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April 24, 2020

Mr. Cosmo Servidio
Regional Administrator
Mail Code: 3RA00
U.S. Environmental Protection Agency, Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Reference: Final Designation Recommendations, 2010 SO_2 NAAQS

Dear Mr. Servidio:

Pursuant to Section 107(d)(1)(A) of the Clean Air Act and on behalf of the Governor of the Commonwealth of Virginia, I hereby submit final recommendations for the designation of attainment/unclassifiable and nonattainment areas under the 2010 Sulfur Dioxide (SO_2) National Ambient Air Quality Standard (NAAQS). These recommendations are in response to the U.S. Environmental Protection Agency (EPA) memorandum dated September 5, 2019. This memorandum provided guidance on how air quality status and boundaries should be determined for SO_2 designations based on data collected from source specific monitoring networks established in accordance with EPA's *Data Requirements Rule* (DRR) at 40 CFR Part 51 Subpart BB.

These recommendations update and supplement the Virginia recommendations dated June 3, 2011, which recommended all areas be designated unclassifiable, and January 11, 2017, which recommended certain jurisdictions be designated attainment/unclassifiable based on modeling, monitoring, and other data.

Based on inventory data, air quality monitoring data, and air quality modeling information gathered under the DRR, Virginia recommends that the following jurisdictions be designated as attainment/unclassifiable for the 2010 SO_2 NAAQS. Enclosure 1 provides more information on these attainment/unclassifiable recommendations.

- City of Covington, FIPS 51-580;
- Alleghany County, FIPS 51-005;
- Botetourt County, FIPS 51-023; and
- All of Giles County, FIPS 51-071, except for the recommended nonattainment area as described in Table 9 of Enclosure 2.

Based on inventory data, air quality monitoring data, and air quality modeling information gathered under the DRR, Virginia recommends that a portion of Giles County (FIPS 51-071) be designated as nonattainment for the 2010 SO_2 NAAQS. This boundary includes one large manufacturer, Lhoist North America – Kimballton. This facility established a site-specific monitoring network and has made great progress towards compliance with the standard. However, this progress has not yet been sufficient to achieve compliance with the 2010 SO_2 NAAQS. The Department of Environmental Quality continues to work with this source to further improve local air quality. The boundaries of this nonattainment area were developed based on EPA guidance and are fully described in Enclosure 2, Table 9.

Virginia is not recommending changes to any other previously designated areas within the Commonwealth.

Please feel free to contact the air division staff if you have any questions or concerns about the information in this letter.

Sincerely,

David K. Paylor

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Enclosures
cc: Ms. Cristina Fernandez, Director, Air Protection Division, EPA Region III

ENCLOSURE 1

2010 SO_2 NAAQS Round 4 Area Designations for City of Covington, Alleghany County, Botetourt County, and Portions of Giles County

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1. Recommendations Summary

Virginia recommends that the U.S. Environmental Protection Agency (EPA) designate the City of Covington, Alleghany County, and Botetourt County as attainment/unclassifiable for the 2010 sulfur dioxide (SO_2) National Ambient Air Quality Standards (NAAQS). Additionally, Virginia recommends that the portions of Giles County not included in the recommended nonattainment area described in Table 9 of Enclosure 2 be designated as attainment/unclassifiable. Air quality monitoring data, emissions inventory data, and other information support these recommendations.

2. Background

EPA published a revision to the primary SO_2 NAAQS on June 22, 2010 (75 FR 35520), strengthening the standard to 75 parts per billion (ppb) or 196 micrograms per cubic meter ($\mu g/m^3$). This rule also changed the form of the standard, which became a three-year average of the 99^{th} percentile of daily maximum one-hour concentrations. Scientific evidence links health effects with short-term SO_2 exposure.

On June 3, 2011, Virginia submitted recommendations regarding jurisdictional designations for the 2010 SO_2 NAAQS as described in §107(d)(1)(A) of the CAA. Virginia's 2011 submittal relied upon the March 24, 2011, EPA memorandum outlining data and analyses to be considered in the initial area designations.[1] Based on the EPA guidance, Virginia recommended that all jurisdictions be designated unclassifiable.

EPA published a rule entitled, "Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS)," on August 21, 2015 (80 FR 51052). This rule, 40 CFR Part 51 Subpart BB and referred to as the DRR, directed states to provide data characterizing air quality in areas with large sources of SO_2 emissions and to identify maximum one-hour ambient SO_2 concentrations. The DRR required that, at a minimum, air agencies characterize air quality around facilities that emitted 2,000 tons per year (tpy) or more of SO_2 in 2014. EPA estimated in the preamble to the DRR (80 FR 51061) that this threshold would include the facilities accounting for 89% of all SO_2 emitted nationally in 2011, based on the 2011 National Emissions Inventory (NEI). The DRR provided flexibility in the use of air quality modeling, air quality monitoring, or emission limitations for these assessments. The DRR specified submittals that states must make to EPA to support actions on the 2010 SO_2 NAAQS. Figure 1 provides this information.

[1] https://www.epa.gov/sites/production/files/2016-06/documents/20150320so2designations.pdf

TABLE 1—TIMELINE FOR DRR IMPLEMENTATION

Date	Action
From promulgation of this rule to January 15, 2016.	Air agency and the EPA Regional Office consult on list of SO_2 sources; air agency submits its list of sources to EPA by January 15, 2016.
July 1, 2016	Air agency specifies for each source whether it will characterize air quality with modeling, characterize air quality with monitoring, or establish a federally enforceable requirement limiting annual emissions of the source to less than 2,000 tpy. For source areas to be modeled, the air agency submits a modeling protocol. For source areas to be monitored, the air agency submits information about any new monitoring sites it will establish by January 1, 2017. For areas where enforceable emission limits will be established as an alternative to air quality characterization, the air agency submits a description of the planned emission limit.
January 1, 2017	Air agency ensures that SO_2 monitors to satisfy the Data Requirements Rule are installed and operational.
January 13, 2017	For any source identified for modeling pursuant to the July 1, 2016, milestone, air agency submits modeling analyses. For any source identified for emission limit approach, air agency submits documentation showing that limits requiring annual emissions to be less than 2,000 tpy are effective and federally enforceable.
May 2020	For any source area identified for monitoring approach, air agency certifies 2019 monitoring data, enabling official design values for the 2017–2019 time period to be calculated.

Figure 1: DRR State Submittal Timeline

On January 12, 2016, the Department of Environmental Quality (DEQ) submitted to EPA a listing of facilities located in the Commonwealth that emitted at least 2,000 tpy of SO_2 in 2014. Table 1 provides this listing of facilities; the 2014, 2015, and 2018 SO_2 emissions from each source; and the jurisdiction in which the facility resides.

Table 1: Virginia Facilities Emitting At Least 2,000 Tons of SO_2 in 2014

Federal ID	Facility	2014 SO_2 Emissions (tpy)	2015 SO_2 Emissions (tpy)	2018 SO_2 Emissions (tpy)	Jurisdiction
VA0000005112100006	US Army – RAAP	3,516	3,166	2	Montgomery County
VA0000005102700004	Jewell Coke Company LLP	4,964	4,845	4,901	Buchanan County
VA0000005116700003	American Electric Power - Clinch River Plant	3,302	2,059	174	Russell County
VA0000005158000003	WestRock Virginia Corporation – Covington (formerly MeadWestvaco)	5,558	6,230	1,204	City of Covington/ Alleghany County
VA0000005119900001	Dominion – Yorktown Power Station	9,756	4,549	4,111	York County
VA0000005104100002	Dominion - Chesterfield Power Station	2,181	2,547	926	Chesterfield County
VA0000005155000026	Dominion – Chesapeake Energy Center	10,218	<1	1	City of Chesapeake
VA0000005102300003	Roanoke Cement Company	2,393	2,300	2,270	Botetourt County
VA0000005107100004	Celanese Acetate LLC	7,120	845	3	Giles County
VA0000005108300046	Dominion/ODEC – Clover Power Station	2,084	1,774	941	Halifax County

Federal ID	Facility	2014 SO_2 Emissions (tpy)	2015 SO_2 Emissions (tpy)	2018 SO_2 Emissions (tpy)	Jurisdiction
VA0000005107100001	Lhoist North America - Kimballton Plant	6,294	6,118	499	Giles County

DEQ notified EPA of the method chosen by each facility for the characterization of peak one-hour SO_2 concentrations to demonstrate compliance with the 2010 SO_2 NAAQS on June 28, 2016. Table 2 contains that information, along with the date on which DEQ supplied EPA with the air quality dispersion modeling protocol for cases where the facility chose modeling as the compliance tool. Pursuant to 40 CFR §51.103(c)(1), the final Annual Monitoring Network Plan dated June 23, 2016, and approved by EPA on November 10, 2016, contained all relevant information about the monitoring sites for the three facilities that chose the monitoring methodology to demonstrate compliance.

Table 2: Methodology for Compliance Demonstrations

Federal ID	Facility	Methodology	Protocol Submittal Date to EPA, if applicable
VA0000005112100006	US Army – RAAP	Limitation	---
VA0000005102700004	Jewell Coke Company LLP	Modeling	6/27/2016
VA0000005116700003	American Electric Power - Clinch River Plant	Limitation	---
VA0000005158000003	WestRock Virginia Corporation – Covington (formerly MeadWestvaco)	Monitoring	---
VA0000005119900001	Dominion – Yorktown Power Station	Modeling	6/27/2016
VA0000005104100002	Dominion - Chesterfield Power Station	Modeling	6/27/2016
VA0000005155000026	Dominion – Chesapeake Energy Center	Limitation	---
VA0000005102300003	Roanoke Cement Company	Monitoring	---
VA0000005107100004	Celanese Acetate LLC	Limitation	---
VA0000005108300046	Dominion/ODEC – Clover Power Station	Modeling	6/27/2016
VA0000005107100001	Lhoist North America - Kimballton Plant	Monitoring	---

The DRR next required states to submit modeling analyses by January 13, 2017, for those facilities that chose to demonstrate compliance with the 2010 SO_2 NAAQS using air quality dispersion modeling. States were required to submit documentation supporting limitations on those facilities that chose to accept SO_2 emission constraints of less than 2,000 tpy. In a July 22, 2016, memorandum entitled, "Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard – Round 3," EPA also invited states to update area

recommendations made in 2011 by January 13, 2017, for all areas not installing monitoring networks.[2] Virginia supplied these data and updated recommendations on January 11, 2017.

These recommendations informed EPA's final designations for these areas to meet the requirements of the March 2, 2015, consent decree filed with the U.S. District Court for the Northern District of California.[3] On January 9, 2018 (83 FR 1098), EPA published designations of attainment/unclassifiable for all Virginia areas except Alleghany County, Buchanan County, Botetourt County, Giles County, and the City of Covington. This publication designated Buchanan County as unclassifiable.

On September 5, 2019, EPA published a memorandum entitled, "Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard – Round 4."[4] This memorandum provided a schedule and process for the 2010 SO_2 NAAQS area designations EPA must complete by December 31, 2020. State recommendations pertaining to these designations must be submitted to EPA by May 1, 2020. These designations target the areas operating a new EPA-approved monitoring network and in Virginia consist of the following:

- Alleghany County and the City of Covington, in which WestRock Virginia Corporation – Covington is located;
- Botetourt County, in which Roanoke Cement Company is located; and
- Giles County, in which Lhoist North America - Kimballton Plant is located.

Each of these companies established an EPA-approved monitoring network and gathered three years of appropriate data upon which to determine designations for those localities. The nonattainment area located within Giles County is the subject of the information provided in Enclosure 2. This enclosure addresses Alleghany County, the City of Covington, Botetourt County, and the remainder of Giles County. Figure 2 shows the locations of WestRock in the City of Covington, which is within Alleghany County. Figure 2 also shows the location of Roanoke Cement Company in Botetourt County and Lhoist North America – Kimballton Plan in Giles County. Yellow stars indicate the location of each facility.

[2] https://www.epa.gov/sites/production/files/2016-07/documents/areadesign.pdf
[3] http://www.csg.org/aapca_site/news/documents/SO2ConsentDecreeAsEntered.pdf
[4] https://www.epa.gov/sites/production/files/2019-09/documents/round_4_so2_designations_memo_09-05-2019_final.pdf

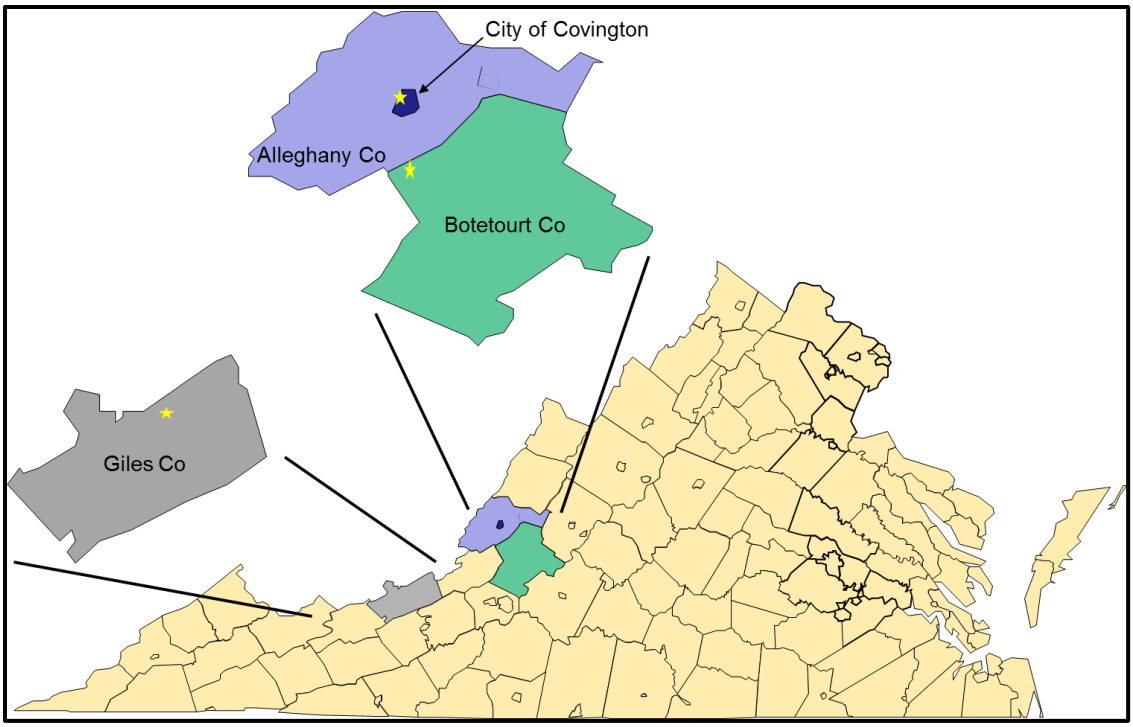

Figure 2: Facilities and Jurisdictions

Attachment 2 to the 2019 EPA memorandum discusses the five factors that EPA provides as a framework for area-specific analyses to support boundary determinations for the 2010 SO_2 NAAQS. These five factors are:

- Ambient air quality data or dispersion modeling results;
- Emissions-related data, including the location of sources and potential contributions to ambient SO_2 concentrations;
- Meteorology, including weather and transport patterns;
- Geography and topography, such as mountain ranges or other air basin boundaries; and
- Jurisdictional boundaries, such as counties, air districts, pre-existing nonattainment areas, and metropolitan planning areas.

The following sections provide information on the relevant factors for Virginia jurisdictions and facilities to support the recommended designations of attainment/unclassifiable for the City of Covington, Alleghany County, Botetourt County, and the portion of Giles County not recommended as nonattainment around the Lhoist – North America Kimballton Plant.

3. Ambient Air Quality Data

Figure 3 shows the Virginia SO_2 monitoring network. Monitors denoted with a green triangle are ambient air quality monitors. All these sites have at least three years of data to support design value calculations. These monitoring sites meet EPA's siting criteria (40 CFR

Part 58, Appendices D and E) and conform to EPA guidance documents and generally accepted air quality monitoring practices.

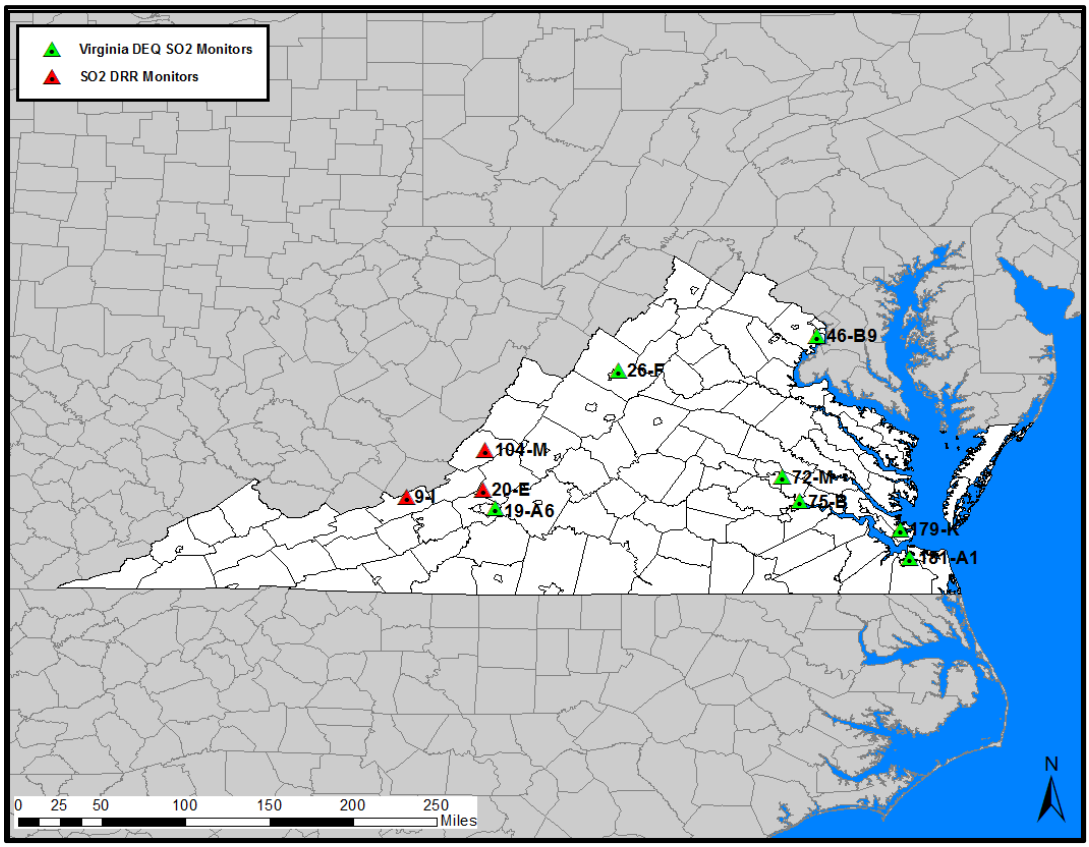

Figure 3: Virginia SO_2 Monitoring Network Operated by DEQ

Monitoring sites denoted with a red triangle are SO_2 monitors designed to characterize the maximum one-hour SO_2 concentrations from facilities applicable to the DRR. These source-specific air quality monitoring networks are located in Giles County for Lhoist North America - Kimballton Plant, Botetourt County for Roanoke Cement Company, and the City of Covington and Alleghany County for WestRock Virginia Corporation – Covington. The monitors in these source-specific networks began gathering data January 2017, and therefore these sites have the necessary three years of data to develop a design value.

The DEQ - Air Quality Monitoring (AQM) division quality assures all data gathered from the Virginia air quality monitoring network in accordance with federal requirements noted in 40 CFR Part 58, Appendix A. The data are published annually in the report entitled, "Virginia Ambient Air Monitoring Data Report."[5]

Table 3 provides the 2017-2019 design values for the City of Covington site and the Botetourt County site shown in Figure 3 (red triangles). These values are well under the 75 ppb

[5] http://www.deq.virginia.gov/Programs/Air/AirMonitoring/Publications.aspx

standard, providing a significant buffer to protect public health. DEQ provided these values to EPA in the certification package dated March 4, 2020. The values shown in Table 3 are well under 50% of the standard and support jurisdictional designations of attainment/unclassifiable.

Table 3: Allegany County, Botetourt County, City of Covington Monitoring Network Design Values, 2017-2019

Facility Location	Site ID/ Station Number	2017-2019 Design Value
Alleghany County/City of Covington	51-580-0008 104-M	32.7 ppb
Botetourt County	51-023-0004 20-E	34.9 ppb

4. Emissions Related Data

EPA created a 2016 base year (BY) emissions inventory for modeling purposes in a collaborative effort with states and MJOs.[6] This data set includes a full suite of 2016 base year inventories, ancillary emissions data, and other information as well as projection year data for 2023 and 2028. EPA also included within this data set the 2011 and 2014 emissions based on modeling inventories derived from NEI data. EPA has provided annual emission summaries of this information at state, county, and Tier 1 inventory sector level. Table 4 provides a summary of the SO_2 emissions from each year's inventory for the jurisdictions in question as well as the emissions from WestRock, Roanoke Cement Company, and Lhoist North America – Kimballton Plant.

Table 4: BY 2016 Modeling Emissions Inventory SO_2 Emissions

Jurisdiction/ Facility	BY 2011en SO_2 Emissions	BY 2014fd SO_2 Emissions	BY 2016ff SO_2 Emissions
Alleghany County	26 tpy	17 tpy	13 tpy
WestRock	356 tpy	5,558 tpy	3,595 tpy
City of Covington	374 tpy	5,563 tpy	3,601 tpy
Roanoke Cement Company	1,918 tpy	2,393 tpy	2,243 tpy
Botetourt County	2,050 tpy	2,501 tpy	2,330 tpy
Giles County	9,230 tpy	14,115 tpy	5,523 tpy
Lhoist North America-Kimballton	897 tpy	6,294 tpy	5,502 tpy

Within all three years of data, Alleghany County SO_2 emissions, which do not include those emissions originating from the City of Covington, are negligible. In the City of Covington,

[6] https://www.epa.gov/air-emissions-modeling/2016v1-platform

estimated emissions of SO_2 in all three years are predominantly from WestRock. In Botetourt County, estimated emissions of SO_2 in all three years are predominantly from Roanoke Cement Company. Since both these facilities have installed and operated EPA-approved SO_2 monitoring networks that demonstrate compliance with the 2010 SO_2 NAAQS with a significant margin of safety, additional violations of the NAAQs beyond these monitoring networks are unlikely due to the very low emissions associated with the rest of the jurisdictions. Therefore, these data support the designation of Alleghany County, the City of Covington, and Botetourt County as attainment/unclassifiable

Giles County's 2011 and 2014 emissions estimates show significant emissions from sources other than Lhoist North America – Kimballton. Point source emissions from two other facilities accounted for the difference between total Giles County emissions and Lhoist North America – Kimballton's emissions in 2011 and 2014. These two facilities are American Electric Power (AEP) Glen Lyn (Registration # 20460) and Celanese Acetate (Reg # 20304). AEP Glen Lyn, an electrical generator that burned coal, retired and signed a mutual determination of shutdown for the boilers on January 29, 2016. Celanese Acetate is a large manufacturing facility that generated process steam using coal-fired boilers. On March 15, 2018, the last of the facility's coal-fired units received a mutual determination of shutdown and were replaced with natural gas-fired units, reducing SO_2 emissions to nearly zero. Table 5 provides the breakdown of these units' emissions versus the total SO_2 emissions in Giles County for years 2011 and 2014. Other than these three facilities, in these years Giles County had only a small amount, about 21 to 23 tons, of SO_2 emissions. As shown Table 6, SO_2 emissions from AEP Glen Lyn and Celanese Acetate are now very low or zero, and Lhoist accounts for the vast majority of the point source SO_2 emissions in Giles County. The area around Lhoist is part of an EPA-approved monitoring network, and significant analyses were performed to determine the appropriate extent of the nonattainment area for that facility (see Enclosure 2). Therefore, the remainder of Giles County outside of the recommended nonattainment area should be designated attainment/unclassifiable based on the county's emissions inventory.

Table 5: Giles County SO_2 Emissions, 2011 and 2014

Facility or Jurisdiction	2011 SO_2 Emissions	2014 SO_2 Emissions
Giles County Total:	9,230 tpy	14,115 tpy
AEP Glen Lyn	1,770 tpy	680 tpy
Celanese Acetate	6,540 tpy	7,120 tpy
Lhoist North America – Kimballton	897 tpy	6,294 tpy
All other sources in Giles County	23 tpy	21 tpy

Table 6: Giles County Point Source Emissions, 2015-2018

Jurisdiction	2015 SO_2 Emissions	2016 SO_2 Emissions	2017 SO_2 Emissions	2018 SO_2 Emissions
AEP Glen Lyn	470 tpy	0 tpy	0 tpy	0 tpy
Celanese Acetate	845 tpy	3 tpy	3 tpy	3
Lhoist North America – Kimballton	6,118 tpy	5,502 tpy	3,256 tpy	499 tpy

5. Meteorology, Geography, and Topography

Alleghany County, Botetourt County, the City of Covington, and Giles County have generally similar meteorology and climate. The areas are in complex terrain, and the local topography influences air flow patterns. Figure 4 shows the precipitation and average temperatures for the City of Covington,[7] which is representative of the area. Figure 5 shows the wind rose from the Roanoke Municipal Airport, a nearby meteorological station. Above the local terrain influences, winds flow parallel to the Blue Ridge and Appalachian Mountains with the primary flow from southwest to northeast. These data provide no indication that current wind patterns and climate information will impact the attainment status of these areas.

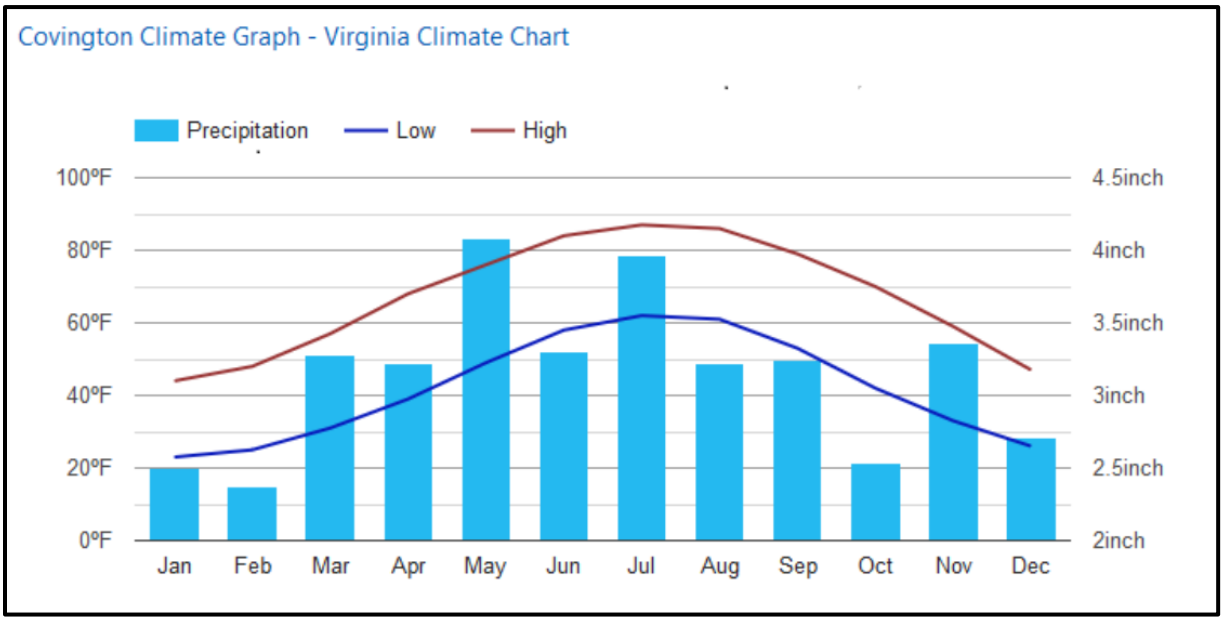

Figure 4: Covington Precipitation and Temperature

[7] https://www.usclimatedata.com

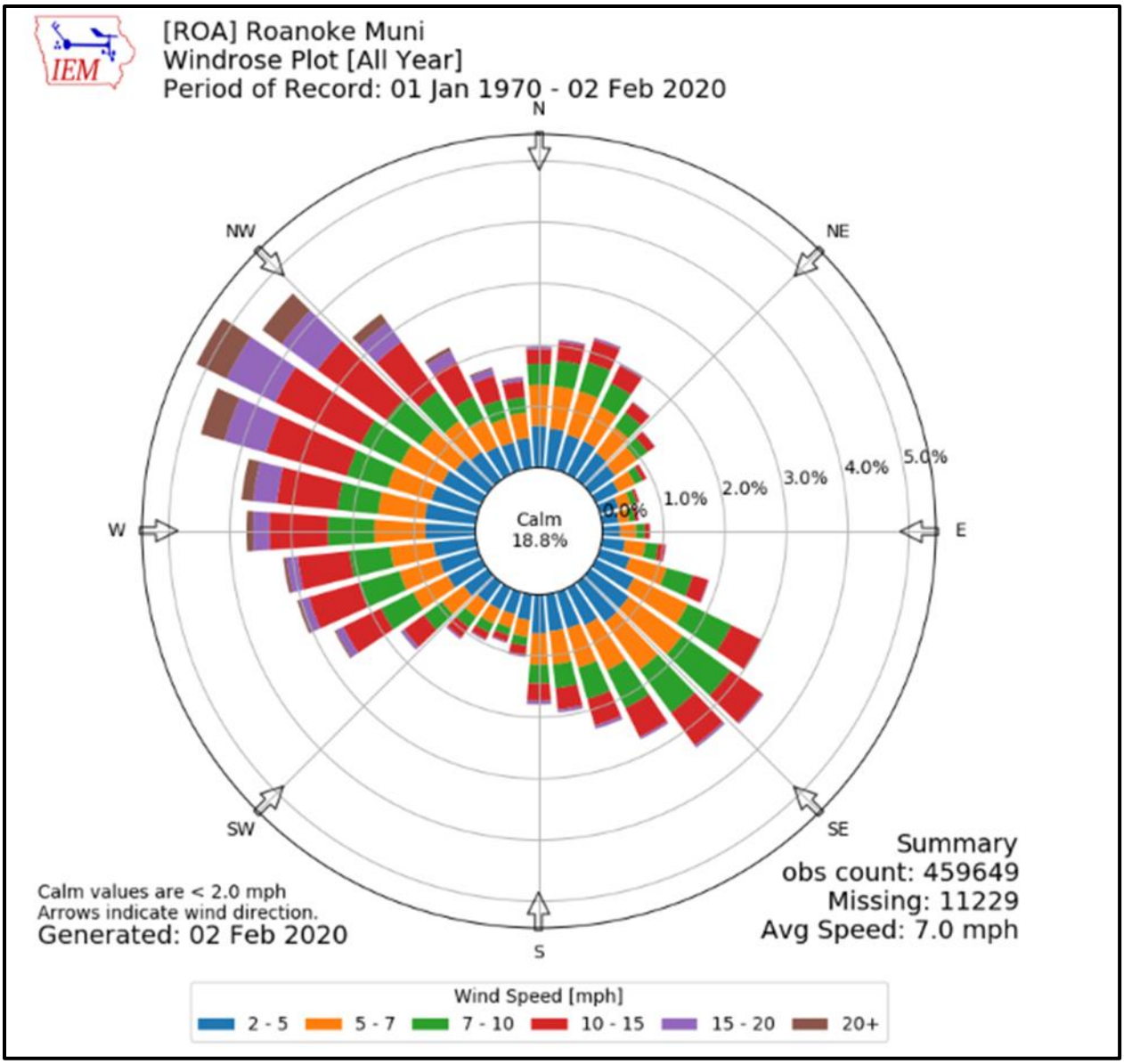

Figure 5: Windrose for Roanoke Airport

6. Jurisdictional Boundaries

Botetourt County is part of the Roanoke Statistical Metropolitan Area, along with Craig County, Roanoke County, the City of Roanoke, and the City of Salem. Alleghany County and the City of Covington sit just to the north of the Roanoke Statistical Metropolitan Area. Giles County is part of the Blacksburg Statistical Metropolitan Area. Table 7 provides 2010 census data and 2019 estimates of population for each jurisdiction.[8] Table 7 also provides the area in

[8] University of Virginia Weldon Cooper Center, Demographics Research Group. (2020). Virginia Population Estimates. https://demographics.coopercenter.org/virginia-population-estimates

square miles (mi^2) of each jurisdiction[9] and shows the calculated populations density in persons per square mile.

Table 7: Population Estimates

Jurisdiction	2010 Census Population*	2019 Estimated Population*	Area mi^2	2010 Population Density persons/mi^2	2019 Population Density persons/mi^2
Alleghany County	16,250	14,952	445.46	36.48	33.59
City of Covington	5,961	5,694	5.47	1,089.76	1,040.95
Botetourt County	33,148	33,494	541.2	61.25	61.89
Giles County	17,286	16,757	355.78	48.58	47.10

The data in Table 7 show that Alleghany County, Botetourt County, and Giles County are sparsely populated and that little population growth occurred during the period between 2010 and 2019. The City of Covington is somewhat more densely populated although population estimates show that the city has lost population between 2010 and 2019.

Table 8 provides data from the Virginia Department of Transportation (VDOT) showing the daily vehicle miles travelled (VMT) for each jurisdiction for 2010 and 2018.[10] The table also provides the 2010 and 2018 percentage of the statewide daily VMT for each jurisdiction. The table shows that these jurisdictions have experience little growth in VMT during this time period and account for only a small percentage of the total state VMT.

Table 8: VMT Estimates

Jurisdiction	2010 VMT	% of VA's VMT	2018 VMT	% of VA's VMT
Alleghany County	655,080	0.29%	655,384	0.28%
City of Covington	97,730	0.04%	96,952	0.04%
Botetourt County	1,907,988	0.85%	2,006,856	0.86%
Giles County	397,794	0.18%	419,953	0.18%

These data show that the areas are relatively sparsely populated and do not account for a significant portion of Virginia's vehicular activity. Further, the data show that Alleghany County, the City of Covington, Botetourt County, and Giles County have experienced little growth in the last eight years in either population or VMT. Population and VMT have less impact on SO_2 emissions and SO_2 air quality than other types of air pollutants such as ozone. However, these data support the recommendation of attainment/unclassifiable since past growth rates indicate little opportunity for future population or VMT activity to degrade SO_2 air quality.

[9] https://indexmundi.com/facts/united-states/quick-facts/virginia/land-area#table
[10] http://www.virginiadot.org/info/ct-TrafficCounts.asp

ENCLOSURE 2

2010 SO_2 NAAQS Designation Technical Assistance Document
Lhoist North America, LLC
Kimballton, VA

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1. Introduction

On June 2, 2010,the U.S. Environmental Protection Agency (EPA) established a revised sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS) at 75 parts per billion (ppb), which is met at a monitoring site when the 3-year average of the annual 99th percentile of daily maximum 1-hour average concentrations does not exceed 75 ppb.

Pursuant to section 107(d) of the Clean Air Act (CAA), EPA must designate areas as either "unclassifiable," "attainment," or "nonattainment" for the 2010 1-hour SO_2 NAAQS. Section 107(d) of the CAA defines a nonattainment area as one that does not meet the NAAQS or that contributes to a violation in a nearby area, an attainment area as any area other than a nonattainment area that meets the NAAQS, and an unclassifiable area as any area that cannot be classified on the basis of available information as meeting or not meeting the NAAQS.

On August 10, 2015, EPA published the "Final Data Requirements Rule (DRR) for the 2010 1-Hour SO_2 Primary NAAQS" (80 FR 51052). The DRR mandated that agencies monitor or model ambient SO_2 levels in areas with large sources of SO_2 emissions (i.e., sources that emit 2,000 tons per year (tpy) or more of SO_2) to help implement the 1-hour SO_2 NAAQS. The DRR gave air agencies the flexibility to characterize air quality using either modeling of actual source emissions or using appropriately sited ambient air quality monitors. Modeling and monitoring are both appropriate ways to assess local SO_2 concentrations and this flexibility allows an air agency to select a cost-effective approach that adequately characterizes each required area.

Three Virginia sources characterized air quality using ambient air quality monitoring data. This document specifically addresses the air quality surrounding one of the Virginia facilities, namely Lhoist North America, LLC (Lhoist), which is located in Kimballton, Virginia. The facility collected ambient air monitoring data for the period 2017 through 2019. The 3-year average of the annual 99th percentile of daily maximum 1-hour average concentrations exceeded 75 ppb. As a result, a nonattainment designation for the area surrounding the facility is deemed appropriate.

The September 5, 2019 EPA memorandum "Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard – Round 4" recommends the evaluation of several factors when determining the geographic extent of a nonattainment area:

- ambient air quality data
- dispersion modeling results
- emissions-related data
- meteorology
- geography and topography
- jurisdictional boundaries
- other relevant available information

The following sections address these factors and provide the justification for the recommended nonattainment area surrounding Lhoist.

2. Ambient Air Quality Data

Lhoist has been performing SO_2 monitoring as a result of the DRR since January of 2017. During the three-year period from January 1, 2017 through December 31, 2019, the facility has met the data capture requirements for SO_2 monitors and has performed the required Quality Assurance (QA) checks as outlined in the Appendix D Validation Templates in Volume II of the QA Handbook. The data from the first three years of monitoring are summarized in Table 1.

Table 1: Summary of Lhoist SO2 Monitoring Data for 2017-2019

Metric	2017	2018	2019
Data Completeness (percent)	90.7	94.6	98.3
99th Percentile 1-hour SO_2 Concentration (ppb)	462.1	66.4	79.7
Design Value (3-Year Average)	---	---	203

The data from 2017 reflects the use of a fuel mix of coke and coal and led to 74 individual days where the numeric value of the NAAQS was exceeded. The facility changed the fuel mix to 100% coal in September of 2017, which led to three exceedance days in 2018 and four exceedance days in 2019. Evaluating the data from 2017, the bulk of the exceedances occurred in the morning around dawn as shown by Figure 1. In this figure, midnight and 1:00 a.m. are not shown since these time periods were used for quality assurance procedures. Figure 2, provided by EPA Region 3, presents the data for all three years. Evaluating the meteorology associated with these exceedances, generally the wind speed is very near zero in all cases and the wind direction is primarily from due north with some instances of wind from the south to south-southwest. The exceedances from 2018 and 2019 generally occur in the same timeframe as the bulk of the exceedances from 2017 as shown in Table 2 below.

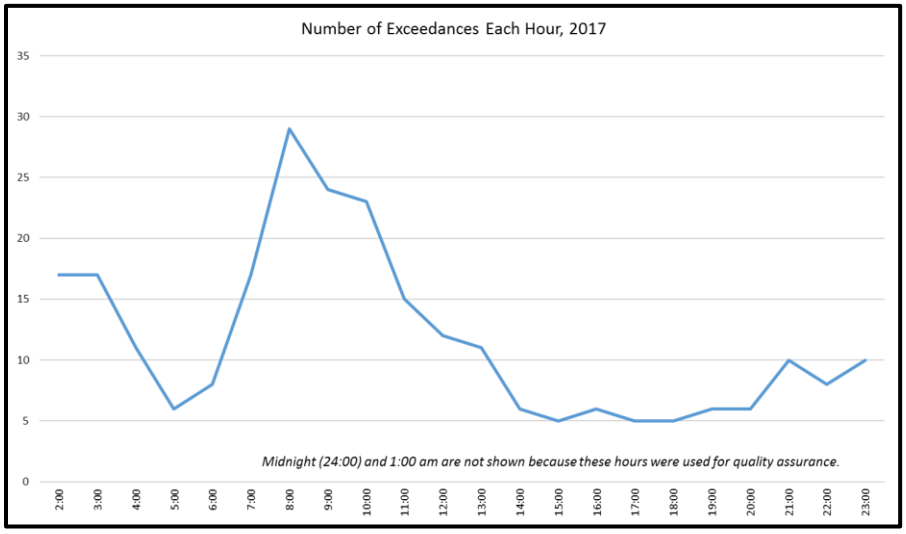

Figure 1: 2017 Monitored Exceedances of the SO_2 NAAQS by Hour of Day

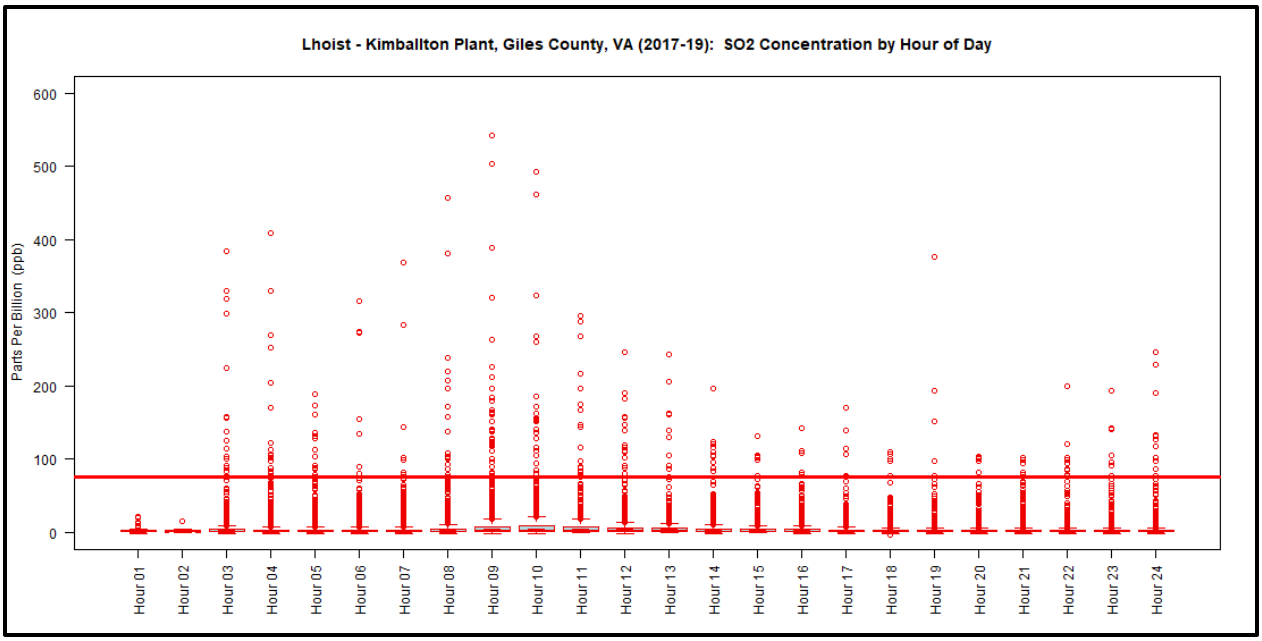

Figure 2: 2017-2019 Monitored Exceedances of the SO2 NAAQS by Hour of Day

Table 2: 2018 and 2019 Monitored Exceedances of the SO_2 NAAQS

Date	Time	Concentration (ppb)	Hourly Wind Speed (mph)	Wind Direction
1/22/2018	7:00	107.6	0.125	SSE
2/1/2018	4:00	113.2	0	N
5/2/2018	8:00	160.2	0.27	NNW
4/23/2019	8:00	150.7	0	N
4/30/2019	8:00	99.8	0.7	NNW
11/26/2019	9:00	85.5	NA	NA
12/27/2019	11:00	79.7	NA	NA

While the fuel switch has addressed the bulk of the issues associated with the 2017 operation of the facility, in 2019 the 99th percentile daily maximum one-hour concentration exceeded the numeric value of the NAAQS. Projecting the next three-year design value for 2020 of 79 ppb or greater would translate to an additional violation of the SO_2 NAAQS standard.

3. Dispersion Modeling

Modeling was conducted to characterize the SO_2 emissions and ambient air quality and to define the boundary of the proposed nonattainment area. The modeling analysis is consistent with EPA's "SO_2 NAAQS Designations Modeling Technical Assistance Document" (SO_2 Modeling TAD) and 40 CFR Part 51, Appendix W – "Guideline on Air Quality Models," where applicable, and guidance contained in the September 5, 2019 EPA memorandum, "Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard – Round 4.

3.1 Site Description

Lhoist operates a lime and limestone manufacturing, processing, and receiving facility near Kimballton, in Giles County, Virginia. The facility is located north of US 460, between Blacksburg and Pearisburg, Virginia. The three maps below (Figure 3, Figure 4, and Figure 5) illustrate the area surrounding the facility. The approximate location of the production area (i.e., the three lime kilns) is 529,900 meters Easting and 4,137,400 meters Northing (Universal Transverse Mercator (UTM) coordinate system Zone 17 of the Northern Hemisphere and the North American Datum of 1983 (NAD83)).

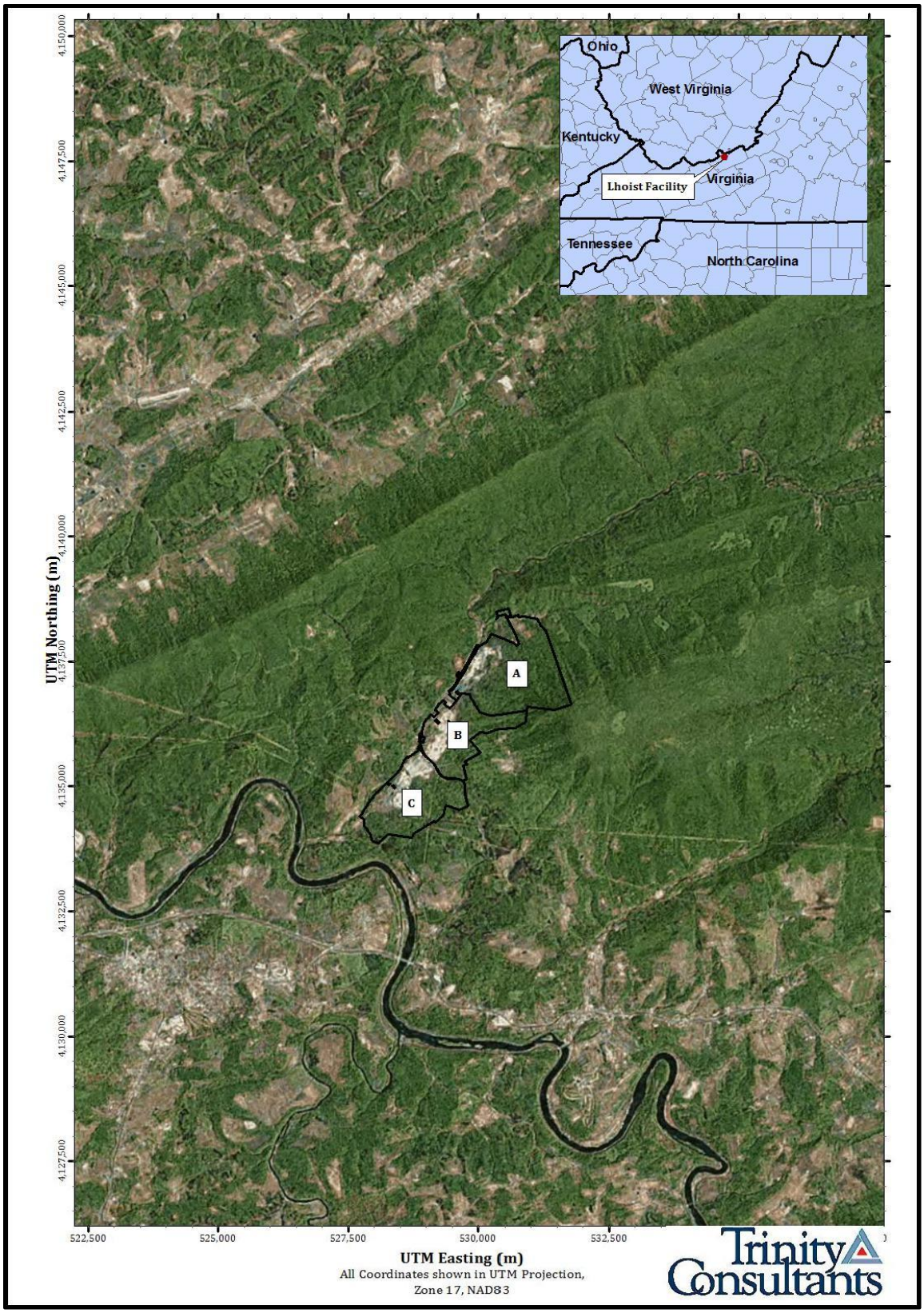

Figure 3: Aerial Photo of Kimballton Area

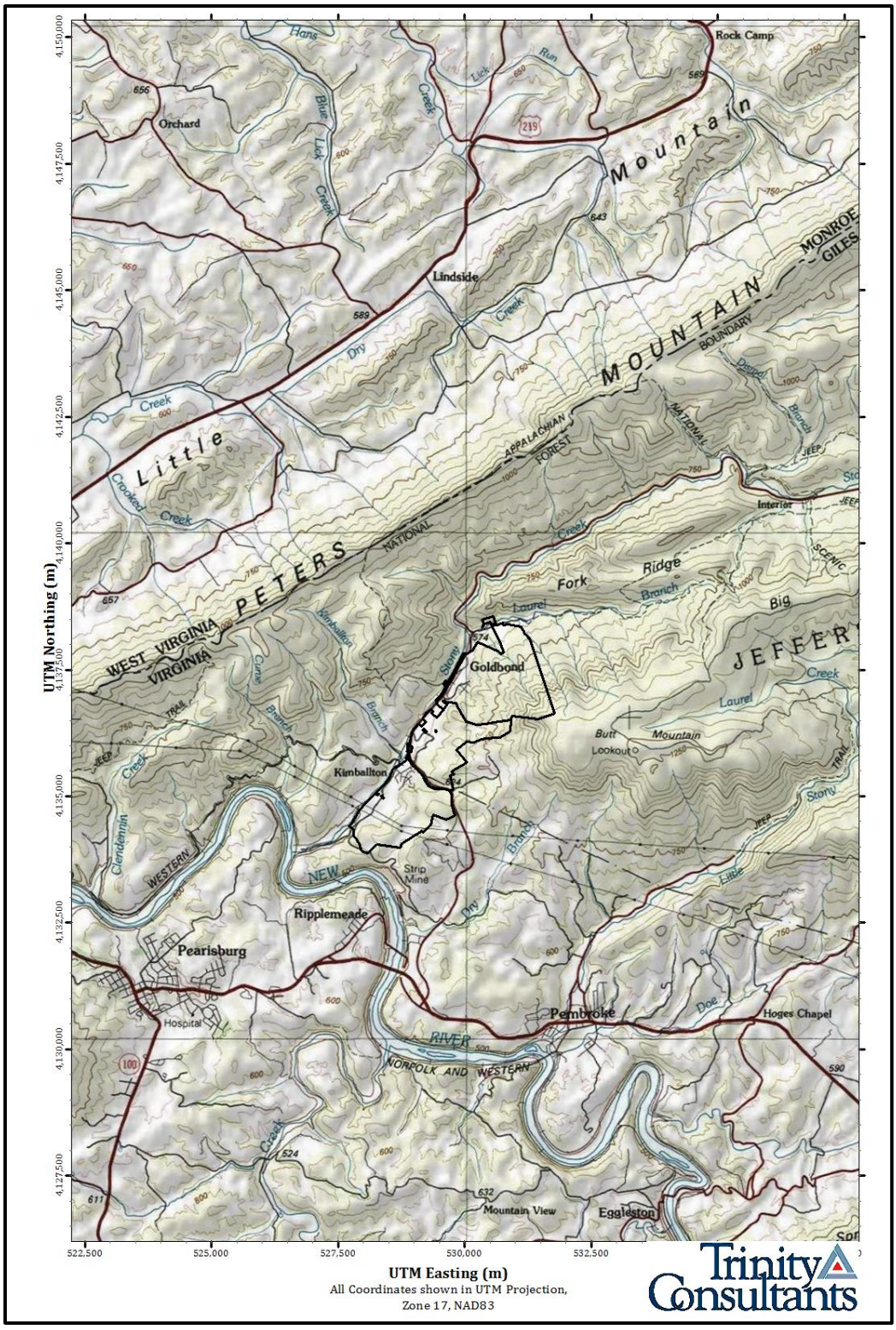

Figure 4: Topographic Map (elevation in meters)

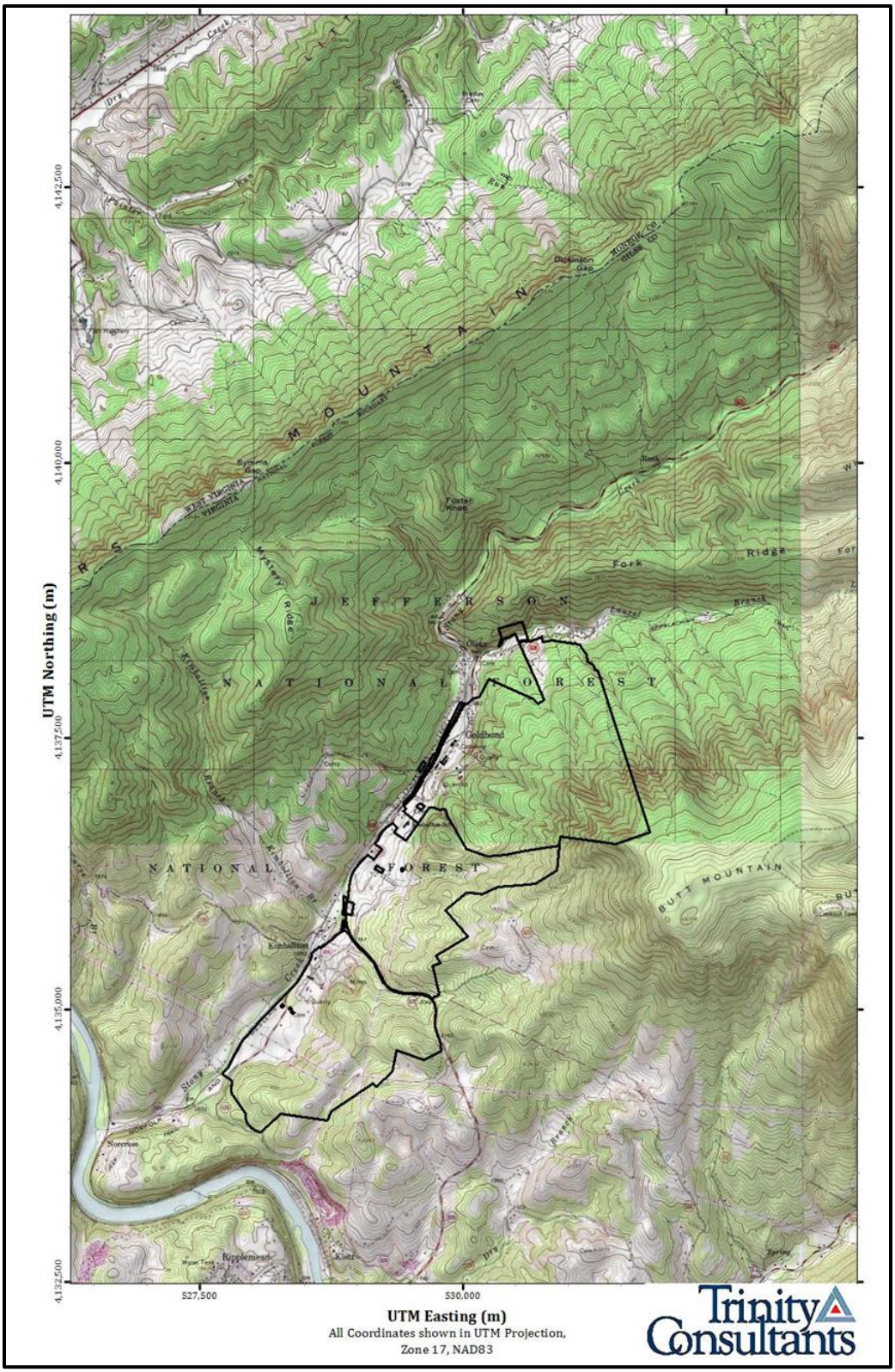

Figure 5: Topographic Map (elevation in feet)

3.2 Modeling Methodology

3.2.1 Model Selection

The air quality model used for this analysis is the most recent version of the AERMOD modeling system (Version 19191). In accordance with the SO_2 Modeling TAD, AERMOD is the recommended model to use for area designations under the 2010 SO_2 NAAQS unless use of an alternative model can be justified. The AERMOD regulatory default options are selected as input to the model.

3.2.2 Meteorological Data

Representative meteorological data is available and consists of hourly site-specific (i.e., onsite) surface data and concurrent National Weather Service (NWS) upper air data from Blacksburg (WBAN 53829) in Montgomery County, Virginia, which is located southeast of Giles County.

The site-specific surface meteorological data were collected using the methodology outlined in the Lhoist Meteorological Monitoring Plan/Quality Assurance Project Plan (November 2012). All data were collected in a manner consistent with the recommendations contained in EPA's *Ambient Monitoring Guidelines for the Prevention of Significant Deterioration* and *Meteorological Monitoring Guidance for Regulatory Modeling Applications*. The period of data collection was October 1, 2012 through September 30, 2013. The complete set of meteorological data is available from DEQ upon request.

3.2.2.1 AERSURFACE Analysis – Meteorological Site Land Use Characteristics

AERMET requires specification of site characteristics including surface roughness, albedo, and Bowen ratio. These parameters are developed according to the guidance provided by EPA in the document entitled, "AERMOD Implementation Guide (AIG)" and dated August 2019.

The AIG recommends that the surface characteristics be determined based on digitized land cover data. EPA has developed a tool called AERSURFACE that can be used to determine the site characteristics based on digitized land cover data in accordance with the recommendations from the AIG. There are two versions of AERSURFACE currently available, Version 13016 and a Version 19039_DRFT. The primary difference between the two versions of AERSURFACE is that the draft 2019 version can use more recent United States Geological Survey (USGS) National Land Cover Database (NLCD) datasets from 2001, 2006, and 2011 compared to Version 13016 that only accepts 1992 NLCD data as input. In addition, one of the main benefits of Version 19039_DRFT is that the program accepts supplemental databases to help characterize surface roughness, including percent impervious and percent tree canopy data, when available.

For this analysis, NLCD data are available for both 1992 and 2011. The 2011 NLCD data also includes the supplemental percent impervious and percent tree canopy data. Therefore, the more recent and representative 2011 NLCD data were selected for processing. The latest version of AERSURFACE that is capable of processing the 2011 data (Version 19039_DRFT) is employed.

As recommended in the 2019 AERSURFACE User's Guide, the surface roughness processing is performed using the default ZORAD method. In addition, the recommended and default radial distance of one kilometer (km) is selected as input to the program.

The AIG recommends that the one kilometer radius circular area centered at the meteorological station site be divided into sectors; each chosen sector has a mix of land uses that varies from that of other selected sectors. Sectors used to define the meteorological surface characteristics for the onsite meteorological tower are listed in Table 3 below and illustrated in Figure 6.

Table 3: AERSURFACE Land Use Sectors

Sector	Start (degrees)	End (degrees)
1	8	65
2	65	200
3	200	250
4	250	8

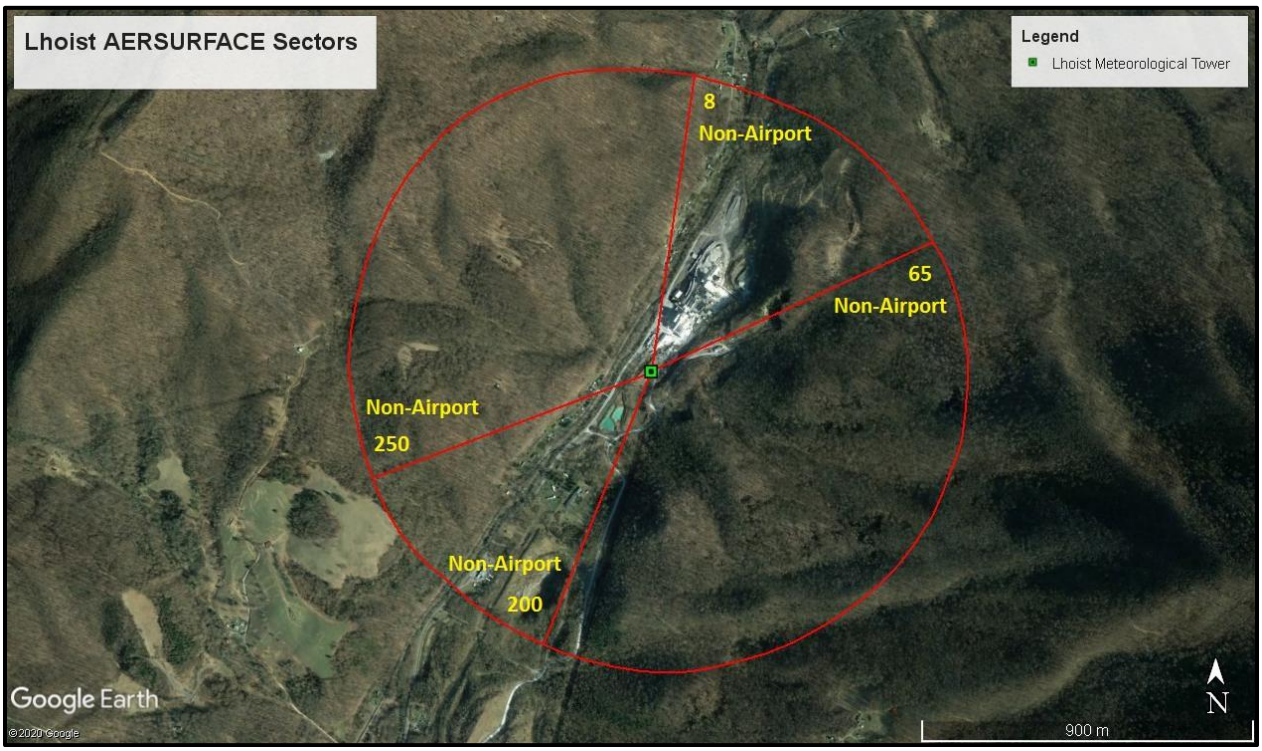

Figure 6: AERSURFACE Land Use Sectors

In AERSURFACE, the various land cover categories are linked to a set of seasonal surface characteristics and the model requires specification of the seasonal category for each month of the year. The following five seasonal categories are mapped in AERSURFACE:

- Midsummer with lush vegetation (June-July-August);
- Autumn with un-harvested cropland (September-October-November);
- Late autumn after frost and harvest, or winter with no snow (December-January-February);
- Winter with continuous snow on ground (none); and
- Transitional spring with partial green coverage or short annuals (March-April-May).

For the Bowen ratio, the land use values are linked to three categories of surface moisture corresponding to average, wet, and dry conditions. As recommended in the AERSURFACE User's Guide, the surface moisture condition for each month is determined by comparing precipitation for each month to the 30-year climatological record.

The most representative precipitation station with a complete 30-year climatological record of monthly data is the Roanoke, Virginia NWS site. Precipitation for the meteorological data collection period (October 2012 through September 2013) are compared to the 1989-2018 30-year average. Each month was assigned a soil moisture state (dry, average, and wet). The monthly surface moisture inputs are summarized in Table 4.

Table 4: AERSURFACE Bowen Ratio Condition Designations

Month	October 2012 – September 2013
January	Wet
February	Average
March	Average
April	Average
May	Average
June	Wet
July	Wet
August	Average
September	Dry
October	Dry
November	Dry
December	Average

3.2.2.2 AERMET Data Processing

Both onsite surface and upper air datasets are processed using the most recent version of AERMOD's meteorological data preprocessor, AERMET (Version 19191). Since the site-specific measurements did not include cloud cover, AERMET can estimate equivalent cloud

cover (i.e., n_{eq}) from a temperature scale (i.e., θ^*) based on measurements of temperature at two levels and wind speed at one level. This technique, known as the Bulk Richardson approach, is utilized in the Stage 3 input. The Stage 3 output from the AERMET processing (which utilizes the surface characteristics from the facility) consists of a surface data file and a vertical profile data file ready for input to AERMOD.

It is important to note that the permittee did not process the SODAR data and provide it to DEQ as an available input to AERMET. The permittee apparently had concerns with the SODAR data completeness. DEQ believes that these data may be a useful tool in the evaluation of AERMOD performance. Specifically, there are some concerns relative to model conservatism when compared to the measured air quality data. DEQ and Lhoist intend to evaluate this issue over the next several months and will coordinate with EPA on an appropriate model performance evaluation protocol.

Figure 7 shows a wind rose of the distribution of both wind direction and wind speed for the surface data file. The prevailing wind direction aligns with the Big Stony Creek valley where the vast majority of modeled violations are located (see Section 3.3).

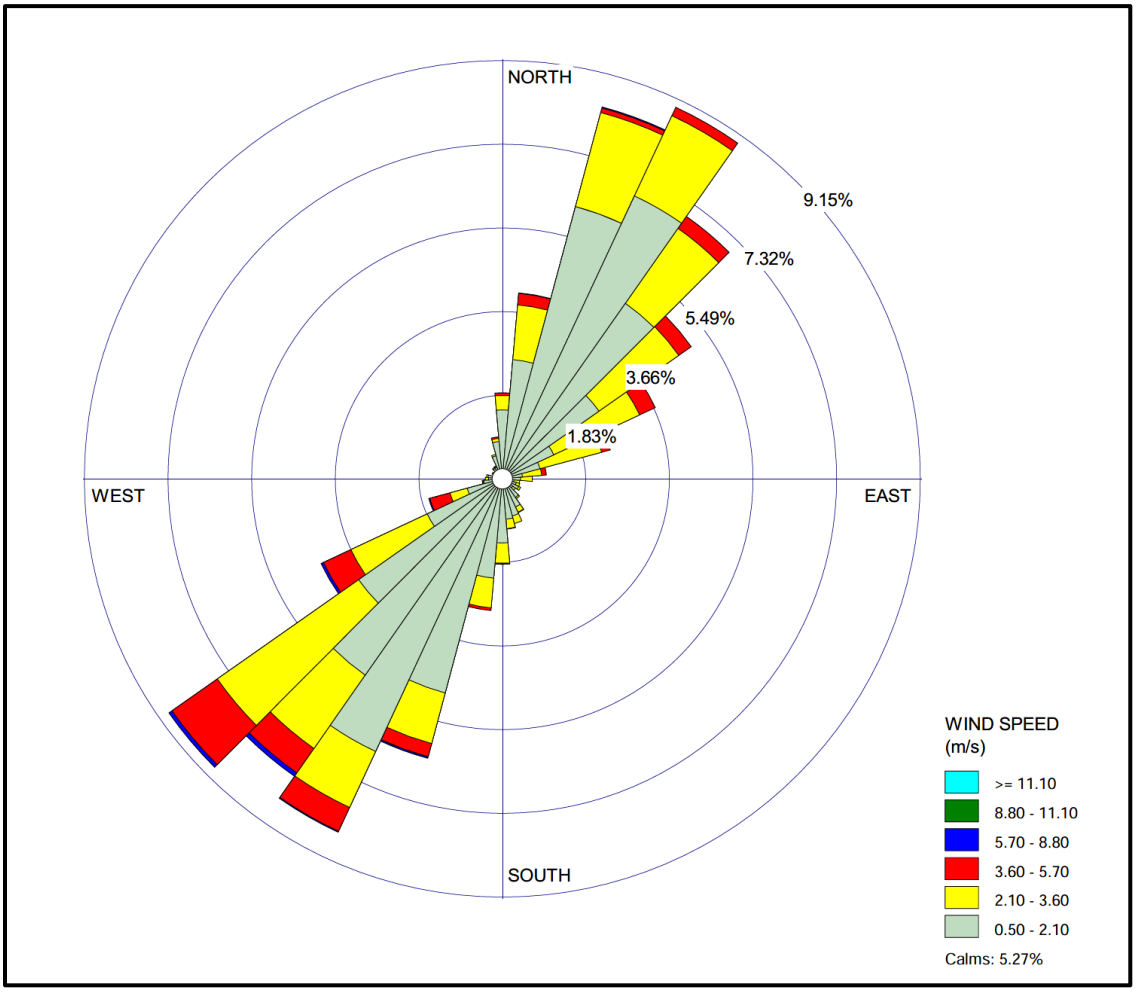

Figure 7: Wind Rose for Lhoist Meteorological Tower at 10-Meter Level

3.2.3 Land Use Analysis

In accordance with EPA's recommended procedure, land use is analyzed within an area defined by a 3-kilometer radius from the approximate center of the facility. Figure 8 shows the aerial image of the area around the facility, and it clearly illustrates that the area is appropriately classified as rural.

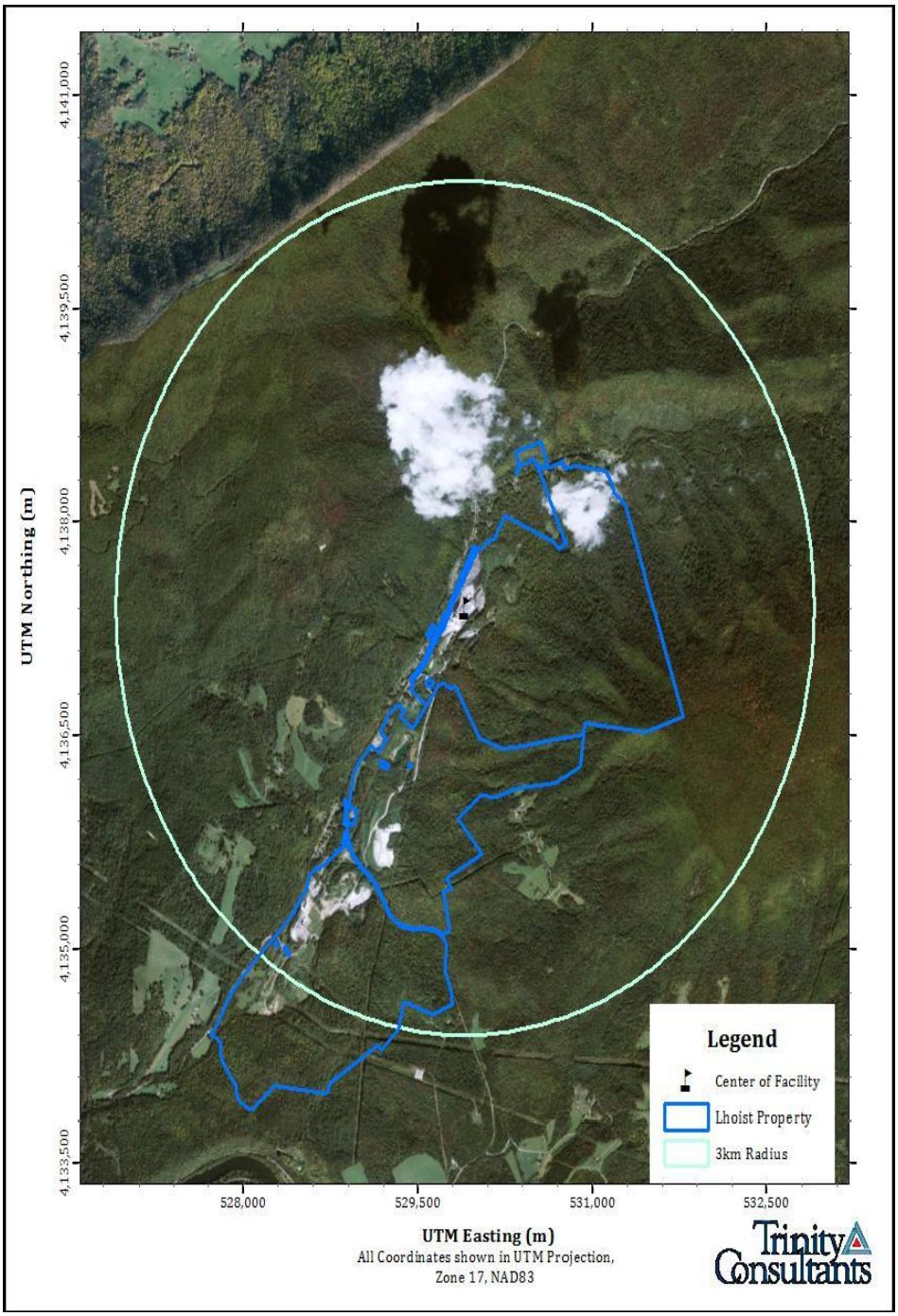

Figure 8: Aerial Image of 3-Kilometer Radius Surrounding the Lhoist Facility

3.2.4 Terrain

Source, building, and receptor elevations input to the model were based upon a combination of site-specific measurements and interpolation from the United States Geologic Survey's 1/3 arc-second National Elevation Dataset (NED). The latest version of AERMAP (Version 18081) is used to determine the ground elevation and hill scale heights for each modeled receptor based on data obtained from the USGS NED. The NED data has a horizontal resolution of 1/3 arc-second (10-meter intervals). The NED data are distributed by USGS and referenced to NAD83.

3.2.5 Receptor Grid

A comprehensive Cartesian receptor grid that extends10 kilometers from all edges of the property boundary is used as input to AERMOD. The Cartesian receptor grid consists of the following receptor spacing:

- 25-meter spacing along the property boundary;
- 50-meter spacing from the property boundary extending to 1 km from the further extent of property boundary most immediately surrounding the production facility (shown as Area A in Figure 3);
- 100-meter spacing from one km to three km from the facility; and
- 250-meter spacing from three km to ten km from the facility.

This grid encompasses all of the relevant peaks and ridges that may be impacted by the facility and are illustrated in Figure 9.

AERMAP is used to define ground elevations and hill scales for each receptor. All receptors are in UTM Zone 17 and NAD83.

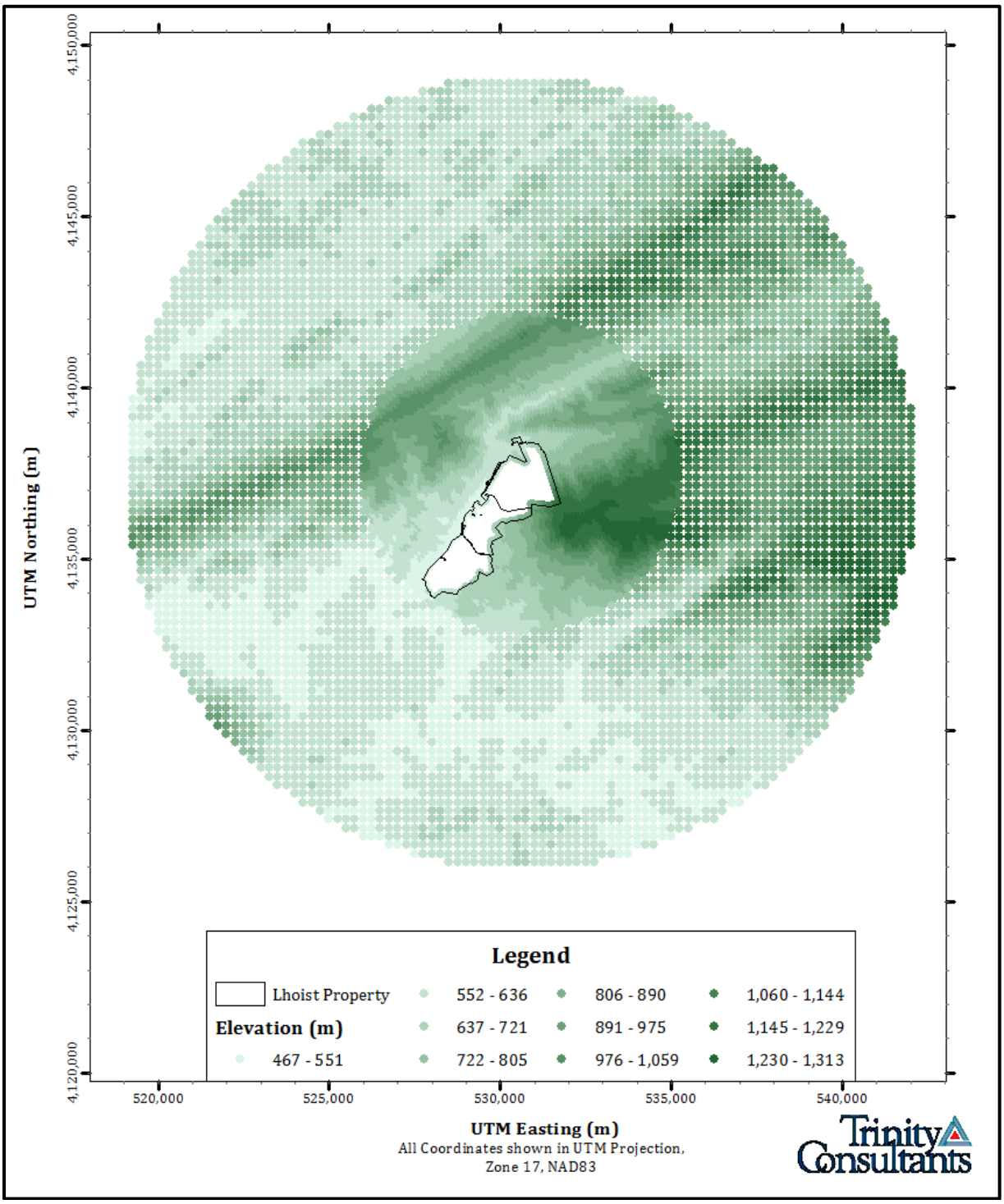

Figure 9: Full Receptor Grid

3.2.6 Building Downwash

The EPA's Building Profile Input Program for PRIME (BPIPPRM) (Version 04274) is used to determine the appropriate building dimensions to use to calculate the effects of downwash on the modeled sources in AERMOD. Building, structure, and tank dimensions and locations relative to the modeled sources are input into BPIPPRM. The stacks for all sources at the facility do not exceed the greater of the Good Engineering Practice (GEP) formula height calculated by BPIPPRM or 65 meters (213 feet).

3.2.7 Background Concentration and Nearby Sources

The SO_2 Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "first tier" approach, based on monitored design values, or 2) a temporally varying approach, based on the 99th percentile monitored concentrations by hour of day and season or month. DEQ used the "first tier" approach and selected an SO_2 background concentration of 3 parts per billion (ppb). This concentration is based on the 2016-2018 design value for the most representative ambient air monitor located in Roanoke County, Virginia (EPA ID 51-161-1004). No other significant sources of SO_2 emissions besides Lhoist are located within the modeling domain. As a result, no other nearby sources are explicitly modeled.

3.2.8 Source Parameters and Emissions

The sources characterized within the area of analysis are selected in accordance with practices outlined as acceptable in the SO_2 Modeling TAD. The modeling domain adequately represents the area where maximum concentrations of SO_2 are expected to occur and includes all sources that might contribute to those concentrations. There are no other significant sources of SO_2 emissions besides Lhoist that have the potential to cause a significant concentration gradient within the area of analysis.

The three kilns at the facility are the only sources of SO_2 emissions. These modeled emission points are represented with their actual stack heights, gas exit velocities, and diameters.

SO_2 emissions used in the modeling analysis are provided by the permittee in a letter dated February 7, 2020. Specifically, DEQ modeled the highest hourly facility-wide SO_2 emission rate for 2017, 2018, and 2019. These emissions are modeled in three separate runs using the maximum hourly emission rate for 8,760 hours per year. This approach is highly conservative and is used in the absence of available Continuous Emissions Monitoring (CEM) data. Portions of the February 7, 2020 letter are labeled as Confidential Business Information (CBI). The CBI justification is currently being evaluated by DEQ for appropriateness, and is, therefore, not included as part of this submittal.

The underlying emission factors used to derive the modeled emission rates are contained in the facility's 2018 certified annual emissions statement. The emission factors are based on a December 2017 stack test when the kilns were burning 100% coal.

The locations (UTM Zone 17, NAD83) and base elevations of the three kilns are provided in Table 5. The modeled emission rates and source parameters are listed in Table 6.

Table 5: Source Locations

Stack Reference Number	Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)
S1306	Kiln 1 Stack	529,952.7	4,137,396.0	558.14
S1405	Kiln 2 Stack	529,914.8	4,137,345.0	555.33
S1502	Kiln 3 Stack	529,894.4	4,137,336.3	554.73

Table 6: Modeled SO2 Emission Rates and Source Parameters

Stack Reference Number	Stack Height (m)	Discharge Type	Stack Diameter (m)	Exhaust Gas Velocity (m/s)	Exhaust Gas Temperature (K)	2017 Emission Rate (g/s)	2018 Emission Rate (g/s)	2019 Emission Rate (g/s)
S1306	30.48	Vertical	1.83	21.56	477.59	3.86	4.08	3.81
S1407	20.42	Vertical	1.68	25.12	477.59	15.16	16.58	14.33
S1502	24.38	Vertical	2.44	15.16	477.59	18.09	18.71	17.96

3.3 Model Results

The AERMOD results are evaluated to determine the geographic extent of the modeled violations. The modeled NAAQS violations are illustrated in Figure 10.

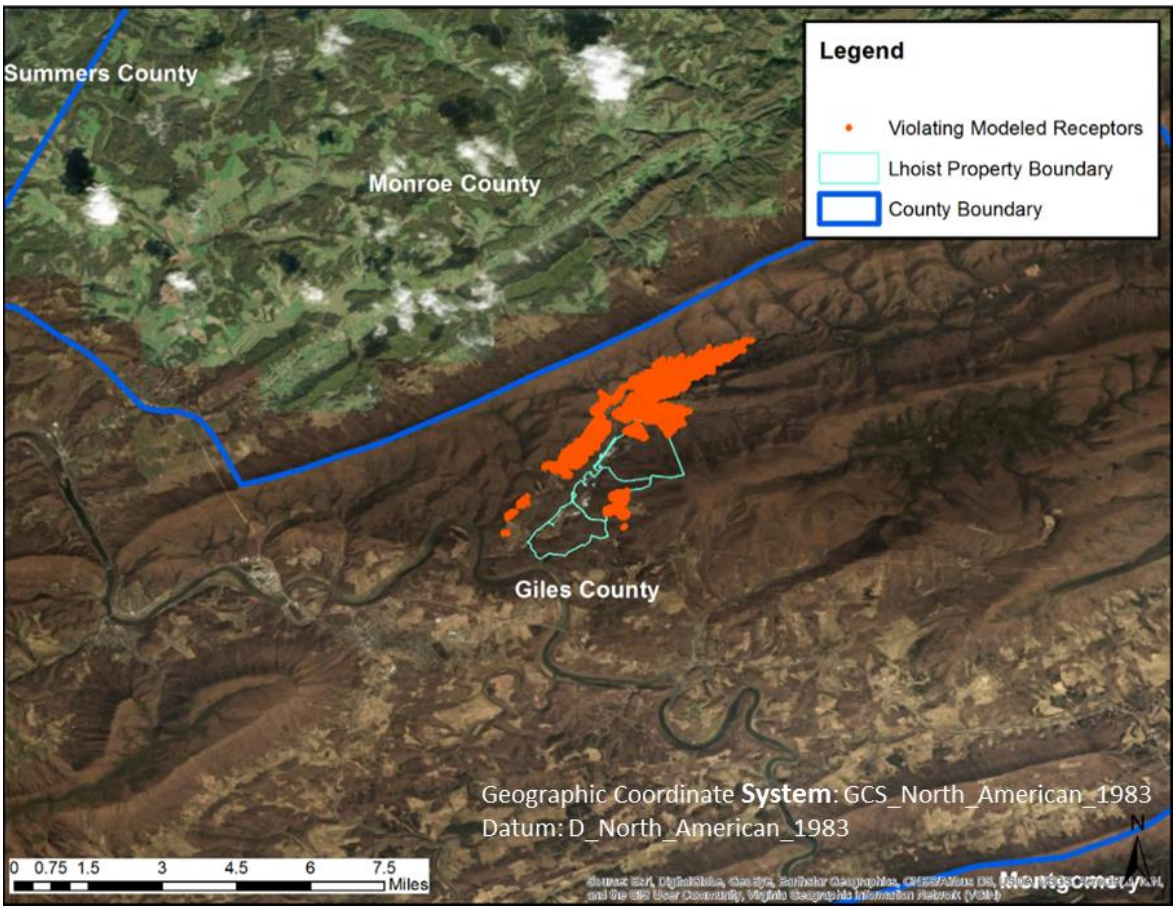

Figure 10: Modeled Violations, Maximum Facility-Wide Actual Emissions (2017-2019)

Lhoist is located in Big Stony Creek valley along Big Stony Creek Road. The approximate elevation of the lime manufacturing facility is 1810 feet (ft) above sea level. The locations of the violating receptors correspond with terrain within a specific elevation range within Big Stony Creek valley. Specifically, all modeled impacts are at elevations between 2,000 ft and 2,800 ft as shown in Figure 11, Figure 12, and Figure 13. The majority of the modeled impacts are below 2,400 ft. Nearly all modeled impacts are located in Big Stony Creek valley. Some violating receptors are located in Laurel Branch valley on the side of Fork Ridge nearest the plant. The Virginia/West Virginia border is located to the northwest with elevations of approximately 3000 ft.

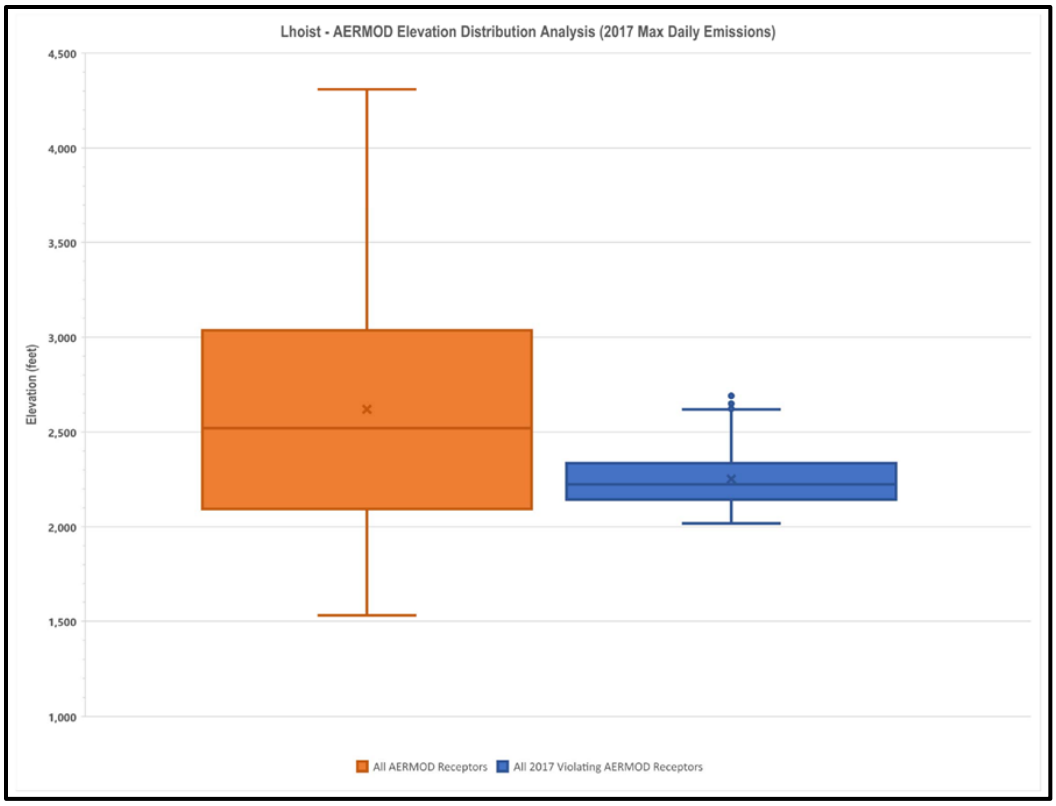

Figure 11: Lhoist - AERMOD Elevation Distribution Analysis (2017 Max Daily Emissions)

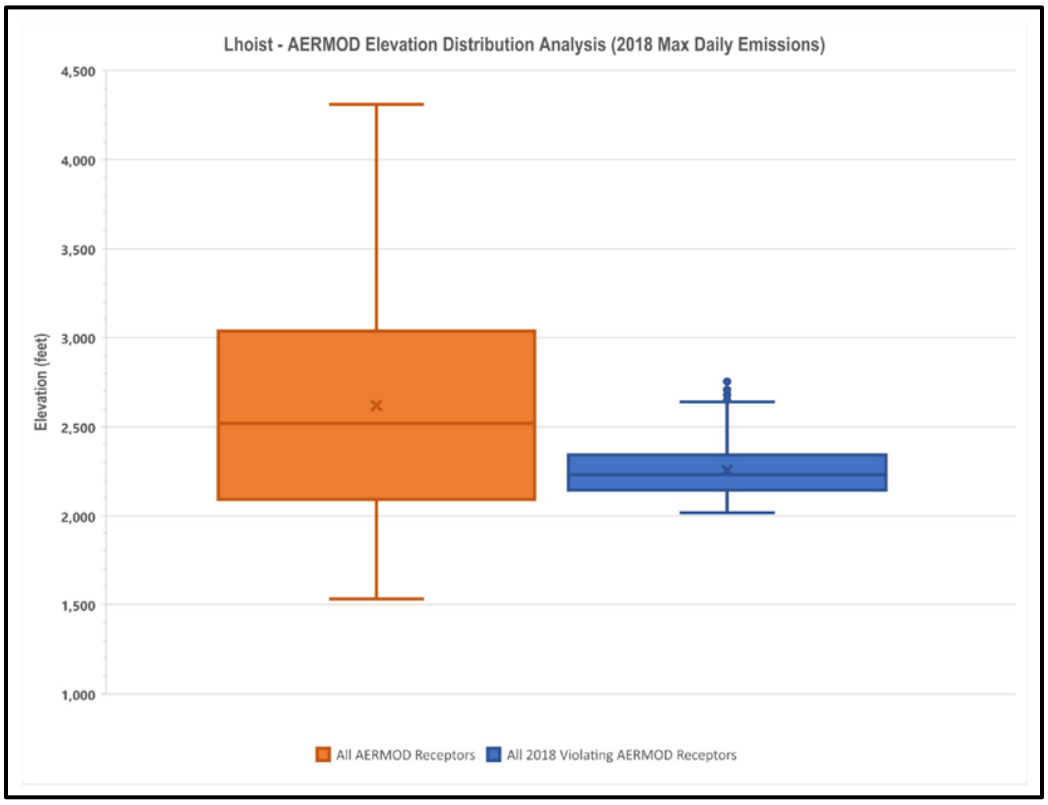

Figure 12: Lhoist - AERMOD Elevation Distribution Analysis (2018 Max Daily Emissions)

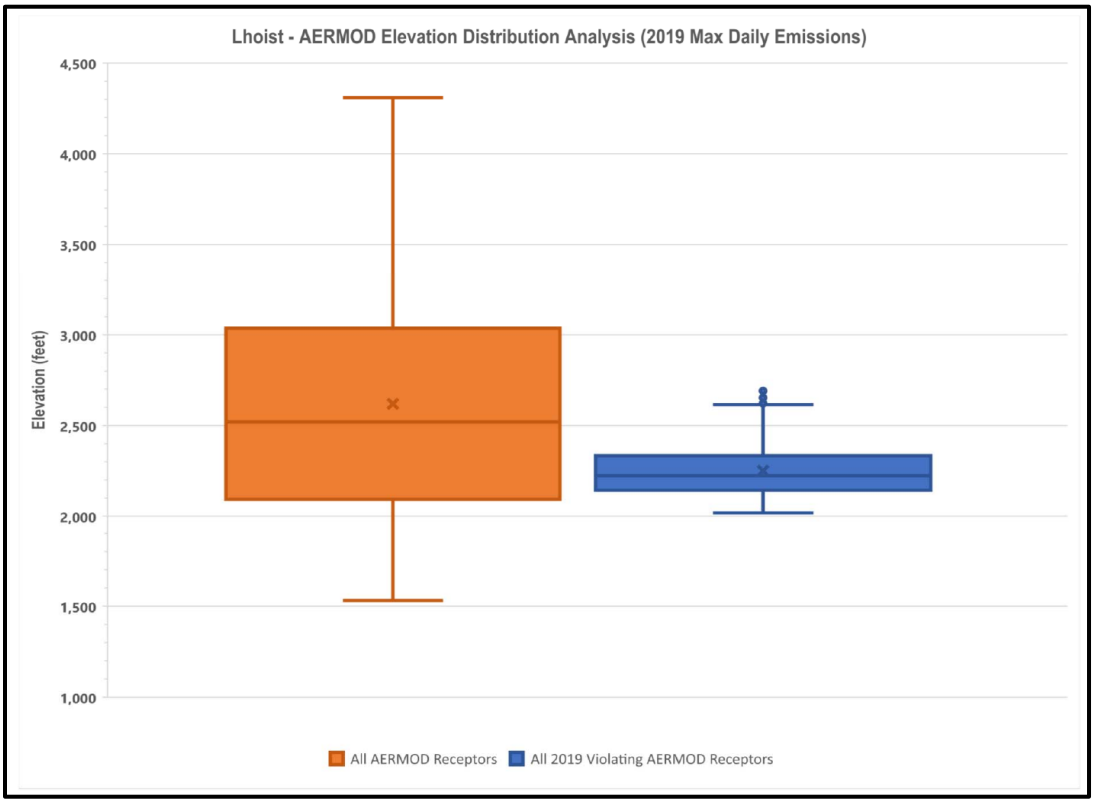

Figure 13: Lhoist - AERMOD Elevation Distribution Analysis (2019 Max Daily Emissions)

It is also likely that the geographic extent of the modeled violations is larger than the area of monitored violations. For example, the modeled results at the location of the ambient monitor are significantly greater than the measured data. These data are not directly comparable in terms of model performance for several reasons, including dissimilar meteorology and the absence of hourly emissions data. However, the comparison supports the fact that the area of modeled violations is sufficiently conservative for the purpose of delineating the nonattainment area boundary. Table 7 compares the measured fourth highest daily maximum hourly concentration for 2018 and 2019 to the modeled result using 2018 maximum facility-wide actual hourly emissions. The modeled result is approximately a factor of two greater than the value measured at the monitor. Please note that 2017 is excluded from this comparison because the fuel conversion at the facility did not occur until September 2017.

Table 7: Modeled versus Measured Comparison

2018 Measured 4th Highest Concentration (ppb)	2019 Measured 4th Highest Concentration (ppb)	2018 Modeled 4th Highest Concentration (ppb)
66.4	79.7	148.5

Finally, the modeling results compare favorably to the monitor location in terms of hour of day (Figure 14) and low wind speeds (Figure 15) that are associated with observed exceedances of the numeric value of the NAAQS.

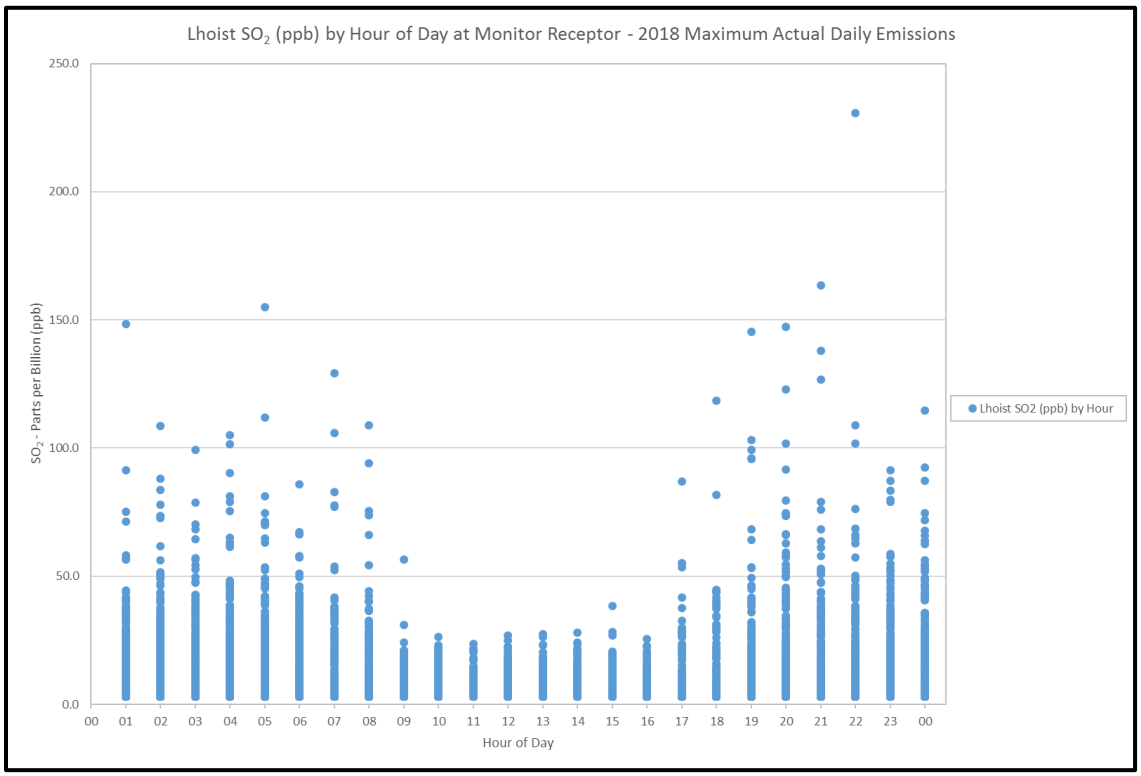

Figure 14: Lhoist SO_2 (ppb) by Hour of Day, 2018

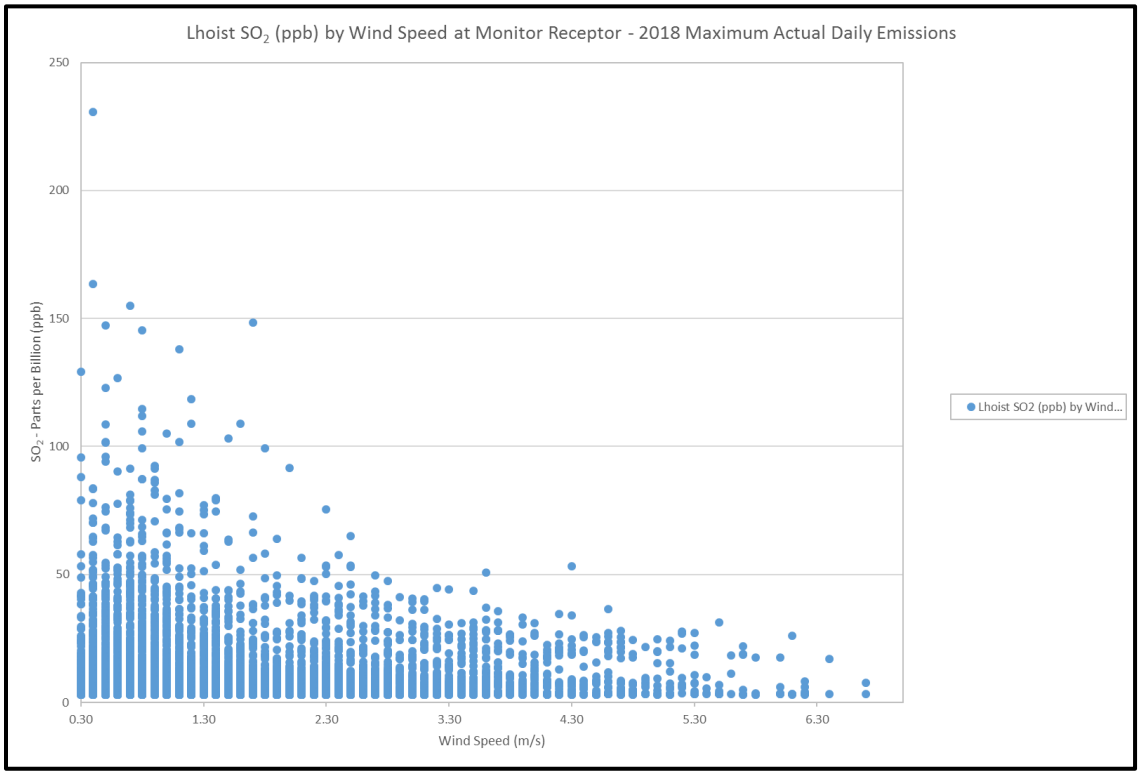

Figure 15: Lhoist SO_2 (ppb) by Wind Speed

4. Proposed Nonattainment Area Boundary

A nonattainment area should contain the area violating the NAAQS (e.g., the area around a violating monitor or encompassing modeled violations), as well as any nearby areas (e.g., counties or portions thereof) that contain emissions sources contributing to the violation. (See CAA section 107(d)(l)(A)(i)).

As previously stated in Section 1 of this TSD, EPA recommends evaluating several factors in determining the nonattainment area boundary. Each of these factors is discussed throughout this document and summarized below.

4.1 Ambient Air Quality Data

Lhoist has been performing SO_2 monitoring at a single site since January of 2017. The monitor was sited appropriately and in accordance with the DRR modeling and monitoring guidance. The design value for this period is 203 ppb, which is well above the NAAQS. The three-year period for the purposes of the nonattainment designation is January 1, 2017 through December 31, 2019. While the fuel switch has addressed the bulk of the issues associated with the 2017 operation of the facility, in 2019 the 99th percentile daily maximum 1-hour concentration exceeded the numeric value of the NAAQS. Projecting the next three-year design value for 2020 of 79 ppb or greater would translate to an additional violation of the SO_2 NAAQS standard. For these reasons, a nonattainment designation is the appropriate conclusion.

4.2 Dispersion Modeling

The dispersion modeling results and the area of modeled violations are a primary consideration when defining the geographic extent of the proposed nonattainment area. The proposed boundary will encompass all predicted violating receptors and include an adequate buffer to account for model uncertainty.

The proposed boundary is also deemed conservative because the area of modeled violations is most likely larger than the expected area of monitored violations. The monitored concentrations for 2018 and 2019 are in close proximity to the NAAQS, whereas the modeled concentrations are considerably in excess of the NAAQS at the monitor location.

Finally, DEQ expects that additional modeling conducted during the time between this proposed designation and the final designation will further reduce the area of modeled violations. These sensitivity model runs are discussed in Section 4.4.

4.3 Emissions Data

As previously stated, all emissions sources characterized within the area of analysis are selected in accordance with practices outlined as acceptable in the EPA SO_2 Modeling TAD.

The three kilns at the facility are the facility's sources of SO_2 emissions. These modeled emission points are represented with their actual stack heights, gas exit velocities, and diameters.

SO_2 emissions used in the modeling analysis were provided by the permittee and based on maximum hourly actual production data for the period 2017-2019. The use of maximum hourly actual emissions is a more conservative methodology than using an hourly emissions profile and yields a larger geographic area of modeled violations.

Finally, it is important to reiterate that Lhoist has proactively made considerable emissions reductions since the commencement of its ambient monitoring program. In response to the high levels of SO_2 measured in 2017, the facility replaced its coke fuel (5.6% sulfur content) to a lower sulfur coal (0.6%) in September 2017. This effort substantially reduced emissions at the facility. The data collected during the last 2 years is in close proximity to the NAAQS with a limited amount of exceedance hours. The facility's annual emissions have decreased substantially because of the fuel switch. Emissions data for the period 2016-2018 are provided in Table 8. 2019 emissions are still being reviewed and are not yet available.

Table 8: Lhoist Annual Emissions Summary

2016 (tpy)	2017 (tpy)	2018 (tpy)
5,502.09	3,255.50	498.75

4.4 Meteorology

Onsite meteorological data is available and is used for both the modeling analysis and the evaluation of the proposed nonattainment area boundary. The onsite data were collected in a manner consistent with the recommendations contained in EPA's "Ambient Monitoring Guidelines for the Prevention of Significant Deterioration and Meteorological Monitoring Guidance for Regulatory Modeling Applications."

The prevailing wind direction near Lhoist aligns well with the Big Stony Creek valley where the vast majority of modeled violations are located. This fact provides a degree of confidence that the proposed boundary is appropriately represented.

Both DEQ and Lhoist intend to conduct additional testing of the meteorological data over the next several months. Future air quality modeling refinements will likely include the use of additional onsite turbulence data (sigma-w) and the incorporation of SODAR data. These improvements are anticipated to reduce the area of modeled nonattainment. It is worth noting that preliminary DEQ sensitivity modeling demonstrated that the use of surface friction velocity (u*) adjustments in lieu of the sigma theta only approach yielded approximately a 20% reduction in the modeled design value.

4.5 Geography and Topography

The geography and topography of the surrounding area are critical factors in the development of an appropriate nonattainment area boundary. Specifically, the boundary is delineated by using the modeling results in combination with nearby geographic and topographic features where appropriate.

All of the modeled violations occur at elevations between 2,000 ft and 2,800 ft, which provide a useful topographical reference for establishing the boundary. In addition, the New River, located to the south of Lhoist, offers a suitable geographic border.

Source, building, and receptor elevations input to the model are based on high-resolution data, using a combination of site-specific measurements and interpolation from USGS NED data. The use of these data provide confidence that the nearby steep terrain is properly represented in the model.

4.6 Jurisdictional Boundaries

Existing jurisdictional boundaries are considered for the purpose of informing the nonattainment area, specifically with respect to clearly defined legal boundaries. The conventional, overly simplistic and unnecessarily conservative Giles County boundary is excluded from consideration. DEQ supports the use of other factors such as modeling, geography and topography in lieu of jurisdictional boundaries because these factors more accurately define the area of potential air quality violations.

4.7 Recommendation

Based on the evaluation of the EPA-recommended factors, DEQ proposes the nonattainment area illustrated in Figure 16. As previously articulated, all of the modeled violations occur at elevations between 2,000 ft and 2,800 ft. DEQ proposes to use the 3,000 ft contour as the general guide for the extent of the nonattainment area, providing an adequate safety buffer to account for model uncertainty. The proposed northernmost boundary tracks the 3,000 ft contour line just inside the Virginia/West Virginia border. On the eastern and southern boundary, the proposed border does include some areas over 3,000 ft, such as White Rock Mountain, but removes parts of Butt Mountain because elevations there range from 3,000 ft to 4,200 ft. In the southwest corner of the proposed nonattainment area, the boundary generally aligns with the 1,600 ft contour that aligns with the New River, a recognized geographic boundary.

The coordinates for the proposed nonattainment area boundary are listed in Table 9. Coordinates 5 through 42 in the table correspond to the portion of the New River from approximately mile marker 145.8 to mile marker 149.

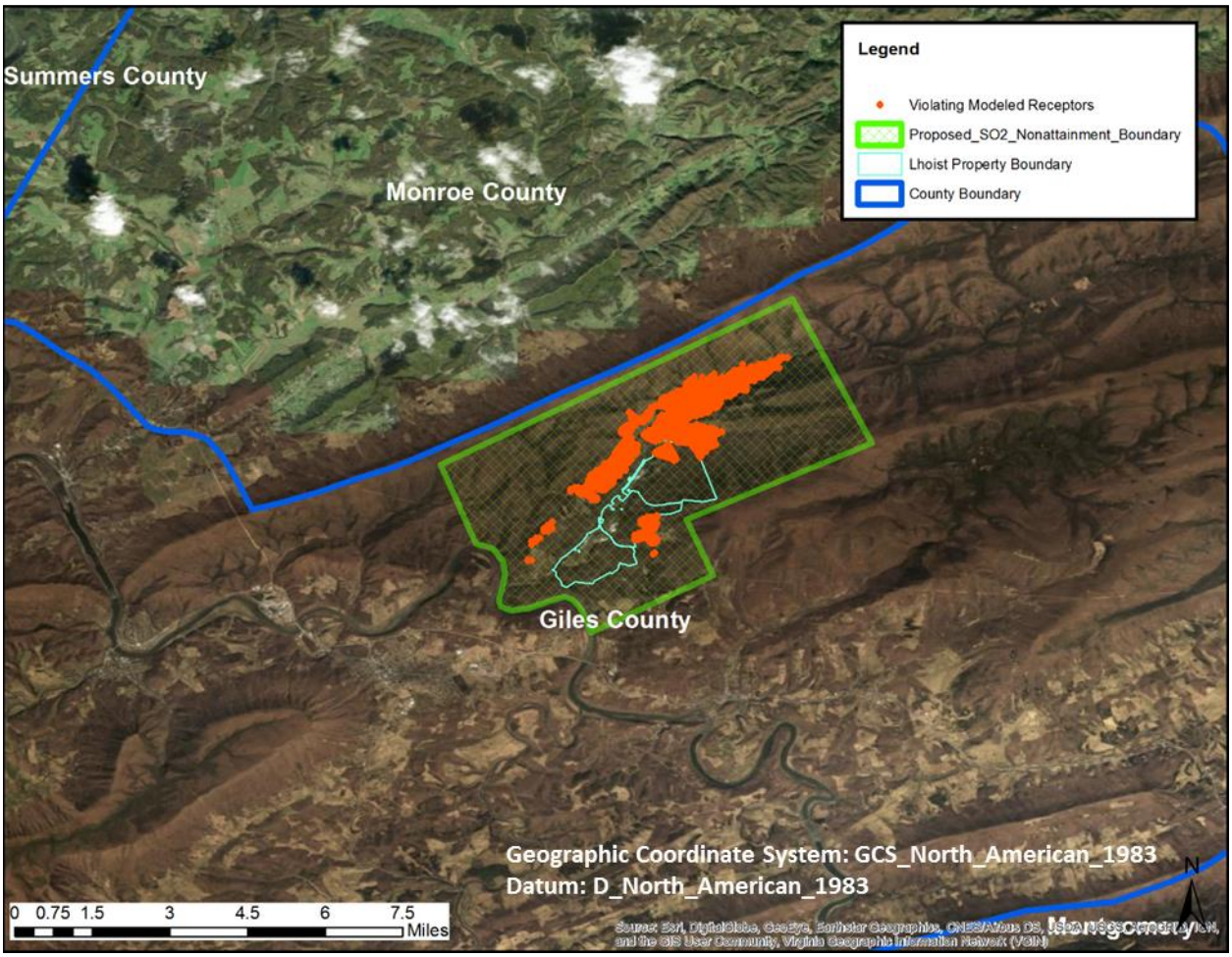

Figure 16: Proposed One-Hour SO_2 Nonattainment Area Surrounding Lhoist

Table 9: Nonattainment Boundary Coordinates

Boundary Point	Latitude* (decimal degrees)	Longitude* (decimal degrees)
0	37.385249	-80.718248
1	37.431656	-80.619986
2	37.391368	-80.597698
3	37.369986	-80.649488
4	37.354441	-80.642085
5	37.338479	-80.676322
6	37.339474	-80.676771
7	37.340652	-80.677123
8	37.341580	-80.677298
9	37.343330	-80.678318
10	37.344937	-80.679026
11	37.345866	-80.679692
12	37.347105	-80.680670
13	37.347976	-80.681783

Boundary Point	Latitude* (decimal degrees)	Longitude* (decimal degrees)
14	37.348229	-80.682898
15	37.348480	-80.683657
16	37.348185	-80.684689
17	37.347824	-80.685948
18	37.347241	-80.687983
19	37.346509	-80.689766
20	37.346075	-80.691489
21	37.345317	-80.693571
22	37.345091	-80.694767
23	37.344900	-80.696603
24	37.344679	-80.697755
25	37.344700	-80.698520
26	37.344989	-80.699570
27	37.345395	-80.700635
28	37.345740	-80.701485
29	37.347021	-80.701929
30	37.348308	-80.701922
31	37.349556	-80.701498
32	37.350789	-80.701099
33	37.352718	-80.700642
34	37.354894	-80.700352
35	37.356601	-80.700486
36	37.358442	-80.700844
37	37.359567	-80.701852
38	37.361185	-80.702914
39	37.361950	-80.703726
40	37.362516	-80.705580
41	37.362901	-80.707040
42	37.363285	-80.708539

*Geographic Coordinate System: GCS_North_American_1983; Datum: D_North_American_1983

In summary, DEQ based its proposed nonattainment area boundary on the recommended EPA methodology. The boundary is appropriately located and satisfies the statutory requirements.