



Andy Beshear
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

300 Sower Boulevard
Frankfort, Kentucky 40601
Phone: (502) 564-2150
Fax: 502-564-4245

Rebecca Goodman
SECRETARY

Anthony R. Hatton
COMMISSIONER

August 15, 2024

Ms. Jeaneanne Gettle
Acting Regional Administrator
U.S. EPA, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303

RE: Submittal of the proposed Kentucky State Implementation Plan revision, satisfying the Attainment Demonstration Requirements for the Partial Counties of Henderson and Webster Located within the Kentucky 2010 1-Hour Sulfur Dioxide Nonattainment Area

Dear Ms. Gettle:

The Kentucky Energy and Environment Cabinet (Cabinet) submits this letter concurrent with a proposed revision to the Kentucky State Implementation Plan (SIP) including an attainment demonstration for the partial counties of Henderson and Webster located within the Kentucky 2010 1-hour SO₂ nonattainment area (hereinafter "the Area"). Specifically, the Cabinet has provided a submittal that satisfies the attainment demonstration requirements for the Area as outlined in Clean Air Act (CAA) Section 172(c); thus, the Cabinet formally requests EPA approve this revision to Kentucky's SIP.

In accordance with 40 CFR 51.102, the proposed SIP revision will be available for public review and comment from August 15, 2024 until September 20, 2024. If you have any questions regarding this matter, please contact Ms. Cassandra Jobe, Environmental Control Manager, in the Program Planning and Administration Branch at (502) 782-6670, or cassandra.jobe@ky.gov.

Sincerely,

A handwritten signature in black ink that reads "Michael Kennedy".

Michael Kennedy, P.E.
Director

PRE-HEARING
Attainment Demonstration for the
Partial Counties of Henderson and Webster
Located within the Kentucky
2010 1-Hour Sulfur Dioxide Nonattainment Area



Prepared by:
Kentucky Energy and Environment Cabinet
Division for Air Quality
August 2024

Attainment Demonstration Table of Contents

EXECUTIVE SUMMARY.....	1
1. INTRODUCTION.....	2
A. Background.....	2
B. Attainment of the SO ₂ Standard.....	7
2. SO ₂ ATTAINMENT DEMONSTRATION.....	8
A. Projected Attainment Year Emissions Inventory.....	8
(i) Century Aluminum Sebree LLC	
(ii) Big Rivers Electric Corporation – Robert Reid and HMP&L Station 2	
(iii) Big Rivers Electric Corporation – Robert D. Green Station	
B. RACT/RACM.....	11
(i) Control Strategy at Century Aluminum	
(ii) Permanent and Enforceable Emissions Reductions at BREC Green Station	
C. Air Dispersion Modeling Demonstration.....	14
(i) Modeling Results	
(ii) Correction for Overprediction	
D. Conformity.....	16
E. Reasonable Further Progress.....	17
F. Contingency Measures.....	17
G. Public Participation.....	18
3. CONCLUSION.....	19

List of Tables

Table 1	Annual 99th Percentile One-Hour Daily Maximum Concentration for the Sebree DRR Monitor (ppb).....	7
Table 2	Design Values for the Sebree DRR Monitor (ppb)	7
Table 3	2026 Attainment Year Emissions Inventory for the Henderson-Webster Nonattainment Area (tpy).....	8
Table 4	Base Year vs. Attainment Year SO ₂ Emissions for Century Aluminum.....	9
Table 5	Base Year vs. Attainment Year SO ₂ Emissions for BREC Robert Reid.....	10
Table 6	Base Year vs. Attainment Year SO ₂ Emissions for BREC HMP&L Station 2 ...	10
Table 7	Base Year vs. Attainment Year SO ₂ Emissions for BREC Green Station.....	10

List of Figures

Figure 1	Henderson-Webster, Kentucky Cumulative Annual Wind Rose for Years 2017-2019.....	3
Figure 2	Map of the Henderson-Webster Nonattainment Area Boundary.....	4
Figure 3	Primary SO ₂ Contributors of the Henderson-Webster Nonattainment Area.....	5
Figure 4	SO ₂ Monitor Location.....	6
Figure 5	Century Aluminum Modeled Impacts.....	15

Appendices

Appendix A – Coordinates of the Nonattainment Area

Appendix B – Technical Support Document - Chapter 3: Final Round 4 Area Designations for the 2010 1-Hour SO₂ Primary National Ambient Air Quality Standard for Kentucky

Appendix C – Nonattainment Area Monitoring Data

Appendix D – Attainment Year Emissions Inventory

Appendix E – BREC Green Station Natural Gas Conversion Letter;
BREC HMP&L Station 2 Retirement Letter

Appendix F – Technical Summary Document - MOVES Onroad Inputs;
Vehicle Miles Traveled and Vehicle Hours Traveled Summary File

Appendix G – Century Aluminum Response to Information Request

Appendix H – Air Dispersion Modeling Demonstration from Trinity Consultants

Appendix I – Public Notice and Statement of Consideration

EXECUTIVE SUMMARY

The Kentucky Division for Air Quality (Division) is proposing a revision to the Commonwealth of Kentucky's State Implementation Plan (SIP) under the federal Clean Air Act (CAA). In the fourth and final set of actions to designate areas of the United States (U.S.) for the 2010 1-hour sulfur dioxide (SO₂) National Ambient Air Quality Standards (NAAQS), U.S. Environmental Protection Agency (EPA) formally designated a small portion of Henderson and Webster counties as a partial nonattainment area based on relevant monitoring data that indicated violations of the 1-hour SO₂ standard. The final area designations were published on March 26, 2021, and became effective April 30, 2021.¹ The designation of the Henderson-Webster nonattainment area (hereinafter "the Area") was included in this action.

Pursuant to CAA Section 172(a)(2)(A), the attainment date for an area designated nonattainment, shall be the date by which attainment can be achieved as expeditiously as practicable, but no later than 5 years from the date such area was designated nonattainment. Thus, the attainment date for the Area is April 30, 2026.

Kentucky is submitting three separate SIP revisions to address the nonattainment planning requirements for the Area. These SIP revisions address three separate requirements of the CAA: 1) nonattainment new source review (NNSR) requirements (172(c)(5)); 2) an accurate base year emissions inventory of current emissions for all sources of SO₂ within the nonattainment area (172(c)(3)); and 3) an attainment demonstration that includes a modeling analysis showing that the enforceable emissions limitations and other control measures taken by the Division will provide for expeditious attainment of the NAAQS for SO₂ (172(c)).²

As described below, this SIP revision addresses the attainment demonstration components of Kentucky's attainment plan for the Area. This proposed attainment demonstration includes modeling runs developed by Trinity Consultants (consultant for Century Aluminum), and verified by the Division, indicating that the Henderson-Webster nonattainment area will not attain the NAAQS. However, Trinity Consultants is confident that the model is conservative and that the area will attain the NAAQS based on 1) SO₂ emission reductions achieved by Big Rivers Electric Corporation (BREC) Green Station's conversion of units 1 and 2 from coal to natural gas operation; 2) adoption of a new federally enforceable annual allowable SO₂ emission limit for Century Aluminum; and 3) the planned installation of a new stack for Century Aluminum's anode bake furnace.

¹ 86 FR 16055

² The NNSR Requirements SIP revision was submitted to EPA on January 26, 2024; the Base Year Emissions Inventory SIP revision was submitted to EPA on February 15, 2024.

1. INTRODUCTION

A. Background

On June 22, 2010 (effective August 23, 2010), EPA revised the primary NAAQS for the criteria pollutant SO₂.³ Revoking both the existing 24-hour and annual primary standards, EPA established a new primary one-hour SO₂ standard of 75 parts per billion (ppb). The new standard is based on a three-year average of the annual 99th percentile of one-hour daily maximum concentrations.

The nonattainment portion of Henderson and Webster counties is located in a rural setting, as most of the Area is undeveloped, consisting of pasture and farmland. The nonattainment area is bound to the east by the Green River and expands westward into Henderson and Webster counties where it is bound by the Edward T. Breathitt Pennyrile Parkway (I-69), light industry, and farmland/wooded areas. The complete coordinates can be found in Appendix A. The remainder of Henderson and Webster counties do not contain any sources that emitted greater than 2,000 tons per year (tpy) of SO₂ in 2017 – 2019 and are therefore designated as attainment/unclassifiable. Official boundaries of the nonattainment area were established by EPA in the final rule dated effective April 30, 2021.

SO₂ is a source-oriented pollutant that is not naturally present in the environment in high concentrations and is not formed in large quantities by any atmospheric process. Elevated concentrations are often due to a single, large industrial source or group of sources with localized impacts.

At the time of the Area's designation, the Division identified three significant sources contributing to SO₂ emissions within the Area:

- BREC's Robert A. Reid Station (BREC Robert Reid) and Henderson Municipal Power and Light Station 2 (HMP&L Station 2). It should be noted that BREC Robert Reid/HMP&L Station 2 is a single stationary source, however, two of the coal-fired units at the facility are owned by HMP&L and operated by BREC.
- BREC's Robert D. Green Station (BREC Green Station);
- Century Aluminum Sebree, LLC (Century Aluminum).

Additionally, at the time of designation, wind rose plot analysis indicated that exceedances of the SO₂ standard at the Sebree Data Requirements Rule (DRR) monitoring site were the result of emissions from both Century Aluminum and the BREC facilities.⁴ The frequency and magnitude of wind speed and direction depicted in the wind rose in Figure 1 are defined in terms of from where the wind is blowing. This wind rose indicates that the predominant wind direction in the Evansville, IN area, due north of Henderson and Webster counties, is winds blowing from the southwest along with winds blowing from the northeast a significant amount of time. The complete technical support document (TSD) can be found in Appendix B.

³ 75 FR 35519

⁴ EPA Technical Support Document (TSD) Final Round 4 Area Designations for the 2010 1-Hour SO₂ Primary National Ambient Air Quality Standard for Kentucky https://www.epa.gov/sites/default/files/2020-12/documents/03-ky-rd4_final_so2_designations_tsd.pdf

It should be noted that both of the BREC facilities have made significant reductions in SO₂ emissions in recent years; therefore, Century Aluminum is currently the primary stationary source of SO₂ emissions in the Area.

Figure 1 – Henderson-Webster, Kentucky Cumulative Annual Wind Rose for Years 2017-2019

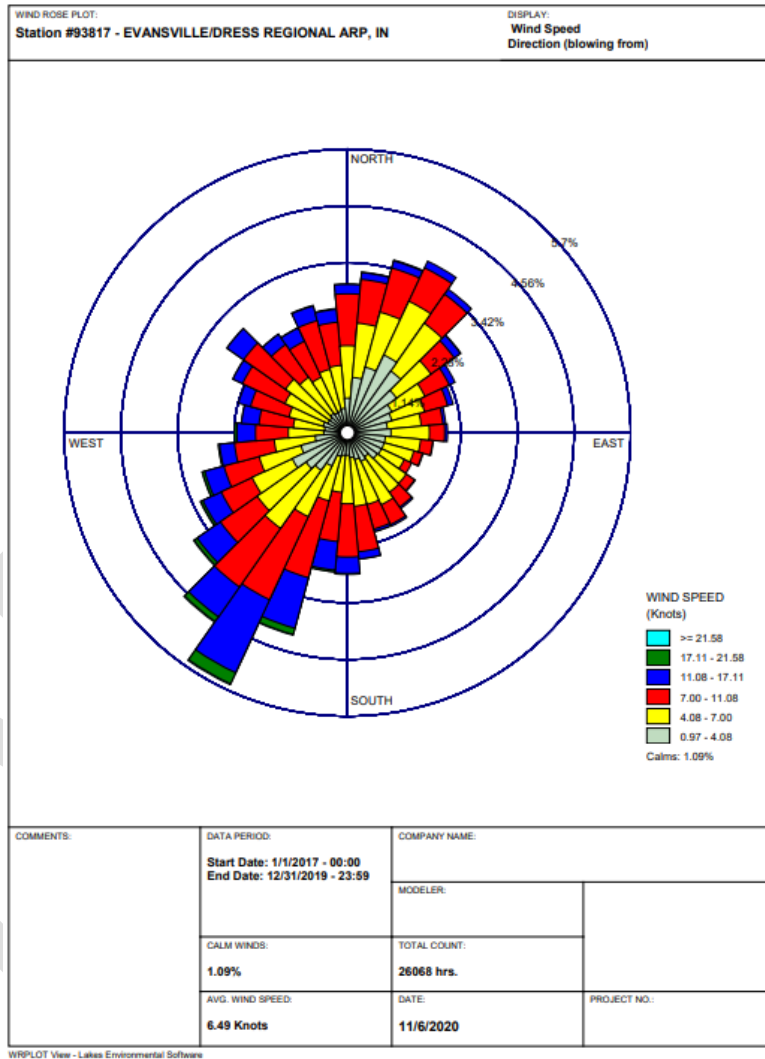


Figure 2 shows the nonattainment boundary in red. Figure 3 shows the locations of Century Aluminum, BREC Robert Reid, and BREC Green Station within the Area.

Figure 2 - Map of the Henderson-Webster Nonattainment Area Boundary

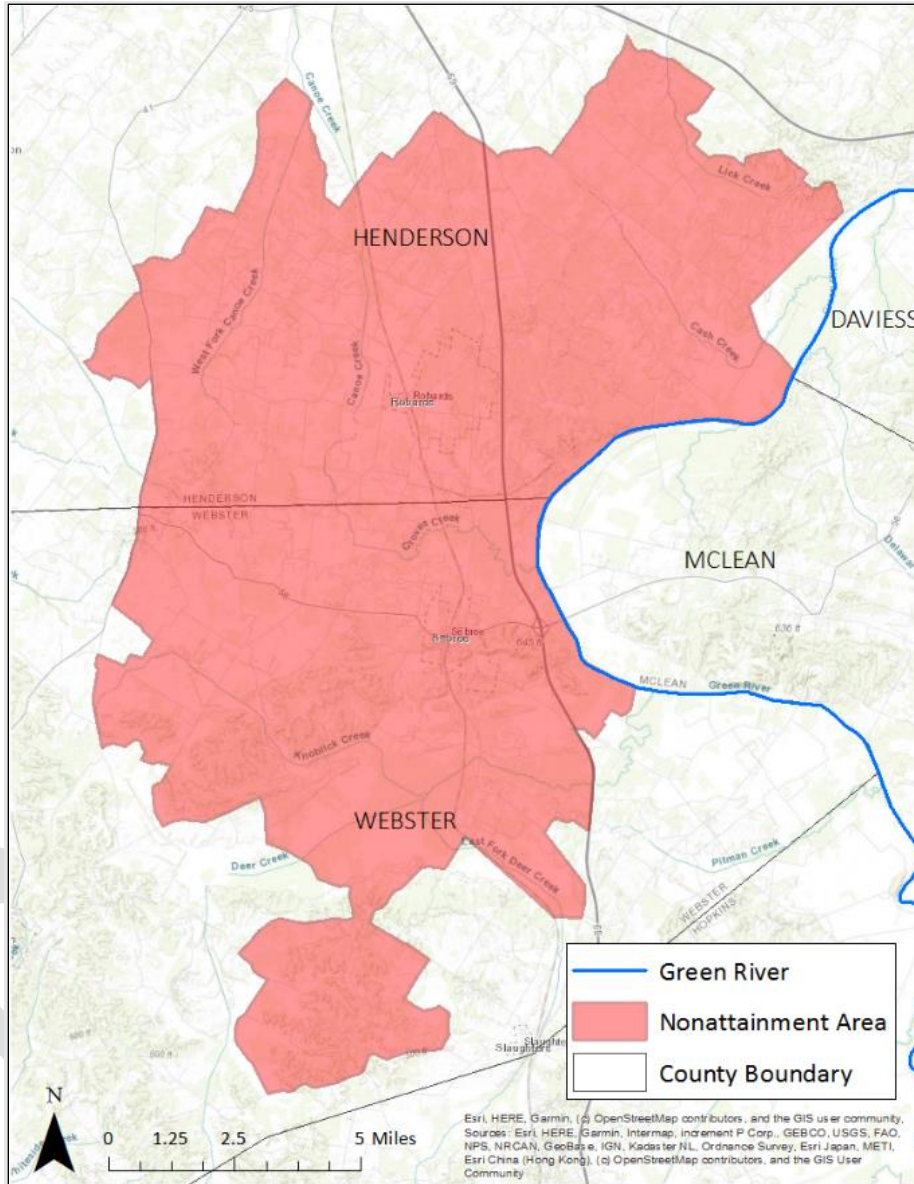


Figure 3 - Primary SO₂ Contributors of the Henderson-Webster Nonattainment Area

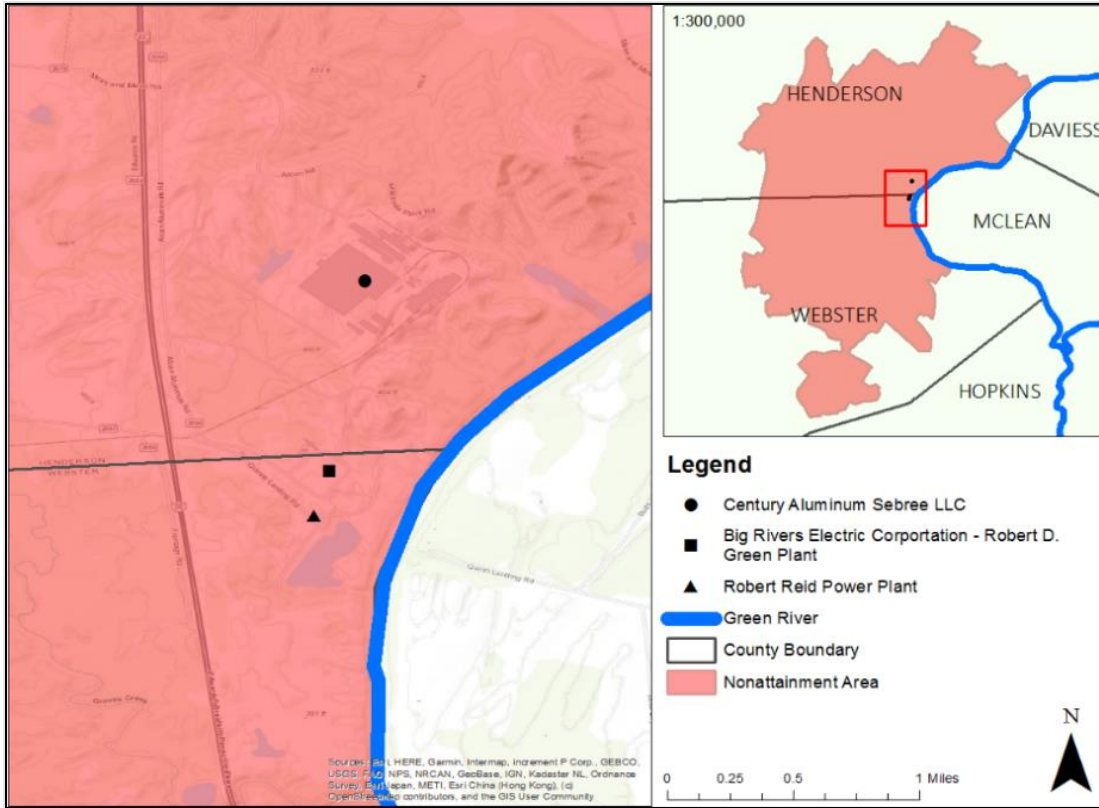
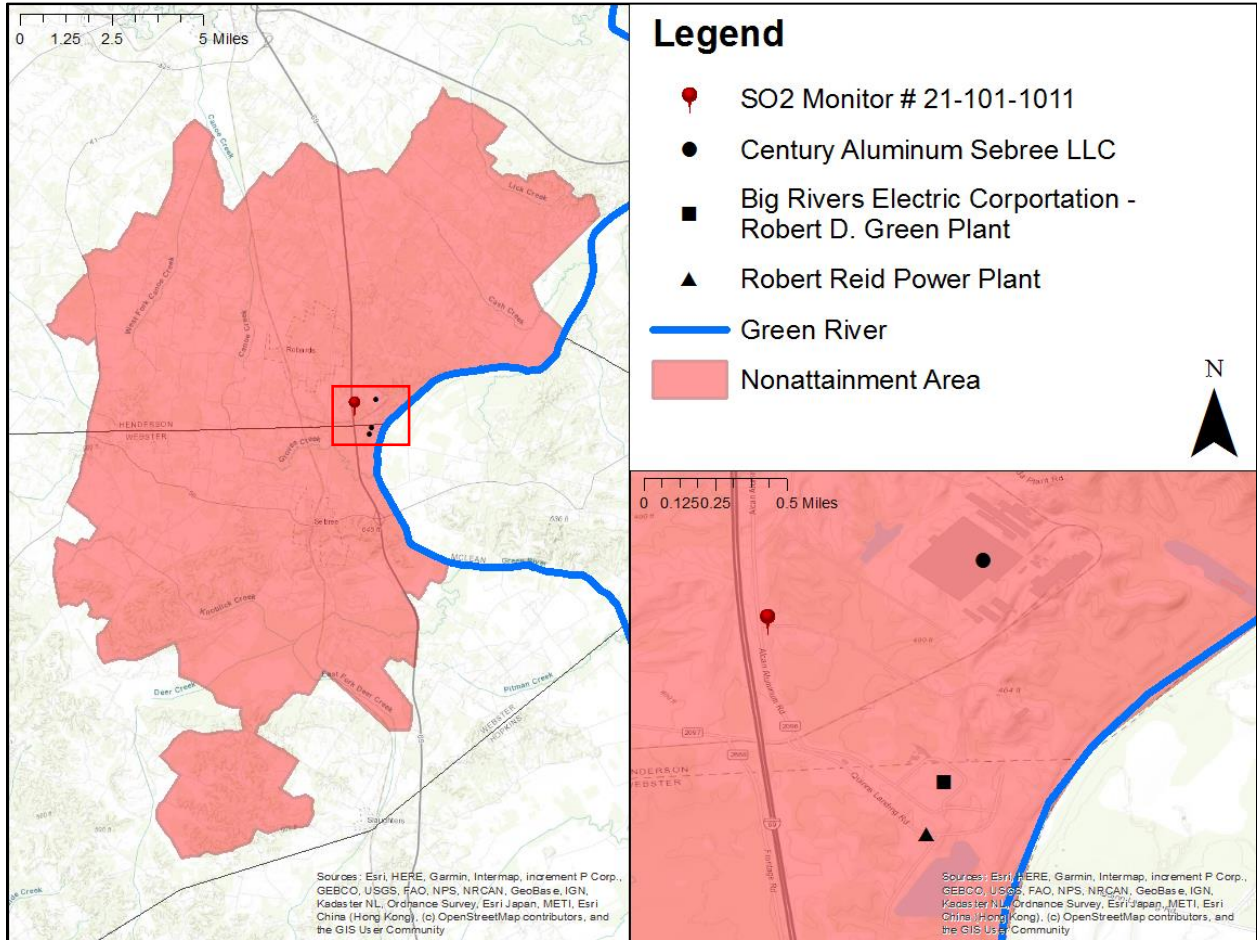


Figure 4 shows the location of the Sebree DRR monitor that was sited to characterize the maximum 1-hour SO₂ concentrations in the area surrounding the three significant sources. All three sources are located less than 2 kilometers (km) from the monitor.

Figure 4 – SO₂ Monitor Location



B. Attainment of the SO₂ Standard

Attainment of the SO₂ standard is achieved when the three-year average of the annual 99th percentile one-hour daily maximum concentration at a monitor does not exceed the level of the NAAQS (i.e. 75 ppb). Table 1, below, shows the annual 99th percentile one-hour daily maximum concentrations at the Sebree DRR monitor from 2017-present.

The annual 99th percentile one-hour daily maximum concentration at the Sebree DRR monitor improved significantly from 2019 to 2020 and the Area maintained a stable trend of improved air quality during the years of 2020, 2021, and 2022; all three years were below the standard. Unfortunately, the annual 99th percentile one-hour daily maximum concentration at the Sebree DRR monitor increased noticeably in 2023 and violated the standard. Century Aluminum reported the increased SO₂ concentrations experienced in 2023 were a result of using anode material recycled from the Hawesville facility, which was idled in June 2022. The recycled anode material elevated the SO₂ content in the green anodes, which caused the higher SO₂ emissions.⁵

Table 1 – Annual 99th Percentile One-Hour Daily Maximum Concentration for the Sebree DRR Monitor (ppb)

Year	Annual 99th Percentile One-Hour Daily Maximum Concentration
2017	94.0
2018	102.0
2019	99.0
2020	73.0
2021	68.0
2022	72.6
2023	94.3

As shown below in Table 2, the three-year design value for the Area attained the standard for the years 2020-2022. However, the most recent three-year design value from 2021-2023 once again exceeded the standard. All monitoring data relied upon in this SIP submittal can be found in Appendix C.

Table 2 – Design Values for the Sebree DRR Monitor (ppb)

Site	2017-2019 Design Value	2018-2020 Design Value	2019-2021 Design Value	2020-2022 Design Value	2021-2023 Design Value
21-101-1011	98.3	91.3	80.0	71.2	78.3

⁵ Please see the “Weight-of-Evidence” Analysis from Trinity Consultants found in Appendix H

2. SO₂ ATTAINMENT DEMONSTRATION

A. Projected Attainment Year Emissions Inventory

EPA's 2014 SO₂ Nonattainment Area SIP Guidance suggests states should submit a projected attainment year inventory that includes estimated emissions for all emission sources of SO₂.⁶ This inventory should reflect projected emissions for the attainment year for all SO₂ sources in the nonattainment area and account for emission changes that are expected after the base year. Such emissions changes would include any expected emission reductions from existing control measures, expected emission reductions from any new measures that may be adopted as part of the local area attainment plan, or from expected source shutdowns, so long as the existing and new control measures and source shutdowns are enforceable; and would include any expected emission increases due to new sources or growth by existing sources (CAA section 172(c)(4)).

Pursuant to section 172(c)(4) of the CAA, this SIP revision must identify and quantify emissions in the Area, as well as account for potential growth of existing sources or expected emission increases due to new source construction in the Area between the year that violations occurred and the attainment year. Thus, the Division is submitting a comprehensive projected attainment inventory of SO₂ emissions as a component of this SIP revision. The Division is working to ensure emission levels attain the 2010 1-hour SO₂ NAAQS within the Area as expeditiously as possible, but no later than April 30, 2026.

The attainment year emissions inventory is broken down into four emission categories: point, nonpoint, onroad and nonroad. Nonpoint, onroad and nonroad emission totals for the Area are partial county totals, based on census tract population data, due to the Area not incorporating the entirety of either Henderson or Webster county.⁷ Table 3 shows a summary of the attainment year emissions inventory for the Area, divided by the emission categories.

Table 3: 2026 Attainment Year Emissions Inventory for the Henderson-Webster Nonattainment Area (tpy)

	Point	Nonpoint	Onroad	Nonroad
Henderson County				
Emissions Total County	4,293.56	10.569	0.086	0.203
Area Percent Adjustment (8%)	N/A	0.846	0.007	0.016
Nonattainment Area Emissions	4,293.56	0.846	0.007	0.016
Webster County				
Emissions Total County	4.82	6.178	0.029	0.059
Area Percent Adjustment (25%)	N/A	1.545	0.007	0.015
Nonattainment Area Emissions	4.82	1.545	0.007	0.015

⁶ Guidance for 1-Hour SO₂ Nonattainment Area SIP Submissions. Stephen D. Page Memorandum dated April 23, 2014, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency.

⁷ Please see the Division's previous SIP revision from February 15, 2024, which includes the base year emissions inventory, for further information regarding the area percent adjustment methodology.

The following sections describe how data for each emission category was obtained and analyzed. The attainment year emissions inventory can be found in Appendix D. It should be noted that the base year emissions inventory was submitted to EPA in a separate SIP submittal on February 15, 2024; comparisons between the attainment year emissions inventory and the base year emissions inventory are included in the following analysis to highlight changes that occurred in the Area.

Point Sources

Actual point source electric generating unit (EGU) emissions and non-EGU data from 2017-2023 was obtained from the Kentucky Emissions Inventory System (KyEIS). For Henderson County, the Division used Excel’s Linear Forecast Function on the 2017-2019 and 2022-2023 data to project emissions for the 2026 attainment year. The Division chose to omit data years 2020 and 2021 from the forecasting due to decreased emissions resulting from the COVID-19 pandemic. For Webster County, point source emissions changed drastically over the 2017-2023 period, following the conversion of BREC Green Station to natural gas. The Division anticipates that future emissions within Webster County will remain consistent with 2023 emission levels (approximately 5 tons) and are representative of what emissions in 2026 will be due to no anticipated future changes or growth.

Furthermore, since the EGU and non-EGU source information from the KyEIS database was located specifically within the nonattainment area, calculations to account for partial county emissions were not required. Below is a comprehensive analysis of the three major point sources in the Area, accounting for changes made to the facilities that will reduce their emissions and help the Area reach attainment.

(i) Century Aluminum Sebree LLC

Century Aluminum was the largest source of SO₂ emissions in the Area during the 2018 base year, accounting for approximately 46% of all emissions in the Area. It continues to be the largest source of SO₂ emissions in the Area. In 2026, SO₂ emissions from Century Aluminum are projected to account for approximately 99.9% of total emissions in the Area. Table 4 shows a comparison of base year emissions to projected attainment year emissions for Century Aluminum, which are not expected to change significantly.

Table 4 – Base Year vs. Attainment Year SO₂ Emissions for Century Aluminum

SO ₂ Emissions (tpy)	
2018 Base Year	2026 Attainment Year
4,239.26	4,292.33

(ii) Big Rivers Electric Corporation – Robert Reid and HMP&L Station 2

Prior to 2019, the BREC Robert Reid and HMP&L Station 2 facilities were significant contributors to SO₂ concentrations within the nonattainment area. However, as previously mentioned in the February 15, 2024, SIP revision containing the base year emissions inventory,

both facilities have since been retired; documentation of the facilities' retirements can be found in a letter from the facility to the Division, located in Appendix E. Tables 5 and 6 show a comparison of base year vs. attainment year emissions for these two facilities, both clearly demonstrating that these facilities will no longer contribute to SO₂ concentrations within the nonattainment area by the attainment year.⁸

Table 5 – Base Year vs. Attainment Year SO₂ Emissions for BREC Robert Reid

SO ₂ Emissions (tpy)	
2018 Base Year	2026 Attainment Year
0.0	0.0

Table 6 – Base Year vs. Attainment Year SO₂ Emissions for BREC HMP&L Station 2

SO ₂ Emissions (tpy)	
2018 Base Year	2026 Attainment Year
848.40	0.0

(iii) Big Rivers Electric Corporation – Robert D. Green Station

Effective May 26, 2022, both emission units at BREC Green Station no longer use coal and have been converted to use natural gas; documentation of the completion of the natural gas conversion project can be found in a letter from the facility to the Division, located in Appendix E. Emissions for this facility decreased dramatically in 2023, demonstrating that the fuel switch had a significant impact on reducing SO₂ emissions in the Area. The Division expects SO₂ emissions at the facility to remain low through the attainment year and beyond due to the completion of the natural gas conversion project. Table 7 shows a comparison of SO₂ emissions between the base year and the projected attainment year for this facility.

Table 7 – Base Year vs. Attainment Year SO₂ Emissions for BREC Green Station

SO ₂ Emissions (tpy)	
2018 Base Year	2026 Attainment Year
4,114.50	0.62

⁸ BREC Robert Reid was idled in 2015 and its operating authority was not revoked until January 17, 2022, hence why it was included in the projected attainment emissions inventory.

Onroad Sources

Onroad source emissions data for 2026 was developed from emission factors produced by EPA's Motor Vehicle Emission Simulator (MOVES3.0.4) software program. Raw fleet data inputs were obtained from the Kentucky Transportation Cabinet (KYTC). The Louisville Metro Air Pollution Control District (LMAPCD) of Jefferson County, Kentucky supplied the Vehicle Type VMT, Road Type Distribution and Source Type Population inventory. RoadTypeDistrib.csv, VehTypeVMT.csv and SourceTypePop.csv files were developed using VMT data given to the Division from Evansville, Indiana's MPO and fleet data from KYTC. Area percent adjustments were applied to data inputs by scaling the fleet population with county population ratios as a means to account for partial counties. More detailed information regarding how onroad sources were projected can be found in Appendix F.

Overall, emissions from onroad sources accounted for less than 0.1% of total projected emissions for the Area in the 2026 attainment year, as shown in Table 3 above.

Nonpoint Sources/Nonroad Sources

Emissions data from 2017 was pulled from EPA's 2016v2 Modeling Platform for the counties in the Area. SO₂ emissions for the 2026 attainment year were then interpolated from the 2017 data using Excel's Linear Forecast Function. Area percent adjustments were applied to account for partial counties.

Overall, nonpoint and nonroad emissions sources accounted for less than 0.1% of total projected emissions for the Area in the 2026 attainment year, as shown in Table 3 above.

B. RACT/RACM

Section 172(c)(1) of the CAA requires that SIPs for nonattainment areas "provide for the 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 reasonably available control technology [RACT]) and shall provide for attainment of the national primary ambient air quality standards."

EPA has defined RACT as: "the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility."⁹ RACT requirements are specifically intended to impose emission controls for purposes of attainment and maintenance of the NAAQS within a specific nonattainment area. EPA has interpreted the terms RACT and RACM as being the level of emissions control that is necessary to provide for expeditious attainment of the NAAQS within a nonattainment area. Courts have upheld this interpretation of the statute with respect to nonattainment SIPs.

⁹ 44 FR 53762

(i) Control Strategy for Century Aluminum

Century Aluminum has numerous sources of SO₂ emissions, including a natural gas-fired remelt furnace, two groups of natural gas-fired holding furnaces, four homogenizing furnaces, small natural gas boilers and pre-heaters, and six emergency generators. However, these emission sources make up less than 0.1% of the total SO₂ emissions at the facility. Since these emission sources made an insignificant contribution to the Area's nonattainment status, and additional control measures on these emission sources could not contribute to attainment of the NAAQS, these emissions sources were not evaluated for RACT/RACM.

The vast majority of SO₂ emissions from Century Aluminum are from the facility's potlines and the anode bake furnace (ABF). Trinity Consultants provided the Division an SO₂ control strategy analysis for Century Aluminum on November 8, 2021; this document has been included as Appendix G.

In the SO₂ control strategy analysis provided by Trinity Consultants, the application of dry and semi-dry scrubbing technologies on Century Aluminum's potlines were considered as an option to supplement the existing wet scrubbers. However, the exhaust temperature from a recent stack test (at the time) indicated that temperatures were too low (120°F), making the use of dry and semi-dry scrubbing technologies infeasible. The cost-effectiveness of this control option was not assessed due to its infeasibility. The Division concurs with Trinity Consultants that this option for RACT/RACM can be ruled out.

In the SO₂ control strategy analysis provided by Trinity Consultants, minimizing the sulfur content of the coke and pitch purchased by Century Aluminum was also considered as a control strategy. According to Trinity Consultants, Century Aluminum purchases coke from the Gulf Region of the U.S., with a maximum sulfur content specification of 3%, in compliance with the terms of the existing Title V permit. This is the standard sulfur content specification in the market for U.S. Gulf Region-sourced coke. To reduce the sulfur content below 3%, green cokes would need to be imported from South America and blended with U.S. cokes. Although this could result in achieving a lower sulfur content petroleum coke, there would be a significant increase in the overall environmental impact expected, including on greenhouse gas emissions, given the significantly increased transportation distances.

Additionally, to achieve a sulfur content appreciably lower (approximately in the 2% range) would cost roughly \$70-\$100 per metric ton (mt) more in the current market based on information provided by Century Aluminum. A reduction in petroleum coke sulfur content from current levels to 2% would translate to a reduction in SO₂ emissions, all else being equal, of roughly 1,200 tpy. However, a forecasted \$100/mt increase in coke premiums for Century Aluminum would translate into an additional cost of \$8,000,000 in annual costs at current production levels, or an estimated \$8,800,000 at capacity. Without considering any other factors, this results in a calculated cost effectiveness of over \$6,900/ton of SO₂. This cost impact would

jeopardize the economic sustainability of the facility. The Division concurs with Trinity Consultants that this option for RACT/RACM can be ruled out on the basis of cost-effectiveness.

In the SO₂ control strategy analysis provided by Trinity Consultants, Century Aluminum considered improvements to the design and configuration of the stacks on the ABF and potlines as a possible control strategy. Century Aluminum contacted six engineering firms to assess the feasibility of altering the stacks at their facility, but did not receive commitments from any of the firms to complete an engineering study. This control strategy analysis stated that a report on the feasibility and cost of this option would be provided to the Division in 4-6 months, but a subsequent report was not received.

Following a review of all potential control strategies, Century Aluminum informed the Division on August 7, 2024, that the chosen control strategy consists of replacing the stacks at their ABF. Currently, there are three existing stacks on the ABF that are 70 ft tall and 4.2 ft in diameter. Century Aluminum intends to replace those three stacks with a new singular stack on the ABF that is expected to be 213.2 ft tall and 8.5 ft in diameter. The cost for replacing the stacks is estimated to be \$4 million. Modeling outlined in Section D and Appendix H, show significant improvements to air quality will occur once the stack is replaced. All changes occurring at the facility will be included in an impending permit revision for the facility. Once the permitting action is finalized it will be included in the final attainment demonstration SIP submittal, or a separate SIP revision supplemental document if the permit action is not finalized before the final SIP submittal; this will make the changes to the stack permanent and federally enforceable.

Replacing the stack for the ABF is the most cost-effective control strategy reported to the Division; therefore, it was determined to be a sufficient control strategy and constitute as RACT/RACM for the Area.

(ii) Permanent and Enforceable Emissions Reductions at BREC Green Station

BREC Green Station's transition to natural gas has been made permanent through the air quality permit revision (permit number: V-19-020 R2) issued to the facility on January 17, 2022, which required emission units 1 and 2 to no longer utilize coal, petroleum coke, or No. 2 fuel oil and only utilize natural gas as a fuel.

On July 29, 2022, BREC sent a letter to the Division, stating that BREC Green Station's natural gas conversion project was completed on May 26, 2022. This letter is included in Appendix E.

The permit revision also limited the fuel heat input to emission units 1 and 2 to no more than 40,410,722 MMBtu/yr on a 12-month rolling total basis, which is significantly lower than the previous 46,603,200 MMBtu/yr input capacity. Further, SO₂ emissions from each unit cannot exceed 0.8 lb/MMBtu actual heat input. With the additional emission limits included in the permit revision, emissions within the nonattainment area have been significantly reduced.

The Division considers that BREC Green Station's conversion to natural gas sufficiently constitutes as RACT for the facility. This rationale is supported due to the fact that other alternatives for BREC Green Station would be costly and result in potential closures of the facility and not contribute to improvement of the Area's nonattainment status.

C. Air Dispersion Modeling Demonstration

The final rule preamble for the 2010 SO₂ standard requires air dispersion modeling to demonstrate compliance in nonattainment areas.¹⁰ EPA's 2014 SO₂ Nonattainment Area SIP Guidance recommends using the American Meteorological Society/EPA Regulatory Model Modeling System (AERMOD) for the SO₂ analysis. It is a steady-state plume model that incorporates air dispersion based on a planetary boundary layer turbulence structure and scaling concepts.

Trinity Consultants utilized the most recent AERMOD version (23132) to model for each stack and other types of source units at Century Aluminum as well as other nearby sources. Trinity Consultants also used the following preprocessors, to determine compliance with the 2010 SO₂ standard. The AERMOD preprocessors include:

- AERMET – meteorological data processor for AERMOD (version 23132)
- BPIP PRIME – building profile input processor (version 04274)
- AERMINUTE – one-minute ASOS winds pre-processor to AERMET (version 15272)
- AERSURFACE – surface characteristics processor for AERMET (version 20060)

Regulatory default options were used in all available cases. Despite the rural nature of the Area, Trinity Consultants used the urban designation with an equivalent population of 2 million when modeling Century Aluminum emissions due to a heat island effect generated by their industrial processes. For all other sources in the Area, Trinity Consultants used the rural designation.

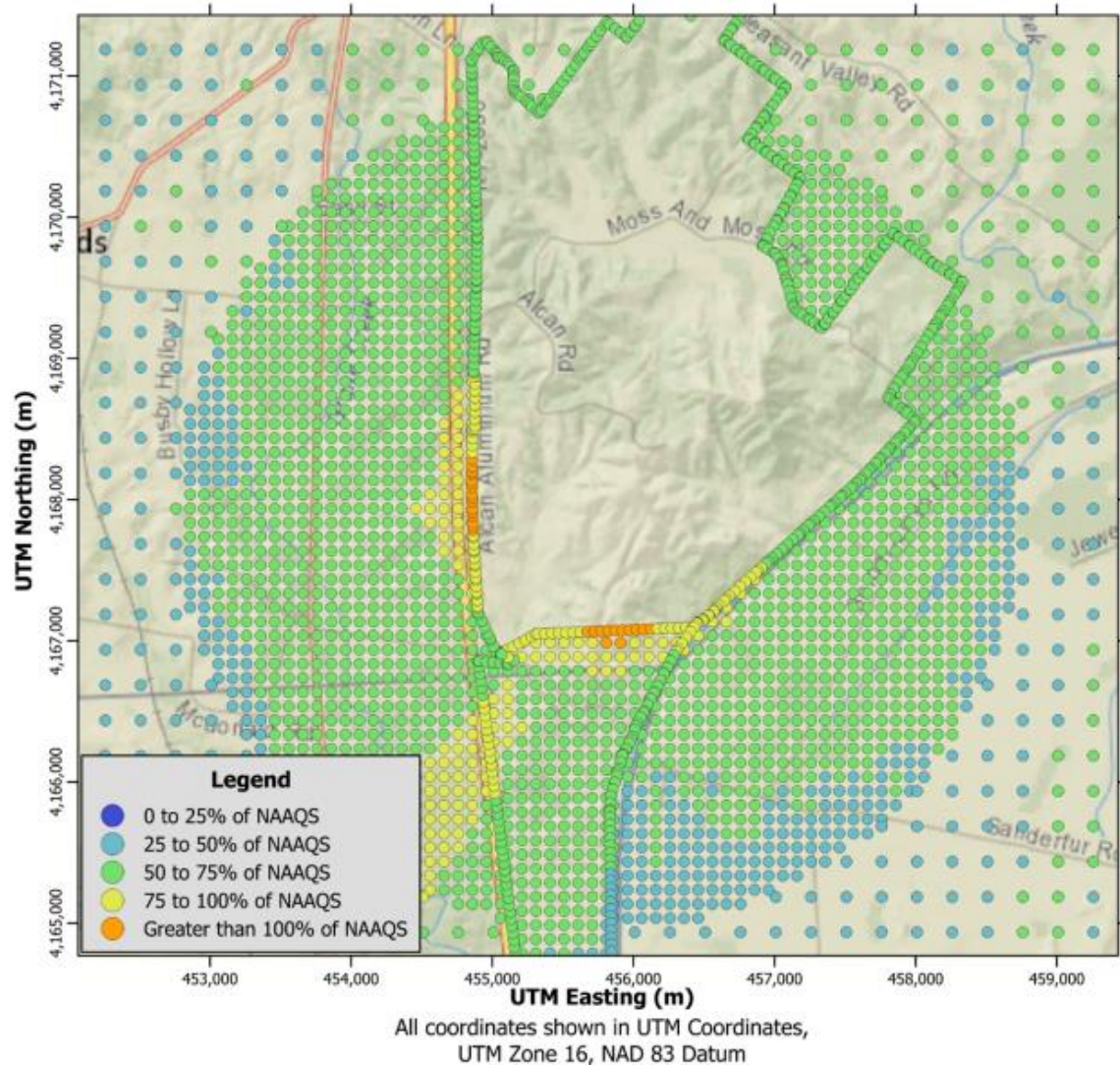
In addition to proposing a stack height change on the ABF, the impending permit action for Century Aluminum referenced in Section B will lower Century Aluminum's annual allowable SO₂ emissions limit. Trinity Consultants utilized this lower emissions limit in their modeling demonstration. The facility's current permitted annual allowable emission rate is 5,853 tpy. The facility's anticipated future annual allowable emission rate is 4,945.50 tpy, however, this rate has not been finalized and will be subject to agreement from the Division and the facility during the impending permit revision process.

¹⁰ 75 FR 35520

(i) Modeling Results

The modeling demonstration, and accompanying modeling runs, performed by Trinity Consultants can be found in Appendix H. According to the modeling demonstration, the 3-year average of the maximum highest 4th high impacts modeled using AERMOD are above the 2010 SO₂ standard. The model predicted possible exceedances at 0.6% of receptors included in the analysis. As seen in Figure 5, all receptors predicting possible exceedances are either near or on the Century Aluminum property line.

Figure 5 - Century Aluminum Modeled Impacts



(ii) Correction for Overprediction

Trinity Consultants outlines a weight of evidence approach in their modeling demonstration that shows the modeled results are conservative and overpredict concentrations recorded at the ambient monitor. Their analysis shows that the urban AERMOD model output overpredicts the SO₂ impacts from Century Aluminum by 1.21 times when compared to monitored values. In addition, Trinity Consultants applied a relative response factor to determine a more accurate prediction of the attainment year design value. The relative response factor is the ratio comparing the current modeling stack configuration to the future stack configuration detailed above. This ratio of 0.73 was then applied to the current design value to estimate the attainment year design value at 55 parts per billion. After correcting for this overprediction, the impending stack reconfiguration and reduced annual allowable SO₂ emissions limit at Century Aluminum will allow the Area to achieve attainment of the 2010 1-hour SO₂ standard.

D. Conformity

CAA Section 176(c) establishes that no federal agency shall support or approve any activity in a nonattainment or maintenance area that does not conform to the approved SIP. Pursuant to CAA Section 176(c)(1)(B)(i-iii), federal actions will not “cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.” Requirements for complying with CAA Section 176(c) and conforming to the SIP fall under two categories: general conformity requirements, which are codified under 40 CFR Part 93, Subpart B, and transportation conformity requirements, which are codified under 40 CFR Part 93, Subpart A.

General conformity regulations apply to all federal actions in all nonattainment and maintenance areas for all six criteria air pollutants (CAPs) except for those related to transportation plans, programs, and projects developed, funded, or approved under Title 23 United States Code (U.S.C.) or the Federal Transit Act. Specifically, these are transportation-related actions by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). The Area became subject to general conformity requirements on April 30, 2022, which is one year after the effective date of the nonattainment designation. In accordance with 40 CFR §93.158, federal actions that are expected to meet or exceed 100 tpy are required to demonstrate general conformity requirements established under 40 CFR Part 93, Subpart B. The Division will ensure that federal actions, in consultation with federal agencies, will continue to conform to the SIP.

Transportation conformity addresses emissions from onroad mobile sources. Under 40 CFR §93.102(b)(1), it states that federal transportation conformity regulations are only applicable to the following transportation-related NAAQS: ozone, carbon monoxide (CO), nitrogen dioxide (NO₂), and both types of particulate matter (PM₁₀ and PM_{2.5}). SO₂ is not considered a transportation-related NAAQS and therefore, is not subject to transportation conformity

requirements. However, 40 CFR §93.102(b)(2)(v) specifies that if transportation-related emissions of SO₂, as a precursor, significantly contribute to a PM_{2.5} nonattainment and maintenance area, the pollutant would be subject to transportation conformity requirements. Since this is not the case for the Area, transportation conformity obligations do not apply, nor is it necessary for this SIP revision to include a motor vehicle emissions budget (MVEB).

E. Reasonable Further Progress

CAA Section 171(1) defines Reasonable Further Progress (RFP) as "such annual incremental reductions in emissions of the relevant air pollutant as are required by this part (part D) or may reasonably be required by the EPA for the purpose of ensuring attainment of the applicable NAAQS by the applicable attainment date." This is most appropriate for pollutants that are emitted by numerous and diverse sources, where the relationship between any individual source and the overall air quality is not explicitly quantified, and where the emission reductions necessary to attain the NAAQS are inventory-wide.

EPA's 2014 SO₂ Nonattainment Area SIP Guidance states that since "SO₂ concentrations are often dominated by emissions from a limited number of sources, and emissions controls often yield swift and dramatic air quality improvement," "adherence to an ambitious compliance schedule" would constitute RFP for SO₂. This means that the air agency needs to ensure that sources implement appropriate control measures as expeditiously as practicable.

Century Aluminum has informed the Division that it intends to establish a lower annual allowable SO₂ emissions limit for the facility. As detailed above in Section C, a lower annual allowable SO₂ emissions limit will improve progress toward attainment of the NAAQS. The Division believes that by taking a lower annual allowable SO₂ emissions limit the facility is committed to making RFP to improve air quality in the Area.

The Division does not believe additional incremental reductions are necessary for Century Aluminum due to the immediate improvements that will occur once it has raised the stack height of its ABF, as outlined in previous sections.

Further, the Division does not believe that additional incremental reductions are necessary at BREC Green Station due to the recent natural gas conversion project that occurred at the facility in 2022, resulting in significant reductions in SO₂ emissions within the Area.

Lastly, the Division believes there are no other major sources of SO₂ emissions in the Area that require a need to be evaluated and provide RFP.

F. Contingency Measures

Section 172(c)(9) of the CAA defines contingency measures as such measures in a SIP that are to be implemented in the event that an area fails to make RFP, or fails to attain the NAAQS, by the applicable attainment date. Contingency measures are to become effective without further action

by the state or the EPA, where the area has failed to (1) achieve RFP or, (2) attain the NAAQS by the statutory attainment date for the affected area. These control measures are to consist of other available control measures that are not included in the control strategy for the attainment plan SIP for the affected area. EPA's 2014 SO₂ Nonattainment Area SIP Guidance states that contingency measures need to be a fully adopted provision in the SIP that becomes effective if the area fails to meet RFP or attain the standard by the statutory attainment date. EPA's 2014 SO₂ Nonattainment Area SIP Guidance states that “contingency measures” can mean that the air agency has a comprehensive program to identify sources of violations of the SO₂ NAAQS and to undertake an “aggressive” follow-up for compliance and enforcement.

Upon notification by the Division that the Sebree DRR monitor has registered four validated ambient SO₂ concentrations in excess of the standard in a calendar year, or that a monitored SO₂ violation based on the three-year annual design value occurs during calendar year 2026 and beyond, Century Aluminum will, without any further action by the Division or EPA, undertake a full system audit of all emissions units subject to control under this plan. Century Aluminum will submit a written system audit report to the Division within 30 days of the notification. The system audit report must detail the operating parameters of all emissions units for four 10-day periods up to and including the date upon which the reference monitor registered each exceedance, together with recommended provisional SO₂ emission control strategies for each affected unit and evidence that these control strategies have been deployed, as appropriate. Upon receipt of the system audit report, the Division will immediately begin a 30-day evaluation period to diagnose the cause of the monitored exceedance. This evaluation will be followed by a 30-day consultation period with Century Aluminum to develop and agree upon operational changes necessary to prevent future monitored violations of the standard. These changes may include using coke with a low-sulfur content as the facility’s fuel source, physical or operational reductions of production capacity at the facility, or other changes as appropriate. Once the Division and Century Aluminum agree to a control strategy, the facility will have 12 months to fully implement the chosen controls. If a permit modification is deemed necessary, the Division would issue a final permit within the statutory timeframes required in 401 KAR 52:020 and any new emissions limits required by such a permit would be submitted to EPA as a SIP revision.

G. Public Participation

In accordance with 40 CFR 51.102, the SIP revision was available for public review and comment from August 15, 2024 through September 20, 2024.

The SIP revision package was made available on the Division’s website during the 37-day comment period from August 15, 2024, until September 20, 2024. A virtual public hearing was scheduled for September 20, 2024, at 10:00 a.m. (EDT). The Division received written comments from X during the public comment period. The Division’s response to those comments is provided in Appendix I along with a copy of the public hearing notice.

3. CONCLUSION

As demonstrated above, this attainment demonstration is dependent upon the permanent and enforceable operational changes and reduced emissions at BREC's facilities in the Area, as well as raising the stack height of Century Aluminum's ABF. The Division requests that EPA approve the specified components of this submittal into Kentucky's SIP, as these components are expected to provide for attainment of the 2010 SO₂ NAAQS in the Henderson-Webster nonattainment area.

DRAFT