Draft Technical Support Document

North Carolina
Area Designations for the 2010 SO_2 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 one-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS). 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 is defined as any area other than a nonattainment area that meets the NAAQS. Unclassifiable areas are defined as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS.

North Carolina submitted updated recommendations on September 18, 2015, ahead of a July 2, 2016 deadline for the EPA to designate certain areas. This deadline established by the U.S. District Court for the Northern District of California is the first of three deadlines established by the court for the EPA to complete area designations for the 2010 SO_2 NAAQS. Table 1 below lists North Carolina's recommendations and identifies the counties or portions of counties in North Carolina that the EPA intends to designate by July 2, 2016 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 Intended Designations

Area	North Carolina's Recommended Area Definition	North Carolina's Recommended Designation	The EPA's Intended Area Definition	The EPA's Intended Designation
Brunswick County, North Carolina	All Townships within Brunswick County and New Hanover County	Attainment	All Townships within Brunswick County except for Northwest Township	Unclassifiable/ Attainment

Background

On June 3, 2010, the EPA revised the primary (health-based) SO_2 NAAQS by establishing a new one-hour standard at a level of 75 parts per billion (ppb) which is attained when the three-year average of the 99th percentile of one-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 SO_2. 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.[1] However, the EPA is not currently designating areas on the basis of either of these two primary standards. Similarly, the secondary standard for SO_2, set at 500 ppb evaluated over 3 hours 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 one 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 will promulgate the designations that it deems appropriate. If a state or tribe disagrees with the EPA's intended designations, they are given an opportunity within the 120 day period to demonstrate why any proposed modification is inappropriate.

On August 5, 2013, the EPA published a final rule establishing air quality designations for 29 areas in the United States for the 2010 SO_2 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 2013 deadline. In an effort intended to resolve the litigation in one of those cases, plaintiffs Sierra Club and the 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 SO_2 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 SO_2 or (ii) more than 2,600 tons of SO_2 with an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units (lbs SO_2/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

[1] 40 CFR 50.4(e) provides that the two prior primary NAAQS will no longer apply to an area one 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 state implementation plan (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. Brunswick County, North Carolina is not such an area.

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 states and other air agencies to provide additional monitoring or modeling information on a timetable consistent with these designation deadlines. The EPA expects 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 SO_2 Data Requirements Rule (DRR).

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 I-X. This memorandum supersedes earlier designation guidance for the 2010 SO_2 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 SO_2 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 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 SO_2. Notably, the EPA released its most recent versions of documents titled, "SO_2 NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) and "SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document" (Monitoring TAD) in December 2013.

Based on ambient air quality data collected between 2012 and 2014, no monitored violations of the 2010 SO_2 NAAQS have been recorded in any undesignated part of the state.[2] 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 draft technical support document, the EPA discusses its review and technical analysis of North Carolina's updated recommendations for the area that the EPA must designate. The EPA also discusses any intended modifications from the State's recommendation based on all available data before us.

[2] For designations based on ambient air quality monitoring data that violates the 2010 SO_2 NAAQS, the consent decree directs the EPA to evaluate data collected between 2013 and 2015. Absent complete, quality assured and certified data for 2015, the analyses of applicable areas for the EPA's intended designations will be informed by data collected between 2012 and 2014. States with monitors that have recorded a violation of the 2010 SO_2 NAAQS during these years have the option of submitting complete, quality assured and certified data for calendar year 2015 by April 19, 2016 to the EPA for evaluation. If after our review, the ambient air quality data for the area indicates that no violation of the NAAQS occurred between 2013 and 2015, the consent decree does not obligate the EPA to complete the designation. Instead, the EPA may designate the area and all other previously undesignated areas in the state on a schedule consistent with the prescribed timing of the court order, i.e., by December 31, 2017, or December 31, 2020.

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

1) 2010 SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 ppb, based on the three year average of the 99th percentile of the annual distribution of daily maximum one-hour average concentrations. See 40 CFR 50.17.
2) Design Value - a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the NAAQS.
3) Designated nonattainment area – an area which the EPA has determined has violated the 2010 SO_2 NAAQS or contributed to a violation in a nearby area. A nonattainment designation reflects considerations of state 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 analysis, and any other relevant information.
4) Designated unclassifiable area – an area which the EPA cannot determine based on all available information whether or not it meets the 2010 SO_2 NAAQS.
5) 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 analysis, and any other relevant information.
6) Modeled violation – a violation based on air dispersion modeling.
7) Recommended attainment area – an area a state or tribe has recommended that the EPA designate as attainment.
8) Recommended nonattainment area – an area a state or tribe has recommended that the EPA designate as nonattainment.
9) Recommended unclassifiable area – an area a state or tribe has recommended that the EPA designate as unclassifiable.
10) Recommended unclassifiable/attainment area – an area a state or tribe has recommended that the EPA designate as unclassifiable/attainment.
11) 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 the CPI Southport – Brunswick County Area

Introduction

The Brunswick County, North Carolina area contains a stationary source that according to the EPA's Air Markets Database emitted in 2012 either more than 16,000 tons of SO_2 or more than 2,600 tons of SO_2 and had an annual average emission rate of at least 0.45 lbs SO_2/MMBtu. As of March 2, 2015, this stationary source had not met the specific requirements for being "announced for retirement." Specifically, in 2012, the Capital Power Incorporated (CPI) USA North Carolina LLC – Southport Plant (CPI Southport) emitted 2,923 tons of SO_2 and had an average emissions rate of 0.74 lbs SO_2/MMBtu. Pursuant to the March 2, 2015 court-ordered schedule, the EPA must designate the area surrounding the facility by July 2, 2016. CPI operates two electric generating units (EGUs) at the CPI Southport Cape Fear facility 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.

In its submission, North Carolina 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 SO_2 are expected. This assessment and characterization was performed using air dispersion modeling software, i.e., AERMOD, analyzing actual emissions from the CPI facility.[3] The assessment and characterization was originally conducted by Trinity Consultants and prepared for CPI Southport. North Carolina then reviewed and submitted the information to the EPA.[4] After careful review of the state's assessment, supporting documentation, and all available data, the EPA agrees that most of Brunswick County is attaining the standard, and intends to designate as unclassifiable/attainment all the townships within the county except for the Northwest township which captures the DAK Americas, LLC facility. While North Carolina has indicated that DAK Americas, LLC is shutdown as of September 2013, the facility still has an active operating permit and has a total facility-wide potential to emit of 10,324 tpy for SO_2 on a rolling 12-month basis. Before shutdown, the facility was emitting approximately 1,442 tpy of actual SO_2 emissions. In fact, the operating permit was renewed on November 5, 2013, and does not expire until October 31, 2018. The EPA is, not yet issuing an intended designation for New Hanover County or the Northwest Township (i.e., the location of DAK Americas, LLC) at this time. Instead, the Agency will designate the aforementioned areas and all other undesignated

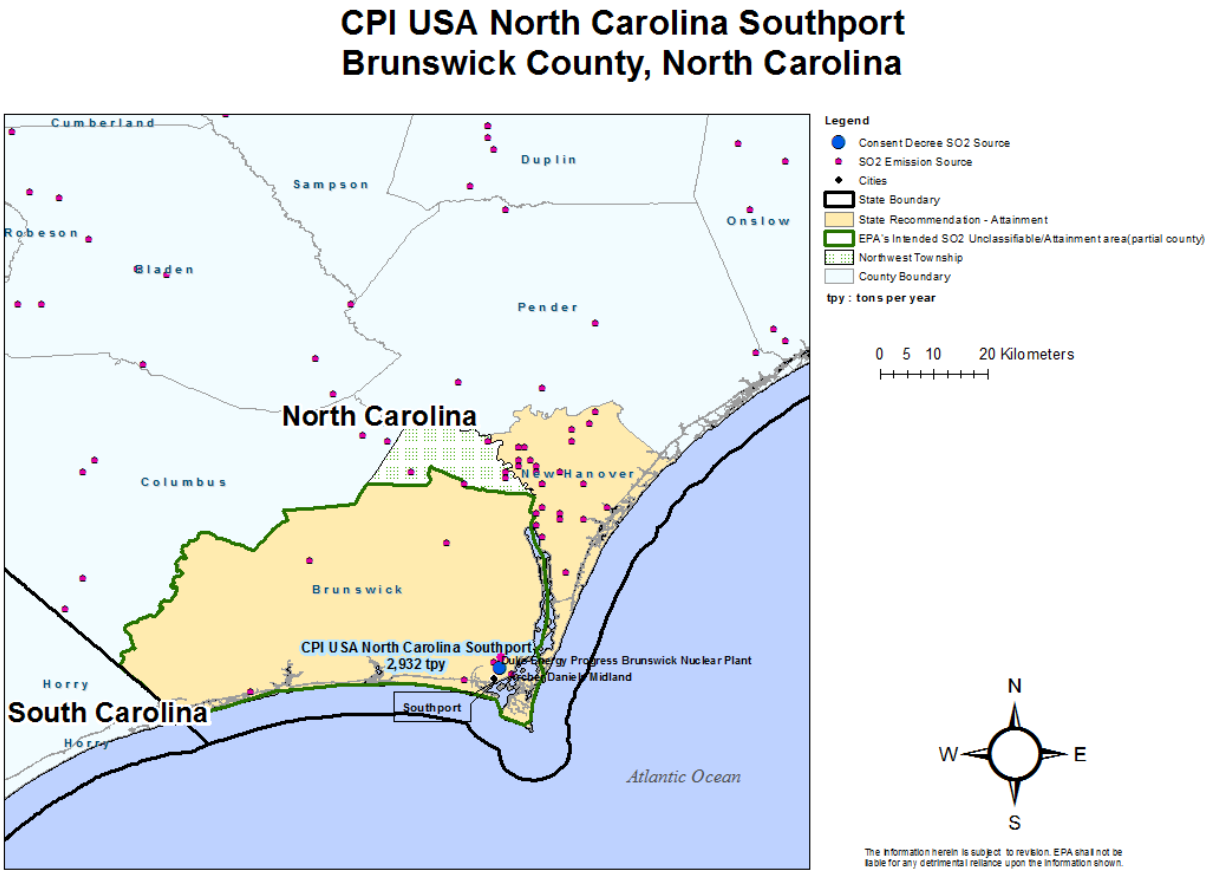
[3] The modeling analysis submitted by state of North Carolina was performed by Trinity Consultants at the request of CPI. Throughout this document, the EPA will refer to the state of North Carolina when discussing modeling information provided to support their designation recommendation.

[4] Throughout this document, the state of North Carolina will be referred to as having assessed air quality in the area because the state agreed with CPI Southport's air quality assessment and characterization of the area of analysis,(with minor modifications) officially submitting the report to the EPA to support their designation recommendation.

areas of North Carolina by either December 31, 2017, or December 31, 2020, consistent with the deadlines in the final consent decree.

The CPI Southport facility is located on the coast in southeastern North Carolina in the southeastern portion of Brunswick County. As seen in Figure 1 below, the facility is located approximately 2 kilometers (km) north-northeast of the center of Southport and 2.5 km due west of the Atlantic Ocean. Also included in the figure are nearby emitters of SO_2, the state's recommended area for the attainment designation, and the EPA's intended unclassifiable/attainment designation for the Brunswick County Area.

Figure 1. The EPA's intended designation for Brunswick County, North Carolina



The discussion that follows below will reference the state's use of the Modeling TAD, the EPA's assessment of the state's modeling in accordance with the Modeling TAD, and the factors for evaluation contained in the EPA's March 20, 2015 guidance, as appropriate.

Detailed Assessment

Model Selection and Modeling Components

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

The state used AERMOD version 15181, and a discussion of the individual components will be referenced in the corresponding discussion that follows as appropriate. The impact assessment provided to the state by the CPI Southport facility was conducted using AERMOD version 14134.

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 km of the facility. According to the EPA's modeling guidelines, 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. The state determined that the surrounding land use was more than 50 percent rural based on analysis of land use types within a 3 km radius from the center of the facility. Based on this analysis, the state established that is was most appropriate to run the model with rural dispersion coefficients.

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 SO_2 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 SO_2 concentrations. For the Brunswick County Area, North Carolina identified SO_2 emission sources in Brunswick and

New Hanover counties and evaluated 2013 actual emissions from the identified facilities based on a 10 km[5] area of analysis but the modeling domain extends up to 30 km. The state determined that this was an appropriate distance to characterize air quality from CPI Southport facility and other nearby sources which may have a potential impact in the area of analysis. Given the emissions levels and distance from the CPI Southport facility the state determined that most of the emissions sources would not interfere with attainment of the SO_2 NAAQS.
The state also identified two large SO_2 emission emissions sources DAK Americas, LLC in Brunswick County and Duke Energy Progress, LLC - L.V. Sutton in New Hanover County but did not model these sources because according to the North Carolina both sources have shutdown operations thereby indicating a zero level for potential to emit (PTE). More detail on these two sources is provided below.

DAK Americas, LLC is located in the northeast portion of Brunswick County (within the Northwest Township) and is approximately 42 km from CPI Southport, and less than 2 km from the New Hanover County border. According to press releases and information obtained from the state, DAK Americas, LLC was shutdown in September 2013, ceasing all combustion operations and demolishing its units. However, the operating permit has not been rescinded, and in fact, was renewed November 5, 2013, and does not expire until October 31, 2018. Therefore, the shutdown is not considered permanent and enforceable for purposes of designations because the source still has a potential to emit, although some modification to the facility may be necessary. The source has a total facility-wide potential to emit of 10,324 tpy for SO_2 on a rolling 12-month basis. The source reported emissions of 1,442 tons in 2012 and 1,149 tons in 2013, and no SO_2 emissions were reported in 2014.

Duke Energy Progress, LLC - L.V. Sutton Electric Plant in New Hanover County (east of Brunswick) is located approximately 38 km from CPI Southport and less than 1 km from the Brunswick County border. The source's three coal fired units were retired in November 2013[6] as a result of the operation of a new, gas-fired combined-cycle unit. The source reported 32 tons of actual SO_2 emissions in 2014.

For the Brunswick County Area, the state decided to include two other sources of SO_2 emissions (i.e., in addition to the source that meets the threshold in the consent decree for the July 2, 2016, designations) in the modeling analysis because of the SO_2 emissions from these sources and close proximity to the CPI Southport facility (less than 2 km). These two sources include: Archer Daniels Midland (ADM) and Duke Energy Progress Brunswick Nuclear Plant. The grid receptor spacing for the area of analysis chosen by the state is as follows:

The grid spacing for the impact assessment conducted by the CPI Southport facility and submitted to the state was:

- 25-meter resolution about the CPI Southport facility and ADM facilities

[5] North Carolina referenced the EPA's guidance entitled "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard."
[6] See https://www.duke-energy.com/power-plants/coal-fired/sutton.asp

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

All maximum impacts were modeled with grids of 100-meter resolution.

The receptor network contained 4,829 receptors, covered the southeastern portion of Brunswick County and the southern portion of New Hanover County. The state indicated that their ambient impact assessment, and the separate analysis conducted by the CPI Southport facility, followed the TAD guidance. The EPA agrees with the state's assessment with the exception of the potential exclusion of specific sources and the extent of the boundary.

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. 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 S02 NAAQS Modeling Analysis prepared by Trinity Consultants, June 20, 2015.

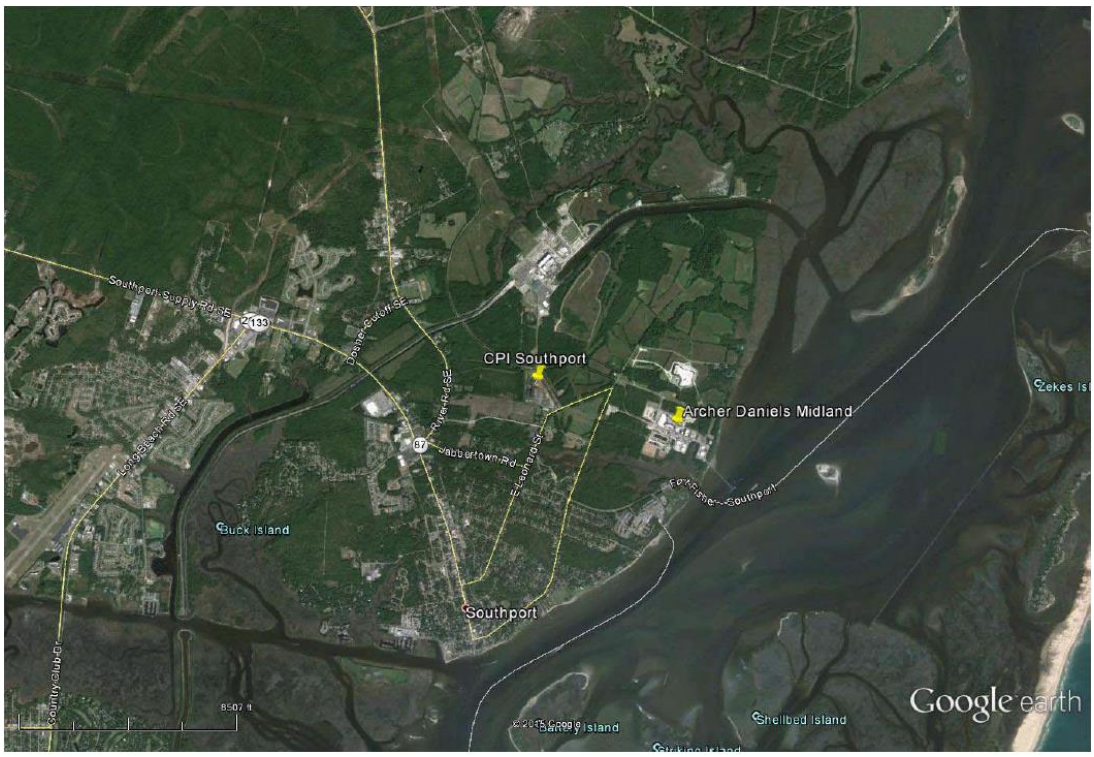
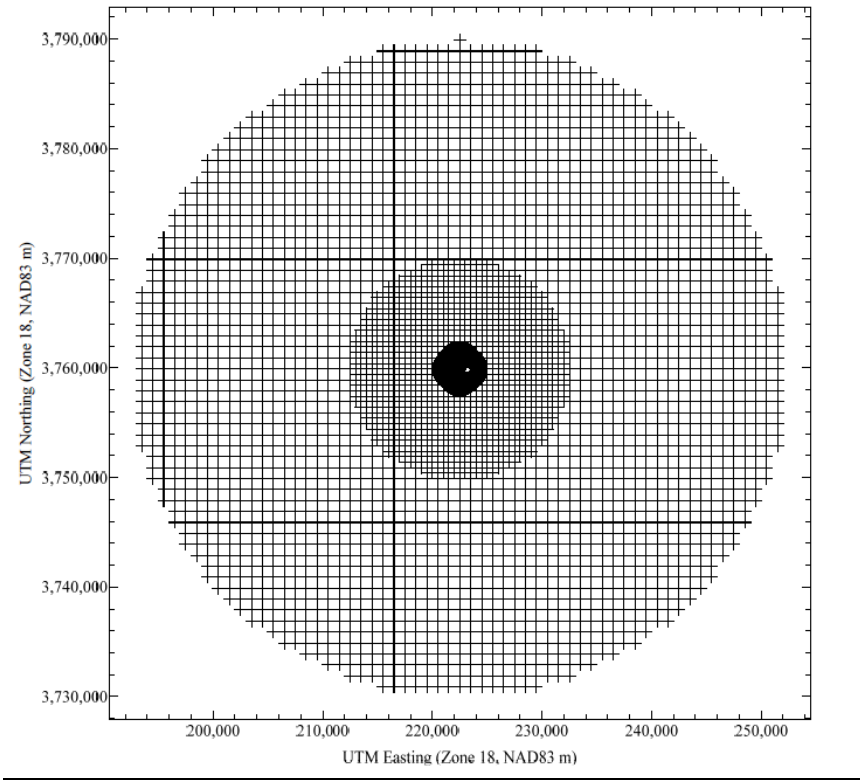


Figure 3: Receptor Grid for the Brunswick County Area of Analysis. Source: CPI USA North Carolina, Southport Facility 1-Hour S02 NAAQS Modeling Analysis prepared by Trinity Consultants, June 20, 2015.



Modeling Parameter: Source Characterization

The state generally characterized the sources within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the state used actual stack heights in conjunction with actual emissions. The state also adequately characterized the included sources' building layout and location, as well as the stack parameters, e.g., exit temperature, exit velocity, location, and diameter. Where appropriate, 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 does provide 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 sources 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 SO_2 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 SO_2 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 included the CPI Southport facility and 2 other emitters of SO_2 (ADM and Duke Energy Brunswick Nuclear Plant both of which are less than 2 km from CPI)within the 10 km area of analysis with the modeling domain extending up to 30 km in all directions. This distance and these facilities were selected because the state believes that this area of analysis adequately represents the area where maximum concentrations of SO_2 are expected and adequately includes the sources which might contribute to those concentrations. No other sources beyond 30 km were determined by the state to have the potential to cause significant concentration gradient impacts within the area of analysis. According to North Carolina, two sources DAK Americas 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 SO_2 emissions were reported in 2014. DAK Americas, LLC was not included in the modeling analysis nor were its 2012-2014 actual emissions included in the background concentration since the calculation only accounted for a design value for year 2014. According to press releases and information obtained from the state, DAK Americas, LLC was shutdown in September 2013, ceasing all combustion operations including the demolition of its units but has not rescinded its operating permit. However, the facility's title V permit was renewed in in November 5, 2013, and is valid through October 31, 2018. The source has a total facility-wide potential to emit of 10,324 tpy for SO_2 on a rolling 12-month basis.

Even though DAK Americas is located 42 km from the CPI Southport facility which is distant enough that it would not potentially impact the area of analysis, it could, however, potentially impact the northeast portion of Brunswick County as well as portions of New Hanover County

because of an open operating permit. Based on this information, the EPA has reason to believe the shutdown may not be permanent and enforceable for purposes of designations because the source still has a potential to emit, although modification to the facility may be necessary. This potential to emit could result in concentration gradients in portions of Brunswick and New Hanover Counties to cause a violation of the NAAQS.
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 sources three coal fired units were retired were retired in November 20137 as a result of the operation of a new, gas-fired combined-cycle unit. The source reported 32 tons of actual SO_2 emissions in 2014. The EPA notes additional sources in nearby counties bordering Brunswick including International Paper – Riegelwood Mill facility in Columbus County, approximately 3.6 km west of the Brunswick County border. This facility emitted 1,200 of SO_2 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 SO_2 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 located in New Hanover County is located approximately 41. 5 km from CPI Southport and 3 km the Brunswick County border(shortest distance) and 119 tons of actual emissions in 119. 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 has reason to believe that emissions from this source will not cause concentration gradients within the area or 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 SO_2 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 SO_2 (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.

The facilities in the area of analysis and their associated annual actual SO_2 emissions between 2012 and 2014, or most recently available actual emissions data, are summarized in Table 2 below.

Table 2: Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Brunswick County Area of Analysis

Facility Name	SO_2 Emissions (tons per year (tpy))		
	2012	2013	2014
CPI Southport[8]	2922.749	3564.7	4089.8
2014 Emissions(tpy)[9]			
ADM	1.36		
Duke Energy Brunswick Nuclear Plant	1.9		

For the CPI Southport facility in the area of analysis, the state used actual emissions from the most recent 3-year data set, i.e., 2012 – 2014. These emissions data were obtained from CEMS.

For ADM 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 in the area of analysis, SO_2 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.

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, Federal Aviation Administration, 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-northeast, and coincident upper air observations from the NWS station in Newport, North Carolina, approximately 140 km to the

[8] Actual emissions data for units at CPI Southport were obtained from EPA's Air Markets Database.

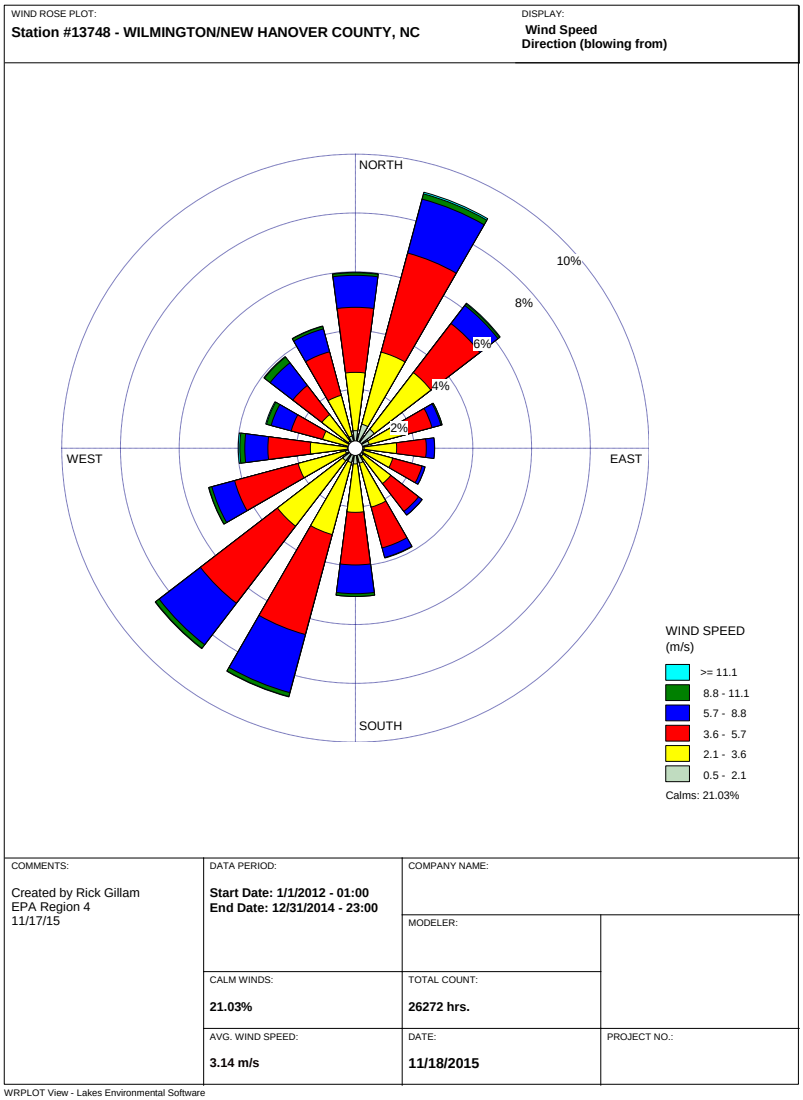
[9] The 2014 annual emissions data were obtained via the Emissions Inventory System (EIS) gateway, in which states report emissions pursuant to 40 CFR Part 51, Subpart A. The EIS gateway can be accessed via: http://www3.epa.gov/ttnchie1/eis/gateway/.

northeast were selected as best representative of meteorological conditions within the area of analysis. These data were recommended by the state for all facilities in Brunswick County. The most recent years of data (2010 – 2014) were used. Note that the CPI Southport-provided impact analyses were performed for both the 3-year period (2012 – 2014) to match the monitored design value as well as the 5-year period (2010 – 2014) to determine the modeled design value.
In the Figure 4 below, generated by the EPA, the location of the Wilmington, North Carolina NWS station is shown relative to the Brunswick County Area of analysis.

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

A three-year surface wind rose for Wilmington, North Carolina is depicted in Figure 5. In this figure, the frequency and magnitude of wind speed and direction are defined in terms of where the wind is blowing from. As shown on the wind rose, the predominant winds blow from the southwest and south-southwest primarily at mid-level speeds from 2 to 9 meters/second (m/s). Also, winds blow from the North-northeast a significant amount of time.

Figure 5: Wilmington, North Carolina Cumulative Annual Wind Rose for Years 2012 – 2014



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. 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.

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 to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the United States Geological Survey National Elevation Database.

Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "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, the state chose a representative background concentration from the SO_2 ambient monitor located in New Hanover County for the year 2014. The background concentration for this area of analysis was determined by the state to be 7.9 micrograms per cubic meter ($\mu g/m^3$), or 3.0 ppb,[10] which is the 99th percentile value from the monitor in 2014. This background concentration value was added into the final AERMOD modeling results. This was the same background concentration selected for the impact assessment conducted by the CPI Southport facility.

Summary of Modeling Results

The AERMOD modeling parameters for the Brunswick County Area of analysis are summarized below in Table 3.

[10] The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1ppb = approximately 2.62 $\mu g/m^3$.

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

Brunswick County Area of Analysis	
AERMOD Version	15181
Dispersion Characteristics	Rural
Modeled Sources	3
Modeled Stacks	10
Modeled Structures	unavailable
Modeled Fencelines	3
Total receptors	4,829
Emissions Type	Actual
Emissions Years	2012 - 2014
Meteorology Years	2012 - 2014
Surface Meteorology Station	Wilmington, North Carolina
Upper Air Meteorology Station	Newport, North Carolina
Methodology for Calculating Background SO_2 Concentration	1st tier
Calculated Background SO_2 Concentration	7.9 $\mu g/m^3$

The results presented below in Table 4 show the magnitude and geographic location of the highest predicted modeled concentration based on actual emissions.

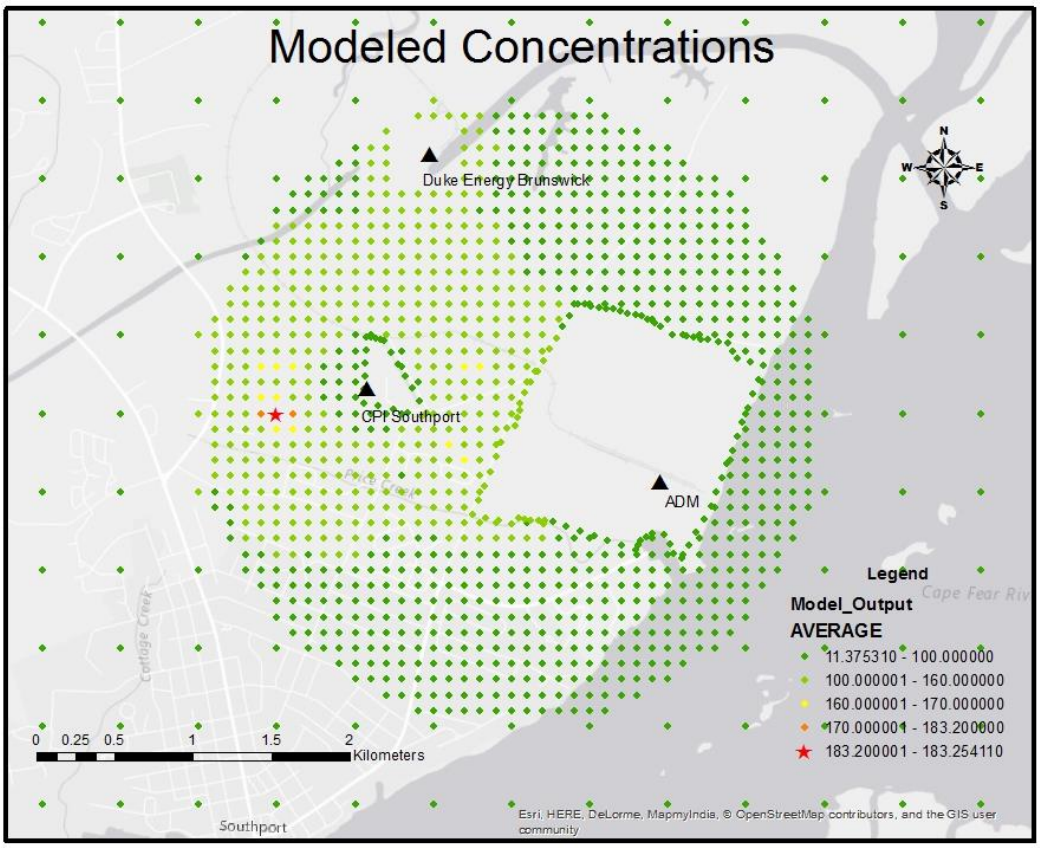
Table 4: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentration in the Brunswick County Area of Analysis Based on Actual Emissions

Averaging Period	Data Period	Receptor Location		SO_2 Concentration ($\mu g/m^3$)	
		UTM/Latitude	UTM/Longitude	Modeled (including background)	NAAQS
99th Percentile 1-Hour Average	2012-2014	221003.5	3759899.6	191.2	196.5*

*Equivalent to the 2010 SO_2 NAAQS set at 75 ppb

The state's modeling indicates that the predicted 99th percentile 1-hour average concentration within the chosen modeling domain is 191.2 $\mu g/m^3$, or 70.1 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facilities. Figure 6 generated by the EPA, indicates that the predicted value occurred approximately 600 meters west of the CPI Southport facility.

Figure 6: Maximum Predicted 99th Percentile 1-Hour SO_2 Concentrations in the Brunswick County Area of Analysis Based on Actual Emissions



Jurisdictional Boundaries:

Once the geographic area of analysis associated with the CPI Southport facility, other nearby sources, and background concentration was determined, existing jurisdictional boundaries were considered for the purpose of informing our intended unclassifiable/attainment area, specifically with respect to clearly defined legal boundaries. The state recommended attainment for Brunswick and New Hanover County requesting designations at the township level due to the relatively short averaging time of the 2010 SO_2 NAAQS and recommended an attainment designation for all townships within Brunswick and New Hanover Counties.

The EPA notes that DAK Americas, LLC, located approximately 42 km north of CPI Southport facility within Brunswick County, reported less than 2,000 in 2012 and 2013. Public media reports, the source shutdown operations in September 2013 which is supported by the source reporting no emissions in 2014. According to North Carolina, DAK Americas, LLC, was shutdown in September 2013, ceasing all combustion operations including the demolition of its units. However, the Facility's title V permit was renewed in November 5, 2013, and is valid through October 31, 2018. Potential emissions from DAK Americas, LLC, as allowed by the

active operating permit were not included in the modeling analysis for CPI Southport nor were its 2012-2014 actual emissions accounted for in the background concentration from the SO_2 ambient monitor located in New Hanover County because it only accounted for emissions for the year 2014. Additionally, the source has a total facility-wide potential to emit of 10,324 tpy for SO_2 on a rolling 12-month basis. Before shutdown, the facility was emitting approximately 1,442 tpy of actual SO_2 emissions.

The EPA notes additional sources in nearby counties bordering Brunswick including International Paper – Riegelwood Mill facility in Columbus County, approximately 3.6 km west of the Brunswick County border. This facility emitted 1,200 of SO_2 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 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 located in New Hanover County is located approximately 41. 5 km from CPI Southport and 3 km the Brunswick County border (shortest distance), and 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 has reason to believe that emissions from this source will not cause concentration gradients within the area or analysis or portions of Brunswick and New Hanover Counties.

Other than the two sources (ADM and Duke Energy Progress Nuclear Plant) included in the modeling analysis, the EPA is not aware of any other SO_2sources 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 SO_2 (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.

North Carolina recommended that the EPA designate New Hanover County as attainment due to the SO_2 monitor located there with a 2012-2014 design value of 32 ppb for the 1-hour ozone standards as a result of recent shutdowns and retirements, the most notable of which was the Duke Energy Progress: L.V. Sutton Plant. This facility emitted approximately 13,000 tons of SO_2 according to the 2011 national emissions inventory, the compilation of EIS reporting completed every three years pursuant to 40 CFR Part 51, Subpart A, but the coal-fired units were retired in 2013 when a new gas-fired combined-cycle unit began operation. The most recently reported emissions from this facility were 32.13 tons according to 2014 actual emissions. No portion of New Hanover County has been designated as nonattainment for the 2010 SO_2 NAAQS in the past. However, a township level designation limited to portions of Brunswick County is appropriate at this time, because the state's supporting information for the immediate area that the EPA must designate by July 2, 2016, consists of air dispersion modeling indicating compliance with the NAAQS for the area around CPI Southport but does not extend into New

Hanover County. Although based on currently available information, the EPA does not have reason to expect sources in New Hanover County to cause or contribute to a violation of the NAAQS in Brunswick County, the state's rationale for why the EPA should also designate New Hanover County as attainment (i.e., an ambient air quality monitor with a 2012 – 2014 design value of 32 ppb), in the absence of any other technical justification, may not adequately address air quality within the entirety of New Hanover County. Moreover, except in unique circumstances, EPA has not yet generally issued designations under the 2010 SO_2 NAAQS based on the existence of a non-violating monitor alone, where, as here, the state has not yet demonstrated that the monitor is located in the expected site of maximum ambient concentrations for the area under analysis. As a result, the EPA will designate New Hanover County and all other remaining undesignated portions of North Carolina by either December 31, 2017, or December 31, 2020.

Regarding DAK Americas, LLC, in Brunswick County, North Carolina indicated that the facility shutdown in September 2013. Despite the shutdown, the facility renewed its permit and has an operating permitting that is valid until October 31, 2018. While the source is located 42 km from CPI Southport which is considered far enough that it would not impact the area of analysis around CPI Southport, it could, if operations were to resume, potentially impact the northeast portion of Brunswick County as well as portions of New Hanover County. Because of the active operating permit, the EPA does not believe, at this time, that the shutdown is permanent and enforceable for purposes of designations. Based on this information, the EPA intends to designate as unclassifiable/attainment all the townships within Brunswick County except for the Northwest Township which contains the DAK Americas, LLC facility. The EPA will consider all additional information during the 120-day process pursuant to section 107(d) of CAA for the Brunswick County Area. The EPA believes that our intended unclassifiable/attainment area, consisting of a portion of Brunswick County, is comprised of clearly defined legal boundaries, and the Agency finds these boundaries to be a suitably clear basis for defining the intended unclassifiable/attainment area.

Other Relevant Information

Except as explained below, the EPA did not receive any additional information about the area in the immediate vicinity of the CPI Southport facility.

The state of North Carolina has stated that it believes that the basis for designations should be monitoring data and that modeling should not be relied upon to designate areas.[11] Despite their concerns regarding modeling accuracy, and due to the timeline required by the March 2, 2015 U.S. District Court for the Northern District of California consent decree, the state has provided modeling information that was considered along with monitoring data and emission data from the region to characterize air quality near the CPI Southport facility. North Carolina

[11] North Carolina Department of Environmental Quality September 18, 2015, updated recommendations submitted to EPA for the 2010 1-hour Sulfur Dioxide Boundary Recommendation for Brunswick County and New Hanover County.

recommended that the EPA designate New Hanover County, specifically, as attainment because the SO_2 monitor readings for the 1-hour standard for the period of 2012-2014 design value was 32 ppb. For the reasons explained above, the EPA is not today issuing an intended designation for New Hanover County on this basis.

In developing the recommendation for the Brunswick County Area, the state considered the air quality impact assessment prepared by CPI Southport facility's environmental consultant, which was submitted to the state. The CPI Southport facility modeling was used as the basis for the state's impact assessment. North Carolina, however, expanded the modeling submitted by the CPI Southport facility in three areas: 1) the state used maximum 1-hour actual emission rates for the ADM source; 2) North Carolina added a small, unpermitted ADM source that was omitted in the CPI Southport facility impact assessment; and 3) the state included the Duke Energy Progress Brunswick Nuclear Plant because of its proximity. The CPI Southport modeling assessment reported the 3-year average of the high 4th High Daily Maximum 1-hour concentration of 195.6 $\mu g/m^3$, which is larger than North Carolina's modeled maximum concentration but which is less than the NAAQS.

Conclusion

Based on the collective modeling results, air quality measurements, emission records, and other factors, the state concluded that all townships within Brunswick and New Hanover Counties should be designated attainment for the 2010 SO_2 NAAQS.

After careful evaluation of the state's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the area around the CPI Southport facility as unclassifiable/attainment for the 2010 SO_2 NAAQS. Specifically, the boundary is comprised of all the townships within Brunswick County except for the Northwest Township which includes the DAK Americas, LLC facility for reasons described earlier in this TSD. North Carolina recommended inclusion of New Hanover County because the SO_2 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 explained above, the EPA does not intend on designating 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. The EPA will consider the designation of New Hanover County and the townships contained therein in a later action.

At this time, our intended designations for the state only apply to this area (Brunswick County). Consistent with the conditions in the March 2, 2015 court-ordered schedule, the EPA will evaluate and designate all remaining undesignated areas in North Carolina, including the Northwest Township in Brunswick County, and New Hanover County and the townships contained therein, by either December 31, 2017, or December 31, 2020.