

Final Technical Support Document

North Carolina Area Designations for the 2010 SO₂ Primary National Ambient Air Quality Standard

Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA, or the Agency) must designate areas as either “unclassifiable,” “attainment,” or “nonattainment” for the 2010 1-hour sulfur dioxide (SO₂) primary national ambient air quality standard (NAAQS). Section 107(d) of the CAA defines a nonattainment area as one that does not meet the NAAQS or that contributes to a NAAQS 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.

July 2, 2016, is the deadline established by the U.S. District Court for the Northern District of California for the EPA to designate certain areas. This deadline is the first of three deadlines established by the court for the EPA to complete area designations for the 2010 SO₂ NAAQS. This deadline applies to certain areas in North Carolina because one emission source meets the conditions of the court’s order.

North Carolina Department of Environmental Quality (NC DEQ) through the Division of Air Quality submitted updated recommendations on September 18, 2015. Table 1 below lists North Carolina’s recommendations and identifies the county in North Carolina that the EPA is designating in order to meet the July 2, 2016, court-ordered deadline. This final designation is based on an assessment and characterization of air quality through ambient air quality data, air dispersion modeling, other evidence and supporting information, or a combination of the above.

Table 1 – North Carolina’s Recommended and the EPA’s Final Designations

Area	State’s Recommended Area Definition	State’s Recommended Designation	The EPA’s Final Area Definition	The EPA’s Final Designation
Brunswick County, North Carolina	Brunswick County and New Hanover County ¹	Attainment	Brunswick County (Brunswick County, NC)	Unclassifiable

Background

¹ In a letter dated April 19, 2016, North Carolina provided an updated boundary recommendation for Brunswick County by reconfirming this recommendation and providing additional information, but did not opine or explicitly change their original recommendation for the area related to Capital Power Incorporated (CPI) USA North Carolina LLC – Southport Plant (CPI Southport), which recommended the area definition be comprised of both Brunswick and New Hanover Counties.

On June 3, 2010, the EPA revised the primary (health based) SO₂ NAAQS by establishing a new 1-hour standard at a level of 75 parts per billion (ppb) which is met at an ambient air quality monitoring site when the 3-year average of the 99th percentile of 1-hour daily maximum concentrations does not exceed 75 ppb. This NAAQS was published in the *Federal Register* on June 22, 2010 (75 FR 35520), and is codified at 40 CFR 50.17. The EPA determined this is the level necessary to protect public health with an adequate margin of safety, especially for children, the elderly, and those with asthma. These groups are particularly susceptible to the health effects associated with breathing SO₂. The two prior primary standards of 140 ppb evaluated over 24 hours, and 30 ppb evaluated over an entire year, codified at 40 CFR 50.4, remain applicable.² However, the EPA is not currently designating areas on the basis of either of these two primary standards. Similarly, the secondary standard for SO₂, set at 500 ppb evaluated over 3 hours, codified at 40 CFR 50.5, has not been revised, and the EPA is also not currently designating areas on the basis of the secondary standard.

General Approach and Schedule

Section 107(d) of the CAA requires that not later than 1 year after promulgation of a new or revised NAAQS, state governors must submit their recommendations for designations and boundaries to the EPA. Section 107(d) also requires the EPA to provide notification to states no less than 120 days prior to promulgating an initial area designation that is a modification of a state's recommendation. If a state does not submit designation recommendations, the EPA may promulgate the designations that it deems appropriate without prior notification to the state, although it is our intention to provide such notification when possible. If a state or tribe disagrees with the EPA's intended designations, it is given an opportunity within the 120-day period to demonstrate why any proposed modification is inappropriate. The EPA is required to complete designations within 2 years after promulgation of a new or revised NAAQS, unless the EPA determines that sufficient information is not available, in which case the deadline is extended to 3 years. The 3-year deadline for the revised SO₂ NAAQS was June 2, 2013.

On August 5, 2013, the EPA published a final rule establishing air quality designations for 29 areas in the United States for the 2010 SO₂ NAAQS, based on recorded air quality monitoring data from 2009 - 2011 showing violations of the NAAQS (78 FR 47191). In that rulemaking, the EPA committed to address, in separate future actions, the designations for all other areas for which the Agency was not yet prepared to issue designations.

Following the initial August 5, 2013, designations, three lawsuits were filed against the EPA in different U.S. District Courts, alleging the Agency had failed to perform a nondiscretionary duty under the CAA by not designating all portions of the country by the June 2, 2013 deadline. In an effort intended to resolve the litigation in one of those cases, plaintiffs, Sierra Club and the

² 40 CFR 50.4(e) provides that the two prior primary NAAQS will no longer apply to an area 1 year after its designation under the 2010 NAAQS, except that for areas designated nonattainment under the prior NAAQS as of August 22, 2010, and areas not meeting the requirements of a SIP Call under the prior NAAQS, the prior NAAQS will apply until that area submits and the EPA approves a SIP providing for attainment of the 2010 NAAQS. The North Carolina area is not designated nonattainment under the prior NAAQS nor is it not meeting the requirements of a SIP Call under the prior NAAQS.

Natural Resources Defense Council, and the EPA filed a proposed consent decree with the U.S. District Court for the Northern District of California. On March 2, 2015, the court entered the consent decree and issued an enforceable order for the EPA to complete the area designations according to the court-ordered schedule.

According to the court-ordered schedule, the EPA must complete the remaining designations by three specific deadlines. By no later than July 2, 2016 (16 months from the court's order), the EPA must designate two groups of areas: (1) areas that have newly monitored violations of the 2010 SO₂ NAAQS and (2) areas that contain any stationary sources that had not been announced as of March 2, 2015, for retirement and that, according to the EPA's Air Markets Database, emitted in 2012 either (i) more than 16,000 tons of SO₂, or (ii) more than 2,600 tons of SO₂ with an annual average emission rate of at least 0.45 pounds of SO₂ per one million British thermal units (lbs SO₂/mmBTU). Specifically, a stationary source with a coal-fired unit that, as of January 1, 2010, had a capacity of over 5 megawatts and otherwise meets the emissions criteria, is excluded from the July 2, 2016, deadline if it had announced through a company public announcement, public utilities commission filing, consent decree, public legal settlement, final state or federal permit filing, or other similar means of communication, by March 2, 2015, that it will cease burning coal at that unit.

The last two deadlines for completing remaining designations are December 31, 2017, and December 31, 2020. The EPA has separately promulgated requirements for state and other air agencies to provide additional monitoring or modeling information on a timetable consistent with these designation deadlines. We expect this information to become available in time to help inform these subsequent designations. These requirements were promulgated on August 21, 2015 (80 FR 51052), in a rule known as the SO₂ Data Requirements Rule (DRR), codified at 40 CFR part 51, subpart BB.

Updated designations guidance was issued by the EPA through a March 20, 2015, memorandum from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Air Division Directors, U.S. EPA Regions 1-10. This memorandum supersedes earlier designation guidance for the 2010 SO₂ NAAQS, issued on March 24, 2011, and it identifies factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO₂ NAAQS. The guidance also contains the factors the EPA intends to evaluate in determining the boundaries for all remaining areas in the country, consistent with the court's order and schedule. These factors include: 1) Air quality characterization via ambient monitoring or dispersion modeling results; 2) Emissions-related data; 3) Meteorology; 4) Geography and topography; and 5) Jurisdictional boundaries. This guidance was supplemented by two non-binding technical assistance documents intended to assist states and other interested parties in their efforts to characterize air quality through air dispersion modeling or ambient air quality monitoring for sources that emit SO₂. Notably, the EPA's documents, titled "SO₂ NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) and "SO₂ NAAQS Designations Source-Oriented Monitoring Technical Assistance Document" (Monitoring TAD), were available to states and other interested parties. Both of these TADs were most recently updated in February 2016.

Based on complete, quality assured and certified ambient air quality data collected between 2013 and 2015, no violations of the 2010 SO₂ NAAQS have been recorded at ambient air quality monitors in any undesignated part of North Carolina. However, there is one source in the State meeting the emissions criteria of the consent decree for which the EPA must complete designations by July 2, 2016. In this final technical support document (TSD), the EPA discusses its review and technical analysis of North Carolina's updated recommendation for the area that we must designate. The EPA also discusses any intended and final modifications from the state's recommendation based on all available data before us.

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

- 1) 2010 SO₂ NAAQS – the primary NAAQS for SO₂ promulgated in 2010. This NAAQS is 75 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) Attaining monitor – an ambient air monitor meeting all methods, quality assurance, and siting criteria and requirements whose valid design value is equal to or less than 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
- 3) 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 NAAQS.
- 4) Designated nonattainment area – an area which the EPA has determined has violated the 2010 SO₂ NAAQS or contributed to a violation in a nearby area. A nonattainment designation reflects considerations of the state's recommendations and all of the information discussed in this document. The EPA's decision is based on all available information including the most recent 3 years of air quality monitoring data, available modeling analyses, and any other relevant information.
- 5) Designated unclassifiable area – an area for which the EPA cannot determine based on all available information whether or not it meets the 2010 SO₂ NAAQS.
- 6) Designated unclassifiable/attainment area – an area which the EPA has determined to have sufficient evidence to find either is attaining or is likely to be attaining the NAAQS. The EPA's decision is based on all available information including the most recent 3 years of air quality monitoring data, available modeling analyses, and any other relevant information.
- 7) Modeled violation – a violation based on air dispersion modeling.
- 8) Recommended attainment area – an area a state or tribe has recommended that the EPA designate as attainment.
- 9) Recommended nonattainment area – an area a state or tribe has recommended that the EPA designate as nonattainment.
- 10) Recommended unclassifiable area – an area a state or tribe has recommended that the EPA designate as unclassifiable.
- 11) Recommended unclassifiable/attainment area – an area a state or tribe has recommended that the EPA designate as unclassifiable/attainment.
- 12) Violating monitor – an ambient air monitor meeting all methods, quality assurance, and siting criteria and requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.

Technical Analysis for Brunswick County, NC

Introduction

The Brunswick County, North Carolina, area contains a stationary sources that, according to the EPA's Air Markets Database, emitted in 2012 either more than 16,000 tons of SO₂ or more than 2,600 tons of SO₂ and had an annual average emission rate of at least 0.45 pounds of SO₂ per one million British thermal units (lbs SO₂/mmBTU). Specifically, in 2012, Capital Power Incorporated (CPI) Southport - Cape Fear electric generating facility (CPI) emitted 2,923 tons of SO₂ and had an emissions rate of 0.74 lbs SO₂/mmBTU. CPI is an electric power generation plant with two electric generating units (EGUs) that are permitted to combust a variety of solid fuels, including coal, woody biomass fuels, and tire derived fuel. The two EGUs are each comprised of three (3) boilers, operating at 223 mmBTU/hr. Each-boiler EGU exhausts from a single stack. As of March 2, 2015, CPI had not met the specific requirements for being "announced for retirement." Pursuant to the March 2, 2015, court-ordered schedule, the EPA must designate the area surrounding this facility by July 2, 2016.

Initial Submittal from the State of North Carolina

On September 18, 2015, the North Carolina Department of Environment and Natural Resources (hereafter referred to as "the state") recommended that the area surrounding the CPI Southport facility, specifically the entirety of Brunswick and New Hanover Counties, be designated as attainment based on an assessment and characterization of air quality from the facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO₂ are expected. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions from the CPI facility from 2012-2014. On February 16, 2016, EPA notified the state of North Carolina that we agreed that most of Brunswick County was attaining the standard in that period, and that we intended to designate as unclassifiable/attainment all townships within the county except for the Northwest Township which includes the DAK Americas, LLC facility. Our analysis of the state's September 18, 2015, submittal is included in our February 16, 2016, TSD. EPA's February 16, 2016, notification further stated that we will not yet issue an intended designation for New Hanover County or the Northwest Township of Brunswick County (i.e., the location of DAK Americas, LLC). Instead, the agency indicated that it would designate the aforementioned areas and all other undesignated areas of North Carolina by either December 31, 2017, or December 31, 2020, consistent with the deadlines in the final consent decree. Our basis for not yet issuing intended designations for New Hanover County and the Northwest Township of Brunswick County is discussed in detail in our February 16, 2016, notification to the state and the associated preliminary North Carolina TSD.

Assessment of New Information

In our February 16, 2016, notification to North Carolina regarding our intended unclassifiable/attainment designation for the Brunswick County, North Carolina, area, the EPA requested that any additional information that the Agency should consider prior to finalizing the

designation should be submitted by April 19, 2016. On March 1, 2016, the EPA also published a notice of availability and public comment period in the *Federal Register*, inviting the public to review and provide input on our intended designations by March 31, 2016 (81 FR 10563). The EPA is explicitly incorporating and relying upon the analyses and information presented in the preliminary TSD for the purposes of our final designation for this area, except to the extent that any new information submitted to the EPA or conclusions presented in this final TSD and RTC, available in the docket, supersede those found in the February 16, 2016 intended designations.

The EPA received new information from NC DEQ regarding our intended designation for this area during the state and public comment period in order to characterize air quality in the Brunswick County, North Carolina, area. Notably, on April 19, 2016, the State provided both additional, updated air dispersion modeling information and a final, issued title V permit during the comment period, which asserts that compliance with the 1-hour SO₂ standard can be shown through compliance with a maximum hourly SO₂ emission rate of 453.6 pounds per hour for CPI Southport units ES01 and ES02 each. This information was submitted by the State after they were notified by CPI that 2015 actual emissions from were higher than those modeled for their initial boundary recommendation. Limits of 453.6 pounds per hour for Units ES01 and ES02 (each) were incorporated into CPI's title V permit, which the State issued on April 18, 2016, and is therefore federally enforceable and effective.

The primary differences between the original modeling submitted by North Carolina in support of its designation recommendation on September 18, 2015, and the updated modeling North Carolina provided on April 19, 2016, are:

1) *Modeling Parameter: Meteorology and Surface Characteristics.*

The initial modeling provided by the state used meteorological data from the NWS station in Wilmington, North Carolina, and coincident upper air data from the NWS station in Newport, North Carolina, for the years 2012-2014. The revised modeling used meteorological data from the same stations for the years 2013-2015.

2) *Modeling Parameter: Emissions*

The initial modeling provided by the state utilized actual emissions from the then-most recent 3-year data set (2012-2014) for CPI Southport. These emissions data were obtained from CEMS. The revised modeling provided by the state utilized maximum allowable SO₂ emission rates of 453.6 pounds per hour for CPI Southport Units 1 and 2 (each) based on their revised title V permit limit.

3) *Modeling Parameter: Background Concentrations of SO₂*

The initial modeling provided by the state utilized a background concentration of 7.9 µg/m³ (3 ppb) based on the 99th percentile value from the New Hanover County SO₂ monitor for the year 2014. The revised modeling provided by the state did not utilize a background concentration. As discussed in more detail below, non-inclusion of a background concentration in the modeling is inconsistent with EPA's Modeling TAD and

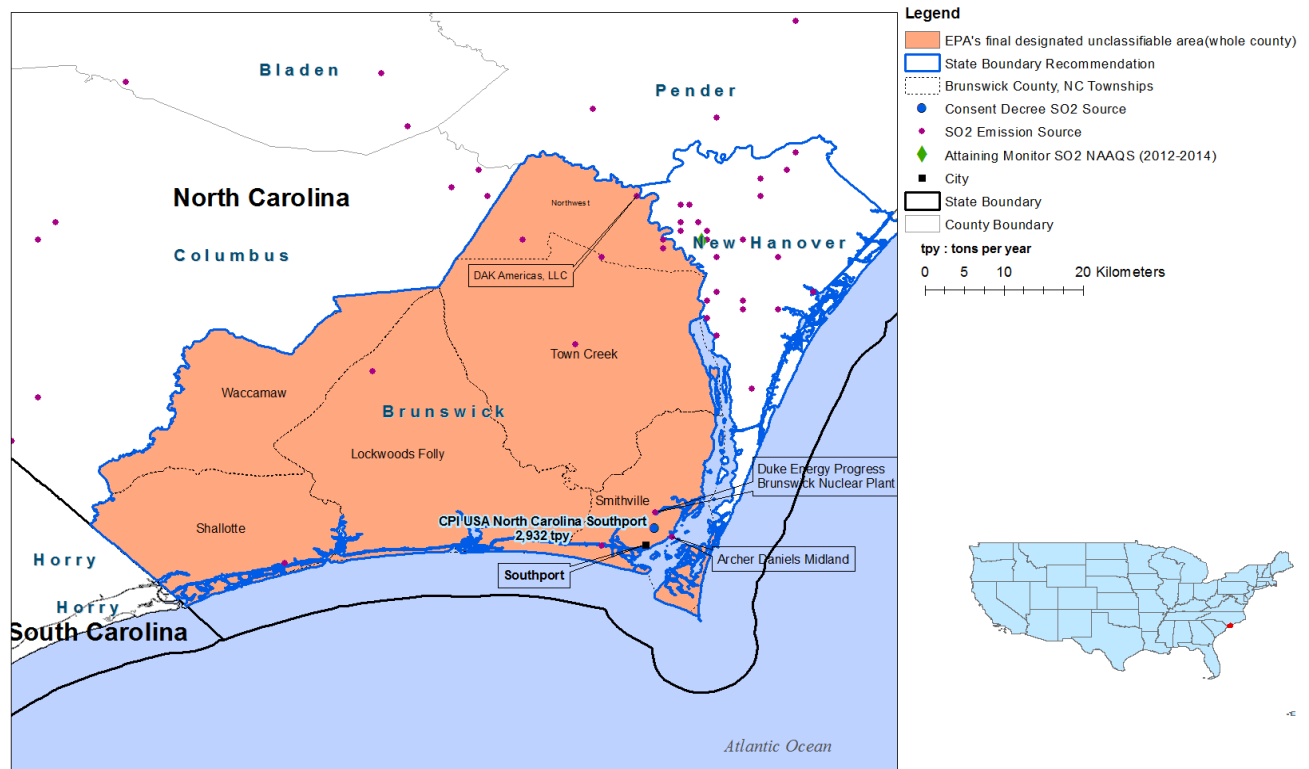
makes the modeling insufficient to support a determination that the area is meeting the NAAQS.

These differences are described in more detail below. North Carolina's April 19, 2016, response also addresses the shutdown of the DAK Americas, LLC source in the Northwest Township of Brunswick County. The EPA's discussion and analysis of all this new information that follow below include reference to the Modeling TAD, the Monitoring TAD, and the factors for evaluation contained in the EPA's March 20, 2015, guidance, as appropriate and applicable.

As further detailed below, after carefully considering all available data and information, the EPA is designating the Brunswick County, North Carolina area as unclassifiable for the 2010 SO₂ NAAQS because the EPA has determined that the initial modeling conducted by the state for 2012-2014 no longer appears to accurately represent current air quality in the area, and the revised modeling analysis provided by North Carolina is incomplete and inconsistent with the EPA's Modeling TAD and, therefore, the EPA is unable to determine based on all available information whether the area is meeting or not meeting the SO₂ NAAQS. The revised modeling provided by the state did not utilize a background concentration. As discussed in more detail below, non-inclusion of a background concentration in the modeling is inconsistent with EPA's Modeling TAD and makes the revised modeling insufficient information to inform a determination of whether the area is meeting or not meeting the NAAQS. The boundaries for this unclassifiable area consist of all the townships within Brunswick County, and are shown in the figure below. Also included in the figure are nearby emitters of SO₂ and North Carolina's recommended area.

Figure 1: The EPA's final unclassifiable area: Brunswick County, North Carolina Area.

Brunswick County, NC Area



Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO₂ NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. In some instances the recommended model may be a model other than AERMOD, such as the BLP model for buoyant line sources. 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
- BPIPPRIME: 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

In both the initial and the revised modeling, the NC DAQ used AERMOD version 15181, the most recent, and a discussion of the individual components will be referenced in the corresponding discussion that follows, as appropriate.

Modeling Parameter: Rural or Urban Dispersion

The EPA's recommended procedure for characterizing an area by prevalent land use is based on evaluating the dispersion environment within 3 kilometer (km) of the facility. According to the EPA's modeling guidelines contained in documents such as the Modeling TAD, rural dispersion coefficients are to be used in the dispersion modeling analysis if more than 50 percent of the area within a 3 km radius of the facility is classified as rural. Conversely, if more than 50 percent of the area is urban, urban dispersion coefficients should be used in the modeling analysis. When performing both the initial and the revised modeling for the area of analysis, NC DAQ determined that it was most appropriate to run the model in rural mode. This determination was based on an analysis of land use types within a 3 km radius from the center of the facility which concluded that the surrounding land use was more than 50 percent rural. Based on a review of satellite images from the area, the EPA agrees that this determination is appropriate.

Modeling Parameter: Area of Analysis (Receptor Grid)

The EPA believes that a reasonable first step towards characterization of air quality in the area surrounding the CPI Southport facility is to determine the extent of the area of analysis, i.e., receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO₂ emission sources or facilities considered for modeling; the extent of significant concentration gradients of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO₂ concentrations.

The grid receptor spacing for the area of analysis chosen by NC DAQ for both the initial and the revised modeling is as follows:

- 25-meter resolution about the CPI Southport facility
- 100-meter resolution from the fence line to a distance of 2 km
- 500-meter resolution from a distance of 2 km to 10 km
- 1,000-meter resolution from a distance of 10 to 30 km

The receptor network used in both the initial and revised modeling contained 4,829 receptors and covered the southeastern portion of Brunswick County and the southern portion of New Hanover County. The impacts of the area's geography and topography will be discussed later within this document.

For the area around the CPI Southport facility, North Carolina included two other emitters of SO₂ within 30 km of the CPI Southport facility in any direction for both the initial and revised modeling. North Carolina determined that this was the appropriate distance in order to adequately characterize air quality from the CPI Southport facility and other nearby sources which may have a potential impact in the area of analysis where maximum concentrations of SO₂ are expected. In addition to the CPI Southport facility, the other emitters of SO₂ included in the area of analysis are: Archer Daniels Midland (ADM) and Duke Energy Progress Brunswick Nuclear Plant. North Carolina's rationale for inclusion of these sources in the modeling is discussed in the EPA's February 16, 2016, intended designations, available in the docket. The EPA agrees that the State's chosen area of analysis is appropriate for both the initial and revised modeling evaluation because it includes nearby point sources of SO₂ emissions and includes a receptor grid adequate for identifying the area of maximum modeled concentrations.

Figures 2 and 3, included in the state’s recommendation, show an aerial view of the CPI South facility and the ADM facility as well as the receptor grid for the area of analysis. The receptor grid depicted in Figure 3 was utilized in both the initial and revised modeling submitted by the state of North Carolina. Consistent with the Modeling TAD, receptors for the purposes of this designation effort were placed only in areas where it would also be feasible to place a monitor and record ambient air impacts. The impacts of the area’s geography and topography will be discussed later within this document.

Figure 2: Brunswick County Area of Analysis Source: CPI USA North Carolina, Southport Facility 1-Hour SO₂ NAAQS Modeling Analysis prepared by Trinity Consultants, June 20, 2015.

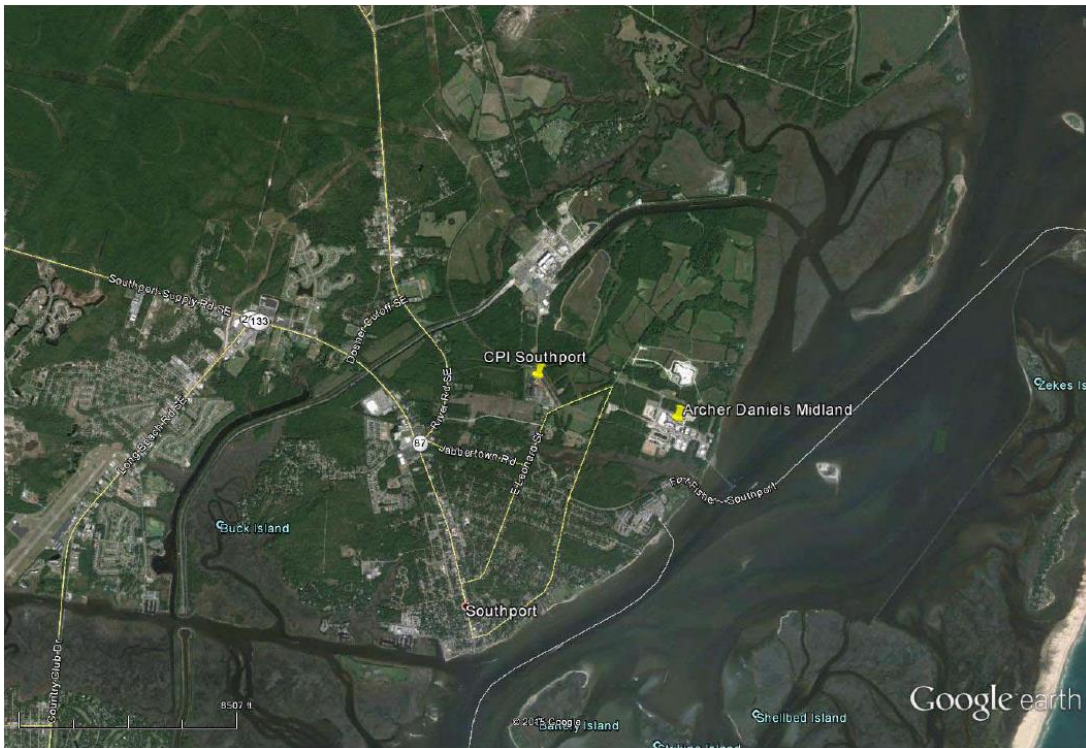
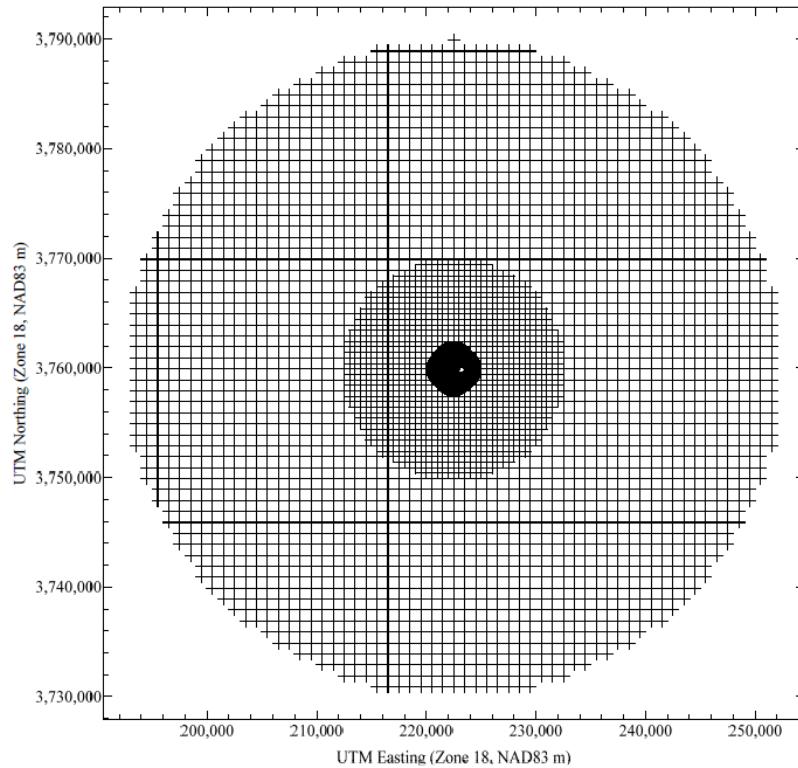


Figure 3: Receptor Grid for the Brunswick County Area of Analysis. Source: CPI USA North Carolina, Southport Facility 1-Hour SO₂ NAAQS Modeling Analysis prepared by Trinity Consultants, June 20, 2015.



Modeling Parameter: Source Characterization

The State characterized the source(s) within the area of analysis in accordance with practices outlined as acceptable in the Modeling TAD. Specifically, in their revised modeling, North Carolina followed the EPA's good engineering practices (GEP) policy in conjunction with allowable emissions limits for the CPI Southport facility. In accordance with the GEP policy, it was determined that use of the actual stack heights for CPI Units 1 and 2 (60.4 meters/198 feet) is appropriate. Actual stack heights and emission rates were used for the other sources included in the modeling including ADM and the Duke Energy Progress Brunswick Nuclear Plant. In the previous modeling submitted by North Carolina on September 18, 2015, in support of their SO₂ designation recommendations, they used actual stack heights in conjunction with actual emissions for all sources. Therefore, both the initial and revised modeling submitted by the state used the same stack heights for CPI Units 1 and 2. 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. The AERMOD component BPIPPRIME was used to assist in addressing building downwash.

Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purposes of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD also provides for the flexibility of using allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate.

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

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. Specifically, a facility may have recently adopted a new federally enforceable emissions limit, been subject to a federally enforceable consent decree, or implemented other federally enforceable mechanisms and control technologies to limit SO₂ emissions to a level that indicates compliance with the NAAQS. These new limits or conditions may be used in the application of AERMOD. In these cases, the Modeling TAD notes that the existing SO₂ emissions inventories used for permitting or SIP planning demonstrations should contain the necessary emissions information for designations-related modeling. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, the State of North Carolina included CPI and two other emitters of SO₂ within 30 km in the area of analysis in both the initial and revised modeling. This distance and these facilities were selected because the State believes that this area of analysis adequately represents the area where maximum concentrations of SO₂ are expected and adequately includes the sources which might contribute to those concentrations. No other sources beyond 30 km were determined by North Carolina to have the potential to cause significant concentration gradient impacts within the area of analysis. According to North Carolina, two sources, DAK Americas, LLC - Cape Fear facility in Brunswick County and Duke Energy Progress, LLC - L.V. Sutton Electric Plant in New Hanover, have ceased operations, are officially shutdown, and were not included in the modeling analysis.

DAK Americas, LLC, Cape Fear facility is located in the northeast portion of Brunswick County and is approximately 42 km from the CPI Southport facility, and less than 2 km from the New Hanover County border (within the Northwest Township). The source reported emissions of 1,442 tons in 2012 and 1,149 tons in 2013, and no SO₂ emissions were reported in 2014. North Carolina's April 19, 2016, response to the EPA's intended designation indicates that on March 21, 2016, DAK Americas, LLC, submitted an application to North Carolina to remove combustion sources (ES01 and ES02) from its title V operating permit. North Carolina's

response indicates that these two emission sources represent over 99.98 percent of 1,441.92 tons of SO₂ emitted by the facility in 2012 (the last full year of operation). NC DAQ issued a revised title V permit on April 5, 2016, removing ES01 and ES02. The EPA has reviewed this revised title V permit and agrees with the state that the DAK Americas facility does not need to be included in the modeling analysis. Detailed information regarding other emission sources are discussed in the EPA's February 16, 2016, intended designations.

Duke Energy Progress, LLC - L.V. Sutton Electric Plant in New Hanover County (east of Brunswick) is located approximately 38 km from the CPI Southport facility and less than 1 km from the Brunswick County border. The source's three coal fired units were retired in November 2013 as a result of the operation of a new, gas-fired combined-cycle unit. The source reported 32 tons of actual SO₂ emissions in 2014. The EPA agrees with North Carolina that the Duke Energy Progress facility does not need to be included in the modeling analysis because the coal-fired units have ceased operations and the remaining SO₂ emissions of 32 tons per year in 2014 are expected to have a minimal potential impact in the area of analysis where maximum concentrations of SO₂ are expected considering the distance of the facility from the area of analysis (38 km).

The EPA notes there are additional sources in nearby counties bordering Brunswick including the International Paper – Riegelwood Mill facility in Columbus County, approximately 3.6 km west of the Brunswick County border. This facility emitted 1,200 of SO₂ according to the 2014 actual emissions. The EPA observes that the predominant wind pattern in the area blows from either the southwest or the northeast, and therefore the impacts from International Paper are not likely to influence the area of modeled maximum concentration from the CPI Southport facility. Additionally, the modeling analysis for CPI Southport indicates that the maximum predicted concentrations of SO₂ from the 3 facilities in the area of analysis are within 600 m of CPI Southport. Based on available information, the EPA does not have reason to believe that the emissions from International Paper combined with the distance to the county border are likely to cause or contribute to a violation of the NAAQS in Brunswick County.

Wilbara, LLC, in New Hanover County is located approximately 41.5 km from CPI Southport and 3 km the Brunswick County border (shortest distance) and reported 119 tons of actual emissions in 2014. Considering the source's emissions, distance to the area of analysis and predominant wind direction in the area from blowing from either the southwest or the northeast, the EPA does not have reason to believe that emissions from this source will cause concentration gradients within the area of analysis or portions of Brunswick and New Hanover Counties.

Other than the two sources included in the modeling analysis, the EPA is not aware of any other SO₂ emitting sources in Brunswick County emitting over 100 tpy according to 2014 actual emissions. Furthermore, according to the review of 2014 actual emissions, there are no other sources emitting over 50 tpy or more of SO₂ (other those previously specified) that border Brunswick County (i.e., Columbus, Pender, New Hanover, and Horry County, South Carolina). The EPA has no reason to believe that these sources would cause or contribute to a violation of the NAAQS in the area of analysis or Brunswick County.

For this area of analysis, North Carolina opted to use a hybrid approach in the revised modeling, where emissions from certain facilities are expressed as actual emissions, and those from other facilities are expressed as PTE rates. For the following facilities in the area of analysis, the State included annual actual SO₂ emissions between 2012 and 2014. Actual emissions were used in both the initial and revised modeling for these two facilities. This information is summarized below.

Table 2: Actual SO₂ Emissions in 2014 from Facilities in the Brunswick CPI Southport Area of Analysis

Facility Name	SO ₂ Emissions (tons per year)
	2014 ³
ADM	1.4
Duke Energy Brunswick Nuclear Plant	1.9
Total Emissions From All Facilities in NC DAQ's Area of Analysis	3.3

For the ADM facility located in the area of analysis, the state used the highest actual 1-hour emissions rate from the 2014 emissions inventory data. For Duke Energy Brunswick Nuclear Plant located in the area of analysis, SO₂ emissions occur on an intermittent basis during testing and operation of the emergency generators and mitigation pumps. The facility-wide total hourly emissions, based on the 2012 – 2014 emissions inventory, were conservatively assumed to be emitted every hour of each year.

North Carolina's April 19, 2016, response to the EPA's recommended designations indicates that their initial boundary recommendation for Brunswick County, submitted to the EPA on September 18, 2015, relied upon the most recent three years of modeling and monitoring data available at the time for CPI Southport (2012 through 2014). Subsequently, the State received an emissions report from CPI Southport dated February 26, 2016, as part of its calendar year 2015 actual versus projected actual comparisons that is required in the facility's operating permit. The 2015 actual SO₂ emissions are higher than those modeled and relied on for the initial boundary recommendation. Therefore, North Carolina evaluated the impact of 2013 through 2015 hourly SO₂ emissions, in conjunction with corresponding meteorology and background sources to assess attainment status. This modeling showed modeled violations of the SO₂ NAAQS, which indicates that the modeling of 2012-2014 actual emissions no longer reflects current air quality status and can no longer be relied upon to support a finding that the area is meeting the NAAQS. Therefore, CPI Southport requested a permit modification to restrict the hourly SO₂ emissions in order to show compliance with the 1-hour SO₂ standard. The revised title V permit was issued on

³ The 2014 annual emissions data were obtained via the Emissions Inventory System (EIS) gateway, in which states report emissions pursuant to 40 CFR Part 51, Subpart A. The EIS gateway can be accessed via: <http://www3.epa.gov/ttnchie1/eis/gateway/>.

April 18, 2016, and contained new SO₂ emissions limits of 453.62 lb/hr for each of the two CPI Southport EGU emissions units. Based upon these revised permit limits, the federally enforceable SO₂ PTE limit for CPI Southport is calculated to be 3,973.8⁴ tpy.

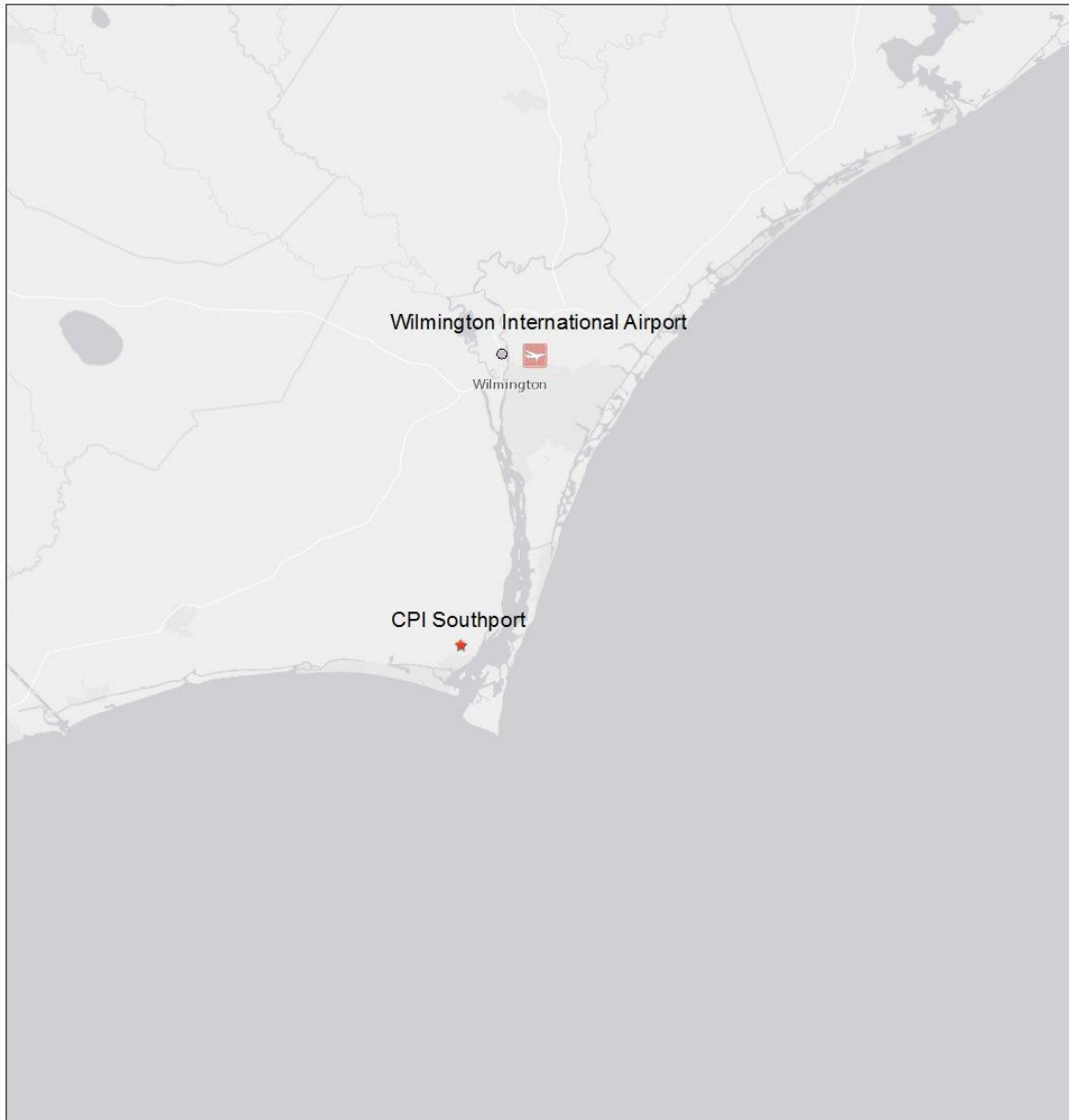
Modeling Parameter: Meteorology and Surface Characteristics

The most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. As noted in the Modeling TAD, the selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data are 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, the Federal Aviation Administration (FAA), and military stations.

For the Brunswick County area of analysis, surface meteorology from the NWS station in Wilmington, North Carolina, approximately 37 km to the north-northwest, and coincident upper air observations from the NWS station in New Port, North Carolina, approximately 140 km to the northeast, were selected as best representative of meteorological conditions within the area of analysis (Figure 4) for both the initial and revised modeling. These data were recommended by North Carolina for all facilities in Brunswick County. The years 2013-2015 were used in the revised modeling submitted by the State. The initial modeling submitted by the state used the same NWS stations and the years 2012-2014.

⁴ Based on title V permit condition at an hourly rate of 453.63 pounds per hour for units 1 and 2 (each) and assuming year round operation (8,760 hours per year).

Figure 4: The Brunswick County Area of Analysis and the Wilmington, North Carolina NWS Station



February 2, 2016

1:577,791

Points



Override 1



SO2 Designations Round 2 - 68 Sources

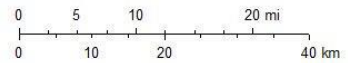
SO2 Site Level DVs



0 to 75



> 75 to 712



Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

Meteorological data from the above surface and upper air stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. In both the initial and revised modeling, the State followed the methodology and settings presented in the EPA's Modeling TAD in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Modeling Parameter: Geography and Terrain

The terrain in the area of analysis is best described as relatively flat and not of significance in the modeling analysis. To account for these terrain changes, the AERMAP terrain program within AERMOD was used in both the initial and revised modeling to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model was the USGS National Elevation Database.

Modeling Parameter: Background Concentrations of SO₂

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO₂ 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. For the Brunswick County area of analysis, North Carolina's updated modeling chose to not include a background concentration on the basis that the additional sources included in the modeling analysis "sufficiently" account for background SO₂ concentrations and that inclusion of a background concentration would essentially "double count" the impact of the sources that were explicitly modeled. However, the EPA does not agree that impacts from the ADM and the Duke Energy Brunswick Nuclear Plant sources included in the modeling sufficiently account for all background concentrations of SO₂, since CPI Southport is located near the Wilmington, North Carolina, urbanized area, which includes non-point sources of SO₂ emissions from vehicles, port operations, and other unidentified sources that the updated modeling from the state specifically did not account for whatsoever. Therefore, the updated modeling by North Carolina was not performed in a manner consistent with the TAD and is not sufficient information from which to determine whether the area is meeting or not meeting the NAAQS. The initial modeling provided by the State on September 18, 2015, utilized a background concentration of 7.9 µg/m³ (3 ppb) based on the 99th percentile value from the New Hanover County SO₂ monitor for the year 2014.

Summary of Modeling Results

The AERMOD modeling parameters, as supplied by additional information from NC DAQ during the comment period for the Brunswick County area of analysis are summarized below in Table 3.

Table 3: AERMOD Modeling Parameters for the Brunswick County, North Carolina Area of Analysis

Brunswick County Area of Analysis	
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	3
Modeled Stacks	8
Modeled Structures	Unavailable
Modeled Fence lines	3
Total receptors	4,829
Emissions Type	Hybrid
Emissions Years	2012-2014
Meteorology Years	2013-2015
Surface Meteorology Station	Wilmington, North Carolina
Upper Air Meteorology Station	New Port, North Carolina
Methodology for Calculating Background SO ₂ Concentration	Not provided
Calculated Background SO ₂ Concentration	Not provided

The results presented below in Table 4 show the magnitude and geographic location of the highest predicted modeled concentration based on PTE emissions for CPI sources and actual emissions for ADM and the Duke Energy Brunswick Nuclear Plant.

Table 4: Maximum Predicted 99th Percentile 1-Hour SO₂ Concentration in the Brunswick County Area of Analysis Based on PTE Emissions for CPI sources and actual emissions for ADM and Duke Energy.

Averaging Period	Data Period	Receptor Location		SO ₂ Concentration (µg/m ³)	
		UTM/Latitude	UTM/Longitude	Modeled (not including sufficient background information)	NAAQS
99th Percentile 1-Hour Average	2013-2015	221000	3759900	196 ⁵	196.5*

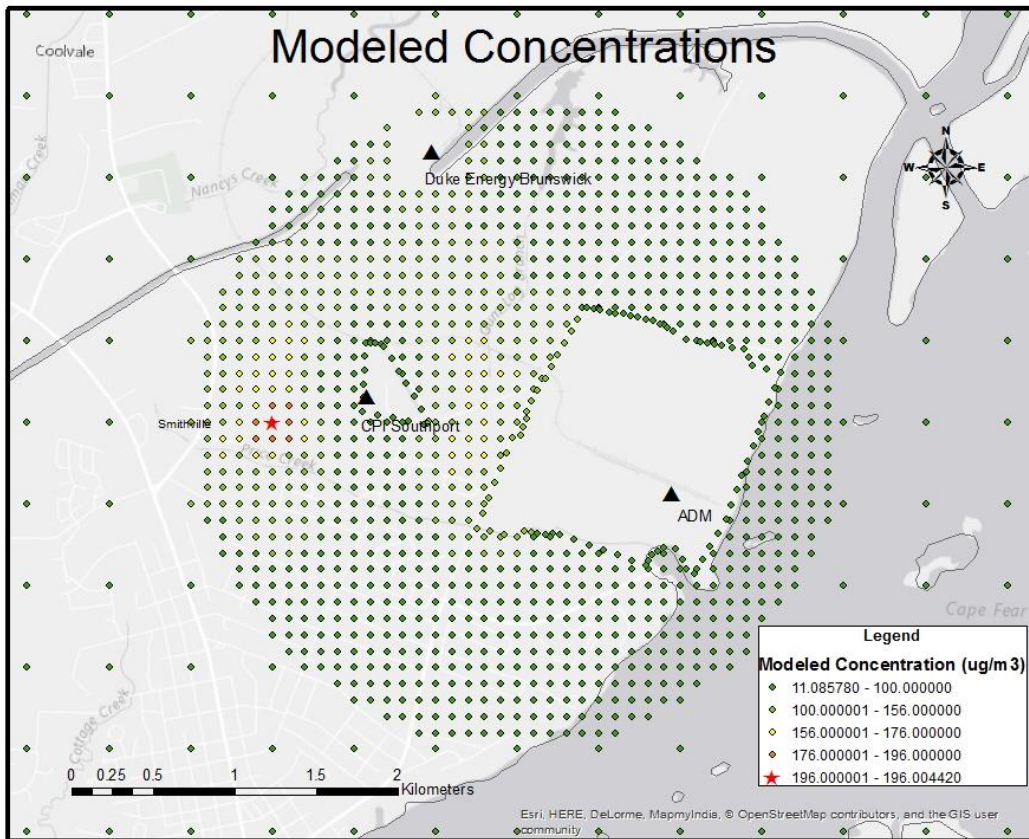
*Equivalent to the 2010 SO₂ NAAQS set at 75 ppb

The state's modeling indicates that the highest predicted 3-year average 99th percentile 1-hour average concentration within the chosen modeling domain is 196 µg/m³, or 75 ppb. This

⁵ As previously noted, NC DAQ did not include a background SO₂ concentration in this analysis.

modeled concentration did not include a background concentration of SO₂, and is based on allowable emissions for CPI sources and actual emissions for ADM and Duke. As previously discussed, the EPA finds that this modeling analysis does not include a representative background concentration in the analysis, and therefore cannot support a conclusion that the area is meeting the NAAQS. Because no background concentration was included in the modeling, it was not performed in a manner consistent with the Modeling TAD and is not sufficient information on which to determine whether the area is meeting or not meeting the NAAQS. Figure 5 below shows that the maximum predicted value occurred 600 meters to the west of CPI.

Figure 5: Maximum Predicted 99th Percentile 1-Hour SO₂ Concentrations in the CPI Southport Area of Analysis Based on Allowable Emissions



Jurisdictional Boundaries:

Once the geographic area of analysis associated with the CPI Southport facility, other nearby sources of SO₂, and background concentration is determined, existing jurisdictional boundaries are considered for the purpose of informing our final unclassifiable area, specifically with respect to clearly defined legal boundaries.

In North Carolina's April 19, 2016, response to the EPA's initial boundary recommendations, the state revised their boundary recommendation to attainment only for Brunswick County and not New Hanover County, requesting designations at the township level due to the relatively short averaging time of the 2010 SO₂ NAAQS and recommending an attainment designation for all townships within Brunswick County. The EPA notes that North Carolina originally recommended inclusion of New Hanover County because of the SO₂ monitor meeting the 1-hour standard with a 2012-2014 design value of 32 ppb as a result of recent shutdowns and retirements. However, as indicated in the intended designations the agency did not intend to designate New Hanover County by July 2, 2016, because a singular ambient air quality monitor indicating compliance with the NAAQS in the absence of any other technical justification may not adequately characterize air quality within the entirety of that county, and the EPA noted designation of New Hanover County and the townships contained therein would be considered at a later action.

According to North Carolina's September 18, 2015, recommendation, DAK Americas, located in the Northwest Township in northern Brunswick County, shutdown September 2013. However, in the EPA's February 16, 2016, intended designation the EPA determined that the facility still had an active operating permit and a total facility-wide potential to emit of 10,324 tpy for SO₂ on a rolling 12-month basis. Before shutdown, the facility was emitting approximately 1,442 tpy of actual SO₂ emissions. In fact, the operating permit was renewed on November 5, 2013, with an October 31, 2018, expiration date. Because of the active operating permit and uncertainty of whether the September 2013 shutdown was permanent and federally enforceable, the EPA intended to designate as unclassifiable/attainment all the townships within Brunswick County excluding the Northwest Township, which contains the DAK Americas, LLC, facility.

As discussed above, on March 21, 2016, DAK Americas, LLC, submitted an application to North Carolina to remove combustion sources (ES01 and ES02) from its title V operating permit. These two emission sources represent over 99.98 percent of 1,441.92 tons of SO₂ emitted by the facility in 2012 (the last full year of operation). The State issued a revised title V permit on April 5, 2016, removing units ES01 and ES02. Based on the conditions of this new permit, DAK Americas, LLC, has a zero potential to emit and is permanently shut down through a federally enforceable mechanism. As a result of the federally-enforceable shutdown of DAK, the EPA is including in the designation boundary for Brunswick County the Northwest Township that was excluded from the 120-day TSD. As previously noted, the EPA is explicitly incorporating and relying upon the analyses and information presented in the February 16, 2016, preliminary TSD for the purposes of our final designation for this area, except to the extent that any new information submitted to the EPA or conclusions presented in this final TSD and RTC, available in the docket, supersede those found in the preliminary document.

The EPA finds that our final unclassifiable area, consisting of all townships in Brunswick County, North Carolina, is comprised of clearly defined legal boundaries, and we find these boundaries to be a suitably clear basis for defining our final unclassifiable area.

Conclusion

After careful evaluation of the State's recommendation, all timely comments and new information received during the state and public comment period, and additional relevant information as discussed in this document, the EPA is unable to determine based on available information whether the area around CPI Southport is meeting or not meeting the 2010 SO₂ NAAQS, so is designating the area as unclassifiable for the NAAQS. Specifically, the boundaries for this unclassifiable area consist of all the townships (Lockwood Folly, Northwest, Shallote, Smithville, Town Creek and Waccamaw) within Brunswick County, North Carolina. The primary reasons that the EPA does not have sufficient information to determine whether the area is meeting or not meeting the SO₂ NAAQS are that the 2015 increased emissions from CPI Southport indicate that the initial modeling of 2012-2014 actual emissions can no longer be viewed as reflecting current air quality status, and while the State submitted an updated modeling analyses of allowable emissions attempting to show that the area meets the NAAQS, the revised modeling analysis excludes a background concentration, and therefore is incomplete and inconsistent with the EPA's Modeling TAD and insufficient information on which to base a NAAQS attainment status determination. Therefore, the area cannot be classified on the basis of all currently available information as meeting or not meeting the NAAQS.

At this time, our final designation for the State only applies to Brunswick County. Consistent with the court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in North Carolina by either December 31, 2017, or December 31, 2020.