavin and Kyger Creek Power Plants. Given the Mountaineer Power Plant's modeled concentration gradients near Gavin/Kyger Creek and local wind patterns, it is unlikely that Mountaineer would have impacts on areas immediately surrounding the Gavin and Kyger Creek Power Plants. Additionally, impacts from Gavin and Kyger Creek would probably have been localized to the areas within several kilometers of those power plants.

5.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Mason County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

5.5. Jurisdictional Boundaries in the Mason County Area

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

West Virginia did not update their unclassifiable recommendation for Mason County since their May 23, 2011, submittal.

5.6. Other Information Relevant to the Designations for the Mason County Area

There are no designated nonattainment areas or areas intended to be designated as nonattainment neighboring any of the counties modeled in the Mason County area of analysis.

5.7. The EPA's Assessment of the Available Information for the Mason County Area

Based on the information submitted by West Virginia and the lack of SO_2 sources in these tax districts, EPA is designating the following tax districts of Mason County as unclassifiable/attainment: Hannah, Clendenin, Arbuckle, Cologne, and Union.

Additionally, because the modeling analysis submitted by West Virginia focused on evaluating Mountaineer Power Plant should have but did not adequately capture the SO_2 emissions from the Gavin and Kyger Creek Power Plants (Ohio sources), EPA is designating the following tax districts in Mason County as unclassifiable: Lewis, Robinson, Waggener, Graham, and Cooper.

For the Hannah, Clendenin, Arbuckle, Cologne, and Union Tax Districts, EPA has come to this decision after review of the available modeling from West Virginia and Ohio's Round 2 recommendations. In both analyses, the predominant winds are from the southwest, which would disperse emissions from the Mountaineer, Gavin, and Kyger Creek facilities away from the Hannah, Clendenin, Arbuckle, Cologne, and Union Tax Districts. West Virginia's modeling for the Mountaineer plant shows a max concentration of 55.27 $\mu g/m^3$ in Meigs County, Ohio (see Figure 5K). Ohio's modeling for the Gavin and Kyger Creek facilities show a max concentration that is centralized in Gallia County, Ohio, with greatly decreasing concentrations approximately 10 km away from this point (see Figure 4 in EPA's Ohio TSD). Additionally, based on the 2014 National Emissions Inventory (NEI), there are no emitters of SO_2 above 1 tpy located in these tax districts.

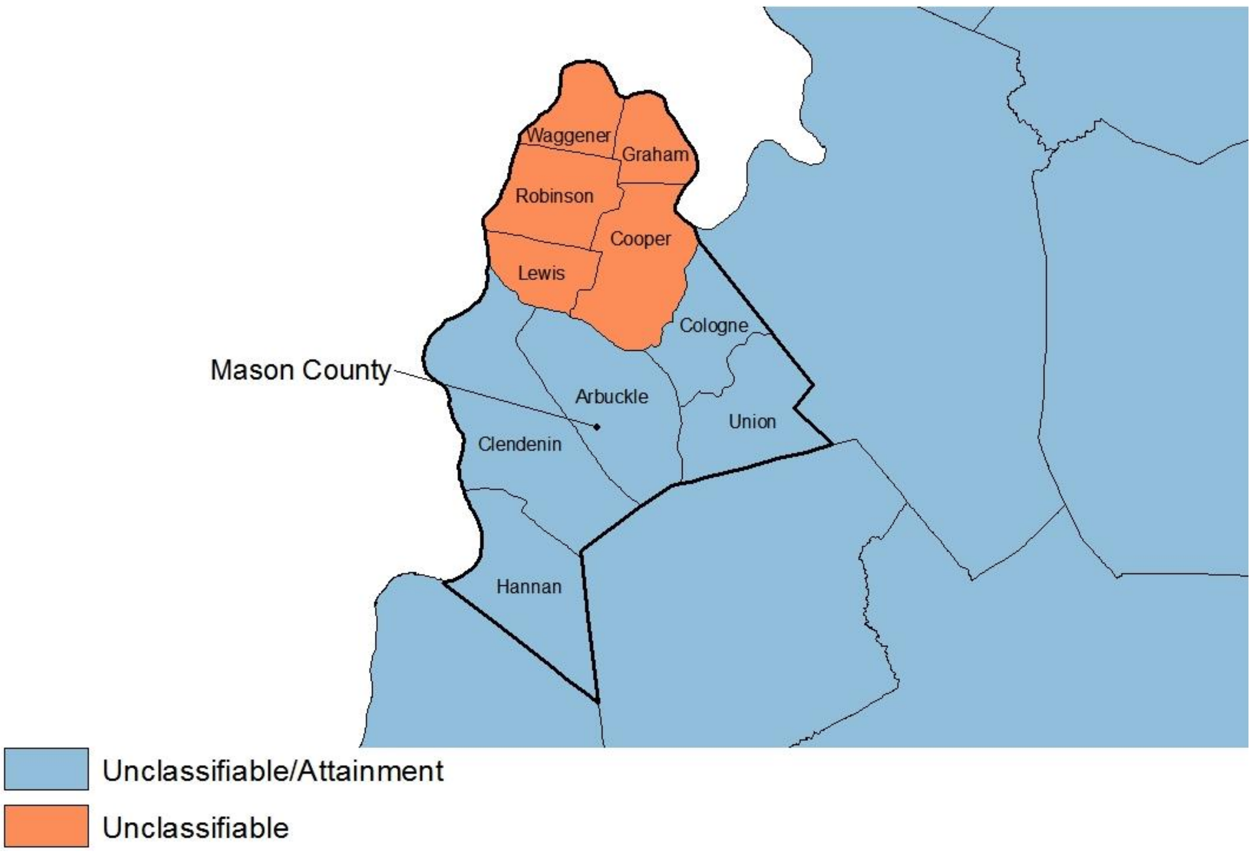
In regards to the Lewis, Robinson, Waggener, Graham, and Cooper Tax Districts, the EPA finds that there is insufficient information to determine whether these tax districts are meeting the 1-hour SO_2 NAAQS. This is due to the omission of the Gavin and Kyger Creek Power Plants in West Virginia's analysis. These sources are less than 20 km from the Mountaineer Power Plant and should be addressed in the analysis. Additionally, the background concentration of 10 ppb used by West Virginia also does not address the Gavin and Kyger Creek Power Plants. Because of the lack of information, EPA is designating these remaining tax districts as unclassifiable.

5.8. Summary of Our Intended Designation for the Mason County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, because the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS, the EPA intends to designate the following tax districts of Mason County as unclassifiable/attainment: Hannah, Clendenin, Arbuckle, Cologne, and Union.

Additionally, because the following areas have not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS, the EPA intends to designate the following tax districts of Mason County as unclassifiable: Lewis, Robinson, Waggener, Graham, and Cooper. Figure 5L shows the boundary of the intended designated areas.

Figure 5L. Boundary of the Intended Mason County Designation Areas



6. Technical Analysis for the Monongalia County, West Virginia Area

6.1. Introduction

The EPA must designate the Monongalia County, West Virginia, area by December 31, 2017, because the area has not been previously designated and West Virginia has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Monongalia County. Pursuant to the Data Requirements Rule (*see* 40 CFR part 51, subpart BB), states had the option to characterize large sources of SO_2 by either monitoring, modeling, or limiting emissions below 2000 tons of SO_2 per year. Although there is an existing SO_2 monitor in Monongalia County, West Virginia chose to conduct modeling for the Fort Martin Power Plant that emits more than 2000 tons of SO_2 per year.

6.2. Air Quality Monitoring Data for the Monongalia County, West Virginia Area

This factor considers the SO_2 air quality monitoring data in Monongalia County. Although the state did not provide specific air quality monitoring data, EPA reviewed available data for the Monongalia County Area. One monitor is located in Monongalia County and has a design value well below the NAAQS. The maximum design value (DV) from 2013-2015 in the county is 15 ppb which is well below the 75 ppb NAAQS. This data was available to EPA for consideration in the designation process, however, EPA does not have information indicating that this monitor is in an area of maximum concentration. Below is a table with information about the Monongalia County monitor.

Table 6A. Air Quality Monitoring Data for the Monongalia County Area of Analysis

County	AQS Monitor ID	Latitude	Longitude	2011-2013 Design Value (ppb)	2012-2014 Design Value (ppb)	2013-2015 Design Value (ppb)	2014-2016 Design Value (ppb)
Monongalia	54-061-0003	39.649367	-79.920867	17	15	15	13

The EPA has reviewed all available monitoring data for the Monongalia County area of analysis. Air quality monitoring data discussed in this section can be found at https://www.epa.gov/air-trends/air-quality-design-values.

6.3. Air Quality Modeling Analysis for the Monongalia County Area Addressing the FirstEnergy Fort Martin Plant

6.3.1. Introduction

This section presents all the available air quality modeling information for a portion of Monongalia County, West Virginia, that includes the FirstEnergy Fort Martin Power Plant (Ft. Martin Power Plant). This area contains the following SO_2 sources which West Virginia is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Fort Martin Power Plant facility emits 2,000 tons or more annually. Specifically, Fort Martin emitted 4,599 tons of SO_2 according to the 2014 NEI. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and West Virginia has chosen to characterize it via modeling.
- The Longview Power facility is not on the SO_2 DRR Source list. WV DEP instructed that sources with an actual SO_2 emission rate of at least 100 tpy during any of 2012, 2013, or 2014, and located within 20 km of the Fort Martin Power Plant, be considered for inclusion in the designation modeling. Longview Power fits this description and was included in the modeling analysis. SO_2 emissions in the 2014 NEI from this facility were 1,401 tons.
- The Morgantown Energy Associates facility is not on the SO_2 DRR Source list. WV DEP instructed that sources with an actual SO_2 emission rate of at least 100 tpy during any of 2012, 2013, or 2014, and located within 20 km of the Fort Martin Power Plant, be considered for inclusion in the designation modeling. Morgantown Energy fits this description and was included in the modeling analysis. SO_2 emissions in the 2014 NEI from this facility were 1,028 tons.

Because we have available results of air quality modeling in which these sources are modeled together, the area around this group of sources is being addressed in this section with consideration given to the impacts of all these sources.

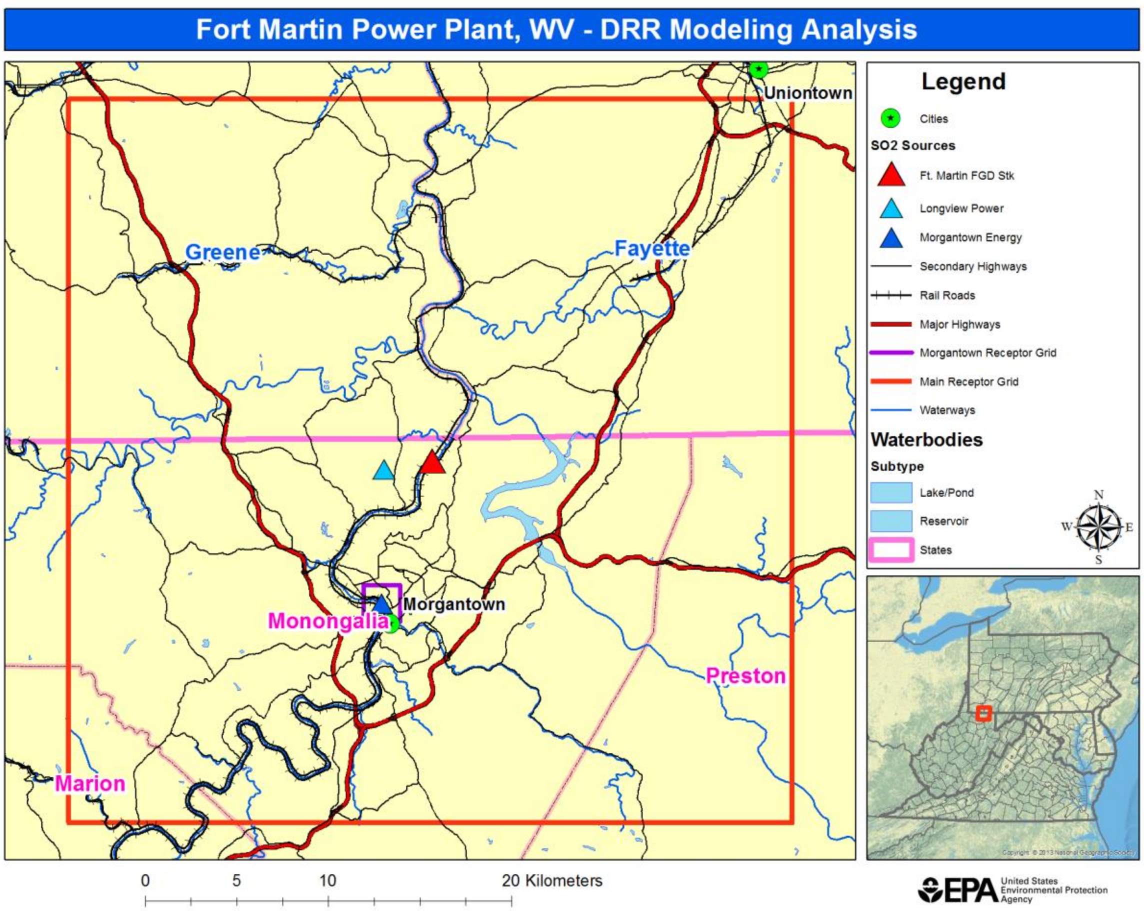
In West Virginia's updated submission on January 22, 2013, West Virginia recommended that Monongalia County be designated as attainment/unclassifiable. On January 12, 2017, West Virginia submitted modeling for the Monongalia County area but did not update their recommendations. This modeling assessment 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, the EPA agrees with the state's recommendation for the area, and intends to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained below.

The area that the state has assessed via air quality modeling is located near the border of southwest Pennsylvania and its border with West Virginia. All of the sources reside close to the Monongahela River that runs from south to north towards the City of Pittsburgh. The modeling domain includes portions of Monongalia, Marion, and Preston Counties in West Virginia as well as Fayette and Greene Counties in Pennsylvania.

As seen in Figure 6B below, the Fort Martin Power Plant facility is located in Monongalia County, WV, along the Monongahela River just before river flows north into the state of Pennsylvania.

Also included in the figure are other nearby emitters of SO_2 included in the modeling analysis.[18] These include the Longview Power facility, a super-critical boiler coal-fired power plant located approximately 3 km west of the Fort Martin Power Plant. The other source is the Morgantown Energy Associates facility, a gob (waste coal) fired power plant located upstream (south) along the Monongahela River in Morgantown, WV, approximately 8 km south of the Fort Martin Power Plant.

Figure 6B. Map of the Monongalia County Area Addressing the Fort Martin Power Plant, Longview Power, and Morgantown Energy Associates.



[18] All other SO_2 emitters of 100 tpy or more (based on information in the WV DEP inventory for 2012, 2013 or 2014) are shown in Figure 6B.

The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered only West Virginia's modeling assessment.

6.3.2. Modeling Analysis Provided by the State

6.3.2.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

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

The state initially used AERMOD version 15181 with the Adjust U* option. This option is/was considered a Beta (non-regulatory) option that required approval under Section 3.2.2 of Appendix W – Guideline on Air Quality Models and Concurrence from EPA's Model Clearinghouse.[19] West Virginia included a formal request to use the Adjust U* Beta option with their January 13, 2017, submittal of their DRR modeling analysis for the Fort Martin Power Plant. On January 17, 2017, EPA published its revision to Appendix W – Guideline to Air Quality Models.[20] Since the publication of Appendix W, the current version of AERMOD is version 16216r. Additionally, on March 8, 2017, EPA issued another Clarification Memo regarding using the Adjust U* Beta option with AERMOD version 15181.[21] In this memo EPA stated:

> *"[F]or state, local, and tribal air agencies, with or without alternative model approval, that submitted SO_2 DRR modeling based on AERMOD version 15181 that included AERMET version 15181 meteorological data processed with the ADJ_U* beta option, the SO2 DRR modeling results would be affected by the formulation bug and, consequently, would not be considered sufficiently representative to inform the Round 3 – SO_2 designations.*"

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[19] https://www3.epa.gov/ttn/scram/guidance/clarification/AERMOD_Beta_Options_Memo-20151210.pdf
[20] https://www.federalregister.gov/documents/2015/07/29/2015-18075/revision-to-the-guideline-on-air-quality-models-enhancements-to-the-aermod-dispersion-modeling
[21] https://www3.epa.gov/ttn/scram/guidance/clarification/SO2_DRR_Designation_Modeling_Clarificaiton_Memo-03082017.pdf

Due to the formulation bug discovered in the Beta Adjust U* option within AERMOD version 15181, any modeling analysis using this option is considered not representative of true model concentration. This point was communicated to West Virginia. In May of 2017, West Virginia submitted revised modeling for the Fort Martin Power Plant using the Adjust U* option with the most recent version, 16216r, of EPA's AERMOD system. West Virginia's resubmittal only included reprocessed meteorological data using the most recent version of AERMET (version 16216) along with the final model result files. All other preprocessing steps, further discussed in this section of the TSD, were unchanged. Final results for West Virginia's original submittal and its resubmittal will be discussed and are for purely comparison purposes.

6.3.2.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

The Auer land use method is the recommended approach for determining rural/urban characterization. The Auer method classifies land use within an area circumscribed by a circle, centered on the source, having a radius of 3 km. If land use types for heavy industrial, light-moderate industrial, commercial, and compact residential (i.e., Auer land use types I1, I2, C1, R2, and R3) collectively account for 50% or more of the land use within 3 km of the source, then the modeling regime is considered urban. A qualitative Auer land-use evaluation of the modeling domain and 3 km radius around the Fort Martin Power Plant is not presented herein, as the area clearly indicates predominant rural land-use. Accordingly, rural dispersion was applied for this designation modeling evaluation. The EPA agrees with this analysis.

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

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The sources of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. For the Monongalia County area, the state has included two (2) other emitters of SO_2 within 20 km of Fort Martin Power Plant in any direction. In addition to the Fort Martin Power Plant, the other emitters of SO_2 included in the area of analysis are: Longview Power and Morgantown Energy Associates. No other sources beyond 20 km were determined by the state to have the potential to cause concentration gradient impacts within the area of analysis. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas.

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

- a 50 m Cartesian receptor grid extending out 1 km from the Fort Martin Power Plant FGD stack; fence line boundary is approximately 2.6 km in length
- a 100 m Cartesian receptor grid extending out 1 to 5 km from the Fort Martin Power Plant FGD stack
- a 250 m Cartesian receptor grid extending from 5 to 10 km from the Fort Martin Power Plant FGD stack
- a 500 m Cartesian receptor grid extending from 10 to 20 km from the Fort Martin Power Plant FGD stack
- a 50 m Cartesian receptor grid extending out 1 km from the Morgantown Energy Associates stack

The receptor network contained 22,897 receptors, and the network covered and area 20 km by 20 km centered on the Fort Martin Power Plant FGD stack. The modeling domain cover portions of Monongalia, Marion, and Preston Counties in West Virginia and stretches northward into Pennsylvania's Fayette and Greene Counties. A small gap in the 100 m and 250 m receptor grid was noticed approximately 1 km south of the Fort Martin Power Plant. This gap was less than a km in length and was not expected to change the final model results since the controlling model concentrations are not occurring in this area.

Figures 6C and 6D, show the state's chosen area of analysis surrounding the Fort Martin Power Plant as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the state placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility, including other facilities' property. All receptor locations outside of the Fort Martin Power Plant's ambient air boundary were retained. No model receptors were removed from significant water bodies such as the Monongahela River, which the Fort Martin Power Plant and Morgantown Energy Associates reside beside. Additionally, model receptors were kept over Cheat River Reservoir (Cheat Lake) about 4 km east of the facility. While there was one "gap" in the receptor network, mentioned earlier in this section, it was not expected to impact final peak model concentrations since the controlling model concentrations are not located in this area. EPA concludes that the model receptor grid surrounding the Fort Martin Power Plant is of adequate design to capture the maximum impacts from the three (3) facilities' SO_2 emissions included in the modeling analysis.

Figure 6C. Area of Analysis for the Monongalia County Area

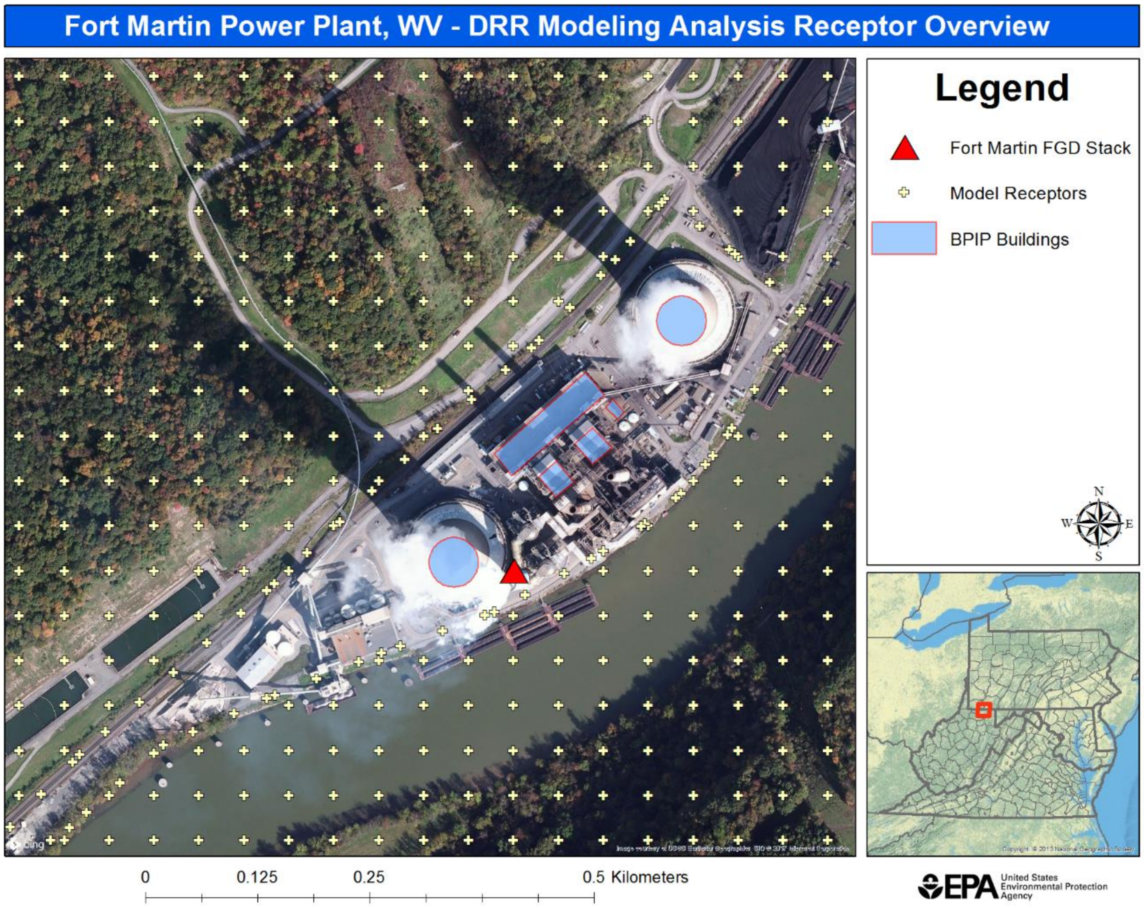
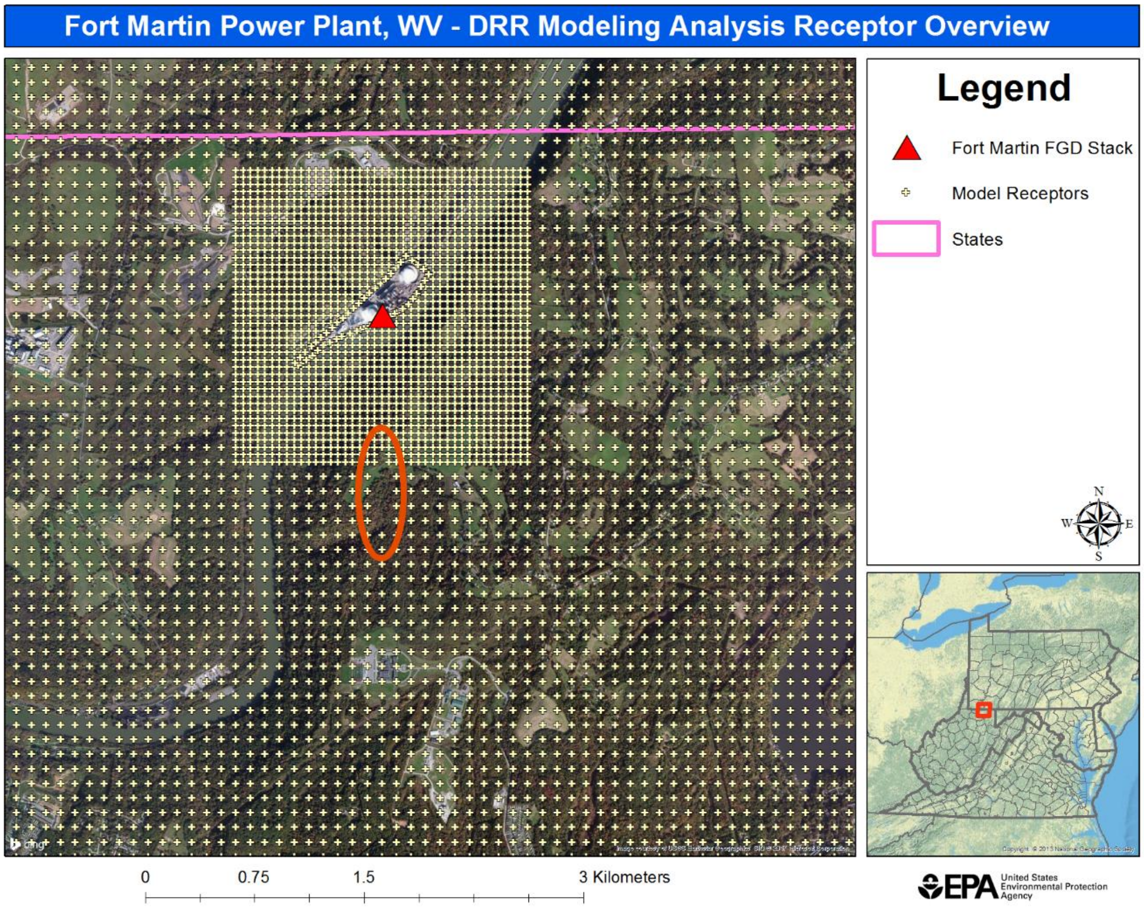
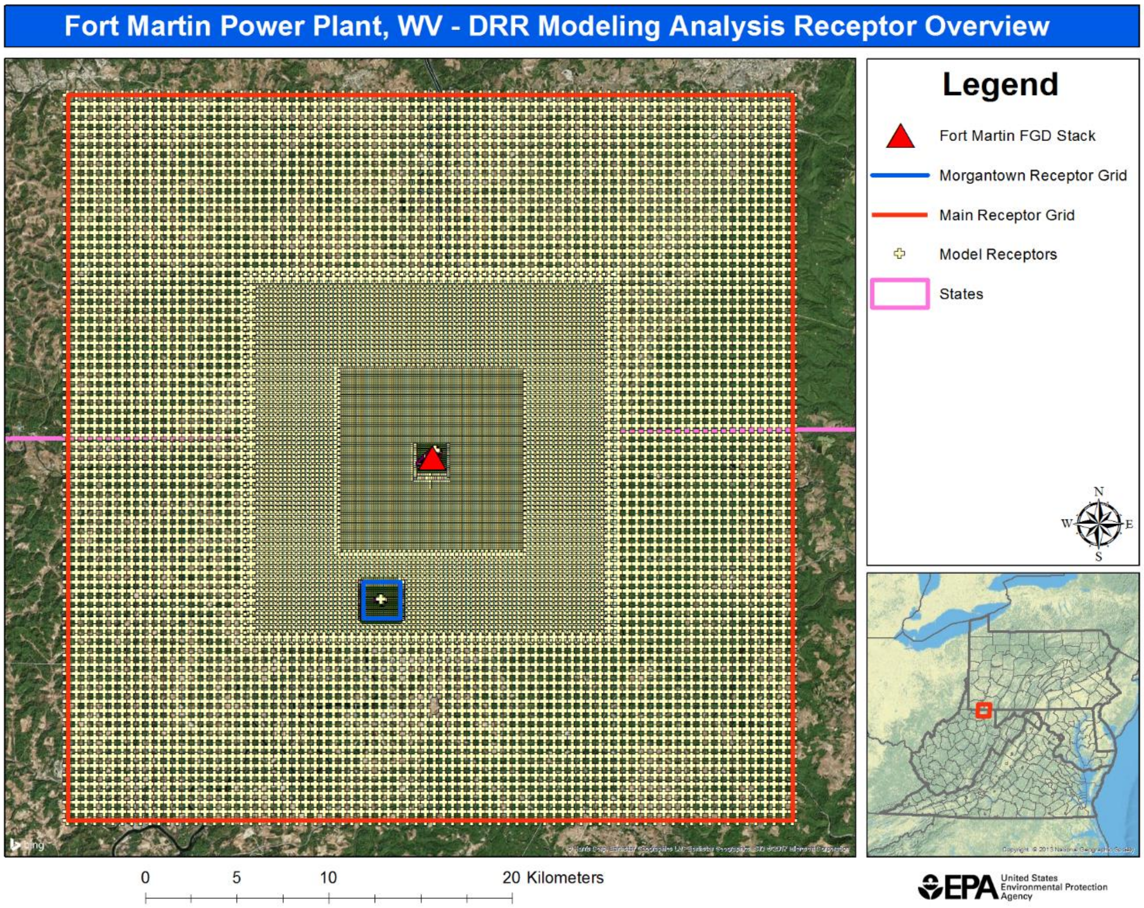


Figure 6D. Receptor Grid for the Monongalia County Area





6.3.2.4. Modeling Parameter: Source Characterization

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

The existing Fort Martin Power Plant is equipped with tangentially fired, pulverized coal dry bottom boilers. Boiler No. 1 has a maximum heat input of 4460 MMBtu/hr and Boiler No. 2 has a maximum heat input of 4634 MMBtu/hr. During 2007, the Fort Martin Power Plant received approval from WV DEP to install and operate a flue gas desulfurization (FGD) system for SO_2 emissions removal from the existing coal fired boilers. The system is configured with the two boilers exhausting through separate flues in a common 550-foot stack. The stack has a continuous emissions monitoring system (CEMS) that records hourly average exhaust flow rate and temperature, and SO_2 emissions. Modeling of the two (2) coal boilers reflected a merged flue configuration using the actual hourly CEMS data recorded for the designation modeling period (2013-2015). The CEMS data was compiled by FirstEnergy for input to this designation modeling evaluation.

In addition to the Fort Martin Power Plant's coal fired boilers, the plant inventory also includes two (2) auxiliary boilers and miscellaneous emergency engines and plant heaters. The auxiliary boilers are limited use black start units used only for coal boiler startup, and their emissions were considered to be insignificant relative to coal boiler operations. Additional sources include the emergency generators and miscellaneous plant heaters. The auxiliary boilers and other equipment emit less than 10 tpy and therefore were not included in the modeling analysis.

The Longview and Morgantown Energy Associates facilities are located at 2.6 km west-southwest and 8 km southwest of the Fort Martin Plant, respectively. The existing Title V operating permit for each source as well as relevant permit applications were obtained through the WV DEP's website. The 2013-2015 actual SO_2 emissions data were obtained via the EPA's Clean Air Markets Division (CAMD) program website. Additional model input emissions inventory data, including three (3) years of hourly stack exhaust gas flow (acfm) or exit velocity and temperature, physical stack data (base elevations, stack heights, & inner diameters) were requested of, and provided by, WV DEP.

Fort Martin Power Plant's hourly stack temperatures and velocities also varied according to CEM measurements. A quick survey of the modeled stack temperatures and stack velocities indicated that the values were within the realm of expected though some hourly temperatures fell close to 273 K, which is unlikely for an active coal-fired boiler. Hourly stack temperatures and velocities were held constant for Longview Power and Morgantown Energy Associates. Both source's stack parameters seemed reasonable.

EPA examined the Fort Martin Power Plant's stack locations and BPIP building analysis for accuracy using GIS software. No building information was included for Longview Power or Morgantown Energy Associates so building downwash was not included for these two (2) sources. The Fort Martin Power Plant's FGD stack appears to be in the proper location. Final building corners, however appear to be slightly off (several meters) when compared with the locations on the overhead base maps. These errors may be due to differences in the building coordinate systems (NAD83 vs. NAD27). Either way, building location errors of this magnitude will probably have little or no impact on final model concentrations given the height of the Fort Martin Power Plant's FGD stack (167 m); downwash impacts generally decrease with distance and peak concentrations are several kilometers from the plant. EPA's determination is that these possible errors in building corner locations will not significantly impact final model concentrations.

6.3.2.5. Modeling Parameter: Emissions

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

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

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, a facility that has recently adopted a new federally enforceable emissions limit 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 for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, the state included emissions from Longview Power and Morgantown Energy Associates, which are located within 20 km of the primary DRR source, the Fort Martin Power Plant. The state has chosen to model these three (3) facilities using actual emissions. The facilities in the state's modeling analysis and their associated annual actual SO_2 emissions between 2013 and 2015 are summarized below.

For the Fort Martin Power Plant, Longview Power, and Morgantown Energy Associates, the state provided annual actual SO_2 emissions between 2013 to 2015. This information is summarized in Table 6E. A description of how the state obtained hourly emission rates is given below this table.

Table 6E. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Monongalia County Area

Modeled Emissions

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
Fort Martin Power Plant	6,879.3	4,658.6	4,284.0
Longview Power	1,353.6	1,466.3	962.9
Morgantown Energy Associates	913.8	1,027.4	1,087.3
Total Emissions from All Modeled Facilities in the State's Area of Analysis	9,146.8	7,152.3	6,334.1

CAMD Emissions

Facility Name	SO_2 Emissions (tpy)		
	2013	2014	2015
Fort Martin Unit 1	3,385.4	1,941.8	1,938.0
Fort Martin Unit 3	3,381.7	2,643.9	2,236.6
Fort Martin Total	6,767.1	4,585.8	4,174.6
Longview Power	1,353.6	1,466.3	1,087.3
Morgantown Energy Associates	913.8	1,027.4	962.9
Total Emissions from All Modeled Facilities in the State's Area of Analysis	9,034.6	7,079.5	6,224.8

2014 NEI Emissions

Facility	2014 NEI SO_2 Emissions (tpy)
Fort Martin Power Plant	4,599.3
Longview Power	1,401.2
Morgantown Energy Associates	1,027.5

For the Fort Martin Power Plant, actual hourly SO_2 emissions data were obtained from CEM data provided by the facility and used in the West Virginia modeling analysis. Hourly emission rates for Longview Power and Morgantown Energy Associates were taken from EPA's Clean Air Markets Data (CAMD) website.[22] EPA also pulled these actual hourly emissions for all sources from EPA's CAMD website for comparison. Modeled emission totals for all three (3) facilities were nearly identical to emissions from EPA's CAMD website and those recorded in the 2014 NEI. A table showing the difference between the hourly modeled emission rates and the hourly CAMD emission rates for the Fort Martin Power Plant, Longview Power, and Morgantown Energy Associates are shown in Table 6F. The table shows modeled hourly emission rates for all three (3) modeled sources were almost entirely within +/- 250 lbs/hr of the hourly rates recorded in CAMD. Based on this information it appears that actual hourly emission rates were properly input into the modeling analysis.

Table 6F. Table showing the difference between modeled and CAMD hourly emission rates (pounds per hour) for the Fort Martin Power Plant, Longview Power and Morgantown Energy Associates.

Fort Martin Power Plant		Longview Power		Morgantown Energy Associates	
Bin	Frequency	Bin	Frequency	Bin	Frequency
-500	124	-500	0	-500	0
-250	148	-250	0	-250	0
0	25,318	0	26,113	0	26,251
250	568	250	167	250	29

[22] https://ampd.epa.gov/ampd/

Fort Martin Power Plant		Longview Power		Morgantown Energy Associates	
Bin	**Frequency**	**Bin**	**Frequency**	**Bin**	**Frequency**
500	15	500	0	500	0
750	12	750	0	750	0
More	95	More	0	More	0

6.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

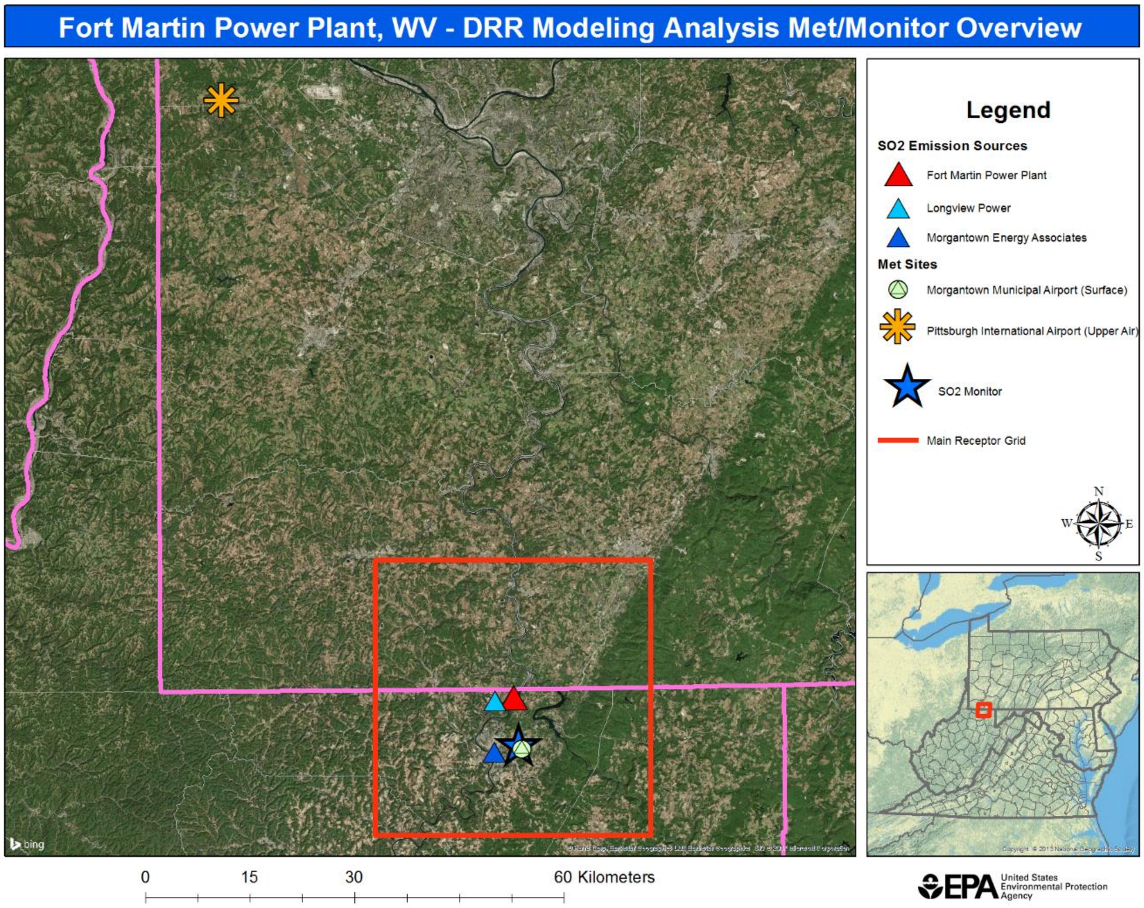
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of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

For the area of analysis for the Monongalia County area, the state selected the surface meteorology from the Morgantown Municipal Airport (MGW) in Monongalia County, WV. The Morgantown Municipal Airport is located proximately 7.5 km south of the Fort Martin Power Plant and is inside the modeling domain. Coincident upper air observations came from Pittsburgh International Airport (PIT) in Allegheny County, PA, located approximately 90 km north-northwest of the Fort Martin Power Plant. This pairing was thought to produce the best representative meteorological conditions within the area of analysis. As noted previously, West Virginia processed the meteorological data using the Adjust U* option. The revised May 2017 modeling analysis using AERMET version 16216, which corrects for the known bug in the previous AERMET version in West Virginia's earlier submittal.

The state used AERSURFACE version 13016 using data from both the Fort Martin Power Plant and the Morgantown Municipal Airport. A review of the ASOS tower location indicated the tower was not properly located; its true location is approximately 850 m northwest of the AERSURFACE location. This inaccuracy is not expected to significantly impact the final model concentrations given the height of the FGD stack. EPA used the AERSURFACE surface characteristics for the Morgantown Municipal Airport site, in accordance with Section 3.3 of the AERSURFACE Users Guide for its analysis. The state estimated values for 12 spatial sectors out to 1.0 km at a seasonal temporal resolution for dry, wet, average conditions reflecting West Virginia Climate Region 2 seasonal moisture information. Due to lack of readily available snow cover information at three (3) NWS stations located in West Virginia, a seasonal determination of continuous seasonal snow cover (defined as 1 inch or more reported on > 45 days in Dec-Jan-Feb) was made based on PIT local climatological data along with use of graphical snow cover information. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as "Zo").

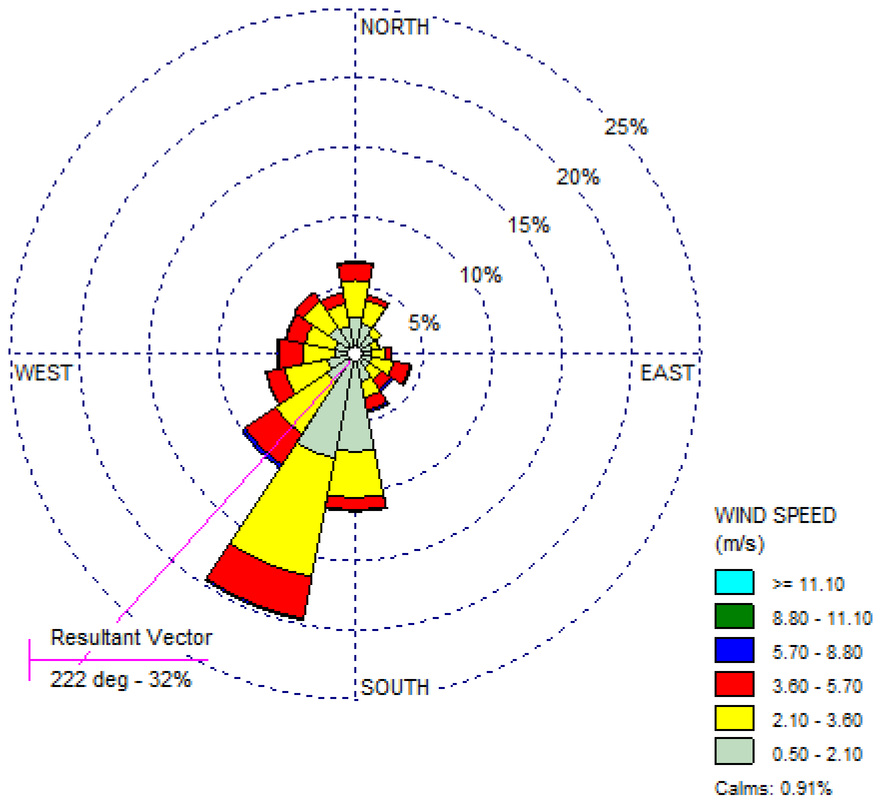
In the figure below, generated by the EPA, the location of this NWS stations are shown relative to the area of analysis.

Figure 6G. Area of Analysis and the NWS Stations in the Monongalia County Area



As part of its recommendation, the state provided the 3-year surface wind rose for the Morgantown Municipal Airport site for 2013-15. In Figure 6H, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The wind rose was produced using the final processed AERMET sfc file in Lakes Environmental's WRPLOT program. Winds were generally bimodal with winds predominantly from the south and north direction. A resultant wind vector of all hours generally from a southerly direction. The bimodal wind distribution is probably due to blocking by the Chestnut Ridge located to the east.

Figure 6H. Morgantown Municipal Airport Cumulative Annual Wind Rose for Years 2013 – 2015



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The state followed the methodology and settings presented in Modeling TAD and associated guidance in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE (Morgantown Municipal Airport) to best represent surface characteristics. EPA notes that the state processed the Morgantown Municipal Airport's anemometer height incorrectly. The anemometer height is listed as 26 ft but the state processed it using 33 ft. This difference is not expected to significantly affect the final processed data.

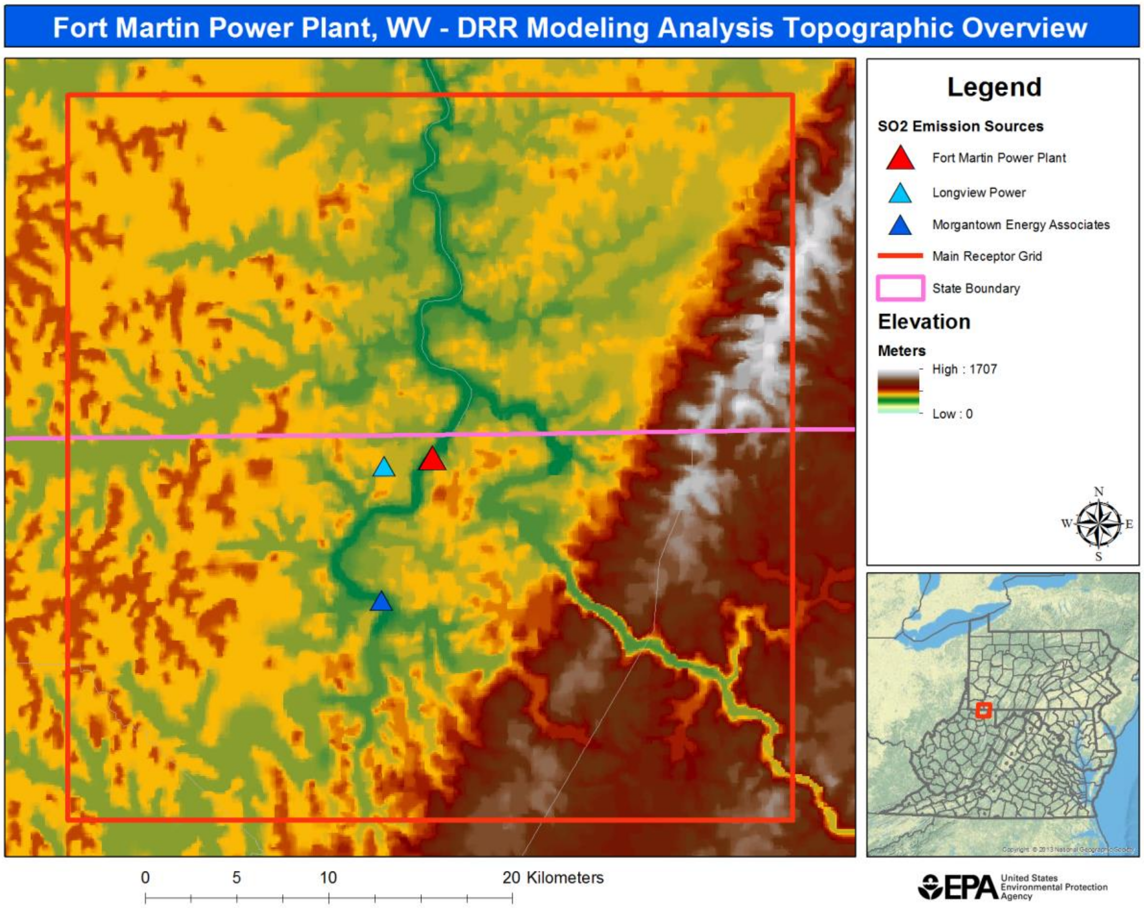
Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute and 5-minute duration was provided from the Morgantown Municipal Airport, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the state set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute and 5-minute wind data.

EPA has determined that the meteorological data was generally processed correctly. Utilizing Pittsburgh snow cover data may not be fully representative of winter conditions in this portion of West Virginia. Additionally, EPA noted a slight discrepancy in the Morgantown Municipal Airport's anemometer height (modeled 33 ft, actual is 26 ft). These factors, however, are not expected to significantly influence the final modeling analysis results.

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

The terrain in the area of analysis is best described as hilly. All three (3) sources included in the modeling analysis are located close to the Monongahela River, which runs north through the Allegheny Plateau region of the Appalachian Mountains. Approximately 8-10 east is the Chestnut Ridge, a significant topographic feature that marks the western edge of the Ridge and Valley Province of the Appalachian Mountains (see Figure 6I). To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. Terrain elevation data was taken from the Multi-Resolution Land Characterization (MRLC) consortium website for the National Elevation Dataset (NED) for this domain (1/3 arc-second (10 meter) resolution). EPA concludes that the receptor grid information was properly processed.

Figure 6I. Area of Analysis and the Topographic Map Showing Elevations in the Monongalia County Area



6.3.2.8. 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 "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the state chose to use the 50th percentile concentration from the Monongalia County SO_2 monitor (AQS ID: 54-061-0003), which is located approximately 6.7 km south of the Fort Martin Power Plant and only 3.7 km west of Morgantown Energy Associates. Support for this approach was outlined in a paper by Sergio Guerra.[23] The single value of the background concentration for this area of analysis determined using the 50th percentile was 7.1 micrograms per cubic meter ($\mu g/m^3$), equivalent to 2.7 ppb when expressed in 2 significant figures,[24] and that value was incorporated into the final AERMOD results. The Monongalia County monitor's 2013-15 design value, for comparison, was 15 ppb or approximately 39 $\mu g/m^3$. As a secondary approach, the modeling analysis also used a temporally varying background monitored concentration computed by hour of day and season. The methodology uses hourly monitored concentration data (2013-2015) to determine 99th percentile values computed by hour of day and season for the monitoring period. Background concentrations for this area of analysis were determined by the state to vary from 55 micrograms per cubic meter ($\mu g/m^3$), equivalent to 21 ppb when expressed in 2 significant figures,[25] to 9.6 $\mu g/m^3$ (3.7 ppb), with an average value of 19 $\mu g/m^3$ (7.2 ppb).

EPA has determined that using the 50th percentile is probably too unfettered though this method may remove some of the impacts from the three (3) nearby sources included in the modeling analysis that are within 10 km of the Monongalia County, WV, monitor. This would avoid "double counting" where explicit model impacts are coupled with impacts from the same sources on the model background concentration. West Virginia's methodology of using the 50th percentile for its background concentration may remove some of these source impacts from the background concentration. The use of seasonal hourly varying background concentrations from the Wood County, WV, monitor is more in line with the Modeling TAD but could still introduce impacts from these three (3) modeled sources. EPA considers the seasonally varying hourly concentration as the best estimate of background concentrations.

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[23] Sergio A. Guerra (2014), "Innovative Dispersion Modeling: Practices to Achieve a Reasonable Level of Conservatism in AERMOD Modeling Demonstrations", EM, December 2014, pp. 24-29 http://www.cppwind.com/wp-content/uploads/2014/01/Innovative-Dispersion-Modeling_Guerra_EM_Dec_2014issue.pdf

[24] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.

[25] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.

6.3.2.9. Summary of Modeling Inputs and Results

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

Table 6J. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Monongalia Area

Input Parameter	Value
AERMOD Version	16216r Adjust U*
Dispersion Characteristics	Rural
Modeled Sources	3
Modeled Stacks	3
Modeled Structures	6
Modeled Fencelines	1, Ft. Martin
Total receptors	22,897
Emissions Type	Actual
Emissions Years	2013-2015
Meteorology Years	2013-2015
NWS Station for Surface Meteorology	Morgantown Municipal Airport, WV
NWS Station Upper Air Meteorology	Pittsburgh International Airport, PA
NWS Station for Calculating Surface Characteristics	Morgantown Municipal Airport, WV
Methodology for Calculating Background SO_2 Concentration	50^{th} Percentile, Seasonal, Hourly Varying
Calculated Background SO_2 Concentration	2.7 ppb or 7.06 ug/m^3 (50^{th}%) 3.67 to 21 ppb, Seasonal/Hourly Varying

The results presented below in Table 6K show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters. Multiple results were presented by West Virginia and all model results indicate the area is not violating the 1-hour SO_2 NAAQS. EPA has determined that the resubmitted modeling concentration using the hourly varying background concentration is the most accurate representation of modeled background concentrations. The resubmittal incorporates the bug fix for the Adjust U* option in the previous version of AERMOD (version 15181) and incorporates a more representative background concentration. Using the 50^{th}% monitor value, in our opinion, is too unfettered and yields a monitor background concentration that is much lower that other background concentrations produced in other Region 3 modeling analyses.

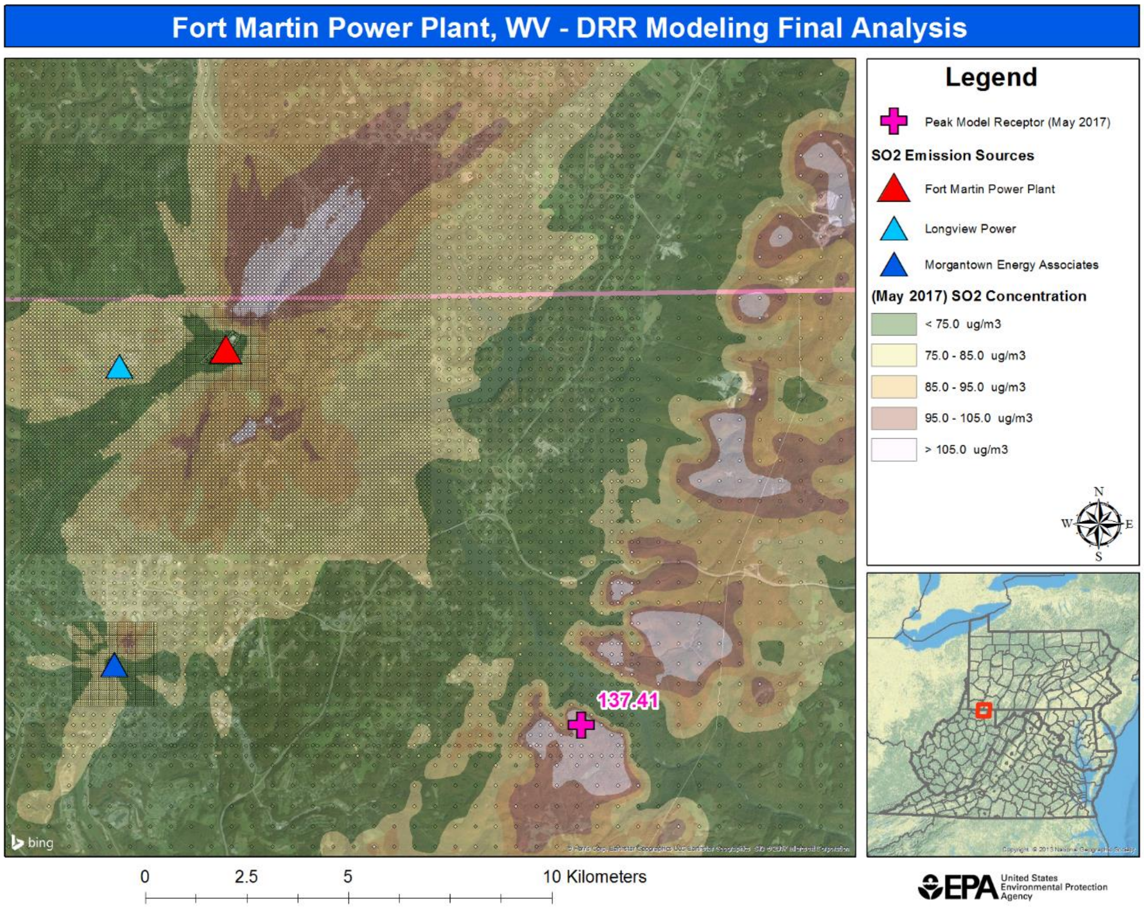
Table 6K. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the

Averaging Period	Data Period	Receptor Location UTM Zone 17		99th Percentile Daily Maximum 1-Hour SO_2 Concentration ($\mu g/m^3$)	
		UTM Easting	UTM Northing	Modeled Concentration (Including Background)	NAAQS Level
99th Percentile 1-Hour Average (50th Percentile Background)	2013-15	593046	4397360	99.92 + 7.06 = 106.98	196.4*
99th Percentile 1-Hour Average (Seasonal 99th Percentile Background)	2013-15	592946	4397360	125.63	196.4*
Resubmitted May 2017 99th Percentile 1-Hour Average (Seasonal 99th Percentile Background)	**2013-15**	**600596**	**4386810**	**137.41**	**196.4***

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The state's original modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 106.98 $\mu g/m^3$, equivalent to 40.8 ppb. This modeled concentration included a background concentration of SO_2, and was based on actual emissions from the three (3) facilities included in the modeling analysis; the primary DRR source, the Fort Martin Power Plant and background sources, Longview Power and Morgantown Energy Associates. Using the seasonally varying background concentrations as discussed before increases the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain to 125.63 $\mu g/m^3$, equivalent to 48.0 ppb. West Virginia's May 2017 resubmitted modeling peak concentration was 137.41 $\mu g/m^3$ or 52.47 ppb. The predicted peak value with the 50th percentile background occurred northeast of the Fort Martin Power Plant just inside Fayette County, PA, which is generally downwind of the plant based on predominant winds. The state's receptor grid is also shown in the figure. The peak model receptor for the seasonal background concentration, not shown, is located just to the west of the 50th percentile background peak receptor in the middle of the Monongahela River. Figure 6L shows concentrations from West Virginia's resubmitted May 2017 modeling using AERMOD (16216r) with Adjust U*. The peak model concentration (137.41 $\mu g/m^3$) shifted to a receptor on the Chestnut Ridge just south of the Cheat River approximately 12.5 km southeast of the Fort Martin Power Plant. This is much more distant from the source then the expected ten (10) stack height distances typically seen in other modeling analyses reviewed by EPA Region 3.

Figure 6L. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Monongalia County Area



The modeling submitted by the state does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

6.3.2.10. The EPA's Assessment of the Modeling Information Provided by the State

West Virginia's modeling analysis for the Fort Martin Power Plant indicates that model concentrations in the vicinity of the facility do not violate the SO_2 NAAQS. EPA noted, however, that the original modeling analysis used a Beta version of AERMOD that has a known formulation bug. Otherwise only minor errors were noted in the modeling analysis, such as missing model receptors south of the Fort Martin Power Plant, displacement of the actual ASOS tower location in AERSURFACE, and an incorrect anemometer height for the Morgantown Municipal Airport. The area of missing receptors was far removed from the area of peak model concentrations so this omission is not important. Surface characteristic differences typically only contribute to small percentage changes in final model concentrations and the anemometer height error would probably contribute to slightly higher model concentrations than using the correct height.

In May 2017, West Virginia submitted a revised modeling analysis using the most recent version of AERMOD (16216r) with the Adjust U* option. West Virginia only reprocessed the meteorological data in its resubmission. The results from this resubmission are what EPA has determined are the correct model concentrations to compare to the 1-hour SO_2 NAAQS and showed modeled concentrations, while higher than West Virginia's original January 2017 submission, are still below the 1-hour SO_2 NAAQS. Peak model concentrations in the revised run shifted to a point along the Chestnut Ridge over 12 km from the Fort Martin Power Plant. This result shifts the peak to a significantly more distant point than what was typically observed in the other modeling submissions reviewed by EPA Region 3.

6.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Monongalia County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

6.5. Jurisdictional Boundaries in the Monongalia County Area

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

On January 22, 2013, West Virginia updated their May 23, 2011 original recommendation for Monongalia County from unclassifiable to attainment/unclassifiable.

6.6. Other Information Relevant to the Designations for the Monongalia County Area

There are no designated nonattainment areas or areas intended to be designated as nonattainment neighboring any of the counties modeled in the Monongalia County area of analysis.

6.7. The EPA's Assessment of the Available Information for the Monongalia County Area

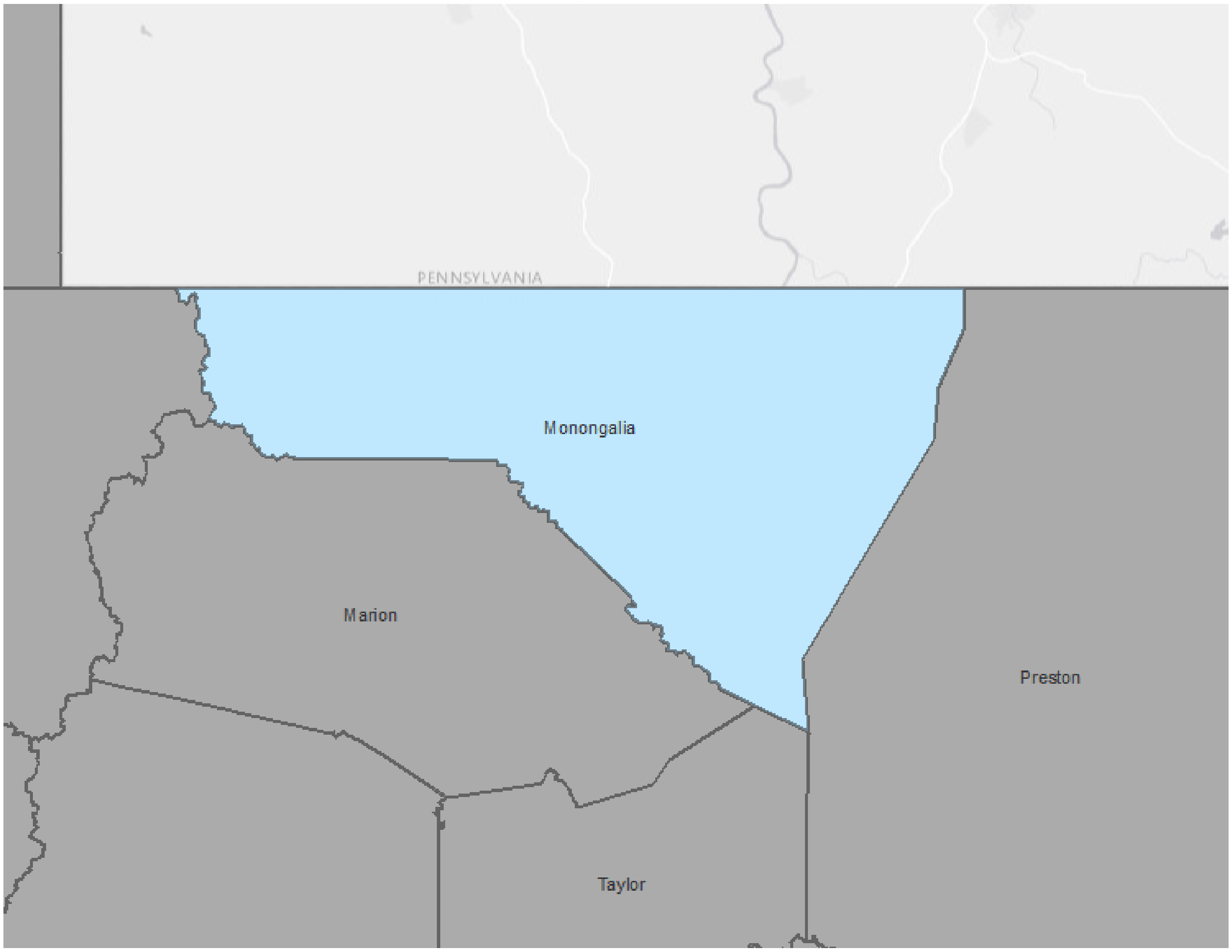
The EPA finds that available air dispersion modeling results show that the Monongalia County area of analysis is meeting the 1-hour SO_2 NAAQS.

West Virginia's updated modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 137.41 $\mu g/m^3$, equivalent to 52.47 ppb. This modeled concentration included a background concentration of SO_2, and is based on actual emissions from the three (3) facilities included in the modeling analysis; the primary DRR source, the Fort Martin Power Plant and background sources, Longview Power, and Morgantown Energy Associates. The modeling submitted by the state does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. Additionally, there are no nonattainment areas for the 1-hour SO_2 NAAQS within 50 km, which is the typical extent of SO_2 dispersion modeling and there are no nearby undesignated areas that will not be addressed in this round of designations.

6.8. Summary of Our Intended Designation for the Monongalia County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate Monongalia County, West Virginia, as unclassifiable/attainment for the 2010 SO_2 NAAQS because, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined the area (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Figure 6M shows the boundary of this intended designated area.

Figure 6M. Boundary of the Intended Monongalia County Unclassifiable/Attainment Area



7. Technical Analysis for the Pleasants County, West Virginia Area

7.1. Introduction

The EPA must designate the Pleasants County, West Virginia, area by December 31, 2017, because the area has not been previously designated and West Virginia has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Pleasants County. Pursuant to the Data Requirements Rule (*see* 40 CFR part 51, subpart BB), states had the option to characterize large sources of SO_2 by either monitoring, modeling or limiting emissions below 2,000 tons of SO_2 per year. Because West Virginia has a large SO_2 source (the FirstEnergy Pleasants Power Plant), the state elected to conduct modeling for the FirstEnergy Pleasants Power Plant that emits more than 2,000 tons of SO_2 per year.

7.2. Air Quality Monitoring Data for the Pleasants County Area

There are no air quality monitors located in the Pleasants County, West Virginia area.

7.3. Air Quality Modeling Analysis for the Pleasants County Area Addressing the FirstEnergy Pleasants Power Plant

7.3.1. Introduction

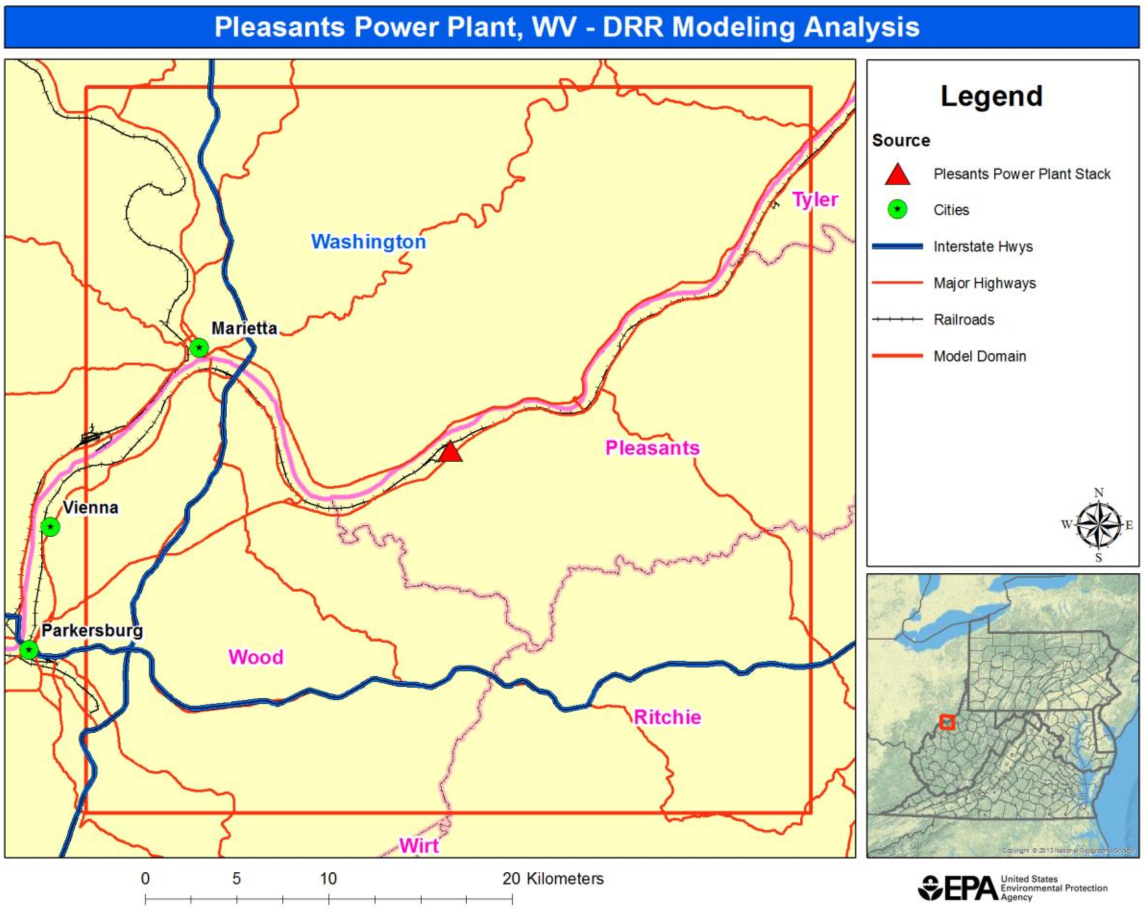
This section presents all the available air quality modeling information for a portion of Pleasants County that includes the FirstEnergy Pleasants Power Plant (the Pleasants Power Plant). This area contains the following SO_2 source, principally the sources around which West Virginia is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Pleasants Power Plant facility emits 2,000 tons or more annually. Specifically, the Pleasants Power Plant emitted approximately 13,738 tons of SO_2 according to the 2014 NEI. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and West Virginia has chosen to characterize it via modeling.

In West Virginia's original submission on May 23, 2011, West Virginia recommended that Pleasants County be designated as unclassifiable. On January 12, 2017, West Virginia submitted modeling for the Pleasants Power Plant but did not update their recommendations. This modeling 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, the EPA intends to modify the state's recommendation for the area, and intends to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained below.

The area that the state has assessed via air quality modeling is located in Pleasants County, WV, along the Ohio River. This area, located northwest West Virginia, includes the following counties: Pleasants, Tyler, Ritchie, and Wood Counties in West Virginia. Also, model receptor grid also covers portions of Washington County in the state of Ohio.

Figure 7A. Map of the Pleasants County Area Addressing the Pleasants Power Plant



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered only West Virginia's modeling assessment.

7.3.2. Modeling Analysis Provided by the State

7.3.2.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the

AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

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

The state used AERMOD version 15181 in regulatory default mode, which was the current version at the time of submittal. On January 17, 2017, EPA published its revision to Appendix W – Guideline to Air Quality Models[26]. Since the publication of Appendix W, AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted here. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

7.3.2.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

The Auer land use method is the recommended approach for determining characteristics surrounding the Pleasants Power Plant. This method classifies land use within an area circumscribed by a circle, centered on the source, having a radius of 3 km. If land use types for heavy industrial, light-moderate industrial, commercial, and compact residential (i.e., Auer land use types I1, I2, C1, R2, and R3) collectively account for 50% or more of the land use within 3 km of the source, then the modeling regime is considered urban. A review of land-use from Google Earth aerial imagery within the 3 km radius area surrounding the Pleasants Power Plant found that the area is predominantly rural based on the above criteria and therefore rural dispersion coefficients were used in the modeling analysis. EPA agrees with this assessment.

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

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the

[26] https://www.federalregister.gov/documents/2015/07/29/2015-18075/revision-to-the-guideline-on-air-quality-models-enhancements-to-the-aermod-dispersion-modeling

spacing of the 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 due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Pleasants County area, based on the 2014 NEI, there are no other emitters of SO_2 above 10 tpy within 20 km of the Pleasants Power Plant in any direction. The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas.

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

- Unevenly spaced fence line receptors were defined in this analysis. Maximum distance between receptors was approximately 50 m. The fence line is approximately 3.6 km in length
- a 50 m Cartesian receptor grid extending out 1 km from the Pleasants Power Plant boundary
- a 100 m Cartesian receptor grid extending out 1 to 5 km from the Pleasants Power Plant boundary
- a 250 m Cartesian receptor grid extending from 5 to 10 km from the Pleasants Power Plant boundary
- a 500 m Cartesian receptor grid extending from 10 to 20 km from the Pleasants Power Plant boundary

The receptor network contained 21,099 receptors, and the network covered portions of Pleasants, Ritchie, Tyler, and Wood Counties in West Virginia. The grid also extended across the Ohio River including portions of Washington County, OH. A closer inspection of the model receptor grid showed there were several small areas in which model receptors appeared be missing. This exclusion zone appears to extend north from the location of the modeled stack from the ambient boundary out over the Ohio River and south from the ambient boundary to about 2 km. The areal extent of the receptor “gaps” are not very large and the northern portion over the Ohio River probably would be allowed to be excluded under the Modeling TAD recommendations. The model peak does not appear to occur in these receptor “gaps” so the exclusion model receptors in these areas are not expected to impact final peak model concentrations.

Figures 7B and 7C, included in the state’s recommendation, show the state’s chosen area of analysis surrounding the Pleasants Power Plant, as well as the receptor grid for the area of analysis.

All receptor locations outside of the Pleasants Power Plant’s potential ambient air boundary were retained except for the gaps noted above. No model receptors were removed from significant water bodies such as the Ohio River, which the Pleasants Power Plant sits beside except for the gap noted above. While there were several “gaps” in the receptor network, discussed earlier in this section, they are not expected to impact final peak model concentrations; the controlling model concentrations are located well away from the receptor gaps (see summary figures).

Figure 7B. Area of Analysis for the Pleasants County Area

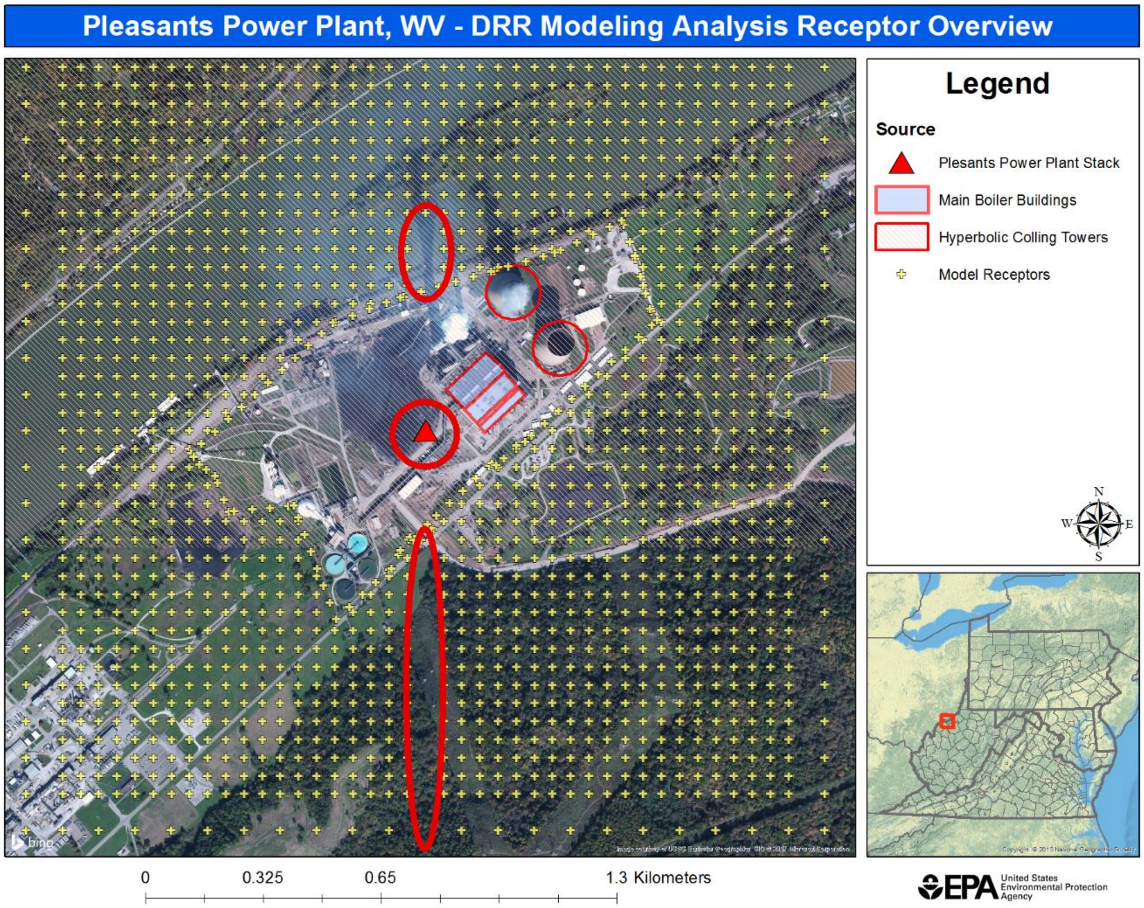
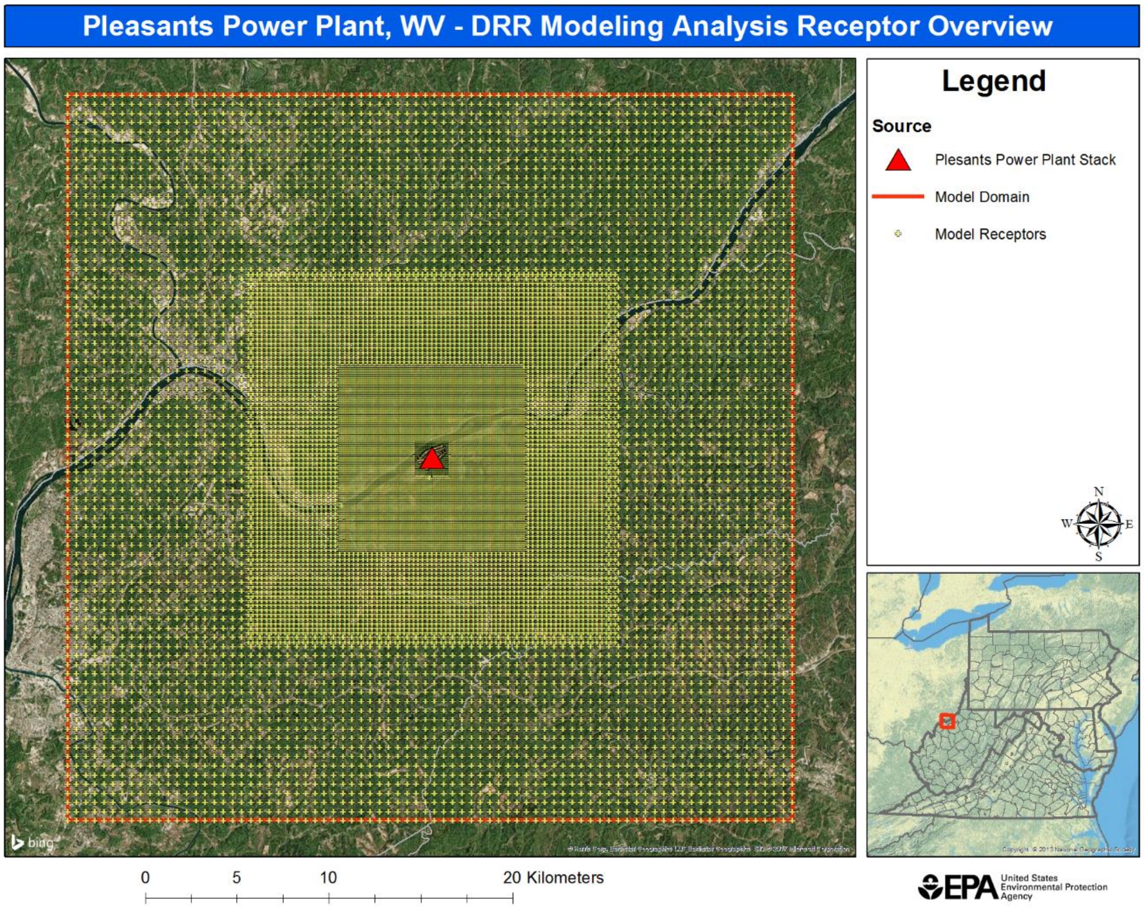


Figure 7C. Receptor Grid for the Pleasants County Area



EPA concludes that the model receptor grid surrounding the Pleasants Power Plant is of adequate design to capture the maximum impacts from the facility's SO_2 emissions.

7.3.2.4. Modeling Parameter: Source Characterization

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

The Pleasants Power Plant is equipped with two (2) identical opposed fired, pulverized coal dry bottom boilers, along with a dedicated flue gas desulfurization (FGD) SO_2 emissions control system. The FGD system was installed during initial plant construction, and upgraded in 2007 for enhanced SO_2 emissions removal. The system is configured with the two boilers exhausting through separate flues in a common 640-foot stack. The stack has a continuous emissions monitoring system (CEMS) that records hourly average exhaust flow rate and temperature, and SO_2 emissions. Modeling of the two (2) coal boilers reflected a merged flue configuration using the actual hourly CEMS data recorded for the designation modeling period (2013-2015).

In addition to the Pleasants Power Plant's coal fired boilers, the plant emission inventory also includes two (2) auxiliary boilers, two (2) emergency diesel engines, and other small heaters and fire pump engines. The annual hours of unit operation and annual SO_2 emission rates for the ancillary combustion equipment were provided by the state. The natural gas fuel auxiliary boilers and other limited use units have no appreciable SO_2 emissions (combined < 1 tpy) and were not considered in final modeling analysis.

EPA examined the Pleasants Power Plant's stack location and BPIP building analysis for accuracy using GIS software. The site's major buildings appear to be located in the correct locations but the main stack appears to be approximately 230 m south-southwest of its proper position. BPIP footprints of the two (2) cooling towers are slightly larger than they actually appear with the northern cooling tower abutting the plant's northern ambient boundary. These cooling towers are the highest structures included in the BPIP analysis. Given the height of the main stack (190 m) and the distance between the main stack and the peak model concentration (~3 km) it's unlikely that the cooling towers are having significant downwash impacts on the final modeled concentrations. Therefore, any exaggeration of the areal extent of the cooling towers is not expected to influence the final model analysis.

Given the error in the main stack's location, we expect the final model concentration would change slightly if corrected. Peak model concentrations may also shift within the domain. EPA's determination is that these changes are not substantive enough to change the final maximum model concentration such that modeled violations would occur.

7.3.2.5. Modeling Parameter: Emissions

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

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

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, a facility that has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, the state included the Pleasants Power Plant as the only emitter of SO_2 within the modeling domain (approximately 20 km from the facility). The state has chosen to model this facility using actual emissions. The facilities in the state's modeling analysis and their associated annual actual SO_2 emissions between 2013 and 2015 are summarized below.

For the Pleasants Power Plant, the state provided annual actual SO_2 emissions between 2013 and 2015. This information is summarized in Table 7D. A description of how the state obtained hourly emission rates is given below this table.

Table 7D. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Pleasants County Area

Modeled Emissions

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
Pleasants Power Plant	14,218.87	12,804.57	12,693.74
Total Emissions from All Modeled Facilities in the State's Area of Analysis	14,218.87	12,804.57	12,693.74

CAMD Emissions

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
Pleasants Unit 1	8,887.97	6,952.87	6,130.50
Pleasants Unit 2	5,588.86	6,784.39	6,559.64
Total Emissions from All Modeled Facilities in the State's Area of Analysis	14,476.82	13,737.26	12,690.14

2014 NEI Emissions

Facility	2014 NEI SO_2 Emissions (tpy)
Pleasants Power Plant	13,737.8

Note that the CAMD emissions for the facility dropped to 9,610 tpy in 2016.

For the Pleasants Power Plant, the actual hourly SO_2 emissions data were obtained from CEM data provided by the facility and used in the West Virginia modeling analysis. In addition to this data, EPA also constructed actual hourly emissions available from EPA's Clean Air Markets Data (CAMD) website[27] and emissions from the 2014 NEI for comparison. As shown in the previous tables, the annual modeled emissions for 2015 are nearly identical to the CAMD emission totals. Modeled annual emission for 2013 and 2014, however, are somewhat less than what was reported to CAMD; about 250 tpy for 2013 and a little over 900 tpy for 2014. While the annual total under representation of emissions are not a large fraction of the total annual emissions, about 2% for 2013 and about 7% for 2014, the differences in hourly emissions often exceeded several thousand pounds per hour.

Hourly modeled emissions for the Pleasants Power Plant's main stack were compared with hourly rates extracted from CAMD. Modeled hourly rates were generally very close to the rates from CAMD for 2015. Hourly modeled emission rates for 2013 and 2014, however, were somewhat less than actual hourly CAMD rates often by several thousands of pounds. A table showing the difference between hourly modeled and the hourly CAMD emission rates for the Pleasants Power Plant's main stack are shown in Table 7E. There were over 1,200 hours in the modeling analysis where modeled SO_2 emissions were over 500 lbs/hr lower than the hourly rates recorded in CAMD. This represents approximately 5% of the simulation period. Outside of these periods of 2013 and 2014, hourly modeled rates are generally within +/- 250 pounds per hour of the CAMD hourly emission rates.

Table 7E. Table showing the difference between modeled and CAMD hourly emission rates (pounds per hour) for the Pleasants Power Plant's main stack.

Bin	Frequency
-500	1,267
-250	53
0	16,720
250	8,222
500	13
750	3
More	2

Even though there are a fair number of hours where the modeled data and the CAMD data differ by more than 500 lb/hr, EPA concluded that the modeled design value is accurate when considering the overwhelming degree to which the facility data and the CAMD data match on an hour by hour basis. Further, given the significant drop in 2016 emissions, EPA concluded that the maximum modeled design value using 2013-2015 emissions is sufficiently conservative (over-estimating the concentrations).

7.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The

[27] https://ampd.epa.gov/ampd/

representativeness of the data is determined based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

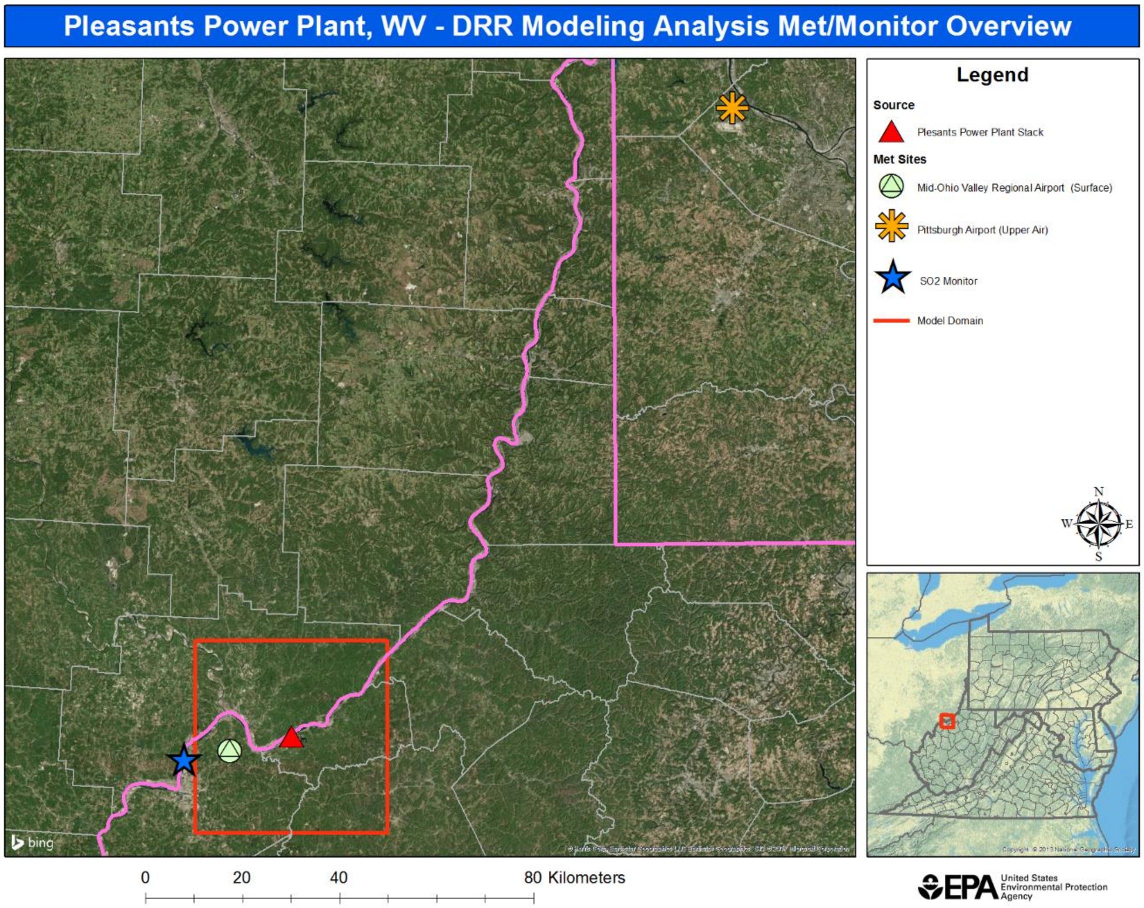
For the area of analysis for the Pleasants County area, the state selected the surface meteorology from the Mid-Ohio Valley Regional Airport (Parkersburg Airport) in Wood County, WV, and coincident upper air observations Pittsburgh Airport in Allegheny County, Pennsylvania, as best representative of meteorological conditions within the area of analysis. The Mid-Ohio Valley Regional Airport lies inside the modeling domain approximately 13 km west of the Pleasants Power Plant. The Pittsburgh Airport is approximately 158 km northeast of the Pleasants Power Plant.

Upon review of the meteorological data, it was found that the surface site, the Mid-Ohio Valley Regional Airport, did not have data that met EPA's recommended 90% collection completion rate for 2013 and 2014. To complete the modeling analysis, met data for 2010-2012 were substituted and combined with the 2013-15 emissions data.

The state used AERSURFACE version 13016 using data from the Mid-Ohio Valley Regional Airport (Parkersburg Airport) site to estimate the surface characteristics of the area of analysis. The state estimated values for 12 spatial sectors out to 1.0 km using default seasons for the temporal resolution. Dry, wet, average conditions were based on the 30-year average precipitation data for West Virginia Climate Region 1. Due to a lack of readily available snow cover information at three (3) NWS stations located in WV, a seasonal determination of continuous seasonal snow cover (defined as 1 inch or more reported on >45 days in Dec-Jan-Feb) was made based on Pittsburgh, PA local climatological data along with use of graphical snow cover information. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as "Zo") for both the Mid-Ohio Valley Regional Airport site and the Pleasants Power Plant. EPA used the AERSURFACE surface characteristics for the Mid-Ohio Valley Regional Airport site, in accordance with Section 3.3 of the AERSURFACE Users Guide for its analysis.

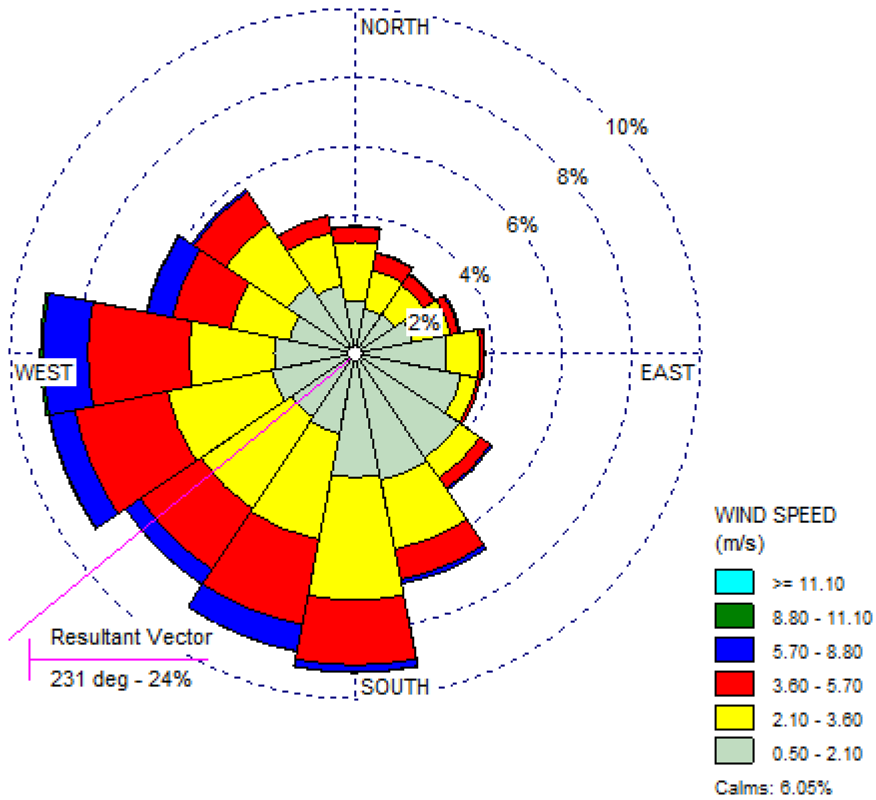
In the figure below, generated by the EPA the locations of the NWS stations and SO_2 monitor site are shown relative to the area of analysis.

Figure 7F. Area of Analysis and the NWS Stations in the Pleasants County Area



As part of its recommendation, the state provided the 3-year surface wind rose for Mid-Ohio Valley Regional Airport (Parkersburg Airport). In Figure 7G, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The wind rose was produced using the final processed AERMET sfc file in Lakes Environmental's WRPLOT program. Winds were generally from the west to south with a resultant wind vector of all hours from a southwesterly direction.

Figure 7G. Mid-Ohio Valley Regional Airport (Parkersburg Airport) Cumulative Annual Wind Rose for Years 2010 – 2012



Meteorological data from the above surface and upper air NWS 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 followed the methodology and settings presented in Modeling TAD and associated guidance in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE (Mid-Ohio Valley Regional Airport site) to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute and 5- minute duration was provided from the Mid-Ohio Valley Regional Airport, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the state set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data.

As noted previously, due to completeness issues at the Mid-Ohio Valley Regional Airport site, the met data (2010-12) does not match the emissions data (2013-15). This could cause minor issues since the Pleasants Power Plant operating loads are partially determined by the regional meteorology, which influences the overall electric grid load. Additionally, utilizing Pittsburgh snow cover data may not be fully representative of winter conditions in this portion of West Virginia. These factors are not expected to significantly influence the final modeling analysis.

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

The terrain in the area of analysis is best described as somewhat hilly though elevation changes are relatively minor along this part of the Ohio River. No terrain within the modeling domain exceeds the top of the Pleasant Power Plant's main stack. Terrain elevation data was taken from the Multi-Resolution Land Characterization (MRLC) consortium website for the National Elevation Dataset (NED) for this domain (1/3 arc-second, approximately 10-meter resolution). EPA has determined the receptor grid information was properly processed.

7.3.2.8. 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 "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the state chose to use the 50th percentile concentration from the Wood County SO_2 monitor (AQS ID: 54-107-1002), which is located approximately 22.5 km west of the Pleasant Power Plant. Support for this approach was outlined in a paper by Sergio Guerra.[28] The single value of the background concentration for this area of analysis determined using the 50th percentile was 18.31 micrograms per cubic meter ($\mu g/m^3$), equivalent to 7 ppb when expressed in 2 significant figures,[29] and that

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[28] Sergio A. Guerra (2014), "Innovative Dispersion Modeling: Practices to Achieve a Reasonable Level of Conservatism in AERMOD Modeling Demonstrations," EM, December 2014, pp. 24-29 http://www.cppwind.com/wp-content/uploads/2014/01/Innovative-Dispersion-Modeling_Guerra_EM_Dec_2014issue.pdf

[29] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 $\mu g/m^3$.

value was incorporated into the final AERMOD results. The Wood County monitor's 2013-15 design value, for comparison, was 28 ppb or approximately 73.3 μg/m^3. As a secondary approach, the modeling analysis also used a temporally varying background monitored concentration computed by hour of day and season. The methodology uses hourly monitored concentration data (2013-2015) to determine 99th percentile values computed by hour of day and season for the monitoring period. Background concentrations for this area of analysis were determined by the state to vary from 89.09 micrograms per cubic meter (μg/m^3), equivalent to 34 ppb when expressed in 2 significant figures,[30] to 18.34 μg/m^3 (7 ppb), with an average value of 43.51 μg/m^3 (16.6 ppb).

EPA has determined that using the 50th percentile probably overestimates background concentration, even though this method may remove some of the impacts from several large SO_2 emission sources located near the Wood County, WV, monitor. These include the Chemours-Washington Works plant located in Wood County, WV, approximately 12 km southwest of the SO_2 monitor. This facility is also a DRR listed source and is located approximately 34 km southwest of the Pleasants Power Plant. There are also two (2) other sources of SO_2 in adjacent Washington County, OH. These include Kraton Polymers and Orion Engineered Carbon. Both sources had SO_2 emissions above 1,000 tpy in the 2014 NEI and are located approximately 8 km and 3 km, respectively, southwest of the Wood County, WV, monitor. These three (3) sources probably have a significant impact on the Wood County, WV, monitor but little to no impact in the immediate area of the Pleasants Power Plant. West Virginia's methodology of using the 50th percentile for its background concentration may remove the impacts from Chemours, Kraton Polymers, and Orion Engineered Carbon from the background concentration. The use of seasonal hourly varying background concentrations from the Wood County, WV, monitor is more in line with the Modeling TAD but could introduce impacts from local sources that would not be expected to impact concentrations near the Pleasants Power Plant.

7.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Pleasants County area of analysis are summarized below in Table 7H.

[30] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in μg/m^3. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 μg/m^3.

Table 7H. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Pleasants County Area

Input Parameter	Value
AERMOD Version	15181 Default Mode
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	1
Modeled Structures	6
Modeled Fencelines	1, Pleasants Power Plant
Total receptors	21,099
Emissions Type	Actual
Emissions Years	2013-15
Meteorology Years	2010-12
NWS Station for Surface Meteorology	Mid-Ohio Valley Regional Airport, WV
NWS Station Upper Air Meteorology	Pittsburgh International Airport, PA
NWS Station for Calculating Surface Characteristics	Mid-Ohio Valley Regional Airport, WV
Methodology for Calculating Background SO_2 Concentration	50^{th} Percentile of 2013-15
Calculated Background SO_2 Concentration	7 ppb

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

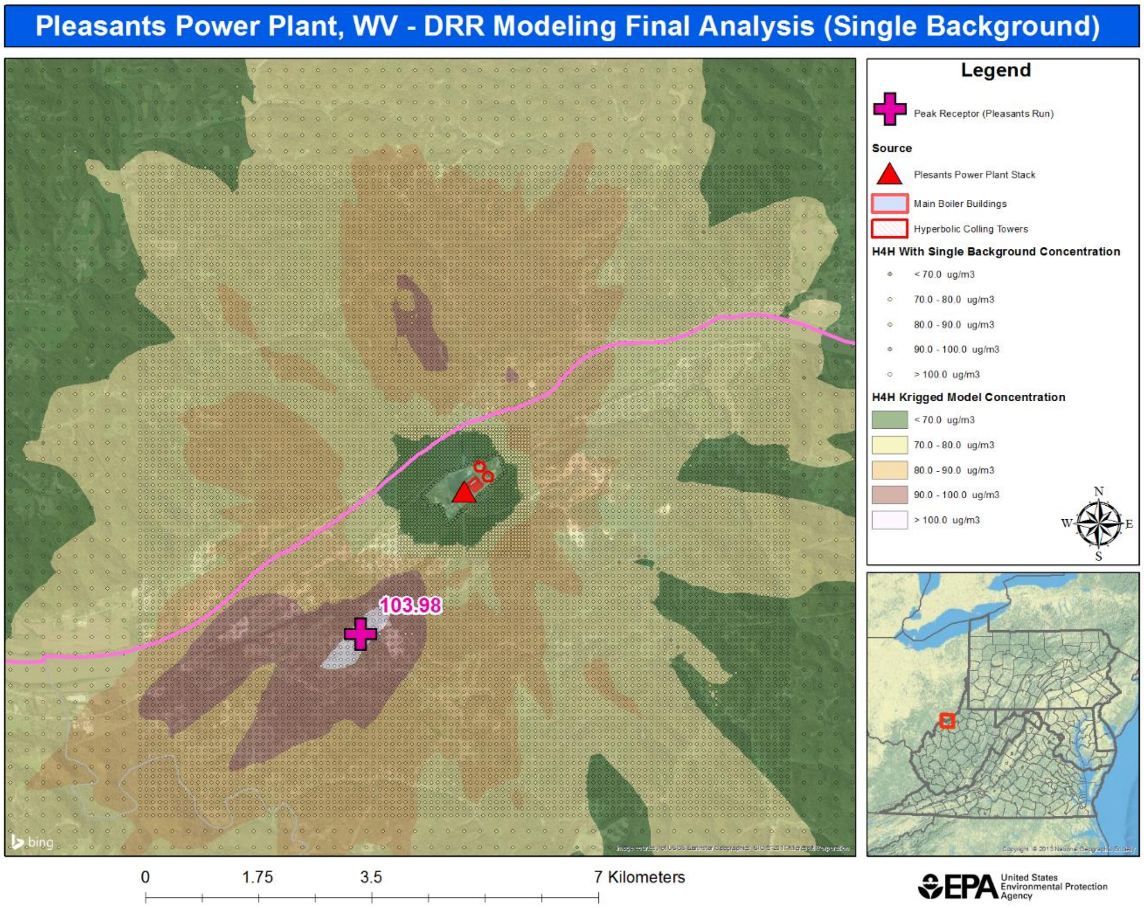
Table 7I. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Pleasants County Area

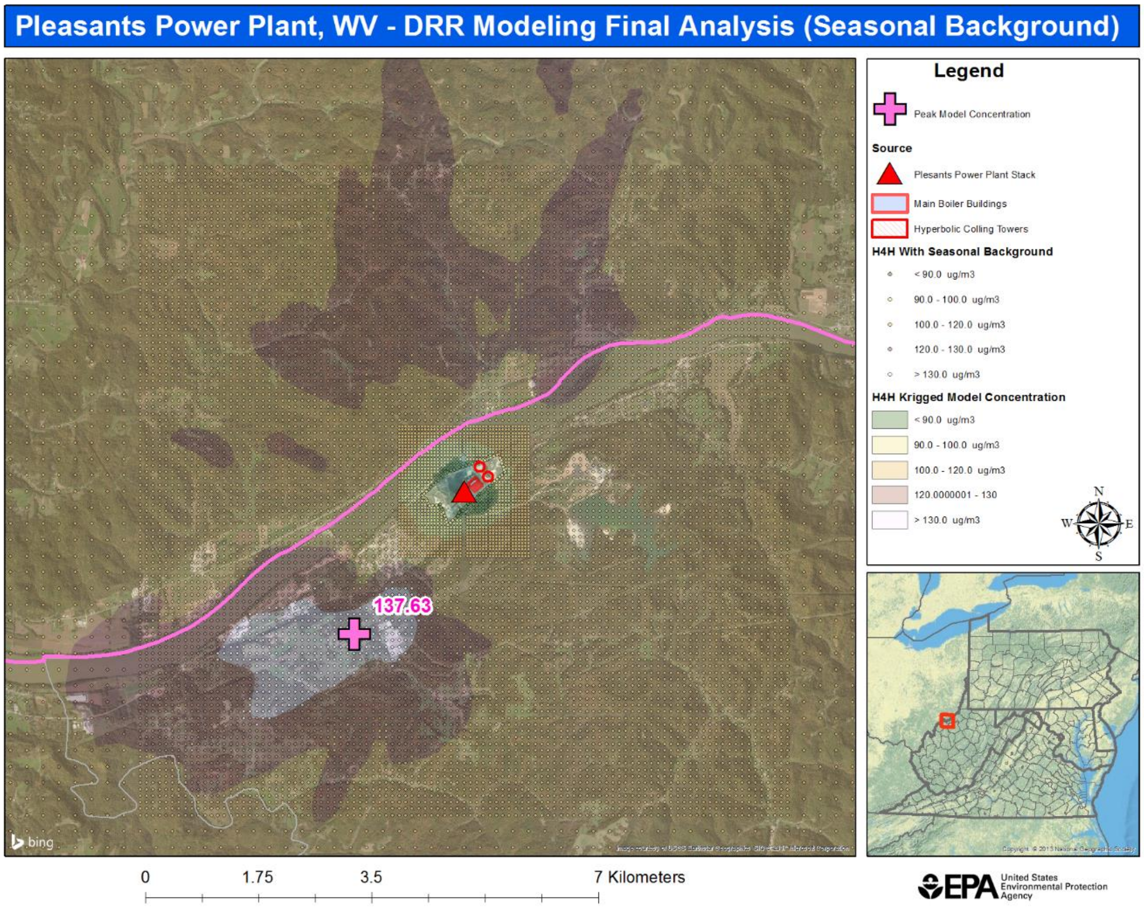
Averaging Period	Data Period	Receptor Location UTM Zone 17		99th Percentile daily Maximum 1-Hour SO_2 Concentration ($\mu g/m^3$)	
		UTM/Latitude	UTM/Longitude	Modeled Concentration (Including Background)	NAAQS Level
99th Percentile 1-Hour Average (50th Percentile Background)	2013-15	472887	4355200	103.98	196.4*
99th Percentile 1-Hour Average (Seasonal 99th Percentile Background)	2013-15	472787	4355200	137.62	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The state's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 103.98 $\mu g/m^3$, equivalent to 39.8 ppb. This modeled concentration included a background concentration of SO_2, and is based on actual emissions from the facility. Using the seasonally varying background concentrations as discussed before increases the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain to 137.62 $\mu g/m^3$, equivalent to 52.6 ppb. Figure 7K below indicates that the predicted value(s) occurred southwest of the Pleasants Power Plant, which is generally upwind of the plant based on predominant winds. The state's receptor grid is also shown in the figure.

Figure 7K. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Pleasants County Area





The modeling submitted by the state does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. Peak model concentrations for the runs using the single value background concentration and the seasonal varying by hour concentrations show peaks that reside within 3 km of the Pleasants Power Plant’s main stack. Both peaks lie southwest of the plant, which is actually upwind of the predominant wind direction. Modeled peak concentrations occur within the 100-meter spaced receptor grid indicating the maximum model concentration is probably reproduced in the modeling analysis.

7.3.2.10. *The EPA's Assessment of the Modeling Information Provided by the State*

West Virginia's modeling analysis for the Pleasants Power Plant indicates that model concentrations in the vicinity of the facility do not violate the SO_2 NAAQS. While EPA noted that there are some hours where modeled emissions are significantly lower than those reported in CAMD (~5% of the modeled hours), this would not impact the overall final assessment, and the modeling shows attainment of the 1-hour SO_2 NAAQS. Emissions for the balance of the simulation appear to be generally correct. Background concentrations were estimated using a method that was not recommended in EPA's Modeling TAD and is generally much lower than recommended methods. This method, however, may remove impacts from sources that are near the background monitor but whose impacts probably do not extend into the area immediately surrounding the Pleasants Power Plant where peak model concentrations are occurring. Using the seasonally varying background concentrations as discussed before increases the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain to 137.62 μg/m^3, equivalent to 52.6 ppb, which still indicates that the area is meeting the SO_2 NAAQS.

7.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Pleasants County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

7.5. Jurisdictional Boundaries in the Pleasants County Area

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

West Virginia did not update their unclassifiable recommendation for Pleasants County since their May 23, 2011, submittal.

7.6. Other Information Relevant to the Designations for the Pleasants County Area

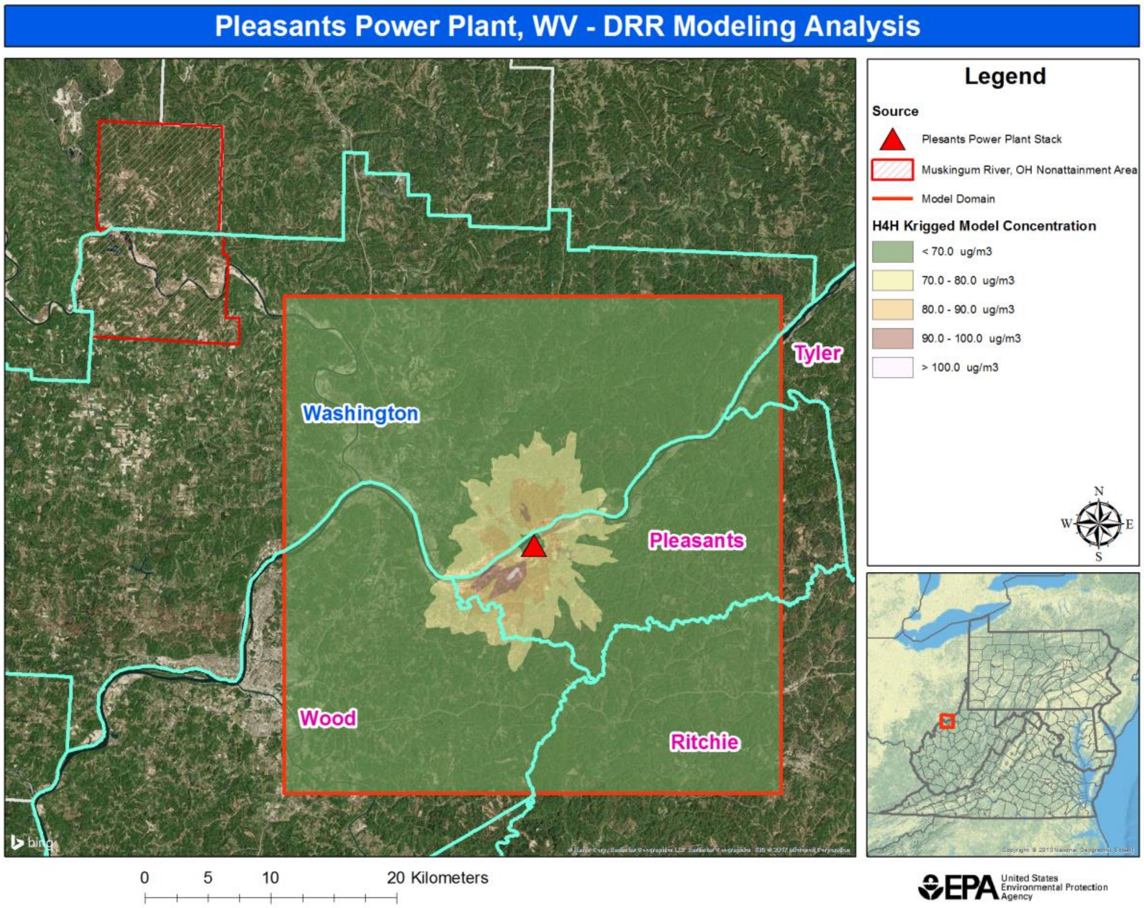
There are no designated nonattainment areas or areas intended to be designated as nonattainment neighboring any of the counties modeled in the Pleasants County area of analysis.

7.7. The EPA's Assessment of the Available Information for the Pleasants County Area

The EPA finds that available air dispersion modeling results show that the Pleasants County area of analysis is unclassifiable/attainment for the 1-hour SO_2 NAAQS.

West Virginia's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 103.98 μg/m^3, equivalent to 39.8 ppb. This modeled concentration included a background concentration of SO_2, and is based on actual emissions from the facility. Using the seasonally varying background concentrations as previously discussed increases the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain to 137.62 μg/m^3, equivalent to 52.6 ppb. The modeling submitted by the state does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. West Virginia's modeling analysis for the Pleasants Power Plant indicates that model concentrations in the vicinity of the facility do not violate the SO_2 NAAQS. Additionally, there are no nonattainment areas within the modeling domain. EPA does not expect emissions from the Pleasants Power Plant to contribute to the nearest nonattainment area, which is located in Muskingum River, Ohio. Modeled emissions greatly decrease towards the direction of the nonattainment area and the peak modeled concentration is localized to Pleasants County. Figure 7L shows the Muskingum River, Ohio nonattainment area in relation to the Pleasants Power Plant. Finally, there are no nearby undesignated areas that will not be addressed in this round of designations.

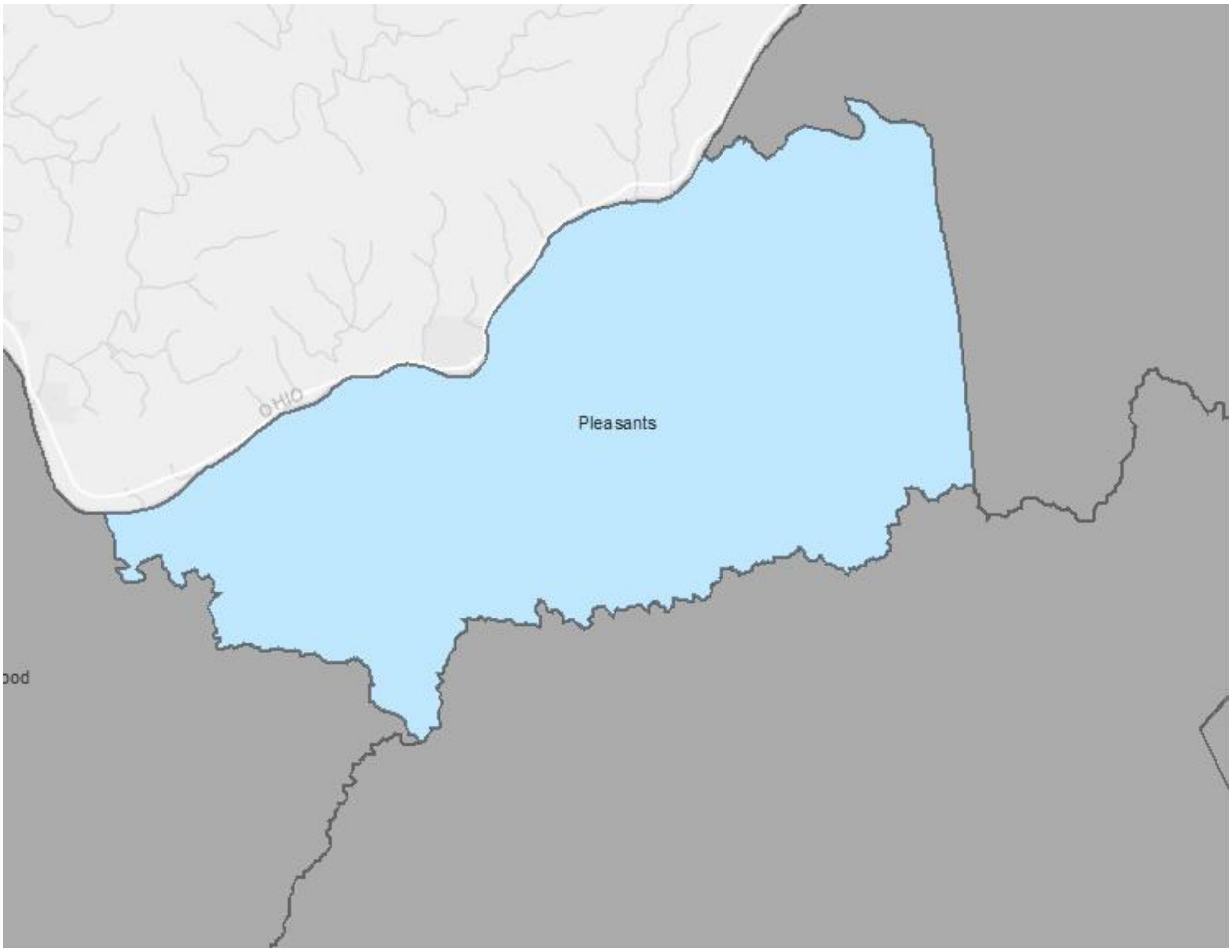
Figure 7L. The Muskingum River, Ohio Nonattainment Area in Relation to the Pleasants Power Plant



7.8. Summary of Our Intended Designation for the Pleasants County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate Pleasants County, West Virginia, as unclassifiable/attainment for the 2010 SO_2 NAAQS because, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined the area (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Figure 7M shows the boundary of this intended designated area.

Figure 7M. Boundary of the Intended Pleasants County Unclassifiable/Attainment Area



8. Technical Analysis for the Putnam County, West Virginia Area

8.1. Introduction

The EPA must designate the Putnam County, West Virginia, area by December 31, 2017, because the area has not been previously designated and West Virginia has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Putnam County. Pursuant to the Data Requirements Rule (*see* 40 CFR part 51, subpart BB), states had the option to characterize large sources of SO_2 by either monitoring, modeling, or limiting emissions below 2,000 tons of SO_2 per year. Because West Virginia has a large SO_2 source (the John E. Amos Power Plant), the state elected to conduct modeling for the John E. Amos Power Plant that emits more than 2,000 tons of SO_2 per year.

8.2. Air Quality Monitoring Data for the Putnam County Area

There are no air quality monitors located in the Putnam County, West Virginia, area.

8.3. Air Quality Modeling Analysis for the Putnam County Area Addressing the John E. Amos Power Plant

8.3.1. Introduction

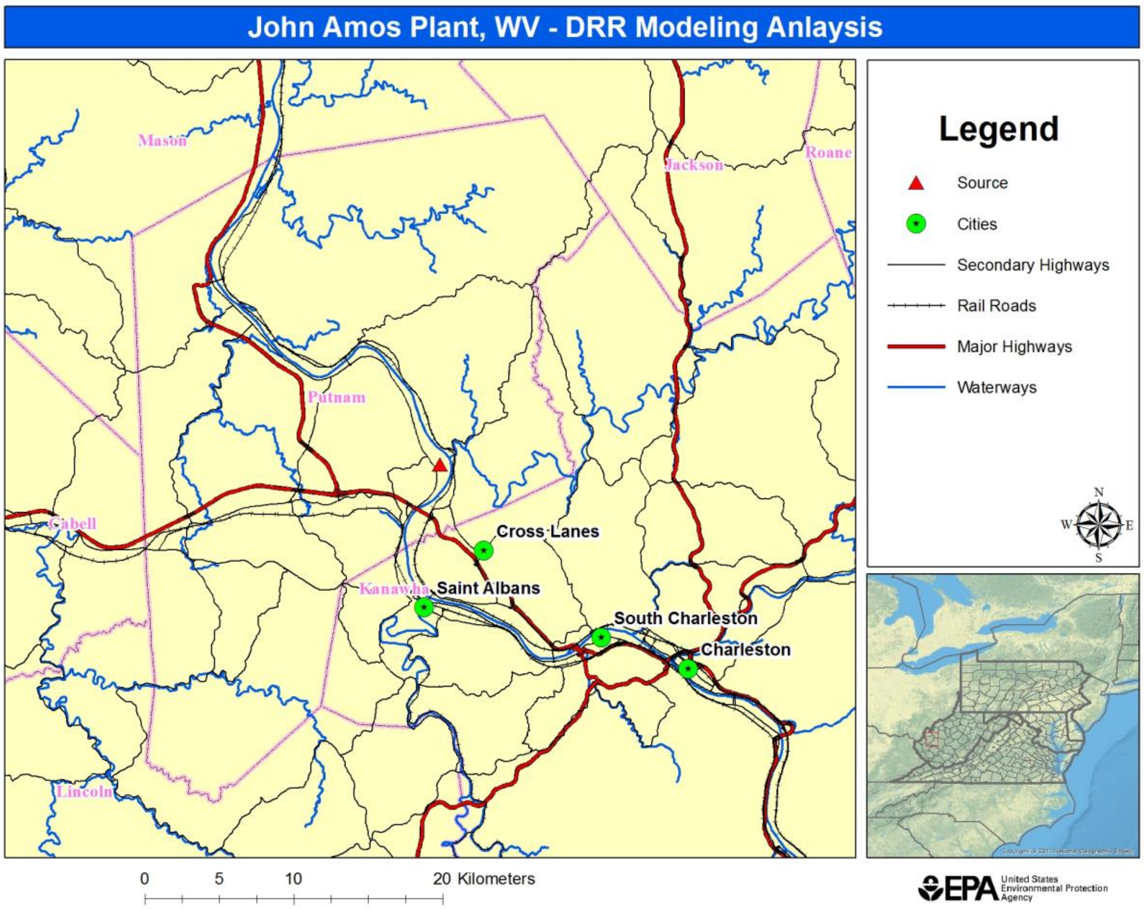
This section presents all the available air quality modeling information for a portion of Putnam County that includes the American Electric Power John E. Amos Power Plant (the John E. Amos Power Plant). This area contains the following SO_2 source which West Virginia is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The John E. Amos Power Plant facility emits 2,000 tons or more annually. Specifically, the John E. Amos Plant emitted approximately 6,172 tons of SO_2 according to the 2014 NEI. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and West Virginia has chosen to characterize it via modeling.

In West Virginia's original submission on May 23, 2011, West Virginia recommended that Putnam County be designated as unclassifiable. On January 12, 2017, West Virginia submitted modeling for the John E. Amos Power Plant but did not update their recommendations. This modeling 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, the EPA intends to modify the state's recommendation for the area, and intends to designate the area as unclassifiable/attainment. Our reasoning for this conclusion is explained below.

The area that the state has assessed via air quality modeling is located in Putnam County, WV. This area includes Putnam, and portions of, Mason, Jackson, Roane, Kanawha, Boone, Lincoln, Wayne, Cabell, Fayette, Clay, and Wirt Counties in West Virginia and Lawrence, Gallia, and Meigs Counties in Ohio.

Figure 8A. Map of the Putnam County Area Addressing the John E. Amos Power Plant



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

For this area, the EPA received and considered only West Virginia's modeling assessment.

8.3.2. Modeling Analysis Provided by the State

8.3.2.1. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model

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

The state used AERMOD version 15181 in regulatory default mode, which was the current version at the time of submittal. On January 17, 2017, EPA published its revision to Appendix W – Guideline to Air Quality Models.[31] Since the publication of Appendix W, AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that would significantly affect the concentrations predicted here. A discussion of the state's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

8.3.2.2. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

The application of AERMOD requires characterization of the local (within 3 kilometers) dispersion environment as either urban or rural, based on a USEPA-recommended procedure (commonly referred to as the Auer Method) that characterizes an area by prevalent land use. This land use approach classifies an area according to 12 land use types. In this scheme, areas of industrial, commercial, and compact residential land use are designated urban. According to USEPA modeling guidelines, if more than 50% of an area within a 3-km radius of the facility is classified as rural, then the urban model option in AERMOD should not be used in the dispersion modeling analysis. Conversely, if more than 50% of the area is urban, then it can be considered.

West Virginia's analysis of the area demonstrates that visual inspection of the 3-km area surrounding the John E. Amos Power Plant clearly shows the area is rural. Additionally, the areas where people live are classified as low density residential. Therefore, the urban model option in AERMOD was not used. For the purpose of performing the modeling for the area of analysis, the state determined that it was most appropriate to run the model in rural dispersion mode. EPA agrees with the state's assessment.

[31] https://www.federalregister.gov/documents/2015/07/29/2015-18075/revision-to-the-guideline-on-air-quality-models-enhancements-to-the-aermod-dispersion-modeling

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

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

In West Virginia's analysis, the John E. Amos Power Plant is the primary source of SO_2 emissions subject to the DRR in this area and is described in the introduction to this section. For the John E. Amos Power Plant area, the state examined the region within 52 km of the facility and found no other emitters of SO_2 that are expected to cause a concentration gradient in the vicinity of the primary source. The Bayer CropScience facility, located in Kanawha County, West Virginia approximately 11 km from the John E. Amos Power Plant, was not included in this analysis. On January 27, 2017, the Bayer CropScience facility ceased operations and shut down their boilers, which was federally enforceable and effective on February 14, 2017. Therefore, this facility is not considered an emitter of SO_2 that needed to be included explicitly in the modeling.

The state determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. No other sources beyond 52 km were determined by the state to have the potential to cause concentration gradient impacts within the area of analysis.

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

- a 100 m Cartesian receptor grid extending from the John E. Amos Power Plant's ambient air boundary out to 4 km
- a 250 m Cartesian receptor grid extending from 4 to 9 km from the John E. Amos Power Plant
- a 500 m Cartesian receptor grid extending from 9 to 16 km from the John E. Amos Power Plant
- a 1,000 m Cartesian receptor grid extending from 16 to 26 km from the John E. Amos Power Plant
- a 2,000 m Cartesian receptor grid extending from 26 to 52 km from the John E. Amos Power Plant
- The receptor network contained 17,545 receptors, and the network covered a 52 km by 52 km area centered around the John E. Amos Power Plant

The receptor network contained 17,545 receptors, and the network covered portions of Putnam, Mason, Jackson, Roane, Kanawha, Boone, Lincoln, Wayne, Cabell, Fayette, Clay, and Wirt Counties in West Virginia and Lawrence, Gallia, and Meigs Counties in Ohio. A closer inspection of the model receptor grid showed that were no modeled receptors removed and there was no ambient air boundary identified by the state around the facility. The model peak is a far enough distance from the facility that it is likely in ambient air.

Figures 8B and 8C, included in the state's recommendation, show the state's chosen area of analysis surrounding the John E. Amos Power Plant, as well as the receptor grid for the area of analysis.

Figure 8B. Area of Analysis for the Putnam County Area

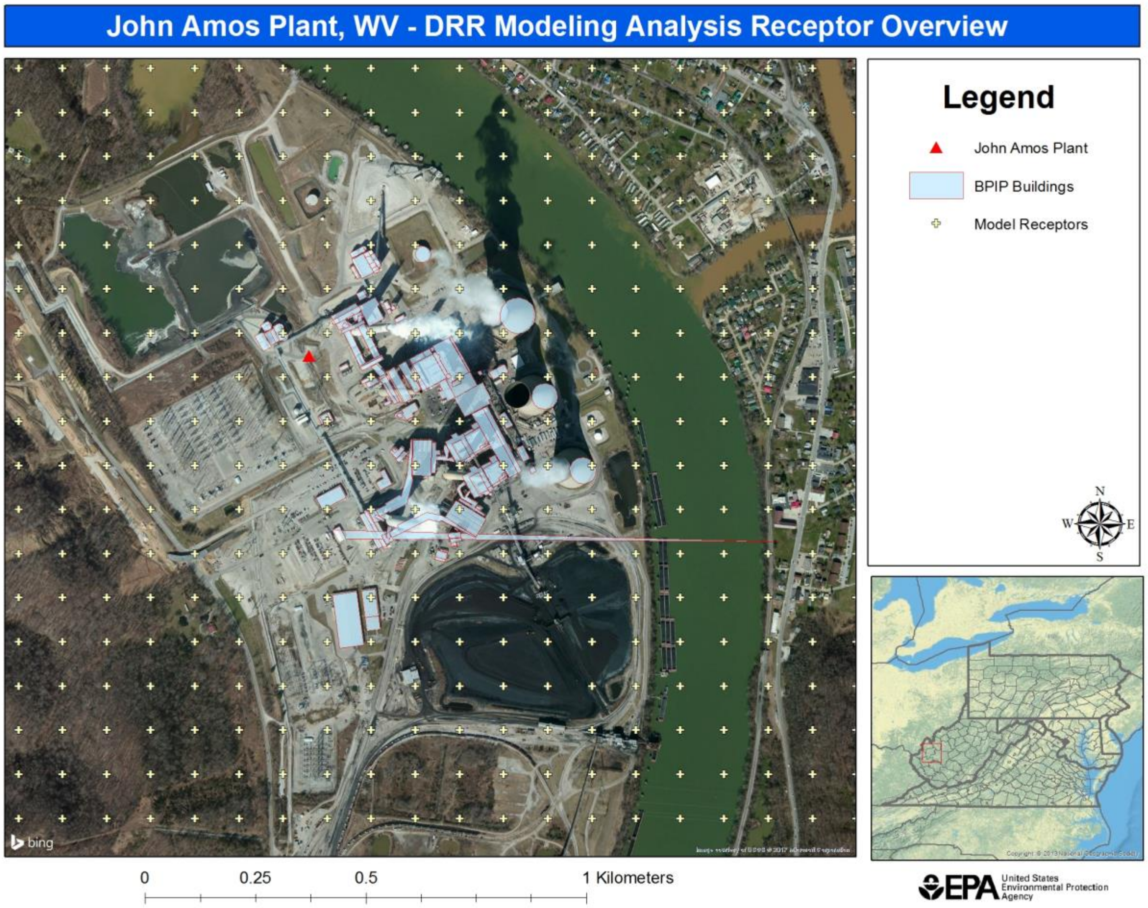
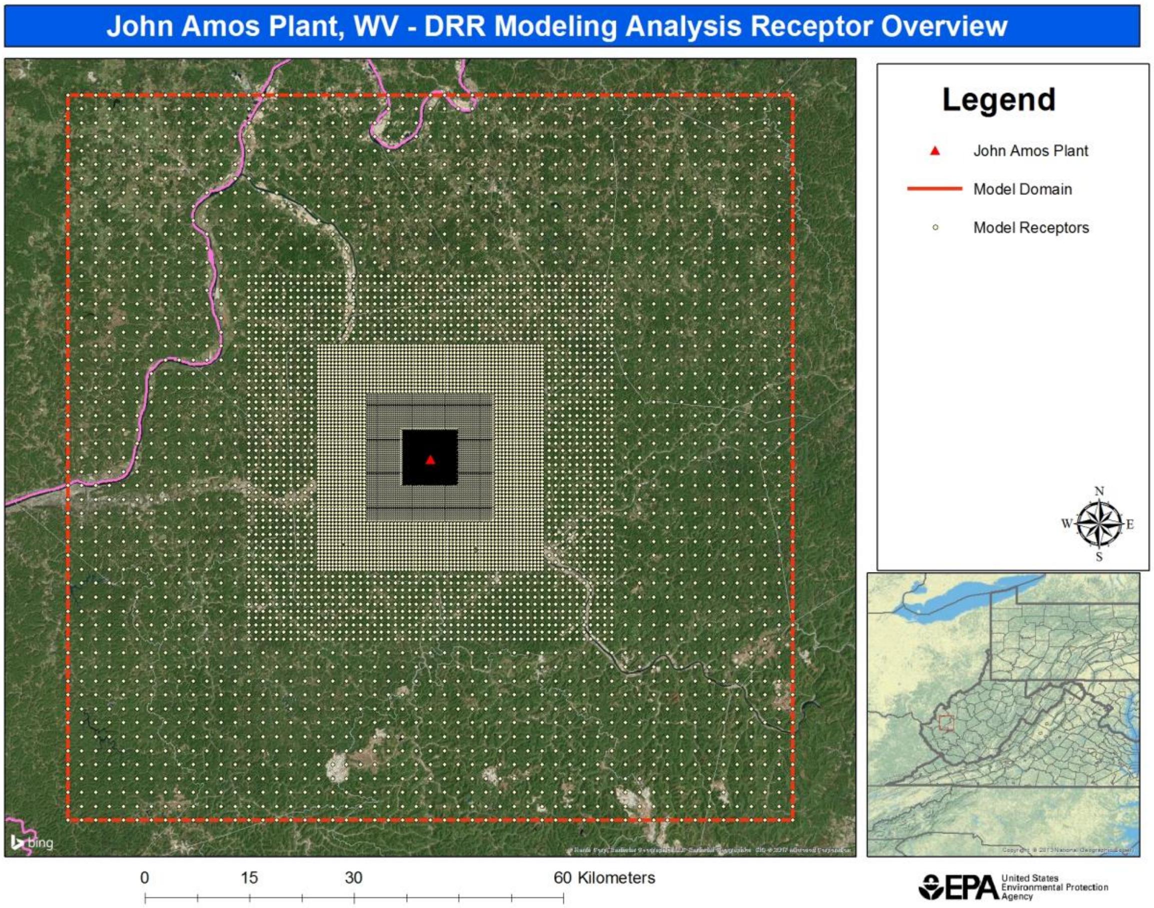


Figure 8C. Receptor Grid for the Putnam County Area



EPA concludes that the model receptor grid surrounding the John E. Amos Power Plant is of adequate design to capture the maximum impacts from the facility's SO_2 emissions.

8.3.2.4. Modeling Parameter: Source Characterization

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

There are three major SO_2 emission sources at the John E. Amos Power Plant that were included in the 1-hour SO_2 modeling analysis. Those sources include Unit 1, Unit 2, and Unit 3, which are all steam generators. SO_2 emissions from all units are controlled with a limestone based flue gas desulfurization system. Units 1 and 2 are rated at 800 MW each and Unit 3 is rated at 1300 MW.

Units 1 and 2 are constructed with a single shell containing two individual flues that discharge at 900 feet above grade and Unit 3 is an individual 900-foot stack. The modeling analysis was performed with the actual stack heights in accordance with recommendations in the DRR and TAD. Hourly exhaust flow rates, temperatures, and emission rates were based on the actual data available from the continuous emission monitor (CEM) systems. Missing data was replaced following Part 75 data substitution requirements. The emissions for modeling consisted of actual hourly data for the most recent three calendar years (2013-2015).

The state characterized this source 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 BPIPPRM was used to assist in addressing building downwash.

EPA examined the John E. Amos Plant's stack locations and BPIP building analysis for accuracy using GIS software. The main stack as well as all of the major buildings appear to be located in the correct locations. BPIP footprints of one of the cooling towers appears to be slightly off to the east than they actually appear. Given the height of the stacks and the distance between the stacks and the peak model concentration it's unlikely that the cooling towers are having significant downwash impacts on the final modeled concentrations. Therefore, any exaggeration of the areal extent of the cooling tower is unlikely to affect the conclusion in the final model analysis. EPA has determined that the characterization of the John E. Amos Power Plant is adequate to determine compliance with the 1-hr SO_2 NAAQS.

8.3.2.5. Modeling Parameter: Emissions

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

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

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, where a facility has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

After analyzing other SO_2 emission sources in the area, the state included the John E. Amos Power Plant as the only emitter of SO_2 within the modeling domain. The state has chosen to model this facility using actual emissions. The facilities in the state's modeling analysis and their associated annual actual SO_2 emissions between 2013 and 2015 are summarized below.

For the John E. Amos Power Plant, the state provided annual actual SO_2 emissions between 2013 and 2015. This information is summarized in Table 8D. A description of how the state obtained hourly emission rates is given below this table.

Table 8D. Actual SO_2 Emissions Between 2013 – 2015 from Facilities in the Putnam County Area

Modeled Emissions

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
John E. Amos Plant Unit 1	750.1	2,072.7	1,159.6
John E. Amos Plant Unit 2	1,340.7	2,260.7	1,360.8
John E. Amos Plant Unit 3	3,599.9	1,773.9	2,830.0
Total Emissions from All Modeled Facilities in the State's Area of Analysis	5,690.7	6,107.3	5,350.4

CAMD Emissions

	SO_2 Emissions (tpy)		
Facility Name	**2013**	**2014**	**2015**
John Amos Plant Unit 1	749.9	2,080.2	1,155.2
John Amos Plant Unit 2	1,339.4	2,294.7	1,360.0
John Amos Plant Unit 3	3,604.9	1,797.2	2,845.0
Total Emissions from All Modeled Facilities in the State's Area of Analysis	5,694.3	6,172.2	5,360.2

2014 NEI Emissions

Facility	2014 NEI SO_2 Emissions (tpy)
John E. Amos Plant	6172.2

For the John E. Amos Power Plant, the actual hourly SO_2 emissions data were obtained from CEM data provided by the facility and used in the West Virginia modeling analysis. In addition to this data, EPA also constructed actual hourly emissions available from EPA's Clean Air Markets Data (CAMD) website[32] and emissions from the 2014 NEI for comparison. As shown in the previous tables, the annual modeled emissions for 2013 to 2015 are nearly identical to the CAMD and 2014 NEI emission totals. A table showing the difference between the hourly modeled emission rates and the hourly CAMD emission rates for the John E. Amos Plant are shown in Table 8E. The table shows modeled hourly emission rates were nearly all within +/- 250 lbs/hr of the hourly rates recorded in CAMD. Based on this information it appears that actual hourly emission rates were properly input into the modeling analysis.

Table 8E. Table showing the difference between modeled and CAMD hourly emission rates (pounds per hour) for the John E Amos Power Plant's three (3) units.

Unit 1		Unit 2		Unit 3	
Bin	**Frequency**	**Bin**	**Frequency**	**Bin**	**Frequency**
-500	15	-500	65	-500	21
-250	8	-250	23	-250	0
0	17,993	0	15,599	0	18,360
250	8,243	250	10,584	250	7,878
500	19	500	7	500	14
750	1	750	1	750	4
More	1	More	1	More	3

8.3.2.6. Modeling Parameter: Meteorology and Surface Characteristics

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

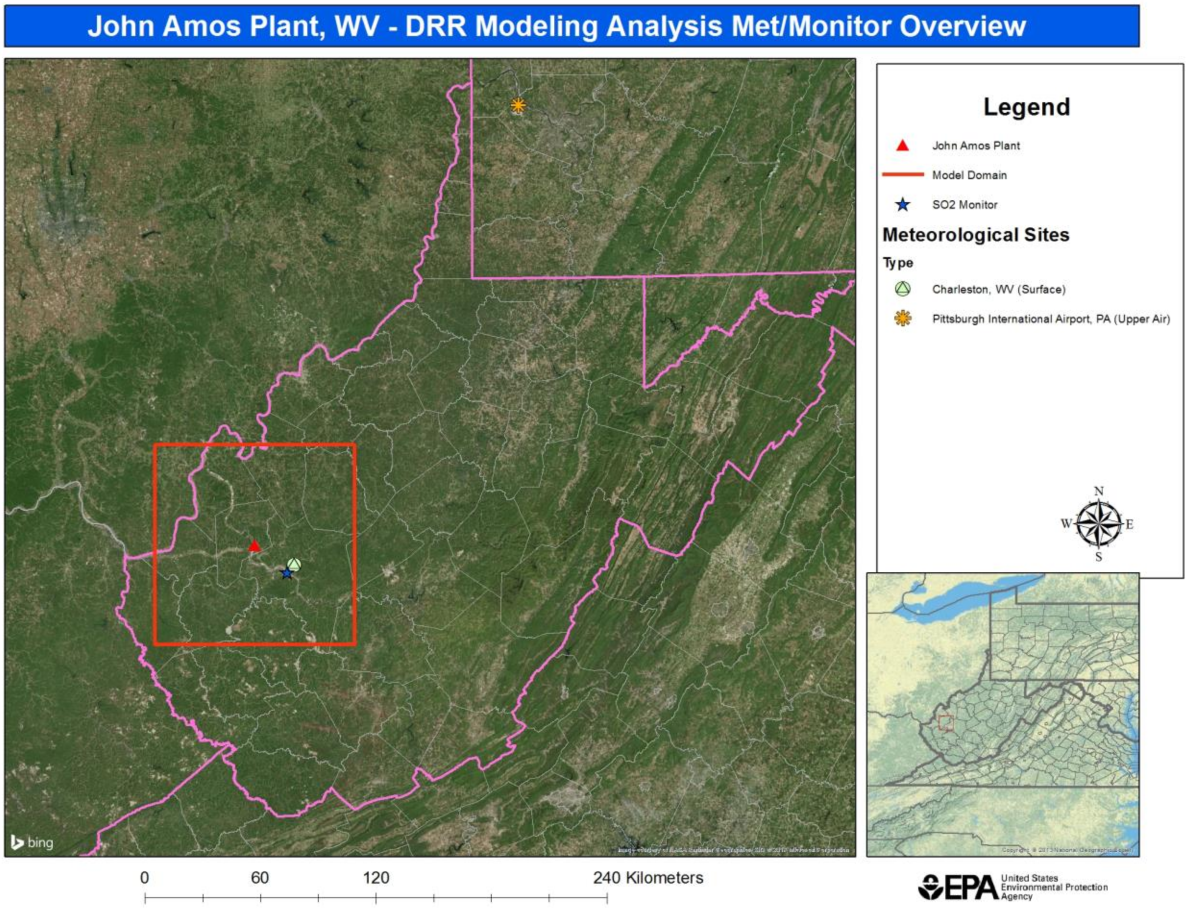
For the area of analysis for the John E. Amos Power Plant, the state selected the surface meteorology from Yeager Airport (Charleston) ASOS based surface data, paired with Pittsburgh Upper Air Data as best representative of meteorological conditions within the area of analysis. These sites are located approximately 22.97 km southeast and 266.6 km northwest (respectfully)

[32] https://ampd.epa.gov/ampd/

from the John E. Amos Power Plant. The Charleston ASOS site, located in Kanawha County, WV, lies within the modeling domain. The tower has an anemometer height of 7.92 m.

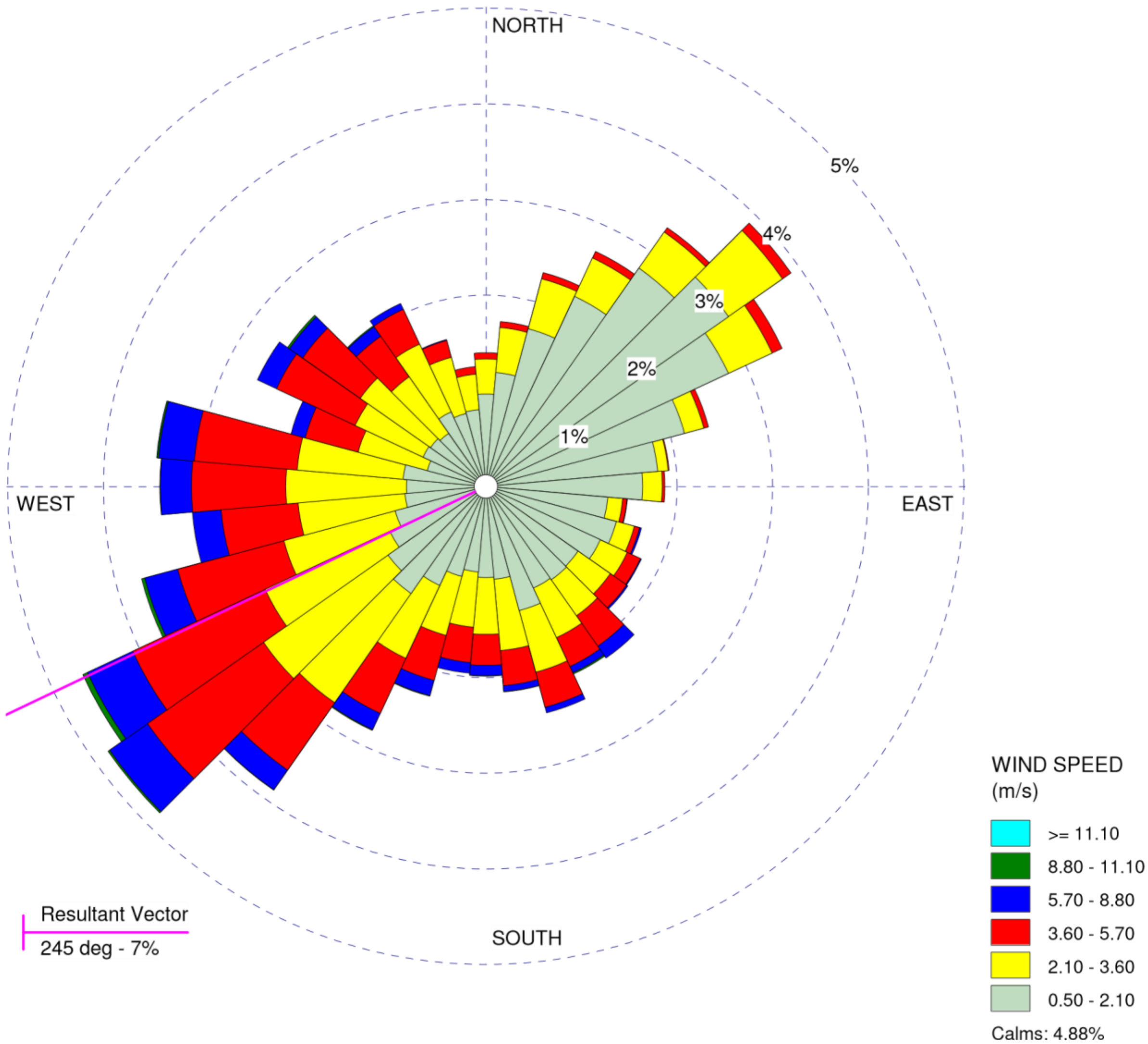
The state used AERSURFACE version 13016 using data from the Charleston ASOS site to estimate the surface characteristics of the area of analysis. The state estimated values for 5 spatial sectors out to 1.0 km using default seasons for the temporal resolution. Dry, wet, average conditions were based on the 30-year average precipitation data for West Virginia Climate Region 2. The state also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as "Zo") for both the Charleston ASOS site and the John E. Amos Power Plant. EPA used the AERSURFACE surface characteristics for the Charleston ASOS site, in accordance with Section 3.3 of the AERSURFACE Users Guide for its analysis.

Figure 8F. Area of Analysis and the NWS Station in the Putnam County Area



As part of its recommendation, the state provided the 3-year surface wind rose for the Charleston ASOS site for 2013-15. In Figure 8G the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. The wind rose constructed from the 2013-15 wind fields indicate predominant winds are from the southwest.

Figure 8G. Yeager Airport (Charleston) Cumulative Annual Wind Rose for Years 2013 – 2015



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The state followed the methodology and settings presented in Modeling TAD and associated guidance in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE (Charleston ASOS site) to best represent surface characteristics.

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

EPA has determined that the meteorological data was processed correctly and provides a reasonable representation of wind fields inside the modeling domain.

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

The terrain in the area of analysis is best described as hilly. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. Terrain elevation data was taken from the Multi-Resolution Land Characterization (MRLC) consortium website for the National Elevation Dataset (NED) for this domain (1/3 arc-second (10 meter) resolution). EPA concludes that the receptor grid information was properly processed.

8.3.2.8. 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 “tier 1” approach, based on a monitored design value, or 2) a temporally varying “tier 2” approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the state chose Charleston-Morris St. (AQS ID: 54-039-0010) SO_2 monitoring site in Kanawha County, WV, as a representative regional background site. The monitor is roughly 23 km southeast of the John E. Amos Power Plant. The single value of the background concentration for this area of analysis was determined by the state to be 47.16 micrograms per cubic meter ($\mu g/m^3$), equivalent to 18 ppb when expressed in 2 significant figures,[33] and that value was incorporated into the final AERMOD results.

The state modified the monitor results to remove impacts from the John E. Amos Power Plant by excluding hours when winds indicated that the plant was upwind of the background monitor. This is in accordance with section 8.3.2(c)(iii) of Appendix W. Background concentrations were then calculated using the remaining monitor values. EPA has determined that this technique will yield a regionally representative background concentration for the state's modeling analysis.

8.3.2.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Putnam County area of analysis are summarized below in Table 8H.

Table 8H. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Putnam County Area

Input Parameter	Value
AERMOD Version	15181 Default
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	3
Modeled Structures	61
Modeled Fencelines	None
Total receptors	17,454
Emissions Type	Actual
Emissions Years	2013-2015
Meteorology Years	2013-2015
Surface Meteorology Station	Charleston-Kanawha Airport, WV
Upper Air Meteorology Station	Pittsburgh International Airport, PA
Methodology for Calculating Background SO_2 Concentration	Modified Design Value to Remove Local Source Influence
Calculated Background SO_2 Concentration	18 ppb
AERMOD Version	15181 Default

[33] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in μg/m^3. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.619 μg/m^3.

The results presented below in Table 8I show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

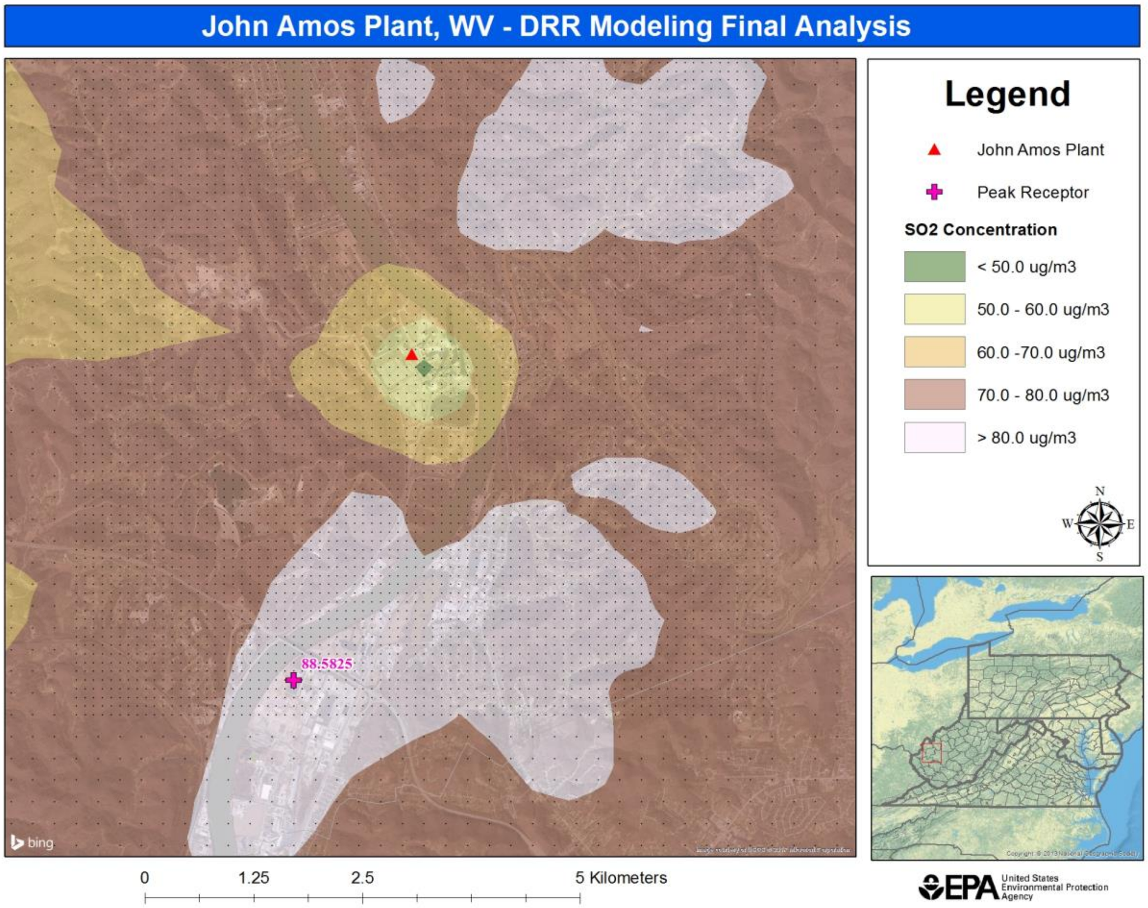
Table 8I. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Putnam County Area

Averaging Period	Data Period	Receptor Location UTM Zone 17		99th Percentile Daily Maximum 1-Hour SO_2 Concentration ($\mu g/m^3$)	
		UTM/Latitude	UTM/Longitude	Modeled Concentration (Including Background)	NAAQS Level
99th Percentile 1-Hour Average	2013-15	426500	4255150	88.58	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The state's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 88.58 $\mu g/m^3$, equivalent to 33.8 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facility. Figure 8J below was included as part of the state's recommendation, and indicates that the predicted value occurred south-southwest of the John E. Amos Power Plant. The state's receptor grid is also shown in the figure.

Figure 8J. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Putnam County Area



The modeling submitted by the state does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. Modeled peak concentrations occur within the 100-meter spaced receptor grid indicating the maximum model concentration is probably reproduced in the modeling analysis.

8.3.2.10. The EPA's Assessment of the Modeling Information Provided by the State

West Virginia's modeling analysis for the John E. Amos Power Plant indicates that model concentrations in the vicinity of the facility do not violate the SO_2 NAAQS. The modeling analysis generally followed EPA's Modeling TAD ensuring model concentrations are representative of actual hourly emissions from the facility.

8.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Putnam County Area

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

8.5. Jurisdictional Boundaries in the Putnam County Area

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

West Virginia did not update their unclassifiable recommendation for Putnam County since their May 23, 2011, submittal.

8.6. Other Information Relevant to the Designations for the Putnam County Area

There are no designated nonattainment areas or areas intended to be designated as nonattainment neighboring any of the counties modeled in the Putnam County area of analysis.

8.7. The EPA's Assessment of the Available Information for the Putnam County Area

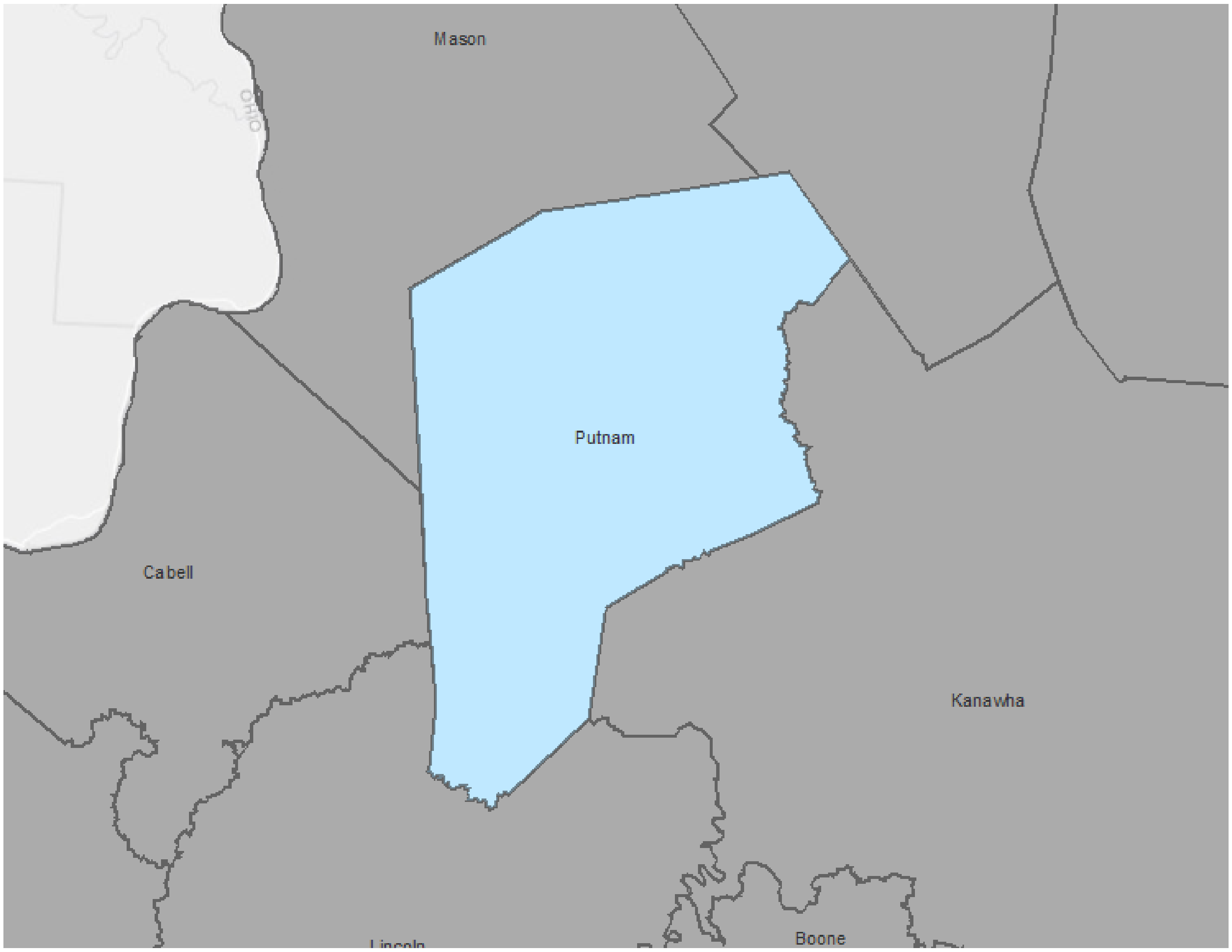
The EPA finds that available air dispersion modeling results show that the Putnam County area of analysis is unclassifiable/attainment for the 1-hour SO_2 NAAQS.

West Virginia's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 88.58 $\mu g/m^3$, equivalent to 33.8 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facility. The modeling submitted by the state does not indicate that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. Additionally, there are no nonattainment areas for the 1-hour SO_2 NAAQS within 50 km, which is the typical extent of SO_2 dispersion modeling and there are no nearby undesignated areas that will not be addressed in this round of designations.

8.8. Summary of Our Intended Designation for the Putnam County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate Putnam County, West Virginia, as unclassifiable/attainment for the 2010 SO_2 NAAQS because, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined the area (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Figure 8K shows the boundary of this intended designated area.

Figure 8K. Boundary of the Intended Putnam County Unclassifiable/Attainment Area



9. Technical Analysis for the Wood County, West Virginia Area

9.1. Introduction

The EPA must designate the Wood County, West Virginia, area by December 31, 2017, because the area has not been previously designated and West Virginia has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in Wood County. Pursuant to the Data Requirements Rule (see 40 CFR part 51, subpart BB), states had the option to characterize large sources of SO_2 by either monitoring, modeling, or limiting emissions below 2000 tons of SO_2 per year. Because West Virginia has a large SO_2 source (the Chemours Company Plant), the state elected to conduct modeling for the Chemours Company Plant that emits more than 2000 tons of SO_2 per year.

9.2. Air Quality Monitoring Data for the Wood County Area

This factor considers the SO_2 air quality monitoring data in Wood County. Although the state did not provide specific air quality monitoring data, EPA reviewed available data for the Wood County area. One monitor is located in Wood County and has a design value well below the NAAQS. The maximum design value (DV) from 2013-2015 in the county is 28 ppb which is well below the 75 ppb NAAQS. This data was available to EPA for consideration in the designation process, however, EPA does not have information indicating that this monitor is in an area of maximum concentration. Below is a table with information about the monitor.

Table 9A. Air Quality Monitoring Data for the Wood County Area of Analysis

County	AQS Monitor ID	Latitude	Longitude	2011-2013 Design Value (ppb)	2012-2014 Design Value (ppb)	2013-2015 Design Value (ppb)	2014-2016 Design Value (ppb)
Wood	54-107-1002	39.323533	- 81.552367	33	27	28	26

The EPA has reviewed all available monitoring data for the Wood County area of analysis. Air quality monitoring data discussed in this section can be found at https://www.epa.gov/air-trends/air-quality-design-values.

9.3. Air Quality Modeling Analysis for the Wood County Area Addressing the Chemours Company Plant (formally Dupont Washington Works)

This section presents all the available air quality modeling information for a portion of Wood County that includes Chemours Company Plant (formally Dupont Washington Works). This area contains the following SO_2 source, which West Virginia is required by the DRR to characterize

SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- The Chemours Company Plant emits 2,000 tons or more annually. Specifically, the Chemours Company Plant emitted approximately 2,265 tons of SO_2 according to the 2014 NEI. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and West Virginia notified EPA that it chose to characterize it via modeling for the DRR.

In West Virginia's original submission on May 23, 2011, West Virginia recommended that Wood County be designated as nonattainment. On January 22, 2013, West Virginia recommended that Wood County be designated as attainment/unclassifiable because 2010-2012 monitoring data indicated that air quality had significantly improved in Wood County. To date, West Virginia has not submitted any modeling data for the Chemours Company Plant.

9.4. Jurisdictional Boundaries in the Wood County Area

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

9.5. The EPA's Assessment of the Available Information for the Wood County Area

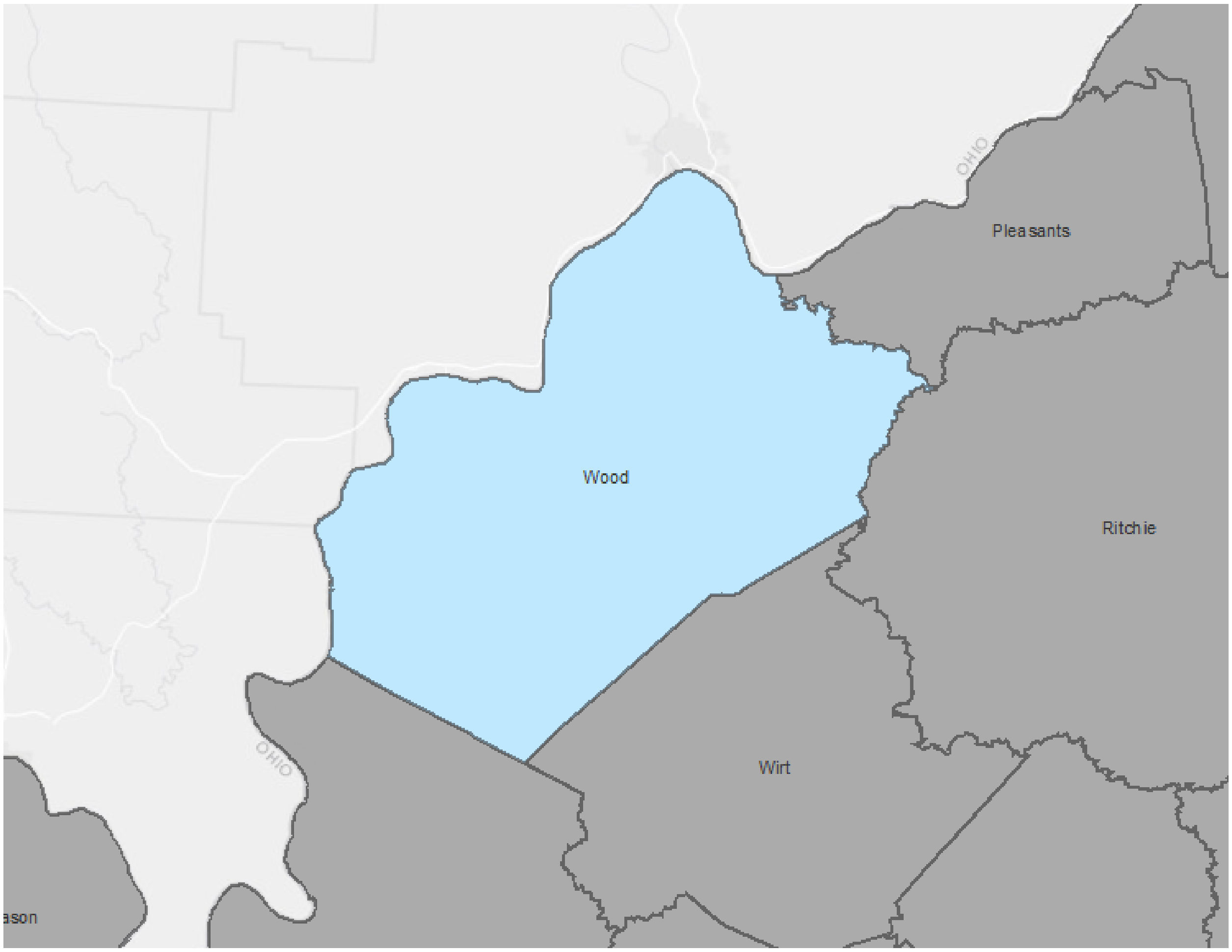
The EPA finds that Wood County is unclassifiable for the 1-hour SO_2 NAAQS.

While Wood County has monitoring data with a design value well below the NAAQS, the EPA does not have sufficient information indicating that this monitor is in an area of maximum concentration and thus the EPA cannot adequately determine if the area is meeting or not meeting the 2010 SO_2 NAAQS, or contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS. There is no other currently available air quality characterization information available for the Wood County area.

9.6. Summary of Our Intended Designation for the Wood County Area

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate Wood County, West Virginia, as unclassifiable for the 2010 SO_2 NAAQS because the area was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS. Figure 9B shows the boundary of this intended designated area.

Figure 9B. Boundary of the Intended Wood County Unclassifiable Area



10. Technical Analysis for Certain Other Counties in West Virginia

10.1. Introduction

In accordance with the DRR, these counties are not required to monitor or model because they do not contain any sources larger than 2000 tons of SO_2 per year. West Virginia has not installed and begun operation of a new, approved SO_2 monitoring network by January 1, 2017 for any sources of SO_2 emissions in the counties identified in Table 10A. Accordingly, the EPA must designate these counties by December 31, 2017. At this time, there are no air quality modeling results available to the EPA for these counties. In addition, there is no air quality monitoring data that indicate any violation of the 1-hour SO_2 NAAQS. The EPA is designating the counties in Table 10A in the state as "unclassifiable/attainment" since these areas were not required to be characterized under 40 CFR 51.1203(c) or (d) and EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that these areas may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

Table 10A. Counties that the EPA Intends to Designate Unclassifiable/Attainment

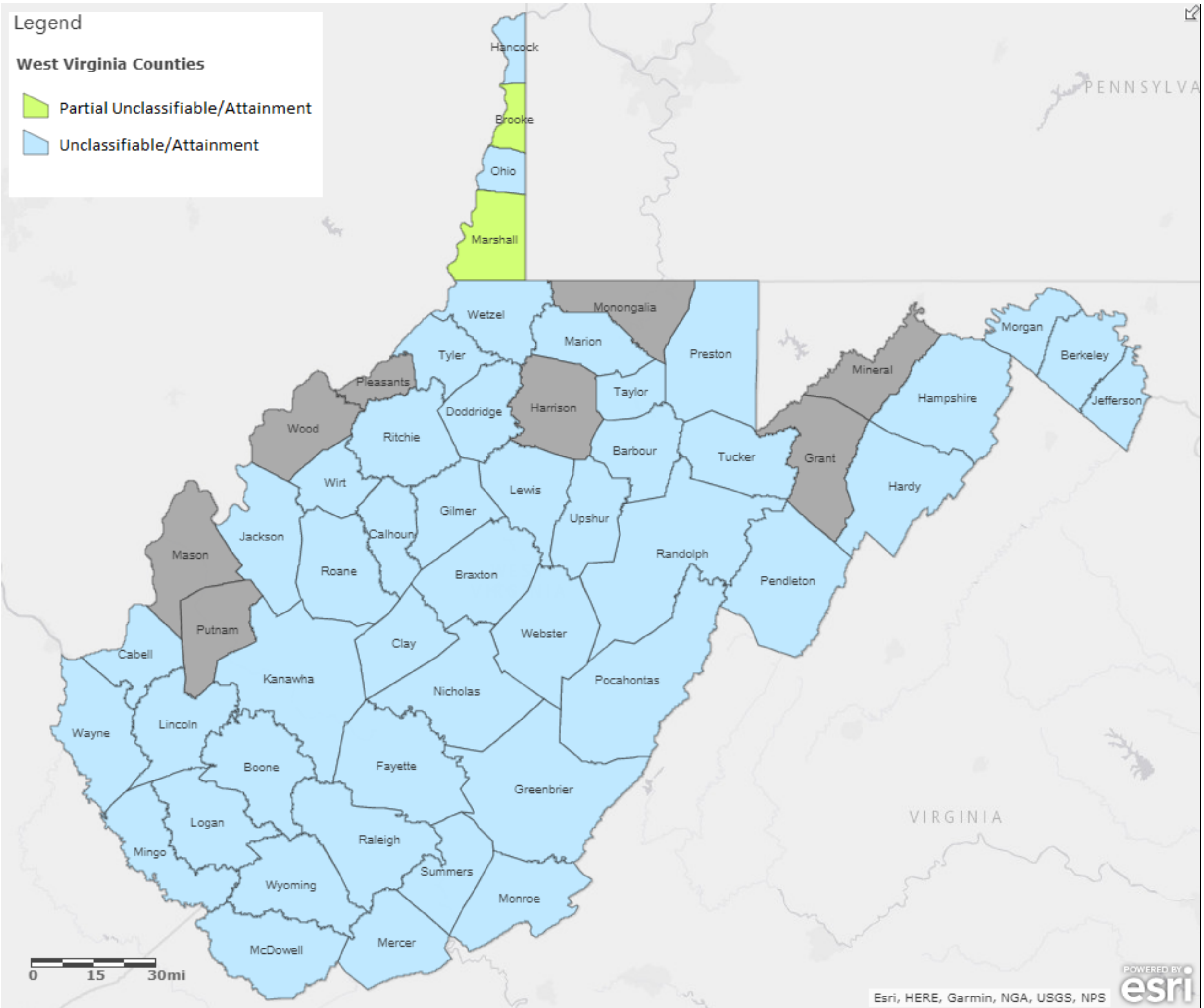
County	West Virginia Recommended Area Definition	West Virginia's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Barbour	Barbour County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Berkeley	Berkeley County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Boone	Boone County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Braxton	Braxton County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Brooke (partial)	Buffalo Tax District	Attainment/ Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Cabell	Cabell County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Calhoun	Calhoun County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Clay	Clay County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Doddridge	Doddridge County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Fayette	Fayette County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Gilmer	Gilmer County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Greenbrier	Greenbrier County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Hampshire	Hampshire County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Hancock	Hancock County	Attainment/ Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Hardy	Hardy County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Jackson	Jackson County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Jefferson	Jefferson County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Kanawha	Kanawha County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Lewis	Lewis County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment

County	West Virginia Recommended Area Definition	West Virginia's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Lincoln	Lincoln County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Logan	Logan County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Marion	Marion County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Marshall (partial)	Cameron, Liberty, Meade, Sand Hill, Union, and Webster Tax Districts	Attainment/ Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
McDowell	McDowell County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Mercer	Mercer County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Mingo	Mingo County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Monroe	Monroe County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Morgan	Morgan County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Nicholas	Nicholas County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Ohio	Ohio County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Pendleton	Pendleton County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Pocahontas	Pocahontas County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Preston	Preston County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Raleigh	Raleigh County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Randolph	Randolph County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Ritchie	Ritchie County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Roane	Roane County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Summers	Summers County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Taylor	Taylor County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment

County	West Virginia Recommended Area Definition	West Virginia's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Tucker	Tucker County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Tyler	Tyler County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Upshur	Upshur County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Wayne	Wayne County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment
Webster	Webster County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Wetzel	Wetzel County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Wirt	Wirt County	Attainment	Same as State's Recommendation	Unclassifiable/ Attainment
Wyoming	Wyoming County	Unclassifiable	Same as State's Recommendation	Unclassifiable/ Attainment

Table 10A also summarizes West Virginia's recommendations for these areas. Specifically, West Virginia recommended that the counties or tax districts, be designated as attainment, attainment/unclassifiable, or unclassifiable. Counties recommended as attainment were unmonitored counties that have cumulative major point source emissions below 100 tons per year. Counties and tax districts recommended as attainment/unclassifiable had monitoring data or a technical analysis that showed the area met the 1-hour SO_2 NAAQS. All other areas were recommended as unclassifiable due to a lack of data or analysis. After careful review of the state's assessment, supporting documentation, and all available data, the EPA intends to modify the state's recommendation for these areas, and designate these West Virginia areas in Table 10B as unclassifiable/attainment.

Figure 10B. The EPA's Intended Unclassifiable/Attainment Designation for Certain Other Counties in West Virginia



As referenced in the Introduction (see Table 2), the counties associated with sources for which Maryland has installed and begun timely operation of a new, approved SO_2 monitoring network are required to be designated by December 31, 2020, but are not being addressed at this time. Counties previously designated in Round 1 (*see* 78 *Federal Register* 4719) and Round 2 (*see* 81 *Federal Register* 45039) will remain unchanged unless otherwise noted.

10.2. Air Quality Monitoring Data for Certain Other Counties in West Virginia

In Table 10A, there are air quality monitors located in Cabell, Hancock, and Kanawha counties. All monitors have a design value well below the NAAQS. Below is a table with information about the monitors. These data were available to EPA for consideration in the designations process, however, since it is unclear if these monitors are located in areas of maximum concentration, it is unclear if the data are representative of the area's actual air quality.

Table 10C. Air Quality Monitoring Data for Certain Other Counties in West Virginia

County	AQS Monitor ID	Latitude	Longitude	2011-2013 Design Value (ppb)	2012-2014 Design Value (ppb)	2013-2015 Design Value (ppb)	2014-2016 Design Value (ppb)
Cabell	54-011-0006	38.424133	-82.4259	26[a]	19[a]	18[a]	14
Hancock	54-029-0005	40.529021	-80.576067	29	29	34	37
Hancock	54-029-0007	40.460138	-80.576567	31	29	26	35
Hancock	54-029-0008	40.61572	-80.56	28	26	22	22
Hancock	54-029-0009	40.427372	-80.592318	44	31	22	25
Hancock	54-029-0015	40.618353	-80.540616	34	34	35	30
Hancock	54-029-1004	40.421539	-80.580717	45	33	27[b]	28[b]
Kanawha	54-039-0010	38.3456	-81.628317	42	42	41	41[c]

[a] The first quarter of 2013 was 27% complete. The code West Virginia used in AQS indicates that there was a malfunction of their monitoring equipment.
[b] This monitor was shut down in the beginning of 2015.
[c] This monitor was shut down in the beginning of 2016 – SO_2 monitoring will continue at the NCore site in Kanawha county.

10.3. Jurisdictional Boundaries for Certain Other Counties in West Virginia

Existing jurisdictional boundaries (county and tax district boundaries) are considered for the purpose of informing the EPA's designation action for all other counties. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

10.4. The EPA's Assessment of the Available Information for Certain Other Counties in West Virginia

These counties were not required to be characterized under 40 CFR 51.1203(c) or (d) and EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS. These counties therefore meet the definition of an "unclassifiable/attainment" area.

Our intended unclassifiable/attainment area, bounded by country boundaries or tax districts, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

10.5. Summary of Our Intended Designation for Certain Other Counties in West Virginia

After careful evaluation of West Virginia's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the counties listed in Table 10A as unclassifiable/attainment for the 2010 SO_2 NAAQS.

Figure 10B above shows the location of these areas within West Virginia.

For each of the counties listed in Table 10A the boundary of the unclassifiable/attainment area is the county boundary or tax district boundary.

At this time, our intended designations for the state only apply to these areas and the other areas presented in this technical support document. The EPA intends to evaluate and designate all remaining undesignated areas in West Virginia, i.e., Mineral County, by December 31, 2020.