



west virginia department of environmental protection

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**Redesignation Request  
and  
Maintenance Plan  
for the  
West Virginia Portion  
of the Steubenville, OH-WV  
2010 1-hour Sulfur Dioxide (SO<sub>2</sub>) Nonattainment Area,  
Comprising the Cross Creek Tax District of Brooke County**

**Proposed  
May 2019**

West Virginia Division of Air Quality  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304

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Promoting a healthy environment.

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## Acronyms and Abbreviations

|                   |  |
|-------------------|--|
| AERR              | Air Emissions Reporting Requirement                          |
| AMPD              | Air Market Program Data                                      |
| AQS               | Air Quality System   |
| CAA               | Clean Air Act  |
| CFR               | Code of Federal Regulations                                  |
| CSAPR             | Cross-State Air Pollution Rule                               |
| CSR               | Code of State Rules  |
| DAQ               | Division of Air Quality                                      |
| DEP               | Department of Environmental Protection                       |
| EGU               | Electric(ity) Generating Unit                                |
| EIS               | Emissions Inventory System                                   |
| EMF               | Emission Modeling Framework                                  |
| EPA               | Environmental Protection Agency                              |
| FGD               | Flue Gas Desulfurization                                     |
| FIP               | Federal Implementation Plan                                  |
| FR                | Federal Register   |
| iSIP              | Infrastructure SIP   |
| MPO               | Metropolitan Planning Organization                           |
| MSC               | Mountain State Carbon  |
| NAA               | Nonattainment Area   |
| NAAQS             | National Ambient Air Quality Standard                        |
| NO <sub>2</sub>   | Nitrogen Dioxide   |
| NSR               | New Source Review  |
| OH                | Ohio   |
| Pb                | Lead   |
| PM <sub>2.5</sub> | Particulate Matter Less Than 2.5 Microns or less in Diameter |
| ppb               | Parts per Billion  |
| PSD               | Prevention of Significant Deterioration                      |
| RACM              | Reasonably Available Control Measure                         |
| RACT              | Reasonably Available Control Technology                      |
| SIP               | State Implementation Plan                                    |
| SLAMS             | State or Local Air Monitoring Station                        |
| SLEIS             | State and Local Emissions Inventory System                   |
| SO <sub>2</sub>   | Sulfur Dioxide   |
| SO <sub>x</sub>   | Sulfur Oxides or Oxides of Sulfur                            |
| TIP               | Tribal Implementation Plan                                   |
| tpy               | Tons per Year  |
| U.S.              | United States  |
| WV                | West Virginia  |

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**Redesignation Request and Maintenance Plan**  
**for the**  
**West Virginia Portion of the Steubenville, OH-WV**  
**2010 1-hour Sulfur Dioxide (SO<sub>2</sub>) Nonattainment Area,**  
**Comprising the Cross Creek Tax District of Brooke County**

**I. INTRODUCTION**

The Steubenville, OH-WV 2010 1-hour sulfur dioxide (SO<sub>2</sub>) nonattainment area is a multi-state nonattainment area, containing the Cross Creek Tax District of Brooke County, West Virginia and Jefferson County, Ohio (partial) including the Cross Creek, Steubenville, Warren, and Wells Townships and Steubenville City. The area was designated as nonattainment with the 2010 1-hour SO<sub>2</sub> National Ambient Air Quality Standard (NAAQS) in the August 3, 2013 Federal Register (FR), effective October 4, 2013 [78 FR 47191].

**A. Request**

The State of West Virginia is requesting that the Environmental Protection Agency (EPA) redesignate the West Virginia portion of the Steubenville, OH-WV 2010 1-hour SO<sub>2</sub> nonattainment area to attainment pursuant to the provisions of the Clean Air Act (CAA) Section 107. The State is requesting the EPA concurrently approve the associated maintenance plan, which demonstrates that the area will continue to meet the current SO<sub>2</sub> air quality standards for at least ten (10) more years, as a revision to the State Implementation Plan (SIP), meeting the requirements of CAA Section 175A. The State is also requesting the EPA incorporate by reference Consent Order number CO-SIP-2017-9 as a SIP revision.

**B. Background**

Based on EPA's review of the air quality criteria for oxides of sulfur (SO<sub>x</sub>) and the primary NAAQS for SO<sub>x</sub> as measured by SO<sub>2</sub>, EPA revised the primary SO<sub>2</sub> NAAQS to provide the requisite protection of public health with an adequate margin of safety, especially for children, the elderly, and those with asthma. The revised 1-hour SO<sub>2</sub> standard is set at a level of 75 parts per billion (ppb). This standard is met at an ambient air quality monitoring site when the 3-year average of the annual 99<sup>th</sup> percentile of 1-hour daily maximum concentrations is less than or equal

to 75 ppb, as determined in accordance with Appendix T of 40 CFR Part 50. The EPA signed the final rule revising the primary SO<sub>2</sub> NAAQS on June 2, 2010. The rule was published in the FR on June 22, 2010 [75 FR 35520], and became effective on August 23, 2010. EPA also provided provisions in the rule to revoke both the existing 24-hour and annual primary SO<sub>2</sub> standards.

On August 5, 2013, the EPA promulgated the initial SO<sub>2</sub> nonattainment area designations for the 2010 1-hour SO<sub>2</sub> NAAQS, with an effective date of October 4, 2013 [78 FR 47191]. The basis for establishing these areas as nonattainment was monitored air quality from 2009-2011 indicating a violation of the NAAQS. The CAA directs states to develop SIPs that meet the requirements of Section 172(c) and Sections 191-192, while providing for attainment of the NAAQS as expeditiously as practicable, but no later than five (5) years from the date such area was designated nonattainment under Section 107(d). The CAA instructs states with SO<sub>2</sub> nonattainment areas to submit these plans within 18 months of the effective date of the designations (April 6, 2015) detailing how the SO<sub>2</sub> standards would be attained by October 4, 2018.

Two areas in West Virginia were included in the initial SO<sub>2</sub> nonattainment area designations:

- Steubenville, OH-WV – Brooke County (part) – an area consisting of the Cross Creek Tax District – with a 2009-2011 design value of 119 ppb; and
- Marshall, WV – Marshall County (part) – an area consisting of the Clay, Franklin, and Washington Tax Districts – with a 2009-2011 design value of 80 ppb.

The CAA requires areas failing to meet a NAAQS to develop SIPs to expeditiously attain and maintain the standard. However, areas that attain before the required date may be exempt from certain otherwise applicable requirements.

On March 18, 2016, the EPA issued a notice, *Findings of Failure to Submit State Implementation Plans Required for Attainment of the 2010 1-Hour Primary Sulfur Dioxide National Ambient Air Quality Standard (NAAQS)* [81 FR 14736], for 16 areas in 11 states, including two areas in West Virginia; the Marshall area, and the Steubenville (OH-WV), Brooke County area.

On April 25, 2016, West Virginia submitted, and requested the EPA to approve as a revision to the SIP, the *Attainment Demonstration for the 1-hour National Ambient Air Quality Standard for Sulfur Dioxide (SO<sub>2</sub>) State Implementation Plan Revision for the West Virginia Portion of the*

*Steubenville-Weirton, OH-WV Nonattainment Area, Comprising the Cross Creek Tax District of Brook County* (Attainment Demonstration). The Attainment Demonstration had a projected attainment date of October 4, 2018 and included the 2011 base year inventory required under CAA Section 172(c)(3). Further, DAQ showed the expected air quality improvement would be achieved through federally enforceable emission reduction measures, which included Consent Order Number CO-SIP-C-2015-14.

On June 13, 2017, the EPA sent a letter notifying DEP that the submittal became complete by operation of law on October 2, 2016. The letter also acknowledged that the submittal corrected the deficiency identified in EPA's March 18, 2016 findings of failure to submit SO<sub>2</sub> SIPs [81 FR 14736] as it related to the West Virginia portion of the Steubenville, OH-WV area; therefore, the sanctions clock triggered by the findings for this area was turned off.

During the review of the SIP submittal, the EPA notified DEP that there were concerns with Director's discretion in the terms and conditions of Consent Order Number CO-SIP-C-2015-14. DEP and the Company (Mountain State Carbon) renegotiated the terms and conditions of the Consent Order, and the Order was revised to address the EPA's comments. By letter dated November 27, 2017, DEP, as a supplement to the attainment demonstration, submitted Consent Order Number CO-SIP-C-2017-9, which supersedes and replaces Consent Order Number CO-SIP-C-2015-14, and requested EPA incorporate Consent Order Number CO-SIP-C-2017-9 as a SIP revision.

### **C. Geographic Description**

The West Virginia portion of the Steubenville, OH-WV 2010 1-hour SO<sub>2</sub> nonattainment area includes the Cross Creek Tax District of Brooke County, WV. This area is shown in Figure 1 under Section II.A.

## **II. REDESIGNATION CRITERIA**

Pursuant to Section 107(d)(3)(E) of the CAA, states must sufficiently address five (5) issues to obtain redesignation of a nonattainment area to attainment:

- A. determine that the area has attained the applicable NAAQS;
- B. have a fully approved applicable implementation plan under CAA Section 110(k);

- C. show that the improvement in air quality is due to permanent and enforceable emission reductions;
- D. submit an EPA approvable maintenance plan which ensures attainment of the NAAQS for at least ten (10) years beyond redesignation; and
- E. show that the area has met the applicable requirements of Section 110 and Part D of the CAA.

The State of West Virginia herein affirmatively completes all five (5) of the required elements as detailed below.

**A. The Steubenville, OH-WV Area Has Attained the 2010 1-hour SO<sub>2</sub> Standard**

[See Appendix A]

EPA's April 2014, *Guidance for the 1-Hour SO<sub>2</sub> Nonattainment Area SIP Submissions*, Section VIII. Redesignation to Attainment of SO<sub>2</sub> Nonattainment Areas, Subsection A. Attainment of the NAAQS, states:

...the EPA may also make determinations based on modeling from the attainment demonstration for the applicable SIP for the affected area, eliminating the need for separate actuals-based modeling to support a redesignation request. A demonstration that the control strategy in the SIP has been fully implemented (compliance records demonstrating that the control measures have been implemented as required by the approved SIP) would also be relevant for making this determination. An additional SIP submittal from the air agency would not be required by the CAA, and if the agency has previously submitted a modeled attainment demonstration, using allowable emissions, no further modeling would be needed as long as the source characteristics (e.g. factors affecting plume height) are still reasonably represented.<sup>1</sup>

**1. Monitoring**

The Ambient Air Monitoring network in the Steubenville, OH-WV nonattainment area consists of four (4) monitoring locations in Brooke County, WV and three (3) sites in Jefferson County, OH; each one having SO<sub>2</sub> monitoring instrumentation. The four (4) West Virginia sites are: Mahan Lane, McKims Ridge, Marland Heights, and Beech Bottom. The three sites located in Ohio are: Logan Street in Steubenville, OH, County Route 19, and 3<sup>rd</sup> Street. The locations of the

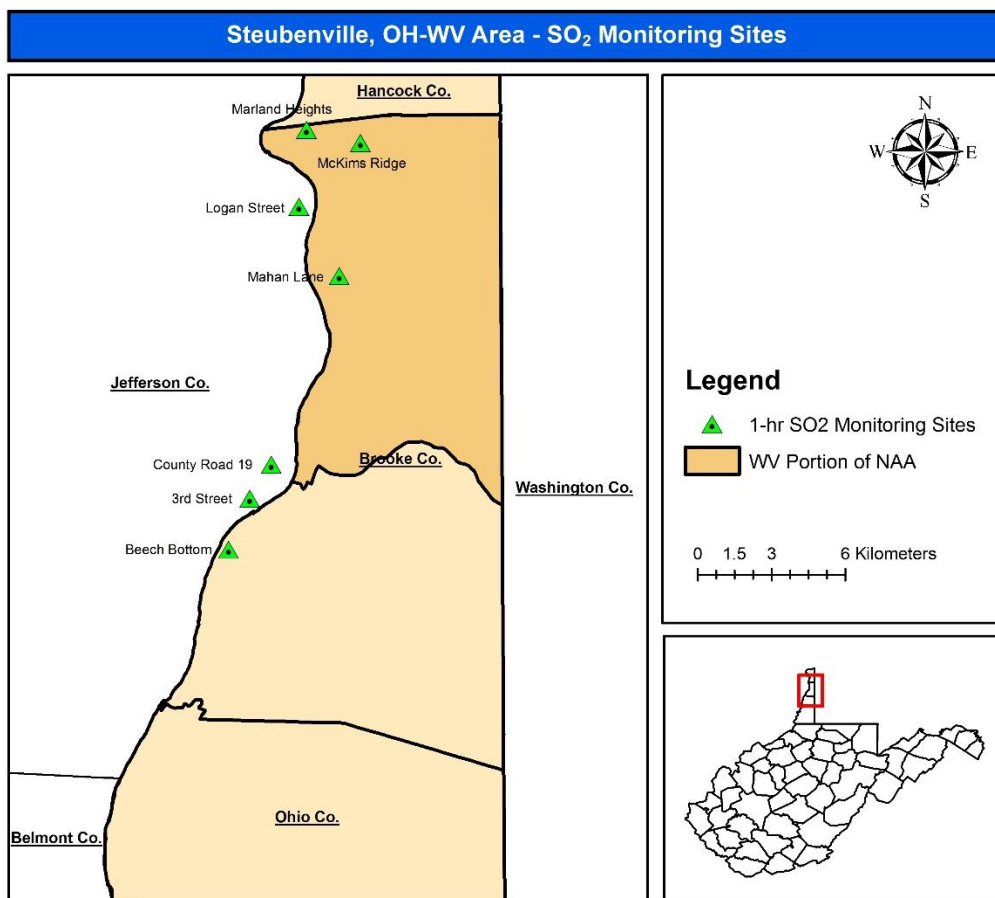
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<sup>1</sup> Memorandum from Stephen D. Page, Director, Office of Air Quality Planning and Standards, U.S. EPA, Research Triangle Park

monitoring sites are shown in Figure 1. A list of the design values based on the 3-year averages of annual concentrations from 2009-2011 through 2016-2018 is shown in Table 1. Data for the monitors is located in Appendix A.

The data in Appendix A has been quality assured up through 2018 in accordance with 40 CFR 58.10 and all other federal requirements. The data has been recorded in the Air Quality System (AQS) database (<https://www.epa.gov/outdoor-air-quality-data>) and is publicly available. Table 1 shows the 1-hr SO<sub>2</sub> design values for the State or Local Air Monitoring Station (SLAMS) network monitoring sites.

**Figure 1. Map of the Steubenville, OH-WV Area SO<sub>2</sub> Monitoring Site Locations**



| <b>Table 1: Steubenville, OH-WV Nonattainment Area 1-hr SO<sub>2</sub> Design Values</b> |                     |             |                           |                |                |                |                |                |                |                |                |                |
|--|---------------------|-------------|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| <b>Monitor</b>   | <b>Tax District</b> | <b>ID</b>   | <b>Design Value (ppb)</b> |                |                |                |                |                |                |                |                |                |
|  |                     |             | <b>2007-09</b>            | <b>2008-10</b> | <b>2009-11</b> | <b>2010-12</b> | <b>2011-13</b> | <b>2012-14</b> | <b>2013-15</b> | <b>2014-16</b> | <b>2015-17</b> | <b>2016-18</b> |
| Mahan Lane   | Cross Creek         | 54-009-0005 | 127                       | 127            | 119            | 115            | 88             | 51             | 44             | 38             | 37             | 36             |
| McKims Ridge   | Cross Creek         | 54-009-0007 | 129                       | 103            | 83             | 79             | 59             | 45             | 30             | 32             | 29             | 29             |
| Marland Heights  | Cross Creek         | 54-009-0011 | 157                       | 148            | 174            | 165            | 138            | 76             | 48             | 44             | 37             | 37             |
| Beech Bottom <sup>1</sup>  | Beech Bottom        | 54-009-6000 | --                        | --             | --             | --             | 32             | 23             | 23             | 29             | 31             | 29             |
| Logan Street   | Steubenville        | 39-081-0017 | 129                       | 116            | 109            | 111            | 81             | 53             | 32             | 29             | 25             | 26             |
| County Route 19 <sup>1</sup>   | Wells Township      | 39-081-0018 | --                        | --             | --             | --             | 48             | 42             | 47             | 40             | 38             | 25             |
| 3 <sup>rd</sup> Street <sup>1</sup>  | Wells Township      | 39-081-0020 | --                        | --             | --             | --             | 35             | 28             | 27             | 22             | 19             | 14             |

<sup>1</sup> Monitors were installed/began operation on January 1, 2011 as part of Cardinal Power Plant’s agreement with Ohio EPA to use alternative modeling techniques. All monitors have been operated equivalent to a SLAMS monitor since their inception, including operation under an approved Quality Assurance Project Plan (QAPP) with quality assurance/quality control (QA/QC) procedures. PTI Admin. Mod. P0104412 at 15; PTI Admin. Mod. P0104411 at 15.

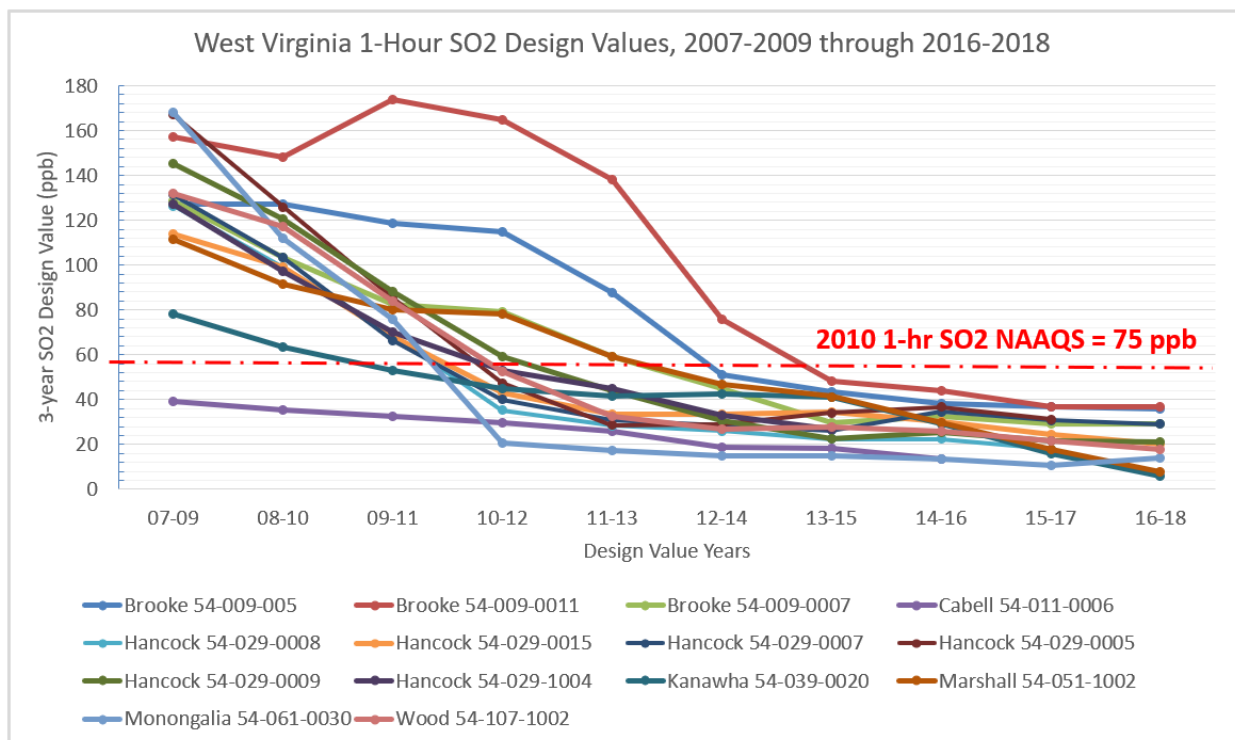
The EPA identified this area as nonattainment based on 2009-2011 air monitoring data. SO<sub>2</sub> ambient air quality monitoring data for the 4 most recent 3-year periods (2013-2015, 2014-2016, 2015-2017, and 2016-2018) demonstrate that the air quality meets the NAAQS for the 2010 1-hour SO<sub>2</sub> standard in this nonattainment area.

DAQ demonstrated the Steubenville, OH-WV area has attained the 2010 1-hour SO<sub>2</sub> standard based on dispersion modeling, submitted with the April 25, 2016 attainment demonstration. The modeled attainment demonstration was based on the allowable emissions from Mountain State Carbon (MSC), Mingo Junction Energy Center (also known as “R.G. Steel – Wheeling Mingo Junction”), the former Wheeling Pittsburgh Mingo Junction Steel Plant (“Mingo Junction Steel Works”), and the American Electric Power (AEP) Cardinal Power Plant. Ohio EPA has subsequently proposed a new sulfur dioxide limit for the Cardinal Power Plant and has performed supplemental air quality analyses and modeling with the new emission limit and revised source characteristics for Cardinal.

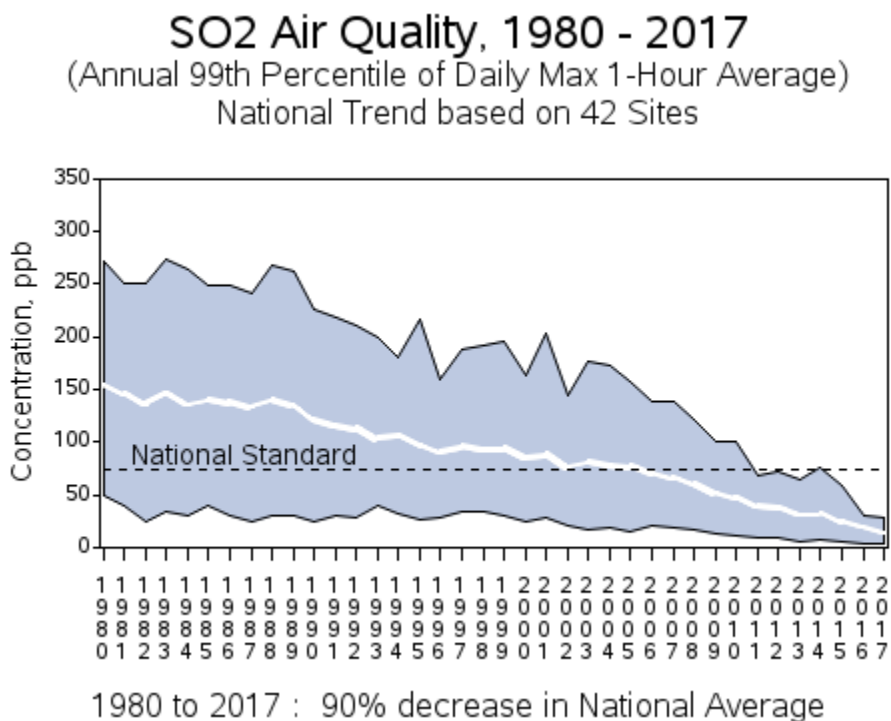
The air dispersion modeling results, supported by the air monitoring data, and the decreases in emission levels discussed in Section III, support a redesignation to attainment for the Steubenville, OH-WV area, based on the requirements in CAA Section 107(d)(3)(E).

There has been a clear downward trend in design values for all monitors in West Virginia, as shown in Figure 2. Design values have also trended downward nationally, as shown in Figure 3.

**Figure 2. West Virginia 1-Hour SO<sub>2</sub> Design Values, 2007-2009 through 2016-2018**



**Figure 3. SO<sub>2</sub> National Trend**



DAQ commits to continue monitoring SO<sub>2</sub> levels at the West Virginia sites indicated in Figure 1 and Table 1. DAQ will consult with EPA Region III prior to making changes to the existing monitoring network, should changes become necessary in the future. DAQ will continue to quality assure the monitoring data to meet the requirements of 40 CFR 58 and all other federal requirements. Connection to a center station and updates to the DAQ website will provide real time availability of the data and knowledge of any exceedances. DAQ will enter all data into AQS on a timely basis in accordance with federal guidelines.

**2. Modeling**

Dispersion modeling analyses were performed to demonstrate attainment with the 1-hr SO<sub>2</sub> NAAQS. This narrative describes both the modeling that was performed and submitted in April 2016 and the revised modeling performed by Ohio EPA with a new sulfur dioxide limit and revised stack characteristics for Cardinal Power Plant. Part j of this section focuses on the supplemental air quality modeling performed by Ohio EPA. A stakeholder workgroup consisting of representatives of WVDEP, Ohio EPA, AK Steel/Mountain State Carbon and their consultant (Trinity Consultants), and American Electric Power (AEP) had many discussions over many



months to help inform an appropriate modeling strategy consistent with applicable guidance. MSC performed the modeling analysis for this SIP revision in accordance with the final strategy as reviewed and approved by WVDEP. This section contains a summary of these modeling efforts with the full modeling analysis details contained in Appendix D.

*a. Source Inventory*

The sources identified to be explicitly modeled are the Mountain State Carbon facility in Follansbee, West Virginia, the Mingo Junction Energy Center, the former Wheeling Pittsburgh Mingo Junction Steel Plant (“Mingo Junction Steel Works”), and the AEP Cardinal Power Plant. The Mingo Junction Steel Works and Mingo Junction Energy Center sources are situated approximately one mile south-southwest of MSC on the opposite side of the Ohio River. The Cardinal Power Plant is located approximately six and a half miles south-southwest of MSC, also on the opposite side of the Ohio River.

MSC owns and operates a metallurgical coke production facility in Follansbee, West Virginia Follansbee Plant Operations at the Follansbee Plant include four (4) by-product recovery coke production batteries, four (4) boilers fired with COG generated in the batteries, an excess COG flare, and other miscellaneous combustion sources. Being situated in the Steubenville-Weirton, OH-WV 1-hour SO<sub>2</sub> nonattainment area, the Follansbee Plant was included in the dispersion modeling compliance demonstration as part of the SO<sub>2</sub> SIP revision submittal to USEPA.

The Mingo Junction Energy Center consists of four boilers permitted to burn desulfurized COG in addition to natural gas and clean blast furnace gas. The source of blast furnace gas has since been removed and it is MSC’s intent to no longer provide desulfurized COG to the boilers. This will be federally enforceable in Consent Order CO-SIP-C-2015-14 included as part of this SIP revision submittal. As such, the only remaining, potentially viable fuel for these boilers is natural gas. Thereby, the Mingo Junction Energy Center has been included in the model with emissions associated with this fuel option (0.5 pound per hour per boiler in accordance with Ohio EPA’s planned SIP). Any significant SO<sub>2</sub> emissions associated with this site in the future will require the appropriate Ohio EPA pre-construction permitting. Note that the Mingo Junction Energy Center is situated within the Mingo Junction Steel Works property boundary.

The Mingo Junction Steel Works consists of the following emissions units: one (1) electric arc furnace (EAF); one (1) ladle metallurgy furnace (LMF); and three (3) reheat furnaces.

Ohio EPA's SIP submittal included a compliance modeling demonstration that maintained the EAF and LMF at existing permit limits. However, the reheat furnaces are required to switch to natural gas.

AEP's Cardinal Power Station was shown by Ohio EPA to have a negligible model predicted impact in the northern portions of the nonattainment area at times when the model predicted the largest concentrations resulting from the sources in the north (i.e., MSC and the Mingo Junction sources). Nonetheless, this analysis conservatively included Cardinal Power Station emissions, as quantified by Ohio EPA in their SIP submittal.

*b. Source Characterization*

Characterization of each source of emissions is necessary for the dispersion modeling to be performed. The AERMOD Model provides for emission sources to be represented as point, area, or volume sources where stacks are generally characterized as point sources and fugitive emissions as an area or volume source depending on the specifics of the release in terms of areal coverage, inside or outside a building, vertical extent, etc. Sources in this modeling analysis are modeled as point sources, with exceptions noted as follows.

*c. Characterization of MSC's Coke Battery Fugitive Emissions*

The treatment of the fugitive emissions associated with the MSC batteries poses a unique consideration for this modeling analysis. Specifically, the fugitive emissions originate at points all along each battery and as such the most appropriate characterization in the AERMOD model is a volume source. However, volume source parameterization does not directly account for the thermal, buoyant momentum associated with hot releases such as the battery fugitive emissions. Therefore, the Buoyant Line and Point Source (BLP) dispersion model was used in this modeling analysis to provide more reasonable release parameters for input to AERMOD for the coke battery sources. The BLP dispersion model was developed by Environmental Research and Technology Inc. (ERT) to address the unique transport, including the unique plume rise, and diffusion of emissions from buoyant line sources (e.g., coke battery). BLP is a preferred/recommended model

for representing buoyant line sources per the *Guideline*.<sup>2</sup> BLP can simulate dispersion from line sources either using a single day of user supplied meteorological data or a full year of data prepared using the preprocessing utilities PCRAMMET or MPRM.

*d. MSC Emissions during Desulfurization Plant Outage*

The MSC desulfurization plant requires routine planned maintenance in order to continue normal operation throughout the remainder of the year. Maintenance is accomplished by shutting down the desulfurization plant operations for a period of 10 days on average throughout a planned outage timeframe. During this period, the desulfurization plant will be unable to control the SO<sub>2</sub> emissions from MSC emission units.

Due to the unavailability of the desulfurization plant, emissions during the outage period will be different from those during normal operation in the modeling analysis; however the emission calculation methodology is identical except for the control device reduction efficiency. To account for these temporally changing emissions during planned outages, hourly emission files were generated and utilized in the modeling analysis.

To address these desulfurization plant outages, an analysis was performed based on the three modeled years which included emissions from both normal operations and outage periods. The modeling analysis considered two (2) ten-day outage periods for each modeled year; one during April and one during November; and in doing so contemplates that the outage events occur during meteorologically desirable periods to ensure that ground level concentrations are minimized.

*e. Model Selection*

Dispersion models predict pollutant concentrations downwind of a source by simulating the evolution of the pollutant plume over time and space given data inputs that include the quantity of emissions and the initial exhaust release conditions (e.g., velocity, flow rate, and temperature). The USEPA-recommended AERMOD Model (Version 14134) was used for this analysis. AERMOD is a refined, steady-state (both emissions and meteorology over a 1-hour time step), multiple source, dispersion model that was promulgated by USEPA in December 2005 as the

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<sup>2</sup> EPA's *Guideline on Air Quality Models*, 40 CFR Part 51, Appendix W (Revised, November 9, 2005).

preferred model to use for industrial sources in this type of air quality analysis.<sup>3</sup> Following procedures outlined in the *Guideline on Air Quality Models*, the AERMOD modeling was performed using the regulatory default options in all cases.

In coordination with the use of AERMOD, the BLP model, which is the preferred/recommended model for representing buoyant line sources, was utilized to assist with the characterization of coke battery fugitive emissions included in the hourly emissions files. This approach is consistent with historic modeling of the Mountain State Carbon facility such as that performed in support of 2007 PM<sub>10</sub> SIP modeling and current SO<sub>2</sub> SIP modeling efforts conducted by Ohio EPA for the nonattainment area. Specifically, BLP was executed outside of AERMOD to inform AERMOD of the release height parameters for the volume sources modeled to represent the coke battery fugitives. This is necessary since AERMOD's volume source parameterization does not directly account for the thermal, buoyant momentum associated with hot releases such as the coke battery fugitive emissions. USEPA has recognized this need through the inclusion of the buoyant line source type as a "Beta" test option in AERMOD. The hybrid approach used in this modeling analysis achieves the same goal through the use of preferred models. Appendix H contains the alternative model approval by U.S. EPA for the BLP/AERMOD Hybrid approach.

*f. Meteorological Data*

To perform the transport and dispersion modeling analysis in AERMOD, the procurement and pre-processing of meteorological data is required. The AERMET program (Version 14134) is the companion program to AERMOD that generates both a surface file and vertical profile file of meteorological observations and turbulence parameters pertinent to the use of AERMOD. AERMET meteorological data are refined for a particular analysis based on the choice of micrometeorological parameters that are linked to the land use and land cover (LULC) around the particular meteorological site. By incorporating measured surface and upper air station National Weather Service (NWS) observation data to AERMET, a complete set of model-ready meteorological data is created.

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<sup>3</sup> 40 CFR 51, Appendix W—*Guideline on Air Quality Models*, Appendix A.1—AMS/EPA Regulatory Model (AERMOD).

AERMET processing is performed in a 3-stage system. The first stage reads and performs quality assurance/quality control (QA/QC) on the raw NWS surface and upper air data files. The second stage synchronizes the observation times and merges the surface and upper air files. The third stage incorporates user-specified micrometeorological parameters (albedo, Bowen Ratio, and surface roughness) with the observed meteorological data and computes specific atmospheric variables for use in the AERMOD Model. These variables are used to characterize the state of the atmosphere and its related turbulence and transport characteristics, including wind speed, wind direction, convective velocity, friction velocity, Monin-Obukhov Length, convective and mechanical mixing heights, etc. Meteorological input files for this modeling analysis were developed by using the most current version of the AERMET program (Version 14134).

On-site measurements from a tower and SODAR located near MSC's Follansbee, WV facility formed the basis for the surface data processing and were provided by Mountain State Carbon. The tower collects temperature, wind and solar radiation measurements at levels ranging from 2 meters (m) to 50 m above ground level. As discussed in the AERMET User's Guide Addendum, AERMET preferentially utilizes the on-site measurements wherever available. If all of the on-site measurements are missing for a given hour, AERMET then looks for surface observations from a user-specified NWS/FAA surface station location; Pittsburgh, PA (WBAN ID: 94823) in this case. Per the guidance, surface stations with 1-minute ASOS wind data are preferred for this process to alleviate numerous calm and/or variable wind observations present in the routine hourly observations. In the absence of on-site wind data for a given hour, the routine processed ASOS hourly observations from the surface station are then utilized.

To complete the surface data processing, the formatted on-site tower data file along with the 1-minute ASOS data and hourly surface data from Pittsburgh, Pennsylvania were utilized. The 1-minute ASOS data from Pittsburgh were then processed through AERMINUTE. In order for AERMINUTE to interpret observations from ice-free wind sensors, an installation date of July 28, 2009 was included in the AERMINUTE processing.

Once the AERMINUTE processing was completed, the Stage 1 AERMET processing was performed for the on-site and hourly surface data observations. Stage 2 processing was then completed to assimilate the 1-minute ASOS data and merge all of the records together.

Upper air radiosonde data from the same data period (1/1/2007-12/31/2009) taken from the Pittsburgh, PA radiosonde site were input during the Stage 1 AERMET processing and then the merge step in Stage 2 of AERMET.

*g. Receptor Grids*

The receptors utilized for the dispersion modeling analysis are identical to those utilized by the Ohio EPA to evaluate SO<sub>2</sub> impacts in the prescribed area. The following nested grids were used:

- *Fence Line Grid:* “Fence line” grid consisting of evenly-spaced receptors 25 meters apart placed along the main property boundary of each facility.
- *Fine Cartesian Grid:* A “fine” grid containing 50-meter spaced receptors extending approximately 1 km from the fence lines of the MSC, Mingo Junction, and AEP facilities.
- *Medium Cartesian Grid:* A “medium” grid containing 100-meter spaced receptors extending from 1 kilometer (km) to 2.5 km from the facility fence lines, exclusive of receptors on the fine grid.
- *Coarse Cartesian Grid:* A “coarse grid” containing 250-meter spaced receptors extending from 2.5 km to 5 km from facility fence lines, exclusive of receptors on the fine and medium grids.
- *Very Coarse Cartesian Grid:* A “very coarse grid” containing 500-meter spaced receptors extending from 5 km up to 12 km from facility fence lines, exclusive of receptors on the fine, medium, and coarse grids.

*h. Ambient Background Concentration*

The SIP modeling analysis submitted in April 2016 incorporated a background concentration of 8.1 ppb SO<sub>2</sub> (approximately 21.17 microgram per cubic meter (µg/m<sup>3</sup>))<sup>4</sup> into the AERMOD results contained in this report and Section J describes the updated background concentration used in the supplemental air quality analysis performed by Ohio EPA. This concentration was determined after consideration of design values from the SO<sub>2</sub> monitors nearest the MSC facility (e.g., 618 Logan Street in Steubenville, OH and Mahan Lane in Follansbee,

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<sup>4</sup> Ohio EPA’s Information for 2010 SO<sub>2</sub> Attainment Demonstration Appendix K, Dispersion Modeling and Weight-of-Evidence Analysis for Steubenville, OH-WV, 2010 SO<sub>2</sub> NAAQS Nonattainment Area (April 3, 2015). [http://www.epa.ohio.gov/portals/27/SIP/SO2/K1\\_10SO2Att\\_DispModAnalysis\\_Steubenville.pdf](http://www.epa.ohio.gov/portals/27/SIP/SO2/K1_10SO2Att_DispModAnalysis_Steubenville.pdf)

WV).<sup>5</sup> The Ohio EPA further describes the background selection process in in the modeling protocol contained in Appendix E of their attainment demonstration SIP.<sup>6</sup> Note that the Ohio EPA SIP submittal effectively concludes that AEP's Cardinal Plant contributions are incorporated into the background for the areas surrounding Mingo Junction and MSC. Nonetheless, this modeling analysis conservatively considers AEP's Cardinal Power Station as a separate modeled source. (The proposed SO<sub>2</sub> Attainment SIP for Ohio is contained in Appendix D.)

*i. Discussion of Results*

As described above, the modeling analysis submitted in April 2016 addresses SO<sub>2</sub> emissions from the Mountain State Carbon facility (both the normal operations and the limited duration planned maintenance outage periods) in Follansbee, WV, the Mingo Junction Energy Center, the former Wheeling Pittsburgh Mingo Junction Steel Plant ("Mingo Junction Steel Works"), and the AEP Cardinal Power Plant. For the 1-hr SO<sub>2</sub> NAAQS, the modeling constraint is related to time periods of planned MSC maintenance outages which imply that normal operating modes result in compliance with this NAAQS by even greater compliance margins. Ohio EPA has performed updated modeling, as summarized below and in detail in the appendices. This supplemental modeling analysis incorporates a new sulfur dioxide limit and revised stack characteristics at Cardinal Power Plant. WV DEP has reviewed, replicated, and concurred with the supplemental modeling analysis performed by Ohio EPA. The final design value modeled for this area at the final control strategy emission rates is 73.44 ppb.

*j. Supplemental Air Quality Modeling and Analyses*

Ohio EPA has adopted revisions to OAC Chapter 3745-18 containing a federally-enforceable, 30-day rolling average combined SO<sub>2</sub> limit of 4858.75 lb/hr for the coal-fired boiler Units 1, 2, and 3 (B001, B002, and B009) for the Cardinal Power Plant. Ohio EPA has conducted supplemental air quality modeling and analyses based on the federally-enforceable SO<sub>2</sub> limit for Cardinal Power Plant. This analysis modeled the Cardinal Power Plant along with the enforceable emission rates for other sources in the are already established by Ohio EPA and

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<sup>5</sup> Ohio EPA's State of Ohio Nonattainment Area State Implementation Plan Appendix A, Nonattainment Area AQS SO<sub>2</sub> Monitoring Data Retrievals.

[http://www.epa.ohio.gov/portals/27/SIP/SO2/A1\\_10SO2Att\\_Monitoring%20Data.pdf](http://www.epa.ohio.gov/portals/27/SIP/SO2/A1_10SO2Att_Monitoring%20Data.pdf)

<sup>6</sup> Ohio EPA's State of Ohio Nonattainment Area State Implementation Plan Appendix E, Modeling Protocol: Dispersion Modeling to Demonstrate Attainment of the 2010 SO<sub>2</sub> NAAQS.

[http://www.epa.ohio.gov/portals/27/SIP/SO2/E1\\_10SO2Att\\_ModelProt.pdf](http://www.epa.ohio.gov/portals/27/SIP/SO2/E1_10SO2Att_ModelProt.pdf)

WV DEP as part of prior analyses and submittals. The WV DEP has reviewed Ohio EPA's air quality modeling demonstration that relies on the revised SO<sub>2</sub> emission limit for the coal-fired boilers at the Cardinal Power Plant in Jefferson County, Ohio and concurs with Ohio EPA that the modeling demonstration ensures attainment and maintenance of the 2010 1-hour SO<sub>2</sub> NAAQS throughout the Steubenville OH-WV Nonattainment area, including the WV portion. The WV DEP considers Ohio's new modeling to be the most current and representative of the modeling demonstrations to date, including WV DEP's April 2016 modeling. The WV DEP provided a concurrence letter to U.S. EPA with a letter dated May 1, 2019 (included in Appendix G).

Ohio EPA reanalyzed the background concentration determined previously by Ohio EPA and WV DEP using more current air quality data. Ohio EPA began operating a background monitor nearby as a part of a preconstruction permitting project. The 2016-2018 design value of 5 ppb from this monitor is representative of background for this area and was used in the updated modeling.

Ohio EPA modeled three scenarios to ensure a facility-wide limit for Cardinal Power Plant would continue to provide for attainment and maintenance of the 2010 1-hour SO<sub>2</sub> NAAQS. Specifically, the three scenarios include: 1) the high load scenario apportioned to each of Cardinal Power's three units (Unit 1, Unit 2, and Unit 3), 2) the sum of all those emissions apportioned to a combined Unit 1 and Unit 2 Stack, and 3) the sum of all those emissions apportioned to the Unit 3 stack.

Based upon Ohio EPA's updated modeling, a critical emission value of 6,942.18 lb/hr for Cardinal Power was identified. This hourly modeled critical emission value was converted to a 30-day rolling average limit of 4,858.75 lb/hr. The 30-day limit, derived in accordance with the procedures outlined in U.S. EPA's April 23, 2014 SO<sub>2</sub> nonattainment area SIP guidance, is considered to be of comparable stringency to the 1-hour limit at the critical emission value. Ohio EPA's supplemental air quality modeling demonstrates the final control strategies will provide for attainment of the standard. The final design value modeled for this area at the final control strategy emission rates is 73.44 ppb.



## **B. The West Virginia Portion of the Steubenville, OH-WV Area Has Submitted an Approvable SIP Under Section 110(k) of the CAA**

On August 5, 2013, EPA promulgated the initial SO<sub>2</sub> nonattainment area designations for the 2010 1-hour SO<sub>2</sub> NAAQS for certain areas in the United States (U.S.), including the West Virginia portion of the Steubenville, OH-WV area. An effective date was set at October 4, 2013 [78 FR 47191]. The CAA requires states with SO<sub>2</sub> nonattainment areas to submit a plan within 18 months of the effective date of the designations (April 6, 2015) detailing how the SO<sub>2</sub> standards would be attained by October 4, 2018.

On April 25, 2016, West Virginia submitted, and requested EPA approve as a revision to the SIP, *Attainment Demonstration for the 1-hour National Ambient Air Quality Standard for Sulfur Dioxide (SO<sub>2</sub>) State Implementation Plan Revision for the West Virginia Portion of the Steubenville-Weirton, OH-WV Nonattainment Area, Comprising the Cross Creek Tax District of Brooke County*. The demonstration included a plan detailing how the standard would be met by October 4, 2018, and modeling results demonstrating that the standard would be met. On June 13, 2017, the EPA notified DEP that the submittal became complete by operation of law. Therefore, all applicable requirements under CAA Section 110(k) have been met.

## **C. The West Virginia Portion of the Steubenville, OH-WV Area's Air Quality Improvements is Due to Permanent and Enforceable Emissions Reductions**

MSC, the only significant source of SO<sub>2</sub> emissions located in the Cross Creek Tax District, is subject to the terms and conditions of Consent Order Number CO-SIP-C-2017-9, which, in the supplement to the Attainment Demonstration, the State requested be incorporated by reference into the SIP, making them permanent and federally enforceable. The allowable emission limitations in the Consent Order were modeled along with Mingo Junction Energy Center (also known as "R.G. Steel-Wheeling Mingo Junction"), the former Wheeling Pittsburgh Mingo Junction Steel Plant ("Mingo Junction Steel Works"), and the American Electric Power (AEP) Cardinal Power Plant in accordance with an EPA approved protocol. The modeling results demonstrate attainment of the 2010 1-hour SO<sub>2</sub> NAAQS.

Several federally enforceable control measures have been implemented in West Virginia during the past decade which contribute to the air quality improvement and will continue to reduce

emissions in the future. These are discussed in detail in Section V – Control Measures and Regulations.

In addition, Ohio EPA has identified federally enforceable control measures implemented during the past decade which have and will continue to reduce emissions. In addition to the Cardinal Power Plant being subject to the 2007 NSR Consent Decree, the Acid Rain Program, the Cross State Air Pollution Rule, and the Mercury and Air Toxics Standard (MATS) rule, the Cardinal Power Plant has restrictions on SO<sub>2</sub> emissions incorporated in OAC Chapter 3745-18 containing a federally-enforceable, 30-day rolling average combined SO<sub>2</sub> limit of 4858.75 lb/hr for the coal-fired boiler Units 1, 2, and 3 (B001, B002, and B009). Those amendments reduced the previous SIP allowable SO<sub>2</sub> emissions from Cardinal by more than 85%, to the levels established in the 2011 Permits-To-Install. Therefore, Cardinal cannot operate in a manner which increases emissions above the levels that have been shown not to contribute to any violating monitors since 2011. Both the Mingo Junction Energy Center and Mingo Junction Steel Works have ceased operations.

**D. The State Has Developed a Maintenance Plan for the West Virginia Portion of the Steubenville, OH-WV Area Which Ensures Attainment of the 2010 1-hour SO<sub>2</sub> Standard for at least Ten (10) Years**

Section 107(d)(3)(E) of the CAA stipulates that for an area to be redesignated to attainment, EPA must approve a maintenance plan that meets the requirements of Section 175A. A state may submit both the redesignation request and maintenance plan at the same time, and the plan adoption process, including rule-making or public hearing proceedings, may proceed on a parallel track. West Virginia is herein submitting a request to redesignate the West Virginia portion of the Steubenville, OH-WV area to attainment and is requesting that EPA concurrently process this request and the associated maintenance plan. Section III contains the Maintenance Plan.

**E. The West Virginia Portion of the Steubenville, OH-WV Area Has Met All Relevant Requirements Under Section 110 and Part D of the CAA**

For purposes of redesignation, a state must meet all requirements of Section 110 and Part D of the CAA that were applicable prior to submittal of the complete redesignation request. In April 2014, EPA distributed a non-binding guidance titled, *Guidance for 1-Hour SO<sub>2</sub> Nonattainment Area SIP Submissions* (SO<sub>2</sub> SIP Guidance). This document was intended to provide guidance and

recommendations to state, local, and tribal governments for the development of SIPs and tribal implementation plans (TIPs) for areas designated as nonattainment for the primary 2010 1-hour SO<sub>2</sub> NAAQS.

Subpart 1 of Part D of the CAA consists of general requirements applicable to all areas which were designated nonattainment based on a violation of the NAAQS. Subpart 5 of Part D of the CAA consists of more specific requirements applicable to SO<sub>x</sub>, nitrogen dioxide (NO<sub>2</sub>), or lead (Pb).

### **1. Section 110(a) Requirements**

Section 110(a) of the CAA contains the general requirements for a SIP. Section 110(a)(2) provides that the implementation plan submitted by a state must have been adopted by the State after reasonable public notice and hearing, and that, among other things, it must include enforceable emission limitations and other control measures, means or techniques necessary to meet the requirements of the CAA; provide for establishment and operation of appropriate devices, methods, systems and procedures necessary to monitor ambient air quality; provide for implementation of a source permit program to regulate the modification and construction of any stationary sources within the areas covered by the plan; including provisions for the implementation of Part C, prevention of significant deterioration (PSD) of air quality, and Part D of the CAA, new source review (NSR) permit programs; include criteria for stationary source emission control measures, monitoring, and reporting; include provisions for air quality modeling; and provide for public and local agency participation in planning and emission control rule development.

Section 110(a)(2)(D) also requires State plans to prohibit emissions from within the State which contribute significantly to nonattainment or maintenance areas in any other State, or which interfere with programs under Part C of the CAA, to prevent significant deterioration of air quality or to protect visibility.

On June 25, 2013, West Virginia submitted an infrastructure SIP (iSIP) for the 2010 SO<sub>2</sub> NAAQS. EPA subsequently approved this SIP revision on October 16, 2014 [79 FR 62022], but did not take action on Section 110(a)(2)(D)(i)(II) for visibility protection.

On June 3, 2015, West Virginia submitted a SIP revision pertaining to the 45 CSR 14 – *Permits for Construction and Major Modification of Major Stationary Sources for the Prevention of*

*Significant Deterioration of Air Quality* (PSD), which the EPA approved effective September 12, 2016 [81 FR 53008, 11 Aug 2016]. In this action the EPA approved the SIP revision for the PSD program and approved several of West Virginia's iSIP revisions as meeting the PSD elements of CAA Section 110(a)(2) for the 1997 Ozone and PM<sub>2.5</sub> NAAQS, the 2006 PM<sub>2.5</sub> NAAQS, the 2008 Lead and Ozone NAAQS, and the 2010 NO<sub>2</sub> and SO<sub>2</sub> NAAQS.

On September 16, 2015, West Virginia submitted a revision to the 2010 NAAQS SO<sub>2</sub> iSIP to address CAA Section 110(a)(2)(D)(i)(II) for visibility protection by relying on implementation of the Cross State Air Pollution Rule (CSAPR) FIP to complete the Regional Haze SIP which helps ensure that West Virginia electrical generating unit (EGU) emissions will not interfere with neighboring states' reasonable progress towards visibility improvement in Class I areas.

Rule 45 CSR 43, *Cross-State Air Pollution Rule (CSAPR) to Control Annual Nitrogen Oxides Emissions, Annual Sulfur Dioxide Emissions, and Ozone Season Nitrogen Oxides Emissions*, was adopted by the 2019 West Virginia Legislature, approved by the Governor and became effective May 1, 2019. Rule 43 incorporates the emission reduction requirements of 40 CFR 97 subpart CCCCC, the CSAPR SO<sub>2</sub> Group 1 Trading Program, in addition to the CSAPR NO<sub>x</sub> Annual Trading Program set forth in 40 CFR part 97, subpart AAAAA and the CSAPR NO<sub>x</sub> Ozone Season Group 2 Trading Program set forth in 40 CFR part 97, subpart EEEEE. This rule will be submitted to EPA as a revision to the West Virginia SIP in June, 2019. Until EPA approval of the SIP revision, West Virginia will remain subject to the CSAPR FIP.

## **2. Section 172(c) Requirements**

Section 172(c) of the CAA contains general requirements for nonattainment plans. The requirements for reasonable further progress, identification of certain emissions increases, and other measures needed for attainment do not apply for redesignations because they only have meaning for areas not attaining the standard.

DEP submitted the 2011 SO<sub>2</sub> inventory for the West Virginia portion of the Steubenville, OH-WV nonattainment area as part of the April 25, 2016, *Attainment Demonstration for the 1-hour National Ambient Air Quality Standard for Sulfur Dioxide (SO<sub>2</sub>) State Implementation Plan Revision for the West Virginia Portion of the Steubenville-Weirton, OH-WV Nonattainment Area, Comprising the Cross Creek Tax District of Brook County*, and request the EPA to approve the

attainment demonstration as a revision to the SIP, including the 2011 base year inventory required under CAA Section 172(c)(3).

### **3. Conformity**

The State must work with EPA to show that its SIP provisions are consistent with CAA Section 176(c)(4) conformity requirements. The redesignation request should include conformity procedures, if the state already has these procedures in place. If a state does not have conformity procedures in place at the time that it submits a redesignation request, the state must commit to follow EPA's conformity regulation upon issuance, as applicable. EPA approved West Virginia's Transportation Conformity SIP detailing conformity procedures, effective July 1, 2008 [73 FR 24175]. Section IV discusses this requirement in more detail.

### III. MAINTENANCE PLAN

CAA Section 107(d)(3)(E)(iv) stipulates that for an area to be redesignated, EPA must fully approve a maintenance plan that meets the requirements of Section 175(A). The maintenance plan will constitute a SIP revision and must provide for maintenance of the relevant NAAQS in the area for at least ten (10) years after redesignation. CAA Section 175(A) further states that the plan shall contain such additional measures, if any, as may be necessary to ensure such maintenance. EPA's April 2014, SO<sub>2</sub> SIP Guidance states:

Where the state has submitted an attainment plan for SO<sub>2</sub>, this plan in many cases can also serve as the basis for the maintenance demonstration for the area, insofar as attainment plans generally rely on maximum allowable emissions, these plans can generally be considered to demonstrate that the standard will be maintained without regard to any changes in operations rate of the pertinent sources.

In addition, the CAA requires the maintenance plan to contain such contingency measures as the Administrator deems necessary to assure prompt correction of any violation of the NAAQS which occur after the redesignation of the area as an attainment area. At a minimum, the contingency measures must include a requirement that the state will implement all measures contained in the nonattainment SIP prior to redesignation. EPA's April 2014, SO<sub>2</sub> SIP Guidance states:

In the "General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990," published on April 16, 1992, at 57 FR 13498, the EPA provides further discussion of contingency measures for SO<sub>2</sub>. This guidance suggests that in many cases, attainment revolves around compliance of a single source or a small set of sources with emission limits shown to provide for attainment. The guidance concludes that in such cases, "the EPA interprets 'contingency measures' to mean that the state agency has a comprehensive program to identify sources of violations of the SO<sub>2</sub> NAAQS and to undertake an aggressive follow-up for compliance and enforcement, including expedited procedures for establishing enforceable agreements pending the adoption of revised SIP's." See 57 FR 13547. Although this guidance applies to contingency measures for nonattainment plans under section 172(c)(9), the EPA envisions applying a similar policy with respect to the contingency measures required in maintenance plans under section 175A(d), to the extent consistent with section 175A(d)'s requirements that all NAA SIP or FIP requirements be implemented.

For the Steubenville, OH-WV nonattainment area compliance revolves around two sources, MSC in West Virginia and the Cardinal Power Plant in Ohio. Ohio EPA has proposed a revised

redesignation request and maintenance plan, *Redesignation Request and Maintenance Plan For the Ohio Portion of the Steubenville, OH-WV 1-hour SO<sub>2</sub> Nonattainment Area*, dated March 2019, which includes supplemental modeling results based on the new Cardinal Power Plant sulfur dioxide emission limit, and revised stack characteristics, for the Steubenville, OH-WV nonattainment area. (See Appendix D.) DEP is relying on the attainment modeling for the area as the basis for the maintenance plan. DEP is also providing an emissions inventory demonstration for Brooke County, as further evidence that the area will continue to attain the standard for 10 years.

West Virginia DAQ, in collaboration with Ohio EPA, selected the year 2030 as the end year of each state's maintenance plan. This document contains projected emissions inventories for 2023 and 2030. Since the three-year period 2009-2011 was the basis of the nonattainment designation, 2011 was selected as the nonattainment year. The pertinent inventory years are: 2011 (nonattainment year), 2016 (attainment year and maintenance plan base year), 2023 (interim year) and 2030 (maintenance plan end year). These specific emissions inventory demonstrations should be made:

1. The attainment year (2016) emissions of SO<sub>2</sub> must be less than the corresponding emissions in the nonattainment year (2011). The reductions must be attributable to federally enforceable emission reductions (as discussed in Section III. B and Section V).
2. The interim year (2023) emissions of SO<sub>2</sub> should be less than the maintenance plan base year (2016).
3. The end year (2030) emissions of SO<sub>2</sub> should be less than the maintenance plan base year (2016).

Based on information from West Virginia's State & Local Emissions Inventory System (SLEIS) database software that is used to collect Title V point source emissions, EPA's Air Market Program Data (AMPD) for EGUs, and Ohio EPA's Emissions Inventory System (EIS) for point sources in Ohio, West Virginia has seen a significant state-wide decline of tons of SO<sub>2</sub> emitted between 2011 and 2016. A summary of significant contributors in the Steubenville, OH-WV area are provided in Table 2.

| <b>Table 2: Reductions in SO<sub>2</sub> Emissions Between 2011 and 2016<br/>Tons per Year (tpy)</b> |                     |   |                            |                            |                 |
|--|---------------------|---|----------------------------|----------------------------|-----------------|
| <b>Location</b>  | <b>Tax District</b> | <b>Facility Name</b>                      | <b>2011 SO<sub>2</sub></b> | <b>2016 SO<sub>2</sub></b> | <b>% Change</b> |
| Brooke County, WV  | Cross Creek         | MSC                                       | 697 <sup>1</sup>           | 347 <sup>1</sup>           | -50.2%          |
| Jefferson County, OH   | Steubenville        | R.G. Steel-<br>Wheeling<br>Mingo Junction | 222 <sup>2</sup>           | 0 <sup>2</sup>             | -100%           |
| Jefferson County, OH   | Wells               | Cardinal Power                            | 25,200 <sup>3</sup>        | 9,195 <sup>3</sup>         | -63.5%          |

<sup>1</sup>Data obtained from WVDEP's SLEIS

<sup>2</sup>Data obtained from Ohio EPA's EIS (year emissions were last reported in 2012 – 74 tons)

<sup>3</sup>Data obtained from EPA's AMPD

Further, Table 3 clearly shows that total emissions from all sectors decreased in the period from 2011 to 2016 in the nonattainment areas. As outlined below, the reductions are enforceable and should continue in the future.

Ohio EPA's attainment demonstration, concerning the Ohio portion of the Steubenville, OH-WV nonattainment areas, indicated Cardinal Power is a well-controlled coal burning power plant equipped with a flue gas desulfurization system (FGD), which would require no additional controls as part of Ohio's attainment/control strategy portion of their SIP. With this noted, as indicated in Table 2, the closure of the R.G. Steel-Wheeling Mingo Junction, as well as the federally enforceable emission reduction measures, which include Consent Order Number CO-SIP-C-2017-09 for MSC will ensure the maintenance level emissions are not exceeded in the Steubenville, OH-WV area during the maintenance period. Note, the Mingo Junction Steel Works facility has not operated since 2008.

### **A. SO<sub>2</sub> Emission Projections**

Emission projections for the Brooke County, WV areas were performed using the following approaches:

- Emissions inventories are required to be projected to future dates to assess the influence of future growth and controls.
- EGU
- Non-EGU



- Oil & Gas 2011 NEIv2 SO<sub>2</sub> data was reprocessed using NEIv2.1 of the Oil and Gas Tool to address an error in NEIv2 that did not accurately represent the gas composition of the Appalachian Basin and Appalachian Basin (Eastern Overthrust Area) gas found in West Virginia. The 2016 SO<sub>2</sub> values represent the sum of SO<sub>2</sub> generated by actual oil and gas production and exploration activities. Using future year production projections from AEO2017, growth factors for years 2023 and 2030 were calculated using the methodology developed by EPA and documented in their 2011-2023en Oil and Gas Projection Factors dated August 24, 2017.
- Area Source emissions were projected for 2016, 2023, and 2030 based upon the 2011 NEIv2, and MARAMA projected 2017 and 2023 SO<sub>2</sub> emissions. The MARAMA's projections for 2017 SO<sub>2</sub> emissions for Brooke County (2017 MARAMA Beta Modeling Inventory in the EMF) is being used as the surrogate for 2016 SO<sub>2</sub> emissions for the county. This substitution is deemed reasonable based upon the "no-growth" observation of fuel usage, population, employment between 2016 and 2017 based upon MARAMA's Excel file "BETA Projection Non-Point 2016\_02\_20/Growth Raw Data".
- Non-road mobile source inventories for those categories calculated by the model were developed by DAQ personnel using daily NONROAD Model runs for 2023 and 2030, and summing the monthly data to obtain annual data.
- On-road mobile source emission projections are based on the EPA MOVES model run performed by DAQ staff. The analysis is described in more detail in Appendix B. All projections were made using federally approved interagency consultation procedures. As discussed in Section IV, DAQ determined that the mobile source emission contribution as a percent of the total emission inventory from the area is insignificant.

The detailed inventory information for the Brooke County, WV area is contained in Appendix B. The Cross Creek Tax District in Brooke County, WV was the only portion of the county designated nonattainment; however, the emission inventory data is for the entire county. Although the point source data includes the emissions for all point sources in the county, it should be noted that the only significant point source (i.e., MSC) is located in the Cross Creek Tax District.

Emission trends are an important gauge for continued compliance with the SO<sub>2</sub> standard. Therefore, DAQ performed an initial comparison of the inventories for the base year and

maintenance years. Sectors included in the following table (Table 3) are: electric generating units (EGU); non-electrical generating units including airports (Non-EGU); Oil and Gas (production and exploration activities); area sources including industrial and commercial/institutional combustion of coal, distillate, residual oil, natural gas, kerosene, wood with boilers and engines, waste disposal, agricultural burning, human cremation, residential wood combustion with woodstoves and fireplaces, commercial marine vessels' port and underway emission of diesel fuel, and railroad equipment diesel emissions; non-road and on-road mobile sources.

| <b>Location</b>                      | <b>Sector</b>                    | <b>2011<br/>(Base)</b> | <b>2016 (WV)<br/>and 2014 (OH)<br/>(Attainment)</b> | <b>2023<br/>(Interim)</b> | <b>2030<br/>(Maintenance)</b> |
|--------------------------------------|----------------------------------|------------------------|---|---------------------------|-------------------------------|
| <b>West<br/>Virginia<br/>Portion</b> | <b>EGU</b>                       | 0                      | 0   | 0                         | 0                             |
|                                      | <b>Non-EGU</b>                   | 730                    | 383   | 382                       | 381                           |
|                                      | <b>Oil &amp; Gas<sup>1</sup></b> | 1.56                   | 6.35  | 7.69                      | 8.11                          |
|                                      | <b>Area</b>                      | 143.46                 | 138.34  | 135.31                    | 134.32                        |
|                                      | <b>Non-Road</b>                  | 0.02                   | 0.01  | 0.01                      | 0.01                          |
|                                      | <b>On-Road</b>                   | 2.07                   | 2.02  | 0.79                      | 0.74                          |
|                                      | <b>TOTAL</b>                     | <b>877.11</b>          | <b>529.72</b>                                       | <b>525.80</b>             | <b>524.18</b>                 |
| <b>Ohio<br/>Portion<sup>2</sup></b>  | <b>EGU</b>                       | 25,122.42              | 10,660.65   | 9,602.02                  | 9,602.02                      |
|                                      | <b>Non-EGU</b>                   | 223.44                 | 0.02  | 0.02                      | 0.02                          |
|                                      | <b>Non-Road</b>                  | 0.29                   | 0.23  | 0.14                      | 0.15                          |
|                                      | <b>Other<br/>(Area)</b>          | 62.13                  | 57.76   | 56.67                     | 56.35                         |
|                                      | <b>On-Road</b>                   | 3.52                   | 3.46  | 1.38                      | 1.32                          |
|                                      | <b>TOTAL</b>                     | <b>25,411.80</b>       | <b>10,722.12</b>                                    | <b>9,660.23</b>           | <b>9,659.86</b>               |
| <b>WV</b>                            | <b>TOTAL</b>                     | 877.11                 | 529.72  | 525.80                    | 524.18                        |
| <b>OH</b>                            | <b>TOTAL</b>                     | 25,411.80              | 10,722.12   | 9,660.23                  | 9,659.86                      |
| <b>Combined</b>                      | <b>TOTAL</b>                     | <b>26,288.91</b>       | <b>11,251.84</b>                                    | <b>10,186.03</b>          | <b>10,184.04</b>              |

<sup>1</sup>See Appendix B for detailed explanation of the Oil and Gas value for 2011.

<sup>2</sup>Information provided by Ohio EPA, February 2018

## **B. Air Quality Improvement is Based on Permanent and Enforceable Reductions**

A demonstration that the improvement in air quality between the year violations occurred and the year attainment was achieved is based on permanent and enforceable emission reductions and not on temporary adverse economic conditions or unusually favorable meteorology.

EPA's redesignation guidance (Policy Memo from John Calcagni, Director, Air Quality Management Division to Regional Air Directors: *Procedures for Processing Requests to Redesignate Areas to Attainment*), dated September 4, 1992, states on page 9 regarding maintenance demonstration:

A State may generally demonstrate maintenance of the NAAQS by either showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory, or by modeling to show that the future mix of sources and emission rates will not cause violation of the NAAQS. Under the Clean Air Act, many areas are required to submit modeled attainment demonstrations to show that proposed reductions in emissions will be sufficient to attain the applicable NAAQS. For these areas, the maintenance demonstration should be based upon the same level of modeling. In areas where no such modeling was required, the State should be able to rely on the attainment inventory approach. In both instances, the demonstration should be for a period of ten (10) years following the redesignation.

The reduction in emissions is attributed to the closure of the R.G. Steel-Wheeling Mingo Junction and Mingo Junction Steel Works facilities and the restrictions on Cardinal Power Plant's SO<sub>2</sub> emissions in their permit; as well as the federally enforceable emission reduction measures at MSC, the requirements for which are contained in Consent Order Number CO-SIP-C-2017-9.

### **C. Emissions Tracking**

Provisions for future annual updates of the inventory to enable tracking of the emission levels, include an annual emission statement from major sources.

In West Virginia, major point sources in all counties are required to submit air emissions information annually. DAQ prepares a new periodic inventory for all SO<sub>2</sub> precursor emission sectors every three (3) years in accordance with EPA's Air Emissions Reporting Requirements (AERR). These SO<sub>2</sub> precursor inventories will be prepared for future years as necessary to comply with the inventory reporting requirements established in the CFR. Emission information will be compared to the 2011 base year and the 2030 projected maintenance year inventories to assess emission trends, as necessary, and to assure continued compliance with the annual SO<sub>2</sub> standard.

#### **IV. TRANSPORTATION ANALYSIS**

##### **A. MOVES Model**

For both on-road and non-road sources, a MOVES run specification was written using model defaults as the inputs for the target years (2011, 2016, 2023, and 2030) and pollutant (SO<sub>2</sub>). MOVES produced an annual SO<sub>2</sub> estimate in grams for each of the target years. MySQL was used to extract annual data from the MOVES output for Brooke County; totals converted to tons. To establish confidence in the model, actual mobile SO<sub>2</sub> emission values were obtained from EPA's EIS Gateway by requesting a mobile SO<sub>2</sub> emission report. These values represent local data previously submitted by West Virginia. Of the target years, 2011 is the most current year available from EPA. This SO<sub>2</sub> value was compared to the value estimated by the model using defaults. The difference was less than 0.3 tons per year; suggesting the defaults within the model produce accurate estimates. The MOVES run specification used to generate both the on-road and non-road emissions estimates can be found in Tables 4 and 5, respectively. The EIS report request parameters can be found in Appendix B.

| <b>Table 4: MOVES Inputs (On-Road)</b> |  |
|--|--|
| <b>Run Spec Parameter Settings</b>     |  |
| MOVES Version                          | MOVES2014a-20151201  |
| Scale                                  | Model: On-road<br>Domain/Scale: National<br>Calculation Type: Inventory  |
| <b>MOVES Modeling Technique</b>        |  |
| Time Span                              | Time Aggregation Level: Hour<br>Years: 2011, 2016, 2023, 2030<br>Months: All<br>Days: All<br>Hours: All  |
| Geographic Bounds                      | Brooke County, West Virginia   |
| Vehicles/Equipment                     | Fuels: All<br>Source Use Types: All  |
| Road Type                              | Selected Road Types: All   |
| Pollutants and Processes               | SO <sub>2</sub><br>Total Energy Consumption  |
| Strategies                             | None   |
| General Output                         | Units: Grams, Joules, Miles<br>Activity: Distance Traveled   |
| Output Emissions                       | Always<br>Time: Checked, Month<br>Location: Checked, County<br>Pollutant Checked<br><br>On-Road/Non-Road<br>On-Road and Non-Road: Checked<br>Road Type: Checked<br>Source Use Type: Checked<br>SCC: Checked<br>Regulatory Class: Unchecked<br><br>Non-Road:<br>Sector: Unchecked<br>Engine Tech.: Unchecked<br>HP Class: Unchecked<br>For All Vehicle/Equipment Categories<br>Model Year: Unchecked<br>Fuel Type: Checked<br>Emission Process: Checked<br>Fuel Subtype: Unchecked<br><br>Estimate Uncertainty: Unchecked<br>Number of Iterations: 2<br>Keep Pseudo-Randomly Sampled Input: Unchecked<br>Keep Output from Each Iteration: Unchecked |
| <b>County Data Manager Sources</b>     |  |
| Source Type Population                 | Default  |
| Vehicle Type VMT                       | Default  |
| I/M Program                            | Default  |
| Fuel Formulation                       | Default  |
| Fuel Supply                            | Default  |
| Meteorology Data                       | Default  |
| Ramp Fraction                          | Default  |
| Road Type Distribution                 | Default  |
| Age Distribution                       | Default  |
| Average Speed Distribution             | Default  |
| Alternative Fuel Type                  | Default  |

| <b>Table 5: MOVES Inputs (Non-Road)</b> |  |
|---|--|
| <b>Run Spec Parameter Settings</b>      |  |
| MOVES Version                           | MOVES2014a-20151201  |
| Scale                                   | Model: Non-road<br>Domain/Scale: National<br>Calculation Type: Inventory   |
| <b>MOVES Modeling Technique</b>         |  |
| Time Span                               | Time Aggregation Level: Day<br>Years: 2011, 2016, 2023, 2030<br>Months: All<br>Days: All<br>Hours: All   |
| Geographic Bounds                       | Brooke County, West Virginia   |
| Vehicles/Equipment                      | Non-Road Vehicle/Equipment<br>Fuels: All<br>Sectors: All<br>Selections: All  |
| Road Type                               | Selected Road Types: Non-road  |
| Pollutants and Processes                | SO <sub>2</sub>  |
| Strategies                              | None   |
| General Output                          | Units: Grams, Joules, Miles  |
| Output Emissions                        | <p>Always<br/>Time: Checked, 24-hour Day<br/>Location: Checked, County<br/>Pollutant Checked</p> <p>On-Road/Non-Road<br/>On-Road and Non-Road: Checked<br/>Road Type: Unchecked<br/>Source Use Type: Unchecked<br/>SCC: Checked<br/>Regulatory Class: Unchecked</p> <p>Non-Road:<br/>Sector: Checked<br/>Engine Tech.: Unchecked<br/>HP Class: Unchecked</p> <p>For All Vehicle/Equipment Categories<br/>Model Year: Unchecked<br/>Fuel Type: Checked<br/>Emission Process: Checked<br/>Fuel Subtype: Unchecked</p> <p>Estimate Uncertainty: Unchecked<br/>Number of Iterations: 2<br/>Keep Pseudo-Randomly Sampled Input: Unchecked<br/>Keep Output from Each Iteration: Unchecked</p> <p>Advanced Performance Features: None</p> |
| <b>County Data Manager Sources</b>      |  |
| Source Type Population                  | Default  |
| Vehicle Type VMT                        | Default  |
| I/M Program                             | Default  |
| Fuel Formulation                        | Default  |
| Fuel Supply                             | Default  |
| Meteorology Data                        | Default  |
| Ramp Fraction                           | Default  |
| Road Type Distribution                  | Default  |
| Age Distribution                        | Default  |
| Average Speed Distribution              | Default  |
| Alternative Fuel Type                   | Default  |

## B. On-Road and Non-Road Mobile Emissions Estimations

Mobile source emission projections, non-road and on-road, are based on the EPA MOVES model. All projections were made using federally approved interagency consultation procedures. From the data provided in Table 6, DAQ determined that the mobile emission contributions as a percent of the total emission inventory from the area is insignificant, ranging from a high of 0.38% (2016) to a low of 0.14% (2030).

| <b>Sector</b>   | <b>2011<br/>(Base)</b> | <b>2016<br/>(Attainment)</b> | <b>2023<br/>(Interim)</b> | <b>2030<br/>(Maintenance)</b> |
|-----------------|------------------------|------------------------------|---------------------------|-------------------------------|
| <b>Non-Road</b> | 0.02                   | 0.01                         | 0.01                      | 0.01                          |
| <b>On-Road</b>  | 2.07                   | 2.02                         | 0.79                      | 0.74                          |

## V. CONTROL MEASURES AND REGULATIONS

### A. Reasonably Available Control Measures (RACM) and Reasonably Available Control Technology (RACT)

Section 172(c)(1) of the CAA requires states with nonattainment areas to implement reasonably available control measures (RACM) and reasonably available control technology (RACT). States with nonattainment areas must submit a SIP providing for implementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonable available control technology).

As identified in EPA's April 2014 guidance, *Guidance for 1-Hour SO<sub>2</sub> Nonattainment Area SIP Submissions*:

Air agencies use the SIP process to identify the emissions sources that contribute to problems in areas designated as nonattainment, and to select the emissions reduction measures that the air agency judges to be most appropriate to implement in order for the affected area to attain the 2010 SO<sub>2</sub> NAAQS based on a variety of local factors such as population exposure, enforceability, and economic impact. To be approved by the EPA, NAA SIPs need to ensure that areas designated as nonattainment reach attainment as expeditiously as practicable.

The dispersion modeling results, which show the estimated the impact of the remaining SO<sub>2</sub> sources, show the area to be in attainment. With the area being in attainment well in advance of the attainment date of October 4, 2018, there is no need for additional measures to advance the attainment date. Therefore, no further RACM/RACT requirements apply.

### **B. Inventory of Actual Emissions**

CAA Section 172(c)(3) requires State plans to include “a comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutant or pollutants in such area, including such periodic revisions as the Administrator may determine necessary to assure that the requirements of this part are met.”

DEP submitted the 2011 SO<sub>2</sub> inventory for the West Virginia portion of the Steubenville, OH-WV nonattainment area as part of the April 25, 2016, *Attainment Demonstration for the 1-hour National Ambient Air Quality Standard for Sulfur Dioxide (SO<sub>2</sub>) State Implementation Plan Revision for the West Virginia Portion of the Steubenville-Weirton, OH-WV Nonattainment Area, Comprising the Cross Creek Tax District of Brook County*, and requests the EPA to approve the attainment demonstration as a revision to the SIP, including the 2011 base year inventory required under CAA Section 172(c)(3).

West Virginia will continue to provide updates to future inventories in accordance with EPA’s AERR rule. As discussed in Section III.C., West Virginia DAQ submits, and commits to submit, emission inventories every three (3) years.

### **C. Assurance that Existing Control Measures Will Remain in Effect**

West Virginia commits to maintaining the aforementioned control measures after redesignation. West Virginia hereby commits that any changes to its rules or emission limits applicable to SO<sub>2</sub>, as required for maintenance of the 1-hour SO<sub>2</sub> standard in the West Virginia portion of the Steubenville, OH-WV area, will be submitted to EPA for approval as a SIP revision.

West Virginia, through the DEP, DAQ, has the legal authority and necessary resources to actively enforce any violations of its rules or permit provisions. After redesignation, it intends to continue enforcing all rules that relate to the emission of SO<sub>2</sub> in the West Virginia portion of the Steubenville, OH-WV area.



## **VI. CONTINGENCY MEASURES**

### **A. Maintenance Plan Review**

West Virginia hereby commits to review its maintenance plan and submit any additional SIP revisions, as required by Section 175(A) of the CAA, eight (8) years after redesignation.

### **B. Corrective Actions**

West Virginia hereby commits to adopt and expeditiously implement necessary corrective actions in the following circumstances:

#### **1. Warning Level Response**

A warning level response shall be prompted whenever the 99<sup>th</sup> percentile of the 1-hour daily SO<sub>2</sub> maximum concentration of 75.5 ppb occurs in a single calendar year within the maintenance areas. A warning level response will consist of a study to determine whether SO<sub>2</sub> values indicate a trend toward higher SO<sub>2</sub> values or whether emissions appear to be increasing. The study will evaluate whether the trend, if any, is likely to continue and, if so, the control measures necessary to reverse the trend taking into consideration ease and timing for implementation as well as economic and social considerations. Implementation of necessary controls in response to a warning level response trigger will take place as expeditiously as possible, but in no event later than 12 months from the conclusion of the most recent calendar year.

Should it be determined through the warning level study that action is necessary to reverse the noted trend, the procedures for control selection and implementation outlined under “Action Level Response” shall be followed.

#### **2. Action Level Response**

An action level response shall be prompted whenever a 2-year average of the 99<sup>th</sup> percentile 1-hour SO<sub>2</sub> concentration of 75 ppb or greater occurs within the maintenance area. A violation of the standard (3-year average of the 99<sup>th</sup> percentile of 75 ppb or greater) shall also prompt an action level response. In the event the action level is triggered and is not found to be due to an exceptional event, malfunction, or noncompliance with a permit condition or rule requirement, DAQ in conjunction with the metropolitan planning organization (MPO) or regional council of governments, will determine additional control measures needed to assure future attainment of the 2010 1-hour SO<sub>2</sub> NAAQS. In this case, measures that can be implemented in a short time will be

selected in order to be in place within 18 months from the close of the calendar year that prompted the action level. DAQ will also consider the timing of an action level trigger and determine if additional, significant new regulations not currently included as part of the maintenance provisions will be implemented in a timely manner and will constitute our response.

### **3. Control Measure Selection and Implementation**

Adoption of any additional control measures is subject to the necessary administrative and legal process. This process will include publication of notices, an opportunity for public hearing, and other measures required by West Virginia for rulemaking.

If a new measure/control is already promulgated and scheduled to be implemented at the federal or State level, and that measure/control is determined to be sufficient to address the upward trend in air quality, additional local measures may be unnecessary. Furthermore, DAQ will submit to EPA an analysis to demonstrate the proposed measures are adequate to return the area to attainment.

#### **C. Potential Contingency Measures**

The EPA in their April 23, 2014, *Guidance for the 1-Hour SO<sub>2</sub> Nonattainment Area SIP Submissions*, in Section VIII.E.5. state:

In the “*General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990*,” published on April 16, 1992, at 57 FR 13498, the EPA provides further discussion of contingency measures for SO<sub>2</sub>. This guidance states that in many cases, attainment revolves around compliance of a single source or a small set of sources with emission limits shown to provide for attainment. This guidance concludes that in such cases, “the EPA interprets ‘contingency measures’ to mean that the state agency has a comprehensive program to identify sources of violations of the SO<sub>2</sub> NAAQS and to undertake an aggressive follow-up for compliance and enforcement, including expedited procedures for establishing enforceable consent agreements pending the adoption of revised SIP’s.” See 57 FR 13547. Although this guidance applies to contingency measures for nonattainment plans under section 172(c)(9), the EPA envisions applying a similar policy with respect to the contingency measures required in maintenance plans under section 175A(d), to the extent consistent with section 175A(d)’s requirement that all NAA SIP or FIP requirements be implemented.

The Steubenville, OH-WV area is an area where “attainment revolves around compliance of a single source or a small set of sources with emission limits shown to provide for attainment,”

specifically MSC in West Virginia and the Cardinal Power Station in Ohio. The MSC Consent Order and the Cardinal Power Station Permit establish monitoring, testing, recordkeeping and reporting requirements to assure compliance with SO<sub>2</sub> emission limits which have been demonstrated to not cause a violation of the standard. The DEP, and Ohio EPA, have comprehensive programs to identify sources of violations of the SO<sub>2</sub> NAAQS as outlined above, and EPA approved compliance and enforcement programs to undertake aggressive follow-up for any violations.

#### **D. SO<sub>2</sub> Source Potentially Subject to Future Additional Control Requirements**

The only facility with significant SO<sub>2</sub> emissions in the West Virginia portion of the Steubenville, OH-WV area, is MSC. MSC is a coke facility that produces metallurgical-grade coke and coke gas byproducts (e.g., light oil, ammonium sulfate, fuel gas, coal tar, sulfuric acid) from coal. This is the only existing facility in West Virginia subject to future controls.

### **VII. PUBLIC PARTICIPATION**

Notice of this proposed redesignation petition, a Class 1 Legal Advertisement, was placed in the Wheeling Intelligencer, Weirton Daily Times, and Charleston Gazette-Mail on May 24, 2019 and published in the State Register on May 24, 2019.

A Public Hearing is scheduled to be held at 6:00 PM on June 24, 2019, at the West Virginia DEP Northern Panhandle Regional Office located at 131A Peninsula Street, Wheeling, West Virginia.

Public participation documentation can be found in Appendix F.

### **VIII. CONCLUSIONS**

The Steubenville, OH-WV SO<sub>2</sub> nonattainment area has attained the 2010 1-hour SO<sub>2</sub> NAAQS and West Virginia has complied with the applicable provisions in the CAA regarding redesignation of SO<sub>2</sub> nonattainment area. Documentation to that effect is contained herein. West Virginia DAQ has prepared a redesignation request and maintenance plan that meet the requirements of Section 110(a)(1) of the CAA.

Based on this presentation, the West Virginia portion of the Steubenville, OH-WV SO<sub>2</sub> nonattainment area meets the requirements for redesignation under the CAA and EPA guidance. West Virginia has provided documentation that air quality improvements are due to permanent

and enforceable measures, and the associated maintenance plan demonstrates that the area will continue to meet the current SO<sub>2</sub> air quality standards for at least ten (10) more years.

The State of West Virginia hereby requests that the West Virginia portion of the Steubenville, OH-WV 2010 1-hour SO<sub>2</sub> nonattainment area be redesignated to attainment simultaneously with EPA approval of the CAA Section 175A maintenance plan provisions contained herein.