APPENDIX A

Coordinates of the Nonattainment Area

The nonattainment portion of Henderson and Webster counties is encompassed by a polygon with 48 vertices using Universal Traverse Mercator (UTM) coordinates of North American Datum 1983 (NAD83) as follows:

> *(1) KY 520, Upper Delaware Rd to the Green River boundary at 463979.00 Easting (E), 4171000.03 Northing (N); (2) The Green River boundary to JZ Shelton Rd 459058.03 E, 4160832.96 N; (3) JZ Shelton Rd to KY 370 457811.00 E, 4159192.96, N; (4) KY 370 to Pennyrile Parkway I 69 457089.96 E, 4159452.95 N; (5) Pennyrile Parkway I 69 to Sassafras Grove Rd 457675.35 E, 4156244.55 N; (6) Sassafras Grove Rd to US 41 456236.68 E, 4156125.75 N; (7) US 41 to Slaughters Elmwood Rd 457442.82 E, 4153425.68 N; (8) Slaughters Elmwood Rd to Railroad Track (NW) 456589.41 E, 4153424.43 N; (9) Railroad Track (NW) to Breton Rd 453677.09 E, 4155992.29 N; (10) Breton Rd to KY 1835 453079.74 E, 4154924.00 N; (11) KY 1835 to KY 138 450702.89 E, 4153141.51 N; (12) KY 138 to Crowder Rd 452587.06 E, 4152032.38 N; (13) Crowder Rd to KY 120 453030.14 E, 4149175.08 N; (14) KY 120 to Gooch Jones Rd 447528.25 E, 4147663.88 N; (15) Gooch Jones Rd to John Roach Rd 446551.75 E, 4150042.51 N; (16) John Roach Rd to Old Dixon Slaughters Rd 447462.17 E, 4151329.04 N; (17) Old Dixon Slaughters Rd to Old Dixon Rd 446532.28 E, 4152143.23 N; (18) Old Dixon Rd to KY 138 446849.49 E, 4152437.09 N; (19) KY 138 to Carnel Brooks Rd 450196.38 E, 4153305.18 N; (20) Carnel Brooks Rd to Rakestraw Bottoms Rd 450079.34 E, 4154326.39 N; (21) Rakestraw Bottoms Rd to KY 132 447141.40 E, 4157145.04 N; (22) KY 132 to KY 283 444025.55 E, 4156172.90 N; (23) KY 283 to Beckley Osbourne Rd 444300.82 E, 4158111.35 N; (24) Beckley Osbourne Rd to Dixon Wanamaker Rd 442067.07 E, 4158641.90 N; (25) Dixon Wanamaker Rd to KY 191 441887.88 E, 4161614.33 N; (26) KY 191 to D Melton Rd 442743.25 E, 4161250.11 N; (27) D Melton Rd to Knoblick Creek Rd 443688.82 E, 4162093.08 N; (28) Knoblick Creek Rd to US 41A 442319.35 E, 4163220.45 N; (29) US 41A to Dixon 1 Rd 443500.62 E, 4170518.52 N; (30) Dixon 1 Rd to GF Sights Rd 443094.58 E, 4170166.59 N; (31) GF Sights Rd to Cairo Dixie Rd 441341.46 E, 4170978.60 N; (32) Cairo Dixie Rd to Liles Cairo Rd 442919.00 E, 4173140.24 N; (33) Liles Cairo Rd to US 41A 443124.23 E, 4173204.51 N; (34) US 41A to Cairo Hickory Grove Rd 442860.28 E, 4174017.18 N; (35) Cairo Hickory Grove Rd to Pruitt Agnew Rd 446056.06 E, 4175740.98 N; (36) Pruitt Agnew Rd to KY 1299 447662.11 E, 4180049.93 N; (37) KY 1299 to Anthoston Frog Island Rd 448905.37 E, 4176327.31 N; (38) Anthoston Frog Island Rd to KY 136 452613.63 E, 4179047.02 N; (39) KY 136 to Upper Delaware Rd 454451.59 E, 4177687.26 N; (40) Upper Delaware Rd to Barren Church Rd S 456153.23 E, 4177723.20 N; (41) Barren Church Rd S to Barren Church Rd N 457912.85 E, 4180247.83 N; (42) Barren Church Rd N to KY 1078 458542.52 E, 4181615.55 N; (43) KY 1078 to Jones Brothers Rd 461322.00 E, 4179952.85 N; (44) Jones Brothers Rd to KY 416*

461209.84 E, 4177755.55 N; (45) KY 416 to KY 1078 463492.08 E, 4178026.50 N; (46) KY 1078 to Onionville Rd 464177.31 E, 4177054.13 N; (47) Onionville Rd to Work Road 465476.34 E, 4176076.78 N; (48) Work Road to Upper Delaware Rd 462529.15 E, 4173036.52 N.

APPENDIX B

Technical Support Document - Chapter 3: Final Round 4 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for Kentucky

Technical Support Document:

Chapter 3
Final Round 4 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for Kentucky

1. Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA, we, or us) must designate areas as either "nonattainment," "attainment," or "unclassifiable" for the 2010 1-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS) (2010 SO_2 NAAQS). On or about August 13, 2020, EPA sent states our responses to certain designation recommendations for the 2010 SO_2 NAAQS. On August 21, 2020, EPA published a notice of availability (NOA) in the *Federal Register* (*see* 85 FR 51694), initiating a 30-day public comment period. The NOA and the technical support document (TSD) for EPA's intended designations provided background on the relevant CAA definitions and the history of the designations for this NAAQS. The TSD for EPA's intended designations also described Kentucky's recommended designations and EPA's assessment of the available information.

This TSD for EPA's final Round 4 area designations for Kentucky addresses any change in Kentucky's recommended designations since EPA communicated its intended designations in August 2020 and provides our assessment of additional relevant information that was submitted by Kentucky or other parties since the publication of the NOA. This TSD does not repeat information contained in the TSD for EPA's intended designations except as needed to explain our assessment of the newer information and to make clear the final action we are taking and its basis, but that information is incorporated as part of our final designations. If the assessment of the information that was already considered in the TSD for EPA's intended designations has changed based on new information and we are finalizing a designation based on such change in our assessment, this TSD also explains that change. For areas of Kentucky that are not explicitly addressed in this chapter, we are finalizing the designations described in our 120-day letters and Chapter 2 of the TSD for EPA's intended Round 4 area designations as explained in those documents.

In letters dated October 16, 2020, and November 12, 2020, Kentucky responded to EPA's intended designations and superseded its July 7, 2020, recommendation, by providing additional information including alternative designation recommendations and additional technical information to support its November 12, 2020, recommendation. EPA also received public comments regarding the intended designation for the Henderson-Webster, Kentucky area. These comments are addressed in the Response to Comments document associated with this final action.

Table 1 identifies Kentucky's current designation recommendations, EPA's final Round 4 designations, and the areas in Kentucky to which those designations apply. Chapter 1 of this

TSD for EPA’s final designations explains the definitions we are applying in the final designations process.

Table 1. Summary of EPA’s Final Designations and the Designation Recommendations by Kentucky

Area/County	Kentucky’s Recommended Area Definition	Kentucky’s Recommended Designation	EPA’s Intended Designation	EPA’s Final Area Definition	EPA’s Final Designation
Henderson-Webster, Kentucky Area	Henderson County (partial); Webster County (partial)	Nonattainment	Nonattainment	Same as Commonwealth’s Revised Recommendation	Nonattainment
Remaining portion of Henderson County	Henderson County (partial)	Attainment/ Unclassifiable	Attainment/ Unclassifiable	Same as Commonwealth’s Revised Recommendation	Attainment/ Unclassifiable
Remaining portion of Webster County	Webster County (partial)	Attainment/ Unclassifiable	Attainment/ Unclassifiable	Same as Commonwealth’s Revised Recommendation	Attainment/ Unclassifiable

Areas that EPA previously designated in Round 1 (*see* 78 FR 47191), Round 2 (*see* 81 FR 45039 and 81 FR 89870), and Round 3 (*see* 83 FR 1098 and 83 FR 14597) are not affected by the designations in Round 4 unless otherwise noted.

2. Technical Analysis for the Henderson-Webster, Kentucky Area

2.1. Introduction

EPA must designate the Henderson-Webster, Kentucky area by December 31, 2020, because the area has not been previously designated, and Kentucky began operating a new EPA-approved monitor pursuant to EPA's SO_2 Data Requirements Rule (DRR).[1] This section presents all the available air quality information for the portions of Henderson and Webster Counties that include the following SO_2 sources around which the DRR required the Commonwealth to characterize air quality:

- The Century Aluminum Sebree LLC (Century Aluminum) facility emits 2,000 tons or more of SO_2 annually. Specifically, Century Aluminum emitted 4,739 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Kentucky has chosen to characterize it via monitoring.

- The Big Rivers Electric Corporation's Robert A. Reid Station/Henderson Municipal Power and Light (HMP&L) Station 2 (BREC Reid/HMP&L Station 2) facility emits 2,000 tons or more of SO_2 annually. Specifically, BREC Reid/HMP&L Station 2 emitted 12,202 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Kentucky has chosen to characterize it via monitoring.

- The Big Rivers Electric Corporation's Robert D. Green Station (BREC Green Station) emits 2,000 tons or more of SO_2 annually. Specifically, BREC Green Station emitted 3,999 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and Kentucky has chosen to characterize it via monitoring.

The Sebree DRR monitor (AQS ID: 21-101-1011) was sited to characterize the maximum 1-hour SO_2 concentrations in the area surrounding all three DRR sources mentioned above. As seen in Figure 1 and Figure 2 below, all 3 facilities are located less than 2 kilometers (km) from the violating monitor in Henderson County, Kentucky. Century Aluminum is located to the northeast of the violating monitor in Henderson County. The BREC Reid/HMP&L Station 2 and the BREC Green Station are both located in Webster County to the southeast of the monitor and both facilities are owned by the Big Rivers Electric Corporation (BREC). Additionally, the Robert A. Reid Station/HMP&L Station 2 is a single stationary source with one operating permit, however two of the coal-fired units at the facility are owned by HMP&L and operated by BREC.

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[1] *See* 80 FR 51052 (August 21, 2015), codified at 40 CFR part 51 subpart BB.

Figure 1. Map of the Henderson-Webster, Kentucky Area Addressing Century Aluminum, BREC Reid/HMP&L Station 2, and BREC Green Station

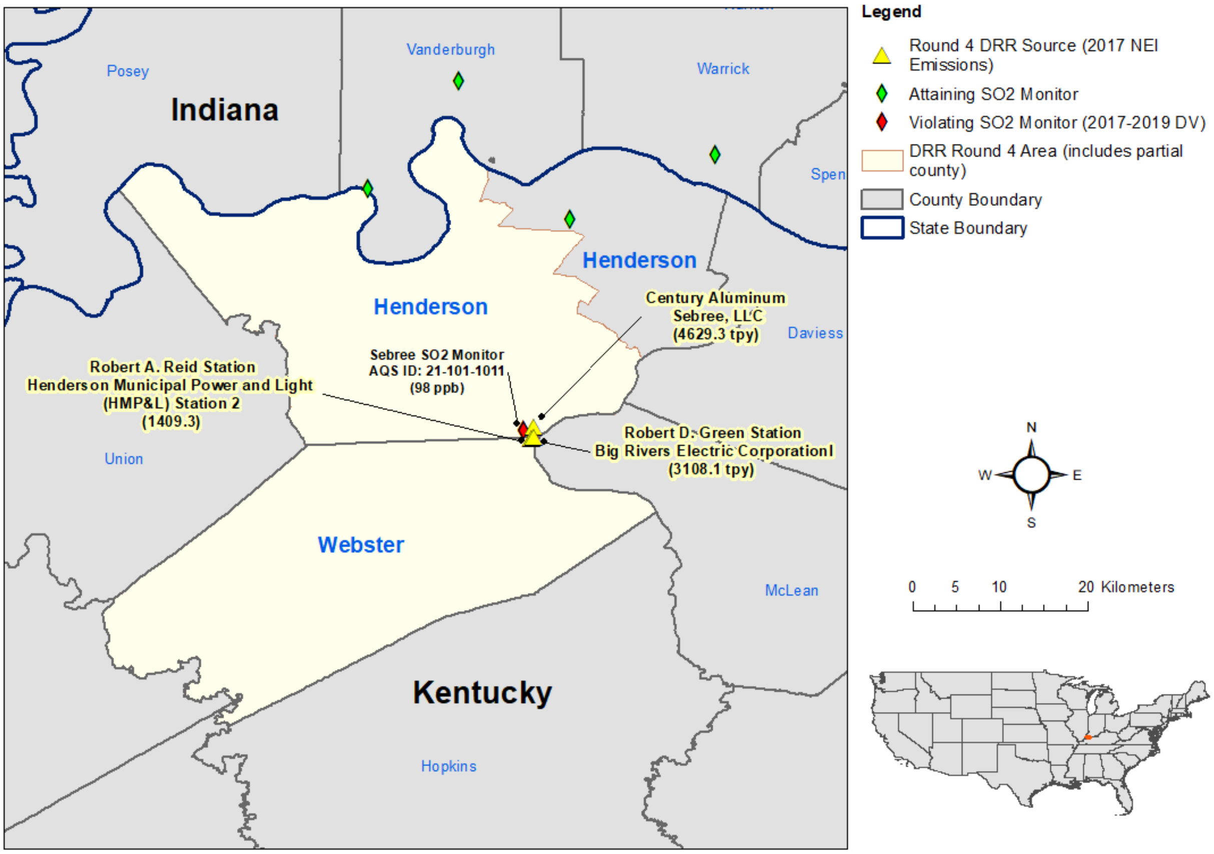
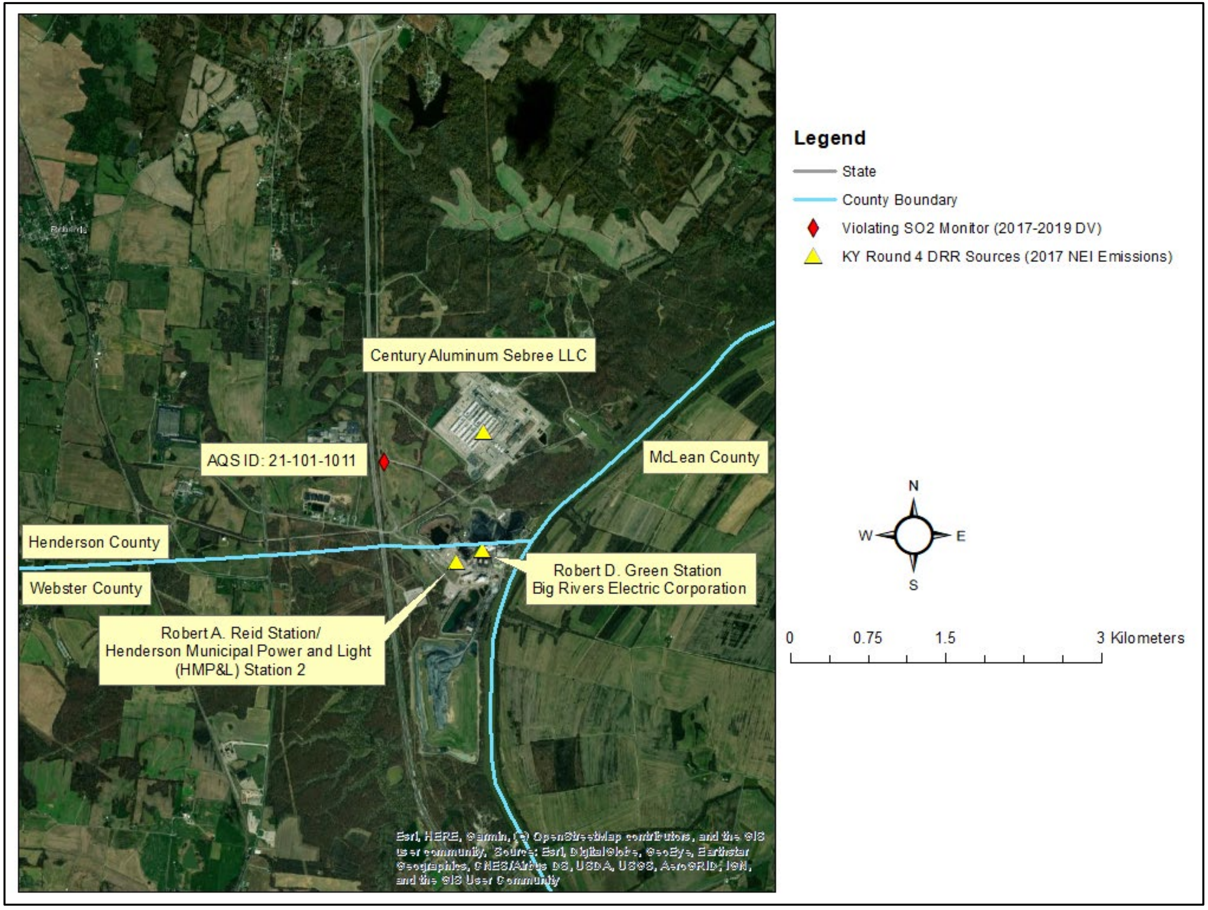


Figure 2. Close-up Image of the Henderson-Webster County, Kentucky Area, including Century Aluminum, BREC Reid/HMP&L Station 2, and BREC Green Station



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2.2. Summary of Information Reviewed in the TSD for the Intended Round 4 Area Designations

In its July 7, 2020, recommendation letter, Kentucky recommended that a portion of Henderson County be designated as nonattainment for the 2010 SO_2 NAAQS, based on monitored air quality from 2017-2019. Kentucky recommended that the remainder of Henderson County and all of Webster County be designated attainment for the 2010 1-hour SO_2 NAAQS. Specifically, the Commonwealth's recommended nonattainment boundary for Henderson County consisted of the area located between Edward T. Breathitt Pennyrile Parkway (to the west) and the Green River (to the east), south of Moss and Moss Road, and north of the Century Aluminum railroad spur and Big Rivers Electric coal haul road which included the ambient air DRR monitor (AQS ID: 21-101-1011) and only one of three DRR source Century Aluminum as shown in Figure 3. EPA's intended designation did not agree with Kentucky's recommendation as to the designation category, in part because Kentucky's original recommended boundary excluded some of the sources contributing to the violating monitor, and EPA intended to designate a portion of Henderson County, Kentucky and Webster County, Kentucky, as described in the intended designations TSD, as nonattainment for the 2010 SO_2 NAAQS based upon currently available monitoring information for the 2017-2019 period. Our intended boundaries were different than the Commonwealth's recommended boundaries.

Figure 3. Kentucky's Recommendation for the Henderson-Webster, Kentucky Area for Intended Round 4 Designations

Kentucky provided a discussion and figures of a dispersion modeling analysis performed to evaluate the SO_2 impacts from the BREC Green Station; however, the modeling files were not provided to EPA for review. Kentucky concluded from the dispersion modeling analysis that BREC Green Station is not causing a violation of the 2010 1-hour SO_2 NAAQS. Kentucky did not provide EPA sufficient information to agree with that conclusion, and EPA instead believes the modeling results provided by Kentucky on July 7, 2020, showed that BREC Green Station was likely contributing to violations of the 2010 1-hour SO_2 NAAQS at the Sebree monitor in Henderson County.

In addition to the dispersion modeling analysis performed to evaluate the BREC Green Station, EPA reviewed modeling that Kentucky provided in 2016 which was conducted to support the location of the Sebree ambient air quality monitor in order to characterize all three DRR sources (rather than install and operate separate monitors for each source). As this modeling was not conducted for the purpose of air quality designations, EPA was unable to use this information specifically in determining the exact geographic extent of the 2010 SO_2 NAAQS violations that occurred during the 2017-2019 monitoring period; however, EPA determined that this modeling indicates the potential for elevated SO_2 concentrations extending well beyond the nonattainment boundary proposed by Kentucky, including a larger portion of Henderson County and a portion of Webster County.

Kentucky provided an analysis of the meteorology for the Henderson-Webster, Kentucky Area. EPA preliminarily agreed with Kentucky's conclusion that the HYSPLIT trajectories indicate that the Century Aluminum facility contributes to the monitored violation; however, EPA also believes that other back trajectories, the level of emissions from BREC Green Station, and the fact that it is located approximately 1.25 km from the Sebree monitor, indicate that the facility is potentially contributing to the measured violations of the 2010 1-hour SO_2 NAAQS at the Sebree monitor. Additionally, EPA evaluated wind patterns in the area based on wind rose created from for the nearest NWS meteorological station which indicate that winds blow from all directions, but most commonly from southwest, and, also from the northeast and northwest significant amounts of time. The highest frequency of slow wind speeds (1-4 knots) blow from the northeast, but also a significant amount of time from the southeast, which is the direction of the two BREC facilities.

As a result of evaluation of all the available information, including EPA's qualitative assessment of the modeling conducted to support the location of the ambient air quality monitor, EPA modified Kentucky's July 2020, recommendation for the nonattainment boundary for Henderson County, as well as modified the Commonwealth's designation and boundary determination for a portion of Webster County. EPA believed that the intended nonattainment area, bounded by the portions of Henderson and Webster Counties contained within census block groups 211010209001, 211010208001, 211010208003, 212339601002, 212339601004, 212339601003, and 212339601001. EPA's intended boundary was appropriate to characterize the geographical extent of impacts from all DRR sources based on the available information at the time of intended designations (i.e. the magnitude of the monitoring concentrations coupled with the emissions from the SO_2 sources and the information available for Henderson County and, the boundary and therefore justified the consideration of a bigger boundary than recommended by the Commonwealth absent additional technical support.

EPA intended to designate the remaining portions of Henderson and Webster Counties as attainment/unclassifiable due to a lack of SO_2 emissions sources or any other information that indicates those areas do not meet the 2010 1-hour SO_2 NAAQS. Based on the factors discussed above, EPA believed that the remaining undesignated area neither has violations nor contains any sources that could contribute to air quality in an area that violates the NAAQS. Therefore, we intended to designate the remainder of Henderson and Webster Counties as attainment/unclassifiable.

2.3. Air Quality Monitoring Data for the Henderson-Webster, Kentucky Area

In the TSD for the intended area designations, EPA considered design values for air quality monitors in the Henderson-Webster, Kentucky area. Specifically, EPA determined that the Sebree DRR monitor (AQS ID# 21-101-1011) violated the 2010 SO_2 NAAQS with a 2017-2019 design value of 98 ppb. EPA has no new monitoring information of any other type that warrants revising our prior analysis of available monitoring data.

2.4. Assessment of New Technical Information for the Henderson-Webster, Kentucky Area Addressing Century Aluminum, BREC Reid/HMP&L Station 2, and BREC Green Station

On November 12, 2020, superseding an October 16, 2020, submission, Kentucky submitted new modeling analyzing air quality in the area surrounding the Century Aluminum, BREC Reid/HMP&L Station 2, and BREC Green Station facilities in the Henderson-Webster, Kentucky area to inform the extent of the nonattainment boundary. This assessment and characterization were performed using air dispersion modeling software, i.e., AERMOD, analyzing a mixture of actual and allowable emissions. The Commonwealth's analysis supports a different designation boundary than its original July 7, 2020, recommended boundary and EPA's intended designation boundary for this area. EPA's intended designation for a portion of Henderson-Webster County area was nonattainment, and Kentucky's analysis supports a nonattainment designation, but with a boundary that is larger than its original recommended boundary and smaller than EPA's intended boundary. After careful review of Kentucky's new October and November 2020 assessments, supporting documentation, and all available data, EPA is relying on Kentucky's November 12, 2020, modeling analysis and agrees with the Commonwealth's updated nonattainment boundary recommendation. Our reasoning for this conclusion is explained in a later section of this TSD, after all the available information is presented.

The discussion and analysis that follows below will reference the "SO_2 NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) and the factors for evaluation contained in EPA's September 5, 2019, guidance, July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.[2]

For this area, EPA received two modeling assessments from Kentucky (submitted October 16, 2020, and November 12, 2020); however, the November 12, 2020, submission supersedes the October information. To avoid confusion in referring to these assessments, the following table lists them, indicates when they were received, provides an identifier for the assessment that is used in the discussion of the assessments that follow, and identifies any distinguishing features of the modeling assessments.

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[2] https://www.epa.gov/sites/production/files/2016-04/documents/so2modelingtad.pdf.

Table 2. Modeling Assessments for the Henderson-Webster Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
Commonwealth of Kentucky	October 16, 2020	October 2020 Modeling	No background concentrations included in the modeling
Commonwealth of Kentucky	November 12, 2020	November 2020 Modeling	Modeling includes representative background concentrations

2.4.1. Modeling Analysis Provided by the Commonwealth

2.4.1.1. Differences Between and Relevance of the Modeling Assessments Submitted by the Commonwealth

As discussed in EPA's TSD for the intended designation for the Henderson-Webster County, Kentucky Area, in the July 7, 2020, recommendation letter, Kentucky provided the results of two limited modeling analyses to support the boundary recommendation: (1) HYSPLIT (Hybrid Single Particle Lagrangian Integrated Trajectory) trajectory modeling, and (2) limited dispersion modeling for the BREC Green Station DRR facility. Neither of these limited modeling analyses provided a comprehensive air modeling analysis that could be used to fully evaluate the ambient SO_2 concentration impacts resulting from emissions from the Century Aluminum, BREC Reid/HMP&L Station 2, and the BREC Green Station facilities.

The following sections provide the details of Kentucky's November 12, 2020, comprehensive AERMOD modeling analysis that were used to evaluate ambient SO_2 concentrations in the area and determine an appropriate nonattainment area boundary.

2.4.1.2. Model Selection and Modeling Components

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

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

The Commonwealth used AERMOD version 19191, the most recent version of the model. A discussion of the Commonwealth's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

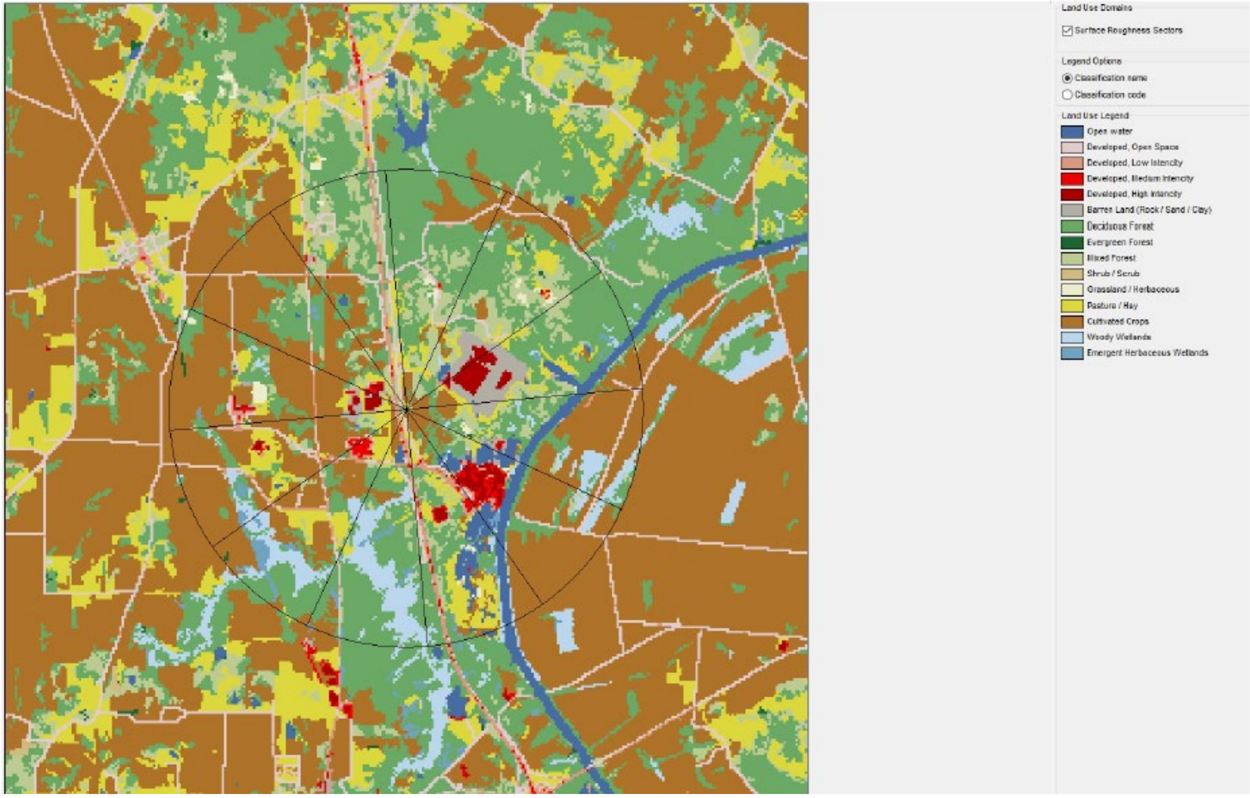
2.4.1.3.Modeling Parameter: Rural or Urban Dispersion

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

For the purpose of performing the modeling for the area of analysis, the Commonwealth determined that it was most appropriate to run the model in rural mode.

Kentucky used the Auer method to determine the land use status of the area around the facilities. Kentucky used a 3-km radius centered on the Sebree SO_2 Monitor to evaluate land use surrounding the Century Aluminum and BREC facilities, based on the Auer land use categories (USGS NLCD 2016). The results of the Auer land use analysis are presented in Figure 4 (Figure 1 of Kentucky's November 12, 2020, submittal). The analysis indicates that the majority of land use can be categorized as undeveloped, pasture, and farmland.

Figure 4. Land Use Diagram Surrounding Century and BREC



Land Use Domains

☑ Surface Roughness Sectors

Legend Options

● Classification name

○ Classification code

Therefore, the Commonwealth determined that it was most appropriate to run the model with rural dispersion coefficients, and EPA agrees with this determination.

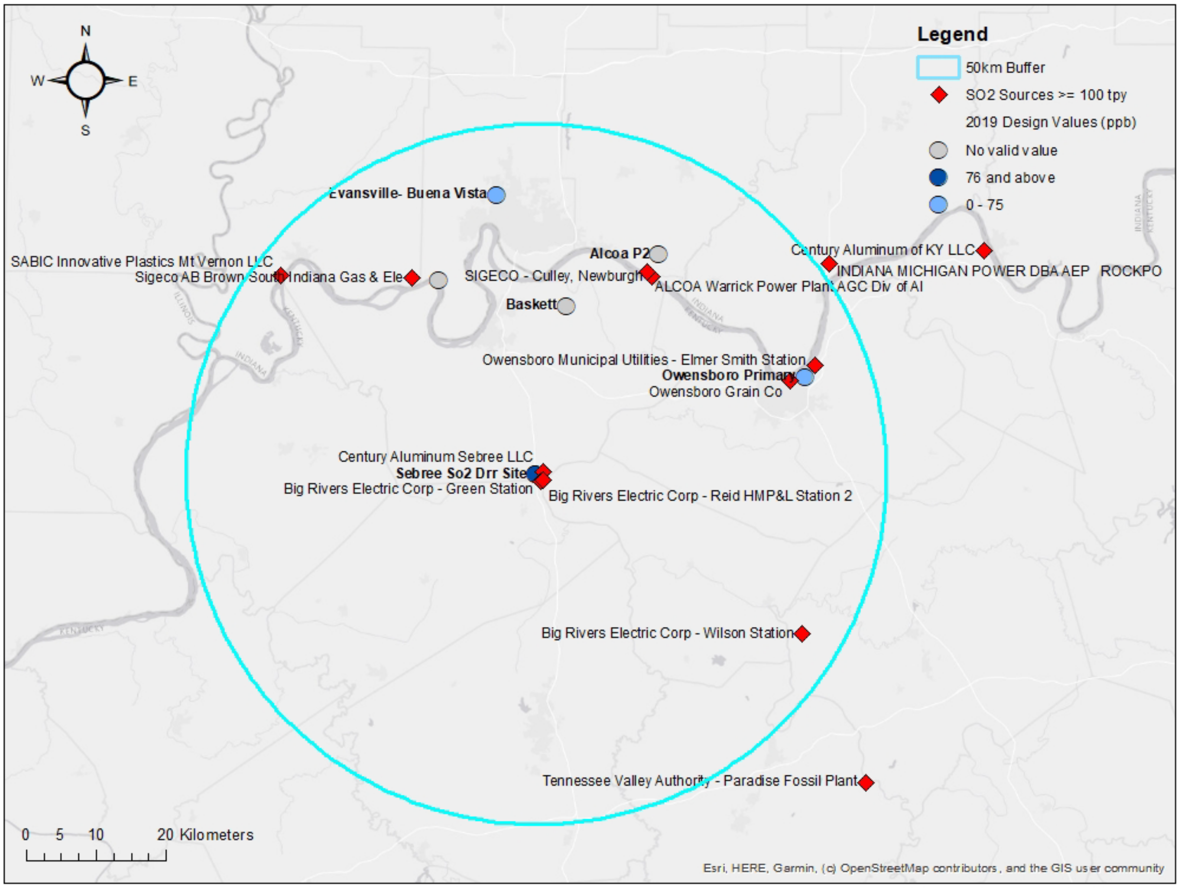
2.4.1.4.Modeling Parameter: Area of Analysis (Receptor Grid)

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

The sources of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. For the Henderson-Webster, Kentucky area, the Commonwealth has included no other emitters of SO_2 within or outside the modeling domain that consists of EPA's intended nonattainment boundary. The Commonwealth determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS violations in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas.

EPA has evaluated the need to include in the modeling analysis any additional SO_2 emissions sources within 50 km of the Century Aluminum and BREC DRR facilities. Figure 5 shows the large SO_2 sources within 50 km. Based upon the levels of emissions and distance from the DRR facilities, EPA agrees that no additional SO_2 sources need to be included in the modeling analysis. EPA believes that the background concentrations from the Evansville, Indiana background monitor adequately account for any potential SO_2 impacts from these sources in the modeling domain.

Figure 5. Large SO_2 Emissions Sources within 50 km of the Century Aluminum and BREC DRR facilities



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

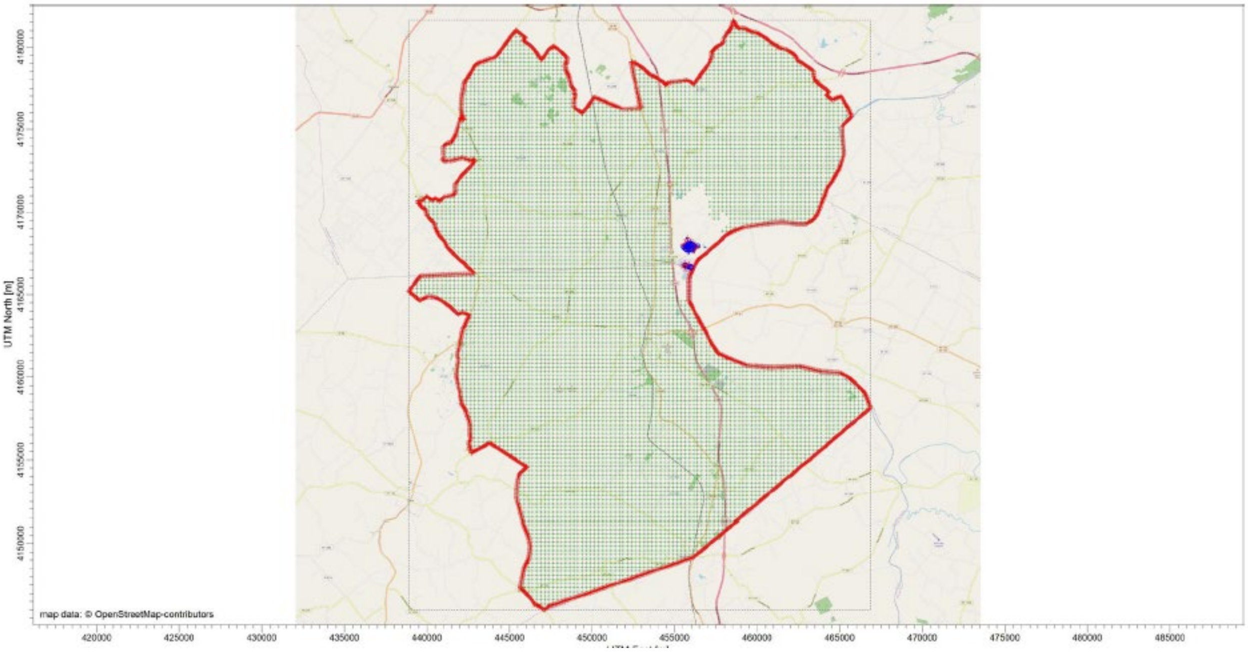
- A cartesian receptor grid with 250 meters spacing between receptors within EPA's intended non-attainment boundary
- Cartesian boundary receptors with 50 meter spacing along EPA's intended nonattainment area boundary.

The receptor network contained 12,160 receptors, and the network covered portions of Henderson and Webster Counties in Kentucky. EPA believes that the 250-meter spacing in the receptor grid is adequate to detect significant gradients in concentrations in the area. As shown in Figure 10 in Section 2.4.1.10, Kentucky's recommended nonattainment area boundary provides an adequate buffer around the receptors with modeled violations of the NAAQS, especially areas with elevated terrain to the southwest of the Century Aluminum and BREC facilities, to account for any areas that could potentially show modeled violations with a denser receptor grid spacing (e.g., 100-meter spacing). Therefore, we believe the 250-meter spacing is adequate for the purposes of defining the nonattainment boundary.

Figure 6, included in the Commonwealth's recommendation, show the Commonwealth's chosen area of analysis surrounding the three facilities, as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the Commonwealth placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility. With the exception of the areas within the Century Aluminum and BREC facilities' fencelines, the Commonwealth included receptors in all areas within EPA's intended nonattainment boundary, including areas where it would not be feasible to place a monitor. The Commonwealth did not provide any information to substantiate the ambient air boundaries of the Century Aluminum and BREC facilities. However, since the purpose of the modeling is to inform the selection of nonattainment area boundaries, and the modeling results show violations of the NAAQS surrounding each of the facilities, and the facilities are fully encompassed within the Commonwealth's recommended nonattainment boundary, EPA does not believe that it is necessary to precisely delineate the ambient air boundaries at the facilities for this analysis.

Figure 6. Receptor Grid for the Henderson-Webster, Kentucky Area



EPA believes that Kentucky's receptor grid is appropriate for the characterization of the area, considering the impacts of SO_2 emissions from the DRR facilities. Also, EPA believes that the receptor grid used in Kentucky's modeling is adequate to determine the extent of the modeled violations of the 1-hour SO_2 NAAQS in the area and thus can be used to inform selection of the nonattainment boundary. However, in future attainment state implementation plan (SIP) development, the State's modeling will need to include all ambient air receptors.

2.4.1.5.Modeling Parameter: Source Characterization

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

Kentucky included the three DRR facilities, Century Aluminum, BREC Reid/HMP&L Station 2, and BREC Green Station, and no other facilities in the modeling demonstration. The BREC facilities have six total emission points that were modeled: two at BREC Green Station: Green Station Boiler 1 and Green Station Boiler 2; two at BREC Reid: Reid Station Unit 1 and Reid Combustion Turbine; and two at HMP&L Station 2: Henderson Station Unit 1 and Henderson Station Unit 2. Century Aluminum consists of an anode bake furnace and potlines as well as a number of smaller and insignificant SO_2 sources. The modeling parameters for these facilities' SO_2 emissions units can be found in Appendix A of Kentucky's November 12, 2020, submittal. As discussed in Section 2.4.1.4 of this TSD, the Commonwealth determined that no other SO_2 emissions sources in the area of analysis needed to be included in the modeling.

The Commonwealth characterized these sources within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the Commonwealth used actual stack heights in conjunction with actual emissions. The Commonwealth also adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPPRM was used to assist in addressing building downwash.

EPA agrees the Commonwealth's characterization of sources in the area. Additionally, the Commonwealth used appropriate parameters for modeling the SO_2 emissions from the sources.

2.4.1.6.Modeling Parameter: Emissions

EPA's Modeling TAD notes that for the purpose of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data.

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

As previously noted, the Commonwealth included Century Aluminum, BREC Reid/HMP&L Station 2, and BREC Green Station and no other emitters of SO_2 within in the area of analysis. For this area of analysis, the Commonwealth has opted to use a hybrid approach, where emissions from certain units at the facilities are expressed as actual emissions, and other units are expressed as potential to emit (PTE) rates. All sources were modeled using actual stack heights. All stack heights for those sources modeled using PTE rates are below the calculated formula Good Engineering Practice (GEP) stack height. The facilities in the Commonwealth's modeling analysis and their associated actual or PTE rates are summarized below.

For BREC Reid/HMP&L Station 2 and BREC Green Station, the Commonwealth provided annual actual SO_2 emissions between 2017 and 2019. The Commonwealth also provided annual actual SO_2 emissions for the anode bake furnace and potlines at Century Aluminum. This information is summarized in Table 3. A description of how the Commonwealth obtained hourly emission rates is given below this table.

Table 3. Actual SO_2 Emissions Between 2017 – 2019 from Facilities in the Area of Analysis for the Henderson-Webster, Kentucky Area

Facility Name	**SO_2 Emissions (tpy)**		
	2017	**2018**	**2019**
HMP&L Station 2	1,408	847	17
BREC Reid	1	2	3
BREC Green Station	3,108	4,114	2,916
Century Aluminum	4,489	4,489	4,489
Total Emissions from All Modeled Facilities in the Commonwealth's Area of Analysis	9,006	9,452	7,425

For BREC Reid/HMP&L Station 2 and BREC Green Station, actual hourly-varying emissions measured with CEMS were used in the AERMOD modeling. The Commonwealth obtained the hourly CEMS data from the U.S. EPA's Air Markets Division (CAMD) database[3]. EPA compared annual emissions values from CAMD to the summed hourly emissions values used in the AERMOD modeling for each of these sources. This comparison confirmed that the modeled emissions match the emissions from CAMD.

Hourly-varying CEMS SO_2 emissions data are not available from the Century Aluminum facility, so the Commonwealth used the most recent stack test data and monthly production records to produce temporally variable actual emissions for the anode bake furnace and potlines. The documentation provided by the Commonwealth contains a spreadsheet that shows the calculations of the monthly-varying emissions. EPA reviewed these calculations and confirmed that they were performed correctly. Also, EPA compared the sum of the emissions used in the modeling to the annual emissions reported for this facility in EPA's Emissions Inventory System (EIS). This comparison showed a small difference between the annual tons per year emissions levels (4,489 tons/year modeled emissions versus 4,629 tons/year reported in the 2017 and 2018 EIS data. EPA believes that the emissions data used in the modeling that is based upon monthly production information and recent stack tests is appropriate for the AERMOD modeling.

For the smaller sources of SO_2 at Century Aluminum, the Commonwealth provided PTE values. This information is summarized in Table 4. A description of how the Commonwealth obtained potential emission rates is given below this table.

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

Table 4. SO_2 Emissions based on PTE from Select Units at Century Aluminum in the Area of Analysis for the Henderson-Webster, Kentucky Area

Facility Name	SO_2 Emissions (tpy, based on PTE)
Century Aluminum Remelt Furnace	0.17
Century Aluminum Holding Furnaces	0.32
Century Aluminum Homogenizing Furnaces	0.14
Century Aluminum Electrode Boiler	0.03
Century Aluminum Indirect Heat Exchanger	0.03
Total Emissions from Facilities in the Area of Analysis Modeled Based on PTE	0.69

The PTE in tons per year for Century Aluminum's natural gas-fired emissions units listed in Table 4 were provided to the Commonwealth by Century Aluminum in previous modeling performed for siting the Sebree DRR monitor in 2016. The Commonwealth used PTE emissions rates (grams/second) in the modeling corresponding to hourly emissions representative of worst-case operations. Emissions were assumed to be the same in each modeled year.

EPA agrees with Kentucky's use of actual hourly-varying emissions for BREC Reid/HMP&L Station 2 and BREC Green Station from CEMS at the facilities. EPA also agrees with using the most recent stack test data and monthly production records to produce temporally variable actual emissions for the anode bake furnace and potlines at Century Aluminum. Additionally, EPA agrees with modeling the smaller, natural gas-fired units at Century Aluminum using potential emissions.

2.4.1.7.Modeling Parameter: Meteorology and Surface Characteristics

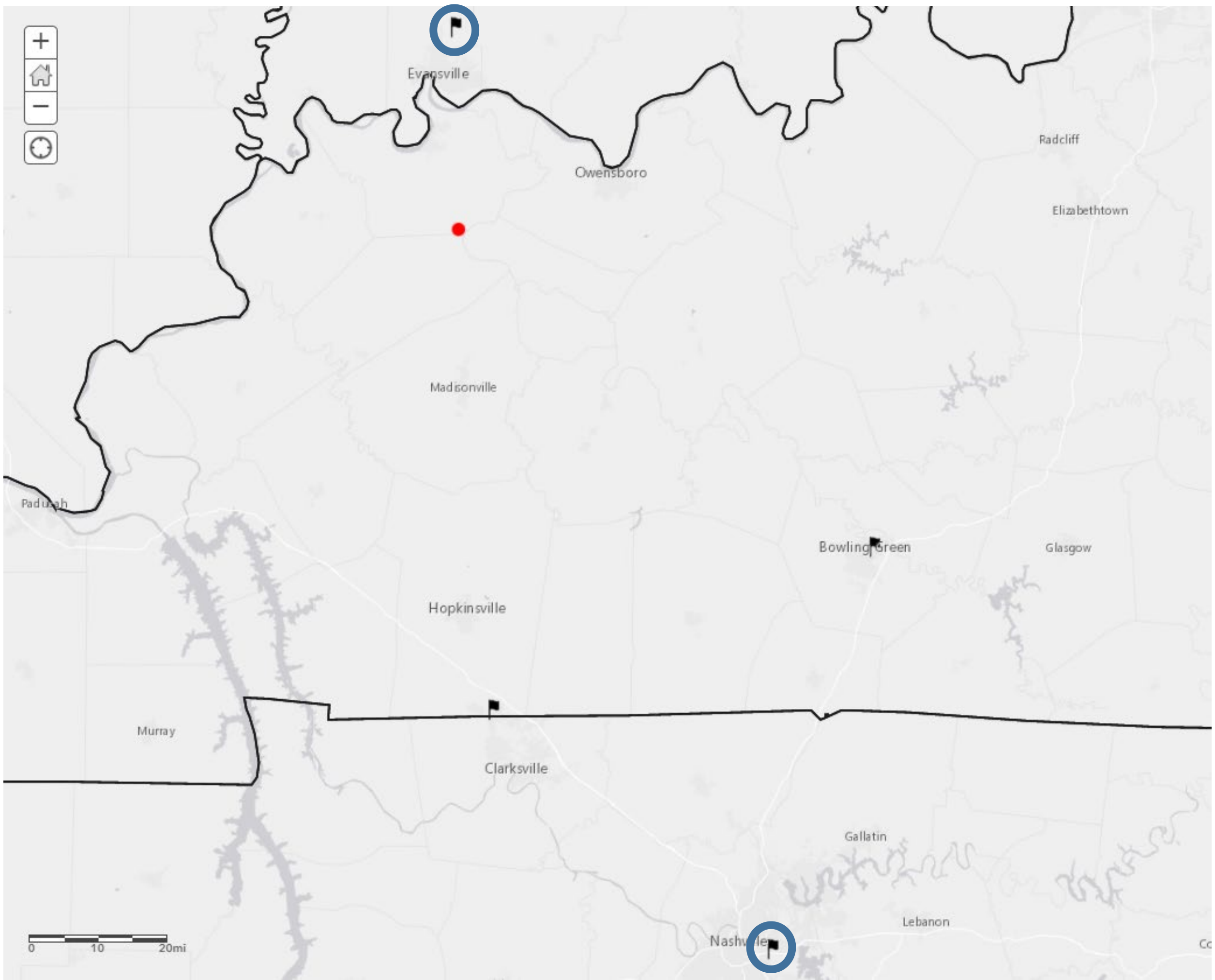
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data, for sources modeled with actual emissions) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness.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

For the area of analysis for the Henderson-Webster, Kentucky area, the Commonwealth selected the surface meteorology from the Evansville Regional Airport NWS station in Evansville, Indiana, located at 38.044 N, 87.521 W, approximately 43 km to the north of the facilities, and coincident upper air observations from a different NWS station, at Nashville International Airport in Nashville, Tennessee, located at 36.126 N, 86.677 W, approximately 185 km to the southeast of the facilities as best representative of meteorological conditions within the area of analysis.

The Commonwealth used AERSURFACE version 20060 using data from the Evansville NWS station to estimate the surface characteristics of the area of analysis. The Commonwealth estimated values for twelve 30° spatial sectors out to 1 km at a monthly temporal resolution for average conditions. The Commonwealth also estimated values for albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the method generally used to calculate heat lost or heat gained in a substance), and the surface roughness (sometimes referred to as “Zo” and is related to the height of obstacles to the wind flow, which is an important factor in determining the magnitude of mechanical turbulence and the stability of the boundary layer).

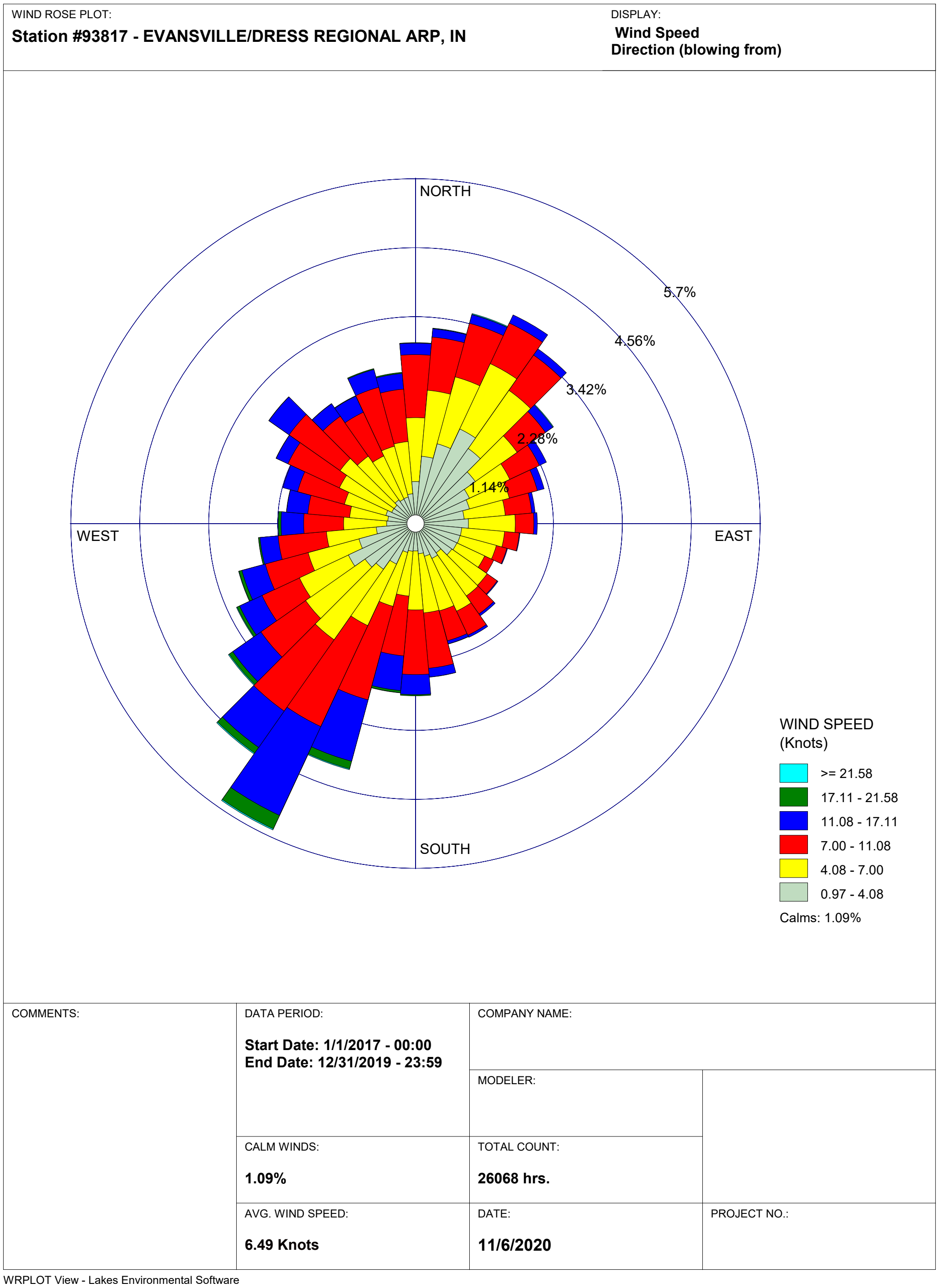
In the figure below, generated by EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 7. Area of Analysis and the NWS stations in the Henderson-Webster, Kentucky Area



EPA generated a surface wind rose for the Evansville, Indiana NWS station for the 2017-2019 period using Lakes Environmental's WRPLOT-View software with the AERMET surface data file provided by Kentucky for the modeled period. In Figure 8, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. This wind rose indicates that the predominant wind direction in the Evansville area is winds blowing from the southwest along with winds blowing from the northeast a significant amount of time.

Figure 8. Henderson-Webster, Kentucky Cumulative Annual Wind Rose for Years 2017 – 2019



WIND ROSE PLOT:
Station #93817 - EVANSVILLE/DRESS REGIONAL ARP, IN

DISPLAY:
Wind Speed
Direction (blowing from)

COMMENTS:

DATA PERIOD:
Start Date: 1/1/2017 - 00:00
End Date: 12/31/2019 - 23:59

COMPANY NAME:

MODELER:

CALM WINDS:
1.09%

TOTAL COUNT:
26068 hrs.

AVG. WIND SPEED:
6.49 Knots

DATE:
11/6/2020

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET processor (version 19191). The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The Commonwealth followed the methodology and settings presented in the SO_2 Modeling TAD and the AERMET User's Guide in the processing of the raw meteorological data into an AERMOD-ready format and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration was provided from the Evansville NWS station, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE (version 15272). These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the Commonwealth set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data. In addition, the "Ice-Free Winds Group" AERMINUTE option was selected for processing and the meteorological data was processed by applying Adjust Surface Friction Velocity (ADJ_U*).

EPA believes that the surface and upper air meteorological data selected by the Commonwealth of Kentucky for use in this modeling analysis is acceptable and was processed in a manner consistent with the SO_2 modeling TAD. EPA believes that the meteorological data shows that impacts from Century Aluminum, BREC Reid/HMP&L Station 2, and BREC Green Station are reasonably expected to most frequently occur generally northeast of each respective facility, but as shown in Figure 12 in Section 2.4.1.10, the maximum modeled concentrations occur south and west of the facilities.

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

The terrain in the area of analysis is best described as gently rolling with some hills above the stack heights of the BREC and Century Aluminum facilities. To account for these terrain changes, the AERMAP (version 18081) terrain program within the AERMOD Modeling System was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the USGS National Elevation Database (NED).

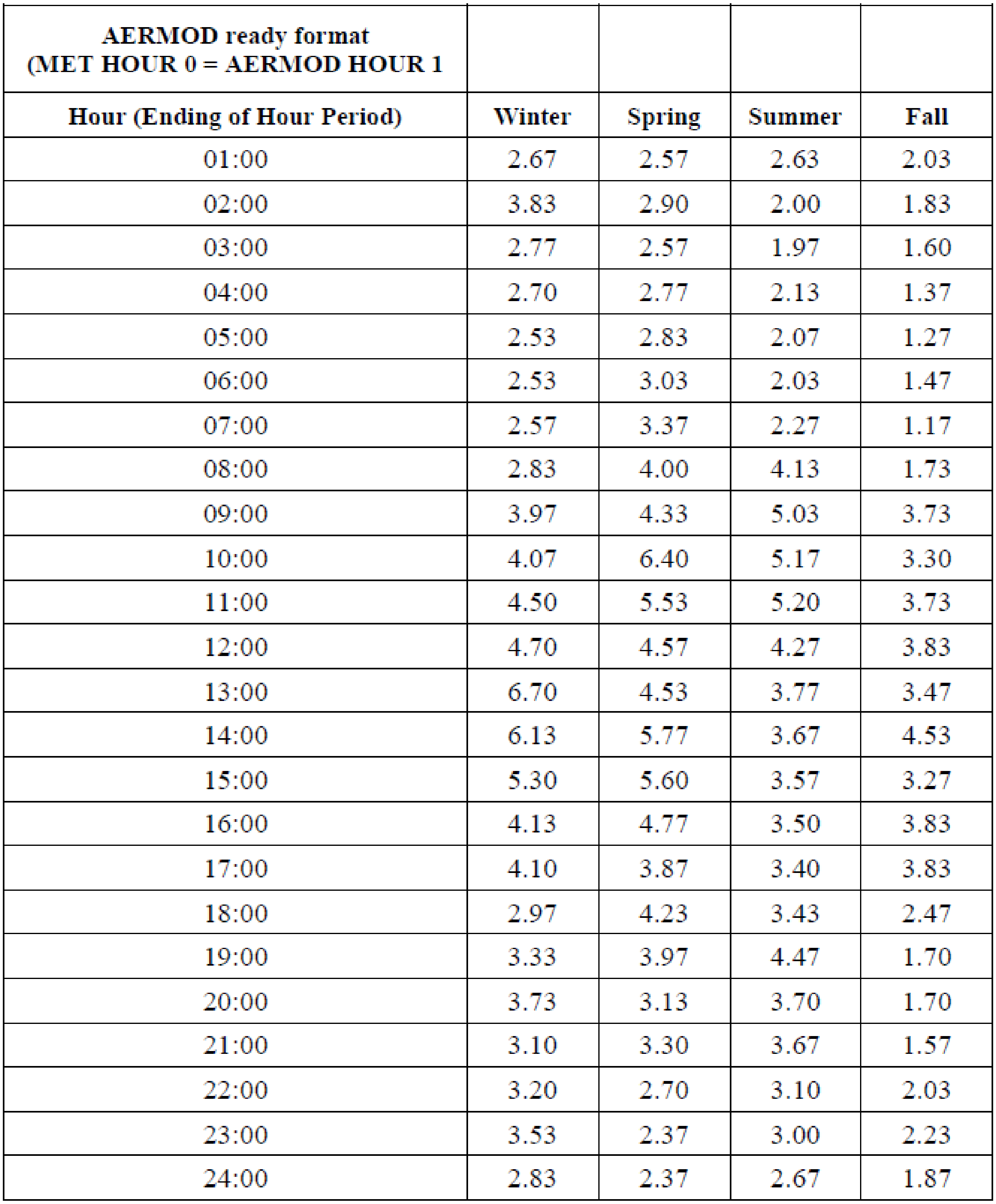
EPA agrees with the Commonwealth's use of the USGS NED database and AERMAP terrain processor for AERMOD to account for the changes in elevation of the area to obtain a more accurate modeling result.

2.4.1.9.Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a “tier 1” approach, based on a monitored design value, or 2) a temporally varying “tier 2” approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the Commonwealth chose to use a tier 2 approach with background concentrations varying by season and by hour of day from the Evansville-Buena Vista monitor (AQS ID# 18-163-0021), located in Evansville, Indiana, approximately 40 km north of the Century Aluminum and BREC DRR facilities. The background concentrations for this area of analysis were determined by the Commonwealth to vary from 3.06 micrograms per cubic meter ($\mu g/m^3$), equivalent to 1.17 ppb when expressed in three significant figures, to 17.5 $\mu g/m^3$ (6.70 ppb), with an average value of 8.73 $\mu g/m^3$ (3.34 ppb). Table 5 provides the complete set of season-hour of day varying background data.

The Commonwealth chose to use the Evansville-Buena Vista monitor because it is representative of the Sebree area background and accounts for potential influences of distant, large SO2 sources in the area. The Evansville SO2 monitor is located approximately 16 km northeast of the Vectren-A. B. Brown Generating Station. The monitor is also approximately 25 km northwest of the Vectren-F. B. Culley Generating Station, Alcoa-Vectren-Warrick Generating Station, and the Alcoa Warrick aluminum smelter operation in Newburgh, IN. The Evansville monitor is closer to these facilities than the facilities are to the Century Aluminum and BREC facilities. The Commonwealth determined that the Evansville monitor is likely impacted by the above-named facilities and that it is an appropriate and representative background monitor for the modeling analysis.

Table 5. Seasonal Hourly SO_2 Concentrations at the Evansville-Buena Vista Monitor



AERMOD ready format (MET HOUR 0 = AERMOD HOUR 1				
Hour (Ending of Hour Period)	**Winter**	**Spring**	**Summer**	**Fall**
01:00	2.67	2.57	2.63	2.03
02:00	3.83	2.90	2.00	1.83
03:00	2.77	2.57	1.97	1.60
04:00	2.70	2.77	2.13	1.37
05:00	2.53	2.83	2.07	1.27
06:00	2.53	3.03	2.03	1.47
07:00	2.57	3.37	2.27	1.17
08:00	2.83	4.00	4.13	1.73
09:00	3.97	4.33	5.03	3.73
10:00	4.07	6.40	5.17	3.30
11:00	4.50	5.53	5.20	3.73
12:00	4.70	4.57	4.27	3.83
13:00	6.70	4.53	3.77	3.47
14:00	6.13	5.77	3.67	4.53
15:00	5.30	5.60	3.57	3.27
16:00	4.13	4.77	3.50	3.83
17:00	4.10	3.87	3.40	3.83
18:00	2.97	4.23	3.43	2.47
19:00	3.33	3.97	4.47	1.70
20:00	3.73	3.13	3.70	1.70
21:00	3.10	3.30	3.67	1.57
22:00	3.20	2.70	3.10	2.03
23:00	3.53	2.37	3.00	2.23
24:00	2.83	2.37	2.67	1.87

EPA agrees with the Commonwealth's use of a time-varying season by hour of day tier 2 approach with background concentration data from the Evansville-Buena Vista ambient SO_2 monitor. EPA also agrees with the Commonwealth's rationale for selection of the Evansville-

Buena Vista monitor as it likely accounts for potential long-range impacts for large SO_2 emissions sources located over 30 km from the Century Aluminum and BREC facilities.

2.4.1.10. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Henderson-Webster, Kentucky area of analysis are summarized below in Table 6.

Table 6. Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Henderson-Webster, Kentucky Area

Input Parameter	Value
AERMOD Version	19191
Dispersion Characteristics	Rural
Modeled Sources	3
Modeled Stacks	28 point sources and 1 buoyant line source with 6 lines
Modeled Structures	79
Modeled Fencelines	2
Total receptors	12,160
Emissions Type	Mixed/Hybrid
Emissions Years	2017-2019 Actual Emissions from the BREC sources and the large sources at Century Aluminum. PTE for small natural-gas fired sources at Century Aluminum.
Meteorology Years	2017-2019
NWS Station for Surface Meteorology	Evansville, IN
NWS Station Upper Air Meteorology	Nashville, TN
NWS Station for Calculating Surface Characteristics	Evansville, IN
Methodology for Calculating Background SO_2 Concentration	Tier 2, monitored concentrations varying by season and by hour of day, from the Evansville-Buena Vista monitor (AQS ID# 18-163-0021), located in Evansville, Indiana
Calculated Background SO_2 Concentration	Varying between 1.17 ppb and 6.70 ppb

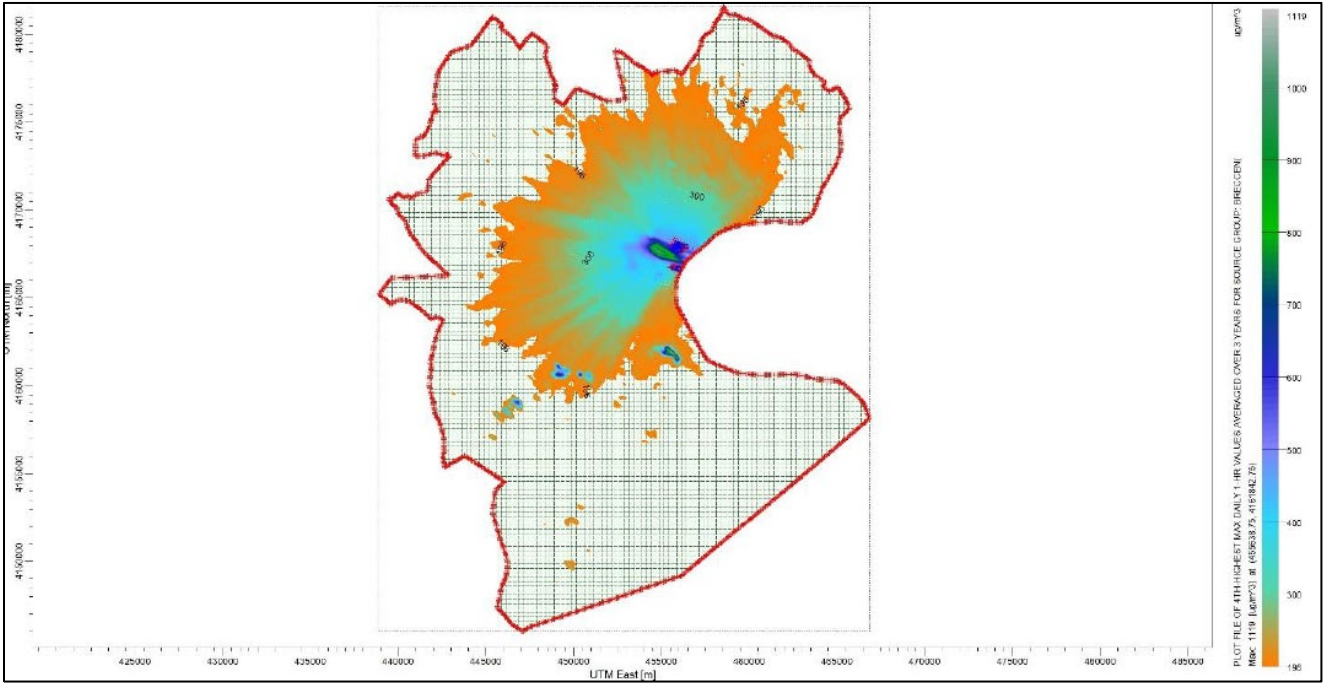
The results presented below in Table 7 and Figure 9 show the geographic extent of the predicted modeled violations based on the input parameters. The Commonwealth's receptor grid is also shown in Figure 9.

Table 7. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over Three Years for the Area of Analysis for the Henderson-Webster, Kentucky Area

Averaging Period	Data Period	Receptor Location UTM zone 16		99th percentile daily maximum 1-hour SO_2 Concentration (μg/m³)	
		UTM Easting (m)	UTM Northing (m)	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2017-2019	455638.75	4161842.75	1119.0	196.4*

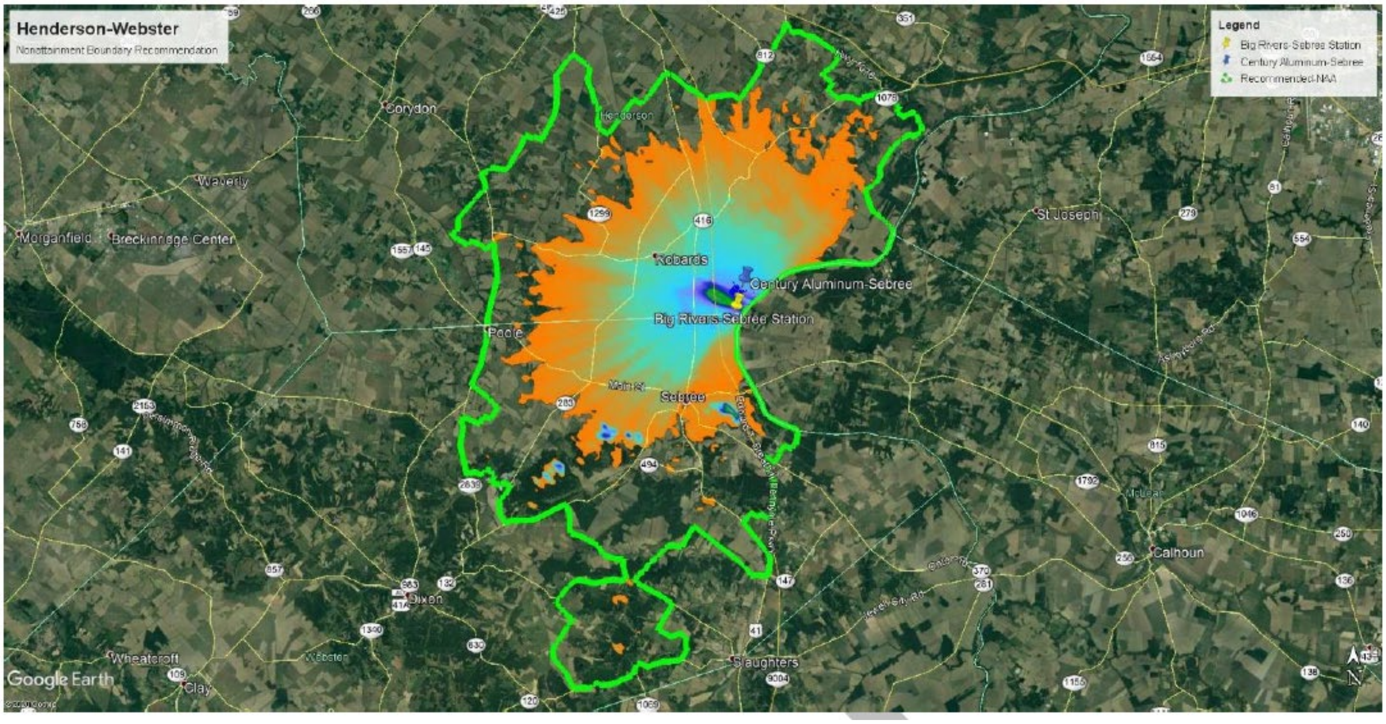
*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 μg/m³ conversion factor

Figure 9. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over Three Years for the Area of Analysis for the Henderson-Webster, Kentucky Area



The modeling submitted by the Commonwealth indicates that the 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration. The modeling results also include the area in which a NAAQS violation was modeled, information that is relevant to the selection of the boundaries of the area that will be designated. Figure 10 was included as part of the Commonwealth's recommendation and indicates that the predicted modeled violations are fully contained within the state's recommended nonattainment area boundary.

Figure 10. Kentucky's Recommended Nonattainment Boundary Encompassing All Areas of Modeled Violations for the Henderson-Webster, Kentucky Area



The Commonwealth used roadways and landmarks to define the nonattainment boundary and provided Figure 11 and Table 8 to clearly described the boundary and identify the UTM coordinates of the vertices of the nonattainment area polygon.

Figure 11. Kentucky's Recommended Nonattainment Boundary

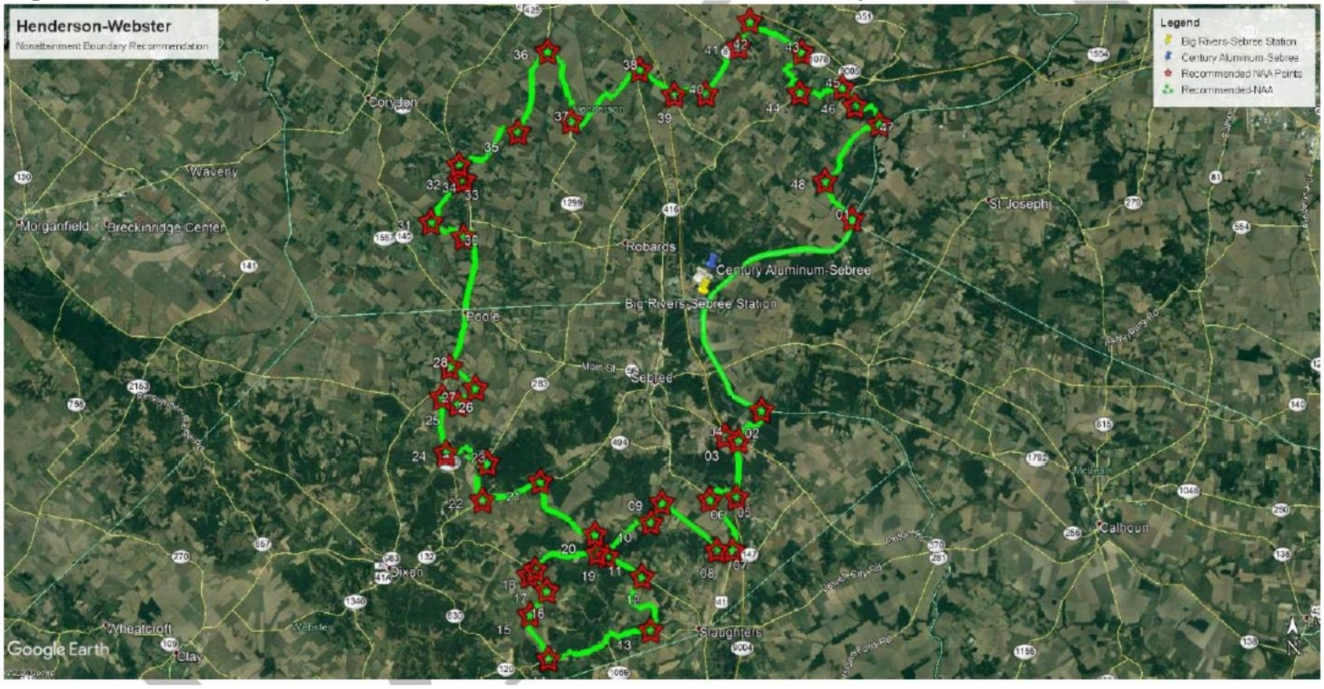


Table 8. Detailed Description of Kentucky's Recommended Nonattainment Boundary

Point ID	Recommended NAA Boundary Point Pathway		X Coord. (UTM)	Y Coord. (UTM)
01	KY 520, Upper Delaware Rd	The Green River boundary	463979.00	4171000.03
02	The Green River boundary	JZ Shelton Rd	459058.03	4160832.96
03	JZ Shelton Rd	KY 370	457811.00	4159192.96
04	KY 370	Pennyrile Parkway I-69	457089.96	4159452.95
05	Pennyrile Parkway I-69	Sassafras Grove Rd	457675.35	4156244.55
06	Sassafras Grove Rd	US 41	456236.68	4156125.75
07	US 41	Slaughters Elmwood Rd	457442.82	4153425.68
08	Slaughters Elmwood Rd	Railroad Track (NW)	456589.41	4153424.43
09	Railroad Track (NW)	Breton Rd	453677.09	4155992.29
10	Breton Rd	KY 1835	453079.74	4154924.00
11	KY 1835	KY 138	450702.89	4153141.51
12	KY 138	Crowder Rd	452587.06	4152032.38
13	Crowder Rd	KY 120	453030.14	4149175.08
14	KY 120	Gooch Jones Rd	447528.25	4147663.88
15	Gooch Jones Rd	John Roach Rd	446551.75	4150042.51
16	John Roach Rd	Old Dixon Slaughters Rd	447462.17	4151329.04
17	Old Dixon Slaughters Rd	Old Dixon Rd	446532.28	4152143.23
18	Old Dixon Rd	KY 138	446849.49	4152437.09
19	KY 138	Carnel Brooks Rd	450196.38	4153305.18

20	Carnel Brooks Rd	Rakestraw Bottoms Rd	450079.34	4154326.39
21	Rakestraw Bottoms Rd	KY 132	447141.40	4157145.04
22	KY 132	KY 283	444025.55	4156172.90
23	KY 283	Beckley Osbourne Rd	444300.82	4158111.35
24	Beckley Osbourne Rd	Dixon Wanamaker Rd	442067.07	4158641.90
25	Dixon Wanamaker Rd	KY 191	441887.88	4161614.33
26	KY 191	D Melton Rd	442743.25	4161250.11
27	D Melton Rd	Knoblick Creek Rd	443688.82	4162093.08
28	Knoblick Creek Rd	US 41A	442319.35	4163220.45
29	US 41A	Dixon 1 Rd	443500.62	4170518.52
30	Dixon 1 Rd	GF Sights Rd	443094.58	4170166.59
31	GF Sights Rd	Cairo Dixie Rd	441341.46	4170978.60
32	Cairo Dixie Rd	Liles Cairo Rd	442919.00	4173140.24
33	Liles Cairo Rd	US 41A	443124.23	4173204.51
34	US 41A	Cairo Hickory Grove Rd	442860.28	4174017.18
35	Cairo Hickory Grove Rd	Pruitt Agnew Rd	446056.06	4175740.98
36	Pruitt Agnew Rd	KY 1299	447662.11	4180049.93
37	KY 1299	Anthoston Frog Island Rd	448905.37	4176327.31
38	Anthoston Frog Island Rd	KY 136	452613.63	4179047.02
39	KY 136	Upper Delaware Rd	454451.59	4177687.26
40	Upper Delaware Rd	Barren Church Rd S	456153.23	4177723.20
41	Barren Church Rd S	Barren Church Rd N	457912.85	4180247.83
42	Barren Church Rd N	KY 1078	458542.52	4181615.55
43	KY 1078	Jones Brothers Rd	461322.00	4179952.85

44	Jones Brothers Rd	KY 416	461209.84	4177755.55
45	KY 416	KY 1078	463492.08	4178026.50
46	KY 1078	Onionville Rd	464177.31	4177054.13
47	Onionville Rd	Work Road	465476.34	4176076.78
48	Work Road	Upper Delaware Rd	462529.15	4173036.52

The Commonwealth also provided Figure 12, which indicates that the greatest SO_2 impacts are within 9 km of the sources under consideration.

Figure 12. Greatest Potential Impact Distance from Modeled Sources

2.4.1.11. EPA's Assessment of the Modeling Information Provided by the Commonwealth

EPA agrees with the modeling methodology used by Kentucky to characterize the area surrounding the Century Aluminum and BREC DRR facilities in the final November 12, 2020, modeling submittal. The Commonwealth performed the modeling using AERMOD version 19191, which is the current version of EPA's preferred regulatory model. The modeling was performed using default regulatory options and following the guidance provided in EPA's Modeling TAD and Guideline on Air Quality Models (40 CFR Part 51, Appendix W).

The following discussion provides a brief summary of EPA's assessment of the major components of the modeling. EPA agrees with the Commonwealth's area of analysis and source characterization components of the modeling. EPA has evaluated the need to include in the modeling analysis any additional SO_2 emission sources within 50 km of the facilities and agrees that no additional SO_2 sources need to be included in the modeling analysis based upon the levels of emissions and distance from the DRR facilities. All other nearby sources not included in the modeling were addressed with the background concentrations used in the modeling. With regards to the background concentrations, the Commonwealth chose the Evansville-Buena Vista monitor to account for potential influences of distant, large SO_2 sources in the area that were not included in the modeling. EPA agrees with the monitor chosen for background concentrations and the 2017-2019 data period. With regards to the receptor grid, EPA believes that Kentucky's receptor grid is appropriate for the characterization of the area, considering the impacts of SO_2 emissions from the DRR facilities. The receptor grid used in Kentucky's modeling is adequate to determine the extent of the modeled violations of the 1-hour SO_2 NAAQS in the area and thus can be used to inform selection of the nonattainment boundary.

EPA also agrees with Commonwealth's selection of meteorology, terrain, and emissions data for the modeling assessment. The surface and upper air meteorological data used in the modeling analysis is appropriate for performing a valid modeling assessment. The Commonwealth appropriately used the AERMET, AERMINUTE, and AERSURFACE meteorology pre-processors to prepare the meteorological data for use in AERMOD. The Commonwealth also appropriately used the AERMAP pre-processor to account for the terrain in the modeling domain and appropriately classified the area as rural using the Auer method to evaluate land-use. The Commonwealth has addressed EPA's original comments in the 120-day intended designation letter that the modeling be revised to include the emissions from all three DRR facilities that are characterized by the Sebree SO_2 Monitor. EPA agrees with Kentucky's use of actual hourly-varying emissions from 2017-2019 for BREC Reid/HMP&L Station 2 and BREC Green Station from CEMS at the facilities. EPA also agrees with using the most recent stack test data and monthly production records to produce temporally variable actual emissions for the anode bake furnace and potlines at Century Aluminum. Additionally, EPA agrees with modeling the smaller, natural gas-fired units at Century Aluminum using potential emissions.

Considering all the data and modeling procedures described in Sections 2.4.1.1 through 2.4.1.10 of this final designations TSD, EPA agrees that Kentucky's November 12, 2020, modeling captures the geographic extent of the violations and can be used to establish the corresponding nonattainment boundary.

2.5. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Henderson-Webster, Kentucky Area

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

2.6. Jurisdictional Boundaries in the Henderson-Webster, Kentucky Area

Kentucky provided an analysis of the jurisdictional boundaries to establish the geographic extent of the nonattainment area in Henderson and Webster Counties. EPA considers existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary for carrying out the air quality planning and enforcement functions for the area. Our goal is to base designations on clearly defined legal boundaries that align with existing administrative boundaries when reasonable. Existing jurisdictional boundaries used to define a nonattainment area must encompass the area that has been identified as meeting the nonattainment definition.

After assessing the five factors outlined above, the Commonwealth recommended the nonattainment boundary illustrated in Figure 11 above, which utilizes permanent and readily identifiable jurisdictional boundaries, roadways, and geographical landmarks to inform the Henderson-Webster partial nonattainment boundary. The Commonwealth's November 12, 2020, nonattainment boundary includes those undesignated portions of Henderson and Webster Counties encompassed by the polygon bounded by 48 vertices using UTM coordinates as described in Table 8 above. Kentucky's boundary includes the violating DRR monitor and all three DRR sources: Century Aluminum, BREC Reid/HMP&L Station 2 and Robert D. Green Station. Table 8 above provides a description of the vertices (*i.e.*, UTM geographic coordinates) and the identifiable roadways and physical landmarks that define the geographical extent of the partial nonattainment boundary. EPA believes the Commonwealth's boundary recommendation provides for a clear, legally defined boundary and encompasses an area identified as meeting the nonattainment definition. The Commonwealth also recommends attainment/unclassifiable for the remaining undesignated areas in Henderson and Webster County not included in the Commonwealth's nonattainment boundary described above. See Figure 13.

2.7. Other Information Relevant to the Designation of the Henderson-Webster, Kentucky Area

Kentucky's November 12, 2020, response to EPA's August 13, 2020, intended designations includes an updated nonattainment boundary recommendation based on a modeling analysis for the undesignated portions of Henderson-Webster Area. EPA's assessment of the Commonwealth's modeling analysis and updated nonattainment boundary recommendation is provided in sections 2.4.1, 2.5 and 2.6 above. EPA received comments from the Sierra Club regarding the intended designation for the Henderson-Webster area. These comments are addressed in the Response to Comments document associated with this final action.

2.8. EPA's Assessment of the Available Information for the Henderson-Webster, Kentucky Area

A monitor in the Henderson-Webster area is violating the NAAQS based on the 2017-2019 design value. Kentucky submitted air dispersion modeling to demonstrate the extent of the NAAQS violations and to establish a nonattainment boundary.

Kentucky submitted additional air dispersion modeling on November 12, 2020, superseding an October 16, 2020, submission to define the extent of the nonattainment area for the Henderson-Webster Area. The Commonwealth's modeling supports the Commonwealth's updated nonattainment boundary recommendation of a nonattainment boundary that includes undesignated portions of Henderson and Webster Counties. EPA believes Kentucky's air dispersion modeling accurately characterizes the extent of the nonattainment boundary based on more recent emissions from both power plants (Robert Reid Station/Henderson Municipal Power and Light (HMP&L) Station 2, and Robert D. Green Station) and the aluminum plant (Century Aluminum), and considered the most recent meteorology data, current background concentrations from nearby monitors, and the current version of AERMOD.[4]

EPA believes that this updated modeling is more representative of the area than the modeling used to site the monitor that was used to develop the intended nonattainment boundary and it accounts for all modeled impacts above the SO_2 standard. EPA believes that our final nonattainment area, bounded by the UTM coordinates listed in Table 8 above, will have clearly defined legal boundaries, and we find these boundaries to be a suitable basis for defining our final nonattainment area.

EPA has no evidence to suggest that violations are occuring in the remainder of Henderson or Webster Counties or that there are sources outside the nonattainment area that are contributing to the violations in the nonattainment area. Specifically, the remainder of Henderson and Webster counties do not contain any sources that emitted greater than 2,000 tpy of SO_2 in 2017 - 2019. For these reasons, EPA is designating the remainder of Henderson and Webster Counties as attainment/unclassifiable.

2.9. Summary of EPA's Final Designation for the Henderson-Webster, Kentucky Area

After careful evaluation of the Commonwealth's recommendation and supporting information, as well as all available relevant information, EPA is designating a portion of the Henderson-Webster, Kentucky area as nonattainment for the 2010 SO_2 NAAQS. Specifically, the boundaries are comprised of the portions of Henderson County and Webster County contained within the area bounded by the UTM coordinates listed in Table 8 above.

Additionally, EPA is designating the remainder of Henderson County and Webster County as attainment/unclassifiable. Figure 13 shows the boundary of this final designated area.

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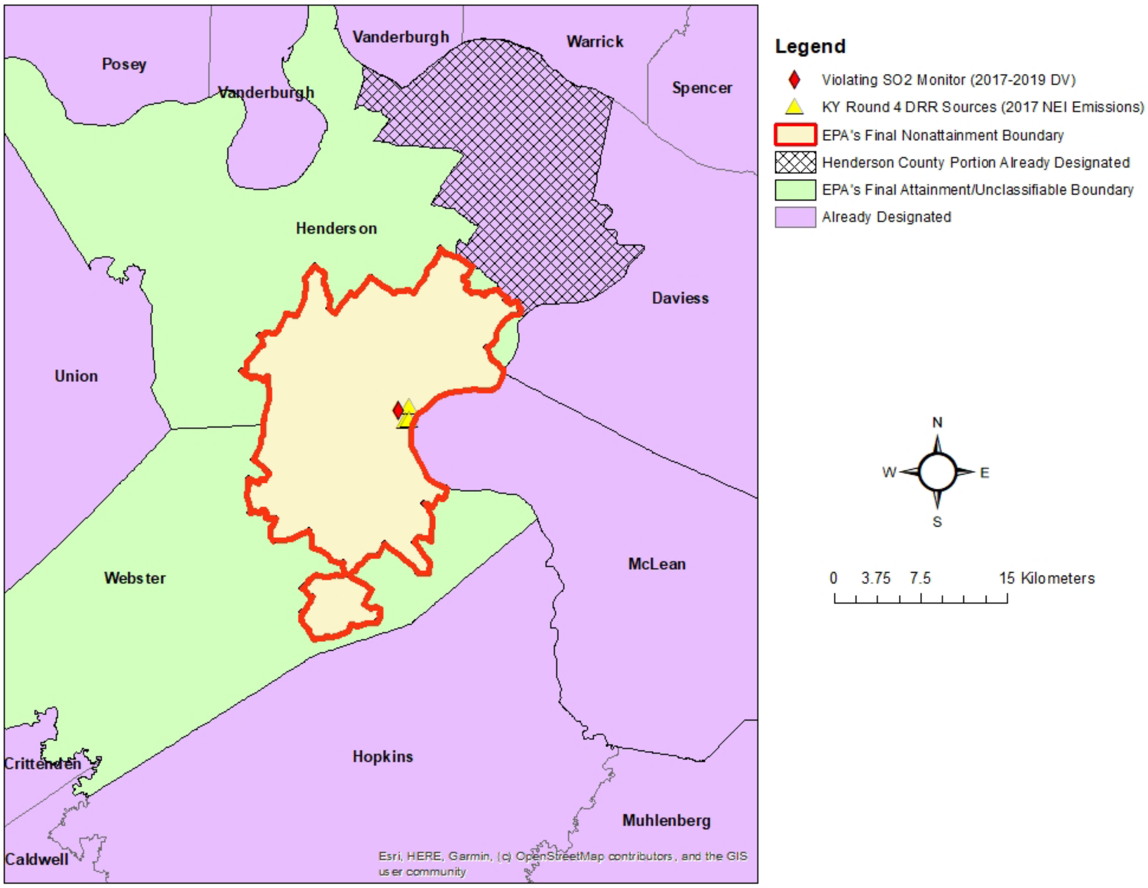
[4] EPA's assessment of the modeling for the Henderson-Webster area to inform our nonattainment boundary for 2010 SO_2 NAAQS designations does not imply that the modeling is appropriate for other purposes, such as new source review, interstate transport, or state implementation plan demonstrations.

Figure 13. Boundary of the Final Henderson-Webster Nonattainment Area



APPENDIX C

Nonattainment Area Monitoring Data

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: JNALL

DESIGN VALUE REPORT

Report Request ID: 2210835 Report Code: AMP480 Jul. 22, 2024

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	21	101	1011								

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
DESIGN VALUE	42401		

SELECTED OPTIONS

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

DATE CRITERIA

Start Date	End Date
2017	2023

APPLICABLE STANDARDS

Standard Description
SO2 1-hour 2010

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jul. 22, 2024

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: Kentucky

		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.
21-101-1011	Alcan Aluminum Road, 1.0 Mi	4	94.0	Y							94	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 ('*').

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jul. 22, 2024

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: 2018
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Kentucky

		2018			2017			2016			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.**
21-101-1011	Alcan Aluminum Road, 1.0 Mi	4	102.0	M	4	94.0	Y				98	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 ('*').

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jul. 22, 2024

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: 2019
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Kentucky

		2019			2018			2017			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.**
21-101-1011	Alcan Aluminum Road, 1.0 Mi	4	99.0	Y	4	102.0	M	4	94.0	Y	98	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: 2020
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Kentucky

		2020			2019			2018			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.
21-101-1011	Alcan Aluminum Road, 1.0 Mi	4	73.0	Y	4	99.0	Y	4	102.0	M	91	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 ('*').

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jul. 22, 2024

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: 2021
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Kentucky

		2021			2020			2019			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.
21-101-1011	Alcan Aluminum Road, 1.0 Mi	4	68.0	Y	4	73.0	Y	4	99.0	Y	80	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 ('*').

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jul. 22, 2024

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: 2022
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Kentucky

		2022			2021			2020			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.**
21-101-1011	Alcan Aluminum Road, 1.0 Mi	4	72.6	Y	4	68.0	Y	4	73.0	Y	71	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: 2023
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.
State Name: Kentucky

		2023			2022			2021			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.
21-101-1011	Alcan Aluminum Road, 1.0 Mi	4	94.3	S	4	72.6	Y	4	68.0	Y	78	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).

APPENDIX D

Attainment Year
Emissions Inventory

Please see attached spreadsheet:

“2024-08-13 Henderson_Webster-Attainment Demo_Emissions Inventory”

APPENDIX E

BREC Green Station Natural Gas Conversion Letter;

BREC HMP&L Station 2 Retirement Letter

Big Rivers
ELECTRIC CORPORATION

Sebree Station
9000 Highway 2096
Robards, KY 42452
www.bigrivers.com

July 29, 2022

Kentucky Division for Air Quality
Department of Environmental Protection
300 Sower Boulevard
Second Floor
Frankfort, KY 40601

Re: Green Station (AI 44411), Unit 1 - Quarterly Reporting for the 2nd Quarter of 2022.

To Whom It May Concern:

Green Station, Unit One is owned and operated by Big Rivers Electric Corporation. This electric generating unit converted from coal-fired to natural gas-fired on May 26, 2022.

Please find enclosed the following quarterly reports for Green Unit 1:

- Excess Emissions and Continuous Monitoring System (CMS) Downtime Summary Reports
- SO_2 and NOx Hourly Emission Rate Report
- Opacity Excess Emissions Report

I certify that, based on the information and belief formed after reasonable inquiry, the statements and information contained in the documents referenced above are true, accurate, and complete.

Please contact Mark Bertram at (270) 844-5708 if you have any questions or require further information.

Sincerely,

Heather Todd

Heather Todd
Plant Manager

Commonwealth of Kentucky
Natural Resources & Environmental Protection Cabinet
Department for Environmental Protection
DIVISION FOR AIR QUALITY

Pollutant: [✓ SO2] NOX TRS H2S CO OPACITY
(circle one)

*FOR OPACITY-RECORD ALL TIMES IN MINUTES. FOR GASES-RECORD ALL TIMES IN HOURS.

(Type or Print Legibly)

Reporting Period Date: From: **4/1/2022** To: **6/30/2022**
Emission Limitation: **> 0.8 lbs/mmBtu - 3 Hour Average**
Company Name: **Big Rivers Electric Corp.**
Address: **201 3rd St., P.O. Box 24**
Henderson, Kentucky 42419-0024
Monitor Manufacture: **Thermo Electron** Model #: **43I**
Date of Latest: CMS CERTIFICATION: **6/7/22** CMS AUDIT:
Process Unit(s) Description: **Green Station Unit 1 - Natural Gas Fired Power Plant**

Total Source Operating Time In Reporting Period?* **540 HOURS**

EMISSION DATA SUMMARY*

(HOURS)

1.Duration of Excess Emission Report Period Due to:

A. Startup/Shutdown:	0
B. Control Equipment Problems:	0
C. Process Problems:	0
D. Other Known Causes:	0
E. Unknown Causes:	0
2. Total Duration of Excess Emission:	0
3. (Total Duration of Excess Emissions) / (Total Source Operating Time) X 100 =	0.00%

CMS PERFORMANCE SUMMARY*

(HOURS)

1. CMS Downtime in Reporting Due to:

A. Monitor Equipment Malfunctions:	0
B. Non-Monitor Equipment Malf:	0
C. Quality Assurance Calibration:	0
D. Other Known Causes:	0
E. Unknown Causes:	0
2. Total CMS Downtime:	0
3. (Total CMS downtime) / (Total Source On Time) X 100 =	0.00%

Describe any changes which have occurred since the last quarterly submittal concerning CMS, PROCESS, or CONTROL: G-1 stopped operating on coal as of 4/4/22 and began operating on natural gas as of 5/26/22.

I CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

NAME: **Heather Todd**

TITLE: **Plant Manager**

SIGNATURE: Heather Todd DATE: 7-29-22

Commonwealth of Kentucky
Natural Resources & Environmental Protection Cabinet
Department for Environmental Protection
DIVISION FOR AIR QUALITY

Pollutant: SO2 [✓ NOX] TRS H2S CO OPACITY
(circle one)

*FOR OPACITY-RECORD ALL TIMES IN MINUTES. FOR GASES-RECORD ALL TIMES IN HOURS.

(Type or Print Legibly)

Reporting Period Date: From: 4/1/2022 To: 6/30/2022
Emission Limitation: > 0.20 lbs/mmBtu - 3-Hour Ave
Company Name: **Big Rivers Electric Corp.**
Address: **201 3rd St., P.O. Box 24**
Henderson, Kentucky 42419-0024
Monitor Manufacture: **Thermo Electron** Model #: **42iQ-ABANN**
Date of Latest: CMS CERTIFICATION: **06/07/22** CMS AUDIT: **06/07/22**
Process Unit(s) Description: **Green Station Unit 1 - Natural Gas Fired Power Plant**

Total Source Operating Time In Reporting Period?* 540 HOURS

EMISSION DATA SUMMARY*

(HOURS)

1. Duration of Excess Emission Report Period Due to:

A. Startup/Shutdown: 0
B. Control Equipment Problems: 0
C. Process Problems: 0
D. Other Known Causes: 0
E. Unknown Causes: 0

2. Total Duration of Excess Emission: 0

3. (Total Duration of Excess Emissions)
(Total Source Operating Time) X 100 = 0.00%

CMS PERFORMANCE SUMMARY*

(HOURS)

1. CMS Downtime in Reporting Due to:

A. Monitor Equipment Malfunctions: 0
B. Non-Monitor Equipment Malf: 0
C. Quality Assurance Calibration: 4
D. Other Known Causes: 9
E. Unknown Causes: 0

2. Total CMS Downtime: 13

3. (Total CMS downtime)
(Total Source On Time) X 100 = 2.41%

Describe any changes which have occurred since the last quarterly submittal concerning CMS, PROCESS, or CONTROL: G-1 stopped operating on coal as of 4/4/22 and began operating on natural gas as of 5/26/22. A new NOx CEMS was certified on 6/7/22.

I CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

NAME: **Heather Todd**

TITLE: **Plant Manager**

SIGNATURE: Heather Todd DATE: 7-29-22

Commonwealth of Kentucky
Natural Resources & Environmental Protection Cabinet
Department for Environmental Protection
DIVISION FOR AIR QUALITY

Pollutant: **SO2** **NOX** **TRS** **H2S** **CO** **[✓ OPACITY]**
(circle one)

*FOR OPACITY-RECORD ALL TIMES IN MINUTES. FOR GASES-RECORD ALL TIMES IN HOURS.

(Type or Print Legibly)

Reporting Period Date: From: **4/1/2022** To: **6/30/2022**
Emission Limitation: **> 20% Opacity - Allowed One Exceedence per Hour (Up to 27%)**
Company Name: **Big Rivers Electric Corp.**
Address: **201 3rd St., P.O. Box 24**
Henderson, Kentucky 42419-0024
Monitor Manufacture: **Spectrum Systems** Model #: **SP41**
Date of Latest: CMS CERTIFICATION: **3/10/2000** CMS AUDIT: **12/09/21**
Process Unit(s) Description: **Green Station Unit 1 - Coal Fired Power Plant**

Total Source Operating Time In Reporting Period?* **32400** **MINUTES**

EMISSION DATA SUMMARY*

(MINUTES)

1.Duration of Excess Emission Report Period Due to:

A. Startup/Shutdown:	0
B. Control Equipment Problems:	0
C. Process Problems:	0
D. Other Known Causes:	0
E. Unknown Causes:	0
2. Total Duration of Excess Emission:	0
3. (Total Duration of Excess Emissions) / (Total Source Operating Time) X 100 =	0.00%

CMS PERFORMANCE SUMMARY*

(MINUTES)

1. CMS Downtime in Reporting Due to:

A. Monitor Equipment Malfunctions:	0
B. Non-Monitor Equipment Malf:	0
C. Quality Assurance Calibration:	198
D. Other Known Causes:	0
E. Unknown Causes:	0
2. Total CMS Downtime:	198
3. (Total CMS downtime) / (Total Source Time) X 100 =	0.61%

Describe any changes which have occurred since the last quarterly submittal concerning CMS, PROCESS, or CONTROL: G-1 stopped operating on coal as of 4/4/22 and began operating on natural gas as of 5/26/22.

I CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

NAME: **Heather Todd**

TITLE: **Plant Manager**

SIGNATURE: Heather Todd

DATE: 7-29-22

Big Rivers
ELECTRIC CORPORATION

EXCESS OPACITY EMISSIONS REPORT
GREEN STATION 1 1st QUARTER 2022

Date	Time	Reading	Code	Comments
				No Opacity Exceedances

HMP&L
Henderson Municipal Power & Light

VIA E-MAIL: Melissa.duff@ky.gov

December 28, 2018

Ms. Melissa Duff, Director
Kentucky Division for Air Quality
300 Sower Boulevard, 2nd Floor
Frankfort, Kentucky 40601

Re: ***Henderson Station II Generating Station Title V Permit; Source I.D. #21-233-00001; Permit #V-11-003 R1; Agency Interest #4196***

Dear Ms. Duff:

Henderson Municipal Power & Light (HMP&L) currently owns Henderson Station II, which is located in Henderson County, Kentucky and regulated under Title V permit #V-11-003 R1. The Title V permit was issued by the Kentucky Division for Air Quality on September 28, 2011 and last revised June 15, 2015.

Henderson Station II is scheduled to be retired effective February 1, 2019. The ownership of the station after January 31, 2019 is in dispute. Nevertheless, both parties intend to cease operations at the plant. The conditions of the Title V permit related to Emission Unit 02 (referred to as Henderson Station Unit 1) and Emission Unit 03 (referred to as Henderson Station Unit 2) will no longer be applicable upon the retirement of this electric generating station. This includes all secondary emission units within the Title V permit (i.e. Emission Unit 4-Coal Handling Operation, Emission Unit 5-Cooling Towers, and Emission Unit 07-08 Emergency Generator and Fire Pump).

Sincerely,

	Robert W Berry
Chris Heimgartner	Bob Berry
General Manager	CEO
Henderson Municipal Power & Light	Big Rivers Electric Cooperative

cc: Mac Cann, KDAQ-Owensboro (mac.cann@ky.gov)
Rick Shewekah, KDAQ-Frankfort (rick.shewekah@ky.gov)
Michael Kennedy, KDAQ-Frankfort (michael.kennedy@ky.gov)
Ken Brooks, HMP&L (kbrooks@hmpl.net)
Mike Pullen, BREC (mike.pullen@bigrivers.com)

100 FIFTH STREET P.O. BOX 8 HENDERSON, KENTUCKY 42419-0008 (270) 826-2726 FAX (270)826-9650

APPENDIX F

Technical Summary Document – MOVES Onroad Inputs;

Vehicle Miles Traveled and Vehicle Hours Traveled Summary File

Summary of Emissions Modeling Decisions

The Kentucky Division for Air Quality (KYDAQ) performed an air quality analyses using the U.S. EPA MOVES3.0.4 mobile emissions simulator. The model demonstration generated SO_2 emissions from Onroad activities in Kentucky counties (Henderson and Webster) for State Implementation Plan (SIP) inclusion. The base year selected to model was 2017 along with the projected years 2021, 2026 and 2033. The MOVES results are presented in tons per year.

Inventory

The raw Fleet data, utilized in the demonstration, was provided by Kentucky Transportation Cabinet (KYTC). The values, in the VMT_VHT spreadsheet, were generated using Kentucky's 5,999 zone Statewide Model. The model ran in Caliper's TransCAD version 8.

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 developed using VMT data from KYDAQ (from Evansville MPO) and Fleet data from KYTC. All processed with LMAPCD workbooks that made use of MOVES default data and FHWA methodology to account for heavy duty pass-through traffic. Oldham County KY was used as a surrogate to assist the development of the input data files for Henderson and Webster counties, scaling the fleet population with county population ratios. All data used included the most recent MOVES input data developed to date by LMAPCD.

Technical Parameters

The parameter selections for the MOVES run specifications and the inputs for the County Data Manager are given in Tables 1 and 2. Run specifications were performed individually by county and year, which resulted in 8 unique iterations of MOVES outputs for this demonstration.

Table 1. Run Specification Parameters

MOVES Version	MOVES3.0.4
Scale	Model: Onroad Domain/Scale: County Calculation Type: Inventory
Time Spans	Years: 2017, 2021, 2026, 2033 Month: All Months Day: Weekdays, Weekends Hours: All Hours
Geographic Bounds	Region: County State: Kentucky County: Henderson, Webster
Onroad Vehicles	All fuels, source use types and combinations
Road Type	All available road types
Pollutants and Processes	SO_2, and Total energy consumption
General Output	Mass Units: Pounds Energy Units: Joules Distance Units: Miles
Output Emissions	Time: Hour Location: County

Table 2. County Data Manager Inputs

Age Distribution	Default
Average Speed Distribution	Default
Fuel	Default
Meteorology Data	Default
Road Type Distribution	Data developed and received from LMAPCD
Source Type Population	Data developed and received from LMAPCD
Vehicle Type VMT	Data developed and received from LMAPCD, KYTC
I/M Programs	No I/M Program

Please see attached spreadsheet:
“VMT_VHT Summaries_fix_042623”

APPENDIX G

Century Aluminum Response to Information Request

Century ALUMINUM
North
America
Operations

November 8, 2021

Ms. Kelly Lewis
Program Planning Branch Manager
Kentucky Division for Air Quality
300 Sower Blvd, 2nd Floor
Frankfort, KY 40601
kelly.lewis@ky.gov

RE: 1-hour SO_2 NAAQS Henderson-Webster Nonattainment Area SIP – Response to Information Request
Century Aluminum Sebree (AI # 1788)

Dear Ms. Lewis:

During an initial planning call between the Kentucky Division for Air Quality (Division), Century Aluminum Sebree LLC (Century), and Trinity Consultants (Trinity) on October 6, 2021, we discussed the nature of the initial work that needs to be completed to make progress towards an end goal of the Division having a sulfur dioxide (SO_2) Nonattainment State Implementation Plan (SIP) for the Henderson-Webster area ready for submittal to the U.S. Environmental Protection Agency (EPA) by October 31, 2022. Century summarized investigative work that has already been completed to better characterize the SO_2 emissions at the Sebree Plant as well as analyses that have been performed to-date on the data from the SO_2 ambient monitoring station and co-located meteorological data monitoring station. We also discussed the options being explored to reduce ambient concentrations at the monitoring station and the challenges associated with implementing those options.

In follow-up to the call, the Division sent an email to Century on October 8, 2021 containing a list of information the Division is looking to obtain to facilitate initial work on the nonattainment SIP. The Division requested that Century respond within 30 days. This letter contains our initial response to the information request.

COMPILATION OF ACTUAL SO_2 EMISSIONS DATA

This section of our response addresses the Division's request for the following information:

- "*Batch processes and information on how emissions are calculated*"
- "*Hourly emissions for each unit (2019, 2020, and 2021)*"

Background on Operations and Emission Units

At the Sebree Plant, Century produces primary aluminum through the electrolytic reduction of raw alumina (Al_2O_3) in vessels termed reduction cells or "pots". Century operates three nearly identical potlines at the Sebree Plant. Each potline is composed of two potroom buildings that each contain 64 reduction cells for a total of 128 cells per potline.

Each pot in the potrooms is constructed as a complete electrolytic circuit with anode, cathode, and electrolyte. The exterior of the pots consists of a rectangular steel shell lined with refractory thermal

insulation. Raw material inputs to the pots include alumina, bath, carbon anodes, and various other additives to the aluminum production process such as aluminum fluoride. Within the pot is an inner lining of carbon (the cathode). Carbon anode blocks are placed just below the surface of a fluoride electrolyte (cryolite) to complete the reaction circuit. A current is applied to metal rods attached to the anode blocks, which passes thorough the molten bath (molten aluminum, cryolite, and alumina) and the carbon cathode lining, and then to the current collector bars. The molten aluminum formed in the reduction cells (as it is liberated from the oxygen in alumina) settles between the anode and cathode where it accumulates. The oxygen liberated reacts with the carbon anode blocks forming carbon dioxide. The accumulated molten metal is siphoned from the pots into crucibles each day. The anode blocks, which are gradually consumed by the reaction in the pots, last a few weeks before they must be replaced with new anodes.

On each potline, the emissions from the reduction cells are captured through hooding systems and are sent to two Alcoa A-398 alumina fluidized bed dry scrubber/baghouse systems, each of which has five reactors. Thus, there are a total of six A-398 alumina fluidized bed dry scrubbers at the plant (2 for each potline) with each one serving half of the pots on a potline. Any fugitive emissions not caught by the hooding system are vented through the roof of each potline.

To provide baked carbon anodes to the reduction cells, Century operates an anode paste mixing and forming operation and an anode bake furnace, in which “green anodes” are baked. The green anodes are formed from petroleum coke, recycled spent anode material, and coal tar pitch, which serves as a binder. The formed anodes are compressed and placed within the bake furnace, where they are baked to remove volatiles, leaving a solid carbon block. The emissions from the paste mixing and anode forming units are vented to a common control device, a Procedair dry coke scrubber. The emissions from the anode bake furnace are sent to an Alcoa A-446 alumina fluidized bed scrubber.

The molten aluminum produced by the reduction cells from all three potlines is sent to the casthouse to be formed into billets and T-bars, along with other products. The casthouse utilizes natural gas-fired holding furnaces to condition molten aluminum and homogenizing furnaces to condition the aluminum billets.

Most of the major equipment and emission units at the Sebree Plant were constructed in 1972 and operations began in 1973. The original emission units included Potlines 1 and 2, the Anode Bake Furnace (ABF) and other support operations. Potline 3 and a second Anode Bake Furnace (now out of service) began operation in 1979. In 2010, following the implementation of an amperage increase project, the production capacity of the plant was increased. The plant currently has a permitted capacity of 253,531 tons per year of aluminum from the potlines.

SO_2 Emissions Calculation Methodology

SO_2 emissions from Century’s Sebree Plant are a by-product of the production of primary aluminum due to the residual sulfur content in the petroleum coke and pitch used in the carbon anodes. Carbon anodes are a critical and integral component of the electrolysis process used to produce aluminum. Except for a negligible amount of SO_2 emissions attributable to natural gas combustion, essentially all the SO_2 emitted from the plant comes from the oxidation of sulfur that comes into the plant in the petroleum coke and pitch raw materials.

Although dry alumina scrubbers (with associated baghouses) are employed on all the Potlines and ABF, these air pollution control systems are designed primarily to control gaseous and particulate fluoride emissions. They do not offer any control for SO_2. As a result, the total SO_2 emissions from the plant can be accurately calculated on a mass balance basis using information known about the total sulfur in the raw materials.

To calculate SO_2 emissions each month, Century compiles data on the sulfur content in the raw petroleum coke and pitch provided from the suppliers, conducts multiple sulfur content samples of green anodes, baked anodes, and packing coke, and tracks other process variables such as green anode mass, baked anode mass, packing coke usage rate, and carbon block consumption rates at the Potlines. The mass balance approach is encompassed in what historically has been termed the "SO_2 Calculation Engine". The SO_2 Calculation Engine has previously been reviewed and approved by the Division and is currently the stipulated method within the Title V permit for calculating actual 12-month rolling average SO_2 emissions to demonstrate compliance with the existing SO_2 emission limit in place.[1] That SO_2 emissions limit, which is a cap on total SO_2 emissions from the ABF and Potlines combined, represents the application of the Best Available Control Technology (BACT) as established in the last Prevention of Significant Deterioration (PSD) permit action completed at the plant in 2010 (V-05-088 R2).[2]

SO_2 Emissions from the Anode Bake Furnace (ABF)

In the SO_2 Calculation Engine mass balance methodology, the sulfur input to the ABF is calculated based on (1) the sulfur content and throughput of green anodes and (2) the sulfur content and usage rate of packing coke. The sulfur output from the furnace is based on the sulfur content and production rate of baked anodes. The difference between the sulfur input to the furnace and sulfur leaving the furnace (in the baked anodes) represents the net sulfur released, which is all assumed to be emitted as SO_2 gas out the A-446 scrubber stacks serving the ABF.

Century tracks the monthly throughputs of green anodes and baked anodes by weighing each anode loaded and unloaded in the pits during a given month. Monthly packing coke usage is tracked based on the make-up supply added each month. Aside from anode and packing coke production rate values, the key inputs that determine the actual SO_2 emissions each month are the sulfur content values for green anodes, baked anodes, and packing coke. The green anode sulfur content in turn is a function of the sulfur content in the raw petroleum coke, pitch, and anode butts material recycled from the potlines. Sulfur content measurements (of green anodes, baked anodes, and packing coke) are conducted multiple times per month in an on-site laboratory. For example, there are typically 120-140 sulfur content samples for baked anodes conducted per month, roughly 4-5 samples per day. Packing coke data is also supplemented with sulfur content data provided directly from the supplier. The samples within a month are then aggregated to define the monthly average sulfur contents for each of the three materials (green anodes, baked anodes, and packing coke), which are then input into the SO_2 calculation. Example sample calculations are provided in the SO_2 emissions tables included in Attachment 1 of this letter. Given the number of sulfur content sampling events (for the green anodes, baked anodes, and packing coke), and the tracking of production

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[1] Refer to Condition 3 in Section D of permit V-19-010 R2.

[2] The V-05-088 R2 permit was issued as Proposed and Final on August 19, 2010 and October 6, 2010, respectively, and authorized a roughly 18% increase in the plant capacity achieved through implementation of a new potline amperage increase technology.

rates, this method yields an accurate calculation of the total plant SO_2 emissions on a monthly average basis.

SO_2 Emissions from the Potlines

The sulfur that is retained in the baked anodes is assumed to be emitted at the Potlines as these anodes are consumed in the pots. The sulfur released is a function of the aluminum production rate, the anode consumption rate (i.e., tons of anode consumed per ton of aluminum produced), and the baked anode sulfur content. A small portion of the sulfur released in the pots (5%) is assumed to be emitted as carbonyl sulfide (COS). This is consistent with assumptions inherently made by EPA in setting the COS emission standard for potlines in the *National Emission Standards for Hazardous Air Pollutants for Primary Aluminum Production* (40 CFR Part 63, Subpart LL, "PMACT").[3] Attributing 5% of the sulfur to COS leaves 95% remaining. Historically, for the purposes of defining potential SO_2 emissions, Century has assumed that 2% of the sulfur is emitted as particulate sulfate compounds in the form of condensable particulate matter, and thus would not count towards the SO_2 total. However, for purposes of tabulating monthly actual SO_2 emissions, Century has typically ignored the 2% CPM conversion rate and more conservatively assumed that 95% of the sulfur in the baked anodes consumed in the potlines is emitted as SO_2. This more conservative approach is retained in the SO_2 actual emission tallies provided in Attachment 1.

As to the distribution of the potline SO_2 emissions between the A-398 stacks and potroom building roof vents, it has been assumed historically that 99% of the SO_2 generated in the pots is captured and routed to the A-398 scrubber systems and is emitted (uncontrolled) at those stacks, while the remaining 1% is emitted from the potroom building roof vents. However, on June 29-30, 2020, in fulfillment of obligations of Condition 3.r.ii in Section B of V-19-010 R2 for the Potlines, Century conducted an SO_2 emissions test on Potline 3. This test included sampling at the A-398 scrubber system stacks and at the downcomer vent (which is used to quantify secondary emissions from the roof vents). During this test, the captured SO_2 emissions emitted at the stack represented 97% of the total, slightly less than the historical 99% assumption. This data point suggests that a lower capture rate should be assumed for tallying actual SO_2 emissions between the stacks and roof vents. However, this test consists of only three 1-hour test runs and thus only defines the capture being achieved over a timeframe that is very short relative to the production cycles of the pots. Data from prior emission tests has shown higher capture rates consistent with the 99% capture assumption. For purposes of defining actual emissions for the data set the Division has requested, Century has assumed that the SO_2 capture rate on average was **98%**. Century plans to conduct additional testing in the next 6 months to further validate this assumption. Note that because emissions are uncontrolled, this assumption does not change the total SO_2 potline emissions calculated, only the location of the emissions.

Actual SO_2 Emissions Data for 2017 to Present

In its October 8, 2021 information request, the Division requested that Century provide information on how SO_2 actual emissions are calculated and to also provide hourly emissions for each unit for 2019, 2020, and 2021. The methodology for how SO_2 emissions are calculated has been presented earlier in this section. As explained, the SO_2 mass balance approach can only be used to resolve emissions to a monthly average basis. In the absence of having continuous emission monitors (CEMS) on all seven dry alumina scrubber

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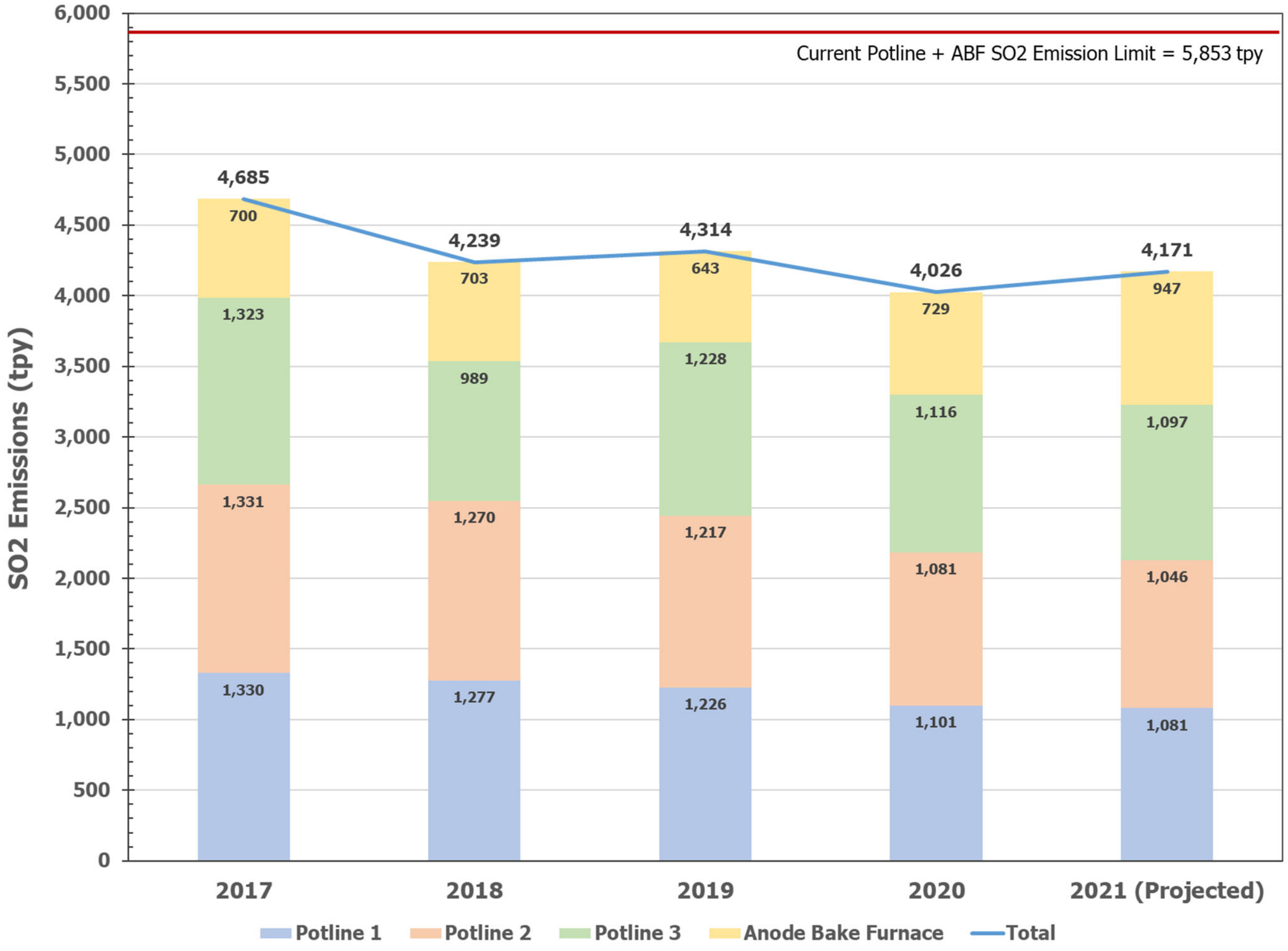
[3] Pursuant to 40 CFR 63.843(e), emissions of COS from potlines are limited to 3.9 lb/ton of aluminum produced. The K-factor in Equation 4 in 40 CFR 63.847(j), which owners and operators must use to calculate COS emissions, embeds an assumption about the amount of sulfur assumed to be converted to COS. Based on data collected from the industry, EPA assumed that 8% of the sulfur in the raw petroleum coke, which they assumed makes up 78% of an anode on average, ends up being emitted as COS, which translates into an effective conversion rate of 6.25%. Century has historically assumed a smaller conversion rate of 5%, which results is a slightly higher estimate of SO_2 emissions from the potlines.

systems (6 for the A-398 systems and 1 for the A-446 system), there would be no feasible way to define emissions that are resolved to the hour. Even if CEMS were in place on all these exhaust streams, the hour-by-hour potroom building roof vent emissions would still be undefined.

The existing mass balance approach, as required by the current permit, yields accurate estimates of total monthly emissions. Because there are so many pots (128 per potline) in continuous operation, it is reasonable to expect that the potline emission rate is relatively stable. Thus, in response to Division's request, Century has compiled and organized the monthly average hourly emissions for the potlines and ABF (which account for more than 99.99% of SO_2 emissions from the plant) from 2017 to present. We included 2017 and 2018 data so that the Division has a complete data set from the time the SO_2 ambient monitoring commenced. The data tables are presented in Attachment 1. These tables also include the anode and potline production rates and sulfur content data used in the SO_2 Calculation Engine methodology described along with sample calculations. A bar graph of the annual SO_2 emissions from the potlines and ABF for 2017 through 2021 (projected) is provided in Figure 1.

Figure 1. ABF and Potline Actual SO_2 Emissions from 2017-Present



As shown in Figure 1, the facility's actual SO_2 emissions are roughly 25% below the current emissions cap. Currently, the plant is running at around 89% of capacity for aluminum production. The additional difference reflects the use of petroleum coke with an actual sulfur content less than the limit (3%) and anode consumption efficiency rates that are better than was used in setting the current SO_2 emission limit in 2010.

Considering the most recent 5-year period, SO_2 emissions have trended downward by roughly 10%. Part of the reduction is due to a small reduction in annual aluminum production rates over this period. Additionally, in the past two years, Century has been able to acquire petroleum coke with slightly lower average sulfur contents. The petroleum coke sulfur content values averaged 2.71% in 2020 and 2021 versus 2.81% in 2017 and 2018.

Actual SO_2 Emissions Trends at Big Rivers

Given its close proximity, SO_2 emissions from the adjacent Big Rivers Electric Corporation (BREC) facility south of the Century Sebree plant also contribute to impacts at the Sebree ambient monitor. As it is informative in reviewing the monitored SO_2 data trends discussed in the next section, a chart of actual SO_2 emissions from the BREC facility is also provided in Figure 2.

BREC owns and operates the Reid Station and operates the Henderson Station II in Henderson County, Kentucky, which is regulated under Title V permit V-11-003 R1. In 2015, Unit 1 at Reid Station, a coal-fired boiler, shut down. This station now consists only of a natural gas-fired combustion turbine with relatively insignificant SO_2 emissions.[4] In 2019, Henderson Station II Units 1 and 2, both large coal-fired utility boilers, also shut down. The remaining R. D. Green Generating Station (Green Station) consists of two pulverized coal-fired boilers, Units 1 and 2. Both of the Green Station Units are being converted to natural gas. This conversion is scheduled to be completed by April 2022. At that time, there will be another roughly 2,500 tpy reduction in SO_2 emissions from the facility.

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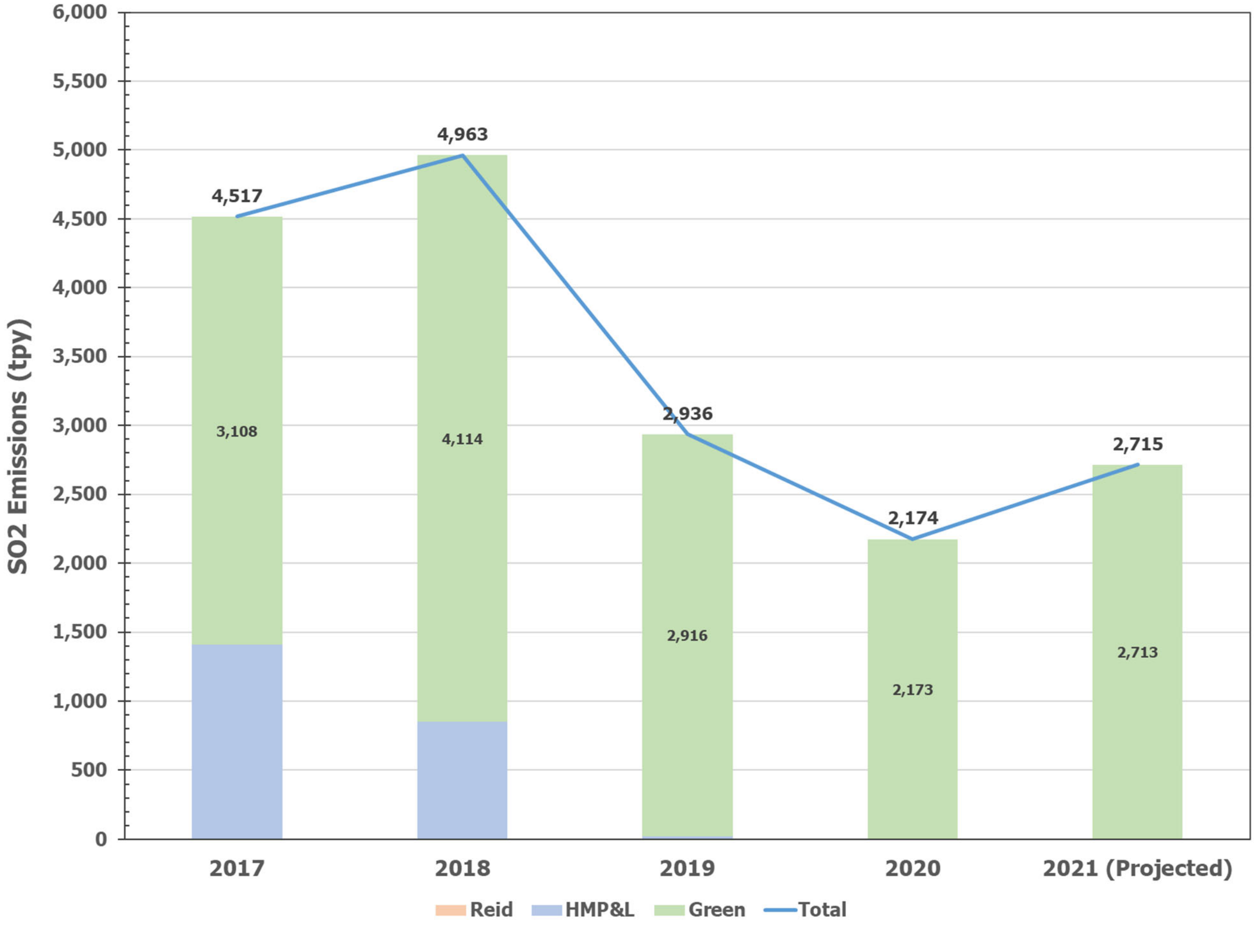
[4] Emission Unit 06, Combustion Turbine at the Reid Station is permitted to use either natural gas or No. 2 fuel oil but typically only operates using natural gas.

Figure 2. Actual SO_2 Emissions from 2017-Present at the BREC Facility



CURRENT STATUS OF SO_2 MONITOR DESIGN VALUE

This and the following section of our response has been prepared in response to the Division's request for the following information:

- "*Analysis of modeled data vs. monitored data*"

As a foundation for discussing the air dispersion modeling work completed to-date, this initial section first presents a summary of the current SO_2 monitoring data.

SO_2 Monitoring Station Location and Operation

Beginning in January 2017, 5-minute and 1-hour average SO_2 concentration data has been collected by the Division at the Sebree monitoring site (Site No. 21-101-1011), which is located on the Century Aluminum property at the southeast corner of the intersection of Alcan-Aluminum Road (State Route 2096) and the Big Rivers coal haul access road. Century reviews the SO_2 concentration data monthly as it is made available. The concentration data is analyzed in conjunction with the meteorological data from the co-located meteorological data station. Figures 3 and 4 show the location of the meteorological and SO_2 monitoring station locations in relation to the Century Aluminum Sebree Plant and the BREC Facility.

Figure 3. Area Surrounding the Century Sebree BREC Facilities

Figure 4. Close Up View of the Location of the Meteorological and SO_2 Monitoring Stations

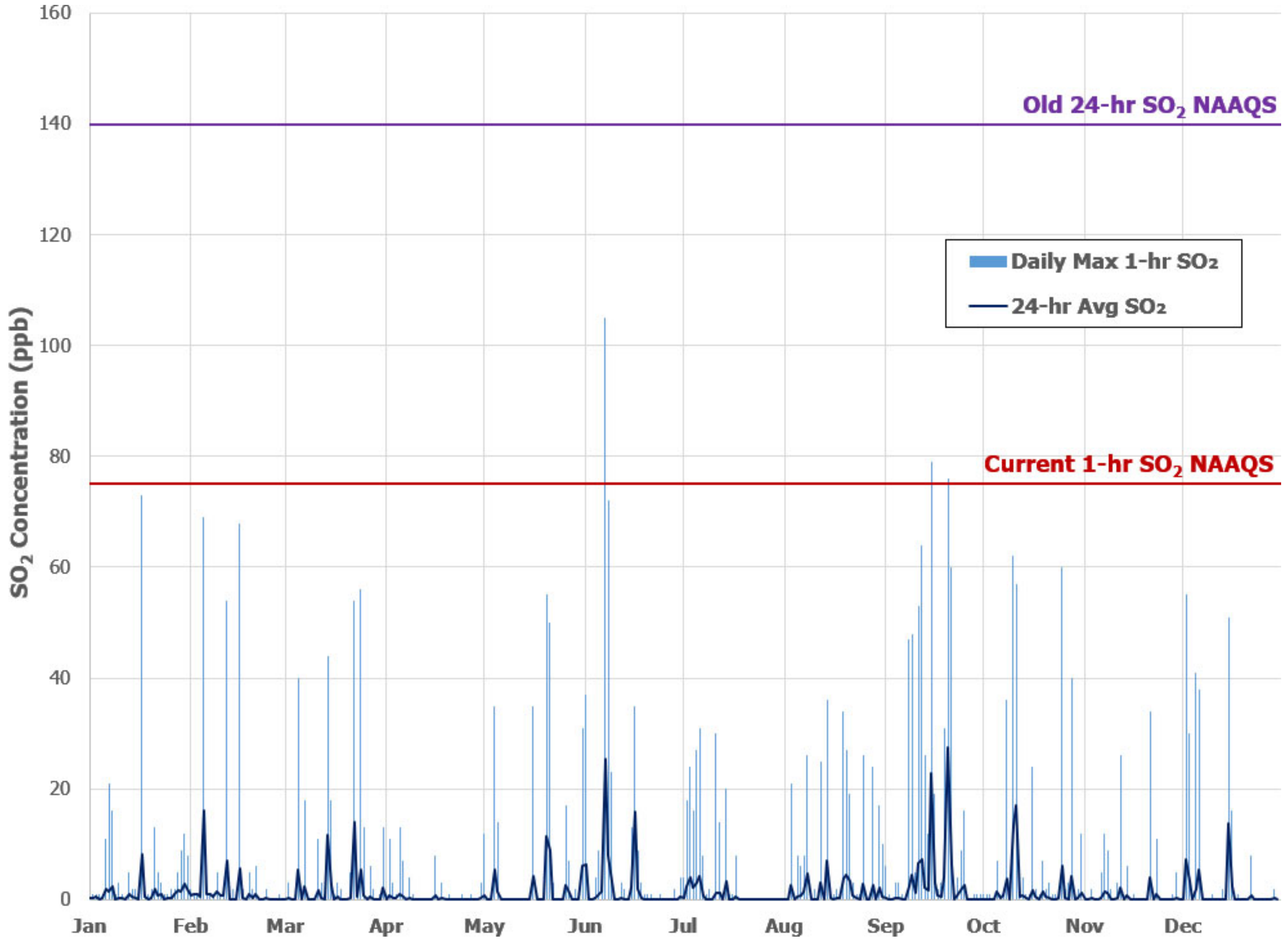
Summary of SO_2 Monitoring Data Collected Since 2017

1-hour Average and Daily Maximum SO_2 Data Trends

The existing SO_2 NAAQS, updated in 2010, is 75 ppb based on the 3-year average of the 99th percentile of the yearly distribution of 1-hour daily maximum concentrations. Each year, the set of 365 daily maximum 1-hour SO_2 concentrations are tabulated. Since the form of the standard considers the 99th percentile of these daily maximums, the 4th highest daily maximum value for the year is determined and this is averaged over 3 years to calculate the "design value" concentration that is compared to the NAAQS.

SO_2 concentrations measured at the Sebree monitor are on average extremely low. Since 2017, the average 1-hour concentration measured at the monitor is only **1.8 ppb** and the average daily maximum 1-hour concentration is only 10.3 ppb. To see this visually, a timeline series plot of the 1-hour daily maximum and 24-hour average SO_2 concentrations for the most recent full year of data, 2020, is shown in a timeline series plot in Figure 5.

Figure 5. SO_2 Concentrations for 2020 Compared to the Current 1-hour NAAQS and Prior 24-hr SO_2 NAAQS

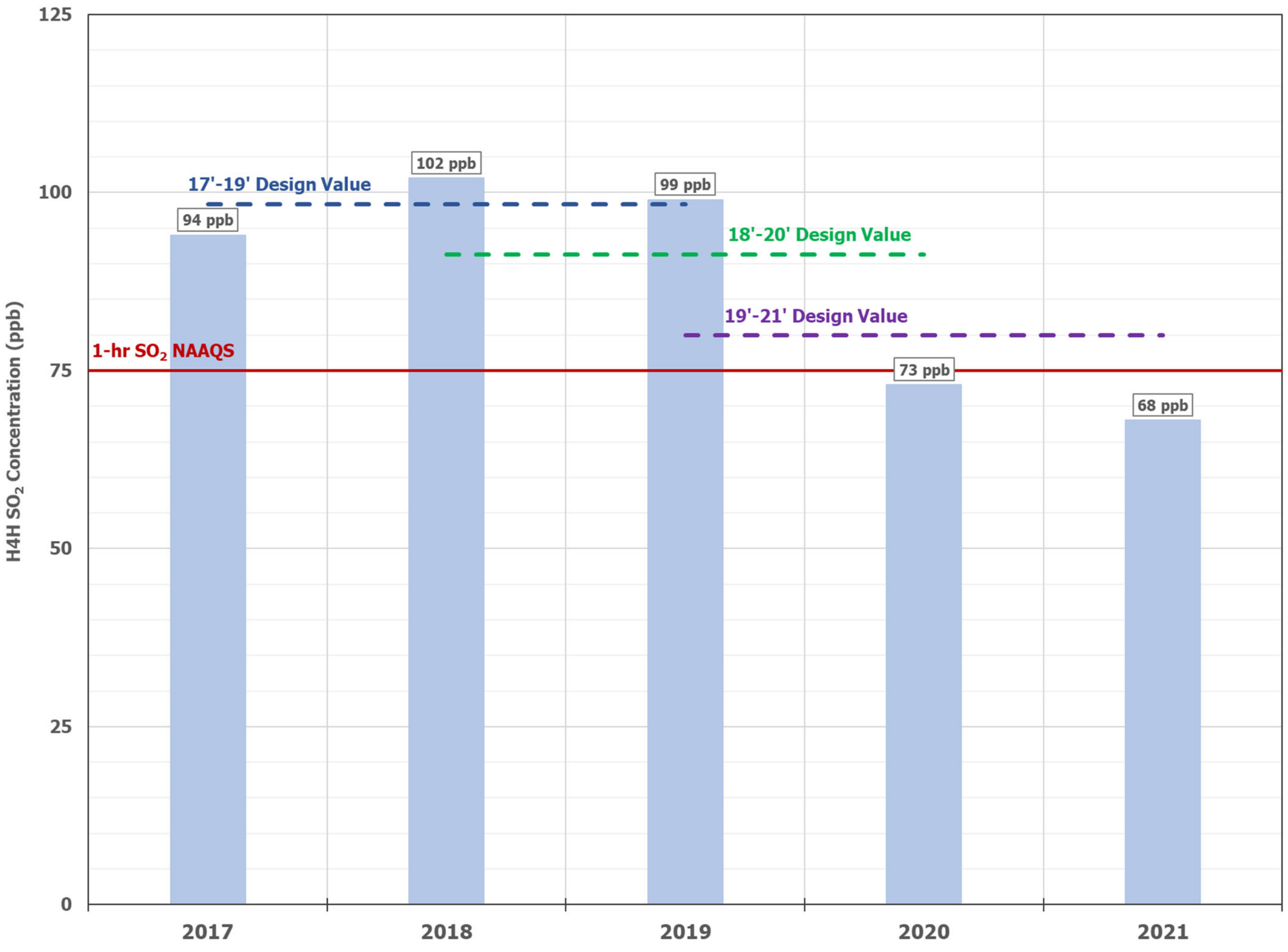


During 2020, there were only three 1-hour daily maximum values above 75 ppb and the average 1-hour daily maximum concentration was only 8.8 ppb. For context and comparison, the 24-hour average SO_2 concentrations are also shown in Figure 5 (dark blue line). For nearly 40 years, a 24-hour average SO_2 concentration below 140 ppb (one component of the prior SO_2 NAAQS) was considered protective of public health with a margin of safety. As noted in Figure 5, in 2020, the maximum 24-hour average at the monitor never exceeded 30 ppb, less than 22% of the prior NAAQS. The timeline series for the other years shows similar patterns and trends.

3-year Average SO_2 Design Value Concentrations at Monitor

Figure 6 summarizes the 4th highest daily maximum 1-hour SO_2 concentration each year since 2017 along with the available 3-year average design values. Only nine months of 2021 data are currently available for the Sebree monitor, thus, the final 4th highest concentration that will be used for the 2021 monitoring year cannot yet be determined. Year-to-date however, the 2021 4th highest daily maximum concentration is 68 ppb.

Figure 6. 4th-Highest Daily Maximum 1-hour SO_2 Concentrations at the Sebree Monitor*



* 2021 value is for year-to-date data through September 2021.

As revealed in Figure 6, due to the relatively high 4th highest concentration measured in 2019 (99 ppb), the calculated design value for the 2019-2021 period is currently above the 1-hour SO_2 NAAQS. However, this chart also shows that the 4th highest daily maximum concentrations have been trending down since 2018. The reduced 4th highest daily maximum values in 2020 and 2021 may be in part due to slightly lower SO_2 emissions from the Sebree Plant during 2020 and 2021, which were shown in Figure 1 combined with much lower SO_2 emissions from BREC shown in Figure 2. The differences may also reflect normal year-to-year variability in meteorological conditions. Regardless, if the current pattern of impacts continues in 2022, the design value concentration for the 2020-2022 period would be less than 75 ppb and showing attainment of the NAAQS. Even without any other actions being taken, a continued decrease in the design value is expected given the additional 2,500 tpy decrease in SO_2 that will occur by April 2022 from BREC when its Green Station coal-fired boilers convert to natural gas.

Additional Consideration of 5-Minute Peak SO_2 Data

When EPA updated the SO_2 NAAQS in 2010, the underlying basis for the new concentration value set was clinical human data studies aimed at documenting respiratory effects in people with asthma exposed to SO_2 for 5 to 10 minutes while breathing at elevated rates (i.e., exercising asthmatics). The human data studies cited by EPA established a 5-minute SO_2 concentration of 400 ppb, as "*the lowest concentration in free-breathing controlled human exposure studies of exercising people with asthma where moderate or greater lung function decrements occurred that were often statistically significant at the group mean level…*".[5] Because health effects (although less severe) were noted within a subset (8-9%) of the at-risk population at concentrations down to 200 ppb, this lower value was set as the basis for the new NAAQS to provide an even greater margin of safety. EPA then selected a 1-hour concentration of 75 ppb as statistically equivalent to and protective of a peak 5-minute 200 ppb concentration (on the assumption that in any hour where the concentration is less than 75 ppb, it is statistically unlikely for there to be a 5-minute peak concentration above 200 ppb).

In 2018, Century conducted a detailed statistical analysis of the peak 5-minute to 1-hour SO_2 concentration relationship at both the Sebree monitor and 15 other SO_2 monitors in the U.S. located within 1 km of emission sources with greater than 4,000 tpy of SO_2. This analysis was summarized in comments Century submitted to EPA on August 8, 2018 as part of the SO_2 NAAQS review rulemaking.[6,7] That analysis suggested that a 1-hour average of 125 ppb, rather than 75 ppb, was protective of a 5-minute 200 ppb concentration level. This conclusion is further buttressed from a more recent review of the data from the Sebree Monitor itself. Figure 7 plots the 4th highest (99th percentile) daily maximum 5-minute average SO_2 concentrations for the 2017 to 2021 period (through September 2021). As shown, the individual year and 3-year average 4th highest daily maximum 5-minute concentrations measured never exceeded 200 ppb (even though the 1-hour concentration did exceed 75 ppb in certain hours). Considering the underlying basis of the current NAAQS, this monitoring data provides strong evidence that there are no adverse health impacts from SO_2 occurring in the area surrounding the Sebree Plant.

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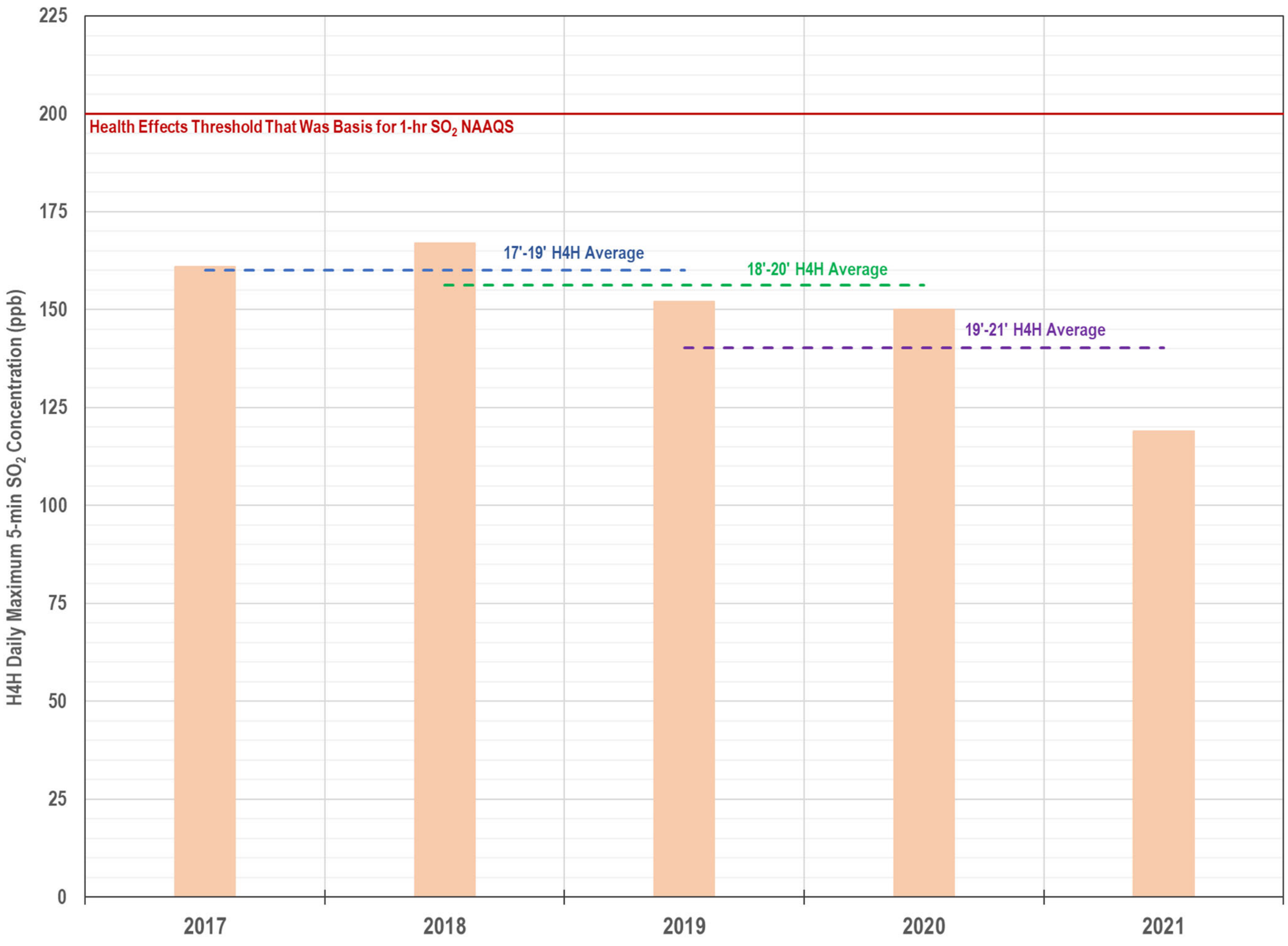
[5] Policy Assessment for the Review of the Primary National Ambient Air Quality Standard for Sulfur Oxides, Final. U.S. EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC, EPA–452/R–18–002, May 2018, Section 3.2.2.1, pg 3-41.

[6] 83 FR 26752, June 8, 2018, "*Review of the Primary National Ambient Air Quality Standards for Sulfur Oxides*"

[7] Comment submitted by John Knight, Environmental Coordinator, Century Aluminum Sebree, LLC to Docket EPA-HQ-OAR-2013-0566-0198; https://www.regulations.gov/comment/EPA-HQ-OAR-2013-0566-0198

Figure 7. 4th-Highest Daily Maximum 5-minute SO_2 Concentrations at the Sebree Monitor*



* 2021 value is for year-to-date data through September 2021.

AIR DISPERSION MODELING TASKS

Since the call with the Division on October 6th, Century has engaged Trinity to re-establish and update the air dispersion modeling infrastructure that will be needed in working towards a model attainment demonstration. Trinity has additionally begun to consider and assess possible refinements to the modeling methodologies. The work completed to-date is summarized in this section.

Updates to AERMOD Modeling Infrastructure

The most recent SO_2 air dispersion modeling analyses conducted by Trinity were those completed in 2016 as part of the siting analysis for the existing SO_2 ambient monitoring station. Revisions to the AERMOD dispersion model and its component programs have been published by EPA since. To establish a new baseline model infrastructure, Trinity first reviewed the AERMOD files provided by the Division on October 12th, which the Division used in 2020 in working with EPA on the nonattainment boundary setting process. To ensure consistency with current operations, Trinity compared the emission unit source block information to Century's internal files and then reran these files to provide a baseline model scenario.

Comparisons of Modeled Actual SO_2 Impacts with Monitor Data

With the source and receptor information synced up between the Division's and Trinity's input data files, Trinity then compiled and processed the 2017 to 2020 meteorological data that has been collected at the meteorological data monitoring station Century installed adjacent to the SO_2 monitoring station shelter, covering the full-year periods SO_2 monitoring data has been collected thus far. Trinity also gathered and updated SO_2 background concentration data and regional source emissions inventory data. Finally, Trinity tabulated the actual SO_2 emissions data from 2017 to present from the Sebree Plant (resolvable to the month) and from the adjacent Big Rivers power stations (resolvable to the hour). With this updated "actual" emissions data set, Trinity conducted a set of air dispersion modeling runs to calculate modeled ambient concentrations for the nearby receptor grid, which also includes a receptor at the location of the monitoring station to compare modeled impacts with those the ambient monitor. As the AERMOD model system is not necessarily intended to be accurate in both space and time, both the highest modeled impacts (in the form of the NAAQS) at any off-site receptor and highest modeled impacts at the monitor location were both examined. Despite using accurate data on actual emissions, stack release parameters, and the on-site meteorological data, modeled concentrations exceeded monitored concentrations by a sizeable margin. Therefore, as a next step, Trinity initiated work on appropriate refinements that could be applied to the AERMOD modeling options that would yield more accurate estimates from the model.

Based on research into recent SO_2 modeling analyses completed for utilities and other large industry sites, including other primary aluminum smelters, Trinity has thus far identified two possible improvements to the modeling system that are being considered and assessed. Both of these improvements, incorporating options already built into the AERMOD program, were used in the SO_2 Data Requirement Rule analysis completed for Alcoa's Warrick, Indiana facility in 2017 and subsequently approved by the Indiana Department of Environmental Management (IDEM) and U.S. EPA.[8] One improvement is to invoke the Urban option in AERMOD (as opposed to the Rural option that would otherwise be used by default for the Sebree area) to better account for enhanced nighttime turbulence generated by the heat released by operations at an aluminum smelter. Large industrial facilities, particularly those with considerable electricity usage, release heat into the environment. Therefore, the nighttime atmosphere over these areas behaves more like an urban area, with elevated heat release driven by surfaces that effectively absorb daytime solar radiation and then re-emit it at night more so than would be typical for a rural area. Trinity has reviewed satellite thermal images covering the Century Sebree plant and identified that a considerable (>10 °C) temperature difference exists between the plant and nearby areas.

Additionally, Trinity is considering revisions to some stack parameters to better reflect the enhanced plume rise resulting from merging of plumes emanating from the cluster stacks on the A-398 dry alumina scrubber reactors situated in close proximity to each other, as is illustrated in Figure 8. The combined air flow rate for the nearby stacks is conserved by holding the exit velocity input to the model constant while calculating an equivalent stack diameter that represents the combined air flow rate. Incorporation of both of the Urban and merged plume options has shown improved (although still not complete) alignment of modeled impacts from actual emissions using actual meteorological data with the corresponding actual SO_2 concentrations measured at the monitor.

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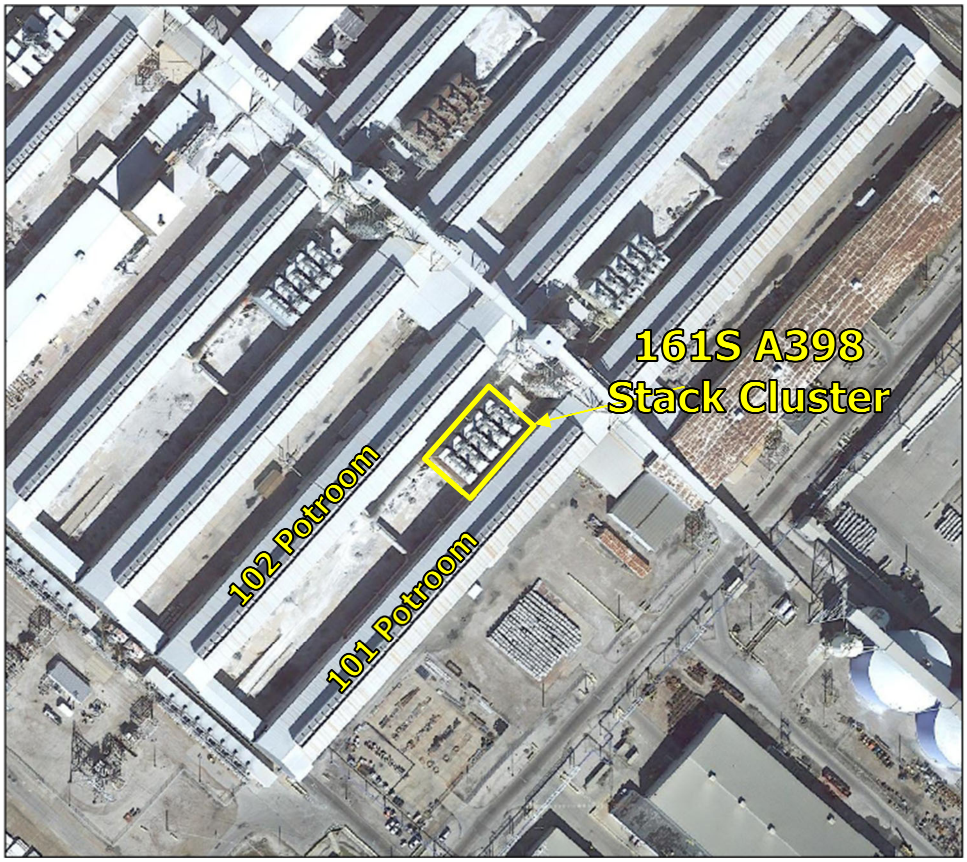
[8] Technical Support Document, Final Round 3 Area Designations for the 2010 1-Hour SO2 Primary National Ambient Air Quality Standard for Indiana. https://www.epa.gov/sites/default/files/2017-12/documents/13-in-so2-rd3-final.pdf

Figure 8. Aerial Image of Potline 1 South A-398 Stack Configuration Showing Close Proximity of Stacks



Development of Modeling Protocol for Model Attainment Demonstration

Trinity is now in the process of running a permutation of AERMOD modeling scenarios considering SO_2 emissions at possible future potential emission levels (i.e., rather than actual emissions) and exploring refinements to emission rates and/or stack release parameters that may yield a forecast model impact that shows compliance with the 1-hr SO_2 NAAQS. This modeling work is being done in parallel and in conjunction with the work being completed on examining strategies to reduce SO_2 emissions and/or improve the stack configurations at the plant, which is discussed subsequently. Based on the accelerated work efforts completed in the past three weeks, Trinity expects to begin work on preparing a formal modeling protocol within the next week with an aim to submit the protocol to KDAQ in December. The modeling protocol will provide appropriate detail on the source data, meteorological data, and modeling methodology that will be employed, including a technical analysis and justification for the model options expected to be used. Upon review and comment on the modeling protocol, Trinity will then continue work towards developing a model attainment demonstration.

SO_2 CONTROLS STRATEGY ANALYSIS

This section of our response has been prepared in response to the Division's request for the following information:

- "*Control Strategy Analyses*"

Challenges Associated with Controlling SO_2 from Primary Aluminum Plants

As explained previously, the majority of the SO_2 emissions from the plant are related to anode production and consumption. The use of petroleum coke, which contains sulfur, in the generation of anodes is the primary cause of these emissions. The coke used by aluminum smelters is purchased from the refining industry, for which coke is a waste product. The refining industry tends to optimize the process in order to produce fuels of higher added value (with a low sulfur content), such as gasoline. This tendency increases the sulfur content in the waste products of the refining process, such as coke, which aluminum smelters use. Due to changes in the fossil fuel industry driven by changes in demand, both now and in the foreseeable future, there are other market forces that also severely constrain options to procure and use lower sulfur containing petroleum coke.

From an end-of-pipe controls strategy, the exhaust characteristics of potline gases make application of SO_2 control strategies typically used on other types of industrial sources and combustion units a challenge. First, due to the large volume of exhaust gas generated from the electrolytic process, the relative concentration of SO_2 in the exhaust gas (as compared to other types of industrial and utility combustion processes) is low. For example, in the last performance test conducted June 29-30, 2020, the SO_2 concentration in the Potline 3 exhaust gas averaged 82 ppm. This is an expected and typical concentration value for these sources. Similar SO_2 concentrations in the 80-100 ppm range have also been measured in prior tests. At such low concentrations (< 100 ppm), the mass transfer of SO_2 to a sorbent (in the case of a scrubber/adsorption type of control) is lower, resulting in reduced efficiencies at available residence times. The exhaust temperature downstream of the existing A-398 scrubbers is also relatively low (120 °F in the last stack test), which makes application of many dry and semi-dry scrubbing technologies infeasible. In general, the presence of other contaminants and impurities in the exhaust stream (fluorides) also requires that any control option for SO_2 work in conjunction with the existing dry alumina scrubbing system.

Background on Prior SO_2 Control Technology Reviews

A comprehensive investigation into the feasibility of controlling SO_2 emissions from the Sebree Plant by reducing the petroleum coke sulfur content and/or by installing SO_2 air pollution control systems was conducted in 2010 as part of the last PSD permit action (V-05-088 R2). That analysis resulted in a determination for SO_2 that management of raw materials and process variables with an emission limit of 5,853 tpy (12-month rolling total from the Potlines and Anode Bake Furnace) constituted the Best Available Control Technology (BACT). The sulfur content in the petroleum coke and pitch used in producing anodes was limited to **3%** and **0.8%**, respectively. This determination was approved by the Division, U.S. EPA Region 4, as well as the Mammoth Cave National Park Federal Land Manager. This conclusion was also consistent with other similar BACT and related control technology evaluations conducted at other primary aluminum plants in the U.S., including the Century Aluminum Hawesville, Kentucky plant, and the Alcoa Massena, New York plant. It is also consistent with Best Available Technology (BAT) determinations and Best Available Techniques Reference Documents (BREFs) in the European Union that were reviewed at that time.

The Division's 2010 BACT determination is also consistent with the fact that EPA has not established any SO_2 standards under the New Source Performance Standard (NSPS) for Primary Aluminum Reduction Plants (40 CFR 60, Subpart S). By definition, the NSPS represent,

> *"the emissions of air pollutants that reflect the degree of emission limitation achievable through the application of the best system of emissions reduction which (taking into account the cost of achieving such reduction and any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated."*

The fact that U.S. EPA has not established SO_2 standards under Subpart S suggests that, at least at the time the NSPS was last reviewed, there was no demonstrated system of emissions reduction that was achievable. The Clean Air Act requires that NSPS be reviewed at least every eight years, yet EPA has not chosen to update Subpart S since 1997. The on-going lack of interest by EPA in evaluating or reconsidering changes to Subpart S may reflect the fact that conclusions of the review would be the same.

Since 2010, there have been no significant changes in primary aluminum production technologies, or substantive changes with regard to SO_2 air pollution control technologies that could be expected to change the determination made in 2010. Regardless, in light of the new SO_2 nonattainment designation and the drivers to find a workable solution, Century has initiated investigations into three potential strategies for reducing offsite SO_2 concentrations: (1) acquiring lower sulfur petroleum coke, (2) installing SO_2 emission controls on the ABF and/or Potlines, and (3) installing new stacks to improve dispersion and reduce building downwash impacts on exhaust plumes. Initial work on these studies completed in the past four weeks is summarized in the following sections.

Reduction in Petroleum Coke Sulfur Content

Petroleum coke and pitch are the two principle raw materials used in the production of green anodes. The petroleum coke from which anodes are formed is a byproduct of the oil refining industry. Pitch is produced by distilling crude tar, which is a byproduct of coking coal. Since SO_2 emissions from the Anode Bake Furnace and Potlines are a direct function of the coke and pitch sulfur content used in making the anodes, seeking to minimize the sulfur content of coke and pitch purchased for use in making anodes is an SO_2 pollution prevention method.

Petroleum coke that is available in the U.S. can be classified as either "anode grade" or "fuel grade". Petroleum coke produced in a delayed coker that has a high carbon content and is low in metals such as vanadium, nickel and iron is suitable for making graphite anodes for the aluminum smelting industry. This "anode-grade" coke is generally processed in calciners and is then marketed to the aluminum industry. Conversely, coke with higher concentrations of metal is generally not suitable for use in making anodes. The sulfur and metal content of the petroleum coke are the primary parameters for determining grade and differential price. Overall, coke prices fluctuate with the price of crude oil.

The sulfur content of petroleum coke can be as high as 7.5%. Low sulfur petroleum coke has a sulfur content of 3% or less. Pitch and coke are raw materials that Century obtains from suppliers. It is not feasible for Century to produce lower sulfur pitch and coke directly through any on-site processing techniques. It is also not possible to reduce the quantity of sulfur in these materials after they are received. Thus, Century, like other primary aluminum plants, is at the mercy of the market when it comes to sulfur content of the raw materials. Still, through optimal selection and negotiation of contracts with potential suppliers, it might be possible to minimize the raw material sulfur contents. Whether this can be done reliably on a go-forward basis and/or in a manner that is economically feasible is highly unlikely. Century is currently undertaking a study to reexamine this question.

Currently, Sebree 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 (e.g., in the 2% range) would cost roughly $70-$100 per metric ton (mt) more in the current market based on preliminary research Century has conducted thus far. Due to shortages of these cokes, the price gap is expected to increase over the next ten years. Some coke experts believe the premiums will reach $200-300/mt over the next ten years.

A forecasted $100/mt increase in coke premiums for Sebree 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. A reduction in petroleum coke sulfur content from current levels to 2% would translate to a reduction in SO_2 emissions, all else being equal, of roughly 1,200 tpy. Without considering any other factors, this results in a calculated cost effectiveness of over $6,900/ton of SO_2. This cost impact would jeopardize the economic sustainability of the Sebree Plant. Further, these are only estimated costs at this stage. Century is currently looking to engage a petroleum coke market expert to prepare a report that more fully presents an analysis on the viability of obtaining lower sulfur coke, and if this is determined to be feasible, to better define the costs. In subsequent communications with the Division, Century will provide further updates on the feasibility of reducing pet coke sulfur content as means to reduce SO_2 emissions and ambient impacts. However, we currently do not anticipate that this will be a viable or sustainable solution.

Evaluation of Possible SO_2 Air Pollution Control Systems

Consistent with the conclusions reached in the 2010 BACT analysis, there are no known instances where BACT for SO_2 on potlines was determined to be the use of wet scrubbing or other related end-of-pipe control technologies. Economic infeasibility is the primary explanation for this. Primary aluminum is a commodity business with product prices set on the London Metal Exchange (LME).[9] It is well established that the incremental cost ($/ton of aluminum) to install and operate any type of SO_2 end-of-pipe air pollution control system would make it infeasible to economically produce primary aluminum in the U.S. In likely recognition of this fact, there are no engineering companies in the U.S. that develop and market SO_2 control systems specifically for potlines in the primary aluminum industry. Nonetheless, Century is currently working to identify possible candidate air pollution control equipment/engineering firms that would be capable of and interested in helping Century evaluate possible control options. Century has reached out to six firms in the past four weeks with inquiries. Additional updates will be provided in subsequent communications with KDAQ.

Improvements to Design and Configuration of Stacks

The stacks on each of the reactors on the six A-398 dry alumina scrubber systems at the plant are the original installations in 1973 (for Potlines 1 and 2) and 1979 (for Potline 3). The release heights of the Potline 1 and 2 stacks are 80.6 ft from ground level, and the heights of the Potline 3 stacks are 104.9 ft from ground level. Given that the potroom buildings themselves are 48.5 ft high, the existing stacks are likely subject to building downwash effects under certain meteorological conditions. Similarly, the three stacks for the A-446 dry alumina scrubber reactors serving the Anode Bake Furnace are currently 70 ft above ground elevation, but only about 20 ft above the reactor structures. Thus, these stacks are also subject to building downwash impacts. To minimize these impacts, Century is exploring the feasibility of raising or building new stacks for the Potlines and/or Anode Bake Furnace. Another option being considered is the feasibility of re-ducting the existing A-446 dry alumina scrubber stacks serving the ABF into the original ABF stack (which existed prior to the installation of the current dry alumina scrubber control system). That original stack has a release heigh of 150.75 ft and is possibly capable of being raised an additional 25 ft based on its original design specifications.

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[9] https://www.lme.com/en/Metals/Non-ferrous/LME-Aluminium#Price+graphs

In the past 4 weeks since our initial call with the Division, Century has researched the market to identify prospective firms that could conduct an engineering study on possible revised stack configurations. To-date, six candidate firms have been identified, researched, and contacted, and Century is continuing work to identify other candidate firms. The status of these inquires to-date is as follows:

- **Air Techniques** (Marietta, GA) – Have declined interest in conducting the engineering study.
- **Hamon Research-Cottrell** (Branchburg, NJ) – This firm previously conducted a limited engineering study considering the feasibility of re-configuring the A-398 stacks on Potlines 1 and 2 at the time of the 2010 permit action. Century solicited the firm again and at this time is awaiting a decision on whether they have availability or interest in performing the requested work.
- **Salas O'Brien** (formerly PCI Skanska, West Chester, OH) – After discussing the needs, this firm indicated that they were not interested in providing the necessary services.
- **EFI Group** (Pikesville, MD) – Century staff have to-date had multiple correspondences with representatives from this firm and they have expressed interest in the project. Century has engaged EFI for an initial consultation and representatives from EFI will be coming to the Sebree site this month to collect initial information on the current layout and locations of the existing stacks. Following the site meeting, EFI plans to formulate a cost for the front-end loading stage 2 (FEL-2) study. However, even if Century chooses to engage this firm, it likely will be several months before actionable decisions on whether a stack change project is feasible can be made.
- **Penta Engineering** (St. Louis, MO) – Century staff have had multiple conference calls and discussions with this firm. They have expressed interest, but the structural design division of the firm is currently very busy. Century is awaiting further information from Penta on whether they will be interested in bidding on the stack study and whether they could provide the services in the timeframe needed.
- **ICC Commonwealth** (Portsmouth, NH) – Century has reached out to this stack design/engineering firm and has had initial discussions. ICC has requesting detailed information on the exhaust gas characteristics, some of which is not available. They are suggesting that the specific future stack configuration be defined (via the air dispersion models) before the engineering feasibility study is undertaken. Discussions on a possible engagement are continuing.

Century expects to be able to engage an engineering firm to conduct a study and prepare a report on the feasibility of reconfiguring stacks at the facility within the next 2-3 months. Subsequently, the results from this analysis should be available within 4-6 months and will provide information on both the costs and feasibility of candidate options. In parallel, Century will be working with Trinity to optimize these candidate stack reconfiguration options in defining a scenario that hopefully allows the facility to model attainment of the NAAQS. Century will keep the Division apprised of these efforts in the coming months.

Summary of Expected SO_2 Controls Options

As noted in EPA's Guidance for 1-Hour SO_2 Nonattainment SIP Submissions[10], the emission reduction measures an air agency justifies as being most appropriate to implement for an area to attain the SO_2 NAAQS should be "*based on a variety of local factors such as* ***population exposure, enforceability, and economic impact***". As noted earlier, the health effects basis of the SO_2 NAAQS is a 5-minute exposure

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[10] Memorandum from Mr. Stephen D. Page, Director, OAQPS, EPA, to Regional Air Division Directors, Regions 1 – 10, April 23, 2014, "Guidance for 1-Hour SO_2 Nonattainment SIP Submissions"; https://www.epa.gov/so2-pollution/guidance-1-hour-sulfur-dioxide-so2-nonattainment-area-state-implementation-plans-sip

above 200 ppb). Considering the fact that the 99th percentile daily maximum 5-minute concentrations at the Sebree monitor have never exceeded 200 ppb, it is reasonable to conclude that population exposure, at least to any possible adverse impacts of SO_2, is minimal. Century presumes that this condition will have significant influence on decisions about possible SO_2 emissions reduction strategies to implement.

With regard to the economic impact factor cited in EPA's SIP development guidance, based on the comprehensive analysis completed in 2010, Century expects that neither a strategy of reducing petroleum coke sulfur content nor installing SO_2 air pollution controls will be economically feasible. We will continue working over the next several months to obtain sufficient additional market, technical, and cost data to support that premise. Century however will continue its efforts to fully assess these options towards development of a report that can be used to support the nonattainment SIP. On the assumption that SO_2 controls will not be feasible, we expect to focus more of our efforts on determining the technical and cost feasibility of modifying the existing Potline or Anode Bake Furnace stacks. Additionally, even with or without these actions, the sizable reductions of SO_2 emissions occurring from the BREC facility in 2022 alone may, based on current monitor data trends, be sufficient to have the area attain the NAAQS.

NEXT ACTIONS

Century is committed to working cooperatively with the Division towards the development of the required SO_2 nonattainment SIP package. To ensure progress towards that goal is being attained, we aim to provide additional information and updates to the Division at least one per month, which can be through follow-up progress letters and/or conference calls with Division staff. Our next priority action item will be to complete and submit a modeling protocol for evaluation by the Division. We expect to be able to do this by the end of December.

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If you have any questions regarding the information provided thus far, or would like to set up a conference call to discuss progress on the actions being taken, please do not hesitate to contact me at 270-521-6215 or christopher.goddard@centuryaluminum.com.

Sincerely,

Chris Goddard
Environmental Manager

Attachments

cc: Mr. Levi Chaffin, Plant Manager, Century Aluminum
Mr. Paul J. Smith, P.E., Trinity Consultants
Mr. Tony Schroeder, CCM, QEP, Trinity Consultants

ATTACHMENT 1

Tabulation of 2017-September 2021 Actual SO_2 Emissions Data

Actual SO2 Emissions by Month (Based on SO2 Calculation Engine Data)

	Anode Bake Furnace SO2 Emissions							**Potlines SO2 Emissions**					
Month	Green Anodes Fed (ton/mo)	Baked Anodes Produced (ton/mo)	Packing Coke Consumed (ton/mo)	Green Anode Sulfur Content (%)	Baked Anode Sulfur Content (%)	Petroleum Coke & Packing Coke Sulfur Content (%)	**ABF SO2 Emissions (ton/mo)**	Potline Production (ton Al/mo)	Anode Consump Rate (ton/ton Al)	% Sulfur Emitted as COS	% SO2 Emitted as CPM	**Total Potlines SO2 Emissions (ton/mo)**	**ABF + Potlines SO2 Emissions (ton/mo)**
Jan 2017	12,916	12,354	185	2.20%	2.04%	2.79%	75.7	20,080	0.416	5%	0%	323.3	399.1
Feb 2017	10,818	10,372	156	2.07%	1.96%	2.86%	50.4	19,981	0.412	5%	0%	307.2	357.5
Mar 2017	12,238	11,712	176	2.00%	1.92%	2.89%	49.1	20,614	0.411	5%	0%	309.2	358.3
Apr 2017	13,035	12,497	187	2.16%	2.02%	2.81%	69.1	19,960	0.415	5%	0%	318.3	387.3
May 2017	12,696	12,282	184	2.27%	2.17%	2.90%	54.3	20,357	0.415	5%	0%	348.3	402.6
Jun 2017	10,838	10,433	157	2.21%	2.04%	2.79%	63.7	19,845	0.417	5%	0%	320.2	383.9
Jul 2017	12,161	11,640	175	2.23%	2.13%	2.83%	57.6	20,458	0.417	5%	0%	345.1	402.7
Aug 2017	12,037	11,551	173	2.25%	2.13%	2.75%	58.8	20,538	0.417	5%	0%	347.2	406.1
Sep 2017	11,046	10,642	160	2.24%	2.12%	2.60%	52.2	19,953	0.424	5%	0%	340.7	392.9
Oct 2017	12,466	11,998	180	2.17%	2.13%	2.67%	38.5	20,671	0.425	5%	0%	356.0	394.5
Nov 2017	12,692	12,182	183	2.17%	2.08%	2.80%	55.8	20,047	0.419	5%	0%	331.7	387.5
Dec 2017	11,442	10,964	164	2.30%	2.11%	2.89%	74.7	20,667	0.408	5%	0%	337.4	412.1
Jan 2018	11,928	11,373	171	2.28%	2.08%	2.80%	80.8	20,757	0.411	5%	0%	337.6	418.5
Feb 2018	11,031	10,453	157	2.25%	2.14%	2.84%	57.0	18,753	0.406	5%	0%	309.8	366.7
Mar 2018	11,805	11,228	168	2.19%	2.08%	2.68%	59.7	20,515	0.406	5%	0%	329.3	388.9
Apr 2018	11,614	11,125	167	2.22%	2.00%	2.85%	79.6	19,730	0.408	5%	0%	306.0	385.7
May 2018	12,049	11,418	171	2.19%	2.06%	2.83%	67.6	19,900	0.406	5%	0%	316.4	384.0
Jun 2018	8,330	8,062	121	2.22%	2.02%	2.77%	51.1	13,180	0.407	5%	0%	205.7	256.8
Jul 2018	6,419	6,085	91	2.18%	2.09%	2.73%	30.6	13,900	0.429	5%	0%	236.9	267.5
Aug 2018	7,933	7,498	112	2.17%	2.03%	2.84%	45.2	17,810	0.410	5%	0%	282.1	327.3
Sep 2018	11,440	10,857	163	2.20%	2.01%	2.91%	76.9	18,734	0.414	5%	0%	295.7	372.6
Oct 2018	13,218	12,573	189	2.18%	1.95%	2.84%	97.4	19,552	0.422	5%	0%	305.7	403.1
Nov 2018	10,196	9,722	146	2.12%	1.89%	2.81%	72.9	19,639	0.421	5%	0%	297.4	370.2
Dec 2018	12,317	14,112	173	2.06%	1.88%	2.82%	-15.4	20,563	0.425	5%	0%	312.8	297.3
Jan 2019	13,411	12,983	195	2.01%	1.90%	2.71%	57.9	20,576	0.425	5%	0%	315.4	373.3
Feb 2019	10,538	10,172	153	2.01%	1.94%	2.76%	37.5	18,712	0.425	5%	0%	293.6	331.2
Mar 2019	11,834	11,532	173	1.95%	1.91%	2.61%	30.0	20,415	0.432	5%	0%	319.8	349.8
Apr 2019	11,555	11,267	169	2.02%	1.83%	2.97%	64.4	19,698	0.436	5%	0%	298.6	363.0
May 2019	12,011	11,666	175	2.00%	1.89%	2.73%	49.9	20,412	0.439	5%	0%	321.5	371.4
Jun 2019	11,926	11,170	168	1.95%	1.84%	2.83%	65.3	19,774	0.411	5%	0%	283.4	348.7
Jul 2019	12,582	11,857	178	2.02%	1.89%	2.86%	69.2	20,310	0.425	5%	0%	310.2	379.4

	Anode Bake Furnace SO2 Emissions							**Potlines SO2 Emissions**					
Month	Green Anodes Fed (ton/mo)	Baked Anodes Produced (ton/mo)	Packing Coke Consumed (ton/mo)	Green Anode Sulfur Content (%)	Baked Anode Sulfur Content (%)	Petroleum Coke & Packing Coke Sulfur Content (%)	**ABF SO2 Emissions (ton/mo)**	Potline Production (ton Al/mo)	Anode Consump Rate (ton/ton Al)	% Sulfur Emitted as COS	% SO2 Emitted as CPM	**Total Potlines SO2 Emissions (ton/mo)**	**ABF + Potlines SO2 Emissions (ton/mo)**
Aug 2019	12,799	12,069	181	2.11%	1.97%	2.78%	76.3	20,352	0.418	5%	0%	318.2	394.5
Sep 2019	11,642	10,988	165	2.02%	1.96%	2.69%	47.6	19,425	0.423	5%	0%	306.4	354.0
Oct 2019	11,332	10,755	161	2.00%	1.93%	2.64%	46.5	20,128	0.413	5%	0%	305.1	351.7
Nov 2019	12,314	11,725	176	1.90%	1.92%	2.83%	28.1	19,466	0.419	5%	0%	297.0	325.2
Dec 2019	13,134	12,563	188	2.03%	1.88%	2.43%	69.9	20,393	0.414	5%	0%	302.2	372.1
Jan 2020	12,840	12,311	185	1.96%	1.92%	2.75%	41.7	20,100	0.404	5%	0%	295.6	337.2
Feb 2020	11,119	10,630	159	2.00%	1.82%	2.62%	66.4	18,964	0.412	5%	0%	270.7	337.1
Mar 2020	12,141	11,605	174	2.04%	1.84%	2.72%	77.6	19,941	0.411	5%	0%	286.8	364.4
Apr 2020	11,132	10,593	159	1.88%	1.80%	2.66%	46.0	18,570	0.415	5%	0%	262.9	308.9
May 2020	12,748	12,166	182	1.80%	1.85%	2.81%	18.8	19,181	0.414	5%	0%	279.3	298.1
Jun 2020	11,987	11,409	171	2.02%	1.83%	2.89%	76.6	18,342	0.419	5%	0%	266.8	343.3
Jul 2020	10,939	10,366	155	2.00%	1.80%	2.84%	73.2	17,864	0.439	5%	0%	268.2	341.4
Aug 2020	11,894	11,301	170	2.00%	1.88%	2.78%	60.1	17,742	0.424	5%	0%	268.8	328.9
Sep 2020	11,681	11,172	168	2.09%	1.96%	2.60%	58.4	17,252	0.439	5%	0%	282.3	340.7
Oct 2020	12,070	11,487	172	2.08%	1.94%	2.70%	65.8	18,192	0.424	5%	0%	284.6	350.5
Nov 2020	10,399	9,890	148	1.95%	1.86%	2.36%	44.6	18,447	0.423	5%	0%	276.0	320.6
Dec 2020	13,114	12,415	186	1.97%	1.72%	2.61%	99.6	18,898	0.413	5%	0%	255.4	354.9
Jan 2021	11,418	10,818	162	2.01%	1.77%	2.68%	84.3	19,675	0.433	5%	0%	286.4	370.7
Feb 2021	11,488	10,091	151	1.94%	1.81%	2.66%	87.1	17,859	0.430	5%	0%	264.8	351.8
Mar 2021	12,356	11,730	176	2.00%	1.79%	2.65%	83.2	19,543	0.433	5%	0%	287.7	370.9
Apr 2021	12,918	12,307	185	1.98%	1.79%	2.59%	81.1	18,588	0.419	5%	0%	264.7	345.7
May 2021	12,313	11,714	176	1.84%	1.73%	2.72%	56.6	19,292	0.438	5%	0%	277.9	334.5
Jun 2021	11,170	10,587	159	1.87%	1.66%	2.86%	75.6	18,335	0.431	5%	0%	249.8	325.4
Jul 2021	11,972	11,390	171	1.85%	1.64%	2.79%	78.0	18,791	0.436	5%	0%	255.3	333.3
Aug 2021	11,924	11,371	171	1.90%	1.65%	2.74%	85.5	18,708	0.448	5%	0%	263.2	348.6

Sample Calculations (Using August 2021 Data as Example)

ABF SO2 Emissions (ton/month) = [(11,924 GA ton/mo x 1.90%) + (171 PC ton/mo x 2.74%) - (11,371 BA ton/mo x 1.65%)] x 64 ton SO2/32 ton S = 85.5 tons SO2/month

Potlines SO2 Emissions (ton/month) = 18,708 ton Al/mo x 0.448 ton anode/ton Al x 1.65% x (1-5%) x (1-0%) x 64 ton SO2/32 ton S = 263.2 tons SO2/month

Total ABF + Potline SO2 Emissions (ton/month) = 85.5 ABF SO2 tons/month + 263.2 Potline SO2 tons/month = 348.6 tons SO2/month

For the Potlines SO2 calculation, although 2% of the sulfur can be expected to be emitted as sulfate compounds in the form of CPM, for these actual emission tallies, Century has conservatively used a 0% value, which results in a higher SO2 emissions estimate.

When more baked anodes are pulled than set in the ABF, a negative emission rate may be calculated for that month. This is an artifact of the mass balance method. However, the combined ABF and Potline emissions are still considered accurate.

Totals by Year

	Anode Bake Furnace SO2 Emissions					Potlines SO2 Emissions			
Year	Green Anodes Fed (ton/yr)	Baked Anodes Produced (ton/yr)	Packing Coke Consumed (ton/yr)	Petroleum Coke & Packing Coke Sulfur Content (Avg %)	**ABF SO2 Emissions (tpy)**	Potline Production (ton Al/yr)	Anode Consump Rate (Average) (ton/ton Al)	**Total Potlines SO2 Emissions (tpy)**	**ABF + Potlines SO2 Emissions (tpy)**
2017	144,385	138,626	2,079	2.80%	699.9	243,170	0.416	3,984.6	4,684.5
2018	128,280	124,506	1,830	2.81%	703.3	223,033	0.414	3,535.4	4,238.7
2019	145,077	138,747	2,083	2.74%	642.8	239,661	0.423	3,671.4	4,314.2
2020	142,065	135,345	2,030	2.70%	728.7	223,494	0.420	3,297.4	4,026.1
2021	143,337	135,012	2,025	2.71%	946.9	226,187	0.434	3,224.6	4,171.5
Capacity		145,720				253,531			

2021 values are projections based on Jan-Aug data.

Hourly Average Actual SO2 Emissions by Month For Each Potline and ABF Emission Point

				Potline Stack + Roof			Potline A-398 Stack Only			Potline Roof Only			ABF	Total
Month	Potline 1 % of Total Production	Potline 2 % of Total Production	Potline 3 % of Total Production	Potline 1 SO2 Emissions (lb/hr)	Potline 2 SO2 Emissions (lb/hr)	Potline 3 SO2 Emissions (lb/hr)	Potline 1 Stack SO2 Emissions (lb/hr)	Potline 2 Stack SO2 Emissions (lb/hr)	Potline 3 Stack SO2 Emissions (lb/hr)	Potline 1 Roof SO2 Emissions (lb/hr)	Potline 2 Roof SO2 Emissions (lb/hr)	Potline 3 Roof SO2 Emissions (lb/hr)	ABF SO2 Emissions (lb/hr)	ABF + Potlines SO2 Emissions (lb/hr)
Jan 2017	33.3%	33.4%	33.3%	289.6	290.1	289.5	283.8	284.3	283.7	5.8	5.8	5.8	203.6	1,072.8
Feb 2017	33.1%	33.3%	33.6%	302.3	304.8	307.0	296.2	298.7	300.9	6.0	6.1	6.1	149.9	1,064.0
Mar 2017	33.2%	33.6%	33.2%	276.3	279.0	275.8	270.8	273.4	270.3	5.5	5.6	5.5	132.0	963.1
Apr 2017	33.2%	33.4%	33.4%	293.2	295.4	295.5	287.4	289.5	289.6	5.9	5.9	5.9	191.8	1,075.9
May 2017	33.2%	33.3%	33.6%	310.5	311.5	314.4	304.3	305.2	308.1	6.2	6.2	6.3	146.0	1,082.4
Jun 2017	33.3%	33.3%	33.5%	295.8	296.0	297.6	289.9	290.1	291.6	5.9	5.9	6.0	177.1	1,066.5
Jul 2017	33.5%	33.3%	33.1%	311.1	309.4	307.3	304.9	303.2	301.1	6.2	6.2	6.1	154.7	1,082.5
Aug 2017	33.6%	33.4%	33.0%	313.4	312.2	307.9	307.1	305.9	301.7	6.3	6.2	6.2	158.2	1,091.6
Sep 2017	33.8%	33.5%	32.7%	319.5	317.2	309.6	313.2	310.9	303.4	6.4	6.3	6.2	145.1	1,091.4
Oct 2017	33.1%	33.4%	33.5%	316.9	320.1	320.2	310.5	313.7	313.8	6.3	6.4	6.4	103.5	1,060.6
Nov 2017	33.3%	33.5%	33.2%	307.1	308.7	305.5	301.0	302.6	299.4	6.1	6.2	6.1	155.0	1,076.3
Dec 2017	34.0%	33.4%	32.6%	308.4	302.5	296.1	302.2	296.5	290.1	6.2	6.1	5.9	200.7	1,107.7
Jan 2018	33.5%	33.2%	33.3%	304.3	301.3	302.0	298.2	295.3	296.0	6.1	6.0	6.0	217.3	1,125.0
Feb 2018	33.4%	33.6%	33.0%	307.6	309.6	304.6	301.5	303.5	298.5	6.2	6.2	6.1	169.6	1,091.5
Mar 2018	33.5%	33.1%	33.4%	296.5	292.9	295.7	290.6	287.0	289.8	5.9	5.9	5.9	160.4	1,045.6
Apr 2018	33.4%	33.6%	33.0%	284.2	285.6	280.3	278.5	279.9	274.6	5.7	5.7	5.6	221.2	1,071.3
May 2018	34.5%	34.4%	31.1%	293.4	292.5	264.8	287.5	286.6	259.5	5.9	5.8	5.3	181.6	1,032.3
Jun 2018	50.4%	49.6%	0.0%	288.2	283.2	0.0	282.5	277.6	0.0	5.8	5.7	0.0	141.9	713.3
Jul 2018	48.7%	48.2%	3.1%	310.1	307.0	19.8	303.9	300.9	19.4	6.2	6.1	0.4	82.2	719.1
Aug 2018	37.7%	38.2%	24.1%	285.6	290.0	182.6	279.9	284.2	179.0	5.7	5.8	3.7	121.5	879.7
Sep 2018	35.6%	34.8%	29.6%	292.6	285.9	243.0	286.8	280.2	238.1	5.9	5.7	4.9	213.6	1,035.1
Oct 2018	33.9%	33.8%	32.3%	278.2	277.9	265.6	272.6	272.3	260.3	5.6	5.6	5.3	261.9	1,083.6
Nov 2018	33.5%	33.4%	33.1%	276.7	276.2	273.2	271.1	270.6	267.7	5.5	5.5	5.5	202.4	1,028.4
Dec 2018	33.4%	33.1%	33.5%	280.7	278.6	281.5	275.1	273.0	275.9	5.6	5.6	5.6	-41.5	799.3
Jan 2019	33.3%	33.6%	33.1%	282.6	284.7	280.4	276.9	279.0	274.8	5.7	5.7	5.6	155.8	1,003.5
Feb 2019	33.0%	33.2%	33.8%	288.3	290.4	295.2	282.5	284.6	289.3	5.8	5.8	5.9	111.7	985.6
Mar 2019	33.6%	33.0%	33.4%	289.1	283.8	286.8	283.4	278.2	281.0	5.8	5.7	5.7	80.7	940.5
Apr 2019	32.9%	33.3%	33.8%	272.7	276.3	280.4	267.3	270.8	274.7	5.5	5.5	5.6	179.0	1,008.3
May 2019	32.8%	33.4%	33.9%	283.1	288.4	292.7	277.5	282.6	286.9	5.7	5.8	5.9	134.1	998.4
Jun 2019	33.5%	32.7%	33.7%	264.0	257.6	265.5	258.7	252.4	260.2	5.3	5.2	5.3	181.4	968.5
Jul 2019	33.3%	32.9%	33.8%	277.5	274.5	281.9	271.9	269.0	276.3	5.5	5.5	5.6	185.9	1,019.8

				Potline Stack + Roof			Potline A-398 Stack Only			Potline Roof Only			ABF	Total
Month	Potline 1 % of Total Production	Potline 2 % of Total Production	Potline 3 % of Total Production	Potline 1 SO2 Emissions (lb/hr)	Potline 2 SO2 Emissions (lb/hr)	Potline 3 SO2 Emissions (lb/hr)	Potline 1 Stack SO2 Emissions (lb/hr)	Potline 2 Stack SO2 Emissions (lb/hr)	Potline 3 Stack SO2 Emissions (lb/hr)	Potline 1 Roof SO2 Emissions (lb/hr)	Potline 2 Roof SO2 Emissions (lb/hr)	Potline 3 Roof SO2 Emissions (lb/hr)	ABF SO2 Emissions (lb/hr)	ABF + Potlines SO2 Emissions (lb/hr)
Aug 2019	33.7%	32.8%	33.5%	287.9	280.6	286.7	282.2	275.0	281.0	5.8	5.6	5.7	205.2	1,060.4
Sep 2019	33.8%	32.9%	33.2%	288.0	280.2	282.8	282.3	274.6	277.2	5.8	5.6	5.7	132.3	983.3
Oct 2019	34.1%	33.5%	32.3%	280.1	274.9	265.3	274.5	269.4	260.0	5.6	5.5	5.3	125.1	945.4
Nov 2019	33.5%	33.7%	32.8%	276.2	278.3	270.6	270.7	272.7	265.2	5.5	5.6	5.4	78.2	903.3
Dec 2019	33.2%	32.7%	34.1%	269.4	266.0	277.0	264.0	260.7	271.5	5.4	5.3	5.5	187.8	1,000.3
Jan 2020	33.8%	33.1%	33.1%	268.4	263.2	263.0	263.0	257.9	257.7	5.4	5.3	5.3	112.0	906.5
Feb 2020	33.7%	33.4%	32.9%	262.2	259.8	255.8	256.9	254.6	250.7	5.2	5.2	5.1	190.9	968.7
Mar 2020	33.3%	33.3%	33.4%	256.5	256.6	257.9	251.4	251.5	252.7	5.1	5.1	5.2	208.5	979.5
Apr 2020	32.0%	33.3%	34.7%	234.0	242.9	253.3	229.3	238.1	248.2	4.7	4.9	5.1	127.9	858.1
May 2020	32.6%	32.2%	35.2%	244.8	241.6	264.3	239.9	236.8	259.0	4.9	4.8	5.3	50.5	801.3
Jun 2020	33.2%	32.4%	34.4%	246.1	240.4	254.6	241.2	235.6	249.5	4.9	4.8	5.1	212.7	953.7
Jul 2020	32.8%	32.8%	34.4%	236.6	236.5	247.9	231.9	231.8	242.9	4.7	4.7	5.0	196.9	917.9
Aug 2020	34.0%	33.2%	32.9%	245.4	239.8	237.5	240.5	235.0	232.7	4.9	4.8	4.7	161.5	884.2
Sep 2020	34.2%	32.9%	32.9%	268.2	257.8	258.2	262.9	252.7	253.0	5.4	5.2	5.2	162.1	946.3
Oct 2020	34.1%	31.3%	34.6%	260.9	239.8	264.4	255.7	235.1	259.1	5.2	4.8	5.3	177.0	942.2
Nov 2020	33.2%	32.5%	34.3%	254.8	249.2	262.8	249.7	244.2	257.5	5.1	5.0	5.3	123.8	890.5
Dec 2020	33.5%	33.1%	33.3%	230.3	227.3	228.9	225.7	222.7	224.3	4.6	4.5	4.6	267.7	954.1
Jan 2021	34.1%	32.3%	33.6%	262.4	249.0	258.6	257.1	244.0	253.4	5.2	5.0	5.2	226.7	996.6
Feb 2021	33.9%	32.5%	33.6%	267.3	256.0	264.6	262.0	250.9	259.3	5.3	5.1	5.3	259.1	1,047.1
Mar 2021	33.5%	32.5%	34.0%	259.3	251.5	262.6	254.1	246.4	257.4	5.2	5.0	5.3	223.5	996.9
Apr 2021	34.3%	32.4%	33.4%	252.0	237.9	245.2	247.0	233.1	240.3	5.0	4.8	4.9	225.2	960.4
May 2021	33.7%	32.1%	34.2%	252.0	239.8	255.2	247.0	235.0	250.1	5.0	4.8	5.1	152.1	899.1
Jun 2021	33.2%	32.2%	34.6%	230.3	223.1	240.3	225.7	218.7	235.5	4.6	4.5	4.8	210.0	903.8
Jul 2021	32.3%	32.9%	34.8%	221.7	225.5	239.1	217.3	221.0	234.3	4.4	4.5	4.8	209.7	896.1
Aug 2021	33.1%	32.7%	34.3%	233.8	231.3	242.4	229.1	226.6	237.5	4.7	4.6	4.8	229.7	937.2

Sample Calculations (Using August 2021 Data as Example)

Potline 1 SO2 Emissions (lb/hr) = 263.2 tons SO2/month / 31 days/month / 24 hr/day x 2000 lb/ton x 33.1% of total potline production (for Potline 1) = 233.8 lb/hr

Potline 1 A-398 Stack SO2 Emissions (lb/hr) = 233.8 lb/hr x 98% capture = 229.1 lb/hr

Potline 1 Roof SO2 Emissions (lb/hr) = 233.8 lb/hr x (1-98% capture) = 4.7 lb/hr

ABF SO2 Emissions (lb/hr) = 85.5 tons SO2/month / 31 days/month / 24 hr/day x 2000 lb/ton = 229.7 lb/hr

Total ABF + Potlines SO2 Emissions (lb/hr) = 233.8 + 231.3 + 242.4 + 229.7 lb/hr = 937.2 lb/hr

APPENDIX I

Public Notice and
Statement of Consideration

KENTUCKY DIVISION FOR AIR QUALITY
PUBLIC NOTICE FOR PROPOSED KENTUCKY STATE IMPLEMENTATION PLAN REVISION ATTAINMENT DEMONSTRATION FOR THE PARTIAL COUNTIES OF HENDERSON AND WEBSTER LOCATED WITHIN THE KENTUCKY 2010 1-HOUR SULFUR DIOXIDE NONATTAINMENT AREA

The Kentucky Energy and Environment Cabinet (Cabinet) is requesting EPA's approval that the proposed State Implementation Plan (SIP) revision satisfies the attainment demonstration requirements for the Henderson-Webster County, Kentucky 2010 1-hour SO_2 nonattainment area. The draft SIP revision includes a projected attainment year emissions inventory for all sources of SO_2 within the nonattainment area, an air dispersion modeling demonstration, reasonably available control measures (RACT)/ reasonably available control technology (RACM), reasonable further progress, conformity, and contingency measures.

In accordance with 40 CFR 51.102, the Cabinet is making this proposed plan available for public inspection and provides the opportunity for public comment concerning Kentucky's attainment demonstration for the Henderson-Webster County, KY nonattainment area. The proposed plan can be found at https://eec.ky.gov/Environmental-Protection/Air/Pages/Public-Notices.aspx. The public comment period will be open from August 15, 2024 through September 20, 2024. Comments should be submitted in writing to the contact person by either mail or email.

The Cabinet will conduct a virtual public hearing on September 20, 2024, at 10:00 a.m. (Eastern Time). This hearing will be held to receive comments on the proposed SIP revision. This hearing is open to the public and all interested persons will be given the opportunity to present testimony. To assure that all comments are accurately recorded, the Division requests that oral comments presented at the hearing are also provided in written form, if possible. It is not necessary that the hearing be held or attended in order for persons to comment on the proposed administrative regulation. If no request for a public hearing is received by September 13, 2024, the hearing will be cancelled, and notice of the cancellation will be posted at https://eec.ky.gov/Environmental-Protection/Air/Pages/Public-Notices.aspx. Written comments should be sent to the contact person and must be received by September 20, 2024, to be considered part of the public record.

Please note that registration is required to participate in this hearing. You must either email your name and mailing address to claire.oyler@ky.gov or mail this information to Claire Oyler, Division for Air Quality, 300 Sower Building, 2nd Floor, Frankfort, KY 40601. Please put "Registration for comment on the 2010 SO_2 attainment demonstration for the partial counties of Henderson and Webster public hearing" as the subject line, and state in the body of the message if you plan to speak during the hearing.

CONTACT PERSON: Claire Oyler, Environmental Scientist III, Evaluation Section, Division for Air Quality, 300 Sower Boulevard, Frankfort, Kentucky 40601. Phone: (502) 782-3930; Email: claire.oyler@ky.gov

The Energy and Environment Cabinet does not discriminate on the basis of race, color, national origin, sex, age, religion or disability and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford an individual with a disability an equal opportunity to participate in all services, programs and activities.