State of North Carolina's Recommendation on Boundaries For the 2010 1-Hour Sulfur Dioxide National Ambient Air Quality Standard

September 18, 2015
Governor Pat McCrory

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Purpose

The purpose of this document is to provide the State of North Carolina's recommendation on boundaries for the 2010 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standard (NAAQS) for the CPI Southport facility in Brunswick County, North Carolina. The document also provides recommendation on boundaries for New Hanover County, North Carolina which is located adjacent to Brunswick County.

Background

On June 22, 2010, the United States Environmental Protection Agency (EPA) promulgated a new 1-hour standard of 75 parts per billion (ppb), measured as a three-year average of the annual 99th percentile of 1-hour daily maximum concentrations (40 CFR 50.17). The EPA also revoked the primary annual and 24-hour SO_2 NAAQS. On August 5, 2013, the EPA promulgated nonattainment designations in 16 states where existing monitoring data from 2009-2011 indicated violations of the 1-hour SO_2 standard (78 FR 47191). All five air quality monitors in North Carolina were measuring attainment; but the EPA indicated in its letter, dated February 6, 2013, that it was deferring designations for North Carolina to a later date.

On March 2, 2015, the U.S. District Court for the Northern District of California accepted a consent decree between the EPA and Sierra Club and Natural Resources Defense Council that specified a schedule for the EPA to complete the remaining designations for the rest of the country. Among several terms in the Consent Decree, the EPA is required to designate areas that contain any stationary sources that emitted more than 16,000 tons of SO_2 in 2012 or emitted more than 2,600 tons of SO_2 and had an emission rate of at least 0.45 lb SO_2/MMBtu in 2012 and that has not been announced (as of March 2, 2015) for retirement.

On March 20, 2015, the EPA notified the North Carolina Department of Environment and Natural Resources (DENR) that CPI Southport in Brunswick County was identified as exceeding the criteria established in the Consent Decree. CPI Southport had 2012 SO_2 emissions level of 2,923 tons at an average emission rate of 0.74 lb SO_2/MMBtu. The EPA requested that DENR submit an updated recommendation and supporting information for the EPA to consider for the CPI Southport area by September 18, 2015.

DENR has clearly stated its position that ambient monitoring data should be the basis of designations, and that modeling should not be relied on to designate areas as nonattainment. It should be noted that the models have been shown to over predict ambient air quality concentrations. The Indiana Department of Environmental Management, Office of Air Quality

recently completed a case study of the accuracy of American Meteorological Society/EPA Regulatory Model (AERMOD) regarding SO_2 concentrations when compared to actual monitoring data. The study concluded that "Direct comparisons of predicted and observed SO_2 levels indicate that AERMOD significantly over predicts by more than a factor of two." The study is included as Attachment C to the recommendation package. Despite the concerns regarding modeling accuracy, and due to the timeline required by the consent decree, modeling information is considered along with monitoring data from the New Hanover County site, and emissions data from the region to characterize air quality near the CPI Southport facility.

Boundary Recommendations: Brunswick County and New Hanover County

DENR is recommending that all townships within Brunswick County and New Hanover County be designated attainment for the 2010 1-hour SO2 NAAQS. In developing this recommendation, DENR utilized the *EPA's Updated Guidance for Area Designations for the 2010 Primary Sulfur Dioxide NAAQS*[1], and conducted an evaluation of five factors specified in the guidance. The results for each of the following five factors are discussed below: 1) ambient air quality data or dispersion modeling, 2) emissions related data, 3) meteorology, 4) geography and topography, and 5) jurisdictional boundaries.

1. CPI Southport Dispersion Modeling

The CPI Southport facility operates an electric power generating station in Brunswick County (see Figure 1). Its SO_2 emissions in 2012 were 2,923 tons at an average emission rate of 0.74 lb SO_2/MMBtu. Figure 1 illustrates the location of CPI Southport and other permitted SO_2 sources in the vicinity of Brunswick County. As shown in the figure, CPI Southport is the largest emitter of SO_2 in the area. All remaining sources emit less than 100 tons per year. The closest SO_2 monitor is located in New Hanover County.

[1] http://epa.gov/airquality/sulfurdioxide/pdfs/20150320SO2designations.pdf

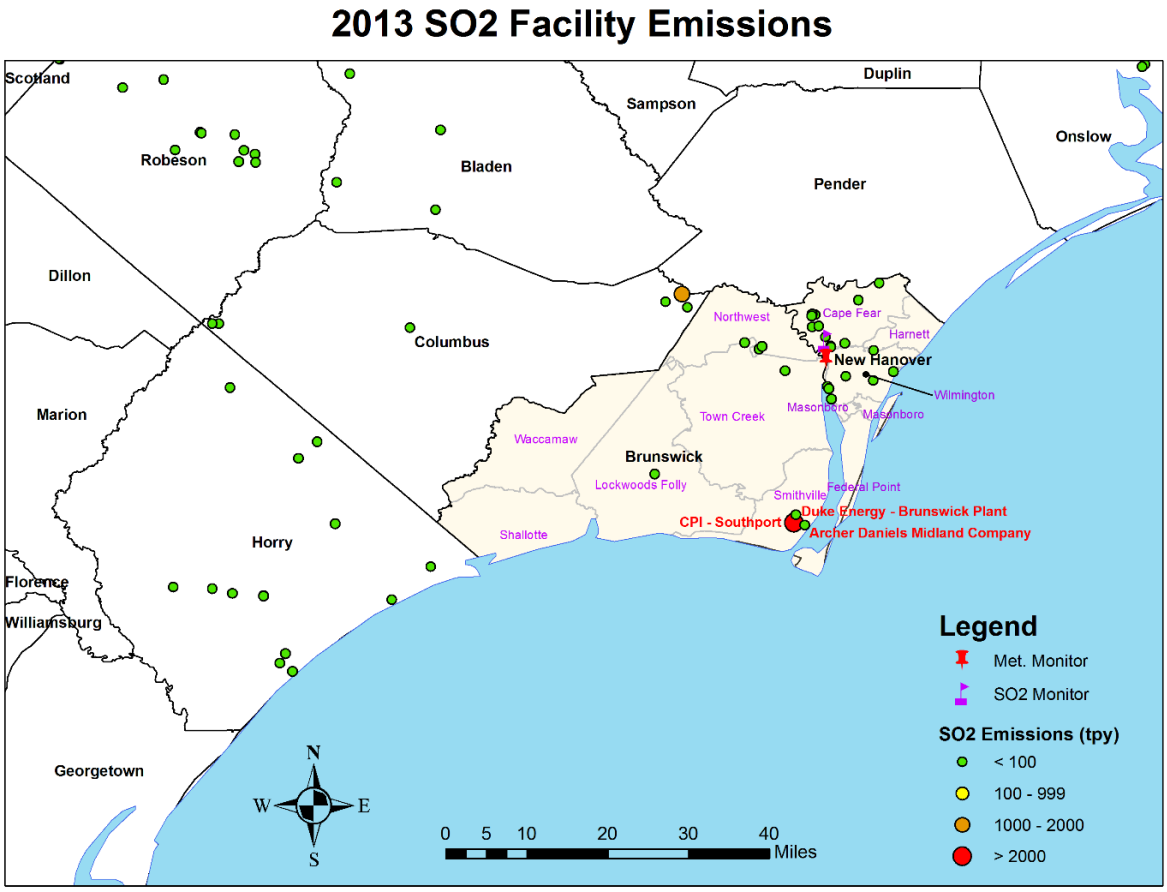

Figure 1. Sources In and Around Brunswick and New Hanover Counties and their 2013 Annual SO_2 Emissions

Using guidance from the SO_2 NAAQS Designations Modeling Technical Assistance Document (TAD), source-specific air dispersion modeling of CPI Southport was performed by Trinity Consultants and submitted to DENR for review. Actual hourly SO_2 emissions from CPI Southport were included in the modeling for the 3-year period from 2012-2014. SO_2 emission sources located at a nearby facility, Archer Daniels Midland (ADM) were also included in the modeling. The modeling results show concentrations below the 1-hour SO_2 NAAQS and as such, the area around CPI Southport was shown to be in attainment of the 1-hour SO2 NAAQS. DENR reviewed the dispersion modeling analysis submitted by CPI Southport and confirmed that the analysis was performed according to the TAD. See Attachment A for details regarding CPI Southport's dispersion modeling assumptions and results.

DENR expanded the modeling submitted by CPI Southport by making three key changes to CPI Southport modeling: 1) used maximum 1-hour emission rates for ADM sources, 2) added a small unpermitted source for ADM and 3) included an additional facility: Duke Energy Brunswick Nuclear Plant. The Brunswick Nuclear Plant and ADM are each about a mile away from CPI Southport (see Figure 1) and are the closest substantial SO_2 emission sources in the vicinity of CPI Southport. SO_2 emissions from both facilities occur on an intermittent basis during periods of power curtailment or when exercising emergency generators. DENR made a conservative assumption that SO_2 emissions occur every hour of each year over the 3-year modeled period from 2012 through 2014. See Attachment B for details regarding DENR's modeling analysis.

DENR's revised modeling indicates a maximum 1-hour concentration impact (i.e. design concentration) level of 183.3 µg/m3, which occurs just over 500 meters to the west of CPI Southport. Adding the representative background concentration of 7.9 $\mu g/m^3$, obtained from the New Hanover County SO_2 monitor, to the modeled impact results gives a maximum SO_2 concentration of 191.2 $\mu g/m^3$, which is less than the 1-hour SO_2 NAAQS of 196.3 $\mu g/m^3$ (75 ppb). This information is shown in Table 1.

Table 1. Revised 1-hour SO_2 Impact near CPI Southport

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Background Concentration (µg/m3)	Total Concentration ($\mu g/m^3$)	SO_2 NAAQS ($\mu g/m^3$)	% of SO_2 NAAQS
SO_2	1-hour	183.3*	7.9	191.2	196.3	97%

* 3 year average of the High-4th-High Daily Max. 1-hour concentration.

Based on this source specific air quality modeling, DENR is concluding that the area currently meets the SO_2 NAAQS, and no other sources cause or contribute to a NAAQS violation in the vicinity of CPI Southport.

2. Ambient Air Quality Monitoring

Since the beginning of 2011, the New Hanover monitor has not observed an exceedance of the 2010 1-hour SO_2 NAAQS. The 99th percentile concentration for 2014 was 3 ppb and the 3-year design value (2012 -2014) was 32 ppb. Table 2 shows the annual concentrations (99th percentile) recorded at the New Hanover monitor. The most recent data for the New Hanover monitor shows a 99th percentile concentration of 4 ppb for 2015. The dramatic decline in measured SO_2 concentrations are due to the retirement/closing of three SO_2 emitting sources (Sutton Steam Station, DAK Americas, and Southern States).

Table 2. New Hanover Monitor SO_2 Monitoring Data (2012 – 2014)

Monitoring Site ID	99th Percentile			3-Year Design Value (2012-2014)
	2012	2013	2014	
37-129-0006	47 ppb	45 ppb	3 ppb	32 ppb

3. Emissions Related Data

The air quality modeling analysis discussed above addressed sources within the vicinity of CPI Southport that would be capable of impacting downwind SO_2 concentrations. DENR also reviewed more distant sources, and concluded that the physical distance (greater than 10 kilometers) and low emissions levels will not interfere with the attainment of 1-hour SO_2 NAAQS. Table 3 shows 2013 emission rates for all other permitted sources operating in Brunswick and New Hanover counties. All sources emitted less than 100 tons per year of SO_2 (see Figure 1). Since none of these sources are above the 2,000 tons per year threshold specified in the EPA's recently finalized Data Requirements Rule, DENR is concluding that (1) further air quality assessment is not necessary, and (2) both Brunswick and New Hanover Counties and their townships are in attainment of the 1-hour SO_2 NAAQS.

Table 3. Other nearby SO_2 Emission Sources in Brunswick and New Hanover Counties

Facility Name	2013 Actual SO_2 Emissions (tons per year)
Technical Coating International, Inc.	0.01
Victaulic Company	0.01
Wilmington Materials	0.01
Louisiana-Pacific Corporation	0.01
Bradley Creek Pump Station	0.01
Sweeney Water Treatment Plant	0.02
Axeon Specialty Products - Wilmington Terminal	0.03
Hewletts Creek Pump Station	0.03
Novant Health Brunswick Medical Center	0.04
Apex Oil Company, Inc.	0.05
Corning Incorporated	0.08
McKean Maffitt WWTP (aka Southside)	0.08
New Hanover Regional Medical Center	0.38
Elementis Chromium	0.43
Kinder Morgan, Wilmington	0.60
Invista, S.a.r.l.	0.67
Carolina Pole Leland, Inc.	1.33
James A Loughlin WWTP (aka Northside)	1.98
Malmo Asphalt Plant	3.83
S. T. Wooten Corporation	6.78
Barnhill Contracting Company	7.20
Fortron Industries LLC	40.59
Wilbara, LLC	87.67
Shutdown Facilities (not shown in Figure 1)	
DAK Americas LLC	1,149.29
Duke Energy Progress - L.V. Sutton Electric Plant	12,131.69

4. Meteorology, Topography and Geography

Meteorology and geography were addressed in CPI Southport dispersion modeling. Attachments A and B provide additional information. Topography does not play a role in the dispersion characteristics at the select sites.

5. Jurisdictional Boundary

The EPA guidance requests clearly defined legal boundaries for carrying out the air quality planning and enforcement functions. Due to the one hour averaging time of the 2010 SO2 NAAQS, DENR is recommending that attainment designations for Brunswick County and New Hanover County be established at the township level as shown in Table 4.

Table 4. North Carolina Recommendation for 1-Hour SO_2 Standard

Brunswick County	
Lockwoods Folly Township	Attainment
Northwest Township	Attainment
Shallotte Township	Attainment
Smithville Township	Attainment
Town Creek Township	Attainment
Waccamaw Township	Attainment
New Hanover County	
Grouped Townships Harnett Township Masonboro Township Wilmington Township	Attainment
Individual Townships	
Cape Fear Township	Attainment
Federal Point Township	Attainment

Conclusions

DENR's five factor analysis using the EPA guidance determined the following:

1. Air dispersion modeling of CPI Southport and nearby sources demonstrate no violations of the 2010 1-hour SO_2 NAAQS. The modeling shows that the 75 ppb SO_2 standard will be met in the vicinity of CPI Southport.

2. The most recent SO_2 design value of the New Hanover monitor is 32 ppb, which is well below the 75 ppb NAAQS.

3. All remaining SO_2 sources in Brunswick County and New Hanover County emit less than 100 tons per year, and are significantly below the 2,000 tons per year threshold established in EPA's final Data Requirements Rule. Further characterization of air quality around these smaller sources is not needed.

Looking at the totality of the information, including the nearby ambient data, the emissions data and the modeling analysis, DENR is recommending that all townships within Brunswick and New Hanover Counties be designated attainment for the 2010 1-hour SO_2 NAAQS.