west virginia department of environmental protection

Appendix D:
State of Ohio Nonattainment Area State Implementation Plan and Demonstration of Attainment for 1-hour SO_2 Nonattainment Areas

West Virginia Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

Promoting a healthy environment.

[This page intentionally left blank.]

Only Information That Pertains to the Brooke County, WV Area is Included

Anyone interested may find Ohio's complete SIP and Demonstration of Attainment for the 1-hour SO_2 Nonattainment Areas at:

https://epa.ohio.gov/dapc/sip/SO2

REDESIGNATION REQUEST AND MAINTENANCE PLAN FOR THE OHIO PORTION OF THE STEUBENVILLE, OH-WV 1-HOUR SO_2 NONATTAINMENT AREA

Partial Jefferson County, Ohio

Prepared by:
Ohio Environmental Protection Agency
Division of Air Pollution Control

March 2019

This page left intentionally blank

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

This page left intentionally blank

REDESIGNATION REQUEST AND MAINTENANCE PLAN FOR THE OHIO PORTION OF THE STEUBENVILLE OH-WV 1-HOUR SO_2 NONATTAINMENT AREA

Partial Jefferson County, Ohio

CHAPTER ONE: Introduction

History

The Clean Air Act (CAA), as amended, requires each state with areas failing to meet the 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standard (NAAQS) to develop State Implementation Plans (SIPs) to expeditiously attain and maintain the standard. The United States Environmental Protection Agency (U.S. EPA) promulgated the revised NAAQS for SO_2 on June 2, 2010. U.S. EPA replaced the 24-hour and annual standards with a new short-term 1-hour standard of 75 parts per billion (ppb). The new 1-hour SO_2 standard was published on June 22, 2010 (75 FR 35520) and became effective on August 23, 2010. The standard is based on the three-year average of the annual 99th percentile of 1-hour daily maximum concentrations.

On August 15, 2013, U.S. EPA published (78 FR 47191) the initial SO_2 nonattainment area designations for the 1-hour SO_2 standard across the country (effective October 4, 2013). Unlike Subpart 2 of the CAA Amendments of 1990 which defined five ozone nonattainment classifications for the areas that exceed the NAAQS based on the severity of the ozone levels, SO_2 nonattainment designations are simply labeled "nonattainment." The CAA Amendments require states with SO_2 nonattainment areas to submit a plan within eighteen months of the effective date of the designations (April 4, 2015) detailing how the SO_2 standard will be attained by October 4, 2018 (referred to as an "attainment demonstration"). However, areas that attain before the required date for submitting a plan may be exempt from certain otherwise applicable requirements.

Section 107(d)(3)(E) of the CAA allows states to request nonattainment areas to be redesignated to attainment provided certain criteria are met. The following are the criteria that must be met in order for an area to be redesignated from nonattainment to attainment:

1. A determination that the area has attained the SO_2 standard. (CAA Section 107(d)(3)(E)(i))
2. An approved SIP for the area under Section 110(k). (CAA Section 107(d)(3)(E)(ii))
3. A determination that the improvement in air quality is due to permanent and enforceable reductions in emissions resulting from implementation of the SIP, federal requirements, and other permanent and enforceable reductions. (CAA Section 107(d)(3)(E)(iii))
4. A fully approved maintenance plan, including a contingency plan, under Section 175A. (CAA Section 107(d)(3)(E)(iv))
5. A determination that all Section 110 and Part D requirements have been met. (CAA Section 107(d)(3)(E)(v))

Each of these criteria is discussed in more detail under Chapter Two with a detailed analysis in subsequent chapters. This document is intended to support Ohio's request that the Ohio portion of the Steubenville OH-WV area be redesignated from nonattainment to attainment for the 1-hour SO_2 standard. This document addresses each of above requirements, and provides additional information to support continued compliance with the 1-hour SO_2 standard.

Geographical Description and Background

The current Steubenville OH-WV nonattainment area is located in eastern Ohio along the Ohio River. Within Ohio, it is comprised of the City of Steubenville and the following townships in Jefferson County: Cross Creek, Warren, Steubenville and Wells. Within West Virginia, it is comprised of the Cross Creek tax district in Brooke County. This area is shown in Figure 1 under Chapter Three.

Portions of the Steubenville OH-WV area were previously subject to nonattainment area rulemakings for the 1971 SO_2 NAAQS. Initial designations were promulgated on March 3, 1978, effective May 2, 1978 (43 FR 8962). However, as a result of public comment, final amended designations were promulgated and effective on October 5, 1978 (43 FR 45993). Within Jefferson County, the Cities of Steubenville and Mingo Junction and the following townships were designated nonattainment: Steubenville, Island Creek, Cross Creek, Knox and Wells. Subsequently, U.S. EPA approved a redesignation request and maintenance plan for this area on August 30, 1999, effective September 29, 1999 (64 FR 47113).

Status of Air Quality

SO_2 complete quality-assured ambient air quality monitoring data for the three (3) years, 2014 through 2016 and 2015 through 2017, demonstrate that the air quality has met the 1-hour SO_2 standard in this nonattainment area. (See Chapter Three) The NAAQS attainment, accompanied by decreases in emission levels discussed in Chapter Four, supports a redesignation to attainment for the Steubenville OH-WV area based on the requirements in Section 107(d)(3)(E) of the CAA as amended.

CHAPTER TWO: Requirements for Redesignation

U.S. EPA has published detailed guidance in a document entitled *Procedures for Processing Requests to Redesignate Areas to Attainment* (redesignation guidance), issued September 4, 1992, to Regional Air Directors. U.S. EPA has also published guidance specific to SO_2 in a document entitled *Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions* (SO_2 nonattainment area SIP guidance), issued April 23, 2014, to Regional Air Division Directors. This redesignation request and maintenance plan is based on the redesignation guidance and SO_2 nonattainment area SIP guidance, supplemented with additional guidance received from U.S. EPA Region 5 staff.

Below is a summary of each redesignation criterion as it applies to the Ohio portion of the Steubenville OH-WV area. The West Virginia Department of Environmental Protection (WVDEP) will prepare and submit their own redesignation request and maintenance plan indicating how they have fulfilled requirements relevant to the West Virginia portion of this nonattainment area. Where germane, Ohio EPA is providing additional information regarding WVDEP's redesignation request and maintenance plan; however, their full request should be consulted regarding all elements.

1. Attainment of the standard (CAA Section 107(d)(3)(E)(i))

There are two components involved in making this demonstration.

The first component relies on ambient air quality data. For SO_2, all available monitoring data in the area should indicate the standard is being met according to 40 CFR 50.17 and 40 CFR Part 50, Appendix T. Analyses should indicate whether any of the monitors located in the nonattainment area are located in the area of maximum concentration.

Demonstration: Chapter Three discusses this requirement in more detail and provides the demonstration.

The second component relies upon supplemental U.S. EPA-approved air quality modeling. Where a monitor(s) is located in the area of maximum concentration, a determination of attainment may be made based on monitoring data alone without the need for additional air quality modeling. When a nonattainment area has no monitors, or monitors are not located in the area of maximum concentration, air quality dispersion modeling is generally needed to estimate SO_2 concentrations in the area. Provided source and emissions characteristics remain consistent, modeling conducted as a part of the attainment demonstration should suffice.

Demonstration: Chapter Three discusses this requirement in more detail (Requirement 4 of 4) and provides the demonstration.

2. Approved SIP for the area under CAA Section 110(k) (CAA Section 107(d)(3)(E)(ii))

The SIP for the nonattainment would need to be fully approved and satisfy all applicable requirements for the area. U.S. EPA approval of SIP elements and redesignation requests may occur simultaneously.

Demonstration: Ohio EPA has submitted all required SIP elements for this area in either previous submittals, or as a part of this submittal. On April 3, 2015, and supplemented on October 13, 2015, Ohio EPA submitted our attainment demonstration SIP for this area. The attainment demonstration SIP satisfied the CAA Section 172 general requirements for areas designated as nonattainment for all NAAQS and the CAA Sections 191 and 192 nonattainment area requirements specific to SO2, with the exception of all necessary federally enforceable limitations. In accordance with U.S. EPA's SO_2 nonattainment area SIP guidance, an approvable attainment demonstration would be an air quality modeling analysis that demonstrates that the emission limits in the plan will suffice to provide for timely attainment of the affected standard. In cases where the necessary emission limits have not previously been made a part of the SIP or have not otherwise become federally enforceable, the plan needs to include the necessary enforceable limits in adopted form suitable for incorporation into the SIP in order for it to be approved by U.S. EPA. In order to meet this requirement for Cardinal Power Plant (Facility ID 0641050002), updated modeling was conducted (Appendix A) and the emission limit was established concurrent with this redesignation request. Effective [date], Ohio EPA adopted revisions to Ohio Administrative Code (OAC) Chapter 3745-18 containing a federally-enforceable emission limit for Cardinal Power Plant, specifically, a 30-day rolling average combined SO_2 emission limit of 4,858.75 lb/hr for the coal-fired boiler Units 1, 2 and 3 (B001, B002 and B009) (Appendix B). The October 13, 2015 submittal also included regulations promulgated under OAC Chapter 3745-18, effective October 23, 2015, containing federally enforceable limitations on emissions for subject sources in the Ohio portion of this area. Subsequently, on March 13, 2017 Ohio EPA submitted amended regulations in OAC Chapter 3745-18, effective February 16, 2017, containing updated federally enforceable limitations on emissions for subject sources in the Ohio portion of this area.[1]

3. Permanent and enforceable improvement in air quality (CAA Section 107(d)(3)(E)(iii))

The state must be able to reasonably attribute the improvement in air quality to emission reductions which are permanent and enforceable. The state should estimate the percent reduction achieved from federal measures as well as control measures that have been adopted and implemented by the state.

[1] All three submittals can be found in the table under the heading "Attainment Demonstration" at http://www.epa.ohio.gov/dapc/SIP/so2.aspx

Demonstration: Chapter Four discusses this requirement in more detail (Requirement 4 of 5) and provides the demonstration.

4. Maintenance plans (CAA Section 107(d)(3)(E)(iv))

Section 107(d)(3)(E) stipulates that for an area to be redesignated, U.S. EPA must fully approve a maintenance plan that meets the requirements of Section 175A. The maintenance plan will constitute a SIP revision and must provide for maintenance of the relevant NAAQS in the area for at least ten years after redesignation along with a commitment to review the plan. Section 175A further states that the plan shall contain such additional measures, if any, as may be necessary to ensure such maintenance.

In addition, the maintenance plan shall contain such contingency measures as the Administrator deems necessary to ensure prompt correction of any violation of the NAAQS. 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.

Demonstration: States seeking approval of a maintenance plan for a nonattainment area should consider the following provisions:

- attainment inventory (Chapter Four contains the discussion and demonstration);
- maintenance demonstration (Chapter Four contains the discussion and demonstration);
- monitoring network (Chapter Three contains the discussion and demonstration);
- verification of continued attainment (Chapter Four (Requirement 5 of 5) contains the discussion and demonstration); and
- contingency plan (Chapter Six contains the discussion and demonstration).

5. Section 110 and Part D requirements (CAA Section 107(d)(3)(E)(v))

For purposes of redesignation, a state must meet all requirements of Section 110 and Part D that were applicable prior to submittal of the complete redesignation request but not those that come due after submittal of the redesignation request.

a. Section 110(a) requirements

Section 110(a) of Title I of the CAA contains the general requirements for a SIP. Section 110(a)(1) generally directs states to submit a SIP that provides for implementation, maintenance, and enforcement of the air quality standards to the U.S. EPA after reasonable notice and public hearing. Section 110(a)(2) provides that the infrastructure SIP 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 limits and other control measures[2], 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 source within the areas covered by the plan; include provisions for the implementation of Part C, prevention of significant deterioration (PSD) and Part D, 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.

Demonstration: In Ohio's June 7, 2013 infrastructure SIP submission, Ohio verified that the state fulfills the requirements of Section 110(a)(1) and Section 110(a)(2) of the CAA with respect to the 2010 SO_2 NAAQS. Ohio's June 7, 2013 infrastructure SIP for the 2010 1-hour SO_2 standard contains SIP approved Ohio Administrative Code Chapter 3745-18, through which SO_2 emissions are directly regulated.

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 to prevent significant deterioration of air quality or to achieve reasonable progress toward the national visibility goal for Federal class I areas (national parks and wilderness areas).

In order to assist states in addressing their obligations regarding regionally transported pollution, U.S. EPA finalized the Clean Air Interstate Rule (CAIR) and then the Cross State Air Pollution Rule (CSAPR) to reduce SO_2 and NO_x emissions from large electric generating units (EGU). Ohio has met the requirements of the federal CAIR to reduce NO_x and SO_2 emissions contributing to downwind states. On February 1, 2008, U.S. EPA approved Ohio's CAIR program, which can be found in Ohio Administrative Code (OAC) Chapter 3745-109[3]. On July 6, 2011, U.S. EPA finalized a replacement to the CAIR program, the CSAPR. CSAPR assisted, and will further assist, states in addressing their obligations regarding regionally transported pollution by providing reductions in NO_x and SO_2 emissions beginning in 2015 and 2017[4].

[2] Other than nonattainment emission limits and measures which are a part of nonattainment area plans and subject to the timing requirements of Section 172 of the CAA.
[3] Note, Ohio EPA rescinded our CAIR rules effective January 29, 2018 as compliance is now required under the CSAPR Federal Implementation Plan.
[4] Timeline for implementation of CSAPR was adjusted from 2012 and 2014 to 2015 and 2017. (79 FR 71663)

b. Part D requirements

Subpart 1 of Part D consists of general requirements applicable to all areas which are designated nonattainment based on a violation of the NAAQS. Subpart 5 of Part D consists of more specific requirements applicable to SO_2[5].

i. Section 172(c) requirements

This Section contains general requirements for nonattainment plans. The requirements for reasonable further progress (RFP), identification of certain emissions increases, and other measures needed for attainment will not apply for redesignations because they only have meaning for areas not attaining the standard. The requirements for an emission inventory will be satisfied by the inventory requirements of the maintenance plan.

Demonstration: The emission inventory is discussed in Chapter Four and the maintenance plan is discussed below. The requirements of the Part D NSR program will be replaced by the PSD program once the area has been redesignated. The PSD program is discussed in Chapter Five (Requirement 5 of 6). The demonstrations are provided in these locations.

ii. Conformity

The state must work with U.S. EPA to show that its SIP provisions are consistent with the 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 U.S. EPA's conformity regulation upon issuance, as applicable.

Demonstration: Ohio EPA meets all of U.S. EPA's conformity procedures. Ohio EPA commits to following the general conformity requirements of 40 CFR 93.150 to 93.165. On August 20, 2014, Ohio EPA submitted signed Memorandums of Understanding (MOUs) to U.S. EPA establishing transportation conformity procedures for inclusion in Ohio's SIP. U.S. EPA issued a direct final rulemaking approving the MOUs on March 2, 2015 (80 FR 11133) with an effective date of May 1, 2015.

As described in the SO_2 nonattainment area SIP guidance, due to the relatively small, and decreasing, amounts of sulfur in gasoline and on-road diesel fuel, the U.S. EPA's transportation conformity rules provide that they

[5] Subpart 5 of Part D identifies requirements related only to plan submission deadlines and attainment dates. SIP submittal and attainment dates are discussed in the introduction of this submittal.

do not apply to SO_2 unless transportation conformity budgets exist for other reasons, such as that SO_2 is found to be a significant contributor to a $PM_{2.5}$ nonattainment problem, or if the SIP has established an approved or adequate budget for such emissions as part of the RFP, attainment or maintenance strategy. Neither of these circumstances applies here. As discussed in Ohio EPA's April 16, 2012[6] redesignation request and maintenance plan for the Steubenville-Weirton OH-WV area under the 1997 $PM_{2.5}$ standard and the May 25, 2012[7] redesignation request and maintenance plan for the Steubenville-Weirton OH-WV area under the 2006 $PM_{2.5}$ standard, mobile SO_2 was found to be an insignificant contributor to the $PM_{2.5}$ nonattainment problem. All of Jefferson County, OH and all of Brooke County, WV were included in those historical nonattainment areas and no SO_2 budgets exist for these counties. As discussed above, portions of the 2010 Steubenville OH-WV SO_2 nonattainment area were also designated as nonattainment under the 1971 SO_2 standard. However, no SO_2 budgets exist for Jefferson County, OH or Brooke County, WV under the older SO_2 standard. Therefore, mobile source SO_2 emission budgets are not required for this area.

[6] http://www.epa.ohio.gov/portals/27/SIP/Attain/PM2_5/Steubenville-Weirton_PM25_annual_redesignation_FINAL.pdf
[7] http://www.epa.ohio.gov/portals/27/SIP/Attain/PM2_5_24hr/Steubenville-Wierton_PM25_24-hr_redesig_Final.pdf

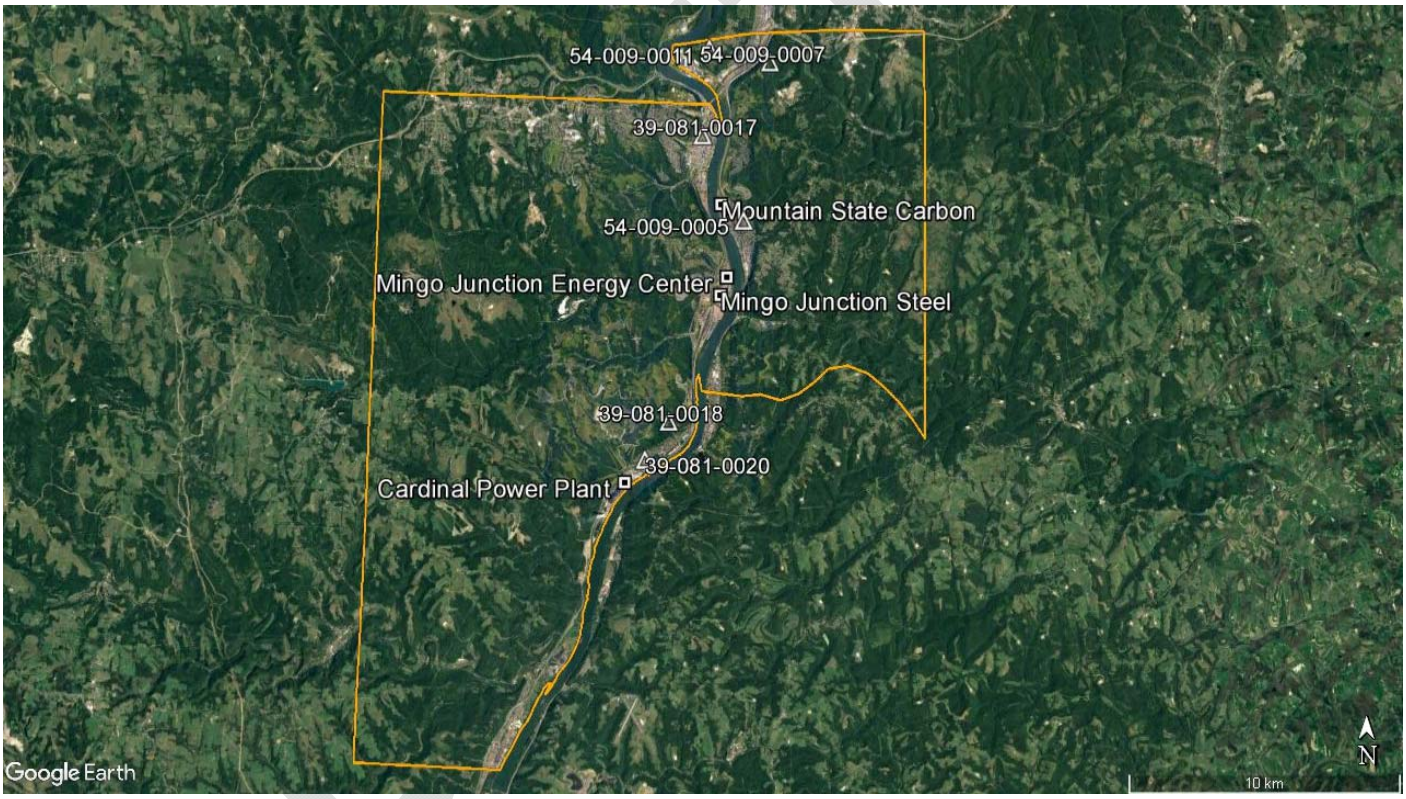
CHAPTER THREE: SO_2 Monitoring

CAA Section 107(d)(3)(E)(i)

Requirement 1 of 4: A demonstration that the NAAQS for 1-hour SO_2, as published in 40 CFR 50.17, has been attained.

There are six monitors measuring SO_2 concentrations in this nonattainment area. The monitors are operated by Ohio EPA's Southeast District Office (one monitor), the Cardinal Power Plant (two monitors)[8], and WVDEP (three monitors). The location of the monitoring sites for this nonattainment area are shown in Figure 1.

Figure 1 - Map of the Steubenville OH-WV nonattainment area and monitor locations



In accordance with 40 CFR Part 50, Appendix T, three complete years of monitoring data are required to demonstrate attainment at a monitoring site. The 1-hour SO_2 standard is

[8] Two additional monitors are a part of the Cardinal Power Plant monitoring network. One monitor is sited in West Virginia and is designated a NAAQS monitor (39-009-6000) but is outside of the nonattainment area boundaries. The second monitor is sited within the fenceline of Cardinal's substantial property and is therefore not designated a NAAQS monitor. All of Cardinal's monitors are QA/QC'd by Ohio EPA and operate under an approved Quality Assurance Project Plan meeting U.S. EPA regulatory requirements (see Ohio EPA's approved air monitoring network plan at http://epa.ohio.gov/dapc/ams/amsmain.aspx#126983982-air-monitoring-plan).

met at an ambient air quality monitoring site when the three-year average of the annual 99th percentile of 1-hour daily maximum concentrations is less than or equal to 75 ppb. The three-year average of the annual 99th percentile of 1-hour daily maximum concentrations is also called the site's "design value." To be complete, at least 75 percent of the days in each quarter of each of the three consecutive years must have at least one reported hourly value. Hourly SO_2 data are reported to U.S. EPA's Air Quality System (AQS). While calculating design values, one decimal place must be carried in the computations, with final values rounded to the nearest 1 ppb. Decimals 0.5 or greater are rounded up, and those less than 0.5 are rounded down. Values at or below 75 ppb meet the standard. Values greater than 75 ppb exceed the standard. An area is in compliance with the 1-hour SO_2 standard only if every monitoring site in the area meets the NAAQS. The air quality design value for the area is the highest design value among all sites in the area.

Demonstration: The most current, highest three-year average of the annual 99th percentile of 1-hour daily maximum concentrations, based on data from the monitoring sites in the area, is 38 ppb. A listing of the design value for 2014 through 2017 is shown in Table 1.

Table 1 - Monitoring data for the Steubenville OH-WV area for 2014 – 2017

Site	County	Year (ppb)				Average 2014-2016 (ppb)	Average 2015-2017 (ppb)
		2014	2015	2016	2017		
54-009-0005	Brooke, WV	33	49	33	28	38	37
54-009-0007	Brooke, WV	32	26	39	23	32	29
54-009-0011	Brooke, WV	48	35	49	27	44	37
39-081-0017	Jefferson, OH	30	29	27	18	29	25
39-081-0018	Jefferson, OH	38	50	31	34	40	38
39-081-0020	Jefferson, OH	24	23	20	13	22	19
	Less than 75% capture in at least one quarter						

Source: U.S. EPA Air Quality System (AQS); http://www.epa.gov/ttn/airs/airsaqs/index.htm

Requirement 2 of 4: Ambient monitoring data quality assured in accordance with 40 CFR 58.10, recorded in the AQS database, and available for public view.

Demonstration: Ohio EPA and WVDEP have quality assured all data shown in Appendix C in accordance with 40 CFR 58.10 and all other federal requirements. Ohio EPA and WVDEP have recorded the data in the AQS database and, therefore, the data are available to the public.

Requirement 3 of 4: A commitment that once redesignated, the state will continue to operate an appropriate monitoring network to verify the maintenance of the attainment status.

Demonstration: Ohio EPA commits to continue monitoring SO_2 levels at the Ohio sites, including those sites operated by Cardinal Power Plant, indicated in Figure 1 and Table 1. Ohio EPA will consult with U.S. EPA Region 5 prior to making changes to the existing monitoring network, should changes become necessary in the future. Ohio EPA will continue to quality assure the monitoring data to meet the requirements of 40 CFR 58 and all other federal requirements. WVDEP has made similar commitments regarding the monitors located in West Virginia as a part of their redesignation request and maintenance plan.

Requirement 4 of 4: Supplemental U.S. EPA-approved air quality modeling.

Where a monitor is located in the area of maximum concentration, a determination of attainment may be made based on monitoring data alone without the need for additional air quality modeling. When a nonattainment area has no monitors, or monitors not located in the area of maximum concentration, air quality dispersion modeling is *generally* needed to estimate SO_2 concentrations in the area. Provided source and emissions characteristics remain consistent, modeling conducted as a part of the attainment demonstration should suffice.

Demonstration: Ohio EPA prepared supplemental air quality modeling and submitted that modeling for approval as a part of Ohio's April 3, 2015 attainment demonstration SIP. Subsequently, WVDEP prepared supplemental air quality modeling and submitted that modeling for approval as a part of West Virginia's attainment demonstration SIP. Subsequent to that, U.S. EPA prepared supplemental air quality modeling to test the sensitivity of varying stack characteristics at Cardinal Power Plant. Lastly, Ohio EPA prepared updated supplemental air quality modeling as a part of this submittal and to support the final emissions limitation and attainment strategy adopted by Ohio EPA. Ohio EPA is requesting this updated supplemental air quality modeling replace the air quality modeling submitted as a part of Ohio's April 3, 2015 attainment demonstration SIP. The modeling efforts described above are discussed in more detail below.

Historical Supplemental Air Quality Modeling and Analyses:

Within the Steubenville OH-WV area there is one source categorized as an electric generating unit (EGU), Cardinal Power Plant, located in Ohio. There are no EGUs in the West Virginia portion of the area. There are four non-EGU sources in the Ohio portion and eight in the West Virginia portion. Cardinal Power Plant's 2011 emissions were 25,122.42 tons; however, it should be noted that by the beginning of 2012 Cardinal began operating a flue gas desulfurization (FGD) control device on their last remaining uncontrolled boiler thereby reducing future emissions significantly. Those 2011 emissions from Cardinal

accounted for 96% of SO_2 emissions in this area. Non-EGU emissions from both Ohio and West Virginia were 953.44 tons with the most significant source being Mountain State Carbon (WV) with 696.79 tons. Ultimately, Cardinal Power Plant (OH), Mountain State Carbon (WV), JSW Steel USA Ohio (the former Wheeling Pittsburgh Steel Plant, referred to as Mingo Junction Steel Works in the WVDEP attainment demonstration, hereinafter referred to as JSW Steel) (OH) and Mingo Junction Energy Center (OH) were selected for analysis. Their combined 2011 emissions accounted for 99% of the SO_2 emissions in the area. Therefore, Ohio EPA's attainment/control strategy analysis included these four sources.

As a part of Ohio's attainment demonstration SIP, Ohio EPA performed extensive modeling and weight-of-evidence analyses to determine if controls were necessary to provide for attainment of the 2010 SO_2 standard and ensure maintenance, once the standard was attained. These analyses demonstrated attainment of the standard and are discussed in greater detail in Appendix K of the attainment demonstration SIP (Appendix D).

Based on this analysis, Ohio submitted a SIP to U.S. EPA on April 3, 2015. Ohio EPA indicated in that submittal that federally enforceable emission limits for Ohio sources commensurate with the modeling and necessary to provide for attainment would be provided in a subsequent submittal after Ohio completes its rulemaking. Ohio promulgated regulations to address Ohio's final attainment strategy for the northern Ohio sources in Ohio EPA's SO_2 regulations under OAC Chapter 3745-18 and submitted these as part of the supplement to the attainment demonstration SIP submittal (Appendix M of the October 13, 2015 supplement to the attainment demonstration SIP). The following requirements were established:

JSW Steel:

- Reheat furnaces 2 to 4 (OEPA source numbers P006 to P008); a maximum of 1.0 pounds of sulfur dioxide per hour.
- Electric arc furnace number 1 (OEPA source number P913); a maximum of 105.0 pounds of sulfur dioxide per hour.
- Ladle metallurgical furnace to the electric arc furnace (OEPA source number P914); a maximum of 14.0 pounds of sulfur dioxide per hour.

Mingo Junction Energy Center:

- Units number 1 to 4 (OEPA source numbers B001 to B004) to exceed a maximum of 0.0028 pounds of SO^2 per MMBtu actual heat input from each boiler.

Ohio EPA did not establish emission limits for Cardinal Power Plant during the above rulemaking. In Ohio's attainment demonstration SIP, Ohio EPA modeled Cardinal Power Plant emissions as a high load scenario to determine the worst-case impact Cardinal Power Plant emissions would have on the ability to attain and maintain the 2010 SO_2 standard given the final strategy Ohio EPA identified for the northern sources.

Furthermore, Ohio used a hybrid approach to simulate the release of emissions for Cardinal's Unit 3 and Ohio EPA understand U.S. EPA considers this an alternative modeling approach that would require justification pursuant to the requirements of Section 3.2.2 of Appendix W, the Guideline on Air Quality Models. Therefore, Ohio is no longer pursuing this approach, Ohio no longer seeks consideration of that modeling, and Ohio intends for U.S. EPA to rely on the modeling presented in the Section below titled "Current Supplemental Air Quality Modeling and Analyses" instead.

The federally enforceable emission limit established for Mingo Junction Energy Center was more stringent than the critical value identified in Ohio's modeling analysis submitted on April 3, 2015. This was based on new developments that occurred since the April 3, 2015 submittal related to Mountain State Carbon. Historically, Mountain State Carbon supplied coke oven gas (COG) (and sometimes desulfurized COG) to both the former Wheeling Pittsburgh Steel Plant (now JSW Steel) and Mingo Junction Energy Center. The COG was burned at either the boiler(s) at Mingo Junction Energy Center or in the reheat furnaces at the former Wheeling Pittsburgh Steel Plant. However, as a part of an agreement between Mountain State Carbon, Ohio EPA and WVDEP, Mountain State Carbon was to disconnect the COG pipeline (completed on August 5, 2016) ensuring COG would no longer be burned at either facility. In addition, both facilities historically had the option to burn blast furnace gas from the former Wheeling Pittsburgh Steel Plant. The blast furnace was permanently shut down and dismantled years ago. Therefore, blast furnace gas can no longer be burned at either facility.

As part of Ohio's rulemaking for the northern Ohio sources, a compliance schedule was incorporated that provided for compliance no later than January 1, 2017.

Additionally, WVDEP entered into a consent decree (CO-SIP-C-2017-9) with Mountain State Carbon requiring permanent and enforceable emission reductions in SO_2. Details on those reductions required can be found in WVDEP's attainment plan submitted on April 25, 2016. WVDEP's modeling submitted with their attainment plan (Appendix E) included minor adjustments to the SO_2 emissions for Mingo Junction Energy Center and Mountain State Carbon when compared to those emissions modeled by Ohio EPA in our attainment demonstration SIP. This was as a result of the disconnection of the COG pipeline discussed above and as a result of the emission reductions required under the consent decree, which was finalized after Ohio EPA submitted our attainment demonstration SIP. Emissions for the other sources, including Cardinal Power Plant, were modeled by WVDEP consistent with Ohio EPA. However, WVDEP did use varying stack characteristics for Cardinal Power Plant when compared to Ohio EPA's modeling.

Ohio's sources (Mingo Junction Energy Center, JSW Steel and Cardinal Power Plant) are in compliance with the current federally enforceable emission limits. Mountain State Carbon in West Virginia is also in compliance with the current enforceable emission limits and the consent decree to the best of Ohio's knowledge.

Subsequent to the October 13, 2015 supplement to the attainment demonstration SIP submittal with finalized supporting regulations, Ohio EPA submitted another supplement to the attainment demonstration SIP on March 13, 2017. This submittal included amendments to Ohio EPA's regulations incorporating emission limits equivalent to limitations in Cardinal Power Plant's federally enforceable permits which were more stringent than the emission limits established in Ohio's first SO_2 SIP established under the 1971 SO_2 standard and included the removal of a provision from the older SIP allowing two exceedances to be used in a 30-day compliance determination. However, this level of emission limits was not set based on supplemental air quality modeling used to demonstrate attainment, and maintenance, of the 2010 SO_2 standard.

Based upon both the Ohio EPA and WVDEP modeling discussed above, U.S. EPA conducted additional supplementary modeling analyses using the same emissions rates as those modeled by WVDEP that contained the most current emission limits for all sources except Cardinal Power Plant (Appendix G). For Cardinal Power Plant, U.S. EPA modeled the same high load scenario emission rate that both Ohio EPA and WVDEP had modeled. However, U.S. EPA's analyses assessed the impact of alternative treatments for the release of emissions from the stacks at Cardinal Power Plant (compared to the characteristics modeled by Ohio EPA and WVDEP) and assessed the impact of expressing the various stack limits as a combined facility-wide limit. Ultimately, all three sets of analyses conducted by Ohio EPA, WVDEP and U.S. EPA identified attainment and maintenance of the 2010 SO_2 standard would be achieved at those modeled emission rates regardless of the stack characteristics assumed for Cardinal Power Plant and when converting the unit specific limits into a facility-wide limit. In addition, U.S. EPA's analyses also included an analysis of emissions data from the Cardinal Power Plant to estimate the degree of adjustment that would be needed to obtain a 30-day average limit that could be comparably stringent to the 1-hour facility-wide limit obtained from the high load scenario modeled by U.S. EPA.

Current Supplemental Air Quality Modeling and Analyses:

For SO_2, U.S. EPA requires federally enforceable emission limits demonstrated to assure continued attainment as a prerequisite for attainment plan approval and redesignation. As noted above, no prior SIP submittal by Ohio EPA incorporated federally enforceable emission limits consistent with modeled attainment demonstration rates for Cardinal Power Plant and therefore, Ohio's SIP did not fully provide for continued attainment. In order to meet this requirement for Cardinal Power Plant (Facility ID 0641050002), additional, more current, supplemental air quality modeling and analyses were conducted and an emission limit was established concurrent with this redesignation request. Effective [date], Ohio EPA adopted revisions to OAC Chapter 3745-18 containing a federally-enforceable, 30-day rolling average combined SO_2 emission limit of 4,858.75 lb/hr for the coal-fired boiler Units 1, 2 and 3 (B001, B002 and B009) (Appendix B).

The emission limit for Cardinal Power Plant was derived from updated supplemental air quality modeling conducted by Ohio EPA (Appendix A) to determine the final SO_2

attainment rate (critical value) that will provide for attainment and maintenance when modeled along with the enforceable emission rates for other sources in the area already established by Ohio EPA and WVDEP as a part of the prior analyses and submittals discussed above. These prior enforceable emission rates were consistent with the rates contained in the modeling conducted by WVDEP as part of their attainment demonstration (Appendix E)[9] and the supplemental modeling conducted by U.S. EPA (Appendix G). Ohio EPA performed modeling analyses to support this final attainment rate (critical value) as follows (and described in more detail in Appendix A):

- Ohio EPA reanalyzed the background concentration determined previously by Ohio EPA and WVDEP based on more current emission sources and using more current air quality data. The background concentration used in the historical modeling discussed above was based upon 2007-2009 air quality data. As discussed in the SO_2 nonattainment area SIP guidance, U.S. EPA suggests developing background concentrations using monitored design values for the latest 3-year period, regardless of the years of meteorological data used in the modeling. In addition, since the historical modeling discussed above was conducted, 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.
- Ohio EPA compared the modeling conducted by WVDEP and U.S. EPA using Cardinal Power Plant's high load scenario emissions rates and determined the U.S. EPA modeling was controlling in that the sensitivity analyses performed to ensure a facility-wide limit would continue to provide for attainment and maintenance showed the most significant impacts. Specifically, U.S. EPA modeled three scenarios that include: 1) the high load scenario emissions apportioned to each of Cardinal Power Plant'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[10], and 3) the sum of all those emissions apportioned to the Unit 3 stack. It was found that the most significant impacts occurred with the scenario of the sum of all emissions apportioned to a combined Unit 1 and Unit 2 stack.
- Using the modeling conducted by U.S. EPA, Ohio EPA performed modeling to determine an SO_2 attainment rate (critical value) for the controlling scenario of the sum of all emissions apportioned to a combined Unit 1 and Unit 2 stack at Cardinal Power Plant. All other sources were modeled at the final Ohio EPA and WVDEP emission rates. Other than adjusting the background concentration consistent with more current data, all other parameters and characteristics of the modeling remained consistent with U.S. EPA's.

[9] WVDEP used an alternative modeling approach using a combination of the Buoyant Line and Point Source model (BLP) and the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) to represent fugitive emissions from the four coke oven batteries at Mountain State Carbon. This alternative modeling approach received concurrence from U.S. EPA's Model Clearinghouse on October 26, 2018. On March 11, 2019, U.S. EPA Region 5 requested concurrence from the Model Clearinghouse on the use of this same approach to characterizing emissions from Mountain State Carbon in Ohio's updated supplemental modeling. The Model Clearinghouse concurred on March 14, 2019 (Appendix F).

[10] U.S. EPA's TSD contained in Appendix G provides justification for this plume merging.

- Ohio conducted additional modeling to assure that a plant-wide Cardinal Power Plant emission limit is justified, i.e. that the limit provides for attainment under the full range of permissible distributions of emissions among the stacks at Cardinal Power Plant. This modeling used U.S. EPA's source characterizations at Cardinal Power Plant and the SO_2 attainment rate (critical value) identified by Ohio EPA in the above step. This modeling demonstrated that attainment and maintenance of the 2010 SO_2 standard would be achieved at the SO2 attainment rate (critical value) when converting the unit specific limits into a facility-wide limit. Again, other than adjusting the background concentration consistent with more current data, all other parameters and characteristics of the modeling remained consistent.
- Lastly, Ohio EPA applied the same adjustment factor established in U.S. EPA's analysis of emissions data from the Cardinal Power Plant to estimate the degree of adjustment that would be needed to obtain a 30-day average limit that could be comparably stringent to the 1-hour facility-wide limit obtained from the final attainment rate modeling scenario conducted by Ohio EPA.

Ohio EPA's updated supplemental air quality modeling demonstrates the final control strategies at all four sources (as shown in Table 2) will provide for attainment and maintenance of the standard. The final design value modeled for this area at these emissions rates is 73.44 ppb. Ohio EPA also ensured this final control strategy would not interfere with attainment and maintenance of the standard outside the boundaries of the nonattainment area, given the complex terrain in the area.

Based on this updated modeling, a critical emission value of 6,942.18 lb/hr combined for the three coal-fired boilers was identified. A combined limitation is appropriate in this case because emissions from the three units should be largely interchangeable at the location of Cardinal's more significant impact near Mountain State Carbon (approximately 12-13 miles to the north). Informed by an analysis of 2013-2017 CAMD Data, the hourly emission limit was converted to a 30-day rolling average limit of 4,858.75 lb/hr[11]. The 30-day limit, derived in accordance with the procedures outlined in U.S. EPA's April 23, 2014 SO_2 nonattainment area SIP guidance, is considered to be of comparable stringency to the 1-hour limit at the critical emission value.

[11] Adjustment factor of 70.0% was calculated based on combined emissions from units 1, 2 and 3, with corrections to select instances of Part 75 substitutions which were skewing the calculation.

Table 2 - Steubenville OH-WV Modeled Attainment Rates and SO_2 Emission Limits

Facility	Source ID	WV/U.S. EPA Modeled Rate (lb/hr)	Final Ohio EPA Modeled Rate (lb/hr)	SO_2 Limit (lb/hr unless noted otherwise)
Mingo Junction Energy Center	Unit 1	0.5	0.5	0.0028 lb/mmBTU[12]
	Unit 2	0.5	0.5	0.0028 lb/mmBTU[12]
	Unit 3	0.5	0.5	0.0028 lb/mmBTU[12]
	Unit 4	0.5	0.5	0.0028 lb/mmBTU[12]
JSW Steel USA Ohio[13]	Reheat Furnace 2	1	1	1
	Reheat Furnace 3	1	1	1
	Reheat Furnace 4	1	1	1
	LMF	14.0	14.0	14.0
	EAF	105.0	105.0	105
Mountain State Carbon[14]	Battery 1 Fugitives	3.5	3.5	N/A
	Battery 2 Fugitives	3.5	3.5	N/A
	Battery 3 Fugitives	3.5	3.5	N/A
	Battery 8 Fugitives	16.1	16.1	N/A
	Battery 1-2-3 Pushing	10.48[15]	10.48	10.48
	Battery 8 Pushing Scrubber	15.7	15.7	15.72
	Acid Stack	6.0	6.0	6.0
	Boiler 10	90.0	90.0	85.7 (24-hour average)[16]
	Boiler 6			
	Boiler 7			
	Boiler 9			
	COG Flare	139.8	139.8	7.1 MMCF/day[17]
	Battery 1 Stack	22.9	22.9	21.4 (24-hour average)[16]
	Battery 2 Stack	22.9	22.9	21.4 (24-hour average)[16]
	Battery 3 Stack	25.7	25.7	24.5 (24-hour average)[16]
	Battery 8 Stack	122.1	122.1	115.4 (24-hour average)[16]
Cardinal	Unit 1	2621.0	6,942.18	4,858.75 lb/hr (30-day rolling average)[18]
	Unit 2	2121.7		
	Unit 3	1259.9		

[12] Equivalent to modeled rate.
[13] former Wheeling Pittsburgh Steel Plant (referred to as Mingo Junction Steel Works in WV Attainment Demonstration).
[14] Modeled emission rates and SO_2 Limits for Mountain State Carbon representative of emissions during desulfurization plant operation. During maintenance outages, the Consent Order establishes applicable requirements including, but not limited to, a limit on the sulfur content of the coal and reduced operations.
[15] WVDEP identified a discrepancy between modeled emission rates identified in the WVDEP Attainment Demonstration (Appendix E, Table A-5) and actual modeled rates for these units. The data in this table represents actual modeled rates as confirmed by WVDEP.
[16] Equivalent 24-hour limits based on adjustment factor computed in accordance with U.S. EPA's April 23, 2014 SO_2 nonattainment area SIP guidance, as described in WVDEP Attainment Demonstration Modeling, Averaging Period Analysis (see Appendix E).
[17] Current permit limit. Modeled rate is higher due to potential future increased limit to 24 MMCF/day.
[18] 30-day rolling average was derived from critical emission rate value of 6,942.18 lb/hr (modeled emission rate for all three boilers combined), based on adjustment factor computed in accordance with U.S. EPA's April 23, 2014 SO_2 nonattainment area SIP guidance (see Appendix G).

CHAPTER FOUR: Emission Inventory

CAA Section 107(d)(3)(E)(iii)

U.S. EPA's redesignation guidance requires the submittal of a comprehensive inventory of SO_2 emissions representative of the year when the area achieves attainment of the 1-hour SO_2 air quality standard. Ohio also must demonstrate that the improvement in air quality between the year that violations occurred and the year that attainment was achieved is based on permanent and enforceable emission reductions. Other emission inventory related requirements include a projection of the emission inventory to a year at least 10 years following redesignation; a demonstration that the projected level of emissions is sufficient to maintain the 1-hour SO_2 standard; and a commitment to provide future updates of the inventory to enable tracking of emission levels during the 10-year maintenance period.

Requirement 1 of 4: A comprehensive emission inventory of SO_2 completed for the base year and a projection of the emission inventory to a year at least 10 years following redesignation.

Periodic inventories, which include emissions from all sectors - mobile, area, non-road, and point sources - are prepared every three years. The 2011 periodic inventory has been identified as one of the preferred databases for SIP development and coincides with nonattainment air quality in the Steubenville OH-WV area. The 2011 inventory is used as the base year for the purpose of this submittal and coincides with the base year inventory submitted to U.S. EPA to fulfill all emission inventory requirements under the 2010 SO_2 standard.

For the attainment year, 2014 was selected since it corresponds to one of the years in the design values showing attainment (2014 – 2016 and 2015 – 2017). The 2014 attainment year also corresponds to the year where the permanent and enforceable improvement in air quality leading to attainment occurred due to Cardinal's installation of the FGD for its only remaining uncontrolled unit (operating beginning in 2012), ceasing of operations at Mingo Junction Energy Center (last operated in 2012) and the enforceable emission reduction measures at Mountain State Carbon (discussed in greater detail in WVDEP's redesignation request and maintenance plan).

Ohio EPA selected the year 2030 as the maintenance year for this redesignation request. This document contains projected emission inventories for 2023 (interim year) and 2030.

The information below describes the procedures Ohio EPA used to generate the 2011 base year inventory, 2014 attainment inventory and future year emission projections.

For each of West Virginia's sectors, Ohio EPA used WVDEP data as contained in the WVDEP's redesignation request and maintenance plan with the following exceptions:

- WVDEP provided Ohio EPA with 2014 point source data (EGUs and non-EGUs) from their State & Local Emissions Inventory System (SLEIS) (Appendix H).
- Ohio EPA assumed 2014 non-road, other and on-road emissions were the same as 2016 emissions as contained in WVDEP's redesignation request and maintenance plan.

For each of Ohio's sector as follows:

- Non-road, other and on-road 2014 emissions were collected from the 2014NEIv1 data available on U.S. EPA's National Emissions Inventory website[19].
- 2014 actual point emissions (for EGUs and non-EGUs) were derived from state inventory databases (e.g., Ohio's Emission Inventory System (EIS) database which serves as the basis for the NEI).
- Non-road, point source (EGUs and non-EGUs), other and on-road emissions were collected from the data available on U.S. EPA's Air Emissions Modeling website[20]. Using Emissions Modeling platform 2011v6.3, data were collected for the 2011 National Emissions Inventory (NEI) year and the 2017, 2023 and 2028 U.S. EPA-projected inventories. Therefore, 2011 point emissions are actual reported emissions from the 2011 NEI.
    - Specific versions of the 2011v6.3 platform used were 2011el, 2017ek, 2023el and 2028el. Differences between the ek and el platforms are not expected to be significant in the Steubenville OH-WV area as updated emissions were primarily for California, Mexico and Canada[21].
- Using the above datasets:
    - Adjustments were made to 2011 EGU emissions. U.S. EPA included Mingo Junction Energy Center in the EGU sector and Ohio EPA moved this source to the non-EGU sector. U.S. EPA reported Cardinal Power Plant emissions as 25,121.83 tons while Ohio EPA's EIS identified 25,122.42 tons. Ohio's data was used.
    - Adjustment was made to the 2011 non-EGU emissions. U.S. EPA reported Mingo Junction Energy Center emissions as 222.46 tons while Ohio EPA's EIS identified 222.48 tons. Ohio's data was used.
    - Adjustment was made to 2023 and 2028 emissions for the non-EGU sector. In the 2023el and 2028el, U.S. EPA projected emissions from all non-EGU facilities (including Mingo Junction Energy Center) to gradually decrease from 2011 levels: However, all four of the non-EGU sources in this area have ceased operations with the two largest non-EGUs, Mingo Junction Energy Center last operating in 2012 and the former Wheeling Pittsburg Steel Plant, now JSW Steel, last operating in 2009[22]. For Mingo Junction Energy Center, non-EGU emissions were kept at 2014 levels for 2023 and 2030. Even if Mingo Junction

[19] https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data
[20] https://www.epa.gov/air-emissions-modeling/2011-version-63-platform
[21] https://www.epa.gov/sites/production/files/2017-11/documents/2011v6.3_2028_update_emismod_tsd_oct2017.pdf (see p. 5)
[22] Minimal emissions have been reported for some facilities due to ancillary activities at roadways or for space heating of remaining structures. All significant SO2 operations have ceased.

Energy Center were to resume operation, any SO_2 emissions would be minimal due to the restriction on types of gas that could be burned. As the former Wheeling Pittsburg Steel Plant, now JSW Steel, is planning to resume operations of the electric arc furnace (EAF), average 2005-2008[23] historical emissions for the EAF (P013) and the ladle metallurgical furnace (LMF, P014) were added back in to the 2023 and 2030 projections. Historical emissions from the reheat furnaces were considered as they will no longer be burning coke oven gas or blast furnace gas. There are no other remaining SO_2 sources at JSW Steel.

- Adjustment was made to 2023 and 2028 emissions for the EGU sector. After Mingo Junction Energy Center was moved to the non-EGU sector, only Cardinal Power Plant remained in the area. In the 2023el and 2028el, U.S. EPA projected emissions to decline by 25% between 2011 and 2023 and 7% between 2023 and 2028. In actuality, after the final FGD was installed on the remaining coal fired boiler, emissions have declined by 62% on average from 2012 to 2016. Were Ohio EPA to assume U.S. EPA's 2023 and 2028 projections were accurate that would increase the post FGD average emissions by 49% and 45%, respectively. This is unrealistic. Cardinal Power Plant's 2012 to 2016 emissions have remained steady as can be seen from Figure 2 under Requirement 2 of 4 below. Although Ohio EPA finalized a federally-enforceable emission limit to Cardinal Power Plant which affected allowable emissions, Ohio EPA does not anticipate any change to actual emissions. Therefore, Ohio EPA assumed 2023 and 2030 emissions would remain consistent with the average 2012 to 2016 post-FGD emissions.
- 2030 emissions for non-road, other and on-road sectors were assumed equivalent to those from the 2028 U.S. EPA-projected emissions (2028el), after the above adjustments were made.

- County-wide non-road, other and on-road emissions were adjusted to city and township level emissions using population ratios and VMT ratios consistent with those used in the attainment demonstration SIP[24]. For non-road and other emissions, the county-wide emissions were adjusted to township level emissions for partial nonattainment areas using a population ratio based on population in each township compared to the entire county during 2011. For on-road emissions, the county-wide emissions were adjusted to township level based on the Vehicles Miles Traveled (VMT) ratio of each township to the entire county. In this case, the ratio developed from projected 2011 VMT was used as it was slightly higher, and therefore more conservative, than 2018 VMT.
- Biogenic emissions are not included in these summaries.

[23] EAF and LMF operated from 2004 to 2009. Partial years (2004 and 2009) were not included in the average annual emissions.
[24] http://epa.ohio.gov/portals/27/SIP/SO2/B1_10SO2Att_Inventory.pdf

Demonstration: Sectors included in Table 3, 4 and 5 are: Electrical Generating Unit (EGU-Point); Non-Electrical Generating Unit (Non-EGU); Non-road Mobile (Non-road); Other (Area); and On-road Mobile (On-road).

Table 3 - Ohio portion SO_2 emission inventory totals for base year 2011, attainment 2014, and projected 2023 and 2030 (tpy)

Sector	2011 Base	2014 Attainment	2023 Interim	2030 Maintenance	Safety Margin
EGU Point	25,122.42	10,660.65	9,602.02	9,602.02	1,058.63
Non-EGU	223.44	0.02	198.03	198.03	-198.01
Non-road	0.29	0.23	0.14	0.15	0.08
Other	62.13	57.76	56.67	56.35	1.41
On-road	3.52	3.46	1.38	1.32	2.14
TOTAL	25,411.80	10,722.12	9,858.24	9,857.87	864.25

Table 4 – West Virginia portion SO_2 emission inventory totals for base year 2011, attainment 2014, and projected 2023 and 2030 (tpy)

Sector	2011 Base	2014 Attainment	2023 Interim	2030 Maintenance	Safety Margin
EGU Point	0.00	0.00	0.00	0.00	0.00
Non-EGU	730.00	466.99	382.00	381.00	85.99
Non-road	0.02	0.01	0.01	0.01	0.00
Other	145.02	144.69	143.00	142.43	2.26
On-road	2.07	2.02	0.79	0.74	1.28
TOTAL	877.11	613.71	525.8	524.18	89.53

Table 5 – Combined Steubenville OH-WV SO_2 emission inventory totals for base year 2011, attainment 2014, and projected 2023 and 2030 (tpy)

	2011 Base	2014 Attainment	2023 Interim	2030 Maintenance	Safety Margin
Ohio Portion	25,411.80	10,722.12	9,858.24	9,857.87	864.25
West Virginia Portion	877.11	613.71	525.8	524.18	89.53
COMBINED TOTAL	26,288.91	11,335.83	10,384.04	10,382.05	953.78

As part of the redesignation request and maintenance plan, motor vehicle emission budgets must be established unless it is determined mobile sources are insignificant contributors for a specific pollutant. As discussed under Section 5.b.ii of Chapter Two, mobile SO_2 emissions are considered an insignificant contributor under the 2010 SO_2 NAAQS for this area.

Requirement 2 of 4: A demonstration that the projected level of emissions is sufficient to maintain the SO_2 standard.

Maintenance is demonstrated either by showing that future emissions of SO_2 will not exceed the level of the attainment inventory at levels that could cause a violation of the NAAQS, or by modeling to show that the future mix of sources and emission rates will not cause a violation of the NAAQS.

A maintenance demonstration should also include a listing of all SO_2 control measures being implemented in the area by sector (See Chapter Five).

Demonstration: As discussed under Requirement 4 of 4 in Chapter Three, a modeling analysis of the future mix of sources and control measures was conducted as a part of this submittal and that analysis demonstrated attainment would be achieved and maintained.

In addition to the modeling analysis, emission trends are an important gauge for continued compliance with the SO_2 standard. Therefore, to meet this requirement, Ohio EPA also performed an initial comparison of the inventories for the base year and maintenance years identified in Requirement 1 of 4 of this Chapter. Maintenance is demonstrated when the future-year (2030) projected emission totals are below the 2014 attainment year totals.

Table 6 – Steubenville OH-WV area comparison of 2014 attainment year and 2023 and 2030 projected emission estimates (tpy)

	2014 Attainment	2023 Interim	2023 Projected Decrease	2030 Maintenance	2030 Projected Decrease
SO_2	11,335.83	10,384.04	951.79	10,382.05	953.78

As shown in the Table 6 above, SO_2 emissions in the nonattainment area are projected to decrease by just over 950 tpy in both 2023 and 2030 from 2014 attainment levels. This drop in emissions from the attainment year in conjunction with the fact that the entire nonattainment area's total emissions will be approximately 10,380 tpy after the attainment year demonstrates maintenance.

Requirement 3 of 4: A demonstration that 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.

Permanent and enforceable reductions should be a result of emission limitations in the SIP. In making this showing, sufficient quantitative information about emission reductions should be provided to demonstrate the improvement in air quality is attributed to permanent and enforceable measures.

Demonstration: Permanent and enforceable reductions of SO_2 emissions have contributed to the attainment of the 1-hour SO_2 standard in this area.

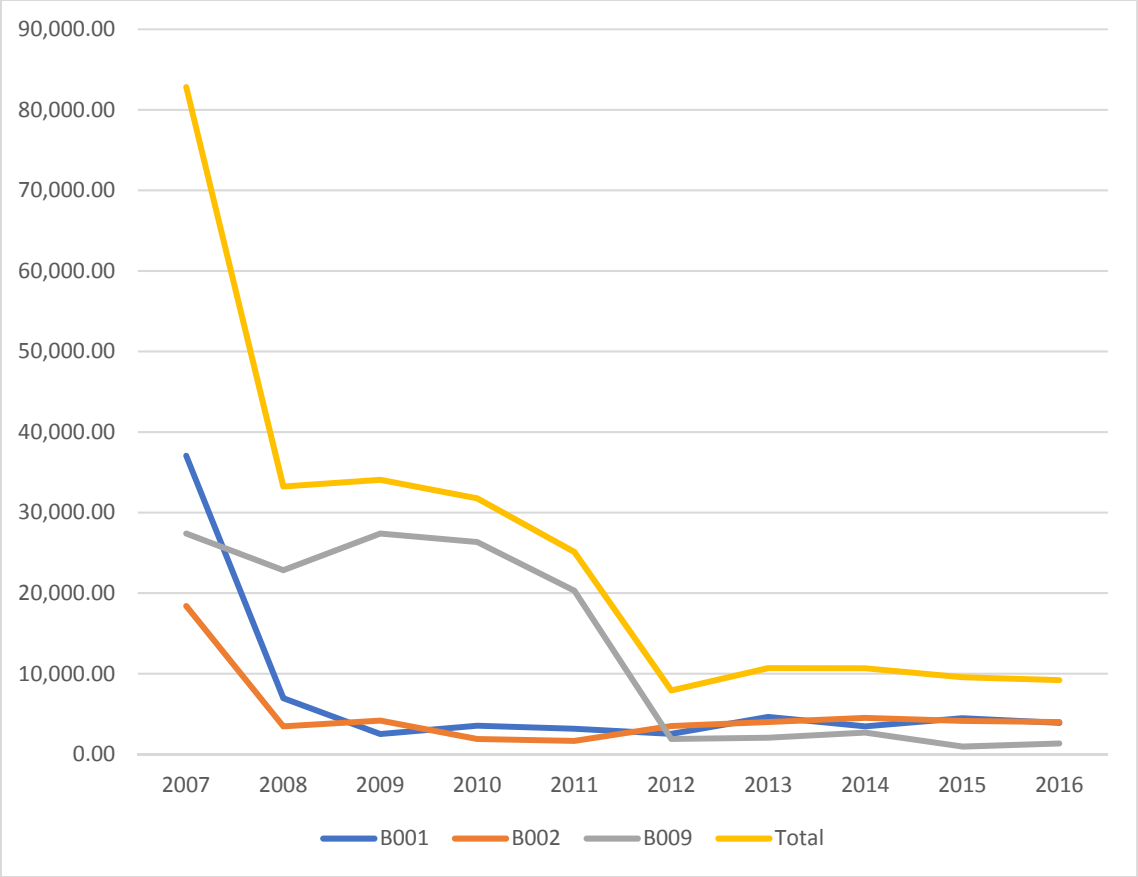
As demonstrated in Table 7 below, permanent and enforceable reductions were realized in this area due to the installation of an FGD at the last remaining coal-fired boiler at Cardinal Power Plant in the fall of 2011, which the recent revisions to OAC Chapter 3745-18 referenced above makes permanent and enforceable. Significant reductions at Mingo Junction Energy Center and other non-EGUs also occurred due to ceasing operations. Although unexpected, if Mingo Junction Energy Center were to operate again, emissions would not be able to increase to 2011 levels due to the restriction eliminating the burning of COG and blast furnace gas at this facility as a result of Ohio's attainment demonstration SIP. Although JSW Steel is planning to resume operations, only the EAF and LMF can operate at previous levels, and commensurate with the SIP limits, due to the discontinuation of coke oven gas and blast furnace gas as fuel options. In addition, WVDEP entered into a consent decree with Mountain State Carbon requiring permanent and enforceable emission reductions in SO_2. Details on those reductions required can be found in WVDEP's redesignation request and maintenance plan.

Table 7 – Steubenville OH-WV area comparison of 2011 base year and 2014 attainment year EGU and non-EGU reductions

SO_2	**2011**	**2014**
Cardinal Power Plant	25,122.42	10,660.65
Mingo Junction Energy Center	222.48	0.00
Mountain State Carbon	696.79	366.72

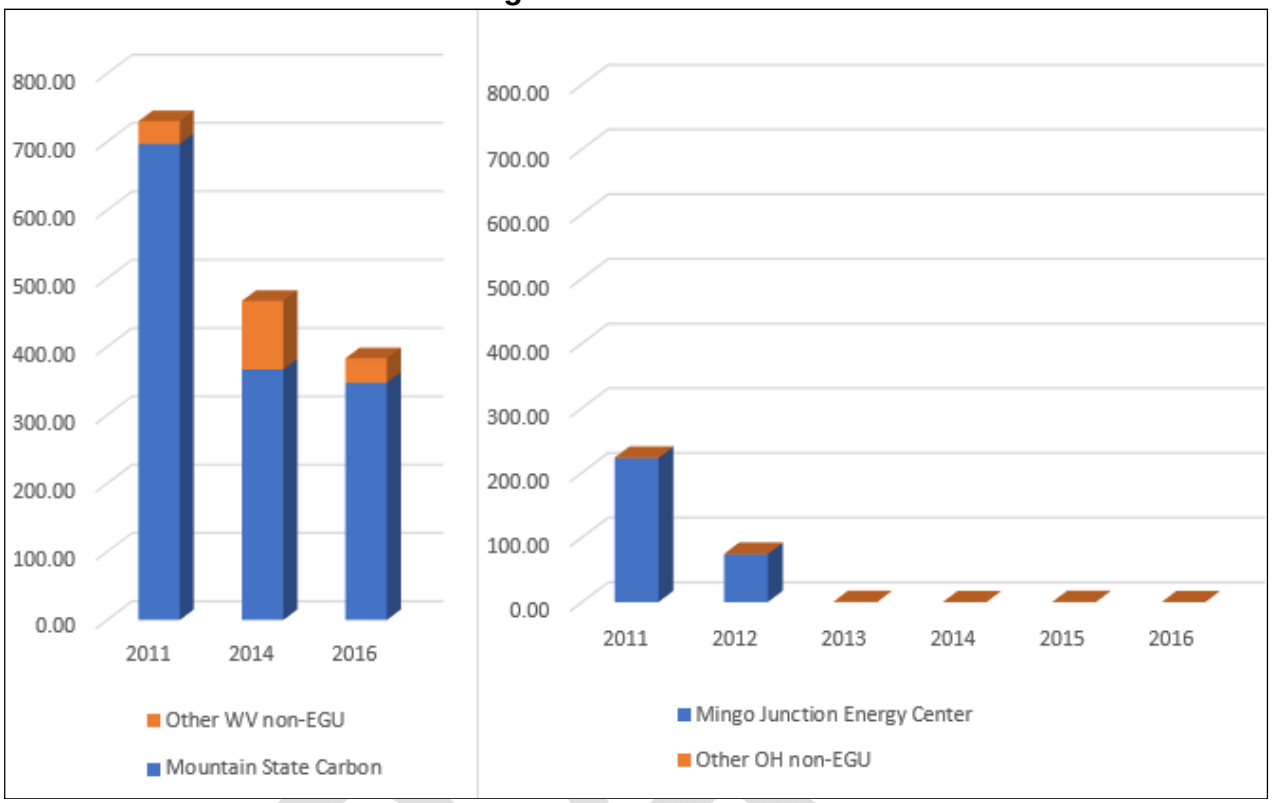
The Cardinal Power Plant is comprised of three coal-fired boilers: B001, B002 and B009 are capable of 5,275 MMBtu/hr, 5,275 MMBtu/hr, and 5,975 MMBtu/hr, respectively. All are equipped with state-of-the-art FGD systems for reducing SO_2 emissions. B001, B002 and B009 FGDs came on line in spring of 2008, winter of 2007, and fall of 2011, respectively. Emissions have remained steady for each unit, and the entire facility, since all FGDs were online (2012 to present). Emissions of SO_2, by unit and for the entire facility (including insignificant emissions units), from 2007 through 2016 can be seen in Figure 2 below. As noted previously, Ohio EPA finalized a federally-enforceable emission limit to Cardinal Power Plant effective [date] (Appendix B), which assures that these reductions are permanent and enforceable.

Figure 2: Cardinal Power Plant SO_2 emissions by unit and entire facility



Mingo Junction Energy Center is comprised of four boilers capable of burning natural gas/blast furnace gas/COG: B001, B002, B003 and B004 each capable of 180 MMBtu/hr. Although this facility remains permitted to operate, it has not operated since 2012 and Ohio EPA has been unsuccessful in locating current ownership. Ohio EPA does not anticipate the need for, or desire for, this facility to operate in the future. However, as a result of Ohio's attainment demonstration SIP, these units are restricted to an emission limit of 0.0028 pounds of SO_2 per MMBtu actual heat input from each boiler. The fact that COG is no longer available due to Mountain State Carbon's agreement resulting in disconnection of the COG pipeline, that the former Wheeling Pittsburg Steel (now JSW Steel) permanently dismantled their blast furnace, and that such a restriction on emissions is now in the SIP, these units will only be able to burn natural gas if they were to operate in the future. Emissions of SO_2 from 2011 through 2016 can be seen in Figure 3 below. Figure 3 also displays emissions of SO_2 for all other Ohio non-EGUs, Mountain State Carbon in West Virginia and all other non-EGUs in West Virginia.

Figure 3: Mingo Junction Energy Center, Mountain State Carbon, and all other Ohio and West Virginia non-EGU SO_2 emissions



Inventories of SO_2 emissions for Ohio and West Virginia EGU and non-EGU sources can be found in Appendix H.

In addition to the above, emissions of SO_2 are limited by new source performance standards (NSPS) under Sections 111 and 129 of the CAA; and the national emission standards for hazardous air pollutants (NESHAP) under Section 112 of the CAA. Several recent U.S. EPA air quality regulations on EGUs and other large sources (such as various types of boilers and incinerators) have the potential to significantly reduce SO_2 emissions further, for example, the Mercury and Air Toxics Standards (MATS). Under MATS, EGUs meeting specific criteria may choose to demonstrate compliance with alternative SO_2 emission limits in lieu of demonstrating compliance with HCl emission limits. Also, Title IV of the CAA, CAIR, CSAPR and federal consent decrees required the reduction of SO_2 emissions from EGUs throughout the nation and will continue to achieve further reductions. U.S. EPA notes that for facilities subject to the previously listed MACT and regional interstate transport rules (such as CAIR and CSAPR), additional control measures may not be necessary to demonstrate compliance with the 1-hour SO_2 NAAQS.

In addition to permanent and enforceable reductions for point sources, several regulations have led, and will continue to lead, to further reductions of SO_2 from other sectors. Examples include the application of tighter federal standards on non-road diesel vehicles

(Clean Air Non-road Diesel Rule), requirements to reduce the sulfur content of various motor fuels including low-sulfur diesel fuel standards phased in from 2004 through 2007 for larger on-road vehicles (Highway Heavy Duty Engines Rule), and the application of tighter federal standards on new vehicles.

Requirement 4 of 4: Provisions for future annual updates of the inventory to enable tracking of the emission levels, including an annual emission statement from major sources.

Demonstration: In Ohio, major point sources in all counties are required to submit air emissions information annually, in accordance with U.S. EPA's Consolidated Emissions Reporting Rule (CERR). Ohio EPA prepares a new periodic inventory for all SO_2 emission sectors every three years. These SO_2 inventories will be prepared for future years as necessary to comply with the inventory reporting requirements established in the CFR. Emissions 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 1-hour SO_2 standard.

CHAPTER FIVE: Control Measures and Regulations

CAA Section 107(d)(3)(E)(ii), 107(d)(3)(iii), and 107(d)(3)(E)(v)

Requirement 1 of 6: Section 172(c)(1) of the 1990 Clean Air Act Amendments requires states with nonattainment areas to implement RACM and RACT.

Section 172(c)(1) requires states with nonattainment areas to submit a SIP providing for implementation of all Reasonably Available Control Measures (RACM) 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 (RACT)). The SO_2 nonattainment area SIP guidance also provides that to the extent that U.S. EPA has promulgated national and regional rules that will require significant SO_2 emission reductions in the period after areas are designated as nonattainment, "expeditious attainment" may in many cases mean that attainment will be possible earlier than the attainment date.

Demonstration: RACM and RACT requirements are established as part of the attainment demonstration SIPs. Ohio EPA performed a RACM/RACT analysis for this area and submitted the demonstration with our attainment demonstration SIP.

The SO_2 nonattainment area SIP guidance also provides that to the extent that U.S. EPA has promulgated national and regional rules that will require significant SO_2 emission reductions in the period after areas are designated as nonattainment, "expeditious attainment" may in many cases mean that attainment will be possible earlier than the attainment date. The SO_2 nonattainment area SIP guidance references programs such as the MATS for EGUs and MACT standards for industrial, commercial and institutional (ICI) boilers. U.S. EPA acknowledges that the control strategies sources may use to comply with these federal programs may also provide for significant SO_2 emission reductions and additional control measures may not be necessary to meet the requirements under the SO_2 standard.

Ohio EPA analyzed RACM/RACT for the three major sources in the Ohio portion of the Steubenville OH-WV nonattainment areas that emitted at least 99% of Ohio's portion of the nonattainment area's SO_2 emissions. Ohio EPA determined that no additional RACM/RACT requirements are needed beyond those already established in OAC Chapter 3475-18; those that will be required under federal measures such as the MATS or MACT that provide for equivalent or better control than RACM/RACT; or those reductions that will be required as a part of Ohio's attainment/control strategy discussed under Chapter 7 of the attainment demonstration SIP and are equivalent to or more stringent than RACM/RACT. Below is a discussion for the Ohio portion of the Steubenville OH-WV area supporting this finding and demonstrating RACM/RACT is met.

Three sources are located in the Ohio portion of this area: AEP Cardinal Power Plant, JSW Steel and the Mingo Junction Energy Center.

AEP Cardinal Power Plant (Facility ID 0641050002) is a well control (FGD) coal burning power plant already meeting current RACT/RACM requirements (FGD level control). Ohio EPA's finalization of a federally-enforceable emission limit to Cardinal Power Plant effective [date] (Appendix B) assures that this source will continue to implement this level of control.

At the time of the RACT/RACM analysis, the JSW Steel was undergoing a purchase agreement in hopes of resuming operations of the remaining Electric Arc Furnace (EAF) that processes (melts) scrap steel. The facility is in the process of resuming operation of the EAF. Current emission control equipment employed for the EAF consists of a baghouse for the control of PM emissions. Potential SO_2 emission controls include wet scrubbing, spray dryer absorption and dry sorbent injection. However, these emission control technologies are not technically feasible for EAF operations for various reasons. In addition, the RACT BACT Clearing House (RBLC) did not identify any EAF that employs add-on SO_2 emission controls.

To date, recommended RACT for controlling SO_2 emissions from the EAF is a scrap management program, which is currently a requirement of the facility's permit. In addition, 40 CFR, Subpart YYYYY (Electric Arc Steelmaking Facilities) requires a facility subject to this subpart to employ an approved scrap management program to aid in reducing overall emissions. Therefore, resumption of the EAF at JSW Steel would meet current RACT/RACM requirements. It should also be noted that the EAF employs the CONSTEEL technology which is considered one of the most environmentally friendly and energy efficient EAF processes.

In addition to the EAF, this facility also has a Ladle Metallurgical Furnace (LMF) to refine molten steel from the EAF and three reheat furnaces. The LMF is permitted at 14 lbs/hr SO_2 and additional controls were not needed as a part of Ohio's attainment/control strategy portion of the SIP. The three reheat furnaces were previously each permitted at 1213 lbs/hr SO_2 and as part of the attainment/control strategy they were reduced to 1 lb/hr each. Additional RACT/RACM was not necessary for these units.

The Mingo Junction Energy Center is comprised of four 180 MMBtu/hr boilers capable of burning a combination of natural gas, blast furnace gas or COG, and two of the units can also burn desulfurized COG. As discussed previously, Mountain State Carbon disconnected the pipeline providing COG or desulfurized COG to this facility in the future. Because the blast furnace at JSW Steel was permanently shut down and dismantled, this gas will also not be supplied. Therefore, the only form of gas that may be burned in the future is natural gas.

Regardless, as part of BACT requirements, these four units were required to install a water injection system on the boilers by March 1, 2011 to control emissions. Permitted limits allowed for 45.7 lbs/hr SO_2, as a 3-hour rolling average, when burning natural gas or natural gas/blast furnace gas blend; or 49.5 lbs/hr SO_2, as a 3-hour rolling average, when

burning only COG, a blend of natural gas and COG, or a blend of natural gas, COG, and blast furnace gas. As part of the attainment/control strategy portion of Ohio's SIP, emissions from each of the four units was limited to 0.0028 pounds of SO_2 per MMBtu actual heat input (below the critical value). Additional RACT/RACM to control SO_2 emissions was not necessary for these sources.

In addition, in 1979, 1987 and 1996, Ohio promulgated rules requiring reasonably available controls measures for SO_2 from stationary sources.

Statewide RACT rules have been applied to all new sources locating in Ohio since that time. RACT requirements are incorporated into permits along with monitoring, recordkeeping, and reporting necessary to ensure ongoing compliance. Ohio EPA also has an active enforcement program to address violations discovered by field office staff. The Ohio RACT rules for SO_2 are found in OAC Chapter 3745-18[25].

In addition, Ohio EPA promulgated and implemented CAIR (OAC Chapter 3745-109[26]) over the past six years. Emissions from EGUs make up a significant contribution to Ohio's inventory. Beginning in 2009, Ohio implemented CAIR which provided for significant reductions in SO_2. Beginning in 2015, the more restrictive CSAPR was implemented and more significant reductions in SO_2 were realized.

Requirement 2 of 6: Section 172(c)(2) of the 1990 CAA Amendments requires attainment demonstration SIPs for nonattainment areas to show RFP.

Section 171(1) defines RFP as "such annual incremental reductions in emissions of the relevant air pollutant as are required by this part (part D) or may reasonable be required by the EPA for the purposes of ensuring attainment of the applicable NAAQS by the applicable attainment date." The SO_2 nonattainment area SIP guidance explains that this definition is most appropriate for pollutants emitted by numerous and diverse sources where inventory-wide reductions are often needed to attain a standard. Furthermore, the definition is generally less pertinent to pollutants like SO_2 that usually have a limited number of sources affecting areas and where emissions controls for such sources result in swift and dramatic improvement in air quality. Therefore, U.S. EPA explained that RFP is best construed as "adherence to an ambitious compliance schedule."

Demonstration: RFP requirements are established as part of the attainment demonstration SIPs. Ohio EPA set an ambitious compliance deadline for compliance with requirements by January 1, 2017, approximately 20 months after the attainment demonstration SIP was submitted and 21 months prior to the required attainment date. As can be seen by the emissions trends for the area, early reductions occurred prior to the compliance deadline. Therefore, the requirement for an ambitious compliance schedule has been met.

[25] http://www.epa.ohio.gov/dapc/regs/3745_18.aspx
[26] http://www.epa.ohio.gov/dapc/regs/3745_109.aspx

Requirement 3 of 6: Section 172(c)(3) requires states to submit a comprehensive inventory of actual emissions.

Section 172(c)(3) requires states to submit a comprehensive inventory of actual emissions in the area, including the requirement for periodic revisions as determined necessary. 40 CFR 51.1008 requires such inventory to be submitted within three years of designation and requires a baseline emission inventory for a suitable year to be used for attainment planning.

The SO_2 nonattainment area SIP guidance provides the SO_2 inventory requirements for attainment demonstration SIPs.

The inventory should also include an attainment year inventory with projected emissions for all SO_2 sources. The inventory should also include the best available information on current enforceable SO_2 emission rates (allowable or permitted rates) for the SO_2 sources located in the nonattainment area.

Demonstration: Ohio EPA submitted its 2011 base year inventory and 2018 future year inventory as a part of its attainment demonstration SIP.

Ohio also updates its inventory in accordance with U.S. EPA's CERR rule (i.e. emissions statements). Ohio EPA submitted its emissions statement SIP on March 18, 1994 which was approved by U.S. EPA on October 13, 1995 (59 FR 51863). As discussed in Chapter Four (Requirement 4 of 4), Ohio EPA submits, and commits to submit, emission inventories (statements) every three years.

Requirement 4 of 6: Evidence that control measures required in past SO_2 SIP revisions have been fully implemented.

Demonstration: In addition to the historic RACM and RACT requirements for SO_2, Ohio has fully implemented the OAC Chapter 3745-18 regulations and CAIR/CSAPR requirements.

On March 10, 2004, the U.S. EPA promulgated the CAIR. Beginning in 2009, U.S. EPA's CAIR rule requires EGUs in 28 eastern states and the District of Columbia to significantly reduce emissions of NO_x and SO_2. Ohio submitted a CAIR SIP which was approved by U.S. EPA on February 1, 2007. Revisions to the CAIR SIP were again submitted on July 15, 2009. The revised CAIR SIP was approved as a direct final action on September 25, 2009 (74 FR 48857). CAIR was replaced by the more stringent CSAPR requirements beginning in 2015.

OAC Chapter 3745-18[27] is Ohio's SIP approved rules for the regulation of SO_2. This set of rules contains general requirements for the entire state along with facility specific requirements for significant emitters of SO_2. Specifically, OAC rule 3745-18-47 regulates emissions from Jefferson County.

Requirements are incorporated into permits along with monitoring, recordkeeping, and reporting necessary to ensure ongoing compliance. Ohio EPA also has an active enforcement program to address violations discovered by field office staff.

Requirement 5 of 6: Acceptable provisions to provide for new source review.

Demonstration: Ohio has a longstanding and fully implemented NSR program. This is addressed in OAC Chapter 3745-31[28]. The Chapter includes provisions for the PSD permitting program in OAC rules 3745-31-01 to 3745-31-20. Ohio's PSD program was conditionally approved on October 10, 2001 (66 FR 51570) and received final approval on January 22, 2003 (68 FR 2909) by U.S. EPA as part of the SIP. The latest revisions to OAC Chapter 3745-31 were approved into Ohio's SIP on February 20, 2013 (78 FR 11748).

Any facility that is not listed in the 2011 emission inventory, or for the closing of which credit was taken in demonstrating attainment, will not be allowed to construct, reopen, modify, or reconstruct without meeting all applicable NSR requirements. Once the area is redesignated, Ohio EPA will implement NSR through the PSD program.

Requirement 6 of 6: Assure that all existing control measures will remain in effect after redesignation unless the state demonstrates through modeling that the standard can be maintained without one or more control measures.

Demonstration: Ohio commits to maintaining the aforementioned control measures after redesignation. Ohio hereby commits that any changes to its rules or emission limits applicable to SO_2 as required for maintenance of the 1-hour SO_2 standard in the Ohio portion of the Steubenville OH-WV area, will be submitted to U.S. EPA for approval as a SIP revision.

Ohio, through Ohio EPA's Legal office and the Ohio Attorney General's office, 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_2 precursors in the Steubenville OH-WV area.

[27] http://www.epa.ohio.gov/dapc/regs/3745_18.aspx
[28] http://www.epa.ohio.gov/dapc/regs/3745_31.aspx

CHAPTER SIX: Contingency Measures

CAA Section 107(d)(3)(E)(v)

Requirement 1 of 4: A commitment to submit a revised plan eight years after redesignation.

Demonstration: Ohio hereby commits to review its maintenance plan eight years after redesignation, as required by Section 175A of the CAA.

Requirement 2 of 4: A commitment to expeditiously enact and implement additional contingency control measures in response to exceeding specified predetermined levels (triggers) or in the event that future violations of the ambient standard occur.

Section 175A(d) requires contingency provisions to promptly correct any violation of the SO_2 NAAQS that occur after redesignation. Unlike Section 172(c)(9), Section 175A does not explicitly require contingency measures take effect without further action by the state. Rather the maintenance plan should ensure contingency measures are adopted and implemented as expeditiously as practicable once they are triggered. The plan should clearly identify the measures to be adopted, provide a schedule and associated procedures for adoption and implementation, and provide a specific time limit for action.

The *General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990* (April 16, 1992, 57 FR 13498) and the SO_2 nonattainment area SIP guidance (page 41 to 42) provides further discussion on contingency measures specifically for SO_2. In many cases, attainment revolves around compliance of a single source, or small set of sources, with emission limits shown to provide for attainment. In those cases, U.S. EPA interprets contingency measures to mean the state has a comprehensive program to identify sources of violations of the SO_2 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 SIPs. (57 FR 13547)

Demonstration: Ohio EPA has an active enforcement program to address violations and Ohio EPA will continue to operate a comprehensive program to identify sources of violations of the SO_2 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 SIPs. Ohio hereby commits to adopt and expeditiously implement necessary corrective actions in the event of a violation.

In the event adoption of any additional control measures is necessary, they are subject to Ohio's administrative and legal process. This process will include publication of notices, an opportunity for public hearing, and other measures required by Ohio law 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 a violation of the SO_2 NAAQS, additional local measures may be unnecessary. Furthermore, Ohio will submit to U.S. EPA an analysis to demonstrate the proposed measures are adequate to return the area to attainment.

Requirement 3 of 4: A list of potential contingency measures that would be implemented in such an event.

Demonstration: Potential measures could include tighter SO_2 emissions offsets for new and modified major sources or additional SO_2 RACT for affected sources in the area.

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

Warning Level Response:
A warning level response shall be prompted whenever the annual average 99th percentile maximum daily 1-hour SO_2 concentration of 79 ppb or greater occurs in a single calendar year within the maintenance area. A warning level response will consist of a study to determine whether the SO_2 value indicates a trend toward higher SO_2 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.

Action Level Response:
An action level response shall be prompted whenever a two-year average of the 99th percentile maximum daily 1-hour SO_2 concentrations greater than 75 ppb occurs within the maintenance area. A violation of the standard (the three-year average of the 99th percentile maximum daily 1-hour value SO_2 concentration of greater than 75 ppb) shall also prompt an action level response. In the event that 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, Ohio EPA in conjunction with the metropolitan planning organization or regional council of governments, will determine additional control measures needed to assure future attainment of the NAAQS for 1-hour SO_2. 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. Ohio EPA 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.

Contingency measures to be considered will be selected from a comprehensive list of measures deemed appropriate and effective at the time the selection is made. The selection of measures will be based on cost-effectiveness, emission reduction potential, economic and social considerations or other factors that Ohio EPA deems appropriate. Ohio EPA will solicit input from all interested and affected persons in the maintenance area prior to selecting appropriate contingency measures.

No contingency measure shall be implemented without providing the opportunity for full public participation during which the relative costs and benefits of individual measures, at the time they are under consideration, can be fully evaluated.

Requirement 4 of 4: A list of SO_2, sources potentially subject to future additional control requirements.

Demonstration: Potentially subject sources include Cardinal Power Plant, Mingo Junction Energy Center, the JSW Steel or any other new source that may locate or expand in the area in the future.

Conclusion: Ohio has met the contingency measure requirement by having an aggressive enforcement program that identifies and mitigates any SO_2 emissions that exceed limits shown to provide for attainment, in accordance with U.S. EPA guidance that indicates that contingency measure requirements may be met in this manner. Nevertheless, Ohio provides additional protection against violations by establishing a warning level and an action level, described above, and committing to take action to identify and implement mitigation measures as appropriate should concentrations at or above these levels occur.

CHAPTER SEVEN: Public Participation

Ohio published notification for a public comment period, including a public hearing, concerning the draft redesignation petition and maintenance plan in a widely distributed county publication on _____.

The public comment period closed on _____. The public hearing was held on _____. Appendix I includes a copy of the public notice, the transcript from the public hearing, and a response to comments document (when applicable).

CHAPTER EIGHT: Conclusions

The Steubenville OH-WV SO_2 nonattainment area has attained the 2010 1-hour NAAQS for SO_2 and complied with the applicable provisions of the 1990 Amendments to the CAA regarding redesignations of SO_2 nonattainment areas. Documentation to that effect is contained herein. Ohio EPA has prepared a redesignation request and maintenance plan that meet the requirements of Section 110(a)(1) of the 1990 CAA.

Based on this presentation, the Steubenville OH-WV 1-hour SO_2 nonattainment area meets the requirements for redesignation under the CAA and U.S. EPA guidance. Ohio has performed an analysis that shows the air quality improvements are due to permanent and enforceable measures. Furthermore, because the remaining significant sources are subject to federally enforceable requirements that provide for attainment, continued compliance (maintenance) with the standard with an increasing margin of safety is ensured.

The State of Ohio hereby requests that the Steubenville OH-WV 1-hour SO_2 nonattainment area be redesignated to attainment simultaneously with U.S. EPA approval of the maintenance plan provisions contained herein.

This page left intentionally blank

Appendix A:
Updated Ohio EPA SIP Modeling

DRAFT Appendix A
Dispersion Modeling Analysis for Steubenville, OH-WV

2010 SO2 NAAQS Nonattainment Area

Introduction

The United States Environmental Protection Agency (U.S. EPA) established a new National Ambient Air Quality Standard (NAAQS) for SO2 on June 22, 2010, of 75 ppb, as the 99th percentile of maximum daily values, averaged over three years. In addition, U.S. EPA revoked the primary annual and 24-hour standards.

On August 5, 2013 (75 FR 47191), effective October 4, 2013, U.S. EPA promulgated the initial SO2 nonattainment areas for the newly established SO2 standard across the country. The Clean Air Act requires states with SO2 nonattainment areas to submit a plan within eighteen months of the effective date of the designations (i.e., by April 4, 2015 based on an October 4, 2013 effective date) detailing how the SO2 standard will be attained.

This document supports the SO2 State Implementation Plan (SIP) for the Steubenville, OH-WV nonattainment area in the State of Ohio. This nonattainment area encompasses emissions from the Cardinal Power Plant, Mountain State Carbon, Mingo Junction Energy Center, and the JSW Steel (formerly Wheeling Pittsburgh Mingo Junction Steel Plant. Cardinal Power Plant (Ohio EPA facility identification # 0641050002) is located at 306 County Road 7 East in Brilliant, Ohio. Mountain State Carbon (WVDEP facility identification # 009-00002) is located at WV Route 2, Follansbee, West Virginia. JSW Steel (Ohio EPA facility identification # 0641090010) is located at 540 Commercial Ave in Mingo Junction, Ohio, and Mingo Junction Energy Center (Ohio EPA facility identification # 0641090234) is located at 540 Commercial Ave in Mingo Junction, Ohio. The Mingo Junction Energy Center property is located within the JSW Steel property. There are no other significant sources of SO2 emissions in the nonattainment area that warrant inclusion in the modeling analysis. As can be seen from the inventory included in Ohio's SO2 Nonattainment Area SIP, the emissions from the facilities comprise more than 99% of the 2011 SO2 emissions in the entire nonattainment area.

Per U.S. EPA's guidance (April 23, 2014 Guidance for 1-Hour SO2 Nonattainment Area SIP Submissions (herein referred to as "Nonattainment SIP Guidance")), "An approvable attainment demonstration would be an air quality modeling analysis that demonstrates that the emission limits in the plan will suffice to provide for timely attainment of the affected standard".

Three separate modeling analyses were performed to demonstrate compliance with the NAAQS using State Implementation Plan (SIP) limits previously established for Mountain State Carbon, JSW Steel, and the Mingo Junction Energy Center. The modeling conducted here establishes new SO2 limits for the Cardinal Power Plant.

Modeling Approach

Per U.S. EPA's Nonattainment SIP Guidance,

> "Appendix A of this document contains modeling guidance supplemental to that provided in the preamble to the final rulemaking promulgating the 2010 S02 NAAQS and in 40 CFR part 51, Appendix W. Appendix A of this document has also been updated to respond to issues raised during the comment period related to the September 2011 draft S02 Guidance Document. This guidance clarifies the EPA's recommendations on how to conduct refined dispersion modeling under Appendix W to support the implementation of the 2010 S02 NAAQS."

Modeling input data, including emission rates, are addressed in Section 8.0 of Appendix W and specifically for SO2, in Appendix A of the Nonattainment SIP Guidance. The averaging period for the 2010 SO2 NAAQS is the 99th percentile of maximum monitored daily values, averaged over three years. Per the Nonattainment SIP Guidance, five years of National Weather Service data or at least one year of on-site meteorological data is sufficient to represent attainment of the standard. Thus, the modeled form of the standard is expressed as the 99th percentile of maximum daily values averaged over the number of years of meteorological data used (herein referred to as "design value").

The recommended dispersion model for SIP modeling for SO2 is the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) modeling system. There are two input data processors that are regulatory components of the AERMOD modeling system: AERMET, a meteorological data preprocessor that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, and AERMAP, a terrain data preprocessor that incorporates complex terrain using United States Geological Survey (USGS) Digital Elevation Data. Additionally, Ohio EPA utilized the AERMINUTE module to incorporate 1-minute ASOS meteorological data into the hourly surface input file. Ohio EPA utilized the most up-to-date version of AERMOD, version 18081 for all modeling analyses conducted in this area.

Meteorological Data

Three years of on-site data collected at Mountain State Carbon for the 2007-2009 period were utilized for this modeling assessment, based on feedback from U.S. EPA and consistent with the modeling conducted to inform West Virginia's SIP for this area.

Background

Ohio EPA applied background concentrations of SO2 to all modeled results under all scenarios. Ohio EPA established a background concentration of 5 ppb for this area using the design value collected at site 39-013-0006 in nearby Belmont County, years 2016-2018. Data collected at this monitor was determined to be free of source-oriented impacts, which are problematic for monitors located within the Steubenville, OH-WV

nonattainment area, as described below.

Background concentrations were previously established for SO_2 in the Steubenville, OH-WV nonattainment area as a part of modeling work completed in the years prior to the April 3, 2015 submittal of Ohio's attainment demonstration State Implementation Plan (SIP). Although as acknowledged in that submittal that "Source-oriented impacts and the lack of a regional background monitor are major obstacles in determining a background concentration for the Steubenville, OH-WV nonattainment area", a background analysis of monitors in the area for the 2007 – 2009 and 2010-2012 time periods was conducted. Based on these analyses, Ohio EPA determine a range of defensible background concentrations and ultimately chose a highly conservative background of 8.1 ppb based on the 2007 – 2009 data.

Since that analysis was conducted and Ohio's attainment demonstration SIP was submitted, much additional work has been done by Ohio EPA, in collaboration with WVDEP and U.S. EPA, in order to allow a final demonstration of attainment and maintenance to occur. During this time, multiple changes in the emissions of sources considered background have occurred, warranting a reanalysis of background concentrations. These include the shutdown of the R.E. Burger plant in 2010, the shutdown of the Kammer Power Plant in 2015, and the shutdown of the Ormet aluminum smelter in the 2013-2014 time period. In addition to these shutdowns, the W.H. Sammis facility has sharply curtailed operations in this time period, emitting a high of 102,195 tons of SO_2 in 2008 to a low of 3,169 tons of SO_2 in 2017. These curtailments are expected to continue, as the W.H. Sammis plant will be shutting down in phases beginning in 2020 and finishing in 2022. These changes have led Ohio EPA to conclude that a background concentration based on data that is now more than a decade old is neither appropriate or representative of the airshed today. Therefore, Ohio EPA has conducted several analyses of more recent monitoring data to establish a more current representative background for the Steubenville, OH-WV nonattainment area. Several analyses, similar to those conducted in the initial efforts as a part of the attainment demonstration SIP were conducted. In addition, in July of 2015, Ohio EPA began operating a preconstruction monitoring site, to determine background concentrations, in Belmont County, Ohio (site 39-013-0006). Ohio EPA also assessed the suitability of this monitor representing background concentrations for the Steubenville, OH-WV nonattainment area.

Methodology:

Hourly monitoring data were collected from U.S. EPA's Air Quality System (AQS) for seven monitors in the Steubenville, OH-WV nonattainment area years 2015 – 2017. Additional hourly data from the 2016-2018 period were collected for monitor 39-013-0006 in nearby Belmont County, Ohio. These location of these monitors with respect to the explicitly modeled facilities in the area are shown in Figure 1. Figure 2 shows the location of the Belmont County monitor in relationship to the Steubenville, OH-WV nonattainment area.

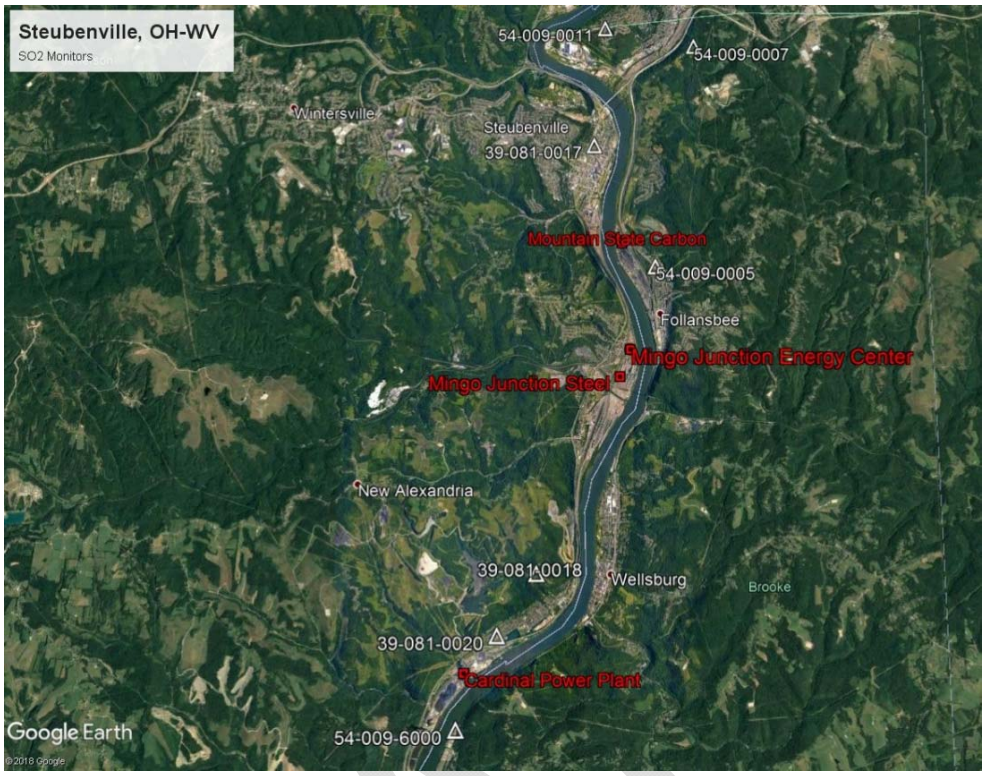


Figure 1: Facilities and SO_2 monitors, Steubenville, OH-WV.

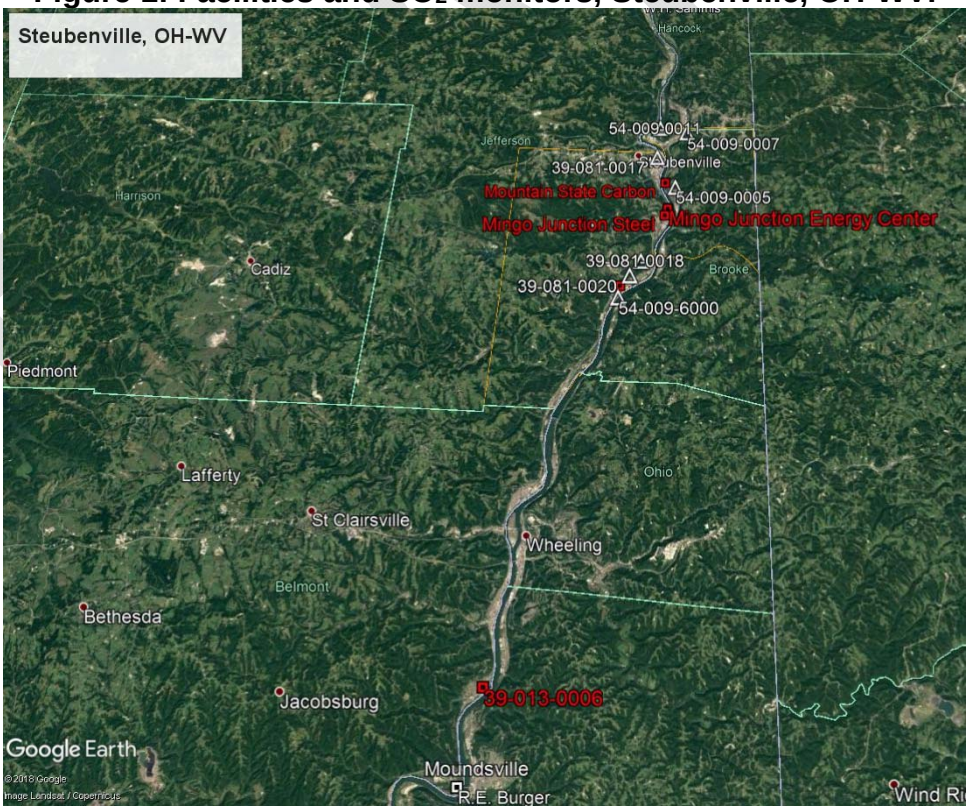


Figure 2: Steubenville, OH-WV nonattainment area and Belmont County monitoring site.

Analysis 1:

Following the same procedures described in Ohio's attainment demonstration SIP, Ohio EPA attempted to remove facility-specific impacts from the hourly monitoring record by excluding those hours for which the wind direction originated within a 90˚ arc of the nearest facility. Wind direction data was collected from monitor 54-009-6000 for the same time period. Following the removal of these data from the hourly record, the 99th percentile maximum daily concentration was determined for each year 2015-2017 and the three-year design value at each monitor was subsequently determined by averaging the annual results.

Analysis 2:

Utilizing the same processed hourly monitoring record as described above (exclusion of concentrations based on wind direction), the second analysis calculated the average of all remaining hourly concentrations at each monitor, excluding zero values. This procedure is very similar to that used to obtain the background of 8.1 ppb utilized in Ohio's original attainment demonstration, absent the cross-monitor averaging and the use of the 95th percentile values at the Cardinal monitoring network.

Analysis 3:

In July of 2015, Ohio EPA began operating a preconstruction monitoring site in Belmont County, Ohio (site 39-013-0006). This site is situated near to Ohio Route 7 along the Ohio River and is located in close proximity to the same railway tracks as those servicing the Steubenville, OH-WV area, very similar to those monitors located in the Steubenville area, excepting the close proximity of nearby large SO_2 sources contributing to the nonattainment area, which are explicitly modeled. The similarity of the terrain and land use between the Belmont County and Steubenville monitors is illustrated by Figures 3 and 4. Ohio EPA is representing Steubenville, OH-WV monitor 39-081-0020 in Figure 4 and it provides the clearest image of the highway, rail lines, and residential land use for comparison to the Belmont County monitoring site.

Figure 3: Background monitor 39-013-0006 in Belmont County, Ohio. Note the location of Ohio State Route 7 to the south and east of the monitor as well as the rail lines immediately to the north of the monitor.

Figure 4: Steubenville monitor 39-081-0020. Note the location of Ohio Route 7 to the south of the monitor and the rail lines visible to the south and east of the monitor.

It was recognized in the original attainment demonstration SIP analyses that determining a background concentration poses difficulty in this area due to the complex terrain, meteorology and geography of the sources explicitly modeled. At that time, a background monitor was not available in Ohio. Now, such a site exists and furthermore, this nearby site is similarly located in the same complex terrain and meteorological conditions as those monitors in the Steubenville, OH-WV nonattainment area.
Ohio EPA will perform an analysis of the data collected from this site to determine a design value concentration that would be representative of background concentrations for the Steubenville, OH-WV nonattainment area.

Background Results and Conclusions:

Analysis 1:

The results of Analysis 1, in which a new design value was calculated from the hourly dataset after attempting to remove facility-specific impacts, is shown in Table 1, below.

Monitor ID	2015-2017 Modified Design Value (ppb)
39-081-0017	20
39-081-0018	38
39-081-0020	19
54-009-0005	37
54-009-0007	29
54-009-0011	37
54-009-6000	31

Table 1: 2015 – 2017 modified SO_2 design values.

The results in Table 1 appear strikingly high for 1-hour SO_2 background concentrations. Indeed, when compared to the un-modified design values as reported in AQS for the same period, there is no difference excepting monitor 39-081-0017, as shown in Table 2.

Monitor ID	2015-2017 Modified Design Value (ppb)	2015-2017 AQS Design Value (ppb)
39-081-0017	20	25
39-081-0018	38	38
39-081-0020	19	19
54-009-0005	37	37
54-009-0007	29	29
54-009-0011	37	37
54-009-6000	31	31

Table 2: Comparison of modified and AQS design values.

The results of this analysis suggest two possibilities. First, these design values could represent the impact of an unknown source or sources of SO_2 with sufficient emissions to impact design values to such a degree that the removal of facility-specific impacts has no effect on the results. The second possibility is that the complexity of the terrain in the area, the frequent inversions that occur in the Ohio River valley, and the dense concentration of sources near to these monitors render this technique unworkable in this area.

It should be noted that the facilities explicitly modeled by both Ohio EPA represent almost all sources of SO_2 in and around the nonattainment area. Modeling conducted for the Data Requirements Rule indicates that the W.H. Sammis facility to the north of the nonattainment area does not significantly impact these monitors, although Ohio EPA does consider the W.H. Sammis facility a background source for this area. The notion that an unknown source or group of sources is impacting the nonattainment area to such a degree is obviously unrealistic and is not supported by any model vs. monitor modeling

conducted in this area. The second possibility is the most likely explanation for these observations. While additional wind sectors could be removed from the hourly monitoring data, Ohio EPA would begin to question the integrity of any dataset in which large portions of measured data are excluded.

Analysis 2:

Table 3 presents the results of Analysis 2, in which monitoring data were excluded by wind sectors and the average of all non-zero hours were calculated. This is the same approach, absent the averaging across monitors and using the 95th percentile values at the Cardinal monitors, that was used to derive the original 8.1 ppb background used in Ohio's attainment demonstration SIP. The methodology was altered from Ohio EPA's previous approach based on feedback from U.S. EPA.

Monitor ID	Average of Non-zero Values (ppb)
39-081-0017	2
39-081-0018	2
39-081-0020	2
54-009-0005	3
54-009-0007	3
54-009-0011	3
54-009-6000	1

Table 3: Average of all non-zero concentrations after wind-sector exclusion.

Concentrations in Table 3 are much lower than those obtained via Analysis 1. Based on the hourly monitoring data and the fact that Ohio's modeling in this area explicitly includes nearly all sources of SO_2, a strong case could be made for selecting a background of 2 or 3 ppb for this area.

Analysis 3:

Ohio EPA's installed a preconstruction monitoring site in Belmont County, Ohio (site 39-013-0006). The purpose of this site is to determine the background concentration of this area. This monitor has a 2016-2018 1-hour SO_2 design value of 5 ppb. This value is close to the lower range of backgrounds contemplated in Ohio's original attainment demonstration SIP. To remain conservative, Ohio EPA believes there is no need to attempt to eliminate source-oriented impacts from the data record for this site. Further, all quarters of the years 2016 – 2018 meet data completeness requirements.

Ohio EPA would contend that a background of 5 ppb, 38% less than the original 8.1 ppb background, is now highly appropriate for this area considering the emission reductions realized at sources not explicitly modeled since the determination was initially made. As an example, the largest background source in the area, W.H. Sammis, has realized a ~97% reduction in emissions since the 2007 – 2009 period. Ohio EPA therefore suggests

that a more current background of 5 ppb taken from a truly regional background monitor is most appropriate for the Steubenville, OH-WV nonattainment area in 2019.

Receptors

A total of 21,476 receptors were included in the modeling domain. Fenceline receptors were placed with 25 meters spacing. 50 meters spacing within a 1 km distance of each facility was used. 100 meters spacing was used within 2.5 km of each facility, 250 meters spacing was used within a radius of 5 km from each facility, and a 500 and 1000 meters spacing was used if further receptors were needed. Additional receptors were placed near to Mountain State Carbon to capture localized hot-spots and to assure coverage of ambient air. Given the number of sources in the nonattainment area, there is substantial receptor density in a majority of the area. Figure 5 shows the location of each facility as well as the receptor grid used for all modeling scenarios.

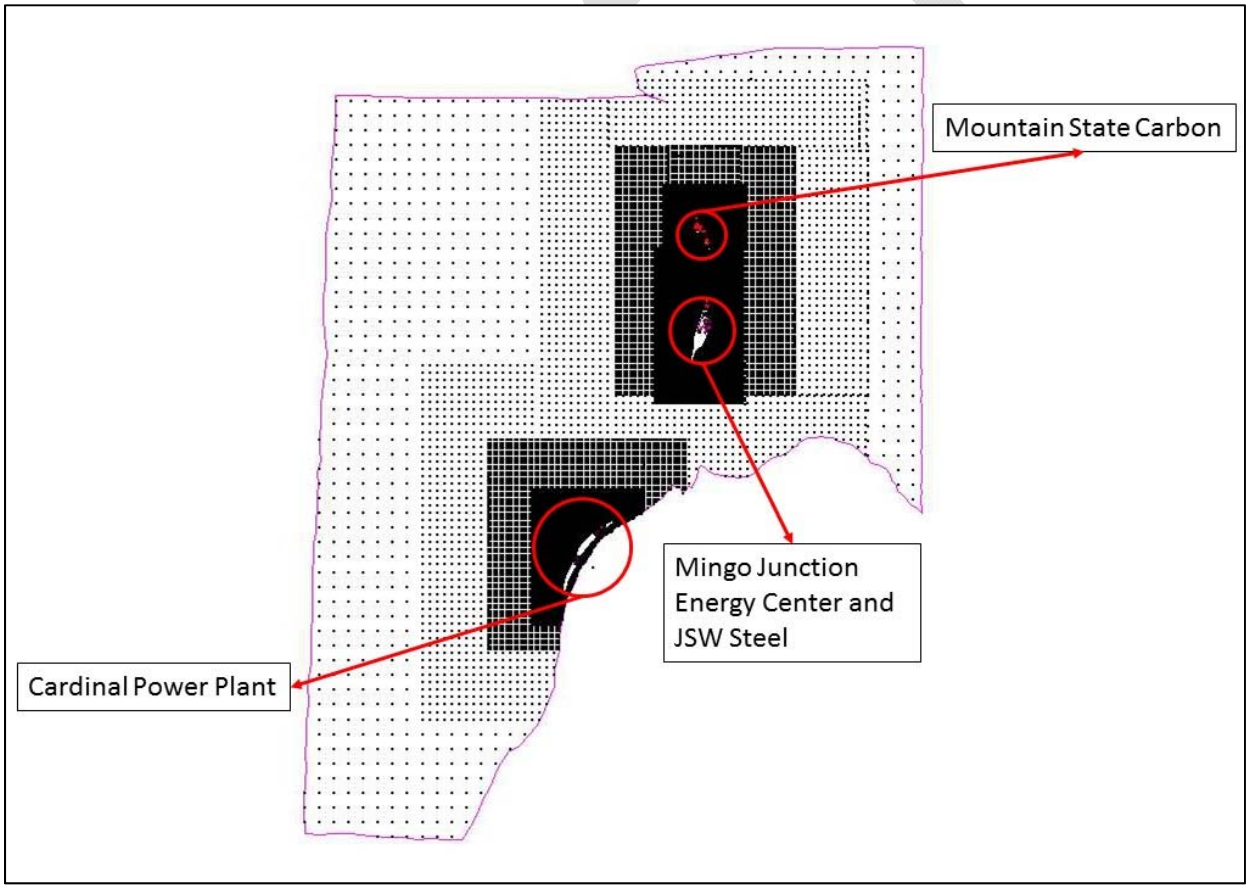


Figure 5: Receptor grid, nonattainment boundary, and facilities.

Source Characterizations

Ohio EPA used identical source characterizations to those used in West Virginia's attainment demonstration SIP modeling for the Mountain State Carbon, Mingo Junction Energy Center, and JSW Steel facilities (see Appendix E). These facilities were modeled using the following federally enforceable emission rates in all analyses:

Facility	Source ID	SO_2 Modeled Rate (lb/hr)
Mingo Junction Energy Center	Unit 1	0.5
	Unit 2	0.5
	Unit 3	0.5
	Unit 4	0.5
JSW Steel USA Ohio (formerly Mingo Junction Steel)	Reheat Furnace 2	1
	Reheat Furnace 3	1
	Reheat Furnace 4	1
	LMF	14.0
	EAF	105.0
Mountain State Carbon	Battery 1 Fugitives	3.5
	Battery 2 Fugitives	3.5
	Battery 3 Fugitives	3.5
	Battery 8 Fugitives	16.1
	Battery 1-2-3 Pushing	9.8
	Battery 8 Pushing Scrubber	15.7
	Acid Stack	6.0
	Boiler 10	90.0
	Boiler 6	
	Boiler 7	
	Boiler 9	
	COG Flare	139.8
	Battery 1 Stack	22.9
	Battery 2 Stack	22.9
	Battery 3 Stack	25.7
	Battery 8 Stack	122.1

Table 4: Modeled federally enforceable emission rates.

Source characterization of the emission units at Cardinal were based on analyses conducted by U.S. EPA and are described briefly here. A more complete description of U.S. EPA's characterization can be found in Appendix G. Units 1 and 2 were modeled at the GEP formula height of 160 meters and, based on a determination by U.S EPA, the plumes for Units 1 and 2 were treated as a merged plume. Due to the unconventional nature of Unit 3's egress point, where emissions are routed through a cooling tower rather than a traditional stack, multiple attempts have been made to characterize Unit 3 by Ohio EPA, U.S. EPA, and modeling experts at American Electric Power (AEP). Ohio EPA is adopting here U.S. EPA's characterization of Unit 3, where the height of the cooling tower, 129 meters, is used with a more conventional set of stack parameters at Unit 3 representing the stack diameter, flow rates, and temperatures of the egress point utilized by Unit 3 before that unit was equipped with a scrubber. This characterization of Unit 3 was based on a model vs. monitor analysis conducted by U.S. EPA (see Appendix G).

Table 5 shows the stack characterizations of Units 1, 2, and 3 at the Cardinal Power Plant.

Source ID	Easting (X) (m)	Northing (Y) (m)	Stack Height (ft)	Temperature (°F)	Exit Velocity (fps)	Stack Diameter (ft)
Units 1 & 2	530039.09	4455906.24	525.43	129.99	49.90	41.01
Unit 3	529131.60	4454598.00	423.99	324.95	95.80	24.02

Table 5: U.S. EPA source characterization of Cardinal.

U.S. EPA Modeling Analysis

Ohio EPA analyzed the results of U.S. EPA's modeling, which consisted of three modeling runs. In all modeling analyses conducted by U.S. EPA, source characterizations and emission rates are as described above and shown in Tables 4 and 5. Cardinal emissions were fixed at 6,003 lbs/hour based on the West Virginia SIP modeling, and a background of 8.1 ppb was used for all cases. In the first scenario, all emissions from Cardinal were assumed to come from the stack serving Units 1 and 2; in the second, all Cardinal emissions were assumed to come from the stack serving Unit 3; in the third analysis, emissions at Cardinal were split amongst the units based on Ohio EPA's "high load" scenario as previously submitted (Appendix D). The results of these analyses are shown in Table 6.

Scenario	3-year DV ($\mu g/m^3$)	3-year DV (ppb)
100% Unit 1 & 2	196.08579	74.96
100% Unit 3	196.13473	74.98
High Load Split	196.09604	74.96

Table 6: U.S. EPA's 3-year design values.

Ohio EPA Modeling Analysis

Ohio EPA utilized the MAXDCONT outputs from U.S. EPA's modeling analyses and the updated background concentration of 5 ppb to derive an emission rate for Cardinal that, when modeled with the emissions of nearby facilities in the nonattainment area (see Table 1), would demonstrate attainment of the 1-hour SO2 standard. Ohio EPA's analysis of the MAXDCONT outputs yielded an emission rate of 874.7 grams/second, or 6,942.18 lbs./hour, that would not cause or contribute to any exceedance of the NAAQS in the nonattainment area. This emission rate was subsequently modeled to confirm that no exceedance of the standard would occur under the three scenarios assessed by U.S. EPA, as described above and in Appendix G. The results of this analysis are shown in Table 7.

Scenario	3-year DV (μg/m³)	3-year DV (ppb)
100% Unit 1 & 2	192.11592	73.44
100% Unit 3	188.06618	71.89
High Load Split	188.09174	71.90

Table 7: Ohio EPA's 3-year design value, with 5 ppb background and 6,942.18 lbs./hour emission rate.

The results of Ohio EPA's modeling, using an updated background of 5 ppb and an emission rate of 6,942.18 lbs./hour indicates a maximum 3-year design value of 73.44 ppb in the nonattainment area. Ohio EPA conducted additional analyses to ensure that this emission rate would not cause or contribute to an exceedance of the standard beyond the boundaries of the nonattainment area.

Ohio EPA, based on a previous analysis conducted by U.S. EPA, has determined that the peak hourly emission rate of 6,942.18 lbs./hour can be used as the basis for establishing a 30-day rolling average emission rate. Following U.S. EPA's methodology as described in Appendix G, an adjustment factor of 70.0 percent was applied to the peak hourly emission rate of 6,942.18 lbs./hour to yield a comparably stringent 30-day rolling average emission rate of 4,858.75 lbs./hour.

Appendix B:
Proposed Ohio EPA rules 3745-18(03,04,47)
Response to Comments

3745-18-03 **Compliance time schedules.**

(A) [Reserved.]

(B) Certification and permit application requirements.

(1) Except as otherwise provided in paragraph (B)(2) and paragraphs (B)(4) to (B)(9) of this rule, no later than December 1, 1979, any owner or operator of any sulfur dioxide emissions source subject to, and not specifically exempted from, rules 3745-18-06 to 3745-18-94 of the Administrative Code shall do either of the following:

(a) Certify in writing to the director that such source is in full compliance with all requirements of this chapter. Such certification shall include the following:

(i) Equipment description.

(ii) OEPA permit application number (if assigned).

(iii) All necessary data (consistent with the appropriate permit application appendices) and calculations which confirm the compliance status.

(iv) An application for a permit-to-operate such source in accordance with rule 3745-35-02 of the Administrative Code as it existed on December 1, 1979 if such source does not possess an effective permit.

(b) Submit an application for a permit-to-operate or an application for a modification to a permit-to-operate in accordance with rule 3745-35-02 of the Administrative Code as it existed on December 1, 1979. Such application shall include a compliance program which will bring the source into full compliance with all the requirements of this chapter as expeditiously as practicable but in no event later than the dates specified in paragraph (C) of this rule, and identify all reasonable interim control measures.

(2) No later than December 1, 1979, any owner or operator of any sulfur dioxide emissions source subject to, and not specifically exempted from, rule 3745-18-56 of the Administrative Code (Mahoning county) shall certify in writing to the director, in a form and manner the director shall specify, all data necessary to establish sulfur dioxide emission limits based on calendar year 1978 operations.

(3) For fuel burning equipment, the certification or permit applications required by paragraphs (B)(1) and (B)(2) of this rule shall include the test method for determining compliance as specified in paragraph (D) or (E) of rule 3745-18-04 of the Administrative Code, whichever is applicable.

(4) No later than December 1, 1984, the "U. S. Steel Seamless Tubular Operations, LLC - Lorain" (Ohio EPA premise number 0247080961), shall submit an application for a permit-to-operate or an application for a modification to a permit-to-operate in accordance with rule 3745-35-02 of the Administrative Code as it existed on December 1, 1984, which application shall include a compliance program which will bring the source into full compliance with paragraph (G) of rule 3745-18-53 of the Administrative Code as expeditiously as practicable but in no event later than the date specified in paragraph (C)(5) of this rule, and identify all reasonable interim control measures.

(5) [Reserved.]

(6) No later than July 15, 1989, any owner or operator of the "ArcelorMittal Cleveland LLC" (OEPA premise number 1318001613) shall do the following:

(a) Submit a compliance program that will bring the facility into compliance with paragraph (O) of rule 3745-18-24 of the Administrative Code as expeditiously as practicable, but in no event later than the date specified in paragraph (C)(7) of this rule.

(b) Identify all reasonable interim control measures.

(7) No later than November 30, 1991, any owner or operator of any sulfur dioxide emissions source subject to, and not specifically exempted from, rule 3745-18-37 of the Administrative Code, Hamilton county emissions limits, shall do the following:

(a) Submit a compliance program that will bring the source into full compliance with rule 3745-18-37 of the Administrative Code as expeditiously as practicable, but in no event later than December 22, 1993.

(b) Identify all reasonable interim control measures.

(8) No later than April 20, 2000, any owner or operator of any sulfur dioxide emissions source subject to, and not specifically exempted from, rule 3745-18-15 of the Administrative Code, Butler county emissions limits, shall do the following:

(a) Submit a compliance program that will bring the source into full compliance with rule 3745-18-15 of the Administrative Code as expeditiously as practicable, but in no event later than the date specified in paragraph (C)(6) of this rule.

(b) Identify all reasonable interim control measures.

(9) ~~Not later than thirty days after the effective date of this rule, any owner or operator subject to paragraphs (F)(1) to (F)(8) of rule 3745-18-49 of the Administrative Code and no later than April 23, 2016, any owner or operator subject to paragraphs (G)(3) to (G)(5) and (P) of rule 3745-18-47 of the Administrative Code~~ The following shall submit an application for an operating permit or an application for a modification to an operating permit in accordance with Chapter 3745-77 of the Administrative Code, for sources subject to the Title V program, or in accordance with Chapter 3745-31 of the Administrative Code, for sources not subject to the Title V program. Such application shall include a compliance program which will bring the source into full compliance with this chapter as expeditiously as practicable but in no event later than the dates specified in paragraph (C) of this rule.

(a) Not later than March 18, 2017, any owner or operator subject to paragraphs (F)(1) to (F)(8) of rule 3745-18-49 of the Administrative Code.

(b) Not later than April 23, 2016, any owner or operator subject to paragraphs (G)(3) to (G)(5) and (P) of rule 3745-18-47 of the Administrative Code.

(c) Not later thirty days after the effective date of this rule, any owner or operator subject to paragraph (D)(3) of rule 3745-18-47 of the Administrative Code.

(C) Compliance time schedules.

(1) Except as otherwise provided in paragraphs (C)(2) to (C)(11) of this rule, no owner or operator shall cause, permit, or allow the operation or other use of any air contaminant source in violation of the limits specified in rules 3745-18-06 to 3745-18-94 of the Administrative Code beyond August 27, 1979.

(2) No owner or operator shall cause, permit, or allow the operation or other use of any air contaminant source in violation of the limits specified in rules 3745-18-15 and 3745-18-83 of the Administrative Code beyond September 1, 1982.

(3) No owner or operator shall cause, permit, or allow the operation or other use of any air contaminant source at the following facilities in violation of the limits

specified in rules 3745-18-06 to 3745-18-94 of the Administrative Code beyond June 17, 1980:

(a) "Honeywell International, Inc."/ Lawerence county / Ironton / OEPA premise number 0744010002.

(b) "ALCOA - Cleveland Works" / Cuyahoga county / Cuyahoga Heights / OEPA premise number 1318170314.

(c) "AK Steel - Zanesville Works" / Muskingum county / Zanesville / OEPA premise number 0660010006.

(d) "Marathon Pipe Line LLC" / Hancock county / Findlay / OEPA premise number 0332010020.

(e) "Chemtrade Refinery Solutions Limited Partnership" / Lucas county / Oregon /OEPA premise number 0448020014.

(f) "Zaclon, LLC" / Cuyahoga county / Cleveland /OEPA premise number 1318000151.

(g) "Chemours Fort Hill Plant" / Hamilton county / North Bend / OEPA premise number 1431350817.

(h) "Axalta Coating Systems" / Lucas county / Toledo / OEPA premise number 0448010058.

(i) "General Motors LLC - Parma Plant" / Cuyahoga county / Parma / OEPA premise number 1318451029.

(j) "Kyklos Bearing International, Inc." / Erie county / Sandusky / OEPA premise number 0322020045.

(k) "Delphi Packard Electric Systems, North River Road" / Trumbull county / Warren / OEPA premise number 0278080051.

(l) "Veyance Technologies, Inc." / Auglaize county / St. Marys / OEPA premise number 0306010138.

(m) "ArcelorMittal Cleveland LLC" / Cuyahoga county / Cleveland / OEPA premise number 1318001613.

(n) "Carmeuse Lime, Inc." / Lake county / Grand River / OEPA premise number 0243030257.

(o) "Republic Steel-Massillon" / Stark county / Massillon /OEPA premise number 1576130697.

(p) "Republic Steel" / Stark county / Canton / OEPA premise number 1576050694.

(q) "Lima Refining Company" / Allen county / Lima / OEPA premise number 0302020012.

(r) "Kraton Polymers U.S. LLC" / Washington county / Belpre / OEPA premise number 0684010011.

(s) "BP-Husky Refining LLC" / Lucas county / Oregon / OEPA premise number 0448020007.

(t) "Toledo Refining Company, LLC" / Lucas county / Oregon / OEPA premise number 0448010246.

(u) "The Timken Company Bucyrus Bearing Plant" / Crawford county / Bucyrus / OEPA premise number 0317010168.

(v) "The TimkenSteel Corporation - Gambrinus Steel Plant" / Stark county / Canton / OEPA premise number 1576222000.

(w) "TimkenSteel Corporation - Faircrest Steel Plant" / Stark county / Canton / OEPA premise number 1576222001.

(x) "TimkenSteel Corporation - Harrison Steel Plant" / Stark county / Canton / OEPA premise number 1576222002.

(y) "Charter Steel - Cleveland Inc." / Cuyahoga county / Cuyahoga Heights / OEPA premise number 1318171623.

(z) "Republic Steel, f/k/a Republic Engineered Products, Inc" / Lorain county / Lorain / OEPA premise number 0247080229.

(aa) "ALTIVIA Petrochemicals, LLC" / Scioto county / Haverhill /OEPA premise number 0773000080.

(bb) "Yorkville Energy Services Terminal" / Jefferson county / Yorkville / OEPA premise number 0641120012.

(cc) "4K Industrial Park LLC" / Belmont county / Martins Ferry / OEPA premise number 0607090013.

(dd) "Duke Energy Ohio, W.C. Beckjord Station" / Clermont county / New Richmond / OEPA premise number 1413100008.

(ee) "Miami Fort Power Station" / Hamilton county / North Bend / OEPA premise number 1431350093.

(ff) "FirstEnergy Generation Corp., Ashtabula Plant" / Ashtabula county / Ashtabula / OEPA premise number 0204010000.

(gg) "Cleveland Thermal LLC" / Cuyahoga county / Cleveland /OEPA premise number 1318000246.

(hh) "Eastlake Substation" / Lake county / Eastlake / OEPA premise number 0243160009.

(ii) "Avon Lake Power Plant" / Lorain county / Avon Lake / OEPA premise number 0247030013.

(jj) "Conesville Power Plant" / Coshocton county / Conesville / OEPA premise number 0616000000.

(kk) "Picway Power Plant" / Pickaway county / Lockbourne / OEPA premise number 0165000006

(ll) "DP&L, J.M. Stuart Generating Station" / Adams county / Aberdeen / OEPA premise number 0701000007.

(mm) "DP&L Tait Generating Station" / Montgomery county / Moraine / OEPA premise number 0857043333.

(nn) "DP&L, O.H. Hutchings Generating Station" / Montgomery county / Miamisburg / OEPA premise number 0857780013.

(oo) "DP&L, Yankee Street Generating Station" / Montgomery county / Centerville / OEPA premise number 0857810015.

(pp) "W. H. Sammis Plant" / Jefferson county / Stratton / OEPA premise number 0641160017.

(qq) "West Lorain Plant" / Lorain county / Lorain / OEPA premise number 0247080487.

(rr) "Niles Plant" / Trumbull county / Niles / OEPA premise number 0278060023.

(ss) "General James M. Gavin Power Plant" / Gallia county / Cheshire / OEPA premise number 0627010056.

(tt) "Muskingum River Development, LLC" / Washington county / Waterford / OEPA premise number 0684000000.

(uu) "Ohio Valley Electric Corp., Kyger Creek Station" / Gallia county / Cheshire / OEPA premise number 0627000003.

(vv) "Richland Substation Peaker Facility" / Defiance county / Defiance / OEPA premise number 0320010006.

(ww) "FirstEnergy Generation LLC, Bay Shore Plant" / Lucas county / Oregon / OEPA premise number 0448020006.

(xx) "Stryker Substation Peaker" / Williams county / Stryker / OEPA premise number 0386000006.

(yy) "Youngstown Thermal" / Mahoning county / Youngstown / OEPA premise number 0250110024.

(4) [Reserved.]

(5) Notwithstanding the provisions of paragraph (C)(1) of this rule, no owner or operator shall cause, permit, or allow the operation or other use of any air contaminant source in violation of the limits specified in paragraph (G) of rule 3745-18-53 of the Administrative Code beyond December 31, 1985.

(6) Notwithstanding the provisions of paragraph (C)(1) of this rule, any owner or operator utilizing low sulfur fuel, including blended or washed coal, or who installs new emission control systems, or who modifies existing emission control systems, or who ceases operation in order to comply with the specified emission limits, shall bring any air contaminant source specified in paragraph (C)(6)(a) of this rule into compliance with the limits specified in rules 3745-18-06 to 3745-18-94 of the Administrative Code as expeditiously as practicable but in no event later than the compliance schedule identified in paragraph (C)(6)(b) of this rule. The compliance time schedule for each source shall commence on the effective date of the applicable emission limit as specified in rules 3745-18-06 to 3745-18-94 of the Administrative Code.

(a) Air contaminant sources.

(i) [Reserved.]

(ii) "Conesville Power Plant" / Coshocton county / Conesville / OEPA premise number 0616000000 / OEPA source numbers B007 and B008.

(iii) Sources subject to rule 3745-18-15 of the Administrative Code.

(b) Compliance time schedule.

(i) No more than eight weeks after the commencement date specified in paragraph (C)(6) of this rule, the owner or operator of a facility specified in paragraph (C)(6)(a) of this rule shall notify the director of the intent to utilize low sulfur fuels, install new emission control systems, modify existing emission control systems, or cease operation to achieve compliance, and if utilizing low sulfur fuel to achieve compliance, the owner or operator shall submit to the director a ten year projection of the amount of fuels by types that will be substantially adequate to enable compliance with the applicable limit.

(ii) No more than thirty-two weeks after the commencement date specified in paragraph (C)(6) of this rule, the owner or operator of a facility specified in paragraph (C)(6)(a) of this rule shall submit to the director, if applicable, data demonstrating the availability of the low sulfur fuel projected to meet the emission limits contained in rules 3745-18-07 to 3745-18-94 of the Administrative Code.

(iii) No more than thirty-six weeks after the commencement date specified in paragraph (C)(6) of this rule, the owner or operator of a facility specified in paragraph (C)(6)(a) of this rule shall submit to the director a statement as to whether modifications to boiler or emission control equipment will be necessary, and if modifications will be necessary, submit preliminary plans for such modifications.

(iv) No more than forty-two weeks after the commencement date specified in paragraph (C)(6) of this rule, the owner or operator of a facility specified in paragraph (C)(6)(a) of this rule shall submit to the director final plans for equipment modifications necessary to achieve compliance.

(v) No more than fifty weeks after the commencement date specified in paragraph (C)(6) of this rule, the owner or operator of a facility specified in paragraph (C)(6)(a) of this rule shall award contracts for necessary boiler or emission control modifications, if

applicable, and notify the director in writing that such action was taken or, if applicable, submit to the director a detailed schedule for final closure.

(vi) No more than sixty weeks after the commencement date specified in paragraph (C)(6) of this rule, the owner or operator of a facility specified in paragraph (C)(6)(a) of this rule shall initiate on-site modifications, if applicable, and notify the director that such action was taken.

(vii) No more than one hundred eighteen weeks after the commencement date specified in paragraph (C)(6) of this rule, the owner or operator utilizing low sulfur fuel to achieve compliance at a facility specified in paragraph (C)(6)(a) of this rule shall complete on-site modifications, if applicable, and notify the director in writing that such action was taken.

(viii) No more than one hundred twenty-two weeks after the commencement date specified in paragraph (C)(6) of this rule, the owner or operator using low sulfur fuels to achieve compliance at a facility specified in paragraph (C)(6)(a) of this rule shall achieve final compliance with the applicable emission limits specified in rules 3745-18-06 to 3745-18-94 of the Administrative Code and certify compliance to the director in accordance with rule 3745-18-04 of the Administrative Code.

(ix) No more than one hundred forty-four weeks after the commencement date specified in paragraph (C)(6) of this rule, the owner or operator installing new emission control systems, or modifying existing emission control systems in order to comply with the emission limits at a facility specified in paragraph (C)(6)(a) of this rule shall complete on-site modifications or installations and notify the director in writing that such action was taken.

(x) No more than one hundred fifty-six weeks after the commencement date specified in paragraph (C)(6) of this rule, the owner or operator installing new emission control systems, or modifying existing emission control systems in order to comply with the emission limits at a facility specified in paragraph (C)(6)(a) of this rule shall achieve final compliance with the applicable emission limits specified in rules 3745-18-06 to 3745-18-94 of the Administrative Code and certify compliance to the director in accordance with rule 3745-18-04 of the Administrative Code.

(7)

(a) Notwithstanding the provisions of paragraph (C)(1) of this rule, any owner or operator who utilizes low sulfur fuels, or who installs new emission control systems, or who modifies existing emission control systems, or who ceases operation in order to comply with the specified emission limits, shall bring any subject air contaminant source into compliance with the limits specified in paragraph (O) of rule 3745-18-24 of the Administrative Code as expeditiously as practicable but in no event later than the compliance schedule identified in paragraph (C)(7)(b) of this rule. The commencement date of the compliance time schedule shall be October 31, 1991.

(b) Compliance time schedule.

(i) No more than eight weeks after the commencement date specified in paragraph (C)(7)(a) of this rule, the owner or operator of a facility specified therein shall notify the director of the intent to utilize low sulfur fuels, install new emission control systems, modify existing emission control systems, or cease operation to achieve compliance, and if utilizing low sulfur fuel to achieve compliance, the owner or operator shall submit to the director a ten year projection of the amount of fuels by types that will be substantially adequate to enable compliance with the applicable emission limits.

(ii) No more than sixteen weeks after the commencement date specified in paragraph (C)(7)(a) of this rule, the owner or operator of a facility specified therein shall submit to the director, if applicable, data demonstrating the availability of the low sulfur fuel projected to meet the applicable emission limits.

(iii) No more than twenty-five weeks after the commencement date specified in paragraph (C)(7)(a) of this rule, the owner or operator of a facility specified therein shall submit to the director a statement as to whether modifications to boiler or emission control equipment will be necessary to achieve compliance, and if modifications will be necessary, submit preliminary plans for such modifications.

(iv) No more than thirty-two weeks after the commencement date specified in paragraph (C)(7)(a) of this rule, the owner or operator of a facility specified therein shall submit to the director final plans for equipment modifications necessary to achieve compliance.

(v) No more than forty-eight weeks after the commencement date specified in paragraph (C)(7)(a) of this rule, the owner or operator of a facility specified therein shall award contracts for necessary boiler or emission control modifications, if applicable, and notify the director in writing that such action was taken or, if applicable, submit to the director a detailed schedule for final closure.

(vi) No more than sixty weeks after the commencement date specified in paragraph (C)(7)(a) of this rule, the owner or operator of a facility specified therein shall initiate on-site modifications, if applicable, and notify the director that such action was taken.

(vii) No more than one hundred twelve weeks after the commencement date specified in paragraph (C)(7)(a) of this rule, the owner or operator utilizing low sulfur fuel to achieve compliance at a facility specified therein shall complete on-site modifications, if applicable, and notify the director in writing that such action was taken.

(viii) No more than one hundred twenty-four weeks after the commencement date specified in paragraph (C)(7)(a) of this rule, the owner or operator utilizing low sulfur fuel to achieve compliance at a facility specified therein shall achieve final compliance with the applicable emission limits and certify compliance to the director in accordance with paragraph (B) of this rule.

(ix) No more than one hundred forty-four weeks after the commencement date specified in paragraph (C)(7)(a) of this rule, the owner or operator installing new emission control systems, or modifying existing emission control systems in order to achieve compliance at a facility specified therein shall complete on-site modifications or installations and notify the director in writing that such action was taken.

(x) No more than one hundred fifty-six weeks after the commencement date specified in paragraph (C)(7)(a) of this rule, the owner or operator installing new emission control systems or modifying existing emission control systems in order to achieve compliance at a facility specified therein shall achieve final compliance with the applicable emission limits specified in paragraph (O) of rule 3745-18-24 of the Administrative Code and certify compliance

to the director in accordance with rule 3745-18-04 of the Administrative Code.

(8)

(a) Notwithstanding the provisions of paragraph (C)(1) of this rule and except as provided in paragraph (C)(9) of this rule, any owner or operator who utilizes low sulfur fuels, or who installs new emission control systems, or who modifies existing emission control systems, or who ceases operation in order to comply with the specified emission limits, shall bring any subject air contaminant source into compliance with the limits specified in rule 3745-18-37 of the Administrative Code, Hamilton county emission limits, as expeditiously as practicable but in no event later than the compliance schedule identified in paragraph (C)(8)(b) of this rule. The commencement date of the compliance time schedule shall be October 31, 1991.

(b) Compliance time schedule.

(i) No later than July 31, 1992, the owner or operator of a facility specified in paragraph (C)(8)(a) of this rule shall notify the director of the intent to utilize low sulfur fuels, install new emission control systems, modify existing emission control systems, or cease operation to achieve compliance, and if utilizing low sulfur fuel to achieve compliance, the owner or operator shall submit to the director a ten year projection of the amount of fuels by types that will be substantially adequate to enable compliance with the applicable emission limits.

(ii) No later than September 25, 1992, the owner or operator of a facility specified in paragraph (C)(8)(a) of this rule shall submit to the director, if applicable, data demonstrating the availability of the low sulfur fuel projected to meet the applicable emission limits.

(iii) No later than October 9, 1992, the owner or operator of a facility specified in paragraph (C)(8)(a) of this rule shall submit to the director a statement as to whether modifications to boiler or emission control equipment will be necessary to achieve compliance, and if modifications will be necessary, submit preliminary plans for such modifications.

(iv) No later than January 20, 1993, the owner or operator of a facility specified in paragraph (C)(8)(a) of this rule shall submit to the

director final plans for equipment modifications necessary to achieve compliance.

(v) No later than February 7, 1993, the owner or operator of a facility specified in paragraph (C)(8)(a) of this rule shall award contracts for necessary boiler or emission control modifications, if applicable, and notify the director in writing that such action was taken or, if applicable, submit to the director a detailed schedule for final closure.

(vi) No later than June 9, 1993, the owner or operator of a facility specified in paragraph (C)(8)(a) of this rule shall initiate on-site modifications, if applicable, and notify the director that such action was taken.

(vii) No later than August 4, 1993, the owner or operator utilizing low sulfur fuel to achieve compliance at a facility specified in paragraph (C)(8)(a) of this rule shall complete on-site modifications, if applicable, and notify the director in writing that such action was taken.

(viii) No later than September 15, 1993, the owner or operator utilizing low sulfur fuel to achieve compliance at a facility specified in paragraph (C)(8)(a) of this rule shall achieve final compliance with the applicable emission limits and certify compliance to the director in accordance with paragraph (B) of this rule.

(ix) No later than November 10, 1993, the owner or operator installing new emission control systems, or modifying existing emission control systems in order to achieve compliance at a facility specified in paragraph (C)(8)(a) of this rule shall complete on-site modifications or installations and notify the director in writing that such action has been taken.

(x) No later than December 22, 1993, the owner or operator installing new emission control systems or modifying existing emission control systems in order to achieve compliance at a facility specified in paragraph (C)(8)(a) of this rule shall achieve final compliance with the applicable emission limits specified in rule 3745-18-37 of the Administrative Code and certify compliance to the director in accordance with rule 3745-18-04 of the Administrative Code.

(9)

(a) Notwithstanding the provisions of paragraph (C)(1) of this rule, any owner or operator who utilizes low sulfur fuels, or who installs new emission control systems, or who modifies existing emission control systems, or who ceases operation in order to comply with the specified emission limits, shall bring any subject air contaminant source into compliance with the limits specified in paragraph (BB) of rule 3745-18-37 of the Administrative Code as expeditiously as practicable but in no event later than the compliance schedule identified in paragraph (C)(9)(b) of this rule. The commencement date of the compliance time schedule shall be October 31, 1991.

(b) Compliance time schedule.

(i) No later than November 6, 1991, the owner or operator of the facility shall submit to the director a final control plan that describes at a minimum the steps which will be taken to achieve compliance; and if utilizing low sulfur fuel to achieve compliance, the owner or operator shall submit to the director a ten year projection of the amount of fuels by types that will be substantially adequate to enable compliance with the applicable emission limits.

(ii) No later than January 1, 1992, the owner or operator of the facility shall submit to the director, if applicable, data demonstrating the availability of the low sulfur fuel projected to meet the applicable emission limits.

(iii) No later than August 6, 1992, the owner or operator of the facility shall negotiate and sign all necessary contracts, or issue orders for the purchase of component parts and notify the director in writing that such action was taken.

(iv) No later than October 6, 1992, the owner or operator of the facility shall initiate on-site construction or installation and notify the director that such action was taken.

(v) No later than November 22, 1993, the owner or operator of the facility shall complete construction, or cease operation of OEPA source number B007, and shall certify compliance to the director in accordance with paragraph (B) of this rule.

(vi) After December 22, 1993, source B007 shall not be operated except in compliance with the requirements of paragraph (BB) of rule 3745-18-37 of the Administrative Code.

(10) [Reserved.]

(11) Notwithstanding paragraph (C)(1) of this rule, no owner or operator shall cause, permit, or allow the operation or other use of any air contaminant source in violation of the limits specified as follows: ~~in paragraphs (F)(1) to (F)(7) of rule 3745-18-49 of the Administrative Code thirty days after the effective date of this rule and paragraphs (D), (G)(3) to (G)(5), and (P) of rule 3745-18-47 of the Administrative Code beyond January 1, 2017.~~

(a) Beyond March 18, 2017 in for paragraphs (F)(1) to (F)(7) of rule 3745-18-49 of the Administrative Code.

(b) Beyond January 1, 2017 for paragraphs (D)(1) to (D)(2), (G)(3) to (G)(5), and (P) of rule 3745-18-47 of the Administrative Code.

(c) Beyond the effective date of this rule for paragraph (D)(3) of rule 3745-18-47 of the Administrative Code.

(D) Alternative emission limits.

(1) Any owner or operator of an air contaminant source specified in paragraphs (D)(1)(a) to (D)(1)(c) of this rule having alternative sulfur dioxide emission limits specified in rules 3745-18-06 to 3745-18-94 of the Administrative Code shall notify the director of the selected emission limits in accordance with the requirements of paragraphs (D)(2)(a) and (D)(2)(b) of this rule.

(a) [Reserved.]

(b) "Ford Motor Company" (OEPA premise number 1431140861); paragraph (V)(1) or (V)(2) of rule 3745-18-37 of the Administrative Code.

(c) "Miami Fort Power Station" (OEPA premise number 1431350093); paragraph (BB)(3) of rule 3745-18-37 of the Administrative Code.

(2) Alternate emission limits.

(a) No more than eight weeks after the effective date of the applicable emission limits the owner or operator shall notify the director of the selected alternative emission limits and shall bring any subject source into compliance with the selected alternative emission limits as expeditiously as practicable, but in no event later than the compliance schedule specified in paragraph (C)(8) or (C)(9) of this rule.

(b) If, after the final compliance date, any owner or operator of an air contaminant source specified in paragraphs (D)(1)(a) to (D)(1)(c) of this rule elects to comply with an alternative emission limit not selected under the provisions of paragraph (D)(2)(a) of this rule, such owner or operator shall notify the director at least ninety days prior to the intended date of final compliance with the new limits. Any air contaminant source having alternative emission limits shall continuously comply with one of the alternative emission limits at all times after the final compliance date.

Effective:

Five Year Review (FYR) Dates: 11/29/2021

Certification

Date

Promulgated Under:	119.03
Statutory Authority:	3704.03(E)
Rule Amplifies:	3704.03(A), 3704.03(E)
Prior Effective Dates:	12/28/1979, 10/01/1982, 12/15/1982, 11/01/1984, 05/11/1987, 06/15/1989, 10/31/1991, 12/31/2000, 01/23/2006, 04/18/2009, 02/17/2011, 08/26/2011, 10/23/2015, 02/16/2017

3745-18-04 **Measurement methods and procedures.**

[Comment: For dates and availability of non-regulatory government publications, publications of recognized organizations and associations, federal rules, and federal statutory provisions referenced in this rule, see paragraph (C) of rule 3745-18-01 of the Administrative Code titled "referenced materials."]

(A) Unless otherwise specified in paragraphs (B) to (E) of this rule, the non-continuous test methods used for determining compliance with the allowable emission limits in rules 3745-18-06 to 3745-18-94 of the Administrative Code shall be those specified in 40 CFR Part 60.

(B) The test methods and procedures used for determining compliance with the allowable emission limits for any sulfur recovery plant shall be those specified in 40 CFR 60.46.

(C) The test methods and procedures used for determining compliance with the allowable emission limit for any sulfuric acid production unit or any primary zinc smelter shall be those specified in 40 CFR 60.85.

(D) Unless otherwise specified in this rule, the test methods and procedures used for determining compliance with the allowable emission limit for any fuel burning equipment burning coal shall be one of the following:

(1) Stack gas sampling using USEPA methods 1 to 4, and 6, 6A, 6B or 6C, at a frequency to be determined by the director.

(2) Continuous emission monitoring using continuous monitoring systems meeting the requirements of "Performance Specification 2" in 40 CFR Part 60, Appendix B and 40 CFR Part 60, Appendix F with any necessary modifications approved by the director. Emission rates shall be determined using methods specified in 40 CFR 60.45 and 40 CFR 60.47a, 40 CFR 60.47b or 40 CFR 60.47c. Compliance with the applicable sulfur dioxide emission limitation shall be based on daily calculations using an arithmetic average of all data available for the preceding thirty-day period.

(3) Coal sampling and analysis in accordance with USEPA method 19 or equivalent methods as approved by the director. The representative sulfur dioxide emission rate from any sample shall be calculated using the formulas in paragraph (F) of this rule. Coal monitoring and compliance determination procedures shall include the following:

(a) Except as specified by the director, for all facilities greater than one thousand MM Btus per hour heat input capacity, daily as-fired fuel sampling. Compliance with the applicable sulfur dioxide emission limit shall be

determined based on the weighted arithmetic average of the preceding thirty consecutive daily sample analyses.

(b) For all facilities greater than one hundred MM Btus per hour heat input capacity and less than or equal to one thousand MM Btus per hour heat input capacity, monthly composite sampling. Such composite samples shall be composed of either periodic as-fired samples, with the collection frequency determined by the director, or as-received samples with a minimum of one sample per truckload or carload. Compliance with the applicable sulfur dioxide emission limit shall be determined based on the analysis of each monthly composite sample.

(c) For all facilities greater than ten MM Btus per hour heat input capacity and less than or equal to one hundred MM Btus per hour heat input capacity, either monthly composite sampling consistent with paragraph (D)(3)(b) of this rule, or monthly average fuel analysis based on fuel supplier analyses. Fuel supplier analyses shall be obtained for each shipment received during the calendar month. Compliance with the applicable sulfur dioxide emission limit shall be determined based on the weighted arithmetic average of all fuel supplier analyses for each calendar month.

(4) [Reserved.]

(5)

(a) For any fuel burning equipment burning coal at the following sources, compliance with the applicable sulfur dioxide emission limits shall be determined using either of the methods described in paragraph (D)(5)(b) or (D)(5)(c) of this rule. A determination of noncompliance pursuant to either of these methods shall not be refuted by evidence of compliance pursuant to the other method:

(i) [Reserved].

(ii) Coshocton county / "Conesville Power Plant" / OEPA premise number 0616000000 / unit 5 and unit 6 main boilers/ OEPA source numbers B007 and B008.

(b) Compliance shall be determined by stack gas sampling using method specified in 40 CFR 60.46, at a frequency to be determined by the director.

(c) Compliance shall be determined by coal sampling and analysis in accordance with USEPA method 19 or equivalent methods as approved by the director. The representative sulfur dioxide emission rate from any

sample shall be calculated using the formulas in paragraph (F) of this rule. Coal monitoring and compliance determination procedures shall include the following:

(i) Except as specified by the director, for all facilities greater than one thousand MM Btus per hour heat input capacity, daily as-fired fuel sampling. Compliance with the applicable sulfur dioxide emission limit shall be determined based on the weighted arithmetic average of the preceding thirty consecutive daily sample analyses.

(ii) For all facilities greater than one hundred MM Btus per hour heat input capacity and less than or equal to one thousand MM Btus per hour heat input capacity, monthly composite sampling. Such composite samples shall be composed of either periodic as-fired samples, with the collection frequency determined by the director, or as-received samples with a minimum of one sample per truckload or carload. Compliance with the applicable sulfur dioxide emission limit shall be determined based on the analysis of each monthly composite sample.

(iii) For all facilities greater than ten MM Btus per hour heat input capacity and less than or equal to one hundred MM Btus per hour heat input capacity, either monthly composite sampling consistent with paragraph (D)(3)(b) of this rule, or monthly average fuel analysis based on fuel supplier analyses. Fuel supplier analyses shall be obtained for each shipment received during the calendar month. Compliance with the applicable sulfur dioxide emission limit shall be determined based on the weighted arithmetic average of all fuel supplier analyses for each calendar month.

(6) For any fuel burning equipment burning coal at the "ArcelorMittal Cleveland LLC" (OEPA premise number 1318001613) facility located in Cleveland, Ohio, compliance shall be determined using one of the following:

(a) Stack gas sampling using methods specified in 40 CFR 60.46, at a frequency to be determined by the director.

(b) Continuous emission monitoring using continuous monitoring systems meeting the requirements of "Performance Specification 2" in 40 CFR Part 60, Appendix B and 40 CFR Part 60, Appendix F with any necessary modifications approved by the director. Emission rates shall be determined using methods specified in 40 CFR 60.45 and 40 CFR 60.47a.

Compliance with the applicable sulfur dioxide emission limits shall be based on daily average calculations.

(c) Coal sampling and analysis in accordance with USEPA method 19 or equivalent methods as approved by the director. Coal monitoring and compliance determination procedures shall consist of daily, as-fired fuel sampling for all sources greater than one hundred MM Btus per hour actual heat input capacity. The representative sulfur dioxide emission rate from any sample shall be calculated using the formulas in paragraph (F) of this rule. Compliance with the applicable sulfur dioxide emission limits shall be determined based on a daily average.

(7) [Reserved.]

(8) For any fuel burning equipment burning coal at any sulfur dioxide emissions source subject to, and not specifically exempted from, rule 3745-18-37 of the Administrative Code, Hamilton county emission limits, emission tracking, recordkeeping, and reporting requirements shall be one of the following:

(a) Continuous emission monitoring using continuous monitoring systems meeting the requirements of "Performance Specification 2" in 40 CFR Part 60, Appendix B and 40 CFR Part 60, Appendix F . Emission rates shall be determined using methods specified in 40 CFR 60.45 and 40 CFR 60.47a, 40 CFR 60.47b or 40 CFR 60.47c.

(b) Coal sampling and analysis in accordance with USEPA method 19. Emission tracking procedures shall consist of weekly, as-fired fuel sampling for all sources greater than one hundred MM Btus per hour actual heat input capacity. The representative sulfur dioxide emission rate from any sample shall be calculated using the formulas in paragraph (F) of this rule.

(c) Either monthly composite sampling consistent with paragraph (D)(8)(b) of this rule, or fuel supplier analyses, for all sources greater than ten MM Btus per hour heat input capacity and less than one hundred MM Btus per hour heat input capacity. Fuel supplier analyses shall be obtained for each shipment received. The representative sulfur dioxide emission rate from any sample or fuel supplier analysis shall be calculated using the formulas in paragraph (F) of this rule.

(d) In lieu of the emission tracking requirements in paragraphs (D)(8)(a) to (D)(8)(c) of this rule, the owners or operators of the following sources shall

provide coal sampling and analysis in accordance with USEPA method 19 and in accordance with the requirements indicated:

(i) [Reserved.]

(ii) [Reserved.]

(iii) [Reserved.]

(iv) [Reserved.]

(v) [Reserved.]

(vi) Until December 22, 1993, "University of Cincinnati" (OEPA premise number 1431070849); ECUP boiler 3 (OEPA source B108); one representative coal sample per week for analysis. The coal sample shall consist of at least one sample increment per boiler and each increment shall weigh a minimum of five pounds each.

(e) Any owner or operator required to perform emissions tracking pursuant to paragraph (D)(8) of this rule shall maintain such records for a period of not less than three years and shall make such records available for inspection by and submittal to the director upon request.

(9) For any fuel burning equipment burning coal at any sulfur dioxide emissions source subject to, and not specifically exempted from, rule 3745-18-15 of the Administrative Code compliance with the applicable sulfur dioxide emission limits shall be determined using one of the following methods:

(a) Stack gas sampling using USEPA methods 1 to 4, and 6, 6A, 6B or 6C, at a frequency to be determined by the director.

(b) Continuous emission monitoring using continuous monitoring systems meeting the requirements of "Performance Specification 2" as specified in 40 CFR Part 60, Appendix B and the requirements specified in 40 CFR Part 60, Appendix F, with any necessary modifications approved by the director. Emission rates shall be determined using methods specified in 40 CFR 60.45 and 40 CFR 60.47a, 40 CFR 60.47b or 40 CFR 60.47c. Compliance with the applicable sulfur dioxide emission limits shall be based on daily average calculations.

(c) Coal sampling and analysis in accordance with USEPA method 9 or equivalent methods as approved by the director. The representative sulfur dioxide emission rate from any sample shall be calculated using the

formulas in paragraph (F) of this rule. Coal monitoring and compliance determination procedures shall include the following:

(i) Except as specified by the director, for all facilities greater than one thousand MM Btus per hour heat input capacity, daily as-fired fuel sampling. Compliance with the applicable sulfur dioxide emission limits shall be determined based on a daily average.

(ii) For all facilities greater than one hundred MM Btus per hour heat input capacity and less than or equal to one thousand MM Btus per hour heat input capacity, monthly composite sampling. Such composite samples shall be composed of either periodic as-fired samples, with the collection frequency determined by the director, or as-received samples with a minimum of one sample per truckload or carload. Compliance with the applicable sulfur dioxide emission limit shall be determined based on the analysis of each monthly composite sample.

(iii) For all facilities greater than ten MM Btus per hour heat input capacity and less than or equal to one hundred MM Btus per hour heat input capacity, either monthly composite sampling consistent with paragraph (D)(9)(c)(ii) of this rule, or monthly average fuel analysis based on fuel supplier analyses. Fuel supplier analyses shall be obtained for each shipment received during the calendar month. Compliance with the applicable sulfur dioxide emission limit shall be determined based on the weighted arithmetic average of all fuel supplier analyses for each calendar month.

A determination of noncompliance pursuant to any of these methods shall not be refuted by evidence of compliance pursuant to any other of these methods.

(10) For any fuel burning equipment burning coal at the “Painesville Municipal Electric Plant” (OEPA premise number 0243110008) facility located in Painesville, Ohio, compliance with the sulfur dioxide emissions rates specified in paragraphs (F)(4) to (F)(6) of rule 3745-18-49 of the Administrative Code shall be demonstrated by calculating an average emission rate in pounds per hour over thirty operating days. Emissions shall be calculated for each operating hour by multiplying the heat input times the applicable emission rate in pounds of sulfur dioxide per MM Btu. The emission rate shall be determined in accordance with paragraph (F) of this rule. The average emission rate shall be calculated using the following equation:

$$Eavg = \frac{\sum_{i=1}^{n} Hi * ERi}{n}$$

where: E_{avg} is the arithmetic average emissions in pounds per hour.

H_i is the hourly heat input in MM Btu for hour i. H_i is determined by a computerized system, or by monitoring the hourly steam production rate and back-calculating the heat input in accordance with the heat balance method or other approved equivalent method.

ER_i is the emission rate in pounds of sulfur dioxide per MM Btu, determined in accordance with paragraph (F) of this rule. If multiple fuels are used, the emission rate shall be calculated as a weighted average based on the heat input of each fuel burned.

n is the number of operating hours during a period of thirty consecutive operating days. An operating day means a twenty-four-hour period that begins at midnight and ends the following midnight during which any fuel is combusted at any time, except that if the schedule for calculating emission averages is revised, an operating day shall mean a twenty-four-hour period between consecutive scheduled emission average calculations during which any fuel is combusted at any time.

The daily rolling arithmetic average is calculated on a fixed schedule updated at twelve a.m. every operating calendar day unless an alternative fixed daily schedule is approved by the director. The director shall notify the United States environmental protection agency upon the approval of any alternate averaging schedule.

(11) For any fuel burning equipment burning coal at the "Cardinal Power Plant" (OEPA premise number 0641050002) or any subsequent owner or operator of the "Cardinal Power Plant" facility in Brilliant, Ohio, compliance with the sulfur dioxide emissions rate specified in paragraph (D)(3) of rule 3745-18-47 of the Administrative Code shall be demonstrated by calculating an average emission rate in pounds per hour over thirty operating days. Emissions shall be calculated for each operating hour for main boiler unit numbers 1, 2 and 3 (OEPA source numbers B001, B002 and B009), combined, as a summation of the emission rates determined in accordance with paragraph (D)(2) of this rule. The permittee may remove values which were substituted for missing data in accordance with 40 CFR Part 75 Subpart D. Compliance with the combined

average sulfur dioxide emission rate shall be calculated using the following equation:

$$E_{avg} = \left(\sum_{i=1}^{n} (SO_{2,B001} + SO_{2,B002} + SO_{2,B009})\right) / n$$

---

where: E_{avg} is the arithmetic average SO2 emissions in pounds per hour as a rolling, 30-operating-day average computed at the end of each operating day.

$SO_{2,B001}$ = SO_2 emissions from emissions unit B001, in pounds/hr for hour i.

$SO_{2,B002}$ = SO_2 emissions from emissions unit B002, in pounds/hr for hour i.

$SO_{2,B009}$ = SO_2 emissions from emissions unit B009, in pounds/hr for hour i.

n = number of operating hours in the rolling, thirty-operating-day averaging period, minus the number of operating hours excluded from the calculation due to missing data.

An operating hour is an hour in which any of units B001, B002 or B009 are operating. An operating day is a day in which any of units B001, B002 or B009 are operating for any portion of the day. A value of E_{avg} shall be computed for each operating day and the twenty-nine preceding operating days.

(E) Unless otherwise specified in this rule, the test methods and procedures used for determining compliance with the allowable emission limit for any fuel burning equipment burning fuels other than coal shall be one of the following:

(1) Stack gas sampling using USEPA methods 1 to 4, and 6, 6A, 6B or 6C, at a frequency to be determined by the director.

(2) Continuous emission monitoring using continuous monitoring systems meeting the requirements of "Performance Specification 2" as specified in 40 CFR Part 60, Appendix B and the requirements of 40 CFR Part 60, Appendix F with any necessary modifications approved by the director. Emissions rates shall be determined using methods specified in 40 CFR 60.45 and 40 CFR 60.47a, 40 CFR 60.47b or 40 CFR 60.47c. Compliance with the applicable sulfur dioxide emission limitation shall be based on daily calculations using an arithmetic average of all data available for the preceding thirty-day period.

(3) Fuel sampling and analysis in accordance with USEPA method 19 or the appropriate ASTM methods, or equivalent methods as approved by the director. In lieu of performing onsite sampling, representative fuel analyses performed by fuel suppliers may be acceptable. The representative sulfur dioxide emission rate from any sample shall be calculated using the formulas in paragraph (F) of this rule. The sampling frequency shall be, at a minimum, such that a sulfur dioxide emission rate representative of the thirty-day average emission rate can be determined.

(4) For any fuel burning equipment burning fuels other than coal at the "ArcelorMittal Cleveland LLC" (OEPA premise number 1318001613) facility located in Cleveland, Ohio, compliance shall be determined using one of the following:

(a) Stack gas sampling using USEPA methods 1 to 4, and 6, at a frequency to be determined by the director.

(b) Continuous emission monitoring using continuous monitoring systems meeting the requirements of "Performance Specification 2" as specified in 40 CFR Part 60, Appendix B and Appendix F with any necessary modifications approved by the director. Emission rates shall be determined using methods specified in 40 CFR 60.45 and 40 CFR 60.47a. Compliance with the applicable sulfur dioxide emission limits shall be based on daily average calculations.

(c) Fuel sampling and analysis in accordance with USEPA method 19 or the appropriate ASTM methods, or equivalent methods as approved by the director. In lieu of performing on-site sampling, representative fuel analyses performed by the fuel suppliers may be acceptable. The representative sulfur dioxide emission rate from any sample shall be calculated using the formulas in paragraph (F) of this rule. The sampling frequency shall be, at a minimum, such that a sulfur dioxide emission rate representative of the daily average emission rate can be determined.

(5) For any fuel burning equipment burning fuels other than coal at any sulfur dioxide emissions source subject to, and not specifically exempted from, rule 3745-18-37 of the Administrative Code, Hamilton county emission limits, compliance with the applicable sulfur dioxide emission limits shall be determined using stack gas sampling using USEPA methods 1 to 4 and 6, 6A, 6B or 6C.

(6) For any fuel burning equipment burning fuels other than coal at any sulfur dioxide emissions source subject to, and not specifically exempted from, rule 3745-18-37 of the Administrative Code, Hamilton county emission limits,

emission tracking, recordkeeping and reporting requirements shall be one of the following:

(a) Continuous emission monitoring using continuous monitoring systems meeting the requirements of "Performance Specification 2" as specified in 40 CFR Part 60, Appendix B and 40 CFR Part 60, Appendix F. Emission rates shall be determined using methods specified in 40 CFR 60.45 and 40 CFR 60.47a, 40 CFR 60.47b or 40 CFR 60.47c.

(b) Fuel sampling and analysis in accordance with USEPA method 19, or the appropriate ASTM methods. In lieu of performing on-site sampling, representative fuel analyses performed by the fuel suppliers may be acceptable. The representative sulfur dioxide emission rate from any sample shall be calculated using the formulas in paragraph (F) of this rule. The sampling frequency shall be, at a minimum, such that at least one analysis is obtained from each shipment of fuel.

(7) For any fuel burning equipment burning fuels other than coal at any sulfur dioxide emissions source subject to, and not specifically exempted from, rule 3745-18-15 of the Administrative Code, Butler county emission limits, compliance with the applicable sulfur dioxide emission limits shall be determined using the methods described in paragraphs (E)(7)(a) to (E)(7)(c) of this rule. A determination of noncompliance pursuant to any of these methods shall not be refuted by evidence of compliance pursuant to any other of these methods:

(a) Stack gas sampling using USEPA methods 1 to 4, and 6, 6A, 6B or 6C, at a frequency to be determined by the director.

(b) Continuous emission monitoring using continuous monitoring systems meeting the requirements of "Performance Specification 2" as specified in 40 CFR Part 60, Appendix B and 40 CFR Part 60, Appendix F with any necessary modifications approved by the director. Emission rates shall be determined using methods specified in 40 CFR 60.45 and 40 CFR 60.47a, 40 CFR 60.47b or 40 CFR 60.47c. Compliance with the applicable sulfur dioxide emission limits shall be based on daily average calculations.

(c) Fuel sampling and analysis in accordance with USEPA method 19 or the appropriate ASTM methods, or equivalent methods as approved by the director. In lieu of performing on-site sampling, representative fuel analyses performed by the fuel suppliers may be acceptable. The representative sulfur dioxide emission rate from any sample shall be calculated using the formulas in paragraph (F) of this rule. The sampling

frequency shall be, at a minimum, such that a sulfur dioxide emission rate representative of the thirty-day average emission rate can be determined.

(F) Sulfur dioxide emissions from fuel samples shall be calculated as follows:

(1) From solid fuels:

$ER = (1 \times 10^6)/H \times S \times 1.9$

where: ER = the emission rate in pounds of sulfur dioxide per MM Btu.

H = the heat content of the solid fuel in Btu per pound.

S = the decimal fraction of sulfur in the solid fuel.

(2) From liquid fuels:

$ER = (1 \times 10^6)/H \times D \times S \times 1.974$

where: ER = the emission rate in pounds of sulfur dioxide per MM Btu.

H = the heat content of the liquid fuel in Btu per gallon.

D = the density of the liquid fuel in pounds per gallon.

S = the decimal fraction of sulfur in the liquid fuel.

(3) From gaseous fuels other than natural gas as specified in paragraph (F)(4) of this rule:

$ER = (1 \times 10^6)/H \times D \times S \times 1.998$

where: ER = the emission rate in pounds of sulfur dioxide per MM Btu.

H = the heat content of the gaseous fuel in Btu per standard cubic foot.

D = the density of the gaseous fuel in pounds per standard cubic foot.

S = the decimal fraction of sulfur in the gaseous fuel.

(4) From natural gas, the sulfur dioxide emission rate shall be considered to be equal to 0.0 pounds of sulfur dioxide per MM Btu.

(G) All data, calculations and reports from any performance test, continuous monitor or fuel sample developed for the purpose of demonstrating compliance with rules

3745-18-06 to 3745-18-94 of the Administrative Code shall be retained for a minimum of three years and shall be available for inspection by the director or the director's representative.

(H) Any owner or operator of any sulfur dioxide emissions source subject to, and not specifically exempted from, rule 3745-18-37 of the Administrative Code, Hamilton county emission limits, shall document any compliance test or applicable emission tracking procedure, shall document compliance with any applicable operating rate limits and shall retain all data, calculations and reports from any performance test, continuous emission monitor, fuel sample, or operating rate monitor utilized for the purpose of demonstrating compliance with the applicable emission limits, emission tracking requirements, or operating rate limits for a period of not less than three years and shall make such records available for inspection by and submittal to the director upon request.

(I) Nothing in this rule shall be interpreted to prevent the director from issuing orders pursuant to section 3704.03 of the Revised Code to require performance testing, continuous emission monitoring, or fuel sampling or to require record-keeping and reporting of emission information. Any such data may be used to further evaluate compliance with rules 3745-18-06 to 3745-18-94 of the Administrative Code.

(J) Any owner or operator of any sulfur dioxide source subject to, and not specifically exempted from, paragraphs (B)(5), (B)(6), (B)(7), (B)(8), (B)(11), (B)(13) and (B)(14) of rule 3745-18-49 of the Administrative Code, "Lubrizol Corporation" processes "M", "N", "O", "W" and "AC" (OEPA source numbers P012, P013, P014, P022 and P030), shall demonstrate compliance with the combined hourly emission limits by performing emission tests in accordance with USEPA method 6 or USEPA method 6C, and by employing the continuous emission rate monitoring system. The combined allowable sulfur dioxide emission limit for these processes for any hour shall be the sum of the individual allowable sulfur dioxide emissions limits for those processes that are in operation during any part of that hour. The combined allowable sulfur dioxide emission limit for these processes for any rolling three hour period shall be the average of the three, one hour allowable limits comprising the three hour period.

Effective:

Five Year Review (FYR) Dates: 11/29/2021

_____

Certification

_____

Date

Promulgated Under:	119.03
Statutory Authority:	3704.03(E)
Rule Amplifies:	3704.03(A), 3704.03(E)
Prior Effective Dates:	12/28/1979, 11/01/1984, 05/11/1987, 06/15/1989, 10/31/1991, 03/21/2000, 09/01/2003, 01/23/2006, 02/17/2011, 10/23/2015, 02/16/2017

3745-18-47 **Jefferson county emission limits.**

(A) No owner or operator of any coal-fired steam generating unit in Jefferson county, unless otherwise specified in this rule, shall cause or permit the emission of sulfur dioxide from any source to exceed a maximum of 1.8 pounds of sulfur dioxide per MM Btu actual heat input.

(B) No owner or operator of any oil-fired steam generating unit in Jefferson county, unless otherwise specified in this rule, shall cause or permit the emission of sulfur dioxide from any source to exceed a maximum of 0.8 pounds of sulfur dioxide per MM Btu actual heat input.

(C) No owner or operator of a by-product coke oven for a facility in Jefferson county which utilizes by-product coke oven gas shall cause or permit the combustion of by-product coke oven gas containing hydrogen sulfide in excess of fifty grains of hydrogen sulfide per one hundred dry standard cubic feet of coke oven gas.

(D) The "Cardinal Power Plant" (OEPA premise number 0641050002) or any subsequent owner or operator of the "Cardinal Power Plant," Brilliant, Ohio shall not cause or permit emissions of sulfur dioxide from the following sources to exceed the amounts indicated:

(1) Main boiler unit numbers 1 and 2 (OEPA source numbers B001 and B002); a maximum of 1.056 pounds of sulfur dioxide per MM Btu actual heat input from each boiler.

(2) Main boiler unit number 3 (OEPA source number B009); a maximum of 0.66 pounds of sulfur dioxide per MM Btu actual heat input.

(3) Main boiler unit numbers 1, 2 and 3 (OEPA source numbers B001, B002 and B009), combined; a maximum of 4,858.75 pounds of sulfur dioxide per hour as a rolling, thirty-day average.

(E) [Reserved.]

(F) [Reserved.]

(G) The "Mingo Junction Steel Works, LLC" (OEPA premise number 0641090010) or any subsequent owner or operator of the "Mingo Junction Steel Works, LLC," Mingo Junction, Ohio shall not cause or permit the emission of sulfur dioxide from the following sources to exceed the amounts indicated:

(1) [Reserved.]

(2) [Reserved.]

(3) Reheat furnaces 2 to 4 (OEPA source numbers P006 to P008); a maximum of 1.0 pounds of sulfur dioxide per hour.

(4) Electric arc furnace number 1 (OEPA source number P913); a maximum of 105.0 pounds of sulfur dioxide per hour.

(5) Ladle metallurgical furnace to the electric arc furnace (OEPA source number P914); a maximum of 14.0 pounds of sulfur dioxide per hour.

(H) [Reserved.]

(I) [Reserved.]

(J) [Reserved.]

(K) [Reserved.]

(L) The "W.H. Sammis Plant" (OEPA premise number 0641160017) or any subsequent owner or operator of the "W.H. Sammis Plant, 29503 State Route 7, Stratton, Ohio" shall not cause or permit the emission of sulfur dioxide from the following sources to exceed the amounts indicated:

(1) [Reserved.]

(2) Diesel numbers A, B1, B2, B3, and B4 (OEPA source numbers B002, B003, B004, B005, and B006); a maximum of 0.8 pounds of sulfur dioxide per MM Btu actual heat input from each diesel.

(3) Boiler numbers 1 to 4 (OEPA source numbers B007 to B010); a maximum of 1.61 pounds of sulfur dioxide per MM Btu actual heat input from each boiler.

(4) Boiler numbers 5 to 7 (OEPA source numbers B011 to B013); a maximum of 4.46 pounds of sulfur dioxide per MM Btu actual heat input from each boiler.

(5) As an alternative to paragraphs (L)(3) and (L)(4) of this rule, boiler numbers 1 to 7 (OEPA source numbers B007 to B013); a maximum of 2.91 pounds of sulfur dioxide per MM Btu actual heat input from each boiler. The "W.H. Sammis Plant" shall notify the director and the administrator at least ninety days prior to the intended date of conversion when changing between the emission limits contained in this paragraph and the emission limits contained in paragraphs (L)(3) and (L)(4) of this rule. "W.H. Sammis Plant" shall comply with either this paragraph or paragraphs (L)(3) and (L)(4) of this rule.

(M) [Reserved.]

(N) [[Reserved.]

(O) [Reserved.]

(P) “Mingo Junction Energy Center, LLC” (OEPA premise number 0641090234) or any subsequent owner or operator of " Mingo Junction Energy Center, LLC," Mingo Junction, Ohio shall not cause or permit the emission of sulfur dioxide from units number 1 to 4 (OEPA source numbers B001 to B004) to exceed a maximum of 0.0028 pounds of sulfur dioxide per MM Btu actual heat input from each boiler.

Effective:

Five Year Review (FYR) Dates: 11/29/2021

_____

Certification

_____

Date

Promulgated Under:	119.03
Statutory Authority:	3704.03(E)
Rule Amplifies:	3704.03(A), 3704.03(E)kB
Prior Effective Dates:	12/28/1979, 05/11/1987, 07/25/1996, 02/17/2011, 10/23/2015, 02/16/2017

Division of Air Pollution Control
Response to Comments

Rules: OAC Rules 3745-18-03, 3745-18-04 and 3745-18-47 "Sulfur Dioxide Regulations"

Agency Contact for this Package

Division Contact: Holly Kaloz, Division of Air Pollution Control, 614-644-3632, holly.kaloz@epa.ohio.gov

Ohio EPA held an interested party comment period on February 5, 2019 regarding draft amended rules in Ohio Administrative Code (OAC) Chapter 3745-18, "Sulfur Dioxide Regulations". This document summarizes the comments and questions received during the comment period, which ended on February 20, 2019.

Ohio EPA reviewed and considered all comments received during the public comment period. By law, Ohio EPA has authority to consider specific issues related to protection of the environment and public health.

In an effort to help you review this document, the questions are grouped by topic and organized in a consistent format. The name of the commenter follows the comment in parentheses.

General/Overall Concerns

Comment 1: Comments were received from JSW Steel USA Ohio, Inc. in support of the proposed amendments, indicating Ohio EPA's efforts to redesignate the Steubenville area to attainment for the sulfur dioxide National Ambient Air Quality Standards (NAAQS) are essential to JSW and failure to do so would unnecessarily stifle economic growth in the area. The full comment letter can be found at the end of this response to comments document. (John Hritz, JSW Steel)

Response 1: Thank you for your comments in support of the proposed amendments.

Comment 2: Comments were received from Buckeye Power, co-owners of the Cardinal Power Plant (along with AEP Generation Resources) in opposition to the proposed amendments. The full comment letter can be found at the end of this response to comments document. (Tom Alban, Buckeye Power)

Response 2: Ohio EPA, in consultation with U.S. EPA and Buckeye Power, has conducted additional supplemental modeling analyses which demonstrate that an emission limit somewhat higher than originally proposed will provide for attainment and maintenance of the SO_2 NAAQS. The emission limit in the proposed rule has been revised accordingly to a 30-

day rolling average combined SO_2 emission limit of 4,858.75 lb/hr, increased from 4,201.2 lb/hr. The attached follow-up letter from Buckeye Power indicates that Buckeye Power supports the newly proposed limit.

End of Response to Comments

February 20, 2019

Paul Braun
Ohio Environmental Protection Agency, DAPC
Lazarus Government Center
P.O. Box 1049
Columbus, Ohio 43216-1049

Subject: Draft Rulemaking OAC 3745-18-47, 3745-18-03, & 3745-18-04
Cardinal Power Plan Sulfur Dioxide Emissions Limit
for NAAQs attainment status in Jefferson County, Ohio

Dear Mr. Braun:

JSW Steel USA Ohio, Inc. (JSW) has reviewed and fully supports the proposed amendments to Ohio Administrative Code (OAC) Rules 3745-18-47 as prepared by the Ohio Environmental Protection Agency, Division of Air Pollution Control (DAPC) to incorporate a revised sulfur dioxide emissions limit for the coal-fired boilers at the Cardinal Power Plant in Jefferson County, Ohio. JSW understands that this limit is necessary to satisfy U.S. EPA requirements in order for the Steubenville, Ohio-West Virginia nonattainment area to be eligible for re-designation to attainment and to ensure maintenance of the 2010 sulfur dioxide National Ambient Air Quality Standard (NAAQS). JSW also understands that Ohio EPA has prepared amendments to OAC Rules 3745-18-03 and 3745-18-04 to incorporate compliance time schedules and measurement methods and procedures relevant to the Cardinal emissions limit.

Ohio EPA's efforts to bring Jefferson County into NAAQS attainment status are absolutely essential to JSW as a significant stakeholder creating hundreds of jobs at our facility in Mingo Junction, Ohio. Not moving forward with such efforts would unnecessarily stifle economic growth for a county that desperately needs jobs in the quantities that JSW has been and continues to plan to create through further expansion at our Mingo Junction, Ohio facility. The proposed rules and eventual re-designation of Jefferson County as in attainment with the 2010 sulfur dioxide NAAQS will play a large role in JSW's strategic decision business making processes, as the Mingo Junction facility competes for capital investments amongst JSW's facilities across the globe.

Sincerely,

John Hritz
President and Chief Executive Officer
JSW Steel (USA), Inc.

1500 Commercial Avenue Mingo Junction, Ohio 43938
T (740) 535 6252
www.jswsteel.us

OHIO'S ELECTRIC COOPERATIVES
Your Touchstone Energy® Cooperatives
BUCKEYE POWER, INC.
OHIO RURAL ELECTRIC COOPERATIVES, INC.

February 20, 2019

By Electronic and U.S. Mail

Paul Braun
Ohio EPA
Division of Air Pollution Control
PO Box 1049
Columbus, Ohio 43216-1049
paul.braun@epa.ohio.gov

RE: Ohio EPA's February 5, 2019 Interested Party Draft Related to Proposed Changes to OAC 3745-18 Comments of Buckeye Power, Inc.

Dear Mr. Braun:

On February 5, 2019, Ohio EPA issued its Interested Party Draft ("IP Draft") of the agency's "OAC Charter 3745-18-Cardinal emissions limit" rulemaking ("Cardinal Rulemaking"). The IP Draft consists of identified changes to OAC Rules 3745-18-03, 3745-18-04 and 3745-18-47 as well as Ohio EPA's required Business Impact Analysis ("BIA"). This letter constitutes Buckeye Power, Inc.'s comments on the IP Draft. As Buckeye Power explained in its January 29, 2019 Early Stakeholder Outreach comment letter, Buckeye Power, along with AEP Generation Resources Inc., are owners of the Cardinal Power Plant and have operational control, via Cardinal Operating Company (jointly-owned by Buckeye Power and AEP Generation Resources), of Cardinal.

The IP Draft of the Cardinal Rulemaking includes changes that seek to significantly reduce Cardinal's maximum SO2 hourly emission rate to approximately 1/3 of Cardinal's current emission limit. *See*, IP Draft at 3745-18-47(D)(3). Importantly, Cardinal's SO2 emissions have already been sharply reduced from historic allowable limits, and Cardinal has already installed state-of-the-art SO2 controls. Additionally, Ohio EPA seeks to mandate this significant emission limit reduction as soon as this rulemaking becomes effective without any ramp down period. *See*, IP Draft at 3745-18-03(C)(11). Finally, Ohio EPA also seeks to require the owners of Cardinal to submit a new Title V permit application no later than 30 days after the effective date of the rulemaking. *See*, IP Draft at 3745-18-03(B)(9).

The Cardinal Rulemaking will impact Cardinal, the owners of Cardinal, the member cooperatives and our customers in a negative way by constraining fuel supply options as well as curtailing operational flexibility, both of which are vital to this long-standing baseload power source for the State of Ohio. Further, Buckeye's on-going technical analysis indicates that Cardinal's contribution in the area does not warrant such steep SO2 reductions. Air quality monitors in the northern part of the Steubenville area have monitored attainment for more than 6 years, and monitors sited near the Cardinal Plant have monitored attainment since 2011, all at levels well below the applicable standard. While Ohio EPA's BIA portion of the Cardinal Rulemaking acknowledges the negative impact on Cardinal, the BIA does not accurately

reflect the true costs to the owners of Cardinal and its customers nor does the BIA consider less significant reductions that still allow the area to maintain compliance with the 1-hour SO2 NAAQs. Finally, Ohio EPA's expectation that Cardinal can immediately become compliant with such a sharp emission reduction is unreasonable.

Buckeye Power, on behalf of the owners of Cardinal as well as its members and customers, acknowledges that Ohio EPA has been and continues to be willing to work cooperatively to reach a real-world solution that allows Cardinal to operate as designed, using a range of available fuels, while assuring that the area regains attainment. To that end, Buckeye Power intends this letter to further this goal and serve as the basis for continued dialog with Ohio EPA.

Please do not hesitate to contact me with questions.

Sincerely,

Tom Alban

Tom Alban
Vice President
Buckeye Power, Inc.

OHIO'S ELECTRIC COOPERATIVES

Your Touchstone Energy® Cooperatives

BUCKEYE POWER, INC.
OHIO RURAL ELECTRIC COOPERATIVES, INC.

March 14, 2019

By Electronic and U.S. Mail

Robert Hodanbosi
Chief, Division of Air Pollution Control
Ohio EPA
P.O. Box 1049
Columbus, Ohio 43216-1049

RE: Ohio EPA's Proposed Changes to OAC 3745-18
Related to Cardinal Operating Station

Dear Bob:

On behalf of the Buckeye Power Inc. and AEP Generation Resources Inc., as the owners of Cardinal Power Plant, I would like to thank you and your staff for working cooperatively with us over the past couple of months to address our concerns about Ohio EPA's proposed changes to O.A.C. Chapter 3745-18 to support Ohio's 1-hour sulfur dioxide (SO2) SIP submittal for the Steubenville, OH-WV area.

Buckeye first notified Ohio EPA during the Early Stakeholder process that we had significant concerns about Ohio EPA's proposed rulemaking. More recently, Buckeye submitted a comment letter on February 20, 2019 as part of Ohio EPA's Interested Party process. In response, you and your staff have worked quickly and efficiently with us to consider the best and most current information in establishing any necessary limitations. In addition, your staff teamed with WVDEP and USEPA to assure that the appropriate analyses were undertaken.

Based on the collective work of our respective teams, I can confirm that the owners of Cardinal will agree to Ohio EPA's proposed limit of 4,858.75 pounds of SO2 per hour as a plant-wide mass emission limit for all three units on a rolling, thirty-day average. This limit provides Ohio with a timely, common sense solution while assuring that Cardinal can operate without unreasonably constraining fuel supply options or curtailing operational flexibility, both of which are vital for this long-standing baseload power source for Ohio.

Please do not hesitate to contact me with questions and thank you again for your swift work on this matter.

Buckeye Power, Inc.

T Alban

Thomas Alban
Vice President
Buckeye Power Inc.

cc: Kurt Helfrich
Janet Henry
April Bott

Appendix C:
2015 to 2017 Air Quality Data

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: HKALOZ

DESIGN VALUE REPORT

Report Request ID: 1706912 Report Code: AMP480 Jan. 2, 2019

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	39	081	0017								
	39	081	0018								
	39	081	0020								
	54	009	0005								
	54	009	0007								
	54	009	0011								

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
DESIGN VALUE	42401		

SELECTED OPTIONS

Option Type	Option Value
WORKFILE DELIMITER	,
SINGLE EVENT PROCESSING	EXCLUDE REGIONALLY CONCURRED EVENTS
QUARTERLY DATA IN WORKFILE	NO
AGENCY ROLE	PQAO
USER SITE METADATA	STREET ADDRESS
MERGE PDF FILES	YES

DATE CRITERIA

Start Date	End Date
2011	2017

APPLICABLE STANDARDS

Standard Description
SO2 1-hour 2010

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2011
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Ohio

		2011			2010			2009			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
39-081-0017	618 LOGAN ST.	4	114		4	127		4	85		109	Y
39-081-0018	3487 COUNTY RD. 19	4	55								55	N
39-081-0020	1469 3rd ST.	4	43								43	N

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2011
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

State Name: West Virginia

		2011			2010			2009			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
54-009-0005	FOLLANSBEE - MAHAN LANE	4	143		4	131		4	82		119	Y
54-009-0007	MCKIMS RIDGE ROAD - CROSS C	4	75		4	92		4	81		83	Y
54-009-0011	WEIRTON - MARLAND HEIGHTS E	2	235 *		4	143		4	143		174	N

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2012
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Ohio

		2012			2011			2010			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
39-081-0017	618 LOGAN ST.	4	92	Y	4	114		4	127		111	Y
39-081-0018	3487 COUNTY RD. 19	4	37		4	55					46	N
39-081-0020	1469 3rd ST.	4	28		4	43					36	N

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2012
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

State Name: West Virginia

		2012			2011			2010			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
54-009-0005	FOLLANSBEE - MAHAN LANE	4	71	Y	4	143		4	131		115	Y
54-009-0007	MCKIMS RIDGE ROAD - CROSS C	4	71	Y	4	75		4	92		79	Y
54-009-0011	WEIRTON - MARLAND HEIGHTS E	4	117	Y	2	235 *		4	143		165	N

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2013
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Ohio

		2013			2012			2011			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
39-081-0017	618 LOGAN ST.	4	37	U	4	92	Y	4	114		81	Y
39-081-0018	3487 COUNTY RD. 19	4	52	U	4	37		4	55		48	Y
39-081-0020	1469 3rd ST.	4	33	U	4	28		4	43		35	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2013
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: West Virginia

		2013			2012			2011			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
54-009-0005	FOLLANSBEE - MAHAN LANE	4	49	U	4	71	Y	4	143		88	Y
54-009-0007	MCKIMS RIDGE ROAD - CROSS C	4	31	U	4	71	Y	4	75		59	Y
54-009-0011	WEIRTON - MARLAND HEIGHTS E	4	62	U	4	117	Y	2	235 *		138	N

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2014
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Ohio

		2014			2013			2012			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
39-081-0017	618 LOGAN ST.	4	30	S	4	37	U	4	92	Y	53	Y
39-081-0018	3487 COUNTY RD. 19	4	38	U	4	52	U	4	37		42	Y
39-081-0020	1469 3rd ST.	4	24	U	4	33	U	4	28		28	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2014
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: West Virginia

		2014			2013			2012			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
54-009-0005	FOLLANSBEE - MAHAN LANE	4	33	Y	4	49	U	4	71	Y	51	Y
54-009-0007	MCKIMS RIDGE ROAD - CROSS C	4	32	Y	4	31	U	4	71	Y	45	Y
54-009-0011	WEIRTON - MARLAND HEIGHTS E	4	48	Y	4	62	U	4	117	Y	76	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2015
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Ohio

		2015			2014			2013			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
39-081-0017	618 LOGAN ST.	4	29	Y	4	30	S	4	37	U	32	Y
39-081-0018	3487 COUNTY RD. 19	4	50	Y	4	38	U	4	52	U	47	Y
39-081-0020	1469 3rd ST.	4	23	Y	4	24	U	4	33	U	27	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2015
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: West Virginia

		2015			2014			2013			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
54-009-0005	FOLLANSBEE - MAHAN LANE	4	49	Y	4	33	Y	4	49	U	44	Y
54-009-0007	MCKIMS RIDGE ROAD - CROSS C	4	26	Y	4	32	Y	4	31	U	30	Y
54-009-0011	WEIRTON - MARLAND HEIGHTS E	4	35	Y	4	48	Y	4	62	U	48	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2016
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Ohio

		2016			2015			2014			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
39-081-0017	618 LOGAN ST.	4	27	S	4	29	Y	4	30	S	29	Y
39-081-0018	3487 COUNTY RD. 19	4	31	S	4	50	Y	4	38	U	40	Y
39-081-0020	1469 3rd ST.	4	20	S	4	23	Y	4	24	U	22	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2016
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

State Name: West Virginia

		2016			2015			2014			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
54-009-0005	FOLLANSBEE - MAHAN LANE	4	33	Y	4	49	Y	4	33	Y	38	Y
54-009-0007	MCKIMS RIDGE ROAD - CROSS C	4	39	Y	4	26	Y	4	32	Y	32	Y
54-009-0011	WEIRTON - MARLAND HEIGHTS E	4	49	Y	4	35	Y	4	48	Y	44	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2017
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Ohio

		2017			2016			2015			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
39-081-0017	618 LOGAN ST.	4	18	S	4	27	S	4	29	Y	25	Y
39-081-0018	3487 COUNTY RD. 19	4	34	S	4	31	S	4	50	Y	38	Y
39-081-0020	1469 3rd ST.	4	13	S	4	20	S	4	23	Y	19	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2017
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: West Virginia

		2017			2016			2015			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
54-009-0005	FOLLANSBEE - MAHAN LANE	4	28	U	4	33	Y	4	49	Y	37	Y
54-009-0007	MCKIMS RIDGE ROAD - CROSS C	4	23	U	4	39	Y	4	26	Y	29	Y
54-009-0011	WEIRTON - MARLAND HEIGHTS E	4	27	U	4	49	Y	4	35	Y	37	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

CERTIFICATION EVALUATION AND CONCURRENCE FLAG MEANINGS

FLAG	MEANING
M	The monitoring organization has revised data from this monitor since the most recent certification letter received from the state.
N	The certifying agency has submitted the certification letter and required summary reports, but the certifying agency and/or EPA has determined that issues regarding the quality of the ambient concentration data cannot be resolved due to data completeness, the lack of performed quality assurance checks or the results of uncertainty statistics shown in the AMP255 report or the certification and quality assurance report.
S	The certifying agency has submitted the certification letter and required summary reports. A value of "S" conveys no Regional assessment regarding data quality per se. This flag will remain until the Region provides an "N" or "Y" concurrence flag.
U	Uncertified. The certifying agency did not submit a required certification letter and summary reports for this monitor even though the due date has passed, or the state's certification letter specifically did not apply the certification to this monitor.
X	Certification is not required by 40 CFR 58.15 and no conditions apply to be the basis for assigning another flag value
Y	The certifying agency has submitted a certification letter, and EPA has no unresolved reservations about data quality (after reviewing the letter, the attached summary reports, the amount of quality assurance data submitted to AQS, the quality statistics, and the highest reported concentrations).

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Appendix D:
Steubenville, OH-WV Nonattainment Area Modeling Results
D-A: Cardinal Monitoring Network QA/QC Protocol
D-B: Cardinal Monitoring Network AQS Data

Appendix K
Dispersion Modeling and Weight-of-Evidence Analysis for Steubenville, OH-WV

2010 SO2 NAAQS Nonattainment Area

Introduction

The United States Environmental Protection Agency (U.S. EPA) established a new National Ambient Air Quality Standard (NAAQS) for SO2 on June 22, 2010, of 75 ppb, as the 99th percentile of maximum daily values, averaged over three years. In addition, U.S. EPA revoked the primary annual and 24-hour standards.

On August 5, 2013 (75 FR 47191), effective October 4, 2013, U.S. EPA promulgated the initial SO2 nonattainment areas for the newly established SO2 standard across the country. The Clean Air Act requires states with SO2 nonattainment areas to submit a plan within eighteen months of the effective date of the designations (i.e., by April 4, 2015 based on an October 4, 2013 effective date) detailing how the SO2 standard will be attained.

This document supports the SO2 State Implementation Plan (SIP) for the Steubenville, OH-WV nonattainment area in the State of Ohio. This nonattainment area encompasses emissions from the Cardinal Power Plant, Mountain State Carbon, Mingo Junction Energy Center, and the former Wheeling Pittsburgh Mingo Junction Steel Plant (herein referred to as "Mingo Junction Steel Works"). Cardinal Power Plant (Ohio EPA facility identification # 0641050002) is located at 306 County Road 7 East in Brilliant, Ohio. Mountain State Carbon (WVDEP facility identification # 009-00002) is located at WV Route 2, Follansbee, West Virginia. Mingo Junction Steel Works (Ohio EPA facility identification # 0641090010) is located at 540 Commercial Ave in Mingo Junction, Ohio, and Mingo Junction Energy Center (Ohio EPA facility identification # 0641090234) is located at 540 Commercial Ave in Mingo Junction, Ohio. The Mingo Junction Energy Center property is located within the Mingo Junction Steel Works property. There are no other significant sources of SO2 emissions in the nonattainment area that warrant inclusion in the modeling analysis. As can be seen from the inventory included in Ohio's SO2 Nonattainment Area SIP, the emissions from the facilities comprise more than 99% of the 2011 SO2 emissions in the entire nonattainment area.

Per U.S. EPA's guidance (April 23, 2014 Guidance for 1-Hour SO2 Nonattainment Area SIP Submissions (herein referred to as "Nonattainment SIP Guidance")), "An approvable attainment demonstration would be an air quality modeling analysis that demonstrates that the emission limits in the plan will suffice to provide for timely attainment of the affected standard". In addition, U.S. EPA's most recent draft of the document "Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze" (December 3, 2014) continues to support the ability to use a weight-of-evidence approach as part of attainment demonstrations. Ohio

EPA will be using an extensive modeling analysis coupled with other evidence, such as actual monitoring data, to form our attainment strategy for this area using a weight-of-evidence approach.

Multiple dispersion modeling analyses were performed for this SIP analysis. The first was an analysis of the July 1, 2013-June 30, 2014 period, using actual variable emissions from each facility included in the modeling domain that was active during that time period. This portion of Ohio EPA's analysis demonstrates the contribution of each facility to the ambient air quality monitors in the nonattainment area, and was used to assess model performance. This specific modeling analysis is herein referred to as the "base case," and all modeling analyses not associated with monitor-only specific impacts are herein referred to as "future case" scenarios. The second analysis demonstrates the impact of each individual facility on the nonattainment area when operating at permitted or potential SO2 emission rates. This portion of the analysis was used to establish emission rates that eliminate facility-specific hotspots exceeding the standard (herein referred to as "ceiling rates"). The third analysis demonstrates the interactive impact of facilities in the nonattainment area when operating at previously identified ceiling rates. This portion of the analysis was used to establish emission rates at all facilities required to model attainment of the standard over the nonattainment area (herein referred to as "attainment rates"). The final analysis demonstrates attainment of the standard. These analyses are discussed in greater detail below.

The base case analysis evaluated a one-year time period, July 1, 2013-June 30, 2014, using actual, temporally varying emissions to determine the contribution of emissions from each active source in the modeling domain to the monitored design value concentrations and to assess model performance. This one-year time period is the result of using a full year of onsite meteorological data collected at Mountain State Carbon and at Cardinal Power Plant (Cardinal). Ohio EPA attempted to use variable emissions at the finest temporal scale available for each facility. For this analysis, Ohio EPA utilized hourly emissions from Cardinal for the July 1, 2013-June 30, 2014 period collected from U.S. EPA's Clean Air Markets Database. Hourly variable emissions from Mountain State Carbon were provided by Mountain State Carbon to Ohio EPA and West Virginia DEP during facility outreach. Other facilities included in the attainment modeling analysis were not modeled for the base case, as they were not operating during this time period.

It should also be noted, as discussed extensively in the protocol portion of Ohio's SIP submittal, there are unique challenges in modeling this particular area and the sources within the area. For example, the area has complex meteorology and terrain that requires special consideration while also giving special consideration to the dynamic nature of Cardinal's Unit 3 cooling tower and exhaust stream.

Also unique to this area is the substantial number of ambient air quality monitors currently in operation. In addition to the four U.S. EPA Air Quality System (AQS) monitors located in the northern portion of the nonattainment area, Cardinal operates four monitors, sited specifically to monitor points of maximum impact from the Cardinal

plant. These monitors began operation in 2011, as part of the permit to install FGD technology on Unit 3 at the Cardinal plant. These monitors were not considered during the nonattainment designation process because the monitors had not operated for a long enough time period. These monitors undergo rigorous quality assurance/quality control (QA/QC), and now there are four full years of data collected in this network and it is being incorporated as part of this SIP submittal for modeling purposes and to inform Ohio EPA's weight-of-evidence approach discussed later.

In addition to the substantial amount of monitoring data available, Mountain State Carbon maintains and operates an onsite meteorological station, and Cardinal maintains and operates three meteorological stations. Thus, there is a significant amount of onsite meteorological data available for this area collected in locations that are more representative of the unique meteorological conditions present in the Ohio River valley. Ohio EPA utilized multiple on-site meteorological datasets as part of the modeling analyses conducted as part of this SIP submittal.

The various future case analyses evaluated the impact of each impacting facility individually on the modeling domain when operated at their permitted limits, as well as any attainment strategies and/or emission reductions necessary. Dispersion modeling was used to validate that the control strategies and permit limits will provide for attainment of the standard using on-site meteorological data.

Modeling Approach

Per U.S. EPA's Nonattainment SIP Guidance,

> "Appendix A of this document contains modeling guidance supplemental to that provided in the preamble to the final rulemaking promulgating the 2010 S02 NAAQS and in 40 CFR part 51, Appendix W. Appendix A of this document has also been updated to respond to issues raised during the comment period related to the September 2011 draft S02 Guidance Document. This guidance clarifies the EPA's recommendations on how to conduct refined dispersion modeling under Appendix W to support the implementation of the 2010 S02 NAAQS."

Modeling input data, including emission rates, are addressed in Section 8.0 of Appendix W and specifically for SO2, in Appendix A of the Nonattainment SIP Guidance. The averaging period for the 2010 SO2 NAAQS is the 99th percentile of maximum monitored daily values, averaged over three years. Per the Nonattainment SIP Guidance, five years of National Weather Service data or at least one year of on-site meteorological data is sufficient to represent attainment of the standard. Thus, the modeled form of the standard is expressed as the 99th percentile of maximum daily values averaged over the number of years of meteorological data used (herein referred to as "design value").

The recommended dispersion model for SIP modeling for SO2 is the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) modeling system. There are two input data processors that are regulatory components

of the AERMOD modeling system: AERMET, a meteorological data preprocessor that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, and AERMAP, a terrain data preprocessor that incorporates complex terrain using United States Geological Survey (USGS) Digital Elevation Data. Additionally, Ohio EPA utilized the AERMINUTE module to incorporate 1-minute ASOS meteorological data into the hourly surface input file. Ohio EPA utilized the most up-to-date versions of AERMOD and the associated preprocessors available at the time of the attainment modeling analyses. These are as follows: AERMOD version 14134, AERMET version 14134, AERMINUTE version 14237, and AERMAP version 11103.

Meteorological Data

Multiple sources of on-site meteorological data were available for modeling analyses in the Steubenville, OH-WV nonattainment area. Three years of on-site data collected at Mountain State Carbon for the 2007-2009 period were available, as well as a one-year period from July 1, 2013-June 30, 2014 (herein referred to as the "split year"). Additionally, Cardinal maintains and operates three meteorological stations. These stations did not begin operation until 2011. Further, the meteorological station located at Mountain State Carbon was not in operation for an extended period of time between 2009 and 2013. Thus, the split year (a full 12 consecutive months) time period was utilized for a majority of the modeling analyses, as it represents a common period when both Cardinal and Mountain State Carbon were collecting meteorological data. As detailed in the protocol discussion of Ohio's SIP submittal, Ohio EPA utilized meteorological data collected at the Cardinal plant to model the impacts of Cardinal, and meteorological data collected at Mountain State Carbon to model impacts from Mountain State Carbon, Mingo Junction Steel Works, and Mingo Junction Energy center. This use of area-specific meteorological data sets is necessary and appropriate given the unique discharge and parameterization associated with the Cardinal Unit 3 cooling tower emissions, as described in the protocol discussion of Ohio's SIP submittal. The use of a split year (12 consecutive months) meteorological dataset, and the use of separate site-specific meteorological data, is consistent with both the Nonattainment SIP Guidance and Appendix W, as described in the protocol discussion of Ohio's SIP submittal.

Background

Ohio EPA applied background concentrations of SO2 to all modeled results under all scenarios. Ohio EPA established a background concentration of 8.1 ppb determined from an analysis of monitored SO2 concentrations in the nonattainment area. A detailed description of the background determination for both the base and future case scenarios is provided in the protocol discussion of Ohio's SIP submittal.

Base Case Analysis

The base case analysis compared model predicted one-year SO2 design values to actual monitored design values during the same July 1, 2013-June 30, 2014 period. The

modeled base case was a reasonable attempt to replicate the actual monitored design values. The purpose of modeling actual conditions was to determine the contribution to the modeled exceedance by each source. Further, the base case provides a means to assess model performance, input data quality, and assess the accuracy of the background concentration. To assess source-specific impacts at the monitor locations, Ohio EPA, following U.S. EPA guidance for situations in which it is not possible to model all facilities simultaneously, generated hourly concentration values modeled at each monitor for both the Cardinal Plant and Mountain State Carbon via the POSTFILE output option. These POSTFILES were subsequently processed to determine the combined impact of both facilities at each monitor, for each hour of the modeled period.

Emission Sources

51 emission sources from the two facilities were included in the base case modeling analysis. This includes 25 point sources and 22 segmented volume sources at Mountain State Carbon, as well as 2 point sources and 2 elevated volume sources at Cardinal Plant representing the Unit 3 discharge via the cooling tower. The treatment of the fugitive emissions from the coke oven batteries at Mountain State Carbon as buoyant volume sources, as well as the parameterization of the Unit 3 cooling tower release point are fully detailed in the protocol discussion of Ohio's SIP submittal. Variable emissions for all 51 sources were included in the model via the HOUREMIS input pathway. As stated previously, the base case analyses were comprised of two separate modeling runs, and the resultant POSTFILES combined externally to AERMOD. Additionally, Ohio EPA accounted for the 8.1 ppb background concentration during the post-processing stage to avoid double counting of background impacts. The relevant release point parameters for the 51 emission units included in the base case analysis are presented in Table 1, below.

Source ID	Source Description	Easting (X)	Northing (Y)	Base Elevation	Stack Height	Temperature	Exit Velocity	Stack Diameter	SO2
	POINT SOURCES	(m)	(m)	(m)	(ft)	(K)	(m/s)	(m)	(g/s)
UNIT1	AEP Cardinal Unit 1	530035.8	4455909.2	204.66	1000	334.02	15.31	8.86	Variable
UNIT2	AEP Cardinal Unit 2	530041.8	4455900.2	204.56	1000	334.02	15.3	8.86	Variable
MSC12301	MSC Battery 1-2-3 Pushing Baghouse Stack 1	533246.53	4466075.75	205.29	56.00393701	332.59	23.2	0.7	Variable
MSC12302	MSC Battery 1-2-3 Pushing Baghouse Stack 2	533245.13	4466078.16	205.3	56.00393701	332.59	23.2	0.7	Variable
MSC12303	MSC Battery 1-2-3 Pushing Baghouse Stack 3	533243.75	4466080.51	205.3	56.00393701	332.59	23.2	0.7	Variable
MSC12304	MSC Battery 1-2-3 Pushing Baghouse Stack 4	533242.03	4466083.41	205.3	56.00393701	332.59	23.2	0.7	Variable
MSC12305	MSC Battery 1-2-3 Pushing Baghouse Stack 5	533240.56	4466085.69	205.31	56.00393701	332.59	23.2	0.7	Variable
MSC12306	MSC Battery 1-2-3 Pushing Baghouse Stack 6	533239.19	4466088.07	205.32	56.00393701	332.59	23.2	0.7	Variable
MSC12307	MSC Battery 1-2-3 Pushing Baghouse Stack 7	533237.75	4466090.41	205.33	56.00393701	332.59	23.2	0.7	Variable
MSC12308	MSC Battery 1-2-3 Pushing Baghouse Stack 8	533250.28	4466077.87	205.29	56.00393701	332.59	23.2	0.7	Variable
MSC12309	MSC Battery 1-2-3 Pushing Baghouse Stack 9	533248.88	4466080.28	205.29	56.00393701	332.59	23.2	0.7	Variable
MSC12310	MSC Battery 1-2-3 Pushing Baghouse Stack 10	533247.5	4466082.63	205.29	56.00393701	332.59	23.2	0.7	Variable
MSC12311	MSC Battery 1-2-3 Pushing Baghouse Stack 11	533245.78	4466085.53	205.3	56.00393701	332.59	23.2	0.7	Variable
MSC12312	MSC Battery 1-2-3 Pushing Baghouse Stack 12	533244.31	4466087.81	205.3	56.00393701	332.59	23.2	0.7	Variable
MSC12313	MSC Battery 1-2-3 Pushing Baghouse Stack 13	533242.94	4466090.19	205.31	56.00393701	332.59	23.2	0.7	Variable
MSC12314	MSC Battery 1-2-3 Pushing Baghouse Stack 14	533241.5	4466092.53	205.32	56.00393701	332.59	23.2	0.7	Variable
MSC8SCRU	MSC Battery 8 Pushing Scrubber	533640.7	4465537.17	205.34	59.12073491	318.2	13.4	2.28	Variable
MSCACIDS	MSC Acid Plant Stack	533439	4466089	205.26	70.01312336	299.82	10.45	0.51	Variable

MSCBATT1	MSC Battery 1 Stack SO2	533290	4466132	205.6	200	583.15	5.06	2.28	Variable
MSCBATT2	MSC Battery 2 Stack SO2	533293	4466127	205.59	200	583.15	5.06	2.28	Variable
MSCBATT3	MSC Battery 3 Stack SO2	533381	4465988	206.07	225	588.71	5	2.44	Variable
MSCBATT8	MSC Battery 8 Stack SO2	533648	4465651	205.49	250	422.04	8.32	3.76	Variable
MSCBLR10	MSC Follansbee Boiler 10 on COG	533534	4465930	205.41	75	547.04	13.29	1.22	Variable
MSCBOIL6	MSC Follansbee Boiler 6 on COG	533526	4465952	205.38	174.8687664	450.93	10.09	2.74	Variable
MSCBOIL7	MSC Follansbee Boiler 7 on COG	533526	4465952	205.38	174.8687664	450.93	10.09	2.74	Variable
MSCBOIL9	MSC Follansbee Boiler 9 on COG	533534	4465938	205.37	75	547.04	13.29	1.22	Variable
MSCCOGFL	MSC Follansbee Excess Coke Oven Gas Flare	533257	4466415	204.89	183.3333333	1273.8	20	2.11	Variable

Source ID	**Source Description**	**Easting (X)**	**Northing (Y)**	**Base Elevation**	**Release Height**	**Temperature**	**Init. Horizontal Dimension**	**Initial Vert. Dimension**	**SO2**
	VOLUME SOURCES	**(m)**	**(m)**	**(m)**	**(m)**	**(K)**	**(m)**	**(m)**	**(g/s)**
UNIT3CO	Cardinal CT	529124	4454688	204.09	Variable	NA	41.54	41.54	Variable
UNIT3CT	Cardinal CO	529124	4454688	204.09	Variable	NA	54.86	54.86	Variable
MSCB1FE1	MSC Battery 1 Fugitive 1	533275.67	4466191.14	206.75	Variable	NA	5.33	3.26	Variable
MSCB1FE2	MSC Battery 1 Fugitive 2	533281.24	4466181.78	206.33	Variable	NA	5.33	3.26	Variable
MSCB1FE3	MSC Battery 1 Fugitive 3	533286.81	4466172.42	206.44	Variable	NA	5.33	3.26	Variable
MSCB1FE4	MSC Battery 1 Fugitive 4	533292.38	4466163.06	206.61	Variable	NA	5.33	3.26	Variable
MSCB1FE5	MSC Battery 1 Fugitive 5	533297.95	4466153.7	206.54	Variable	NA	5.33	3.26	Variable
MSCB2FE1	MSC Battery 2 Fugitive 1	533318.16	4466120.04	206.56	Variable	NA	5.33	3.26	Variable
MSCB2FE2	MSC Battery 2 Fugitive 2	533324.03	4466110.2	206.5	Variable	NA	5.33	3.26	Variable
MSCB2FE3	MSC Battery 2 Fugitive 3	533329.9	4466100.38	206.39	Variable	NA	5.33	3.26	Variable
MSCB2FE4	MSC Battery 2 Fugitive 4	533335.77	4466090.55	206.36	Variable	NA	5.33	3.26	Variable
MSCB2FE5	MSC Battery 2 Fugitive 5	533341.64	4466080.72	206.43	Variable	NA	5.33	3.26	Variable
MSCB3FE1	MSC Battery 3 Fugitive 1	533358.87	4466051.49	206.24	Variable	NA	5.33	3.26	Variable
MSCB3FE2	MSC Battery 3 Fugitive 2	533364.71	4466041.65	206.54	Variable	NA	5.33	3.26	Variable
MSCB3FE3	MSC Battery 3 Fugitive 3	533370.55	4466031.81	206.57	Variable	NA	5.33	3.26	Variable

MSCB3FE4	MSC Battery 3 Fugitive 4	533376.39	4466021.97	206.43	Variable	NA	5.33	3.26	Variable
MSCB3FE5	MSC Battery 3 Fugitive 5	533382.23	4466012.13	206.65	Variable	NA	5.33	3.26	Variable
MSCB8FE1	MSC Battery 8 Fugitive 1	533588.45	4465668.37	205.47	Variable	NA	6.84	6.37	Variable
MSCB8FE2	MSC Battery 8 Fugitive 2	533596.06	4465655.8	205.39	Variable	NA	6.84	6.37	Variable
MSCB8FE3	MSC Battery 8 Fugitive 3	533603.67	4465643.23	205.44	Variable	NA	6.84	6.37	Variable
MSCB8FE4	MSC Battery 8 Fugitive 4	533611.28	4465630.66	205.42	Variable	NA	6.84	6.37	Variable
MSCB8FE5	MSC Battery 8 Fugitive 5	533618.89	4465618.09	205.35	Variable	NA	6.84	6.37	Variable
MSCB8FE6	MSC Battery 8 Fugitive 6	533626.5	4465605.52	205.38	Variable	NA	6.84	6.37	Variable
MSCB8FE7	MSC Battery 8 Fugitive 7	533634.11	4465592.95	205.47	Variable	NA	6.84	6.37	Variable

Table 1: Base Case modeled source parameters, Steubenville, OH-WV nonattainment area, July 2013-June 2014 period.

Receptors

It was only necessary for eight receptors, at the location of the four AQS monitors located in the nonattainment area as well as the four SO2 monitors maintained by Cardinal, to be modeled for the base case, as the purpose of this analysis was to duplicate the monitored design value for the July 1, 2013-June 30, 2014. The modeled results were then compared to the monitored design value for the same period.

Meteorology

In order to replicate actual conditions during the July 1, 2013-June 30, 2014 period, the base case was modeled using only July 1, 2013-June 30, 2014 meteorological data, processed as described previously.

Results

The intent of the base case was to determine the contribution of each source to modeled exceedances of the standard, as well as assess model performance. Table 2 was created from the combined POSTFILE data, and shows the 1st through 15th highest modeled design values at each northern monitor in the nonattainment area, as well as the average contribution of each facility included in the modeling domain. It is readily apparent from Table 2 that Mountain State Carbon was, for the July 1, 2013-June 30, 2014 period, the major contributor to the 1st through 15th highest modeled design values at the location of each northern monitor. These contribution analysis results are used, in part, to determine the final attainment strategy for the nonattainment area. Figure 1 shows the location of the sources included in the base case analyses, as well the design value modeled at the location of each ambient air quality monitor.

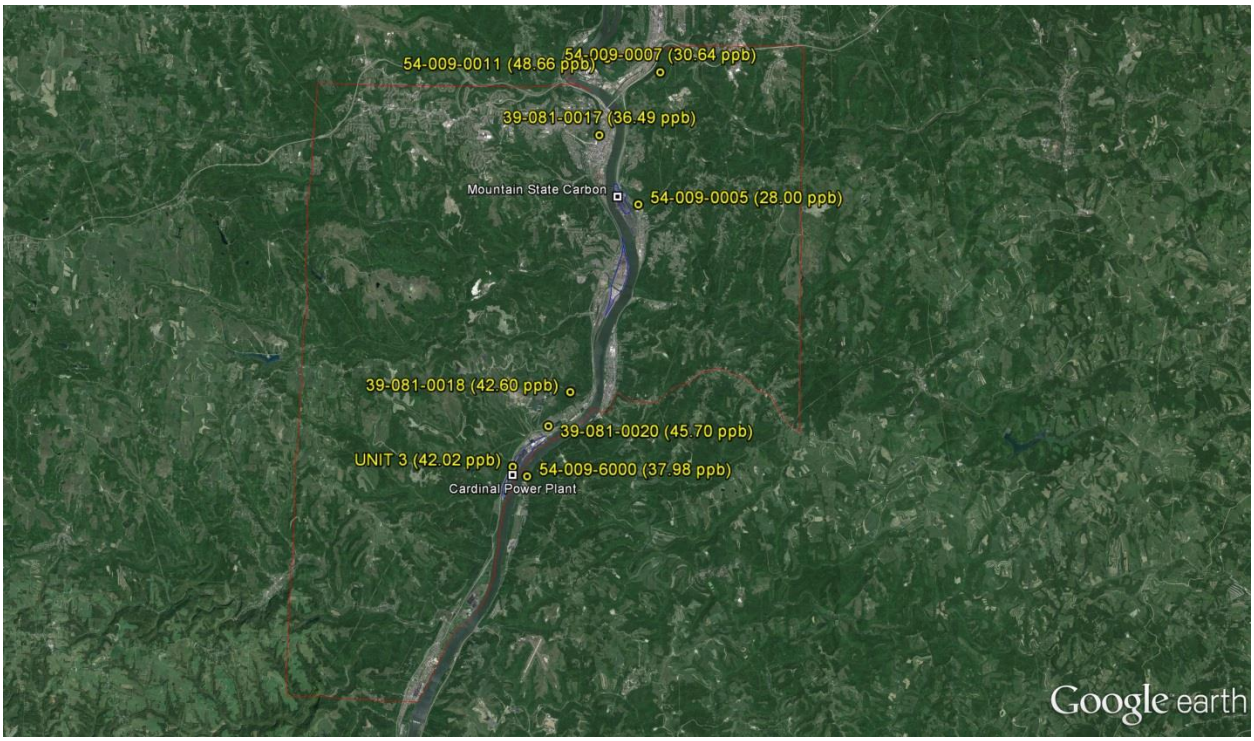


Figure 1: Split year base case analysis: facilities, monitors, and design values, with background.

39-081-0017				54-009-0011			
RANK	**Cardinal Contribution (ppb)**	**Mountain State Carbon Contribution (ppb)**	**Modeled DV (with 8.1 ppb background)**	**RANK**	**Cardinal Contribution (ppb)**	**Mountain State Carbon Contribution (ppb)**	**Modeled DV (with 8.1 ppb background)**
1ST	3.82E-06	33.41	41.51	**1ST**	6.12E-05	59.15	67.25
2ND	0.00	31.46	39.56	**2ND**	0.00	50.51	58.61
3RD	10.43	18.97	37.50	**3RD**	0.00	48.87	56.97
4TH	0.00	28.39	36.49	**4TH**	0.00	40.56	48.66
5TH	19.68	0.01	27.78	**5TH**	3.82E-06	35.37	43.47
6TH	0.00	19.07	27.17	**6TH**	9.17E-05	21.99	30.09
7TH	0.00	15.72	23.82	**7TH**	0.00	21.92	30.02
8TH	15.04	0.03	23.17	**8TH**	1.15E-05	19.99	28.09
9TH	0.00	14.51	22.61	**9TH**	0.00	19.66	27.76
10TH	0.00	14.20	22.30	**10TH**	3.82E-06	17.92	26.02
11TH	0.00	13.95	22.05	**11TH**	6.88E-05	16.18	24.28
12TH	0.00	13.74	21.84	**12TH**	0.00	14.11	22.21
13TH	0.00	13.07	21.17	**13TH**	13.96	0.00	22.06
14TH	3.82E-06	13.04	21.14	**14TH**	11.60	0.04	19.74
15TH	0.00	12.86	20.96	**15TH**	0.00	10.76	18.86
Average % Contribution	**15.68%**	**84.32%**			**13.31%**	**86.69%**	

54-009-0007				54-009-0005			
RANK	Cardinal Contribution (ppb)	Mountain State Carbon Contribution (ppb)	Modeled DV (with 8.1 ppb background)	RANK	Cardinal Contribution (ppb)	Mountain State Carbon Contribution (ppb)	Modeled DV (with 8.1 ppb background)
1ST	0.00	33.42	41.52	1ST	0.00	31.23	39.33
2ND	0.00	30.83	38.93	2ND	25.32	0.44	33.86
3RD	0.00	26.87	34.97	3RD	20.48	0.12	28.70
4TH	0.00	22.54	30.64	4TH	18.37	1.53	28.00
5TH	20.33	0.01	28.43	5TH	0.02	19.35	27.47
6TH	0.05	17.90	26.06	6TH	0.03	17.04	25.18
7TH	0.00	16.11	24.21	7TH	0.01	15.25	23.35
8TH	14.04	0.06	22.20	8TH	0.00	14.99	23.09
9TH	0.00	12.46	20.56	9TH	0.00	13.03	21.13
10TH	0.00	10.95	19.05	10TH	0.01	12.66	20.77
11TH	10.66	0.00	18.76	11TH	12.21	0.04	20.35
12TH	0.00	10.58	18.68	12TH	10.08	1.14	19.32
13TH	1.74	8.15	17.99	13TH	0.00	11.22	19.32
14TH	0.00	9.84	17.94	14TH	0.04	11.04	19.18
15TH	8.21	0.00	16.31	15TH	10.76	0.31	19.17
Average % Contribution	**27.82%**	**72.18%**			**38.49%**	**61.51%**	

Table 2: Base case modeled design values and contributions, AQS monitors, July 1, 2013-June 30, 2014.

With regards to model performance at the northern monitors, the split-year design value (4th highest) at each monitor was compared to the split year modeled design value for the same period, inclusive of background. This comparison is shown in Table 3, below.

	39-081-0017	54-009-0011	54-009-0007	54-009-0005
Monitored DV (ppb)	33	57	32	37
Modeled DV (ppb)	36.49	48.66	30.64	28.00

Table 3: Monitored and modeled design values, July 1, 2013-June 30, 2014.

As can be seen from Table 3, modeled design values range from 76% to 111% of monitored values. Overall, modeled design values approximate 91.85% of the monitored design values at the 4th highest level.

In addition to the four northern monitor locations, Ohio EPA performed the same analysis as above at the four southern locations representing the Cardinal monitoring network. The results of this analysis are given in Table 4.

Cardinal Unit 3 Monitor				Cardinal 6000			
RANK	Cardinal Contribution (ppb)	Mountain State Carbon Contribution (ppb)	Modeled DV (with 8.1 ppb background)	RANK	Cardinal Contribution (ppb)	Mountain State Carbon Contribution (ppb)	Modeled DV (with 8.1 ppb background)
1ST	46.54	0.00	54.65	1ST	54.25	0.00	62.35
2ND	35.52	0.02	43.64	2ND	37.56	0.00	45.66
3RD	34.68	0.00	42.78	3RD	30.39	0.05	38.54
4TH	33.91	0.00	42.02	4TH	29.85	0.03	37.98
5TH	27.53	0.01	35.64	5TH	27.88	0.00	35.98
6TH	26.61	0.00	34.71	6TH	26.41	0.00	34.51
7TH	24.30	0.03	32.42	7TH	26.11	0.02	34.23
8TH	22.32	0.01	30.42	8TH	24.68	0.00	32.78
9TH	22.03	0.08	30.20	9TH	20.26	0.00	28.36
10TH	18.87	0.01	26.99	10TH	17.90	0.02	26.02
11TH	16.73	0.00	24.84	11TH	15.92	0.07	24.09
12TH	16.24	0.10	24.44	12TH	15.78	0.00	23.89
13TH	14.41	0.01	22.52	13TH	15.71	0.00	23.81
14TH	13.14	0.01	21.25	14TH	15.64	0.07	23.81
15TH	11.76	0.00	19.86	15TH	14.12	0.03	22.25
Average % Contribution	99.91%	0.09%			99.90%	0.10%	

Cardinal 0020				Cardinal 0018			
RANK	Cardinal Contribution (ppb)	Mountain State Carbon Contribution (ppb)	Modeled DV (with 8.1 ppb background)	RANK	Cardinal Contribution (ppb)	Mountain State Carbon Contribution (ppb)	Modeled DV (with 8.1 ppb background)
1ST	138.11	0.07	146.28	1ST	73.40	0.04	81.53
2ND	50.16	0.00	58.26	2ND	39.25	0.00	47.35
3RD	37.76	0.00	45.86	3RD	35.32	0.00	43.43
4TH	37.60	0.00	45.70	4TH	34.49	0.00	42.60
5TH	35.40	0.00	43.50	5TH	32.23	0.00	40.33
6TH	31.19	0.00	39.29	6TH	31.20	0.00	39.30
7TH	31.17	0.00	39.27	7TH	0.00	28.20	36.30
8TH	28.36	0.00	36.46	8TH	26.32	0.00	34.42
9TH	26.70	0.00	34.80	9TH	24.14	0.00	32.25
10TH	26.39	0.03	34.52	10TH	23.19	0.00	31.29
11TH	25.91	0.00	34.02	11TH	23.06	0.00	31.16
12TH	25.15	0.01	33.27	12TH	21.05	0.00	29.16
13TH	25.15	0.00	33.25	13TH	20.92	0.02	29.04
14TH	23.68	0.00	31.78	14TH	20.78	0.00	28.88
15TH	22.25	0.00	30.35	15TH	20.54	0.00	28.64
Average % Contribution	99.98%	0.02%			93.32%	6.68%	

Table 4: Base case modeled design values and contributions, Cardinal monitors, July 1, 2013-June 30, 2014.

This modeling analysis clearly demonstrates that the major contributor to modeled values at the Cardinal network monitors is emissions from the Cardinal plant. Only

minor contributions from Mountain State Carbon are observed during the modeled period. This result was anticipated, as the prevailing wind patterns in the area would limit impacts from facilities located to the north of Cardinal. Further, these monitors were specifically sited to monitor areas of maximum impact from Cardinal based on the Unit 3 FGD permit application modelling study discussed in more detail later in this document.

To assess model performance at the Cardinal monitoring network, Ohio EPA compared the 1st through 15th modeled and monitored design values for the split year period. These results are shown in Table 5, below.

	Cardinal Unit 3 Monitor			Cardinal Monitor 6000			Cardinal Monitor 0020			Cardinal Monitor 0018		
	MODEL	MONITOR	% of MONITOR	MODEL	MONITOR	% of MONITOR	MODEL	MONITOR	% of MONITOR	MODEL	MONITOR	% of MONITOR
1ST	55	39	140	62	46	136	146	34	430	82	68	120
2ND	44	35	125	46	25	183	58	32	182	47	66	72
3RD	43	27	158	39	24	161	46	30	153	43	57	76
4TH	42	27	156	38	20	190	46	30	152	43	52	82
5TH	36	24	148	36	18	200	43	29	150	40	50	81
6TH	35	22	158	35	18	192	39	27	146	39	47	84
7TH	32	19	171	34	17	201	39	24	164	36	44	83
8TH	30	19	160	33	16	205	36	24	152	34	41	84
9TH	30	19	159	28	15	189	35	23	151	32	40	81
10TH	27	19	142	26	15	173	35	22	157	31	38	82
11TH	25	19	131	24	15	161	34	22	155	31	33	94
12TH	24	18	136	24	15	159	33	21	158	29	33	88
13TH	23	18	125	24	13	183	33	21	158	29	29	100
14TH	21	16	133	24	13	183	32	21	151	29	27	107
15TH	20	16	124	22	13	171	30	19	160	29	27	106

Table 5: Split year model vs. monitor design values, Cardinal network. Background of 8.1 ppb included for all modeled design values.

The results of Table 5 demonstrate that the model is significantly over-predicting design values at the Cardinal network, with the exception of Monitor 0018. It should be noted this is not an occasional over-prediction, but rather it is systematic and occurs at every one of the 1st through 15th modeled design values. Further, the overall average percent over-prediction at the 4th highest design value rank (level of the standard) is 45%.

Ohio EPA performed further modeling and statistical analyses to determine the level of modeled over-prediction with respect to monitored values recorded at the Cardinal network. Ohio EPA obtained additional on-site meteorological data collected at the Cardinal Plant, as well as additional hourly emissions. This new dataset encompasses the entirety of 2013 and 2014 through June 30. It is important to note that hourly emissions from other sources were not available for this full time period, and thus all results shown for this modeling represent only the modeled impacts of Cardinal emissions. However, the previous split-year base case modeling analysis demonstrates that emissions from Mountain State Carbon impact the Cardinal monitoring network only in rare circumstances. This analysis compared the number of modeled values exceeding 37.5 ppb, 50 ppb, and 60 ppb at each monitor location to the same metrics

recorded at each monitor in the Cardinal network. Additionally, Ohio EPA assessed the maximum 1-hour value modeled at each monitor location in comparison to the maximum 1-hour value recorded at each monitor in the Cardinal network. As stated previously, this comparison was done over the 2013-June 30, 2014 time period. The results of this analysis are shown in Table 6.

	Modeled Values >60 ppb	Monitor Values >60 ppb	Modeled Values >50 ppb	Monitor Values >50 ppb	Modeled Values >37.5 ppb	Monitor Values >37.5 ppb	Modeled Max Hourly	Monitored Max Hourly
Cardinal Unit 3 Monitor	0	0	1	0	4	1	55	39
Cardinal Monitor 6000	1	0	1	0	4	1	62	46
Cardinal Monitor 0020	1	0	2	0	12	1	146	41
Cardinal Monitor 0018	1	4	1	10	8	21	81	71

Table 6: 2013-June 30, 2014 modeled vs. monitor values, Cardinal network.

The results in Table 6 show that, with the exception of Cardinal Monitor 0018, the model is over-predicting in both the number of hours at the relevant concentration bins, and in terms of maximum hourly value relative to monitor data.

The results of this analysis with respect to Cardinal Monitor 0018 are mixed, making it difficult to draw hard conclusions with respect to model vs. monitor values. Results of the base case clearly indicate that the model is under-predicting at this monitor with respect to design values, and in terms of number of hours at each concentration bin for the extended time period analysis shown in Table 6. However, it is concerning that the maximum hourly value is over-predicted at this monitor in the extended analysis.

Ohio EPA did explore other alternative modeling protocols, and overall this protocol and the AERMOD platform provided the best balance of performance, computation time, and ease of incorporating multiple on-site meteorological datasets, given the unique meteorological circumstances of this area and the importance of obtaining good model performance in the northern portion of this area. It is the northern portion of the nonattainment area designated by U.S. EPA that contains monitors that led to the designations. It was U.S. EPA's belief during the designation process that the lower portion of this area, the portion containing Cardinal, should be included because "The wind is more likely from the south than the north, so the much larger Cardinal Power Plant to the south of the monitors is more likely to affect air quality at the violating monitors[1]." In fact, this was the only reason U.S. EPA cited for inclusion of Cardinal in this area in the nonattainment designation process. Ohio EPA notes that the wind data used by U.S. EPA in their designation analysis was obtained from the Nation Weather Service station in Pittsburgh. Ohio EPA does not believe that this dataset adequately captures the unique meteorological conditions in the Ohio River valley.

As noted above, monitoring at the Cardinal location did not begin until 2011 and was not considered when making designations for this area. As discussed below, there are now four years of monitoring data available around the Cardinal facility, from locations expected to show maximum impact, that clearly show this portion of the nonattainment area is in fact attaining the standard. Further, this base case modeling analysis shows that, as suspected, emissions from Cardinal do travel north towards the violating monitors; however, and most importantly, Cardinal is not meaningfully impacting those monitors compared to Mountain State Carbon. In fact, Cardinal only contributed on average 13% of the 1st through 15th highest modeled design values at monitor 54-009-0011 which is the design value monitor that has always recorded the highest monitoring values and is the only monitor currently showing nonattainment at 76 ppb (2012 to 2014). In fact, the other monitors in the northern area have current design values ranging from 45 to 53 ppb.

As discussed in the protocol discussion of Ohio's SIP submittal, Appendix W considers the use of measured data in lieu of model estimates. It is acknowledged in Appendix W that there are some conditions where measured data may lend credence to modeling

[1] See U.S. EPA's "Technical Support Document Ohio Area Designations for the 2010 SO2 Primary National Ambient Air Quality Standard."

results, and that certain criteria should be considered, such as monitors being sited at maximum impact, monitors that meet U.S. EPA quality control standards, and most importantly, a demonstration the modeled results are not representative of monitored data. It is Ohio EPA's conclusion that there are enough inaccuracies and inconsistencies evident in the base case (using actual emissions) modeling results for the southern portion of this nonattainment area and that these inaccuracies are significant enough that deference must be given to the now extensive amount of actual monitoring data in demonstrating attainment in the southern portion of the nonattainment area.

Further, the base case analysis and long existing violating northern monitoring network demonstrates the importance of the northern portion of this area. Because there is acceptable model performance within this portion, the remainder of the attainment modeling should be conducted using this protocol and should focus on strategies that result in reductions from sources located in the northern portion of the area in order to demonstrate attainment.

Cardinal Monitoring Network

In 2008, as part of the process to modify the Cardinal Plant Unit 3 FGD PTI to allow the discharge of the FGD effluent gas from a duct routed into the cooling tower, a specialized air quality modeling study was undertaken. This study used an innovative technique to evaluate the emission discharge from the cooling tower discharge that was judged to be qualitatively correct. The reason for this qualitative judgment was the lack of objective data to use to perform a model evaluation. As a result, it was agreed as part of the permit modification, that an ambient air monitoring network would be installed in the area around Cardinal and operated for roughly one year prior to the conversion of the Unit 3 discharge from the existing stack to the new FGD discharge. Ohio EPA, American Electric Power Service Corporation (AEPSC), and Shell Engineering worked together to develop this ambient monitoring network that would allow a thorough testing of CALPUFF, the model that was used in the PTI modification modeling exercise, along with AERMOD and potentially other models to determine if the methodology used in the Cardinal Plant Unit 3 permit modification modeling was reproducing ambient conditions with acceptable accuracy. This effort resulted in a monitoring network that included three meteorological sites and four monitors, with two of the meteorological sites co-located with monitors. The monitoring network was sited at points of maximum impact from the Cardinal Plant, and has been collecting ambient SO2 concentration data since 2011 through the present. As such, there is a substantial amount of monitoring data indicative of the impacts of Cardinal on ambient SO2 concentrations. The Cardinal monitoring network is the only one of its type currently operating in Ohio, whereby a substantial number of monitors have been specifically sited to capture the maximum impacts of a facility.

Ambient Monitoring Data: Cardinal Monitor Network

There are four monitors that are a part of the Cardinal monitoring network (monitor ID 54-009-6000 (in WV), 39-081-0020 (in OH), 39-081-0018 (in OH), and Unit 3 (in OH).

Cardinal reports all monitoring data from their network to U.S. EPA's AQS[2]. This data is quality assured and quality controlled in accordance with approved protocol. (Appendix A). Cardinal supplied all monitoring data to Ohio EPA for the 2011 to 2014 period. Cardinal has routinely performed extensive analyses on this air monitoring data and has provided information to Ohio EPA for review. Ohio EPA has reviewed these analyses and is including relevant information below regarding the air quality in the lower portion of this area based on analysis of this data. Tables 7-10 include a summary of relevant metrics related to the air quality in the lower portion of this area based on analyses of monitoring data from the four monitors.

Table 7 shows the results of this analysis performed on data collected at the Unit 3 monitor.

Criteria	2011	2012	2013	2014	2011-2013 Avg/Total	2012-2014 Avg/Total
99th Percentile Daily High Value (Design Value)	58	31	24	27	38	27
25th High Daily High Value	20	15	12	10	16	12
Highest Hourly Value	68	46	36	44	68	46
Hourly Values Above 60 ppb	4	0	0	0	4	0
Hourly Values Above 50 ppb	12	0	0	0	12	0
25th High Hourly Value	31	16	15	16	21	16
99th Percentile Hourly Value	17	12	8	9	12	10
98th Percentile Hourly Value	14	10	9	6	11	8
95th Percentile Hourly Value	10	8	7	4	8	7
50th Percentile Hourly Value	4	4	3	2	4	3
Annual Average Hourly Value	5	4	3	2	4	3

Table 7: Unit 3 monitor analysis, 2011-2014. All values reported in ppb.

Table 8 shows the results of this analysis for Cardinal Monitor 54-009-6000.

Criteria	2011	2012	2013	2014	2011-2013 Avg/Total	2012-2014 Avg/Total
99th Percentile Daily High Value (Design Value)	46	28	21	20	32	23
25th High Daily High Value	22	13	6	11	14	10
Highest Hourly Value	80	45	37	47	80	47
Hourly Values Above 60 ppb	3	0	0	0	3	0

[2] The Unit 3 monitor is not reported to AQS because it's located inside AEP's fenceline (an area typically not defined as ambient air). It represents a site that was selected for ambient monitoring but siting was not technically possible in that location. Therefore, this location was used in its place as a nearby substitute. It is still subjected to the same QA/QC process.

Hourly Values Above 50 ppb	5	0	0	0	5	0
25th High Hourly Value	26	15	9	13	17	13
99th Percentile Hourly Value	16	10	5	9	10	8
98th Percentile Hourly Value	13	7	4	8	8	6
95th Percentile Hourly Value	9	5	3	6	6	5
50th Percentile Hourly Value	3	2	2	1	2	2
Annual Average Hourly Value	4	2	2	2	3	2

Table 8: Cardinal 6000 monitor analysis, 2011-2014. All values reported in ppb.

Table 9 shows the results of this analysis for Cardinal Monitor 39-0810020.

Criteria	**2011**	**2012**	**2013**	**2014**	**2011-2013 Avg/Total**	**2012-2014 Avg/Total**
99th Percentile Daily High Value (Design Value)	43	28	33	24	35	28
25th High Daily High Value	21	13	11	13	15	12
Highest Hourly Value	62	44	41	30	62	44
Hourly Values Above 60 ppb	1	0	0	0	1	0
Hourly Values Above 50 ppb	2	0	0	0	2	0
25th High Hourly Value	25	16	17	15	19	16
99th Percentile Hourly Value	16	11	10	11	12	11
98th Percentile Hourly Value	13	9	8	8	10	8
95th Percentile Hourly Value	9	7	6	6	7	6
50th Percentile Hourly Value	3	2	3	2	3	2
Annual Average Hourly Value	4	3	3	2	3	3

Table 9: Cardinal 0020 monitor analysis, 2011-2014. All values reported in ppb.

Table 10 shows the results of this analysis for Cardinal Monitor 39-082-0018.

Criteria	2011	2012	2013	2014	2011-2013 Avg/Total	2012-2014 Avg/Total
99th Percentile Daily High Value (Design Value)	55	37	52	38	48	42
25th High Daily High Value	24	21	24	19	23	21
Highest Hourly Value	73	84	71	57	84	84
Hourly Values Above 60 ppb	2	1	4	0	7	5
Hourly Values Above 50 ppb	5	3	8	2	16	13
25th High Hourly Value	33	25	33	16	30	25
99th Percentile Hourly Value	21	17	18	16	19	17
98th Percentile Hourly Value	16	14	13	13	14	13
95th Percentile Hourly Value	11	10	9	9	10	9
50th Percentile Hourly Value	2	3	3	3	3	3
Annual Average Hourly Value	4	4	4	4	4	4

Table 10: Cardinal 0018 monitor analysis, 2011-2014. All values reported in ppb.

From examination of the various criteria presented in Tables 7-10, it is apparent that there are very few hours of high readings at any of the monitors. The bulk of these elevated readings were recorded in 2011, likely due to the operation of Unit 3 without the FGD system installed. Installation of the FGD occurred starting in the fall of 2011, and the FGD system became fully operational in late January of 2012. This suggests that the uncontrolled Unit 3 Main Boiler emissions were the likely contributor to elevated ambient concentrations of SO2 observed at the various monitoring locations in the southern portion of this area in 2011.

The monitoring network data demonstrates that the 99th percentile daily maximum value at all monitors, for all years 2011 to 2014, are well below the standard of 75 ppb. Further, no three-year design value is close to a value that would exceed the standard and lead to a nonattainment designation. Appendix B includes the AQS data and design value report for the three monitors reported into AQS. The highest three-year design values are well below the standard; 48 ppb for 2011-2013 and 42 ppb for 2012-2014. As noted above, at the time of designations a full three years of monitor data from the Cardinal network was not available and any limited data that was available towards the end of the designation process was not considered. Based on the full four years of monitor data collected at the Cardinal network, it is now apparent that the southern portion of the original nonattainment area was and is attaining the standard. Further, Ohio EPA concludes that any additional control of Cardinal (already fully controlled by FGD) will not assist in bringing the northern portion of the Steubenville, OH-WV nonattainment area into attainment as indicated by the limited impact Cardinal demonstrated in the base case analysis.

The base case modeling, however, indicates that emissions from Cardinal have a minor contribution to monitor values located in the northern portion of the nonattainment area. As such, Ohio EPA will, as part of this attainment demonstration, account for emissions from the Cardinal Plant in the final attainment demonstration.

Future Case Analysis

As stated previously, the future case analysis consists of multiple separate modeling scenarios. The first assessed the impact of each facility in the northern portion of the nonattainment area when modeled individually for the split-year period at permitted emission rates. The results of this analysis informed the second analysis, which established a "ceiling rate" for each northern facility that is sufficient to eliminate any facility specific exceedances in the modeling domain. The second analysis modeled each northern facility interactively to determine the combined impact of the emission units when modeled at their previously established ceiling rates. The final modeling analyses for the future case represents the final attainment strategy for all facilities, and demonstrates modeled attainment of the standard at all receptors in the northern portion of the modeling domain. In addition, Ohio EPA assessed the impact of emissions from Cardinal when operating at a theoretical, conservatively assumed and unrealistically high utilization rate, as described below and in the protocol discussion of Ohio's SIP submittal.

Emission Sources

All future case modeling scenarios utilized fixed emission rates at all relevant sources included in the modeling domain. However, Ohio EPA utilized the HOUREMIS pathway to account for the buoyant volume release points representing fugitive emissions from Batteries 1, 2, 3, and 8 at Mountain State Carbon. Table 11 shows the relevant release point parameters and the emission rates modeled for each step of the attainment demonstration. The results of these steps are discussed in the "Results" section below. Ohio EPA is excluding the locations and base elevations for sources shown in Table 11, due to the large number of sources explicitly modeled in the future case scenarios. These data can be found in the protocol discussion of Ohio's SIP submittal, as well as those relevant modeling files submitted as part of the SO2 SIP attainment demonstration. It should be noted that Batteries 1, 2, and 3 fugitive emissions were represented as five separate volume sources, and Battery 8 fugitive emissions as seven separate volume sources in the AERMOD modeling, as represented in Table 11.

Point Source Parameters		Stack Height	Temperature	Exit Velocity	Stack Diameter	Permitted SO2	Ceiling SO2	Attainment SO2
Source ID	Source Description	(m)	(K)	(m/s)	(m)	(lb/hr)	(lb/hr)	(lb/hr)
MJEAFBAG	Mingo Jct Electric Arc Furnace P913 024 914	42.67	408.06	13.5898128	6.1	105	39.12	39.109
MJECUN1C	MJ Energy Center Unit 1 SO2 with COG	42.67	449.82	6.06	3.05	49.5	11.971	1
MJECUN2C	MJ Energy Center Unit 2 SO2 with COG	42.67	449.82	6.06	3.05	49.5	11.971	1
MJECUN3C	MJ Energy Center Unit 3 SO2 with COG	42.67	449.82	6.06	3.05	49.5	11.971	1
MJECUN4C	MJ Energy Center Unit 4 SO2 with COG	42.67	449.82	6.06	3.05	49.5	11.971	1
MJSTRIP2	Mingo Junction Reheat Furnace Number 2 P006	57	783.2	3.928872	3.96	1213	1	1
MJSTRIP3	Mingo Junction Reheat Furnace Number 3 P007	57	783.2	3.928872	3.96	1213	1	1
MJSTRIP4	Mingo Junction Reheat Furnace Number 4 P008	57	783.2	3.928872	3.96	1213	1	1
MSC12301	MSC Battery 1-2-3 Pushing Baghouse Stack 1	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12302	MSC Battery 1-2-3 Pushing Baghouse Stack 2	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12303	MSC Battery 1-2-3 Pushing Baghouse Stack 3	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12304	MSC Battery 1-2-3 Pushing Baghouse Stack 4	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12305	MSC Battery 1-2-3 Pushing Baghouse Stack 5	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12306	MSC Battery 1-2-3 Pushing Baghouse Stack 6	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12307	MSC Battery 1-2-3 Pushing Baghouse Stack 7	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12308	MSC Battery 1-2-3 Pushing Baghouse Stack 8	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12309	MSC Battery 1-2-3 Pushing Baghouse Stack 9	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12310	MSC Battery 1-2-3 Pushing Baghouse Stack 10	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12311	MSC Battery 1-2-3 Pushing Baghouse Stack 11	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12312	MSC Battery 1-2-3 Pushing Baghouse Stack 12	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12313	MSC Battery 1-2-3 Pushing Baghouse Stack 13	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC12314	MSC Battery 1-2-3 Pushing Baghouse Stack 14	17.07	332.59	23.2	0.7	0.74857	0.466389	0.466276
MSC8SCRU	MSC Battery 8 Pushing Scrubber	18.02	318.2	13.4	2.28	15.72	15.72	15.72

MSCACIDS	MSC Acid Plant Stack	21.34	299.82	10.45	0.51	12.46	1.46	1.46
MSCBATT1	MSC Battery 1 Stack SO2	60.96	583.15	5.06	2.28	22	22	22
MSCBATT2	MSC Battery 2 Stack SO2	60.96	583.15	5.06	2.28	22	22	22
MSCBATT3	MSC Battery 3 Stack SO2	68.58	588.71	5	2.44	24.75	24.75	24.75
MSCBATT8	MSC Battery 8 Stack SO2	76.2	422.04	8.32	3.76	117.41	104.7	103.077
MSCBLR10	MSC Follansbee Boiler 10 on COG	22.86	547.04	13.29	1.22	27	13.275	13.275
MSCBOIL6	MSC Follansbee Boiler 6 on COG	53.3	450.93	10.09	2.74	24.75	21.25	20.628
MSCBOIL7	MSC Follansbee Boiler 7 on COG	53.3	450.93	10.09	2.74	24.75	21.25	20.628
MSCBOIL9	MSC Follansbee Boiler 9 on COG	22.86	547.04	13.29	1.22	27	13.288	13.288
MSCCOGFL	MSC Follansbee Excess COG Flare	55.88	1273.8	20	2.11	39.8	39.8	39.8
MJLMF	MingoSteel LMF	22.86	399.82	5.34924	3.3528	14	14	14
Volume Source Parameters		**Release Height**	**Temperature**	**Init. Horizontal Dimension**	**Initial Vert. Dimension**	**Permitted SO2**	**Ceiling SO2**	**Attainment SO2**
Source ID	**Source Description**	**(m)**	**(K)**	**(m)**	**(m)**	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**
MSCB1FE1	MSC Battery 1 Fugitive 1	Variable	NA	5.33	3.26	0.37947	0.37947	0.37947
MSCB1FE2	MSC Battery 1 Fugitive 2	Variable	NA	5.33	3.26	0.37947	0.37947	0.37947
MSCB1FE3	MSC Battery 1 Fugitive 3	Variable	NA	5.33	3.26	0.37947	0.37947	0.37947
MSCB1FE4	MSC Battery 1 Fugitive 4	Variable	NA	5.33	3.26	0.37947	0.37947	0.37947
MSCB1FE5	MSC Battery 1 Fugitive 5	Variable	NA	5.33	3.26	0.37947	0.37947	0.37947
MSCB2FE1	MSC Battery 2 Fugitive 1	Variable	NA	5.33	3.26	0.37947	0.37947	0.37947
MSCB2FE2	MSC Battery 2 Fugitive 2	Variable	NA	5.33	3.26	0.37947	0.37947	0.37947
MSCB2FE3	MSC Battery 2 Fugitive 3	Variable	NA	5.33	3.26	0.37947	0.37947	0.37947
MSCB2FE4	MSC Battery 2 Fugitive 4	Variable	NA	5.33	3.26	0.37947	0.37947	0.37947
MSCB2FE5	MSC Battery 2 Fugitive 5	Variable	NA	5.33	3.26	0.37947	0.37947	0.37947
MSCB3FE1	MSC Battery 3 Fugitive 1	Variable	NA	5.33	3.26	0.40794	0.40794	0.40794
MSCB3FE2	MSC Battery 3 Fugitive 2	Variable	NA	5.33	3.26	0.40794	0.40794	0.40794
MSCB3FE3	MSC Battery 3 Fugitive 3	Variable	NA	5.33	3.26	0.40794	0.40794	0.40794
MSCB3FE4	MSC Battery 3 Fugitive 4	Variable	NA	5.33	3.26	0.40794	0.40794	0.40794
MSCB3FE5	MSC Battery 3 Fugitive 5	Variable	NA	5.33	3.26	0.40794	0.40794	0.40794
MSCB8FE1	MSC Battery 8 Fugitive 1	Variable	NA	6.84	6.37	0.28333	0.28333	0.28333
MSCB8FE2	MSC Battery 8 Fugitive 2	Variable	NA	6.84	6.37	0.28333	0.28333	0.28333
MSCB8FE3	MSC Battery 8 Fugitive 3	Variable	NA	6.84	6.37	0.28333	0.28333	0.28333
MSCB8FE4	MSC Battery 8 Fugitive 4	Variable	NA	6.84	6.37	0.28333	0.28333	0.28333
MSCB8FE5	MSC Battery 8 Fugitive 5	Variable	NA	6.84	6.37	0.28333	0.28333	0.28333
MSCB8FE6	MSC Battery 8 Fugitive 6	Variable	NA	6.84	6.37	0.28333	0.28333	0.28333
MSCB8FE7	MSC Battery 8 Fugitive 7	Variable	NA	6.84	6.37	0.28333	0.28333	0.28333

Table 11: Stack parameters and future case emission rates for all modeled scenarios, spilt year meteorological data.

Receptors

A total of 21,186 receptors were included in the modeling domain. Fenceline receptors were placed with 25 meters spacing. 50 meters spacing within a 1 km radius of each facility was used. 100 meters spacing was used within 2.5 km of each facility, 250 meters spacing was used within a radius of 5 km from each facility, and a 500 meters spacing was used if further receptors were needed. Given the number of sources in the nonattainment area, there is substantial receptor density in a majority of the area. Discrete receptors were also included at the locations of the eight ambient air quality monitors, as was done in the base case scenario. Figure 2 shows the location of each facility as well as the receptor grid used for all future case modeling scenarios.

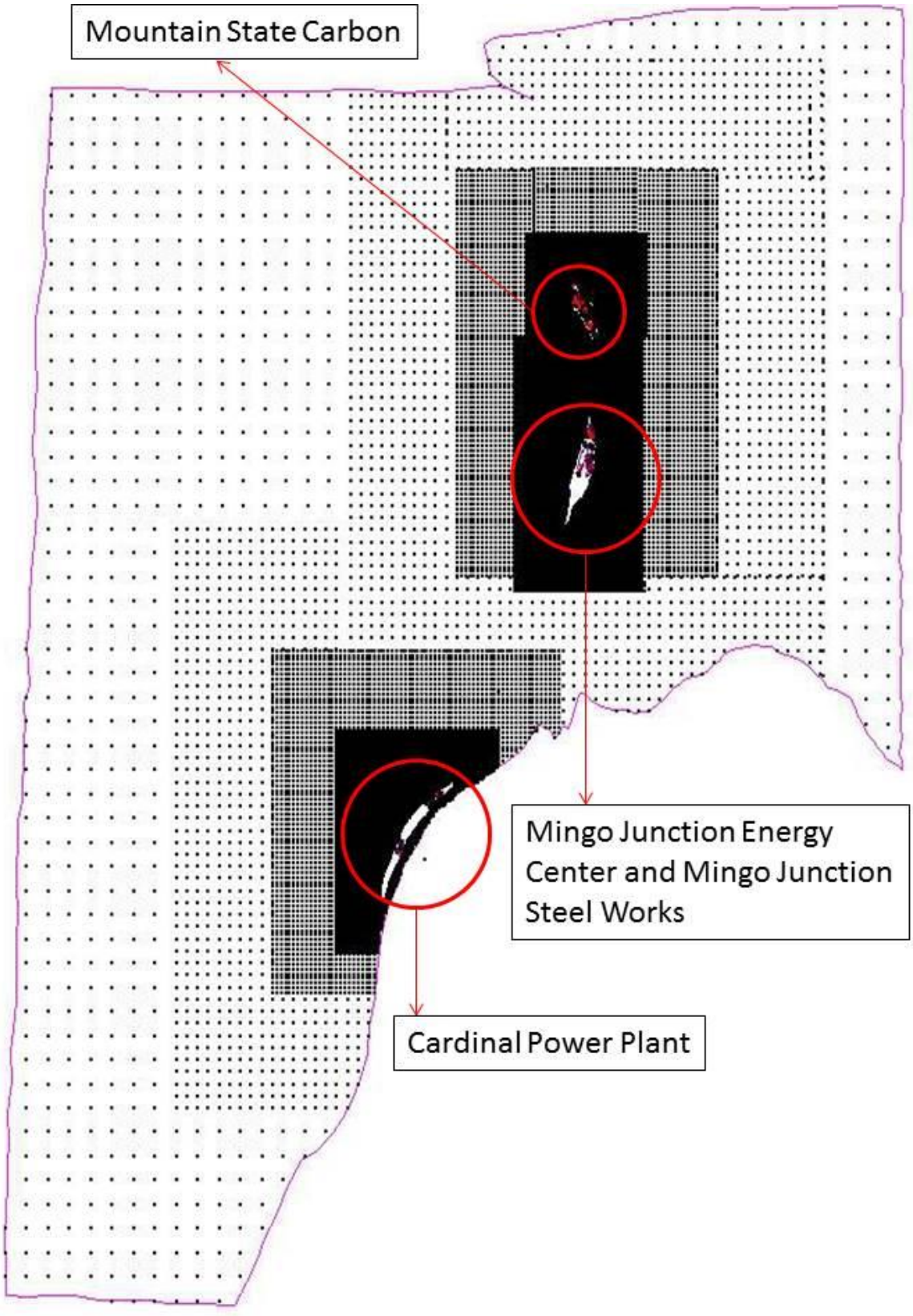


Figure 2: Receptor grid and facilities, future case.

Meteorology

All future case analyses were based on the split-year on-site meteorological data set collected at Mountain State Carbon (July 1, 2013-June 30, 2014 period) as described in the general meteorology section at the beginning of this document and following U.S. EPA guidance with respect to the determination of SO2 design values. Given the close proximity of the Mingo Junction Energy Center and Mingo Junction Steel Works, as well as the similar location of these facilities in the Ohio River valley, the on-site meteorological data from Mountain State Carbon is considered as on-site data for these facilities as well. Further, this meteorological station, situated in the Ohio River valley, is more representative of valley wind flows relative to other meteorological stations nearby (i.e., Pittsburgh or Wheeling).

Results

The first future case analysis evaluated the individual impact of each facility as a design value when modeled at their permitted SO2 emission rate. The 4th highest maximum daily impact of each facility is shown in Table 12. Any maximum impact over 175.0104 ug/m3 represents a modeled exceedance if background is not explicitly included in the model output. Modeled design values above 196.2 ug/m3 represent exceedances when the background is explicitly included in the model output.

	Design Value, with background
Facility ID	**ug/m3**
Mountain State Carbon	358.9257
Mingo Junction Energy Center	744.8563
Mingo Junction Steel Works	15,005.2696

Table 12: Maximum design value individual facility impacts at permitted SO2 rates, split year.

The results in Table 12 clearly demonstrate that reductions in SO2 emission rates were required for all modeled facilities.

Using these results and the results generated by the MAXDCONT file for the permitted rate modeling analysis, Ohio EPA determined unit-specific ceiling emission rates that would eliminate individual facility exceedances. It should be noted that Ohio EPA included, as part of the ceiling rate determination, facility supplied information with regards to some units being limited to burning natural gas. Ohio EPA then modeled each facility individually at these ceiling rates, and subsequently modeled all facilities interactively/combined, at those same ceiling rates. These ceiling rates are indicated in

Table 11, above. Table 13 shows the results of both the individual and interactive modeling analysis performed using ceiling rates.

	Individual Design Value Impact, no background, Ceiling Rates	Combined Design Value Impact, with background, Ceiling Rates
Facility ID	**ug/m3**	**ug/m3**
Mountain State Carbon	175.01069	227.06034
Mingo Junction Energy Center	175.0104	
Mingo Junction Steel Works	175.00023	

Table 13: Maximum design value impacts at ceiling rates, individual and combined impacts, split year.

The results shown in Table 13 indicate that the ceiling rates determined by Ohio EPA eliminate all facility specific hotspots when modeled alone (compared to 175.0104 ug/m3). However, the combined impacts of all facilities in the interactive analysis demonstrate exceedances of the standard, necessitating further reductions to demonstrate area-wide attainment of the standard. Note that the individual design value of Mountain State Carbon is slightly above the standard at the ceiling rates. This is addressed in the final attainment modeling analysis.

To allocate the final reductions necessary to demonstrate modeled attainment of the standard, Ohio EPA considered several factors. Firstly, the results of the base case analysis indicate that Mountain State Carbon contributed significantly to modeled exceedances. It should be noted; however, that the base case did not include Mingo Junction Energy Center or Mingo Junction Steel Works because these facilities were not in operation during the base case actual emission period. Ohio EPA also assessed the contribution of each facility and unit to modeled exceedances. Table 14 shows the MAXDCONT output for all exceedances of the standard generated from the interactive ceiling rate analysis. For clarity with respect to facility specific contributions, Ohio EPA is not including background concentration in Table 14. Thus, all modeled design values exceeding 175.0104 ug/m3 are considered exceedances for this analysis. A total of 19 receptors in the nonattainment area exceeded the standard when all northern facilities were modeled interactively at the ceiling rates. The largest contributor(s) to each of the 19 exceedances are highlighted in bold text.

				Mingo Junction Energy Center	Mingo Junction Steel Works			Mountain State Carbon															
AVERAGE CONC	AVE	GRP	RANK	CONT MJEC	CONT STRIPS	CONT MJSTEAF	CONT MJSTLMF	CONT BAT1FUG	CONT BAT2FUG	CONT BAT3FUG	CONT BAT8FUG	CONT 123PUSH	CONT BAT8PU	CONT ACIDS	CONT BLR10	CONT BLR6	CONT BLR7	CONT BLR9	CONT COGFLR	CONT BAT1STK	CONT BAT2STK	CONT BAT3STK	CONT BAT8STK
205.87074	1-HR	ALL	4TH	**165.73194**	0	0.00006	40.12628	0.00007	0.00008	0.00008	0.00001	0.0045	0.00269	0.00242	0.00069	0.00008	0.00008	0.00069	0.00004	0.00036	0.00036	0.00023	0.00007
205.74267	1-HR	ALL	4TH	**166.25041**	0.00001	0.00009	39.48349	0.00007	0.00007	0.00008	0.00001	0.00203	0.00216	0.00064	0.00074	0.00014	0.00014	0.00074	0.00008	0.00059	0.00059	0.00044	0.00017
198.58487	1-HR	ALL	4TH	**150.37254**	0	0.00002	48.15781	0.00325	0.00296	0.00358	0.00055	0.02205	0.00596	0.0135	0.00124	0.00002	0.00002	0.00123	0.00001	0.00004	0.00004	0.00002	0
197.39692	1-HR	ALL	4TH	**153.09208**	0	0.00003	44.26534	0.00231	0.00215	0.00257	0.00051	0.01531	0.00622	0.00744	0.00135	0.00003	0.00003	0.00135	0.00002	0.00007	0.00007	0.00004	0.00001
196.43344	1-HR	ALL	4TH	**158.8638**	0.00001	0.00012	37.5612	0.00007	0.00007	0.00008	0.00001	0.00101	0.00175	0.0004	0.00081	0.00021	0.00021	0.00081	0.00011	0.00085	0.00085	0.00071	0.00033
196.05389	1-HR	ALL	4TH	**167.93016**	0.00001	0.00006	28.1081	0.0009	0.00086	0.001	0.00032	0.00405	0.0042	0.00063	0.00131	0.0001	0.0001	0.00131	0.00005	0.00025	0.00025	0.00017	0.00005
194.97445	1-HR	ALL	4TH	**158.14039**	0	0.00004	36.80803	0.00154	0.00145	0.00171	0.00042	0.00904	0.0054	0.00327	0.00134	0.00005	0.00005	0.00134	0.00003	0.00012	0.00012	0.00007	0.00002
194.12845	1-HR	ALL	4TH	**159.2839**	0	0.00003	34.8092	0.00008	0.00009	0.00009	0.00001	0.0123	0.00312	0.01796	0.00061	0.00003	0.00003	0.00061	0.00002	0.00015	0.00015	0.00006	0.00002
190.99438	1-HR	ALL	4TH	**151.95242**	0	0.00003	39.00992	0.00009	0.00009	0.0001	0.00001	0.0122	0.00342	0.01426	0.00065	0.00003	0.00003	0.00065	0.00002	0.00018	0.00018	0.00008	0.00002
190.89465	1-HR	ALL	4TH	**154.41417**	0.00001	0.00014	36.27817	0.00725	0.00762	0.00827	0.00057	0.05635	0.1002	0.00358	0.00912	0.00003	0.00003	0.00911	0.00001	0.00001	0.00001	0	0
187.59333	1-HR	ALL	4TH	**153.34877**	0.00001	0.00042	34.23627	0.00012	0.00012	0.00013	0.00015	0.00007	0.00108	0.00002	0.00081	0.00019	0.00019	0.00081	0.00007	0.00128	0.00128	0.00122	0.00033
186.42352	1-HR	ALL	4TH	**151.62352**	0.00001	0.00015	34.70216	0.00396	0.00413	0.00451	0.0005	0.00679	0.05549	0.00024	0.01079	0.00013	0.00013	0.01076	0.00005	0.00009	0.00009	0.00001	0
181.08652	1-HR	ALL	4TH	**145.81315**	0.00001	0.00011	35.26475	0.00007	0.00007	0.00008	0.00001	0.00137	0.00195	0.00055	0.00079	0.00018	0.00018	0.00079	0.0001	0.00075	0.00075	0.00059	0.00026
180.41492	1-HR	ALL	4TH	**180.34937**	0	0.00004	0.00107	0.00178	0.00171	0.00197	0.00014	0.04052	0.00513	0.01044	0.00135	0.00002	0.00002	0.00135	0.00001	0.00001	0.00001	0	0
180.25676	1-HR	ALL	4TH	0.00156	0.00005	0.00018	0.4822	0.0002	0.0002	0.00021	0.00002	0	0.00119	0.0001	0.0021	**89.67743**	**89.67743**	0.00213	0.00083	0.00432	0.00432	0.40121	0.00108
177.36888	1-HR	ALL	4TH	0.00149	0.00005	0.00056	24.8933	0.00607	0.00724	0.00975	0.0054	0.03209	0.15017	0.03455	0.01632	0.0061	0.0061	0.01587	0.00219	0.00319	0.00323	0.00491	**152.17029**
176.61327	1-HR	ALL	4TH	1.06664	0.07803	0.21176	0.27852	0.00186	0.0023	0.00315	0.00473	0.02396	2.92179	0.02851	0.05799	0.04696	0.04696	0.05582	0.01455	0.01704	0.01729	0.02964	**171.70576**
175.06383	1-HR	ALL	4TH	0.02198	0.00564	**168.39071**	6.61379	0.00018	0.00019	0.0002	0.00022	0.00064	0.0018	0.00014	0.00135	0.00212	0.00212	0.00134	0.00344	0.00209	0.0021	0.00245	0.01135
175.0486	1-HR	ALL	4TH	0.02314	0.00007	0.00003	0.01468	7.58744	8.7892	0.25334	0.00336	**157.63492**	0.21827	0.076	0.22137	0.00002	0.00002	0.22303	0.00001	0.0019	0.00181	0	0

Table 14: Split year MAXDCONT results for interactive ceiling rate analyses.

As shown in Table 14, with all facilities modeled at previously established ceiling rates, results in 19 receptors exceeding the standard. Fourteen exceedances demonstrate that the major contributor is emissions from Mingo Junction Energy Center, two exceedances demonstrate that the major contributor is emissions from the Battery 8 Stack at Mountain State Carbon. The three other exceedances demonstrate that emissions from the Electric Arc Furnace (EAF) at Mingo Junction Steel, Boilers 6 and 7 at Mountain State Carbon, and emissions from the Batteries 1-3 pushing stacks at Mountain State Carbon are the primary contributors. Further examination of the impacts of the facilities to the modeled exceedances shown in Table 14 indicate that reductions at only a single facility or unit will not yield modeled attainment at all monitors in the modeling domain. Thus, Ohio EPA applied further reductions to all facilities that will demonstrate modeled attainment of the standard at all receptors.

The above results and subsequent reductions yielded final emission rates necessary to model attainment at all receptors in the modeling domain. These final attainment rates are given in the last column of Table 11, above. Figure 3, below, shows the results of the combined attainment run for the split year. For clarity, Ohio EPA is showing only those receptors with modeled design values greater than or equal to 70 ppb, inclusive of background. Further, as the maximum impacts occur at or near each facility fenceline, Ohio EPA is showing the maximum impacts around each facility. The highest modeled five-year design value, 75.00 ppb inclusive of background, is highlighted in red text. This value occurs on the fenceline of Mountain State Carbon.

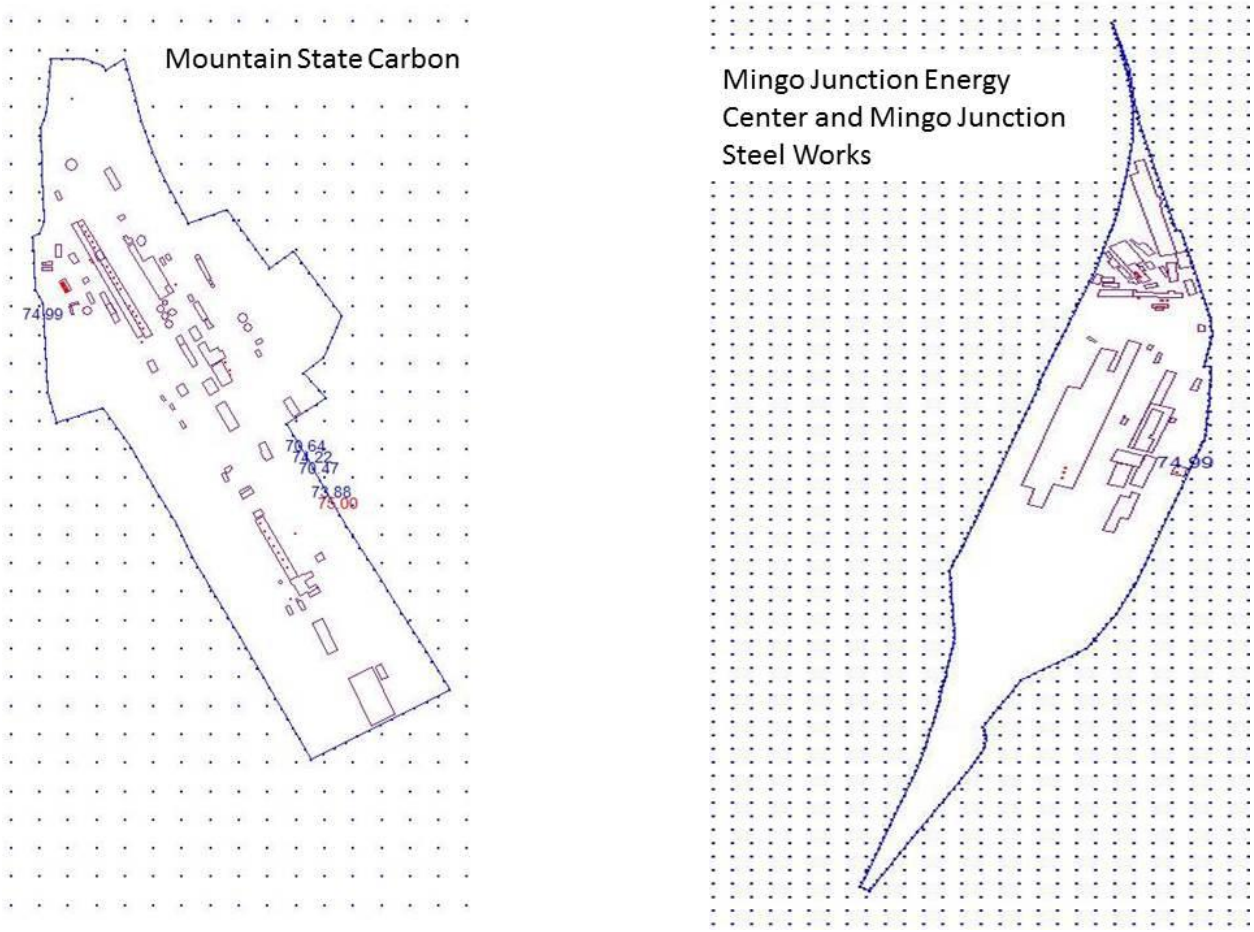


Figure 3: Attainment demonstration, interactive modeling, split year.

As noted previously, Ohio EPA has demonstrated that the model does not accurately predict impacts from the Cardinal Plant in the southern portion of the nonattainment area and that emissions from the Cardinal Plant will not impact the final attainment strategy for the northern portion of the nonattainment area. To illustrate this, Ohio EPA performed and is presenting an additional analysis as follows.

Ohio EPA modeled any potential impact from a highly conservative scenario of Cardinal emissions at all receptors in the nonattainment area for which the combined impacts of Mountain State Carbon, Mingo Junction Energy Center, and Mingo Junction Steel showed an impact of greater than or equal to 20% of the standard in the final attainment analysis presented above. The objective of this analysis is to demonstrate that the attainment strategy resulting from control of the northern sources' SO2 emissions will not be influenced by emissions from Cardinal in a manner that will prevent attainment. In this case, the emissions, flows (used to derive the velocity), and exit temperature from the steam generators through the FGD Systems are based on the 90th percentile value of the high load range, defined for Units 1 and 2 as > 580 MW and > 600 MW for Unit 3. All 90th percentile hours at this high load were then sorted and the 90th percentile value for emissions, the 90th percentile value for flow, and the 90th percentile

value for temperature were individually selected for each unit. These conservative values were then assumed for 8,760 hours. Because of the dynamic nature of Unit 3's cooling tower and exhaust stream, the data was further parameterized for Unit 3 based on the same techniques used for the actual emissions case (except that the Unit is assumed to operate all hours with the Steam Generator contribution to the total flow in the tower based on the above parameterization instead of actual operations), as described in the protocol discussion of Ohio's SIP submittal. Because modeling of Unit 3 without parameterization yields very poor results, it is impossible to accurately model Cardinal emissions otherwise. Therefore, Ohio EPA chose this very conservative high load scenario based on actual Cardinal data for operating all three units at an extremely high rate for an entire year.

Figure 4 shows this receptor grid of 8,951 receptors that represent an impact of greater than or equal to 20% of the standard in the final attainment analysis for the northern sources. It should be noted that this grid encompasses a large portion of the dense receptor grids in the nonattainment area.

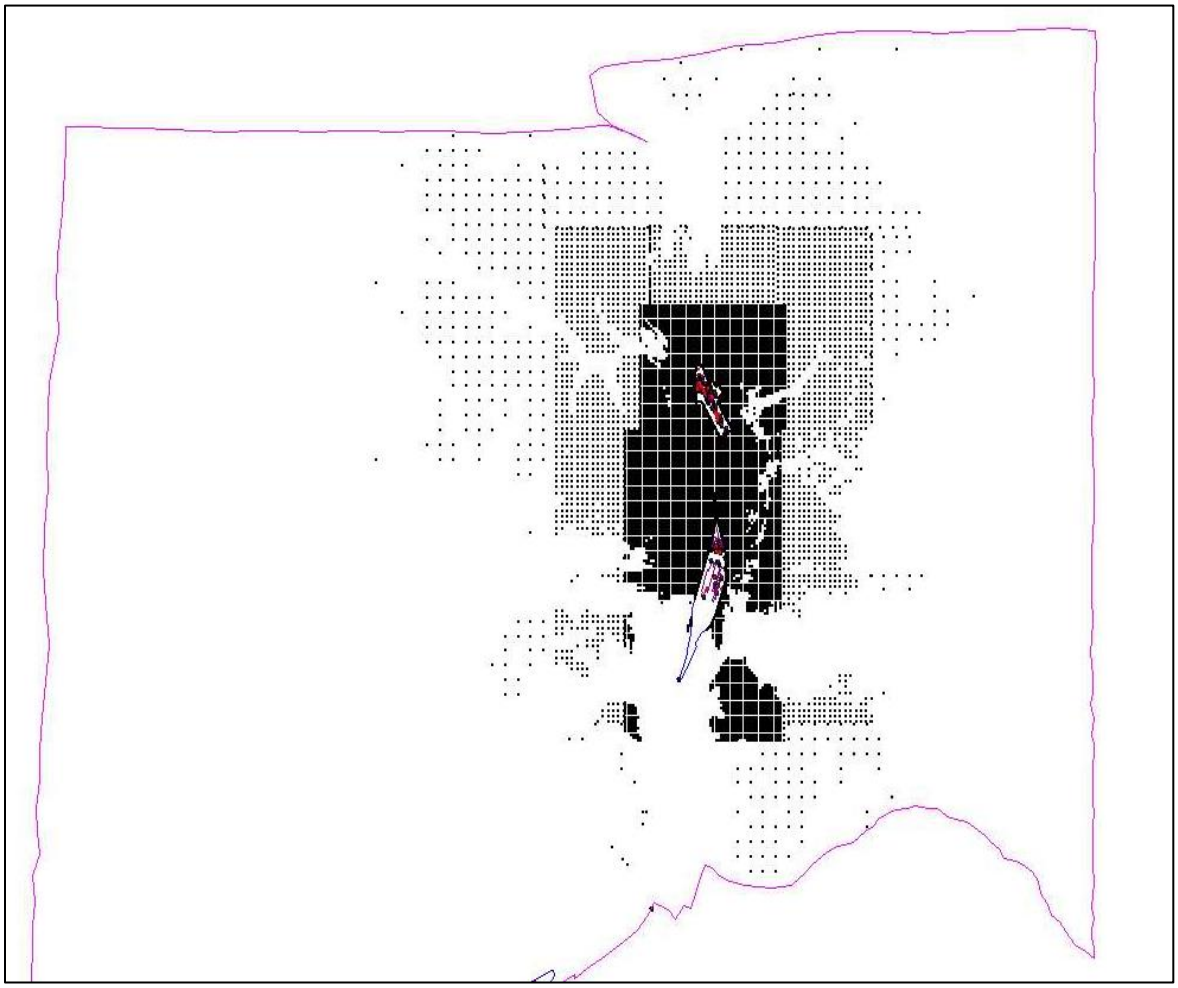


Figure 4: Critical receptor grid, Cardinal impact assessment.

As was done for the base case, POSTFILE outputs were generated for the split year,

and combined external to AERMOD. Figure 5 shows the results of this analysis, indicating that a single receptor, located on the Mingo Junction Energy Center/Mingo Junction Steel Works fenceline, is above the standard at 75.11 ppb, including background.

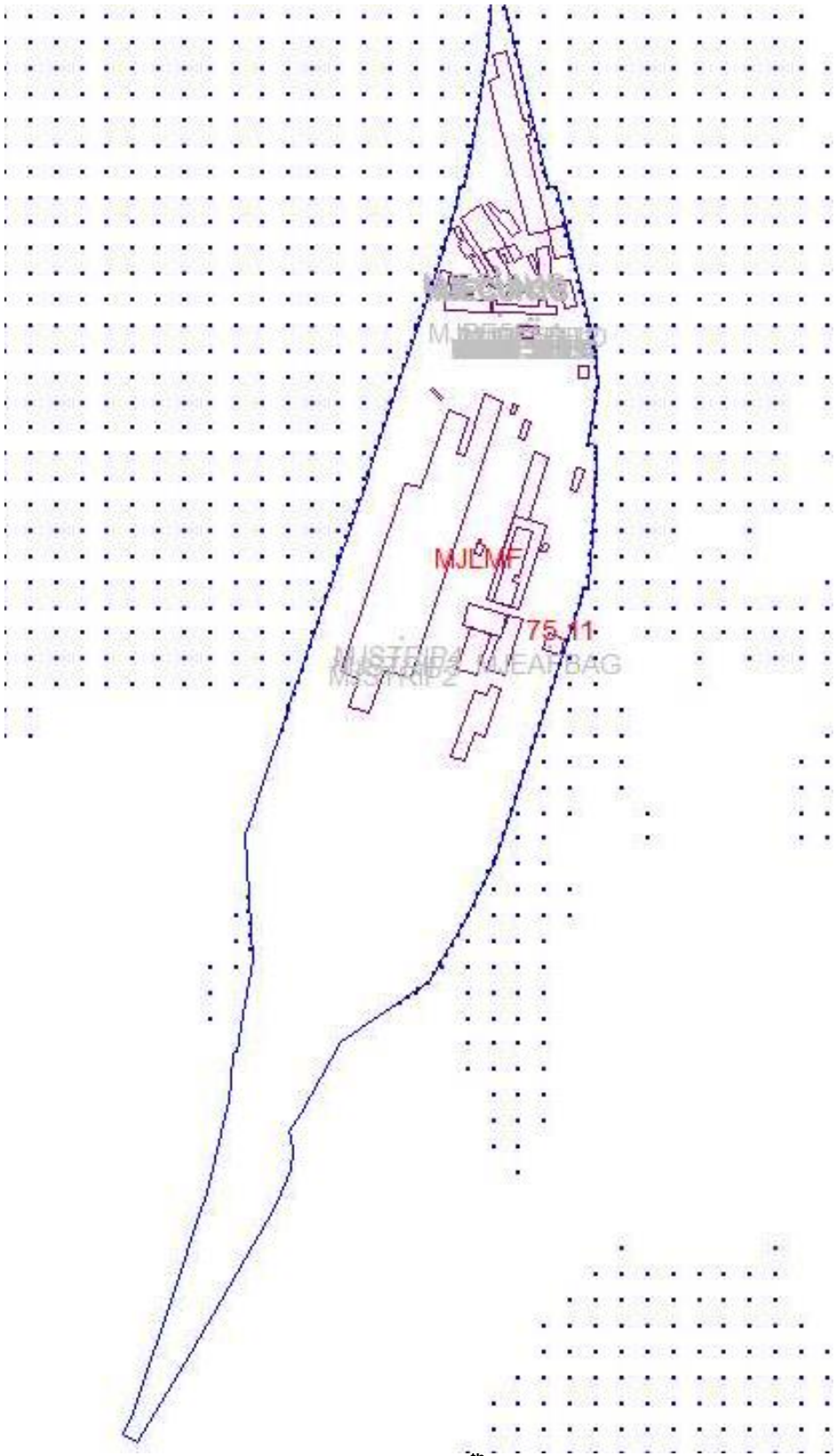


Figure 5: Hotspot analysis results with 90th percentile Cardinal emissions.

Incorporating Cardinal's high load conservative emissions (at 8,760 hours) into the attainment strategy shows that continued operation of Cardinal, without the need for additional control beyond the current FGD systems, will not interfere with attainment of the standard in this area. Our weight-of-evidence is as follows:

- As discussed extensively in the protocol portion of Ohio's SIP submittal, there are unique challenges in modeling this particular area and the sources within the area. The complex meteorology and terrain requires special consideration while also giving special consideration to the dynamic nature of Cardinal's Unit 3 cooling tower and exhaust stream.

- The base case analysis and long existing violating northern monitoring network demonstrates the importance of the northern portion of this area.

- Ohio EPA has provided ample modeling results in the northern portion of the nonattainment area that demonstrates attainment will occur due to necessary reductions at Mountain State Carbon and the control of emissions from Mingo Junction Energy Center, and Mingo Junction Steel.

- As additional assurance, Ohio EPA modeled the potential for Cardinal's influence on the attainment strategy resulting from control of the northern sources. A very conservative high load scenario of Cardinal emissions was modeled with the attainment rates of the northern sources. Ohio EPA demonstrated that the attainment strategy resulting from control of the northern sources' SO2 emissions will not be influenced by emissions from Cardinal in a manner that will prevent attainment. Although one receptor showed a very minor exceedance under this scenario, it is highly unrealistic that Cardinal could maintain operations for 8,760 hours at high load at all three units. It is similarly unrealistic that one receptor showing a modeled exceedance of 0.11 ppb over this period would ever occur in the real world.

- Cardinal is a well-controlled facility with each of the three boilers' SO2 emissions controlled by FGD. Any additional control of Cardinal will not assist in bringing the northern portion of the Steubenville, OH-WV nonattainment area into attainment as indicated by the limited impact Cardinal demonstrated in the base case analysis.

- There are enough inaccuracies and inconsistencies evident in the base case (using actual emissions) modeling results for the southern portion of this nonattainment area and that these inaccuracies are significant enough that deference must be given to the now extensive amount of actual monitoring data in demonstrating attainment in the southern portion of the nonattainment area.

- The complex meteorology and terrain coupled with the dynamic nature of Cardinal's Unit 3 cooling tower and exhaust stream makes it challenging, if not impossible, to accurately characterize near-field impacts using current modeling

capabilities. For this very reason, as part of the Unit 3 FGD PTI, the Cardinal ambient air monitoring network was needed.

- It is acknowledged in Appendix W that there are some conditions where measured data may lend credence to modeling results, and that certain criteria should be considered, such as monitors being sited at maximum impact, monitors that meet U.S. EPA quality control standards, and most importantly, a demonstration the modeled results are not representative of monitored data. Weight must be given to actual monitoring results compared to modeling results.

- Monitoring at the Cardinal location did not begin until 2011 and was not considered when making designations for this area. There are now four years of monitoring data available around the Cardinal facility, from locations expected to show maximum.

- There is ample real monitoring evidence showing that Cardinal emissions are not causing an exceedance in the southern portion of the nonattainment area. Four years of monitoring data sited to identify high impacts clearly shows the area is well under the 75 ppb standard. The highest three-year design values for the Cardinal network are 48 ppb for 2011-2013 and 42 ppb for 2012-2014. There is ample "cushion" between the monitor design values and standard to account for any fluctuation in emissions from Cardinal.

- Had the monitoring data available today existed at the time of designations, the nonattainment area may have been decided very differently. If that were the case, Cardinal would be subject to U.S. EPA's unclassifiable area requirements which would include the option of monitoring in lieu of modeling. Monitoring shows attainment.

- Ultimately the purpose of the attainment demonstration analysis is to provide sufficient evidence, and reductions when necessary, of attainment of the standard. An attainment demonstration does not assume required reductions from all sources in the area. Ohio EPA has clearly demonstrated through reductions at the northern facilities that attainment will be achieved in the northern portion of the nonattainment area. Ohio EPA has also clearly demonstrated through the use of actual monitoring data that the southern portion of the nonattainment area is in attainment. Based on the current controls at Cardinal and reductions from the northern facilities, the entire nonattainment area will continue to attain the standard.

- Ambient air quality has greatly improved in the nonattainment area and the area is very close to achieving attainment. The design value monitor for this nonattainment area is currently showing nonattainment at 76 ppb (2012 to 2014). In fact, the other monitors in the northern area have current design values ranging from 45 to 53 ppb.

Therefore, based upon the above analysis and weight-of-evidence, the attainment and control strategy for this nonattainment area is only required from, and limited to, the three sources located in the northern portion of this nonattainment area: Mountain State Carbon, Mingo Junction Energy Center, and Mingo Junction Steel Works.

Additional Analysis using an Expanded Meteorology Data Set

Examination of the final attainment emission rates for Mingo Junction Steel Works and the Mingo Junction Energy Center demonstrates that substantial emission reductions are required (see Table 11). In particular, the level of emission reductions required for the Mingo Junction Steel Works EAF, which is a new unit based on the Consteel process and designed to have substantially less emissions than a typical EAF, suggests that the use of a single year of meteorological data (split year) is leading to over-control of some units. The details of the Consteel process are provided as Appendix D of Ohio's SIP submittal. The July 1, 2013-June 30, 2014 split year meteorological dataset encompasses an unusually cold winter season experienced in Ohio. Further, the use of a single year of meteorological data could potentially bias the design value through the impacts of unusual weather events or rare meteorological conditions that would otherwise be averaged out over three or more years of meteorological data. Recall, the original reason the single year of meteorological data (split year) was selected was because it was the only period of time that a full year of data was available for both the meteorologically distinct northern and southern portions of the nonattainment area (Mountains State Carbon on-site data and Cardinal Power Plant on-site data) and also encompassed a time period Cardinal was fully controlled by FGD. Since Ohio EPA has determined that Cardinal does not need to be a part of the attainment strategy for this area, we are now able to consider larger, earlier (prior to Cardinal monitors and Unit 3 FGD being in operation) meteorological data sets from the Mountain State Carbon sites (that represents the northern portion of this area). As such, Ohio EPA explored the use of an extended 2007-2009 meteorological dataset collected at the Mountain State Carbon facility. Ohio EPA notes here that the West Virginia Department of Environmental Protection (WV DEP) will be responsible for determining the ultimate attainment strategy for Mountain State Carbon and deciding which meteorological data set they will use in their analysis. Ohio EPA understands, via consultation with WV DEP and Mountain State Carbon, that the critical attainment values ultimately included in WV DEP's attainment strategy will be consistent with the principles behind the analysis performed by Ohio EPA. However, multiple reduction strategies, or variations in strategy, for Mountain State Carbon may achieve the same results as presented here.

To examine the impact of modeling an extended on-site meteorological dataset, Ohio EPA first individually modeled both Mingo Junction Steel Works and Mingo Junction Energy Center, using their permitted rates. These results were compared to those results obtained when these facilities were modeled in the same manner using the split year meteorology. The results of this analysis are shown in Table 15.

2007-2009 met Period vs Split Year	2007-2009	Split Year
	ug/m3, with background	ug/m3, with background
Mingo Junction Steel Works	6977.89912	15005.26608
Mingo Junction Energy Center	391.77225	744.85636

Table 15: 2007-2009 met data vs split year met data.

The results of this analysis demonstrate that the design values of both Mingo Junction Steel Works and the Mingo Junction Energy Center when modeled at permitted limits are approximately doubled using only a single year of meteorological data. Ohio EPA also performed this same analysis for Mountain State Carbon. The design value for Mountain State Carbon at permitted limits was also reduced using the 2007-2009 meteorological data. However, while the Mingo Junction Steel Works and Mingo Junction Energy Center demonstrate results approximately double when the split year meteorological data is used, the Mountain State Carbon results differ by a factor of 0.2. It is probable that the complex terrain of the Ohio River valley and the location of the Mingo Junction Energy Center/Steel Works complex play a role in these observed differences in impacts.

As demonstrated above, modeling the split year meteorological data significantly enhances the modeled impacts of Mingo Junction Energy Center and Mingo Junction Steel Works, yet has much less impact on the modeled results from Mountain State Carbon. As such, Ohio EPA concludes that an attainment strategy developed for those two facilities based on the split year meteorological data alone would represent over control and/or potentially impose unrealistic or unachievable emission limits on those sources. Thus, Ohio EPA will develop an attainment strategy for these facilities based on the 2007-2009 on-site meteorological dataset. It should be noted here that Ohio EPA has demonstrated that emissions from Cardinal do not impact the attainment strategies of those facilities in the northern portion of the nonattainment area using the more conservative split year meteorological dataset, and that the full four years of monitored attainment of the standard at the Cardinal monitoring network, sited specifically to monitor maximum impacts of Cardinal's emissions, is sufficient evidence to eliminate additional assessment of Cardinal's emissions here. Further, the parameterization of the cooling tower release point, which is highly dependent on ambient air temperature, necessitates on-site meteorological data. No such data is available for this period, as the monitoring network and meteorological stations around Cardinal did not begin operation until January 1, 2011.

Attainment Rates for Northern Facilities Using 2007-2009 Meteorological Data

To determine an attainment strategy for Mingo Junction Energy Center and Mingo Junction Steel Works, Ohio EPA assumed that the attainment strategy determined by Ohio EPA would be maintained by the attainment strategy developed for Mountain State Carbon by WV DEP. One potential emission reduction strategy from Mountain State Carbon could be based on the combustion units (Boilers 6 and 7 and Boilers 9 and 10). For the split year met data, Ohio EPA determined that the combined attainment rate of

these units would be 67.823 lbs/hr. To maintain the critical design value impacts determined by Ohio EPA for Mountain State Carbon, Ohio EPA used the MAXDCONT results of the 2007-2009 permitted rates for Mountain State Carbon to calculate a new emission rate for these boilers that would maintain the critical design value impacts from these units. This calculated value was determined to be 61.68 lbs/hr, a combined difference of 6.143 lbs/hr. Absent a full attainment strategy from WV DEP, Ohio EPA assumed this rate at the four boilers at Mountain State Carbon. It should be noted here that other units at Mountain State Carbon were analyzed in like manner. Ohio EPA determined that multiple units at Mountain State Carbon could be modeled at higher rates for the 2007-2009 than those determined for the split year. In combination, the net attainment emission rate for the combined units at Mountain State Carbon was 290.345 lbs/hr for the split year, and 329.694 lbs/hr, 2007-2009. Thus, Ohio EPA modeled the higher, less-stringent, emission rate to maintain conservatism in the modeled results in this portion of the analysis in the absence of a known attainment strategy for Mountain State Carbon. In the end, this conservative approach will allow flexibility in an attainment strategy for Mountain State Carbon that still demonstrates attainment in the area with Ohio's attainment strategy for Mingo Junction Energy Center and Mingo Junction Steel Works.

To determine a final attainment strategy for Mingo Junction Energy Center and Mingo Junction Steel Works, Ohio EPA first accounted for the planned restriction of the strip reheat furnaces at Mingo Junction Steel Works to natural gas use. These were conservatively modeled at an emission rate of 1 lb SO2/hr. As stated above, the increased emissions at Mountain State Carbon necessary to maintain critical design value impacts were also included in the 2007-2009 analysis. Lastly, Ohio EPA determined, using the results of the split year attainment modeling and the 2007-2009 permit rate modeling for Mingo Junction Energy Center and Mingo Junction Steel Works, emission rates necessary to attain the standard. These rates are shown in Table 16 below.

Facility	Unit ID	Previous Attainment Rates (lbs/hr) Using 2013-2014 Split Year	New Attainment Rates (lbs/hr) Using 2007-2009
Mingo Junction Energy Center	Unit 1	1	20.34
	Unit 2	1	20.34
	Unit 3	1	20.34
	Unit 4	1	20.34
Mingo Steel	Reheat Furnace 2	1	1
	Reheat Furnace 3	1	1
	Reheat Furnace 4	1	1
	LMF	14	14
	EAG Baghouse	39.11	105

Mountain State Carbon	Battery 1 Fugitives	1.897	1.897
	Battery 2 Fugitives	1.897	1.897
	Battery 3 Fugitives	2.04	2.04
	Battery 8 Fugitives	1.98	1.98
	Battery 1-2-3 Pushing	6.528	10.48
	Battery 8 Pushing Scrubber	15.72	15.72
	Acid Stack	1.46	8.04
	Boiler 10	13.275	15.5
	Boiler 6	20.63	15.34
	Boiler 7	20.63	15.34
	Boiler 9	13.288	15.5
	COG Flare	39.8	39.8
	Battery 1 Stack	22	22
	Battery 2 Stack	22	22
	Battery 3 Stack	24.75	24.75
	Battery 8 Stack	103.08	117.41

Table 16: Attainment rates, split year and 2007-2009 meteorological data.

The results of this analysis, in ppb with background accounted for, are shown in Figure 6. For clarity, Ohio EPA is showing only those values greater than 70 ppb, with background included.

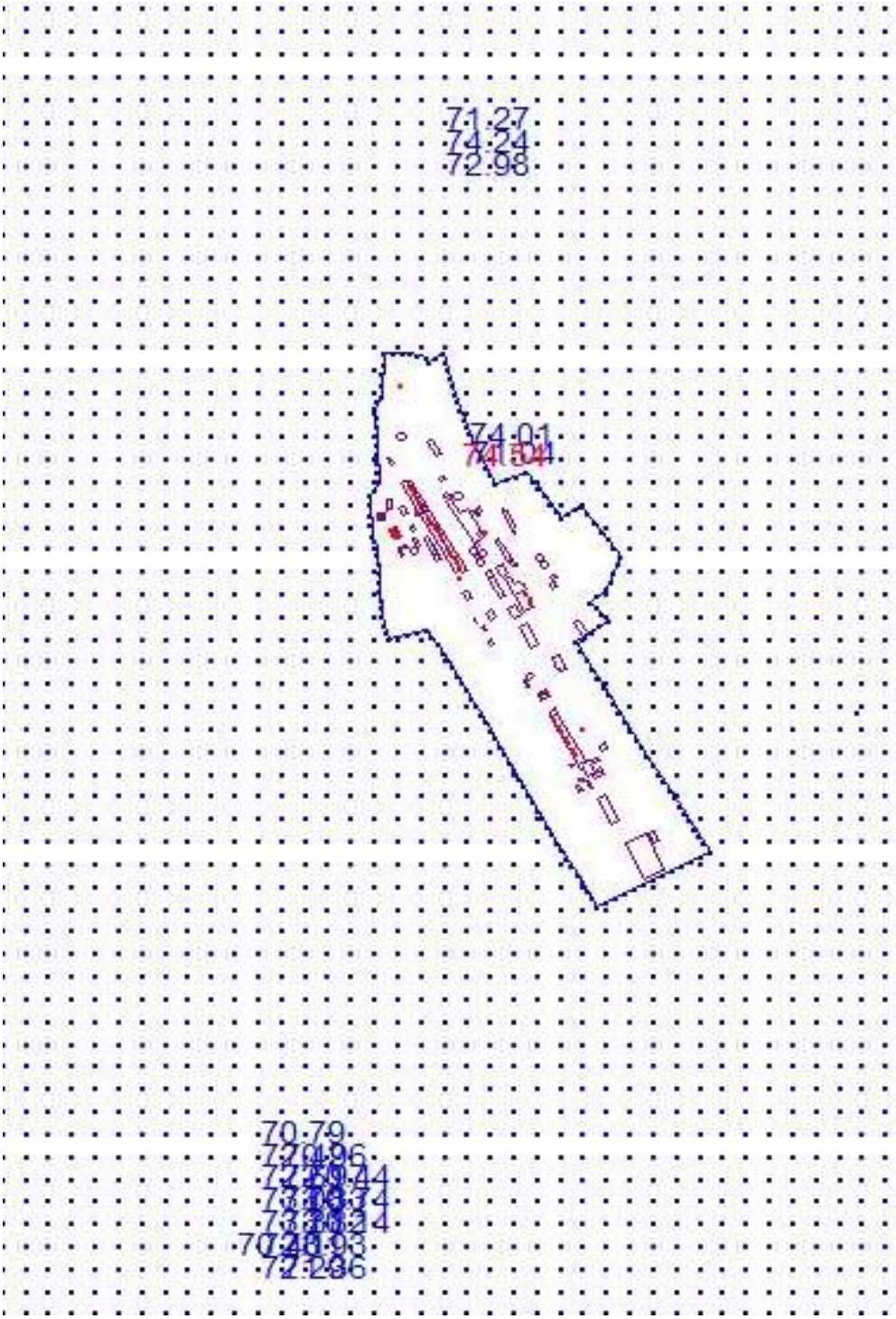


Figure 6: 2007-2009 interactive attainment results. Max design value, with background of 74.54 ppb.

The interactive modeling at the rates shown in Table 16 yield a 4th high maximum daily value, averaged over three years, of 74.54 ppb, including background. The rates established for the Mingo Junction Energy Center and Mingo Junction Steel Works are

far more representative of an attainment strategy than the severe reductions in emissions needed to demonstrate attainment using the split year meteorological data. As such, these rates will be incorporated into Ohio's attainment plan for the Steubenville, OH-WV nonattainment area.

Attainment Rates for Ohio's Northern Facilities Using 2007-2009 Meteorological Data if Attainment Rates for Mountain State Carbon are based on 2013-2014 Meteorological Data

As a final confirmation of the suitability of the attainment rates established using the 2007-2009 meteorological data for Mingo Junction Steel Works and Mingo Junction Energy Center, Ohio EPA interactively modeled these new attainment rates with the attainment rates determined using the split year met data for Mountain State Carbon. The purpose of this modeling is to ensure that Ohio's adoption of rates established using the 2007-2009 meteorological data will provide for attainment regardless of which meteorological data set WV DEP uses when adopting rates for Mountain State Carbon. The rates modeled in this analysis are shown in Table 17.

Facility	Unit ID	Attainment Rates (lbs/hr) 2007-2009
Mingo Junction Energy Center	Unit 1	20.34
	Unit 2	20.34
	Unit 3	20.34
	Unit 4	20.34
Mingo Steel	Reheat Furnace 2	1
	Reheat Furnace 3	1
	Reheat Furnace 4	1
	LMF	14
	EAG Baghouse	105
		Attainment Rates (lbs/hr) 2013-2014
Mountain State Carbon	Battery 1 Fugitives	1.897
	Battery 2 Fugitives	1.897
	Battery 3 Fugitives	2.04
	Battery 8 Fugitives	1.98
	Battery 1-2-3 Pushing	6.528
	Battery 8 Pushing Scrubber	15.72
	Acid Stack	1.46
	Boiler 10	13.275
	Boiler 6	20.63
	Boiler 7	20.63
	Boiler 9	13.288
	COG Flare	39.8
	Battery 1 Stack	22
	Battery 2 Stack	22
	Battery 3 Stack	24.75
	Battery 8 Stack	103.08

Table 17: Modeled rates for 2007-2009 attainment demonstration for Ohio sources with 2013-2014 (split year) modeled rates for West Virginia source.

The results of this analysis show no exceedances of the standard expressed as the three-year average of annual 99th percentile maximum daily values, and are shown in Figure 7. For clarity (the maximum design value is located in a dense receptor grid), Ohio EPA is showing only the maximum design value of 74.52 ppb, including background.

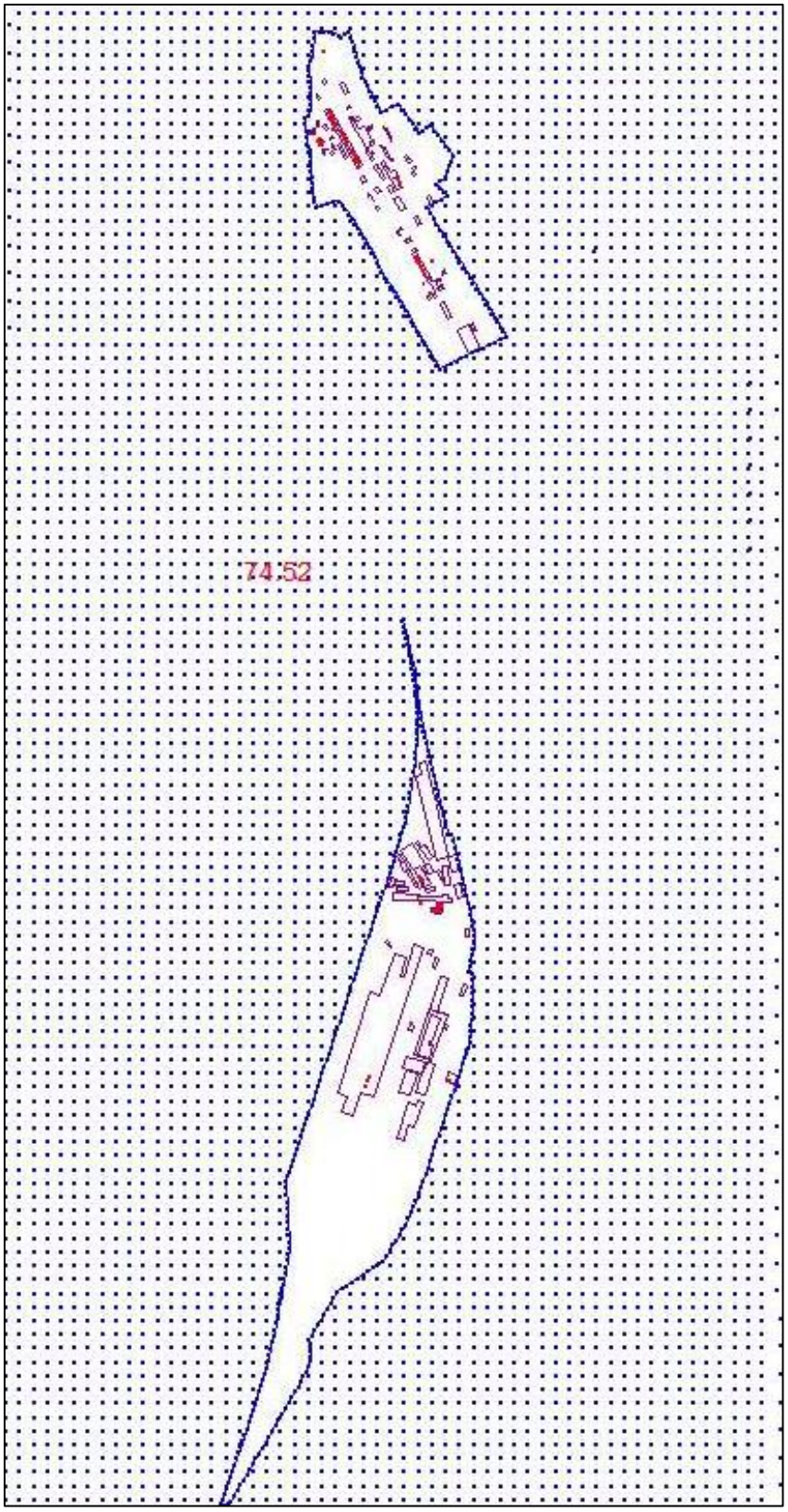


Figure 7: Final attainment modeling results, 2007-2009 met period.

The two modeling analyses performed by Ohio EPA using on-site 2007-2009 meteorological data demonstrate that the use of the split year meteorological data would lead to over-control of both the Mingo Junction Energy Center and Mingo Junction Steel Works, but the choice of meteorological data set has less of an impact on the attainment rates for Mountain State Carbon. In both analyses, Ohio's adoption of attainment rates for Ohio's northern facilities using 2007-2009 meteorological data provided for no exceedances of the standard regardless of which meteorological data set (2007-2009 or 2013-2014) WV DEP uses when developing attainment rates for Mountain State Carbon. Therefore, the attainment rates established for Mingo Junction Energy Center and Mingo Junction Steel Works, using three years (2007-2009) of on-site meteorological data will not cause or contribute to exceedances of the standard, irrespective of the attainment strategy implemented by WV DEP for Mountain State Carbon.

6.3 Scheduled Field Activities

Federal regulation provides for the implementation of a number of qualitative and quantitative checks to ensure that the data will meet the Data Quality Objectives for the project. Each of the checks attempts to evaluate phases of measurement uncertainty. The types of checks that are being used in this project are listed below.

- *Precision and Accuracy (P&A) Checks* – Used to provide an overall assessment of measurement uncertainty.
- *Zero/Span Checks* – Provide an internal quality control check of proper operation of the measurement system.
- *Annual Certifications* – A certification is the process that ensures the traceability and viability of various quality control (QC) standards. Standard traceability is the process of transferring the accuracy or authority of a primary standard to a field-usable standard.
- *Calibrations* – Calibrations are carried out at the field monitoring sites by allowing analyzers to sample test atmospheres containing known pollutant concentrations.

Performance Audits are used to provide an independent assessment on the measurement operations of each instrument by comparing performance samples or devices of known concentrations or values to the values measured by the instrument.

Table 6-3. Scheduled Field Activities

Field Operations	Every Visit	*Bi-Weekly	Quarterly	Semi-Annually	Annually
Change inlet filter	X				
Record all pertinent observations and information in the site logbook.	X				
Record all zero, precision & span check results.		X			
Perform & record analyzer calibrations.				X	
Perform & record meteorological calibrations.				X	
Audit analyzers (independent)			X		
Audit Met systems (independent)				X	
Certify SO_2 tanks (18 months)				X	X
Certify SO_2 calibration systems				X	
Certify Met calibration systems					X

* Automated zero, span and precision checks are conducted daily. A manual zero, span and precision check, is performed monthly. A total of 9 precision checks (QC) and the Audit results (QA) are submitted to OEPA quarterly thru Mark Runyon with American Electric Power.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: GYE

DATA COMPLETENESS REPORT

Report Request ID: 1313206 Report Code: AMP430 Mar. 30, 2015

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	39	081	0020								
	39	081	0018								
	54	009	6000								

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
CRITERIA	42401		

SELECTED OPTIONS

Option Type	Option Value
OZONE EVALUATION	SEASONAL-HOURLY
MERGE PDF FILES	YES
AGENCY ROLE	REPORTING

SORT ORDER

Order	Column
1	EPA_REGION
2	STATE_CODE
3	MONITOR_TYPE
4	COUNTY_CODE
5	SITE_ID
6	PARAMETER_CODE
7	POC

DATE CRITERIA

Start Date	End Date
2011 01	2011 12

APPLICABLE STANDARDS

Standard Description
SO2 1-hour 2010

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS NOT REPORTING

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS REPORTING

DATE RANGE: JAN. 01, 2011 THRU DEC. 31, 2011
REGION: (03) PHILADELPHIA
STATE: West Virginia

REP ORG: Shell Engineering & Assoc., MO
MONITOR TYPE: INDUSTRIAL

SITE ID / CITY / ADDRESS	PARAMETER	POC	DURATION / METHOD	OBSERVATIONS NUMBER / PERCENT												
				JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
54-009-6000	42401 Sulfur dioxide	1	1	712	640	711	688	712	689	711	712	684	712	688	710	8369
Beech Bottom			060	96%	95%	96%	96%	96%	96%	96%	96%	95%	96%	96%	95%	96%
STATE TOUTE 2, BOX27A, BEECH BOTTOM, WVA																

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS REPORTING

DATE RANGE: JAN. 01, 2011 THRU DEC. 31, 2011
REGION: (05) CHICAGO
STATE: Ohio

REP ORG: Ohio EPA, Southeast District Office
MONITOR TYPE: INDUSTRIAL

SITE ID / CITY / ADDRESS	PARAMETER	POC	DURATION / METHOD	OBSERVATIONS NUMBER / PERCENT JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
39-081-0018	42401 Sulfur dioxide	1	1	712	640	707	686	712	689	711	708	685	712	688	706	8356
			060	96%	95%	95%	95%	96%	96%	96%	95%	95%	96%	96%	95%	95%
3487 COUNTY RD. 19																
39-081-0020	42401 Sulfur dioxide	1	1	712	631	710	688	700	666	711	712	688	711	688	707	8324
			060	96%	94%	95%	96%	94%	93%	96%	96%	96%	96%	96%	95%	95%
1469 3rd ST.																

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

REPORT SUMMARY

DATE RANGE: JAN. 01, 2011 THRU DEC. 31, 2011
REGION: (03) PHILADELPHIA
STATE: West Virginia
REP ORG: Shell Engineering & Assoc., MO
MONITOR TYPE: INDUSTRIAL

PARAMETER	ACTIVE MONITORS	# NOT REPORTING	# MONITORS > 75%	MONITORS AVG COMPLETENESS
42401 Sulfur dioxide	1	0	1	96.0%
MT SUMMARY: INDUSTRIAL	1	0	1	96.0%
RO SUMMARY: Shell Engineering & Assoc., MO	1	0	1	96.0%
STATE SUMMARY: West Virginia	1	0	1	96.0%
REGION SUMMARY: (03) PHILADELPHIA	1	0	1	96.0%

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

REPORT SUMMARY

DATE RANGE: JAN. 01, 2011 THRU DEC. 31, 2011
REGION: (05) CHICAGO
STATE: Ohio
REP ORG: Ohio EPA, Southeast District Office
MONITOR TYPE: INDUSTRIAL

PARAMETER	ACTIVE MONITORS	# NOT REPORTING	# MONITORS > 75%	MONITORS AVG COMPLETENESS
42401 Sulfur dioxide	2	0	2	95.0%
MT SUMMARY: INDUSTRIAL	2	0	2	95.0%
RO SUMMARY: Ohio EPA, Southeast District Office	2	0	2	95.0%
STATE SUMMARY: Ohio	2	0	2	95.0%
REGION SUMMARY: (05) CHICAGO	2	0	2	95.0%
REPORT SUMMARY:	3	0	3	95.3%

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: GYE

DATA COMPLETENESS REPORT

Report Request ID: 1313207 Report Code: AMP430 Mar. 30, 2015

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	39	081	0020								
	39	081	0018								
	54	009	6000								

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
CRITERIA	42401		

SELECTED OPTIONS

Option Type	Option Value
OZONE EVALUATION	SEASONAL-HOURLY
MERGE PDF FILES	YES
AGENCY ROLE	REPORTING

SORT ORDER

Order	Column
1	EPA_REGION
2	STATE_CODE
3	MONITOR_TYPE
4	COUNTY_CODE
5	SITE_ID
6	PARAMETER_CODE
7	POC

DATE CRITERIA

Start Date	End Date
2012 01	2012 12

APPLICABLE STANDARDS

Standard Description
SO2 1-hour 2010

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS NOT REPORTING

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS REPORTING

DATE RANGE: JAN. 01, 2012 THRU DEC. 31, 2012
REGION: (03) PHILADELPHIA
STATE: West Virginia

REP ORG: Shell Engineering & Assoc., MO
MONITOR TYPE: INDUSTRIAL

SITE ID / CITY / ADDRESS	PARAMETER	POC	DURATION / METHOD	OBSERVATIONS NUMBER / PERCENT												
				JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
54-009-6000	42401 Sulfur dioxide	1	1	710	666	711	689	712	686	710	705	683	711	689	712	8384
Beech Bottom			060	95%	96%	96%	96%	96%	95%	95%	95%	95%	96%	96%	96%	95%
STATE TOUTE 2, BOX27A, BEECH BOTTOM, WVA																

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS REPORTING

DATE RANGE: JAN. 01, 2012 THRU DEC. 31, 2012
REGION: (05) CHICAGO
STATE: Ohio

REP ORG: Ohio EPA, Southeast District Office
MONITOR TYPE: INDUSTRIAL

SITE ID / CITY / ADDRESS	PARAMETER		POC	DURATION / METHOD	OBSERVATIONS NUMBER / PERCENT JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
39-081-0018	42401	Sulfur dioxide	1	1	710	666	710	688	711	687	712	709	688	710	689	710	8390
				060	95%	96%	95%	96%	96%	95%	96%	95%	96%	95%	96%	95%	96%
3487 COUNTY RD. 19																	
39-081-0020	42401	Sulfur dioxide	1	1	710	665	584	688	712	682	669	705	686	710	688	711	8210
				060	95%	96%	78%	96%	96%	95%	90%	95%	95%	95%	96%	96%	93%
1469 3rd ST.																	

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

REPORT SUMMARY

DATE RANGE: JAN. 01, 2012 THRU DEC. 31, 2012
REGION: (03) PHILADELPHIA
STATE: West Virginia
REP ORG: Shell Engineering & Assoc., MO
MONITOR TYPE: INDUSTRIAL

PARAMETER	ACTIVE MONITORS	# NOT REPORTING	# MONITORS > 75%	MONITORS AVG COMPLETENESS
42401 Sulfur dioxide	1	0	1	95.0%
MT SUMMARY: INDUSTRIAL	1	0	1	95.0%
RO SUMMARY: Shell Engineering & Assoc., MO	1	0	1	95.0%
STATE SUMMARY: West Virginia	1	0	1	95.0%
REGION SUMMARY: (03) PHILADELPHIA	1	0	1	95.0%

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

REPORT SUMMARY

DATE RANGE: JAN. 01, 2012 THRU DEC. 31, 2012
REGION: (05) CHICAGO
STATE: Ohio
REP ORG: Ohio EPA, Southeast District Office
MONITOR TYPE: INDUSTRIAL

PARAMETER	ACTIVE MONITORS	# NOT REPORTING	# MONITORS > 75%	MONITORS AVG COMPLETENESS
42401 Sulfur dioxide	2	0	2	94.5%
MT SUMMARY: INDUSTRIAL	2	0	2	94.5%
RO SUMMARY: Ohio EPA, Southeast District Office	2	0	2	94.5%
STATE SUMMARY: Ohio	2	0	2	94.5%
REGION SUMMARY: (05) CHICAGO	2	0	2	94.5%
REPORT SUMMARY:	3	0	3	94.7%

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: GYE

DATA COMPLETENESS REPORT

Report Request ID: 1313208 Report Code: AMP430 Mar. 30, 2015

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	39	081	0020								
	39	081	0018								
	54	009	6000								

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
CRITERIA	42401		

SELECTED OPTIONS

Option Type	Option Value
OZONE EVALUATION	SEASONAL-HOURLY
MERGE PDF FILES	YES
AGENCY ROLE	REPORTING

SORT ORDER

Order	Column
1	EPA_REGION
2	STATE_CODE
3	MONITOR_TYPE
4	COUNTY_CODE
5	SITE_ID
6	PARAMETER_CODE
7	POC

DATE CRITERIA

Start Date	End Date
2013 01	2013 12

APPLICABLE STANDARDS

Standard Description
SO2 1-hour 2010

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS NOT REPORTING

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS REPORTING

DATE RANGE: JAN. 01, 2013 THRU DEC. 31, 2013
REGION: (03) PHILADELPHIA
STATE: West Virginia

REP ORG: Shell Engineering & Assoc., MO
MONITOR TYPE: INDUSTRIAL

SITE ID / CITY / ADDRESS	PARAMETER	POC	DURATION / METHOD	OBSERVATIONS NUMBER / PERCENT												
				JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
54-009-6000	42401 Sulfur dioxide	1	1	712	640	707	684	710	689	712	705	671	712	687	706	8335
Beech Bottom			060	96%	95%	95%	95%	95%	96%	96%	95%	93%	96%	95%	95%	95%
STATE TOUTE 2, BOX27A, BEECH BOTTOM, WVA																

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS REPORTING

DATE RANGE: JAN. 01, 2013 THRU DEC. 31, 2013
REGION: (05) CHICAGO
STATE: Ohio

REP ORG: Ohio EPA, Southeast District Office
MONITOR TYPE: INDUSTRIAL

SITE ID / CITY / ADDRESS	PARAMETER		POC	DURATION / METHOD	OBSERVATIONS NUMBER / PERCENT JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
39-081-0018	42401	Sulfur dioxide	1	1	710	642	709	688	711	684	698	689	685	712	687	710	8325
				060	95%	96%	95%	96%	96%	95%	94%	93%	95%	96%	95%	95%	95%
3487 COUNTY RD. 19																	
39-081-0020	42401	Sulfur dioxide	1	1	712	641	706	689	710	680	711	710	685	712	686	712	8354
				060	96%	95%	95%	96%	95%	94%	96%	95%	95%	96%	95%	96%	95%
1469 3rd ST.																	

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

REPORT SUMMARY

DATE RANGE: JAN. 01, 2013 THRU DEC. 31, 2013
REGION: (03) PHILADELPHIA
STATE: West Virginia
REP ORG: Shell Engineering & Assoc., MO
MONITOR TYPE: INDUSTRIAL

PARAMETER	ACTIVE MONITORS	# NOT REPORTING	# MONITORS > 75%	MONITORS AVG COMPLETENESS
42401 Sulfur dioxide	1	0	1	95.0%
MT SUMMARY: INDUSTRIAL	1	0	1	95.0%
RO SUMMARY: Shell Engineering & Assoc., MO	1	0	1	95.0%
STATE SUMMARY: West Virginia	1	0	1	95.0%
REGION SUMMARY: (03) PHILADELPHIA	1	0	1	95.0%

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

REPORT SUMMARY

DATE RANGE: JAN. 01, 2013 THRU DEC. 31, 2013
REGION: (05) CHICAGO
STATE: Ohio
REP ORG: Ohio EPA, Southeast District Office
MONITOR TYPE: INDUSTRIAL

PARAMETER	ACTIVE MONITORS	# NOT REPORTING	# MONITORS > 75%	MONITORS AVG COMPLETENESS
42401 Sulfur dioxide	2	0	2	95.0%
MT SUMMARY: INDUSTRIAL	2	0	2	95.0%
RO SUMMARY: Ohio EPA, Southeast District Office	2	0	2	95.0%
STATE SUMMARY: Ohio	2	0	2	95.0%
REGION SUMMARY: (05) CHICAGO	2	0	2	95.0%
REPORT SUMMARY:	3	0	3	95.0%

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: GYE

DATA COMPLETENESS REPORT

Report Request ID: 1313209

Report Code: AMP430

Mar. 30, 2015

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	39	081	0020								
	39	081	0018								
	54	009	6000								

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
CRITERIA	42401		

SELECTED OPTIONS

Option Type	Option Value
OZONE EVALUATION	SEASONAL-HOURLY
MERGE PDF FILES	YES
AGENCY ROLE	REPORTING

SORT ORDER

Order	Column
1	EPA_REGION
2	STATE_CODE
3	MONITOR_TYPE
4	COUNTY_CODE
5	SITE_ID
6	PARAMETER_CODE
7	POC

DATE CRITERIA

Start Date	End Date
2014 01	2014 12

APPLICABLE STANDARDS

Standard Description
SO2 1-hour 2010

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS NOT REPORTING

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS REPORTING

DATE RANGE: JAN. 01, 2014 THRU DEC. 31, 2014
REGION: (03) PHILADELPHIA
STATE: West Virginia

REP ORG: Shell Engineering & Assoc., MO
MONITOR TYPE: INDUSTRIAL

SITE ID / CITY / ADDRESS	PARAMETER	POC	DURATION / METHOD	OBSERVATIONS NUMBER / PERCENT												
				JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
54-009-6000	42401 Sulfur dioxide	1	1	711	606	709	685	711	689	710	711	683	712	688	711	8326
Beech Bottom			060	96%	90%	95%	95%	96%	96%	95%	96%	95%	96%	96%	96%	95%
STATE TOUTE 2, BOX27A, BEECH BOTTOM, WVA																

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

MONITORS REPORTING

DATE RANGE: JAN. 01, 2014 THRU DEC. 31, 2014
REGION: (05) CHICAGO
STATE: Ohio

REP ORG: Ohio EPA, Southeast District Office
MONITOR TYPE: INDUSTRIAL

SITE ID / CITY / ADDRESS	PARAMETER		POC	DURATION / METHOD	OBSERVATIONS NUMBER / PERCENT JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
39-081-0018	42401	Sulfur dioxide	1	1	711	643	708	689	711	689	710	711	681	709	687	712	8361
				060	96%	96%	95%	96%	96%	96%	95%	96%	95%	95%	95%	96%	95%
3487 COUNTY RD. 19																	
39-081-0020	42401	Sulfur dioxide	1	1	710	642	681	689	710	689	711	711	681	711	686	712	8333
				060	95%	96%	92%	96%	95%	96%	96%	96%	95%	96%	95%	96%	95%
1469 3rd ST.																	

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

REPORT SUMMARY

DATE RANGE: JAN. 01, 2014 THRU DEC. 31, 2014
REGION: (03) PHILADELPHIA
STATE: West Virginia
REP ORG: Shell Engineering & Assoc., MO
MONITOR TYPE: INDUSTRIAL

PARAMETER	ACTIVE MONITORS	# NOT REPORTING	# MONITORS > 75%	MONITORS AVG COMPLETENESS
42401 Sulfur dioxide	1	0	1	95.0%
MT SUMMARY: INDUSTRIAL	1	0	1	95.0%
RO SUMMARY: Shell Engineering & Assoc., MO	1	0	1	95.0%
STATE SUMMARY: West Virginia	1	0	1	95.0%
REGION SUMMARY: (03) PHILADELPHIA	1	0	1	95.0%

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 30, 2015

REPORT SUMMARY

DATE RANGE: JAN. 01, 2014 THRU DEC. 31, 2014
REGION: (05) CHICAGO
STATE: Ohio
REP ORG: Ohio EPA, Southeast District Office
MONITOR TYPE: INDUSTRIAL

PARAMETER	ACTIVE MONITORS	# NOT REPORTING	# MONITORS > 75%	MONITORS AVG COMPLETENESS
42401 Sulfur dioxide	2	0	2	95.0%
MT SUMMARY: INDUSTRIAL	2	0	2	95.0%
RO SUMMARY: Ohio EPA, Southeast District Office	2	0	2	95.0%
STATE SUMMARY: Ohio	2	0	2	95.0%
REGION SUMMARY: (05) CHICAGO	2	0	2	95.0%
REPORT SUMMARY:	3	0	3	95.0%

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: GYE

DESIGN VALUE REPORT

Report Request ID: 1313202 Report Code: AMP480 Mar. 30, 2015

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	39	081	0020								
	39	081	0018								
	54	009	6000								

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
DESIGN VALUE	42401		

SELECTED OPTIONS

Option Type	Option Value
SINGLE EVENT PROCESSING	EXCLUDE REGIONALLY CONCURRED EVENTS
WORKFILE DELIMITER	,
USER SITE METADATA	STREET ADDRESS
MERGE PDF FILES	YES
QUARTERLY DATA IN WORKFILE	NO
AGENCY ROLE	PQAO

DATE CRITERIA

Start Date	End Date
2013	2014

APPLICABLE STANDARDS

Standard Description
SO2 1-hour 2010

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Mar. 30, 2015

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2013
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Ohio

		2013			2012			2011			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
39-081-0018	3487 COUNTY RD. 19	4	52		4	37		4	55		48	Y
39-081-0020	1469 3rd ST.	4	33		4	28		4	43		35	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2013
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: West Virginia

		2013			2012			2011			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
54-009-6000	STATE TOUTE 2, BOX27A, BEEC	4	21		4	28	N	4	46		32	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2014
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Ohio

		2014			2013			2012			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
39-081-0018	3487 COUNTY RD. 19	4	38		4	52		4	37		42	Y
39-081-0020	1469 3rd ST.	4	24		4	33		4	28		28	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Pollutant: Sulfur dioxide(42401)
Standard Units: Parts per billion(008)
NAAQS Standard: SO2 1-hour 2010
Statistic: Annual 99th Percentile **Level:** 75

Design Value Year: 2014
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: West Virginia

		2014			2013			2012			3-Year	
Site ID	STREET ADDRESS	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Comp. Qrtrs	99th Percentile	Cert& Eval	Design Value	Valid Ind.
54-009-6000	STATE TOUTE 2, BOX27A, BEEC	4	20		4	21		4	28	N	23	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

CERTIFICATION EVALUATION AND CONCURRENCE FLAG MEANINGS

FLAG	MEANING
M	The monitoring organization has revised data from this monitor since the most recent certification letter received from the state.
N	The certifying agency has submitted the certification letter and required summary reports, but the certifying agency and/or EPA has determined that issues regarding the quality of the ambient concentration data cannot be resolved due to data completeness, the lack of performed quality assurance checks or the results of uncertainty statistics shown in the AMP255 report or the certification and quality assurance report.
S	The certifying agency has submitted the certification letter and required summary reports. A value of "S" conveys no Regional assessment regarding data quality per se. This flag will remain until the Region provides an "N" or "Y" concurrence flag.
U	Uncertified. The certifying agency did not submit a required certification letter and summary reports for this monitor even though the due date has passed, or the state's certification letter specifically did not apply the certification to this monitor.
X	Certification is not required by 40 CFR 58.15 and no conditions apply to be the basis for assigning another flag value
Y	The certifying agency has submitted a certification letter, and EPA has no unresolved reservations about data quality (after reviewing the letter, the attached summary reports, the amount of quality assurance data submitted to AQS, the quality statistics, and the highest reported concentrations).

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: GYE

QUICKLOOK CRITERIA PARAMETERS

Report Request ID: 1313203

Report Code: AMP450

Mar. 30, 2015

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	39	081	0020								
	39	081	0018								
	54	009	6000								

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
QUICK LOOK	42401		

SELECTED OPTIONS

Option Type	Option Value
WORKFILE DELIMITER	,
MERGE PDF FILES	YES
EVENTS PROCESSING	EXCLUDE REGIONALLY CONCURRED EVENTS
AGENCY ROLE	PQAO

SORT ORDER

Order	Column
1	PARAMETER_CODE
2	STATE_CODE
3	COUNTY_CODE
4	SITE_ID
5	POC
6	DATES
7	EDT_ID

DATE CRITERIA

Start Date	End Date
2011	2014

APPLICABLE STANDARDS

Standard Description
SO2 1-hour 2010
SO2 24-hour 1971
SO2 3-hour 1971
SO2 Annual 1971

Mar. 30, 2015

EXCEPTIONAL DATA TYPES

EDT	DESCRIPTION
0	NO EVENTS
1	EVENTS EXCLUDED
2	EVENTS INCLUDED
5	EVENTS WITH CONCURRENCE EXCLUDED

Note: The * indicates that the mean does
not satisfy summary criteria.

Mar. 30, 2015

Sulfur dioxide (42401) Ohio Parts per billion (008)

SITE ID	POC	PQAO	CITY	COUNTY	ADDRESS	YEAR	METH	OBS	COMP QTRS	1ST MAX 1-HR	2ND MAX 1-HR	99TH PCTL 1-HR	1ST MAX 24-HR	2ND MAX 24-HR	Days >24HR STD	ARITH MEAN AN-STD	CERT and EVAL EDT
39-081-0018	1	1373	Not in a city	Jefferson	3487 COUNTY RD. 19	2011	060	8356	4	73.0	67.0	55.0	12.5	11.9	0	3.77	0
39-081-0018	1	1373	Not in a city	Jefferson	3487 COUNTY RD. 19	2012	060	8390	4	84.0	44.0	37.0	16.0	12.2	0	4.10	0
39-081-0018	1	1373	Not in a city	Jefferson	3487 COUNTY RD. 19	2013	060	8325	4	71.0	68.0	52.0	16.8	11.7	0	3.83	0
39-081-0018	1	1373	Not in a city	Jefferson	3487 COUNTY RD. 19	2014	060	8361	4	57.0	50.0	38.0	11.1	10.5	0	4.11	0
39-081-0020	1	1373	Not in a city	Jefferson	1469 3rd ST.	2011	060	8324	4	62.0	53.0	43.0	9.9	9.5	0	3.62	0
39-081-0020	1	1373	Not in a city	Jefferson	1469 3rd ST.	2012	060	8210	4	44.0	38.0	28.0	7.8	7.7	0	2.87	0
39-081-0020	1	1373	Not in a city	Jefferson	1469 3rd ST.	2013	060	8354	4	41.0	34.0	33.0	9.5	7.4	0	3.24	0
39-081-0020	1	1373	Not in a city	Jefferson	1469 3rd ST.	2014	060	8333	4	30.0	27.0	24.0	8.1	7.9	0	2.30	0

Note: The * indicates that the mean does
not satisfy summary criteria.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
QUICK LOOK REPORT (AMP450)

Mar. 30, 2015

Sulfur dioxide (42401) West Virginia Parts per billion (008)

SITE ID	POC	PQAO	CITY	COUNTY	ADDRESS	YEAR	METH	OBS	COMP QTRS	1ST MAX 1-HR	2ND MAX 1-HR	99TH PCTL 1-HR	1ST MAX 24-HR	2ND MAX 24-HR	Days >24HR STD	ARITH MEAN AN-STD	CERT and EVAL	EDT
54-009-6000	1	1373	Beech Bottom	Brooke	STATE TOUTE 2, BOX27A, BEECH BOTTOM, WVA	2011	060	8369	4	80.0	79.0	46.0	13.3	12.1	0	3.80		0
54-009-6000	1	1373	Beech Bottom	Brooke	STATE TOUTE 2, BOX27A, BEECH BOTTOM, WVA	2012	060	8384	4	45.0	37.0	28.0	7.2	6.6	0	2.39	N	0
54-009-6000	1	1373	Beech Bottom	Brooke	STATE TOUTE 2, BOX27A, BEECH BOTTOM, WVA	2013	060	8335	4	37.0	32.0	21.0	5.7	5.0	0	1.82		0
54-009-6000	1	1373	Beech Bottom	Brooke	STATE TOUTE 2, BOX27A, BEECH BOTTOM, WVA	2014	060	8326	4	47.0	46.0	20.0	7.1	7.1	0	1.72		0

Note: The * indicates that the mean does
not satisfy summary criteria.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
QUICK LOOK REPORT (AMP450)
Lead (TSP) LC

Mar. 30, 2015

Note: These reported values do not reflect the combination of 14129 and 85129 and validation substitution tests utilized for Design Value Calculations

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
QUICK LOOK REPORT (AMP450 END)

Mar. 30, 2015

METHODS USED IN THIS REPORT

PARAMETER	METHOD CODE	COLLECTION METHOD	ANALYSIS METHOD
42401	060	INSTRUMENTAL	PULSED FLUORESCENT

Note: The * indicates that the mean does
not satisfy summary criteria.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
QUICK LOOK REPORT (AMP450 END)

Mar. 30, 2015

PQAOS USED IN THIS REPORT

PQAO	AGENCY DESCRIPTION
1373	Shell Engineering & Assoc., MO

Note: The * indicates that the mean does
not satisfy summary criteria.

Mar. 30, 2015

CERTIFICATION EVALUATION AND CONCURRENCE FLAG MEANINGS

FLAG	MEANING
M	The monitoring organization has revised data from this monitor since the most recent certification letter received from the state.
N	The certifying agency has submitted the certification letter and required summary reports, but the certifying agency and/or EPA has determined that issues regarding the quality of the ambient concentration data cannot be resolved due to data completeness, the lack of performed quality assurance checks or the results of uncertainty statistics shown in the AMP255 report or the certification and quality assurance report.
S	The certifying agency has submitted the certification letter and required summary reports. A value of "S" conveys no Regional assessment regarding data quality per se. This flag will remain until the Region provides an "N" or "Y" concurrence flag.
U	Uncertified. The certifying agency did not submit a required certification letter and summary reports for this monitor even though the due date has passed, or the state's certification letter specifically did not apply the certification to this monitor.
X	Certification is not required by 40 CFR 58.15 and no conditions apply to be the basis for assigning another flag value
Y	The certifying agency has submitted a certification letter, and EPA has no unresolved reservations about data quality (after reviewing the letter, the attached summary reports, the amount of quality assurance data submitted to AQS, the quality statistics, and the highest reported concentrations).

Note: The * indicates that the mean does
not satisfy summary criteria.

Appendix E:
WVDEP Attainment Demonstration Modeling (Not re-copied from Ohio EPA - Included in WV's SIP)

Appendix F:
MCH Concurrence Letters for BLP/AERMOD Hybrid Alternative Model Approach

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OCT 2 6 2018

MEMORANDUM

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

SUBJECT: Model Clearinghouse Review of the BLP/AERMOD Hybrid Alternative Model Approach for Modeling Fugitive Emissions from Coke Oven Batteries at the AK Steel – Mountain State Carbon facility located in Follansbee, Brooke County, West Virginia

FROM: George Bridgers, Model Clearinghouse Director
Air Quality Modeling Group, Air Quality Assessment Division, Office of Air Quality Planning and Standards

TO: Timothy A. Leon Guerrero, Meteorologist
Office of Air Monitoring and Analysis, Air Protection Division, EPA Region 3

Alice Chow, Associate Director
Office of Air Monitoring and Analysis, Air Protection Division, EPA Region 3

INTRODUCTION

The AK Steel – Mountain State Carbon, LLC Follansbee Plant (Mountain State Carbon) located in Follansbee, West Virginia is a by-product coke plant that produces metallurgical-grade coke along with foundry coke from coal for use at off-site steel and foundry facilities and for commercial sales. Coke is produced from coal at the facility's four coke oven batteries. EPA Region III is seeking concurrence from the Model Clearinghouse on an alternative modeling approach using a combination of the Buoyant Line and Point Source model (BLP) and the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) to represent fugitive emissions from these four coke oven batteries at Mountain State Carbon. The proposed alternative modeling approach was applied in West Virginia's 2010 1-hour SO_2 National Ambient Air Quality Standard (NAAQS) Nonattainment Area State Implementation Plan (SIP) for the Steubenville, Ohio-West Virginia multi-state nonattainment area.

BACKGROUND

Mountain State Carbon is located along the Ohio River in the northern panhandle of West Virginia. This area resides in the Allegheny Plateau physiographic province of the Appalachian Mountain system and is marked by dendritic rivers systems imbedded within steep valleys. The terrain surrounding Mountain State Carbon rises approximately 120 meters above the river valley

floors and contributes to terrain induced atmospheric temperature inversions. These temperature inversions are periods of diminished air dispersion out of the river valley and often result in episodes of poor air quality for the nearby region.

While many of the emissions sources at Mountain State Carbon can be appropriately characterized by point, area, and/or volume source types for compliance demonstrations and SIP purposes, the coke oven batteries also produce a significant amount of fugitive emissions distributed along the length of the coke oven batteries and are much more difficult to accurately characterize given a variety of factors, including accurately estimating fugitive emissions across each battery, the sporadic nature of these emissions, extremely hot temperatures associated with some of these emissions releases, etc. Historically, coke oven fugitive emissions have been modeled as a type of buoyant line source using the BLP model. The BLP model was created for modeling aluminum reduction facilities with much more uniform heat release profiles and was intended to handle the unique dispersion from these types of facilities where plume rise and downwash effects from stationary line sources are important in simple terrain environments.

For coke oven batteries in complex terrain environments, a variety of alternative model approaches have been used in compliance demonstrations and SIP submittals over the past 40-years. Most commonly, some "hybrid" combination of the BLP model estimates of plume rise and/or initial vertical and/or lateral dispersion characteristics have been used to characterize coke oven battery emissions as volume sources within the Industrial Source Complex (ISC) model. In 2005, AERMOD replaced the ISC model as EPA's preferred near-field dispersion model. The BLP model was also replaced as an EPA preferred model with the release of AERMOD version 16216 as part of the 2017 revisions to the *Guideline on Air Quality Models* (Appendix W to 40 CFR Part 51, *Guideline*). AERMOD now incorporates the BLP model formulation algorithms as a "BUOYLINE" source option. However, there have not been any scientific formulations updates to the original BLP model formulations algorithms with the incorporation in AERMOD.

MODEL CLEARINGHOUSE REVIEW

In the West Virginia 2010 1-hour SO_2 NAAQS Nonattainment Area SIP for the Steubenville, Ohio-West Virginia multi-state nonattainment area, West Virginia used AERMOD for all sources except the fugitive emissions emanating from the coke oven batteries. To characterize these fugitive emissions, West Virginia generated hourly varying release heights using BLP and then calculated initial dispersion coefficients based on the release heights. Fugitive emissions were then included in AERMOD, using multiple hourly varying volume sources based on these parameters. This "BLP/AERMOD Hybrid Approach" is similar to the August 2018 Model Clearinghouse concurred and EPA Region 3 approved alternative model approach for the U.S. Steel Mon Valley Works – Clairton Plant (Clairton Plant) located in Allegheny County, Pennsylvania[1]

In this Model Clearinghouse review, it should be noted that the Model Clearinghouse did not reconsider the justification or basis for the application of the BLP/AERMOD Hybrid Approach

[1] https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=18-III-01

for fugitive emissions from coke oven batteries. Rather, the Model Clearinghouse focused its attention on the portability and applicability of the case-specific Model Clearinghouse concurrence and EPA Regional Office approval of this alternative model approach from the aforementioned Clairton Plant to the Mountain State Carbon facility. As stated in the EPA Region 3's technical assessment of the West Virginia 1-hour SO_2 SIP,

> "monitoring data necessary to complete [case-specific] statistical analysis is unavailable for the areas in which the regulatory version of AERMOD and the BLP/AERMOD Hybrid approach predict maximum impacts. EPA Region 3 is proposing to approve the use of the BLP/AERMOD Hybrid method based on a recently approved application of this methodology for the U. S. Steel Clairton Plant in Allegheny County, PA. We believe this approval is appropriate in this instance since both facilities are using a similar BLP/AERMOD Hybrid approach to simulate their buoyant fugitive coke oven emissions, both facilities are by-product coking plants with nearly identical coke production/handling methods, both facilities are located in similar terrain and both facilities appear to experience terrain-induced complex vertical wind patterns."

The previous justification for the application of the BLP/AERMOD Hybrid Approach at the Clairton Plant met the requirements of Section 3.2.2(b)(2) of the *Guideline on Air Quality Models* (Appendix W to 40 CFR Part 51, *Guideline*) for that particular situation based on a case-specific statistical analysis that was provided in the Allegheny County technical support document, "Alternative Modeling Technical Support Document: BLP/AERMOD Hybrid Approach for Buoyant Fugitives in Complex Terrain."[2]

From a facility perspective, the fugitive coke oven emissions from both Mountain State Carbon and Clairton Plant are essentially the same in that they are initially very buoyant due to the substantial heating involved in the coke making process. There are differences in the number of batteries and the overall size of the entire Clairton Plant facility as compared to that of Mountain State Carbon, but the near-field dispersion characteristics of the fugitive emissions from the coke oven batteries from both facilities are expected to be equivalent.

Further from EPA Region 3's technical assessment,

> "Mountain State Carbon and U.S. Steel's Clairton Plant are both located in similar terrain settings since they reside in the same physiographic province; the Allegheny Plateau province of the Appalachian Mountain system. Both plants lie in river valleys, the Monongahela and Ohio rivers, that make up a larger regional pattern of incised dendritic valleys within an overall elevated plateau. Elevation differences between the valley floor and surrounding elevated terrain for both facilities are approximately 120 meters (m). Actual distances between the two (2) facilities are modest. Mountain State Carbon is located approximately 60 km west of the Clairton Plant. Given the similarities in terrain between the coke plants we would expect each facility's buoyant fugitive emissions to

[2] http://www.epa.gov/ttn/scram/guidance/mch/new_mch/ACHD_Alternative_Demo_Buoyant_Fugitives_Final.pdf

behave similarly and therefore be better simulated using the alternative BLP/AERMOD Hybrid approach."

The Model Clearinghouse finds this geographical and proximity intercomparison especially important in determining the portability of the Clairton Plant case-specific alternative model approval to Mountain State Carbon. Although the two facilities are approximately 60 kilometers apart, their locations within the Allegheny Plateau are such that the meso- and synoptic-scale meteorological influences can easily be considered equivalent. While the surface height wind roses provided for both facilities were different, it was noted that the orientation of the river valleys in both cases was also different. EPA Region 3 demonstrated an equivalent and appropriately similar shifting of winds with height throughout the two valleys, which would result in similar dispersion patterns with respect to the nearby complex terrain of the river valley.

There are numerous aspects of complex terrain that could have significant influences on the downwind dispersion of pollutants from these two facilities. In both cases, the aspects of complex terrain are very similar; narrow river valley settings with elevated terrain at approximately 120 meters just beyond the property boundaries of both facilities. Had the facility settings been uniquely different, *e.g.*, one facility in a river valley and the other on a flat plateau with adjacent mountains, it would have been inappropriate for the Model Clearinghouse to consider the case-specific alternative model performance evaluation at one to be representative of the other. The Model Clearinghouse finds that the similarities of the topographical settings around both the Mountain State Carbon and Clairton Plant to be equivalent and that EPA Region 3 has provided a rational justification for the applicability of the Clairton Plant case-specific alternative model performance evaluation.

MODEL CLEARINGHOUSE CONCURRENCE SUMMARY

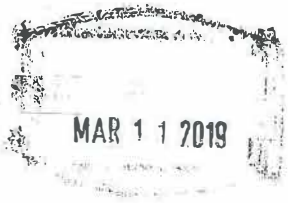
Per the request of EPA Region 3, the Model Clearinghouse has reviewed the model attainment demonstration included in the West Virginia 2010 1-hour SO_2 NAAQS Nonattainment Area SIP for the Steubenville, Ohio-West Virginia multi-state nonattainment area and associated EPA Region 3 technical assessment for the use of the alternative BLP/AERMOD Hybrid Approach for the assessment of the fugitive coke oven battery emissions at the Mountain State Carbon facility in Follansbee, West Virginia. The Model Clearinghouse finds that the requirements and recommendations of Section 3.2 of the *Guideline* were previously met for the BLP/AERMOD Hybrid method in the case of the U.S. Steel Mon Valley Works - Clairton Plant situation. Furthermore, a justifiable basis has been provided by EPA Region 3 for the application of this previously case-specific approved alternative model at the AK Steel – Mountain State Carbon, LLC Follansbee Plant given the unique similarities between the emissions sources at these two facilities, the similarities in complex topographical and meteorological settings surrounding these two facilities, and the similarities in alternative modeling approach for assessing the fugitive emissions from the coke oven batteries at these two facilities. The Model Clearinghouse hereby concurs with EPA Region 3 on the alternative model approval for the West Virginia SIP. It is noted that all aspects of this Regional Office alternative model approval and Model Clearinghouse concurrence should be included in the record for the SIP approval and made available for comment during the appropriate public comment period.

The EPA has highlighted the need for further model development related to buoyancy in the AERMOD Development White Papers[3] initially released for the 2017 Regional, State, and Local Modelers' Workshop. More specifically, buoyancy related to elongated sources, such as coke oven batteries, was further discussed by the EPA at the 2018 Regional, State, and Local Modelers' Workshop[4]. The White Papers, which will be expanded in the EPA's forthcoming AERMOD Model Development and Update Plan, chart a pathway for further model development for addressing plume rise from many source types. It is expected that such development will better address model performance issues with sources like coke oven batteries. In the interim, the EPA has evaluated characterizing coke over batteries as a series of point sources in a manner that reasonably accounts for plume rise, downwash, and subsequent dispersion within the framework of the preferred model.

cc: Richard Wayland, C304-02
Anna Wood, C504-01
Tyler Fox, C439-01
Raj Rao, C504-01
EPA Air Program Managers
EPA Regional Modeling Contacts

[3] https://www3.epa.gov/ttn/scram/models/aermod/20170919_AERMOD_Development_White_Papers.pdf
[4] http://www.cleanairinfo.com/regionalstatelocalmodelingworkshop/archive/2018/Presentations/1-9_2018_RSL-White_Paper_Summaries.pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590



REPLY TO THE ATTENTION OF:

MEMORANDUM

SUBJECT: Concurrence Request for Approval of Alternative Model: BLP/AERMOD Hybrid as Applied to the Ohio Environmental Protection Agency State Implementation Plan for the Steubenville Ohio/West Virginia Multi-State Nonattainment Area

FROM: Randy Robinson, Meteorologist RSR
Control Strategies Section, Air Programs Branch,
Air and Radiation Division, EPA Region 5

THRU: John Mooney, Chief
Air Programs Branch, Air and Radiation Division,
EPA Region 5

TO: George Bridgers, Director
Model Clearinghouse, Air Quality Modeling Group,
Office of Air Quality Planning and Standards

Background

On August 7, 2018, EPA Region 3 requested concurrence from the Model Clearinghouse on approval of an alternative modeling approach used by the Allegheny County Health Department (ACHD) to model fugitive emissions from coke batteries at the U.S. Steel Mon Valley Works – Clairton Plant located in Clairton, Pennsylvania. The Region 3 request was accompanied by a technical review of the modeling methodology which used a hybrid approach based on information generated by the Buoyant Line and Point Source model (BLP) and the American Meteorological Society/Environmental Protection Agency Model (AERMOD). The technical review described the application, by ACHD, of the EPA recommended approach of using representative ambient air monitors along with theoretical justification, in accordance with Section 3.2.2(b)(2) of the Guideline on Air Quality Models, to determine if the proposed alternative model approach performed better than standard recommendations. Region 3 concluded that the alternative modeling evaluation was done appropriately and that the method proposed for use with the fugitive emissions at the coke oven batteries at the Clairton

Plant was approvable. A memorandum, concurring with Region 3's conclusions, was sent from the Model Clearinghouse to EPA Region 3 on August 10, 2018.

On October 18, 2018, EPA Region 3 requested concurrence from the Model Clearinghouse on approval of a determination that the alternative modeling approach as used in Allegheny, Pennsylvania, was also appropriate for application to the coke battery fugitive emissions at the AK Steel – Mountain State Carbon facility, located in Follansbee, West Virginia. The request was based on unique similarities between emission source characteristics, topography, and meteorological influences. A memorandum, concurring with Region 3's conclusions, was sent from the Model Clearinghouse to EPA Region 3 on October 26, 2018. This alternative modeling approach was used in the greater Steubenville, Ohio-West Virginia nonattainment area State Implementation Plan (SIP) submittals developed by the States of West Virginia and Ohio.

Region 5 Request

Ohio and West Virginia submitted separate SIP modeling analyses, to their respective EPA Regional Offices, using this alternative approach for modeling Mountain State Carbon. Ohio submitted a SIP using the same approach to modeling Mountain State Carbon as West Virginia. Currently, the Ohio Environmental Protection Agency (OEPA) is preparing a new SIP submittal for the Steubenville multi-state nonattainment area with revised limits for the Cardinal Power Plant (Cardinal) and a revised attainment demonstration. The revised modeling will contain an updated characterization of Cardinal's stack emissions and an updated background concentration, as well as a revised emission limit. The remainder of OEPA's modeling analysis will be identical to West Virginia's SIP modeling analysis. It uses the same alternative modeling approach to characterize emissions from the Mountain State Carbon facility and models the other sources in the northern portion of the area the same as West Virginia. The only source for which Ohio will revise inputs is Cardinal, which is the only source located in the southern portion of the nonattainment area. The analysis is expected to demonstrate attainment in the entire Ohio and West Virginia modeling domains.

Ohio's intended revisions will affect only the ambient impacts from Cardinal. The remainder of Ohio's source modeling is identical to that submitted by West Virginia. Consequently, EPA Region 5 believes that no additional technical justification or evaluation of the alternative model approach is needed. Region 5 is requesting concurrence from the Model Clearinghouse that the alternative modeling approach for Mountain State Carbon (as used and submitted by West Virginia and approved by Region 3 and the Model Clearinghouse) is also acceptable as used in OEPA's revised modeling, given that the modeling methodology and model inputs are identical with respect to the source of interest in the alternative approach.

Please feel free to contact me at (312) 353-6713 if you have questions regarding this request.

cc: Tim Leon-Guerrero, EPA Region 3
Jennifer VanVlerah, Ohio Environmental Protection Agency
Chris Beekman, Ohio Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

MAR 1 4 2019

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Model Clearinghouse Review of the Proposed Region 5 Approval for the Application of the BLP/AERMOD Hybrid Alternative Model Approach in the Ohio Environmental Protection Agency's 2010 1-hour SO_2 National Ambient Air Quality Standard State Implementation Plan for the Steubenville Ohio-West Virginia Multi-State Nonattainment Area

FROM: George Bridgers, Model Clearinghouse Director
Air Quality Modeling Group, Air Quality Assessment Division, Office of Air Quality Planning and Standards

TO: Randy Robinson, Meteorologist
Control Strategies Section, Air Programs Branch, Air and Radiation Division, EPA Region 5

John Mooney, Chief
Air Programs Branch, Air and Radiation Division, EPA Region 5

INTRODUCTION

In October 2018, EPA Region 3 sought and subsequently gained Model Clearinghouse concurrence for approving the application of an alternative modeling approach that used a combination of the Buoyant Line and Point Source model (BLP) and the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) to represent fugitive emissions from four coke oven batteries at the AK Steel – Mountain State Carbon facility located in Follansbee, Brooke County, West Virginia. This "BLP/AERMOD Hybrid Alternative Modeling Approach" was included in the West Virginia Department of Environmental Protection's 2010 1-hour SO_2 National Ambient Air Quality Standard (NAAQS) Nonattainment Area State Implementation Plan (SIP) for the Steubenville, Ohio-West Virginia multi-state nonattainment area. In preparing their state's 2010 1-hour SO_2 NAAQS SIP for this multi-state nonattainment area, the Ohio Environmental Protection Agency proposes to model all the sources within the nonattainment area identically to that of the modeling included in the West Virginia SIP with the exception of making targeted changes to the stack characterization and modeled emissions limits at one facility, Cardinal Power Plant, and an updated background concentration. This would include modeling the Mountain State Carbon facility with the BLP/AERMOD Hybrid Alternative Model Approach exactly as West Virginia based on the same

alternative model justification as presented to and approved by EPA Region 3. Considering that the alternative modeling is identical to an already EPA Regional Office approved case-specific approach and that the changes that the Ohio Environmental Protection Agency has made to the modeling assessment do not influence the basis of the BLP/AERMOD Hybrid Alternative Modeling Approach for estimating the fugitive emissions impacts of Mountain State Carbon, EPA Region 5 is seeking concurrence from the Model Clearinghouse on extending the approval for modeling the Mountain State Carbon facility with the BLP/AERMOD Hybrid Alternative Modeling Approach to Ohio's 2010 sulfur dioxide attainment plan for the Steubenville Ohio-West Virginia Multi-State Nonattainment Area.

BACKGROUND

As presented in the March 11, 2019, EPA Region 5 Model Clearinghouse Concurrence Request Memorandum, the original foundation for the BLP/AERMOD Hybrid Alternative Modeling Approach applied in West Virginia's 2010 1-hour SO_2 NAAQS SIP was an August 2018, alternative model justification and case-specific approval by EPA Region 3. In this August 2018, alternative model approval, a technical justification and model performance evaluation of the BLP/AERMOD Hybrid Alternative Modeling Approach was conducted. The Allegheny County Health Department applied the Cox-Tikvart Protocol using a network of facility representative ambient monitors and sufficiently demonstrated, per Section 3.2.2(b)(2) of the *Guideline on Air Quality Models* (Appendix W to 40 CFR Part 51, *Guideline*), that the BLP/AERMOD Hybrid Alternative Model Approach performed better than the EPA's preferred model approach and other approaches tested for characterizing the fugitive emissions from coke oven batteries at the U.S. Steel Mon Valley Works – Clairton Plant located in Allegheny County, Pennsylvania. The alternative model approval was appropriately concurred by the Model Clearinghouse and the alternative model justification and concurrence can be referenced by the Model Clearinghouse record number, 18-III-01[1].

Specific to West Virginia's 2010 1-hour SO_2 NAAQS SIP and relevant for the subsequent consideration for the application of the BLP/AERMOD Hybrid Alternative Modeling Approach in Ohio's 2010 1-hour SO_2 NAAQS SIP is the October 2018, alternative model justification and case-specific approval by EPA Region 3. In this October 2018, alternative model approval, a justifiable basis was provided for the application of BLP/AERMOD Hybrid Alternative Modeling Approach, as approved at the aforementioned Clairton Plant, at the Mountain State Carbon facility given the unique similarities between the emissions sources at the Mountain State Carbon and Clairton Plant, the similarities in complex topographical and meteorological settings surrounding these two facilities, and the similarities in alternative modeling approach for assessing the fugitive emissions from the coke oven batteries at these two facilities. The October 2018, alternative model approval was also appropriately concurred by the Model Clearinghouse and the alternative model justification and concurrence can be referenced by the Model Clearinghouse record number, 18-III-02[2].

[1] https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=18-III-01
[2] https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=18-III-02

MODEL CLEARINGHOUSE REVIEW

In this Model Clearinghouse review, the Model Clearinghouse is not reconsidering the technical justification or basis for the application of the BLP/AERMOD Hybrid Alternative Model Approach for fugitive emissions from coke oven batteries at the U.S. Steel Mon Valley Works – Clairton Plant or the AK Steel – Mountain State Carbon facility. The Model Clearinghouse review and discussion on both of these applications can be found at the previously referenced EPA Region 3 alternative model approvals. The focus of the Model Clearinghouse review here is solely on whether or not there are substantive changes to Ohio's 2010 1-hour SO2 NAAQS SIP modeling assessment that alters the portability of the BLP/AERMOD Hybrid Alternative Model Approach from the Clairton Plant case-specific approval to case-specific approval that West Virginia received from EPA Region 3 for Mountain State Carbon.

The Ohio Environmental Protection Agency proposes to model almost all of the sources within the nonattainment area identically to that of the modeling included in West Virginia's 2010 1-hour SO_2 NAAQS SIP, including modeling the fugitive coke oven battery emissions at Mountain State Carbon exactly as previously EPA Region 3 approved with the BLP/AERMOD Hybrid Alternative Modeling Approach. The lone exception is targeted changes to the stack characterization and modeled emissions limits at the Cardinal Power Plant in the Wells Township, Jefferson County, Ohio. The Ohio Environmental Protection Agency also proposes to update background concentration to be more reflective of recent air quality levels (2016-2018).

The importance and impact of the BLP/AERMOD Hybrid Alternative Modeling Approach is most prevalent in the complex terrain immediately surrounding and downwind of the Moutain State Carbon facility. It is not an alternative modeling approach that results in significant domain-wide concentration impact differences. The characteristics of the terrain surrounding and the configuration of the fugitive sources at Mountain State Carbon remain identical to what was previously presented to EPA Region 3 when the case-specific justification and approval was being made in October 2018. Although the changes in Cardinal emissions alter the plant's contribution to concentrations throughout the modeling domain, these changes do not influence the basis of the BLP/AERMOD Hybrid Alternative Modeling Approach for estimating the fugitive emissions impacts of Mountain State Carbon. Thus, the previous alternative model basis would remain unchanged and there is not any question about the portability of the previous BLP/AERMOD Hybrid Alternative Modeling Approach approval to modeling assessment in the proposed Ohio Environmental Protection Agency's 2010 1-hour SO2 NAAQS SIP.

MODEL CLEARINGHOUSE CONCURRENCE SUMMARY

In summary, the Model Clearinghouse fully concurs with EPA Region 5 that the BLP/AERMOD Hybrid Alternative Modeling Approach that is being considered as a part of the Ohio Environmental Protection Agency's 2010 1-hour SO2 NAAQS SIP for the Steubenville Ohio-West Virginia Multi-State Nonattainment Area to represent fugitive emissions from four coke oven batteries at the AK Steel – Mountain State Carbon facility located in Follansbee, Brooke County, West Virginia has already been appropriately vetted and approved by EPA Region 3 and that the targeted changes to the stack emissions and modeled emissions limit at the Cardinal

Power Plant in the Wells Township, Jefferson County, Ohio and updates to background concentrations do not influence that alternative model basis. The Model Clearinghouse encourages EPA Region 5 to respond to the Ohio Environmental Protection Agency with a letter of alternative model approval for inclusion in their SIP record. The Ohio Environmental Protection Agency should then include in the SIP record and make available for comment during the appropriate public comment period that letter of alternative model approval along with the memoranda included in this action, Model Clearinghouse record number 19-V-01[3], and the previous action related to the West Virginia 2010 1-hour SO2 NAAQS SIP, Model Clearinghouse record number 18-III-02[4].

cc: Richard Wayland, C304-02
Anna Wood, C504-01
Tyler Fox, C439-01
Raj Rao, C504-03
Megan Brachtl, C539-01
EPA Air Program Managers
EPA Regional Modeling Contacts

[3] https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=19-V-01
[4] https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=18-III-02

Appendix G:
U.S. EPA Memorandum "Analyses of Modeled Air Quality and Emissions of Sulfur Dioxide (SO_2) in the Steubenville, Ohio-West Virginia Area"

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
AIR AND RADIATION DIVISION
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

MEMORANDUM

SUBJECT: Analyses of Modeled Air Quality and Emissions of Sulfur Dioxide (SO_2) in the Steubenville, Ohio-West Virginia Area

FROM: John Summerhays
Environmental Scientist

Randall Robinson
Regional Meteorologist

TO: Files

THRU: Pamela Blakley
Chief, Control Strategies Section

On April 3, 2015, as supplemented on October 13, 2015, Ohio submitted its plan for attainment of the SO_2 standard in the Steubenville area. West Virginia submitted its plan for this area on April 25, 2016, with a supplemental submission on November 27, 2017. These plans included modeling in which the Cardinal power plant was modeled as having emissions of 6,003 pounds per hour. Ohio has subsequently begun rulemaking to adopt an emission limit that would restrict emissions to this level.

In association with this effort, we have conducted two types of modeling runs. The first run analyzed alternative treatments of the release of emissions from the stacks at Cardinal, to assess an alternate means of characterizing the release of emissions from Cardinal Unit 3. Subsequent runs were designed to assess whether a limit on Cardinal reflecting the modeled 6,003 pounds per hour (in conjunction with limits on other facilities in the area) would provide for attainment under different interpretations of creditable stack height at Cardinal. These runs were designed also to assess whether this limit could be expressed as a plant-wide limit, including modeling runs with various distributions of emissions at this plant to assure that any distribution of emissions that would be allowed with such a limit would yield attainment.

In addition, we analyzed emissions data from the Cardinal plant to estimate the degree of adjustment that would be needed to obtain a 30-day average limit that could be considered comparably stringent to a 1-hour limit of 6,003 pounds per hour. The purpose of this memorandum is to document these analyses.

This document is not intended to provide a complete review of the attainment demonstrations in Ohio's and West Virginia's plans. While the modeling discussed here uses information from the states' plans, the discussion of modeling in this document only addresses the impact of various scenarios with respect to the emissions of Cardinal.

I. Modeling Analyses

Cardinal has three units. For Units 1 and 2 at Cardinal, the current stack is a single stack with separate vents for these units, with a height of 305 meters. Ohio and West Virginia both used this actual stack height as the release height of the emissions, along with representative stack gas characteristics. For Unit 3, West Virginia used the stack height of a prior stack, 274 meters, whereas Ohio used a release height reflecting anticipated plume height, using an approach similar to the approach used to represent the release of fugitive emissions from Mountain State Carbon.

Ohio's modeling protocol states that the state modeled all sources at good engineering practice (GEP) stack height. However, Ohio did not discuss whether any of the stacks at Cardinal warrant being grandfathered, nor did Ohio compare the heights of these stacks to the formula GEP heights that would be computed (according to the formula in the stack height regulations at 40 CFR 51.100(ii)(2)) based on the dimensions of nearby downwash-inducing buildings. Therefore, we conducted modeling runs to assess whether limits for Cardinal corresponding to the emission rates that Ohio and West Virginia modeled (adding up to 6,003 pounds per hour), in combination with the other limits in the states' plans, would provide for attainment with stacks at formula GEP height, to supplement the states' modeling runs.

For Units 1 and 2, the formula in 40 CFR 51.100(ii)(2)(ii) suggests a GEP stack height of 160 meters. Therefore, we modeled Units 1 and 2 emissions as being released at a height of 160 meters.

We also examined whether the emissions from Units 1 and 2 warrant being merged. The emissions from these units are vented out of different vents from a single stack. Satellite imagery indicates that the top of the stack is approximately 22 meters in diameter, and the vents are approximately 9 meters apart. Consequently, treating the release of the emissions from these two units as a single combined release (which, given the similarity of the two units, means modeling the plumes as having twice the heat flux) provides for best simulation of expected plume behavior. Nevertheless, EPA's stack height regulations restrict the circumstances under which plume merging is creditable.

Under 40 CFR 51.100(hh), plume merging is defined to be a prohibited dispersion technique except, in the case of merging occurring after July 8, 1985, for cases in which "such merging is part of a change in operation at the facility that includes the installation of pollution controls and is accompanied by a net reduction in the allowable emissions of a pollutant." (*See* 40 CFR 51.100(hh)(2)(B).) The stack height regulations also note: "This exclusion from the definition of *dispersion techniques* shall apply only to the emission limitation for the pollutant affected by such change in operation."

As a compliance strategy for meeting the requirements of the Clean Air Interstate Rule (CAIR), Cardinal began operation of flue gas desulfurization of the emissions from Units 1 and 2 on March 25, 2008 and December 15, 2007, respectively. Available evidence suggests that the

construction of the new stack to vent the emissions from these units was part of the same project as installation of flue gas desulfurization equipment. Although Ohio is proposing its emission limit several years after the installation of the pollution controls, the merging accompanied the installation of controls, and the merging may also be considered to accompany a net reduction in allowable emissions in the sense that the initial request for credit for merging (in this SIP) is accompanied by a limit that requires the net emission reduction that the Cardinal control project achieved. In addition, although CAIR did not establish specific emission limits for Cardinal, CAIR imposed requirements contemporaneous with the installation of controls and construction of a new stack with a configuration resulting in the physical merging of the two plumes, requirements that had the effect of requiring a net reduction of SO_2 emissions from Cardinal. For these reasons, we view the merging of the plumes from Units 1 and 2 to qualify as creditable for SO_2 under 40 CFR 51.100(hh)(2)(B).

For Unit 3, the key modeling challenge is to determine how to characterize the release of these emissions from a cooling tower. When Ohio modeled these emissions using the actual stack parameters of this cooling tower, the results were dramatically higher than concentrations monitored at multiple nearby sites, including widespread modeled impacts of 10,000 $\mu g/m^3$, and a maximum estimated impact over 20,000 $\mu g/m^3$. Therefore, Ohio instead used hourly meteorological data to estimate hourly plume heights and characterized the Unit 3 emissions as being released from a volume source at these hour-specific heights. Further information on Ohio's analysis for Unit 3 is provided in Appendix A to its modeling protocol, available at http://www.epa.ohio.gov/portals/27/SIP/SO2/E1A_10SO2Att_Unit%203.pdf. Ohio compared modeling results to monitoring results for various monitoring sites for various means of characterizing the releases from Unit 3 and concluded that the use of hourly varying plume heights yielded better model performance than more standard approaches to characterizing the releases of Unit 3 emissions.

As noted above, West Virginia modeled Unit 3 emissions as being released from the prior Unit 3 stack, using the height and diameter of that stack and the exit temperature and velocity that historically applied to the release from that stack. Our modeling assumed a release height reflecting the current actual height of the release of these emissions, at 129 meters.[1] However, Ohio has demonstrated that modeling these emissions as being released from a stack with a 56 meter diameter yielded clearly excessive concentration estimates. Therefore, we conducted additional modeling in order to identify alternate means of characterizing the release of these emissions that would provide a more accurate simulation of the impacts of these emissions. In particular, we modeled the Unit 3 emissions as being released from a stack with a height of 129 meters but with a stack diameter, temperature and velocity of the old stack as characterized by West Virginia. These simulations used meteorological data from a 12-month period from July 1, 2013 to June 30, 2014, using actual hourly emissions and stack gas information for this period, to assess how well the modeled concentrations using this source characterization match the concentrations observed at nearby monitoring sites. Further details on the methodology and results of this modeling is provided in an appendix to this document. This modeling supported a conclusion that use of the actual release height for the Unit 3 emissions in combination with the expected stack parameters with a conventional stack (i.e., the stack diameter and exit gas characteristics that West Virginia used based on the characteristics of the historic Unit 3 stack) provides an appropriate characterization of the release of these emissions for purposes of

[1] This height is less than the formula GEP height (197 meters) calculated based on the dimensions of nearby buildings.

assessing the impact of these emissions.

Using these approaches to characterize the release of emissions from the various units at Cardinal, we then conducted a series of runs to evaluate whether air quality in the area would be suitably protected with a limit that governed the sum of emissions across all three units, without limiting the emissions of each unit individually. Ohio and West Virginia modeled 6,003 pounds per hour from Cardinal as being emitted 44 percent from Unit 1, 35 percent from Unit 2, and 21 percent from Unit 3. However, a limit on total emissions from Cardinal, without limits on emissions on a unit-by unit basis, would allow a range of other distributions of these emissions among these three units. Particularly given the 1.6 kilometer distance between the stack for Units 1 and 2 and the stack for Unit 3, the endpoints of the range of allowable distributions of emissions are 1) to have all emissions arising from the stack for Units 1 and 2 and 2) to have all emissions arising from the stack for Unit 3. Therefore, EPA conducted one simulation in which 6,003 pounds per hour were emitted from the stack for Units 1 and 2 and one simulation in which 6,003 pounds per hour were emitted from the stack for Unit 3. (Since Unit 1 and Unit 2 are essentially identical units with identical GEP stack heights and essentially identical other stack parameters, it was not necessary to distinguish whether emissions arose from Unit 1 or from Unit 2.) We also conducted a third run using the intermediate, more typical mix of emissions used by Ohio and West Virginia. In this run, Unit 1 emitted 2,621 pounds per hour, Unit 2 emitted 2,122 pounds per hour, and Unit 3 emitted 1,260 pounds per hour, again with total emissions of 6,003 pounds per hour. EPA believes that these three runs address the range of air quality that can result from the range of possible distributions of emissions at Cardinal within the total plant emissions limit proposed by Ohio.

All three of these runs yielded design values (the maximum value among all receptors of the average over three years of the 99th percentile daily maximum concentration) below the standard. Specifically, these runs yielded between 196.0 $\mu g/m^3$ (74.8 ppb) and 196.1 $\mu g/m^3$ (74.9 ppb), all at a receptor near Mountain State Carbon that as expected shows limited sensitivity to the distribution of emissions at Cardinal, though these runs also demonstrate that other receptors that are more sensitive to the distribution of Cardinal emissions also have design values below the standard regardless of how these allowable emissions are distributed.

II. Analysis of Comparably Stringent 30-day Average Limits

EPA guidance states that limits with averaging times of up to 30 days can in many cases adequately provide for attainment so long as 1) the limit is established at an adjusted level such that the limit is comparably stringent to the 1-hour limit that is shown to provide for attainment (the latter reflecting the "critical emission level"), and 2) emissions are sufficiently constrained that "occasions of emissions above the critical emission value will be limited in frequency and magnitude."

We analyzed available Cardinal emissions data to determine the degree of adjustment warranted to establish a suitable 30-day average limit. This analysis used data from the last five available calendar years of data, i.e. 2013 to 2017, as reported to EPA's Clean Air Markets Division, except that data for a modest number of hours was not considered because the reported emissions are substitute data required under 40 CFR Part 75 in the absence of direct measurements.

This analysis assumed that Ohio would adopt its limit in the form of a multi-stack limit governing the sum of emissions from the three units. Therefore, the adjustment factor was

derived from an evaluation of statistics for the hourly and 30-day average sums of emissions from the three units. The analysis further assumed that Ohio's limit would consider only operating day emissions, in particular that the limit would govern the average of emissions on 30 consecutive days which at least one of the three units was operating and would consider only operating hours.[2] That is, the five years of hourly emissions data were screened to eliminate a modest number of substitute data and then screened to eliminate days in which none of the three units were operating; plant total emissions were determined for each remaining hour, 30-operating-day average emissions (not including hours with no operation) were calculated for the end of each 30-operating-day period, and the 99th percentile value among the hourly (nonzero) values and the 99th percentile among the 30-operating-day values was computed. The resulting adjustment factor, reflecting the ratio of these 99th percentile values, was 70.0 percent. This adjustment factor may be considered to represent an estimate of the impact of using a 30-day average limit on total emissions of this facility. This analysis suggests that the longer term average that is comparably stringent to a plant-wide limit of 6,003 pounds per hour is a 30-day average plant-wide limit of 4,201 pounds per hour. That is, modeling Cardinal as emitting 6,003 pounds per hour may be considered to assess whether a limit of 4,201 pounds per hour would provide for attainment.

We also examined the history of Cardinal's emissions relative to these potential limits. During these five years, from 2013 to 2017, total emissions from Cardinal were always below 4,201 pounds per hour on a 30-day average basis. Hourly emissions exceeded 6,003 pounds per hour only 0.1 percent of the time.

[2] For example, if at least one of the units is operating on Days 1 to 10, no unit is operating on Days 11 to 15, and then at least one unit is operating on Days 16 to 35, then the 30-operating day average emissions would be computed on the basis of emissions during operating hours on Days 1 to 10 and 16 to 35.

Appendix – Stack Parameters for Cardinal

An important element of the plans that Ohio and West Virginia submitted to address SO_2 in the Steubenville area is the set of stack parameters used to characterize the release of emissions from the Cardinal power plant. The characterization of the release of emissions from Unit 3, at which the emissions have been rerouted through a cooling tower at the facility, is especially challenging. This appendix describes modeling done to assess the appropriate characterization of this release.

Modeling conducted by Ohio demonstrated that use of cooling tower stack parameters (including use of a very wide stack diameter) in modeling the emissions of Unit 3 yielded a dramatic overestimate of the impacts of this boiler. Thus, the primary subject of this appendix is to compare concentration estimates from modeling using more conventional stack parameters against measured concentrations at four nearby monitoring locations, and thereby to determine whether these more conventional stack parameters provide a suitable means of characterizing the release of emissions from Unit 3.

Unit 3 is located 1.6 km southwest of Units 1 and 2. The stand-alone stack was disabled when Cardinal installed the scrubbers for this unit. Those scrubbers became operational in 2012. When the scrubbers were installed, the emissions from Unit 3 were ducted to a cooling tower located near the old Unit 3 stack.

AERMOD is not well-equipped to directly model emissions from cooling towers given the large diameter openings and the large amount of cooling tower moisture released from cooling towers. Ohio EPA originally conducted modeling using the cooling tower dimensions and predicted concentrations orders of magnitude above concentrations measured by well-placed monitors in the immediate area. According to Ohio EPA's Appendix E1A document, the peak predicted concentration was 20,375 ug/m3 with a broader area of concentrations above 10,000 ug/m3. These concentrations were well above monitoring data collected near Cardinal. Consequently, the Ohio EPA modeled the SO_2 emissions from Unit 3 using an approach that externally calculated a plume rise based on hourly meteorological conditions. This final plume rise was then used to describe volume source releases, using release height, sigma y, and sigma z values that vary on an hourly basis. We did not pursue this approach because of potential complications arising from alternative model requirements. Rather, we pursued a third approach, characterizing the stack emissions simply as being released from a normal stack, i.e., treating these emissions as being released from a narrow portion of the cross-section of the cooling tower.

In our modeling run, the Unit 3 SIP modeling stack height is 129.232 m (the reported height of the cooling tower), the temperature is 435.9 K, the exit velocity is 29.2 m/s, and the diameter is 7.32 m. Except for the stack height, these are the parameters used in the West Virginia SIP modeling. While there is no stack within the cooling tower, EPA is continuing to utilize that characterization and has used monitoring data, 4 monitors well-sited to measure Cardinal impacts, to show that the characterization results in reasonable model predictions when compared to available monitoring data.

The purpose of EPA's modeling run was to compare the modeled concentration estimates using this stack characterization against the measured concentrations at four nearby monitoring sites. For this purpose, we designed the modeling run to use actual meteorological data and actual

emissions data for a period for which these data and comparable monitoring data were all available. For this comparison, we used "site-specific" meteorological data collected near the Cardinal facility for a one-year period from July 1, 2013 through June 30, 2014. These data were provided by Ohio EPA with their original submittal. The locations of the meteorological tower and the air quality monitors are shown in Figure 1. AERMOD receptors were placed at the location of each of the four monitors. Two of the monitors, "On-Site" and "Trailer" are located near Unit 3. The modeled Unit 3 stack is located at the cooling tower site. Since the purpose of this run was to assess model performance, irrespective of how much stack height is creditable, this run also included emissions from Units 1 and 2, simulated as a merged plume being released from the actual height of 304.8 m. Actual emissions for all three units for the July 2013-June 2014 time-period were used in the modeling. The HOUREMIS file was also provided by Ohio EPA with their original submittal. The Unit 3 stack is represented in the HOUREMIS file by two source names (Unit3CO and Unit3CT, which were used originally by Ohio EPA as two volume sources). These two Unit 3 sources are listed in the hourly emission file with constant temperatures and velocities of 435.9 K and 29.2 m/s. These temperature and velocity values were used in the West Virginia modeling. Units 1 and 2 are also represented in the hourly emission file with varying emissions but constant temperatures and velocities of 327.59 K and 15.21 m/s, respectively. Building downwash output from BPIP was used as listed in the West Virginia modeling for all Cardinal stacks. A constant background of 21.17 ug/m3 (8 ppb) was used. The table below shows a comparison of AERMOD predictions to the monitored values.

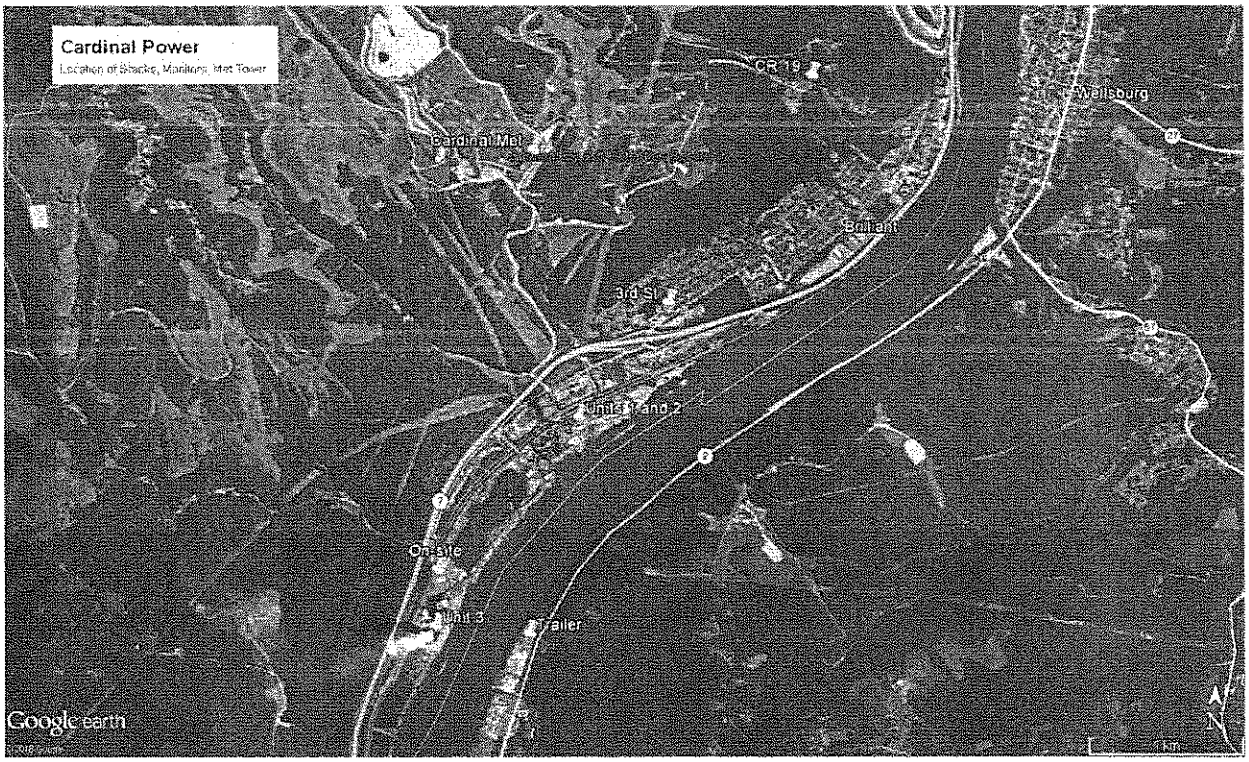
Table 1. Model and Monitor Comparisons (ug/m3)

	Model On-site	**Monitor***	**Model Trailer**	**Monitor**	**Model 3rd St.**	**Monitor**	**Model CR - 19**	**Monitor**
Peak Conc.	91.52	94.4	72.27	120.5	265.78	89.04	213.11	178.07
DV Conc.	79.55	62.9	60.56	49.0	83.20	76.89	105.12	132.85
Top 25 Ave	57.94	54.4	48.23	47.9	71.29	62.85	78.78	114.38
% Diff. Pks	-3.05		-40.0		198.5		19.7	
% Diff.DV	26.5		23.59		8.21		-20.9	
% Diff-T25	6.5		0.68		13.4		-31.12	

*Based on Ohio EPA Appendix E Report – Using data from 1/1/2013 to 12/31/2013. Data for this monitor are not listed in AIRS.
Other 3 site monitoring results are from raw data for 7/1/2013 to 6/30/2014

Table 1 above shows that the characterization of Unit 3 in AERMOD yields concentration estimates that compare well with the nearby monitoring data. Values are paired in space but unpaired in time. The On-site and Trailer monitors are much closer to the Unit 3 stack, under a kilometer, while the 3rd Street and CR-19 monitors are further away from the Unit 3 stack, 2.5 km and 4 km to the north, respectively. The comparison shows good agreement at the monitors, with some underprediction at the peak measured at the Trailer monitor just across the river and with the design value and top-25 averages at the further downwind CR-19 monitor. Overprediction is evident at the 3rd Street monitor peak value. The remaining estimates compare quite well with monitored estimates. In summary, we find the table above provides adequate information that the stack characterization used in the modeling for Unit 3, combined with emissions from merged Units 1 and 2, performs well and provides a substantially better assessment than if the release out the cooling tower was modeled with cooling tower dimensions.

Figure 1. Cardinal Power Stacks, Monitors and Met Station


Cardinal Power
Location of Stacks, Monitors, Met Tower
OR 19
Wellsburg
Cardinal Met
Bellaire
3rd St
Units 1 and 2
On-site
Unit 3
Trailer
Google earth
N

Appendix H:
Ohio and West Virginia EGU and non-EGU SO_2 Emissions

OHIO POINT

Facility ID (OEPA)	Facility Name	Type	EU ID	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	NOTES
0641050002	Cardinal Power Plant	EGU	B001	37,044.20	6,946.72	2,502.47	3,543.52	3,165.91	2,521.21	4,636.30	3,455.45	4,471.77	3,885.55	FGD spring 2008
			B002	18,392.60	3,448.03	4,171.42	1,880.85	1,651.38	3,496.31	3,993.57	4,516.68	4,135.28	3,986.25	FGD winter 2007
			B008	25.26	41.43	1.95	0.25	1.33	1.11	0.59	0.61	0.43	1.00	
			B009	27,387.80	22,851.30	27,400.50	26,348.40	20,302.20	1,895.15	2,049.73	2,687.58	947.99	1,325.49	FGD fall 2011
			B010	1.15	24.46	1.20	0.62	1.60	0.44	0.42	0.33	0.39	0.41	
			Total	82,851.01	33,311.94	34,077.54	31,773.64	25,122.42	7,914.22	10,680.61	10,660.65	9,555.86	9,198.70	
0641120012	Yorkville Energy Services Terminal	non-EGU	n/a					0.20	0.05	0.01	0.01	0.01	0.00	Permanently shutdown 12/31/16
0641950044	Ewusiak Development LLC	non-EGU	n/a					0.73	0.45	0.46	0.00	0.28	0.00	
0641090234	Mingo Junction Energy Center, LLC	non-EGU	n/a					222.48	74.23	0.00	0.00	0.00	0.00	
0641090010	Acero Junction Incorporated	non-EGU	n/a					0.03	0.03	0.03	0.01	0.00	0.00	
			Total non_EGU					223.44	74.76	0.50	0.02	0.29	0.00	

WV 2014 POINT

FAC_IDENTIFIER	FAC_NAME	SCC	SCC Description	2014	Facility Total
54-009-00001	KOPPERS FOLLANSBEE	10200601	External Combustion Boilers-Industrial-Natural Gas-> 100 Million BTU/hr	0.055208	
54-009-00001	KOPPERS FOLLANSBEE	10200602	External Combustion Boilers-Industrial-Natural Gas-10-100 Million BTU/hr	0.046094	
54-009-00001	KOPPERS FOLLANSBEE	10201302	External Combustion Boilers-Industrial-Liquid Waste-Waste Oil	20.2878	
54-009-00001	KOPPERS FOLLANSBEE	10300602	External Combustion Boilers-Commercial/Institutional-Natural Gas-10-100 Million BTU/hr	0.024963	
54-009-00001	KOPPERS FOLLANSBEE	30190003	Industrial Processes-Chemical Manufacturing-Fuel Fired Equipment-Process Heater: Natural Gas	0.020108	
54-009-00001	KOPPERS FOLLANSBEE	30190099	Industrial Processes-Chemical Manufacturing-Fuel Fired Equipment-Other Not Classified	79.35203	99.7862
54-009-00002	MOUNTAIN STATE CARBON, LLC	10200602	External Combustion Boilers-Industrial-Natural Gas-10-100 Million BTU/hr	0.007918	
54-009-00002	MOUNTAIN STATE CARBON, LLC	10200603	External Combustion Boilers-Industrial-Natural Gas-< 10 Million BTU/hr	0.000329	
54-009-00002	MOUNTAIN STATE CARBON, LLC	10200707	External Combustion Boilers-Industrial-Process Gas-Coke Oven Gas	137.2628	
54-009-00002	MOUNTAIN STATE CARBON, LLC	20300109	Internal Combustion Engines-Commercial/Institutional-Distillate Oil (Diesel)-Turbine: Exhaust	0.003987	
54-009-00002	MOUNTAIN STATE CARBON, LLC	30102318	Industrial Processes-Chemical Manufacturing-Sulfuric Acid-Absorber (93.0% Conversion)	2.254887	
54-009-00002	MOUNTAIN STATE CARBON, LLC	30300302	Industrial Processes-Primary Metal Production-Metallurgical Coke Manufacturing-By-product Process: Oven Charging	0	
54-009-00002	MOUNTAIN STATE CARBON, LLC	30300303	Industrial Processes-Primary Metal Production-Metallurgical Coke Manufacturing-By-product Process: Oven Pushing	33.48165	
54-009-00002	MOUNTAIN STATE CARBON, LLC	30300306	Industrial Processes-Primary Metal Production-By-product Coke Manufacturing-Oven Underfiring	178.8178	
54-009-00002	MOUNTAIN STATE CARBON, LLC	30300308	Industrial Processes-Primary Metal Production-Metallurgical Coke Manufacturing-By-product Process: Oven/Door Leaks	0	
54-009-00002	MOUNTAIN STATE CARBON, LLC	30300314	Industrial Processes-Primary Metal Production-Metallurgical Coke Manufacturing-By-product Process: Topside Leaks, Lid Leaks	0	
54-009-00002	MOUNTAIN STATE CARBON, LLC	30300331	Industrial Processes-Primary Metal Production-Metallurgical Coke Manufacturing-By-product Process: General	0.000329	
54-009-00002	MOUNTAIN STATE CARBON, LLC	30300399	Industrial Processes-Primary Metal Production-Metallurgical Coke Manufacturing-By-product Process: Not Classified	2.787962	
54-009-00002	MOUNTAIN STATE CARBON, LLC	30300813	Industrial Processes-Primary Metal Production-Iron Production (See 3-03-015 for Integrated Iron & Steel MACT)-Windbox	0	
54-009-00002	MOUNTAIN STATE CARBON, LLC	30390024	Industrial Processes-Primary Metal Production-Fuel Fired Equipment-Process Gas: Flares	12.0978	366.7154
54-009-00004	Jupiter Aluminum Corporation - Beech Bottom Plant	10200602	External Combustion Boilers-Industrial-Natural Gas-10-100 Million BTU/hr	0.00142	
54-009-00004	Jupiter Aluminum Corporation - Beech Bottom Plant	10200603	External Combustion Boilers-Industrial-Natural Gas-< 10 Million BTU/hr	0.000306	
54-009-00004	Jupiter Aluminum Corporation - Beech Bottom Plant	10500106	External Combustion-Space Heaters-Industrial-Natural Gas	0.00088	0.002605
54-009-00012	ARDAGH METAL PACKAGING USA, INC	39000699	Industrial Processes-In-process Fuel Use-Natural Gas-General	0.003915	
54-009-00012	ARDAGH METAL PACKAGING USA, INC	40201001	Chemical Evaporation-Surface Coating Operations-Coating Oven Heater-Natural Gas	0.024583	0.028498
54-009-00014	CROWN CORK & SEAL COMPANY (USA) INC.	10300603	External Combustion Boilers-Commercial/Institutional-Natural Gas-< 10 Million BTU/hr	0.039249	0.039249
54-009-00027	BALL METAL FOOD CONTAINER LLC	40201001	Chemical Evaporation-Surface Coating Operations-Coating Oven Heater-Natural Gas	0.09012	0.09012
54-009-00053	Valero Terrestrial Corp. - BROOKE COUNTY LANDFILL	28888801	Internal Combustion Engines-Fugitive Emissions-Other Not Classified-Specify in Comments	0.00279	0.00279
54-009-00054	PRECOAT METALS	10300602	External Combustion Boilers-Commercial/Institutional-Natural Gas-10-100 Million BTU/hr	0.052228	
54-009-00054	PRECOAT METALS	40282599	Chemical Evaporation-Surface Coating Operations-Wastewater, Points of Generation-Other Not Classified	0.27	0.322228
			Total		**466.9871**

Appendix I:
Public Notice

Public Notice and Public Hearing
Regarding Draft Actions Relevant to the Steubenville, OH-WV Sulfur Dioxide Nonattainment Area
Ohio Environmental Protection Agency
Revisions to Ohio Administrative Code (OAC) Rules 3745-18-03, 3745-18-04 and 3745-18-47 – Sulfur Dioxide Regulations; Supplement to Ohio's Attainment Demonstration; and Redesignation Request and Maintenance Plan for the Ohio Portion this area

Notice is hereby given that the Ohio Environmental Protection Agency, Division of Air Pollution Control (DAPC) has prepared amendments to OAC Rule 3745-18-47 to incorporate a revised sulfur dioxide (SO_2) emission limit for the coal-fired boilers at the Cardinal Power Plant in Jefferson County. This limit is necessary to satisfy U.S. EPA requirements for Ohio's SO_2 attainment demonstration for the Steubenville, OH-WV nonattainment area (the City of Steubenville and the following townships in Jefferson County: Cross Creek, Warren, Steubenville and Wells) and in order for the area to be eligible for redesignation to attainment and to ensure maintenance of the 2010 SO_2 National Ambient Air Quality Standard (NAAQS). Ohio EPA has also prepared amendments to OAC Rules 3745-18-03 and 3745-18-04 to incorporate compliance time schedules and measurement methods and procedures relevant to the Cardinal emission limit.

Pursuant to Section 121.39 of the Ohio Revised Code, DAPC was required to consult with interested parties affected by the rules before the Division formally adopts them. On February 5, 2019, these rules went out for a 15-day review by interested parties. Ohio EPA's responses to comments received is available electronically on Ohio EPA's website at the URL listed below.

Pursuant to Part D of Title I of the Clean Air Act (CAA), Ohio EPA is required to establish a State Implementation Plan (SIP) for the attainment and maintenance of the NAAQS. The above-mentioned rules are a part of Ohio's SIP and the proposed amendments will be submitted to United States Environmental Protection Agency (U.S. EPA) as a modification of the SIP. Ohio EPA is submitting the proposed revisions to OAC Chapter 18 as a supplement to Ohio's attainment demonstration for the SO_2 NAAQS for the Steubenville OH-WV Nonattainment Area, along with a draft redesignation request and maintenance plan which contains the technical justification and air quality modeling demonstrating the revised emission limit provides for attainment and maintenance of the SO_2 NAAQS. Ohio is requesting parallel processing of U.S. EPA's approval of Ohio's attainment demonstration strategy and the revisions to OAC Chapter 3745-18 establishing a revised emission limit for the Cardinal Power Plant.

Ohio is also requesting that U.S. EPA revise the current air quality designation for the Ohio Portion of the Steubenville, OH-WV nonattainment area to attainment with respect to the 2010 SO_2 NAAQS. Air quality monitoring data collected between 2015 and 2017 in the nonattainment area demonstrates attainment of the NAAQS. Significant SO_2 emission reductions have resulted from the installation of a flue gas desulfurization control device at the last remaining coal-fired boiler at Cardinal Power Plant, cessation of operations at Mingo Junction Energy Center, and a consent decree with Mountain State Carbon requiring permanent and enforceable emission reductions in SO_2. The air quality modeling demonstrates that the revised emission limit for Cardinal Power Plant in conjunction with previously established federally enforceable emission limits for other sources in the area will ensure the improvement in air quality is due to permanent, enforceable emission reductions and can be maintained for at least ten years into the future upon redesignation.

Ohio EPA proposes to utilize existing emission inventory information, projections of future emissions, and air quality modeling as the demonstration of the ability to maintain the NAAQS in the Steubenville, OH-

WV area in the future.

The State of Ohio proposes to:

1. Request the U.S. EPA redesignate the Ohio Portion of the Steubenville, OH-WV area to attainment with respect to the 2010 SO_2 NAAQS and incorporate the maintenance plan. This request will document that existing enforceable control measures are responsible for the observed improvement in air quality; and

2. Designate existing enforceable controls along with the emission limit being established for Cardinal Power Plant as sufficient to maintain the NAAQS into the future.

Pursuant to Section 106.03 and 106.031 of the Ohio Revised Code and to satisfy U.S. EPA requirements for public involvement in SIP related activities in accordance with 40 CFR 51.102, a public hearing on these rule changes and SIP revisions will be conducted on **Monday, April 29, 2019 at 2:30 PM** at Steubenville Library, Schiappa Branch, 4141 Mall Dr, Steubenville, OH 43952.

All interested persons are entitled to attend or be represented at the hearing and give written or oral comments on these rule changes and SIP revisions. All oral comments presented at the hearing, and all written statements submitted at the hearing or by the close of business on **April 29, 2019** will be considered by Ohio EPA prior to final action on this rule and SIP revisions. Written statements submitted after **April 29, 2019** may be considered as time and circumstances permit, but will not be part of the official record of the hearing.

These rules and associated rulemaking documents are available on DAPC's Web page for electronic downloading. The URL is: http://epa.ohio.gov/dapc/DAPCrules.aspx. Please see the information under the "proposed rules" tab. The draft air quality modeling and redesignation request and maintenance plan is available on Ohio EPA DAPC's Web page for electronic downloading at: http://www.epa.ohio.gov/dapc/SIP/so2.aspx. Questions regarding accessing the web site should be directed to Paul Braun at 614-644-3734; other questions or comments about these rules or SIP revisions should be directed to Holly Kaloz at Ohio EPA, (614) 644-3632, holly.kaloz@epa.ohio.gov, or mailed to Holly Kaloz, Ohio EPA, Division Air Pollution Control, Lazarus Government Center, P.O. Box 1049, Columbus, Ohio 43216-1049.