Technical Support Document:

Chapter 7
Intended Round 4 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for North Carolina

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 1-hour SO_2 NAAQS). The CAA defines a nonattainment area as an area that does not meet the NAAQS or that contributes to a nearby area that does not meet the NAAQS. An attainment area is defined by the CAA as any area that meets the NAAQS and does not contribute to a nearby area that does not meet the NAAQS. Unclassifiable areas are defined by the CAA as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS. See CAA section 107(d)(1)(A)(i)-(iii).

In this action, EPA defines a nonattainment area as an area that, based on available information including (but not limited to) monitoring data and/or appropriate modeling analyses, EPA has determined either: (1) does not meet the 2010 1-hour SO_2 NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS. An attainment/unclassifiable area is defined as an area that, based on available information including (but not limited to) appropriate monitoring data and/or modeling analyses, EPA has determined meets the NAAQS and does not likely contribute to ambient air quality in a nearby area that does not meet the NAAQS. An unclassifiable area is defined as an area for which the available information does not allow EPA to determine whether the area meets the definition of a nonattainment area or the definition of an attainment/unclassifiable area.

EPA is under a December 31, 2020, deadline to designate all remaining undesignated areas as required by the U.S. District Court for the Northern District of California.[1] This deadline is the final of three deadlines established by the court for EPA to complete area designations for the 2010 1-hour SO_2 NAAQS. The remaining undesignated areas are: 1) those areas which, under the court order, did not meet the criteria that required designation in Round 2 and also were not required to be designated in Round 3 due to installation and operation of a new SO_2 monitoring network by January 2017 in the area meeting EPA's specifications referenced in EPA's SO_2 Data Requirements Rule (DRR),[2] and 2) those areas which EPA has not otherwise previously designated for the 2010 1-hour SO_2 NAAQS. EPA previously issued guidance on how to appropriately and sufficiently monitor ambient air quality in the "SO_2 NAAQS Designations

[1] *Sierra Club v. McCarthy*, No. 3-13-cv-3953 (SI) (N.D. Cal. Mar. 2, 2015).
[2] *See* 80 FR 51052 (August 21, 2015), codified at 40 CFR part 51 subpart BB.

Source-Oriented Monitoring Technical Assistance Document" (SO_2 NAAQS Designations Monitoring TAD).[3]

In previous final actions, EPA has issued designations for the 2010 1-hour SO_2 NAAQS for most areas of the country.[4] As mentioned, EPA is under a deadline of December 31, 2020, to designate the areas addressed in this technical support document (TSD) as required by the U.S. District Court for the Northern District of California. We are referring to the set of designations being finalized by the deadline of December 31, 2020, as "Round 4" or the final round of the designations process for the 2010 1-hour SO_2 NAAQS. After these Round 4 designations are completed, there will be no remaining undesignated areas for the 2010 1-hour SO_2 NAAQS.

This TSD addresses designations for all remaining undesignated areas in North Carolina for the 2010 1-hour SO_2 NAAQS. Areas with monitored violations of the NAAQS are explicitly evaluated in this TSD. Undesignated areas in North Carolina without monitored violations are referenced in this TSD for completeness but are covered in more detail in Chapter 2.

The North Carolina Department of Environmental Quality, Division of Air Quality (DAQ) submitted its first recommendation regarding designations for the 2010 1-hour SO_2 NAAQS on June 2, 2011, requesting EPA designate a portion of New Hanover County nonattainment based on a violating monitor in Hanover County at that time. This recommendation also requested attainment for 36 counties[5] and unclassifiable/attainment for the rest of the state. On September 18, 2015, the State submitted updated recommendations requesting attainment for Brunswick and New Hanover Counties. On January 13, 2017, DAQ requested EPA designate the entire state attainment except for those areas designated in previous rounds and areas intended for designations by December 31, 2020.[6] The State submitted their latest recommendations on April 29, 2020, and July 24, 2020, to address more recent air quality monitoring data for monitors that were installed pursuant the DRR. DAQ recommended attainment for Limestone Township in Buncombe County, Cunningham Township in Person County and Beaverdam Township in Haywood County. DAQ recommended attainment/unclassifiable for Beaverdam Township in Haywood County even though the area has a violating monitor. In our intended designations, we have considered all the submissions from the State, except where a later submission indicates that it replaces an element of an earlier submission.

Table 1 identifies EPA's intended Round 4 designations and the areas in North Carolina to which they would apply. It also lists North Carolina's current recommendations. EPA intends to

[3] https://www.epa.gov/sites/production/files/2016-04/documents/so2monitoringtad.pdf

[4] Most areas of the U.S. were previously designated in actions published on August 5, 2013 (78 FR 47191), July 12, 2016 (81 FR 45039), December 13, 2016 (81 FR 89870), January 9, 2018 (83 FR 1098) and April 5, 2018 (83 FR 14597). EPA is not reopening these previous designation actions in this current Round 4 of designations under the 2010 SO_2 NAAQS, except where specifically discussed.

[5] These counties include Alleghany County, Avery County, Beaufort County, Camden County, Caswell County, Cherokee County, Chowan County, Clay County, Currituck County, Dare County, Davie County, Forsyth County, Gates County, Greene County, Henderson County, Hyde County, Jackson County, Jones County, Lee County, Macon County, Madison County, Mecklenburg County, Mitchell County, Pamilco County, Pasquotank County, Pender County, Perquimans County, Polk County, Swain County, Transylvania County, Tyrell County, Wake County, Warren County, Washington County, Watauga County, and Yadkin County.

[6] On June 30, 2016, EPA designated all of Brunswick County "unclassifiable" for the 2010 1-hour SO_2 NAAQS. See 81 FR 45039.

designate these areas by December 31, 2020, through an assessment and characterization of air quality based primarily on ambient monitoring data, including data from existing and new EPA-approved monitors that have collected data from January 2017 forward, pursuant to the DRR; however, other available evidence and supporting information, such as air dispersion modeling in certain situations, may also be considered.[7]

Table 1. Summary of EPA's Intended Designations and the Designation Recommendations by North Carolina

Area/County	North Carolina's Recommended Area Definition	North Carolina's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Haywood County	Beaverdam Township – Haywood County	Attainment/ Unclassifiable	Beaverdam Township – Haywood County	Nonattainment
Buncombe County*	Limestone Township – Buncombe County	Attainment	Limestone Township – Buncombe County	Attainment/Unclassifiable
Person County*	Cunningham Township – Person County	Attainment	Cunningham Township – Person County	Attainment/Unclassifiable

* EPA addresses this area in Chapter 2 with all other areas which EPA intends to designate "attainment/unclassifiable" or "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. General Approach and Schedule

An updated designations guidance document was issued by EPA through a September 5, 2019, memorandum from Peter Tsirigotis, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Regional Air Division Directors, U.S. EPA Regions 1-10.[8] To better reflect the Round 4 designations process, this memorandum supplements, where necessary, prior designations guidance documents on area designations for the 2010 primary SO_2 NAAQS issued on March 24, 2011, March 20, 2015, and July 22, 2016. This memorandum identifies factors that EPA intends to evaluate in determining whether areas are in violation of the 2010 1-hour SO_2 NAAQS. The document also contains the factors that EPA intends to evaluate in determining the boundaries for all remaining areas in the country. These factors include: 1) air quality

[7] Detailed SO_2 monitor information may be found in either the 2016 or 2017 ambient monitoring network plans, or associated addenda.

[8] https://www.epa.gov/sites/production/files/2019-09/documents/round_4_so2_designations_memo_09-05-2019_final.pdf

characterization via ambient monitoring and/or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and topography; and 5) jurisdictional boundaries.

In EPA's September 2019, memorandum, we note that Round 4 area designations will be based primarily on ambient monitoring data, including data from existing and new EPA-approved monitors that have collected data at least from January 2017 forward, pursuant to the DRR. In addition, EPA may evaluate air dispersion modeling submitted by state air agencies for two specific circumstances. First, states may submit air dispersion modeling to support the geographic extent of a nonattainment boundary. Second, states may submit air dispersion modeling to demonstrate that federally enforceable and permanent SO_2 emissions limits provide for attainment of the NAAQS and represent a more accurate characterization of current air quality at the time of designation than does monitoring of past air quality.

This TSD is organized such that there is a section for each area in North Carolina for which air quality monitoring data indicate a violation of the 2010 1-hour SO_2 NAAQS. When modeling information is available, it is evaluated in the context of that section. EPA does not plan to revise this intended designations TSD after consideration of state and public comment on our intended designation. A separate final TSD will be prepared as necessary to document how we have addressed such comments in the final designations.

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

1) 2010 1-hour SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 parts per billion (ppb), based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. See 40 CFR 50.17.
2) Design Value - a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the 2010 1-hour SO_2 NAAQS.
3) Intended designated nonattainment area –an area that, based on available information including (but not limited to) monitoring data and/or appropriate modeling analyses, EPA intends to determine either: (1) does not meet the 2010 1-hour SO_2 NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS.
4) Intended designated attainment/unclassifiable area – an area that, based on available information including (but not limited to) appropriate monitoring data and/or appropriate modeling analyses, EPA intends to determine meets the 2010 1-hour SO_2 NAAQS and does not likely contribute to ambient air quality in a nearby area that does not meet the NAAQS.
5) Intended designated unclassifiable area – an area for which the available information does not allow EPA to determine whether the area meets the definition of a nonattainment area or the definition of an attainment/unclassifiable area.
6) Modeled violation – a modeled design value impact above the 2010 1-hour SO_2 NAAQS demonstrated by air dispersion modeling.
7) Recommended attainment area – an area that a state, territory, or tribe has recommended that EPA designate as attainment.
8) Recommended nonattainment area – an area that a state, territory, or tribe has recommended that EPA designate as nonattainment.

9) Recommended unclassifiable area – an area that a state, territory, or tribe has recommended that EPA designate as unclassifiable.
10) Recommended attainment/unclassifiable (or unclassifiable/attainment) area – an area that a state, territory, or tribe has recommended that EPA designate as attainment/unclassifiable (or unclassifiable/attainment).
11) Violating monitor – an ambient air monitor meeting 40 CFR parts 50, 53, and 58 requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
12) We, our, and us – these refer to EPA.

3. Technical Analysis for the Haywood County Area

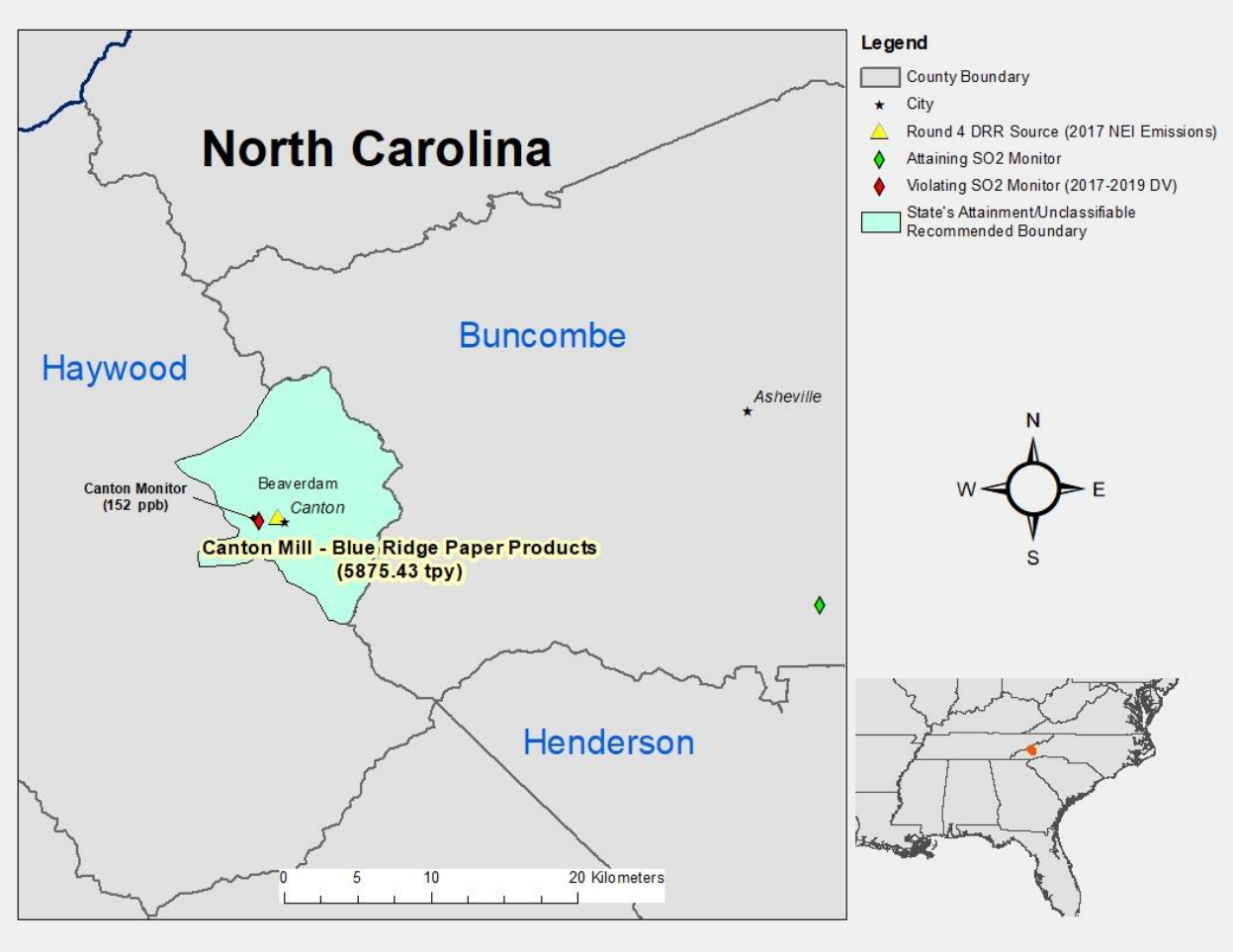
3.1. Introduction

EPA must designate the remaining portion of the Haywood County Area (i.e., Beaverdam Township) in North Carolina by December 31, 2020, because the area has not been previously designated, and North Carolina installed and began operating a new EPA-approved monitor pursuant to the DRR. This section presents all the available air quality information for the Beaverdam Township Area that includes the following SO_2 source around which the DRR required the State to characterize air quality:

- The Blue Ridge Paper Products – Canton Mill (BRPP) (formerly Evergreen Package) facility emitted 2,000 tons or more of SO_2 annually. Specifically, BRPP emitted 7,593 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR Source list, and North Carolina has chosen to characterize it via monitoring.

As seen in Figure 1 below, the BRPP facility is located in the City of Canton, Beaverdam Township, Haywood County, approximately 25 kilometers (km) west of Asheville, North Carolina. BRPP is positioned on the Pigeon River on a 200-acre site in downtown Canton. Also included in Figure 1 is North Carolina's June 2020 recommended boundary.

Figure 1. Map of the Haywood County Area Addressing BRPP



North Carolina submitted its first recommendation regarding designations for the 2010 1-hour SO_2 NAAQS on June 2, 2011. The State submitted updated air quality analysis and recommendations on April 29, 2020, and July 24, 2020, to address more recent air quality monitoring data for monitors that were installed pursuant the DRR. In its July 24, 2020, recommendation letter, North Carolina recommended attainment/unclassifiable for Beaverdam Township in Haywood County for the 2010 1-hour SO_2 NAAQS, because the State asserts that BRPP has recently become subject to and is complying with SO_2 emission limits federally enforceable through the title V permit and modeling with those limits shows attainment of the 2010 1-hour SO_2 NAAQS, (as described in EPA's September 5, 2019, Round 4 designations guidance). Specifically, the State's recommended boundary for the Haywood County Area consists of Beaverdam Township. See Figure 1.

North Carolina submitted a draft source-specific state implementation plan (SIP) revision to EPA on June 24, 2020, for parallel processing, to incorporate into the SIP, SO_2 emission limits that are

permitted[9] limits established in the facility's title V operating permit. EPA Region 4's Administrator signed a proposed approval of the draft SIP revision on July 31, 2020. The proposed approval will have a 30-day public comment period, after which EPA will assess any new information before taking final action on the SIP.

3.2. Air Quality Monitoring Data for the Haywood County Area

EPA considered design values for the air quality monitor in the Haywood County Area by assessing the most recent 3 consecutive years (i.e., 2017-2019) of quality-assured, certified ambient air quality data in EPA's Air Quality System (AQS) using data from Federal Reference Method and Federal Equivalent Method monitors that are sited and operated in accordance with 40 CFR parts 50 and 58.[10] Procedures for using monitored air quality data to determine whether a violation has occurred are given in 40 CFR part 50 Appendix T, as revised in the 2010 1-hour SO_2 NAAQS rulemaking. The 2010 1-hour SO_2 NAAQS is met when the design value is 75 ppb or less. Whenever several monitors are located in an area, the design value for the area is determined by the monitor with the highest valid design value. The presence of one or more violating monitors (i.e., monitors with design values greater than 75 ppb) in a geographic area forms the basis for designating that area as nonattainment. The remaining factors, described in the next section, are then used as the technical basis for determining the spatial extent of the designated nonattainment area surrounding the violating monitor. Table 2 contains the 2017-2019 design values for the area of analysis.

Table 2. 2010 1-Hour SO_2 NAAQS Design Values for the Haywood County Area

AQS Site ID	Monitor Location	2017 99th Percentile (ppb)	2018 99th Percentile (ppb)	2019 99th Percentile (ppb)	2017-2019 Design Value (ppb)
37-087-0013	35.53410, -82.85287 104 Pace St, Canton, NC 28716	206.8	213.4	34.8	**152**

Data collected at the monitor in the Haywood County Area (hereafter referred to as the Canton DRR site) indicates that the Area has a complete, valid 2017-2019 design value that is violating

[9] For purposes of this document, the terms "permitted," "allowable" or "potential to emit" are used to describe SO_2 emission limits that reference an emission limit established through a federally enforceable permitting mechanism. Pursuant to 40 CFR 70.2, the term potential to emit (PTE) means the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation is enforceable by the Administrator. This term does not alter or affect the use of this term for any other purposes under the CAA, or the term "capacity factor" as used in title IV of the Act or the regulations promulgated thereunder.

[10] SO_2 air quality data are available from EPA's website at https://www.epa.gov/outdoor-air-quality-data. SO_2 air quality design values are available at https://www.epa.gov/air-trends/air-quality-design-values.

the 2010 1-hour SO_2 NAAQS.[11] Therefore, a portion of the area must be designated nonattainment because of the violating monitor and the lack of new federally enforceable **and** permanent SO_2 limits for which reliable modeling demonstrates attainment of the NAAQS.

3.3. Air Quality Modeling Analysis for the Haywood County Area Addressing BRPP

In its July 24, 2020, recommendation letter, North Carolina provided the results of an air quality modeling analysis for the area surrounding BRPP to demonstrate that with new and in effect SO_2 emission limits that are currently federally enforceable through the title V permit,[12] and for which North Carolina intends to make federally enforceable **and** permanent through approval in the SIP, that current air quality in the area is attaining the 2010 1-hour SO_2 NAAQS even though the Canton DRR site monitor indicates a violation of the NAAQS for the 2017-2019 period.

North Carolina submitted a source-specific SIP revision to EPA on June 24, 2020, for parallel processing, requesting specific portions of the BRPP title V permit that contain certain permitted SO_2 emission limits and compliance parameters be incorporated into the SIP, thereby making these limits federally enforceable and permanent upon EPA's final action, to support its attainment/unclassifiable recommendation for Beaverdam Township in the Haywood County Area. EPA Region 4's Administrator signed a proposed approval of the draft SIP revision on July 31, 2020. The proposed approval will have a 30-day public comment period, after which EPA will assess any new information before taking final action on the SIP.

This assessment and characterization were performed using air dispersion modeling software, i.e., AERMOD, analyzing the new and in effect SO_2 emissions limits that are currently federally enforceable through the title V permit. The area that the State has assessed via air quality modeling is located in the City of Canton, Beaverdam Township in Haywood County, approximately 25 km west of Asheville, North Carolina. See Figure 1 above. The discussion and analysis that follows below will reference the *Guideline on Air Quality Models* (Appendix W to 40 CFR part 51) and the factors for evaluation contained in EPA's September 5, 2019, guidance, July 22, 2016, guidance and March 20, 2015, guidance, as appropriate.

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[11] The Canton DRR site monitor (AQS ID: 37-087-0013) was approved by EPA to characterize the maximum 1-hour SO_2 concentrations in the area surrounding BRPP. This approval was based on a modeling analysis submitted by North Carolina in its 2016 ambient air monitoring network plan that showed that the monitor was in the area of expected maximum concentration.

[12] Emission limits established in a title V operating permit are federally enforceable provided that the establishment of the limit implements an "applicable requirement" as defined at 40 CFR 70.2. Emission limits that are established in title V permits are not necessarily permanent, as the CAA requires that permits have a fixed term not to exceed 5 years. See CAA section 502(b)(5)(B), 42 U.S.C. 7661a(b)(5)(B). See also EPA's regulations at 40 CFR 70.6(a)(2). The BRPP allowable emission limits incorporated in the facility's current title V operating permit were established pursuant to federal title V regulations at 40 CFR part 70 (i.e. based on an appropriate SIP-approved applicable requirement) and are therefore currently federally enforceable. Throughout this document the phrase "federally enforceable through the title V permit" is used to describe the BRPP allowable SO_2 emission limits that were incorporated into the facilities title V operating permit pursuant to 40 part 70. The phrase "federally enforceable and permanent" refers to EPA's description of the BRPP's allowable SO_2 emission limits in the context of being approved into the North Carolina SIP. Should EPA finalize approval of BRPP's any SO_2 emission limits into the North Carolina SIP, such an action, at that time, will render those emission limits permanent in addition to federally enforceable.

For the Haywood County Area, EPA received and considered one modeling assessment from North Carolina and no assessments from other parties. Table 3 identifies the assessment, indicates when it was received, provides an identifier for the assessment that is used in the discussion that follows, and identifies any distinguishing features of the modeling assessment.

Table 3. Modeling Assessments for the Haywood County Area

Assessment Submitted by	Date of the Assessment	Identifier Used in this TSD	Distinguishing or Otherwise Key Features
North Carolina DAQ	October 28, 2019[13]	BRPP Modeling Assessment	Modeling of Allowable Emissions from the BRPP Facility

3.3.1. Modeling Analysis Provided by the State

3.3.1.1. Model Selection and Modeling Components

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

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

The State used AERMOD version 18081 in regulatory default mode for the BRPP modeling assessment. AERMOD version 19191 is the current regulatory version of AERMOD. However, EPA proposes that use of AERMOD version 18081 is acceptable for this analysis because it was the current regulatory version of the model in 2018 and 2019, when the modeling analysis was performed by BRPP and DAQ, and none of the changes included in the updated 19191 version would likely change the results of the modeling. A discussion of the State's approach to the individual components is provided in the corresponding discussion that follows, as appropriate.

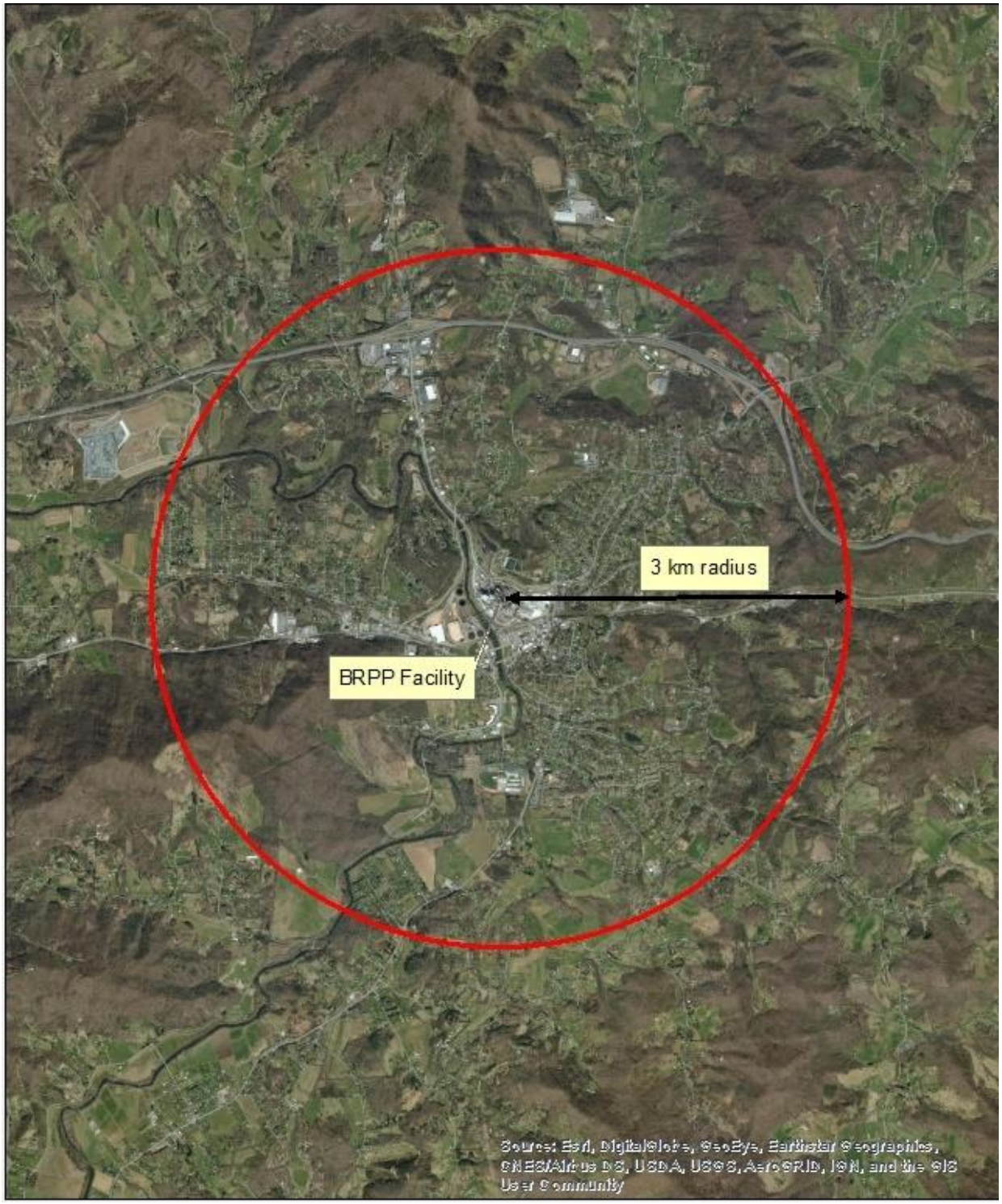
[13] Email from Joseph Voelker, North Carolina Division of Air Quality, to Rick Gillam and Katherine Walther, EPA Region 4, dated October 28, 2019, transmitting the final modeling analysis. North Carolina's recommendation letter dated July 24, 2020, referenced this modeling analysis.

3.3.1.2. 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 important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 7.2.1.1 of Appendix W 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 State determined that it was most appropriate to run the model in rural mode. North Carolina did not provide specific supporting information for the rural classification. EPA performed a qualitative assessment of the land use within 3 km of the BRPP facility using an aerial photo of the area surrounding the facility shown in Figure 2. The majority of the area is clearly low-intensity developed/residential encompassing the small town of Canton, North Carolina. Much of the area is also undeveloped forest or open space. These land uses are considered rural for AERMOD analyses. Therefore, EPA preliminarily concurs that this area warrants being modeled as a rural area.

Figure 2. Aerial Photo of the Area Surrounding the BRPP Facility



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

Appendix W 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 Appendix W 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 BRPP source of SO_2 emissions subject to the DRR in the Haywood County Area is described in the introduction to this section. For the Haywood County Area, the State considered other emitters of SO_2 within 30 km of BRPP in any direction. The State determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. In addition to BRPP, the other emitters of SO_2 considered in the area of analysis are summarized in Table 4.

Table 4. SO_2 Emissions Sources in the Area of Analysis

Facility Name	Distance from BRPP Facility (km)	Annual Emissions (Tons)	Year*	Located in Beaverdam Township
DEP Asheville	27.8	710	2019	No
Harrison Construction	17.4	3.34	2013	No
Holston Environmental Services	20.6	0.39	2014	No
Giles Chemical	14.5	0.01	2014	No
Blue Ridge Paper Products – Waynesville	12.5	0.04	2014	No
Americarb, Inc.	1.3	0.10	2015	Yes

*Small sources, including all the facilities in this table except DEP Asheville, are only required to report emissions when they renew their permit, and permit renewals for such sources are required once every 8 years under North Carolina's rules.

North Carolina determined that none of the sources in Table 4 either have emissions levels large enough or are located close enough to BRPP (or a combination of the two) to include in the modeling analysis. No other sources beyond 30 km were determined by the State to have the potential to cause significant concentration gradients within the area of analysis. The potential impacts of other SO_2 emissions sources in the Haywood County Area that were not modeled are accounted for with the representative background concentration.

The largest emissions source in the vicinity not included in the modeling analysis is the Duke Energy Progress (DEP) Asheville facility, which is located approximately 28 km from the BRPP facility, with significant elevated terrain located between the two sources. The coal-fired units at the DEP Asheville facility were permanently shut down on January 29, 2020, in accordance with Session Law 2015-110, Section 2(c), of Senate Bill 716, enacted by the 2015 session of the North Carolina General Assembly. The two boilers have been replaced with natural gas/fuel-oil fired combined-cycle units. On February 6, 2020, DEP Asheville notified the Western North Carolina Regional Air Quality Agency that the two coal-fired units (Unit Nos. 1 and 2) have been officially retired with respect to the two referenced programs effective January 29, 2020, and submitted Retired Unit Exemption Forms in accordance with EPA's Acid Rain and Cross State Air Pollution Rule Programs. DEP Asheville is in the process of dismantling the stack and the two coal fired boilers. The title V permit will be revised to remove the coal fired boilers during the fall of 2020. The SO_2 emissions from the DEP Asheville facility decreased from 792 tons per year (tpy) in 2017 to 710 tpy in 2019.

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

- Receptors were placed every 50 meters (m) along the fenceline;
- Receptors at 100 m spacing from the BRPP facility boundary extending out from the fenceline to 1.5 km in each direction;
- Receptors at 250 m spacing from 1.5 km to 3 km in each direction;
- Receptors at 500 m spacing from 3 km to 6 km in each direction; and
- Receptors at 1,000 m spacing from 6 to out to 10 km in each direction.

Preliminary modeling performed by North Carolina indicated that the maximum modeled concentration occurred within the 250 m spacing receptor grid. Therefore, an additional grid of receptors was added and spaced at 100 m intervals centered on the location of the preliminary modeled maximum concentration and extending out 500 m in each direction, to ensure that the maximum concentration was resolved in a grid with resolution of 100 m. The receptor network contained 2,496 receptors, and the network covered the City of Canton and Beaverdam Township, in eastern Haywood County, North Carolina. Figures 3 and 4, included in the State's modeling documentation, show the State's chosen area of analysis surrounding the BRPP, as well as the receptor grid for the area of analysis.

Consistent with Appendix W, the State placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to BRPP, including other facilities' property. North Carolina staff confirmed with staff at BRPP that public access is prohibited from the areas inside the ambient air boundary of the BRPP facility (fenceline). Public access to the facility is restricted by either a fence, gate, and/or guard. Additionally, since all

other SO_2 emissions sources identified in Table 4 are small enough that their impacts are accounted for with the background concentrations discussed in Section 3.3.1.8 of this TSD, no modeling analysis is necessary to examine whether these other facilities may cause violations within the BRPP fenceline.

Figure 3. Area of Analysis for the Haywood County Area

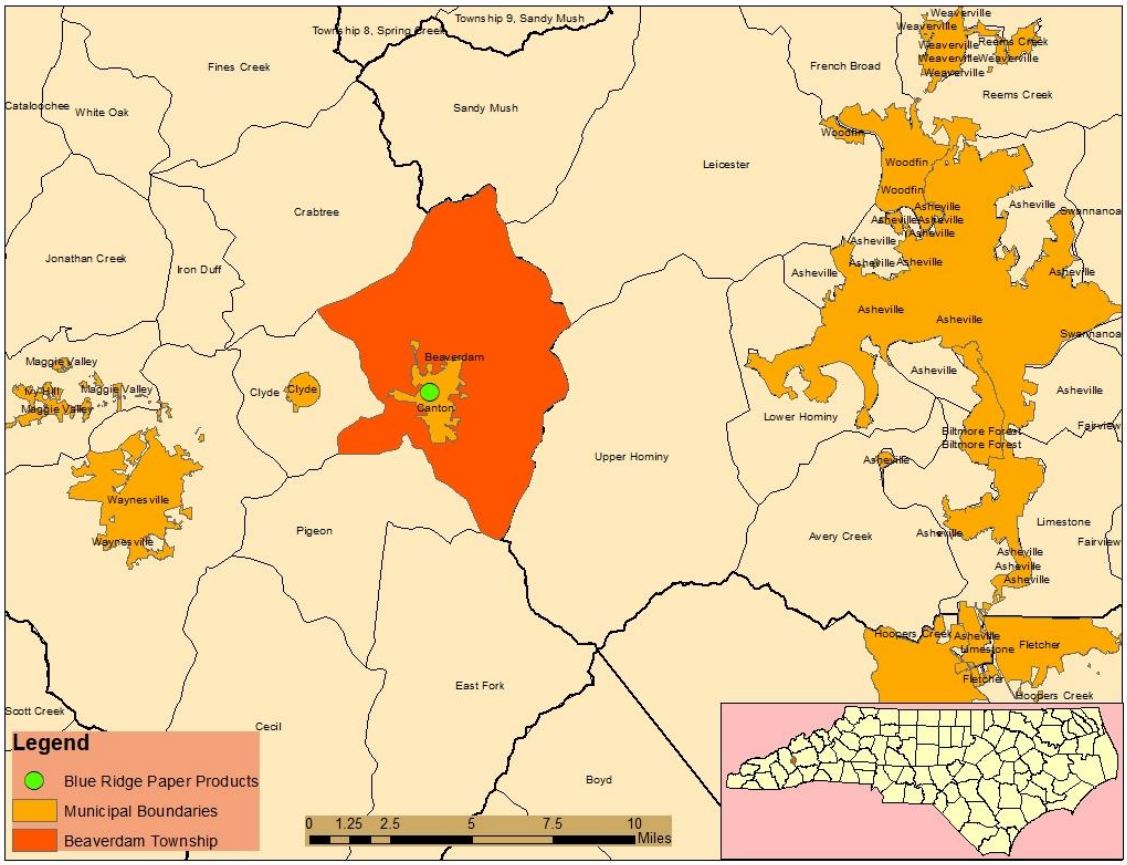
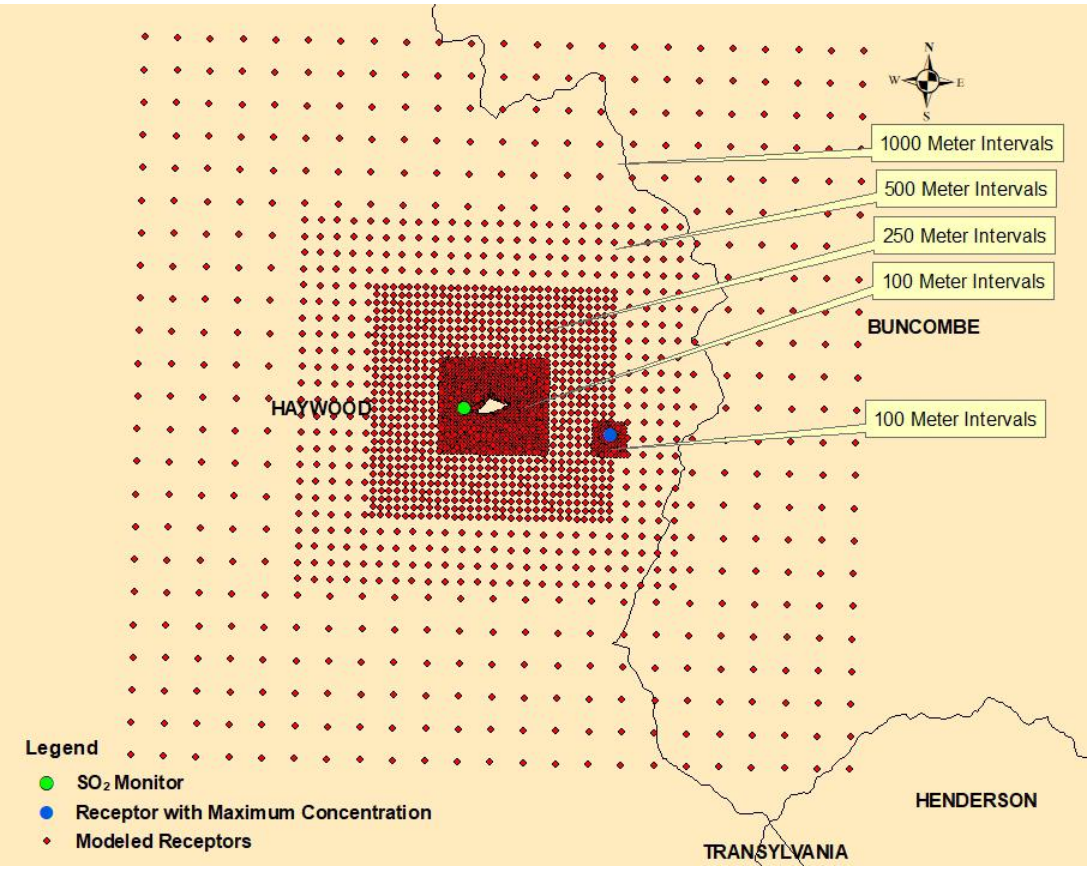


Figure 4. Receptor Grid for the Haywood County Area



EPA has preliminarily determined that the receptor grid chosen by North Carolina adequately captured the area of maximum concentration near BRPP and adequately assesses whether any portion of the area near BRPP will violate the standard, as the maximum modeled concentration occurs over 7 km inside the outer boundaries of the receptor grid.

3.3.1.4. Modeling Parameter: Source Characterization

Appendix W offers recommendations on source characterization including source types, use of accurate stack parameters, inclusion of building dimensions for building downwash (if warranted), and additional details regarding good engineering practices (GEP) policy to be used when modeling allowable emissions.

As discussed in Section 3.3.1.3, the State modeled only BRPP emissions units in its analysis, as the impacts of other sources in the Area were determined by the State to be adequately represented by the ambient background concentration discussed in Section 3.3.1.8 of this TSD. The State characterized the BRPP source in accordance with Appendix W. Specifically, the State followed EPA's GEP policy by using actual stack heights which were all well below the GEP heights calculated with BPIPPRM, in conjunction with allowable emissions limits for all the modeled BRPP emissions units. The State also adequately characterized the source's building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location,

and diameter. Where appropriate, the AERMOD component BPIPPRM (version 04274) was used to assist in addressing building downwash and evaluating GEP stack heights. EPA preliminarily agrees that North Carolina has appropriately characterized the sources at the BRPP facility.

3.3.1.5. Modeling Parameter: Emissions

Appendix W recommends the use of allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate that is federally enforceable and in effect (or that will become federally enforceable **and** permanent upon EPA approval).

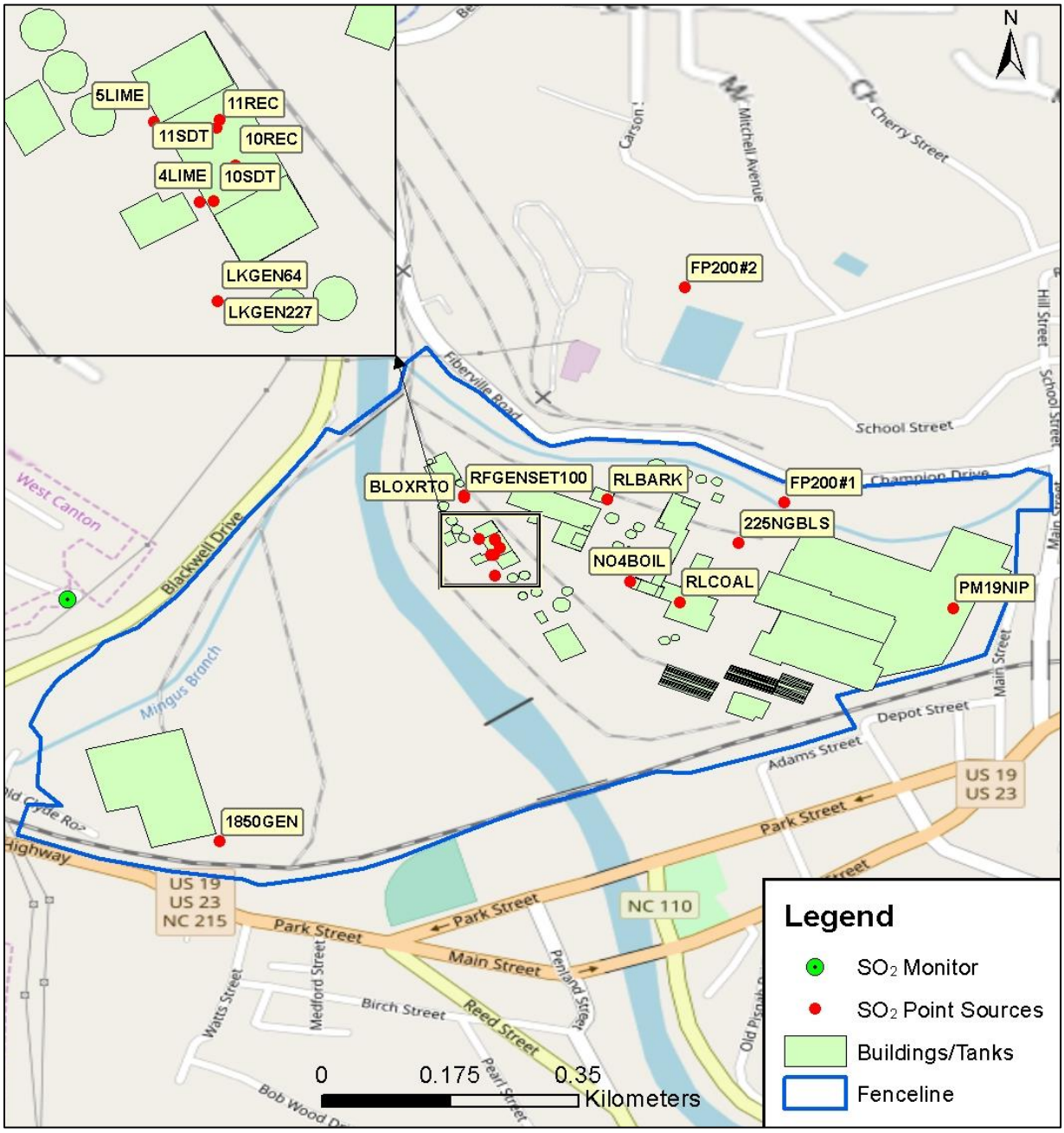
DAQ established new SO_2 emissions limits, that are federally enforceable through the title V permit, to a level that modeling indicates will result in attainment of the 2010 1-hour SO_2 NAAQS. These new limits were used in the State's application of AERMOD and are presented in Table 5. BRPP is currently subject to permitted SO_2 emission limits and compliance parameters, however, these limits are not yet approved in the North Carolina SIP and thus are not considered permanent. EPA is in the process of evaluating a SIP revision from North Carolina which, if approved, would make a subset of these limits permanent in addition to being federally enforceable (see the discussion in Section 3.6 of this TSD). Two modeling scenarios were evaluated. The difference between the two scenarios were the emissions from the BRPP Recovery Furnace Units 10 and 11. Scenario 1 modeled the permit limit for the recovery furnaces in effect during normal operations when they are burning black liquor solids (BLS). Scenario 2 modeled the permit limit for the recovery furnaces in effect during startups and shutdowns when they are burning ultra-low sulfur diesel (ULSD). Table 5 provides the allowable limits that were modeled for both modeling scenarios. The locations of the modeled BRPP emissions units are shown in Figure 5 below.

Table 5. Modeled BRPP Facility-wide Permitted SO_2 Emission Limitations

Unit/Permit ID	Emission Source Description	Permitted SO_2 Emission Limitation, lbs/hr
G08020	No. 10 Recovery Furnace - BLS - normal operation	28.0
G08020	No. 10 Recovery Furnace - ULSD - startup and shutdown	0.54
G08021	No. 11 Recovery Furnace - BLS - normal operation	28.0
G08021	No. 11 Recovery Furnace - ULSD - startup and shutdown.	0.54
G08023	No. 10 Smelt Dissolving Tank	0.42
G08024	No. 11 Smelt Dissolving Tank	0.42
G09028	No. 4 Lime Kiln	6.28
G09029	No. 5 Lime Kiln	10.47
G11039	Riley Coal Boiler	61.32
G11040	No. 4 Power Boiler	82.22
G11042	Riley Bark Boiler	68.00
G12077	Calendar natural gas and/or propane hot oil heaters	0.012
16-CU-001	1850 hp Backup Diesel Generator (Engine)	0.022
I-G23066.f-ire	200 hp Fire Control Generator #1 (Engine)	2.43E-03
I-G23066.f-ire	200 hp Fire Control Generator #2 (Engine)	2.43E-03
I-G23066.f-gen	64 hp Lime Kiln Emergency Generator (Engine)	7.77E-04
I-G23066.f-gen	227 hp Lime Kiln Emergency Generator (Engine)	2.75E-03
I-G23066.f-rec	100 kW Recovery Furnace Emergency Generator (Engine)	1.42E-03
G08022	Black Liquor Oxidation - RTO	2.50
G11050	No. 1 Natural Gas Package Boiler	0.13
G11051	No. 2 Natural Gas Package Boiler	0.13

*lbs/hour = pounds per hour

Figure 5. Location of Modeled BRPP SO_2 Emissions Units



As previously noted, the State included BRPP and no other emitters of SO_2 within 30 km in the area of analysis. The State modeled BRPP using the most recent SO_2 emissions limits that are currently federally enforceable through the title V permit and summarized in Table 6. A description of how the State obtained the emission rates is given below this table.

Table 6. SO_2 Emissions based on limits from BRPP in the Haywood County Area

Facility Name	SO_2 Emissions (tpy, based on allowable limits)
BRPP	1,266
Total Emissions from All Modeled Facilities in the Area of Analysis	1,266

The allowable SO_2 emissions in tpy for BRPP was determined by the State based on the permitted allowable lbs/hr emissions limits for the SO_2 emissions units shown in Table 5 above. Maximum permitted emissions were calculated by multiplying lbs/hr maximum allowable permit limit for each unit by the maximum hours of operation in a year. North Carolina converted the lbs/hr maximum allowable emissions limits to tpy by multiplying the maximum allowable permitted emission rate for each unit by 8,760 hours per year (hrs/yr) and dividing by 2,000 pounds per ton, except for the emergency generators and fire pumps, which are based upon 500 hours of operation per year. The tpy values for each unit were summed to obtain the total of 1,266 tpy. The hourly emissions limits that were used to calculate the allowable emissions were established in BRPP's title V permit (Permit No. 08961T26 or T26) issued by North Carolina on September 12, 2019. Subsequent title V permit modifications were issued after T26; the current permit version is T29. The hourly emissions limits for the seven emission sources that emit the majority of the SO_2 emissions at BRPP (No. 10 and 11 Recovery Furnaces, No. 4 and 5 Lime Kilns, Riley Coal, Riley Bark and No. 4 coal-fired Power Boilers) listed in Table 5 above have been submitted to EPA for incorporation into North Carolina's SIP in a source-specific SIP revision dated June 24, 2020. See Sections 3.6 and 3.7 below for a description of the SO_2 emission limits. EPA Region 4's Administrator signed a proposed approval of the draft SIP revision on July 31, 2020. The proposal approval will have a 30-day public comment period, after which EPA will assess any new information before taking final action on the SIP. The State used hourly emissions rates in the modeling corresponding to the permitted short-term lbs/hr allowable emissions limits shown in Table 5 above. Emissions were assumed to be the same in each modeled year.

From 2017 through 2019, BRPP converted two coal fired boilers to use only natural gas fuel and the use of alternative fuels for startup and normal operations for the recovery furnaces that have significantly reduced SO_2 emissions by 93 percent (5,470 tons) from pre-controlled levels. BRPP chose to control these units because they had a more significant modeled impact on compliance with the 2010 1-hour SO_2 NAAQS than other emission units at the facility. Much of the SO_2 emission reductions have occurred during the past 2 years where BRPP reduced emissions by 86 percent (2,497 tons). EPA preliminarily agrees that appropriate emissions limits were used in the modeling and preliminarily concurs with this component of the modeling analysis.

3.3.1.6. Modeling Parameter: Meteorology and Surface Characteristics

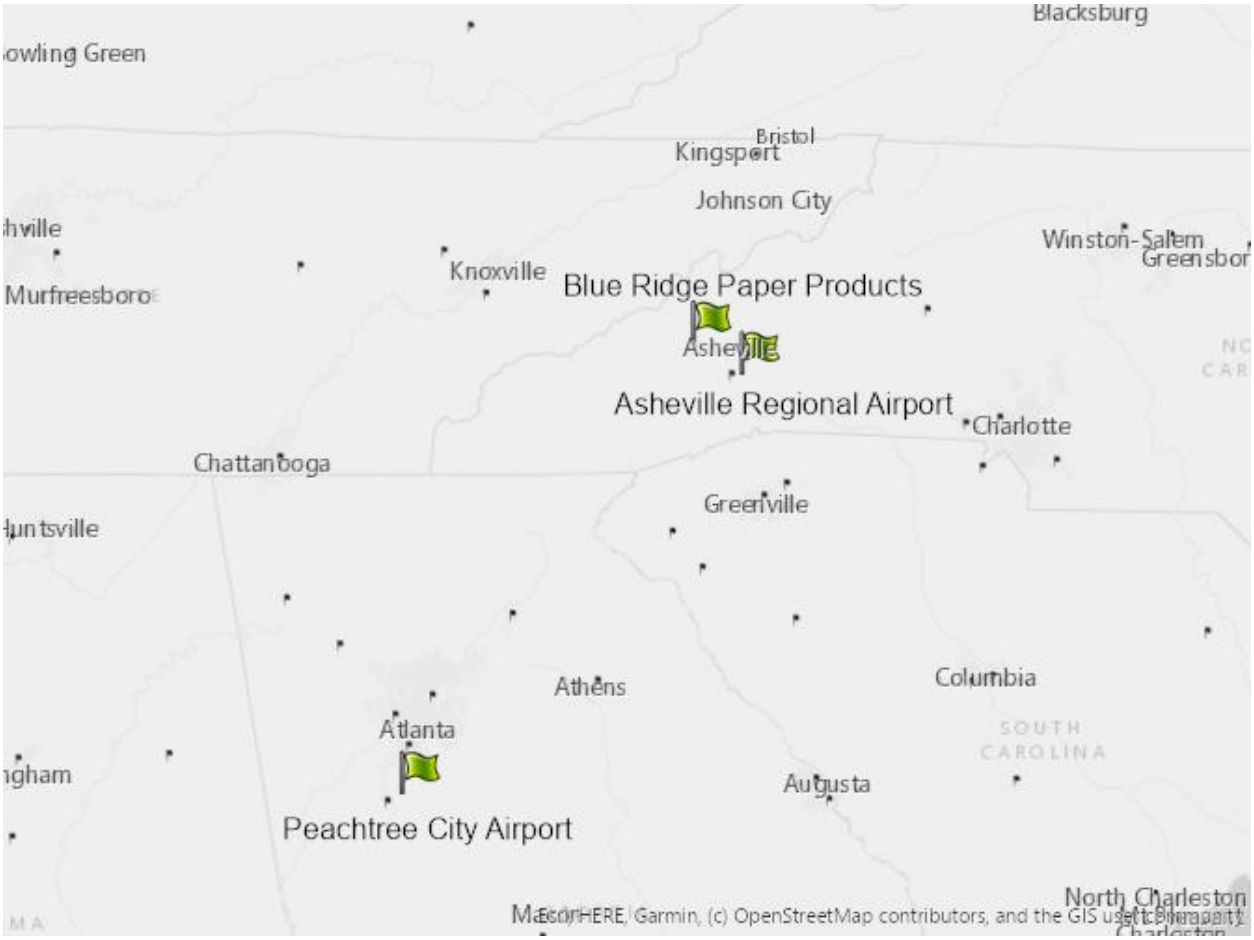
Per Appendix W, the most recent (or most representative) 5 years of meteorological data should be used when modeling with allowable emissions. The selection of data should be based on

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 Haywood County Area, the State used meteorological data for the years 2012-2016 collected at BRPP (on-site data), supplemented with surface meteorology from the NWS site at Asheville Regional Airport (KAVL, NWS station number 03812), approximately 31 km southeast of the source, and coincident upper air observations from the Peachtree City, Georgia NWS site (KFFC, NWS station number 53819), approximately 287 km southwest of the source, as best representative of meteorological conditions within the area of analysis.

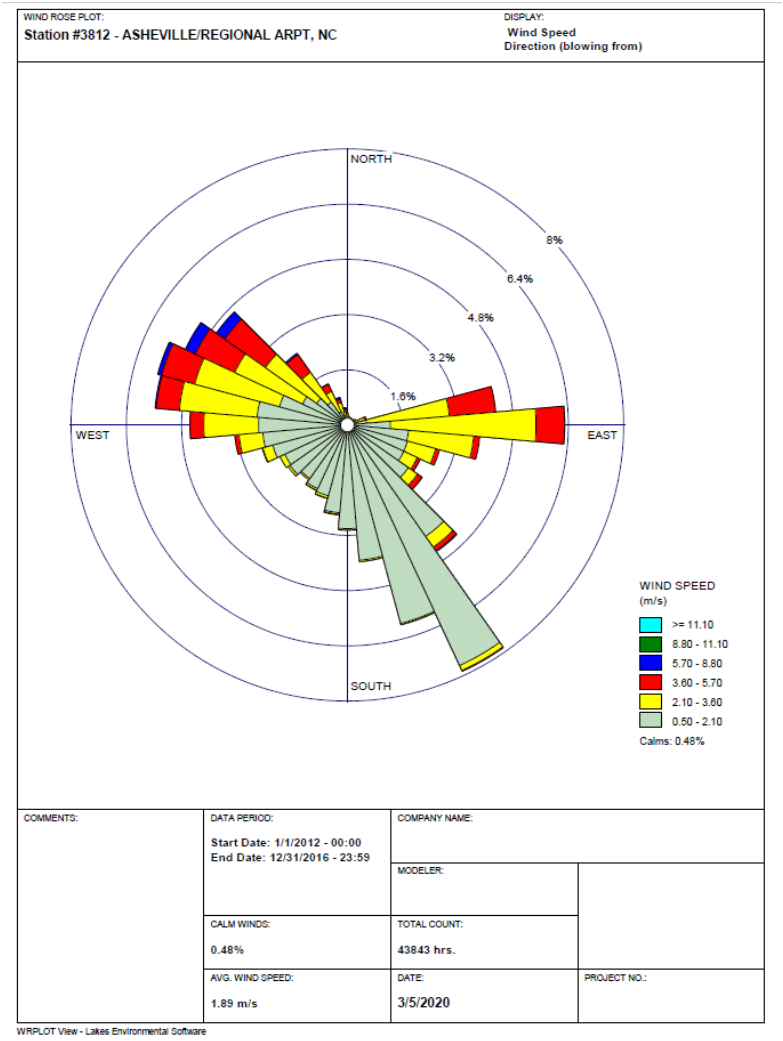
The State used AERSURFACE version 13016 using data from both the BRPP on-site meteorology station and the Asheville NWS station to estimate the surface characteristics of the area of analysis. The surface characteristics consist of albedo (the fraction of solar energy reflected from the earth back into space), the Bowen ratio (the ratio of sensible to latent heat flux from the surface), 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 in the boundary layer). To determine the Bowen ratio, AERSURFACE requires the characterization of the surface moisture conditions at the site relative to climatological normals. This characterization was determined by North Carolina using the Divisional Precipitation Ranks map from the National Centers for Environmental Information. From these maps, it was determined that BRPP had below average precipitation in 2012, 2014, and 2016, while 2013 and 2015 had above average precipitation. The State estimated values for 12 spatial sectors out to one km at a monthly temporal resolution for dry (2012, 2014, and 2016) and wet (2013 and 2015) conditions. In Figure 6 below, generated by EPA, the locations of these NWS stations are shown relative to the area of analysis.

Figure 6. Area of Analysis and the NWS stations in the Haywood County Area



EPA generated a wind rose for the merged BRPP on-site met data/Asheville Regional Airport NWS station data with the Lakes Environmental "WRPLOT View" utility program using state submitted pre-processed AERMET surface meteorology data for the 2012-2016 period. In Figure 7 below, the frequency and magnitude of wind speed and direction are defined in terms of where the wind is blowing from. Analysis of the NWS data indicate winds blow predominantly from the south-southeast with a low average wind speed of 1.89 meters per second (m/s). Winds also blow from the west-northwest and east more frequently than other directions.

Figure 7. Haywood County Area Cumulative Annual Wind Rose for Years 2012 – 2016



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET processor, version 16216.[14] The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. The State followed the methodology and settings presented in the AERMET User Guide, the SO_2 Modeling TAD, and the SO_2 Designation Guidance in the processing of the raw meteorological data into an AERMOD-ready format and used AERSURFACE to best represent surface characteristics. North Carolina did not use the adjusted surface friction velocity (ADJ_U*) option in its modeling.

[14] AERMET version 19191 is the current regulatory version of AERMOD. North Carolina chose to use of AERMET version 16216 for this analysis because it was the current regulatory version of the model in late 2017 when the modeling project began. None of the changes included in the updated AERMET versions 18081 or 19191 would likely change the results of the modeling. Therefore, EPA proposes to find use of AERMET version 16216 acceptable for this modeling analysis.

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 NWS site at the Asheville Regional Airport, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated along with the hourly BRPP on-site data 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. The State set a minimum threshold of 0.5 m/s 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 merged on-site BRPP and NWS 1-minute wind data.

EPA preliminarily concurs with the meteorological data and surface characteristics components of North Carolina's modeling assessment and believes that the wind rose shown in Figure 6 supports the conclusions from the modeling assessment.

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

The terrain in the area of analysis is best described as complex terrain with many elevated terrain features taller than the BRPP stack heights nearby. To account for these terrain changes, the AERMAP version 11103 terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the US Geological Survey's National Elevation Database.

EPA preliminarily concurs with North Carolina's application of AERMAP and treatment of the local terrain in the modeling analysis.

3.3.1.8. Modeling Parameter: Background Concentrations of SO_2

Appendix W and EPA's SO_2 Modeling TAD offer two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the State used a tier 1 approach.

Background data was obtained from the 2014-2016 time period from the Greenville ESC monitor located in Greenville County, South Carolina (AQS Site: 45-045-0015), approximately 86 km southeast of BRPP. The single, design value background concentration for this area of analysis was determined by the State to be 8 micrograms per cubic meter ($\mu g/m^3$), equivalent to 3

ppb,[15] when expressed in one significant figure, and that value was incorporated into the final AERMOD results.

In order to select the most appropriate ambient monitoring site to use for the background concentration, North Carolina evaluated the three active SO_2 monitors within 100 km of BRPP. Of these, only two had valid 2014-2016 design values, Seneca and Greenville, South Carolina. Of these two, the Greenville ESC monitor has more sources in close proximity to it and is the more conservative option. The State has chosen a monitor that is adequate for modeling purposes, with complete data for the 2014-2016 time period.[16]

EPA preliminarily believes that the chosen background monitored concentration is representative of the area and adequately accounts for potential SO_2 impacts from nearby sources not explicitly included in the modeling.

3.3.1.9. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Haywood County Area of analysis are summarized below in Table 7.

[15] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1 ppb = approximately 2.619 $\mu g/m^3$.
[16] An evaluation of more recent data from the Greenville ESC monitor shows that the 2015-2017 design value was 2 ppb, and the 2016-2018 design value was 1 ppb. This information further supports North Carolina's decision to use the 2014-2016 design value of 3 ppb as a conservative estimate of the background concentrations in the area of analysis.

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

Input Parameter	Value
AERMOD Version	Version 18081 (regulatory default mode)
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	18
Modeled Structures	44
Modeled Fencelines	1
Total receptors	2,496
Emissions Type	Allowable emissions under the permit
Emissions Years	Permit allowable limits effective in 2019
Meteorology Years	2012-2016
NWS Station for Surface Meteorology	BRPP On-site Data in conjunction with Asheville Regional Airport, North Carolina
NWS Station Upper Air Meteorology	Peachtree City, Georgia
NWS Station for Calculating Surface Characteristics	BRPP On-site Data in conjunction with Asheville Regional Airport, North Carolina
Methodology for Calculating Background SO_2 Concentration	Tier 1 Greenville ESC Site: 45-045-0015
Calculated Background SO_2 Concentration	3 ppb/8 $\mu g/m^3$

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

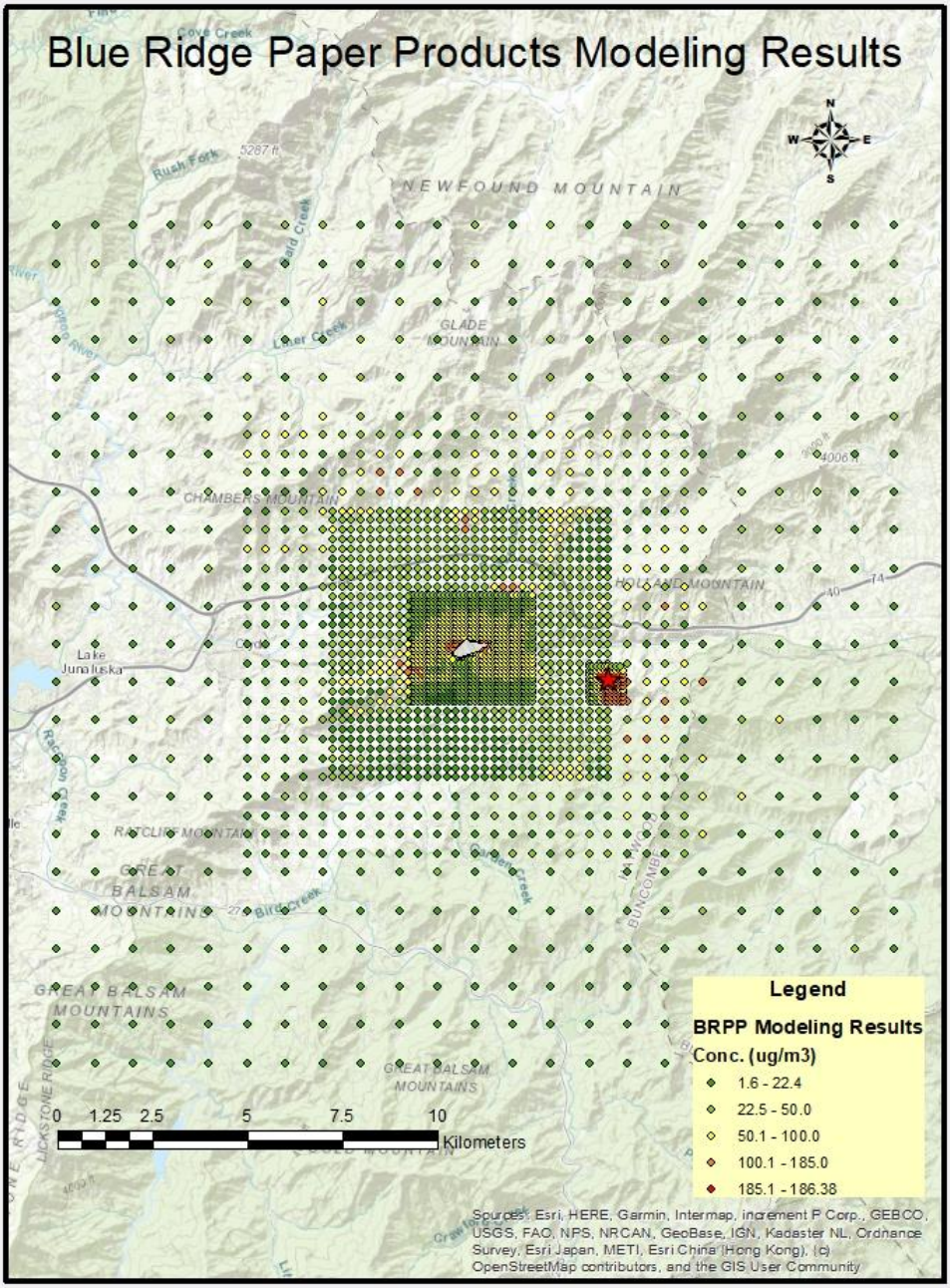
Table 8. Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over Three Years for the Area of Analysis for the Haywood County Area

Averaging Period	Modeling Scenario*	Receptor Location UTM zone 17		99th percentile daily maximum 1-hour SO_2 Concentration (µg/m^3)	
		UTM Easting	UTM Northing	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	Scenario 1 (BLS)	336500	3933100	194.4	196.4**
99th Percentile 1-Hour Average	Scenario 2 (ULSD)	336500	3933100	175.0	196.4**

*BRPP Recovery furnaces burning ULSD or BLS.
**Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 µg/m3 conversion factor.

The State's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration averaged over the modeled period of 2012-2016 within the chosen modeling domain is 194.4 µg/m^3, equivalent to 74 ppb. This modeled concentration included the background concentration of SO_2 (3 ppb (8 µg/m^3)) and is based on allowable SO_2 emissions from BRPP, during the normal operations scenario when the recovery furnaces are burning BLS fuel. Figure 8 below was generated by EPA using the model output files provided by North Carolina. The receptor at which the maximum modeled impact occurred is located approximately 3.2 km (1.98 miles) east-southeast of BRPP's fenceline, shown with the red star in Figure 8. Note that the modeling results shown in Figure 8 do not include the "Tier 1" constant 3 ppb (8 µg/m^3) background concentration that was added to the modeled concentrations at each receptor location.

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



The modeling submitted by the State does not indicate that the 2010 1-hour SO_2 NAAQS is violated at the receptor with the highest modeled concentration.

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

EPA preliminarily agrees with North Carolina's methodology used in their modeling to characterize SO_2 impacts in the Haywood County Area. The State made use of AERMOD version 18081, which was the most recent version available at the time the modeling was conducted. Additionally, EPA preliminarily agrees that this model version is appropriate to characterize the Haywood County Area because the State made use of default regulatory options and any updates to the model are not expected to change any of the predicted SO_2 impacts. EPA also preliminarily agrees with the State's decision to run AERMOD with the rural setting due to the non-urban land-use in the area surrounding BRPP. EPA believes the modeling domain is appropriate to capture predicted maximum impacts in the Haywood County Area. North Carolina's selection of meteorology, surface characteristics and background monitor concentrations for the Area appear also to be appropriate to make a valid modeling demonstration.

North Carolina's decision to only include the BRPP source in the modeling appears to be appropriate based upon their finding that no other large SO_2 emissions sources are located in the Area. Based on the available information for the remaining areas in North Carolina, including monitoring and modeling, there are no current SO_2 nonattainment areas near Haywood County, North Carolina. Additionally, there are no available modeling or monitoring data available that would indicate violations of the NAAQS in nearby areas. The closest monitor located approximately 24 km away in Limestone Township, Buncombe County is attaining the NAAQS with a 2017-2019 design value of 11.9 ppb. Therefore, the sources of SO_2 emissions in Haywood County are not expected to contribute to ambient air quality in a nearby area that does not meet the NAAQS.

North Carolina's modeling for the Haywood County Area is based on the permitted SO_2 emission limits in BRPP's most recent title V permit T29. These limits correspond with the emissions reductions that have occurred from 2017 through 2019, resulting from BRPP converting two coal-fired boilers to use natural gas fuel and the use of alternative fuels during startup and normal operations for the two recovery furnaces. These controls have significantly reduced SO_2 emissions by 93 percent (5,470 tons) from pre-controlled levels. Most of the SO_2 emission reductions occurred during the past 2 years, when the facility reduced emissions by 86 percent (2,497 tons).

Concurrent with the emissions controls, the 99th percentile ambient concentrations measured at the Canton DRR site monitor have decreased from 207 ppb in 2017 to 35 ppb in 2019 (approximately 83 percent reduction). The large reductions in both emissions from BRPP and the most recent ambient concentrations measured at the Canton DRR site monitor, support EPA's preliminary conclusion that the BRPP allowable emissions modeling provided by North Carolina provides a more reliable assessment of current air quality than the 2017-2019 design value from the Canton DRR site monitor (152 ppb). The maximum modeled design value concentration of 74 ppb, based upon BRPP's allowable emissions limits during normal operations in Modeling Scenario 1, indicates that the air quality is attaining the 2010 1-hour SO_2 NAAQS and is expected to continue to attain the NAAQS in the future once certain permitted SO_2 emission limits established in title V operating permit T29 become incorporated into the SIP and are made

permanent in addition to being federally enforceable. EPA preliminarily finds that the modeling provided by North Carolina is fully consistent with Appendix W and the SO_2 Modeling TAD that demonstrates attainment with the 2010 1-hour SO_2 NAAQS and provides a more reliable assessment of current air quality than the 2017-2019 design value from the Canton DRR site monitor (152 ppb), provided the specified SO_2 emission limits become permanent through EPA's approval into the North Carolina SIP and are shown to be met by the source.

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

3.5. Jurisdictional Boundaries in the Haywood County Area

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.

BRPP is located in the City of Canton, Beaverdam Township, Haywood County, approximately 25 km west of Asheville, North Carolina. Haywood County is bounded by Swain and Jackson Counties to the west, Madison and Buncombe Counties to the east, Transylvania County to the south. Haywood County is also bounded to the north by the Tennessee state border, which is approximately 30 km from BRPP. In its July 24, 2020, updated recommendation letter, North Carolina recommended attainment/unclassifiable for all of Beaverdam Township in Haywood County based in part on an air dispersion modeling assessment of enforceable allowable emission limits for BRPP and characterization of air quality impacts. The modeling analysis only included Beaverdam Township. EPA notes the remaining townships in Haywood County were designated attainment/unclassifiable in Round 3 designations.

3.6. Other Information Relevant to the Designation of the Haywood County Area

EPA received additional information relevant to the designation of this Area. On June 24, 2020, North Carolina submitted to EPA a draft source-specific SIP revision requesting EPA to incorporate, into the SIP, certain SO_2 emissions limits and associated operating and compliance parameters (monitoring, recordkeeping and reporting (MRR) and testing) from title V permit T29 to strengthen the SIP requirements for BRPP, and thereby make the certain allowable SO_2 emissions limits permanent in addition to being federally enforceable for consideration in the SO_2 designations process. Between 2017 and 2019, BRPP implemented facility modifications and installed control equipment to reduce SO_2 emissions and ambient concentrations to below the 2010 1-hour SO_2 standard. The following information provided below describes the SO_2

emissions limits that are currently federally enforceable through the title V permit and that were included in North Carolina's air dispersion modeling analysis discussed in section 3.3. above.

On October 9, 2017, North Carolina and BRPP entered into a Special Order by Consent 2017-002 (also referred to as SOC), to address monitored exceedances at the Canton DRR site monitor but also to implement facility process modifications, upgrade existing control equipment, and install new control equipment to comply with the Boiler Maximum Available Control Technology (MACT) rule. The SOC contained provisions for the facility to comply with the CAA section 112(d) Boiler MACT rule by May 20, 2019, per the CAA section 112(j) requirements in its permit. The SOC required BRPP to submit a permit application and modeling analysis to DAQ by March 1, 2018, to characterize the facility's emission sources and develop allowable SO_2 emission limitations based on modeled predictions of ambient SO_2 concentrations which resulted in control and reduction of facility-wide SO_2 emissions. The allowable SO_2 emission limits were established in BRPP's title V operating permit issued on September 12, 2019, Permit Number 08961T26 or T26;[17] subsequent permit revisions resulted in the current BRPP title V permit Number 08961T29 or T29 issued on June 2, 2020.[18] DAQ also performed air dispersion modeling analysis which EPA preliminarily finds is fully consistent with Appendix W and the SO_2 Modeling TAD and appears to demonstrate attainment with the 2010 1-hour SO_2 NAAQS. See section 3.3 above for a detailed analysis of North Carolina's modeling.

North Carolina's June 24, 2020, SIP revision requested EPA incorporate, into the SIP, certain maximum permitted SO_2 emission limits, operation, MRR and testing parameters for purposes of making this set of limits permanent in addition to being federally enforceable. There are 19 SO_2 emission units at BRPP and each unit's SO_2 maximum allowable emission limit in the permit was modeled to demonstrate attainment of the 2010 1-hour SO_2 standard. See Table 5 above. Specifically, North Carolina requested EPA incorporate the SO_2 emission limits and compliance parameters for seven of the 19 emission units at the facility because these units are the highest SO_2 emitting sources at BRPP. These seven emission units include No. 10 and 11 Recovery Furnaces, No. 4 and 5 Lime Kilns, Riley Coal, Riley Bark and No. 4 coal-fired Power Boilers. Table 9 below list the seven emission units and their maximum permitted SO_2 emission limits.

The remaining 12 SO_2-emitting sources at BRPP were included in the modeling analysis at their maximum permitted emission limits under the title V permit T29 but have not been considered for incorporation into the North Carolina SIP, and although federally enforceable through the title V permit would not become permanent through the SIP. These units have low actual SO_2 emissions and negligible modeled impacts to the maximum modeled receptor. Six of these 12 emission units are engine generators and their operations are considered intermittent. After careful technical analysis, EPA preliminarily concludes that not making these limits permanent

[17] Title V Permit Number 08961T26 initially established facility wide SO_2 emission limits, operating, MRR and testing requirements in accordance with the SOC and the Boiler MACT (including a demonstration of modeled attainment).

[18] On June 2, 2010, DAQ issued title V Permit Number 08961T29, which among other changes, clarified parametric monitoring procedures for the No. 4 and No. 5 lime kiln during wet scrubber annual maintenance and simplified the Boiler MACT scrubber MRR requirements. Permit T29 is the current title V operating for which EPA proposed to incorporate portions into the North Carolina SIP on July 31, 2020, to strengthen the SIP. This permit update did not modify any SO_2 emissions limitations or significantly change the monitoring, recordkeeping, reporting, or testing requirements established in T26.

and federally enforceable through SIP approval does not undermine the reliability of the modeling demonstrating attainment based on all the SO_2 emission limits in the permit.

Table 9. BRPP Permitted SO_2 Emission Limits for the Highest's SO_2 Emitting Units

Unit ID	Emission Unit Description	Permitted SO_2 Emission Limit Title V Permit No. 08961T29 (lbs/hr)
G08020	No. 10 Recovery Furnace-BLS-normal Operation	28.0
	No. 10 Recovery Furnace-ULSD – startup and shutdown	0.54
G08021	No. 11 Recovery Furnace-BLS – normal operation	28.0
	No. 11 Recovery Furnace-ULSD – startup and shutdown	0.54
G09028	No. 4 Lime Kiln	6.28
G09029	No. 5 Lime Kiln	10.47
G11039	Riley Coal Boiler	61.32
G11040	No. 4 Power Boiler	82.22
G11042	Riley Bark Boiler	68.00

Below is a description of the seven major SO_2-emitting units at BRPP including the allowable SO_2 emission limit, operating restrictions, MRR and testing requirements:

- **No. 10 and No. 11 Recovery Furnace (G08020 and G08021)** - These two emission units recover pulping chemicals from spent pulping liquor (black liquor). Each recovery furnace is subject to a pair of permitted SO_2 limits based on ULSD and BLS fuel usage. The ULSD is used specifically during startup and shutdown, and the BLS is used during normal operation. During start-up, fuel oil is burned for a period of time to warm up the furnace. The exhaust parameters during startup differ from that of normal operation (i.e., the exhaust flow and temperature are lower when only startup fuel is being fired). Each recovery furnace is subject to two enforceable SO_2 emission limits for start-up and shutdown (0.54 lb/hr) firing only ULSD fuel oil (with a maximum sulfur content of 15 parts per million (ppm)), and a separate enforceable emission limit of 28.0 lb/hr when firing black liquor solids. These units are not equipped with control devices and are required to conduct source testing annually to determine compliance with the SO_2 emission limits established in title V permit T29 and are required to maintain records for start-up and shutdown operations and fuel oil supply.

- **No. 4 Power, Riley Coal, and Riley Bark (G09028, G09029 and G11039)** – These coal-fired boilers are subject to permitted SO_2 emission limits of 82.22 lb/hr, 61.32 lb/hr and 68.00 lb/hr, respectively. These coal-fired boilers are operated to produce steam for energy generation and provide heat for the pulping and paper making processes. The Riley Coal and No. 4 Power Boilers are each equipped with a caustic wet scrubber, and the Riley Bark has a venturi-type wet scrubber with caustic addition. For the three

boilers, the wet scrubber on each boiler is required to be operated continuously and is considered a part of the physical and operational design of the boilers. Each scrubber is subject to MRR, testing, and compliance certification requirements specified in T29 which include Boiler MACT parametric monitoring requirements.[19] These three coal-fired units are not equipped with continuous emission monitoring system (CEMS) to continuously collect, record, and report emission data for compliance with an array of enforceable emission standards and other regulatory requirements. In lieu of CEMS, the permit requires BRPP to install, operate, and maintain a continuous monitoring system (CMS) for the wet scrubbers parametric monitoring pursuant to the Boiler MACT monitoring requirements at 40 CFR 63.7525 (d) through (g) and section 63.7535.[20] BRPP is required to continuously monitor the minimum scrubbing liquid pH and recirculation liquid flowrate to verify compliance with the applicable SO_2 emissions for these three boilers. Minimum parametric values for the scrubbing liquid pH and recirculation liquid flowrate are established through performance testing and provided in permit T29 for the wet scrubbers. The facility is required to determine the source-specific scrubber liquid pH and flow rate calculated as 3-hour block averages based on three 1-hour source test runs to determine continuous compliance with the permitted SO_2 emission limits in permit T29. BRPP is required to maintain the parametric scrubbing flow rate and pH levels at or above the minimum levels confirmed or re-established by the most recent performance test performed and approved by DAQ that demonstrates compliance with the corresponding emission limits. Maintaining the 3-hour block averages for the pH and scrubber liquid flow at or above the minimum values is expected to result in maintaining compliance with emission rate. For the Riley Coal, Riley Bark, and No. 4 Power Boiler scrubbers, the title V permit T29 identifies the parameters that BRPP is required to monitor - the minimum pH and recirculation flow rate (gpm) and provides the values for pH and recirculation flow rate (gpm) from the most recent SO_2 performance testing, and the date of the latest testing for the three coal-fired boilers. The parametric values in permit T29 simply shows the values confirmed or re-established by the most recent performance testing that demonstrated compliance at the time of permit issuance. BRPP is required to meet the minimum values confirmed or re-established in the most recent performance testing. BRPP is also required to conduct periodic performance testing of the wet and venturi scrubbers. If the currently applicable parametric values are revised in subsequent performance testing,[21] the newly established values are enforceable upon

[19] Parametric monitoring is a common method to ensure continuous compliance with an emissions limit in lieu of continuous direct sampling/monitoring of the subject pollutant, in this case SO_2. This is a common regulatory approach used in various Federal regulations such as the MACT and New Source Performance Standards (NSPS). In parametric monitoring, certain performance parameters that are critical to the proper operation of the emission control device are continuously monitored. These parameters can include scrubber recirculation flow, pH, and pressure drop. The compliance parameter minimum levels are typically established during emission source testing to ensure operating at those parameter levels meets the underlying emission control requirement.

[20] Pursuant to 63.7525 (d) through (g), BRPP must operate the CMS in accordance with the criteria on the collection of data and recordkeeping, inspection, and validation requirements at 63.7525(d) (except (d)(4)) and 63.7535; and must meet the criteria for the operation of flow and pH sensors of 63.7525(e) and (g). In lieu of the 30-day rolling average per 62.7525(d)(4), BRPP is required to maintain the 3-hour block average for the parameters in title V permit T29 at or above the levels required in the permit.

[21] The initial parametric monitoring ranges identified in permit T29 have already been established by performance tests; any tests conducted subsequent to that time are used to either confirm that the monitoring ranges are still valid or to re-establish new ranges if the tests indicate that is necessary.

approval by DAQ.[22] Deviations from the applicable parameters must be reported to the DAQ. For the Riley Coal and No. 4 Power Boilers, testing is required on an annual basis or, once a test is conducted such that the results of the test are less than 80 percent of the SO_2 emission limit, BRPP will be required to stack test only once every five years.

- **No. 4 and No. 5 Lime Kilns (G09028)** – The No. 4 Lime Kiln is subject to an enforceable SO_2 emissions limit of 6.28 lb/hr and is equipped with a wet scrubber. The No. 5 Lime Kiln (G09029) is subject to an enforceable SO_2 emissions limit of 10.47 lb/hr and equipped with a venturi-type wet scrubber.[23] These two emission units are part of the Kraft pulp mill chemical recovery cycle and, following startup, they calcine lime mud ($CaCO_3$) to produce lime product (CaO). During normal operation, the kilns emit very little SO_2 because the calcium in the lime mud acts as a natural scrubbant by absorbing sulfur. The wet scrubbers are primarily in place to control emissions of particulate matter (PM) and total reduced sulfur (TRS) but also control emissions of SO_2 during startup and can provide some control of SO_2 during normal operation. The lime kilns burn a combination of No. 6 fuel oil and natural gas during both startup and normal operation, with the majority of the heat input coming from natural gas. The kilns go through startup approximately once per month for Kiln No. 4 and every other month for Kiln No. 5. To ensure compliance with the hourly SO_2 emissions limit, BRPP is required to continuously operate the scrubbers and comply with the operating restrictions, testing, recordkeeping, and reporting requirements. In the case of the lime kilns, the parametric monitoring requirements for SO_2 in permit T29 refer to pre-existing air permit and regulatory requirements for proper scrubber operation and air emissions control for the Federal MACT Standard 40 CFR 63 Subpart MM "*National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources*." As such, the facility is required to operate the scrubbers for PM control (which also results in SO_2 control) by regulations that are in addition to the SO_2 control requirements. BRPP must install, calibrate, maintain, and operate a continuous parameter monitoring system that can be used to determine and record the pressure drop across each scrubber and the scrubbing liquid flow rates. These parameters are continuously monitored, recorded, and reduced to 3-hour averages for comparison to the minimum operating limits. Parameters must be maintained above the minimum established values. Deviations from the established parameters must be reported to DAQ. To verify compliance with the emission limitations in permit T29, BRPP is required to perform annual testing or, once a test is conducted such that the results of the test are less than 50 percent of the emission limit, the facility is required to stack test only once every five years. This reduction in testing frequency for sources with control devices, monitored operating parameter limits, and margins of compliance are consistent with the federal rules applicable to the facility (i.e., NSPS, MACT, compliance assurance monitoring, and title V). BRPP is in the process of upgrading its scrubbers for lime kilns 4 and 5. Thus, permit T29, establishes operating parameter limits for operations prior to and after the upgrades. For lime kiln #4,

[22] If revised parametric values are approved based on subsequent performance testing, the permit may be revised to change the values provided in permit T29.

[23] Source testing was conducted on each lime kiln during normal operation, and the source test results showed that the emission rate for each kiln was much lower than the emission rate, calculated using the emission factor that was used to establish the SO_2 limit. The permitted emission rate is therefore conservative, and normal emission rates are expected to be quite low, based on stack test results, and contribute little to the facility's ambient SO_2 impact.

recirculation liquid flow and differential pressure must meet minimum operating limits prior to the upgrade. Following the upgrade, BRPP will be required to meet the minimum values for these parameters recommended by the manufacturer as an interim measure and will be required to conduct testing to establish site-specific limits. Similarly, for lime kiln #5, the permit requires BRPP to meet minimum operating limits prior to the upgrade. Lime kiln #5 uses a venturi-type scrubber and is required to meet minimum limits for venturi liquid flow, quench liquid flow, and differential pressure. Again, following the upgrade, this scrubber is required to meet manufacturer's recommended minimums for these parameters as an interim measure and conduct testing to establish site-specific limits. The scrubber-specific minimum monitoring parameters from performance tests approved by DAQ will supersede the manufacturer's recommended limits without requiring a permit or SIP revision.

Table 10 below provides the modeled impact of each BRPP emission unit at the receptor with the maximum impact and at the receptor located at the Canton DRR monitor reported as the 99th percentile of 1-hour daily maximum modeled concentrations averaged over the 5-year period (2012-2016). The table also provides the percent contribution of each source to the total impact modeled for the receptor with the maximum impact and the receptor located at the Canton DRR monitor. The results are presented for both the recovery furnaces burning BLS during normal operation and burning ULSD during start-up and shutdown.

Table 10. BRPP SO_2 Modeling Results

Unit/Permit ID	Source Description	Impact per Source at Receptor				Contribution per Source at Receptor			
		Maximum (ppb)		Maximum Percent(%)		Maximum (%)		Monitor (%)	
		BLS	BLS	ULSD	BLS	BLS	ULSD	BLS	ULSD
G08020	No. 10 Recovery Furnace	4.09	0.09	4.09	0.05	5.75	0.14	8.97	0.12
G08021	No. 11 Recovery Furnace	3.31	0.09	3.27	0.05	4.65	0.13	7.18	0.11
G09028	No. 4 Lime Kiln	0.36	0.42	3.23	4.09	0.50	0.65	7.08	10.06
G09029	No. 5 Lime Kiln	0.48	0.88	5.19	6.46	0.67	1.39	11.39	15.90
G11039	Riley Coal Boiler	23.88	20.99	4.79	3.97	33.57	32.93	10.51	9.77
G11040	No. 4 Power Boiler	31.58	27.69	8.48	6.34	44.39	43.40	18.62	15.59
G11042	Riley Bark Boiler	7.34	13.52	15.10	18.06	10.32	21.21	33.14	44.44
G12077	Calendar Nip Heaters	0	0	0.001	0.002	0.00	0.00	0.00	0.00
16-CU-001	1850 hp Backup Diesel Generator	0	0	0.000	0.000	0.00	0.00	0.00	0.00
I-G23066. f-ire	200 hp Fire Control Generator #1	0	0	0.000	0.001	0.00	0.00	0.00	0.00
I-G23066. f-ire	200 hp Fire Control Generator #2	0	0	0.000	0.000	0.00	0.00	0.00	0.00
I-G23066. f-en	64 hp Lime Kiln Emergency Generator	0	0	0.001	0.002	0.00	0.00	0.00	0.00

Table 10. BRPP SO_2 Modeling Results (Continued)

Unit/Permit ID	Source Description	Impact per Source at Receptor				Contribution per Source at Receptor			
		Maximum (ppb)		Maximum Percent(%)		Maximum (%)		Monitor (%)	
		BLS	BLS	ULSD	BLS	BLS	ULSD	BLS	ULSD
rec	Recovery Furnace Emergency Generator	0	0	0.002	0.002	0.00	0.00	0.00	0.01
G08022	Black Liquor Oxidation – RTO	0	0.00	0.96	1.09	0.00	0.00	2.11	2.69
G11050 and G11051	No. 1 and No. 2 Natural Gas Package Boiler	0.06	0.05	0.03	0.03	0.09	0.08	0.08	0.06
G08023	No. 10 Smelt Dissolving Tank	0.02	0.02	0.21	0.24	0.03	0.03	0.46	0.60
G08024	No. 11 Smelt Dissolving Tank	0.02	0.02	0.20	0.25	0.03	0.04	0.44	0.62
Totals		**71.14**	**63.77**	**45.57**	**40.63**	**100.00**	**100.00**	**100.00**	**100.00**

On July 31, 2020, EPA Region 4's Administrator signed a proposed rulemaking to approve North Carolina's June 24, 2020, source-specific SIP revision which incorporates, into the North Carolina SIP, specific maximum permitted SO_2 emission limits and operating restrictions, MRR and testing compliance parameters established in BRPP title V permit T29 for the seven highest SO_2 emitting units at BRPP as more stringent permanent and enforceable SO_2 control measures. Section 2.2.J of BRPP's title V permit T29 provides for the facility-wide enforceable SO_2 emissions and compliance parameters (i.e. operating restrictions, MRR and testing requirements) that provide for modeled attainment of the 2010 1-hour SO_2 NAAQS.[24] The permitted SO_2 emission limits were established as a result of the facility improvements, control measures and unit shutdowns required by the SOC to comply with the Boiler MACT based on parametric monitoring and performance testing of the wet scrubbers and fuel restrictions during start-up and

[24] The applicable requirement for the permit requirements is governed by North Carolina's Rule 15A.NCAC.02D. .0501(c) Compliance with the National Ambient Air Quality Standards. As stated in Section 2.2.J of the permit, pursuant to 15A NCAC 02D .0501(c), when controls more stringent than named in the applicable emission standards in Section .0500 are required to prevent violation of the ambient air quality standards or are required to create an offset, the permit shall contain a condition requiring these controls.

normal operations. The permitted emission limits for each SO_2 emitting unit were modeled using AERMOD to determine whether they complied with the 2010 1-hour SO_2 NAAQS. More details on DAQ's air dispersion modeling demonstration can be found in section 3.3. above.

Specific permit conditions established in section 2.2.J of title v permit T29 provide for enforceable operating, MRR and testing compliance parameters[25] that require BRPP to demonstrate continuous compliance with the permitted SO_2 emission limits. Additionally, these permit conditions also cross-reference additional MRR requirements required to demonstrate continuous compliance with the respective emission units' permitted SO_2 emission limit through parametric monitoring performance testing of the wet scrubber controls in portions of section 2.2.D.1 of permit T29 for the No.4 and 5 lime kilns scrubber parametric monitoring.

Between 2017 and 2019, BRPP implemented facility improvements and control measures to comply with a SOC which required the facility to characterize the facility's emission sources subsequent to installation of control measure improvements and develop allowable SO_2 emission limitations based on modeled predictions of ambient SO_2 concentrations. The control measure improvements included installation of two new natural gas-fired boilers, the permanent shut down of two coal-fired boilers, and installation of new wet scrubbers and the rebuilding of ESPs on two additional coal-fired boilers.[26] These measures reduced SO_2 actual emissions and corresponding ambient SO_2 concentrations to demonstrate attainment of the 2010 1-hour SO_2 NAAQS. These control measures resulted in enforceable permitted SO_2 emission limits authorized in title V permit T29. As a result of these control measures and new enforceable emission limits actual SO_2 emissions at BRPP decreased from 5,875 tons in 2017 to 405 tons in 2019, for a 93 percent reduction (reduction of 5,470 tons). Table 11 below provides trends in actual annual SO_2 emissions at BRRP from 2017 to 2019 and shows an incremental reduction in SO_2 emissions at BRPP as the facility implemented control measures per the SOC from 2017 through 2019. The total maximum permitted potential for all facility-wide SO_2 emitting sources at BRPP is 1,266 tpy. Between 2018-2019 the facility reduced emissions from 2, 901 tons to 405 tons, respectively or 86 percent (2,496 tons) including reductions from the three coal-fired units and the recovery furnaces. Table 11 also shows 2019 actual emissions percentage of the maximum permitted maximum allowable emissions for each unit.

[25] The SOC required emissions source testing of the No. 10 and No. 11 Recovery Furnaces burning BLS, Riley Coal Boiler, No. 4 Coal Boiler, and Riley Bark Boiler. The source test results were used to develop the permitted emission limitations and establish parametric monitoring parameters to be used to verify compliance with the limitations for these five processes. All the SO_2 emission units at BRPP are required pursuant to T29 permit conditions to comply with testing, monitoring recordkeeping and reporting requirements in order to demonstrate compliance with the permitted SO_2 emission limits that demonstrate modeled attainment of the 2010 1-hour SO_2 NAAQS including those seven units that were submitted for incorporation into the North Carolina SIP.

[26] Although the MACT standards control hazardous air pollutants (HAPs), these improvements in controls for HAPs also reduced SO_2 emissions. BRPP begin operating the facility under Boiler MACT 40 CFR 63 Subpart DDDDD on May 20, 2019.

Table 11. SO_2 Actual Annual Emission Trends at BRPP (2017-2019)

Unit/Permit ID	Source Description	Annual SO_2 Emissions (tpy)			
		2017	2018	2019	Permitted Maximum Emissions
G11039	Riley Coal Boiler	1,388.41	833.39	115.08	268.58
G11040	No. 4 Power Boiler	1,561.36	1,168.63	195.21	360.12
G11042	Riley Bark Boiler	687.09	602.20	55.07	297.84
G08020	No. 10 Recovery Furnace – BLS - normal operation	575.23	157.64	5.47	122.64
G08021	No. 11 Recovery Furnace - BLS - normal operation	461.34	133.19	27.57	122.64
G08020	No. 10 and No. 11 Recovery Furnace - ULSD - startup and shutdown	0.00	0.01	0.08	4.76
G09028	No. 4 Lime Kiln	1.31	1.11	1.41	27.51
G09029	No. 5 Lime Kiln	0.38	0.36	0.50	45.84
G08022	Black Liquor Oxidation – RTO	1.07	1.08	0.55	10.95
G08023	No. 10 Smelt Dissolving Tank	1.21	1.18	1.16	1.84
G08024	No. 11 Smelt Dissolving Tank	1.25	1.19	1.17	1.84
G11050	No. 1 Natural Gas Package Boilers	0.01	0.37	0.40	0.58
G11051	No. 2 Natural Gas Package Boilers	0.01	0.43	0.41	0.58
G12077	Calendar natural gas and/or propane hot oil heaters	0.01	0.01	0.01	0.05
16-CU-001	One 1850 horsepower, diesel-fired emergency generator	5.6E-03	5.6E-03	5.6E-03	5.6E-03
I-G23066.f-ire, I-G23066.f-rec, I-G23066.f-gen	200 hp Fire Control Generator #1; 200 hp Fire Control Generator #2; 64 hp Lime Kiln Emergency Generator; 227 hp Lime Kiln Emergency Generator; and 100 kW Recovery Furnace Emergency Generator.	2.5E-03	2.5E-03	2.5E-03	2.5E-03

Table 11. SO_2 Actual Annual Emission Trends at BRPP (2017-2019) (Continued)

Unit/Permit ID	Source Description	Annual SO_2 Emissions (tpy)			
		2017	2018	2019	Permitted Maximum Emissions
G11037	Big Bill coal-fired utility boiler (tons of bituminous coal/year)	538.11	0.00	0.00	0
G11038	Peter G-One Coal Fired utility boiler (tons of bituminous coal per year)	657.51	0.00	0.00	0
	Totals	**5,875**	**2,901**	**405**	**1,266**
	Reduction (2018-2017) = 51%		2,973.51		
	Reduction (2019-2018) = 86%			2,496.70	
	Reduction (2019-2017) = 93%			5,470.21	

Table 12 below shows the reduction in maximum allowable SO_2 emission potential in tpy before and after the control measure improvements for the BRPP Riley Coal, No. 4 Power Boilers, and the Riley Bark coal-fired boilers. All three boilers had a reduction in potential to emit over 80 percent. These allowable emission calculations are based on the previous SO_2 pounds per one million British Thermal Units (MMBtu) permit limits and boiler capacities versus the SO_2 emissions limitations specified in title V permit lb/hr limits and equivalent tpy based on 8,760 hours.

Table 12. Change in Allowable SO_2 Emissions for the BRPP Riley Coal, No. 4 Power, and Riley Bark Boilers

Boiler	Current Allowable SO_2 Emissions - Post Control Measures[1]		Allowable SO_2 Emissions prior to Control Measures			Percent Reduction in Allowable SO_2 Emissions
	SO_2 Limit (lb/hr)	Equivalent Annual Limit (tpy)[2]	Boiler Capacity (MMBtu/hr)	SO_2 Limit (lb/MMBtu heat input)	Equivalent Annual Emissions (tpy)[3]	
Riley Coal	61.32	268.6	399	2.3	4,019.5	93.3
No. 4 Power	82.22	360.1	535	1.2	2,812.0	87.2
Riley Bark	68	297.8	380	2.3	3,828.1	92.2

[1]Allowable SO limits added to the permit (No. 08961T26) to comply with the SOC.
[2](SO_2 limit (lb/hr)) x (8,760 hrs/year)) / (2,000 lb/ton).
[3](Boiler capacity (MMBtu/hr)) * (SO_2 limit (lb/MMBtu)) x (8,760 hrs/year)) / (2,000 lb/ton).

As mentioned above, there are 19 SO_2-emitting units at BRPP. North Carolina requested EPA incorporate into the North Carolina SIP the maximum permitted SO_2 emission limits and compliance parameters for the seven largest SO_2 emission sources at BRPP (Riley Bark, Riley Coal, No. 4 Power Boiler, No. 10 and 11 Recovery Furnaces and the No. 4 and 5 Lime Kilns) from title V permit T29 to establish permanent and enforceable SO_2 control measures through the SIP. The remaining 12 SO_2 emitting sources maximum permitted emission limits for the smelt dissolving tanks, calendar heaters, natural gas package boilers, generators, and black liquor oxidation) are federally enforceable through BRPP's title V operating permit T29. These units were included in North Carolina's model analysis as discussed in section 3.3. above, however, these emission units have low actual SO_2 emissions (see Table 11) and negligible modeled contributions to the maximum modeled receptor (see Table 10). Six of the 12 emission units are engine generators considered intermittent sources. Below is a description of these SO_2 emission units.

- **Engine generators** - The six engine generators: 1850 horse-power (hp) backup diesel generator (16-CU-001), 200 hp fire control generator #1 (I-G23066.f-ire) and #2 (I-G23066.f-ire), 64 hp lime kiln emergency generator (I-G23066.f-gen); 227 hp lime kiln emergency generator (I-G23066.f-gen) and 100 kilowatt recovery furnace emergency generator (I-G23066.f-rec) were not proposed for incorporation into the North Carolina SIP because they are considered intermittent sources, all having negligible modeled impacts under the permit to the maximum receptor. For purposes of modeling, emissions for the six generators were conservatively estimated based on 500 hrs/yr of operation on 15 ppm sulfur diesel. Actual operating hours are less than 500. At the maximum modeled impact receptor, these six emission sources combined were estimated to have no contribution to the total modeled concentration for all SO_2 sources. DAQ's decision to exclude these emission units is based on their intermittent operations, low emissions and no contribution to the maximum modeled impact receptor (i.e., little to no impact to ambient concentrations at the receptor for the monitor). Exclusion of these intermittent sources is consistent with EPA's policy regarding modeling of intermittent sources and EPA's 2016 SO_2 NAAQS Designations Modeling TAD. As provided in Table 10 above, modeling of the allowable emissions under the permit for the generators combined showed no impacts at the maximum impact receptor and very minimal impacts on the receptor located at the monitor. These sources will not cause a violation of the 2010 1-hour SO_2 NAAQS.

- **No. 10 and 11 Smelt Dissolving Tank (G08023 and G08024)** - These units process dissolve smelt from the recovery furnaces and they do not burn any fuel. A small amount of sulfur is formed as a result of chemical reactions in the tanks. The smelt dissolving tanks are controlled with wet scrubbers. Although the scrubbers are installed primarily for control of PM and TRS emissions, they also control SO_2 emissions. Each smelt tank was modeled with a permit maximum allowable SO_2 emissions of 0.42 lb/hr based on National Council for Air and Stream Improvement emissions data that ranges from non-detect to low, and these emissions are likely a result of either carryover from the recovery furnace or smelt/water interactions. Actual emissions in 2019 for the smelt dissolving tanks were 63 to 64 percent of allowable maximum potential emissions under the permit estimated for these two emission units. At the maximum impact receptor, these two emission sources combined were estimated to contribute approximately 0.04 ppb or up to

0.07 percent of the total modeled concentration for all SO_2 sources. For the receptor located at the monitor, together the two sources were estimated to contribute from 0.41 ppb to 0.49 ppb or 0.9 to 1.22 percent of the total modeled concentration for all SO_2 sources. See Table 10.

- **Calendar Natural Gas and/or Propane Hot Oil Heaters (G12077)** – These two small natural gas heaters (3.9 MMBtu/hr each) are used to warm oil for the calendar that is used to roll paper. The heaters heat tubes through which oil is circulated; therefore, the oil does not come into direct contact with any flames from the heaters. The heaters are permitted to burn only natural gas and propane and are only capable of burning these two fuels. The sulfur content of propane is over 70 percent lower than the sulfur content of natural gas. Therefore, potential maximum emissions under the permit were calculated assuming that the two heaters burn natural gas. The emission rates represent the maximum SO_2 emissions that the sources could potentially emit based on their operational and physical design. DAQ is not aware of any future plans to modify these emission units to burn any fuel other than natural gas. Actual emissions in 2019 for the two small natural gas heaters were 20 percent of maximum potential emissions under the permit estimated for the two heaters combined. At the maximum impact receptor, maximum potential emissions under the permit for the two heaters were modeled to have no contribution to ambient SO_2 concentrations. For the receptor located at the monitor, maximum potential emissions under the permit for the two heaters were estimated to have negligible impact with modeled contributions of 0.001 to 0.002 ppb. See Table 10.

- **Black Liquor Oxidation – Regenerative Thermal Oxidizer (RTO) (G08022)** - The black liquor oxidation system is vented to an RTO and a caustic wet scrubber. Combustion of TRS compounds in the RTO creates SO_2. The black liquor oxidation system itself does not combust any fuel; however, the RTO combusts a small amount of natural gas. The title V permit requires the RTO to be controlled by a wet scrubber as part of a prevention of significant deterioration (PSD) avoidance condition to limit SO_2 emissions to less than 40 tpy. The wet scrubber is required to be operated continuously and is considered part of the physical and operational design of the black liquor oxidation system – RTO system. Source testing downstream of the wet scrubber measured controlled emissions at approximately 0.25 lb/hr (all runs were less than 0.5 lb/hr). For attainment demonstration purposes, BRPP chose to model an emission rate of 2.5 lb/hr which is 10 times higher than the rate measured during source testing to be conservative. Actual emissions for the black liquor oxidation system – RTO in 2019 were only 5 percent of the maximum potential emissions under the permit estimated for the black liquor oxidation system RTO. At the maximum impact receptor, maximum potential emissions under the permit modeled no contribution to ambient SO_2 concentrations. For the receptor located at the monitor, maximum potential emissions under the permit were modeled to contribute from 0.96 to 1.09 ppb or 2.11 to 2.69 percent of the total modeled concentration for all SO_2 sources. See Table 10.

- **No. 1 and 2 Natural Gas Package Boilers (G11050 and G11051)** - The two natural gas boilers each are rated at 225 MMBtu/hr maximum heat input rate. They were installed in May 2017 to replace two old coal fired boilers to reduce SO_2 emissions. Both boilers are only permitted to burn natural gas and are not capable of firing oil, coal, or biomass. The

SO_2 emission rates represent the maximum SO_2 emissions that the sources could potentially emit based on their operational and physical design. Natural gas fired only combustion sources, which have inherently low SO_2 emissions, are not subject to any MRR requirements. These sources are required to burn only natural gas under the permit thus ensuring compliance with the permitted emission limitations for these units. In addition, these units cannot burn fuels other than natural gas or propane because of their operational and physical design. Actual emissions for 2019 were 71 percent of maximum potential emissions estimated for the two natural gas boilers combined. At the maximum impact receptor, these two boilers combined were estimated to contribute about 0.05 ppb to 0.06 ppb or up to 0.09 percent of the total modeled concentration for all SO_2 sources. For the receptor located at the monitor, together the two boilers were estimated to contribute 0.03 ppb or up to 0.08 percent of the total modeled concentration for all SO_2 sources. See Table 10. These sources are not expected to cause a violation of the 2010 1-hour SO_2 NAAQS. These small natural gas heaters, which have inherently low SO_2 emissions, are not subject to any MRR requirements. These sources are required by the title V permit T29 to burn only natural gas or propane thus ensuring compliance with the permitted emission limitations for these units. In addition, these units cannot burn fuels other than natural gas or propane because of their operational and physical design.

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

A monitor in the Haywood County Area is violating the 2010 1-hour SO_2 NAAQS based on the 2017-2019 design value. However, as described in the preceding sections, North Carolina submitted air dispersion modeling to demonstrate that new SO_2 emissions limits that are currently federally enforceable through a title V permit are more representative of current air quality than the violating design value at the Canton DRR monitor. The BRPP facility is currently subject to these allowable SO_2 emission limits which provide for compliance pursuant to the enforceable title V operating permit MRR. The air dispersion modeling represents a reliable assessment that the area is currently attaining the NAAQS.[27]

EPA intends to designate the remaining portion of Haywood County Area as nonattainment, because, while the SO_2 emission limits that would result in this area attaining the 2010 1-hour SO_2 NAAQS are currently federally enforceable through the title V permit, they are not, at present, permanent and federally enforceable through the SIP. EPA believes that the intended nonattainment area encompassing Beaverdam Township in Haywood County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended designated area.

EPA's guidance provides that modeling may be considered for a source that has recently become subject to and is complying with federally enforceable SO_2 emission limits and modeling with those limits shows attainment of the 2010 1-hour SO_2 NAAQS, but the monitored design value does not yet account for these recent emissions reductions. BRPP became subject to the

[27] EPA's assessment of the modeling for the Haywood County Area for 2010 1-hour SO_2 NAAQS designations does not imply that the modeling is appropriate for other purposes, such as new source review, interstate transport, or SIP demonstrations.

permitted SO_2 emissions limits on September 12, 2019 and is complying with these SO_2 emissions limits that are federally enforceable through the title V permit and that provide for modeled attainment of the 2010 1-hour SO_2 NAAQS. North Carolina has initiated the process to make certain SO_2 emission limits from the title V permit permanent and federally enforceable through the SIP.

The installation of control measures per the SOC from 2018 to 2019 provided for new enforceable SO_2 emission limits at BRPP in 2019 which has resulted in a decrease of actual SO_2 from 5,875 tons in 2017 to 405 tons in 2019, for a 93 percent reduction (a reduction of 5,470 tons). See Table 11 above. The decrease in actual SO_2 emission reductions due to facility control measure improvements also resulted in a corresponding decrease in ambient air SO_2 concentrations at the Canton DRR site monitor. The certified 3-year design value at the Canton DRR monitor site is 152 ppb. However, in calendar year 2019, the annual 99th percentile of the SO_2 1-hour daily maximum concentrations measured by the Canton DRR site monitor was 34.8 ppb or 46 percent of the NAAQS. Specifically, concurrent with the emissions controls, the 99th percentile ambient concentrations measured at the Canton DRR site monitor have decreased from 207 ppb in 2017 to 35 ppb in 2019 (approximately 83 percent reduction). See Table 2 above.

Under various operating scenarios, the air quality modeling of the BRPP SO_2 emissions limits provide for attainment of the 2010 1-hour SO_2 NAAQS. These modeled SO_2 emission limits represent the maximum SO_2 emissions that the units could potentially emit based on their operational and physical design, including air pollution control equipment. The three coal fired units and the two recovery furnaces represent the largest SO_2 emitting units at BRPP and were controlled because they had a more significant modeled impact on compliance with the 2010 1-hour SO_2 NAAQS than other emission units at the facility. The SOC control measures and subsequent enforceable SO_2 emission limits have resulted in SO_2 emission reductions as shown in Table 10 above. The majority of the SO_2 emission reductions occurred between 2018-2019 where the facility reduced actual SO_2 emissions by 86 percent (or 2,497 tons) including reductions from the three coal-fired units and the two recovery furnaces. The three coal-fired reduce units had over 80 percent change in maximum allowable emission rate between before and after the controls measures were implemented. See Table 12 above. The maximum emission limitation modeled for each boiler provides a margin of safety to ensure that each boiler will comply with the emission limitation and be protective of the 2010 1-hour SO_2 NAAQS. The modeled emission limits for the two recovery furnaces are based on the worst-case operating conditions that yield the highest SO_2 emissions that would occur during a 1-hour period.

The remaining, smaller SO_2 emitting units' modeled permitted limits also account for the maximum potential emissions and have enforceable fuel restrictions due to their operational and physical design thus ensuring compliance with the emission limitations for these units. These SO_2 emissions limits that are federally enforceable through the title V permit are intermittent (such as the generators) and/or the actual SO_2 emissions and maximum modeled impacts are minor to negligible. At the maximum impact receptor, modeling of the maximum allowable emissions for these 12 remaining emission units combined show a contribution up to only 0.10 ppb or 0.14 percent of the total modeled impact. For the receptor located at the monitor, together the sources contributed up to 1.62 ppb or up to 4 percent of the total impact modeled for all SO_2 sources. See Table 10 above. The modeling analysis for these emitting sources show minor to no

impact for the modeled receptor with the maximum impact. The allowable permit limits are based on the modeled receptor with the maximum impact and not on the impact at the Canton DRR monitor. Additionally, these small emission units are operated per the conditions title V operating permit T29 and are not allowed to operate in such a way that results in a violation of the 2010 1-hour SO_2 NAAQS. Therefore, the SO_2 emission limits for these remaining 12 SO_2 emitting sources are not considered for incorporation into the North Carolina SIP for the aforementioned reasons. These sources are not anticipated to be modified or to change operation in any manner to increase actual or potential SO_2 emissions and therefore are not expected to cause a violation of the 2010 1-hour SO_2 NAAQS. EPA preliminarily concludes that not making these limits permanent and federally enforceable through incorporation into the SIP does not undermine the reliability of the modeling demonstrating attainment based on all the limits in the title V permit.

The maximum modeled design value concentration of 74 ppb, based upon BRPP's allowable emissions limits during normal operations in Modeling Scenario 1, indicates that the air quality is attaining the 2010 1-hour SO_2 NAAQS and is expected to continue to attain the NAAQS in the future provided a subset of these emissions limits are incorporated into the SIP, and thereby become permanent and federally enforceable through the SIP. North Carolina's decision to only include the BRPP source in the modeling appears to be appropriate based upon their finding that no other large SO_2 emissions sources are located in the area or contribute to the Area. In addition, based on the available information for the remaining areas in North Carolina, including monitoring and modeling, there are no current SO_2 nonattainment areas near Haywood County, North Carolina and no expected future nonattainment areas. The sources of SO_2 emissions in Haywood County Area are not expected to contribute to ambient air quality in a nearby area that does not meet the NAAQS.

EPA believes the SO_2 emission reductions at BRPP realized since 2018 and the 2019 monitored 99^{th} percentile demonstrate that the current 3-year design value is not representative of current air quality in the vicinity of BRPP in Beaverdam Township. The facility has reduced its actual and allowable SO_2 emission as a result of control measures that were established in the facilities title V permit and submitted to EPA to be incorporated into the North Carolina SIP to be established as permanent and federally enforceable through the SIP. The permitted SO_2 emission limitations and compliance parameters in title V permit T29 submitted to EPA to be incorporated into the North Carolina SIP as federally enforceable and permanent control measures, appear to provide reasonable assurance that BRPP will not violate the 2010 1-hour SO_2 NAAQS, and indicates that the Haywood County Area will continue to demonstrate attainment of the SO_2 NAAQS in the future.

The SO_2 emission reductions achieved at BRPP from 2018 thru 2019 (as a result of control measures and SO_2 emissions limits that are currently federally enforceable through the title V permit) and corresponding decrease in 99^{th} percentile ambient air monitoring concentrations at the Canton DRR monitor for calendar year 2019 support EPA's preliminary conclusion that the BRPP modeling of SO_2 emission limits provided by North Carolina provides a more reliable assessment of current air quality than the 3-year design value from the Canton DRR site monitor. Provided EPA approves the incorporation of specific limits SO_2 emission limits into the North Carolina SIP, EPA anticipates considering this information to represent a more accurate

characterization of current air quality at the time of designation than monitoring of past air quality, as outlined in the September 2019 Round 4 SO_2 designations memorandum.

3.8. Summary of EPA's Intended Designation for the Haywood County Area

After careful evaluation of the State's recommendation and supporting information, as well as all available relevant information, EPA intends to designate all of Beaverdam Township in Haywood County, as nonattainment for the 2010 1-hour SO_2 NAAQS. Specifically, the boundaries are comprised of Beaverdam Township in its entirety. Figure 9 below shows the boundary of this intended designated area.

As discussed in sections 3.3. through 3.7, EPA's preliminary conclusion that upon approval of specific SO_2 emission limits into the North Carolina SIP, EPA could consider the BRPP allowable emissions modeling provided by North Carolina to provide a more reliable assessment of current air quality than the 2017-2019 design value from the Canton DRR site monitor. North Carolina submitted a draft source-specific SIP revision to EPA on June 24, 2020, for parallel processing, to incorporate into the SIP, certain permitted SO_2 emission limits established in the facility's title V operating permit. EPA Region 4's Administrator signed a proposed approval of the draft SIP revision on July 31, 2020. The proposed approval will have a 30-day public comment period, after which EPA will assess any new information before taking final action on the SIP. Pursuant to EPA's 2019 Round 4 designations guidance, if prior to finalizing designation, the permitted SO_2 emission limits and compliance parameters are approved into North Carolina's SIP as permanent and federally enforceable through the SIP, EPA may consider modifying the intended designations to attainment/unclassifiable.

Figure 9. Boundary of the Intended Haywood County Area