Air Quality
ENVIRONMENTAL QUALITY

PAT MCCRORY
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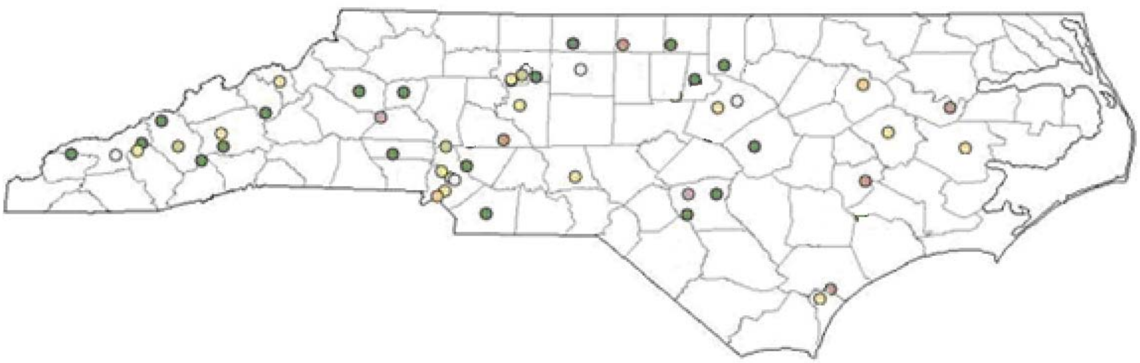
Air Quality Director

2016-2017 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 1
Network Descriptions



July 1, 2016

North Carolina Division of Air Quality
A Division of the North Carolina Department
of Environmental Quality
Mail Service Center 1641
Raleigh, North Carolina 27699-1641

CERTIFICATION

By the signatures below, the North Carolina Division of Air Quality, DAQ, certifies that the information contained in the 2016-2017 Annual Monitoring Network Plan is complete and accurate at the time of submittal to EPA Region 4. However, due to circumstances that may arise during the sampling year, some network information may change. A notification of change and a request for approval will be submitted to EPA Region 4 at that time.

Signature ______________________ Date 6/30/16
Donald D. Redmond, Jr.
Ambient Monitoring Section Chief, DAQ

Signature Sheila C Holman ______________________ Date 6/30/16
Sheila C. Holman
Director, DAQ

I. Introduction

The North Carolina Division of Air Quality, DAQ, works with the state's citizens to protect and improve outdoor, or ambient, air quality in North Carolina for the health and benefit of all. To carry out this mission, the DAQ has programs for monitoring air quality, permitting and inspecting air emissions sources, developing plans for improving air quality and educating and informing the public about air quality issues.

The DAQ, which is part of the N.C. Department of Environmental Quality, DEQ, also enforces state and federal air pollution regulations. In North Carolina, the General Assembly enacts state air pollution laws and the Environmental Management Commission adopts most regulations dealing with air quality. In addition, the U.S. Environmental Protection Agency, EPA, has designated the DAQ as the lead agency for enforcing federal laws and regulations dealing with air pollution in North Carolina.

The Ambient Monitoring Section, AMS, of the DAQ operates an air quality-monitoring program for the state. The AMS is responsible for measuring levels of regulated pollutants in the ambient (outdoor) air by maintaining a network of 38 monitoring stations across the state and measuring the concentration of pollutants such as ozone, lead, particles (dust), nitrogen oxides, sulfur dioxide and carbon monoxide. The AMS provides these monitoring services in accordance with EPA regulatory requirements. The criteria pollutant monitoring system is designed to make measurements to assess compliance with the national ambient air quality standards, NAAQS, as set by the EPA. The NAAQS define air pollutant concentration level thresholds judged necessary to protect the public health and welfare.

The law as defined in Title 40 of the Code of Federal Regulations, CFR, Part 58.10 *Annual Monitoring Network Plan and Periodic Network Assessment* requires an annual monitoring network plan. This plan must provide the following information for each monitoring station in the network:

- The Air Quality System, AQS, site identification number;
- The location, including street address and geographical coordinates;
- The sampling and analysis method(s) for each measured parameter;
- The operating schedules for each monitor;
- Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal;
- The monitoring objective and spatial scale of representativeness for each monitor as defined in appendix D to part 40 CFR 58;
- The identification of any sites that are suitable and sites that are not suitable for comparison against the annual fine particle, $PM_{2.5}$, NAAQS as described in §58.30; and
- The metropolitan statistical area, MSA, core-based statistical area, CBSA, combined statistical area, CSA, or other area represented by the monitor.
- The designation of any lead, Pb, monitors as either source-oriented or non-source-oriented according to Appendix D to 40 CFR Part 58.
- Any source-oriented monitors for which a waiver has been requested or granted by the EPA regional administrator as allowed for under paragraph 4.5(a)(ii) of Appendix D to 40 CFR part 58.

- Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA regional administrator for the use of Pb-PM_{10} monitoring in lieu of Pb-TSP monitoring as allowed for under paragraph 2.10 of Appendix C to 40 CFR part 58.
- The identification of required nitrogen dioxide, NO_2, monitors as either near-road or area-wide sites in accordance with appendix D, section 4.3 of part 40 CFR 58; and
- The identification of any $PM_{2.5}$ federal equivalent methods, FEMs and/or approved regional methods, ARMs, used in the monitoring agency's network where the data are not of sufficient quality such that data are not to be compared to the NAAQS.

This plan contains information on the criteria and other pollutant monitoring networks operated by the DAQ and continues in the following sections as outlined below:

II. Summary of Proposed Changes
III. Carbon Monoxide, CO, Monitoring Network
IV. Sulfur Dioxide Monitoring Network
V. Ozone Monitoring Network
VI. Particle Monitoring Network for Particles with Aerodynamic Diameters of 10 Micrometers or Less, PM10
VII. Fine Particle, PM2.5, Monitoring Network
VIII. Lead Monitoring Network
IX. Urban Air Toxics Monitoring Network
X. DAQ NCore Monitoring Network
XI. Nitrogen Dioxide Monitoring Network
XII. EPA Approval Dates for Quality Management Plan and Quality Assurance Project Plans
XIII. Equipment Condition of North Carolina Monitoring Sites

A table summarizing the monitoring network and providing the types of monitors operated at each station is provided in Appendix A. Summary of Monitoring Sites and Types of Monitors. The annual network review forms filled out each year for each of the monitoring sites operated by the DAQ and the Western North Carolina Regional Air Quality Agency are attached as an appendix to each regional section in Volume 2 and are also available for review at the Division of Air Quality, 217 West Jones Street, Raleigh, North Carolina, 27603. The Mecklenburg County Air Quality 2016 Annual Monitoring Network Plan is provided in Appendix B. The Forsyth County Office of Environmental Assistance and Protection 2016 Annual Monitoring Network Plan is provided in Appendix C.

Volume II of the annual network plan discusses the monitoring network by metropolitan statistical areas, MSAs, organized by the area of the state in which they are located. The day-to-day operations of the monitors are managed by regional office monitoring staff located in one of the seven regional DAQ Offices located in Asheville, Mooresville, Winston-Salem, Raleigh, Fayetteville, Washington and Wilmington. Volume II of the monitoring plan discusses the monitoring network for each regional office starting with Asheville in the west and moving to Wilmington in the east. Each region is subdivided into sections based on metropolitan statistical areas. Volume II discusses the current monitoring as well as future monitoring plans or needs.

In February 2013 the Office of Management and Budget revised the definitions of MSAs based on the 2010 census as shown in Figure 1.[1] As a result of these revisions, North Carolina gained two MSAs in the eastern part of the state: Myrtle Beach-Conway-North Myrtle Beach and New Bern. Three MSAs gained additional counties and, thus, additional people– Charlotte-Concord-Gastonia, Virginia Beach-Norfolk-New Port News and Winston-Salem. Two MSAs lost counties and, thus, people – Greenville and Wilmington. The discussions in this network monitoring plan are based on the 2013 MSA definitions.

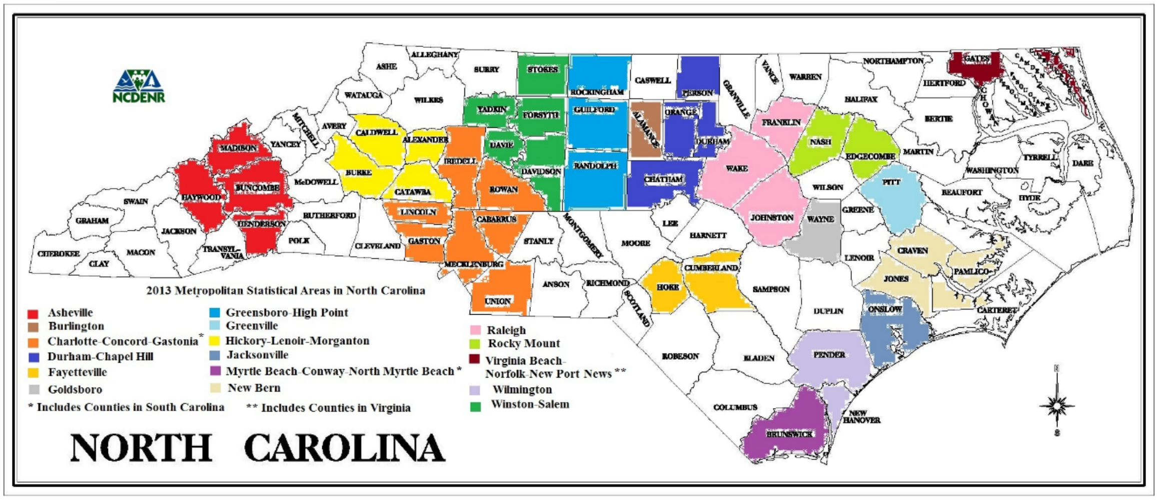


Figure 1. North Carolina metropolitan statistical areas as of Feb. 2013

From 2007 through the end of 2015, the EPA considered the DAQ and the three local programs in North Carolina to be one primary quality assurance organization, PQAO. In 2014, the EPA determined the state and local programs did not meet the PQAO requirements listed in Section 3 of 40 CFR 58 Appendix A.[2] Forsyth County and MCAQ decided to become separate PQAOs starting Mar. 19, 2015. The Western North Carolina Regional Air Quality Agency elected to remain with the DAQ as a joint PQAO.

[1] Office of Management and Budget, OMB BULLETIN NO. 13-01: Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas and Combined Statistical Areas and Guidance on Uses of the Delineations of These Areas, Feb. 28, 2013, available on the worldwide web at http://www.whitehouse.gov/sites/default/files/omb/bulletins/2013/b13-01.pdf, accessed Mar. 22, 2013.
[2] See http://www.ecfr.gov/cgi-bin/text-idx?SID=87c8d2b6f9ef2f4c8b11437b1077746b&mc=true&node=ap40.6.58_161.a&rgn=div9.

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II. Summary of Proposed Changes

This section lists the known changes to the network expected to occur during the next 18 months. It also includes a list of the current 2017 requirements for near road monitoring according to 40 CFR 58 Appendix D 4.3.2 (a) as of Mar. 26, 2016. Table 1 contains a list of fastest growing counties in North Carolina for reference in the discussions in this section and the following sections of the plan, which describe monitoring changes required because of population growth in the MSA. The discussion in this section is organized as follows:

- Monitors scheduled to start-up or shut-down in 2016 or 2017;
- Sites to be relocated, moved, or upgraded in 2016 or 2017;
- Changes to the methods used to measure fine particles for comparison to the NAAQS;
- Rotating background monitors and their operating schedules;
- Near road nitrogen dioxide monitoring in 2017; and
- Waiver and other requests.

Table 1. Alphabetical list of fastest growing counties in North Carolina based on population change between Apr. 1, 2010, or July 1, 2013 and July 1, 2014.

County Name	Population Estimate July 1, 2015	State Ranking of Counties by 2015 Estimate	Reason for Selection as one of the Fastest Growing Counties in North Carolina
Brunswick	122,765	25	Growth of 3.2 % from 2014 to 2015 and 14.3 % from Apr. 1, 2010, to July 1, 2015. Nation's 38th (annual) & 40th (decade) fastest growing county.
Cabarrus	196,762	11	Growth of 4,833 people (2.5 %) from 2014 to 2015. Nation's 87th (annual) fastest growing county (percentagewise).
Chatham	70,928	37	Growth of 2,319 people (3.4 %) from 2014 to 2015 and 11.7 % from Apr. 1, 2010, to July 1, 2015. Nation's 27th (annual) fastest growing county (percentagewise).
Durham	300,952	6	Growth of 30,978 people (11.5 %) from Apr. 1, 2010, to July 1, 2015. Nation's 78th (decade) fastest growing county (percentagewise).
Harnett	128,140	23	Growth of 11.7 % between 4/1/2010 and 7/1/2015. Nation's 74th fastest growing county (decade).
Hoke	52,671	53	Growth of 12.2 % between Apr. 1, 2010 and July 1, 2015. Nation's 68th fastest growing county.
Johnston	185,660	13	Growth of 4,701 people (2.6 %) from 2014 to 2015. Nation's 76th (annual) fastest growing county (percentagewise).

Table 1. Alphabetical list of fastest growing counties in North Carolina based on population change between Apr. 1, 2010, or July 1, 2013 and July 1, 2014.

County Name	Population Estimate July 1, 2015	State Ranking of Counties by 2015 Estimate	Reason for Selection as one of the Fastest Growing Counties in North Carolina
Mecklenburg	1,034,070	1	Growth of 114,404 people (12.4 %) between 4/1/2010 and 7/1/2015. Nation's 62nd (decade) fastest growing county (percentagewise).
Pender	57,611	49	Growth of 1,525 people (2.7 %) from 2014 to 2015. Nation's 69th (annual) fastest growing county (percentagewise).
Union	222,742	8	Growth of 21,435 people (10.6 %) from Apr. 1, 2010, to July 1, 2015. Nation's 99th (decade) fastest growing county.
Wake	1.024,198	2	Growth of 24,927 people (2.5 %) from 2014-2015. Nation's 90th (decade) fastest growing county.

A. Monitors Scheduled to Start Up or Shut Down in 2016 or 2017

Table 2 presents a list of monitors that are expected to start-up or shut-down in 2016 or 2017 listed by metropolitan statistical area, MSA, and AQS site identification number. Changes to the monitors operated by Mecklenburg County Air Quality are discussed in Appendix B. 2016 Annual Monitoring Network Plan for Mecklenburg County Air Quality. The only changes discussed here are those applying to the five monitoring sites listed in the table that are operated by the DAQ.

Table 2. Summary of Monitors Scheduled to Start Up or Shut Down in 2016 or 2017

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Charlotte-Concord-Gastonia	371190003	#11 Fire Station	PM_{10}	Site will shut down	6/30/2016
	371190041 [a]	Garinger	PM_{10} Lead	Monitoring ended	4/30/2016
	371190043	Oakdale	PM2.5	Site will shut down	6/30/2016
	371190045 [a]	Remount Road	CO	Monitoring will begin at near road site	1/1/2017
			PM2.5	Monitoring will begin at near road site	1/1/2017
Raleigh	371830014	Millbrook	PM_{10} Lead	Monitoring ended	4/30/2016
	371830021	Triple Oak Road	CO	Monitoring will begin at near road site	1/1/2017
			PM2.5	Monitoring will begin at near road site	1/1/2017
Durham-Chapel Hill	371450004[b]	Semora DRR	SO2	Monitor will start operating to meet the requirements in the SO_2 data requirements rule	1/1/2017
Asheville	370870013	Canton DRR	SO2	Monitor will start operating to meet the requirements in the SO_2 data requirements rule	1/1/2017
Myrtle Beach – Conway – North Myrtle		South Port DRR	SO2	Monitor will start operating to meet the requirements in the SO_2 data requirements rule	1/1/2017

Table 2. Summary of Monitors Scheduled to Start Up or Shut Down in 2016 or 2017

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Beach					

[a] Operated by Mecklenburg County Air Quality
[b] Operated by Duke Progress Energy

1. Monitoring Changes in the Charlotte-Concord-Gastonia MSA

The only changes occurring in the Charlotte-Concord-Gastonia MSA are changes being made by Mecklenburg County Air Quality to the monitors they operate. The DAQ is not making any changes to the monitors it operates in this MSA.

2. Changes to Monitoring in the Raleigh MSA

At the end of 2016, the DAQ plans to begin operating a carbon monoxide monitor and fine particle monitor at the **Triple Oak**, 37-183-0021, near road site in Wake County, where the DAQ currently operates a nitrogen dioxide monitor. The addition of these two monitors is required by 40 CFR 58 Appendix D sections 4.2.1 and 4.7.1. The monitors must be operational by Jan. 1, 2017.

Figure 2. The Triple Oak near road monitoring site

3. Monitoring Changes in the Durham-Chapel Hill MSA

In 2015, the North Carolina Division of Air Quality, DAQ, began working with Duke Energy Progress to establish a sulfur dioxide monitoring station in Semora, North Carolina, to characterize the ambient sulfur dioxide concentrations near the Roxboro steam station as required by the data requirements rule for sulfur dioxide.[3] Further details are available in Section IV. Sulfur Dioxide Monitoring Network, B. Facilities Subject to the SO2 Data Requirements Rule, DRR and **Appendix D.** Duke Energy Roxboro Siting Analysis and Additional Site Information.

4. Monitoring Changes in the Asheville MSA

In 2015, the North Carolina Division of Air Quality, DAQ, began working with Evergreen/Blue Ridge Paper to establish a sulfur dioxide monitoring station in Canton, North Carolina, to characterize the ambient sulfur dioxide concentrations near the Evergreen/Blue Ridge Paper facility as required by the data requirements rule for sulfur

[3] Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide Primary National Ambient Air Quality Standard, Federal Register of Aug. 21, 2015, (80 FR 51052) (FRL-9928-18-OAR), 2015-20367.

dioxide.[4] Further details are available in Section IV. Sulfur Dioxide Monitoring Network, B. Facilities Subject to the SO2 Data Requirements Rule, DRR and Appendix E. Evergreen Packaging Canton Siting Analysis and Additional Site Information.

5. Monitoring Changes in the Myrtle Beach-Conway-North Myrtle Beach MSA

In 2016, the North Carolina Division of Air Quality, DAQ, began working with the CPI USA North Carolina - Southport Plant to establish a sulfur dioxide monitoring station in South Port, North Carolina, to characterize the ambient sulfur dioxide concentrations near the CPI facility as required by the data requirements rule for sulfur dioxide.[5] Currently, several parcels of land near the subject facility are being considered for the potential monitoring site, but no owner's permission has yet been secured. An addendum to the network plan will be prepared and submitted for a separate 30-day public comment period once the location of the monitoring site is finalized.

B. Sites to be Relocated or Moved

Between the 2015 and 2016 ozone seasons Mecklenburg County Air Quality moved an ozone site to a new location. Information on this move was posted for a 30-day public comment period.[6] The DAQ also relocated one ozone and sulfur dioxide monitoring site and one ozone and fine particle monitoring site. Both sites were relocated on the same property when new monitoring shelters were installed. These sites are listed in Table 3 and more information is provided for the DAQ sites.

Table 3. List of Sites to Be Modified or Relocated and New Locations

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Charlotte-Concord-Gastonia	371190046 [a]	University Meadows	Ozone	Monitoring will begin to replace County Line	4/1/2016
Charlotte-Concord-Gastonia	371191009 [a]	County Line	Ozone	Evicted from site, monitoring ended	10/31/2015
Hickory	370270003	Lenoir	Ozone & SO2	New building installed, site moved 4 feet	January 2016
Greenville	371470006	Pitt Co Ag Center	Ozone & fine particles (PM2.5)	Site will be relocated to the north side of the property to avoid new construction	1/1/2016

[a] Operated by Mecklenburg County Air Quality, AQS reporting agency 0669.

1. *Monitoring Site Relocations in the Hickory MSA*

The Hickory MSA has three monitoring sites: two ozone-monitoring sites at Taylorsville Liledoun, 37-003-0005, and Lenoir, 37-027-0003, and one particle monitoring site at the water tower, 37-025-0004, in Hickory. A new shelter purchased for the **Lenoir** monitoring station was installed in January 2016. The shelter was

[4] Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide Primary National Ambient Air Quality Standard, Federal Register of Aug. 21, 2015, (80 FR 51052) (FRL-9928-18-OAR), 2015-20367.
[5] Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide Primary National Ambient Air Quality Standard, Federal Register of Aug. 21, 2015, (80 FR 51052) (FRL-9928-18-OAR), 2015-20367.
[6] Notification of Change – Addendum to the "2015 Annual Monitoring Network Plan for Mecklenburg County Air Quality" - Relocation of County Line (37-119-1009) Ozone Monitoring Station to 35.314158, -80.713469 (proposed site name: University Meadows), Feb. 10, 2016, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7805.

relocated 4 feet further to the right, when looking at the front door, from its original roofline. The probe still meets siting criteria with regards to the trees to the right of the shelter. The shelter had to be moved to the right because of access to the electrical feed coming into the power pedestal to be installed and placement of new foundation piers and anchors away from the already excavated holes and backfill.

2. *Monitoring Site Relocations in the Greeneville MSA*

The Greeneville MSA has one monitoring site: an ozone and fine particle monitoring site at the Pitt County Agricultural Center, 37-147-0006, in Greeneville. On Aug. 7, 2015, Tim Corley, with Pitt County, called the North Carolina Division of Air Quality (DAQ) about the potential leasing of the property near or on which the DAQ Pitt Ag ambient air monitoring station is located in Greenville, North Carolina. Further conversations with Mr. Corley indicated that the organization leasing the property would be building a building that would create an obstruction for the current monitoring station. As a result, on Sep. 30, DAQ contacted Mr. Corley to see if the building could be relocated approximately 325 meters to the other side of the property. Details about the new location are provided in Appendix F. Region 4 Requested Siting Information for the Pitt County Agricultural Center Site Relocation. DAQ began work on relocating the site the week of Oct. 26, 2015, in order to get the fine-particle monitor up and operational at the new location by Jan. 1, 2016. The ozone monitor was operational by Apr. 1, 2016.

C. Changes to the Methods Used to Measure Fine Particles for Comparison to the NAAQS

From 1999 until the end of 2015, the DAQ used an R & P Model 2025 $PM_{2.5}$ Sequential Monitor with a WINS impactor, Air Quality System, AQS, method code 118, and EPA reference method designation RFPS-0498-118 for determining compliance with the fine particle NAAQS for all but three of its sites. Starting on Jan. 1, 2016, the DAQ switched to using an R & P Model 2025 PM2.5 Sequential Monitor with a very sharp cut cyclone, AQS method code 145 and EPA reference method designation RFPS-1006-145. The DAQ used a Ruprecht & Patshneck TEOM Series 1400a for continuous, averaged on an hourly basis, measurement of fine particles until January 2016. The TEOM was ineligible to become an equivalent method for fine particles because it does not work as well in other parts of the nation as it does in North Carolina. Reference and equivalent methods need to work the same throughout the nation. Also, the TEOM is no longer supported by the manufacturer so its continued operation was no longer feasible.

In early 2008, the Met One beta attenuation monitor, BAM, was approved as a federal equivalent method, FEM. Since 2008 the DAQ purchased numerous BAMs. After one-to-two-year studies, three R & P Model 2025 $PM_{2.5}$ sequential monitors have been replaced by BAMs. These BAM monitors are located at the Raleigh Millbrook, 37-183-0014, Candor, 37-123-0001, and Bryson City, 37-173-0002, monitoring sites. Table 4 lists the current sites and proposed sites with BAMs that are operating but not being compared to the NAAQS. In 2014 the DAQ established a new site at Blackstone in Lee County and added BAMs at the Lexington and Hickory sites. On July 16, 2015, the EPA approved operating the Blackstone BAM as an AQI monitor only. See Appendix G. 2014-2015 Network Plan EPA Approval Letter. In 2015 the DAQ added BAMs at the Durham Armory, Mendenhall and William Owen sites. In 2016 the DAQ has added or will add BAMs at the Pitt County Agricultural Center, Spruce Pine and West Johnston sites.

Table 4. List of Monitoring Sites with Special Purpose Non-Regulatory and Air Quality Index Continuous Fine Particle Monitors

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Charlotte-Concord-Gastonia	371190041	Garinger	Fine Particles ($PM_{2.5}$)	Swapped out TEOM for a BAM 1020	4/1/2016
	371190042	Montclaire	Fine Particles ($PM_{2.5}$)	Will swap out TEOM for a BAM	1/1/2017
	371190045	Remount Road	Fine Particles ($PM_{2.5}$)	Will add BAM 1022	1/1/2017
Raleigh	371010002	West Johnston	Fine Particles ($PM_{2.5}$)	Will add BAM 1022	7/1/2016
	371830014	Millbrook	Fine Particles ($PM_{2.5}$)	Monitor will convert to AQI only	7/1/2016
	371830021	Triple Oak Road	Fine Particles ($PM_{2.5}$)	Will add BAM 1022	1/1/2017
Greensboro-High Point	370810013	Mendenhall	Fine Particles ($PM_{2.5}$)	Swapped out TEOM for a BAM 1022	12/1/2015
Winston-Salem	370570002	Lexington	Fine Particles ($PM_{2.5}$)	Swapped out TEOM for a BAM 1020	7/22/2014
Durham-Chapel Hill	370630015	Durham Armory	Fine Particles ($PM_{2.5}$)	Swapped out TEOM for a BAM 1020	5/31/2015
Asheville	370210034	Board of Education	Fine Particles ($PM_{2.5}$)	Will swap out TEOM for a BAM	1/1/2017
Hickory	370350004	Hickory	Fine Particles ($PM_{2.5}$)	Swapped out TEOM for a BAM 1020	12/11/2014
Fayetteville	370510009	William Owen	Fine Particles ($PM_{2.5}$)	Swapped out TEOM for a BAM 1022	12/30/2015
Wilmington	371290002	Castle Hayne	Fine Particles ($PM_{2.5}$)	BAM 1020 will convert to NAAQS	7/1/2016
Greenville	371470006	Pitt County Ag Center	Fine Particles ($PM_{2.5}$)	Added BAM 1022	4/8/2016
None	371050002	Blackstone	Fine Particles ($PM_{2.5}$)	BAM 1020 started	1/1/2014
	371210004	Spruce Pine	Fine Particles ($PM_{2.5}$)	Will add BAM 1022	1/1/2017

D. Rotating Background Monitors

The DAQ operates two rotating background monitoring networks for providing background concentration data for prevention of significant deterioration, PSD, modeling. PSD modeling is a federal requirement necessitating the collection of one calendar year of background data.[7] Monitors for sulfur dioxide, SO_2, or PM_{10} rotate to

[7] **42 U.S.C.** United States Code, 2013 Edition Title 42 - THE PUBLIC HEALTH AND WELFARE CHAPTER 85 - AIR POLLUTION PREVENTION AND CONTROL SUBCHAPTER I - PROGRAMS AND ACTIVITIES Part C - Prevention of Significant Deterioration of Air Quality subpart i - clean air Sec. 7475 - Preconstruction requirements, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapI-partC-subparti-sec7475.htm.

these sites every three years. The rotating sites are selected to provide the greatest possible spatial coverage from the coastal plain to the foothills. Table 5 and Table 6 provide the background monitoring sites with their operating schedules.

Table 5 The 2016-2018 Rotating Background Sulfur Dioxide Monitoring Network

AQS Site Id Number:	37-157-0099	37-051-0010	37-027-0003	37-117-0001
Site Name:	Bethany	Honeycutt E.S.	Lenoir	Jamesville
Street Address:	6371 NC 65	4665 Lakewood Drive	291 Nuway Circle	1210 Hayes Street
City:	Bethany	Fayetteville	Lenoir	Jamesville
Latitude:	36.308889	35.00	35.935833	35.810690
Longitude:	-79.859167	-78.99	-81.530278	-76.897820
MSA, CSA or CBSA represented:	Greensboro-High Point	Fayetteville	Hickory	Not in an MSA
Monitor Type:	Special purpose	Special purpose	Special purpose	Special purpose
Operating Schedule:	Hourly- every third year	Hourly- every third year	Hourly – every third year	Hourly – every third year
Statement of Purpose:	Industrial expansion monitoring for PSD modeling.	Industrial expansion monitoring for PSD modeling.	Industrial expansion monitoring for PSD modeling.	Industrial expansion monitoring for PSD modeling.
Monitoring Objective:	General/ background	Population exposure	General/ background	Upwind/ background general/ background
Scale:	Urban	Neighborhood	Regional	Urban
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQSA-0486-060	Yes: EQSA-0486-060	Yes: EQSA-0486-060	Yes: EQSA-0486-060
Meets Requirements of Part 58 Appendix D:	No	No	No	No
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Will operate 5/2017 to 4/2018	Operated 5/2015 to 5/2016	Is operating 4/2016 to 3/2017	Is operating 4/2016 to 3/2017

Table 6 The 2016-2018 Rotating Background PM_{10} Monitoring Network

AQS Site Id Number:	37-003-0005	37-129-0002	37-033-0001	37-107-0004	37-117-0001	371230001
Site Name:	Taylorsville-Liledoun	Castle Hayne	Cherry Grove	Lenoir Community College	Jamesville	Candor
Street Address:	700 Liledoun Road	6028 Holly Shelter Road	7074 Cherry Grove Road	231 Highway 58 S	1210 Hayes Street	112 Perry Drive
City:	Taylorsville	Castle Hayne	Reidsville	Kinston	Jamesville	Candor
Latitude:	35.9139	34.364167	36.307033	35.231459	35.810690	35.262490
Longitude:	-81.191	-77.838611	-79.467417	-77.568792	-76.897820	-79.836613
MSA, CSA or CBSA represented:	Hickory	Wilmington	Not in an MSA	Not in an MSA	Not in an MSA	Not in an MSA
Monitor Type:	Special purpose	Special purpose	Special purpose	Special purpose	Special purpose	Special Purpose
Operating Schedule:	Hourly 3-year rotation	Every 6th day 3-year rotation	Hourly 3-year rotation	Hourly 3-year rotation	Hourly 3-year rotation	Hourly 3-year rotation
Statement of Purpose:	Industrial expansion monitoring for PSD modeling	Industrial expansion monitoring for PSD modeling	Industrial expansion monitoring for PSD modeling	Industrial expansion monitoring for PSD modeling	Industrial expansion monitoring for PSD modeling.	Industrial expansion monitoring for PSD modeling
Monitoring Objective:	General/ background	General/ background	Population exposure general/ background	Population exposure general/ background	Upwind/ background general/ background	Population exposure general/ background
Scale:	Urban	Urban	Urban	Neighborhood	Urban	Regional
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	EQPM-0798-122	RFPS-1298-127	EQPM-0798-122	EQPM-0798-122	EQPM-0798-122	EQPM-0798-122
Meets Requirements of Part 58 Appendix D:	No	No	No	No	No	No
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Is operating 4/1/2016 to 3/31/2017	Will operate 8/1/2016 to 7/31/2017	Will operate 4/1/2016 to 3/31/2017	Will operate 5/1/2017 to 4/30/2018	Will operate 6/1/2018 to 5/31/2019	Will operate 5/1/2017 to 4/30/2018

E. Required Near-Road Nitrogen Dioxide Monitors

The monitoring regulations as of May 20, 2016, require the DAQ to add three additional near road nitrogen dioxide monitors starting Jan. 1, 2017. Table 7 lists these required sites. However, based on the latest information and guidance provided by the United States Environmental Protection Agency, EPA, DAQ understands that the requirement for a near-road site by Jan. 1, 2017, in CBSA's of populations between 500,000 and 1,000,000 is under reconsideration. In fact, the EPA published a proposal on May 16, 2016, that would remove this NO2 monitoring requirement (also known as Phase 3 of the near-road network) from Appendix D of 40 CFR Part 58 https://www3.epa.gov/airquality/nitrogenoxides/pdfs/nr_no2_rev_050516.pdf. Accordingly, and with the concurrence of EPA Region 4, DAQ has placed a hold on the planning activities for the Greensboro and Durham sites. It is DAQ's understanding that the EPA plans on completing the associated final rule before the Jan. 1, 2017, deadline for Phase 3 operations. The DAQ will continue to follow this issue and adjust plans, if needed, as further information becomes available from the EPA. If the EPA does not finalize the proposed changes to the nitrogen dioxide monitoring regulations and if funding is provided for additional near road sites, those sites will be discussed in greater detail in an addendum to the 2016 to 2017 network plan.

Table 7. List of Near Road Nitrogen Dioxide Monitors Scheduled to Start Jan. 1, 2017

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Greensboro-High Point	370830015	Knox Road	NO_2	A near-road NO2 monitor is currently required to meet Appendix D requirements	1/01/2017
Winston-Salem	370670031 [a]	To be determined	NO_2	A near-road NO2 monitor is currently required to meet Appendix D requirements	1/01/2017
Durham-Chapel Hill	37063016	Page Road	NO_2	A near-road NO2 monitor is currently required to meet Appendix D requirements	1/01/2017

[a] Operated by Forsyth County Office of Environmental Assistance and Protection

F. Current Waivers and New Requests

Every five years DAQ is required to request that any existing waivers be renewed. This subsection describes existing waivers approved by the EPA as well as new requests for waivers and other actions.

1. *Current Waivers Approved by the EPA in 2015*

In 2015 the EPA approved the following waivers:

Waiver for a PWEI Sulfur Dioxide Monitor in the Asheville MSA

The population-weighted emission index, PWEI, for the Asheville MSA using the 2011 national emission inventory and 2014 population estimates is 5074, just over the 5000 threshold for monitoring. Forty CFR Part 58, Appendix D, 4.4 states that "For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 1,000,000, a minimum of one S02 monitor is required within that CBSA."[8] The EPA's previous calculations show the Asheville PWEI to be below the PWEI threshold for requiring a sulfur dioxide monitor. The DAQ is electing to conduct sulfur dioxide monitoring in the Ashville CBSA beginning in 2017 under the Data Requirements Rule.[9] The EPA is working with DAQ to determine the appropriate sulfur dioxide monitoring requirements for this CBSA. The EPA granted a waiver the PWEI sulfur dioxide monitoring requirement for 2016, so that the DAQ, the Western North Carolina Regional Air Quality Agency, WNCRAQA, and the EPA can determine the appropriate sulfur dioxide monitoring requirements for this CBSA.[10] DAQ has addressed the sulfur dioxide monitoring requirements for the Asheville CBSA elsewhere in the 2016-2017 Network Plan.

Waiver for Lead Monitoring at St. Gobain Containers

40 CFR Part 58, Appendix D, 4.5 requires that "At a minimum, there must be one source-oriented SLAMS [state and local air monitoring station] site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year ..."[11] Section 4.5(a)(ii) provides the following provisions for a waiver of the lead monitoring requirements:

> "(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50% of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under 58.10(d)."[12]

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[8] Title 40: Protection of Environment, PART 58—AMBIENT AIR QUALITY SURVEILLANCE, APPENDIX D TO PART 58—NETWORK DESIGN CRITERIA FOR AMBIENT AIR QUALITY MONITORING, available on the worldwide web at http://www.ecfr.gov/cgi-bin/text-idx?SID=da14c4661eddfd14519d93a82e410ec9&mc=true&node=ap40.6.58_161.d&rgn=div9.

[9] Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide (SO2) Primary National Ambient Air Quality Standard (NAAQS), Federal Register, Vol. 80, No. 162, Friday, Aug. 21, 2015, pp 51052- 51088, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-08-21/pdf/2015-20367.pdf.

[10] 2015 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p7, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7440.

[11] Title 40: Protection of Environment, PART 58—AMBIENT AIR QUALITY SURVEILLANCE, APPENDIX D TO PART 58—NETWORK DESIGN CRITERIA FOR AMBIENT AIR QUALITY MONITORING, available on the worldwide web at http://www.ecfr.gov/cgi-bin/text-idx?SID=da14c4661eddfd14519d93a82e410ec9&mc=true&node=ap40.6.58_161.d&rgn=div9.

[12] ibid.

In its approval of the state's 2011 Network Plan, pursuant to the provisions of the above section, the EPA granted waivers of the source-oriented ambient air monitoring requirements at two sources: Blue Ridge Paper Products, Inc. in Canton, NC and Saint Gobain Containers in Wilson, NC.[13] The waivers must be renewed every five years as part of the network assessment required under 40 CFR §58.10(d).

The Saint Gobain Containers facility is the only facility in North Carolina with 2011 National Emissions Inventory lead emissions over 0.5 tons per year.[14] This facility is estimated to emit 0.53 tons per year. The 2011 modeling of this facility used lead emissions of 1.3 tons per year. The EPA believes that the previously submitted modeling is sufficiently conservative and approved the renewal of the source-oriented ambient air lead monitoring requirements at Saint Gobain Containers in Wilson, NC for five years, until 2020.[15]

Waiver for the Second PM_{10} Monitor in Raleigh

In 2015 the DAQ requested that the waiver for the second PM_{10} monitor in Raleigh be renewed. Other than changing to a low volume method in 2009 to meet NCore requirements, nothing changed with PM_{10} in the Raleigh area within the past decade. As shown in Figure 3 all of the measured concentrations are less than 80 percent of the NAAQS and all but two concentrations measured in the past decade are less than 40 percent of the NAAQS. Thus, there is no danger of exceeding the NAAQS. In addition, PM_{10} has not been responsible for determining what the air quality index will be in the Raleigh MSA during 2012, 2013, 2014, or 2015.[16] Thus, the PM10 concentrations in Raleigh are not expected to cause any harm to people's health and wellbeing. The DAQ point source emission inventory for PM_{10} reports 132 facilities in the Raleigh MSA emitting 541.9 tons of PM_{10} in 2013. This number is down from 143 facilities reporting 781.7 tons of PM_{10} emissions in 2008.[17] For these reasons as well as because the state is working with limited resources to meet additional monitoring requirements for sulfur dioxide, carbon monoxide and fine particles in 2017, the DAQ requested that the waiver for the second PM_{10} monitor in the Raleigh MSA be renewed. Since PM10 levels have been significantly lower than the NAAQS for the last decade, the EPA granted a waiver of the requirement for a second PM10 monitor in the Raleigh MSA.[18]

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[13] 2011 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p4, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7843.
[14] 2011 National Emission Inventory, NEI, Data, available on the worldwide web at https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-data.
[15] 2015 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p7, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7440.
[16] Air quality index summary information is available on the worldwide web at https://www3.epa.gov/airdata/ad_rep_aqi.html.
[17] NC DAQ - North Carolina Point Source Emissions Report, Available on the world wide web at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&year=2014&physical=byCounty&overridetype=All&toxics=263&sortorder=103.
[18] 2015 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p7, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7440.

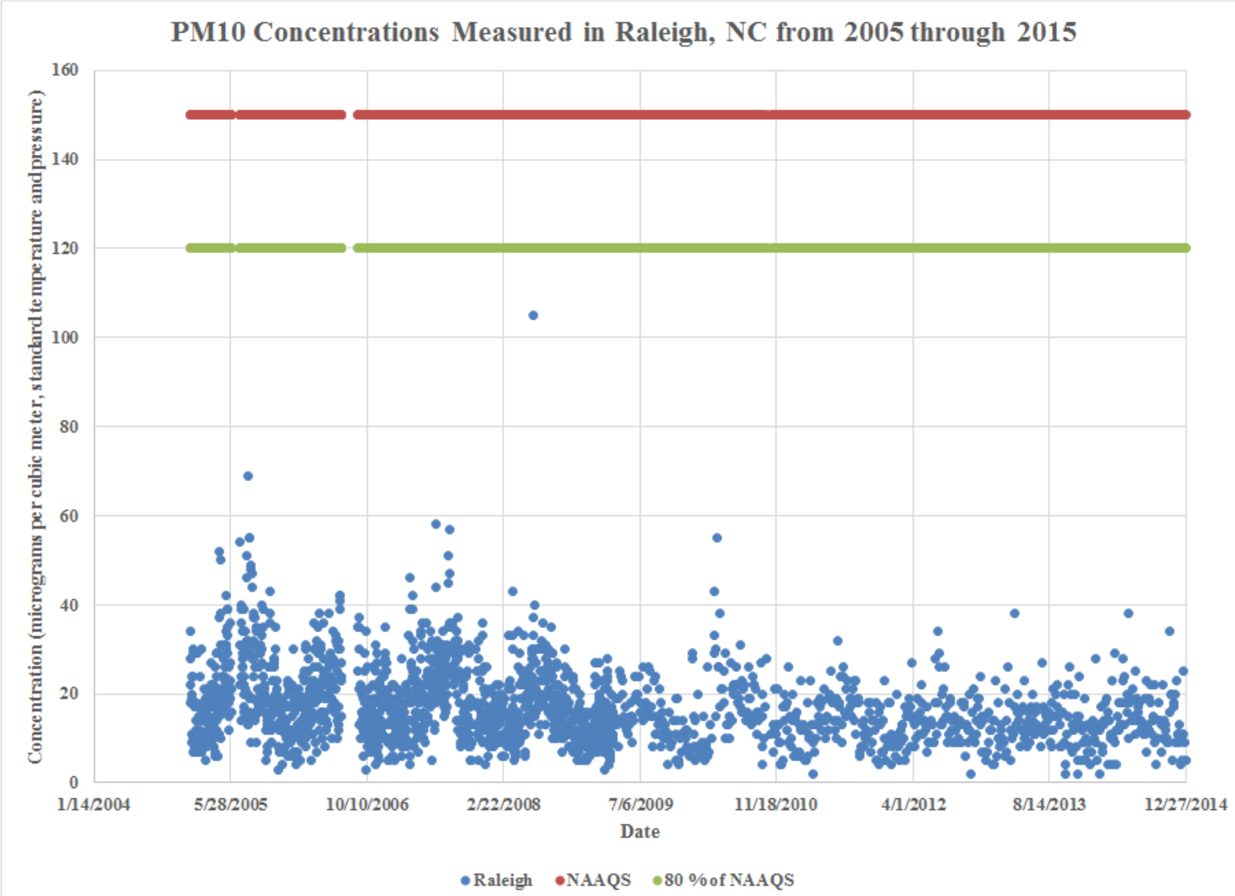


Figure 3. PM_{10} concentrations measured in Raleigh from 2005 through 2015

Waiver Request for Third Fine Particle NAAQS Monitor in the Raleigh MSA

The 2012-2014 annual fine particle design value for the Raleigh MSA was 86 percent of the standard, requiring the Raleigh MSA to add a third fine particle monitor. Because the MSA will be adding a third fine particle monitor in 2017 at the near road site, the EPA approved a waiver for the third fine particle monitor for 2016.[19]

Waiver Request for Millbrook Meteorological Tower

In 2015 the DAQ requested the waiver for the meteorological tower at the East Millbrook Middle School NCore site be renewed. This site has been in operation since 1989. The tower is located approximately due south and 15.5 meters from the shelters that house the various monitors, see Figure 52. The wind direction/speed sensors are located at a height of 10 meters above ground and the relative humidity sensor is located at two meters. Ambient temperature sensors are located at two meters and 10 meters above ground. The tower is located in an open, grassy area that is free from any obstructions in a 270º arc to the prevailing winds that come from the south/west direction.

[19] 2015 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p9, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7440.

The tower is positioned 15.5 meters from the shelters on a 3% uphill grade. This grade adds approximately one meter to the height of the tower above the shelters. This siting does not meet the EPA requirement for the tower being a distance of 10 times the height of the shelter (3.7 meters). Additionally, a single tree, approximately seven meters tall, is located 18 meters to the south southwest of the tower. Since the position of the meteorological tower is free from any obstructions in a 270º arc to the prevailing winds that come from the south and west direction, DAQ is confident the measurements are representative of meteorological conditions in the area of interest. The state, therefore, requests that the EPA renew the waiver and deem the position of the tower to be acceptable.

Figure 4. Millbrook NCore Site
(from City of Raleigh and Wake County iMAPS, http://maps.raleighnc.gov/iMAPS/)

2. *New Waiver and Other Requests*
   The DAQ makes the following requests:

   - A waiver for the Mar. 1 start of the ozone season for the five remote sites at Linville Falls, 37-11-0002, Joanna Bald, 37-075-0001, Frying Pan, 37-087-0035, Purchase Knob, 37-087-0036 and Mount Mitchell, 37-199-0004;
   - A waiver for exclusion of BAM data from nonattainment determinations for Lexington, 37-057-0002, Durham, 37-063-0015 and Raleigh; 37-183-0014;
   - A waiver for near-road nitrogen dioxide monitoring in the Durham-Chapel Hill MSA; and
   - For permission to combine ozone data for design value calculations for the monitors at Waggin Trail, 37-003-0004 and Taylorsville Liledoun, 37-003-0005 and Honeycutt, 37-051-0010 and Golfview, 37-051-1003.

Waiver Request for Mar. 1 Start of the Ozone Season at Remote Sites

The 2016 ozone monitoring season for North Carolina is April through October. EPA's 2015 ozone rule extended this season from March through October. North Carolina requests that the ozone season for the high elevation mountain sites remain at April through October.

DAQ's concern is that the remote high elevation sites might not be accessible for a March start date. The roads are sometimes not passable, or closed *by* Federal or local authorities, well into March due to winter weather conditions, e.g., ice. snow, fallen trees or rocks. damage to the driving surface, etc. The earlier start date would require DAQ to get to the mountain tops in February to calibrate equipment and perform other quality assurance, QA, functions. Depending on the weather it may be possible in some years. In other years it is questionable whether it could be done safely, if at all.

The specific sites covered by this request and their elevations above sea level:

- Linville Falls, AQS site 37-011-0002, 3,238 feet.
- Joanna Bald, AQS site 37-075-0001, 4,688 feet;
- Frying Pan, AQS site 37-087-0035, 5,200 feet;
- Purchase Knob, AQS site 37-087-0036, 5,085 feet;
- Mt. Mitchell, AQS site 37-199-0004, 6,502 feet.

The current regulation. 40 CFR Part 58. Appendix D, Section 4.l(i) gives Region IV the authority to approve a deviation to the ozone monitoring season.

In EPA's "Guideline for Selecting and Modifying the Ozone Monitoring Season Based on an 8-hour Ozone Standard" (EPA-454R-98-001), it is noted:

> "For the initial formulation of the ozone monitoring season … The basic premise was that areas with monthly mean maximum temperatures predominantly below 55 degrees Fahrenheit (F) are expected to have hourly concentrations less than 0.08 ppm…"

North Carolina used to operate meteorology stations at two of the five sites, Joanna Bald and Linville. The monthly mean maximum temperature for March for 2007 to 2011 was 53 degrees F at Joanna Bald and 55 degrees F at Linville, the lowest elevation of the five sites. Additionally, data from the North Carolina State Climate Office show the highest monthly mean maximum temperatures are about 9 degrees F colder in February when DAQ would be accessing these remote mountain areas to recalibrate equipment and perform other QA functions.

DAQ does operate three of these sites year-round, Purchase Knob, Joanna Bald and Frying Pan. However, DAQ cannot always get to the sites to perform QA functions during the winter, so we do not report or certify the off-season data. The monitors run simply to provide raw, invalidated data for public information on the National Park Service's Great Smoky Mountains National Park and U.S. Forest Service's websites.

As a result of these considerations, DAQ requests that Linville Falls, Joanna Bald, Frying Pan, Purchase Knob and Mount Mitchell be exempt from ozone monitoring earlier than April. This waiver to the ozone monitoring requirements will ensure a measure of safety to DAQ staff and assist DAQ in planning and managing our limited resources.

Renewal Request for Exclusion of BAM Data from Nonattainment Determinations

DAQ requests permission to exclude BAM data from nonattainment determinations for BAMs at Lexington, 37-057-0002, Durham, 37-063-0015 and Raleigh; 37-183-0014. The request for excluding these data is provided in **Appendix H. Request for Exclusion of PM2.5 Continuous FEM data from Comparison to the NAAQS**.

Waiver Request for Near Road Nitrogen Dioxide Monitoring in the Durham-Chapel Hill MSA

The 2010 **nitrogen dioxide** monitoring requirements currently require the Durham-Chapel Hill MSA to monitor for nitrogen dioxide because its population exceeded the 500,000 threshold in 2009. Thus, DAQ is required to operate a near roadway monitor in this MSA. In 2013 due to lack of funds, the United States Environmental Protection Agency, EPA, revised the regulation to require near road monitors in MSAs with less than one million people to start operating on Jan. 1, 2017. On May 16, 2016, the EPA published a proposal to eliminate the requirement to monitor for nitrogen dioxide in areas with populations below one million.

According to the technical assistance document for siting near-road nitrogen dioxide monitors, EPA recommends placing near road monitoring stations along road segments with the highest average annual daily traffic values adjusted for fleet mix. Sites should also be evaluated based on congestion patterns, roadway design, terrain and meteorology. Analysis of the road segments in the Durham-Chapel Hill MSA using highest AADT values adjusted for fleet mix indicates the monitoring station should be located near the Page Road exit along I-40. The fleet mix on I-40 by Page Road is 90 percent passenger vehicles using data provided by the North Carolina Department of Transportation, DOT, and 95 to 97 percent passenger vehicles using microwave radar data collected 365 days a year near the interchange. The AADT is 174 to 180 thousand using published DOT data and 147 to 153 thousand using microwave radar data. These numbers result in a fleet adjusted AADT of 330 to 342 thousand using the DOT values and 188 to 222 thousand using the microwave radar data.

For comparison, at the Triple Oak site the fleet mix on I-40 is 94 percent using DOT provided data and 95 percent using microwave radar data. The DOT provided AADT is 149,000 resulting in a fleet adjusted AADT of 229,000. Using the microwave radar data located near the site the AADT is 142,000 and the fleet adjusted AADT is 209,000. Thus, based on the microwave radar data the type of traffic and amount of traffic are very similar at the two sites and the two stations would be measuring essentially the same emissions. Therefore, because, as shown in Figure 5, the highest ranked sites are within 3 kilometers of the Raleigh near road monitoring site off of Triple Oak Road along I-40 between Exit 283 and Exit 284 and have similar traffic counts and heavy duty vehicle make-up, DAQ requests a waiver for the near road Durham-Chapel Hill monitoring site if the May 16 EPA proposal to eliminate this monitoring requirement is not finalized.

Figure 5. Location of proposed Durham-Chapel Hill Near Road Nitrogen Dioxide Monitor (red circle) Relative to the Triple Oak Site (blue balloon)

Request Permission to Combine Ozone Data for Design Value Calculations for the Monitors at Waggin Trail, 37-003-0004 and Taylorsville Liledoun, 37-003-0005 and Honeycutt, 37-051-0010 and Golfview, 37-051-1003

The DAQ requests approval to combine data from the discontinued Waggin Trail site, 37-003-0004, with the relocated Taylorsville Liledoun site, 37-003-0005, for the purpose of calculating a design value for a relocated site in accordance with 40CFR Part 50 Appendix U(2)(c):

> "In certain circumstances, including but not limited to site closures or relocations, data from two nearby sites may be combined into a single site data record for the purpose of calculating a valid design value. The appropriate Regional Administrator may approve such combinations after taking into consideration factors such as distance between sites, spatial and temporal patterns in air quality, local emissions and meteorology, jurisdictional boundaries and terrain features."

As shown in Figure 6, the Taylorsville Liledoun site is approximately 1.6 kilometers south from where the Waggin Trail site was located. The monitors operated simultaneously from Aug. 2, 2013 through Oct. 30, 2013, and as shown in Figure 7 are representative of the same air shed in the Hickory area. Thus, this request meets the relocation requirements of 40 CFR § 58. I 4(c)(6) and the data from these two sites should be eligible to be combined for design value calculations as described in 40 CFR § 50 Appendix U(2)(c).

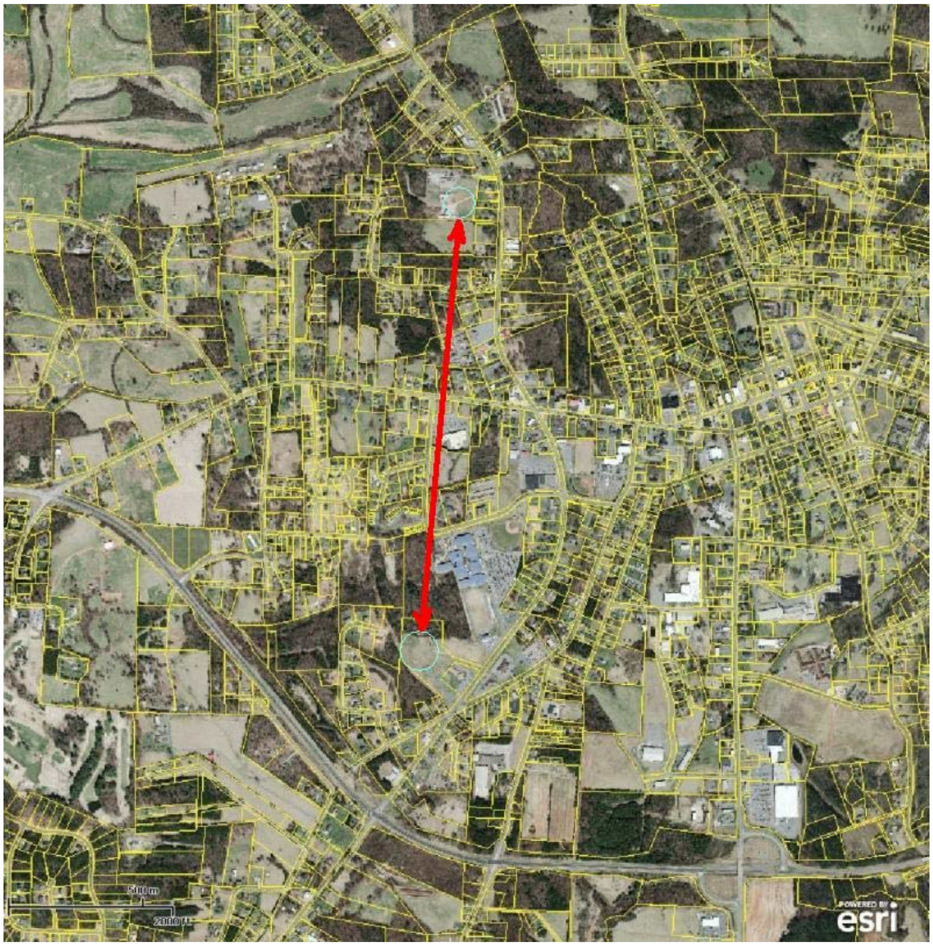


Figure 6. Relationship between Waggin Trail site and Taylorsville Liledoun Site

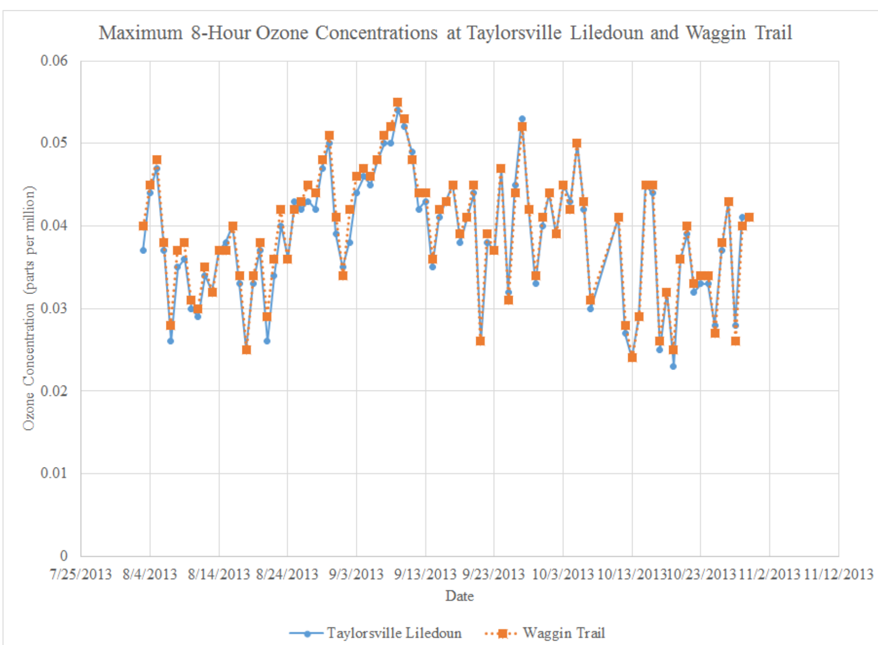


Figure 7. Comparison of Maximum Daily 8-Hour Ozone Concentrations

The DAQ also requests approval to combine data from the discontinued Golfview site, 37-051-1003, with the relocated Honeycutt site, 37-051-0010, for the purpose of calculating a design value for a relocated site in accordance with 40CFR Part 50 Appendix U(2)(c). As shown in Figure 8, the Honeycutt site is approximately nine kilometers northwest from where the Golfview site was located. Because of the timing of the request, the two monitors could not be operated. However, the two monitors are representative of the same air shed in the Fayetteville area based on distance between sites, spatial and temporal patterns in air quality, local emissions and meteorology, jurisdictional boundaries and terrain features. Thus, this request meets the relocation requirements of 40 CFR § 58. I 4(c)(6) and the data from these two sites should be eligible to be combined for design value calculations as described in 40 CFR § 50 Appendix U(2)(c).

Figure 8. Location of Honeycutt site, no dot, in relation to Golfview, dot

III. Carbon Monoxide, CO, Monitoring Network

Carbon monoxide monitoring is conducted in two of the major urban areas of the state, the Raleigh and Charlotte-Concord-Gastonia metropolitan statistical areas, also known as MSAs. The 2016-2017 state-operated network consists of a monitor in Raleigh operated by the Division of Air Quality, DAQ, and a monitor in Charlotte operated by Mecklenburg County Air Quality, MCAQ. Both monitors collect data using a federal reference method for comparison to the national ambient air quality standards, NAAQS. Until the end of 20c15, the local program agency in Forsyth County also operated a carbon monoxide monitor in Winston-Salem. However, because statewide carbon monoxide levels have fallen so far below the standard (see Figure 9) and the state has maintained the standard for over twenty years, the Peters Creek Winston-Salem micro-scale site is no longer required and was shut down at the end of 2015. The Raleigh and Charlotte sites are middle and neighborhood scale sites that are part of the national core, NCore, network. None of the three sites operating in 2015 reported exceedances of the one or eight-hour ambient air quality standard from 2011 to 2015.

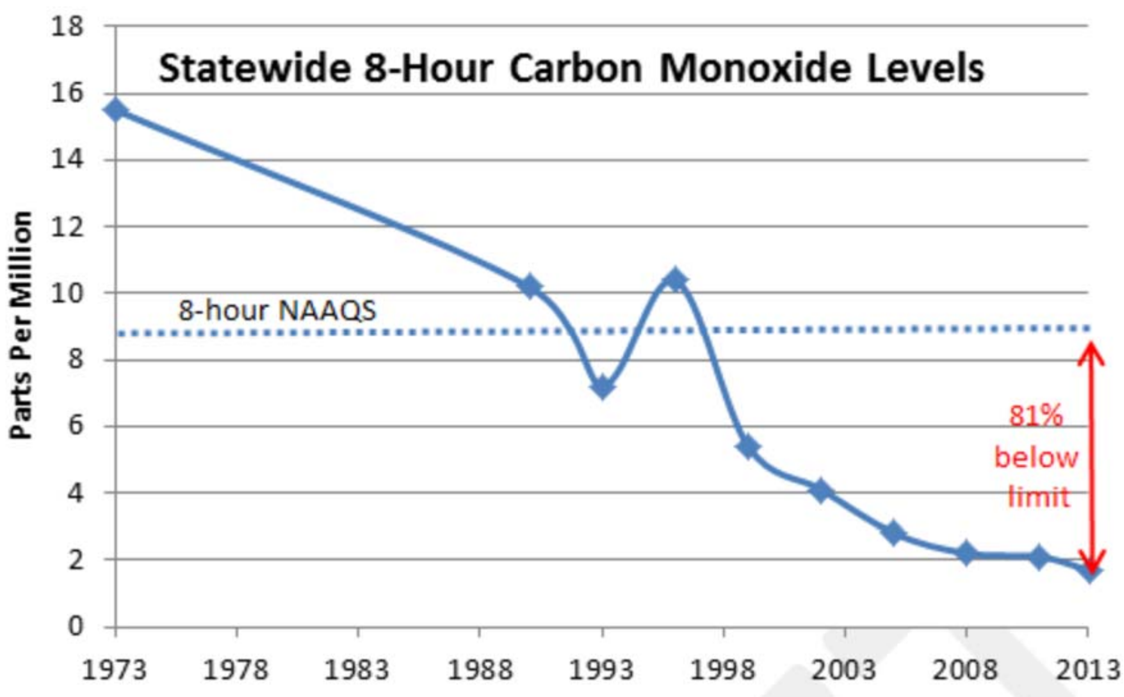


Figure 9. Statewide 8-hour carbon monoxide levels through 2013
(from *Air Quality Trends in North Carolina* located at https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/Air_Quality_Trends_in_North_Carolina.pdf)

As of the end of 2015 the state has met all of the monitoring requirements in the DAQ CO maintenance state implementation plans, SIPs, for Mecklenburg, Forsyth, Durham and Wake Counties. The SIP required the state to operate at least one CO monitor in Mecklenburg, Forsyth and either Durham or Wake Counties through the end of 2015 so that the data from the monitor could be used to trigger contingency requirements.[20]

Figure 10 provides the maximum 1-hour and Figure 11 provides the maximum 8-hour concentrations for all operating sites for 2011 through 2015. All measured carbon monoxide concentrations during the past five years have been well below 80 percent of the standards. The maximum 1-hour concentration during the past five years was 13 percent of the standard and occurred at the Millbrook site in 2015. The maximum 8-hour concentration during the past five years was 26 percent of the standard and occurred at Peter's Creek in 2011. Currently the state and local programs are operating the minimum required carbon monoxide network, that is, one CO monitor at each NCore site. Starting on Jan. 1, 2017, the state and the MCAQ local program will be required to operate a CO monitor at the near road stations in Raleigh and Charlotte.

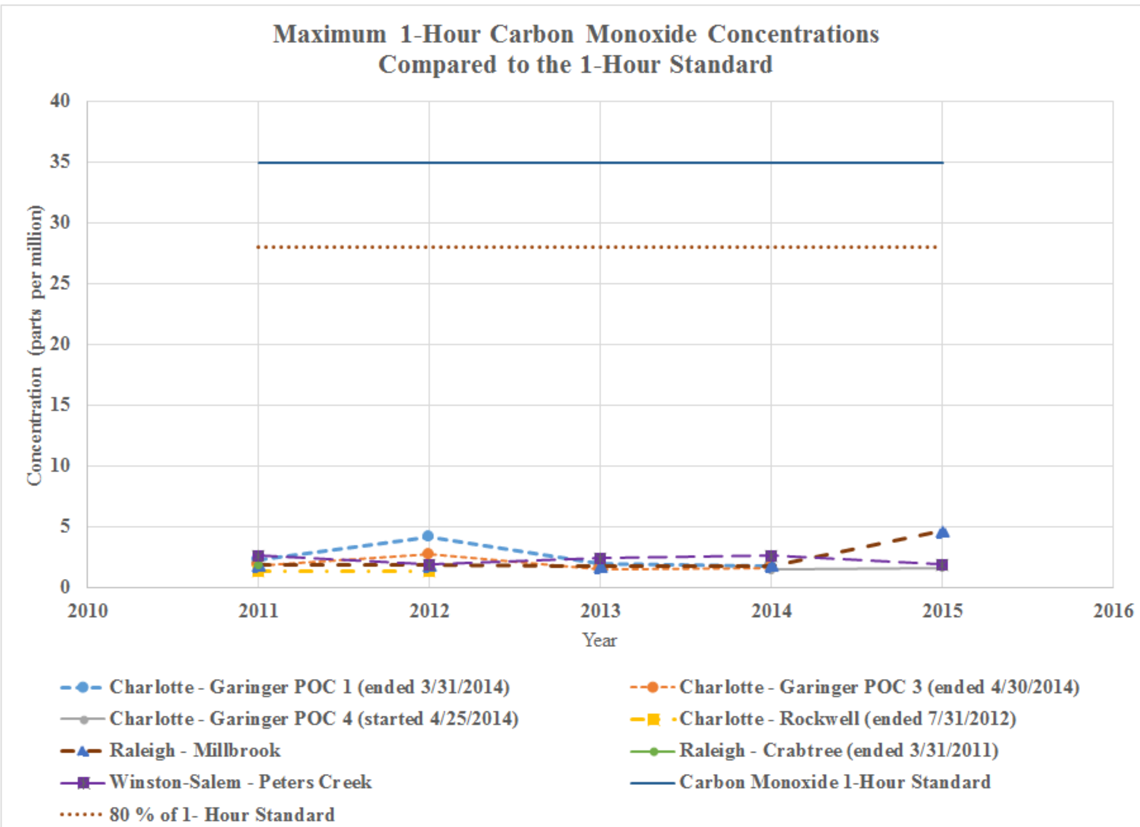


Figure 10. Maximum 1-hour carbon monoxide concentrations measured in North Carolina from 2011 to 2015

[20] "Carbon Monoxide (CO) Limited Maintenance Plan for the Charlotte, Raleigh/Durham & Winston-Salem CO Maintenance Areas", Aug. 2, 2012, available at http://deq.nc.gov/about/divisions/air-quality/air-quality-planning/state-implementation-plans/carbon-monoxide-limited-maintenance-plans.

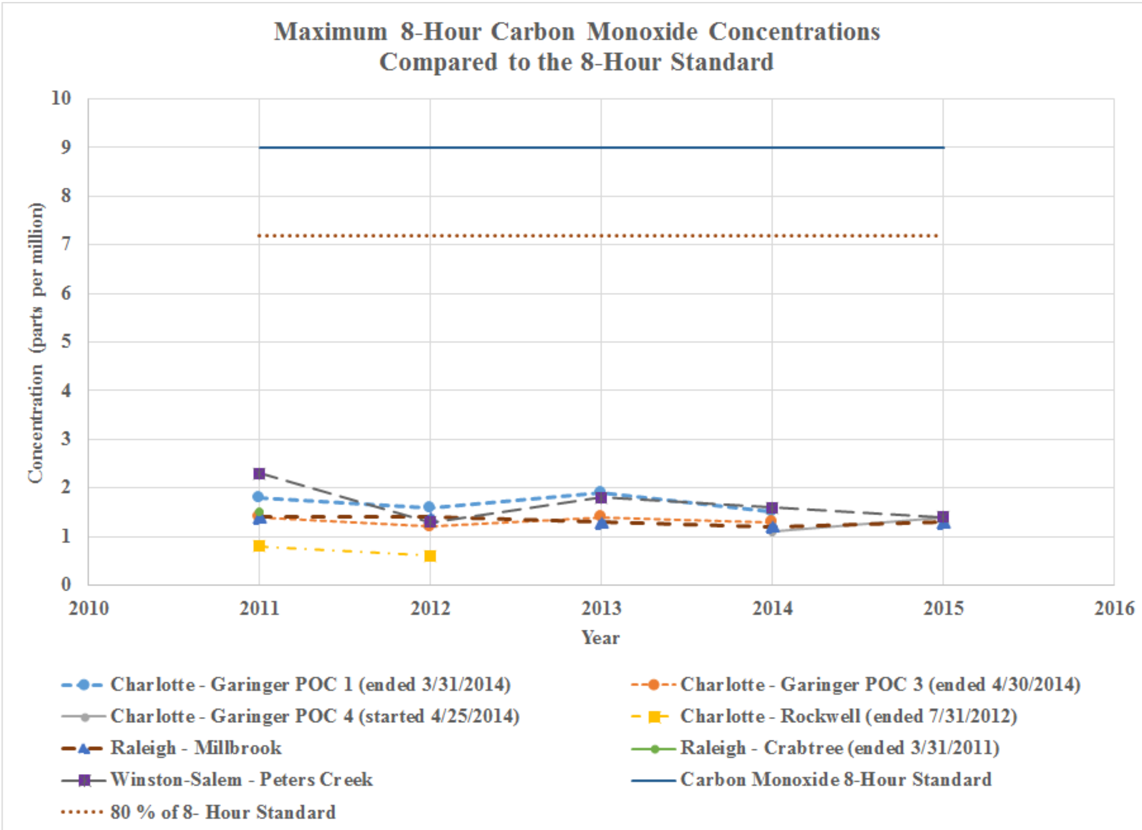


Figure 11. Maximum 8-hour carbon monoxide concentrations measured in North Carolina from 2011 to 2015

Table 8 provides the location, the statement of purpose, the status for each monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D and E of 40 CFR 58 and a summary of proposed and planned changes to the carbon monoxide monitoring network in the Charlotte-Concord-Gastonia MSA. Table 9 provides the location, the statement of purpose, the status for each monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D and E of 40 CFR 58 and a summary of proposed and planned changes to the carbon monoxide monitoring network in the Raleigh MSA.

Table 8 The 2016-2017 Carbon Monoxide Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041	37-119-0045
Site Name:	Garinger	Remount Road
Street Address:	1130 Eastway Drive	902 Remount Road
City:	Charlotte	Charlotte
Latitude:	35.2401	35.212657
Longitude:	-80.7857	-80.874401
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS	SLAMS

Operating Schedule:	Hourly	Hourly
Statement of Purpose:	Compliance with NAAQS; ozone and fine particle precursor monitoring;	Near road monitoring site. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Source oriented
Scale:	Neighborhood	Micro-scale
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: RFCA-0981-054	Yes: RFCA-0981-054
Meets Requirements of Part 58 Appendix D:	Yes - NCore	Yes –near road
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	Will start 1/1/2017

[a] All monitors use an Instrumental nondispersive infrared Thermo Electron 48 i method, Air Quality System, AQS, method code 554. Both monitors are operated by Mecklenburg County Air Quality, AQS primary quality assurance and reporting agency 0669

Table 9 The 2016-2017 Carbon Monoxide Monitoring Network for the Raleigh MSA [a]

AQS Site Id Number:	37-183-0014	37-183-0021
Site Name:	Millbrook	Triple Oak Road
Street Address:	3801 Spring Forest Road	2826 Triple Oak Road
City:	Raleigh	Cary
Latitude:	35.8561	35.8654
Longitude:	-78.5742	-78.8195
MSA, CSA or CBSA represented:	Raleigh	Raleigh
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly	Hourly
Statement of Purpose:	Compliance with NAAQS; ozone and fine particle precursor monitoring;	Near road monitoring site. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure; general/ background	Source oriented
Scale:	Middle	Micro-scale
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: RFCA-0981-054	Yes: RFCA-0981-054
Meets Requirements of Part 58 Appendix D:	Yes - NCore	Yes –near road
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	Will start 1/1/2017

[a] All monitors use an Instrumental nondispersive infrared Thermo Electron 48 i method, Air Quality System, AQS, method code 554

IV. Sulfur Dioxide Monitoring Network

Sulfur dioxide, SO_2, monitoring is currently conducted in North Carolina at 12 sites operated by the North Carolina Division of Air Quality, DAQ, and at two sites operated by local programs. In addition, the South Carolina Department of Health and Environmental Control operates a background special purpose SO2 monitor in York County, South Carolina, part of the Charlotte- Concord-Gastonia Metropolitan Statistical Area, MSA.

The data collected are used to determine human health effect exposures in MSAs with more than one million people, to collect background levels for prevention of significant deterioration, PSD, permit modeling and to determine the impact on SO_2 levels due to facilities that burn large quantities of fossil fuels or manufacture sulfuric acid. Though few major cities are being monitored for sulfur dioxide, data from previous years, as shown in Figure 12, indicate statewide levels of sulfur dioxide are well below the 1-hour standard established by the U.S. Environmental Protection Agency, EPA.

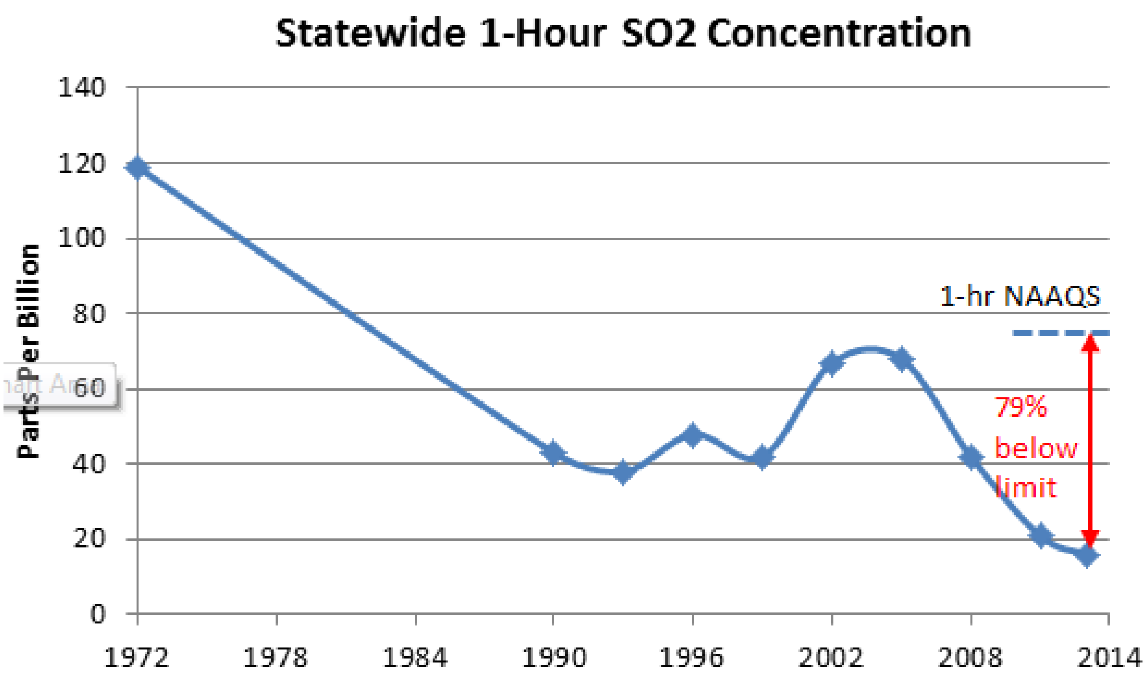


Figure 12. Statewide trends for sulfur dioxide

(from *Air Quality Trends in North Carolina* located at https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/Air_Quality_Trends_in_North_Carolina.pdf)

Figure 13 through Figure 15 show the design value or concentrations of sulfur dioxide measured in North Carolina between 2011 and 2015 as compared to the national ambient air quality standards, NAAQS. Although the design value exceeded the standard in Wilmington in 2011, in 2015 all of the design values were less than 28 percent of the standard. For the rotating and special purpose monitors the maximum 99 percentile 1-hour concentration during the past five years was 24 percent of the standard and occurred at the Bethany site in 2011 and the Bushy Fork site in 2014.

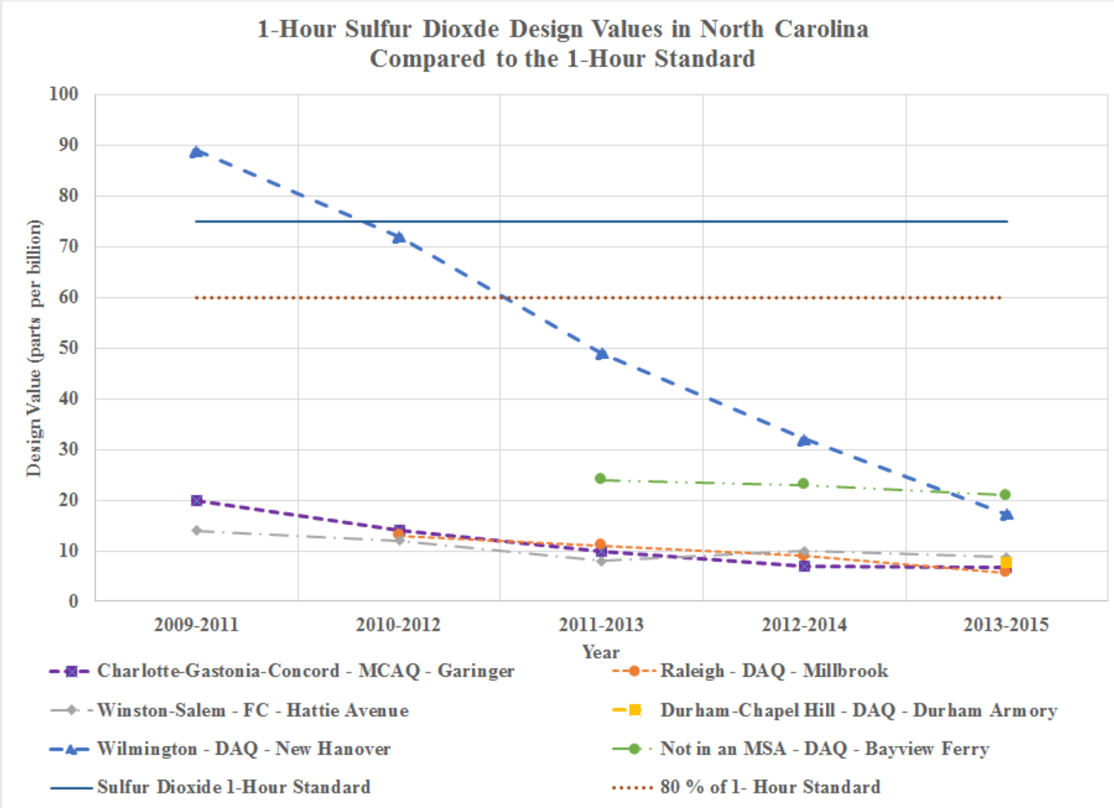


Figure 13. Sulfur dioxide 1-hour design value trends

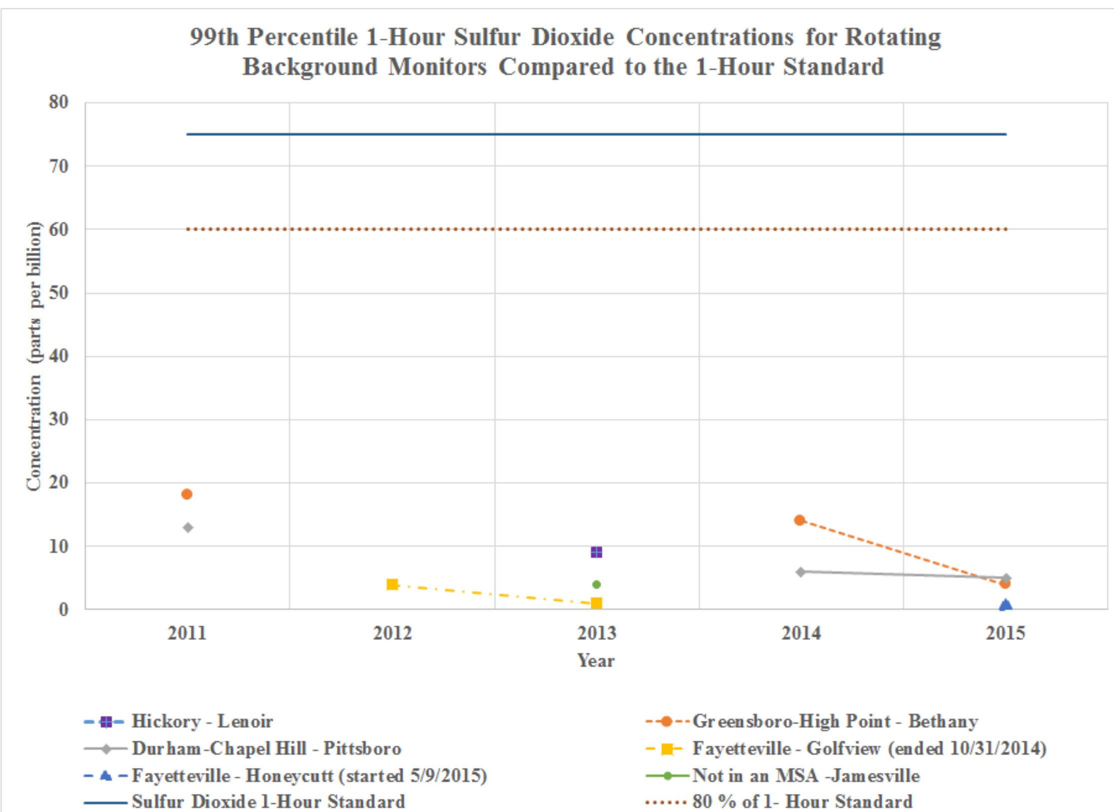


Figure 14. Background Sulfur Dioxide Concentrations

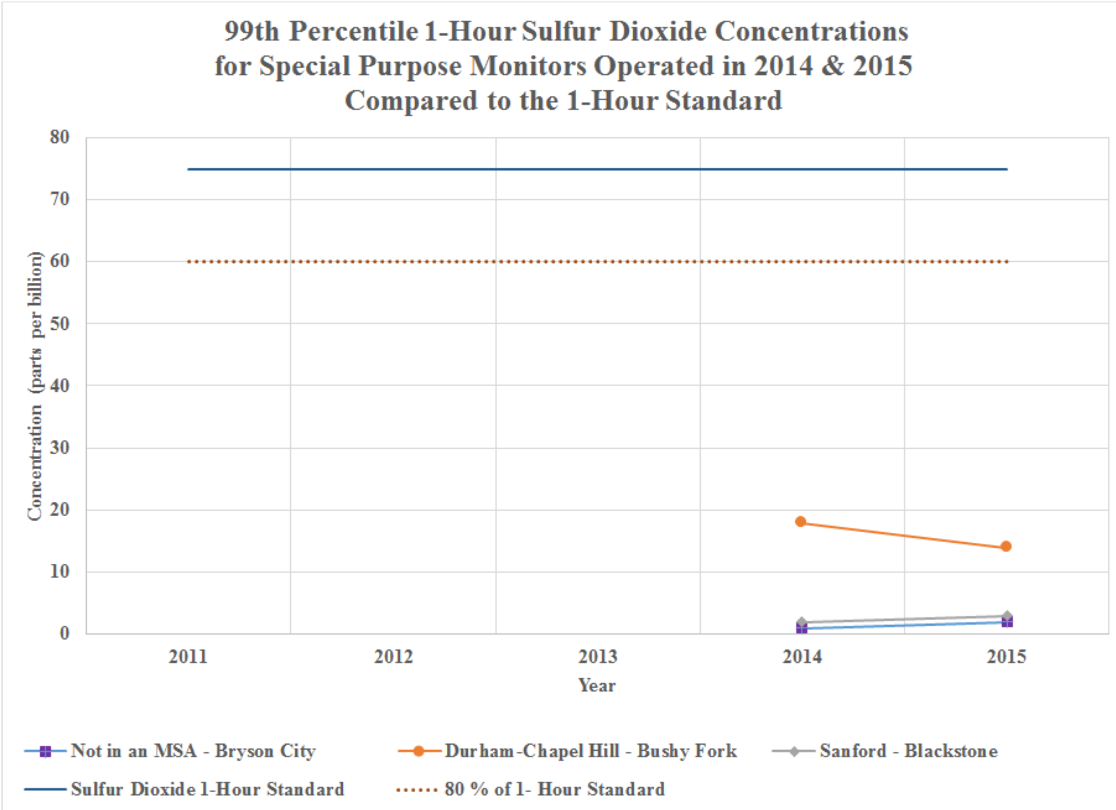


Figure 15. Sulfur Dioxide Concentrations at Special Purpose Sites

The DAQ operates one trace-level SO_2 monitor on a 100 ppb scale because low levels of SO_2 are a precursor for fine particle formation. The current network consists of one site in Wake County. The Wake County site is a national core, NCore, monitoring site. The DAQ monitors for these trace-level-particle precursor pollutants year-round because monitoring for fine particles is required on a year-round basis. Mecklenburg County Air Quality also operates a trace-level SO_2 monitor at the Garinger NCore site in Mecklenburg County.

The federal government requires industries that want to expand or begin operations in an area to conduct 12 consecutive months of background monitoring to use in modeling to demonstrate the addition or expansion of their facility will not contribution to the significant deterioration of air quality in that area. In 2010, the DAQ modified the rotating PSD network by shutting down the Bryson City SO_2 monitor in Swain County and adding rotating PSD SO_2 monitors at Lenoir in Caldwell County and Bethany in Rockingham County. Assessment of the SO_2 monitoring network indicated that the ability of DAQ to meet its obligation to provide relevant background SO_2 data for PSD modeling could be improved by these changes. In 2015 the DAQ decided to shut down the rotating PSD SO_2 monitor at Pittsboro. The monitor was no longer needed because of the monitor at the Durham Armory.

In 2011 the DAQ moved the Aurora monitor across the Pamlico River to the Bayview Ferry station because more people live over there and the new site is downwind of the PCS facility. Figure 16 shows the relative locations of the two sites. The Bayview Ferry site began operating January 2011

Figure 16. Location of the Bayview Ferry Site (B) Relative to the Aurora Site (A)

A. Population Weighted Emissions Index Sulfur Dioxide Monitoring

In 2010 the EPA changed the monitoring regulations for sulfur dioxide to support the lower sulfur dioxide NAAQS. For the SO_2 monitoring network the EPA developed the population weighted emissions index, PWEI. The PWEI is calculated for each core-based statistical area, CBSA, by multiplying the population of each CBSA, using the most current census data or estimates, by the total amount of SO_2 in tons per year emitted within the CBSA, using an aggregate of the most recent county level emissions data available in the national emissions inventory for each county in each CBSA. The resulting product is divided by 1,000,000, providing a PWEI value, the units of which are million person-tons per year. For any CBSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO_2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO_2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO_2 monitor is required within that CBSA. In 2013, the 2010 sulfur dioxide monitoring requirements required North Carolina to add three PWEI sulfur dioxide monitors to three MSAs in North Carolina: Charlotte-Concord-Gastonia, Durham-Chapel Hill and Wilmington.

The SO_2 monitoring site required as a result of the calculated PWEI in each CBSA satisfies minimum monitoring requirements if the monitor is sited within the boundaries of the parent CBSA and is one of the following site types as defined in section 1.1.1 of 40 CFR 58 Appendix D: population exposure, highest concentration, source impacts, general background or regional transport. The SO_2 monitors at NCore stations may satisfy minimum monitoring requirements if that monitor is located within a CBSA that is required to have one or more PWEI monitors.

The 2010 regulations required the DAQ to include a monitoring plan for the sulfur dioxide PWEI network with the network monitoring plan due on July 1, 2011, and allowed that monitoring plan to be revised in 2012. After the 2012 monitoring plan was submitted, the EPA recalculated the PWEI numbers. This plan reflects the revised numbers calculated by the EPA in July 2012. Figure 17 shows the locations of the three required PWEI sulfur dioxide monitoring sites.

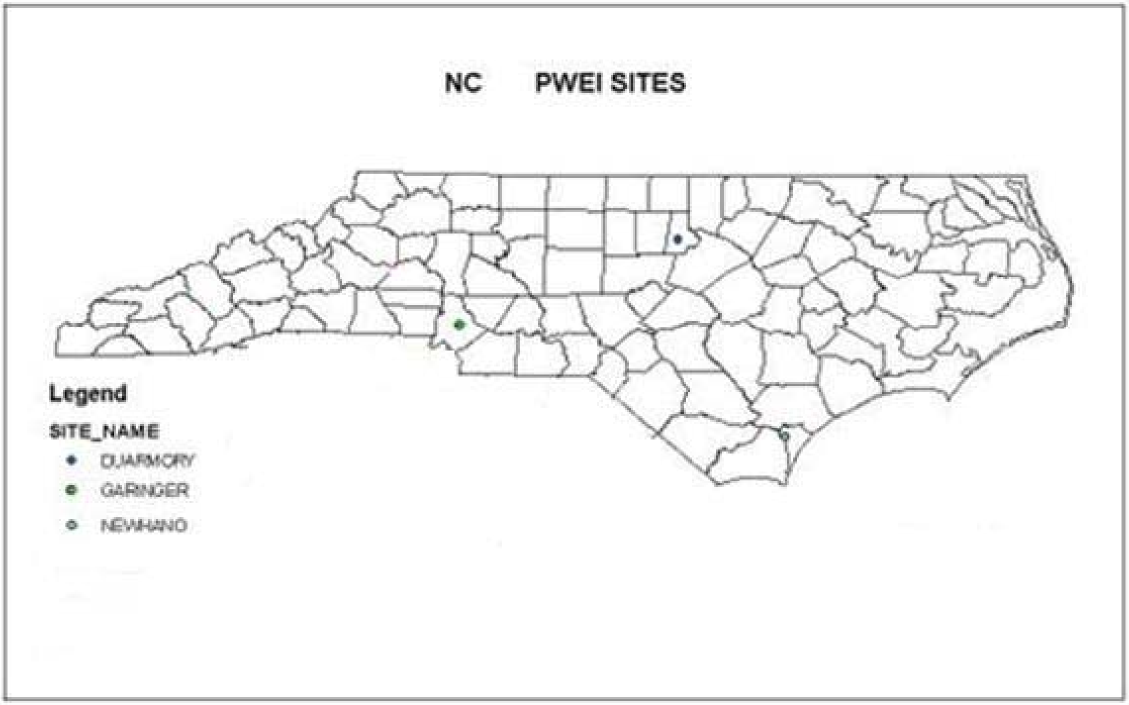


Figure 17. Location of North Carolina PWEI monitors

In 2011 the DAQ and the MCAQ proposed the following monitoring sites to meet the PWEI requirements:

- Garinger as a population exposure monitor in the Charlotte-Concord-Gastonia MSA;
- Durham Armory as a population exposure monitor in the Durham MSA; and
- New Hanover as a population exposure/highest concentration monitor in the Wilmington MSA.

These locations were approved by EPA Region 4 in 2011 (see Appendix I. 2011 Network Plan EPA Approval Letter).

In the 2011 network plan the DAQ proposed doing PWEI monitoring at five additional sites, located in the Asheville, Charlotte-Concord-Gastonia, Greensboro-High Point, Hickory and Winston-Salem MSAs. After the network plan was written the EPA developed revised PWEI lists, which no longer included required PWEI monitors for those three areas. As a result, the DAQ did not add PWEI monitors to the Waynesville Elementary School, Mendenhall School and Hickory sites and the revised 2013 network plan, reflecting a smaller PWEI network, was approved by the EPA (see Appendix J. 2013 Network Plan EPA Approval Letter).

In 2014 the EPA came out with guidance for modeling and monitoring around specific facilities emitting over certain quantities of sulfur dioxide. The modeling and/or monitoring is required to demonstrate compliance with the NAAQS. The modeling guidance requires background levels of sulfur dioxide to be taken into account. The DAQ anticipated that the Roxboro coal-fired electric generating facility in Person County would be one of the facilities in North Carolina for which the DAQ would need to do modeling. Background sulfur dioxide data had not been collected in Person County within the last three years. Thus, the DAQ collected background sulfur dioxide data at the Bushy Fork site from May 21, 2014, through late May 2015 to meet the federally-required modeling protocols. For similar reasons the DAQ operated a sulfur dioxide monitor at Bryson City in Swain County from August 2014 through August 2015. The DAQ anticipated that the Asheville coal-fired electric generating facility in Buncombe County would also be a facility for which the DAQ would need to do modeling.

B. Facilities Subject to the SO2 Data Requirements Rule, DRR

On Jan. 15, 2016, the DAQ submitted to the EPA a list identifying all facilities within North Carolina with SO_2 emissions that exceeded the 2,000 tons per year threshold based on the most recent emissions data. The DAQ's list also includes facilities for which the DAQ received third-party SO_2 modeling information even though the emissions for the facilities were below the 2,000 tons per year threshold. By July 1, 2016, the DAQ will submit to the EPA documentation specifying the compliance path (modeling or monitoring) for each of the affected facilities.

Ambient monitoring will be used to characterize air quality for the following facilities:

- Duke Energy Progress, Roxboro Plant (Facility ID 7300029)
- Blue Ridge Paper Products, Canton Mill (Facility ID 4400159) (hereafter referred to as Evergreen)
- PCS Phosphate Company, Inc. – Aurora (Facility ID 0700071)
- CPI USA North Carolina – Southport Plant (Facility ID 1000067)

DAQ will establish a single SO2 monitor at each of these facilities. Specific details for each facility are included in:

Appendix D. Duke Energy Roxboro Siting Analysis and Additional Site Information;
Appendix E. Evergreen Packaging Canton Siting Analysis and Additional Site Information; and
Appendix K. PCS Phosphate, Inc. – Aurora Siting Analysis and Additional Site Information.
Appendix L. CPI Southport Siting Analysis and Additional Site Information

Note that:

- Duke Energy will operate the monitor at Roxboro as part of DAQ's primary quality assurance organization, PQAO. Duke will provide full access to all data on an hourly basis for reporting to AIRNow and DAQ's real-time website; Duke will quality assure, QA, the data on a daily and monthly basis. DAQ will perform additional QA activities, including annual performance evaluations, technical system audits and annual certification of the data.

- DAQ will operate the monitors at Evergreen's Canton mill, PCS Phosphate and CPI Southport.
- DAQ will report the data to AIRNow and EPA's Air Quality System and certify data for all four monitors.

(Note: Details of the proposed CPI Southport monitoring site are not included in the network plan, although a placeholder is reserved in Appendix L. CPI Southport Siting Analysis and Additional Site Information. As of this writing (May 27, 2016), several parcels of land near the subject facility are being considered for the potential monitoring site, but no owner's permission has yet been secured. An addendum to the network plan will be submitted after a separate 30-day public comment period once the location of the monitoring site is finalized.)

It is important to be reasonable in determining the number of monitors a facility be required to operate. EPA has stated that this will be determined on a case-by-case basis, with no predetermined minimum. DAQ agrees it is appropriate to consider each situation on its merits.

The rationale for a single monitor at each facility follows. Full details are included in the Appendices. Modeling input and output files for siting the monitors have been provided outside of the network plan. A Region 4 representative has visited each proposed monitoring site except the existing site at Bayview.

<u>Evergreen's Canton mill</u> (Canton DRR)

- Modeling is questionable in complex terrain
- Evergreen has already announced emissions controls that will be complete in 2019
  - Modeling suggests the facility will attain the standard with the new controls
- Modeling shows three clusters of impacted receptors
  - The proposed site is located among a cluster containing seven of the top 10 ranked receptors and meets monitor siting criteria. The proposed site has a clear view of the facility, has power nearby and is located on unoccupied state property where we are assured of a long-term uninterrupted presence.
  - The second cluster contains two of the top 10 receptors, but will be disrupted by a major construction project in early 2017. This cluster will not support a three-year design value for 2017 to 2019.
  - The final cluster contains one top 10 receptor, but is located in an employee parking lot and may also be impacted by adjacent rail line and idling heavy-duty trucks.
- The main difference between the proposed site and the alternatives is wind direction on a particular day. All three are very close to the mill. We have proposed a site within the highest rated cluster.

Duke's Roxboro plant (Semora DRR)

- The top 50 receptors for this facility are all within a single cluster to the northeast of the facility.
- The top 20 receptors are all located within a deep depression, in heavily-wooded areas, or on privately-owned property.
- The recommended site (receptor #64 of +8,000) is immediately adjacent to the top 20 and within 300 meters of the #1 receptor.
- The recommended site meets siting criteria, has an unobstructed view of the facility and the property owner has agreed to a long-term presence (at least three years).

PCS Phosphate Company, Inc. – Aurora (Bayview)

- This facility is surrounded by heavily forested areas, a major river and privately-owned waterfront property. The facility is located on the southern banks of the Pamlico River. The prevailing winds blow from the facility and across the river. The river is at least two miles wide at this location, so siting options are limited for a "downwind" monitor.
- The highest ranked feasible receptor (#15) already has an operational SO2 monitor; it is located on opposite side of the river on public land with an unobstructed view of the facility.

When reviewing potential monitoring sites, it is important to note that there is a significant difference between the SO_2 data requirements rule and other rules in regards to monitoring. Usually, if there is no three-year design value, then the area is designated unclassifiable until a design value is available. However, the DRR states that in the absence of a three-year design value, the area will be designated based on a modeling analysis. This becomes a major factor in selecting a monitoring site – if DAQ cannot be assured that a monitoring site is continuously available through 2019 then we are setting the state up for a possible nonattainment designation.

Table 10 provides the location, the statement of purpose, the status for each monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D and E of 40 CFR 58 and a summary of proposed and planned changes to the sulfur dioxide monitoring network in the Charlotte-Concord-Gastonia MSA. Table 11 provides the location, the statement of purpose, the status for each monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D and E of 40 CFR 58 and a summary of proposed and planned changes to the sulfur dioxide monitoring network in the Raleigh, Greensboro and Winston-Salem MSAs.

Table 10 The 2016-2017 Sulfur Dioxide Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041	450910006
Site Name:	Garinger	York
Street Address:	1130 Eastway Drive	2316 Chester Highway (US 321)
City:	Charlotte	York, SC
Latitude:	35.2401	34.935817
Longitude:	-80.7857	-81.228409
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS	Special Purpose
Operating Schedule:	Hourly – every year	Hourly – every year
Statement of Purpose:	Compliance with the NAAQS; required monitor for NCore & PWEI.	Second required PWEI monitor for the MSA
Monitoring Objective:	Population exposure	Extreme downwind
Scale:	Neighborhood	Urban
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: RFCA-0981-054	Yes: RFCA-0981-054
Meets Requirements of Part 58 Appendix D:	Yes – NCore & PWEI	Yes - NCore
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	None

[a] Both monitors use an instrumental pulsed fluorescence method using a Thermo Electron 43i, Air Quality System, AQS, method code 060.
[b] Operated by Mecklenburg County Air Quality, AQS reporting agency 0669
[c] Operated by South Carolina Department of Health and Environmental Control, AQS reporting agency 0971.

Table 11 The 2016-2017 Sulfur Dioxide Monitoring Network for the Raleigh, Greensboro and Winston-Salem MSAs [a]

AQS Site Id Number:	37-183-0014	37-157-0099	37-067-0022[b]
Site Name:	Millbrook	Bethany	Hattie Avenue
Street Address:	3801 Spring Forest Road	6371 NC 65	1300 block of Hattie Avenue
City:	Raleigh	Bethany	Winston-Salem
Latitude:	35.8561	36.308889	36.110556
Longitude:	-78.5742	-79.859167	-80.226667
MSA, CSA or CBSA represented:	Raleigh	Greensboro-High Point	Winston-Salem
Monitor Type:	SLAMS	Special purpose	Other
Operating Schedule:	Hourly – every year	Hourly- every third year	Hourly- every year
Statement of Purpose:	Required monitor for NCore. SO_2 fine particle precursor monitoring. Compliance w/NAAQS.	Industrial expansion monitoring for PSD modeling.	Compliance with the NAAQS; PWEI Monitor
Monitoring Objective:	General/ background	General/ background	Population exposure
Scale:	Neighbor-hood	Urban	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQSA-0486-060	Yes: EQSA-0486-060	Yes: EQSA-0486-060
Meets Requirements of Part 58 Appendix D:	Yes - NCore	Yes	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	Will operate 5/2017 to 4/2018	None

[a] Both monitors use an instrumental pulsed fluorescence method using a Thermo Electron 43i, Air Quality System, AQS, method code 060.

[b] Operated by Forsyth County Office of Environmental Assistance and Protection, AQS primary quality assurance organization and reporting agency 0403

Table 12 The 2016-2017 Sulfur Dioxide Monitoring Network for the Durham-Chapel Hill MSA [a]

AQS Site Id Number:	37-063-0015	37-145-0003	37-145-0004 [b]
Site Name:	Durham Armory	Bushy Fork	Semora DRR
Street Address:	801 Stadium Drive	7901 Burlington Road	Shore Drive Air Monitor, Roxboro Plant
City:	Durham	Hurdle Mills	Semora
Latitude:	36.032944	36.306965	36.489943
Longitude:	-78.905417	-79.091970	-79.058523
MSA, CSA or CBSA represented:	Durham-Chapel Hill	Durham-Chapel Hill	Durham-Chapel Hill
Monitor Type:	SLAMS	Special purpose	SLAMS
Operating Schedule:	Hourly – every year	Hourly	Hourly – every year
Statement of Purpose:	PWEI monitor for Durham-Chapel Hill MSA	Provide background data for SO2 permit modeling	Maximum concentration site in the vicinity of the Roxboro Plant. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	General/background	Source oriented
Scale:	Neighborhood	Urban	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQSA-0486-060	Yes: EQSA-0486-060	Yes: EQSA-0486-060
Meets Requirements of Part 58 Appendix D:	Yes - PWEI	No	Yes – Data Requirements Rule
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	Monitoring ended in 2015	Monitoring will start by Jan. 1, 2017

[a] Both monitors use an instrumental pulsed fluorescence method using a Thermo Electron 43i, Air Quality System, AQS, method code 060.
[b] Operated by Duke Progress Energy

Table 13 The 2016-2017 Sulfur Dioxide Monitoring Network for the Asheville, Fayetteville, Hickory and Wilmington MSAs [a]

AQS Site Id Number:	37-087-0013	37-051-0010	37-027-0003	371290006
Site Name:	Canton DRR	Honeycutt E.S.	Lenoir	New Hanover
Street Address:	Pace Street, Evergreen Plant	4665 Lakewood Drive	291 Nuway Circle	2400 US Highway 421 N
City:	Canton	Fayetteville	Lenoir	Wilmington
Latitude:	35.534	35.00	35.935833	34.268403
Longitude:	-82.853	-78.99	-81.530278	-77.956529
MSA, CSA or CBSA represented:	Asheville	Fayetteville	Hickory	Wilmington
Monitor Type:	SLAMS	Special purpose	Special purpose	SLAMS
Operating Schedule:	Hourly	Hourly- every third year	Hourly – every third year	Hourly – every year
Statement of Purpose:	Maximum concentration site in the vicinity of the Evergreen Plant. Compliance w/NAAQS.	Industrial expansion monitoring for PSD modeling.	Industrial expansion monitoring for PSD modeling.	Maximum concentration site to ensure compliance w/NAAQS; required PWEI monitor
Monitoring Objective:	Source-oriented	Population exposure	General/ background	Population exposure/ highest concentration
Scale:	Middle	Neighborhood	Regional	Urban
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQSA-0486-060	Yes: EQSA-0486-060	Yes: EQSA-0486-060	Yes: EQSA-0486-060
Meets Requirements of Part 58 Appendix D:	Yes – Data Requirements Rule	No	No	Yes –PWEI
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Monitoring will begin by Jan. 1, 2017	None	None	None

[a] All monitors use an instrumental pulsed fluorescence method using a Thermo Electron 43i, Air Quality System, AQS, method code 060.

Table 14 The 2016-2017 Sulfur Dioxide Monitoring Network for areas outside MSAs [a]

AQS Site Id Number:	370130151 [g]	37-117-0001	37-173-0002
Site Name:	Bayview	Jamesville	Bryson City
Street Address:	229 NC Highway 306N	1210 Hayes Street	Parks & Rec Bldg, Center Street
City:	Bath	Jamesville	Bryson City
Latitude:	36.109167	35.810690	35.434767
Longitude:	35.428	-76.897820	-83.442133
MSA, CSA or CBSA represented:	None	Not in an MSA	Not in an MSA
Monitor Type:	SLAMS	Special purpose	Special purpose
Operating Schedule:	Hourly – every year	Hourly – every third year	Hourly for 12 months
Statement of Purpose:	Fence-line monitoring at PCS Phosphate facility to ensure compliance with the NAAQS	Industrial expansion monitoring for PSD modeling.	Provide background data for SO2 permit modeling
Monitoring Objective:	Source oriented	Upwind/ background general/ background	General/background
Scale:	Neighborhood	Urban	Regional
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQSA-0486-060	Yes: EQSA-0486-060	Yes: EQSA-0486-060
Meets Requirements of Part 58 Appendix D:	Yes – DRR monitor	No – rotating PSD background monitor	No – temporary background monitor
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	Is operating 4/1/2016 to 3/31/2017	Monitor operated 8/2014 to 8/2015

[a] Both monitors use an instrumental pulsed fluorescence method using a Thermo Electron 43i, Air Quality System, AQS, method code 060.
[g] This monitor is located in Beaufort County on the fence line of the PCS Phosphate facility. It replaced the New Aurora Site, 370130007, that was dislocated by nearby current land clearing and future mining activities.

V. Ozone Monitoring Network

The North Carolina Division of Air Quality, DAQ, operates an extensive ozone network covering the state from large urban areas to smaller rural areas and from valley communities to mountain top recreation and wilderness areas. This strong network has greatly benefited the state by enabling the DAQ to learn how ozone is transported to and within the state, to identify the parts of the state where the formation of ozone results in peak concentrations and to know where ozone concentrations do and do not exceed the national ambient air quality standards, NAAQS. By having sufficient monitors to provide understanding of ozone formation in an area, DAQ was able to make strong arguments with the United States Environmental Protection Agency, EPA, to prevent certain areas of the state from being designated as nonattainment and was able to develop effective state implementation plans.

A. Analysis of Existing Monitors

1. Analysis of Measured Concentrations Compared to NAAQS

Figure 18 through Figure 23 graphically display the ozone design values for the monitors in the North Carolina state-operated network for the past five years. This information is important because 40 CFR 58.14(c)(1) requires a monitor to be attaining the NAAQS for the past five years before the monitor can be shut down. On Oct. 1, 2015, the EPA lowered the 8-hour ozone standard to 0.070 parts per million. Only 12 of the 38 monitors operating statewide in 2015 have met an 8-hour ozone design value of 0.070 parts per million for the past five years. These monitors are located in:

- The Durham-Chapel Hill MSA - Pittsboro, 37-037-0004, in Chatham County, which was shut down on Oct. 31, 2015;
- The Asheville MSA – Waynesville, 37-087-0004/8, in Haywood County and Bent Creek, 37-021-0030, in Buncombe County;
- The Hickory-Lenoir-Morganton MSA – Lenoir, 37-027-0003, in Caldwell County and Waggin Trail, 37-003-0004, replaced by Taylorsville-Liledoun, 37-003-0005, in Alexander County;
- The Wilmington MSA - Castle Hayne, 37-129-0002, in New Hanover County;
- Mountain Top Sites - Purchase Knob, 37-087-0036, and Frying Pan, 37-087-0035, in Haywood County; and
- Valley, Piedmont and Coastal Sites not in MSAs: Bryson City, 37-173-0002, in Swain, Lenoir Community College, 37-107-0004, in Lenoir, Jamesville, 37-117-0001, in Martin and Linville Falls, 37-011-0002, in Avery County.

On Nov. 19, 2015, the EPA approved shutting down one of those monitors, the Pittsboro monitor, at the end of the 2015 ozone season because, as shown in Figure 19, it has consistently been below the standard and has consistently measured lower concentrations than nearby monitors.[21] None of the remaining 11 monitors have design values less than 80 percent of the NAAQS so they will not meet the additional requirement of having less than 10 percent probability of exceeding 80 percent of the NAAQS during the next three

[21] See Appendix M. 2015-2016 Network Plan Approval Letter.

years. Thus, DAQ does not propose to shut down any ozone monitors based on design values alone.

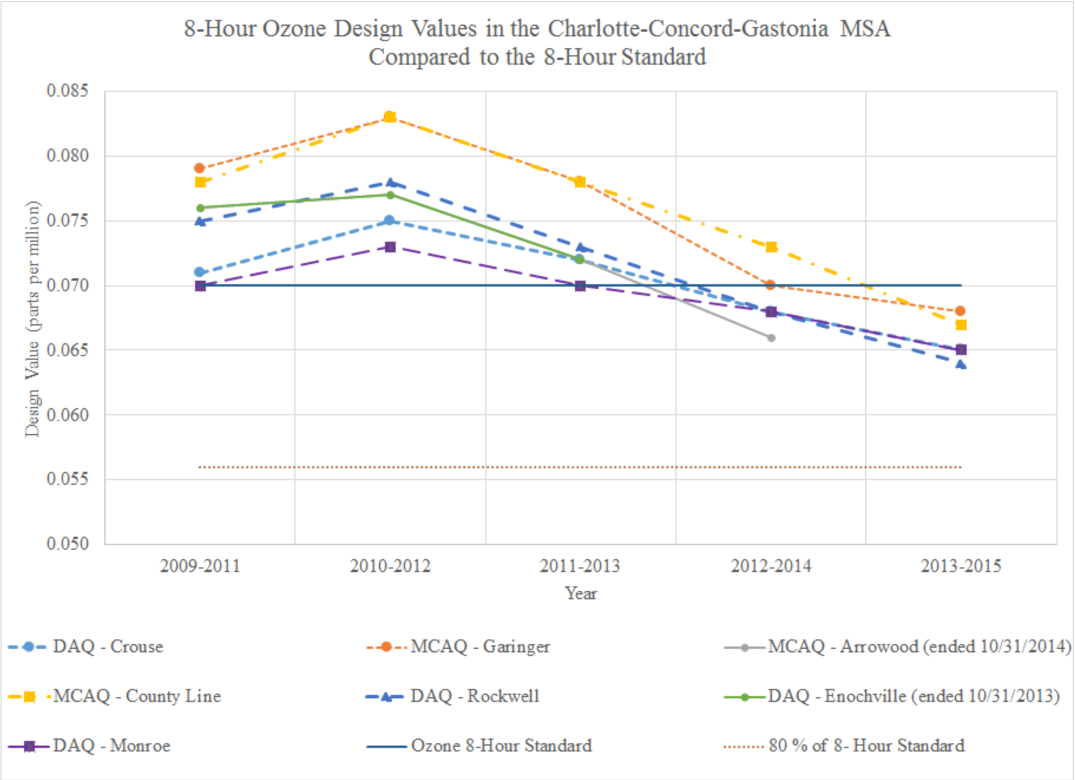


Figure 18. Ozone design values in the Charlotte-Concord-Gastonia MSA during the past 5 years

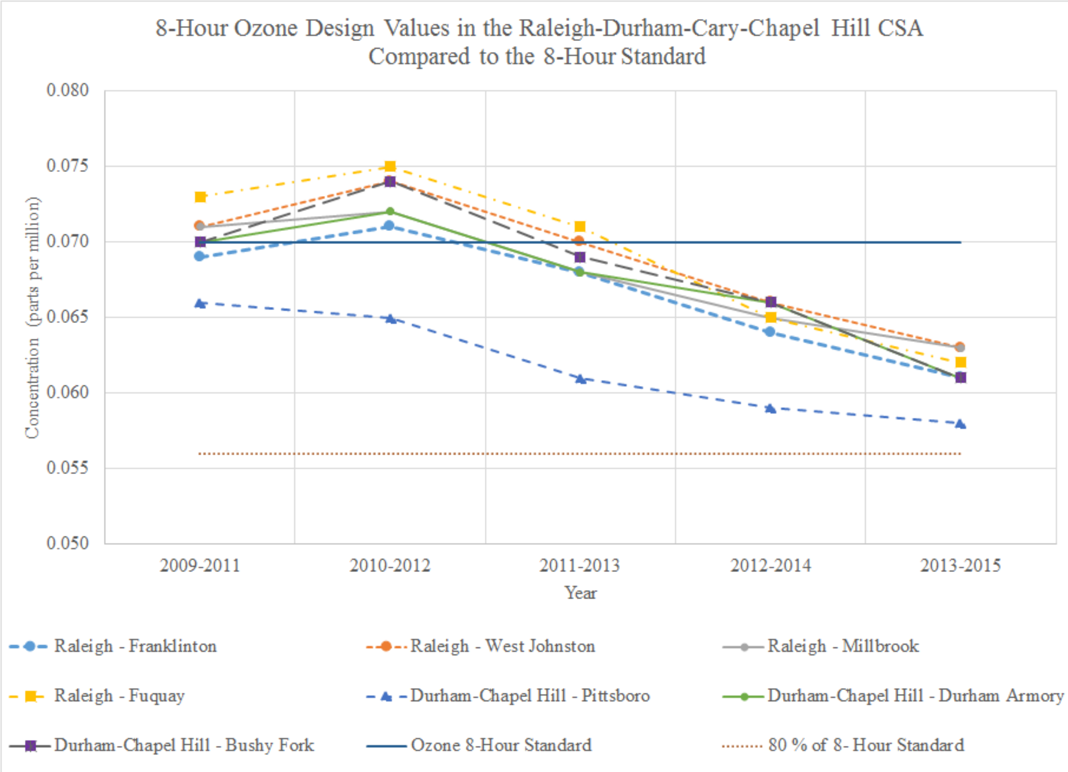


Figure 19. Ozone design values in the Raleigh and Durham-Chapel Hill MSAs during the past 5 years

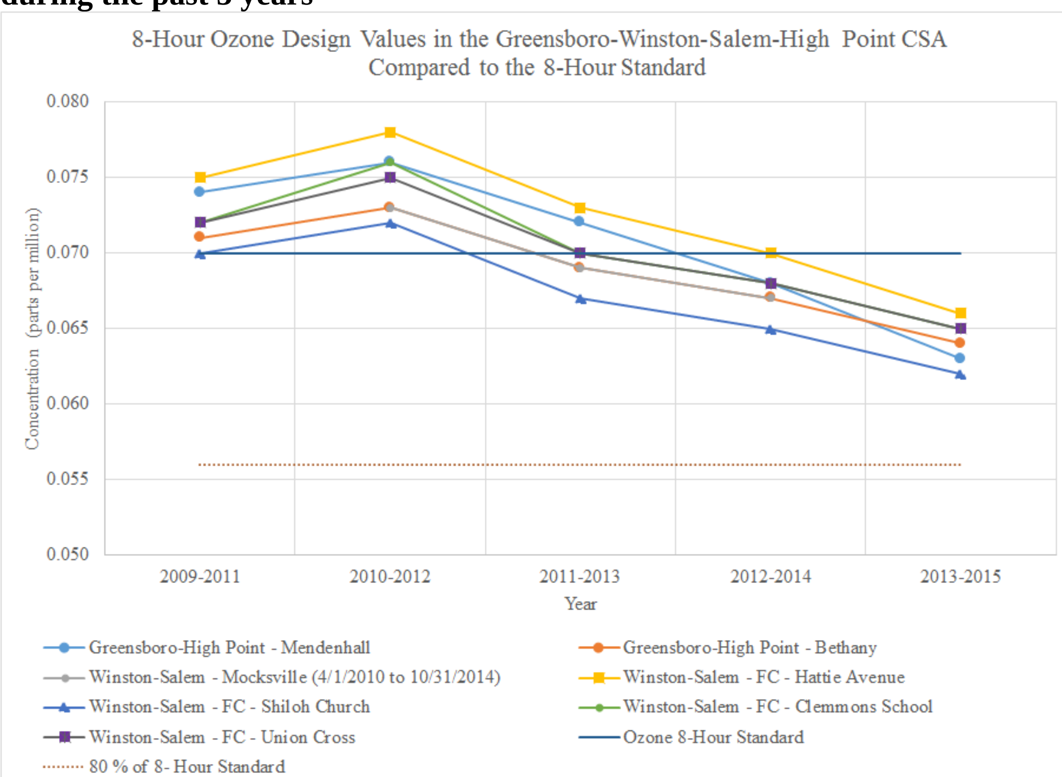


Figure 20. Ozone design values for the Greensboro-High Point and Winston-Salem MSAs for the past 5-years

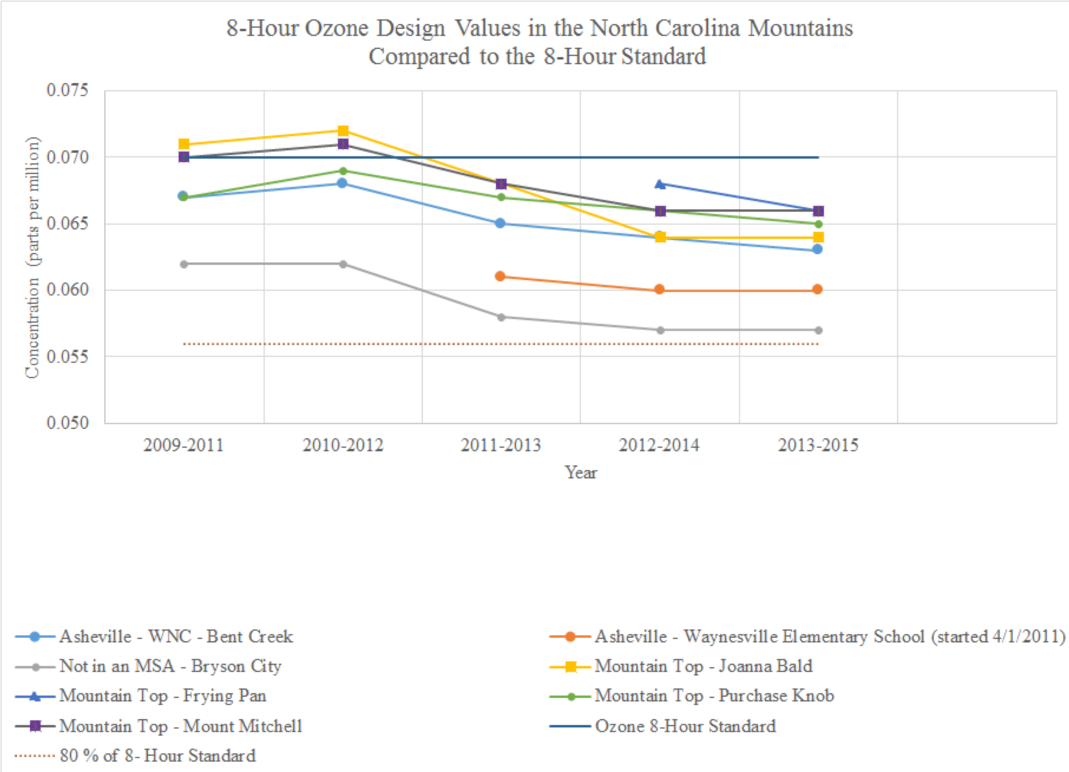


Figure 21. Ozone design values for the Asheville MSA and North Carolina mountains for the past 5 years

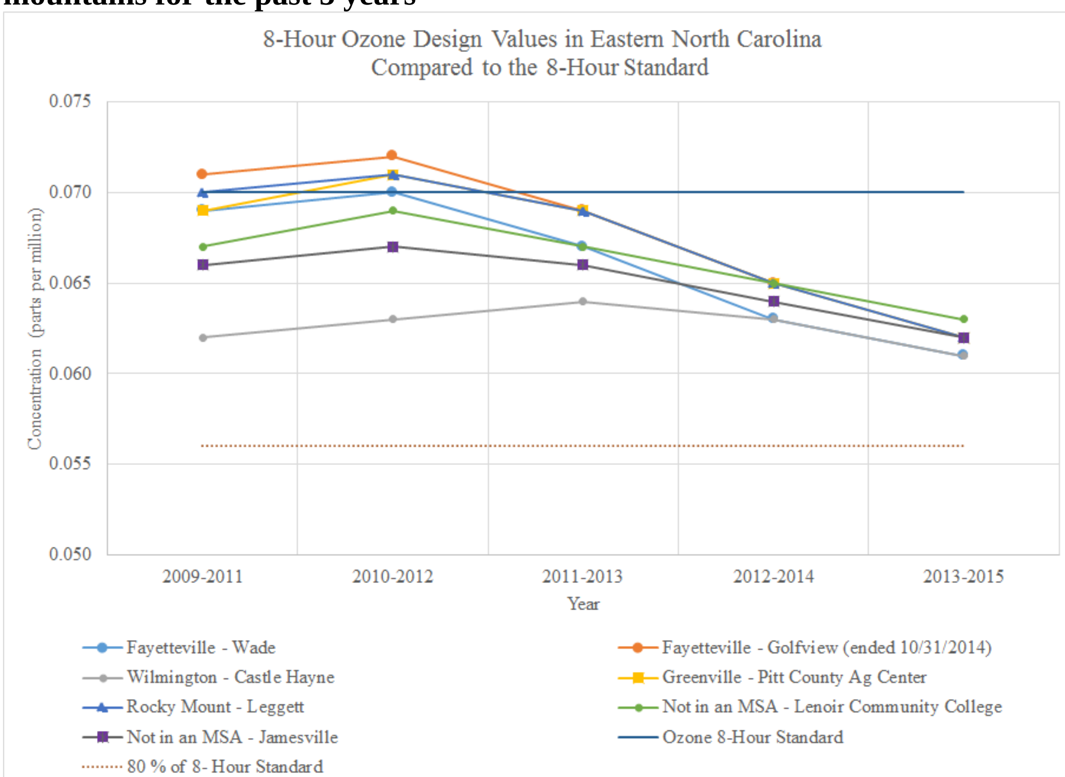


Figure 22. Ozone design values in the Fayetteville, Greenville, Rocky Mount and Wilmington MSAs and at other coastal sites during the past 5 years

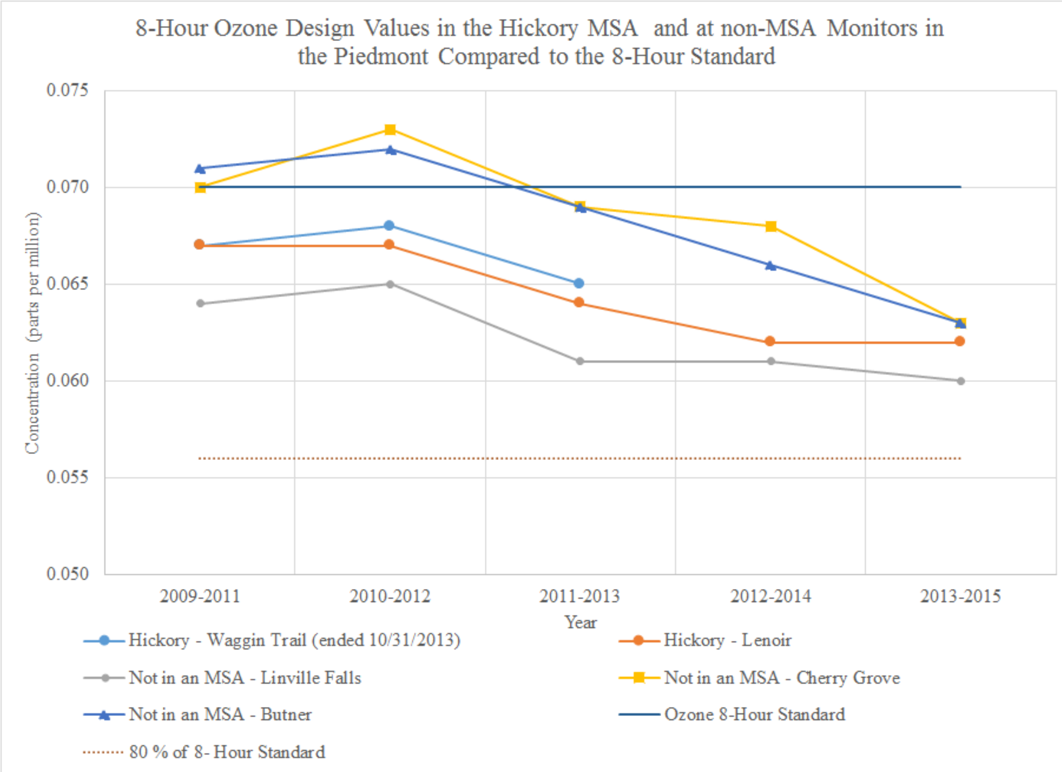


Figure 23. Ozone design values in the Hickory MSA and at other monitors in the piedmont area for the past 5 years

2. Analysis of Operating Monitors Compared to Appendix D Requirements

Other ozone monitors that could be considered for shut down are those monitors that exceed the minimum number of monitors required in 40 CFR 58 Appendix D Table D-2 provided in Figure 24. The latest estimated population of the MSA and the most recent ozone 8-hour design value for the area determines the number of required monitors for an area.

TABLE D–2 OF APPENDIX D TO PART 58.—SLAMS MINIMUM O_3 MONITORING REQUIREMENTS

MSA population[1,2]	Most recent 3-year design value concentrations ≥85% of any O_3 NAAQS [3]	Most recent 3-year design value concentrations <85% of any O_3 NAAQS[3,4]
>10 million	4	2
4–10 million	3	1
350,000–<4 million	2	1
50,000–<350,000 [5]	1	0

[1] Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).
[2] Population based on latest available census figures.
[3] The ozone (O_3) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.
[4] These minimum monitoring requirements apply in the absence of a design value.
[5] Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

Figure 24. 40 CFR 58 Appendix D Table D-2

Table 15 provides the 2015 estimated population for the MSAs in North Carolina, the design values for 2013-2015, the number of required monitors based on Appendix D and the number of current monitors operated by the DAQ and the local programs. Currently, the DAQ and the local programs operate at least the minimum number of required monitors in every MSA except for the Virginia Beach-Norfolk-New Port News and the Myrtle Beach-Conway-North Myrtle Beach MSAs. The DAQ has a written agreement with the Virginia Department of Environmental Quality, VDEQ, Office of Air Quality Monitoring, that VDEQ will maintain the minimum required number of monitors for the Virginia Beach-Norfolk-New Port News MSA.[22] The Office of Management and Budget changed the Myrtle Beach –Conway-North Myrtle Beach MSA definition in February 2013 to include Brunswick County in North Carolina. Adding Brunswick County to the MSA resulted in the MSA exceeding the 350,000 population threshold for a required ozone monitor. In May 2015 the South Carolina Department of Health and Environmental Control, DHEC, proposed operating a monitor in Horry County. The EPA and DHEC continue to work on getting this site approved. The DAQ worked with DHEC to develop an appropriate monitoring agreement. This monitoring agreement is provided in Appendix O. Monitoring Agreement for the Myrtle Beach-Conway-North Myrtle Beach Metropolitan Statistical Area. Brunswick County was formerly part of the Wilmington, NC, MSA and for many years was characterized by the Castle Hayne ozone monitor. As shown in Figure 22, Castle Hayne's highest design value during the past five years was 64 ppb. The Castle Hayne monitor has never violated the ozone standard.

[22] See Appendix N. Monitoring Agreement between Virginia and North Carolina for the Virginia Beach-Norfolk-New Port News Metropolitan Statistical Area.

Table 15 Design Values and Required Ozone Monitors for North Carolina Metropolitan Statistical Areas, MSA

MSA	Population Estimate, 2015 [a]	2013-2015 Ozone 8-Hour Design Value (As percent of NAAQS) [b]	Number of Monitors operated in North Carolina	
			Required	Current
Charlotte-Concord- Gastonia	2,426,368	97	2	5 [c]
Virginia Beach-Norfolk-Newport News, VA-NC	1,706,680	91	2	0 [d]
Raleigh	1,273,568	90	2	2
Greensboro-High Point	752,157	91	2	2
Winston-Salem	659,330	94	2	3
Durham-Chapel Hill	552,493	87	2	2
Asheville	446,840	90	2	2
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	431,964	Not Available	1	0 [e]
Fayetteville	376,509	87	2	2
Hickory-Lenoir-Morganton	362,510	89	2	2
Wilmington	277,969	87	1	1
Jacksonville	186,311	Not Available	0	0
Greenville	175,842	89	1	1
Burlington	158,276	Not Available	0	0
Rocky Mount	148,069	89	1	1
New Bern	126,245	Not Available	0	0
Goldsboro	124,132	Not Available	0	0

[a] Annual Estimates of the Resident Population: Apr. 1, 2010 to July 1, 2015; Source: U.S. Census Bureau, Population Division; Release Date: Mar., 24, 2016, available on the world wide web at http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.

[b] The national ambient air quality standard for an 8-hour period is 0.070 parts per million. Attainment is based on the average of the 4th highest value over three consecutive ozone seasons. Values of 0.070 (100 %) and below are considered to be attaining the national ambient air quality standard.

[c] South Carolina Department of Health and Environment operates an additional monitor in York County, South Carolina.

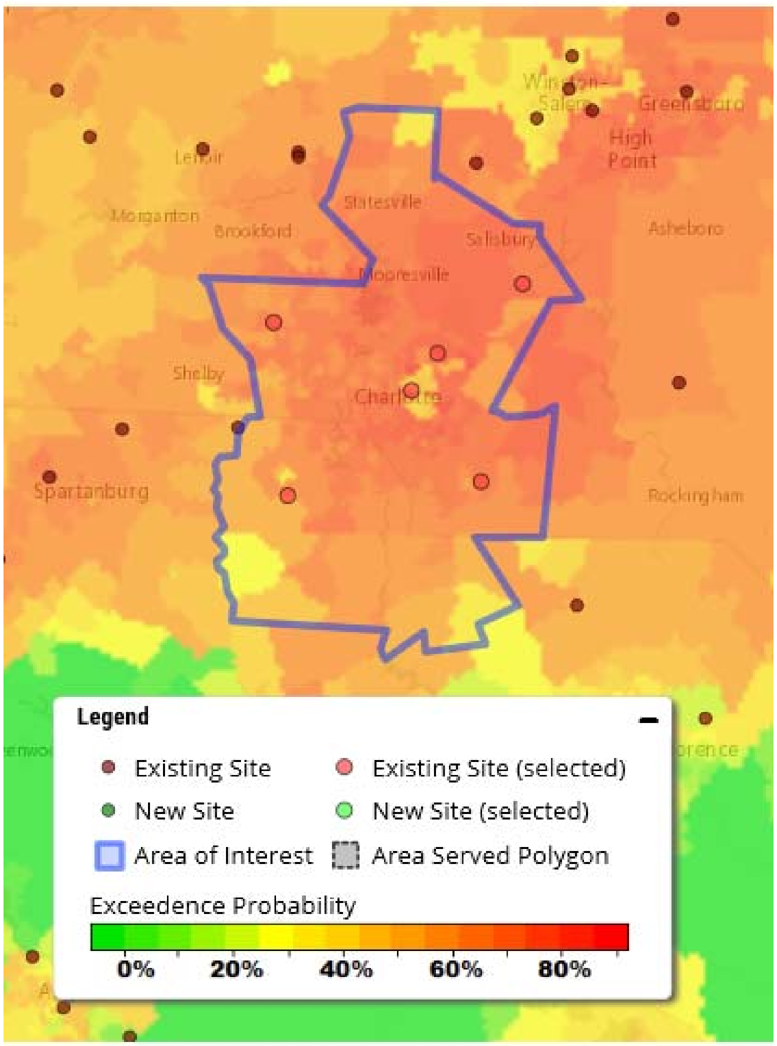
[d] Virginia Department of Environmental Quality, VDEQ, Office of Air Quality Monitoring operates three monitors in this MSA.

[e] South Carolina Department of Health and Environment proposed operating a monitor in Horry County, South Carolina, in May 2015.

The DAQ evaluated each MSA with more than the required monitors to determine if all of the current monitors in the MSA are still needed and providing valuable information. The local program monitors were not included in this analysis. The local program monitors were excluded because the decision on whether to continue to operate them or shut them down is up to the local program and not the DAQ. Thus, three monitors were considered in this evaluation.

Monroe Middle School, 37-179-0003

Monroe Middle School, shown in Figure 25, is in the Charlotte-Concord-Gastonia MSA, also known as the Metrolina area. This monitor provides valuable information for ozone forecasting in the Metrolina area. Because it is attaining the standard, these data can also be used to justify excluding part of Union County from the Metrolina nonattainment area should the area fail to attain the 2015 ozone standard. Union County is one of the fastest growing counties in North Carolina and is one of the fastest growing counties in the nation, making it on the top 100 list for growth during the current decade. It is also located in the state's largest MSA. The DAQ views this monitor as being significant for attainment and maintenance plan development for the Metrolina area and will therefore be retaining this site.



The Rockwell site is furthest to the northeast; the Monroe site is furthest to the southeast; and the Crouse site is furthest to the northwest. The color of the map indicates the probability of having at least one exceedance of the 2015 ozone standard of 0.070 parts per million.

Figure 25. Charlotte-Concord-Gastonia MSA Ozone Monitors.

Crouse, 37-109-0004

As shown in Figure 25, Crouse is in the Charlotte-Concord-Gastonia MSA. This monitor provides valuable spatial information for ozone forecasting in the Charlotte area. Elimination of the Crouse monitor would leave a hole in the ozone network in the area to the west of Charlotte. The data from this monitor are also valuable in helping to determine nonattainment boundaries and keeping Lincoln County or parts of Lincoln County from being designated as nonattainment should the Metrolina area fail to attain the 2015 ozone standard. The DAQ views this monitor as being a significant monitor for attainment and maintenance plan development for the Metrolina area and will therefore be retaining this site.

Rockwell, 37-159-0021

As shown in Figure 25, Rockwell is in the Charlotte-Concord-Gastonia MSA. The ozone concentrations measured at Rockwell are sometimes some of the highest ozone concentrations measured in the MSA. DAQ believes the information collected at Rockwell is important in adding to our understanding of pollution formation and transport in the Piedmont area. Rockwell is downwind of Charlotte and provides information on the pollution being transferred out of Charlotte into the Winston-Salem area. The DAQ views this monitor as being a significant monitor for attainment and maintenance plan development. Thus, the DAQ plans to retain the Rockwell monitor.

B. Analysis of Unmonitored Areas with Rapid Population Growth

The DAQ also evaluated the fastest growing areas in the state. Of the 11 fastest growing counties in North Carolina listed in Table 1, six of those counties do not have an ozone monitor.

1. Brunswick County

Brunswick County grew by 14.3 percent between Apr. 1, 2010, and July 1, 2015. It is the 40th fastest growing county in the nation so far during this decade and it is the 38th fastest growing county in the nation during the past year. Brunswick County is impacted by growth in the Wilmington, North Carolina and North Myrtle Beach, South Carolina, areas. As of February 2013 Brunswick County is one of two counties making up the Myrtle Beach-Conway-North Myrtle Beach MSA. Before February 2013 Brunswick County was part of the Wilmington MSA. The Myrtle Beach-Conway-North Myrtle Beach MSA now has a population exceeding 350,000 so an ozone monitor is required. Based on ozone monitoring at Castle Hayne in the Wilmington MSA, the design value for the Myrtle Beach-Conway-North Myrtle Beach MSA is expected to be around 85 percent of the standard. As shown in Figure 26, the probability that there would be one exceedance of the 70 ppb ozone standard in Brunswick County is less than 50 percent. The DAQ has an agreement with the SCDHEC, which in 2015 established the Coastal Carolina monitoring site in the Myrtle Beach-Conway-North Myrtle Beach MSA.

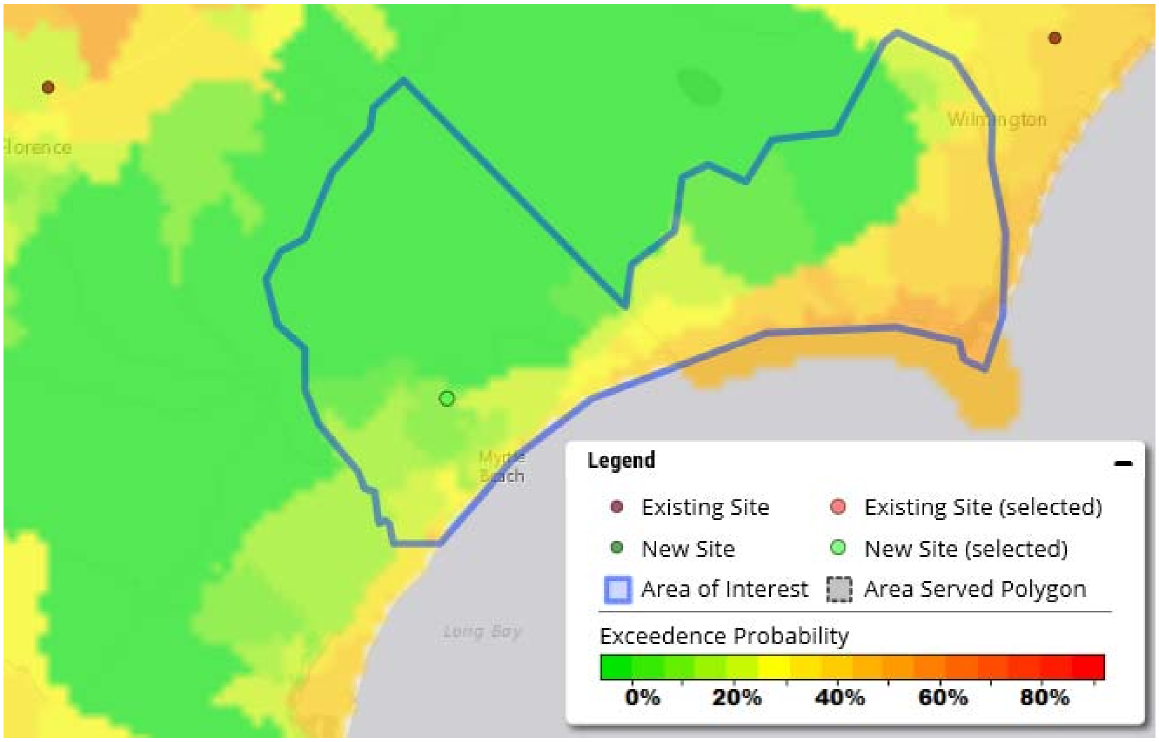


Figure 26. Probability of having one exceedance of the 70 ppb ozone standard in the Myrtle Beach-Conway-North Myrtle Beach MSA

2. Cabarrus County

Cabarrus County is estimated to have grown by 4,833 people or 2.5 percent between July 1, 2014, and July 1, 2015. It is the 87th fastest growing county in the nation during the past year percentagewise. Cabarrus County is in the Charlotte-Concord-Gastonia MSA. Currently, the DAQ is required to operate two monitors in the MSA. As shown in Figure 25, this MSA currently has six ozone monitors, with one monitor to the south and one to the north of the county. The ozone exceedance probability for Cabarrus County indicates that the probability of having one exceedance of the 70 ppb ozone standard in Cabarrus County is similar to the probability of having one exceedance at either of these two monitors. Thus, the existing monitors should adequately characterize the air quality in Cabarrus County. At this time DAQ has no plans to monitor for ozone there.

3. Chatham County

Chatham County is estimated to have grown by 2,319 people or 3.4 percent between July 1, 2014, and July 1, 2015. It is the 27th fastest growing county in the nation during the past year percentagewise. Chatham County is in the Durham-Chapel Hill MSA. Currently, the DAQ is required to operate two monitors in this MSA. As shown in Figure 27, the ozone exceedance probability for Chatham County indicates that the probability of having one exceedance of the 70 ppb ozone standard in Currituck County is similar to the probability of having one exceedance at either of these two monitors. Thus, the existing monitors should adequately characterize the air quality in Chatham County. At this time DAQ has no plans to resume monitoring for ozone there.

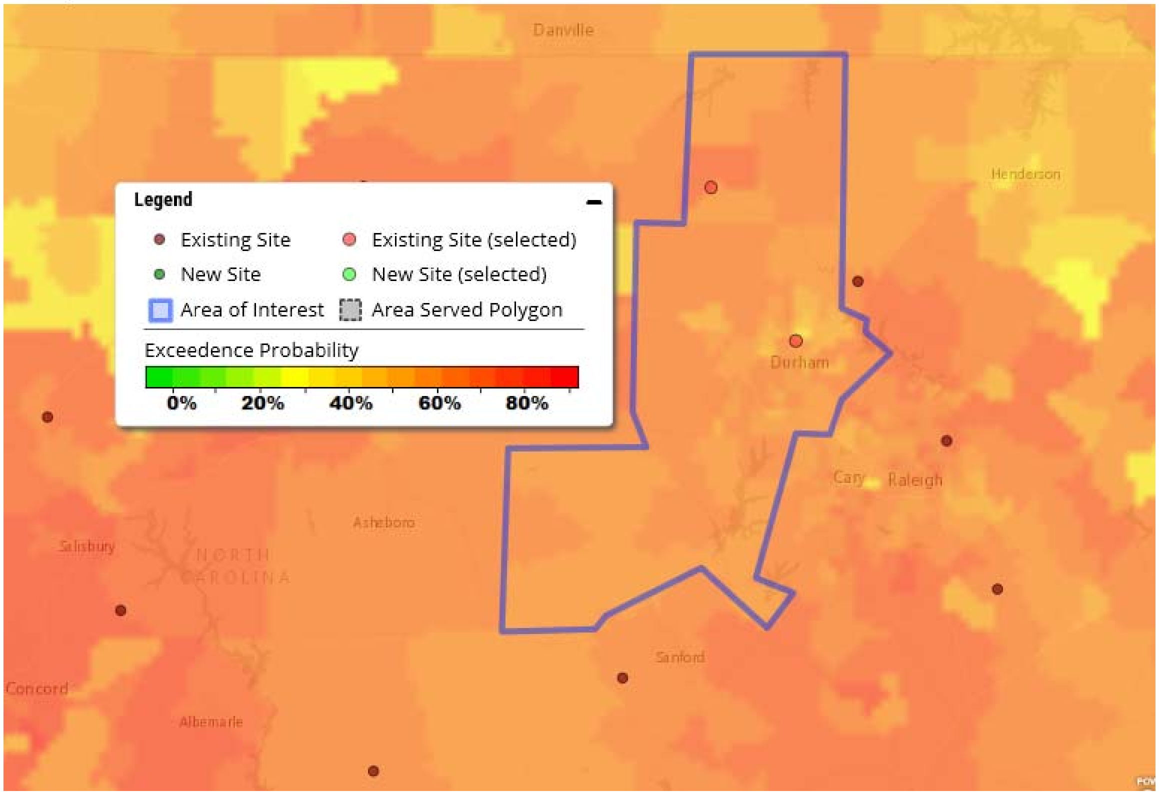


Figure 27. Probability of having one exceedance of the 75 ppb ozone standard in the Virginia Beach-Norfolk-Newport News MSA.

4. Harnett County

Harnett County grew by 11.7 percent between Apr. 1, 2010, and July 1, 2015. It is the 74th fastest growing county in the nation. Harnett County is located between Raleigh to the north and Fort Bragg and the Fayetteville MSA to the south, two rapidly growing areas. As shown in Figure 28 there are three ozone monitors surrounding Harnett County: West Johnston to the northeast, Wade to the south and Blackstone to the west. Also, Figure 28 indicates that the probability for any area within the county to have one exceedance of the 70 ppb ozone standard is similar to the probability of any of the neighboring monitors exceeding the standard. Thus, the DAQ currently does not plan to monitor for ozone in Harnett County.

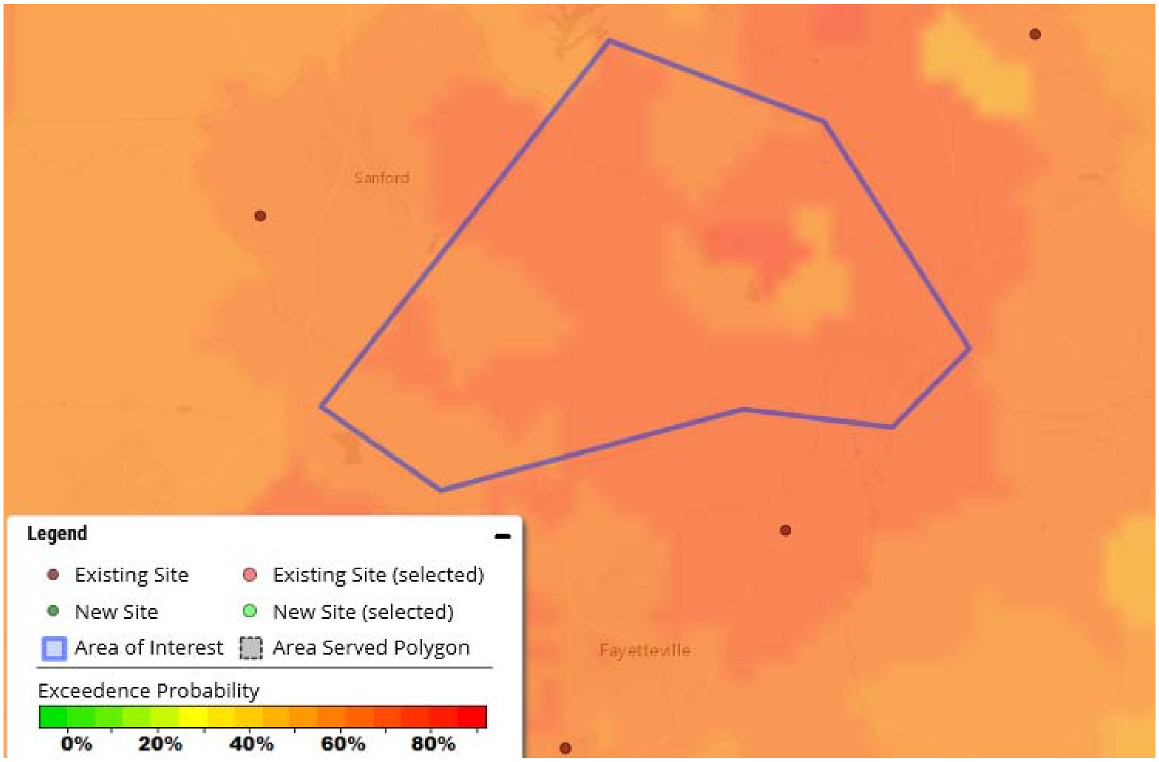


Figure 28. Ozone monitors surrounding Harnett County

5. Hoke County

Hoke County grew by 12.2 percent between Apr. 1, 2010, and July 1, 2015. It is the 68th fastest growing county in the nation during this decade. Hoke County is part of the Fayetteville MSA. The DAQ currently operates two ozone monitors in the Fayetteville MSA as required by 40 CFR 58 Appendix D. Both monitors are in Cumberland County. The ozone exceedance probability for Hoke County (see Figure 29) indicates that the probability of having one exceedance of the 70 ppb ozone standard in Hoke County is similar to the probability of having an exceedance at the Wade monitor in Cumberland County. Currently this monitor has a design value of 0.061 parts per million. Thus, the DAQ has no plans to monitor for ozone in Hoke County at this time.

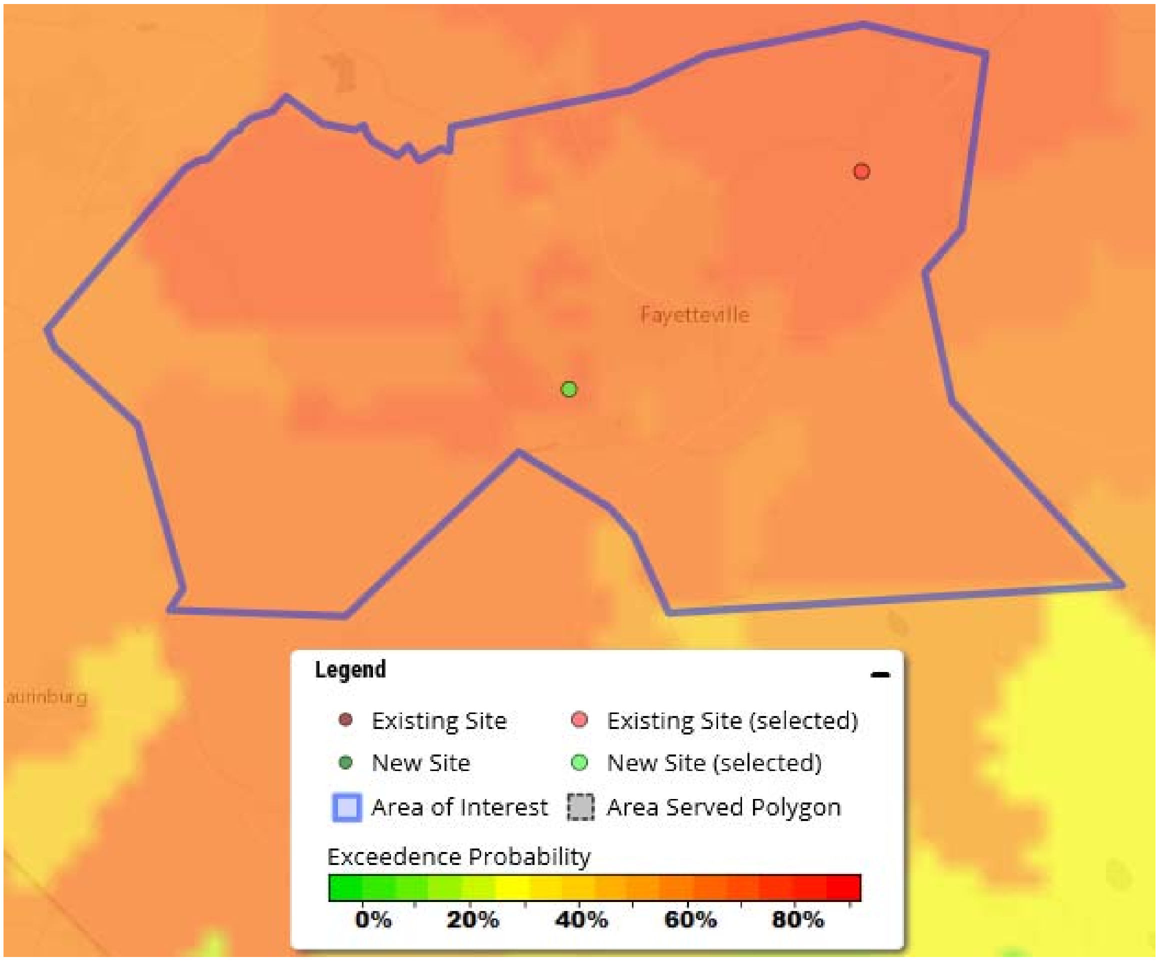


Figure 29. Probability of having one exceedance of the 70 ppb ozone standard in the Fayetteville MSA.

6. Pender County

Pender County grew by 1,525 people (2.7 percent) between July 1, 2014, and July 1, 2015, and is the 69th fastest growing county in the nation during this decade. Pender County is in the Wilmington MSA. Currently, the NC-DAQ is required to operate one monitor in the MSA. This monitor is located at Castle Hayne in New Hanover County. The Castle Hayne monitor indicates that the ozone concentrations on the coast are currently at 87 percent of the NAAQS. The ozone exceedance probability for Pender County shown in Figure 30 indicates that the probability of having one exceedance of the 70 ppb ozone standard in Pender County is similar to the probability of having an exceedance at Castle Hayne. As a result the DAQ has no plans to monitor for ozone in Pender County at this time.

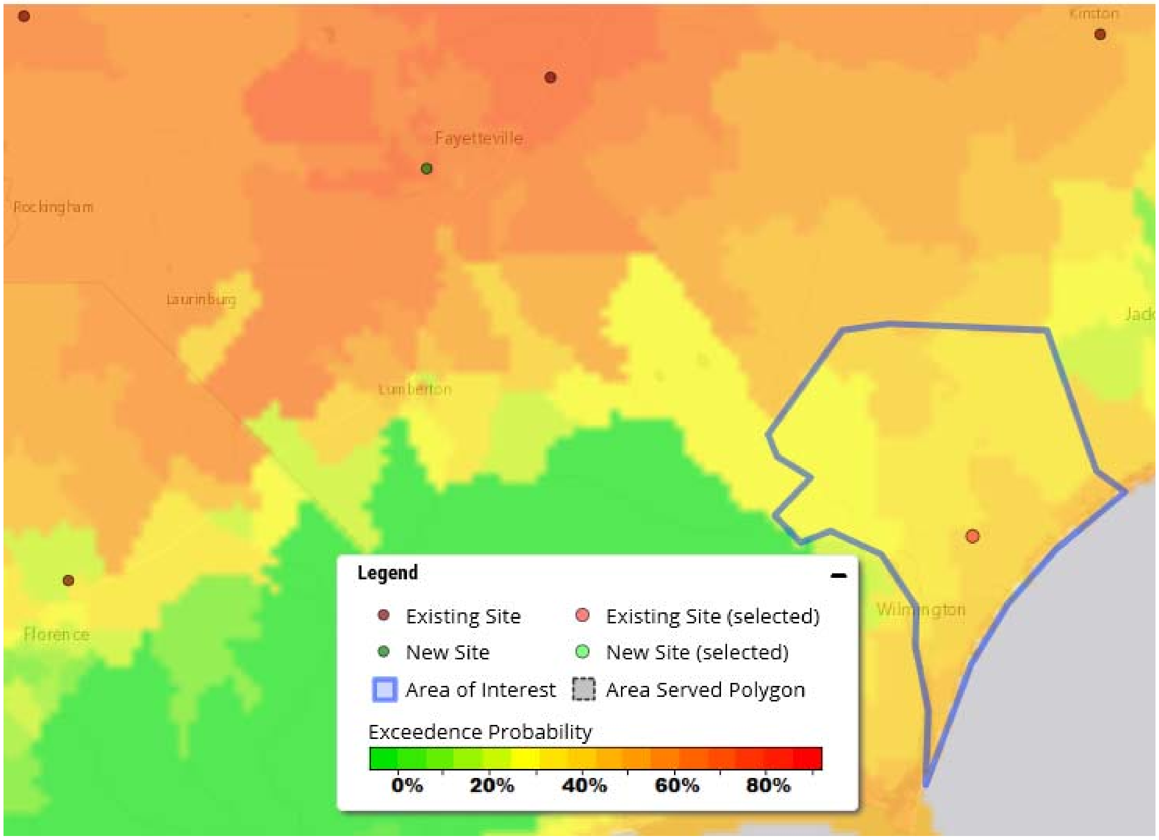


Figure 30. Probability of having one exceedance of the 70 ppb ozone standard in the Wilmington MSA

C. Changes to Existing Monitors

On Aug. 7, 2015, Tim Corley, with Pitt County, called the North Carolina Division of Air Quality (DAQ) about the potential leasing of the property near or on which the DAQ Pitt Ag ambient air monitoring station is located in Greenville, North Carolina. Further conversations with Mr. Corley indicated that the organization leasing the property would be building a building that would create an obstruction for the current monitoring station. As a result, on Sept. 30, 2015, DAQ contacted Mr. Corley to see if the ozone-monitor shelter could be relocated approximately 325 meters to the other side of the property. See subsection B. Sites to be Relocated or Moved, section 2. Monitoring Site Relocations in the Greeneville MSA for more details.

D. DAQ Recommendations

At this time the DAQ recommends:

- Not establishing any new ozone sites in 2016 or 2017; and
- Continuing to operating the special purpose monitoring site in Lee County for baseline shale gas development monitoring and maintaining the site as a special purpose monitoring site.

E. Network Description

Figure 31 shows the locations of the ozone monitors operating in 2016. The locations, monitor type, operating schedules, monitoring objectives, scales, statement of purpose and any proposed change to the monitor or site are listed in Table 16 through Table 27. All monitors listed in these tables are suitable for comparison to the national ambient air quality standards and meet the requirements of Appendices A, C, D and E of Part 58. All of these monitors use the EPA equivalent method designation EQOA-0880-047. All monitors operate on an hourly schedule from Apr. 1 through Oct. 31 each year. Starting in 2017 all seasonal monitors except for the mountain top monitors will operate from Mar. 1 through Oct. 31. The DAQ is requesting a waiver to the start of the monitoring season for the mountain top sites because the roads going to the sites are often closed during February. Several of the monitors operate year-round.

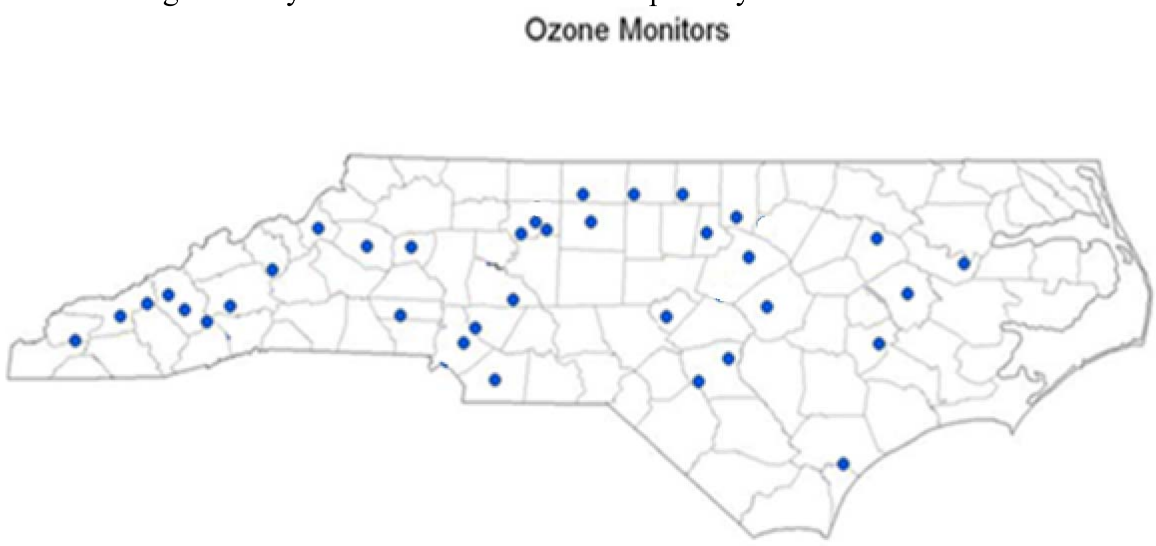


Figure 31. Location of 2016 Ozone Monitoring Stations

Table 16 The 2016-2017 Ozone Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-109-0004	37-119-0041 [b]	37-119-0046 [b]	37-159-0021	37-179-0003
Site Name:	Crouse	Garinger	University Meadows	Rockwell	Monroe Middle School
Street Address:	1487 Riverview Road	1130 Eastway Drive	1660 Pavilion Blvd	301 West Street	701 Charles Street
City:	Lincolnton	Charlotte	Charlotte	Rockwell	Monroe
Latitude:	35.438556	35.2401	35.314158	35.551868	34.973889
Longitude:	-81.276750	-80.7857	-80.713469	-80.395039	-80.540833
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS	SLAMS / NCore	SLAMS	SLAMS	Special purpose
Operating Schedule:	Hourly 4/1 to 10/31	Hourly Year round	Hourly 4/1 to 10/31	Hourly Year round	Hourly 4/1 to 10/31
Statement of Purpose:	Compliance w/NAAQS; SIP development.	Compliance with NAAQS; AQI reporting	AQI reporting. Compliance w/NAAQS.	Modeling. Ozone precursor monitoring. Compliance w/NAAQS.	Forecasting. Compliance w/NAAQS. SIP Development
Monitoring Objective:	General/ background	Highest concentration	Highest concentration	Highest concentration	Population exposure
Scale:	Urban	Neighborhood	Urban	Urban	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58 Appendix D:	No	Yes - NCore	Yes	No	No
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Season will start 3/1 in 2017	None	Season will start 3/1 in 2017	Season will start 3/1 in 2017	Season will start 3/1 in 2017

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.
[b] Operated by Mecklenburg County Air Quality, AQS primary quality assurance organization and reporting agency 0669

Table 17 The 2016-2017 Ozone Monitoring Network for the Raleigh MSA [a]

AQS Site Id Number:	37-101-0002	37-183-0014
Site Name:	West Johnston	Millbrook
Street Address:	1338 Jack Road [c]	3801 Spring Forest Road
City:	Clayton	Raleigh
Latitude:	35.590833	35.8561
Longitude:	-78.461944	-78.5742
MSA, CSA or CBSA represented:	Raleigh	Raleigh
Monitor Type:	SLAMS	SLAMS / NCore
Operating Schedule:	Hourly 4/1 to 10/31	Hourly Year round
Statement of Purpose:	Real-time AQI reporting for the Raleigh MSA. Compliance w/NAAQS. SIP development	Maximum Concentration Site for Raleigh MSA. Ozone precursor monitoring Site. Real-time AQI reporting for the Raleigh MSA. Compliance w/NAAQS.
Monitoring Objective:	General/background	Maximum ozone concentration/ population exposure
Scale:	Urban	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58 Appendix D:	Yes	Yes - NCore
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	Season will start 3/1 in 2017	None

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.

Table 18 The 2016-2017 Ozone Monitoring Network for the Greensboro-High Point MSA [a]

AQS Site Id Number:	37-081-0013	37-157-0099
Site Name:	Mendenhall	Bethany
Street Address:	205 Willoughby Blvd.	6371 NC 65
City:	Greensboro	Bethany
Latitude:	36.109167	36.308889
Longitude:	-79.801111	-79.859167
MSA, CSA or CBSA represented:	Greensboro-High Point	Greensboro-High Point
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31
Statement of Purpose:	Maximum concentration site downwind of the Greensboro-High Point MSA. Compliance w/NAAQS. Real-time AQI reporting for the	Maximum ozone concentration site downwind of the Winston-Salem MSA. Real-time AQI reporting for the Greensboro-Winston-Salem-

Table 18 The 2016-2017 Ozone Monitoring Network for the Greensboro-High Point MSA [a]

AQS Site Id Number:	37-081-0013	37-157-0099
Site Name:	Mendenhall	Bethany
	Greensboro-Winston-Salem-High-Point CSA	High-Point CSA. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Highest concentration
Scale:	Urban	Urban
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58 Appendix D:	Yes	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	Season will start 3/1 in 2017	Season will start 3/1 in 2017

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.

Table 19 The 2016-2017 Ozone Monitoring Network for the Winston-Salem MSA [a]

AQS Site Id Number:	37-067-0022[b]	37-067-0030 [b]	37-067-1008 [b]
Site Name:	Hattie Avenue	Clemmons School	Union Cross
Street Address:	1300 block of Hattie Avenue	Fraternity Church Road	3656 Piedmont Memorial Drive
City:	Winston-Salem	Clemmons	Union Cross
Latitude:	36.110556	36.026000	36.050833
Longitude:	-80.226667	-80.342000	-80.143889
MSA, CSA or CBSA represented:	Winston-Salem	Winston-Salem	Winston-Salem
Monitor Type:	Other	SLAMS	SLAMS
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31
Statement of Purpose:	Urban center city site for modeling. Real-time AQI reporting for the Greensboro-Winston-Salem-High Point CSA. Compliance w/NAAQS.	. Real-time AQI reporting for the Greensboro-Winston-Salem-High Point CSA. Compliance w/NAAQS.	Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Population exposure	Population exposure
Scale:	Neighborhood	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58 Appendix D:	Yes	No	Yes

Table 19 The 2016-2017 Ozone Monitoring Network for the Winston-Salem MSA [a]

AQS Site Id Number:	37-067-0022[b]	37-067-0030 [b]	37-067-1008 [b]
Site Name:	Hattie Avenue	Clemmons School	Union Cross
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Season will start 3/1 in 2017	Season will start 3/1 in 2017	Season will start 3/1 in 2017

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.
[b] Operated by Forsyth County Office of Environmental Assistance and Protection, AQS primary quality assurance organization and reporting agency 0403

Table 20 The 2016-2017 Ozone Monitoring Network for the Durham-Chapel Hill MSA [a]

AQS Site Id Number:	37-063-0015	37-145-0003
Site Name:	Durham Armory	Bushy Fork
Street Address:	801 Stadium Drive	7901 Burlington Road
City:	Durham	Hurdle Mills
Latitude:	36.032944	36.306965
Longitude:	-78.905417	-79.091970
MSA, CSA or CBSA represented:	Durham-Chapel Hill	Durham-Chapel Hill
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31
Statement of Purpose:	Maximum concentration site in the Durham-Chapel Hill MSA. Ozone precursor monitoring site. Real-time AQI reporting for the Durham-Chapel Hill MSA. Compliance w/NAAQS.	Compliance w/NAAQS.
Monitoring Objective:	Population exposure	General/background
Scale:	Neighborhood	Urban
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58 Appendix D:	Yes	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	Season will start 3/1 in 2017	Season will start 3/1 in 2017

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.

Table 21 The 2016-2017 Ozone Monitoring Network for the Asheville MSA [a]

AQS Site Id Number:	37-021-0030 [b]	37-087-0008
Site Name:	Bent Creek	Waynesville E.S.
Street Address:	Route 191 South	2236 Asheville Road
City:	Asheville	Waynesville

Latitude:	35.500102	35.507160
Longitude:	-82.599860	-82.963370
MSA, CSA or CBSA represented:	Asheville	Asheville
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31
Statement of Purpose:	Industrial expansion monitoring for PSD modeling. Real-time AQI reporting. Compliance with the NAAQS.	Low elevation (valley) site for Haywood County. Real-time AQI reporting. Modeling. Compliance w/NAAQS.
Monitoring Objective:	Maximum ozone concentration/ Highest concentration	Population exposure
Scale:	Urban	Urban
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58 Appendix D:	Yes	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	Season will start 3/1 in 2017	Season will start 3/1 in 2017

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.
[b] Operated by Western North Carolina Regional Air Quality Agency, AQS reporting agency 0779.

Table 22 The 2016-2017 Ozone Monitoring Network for the Fayetteville MSA [a]

AQS Site Id Number:	37-051-0008	37-051-0010
Site Name:	Wade	Honeycutt E.S.
Street Address:	7112 Covington Lane	4665 Lakewood Drive
City:	Wade	Fayetteville
Latitude:	35.158686	35.00
Longitude:	-78.728035	-78.99
MSA, CSA or CBSA represented:	Fayetteville	Fayetteville
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31
Statement of Purpose:	Maximum concentration site in the Fayetteville MSA. Real-time AQI reporting for the Fayetteville MSA. Compliance w/NAAQS.	Upwind site in the Fayetteville MSA. Real-time AQI reporting for the Fayetteville MSA. Compliance with the NAAQS
Monitoring Objective:	Highest concentration	Population exposure
Scale:	Urban	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047

Table 22 The 2016-2017 Ozone Monitoring Network for the Fayetteville MSA [a]

AQS Site Id Number:	37-051-0008	37-051-0010
Site Name:	Wade	Honeycutt E.S.
Meets Requirements of Part 58 Appendix D:	Yes	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	Season will start 3/1 in 2017	Season will start 3/1 in 2017

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.

Table 23 The 2016-2017 Ozone Monitoring Network for the Hickory MSA [a]

AQS Site Id Number:	37-003-0005	37-027-0003
Site Name:	Taylorsville-Liledoun	Lenoir
Street Address:	700 Liledoun Road	291 Nuway Circle
City:	Taylorsville	Lenoir
Latitude:	35.9139	35.935833
Longitude:	-81.191	-81.530278
MSA, CSA or CBSA represented:	Hickory	Hickory
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31
Statement of Purpose:	Compliance w/NAAQS..	Highest ozone precursor concentration site for Hickory MSA. Real-time AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	General/ background	General/ background
Scale:	Urban	Regional
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58 Appendix D:	Yes	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	Season will start 3/1 in 2017	Season will start 3/1 in 2017

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.

Table 24 The 2016-2017 Ozone Monitoring Network for the Wilmington, Greenville and Rocky Mount MSAs [a]

AQS Site Id Number:	37-129-0002	37-147-0006	37-065-0099
Site Name:	Castle Hayne	Pitt County Ag Center	Leggett
Street Address:	6028 Holly Shelter Road	403 Government Circle	7589 NC Hwy 33-NW
City:	Castle Hayne	Greenville	Leggett
Latitude:	34.364167	35.638610	35.988333
Longitude:	-77.838611	-77.358050	-77.582778
MSA, CSA or CBSA represented:	Wilmington	Greenville	Rocky Mount
Monitor Type:	SLAMS	SLAMS	SLAMS
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31
Statement of Purpose:	Real-time AQI reporting. Compliance w/NAAQS.	Real-time AQI reporting. Compliance w/NAAQS.	Real-time AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	General/ background	General/ background
Scale:	Neighborhood	Regional	Regional
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58 Appendix D:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Season will start 3/1 in 2017	Season will start 3/1 in 2017	Season will start 3/1 in 2017

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.

Table 25 The 2016-2017 Ozone Monitoring Network for the Mountain Tops [a]

AQS Site Id Number:	37-075-0001[b]	37-087-0035	37-087-0036	37-199-0004
Site Name:	Joanna Bald	Frying Pan	Purchase Knob	Mount Mitchell
Street Address:	Forest Road 423 Spur	State Rd 450, Blue Ridge Pkwy Mile 409	6905 Purchase Road	2388 State Hwy 128
City:	Robbinsville	Pisgah Forest	Waynesville (GSMNP)	Burnsville
Latitude:	35.257930	35.379167	35.590000	35.765413
Longitude:	-83.795620	-82.792500	-83.077500	-82.264944
MSA, CSA or CBSA represented:	Not in an MSA	Not in an MSA	Not in an MSA	Not in an MSA
Monitor Type:	Other	Other	Other	Special purpose
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31
Statement of Purpose:	Operated in cooperation with the USFS. Located in a Class I area. Provides ozone data for PSD modeling for industrial expansion. Provides AQI data for recreational users. Modeling. Compliance w/NAAQS.	Operated in cooperation with the USFS. Located in a Class I area and collocated at an IMPROVE site. Provides ozone data for PSD modeling for industrial expansion. Provides AQI data for recreational users. Real-time AQI reporting for the Asheville MSA. Modeling. Compliance w/NAAQS.	Operated in cooperation with the USFS. Located in a Class I area. Provides ozone data for PSD modeling for industrial expansion. Provides AQI data for recreational users. Real-time AQI reporting for the Asheville MSA. Modeling. Compliance w/NAAQS.	Provides ozone data for PSD modeling for industrial expansion. Provides AQI data for recreational users. Modeling. Compliance w/NAAQS.
Monitoring Objective:	Welfare related impacts/ general/ background	Welfare related impacts/ general/ background	Welfare related impacts/ general/ background	Welfare related impacts/ general/ background/ regional transport
Scale:	Regional	Regional	Regional	Regional
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58	No	No	No	No

Table 25 The 2016-2017 Ozone Monitoring Network for the Mountain Tops [a]

AQS Site Id Number:	37-075-0001[b]	37-087-0035	37-087-0036	37-199-0004
Site Name:	Joanna Bald	Frying Pan	Purchase Knob	Mount Mitchell
Appendix D:				
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Requesting waiver for 3/1 season start	Requesting waiver for 3/1 season start	Requesting waiver for 3/1 season start	Requesting waiver for 3/1 season start

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.
[b] This monitor is owned by the United States Forest Service and operated by the North Carolina Division of Air Quality.

Table 26 The 2016-2017 Ozone Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA (Part 1) [a]

AQS Site Id Number:	37-011-0002	37-033-0001	37-077-0001	37-105-0002
Site Name:	Linville Falls	Cherry Grove	Butner	Blackstone
Street Address:	100 Linville Falls Road	7074 Cherry Grove Road	800 Central Ave	4110 Blackstone Drive
City:	Linville Falls	Reidsville	Butner	Sanford
Latitude:	35.972222	36.307033	36.141111	35.432500
Longitude:	-81.933056	-79.467417	-78.768056	-79.288700
MSA, CSA or CBSA represented:	Not in an MSA	Not in an MSA	Not in an MSA	Not in an MSA
Monitor Type:	Other	Other	SLAMS	Special purpose
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31	Hourly Year round
Statement of Purpose:	Operated in cooperation with the USFS. Located in a Class I area and collocated at an IMPROVE site. Provides ozone data for PSD modeling for industrial expansion. Provides AQI data for recreational users. Modeling. Compliance w/NAAQS.	Extreme downwind site for the Greensboro-High Point MSA. Modeling. Real-time AQI reporting for the Greensboro-Winston-Salem-High Point CSA. Compliance with the NAAQS	Maximum concentration site downwind for the Durham-Chapel Hill MSA. Modeling. Real-time AQI reporting for the Raleigh-Durham-Chapel Hill CSA. Compliance w/NAAQS.	General/ background site for shale gas development study.
Monitoring Objective:	Welfare related impacts/ general/ background	General/ background	Highest concentration	General/ background
Scale:	Urban	Urban	Urban	Urban
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes
Meets	Yes	Yes	Yes	Yes

Table 26 The 2016-2017 Ozone Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA (Part 1) [a]

AQS Site Id Number:	37-011-0002	37-033-0001	37-077-0001	37-105-0002
Site Name:	Linville Falls	Cherry Grove	Butner	Blackstone
Requirements of Part 58 Appendix A:				
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58 Appendix D:	No	No	No	No
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Season will start 3/1 in 2017	Season will start 3/1 in 2017	Season will start 3/1 in 2017	None

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.
[b] This monitor is owned by the United States Forest Service and operated by the North Carolina Division of Air Quality.

Table 27 The 2016-2017 Ozone Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA (Part 2) [a]

AQS Site Id Number:	37-107-0004	37-117-0001	37-173-0002
Site Name:	Lenoir Community College	Jamesville	Bryson City
Street Address:	231 Highway 58 S	1210 Hayes Street	Parks & Rec Bldg, Center Street
City:	Kinston	Jamesville	Bryson City
Latitude:	35.231459	35.810690	35.434767
Longitude:	-77.568792	-76.897820	-83.442133
MSA, CSA or CBSA represented:	Not in an MSA	Not in an MSA	Not in an MSA
Monitor Type:	Other	SLAMS	SLAMS
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31	Hourly 4/1 to 10/31
Statement of Purpose:	Compliance w/NAAQS.	Compliance w/NAAQS.	Regional transport and general background site. Low elevation (valley) mountain site on the NC side of the Great Smokey Mountains National Park. Modeling. Forecasting. Compliance w/NAAQS.
Monitoring Objective:	General/ background	General/ background	General/ background
Scale:	Neighborhood	Regional	Neighborhood

Table 27 The 2016-2017 Ozone Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA (Part 2) [a]

AQS Site Id Number:	37-107-0004	37-117-0001	37-173-0002
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58 Appendix D:	No	No	No
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Season will start 3/1 in 2017	Season will start 3/1 in 2017	Season will start 3/1 in 2017

[a] All monitors use an instrumental ultra violet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.

VI. Particle Monitoring Network for Particles with Aerodynamic Diameters of 10 Micrometers or Less, PM_{10}

Monitoring for particles of 10 micrometers or less aerodynamic diameter, PM_{10}, is currently conducted in North Carolina at six sites operated by the North Carolina Division of Air Quality, DAQ, and at four sites operated by local programs. The data collected are used to determine human health effect exposures in metropolitan statistical areas, MSAs, with over 500,000 people and to collect background levels for prevention of significant deterioration, PSD, purposes. The DAQ also uses PM_{10} as a surrogate for PSD modeling for the state standard for total suspended particulates, TSP.

Figure 32 through Figure 34 provide the highest PM_{10} concentrations measured in North Carolina for the past five years. The monitoring regulations currently require a monitor to be attaining the national ambient air quality standards, NAAQS, for the past five years before the monitor can be shut down. All PM_{10} monitors operated in North Carolina in the last five years have attained the NAAQS and have reported values less than 80 percent of the standard. Thus, the only monitors that the EPA requires the state to operate are the ones required to meet the minimum monitoring requirements in 40 CFR 58 Appendix D Table D-4 provided in Figure 35 and those used to provide background data for PSD modeling.

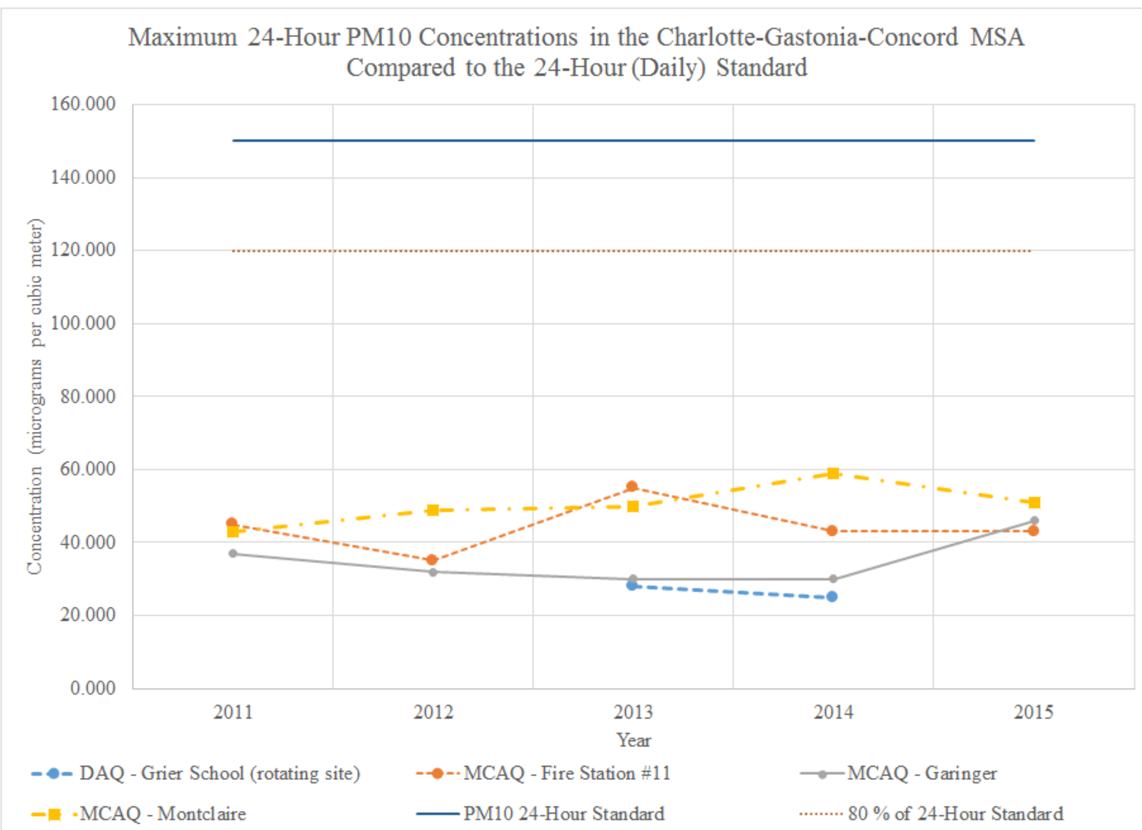


Figure 32. Maximum 24-hour PM10 concentration in the Charlotte -Concord-Gastonia MSA from 2011-2015

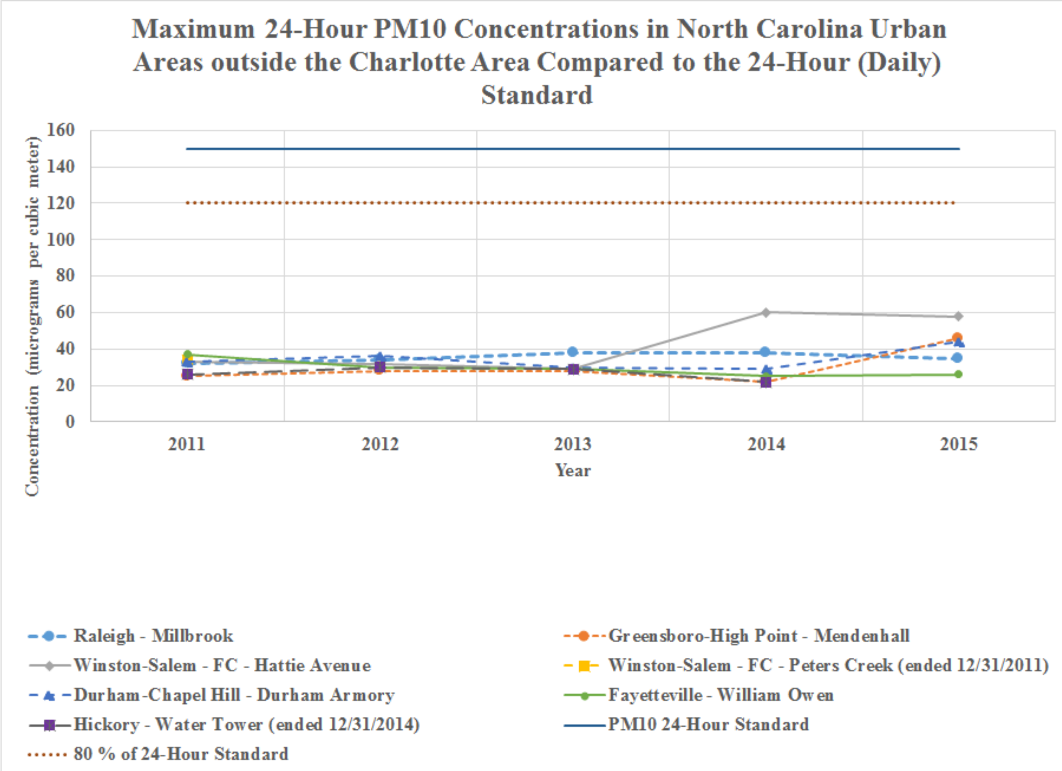


Figure 33. Maximum 24-hour concentration in North Carolina urban areas from 2011 to 2015

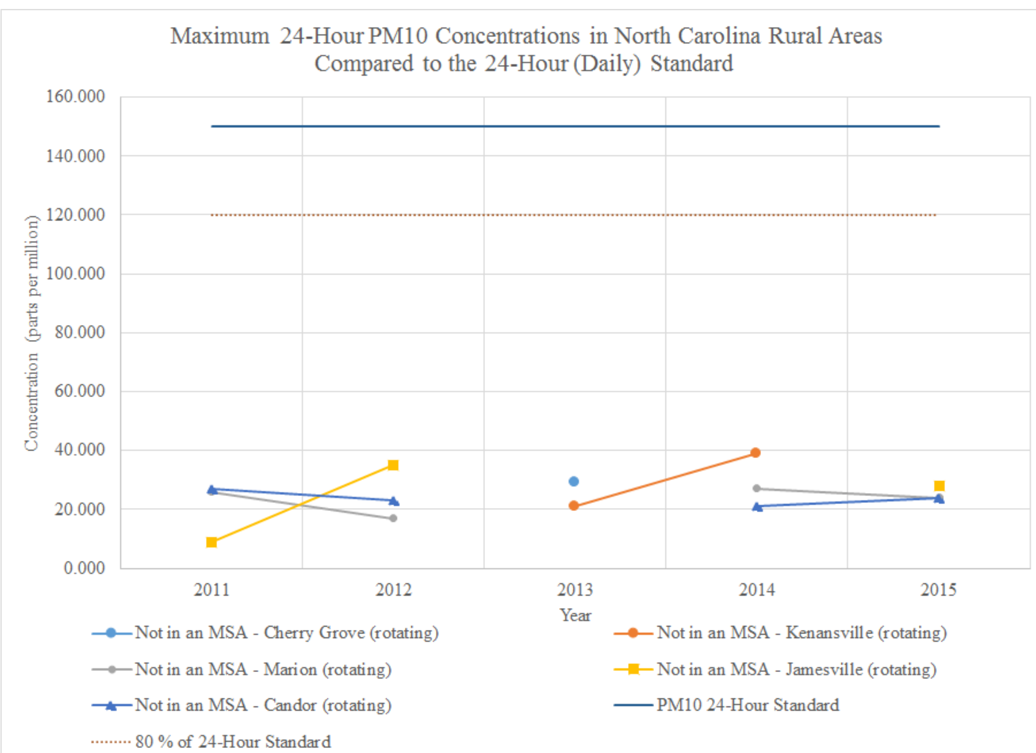


Figure 34. Maximum PM10 concentrations in rural areas in North Carolina from 2011 to 2015

Table D–4 of Appendix D to Part 58. PM_{10} Minimum Monitoring Requirements (Number of Stations per MSA)[1]

Population category	High concentration[2]	Medium concentration[3]	Low concentration[4,5]
>1,000,000	6–10	4–8	2–4
500,000–1,000,000	4–8	2–4	1–2
250,000–500,000	3–4	1–2	0–1
100,000–250,000	1–2	0–1	0

[1] Selection of urban areas and actual numbers of stations per area within the ranges shown in this table will be jointly determined by EPA and the State Agency.
[2] High concentration areas are those for which ambient PM10 data show ambient concentrations exceeding the PM_{10} NAAQS by 20 percent or more.
[3] Medium concentration areas are those for which ambient PM10 data show ambient concentrations exceeding 80 percent of the PM_{10} NAAQS.
[4] Low concentration areas are those for which ambient PM10 data show ambient concentrations less than 80 percent of the PM_{10} NAAQS.
[5] These minimum monitoring requirements apply in the absence of a design value.

Figure 35. Table D-4 from 40 CFR 58 Appendix D

The 2015 estimated population of the MSA and the most recent PM_{10} ambient concentration values for the area determines the number of required monitors for an area. Table 28 provides the 2015 estimated total population for the MSAs in North Carolina, the maximum ambient daily concentration values as percentage of the NAAQS for 2015, the number of required monitors based on 40 CFR 58 Appendix D Table D-4 and the number of current monitors operated by the DAQ and the local programs. Currently, the DAQ and the local programs are operating the minimum number of required monitors in every MSA except for the Virginia Beach-Norfolk-New Port News and the Raleigh MSA. The DAQ has a written agreement with the Virginia Department of Environmental Quality, VDEQ, Office of Air Quality Monitoring, that VDEQ will maintain the minimum required number of monitors for the Virginia Beach-Norfolk-New Port News MSA.[23]

The DAQ received a waiver from the EPA for the second required monitor in the Raleigh MSA. The EPA granted the waiver because PM_{10} values recorded in the Raleigh MSA have been less than 50 percent of the NAAQS except for when the existing monitor was impacted by an exceptional event on June 12, 2008.

Currently the DAQ operates one PM_{10} monitor that may not be required by 40 CFR 58 Appendix D. This monitor is located at William Owen School in Fayetteville. The monitor may not be required because Appendix D requires zero to one monitor for areas with populations less than 500,000 and measured concentrations less than 80 percent of the NAAQS. The DAQ evaluated the purpose for this monitor and the use of the data from the monitor. The data from the William Owen monitor are used for PSD modeling so the DAQ will continue operating this monitor. A PM_{10} monitor at Hickory was shut down at the end of 2014 because the data were not used for PSD modeling, the measured concentrations were less than 40 percent of the standard and trending downward and the population in Hickory is less than 500,000.

[23] See Appendix N. Monitoring Agreement between Virginia and North Carolina for the Virginia Beach-Norfolk-New Port News Metropolitan Statistical Area.

Table 28 Ambient Concentrations and Required Number of PM_{10} Monitors for North Carolina Metropolitan Statistical Areas, MSA

MSA	Population Estimate, 2015 [a]	2015 PM_{10} 24-Hour Maximum Ambient Concentration, as percent of NAAQS	Number of Monitors operated in North Carolina	
			Required [b]	Current
Charlotte-Concord-Gastonia	2,426,368	34	2-4	3
Virginia Beach-Norfolk-New Port News, VA-NC	1,706,680	18	2-4	0 [c]
Raleigh	1,273,568	23	2-4	1 [d]
Greensboro-High Point	752,157	31	1-2	1
Winston-Salem	659,330	39	1-2	1
Durham-Chapel Hill	552,493	29	1-2	1
Asheville	446,840	20 [e]	0-1	0
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	431,964	Not Available	0-1	0
Fayetteville	376,509	17	0-1	1
Hickory	362,510	15 [f]	0-1	0
Wilmington	277,969	10 [g]	0-1	0
Jacksonville	186,311	25 [h]	0	0
Greenville	175,842	Not Available	0	0
Burlington	158,276	Not Available	0	0
Rocky Mount	148,069	30 [i]	0	0
New Bern	126,245	Not Available	0	0
Goldsboro	124,132	21 [h]	0	0

[a] Source: Annual Estimates of the Resident Population: Apr. 1, 2010 to July 1, 2015, U.S. Census Bureau, Population Division, Released Mar. 24, 2016, available on the world wide web at http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.
[b] 40 CFR 58 Appendix D Table D-4
[c] The Virginia Department of Environment operates two PM_{10} monitors
[d] The DAQ received a waiver in 2008 for the second required PM_{10} monitor
[e] PM_{10} 24-hour maximum ambient concentration is from 2009
[f] PM_{10} 24-hour maximum ambient concentration is from 2014
[g] Only eight samples were collected from mid-February to the end of March 2008.
[h] PM_{10} 24-hour maximum ambient concentration is from 2007
[i] PM_{10} 24-hour maximum ambient concentration is from 2006

In 2011 the DAQ modified its PM_{10} PSD monitoring network by establishing a network of rotating background PM_{10} sites. One to three PM_{10} monitors operate each year and each site operates once every 39 months. Because the DAQ decided to shut down the Grier School particle monitoring site in Gastonia at the end of 2014, the rotating PM_{10} monitor at Grier School was replaced with a rotating PM_{10} monitor at the Taylorsville Liledoun site. Likewise, when DAQ shut down the Marion and Kenansville particle monitoring sites, the rotating PM_{10} monitors at those sites were moved to the Lenoir Community College, LCC, site in Kinston and the Castle Hayne site in Wilmington. Thus, the six PM_{10} background sites are:

- Candor and LCC, operating from May 2017 through April 2018;
- Jamesville operating from June 2018 through May 2019; and
- Castle Hayne, Cherry Grove and Taylorsville Liledoun, operating from April 2016 through March 2017.

Two of these six sites, Candor and Castle Hayne, are also fine particle monitoring sites. The other four sites are ozone monitoring sites.

The monitoring regulations promulgated in 2006 include a method for measuring coarse particles. The coarse particle monitoring method measures coarse particles by the difference between the measured PM_{10} concentration and the fine particle concentration measured using the same sampling and analytical method. The DAQ purchased two coarse particle BAM monitors and plans to gradually convert the current manual PM_{10} high volume samplers to continuous PM_{10} low volume samplers. Some of these sites can be used to measure both PM_{10} and coarse particles.

Also, Mecklenburg County Air Quality, MCAQ, and DAQ became separate primary quality assurance organizations, PQAOs, in 2015. The MCAQ operated the collocated low-volume PM_{10} monitor for the PQAO. Since MCAQ and the DAQ are separate PQAOs, the DAQ added a collocated low volume PM_{10} monitor at Millbrook starting Jan. 1, 2015.

The locations of the current and rotating PM_{10}-monitoring sites are provided in Figure 36. Table 29 through Table 33 list the locations, monitor type, operating schedules, monitoring objectives, scales, statement of purpose, status for each current and proposed monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D and E of 40 CFR 58 and any proposed changes to the network. All monitors listed in these tables are suitable for comparison to the NAAQS. All of the monitors meet the requirements of Appendices A, C and E of 40 CFR 58. All of the monitors operate year-round.

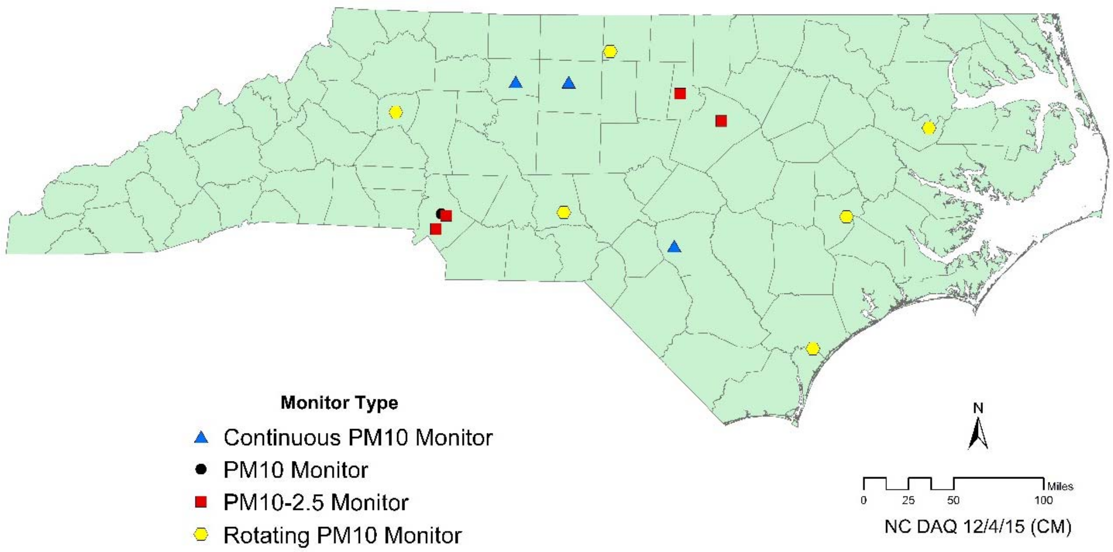


Figure 36. 2016-2017 PM 10 Monitor Locations

Table 29 The 2016-2017 PM10 Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0003 [b, c]	37-119-0041 [d]	371190042 [c, d]
Site Name:	#11 Fire Station	Garinger	Montclaire
Street Address:	Fire Station #11, 620 Moretz Avenue	1130 Eastway Drive	1935 Emerywood Drive
City:	Charlotte	Charlotte	Charlotte
Latitude:	35.251717	35.2401	35.151283
Longitude:	-80.824717	-80.7857	-80.866983
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS	SLAMS / NCore	SLAMS
Operating Schedule:	24-hour, midnight to midnight, 1 in 6 day	24-hour, midnight to midnight, 1 in 3 day	24-hour, midnight to midnight, 1 in 3 day
Statement of Purpose:	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling	Required by Appendix D for NCore sites. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling	Required by Appendix D. Collocated low volume PM10 site required by Appendix A. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.
Monitoring Objective:	Highest concentration/ population exposure	Population exposure	Population exposure
Scale:	Neighborhood	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: RFPS-1287-063	Yes: RFPS-1298-127	Yes: RFPS-1298-127

AQS Site Id Number:	37-119-0003 [b, c]	37-119-0041 [d]	371190042 [c, d]
Site Name:	#11 Fire Station	Garinger	Montclaire
Meets Requirements of Part 58 Appendix D:	Yes	Yes - NCore	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Site will shut down on 6/30/2016	None	None

[a] Operated by Mecklenburg County Air Quality, AQS primary quality assurance organization and reporting agency 0669
[b] Monitor uses a high-volume SA/GMW-1200 (AQS Method Code 063), U.S. EPA reference method designation RFPS-1087-063
[c] This site has a collocated PM_{10} monitor to meet Appendix A requirements
[d] Monitor uses a low-volume Thermo R&P 2025 (AQS Method Code 127), U.S. EPA reference method designation RFPS-1298-127

Table 30 The 2016-2017 PM_{10} Monitoring Network for the Raleigh-Durham-Cary CSA

AQS Site Id Number:	37-063-0015 [a]	37-183-0014 [b]
Site Name:	Durham Armory	Millbrook
Street Address:	801 Stadium Drive	3801 Spring Forest Road
City:	Durham	Raleigh
Latitude:	36.032944	35.8561
Longitude:	-78.905417	-78.5742
MSA, CSA or CBSA represented:	Durham-Chapel Hill	Raleigh
Monitor Type:	SLAMS	SLAMS / NCore
Operating Schedule:	Hourly	24-hour, midnight to midnight, 1 in 3 day
Statement of Purpose:	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.
Monitoring Objective:	Population exposure	Population exposure
Scale:	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	EQPM-0798-122	Yes: RFPS-1298-127
Meets Requirements of Part 58 Appendix D:	Yes	Yes - NCore
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	None

[a] This monitor is a Met One 1020 beta attenuation monitor, Air Quality System, AQS, method code 122. It uses the EPA equivalent method designation EQPM-0798-122.
[b] Monitor uses a low-volume Thermo R&P 2025 (AQS Method Code 127), U.S. EPA reference method designation RFPS-1298-127. This site has a collocated PM_{10} monitor to meet Appendix A requirements.

Table 31 The 2016-2017 PM_{10} Monitoring Network for the Greensboro-Winston-Salem-High Point CSA

AQS Site Id Number:	37-067-0022[a]	37-081-0013[b]
Site Name:	Hattie Avenue	Mendenhall
Street Address:	1300 block of Hattie Avenue	205 Willoughby Blvd.
City:	Winston-Salem	Greensboro
Latitude:	36.110556	36.109167
Longitude:	-80.226667	-79.801111
MSA, CSA or CBSA represented:	Winston-Salem	Greensboro-High Point
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly	Hourly
Statement of Purpose:	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.
Monitoring Objective:	Population exposure	Population exposure/ general/ background
Scale:	Neighborhood	Neighborhood/urban
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQPM-1090-079	EQPM-0798-122
Meets Requirements of Part 58 Appendix D:	Yes	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	None

[a] Operated by Forsyth County Office of Environmental Assistance and Protection, AQS primary quality assurance organization and reporting agency 0403. Monitor uses a Ruprecht & Patshneck TEOM Series 1400 (AQS Method Code 079), U.S. EPA equivalent method designation EQPM-1090-079.
[b] This monitor uses a Met One 1020 beta attenuation monitor, Air Quality System, AQS, method code 122. This monitor uses the EPA equivalent method designation EQPM-0798-122.

Table 32 The 2016-2017 PM10 Monitoring Network for the Fayetteville, Hickory and Wilmington MSAs [a]

AQS Site Id Number:	370510009	37-003-0005	37-129-0002
Site Name:	William Owen	Taylorsville-Liledoun	Castle Hayne
Street Address:	4533 Raeford Road	700 Liledoun Road	6028 Holly Shelter Road
City:	Fayetteville	Taylorsville	Castle Hayne
Latitude:	35.041416	35.9139	34.364167
Longitude:	-78.953112	-81.191	-77.838611
MSA, CSA or CBSA represented:	Fayetteville	Hickory	Wilmington
Monitor Type:	SLAMS	Special purpose	Special purpose
Operating Schedule:	Hourly	Hourly 3-year rotation	Hourly 3-year rotation
Statement of Purpose:	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Industrial expansion monitoring for PSD modeling	Industrial expansion monitoring for PSD modeling
Monitoring Objective:	Population exposure	General/ background	General/ background
Scale:	Urban	Urban	Urban
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	EQPM-0798-122	EQPM-0798-122	EQPM-0798-122
Meets Requirements of Part 58 Appendix D:	Yes	No	No
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	Will operate 4/1/2016 to 3/31/2017	Will operate 8/1/2016 to 7/31/2017

[a] All monitors use a Met One 1020 beta attenuation monitor, Air Quality System, AQS, method code 122. All monitors use the EPA equivalent method designation EQPM-0798-122.

Table 33 The 2016-2017 PM10 Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA [a]

AQS Site Id Number:	37-033-0001	37-107-0004	37-117-0001	371230001
Site Name:	Cherry Grove	Lenoir Community College	Jamesville	Candor
Street Address:	7074 Cherry Grove Road	231 Highway 58 S	1210 Hayes Street	112 Perry Drive
City:	Reidsville	Kinston	Jamesville	Candor
Latitude:	36.307033	35.231459	35.810690	35.262490
Longitude:	-79.467417	-77.568792	-76.897820	-79.836613
MSA, CSA or CBSA represented:	Not in an MSA	Not in an MSA	Not in an MSA	Not in an MSA
Monitor Type:	Special purpose	Special purpose	Non-regulatory	SLAMS
Operating Schedule:	Hourly 3-year rotation	Hourly 3-year rotation	Hourly 3-year rotation	Hourly 3-year rotation
Statement of Purpose:	Industrial expansion monitoring for PSD modeling for northern piedmont areas	Industrial expansion monitoring for PSD modeling for coastal areas	Industrial expansion monitoring for PSD modeling for northern coastal areas	Industrial expansion monitoring for PSD modeling for sand hill areas
Monitoring Objective:	Population exposure general/ background	Population exposure general/ background	General/ background	Population exposure general/ background
Scale:	Urban	Neighborhood	Regional	Regional
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes
Meets Part 58 Appendix A Requirements:	Yes	Yes	Yes	Yes
Meets Part 58 Appendix C Requirements:	EQPM-0798-122	EQPM-0798-122	EQPM-0798-122	EQPM-0798-122
Meets Part 58 Appendix D Requirements:	No	No	No	No
Meets Part 58 Appendix E Requirements:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Will operate 4/1/2016 to 3/31/2017	Will operate 5/1/2017 to 4/30/2018	Will operate 6/1/2018 to 5/31/2019	Will operate 5/1/2017 to 4/30/2018

[a] All monitors use a Met One 1020 beta attenuation monitor, Air Quality System, AQS, method code 122. All monitors use the EPA equivalent method designation EQPM-0798-122.

VII. Fine Particle, $PM_{2.5}$, Monitoring Network

This section is divided into three subsections. The first discusses the network of federal reference method, FRM, and federal equivalent method, FEM, fine particle monitors used to determine compliance with the national ambient air quality standards, NAAQS. The second section discusses the continuous fine particle monitors that are used for air quality forecasting, real-time reporting and air quality index reporting. Three of these monitors are FEMs that are also part of the FRM/FEM network. The third section discusses the fine particle manual speciation monitors.

A. The Federal Reference Method and Federal Equivalent Method Network

The North Carolina Division of Air Quality, DAQ, currently operates 12 FRM or FEM fine particle monitoring sites and the local programs operate five. The monitors at these sites have been approved by the United States Environmental Protection Agency, EPA, and can be used to determine compliance with the NAAQS. The DAQ believes this network is sufficient to protect the health and welfare of the people and environment in North Carolina as well as to provide information on how fine particles are transported to and within the state, to identify the parts of the state with the highest concentrations of fine particles and to know where fine particle concentrations do and do not exceed the NAAQS.

Figure 37 through Figure 48 provides the fine particle design values for the monitors in North Carolina for the past five years. This information is important because the monitoring regulations require a monitor to be attaining the NAAQS for the past five years before the monitor can be shut down (see 40 CFR 58.14(c)(1)). All of the currently operating FRM/FEM monitors meet this requirement. However, 40 CFR 58 Appendix D 4.7 requires nine of these monitors:

- Garinger and Montclaire in the Charlotte-Concord-Gastonia MSA;
- Millbrook and West Johnston in the Raleigh MSA;
- Mendenhall in the Greensboro MSA;
- Hattie Avenue in the Winston-Salem MSA;
- Durham Armory in the Durham MSA;
- Bryson City as a transport monitor; and
- Candor as a background monitor.

Two of these monitors, Hickory and Lexington, are required in the December 2009 Redesignation and Maintenance Plan for Fine Particulate Matter.[24]

The remaining six monitors are less than 80 percent of the standard and may meet the additional requirement of having less than 10 percent probability of exceeding 80 percent of the NAAQS during the next three years (see 40 CFR 58.14(c)(1)) based on design value trends and model predictions. Thus, there are six monitors, two operated by local programs and four operated by DAQ, that are not required by Appendix D or by the

[24] "Redesignation Demonstration and Maintenance Plan for the Hickory and Greensboro/Winston-Salem/High Point Fine Particulate Matter Nonattainment Areas" State Implementation Plan (SIP), Dec. 18, 2009, available on the worldwide web at http://deq.nc.gov/about/divisions/air-quality/air-quality-planning/state-implementation-plans/hickory-area.

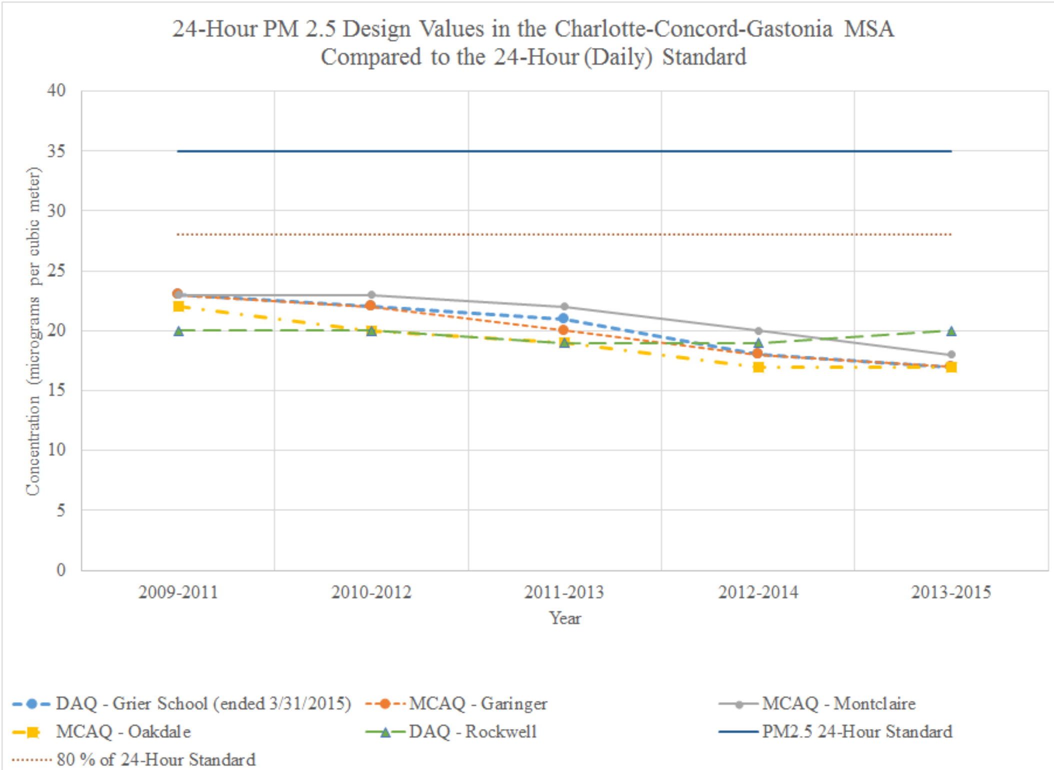


Figure 37. Measured daily fine particle design values in the Charlotte-Concord-Gastonia MSA during the past 5 years

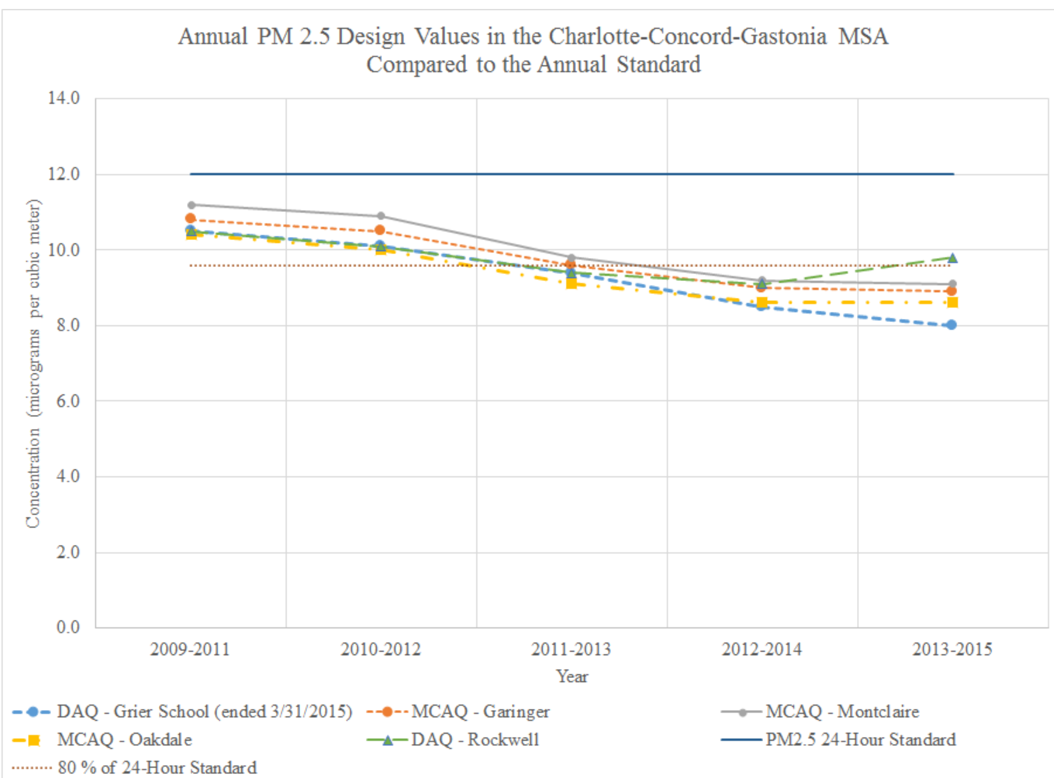


Figure 38. Annual design values measured in the Charlotte-Concord-Gastonia MSA during the past 5 years

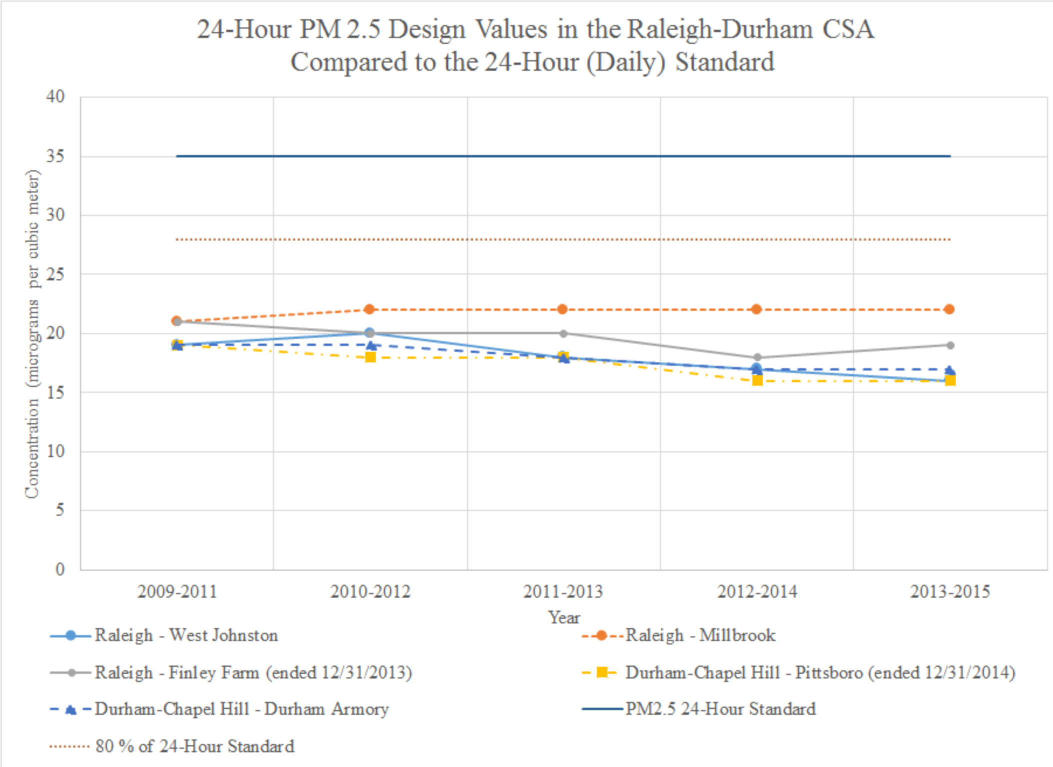


Figure 39. Daily fine particle design values measured in the Raleigh-Durham CSA during the past 5 years

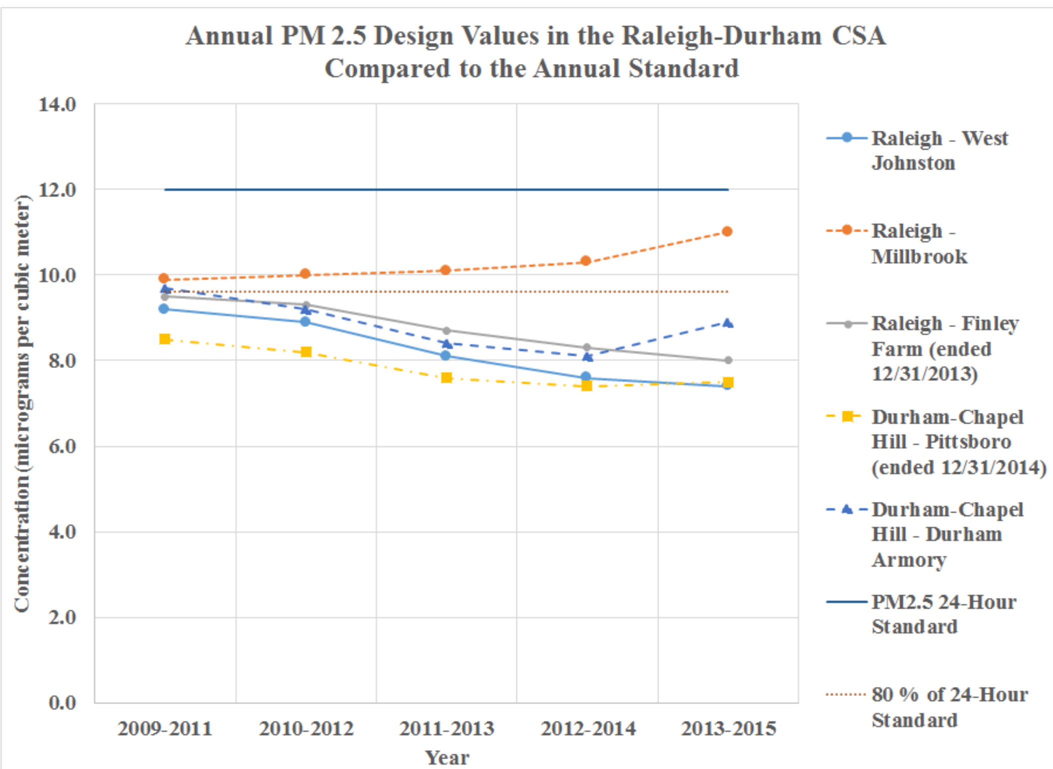


Figure 40. Annual fine particle design values measured in the Raleigh-Durham CSA during the past 5 years

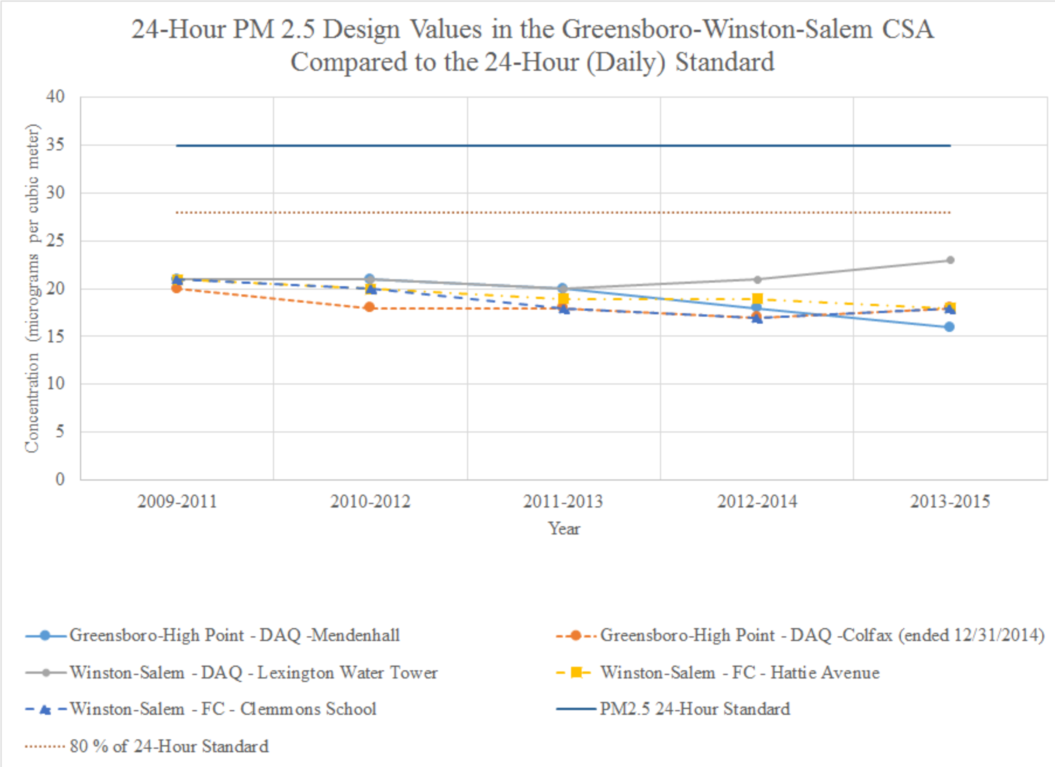


Figure 41. Daily fine particle design values measured in the Greensboro-Winston-Salem CSA during the past 5 years

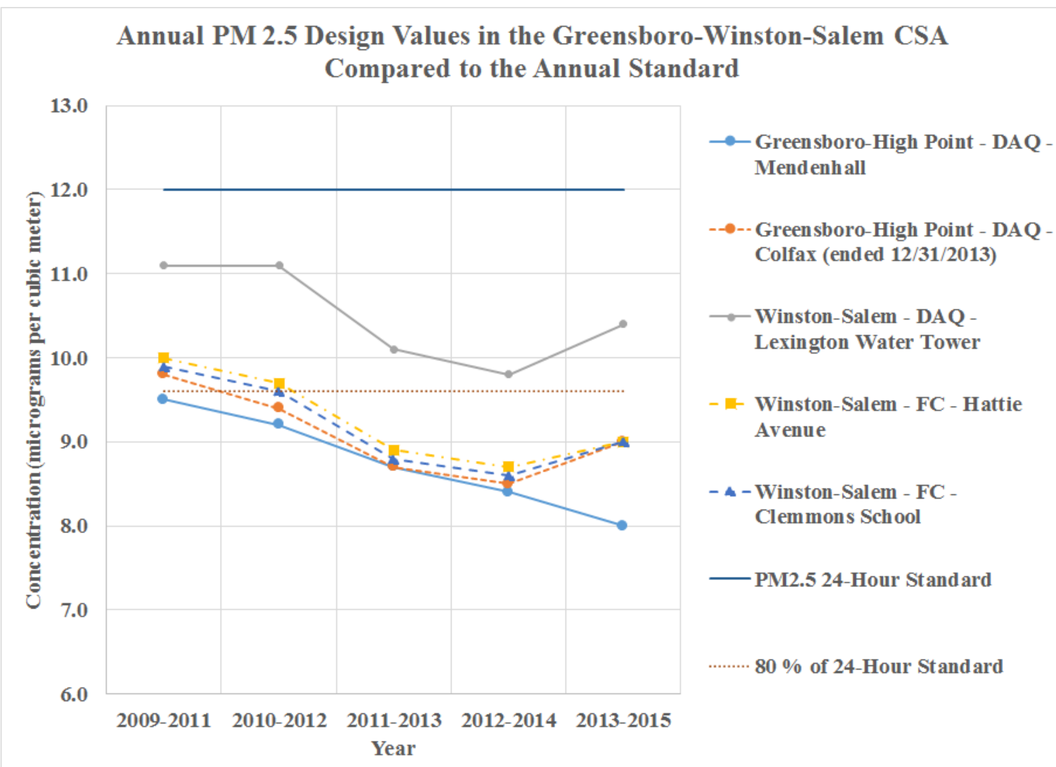


Figure 42. Annual fine particle design values measured in the Greensboro-Winston-Salem CSA from 201 to 2015

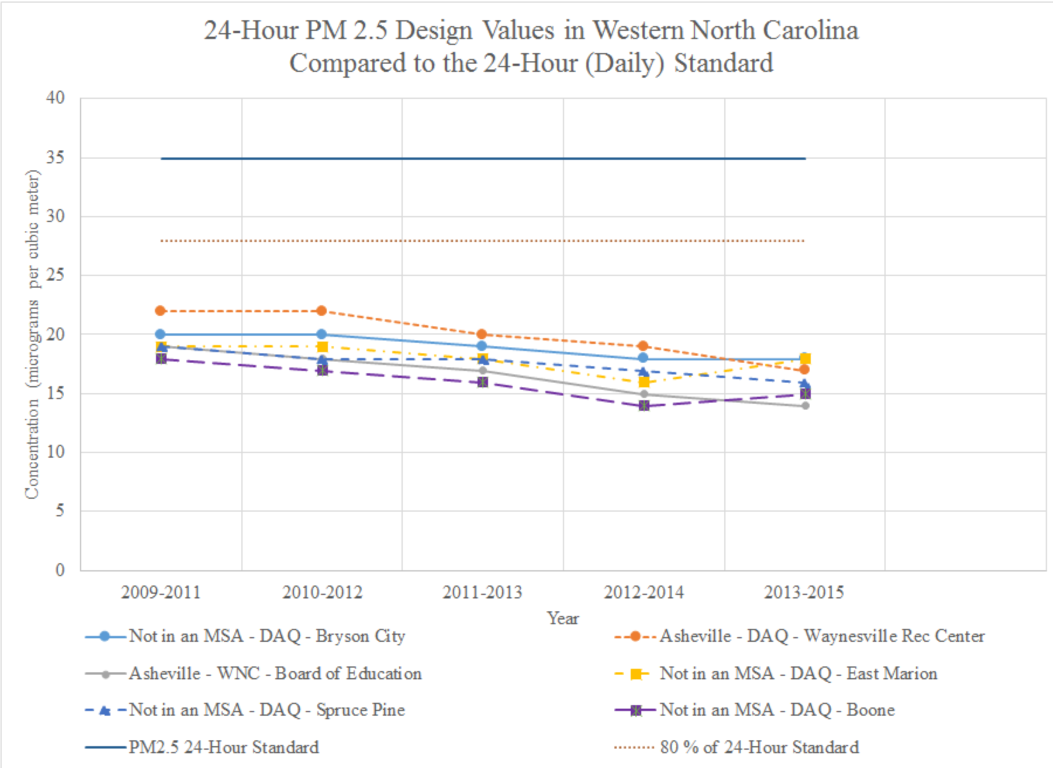


Figure 43. Daily fine particle design values measured in western North Carolina during the past 5 years

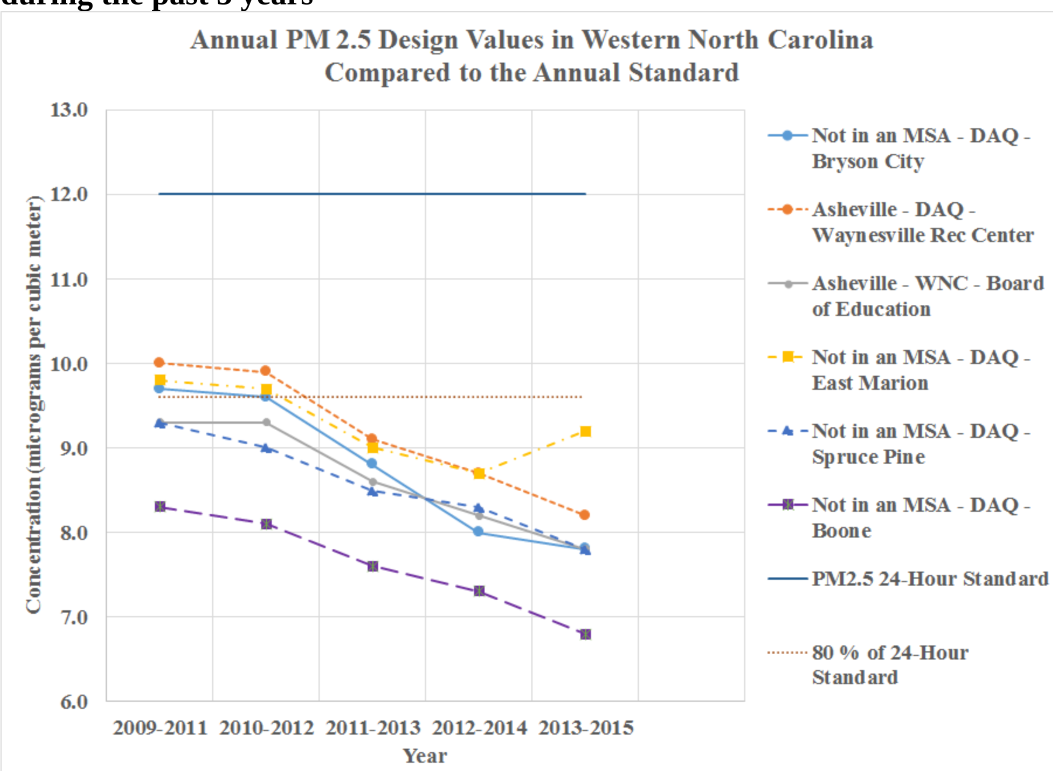


Figure 44. Annual fine particle design values measured in western North Carolina during the past 5 years

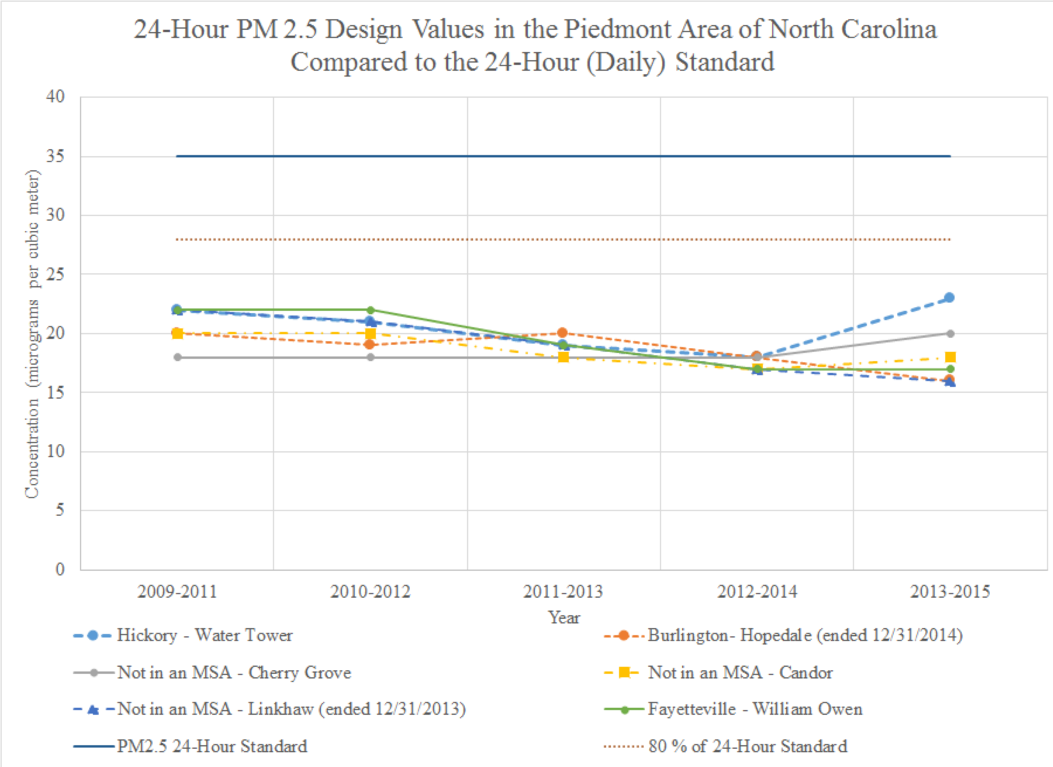


Figure 45. Daily fine particle design values measured in central North Carolina during the past 5 years

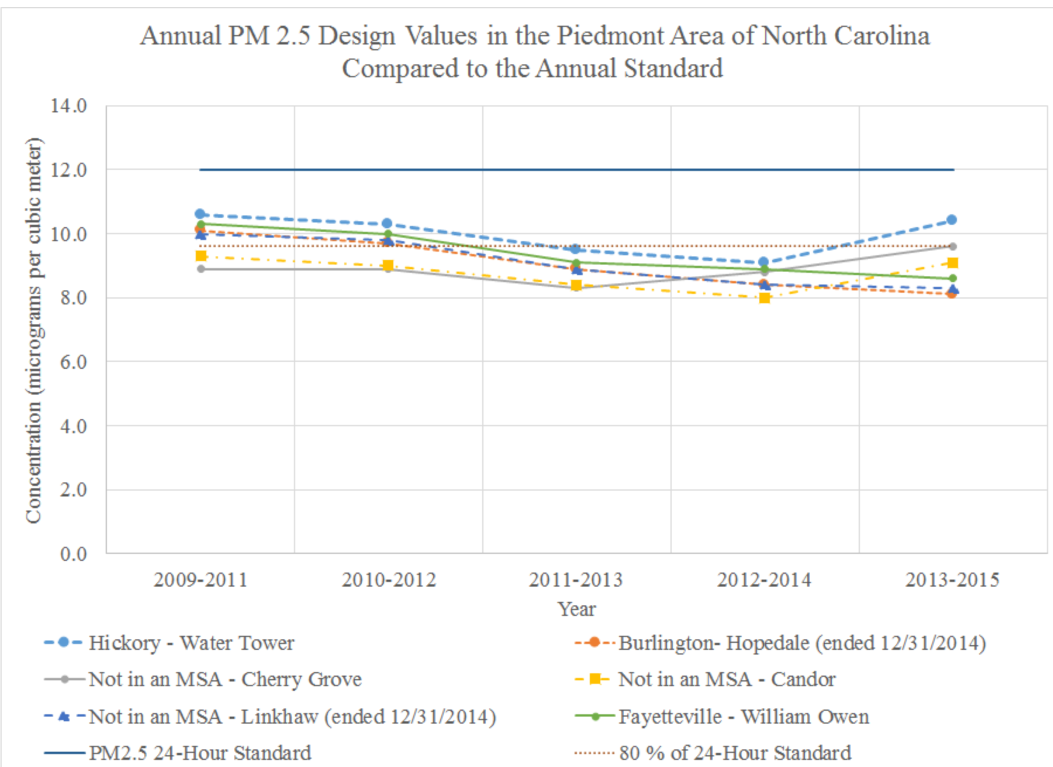


Figure 46. Annual fine particle design values measured in central North Carolina during the past 5 years

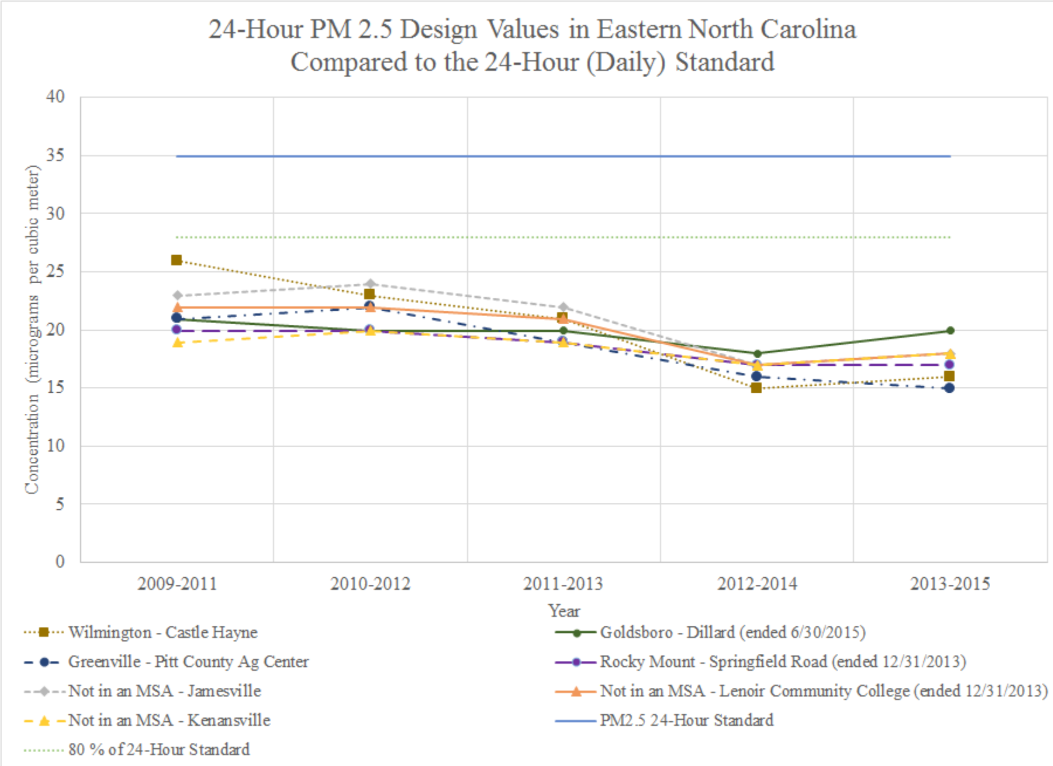


Figure 47. Daily design values measured in eastern North Carolina during the past 5 years

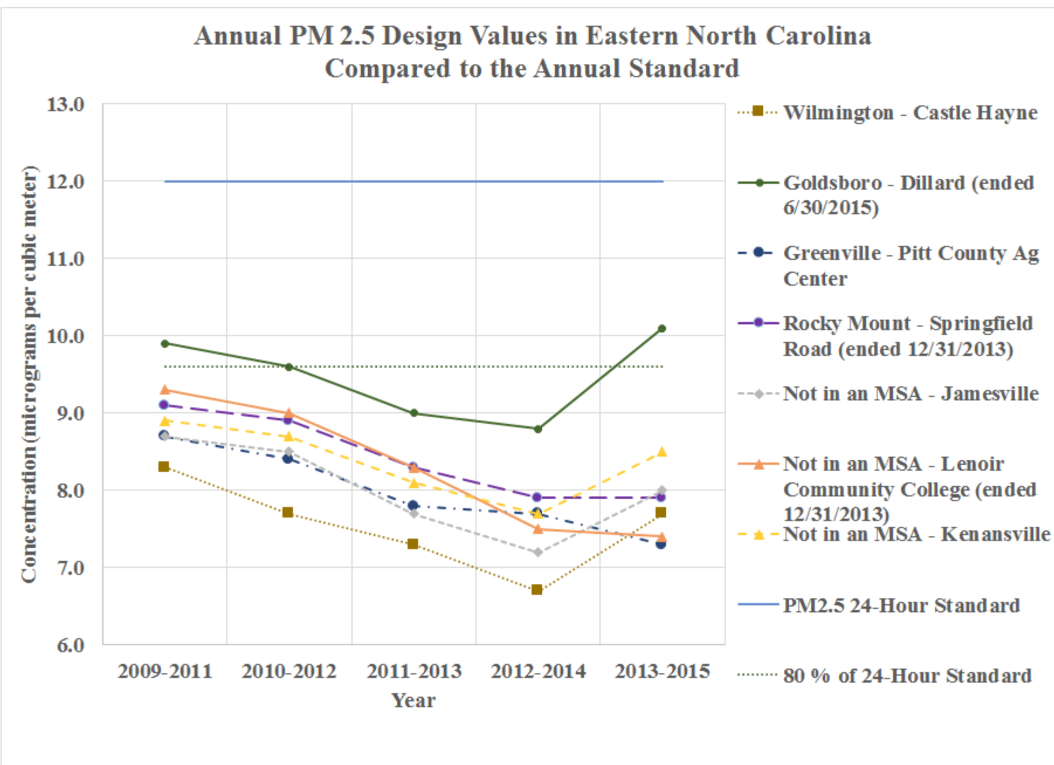


Figure 48. Annual fine particle design values measured in eastern North Carolina during the past 5 years

state implementation plan and that could potentially meet all of the requirements of 40 CFR 58.14(c)(1) to be shut down. The DAQ reviewed the four monitors operated by DAQ and their current monitoring objectives and determined these four monitors are still required to meet state objectives and provide an adequate background network for prevention of significant deterioration permitting and modeling. These four monitors are:

- 37-051-0009 at William Owen in the Fayetteville MSA;
- 37-129-0002 at Castle Hayne in the Wilmington MSA;
- 37-147-0006 at the Pitt County Ag Center in the Greenville MSA; and
- 37-121-0004 at Spruce Pine in Mitchell County.

The DAQ decided to continue operating these four monitors for the following reasons:

- The William Owen, 37-051-0009, monitor is needed to maintain an adequate spatial coverage for the fine particle monitoring network. Without it, there would be a hole in coverage for the south central part of the state. The data from this monitor are also used for PSD modeling. In addition, the Fayetteville MSA is in one of the fastest growing areas of the state. Hoke County, one of two counties in the MSA, is the 68th fastest growing county in the nation.
- The Castle Hayne, 37-129-0002, monitor is in an area where there is a great deal of interest in the air quality because of plans to build a concrete facility across the road from the monitor. The DAQ believes it is important to maintain a design value monitor at this location.
- The Pitt County Agricultural Center, 37-147-0006, monitor is located in Greenville, one of the largest urban areas in northern coastal North Carolina. Having a fine particle monitor here is important when there are wildfires in the area. Eventually, the DAQ may extend air quality forecasting to the area.
- The Spruce Pine, 37-121-0004, monitor is located in a mining community and monitors potential mining activity impacts.

The reasons for continued operation of these monitors are consistent with the federal guidelines in 40 CFR 58 Appendix D 1.1.1, which states:

> "…a network must be designed with a variety of types of monitoring sites. Monitoring sites must be capable of informing managers about many things including the peak air pollution levels, typical levels in populated areas, air pollution transported into and outside of a city or region and air pollution levels near specific sources."

These monitors are necessary for the staff of the DAQ to make informed decisions and provide air quality information to the public to inform public health and welfare decisions.

Thus, the current network continues to meet the goals of DAQ to protect the public health and welfare. Thus, DAQ believes the 2016 fine particle network shown in Figure 49 is an adequate network to protect human health and environmental welfare and this network should be continued in 2017.

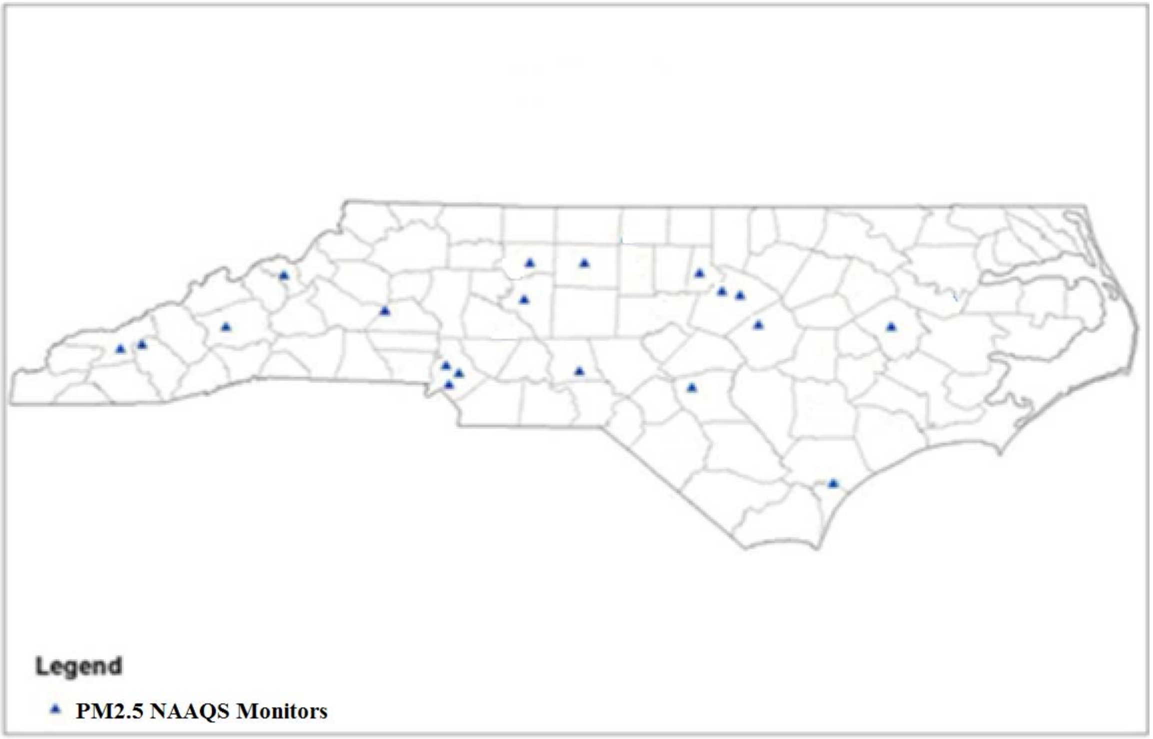


Figure 49. Current 2016 and proposed 2017 federal reference and equivalent method monitoring network

Other fine particle monitors that could be considered for shut down are those monitors that exceed the minimum number of monitors required in 40 CFR 58 Appendix D Table D-5 provided in Figure 50. The latest estimated population of the Metropolitan Statistical Area, MSA, and the most recent fine particle 24-hour and annual design value for the area determines the number of required monitors for an area. Table 34 provides the 2015 population estimates for the MSAs in North Carolina, the design values for 2013-2015, the number of required monitors based on Appendix D and the number of current monitors operated by DAQ and the local programs. Currently, DAQ and the local programs are operating at least the minimum number of required monitors in all but two MSAs: The Virginia Beach-Norfolk-New Port News and the Raleigh MSAs. The DAQ has a written agreement with the Virginia Department of Environmental Quality, VDEQ, Office of Air Quality Monitoring, that VDEQ will maintain the minimum required number of monitors for the Virginia Beach-Norfolk-New Port News MSA.[25] In 2015 the annual and daily fine particle design values in North Carolina continued to decline, reducing the number of required monitors in MSAs throughout the state, except for the Raleigh MSA. The DAQ requested a waiver for the third required monitor in the Raleigh MSA and the EPA granted a waiver for 2016. In 2017 the DAQ will add a third monitor at the near road monitoring station.

[25] See Appendix N. Monitoring Agreement between Virginia and North Carolina for the Virginia Beach-Norfolk-New Port News Metropolitan Statistical Area.

TABLE D–5 OF APPENDIX D TO PART 58. $PM_{2.5}$ MINIMUM MONITORING REQUIREMENTS

MSA population [1,2]	Most recent 3-year design value ≥85% of any $PM_{2.5}$ NAAQS [3]	Most recent 3-year design value <85% of any $PM_{2.5}$ NAAQS [3,4]
>1,000,000	3	2
500,000–1,000,000	2	1
50,000–<500,000 [5]	1	0

[1] Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

[2] Population based on latest available census figures.

[3] The $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

[4] These minimum monitoring requirements apply in the absence of a design value.

[5] Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

Figure 50. 40 CFR 58 Appendix D Table D-5

Table 34 Design Values and Required Fine Particle Monitors for North Carolina Metropolitan Statistical Areas, MSA

MSA	Population Estimate, 2015 [a]	2015 Fine Particle Design Value, as percent of NAAQS		Number of Monitors operated in North Carolina [b]	
		24-Hour	Annual	Required [f]	Current
Charlotte-Concord- Gastonia, NC-SC	2,426,368	51	75	2	3
Virginia Beach-Norfolk-New Port News, VA-NC	1,706,680	51 [c]	65 [c]	2	0 [d]
Raleigh, NC	1,273,568	63	89	3	2
Greensboro-High Point	752,157	46	70	1	1
Winston-Salem	659,330	54	71	1	2
Durham- Chapel Hill	552,493	51	69	1	1
Asheville	446,840	51	68	0	1
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	431,964	Not available		0	0

Table 34 Design Values and Required Fine Particle Monitors for North Carolina Metropolitan Statistical Areas, MSA

MSA	Population Estimate, 2015 [a]	2015 Fine Particle Design Value, as percent of NAAQS		Number of Monitors operated in North Carolina [b]	
		24-Hour	Annual	Required [f]	Current
Fayetteville	376,509	46	71	0	1
Hickory	362,510	51	74	0	1
Wilmington	277,969	43	55	0	1
Jacksonville	186,311	Not available		0	0
Greenville	175,842	43	61	0	1
Burlington	158,276	46	68	0	0
Rocky Mount	148,069	49	66	0	0
New Bern	126,245	Not available		0	0
Goldsboro	124,132	51	74	0	0

[a] Source: Annual Estimates of the Resident Population: Apr. 1, 2010 to July 1, 2015, U.S. Census Bureau, Population Division, Released March 2016, available on the world wide web at http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.
[b] Includes monitors operated by DAQ and the local programs; see **Error! Reference source not found.** for more details.
[c] Design value for 2009-2011.
[d] Virginia Department of Environmental Quality, VDEQ, Office of Air Quality Monitoring operates three monitors in this MSA.
[e] Based on measurements taken in 2007, when the monitor was shut down.
[f] Code of Federal Regulations, Title 40 Protection of the Environment, Part 58 Ambient Air Quality Surveillance, Appendix D Network Design Criteria for Ambient Air Quality Monitoring, Table D-5, available on the worldwide web at http://www.ecfr.gov/cgi-bin/text-idx?SID=f4ac6b967f32490f3a03543735a756fc&mc=true&node=ap40.6.58_161.d&rgn=div9.

The information required by 40 CFR 58 to be included in the network plan is provided in the following tables. Table 35 through Table 40 provide the locations of the current FRM/FEM fine particle-monitoring sites, the monitor type, operating schedules, monitoring objectives, scales and statement of purpose for all of the current and proposed monitors in the North Carolina fine particle monitoring network. All monitors listed in these tables are suitable for comparison to the NAAQS. All of the monitors meet the requirements of Appendices A, C, D and E of 40 CFR 58. All of these monitors except the monitors at Bryson, 37-173-0002, Candor, 37-123-0001, and Millbrook, 37-183-0014, use the EPA reference method designation RFPS-0498-145. The monitors at Bryson, Candor and Millbrook use the EPA automated equivalent method: EQPM-0308-170. All monitors, except the Millbrook, Candor and Bryson monitors, operate on a 24-hour schedule from midnight to midnight on each scheduled sampling day. The Millbrook, Candor and Bryson monitors collect data each hour. All of the monitors operate year-round. Table 35 through Table 40 also summarize the status for each current and proposed monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in 40 CFR58 Appendices A, C, D and E and also provide the proposed changes to the network.

Table 35 The 2016-2017 NAAQS Fine Particle Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041	37-119-0042	37-119-0043	37-119-0045
Site Name:	Garinger	Montclaire	Oakdale	Remount Road
Street Address:	1130 Eastway Drive	1935 Emerywood Drive	513 Radio Road	902 Remount Road
City:	Charlotte	Charlotte	Charlotte	Charlotte
Latitude:	35.2401	35.151283	35.304100	35.212657
Longitude:	-80.7857	-80.866983	-80.888650	-80.874401
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS / NCore	SLAMS	SLAMS	SLAMS
Operating Schedule:	1-in-3 day	1-in-3 day	1-in-3 day	1-in-6 day
Statement of Purpose:	1 of 2 required monitors in Charlotte-Concord-Gastonia MSA. AQI reporting. Compliance w/NAAQS.	1 of 2 required monitors in Charlotte-Concord-Gastonia MSA. AQI reporting. Compliance w/NAAQS.	AQI reporting. Compliance w/NAAQS.	Near road monitoring site. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Population exposure	Population exposure	Source oriented
Scale:	Neighborhood	Neighborhood	Neighborhood	Microscale
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes - RFPS-1006-145	Yes - RFPS-1006-145	Yes - RFPS-1006-145	Yes - RFPS-1006-145
Meets Requirements of Part 58 Appendix D:	Yes- 1 of 2 required monitors for the Charlotte-Concord-Gastonia MSA. Also required for NCore	Yes- 1 of 2 required monitors for the Charlotte-Concord-Gastonia MSA.	No – not a required monitor.	Yes –near road
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Method changed on 1/1/2016	Method changed on 1/1/2016; will change to 1-in-6 day on 1/1/2017	Method changed on 1/1/2016; Site will shut down 12/31/2016	Will start 1/1/2017

[a] All monitors that are not near-road use an R & P Model 2025 PM2.5 Sequential Monitor with a very sharp cut cyclone, Air Quality System, AQS method code 145, The near-road monitor will use a BAM 1022. All monitors operate year-round. All monitors are operated by Mecklenburg County Air Quality, AQS reporting agency 0669.

Table 36 The 2016-2017 NAAQS Fine Particle Monitoring Network for the Raleigh and Greensboro-High Point MSA [a]

AQS Site Id Number:	37-101-0002	37-183-0014	37-183-0021	37-081-0013
Site Name:	West Johnston	Millbrook	Triple Oak Road	Mendenhall

Table 36 The 2016-2017 NAAQS Fine Particle Monitoring Network for the Raleigh and Greensboro-High Point MSA [a]

AQS Site Id Number:	37-101-0002	37-183-0014	37-183-0021	37-081-0013
Site Name:	West Johnston	Millbrook	Triple Oak Road	Mendenhall
Street Address:	1338 Jack Road [c]	3801 Spring Forest Road	2826 Triple Oak Road	205 Willoughby Blvd.
City:	Clayton	Raleigh	Cary	Greensboro
Latitude:	35.590833	35.8561	35.8654	36.109167
Longitude:	-78.461944	-78.5742	-78.8195	-79.801111
MSA, CSA or CBSA represented:	Raleigh	Raleigh	Raleigh	Greensboro-High Point
Monitor Type:	SLAMS	SLAMS / NCore	SLAMS	SLAMS
Operating Schedule:	1-in-3 day	Hourly; Collocated 1-in-3 day [f]	Hourly	1-in-6 day
Statement of Purpose:	1 of 3 required monitors in Raleigh MSA. AQI reporting. Compliance w/NAAQS.	1 of 3 required monitors in Raleigh MSA. AQI reporting. Compliance w/NAAQS. Air quality forecasting	Near road monitoring site. AQI reporting. Compliance w/NAAQS.	Required monitor in Greensboro-High Point MSA. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Population exposure	Source oriented	Population exposure / general / background
Scale:	Neighborhood	Neighborhood	Micro-scale	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes - RFPS-1006-145	Yes – EQPM-0308-170	Yes – EQPM-1013-209	Yes - RFPS-1006-145
Meets Requirements of Part 58 Appendix D:	Yes - 1 of 3 required monitors for the Raleigh MSA.	Yes - 1 of 3 required monitors for the Raleigh MSA. Also required for NCore	Yes – 1 of 3 required monitors for the Raleigh MSA. Also required for near road	Yes - required monitor for the Greensboro-High Point MSA.
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Method changed 1/1/2016	Method will change on 7/1/2016	Will start 1/1/2017	Method changed 1/1/2016

[a] Monitors at West Johnston and Mendenhall use a R & P Model 2025 PM2.5 Sequential Monitor with a very sharp cut cyclone, Air Quality System, AQS method code 145,. The monitor at Millbrook uses a Met One BAM-1020 Monitor, AQS method code 170. The monitor at Triple Oak will be a BAM 1022

Table 37 The 2016-2017 NAAQS Fine Particle Monitoring Network for the Winston-Salem MSA [a]

AQS Site Id Number:	370570002	37-067-0022[b]	37-067-0030 [b]
Site Name:	Lexington Water Tower	Hattie Avenue	Clemmons School
Street Address:	938 South Salisbury Street	1300 block of Hattie Avenue	Fraternity Church Road
City:	Lexington	Winston-Salem	Clemmons
Latitude:	35.814444	36.110556	36.026000
Longitude:	-80.262500	-80.226667	-80.342000
MSA, CSA or CBSA represented:	Winston-Salem	Winston-Salem	Winston-Salem
Monitor Type:	SLAMS	SLAMS	SLAMS
Operating Schedule:	1-in-3 day	1-in-1 day	1-in-3 day
Statement of Purpose:	Required monitor for maintenance area & the Winston-Salem MSA. Compliance w/NAAQS	AQI reporting. Compliance w/NAAQS.	AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Population exposure	Population exposure
Scale:	Neighborhood	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes - RFPS-1006-145	Yes - RFPS-1006-145	Yes – RFPS-0498-118
Meets Requirements of Part 58 Appendix D:	Yes- Required monitor for the Winston-Salem MSA.	No – not a required monitor	No – not a required monitor
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Method changed 1/1/2016	None	Site will shut down

[a] All monitors except the Clemmons monitor use an R & P Model 2025 PM2.5 Sequential Monitor with a very sharp cut cyclone, Air Quality System, AQS method code 145. The Clemmons monitor uses a WINS impactor, AQS method code 118. All monitors operate year-round.
[b] Operated by Forsyth County Office of Environmental Assistance and Protection, AQS primary quality assurance organization and reporting agency 0403

Table 38. 2016-2017 NAAQS Fine Particle Monitoring Network for the Durham-Chapel Hill, Asheville and Hickory MSAs [a]

AQS Site Id Number:	37-063-0015	37-021-0034[b]	37-035-0004
Site Name:	Durham Armory	Board of Education	Hickory
Street Address:	801 Stadium Drive	175 Bingham Road	Water Tank 15 First Avenue
City:	Durham	Asheville	Hickory
Latitude:	36.032944	35.607500	35.728889
Longitude:	-78.905417	-82.583333	-81.365556
MSA, CSA or CBSA represented:	Durham-Chapel Hill	Asheville	Hickory
Monitor Type:	SLAMS	SLAMS	SLAMS
Operating Schedule:	1-in-3 day	1-in-3 day	1-in-3 day
Statement of Purpose:	Design value monitor for the Durham-Chapel Hill MSA. AQI reporting. Compliance w/NAAQS.	AQI reporting. Compliance w/NAAQS.	Maintenance monitor for the Hickory MSA. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Population exposure	Population exposure
Scale:	Neighborhood	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	Yes	No	No
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes - RFPS-1006-145	Yes - RFPS-1006-145	Yes - RFPS-1006-145
Meets Requirements of Part 58 Appendix D:	Yes – Required monitor for the Durham-Chapel Hill MSA.	No – not a required monitor	No - Maintenance monitor for the Hickory MSA.
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Method changed 1/1/2016	Method changed 1/1/2016	Method changed 1/1/2016

[a] All monitors use an R & P Model 2025 PM2.5 Sequential Monitor with a very sharp cut cyclone, Air Quality System, AQS method code 145. All monitors operate year-round.
[b] Operated by the Western North Carolina Regional Air Quality Agency, AQS reporting agency 0779.

Table 39 The 2016-2017 NAAQS Fine Particle Monitoring Network for the Fayetteville, Wilmington and Greenville MSAs [a]

AQS Site Id Number:	37-051-0009	37-129-0002	37-147-0006
Site Name:	William Owen	Castle Hayne	Pitt County Ag Center
Street Address:	4533 Raeford Road	6028 Holly Shelter Road	403 Government Circle
City:	Fayetteville	Castle Hayne	Greenville
Latitude:	35.041416	34.364167	35.638610
Longitude:	-78.953112	-77.838611	-77.358050
MSA, CSA or CBSA represented:	Fayetteville	Wilmington	Greenville
Monitor Type:	SLAMS	SLAMS	SLAMS
Operating Schedule:	1-in-6 day	1-in-3 day	1-in-3 day
Statement of Purpose:	AQI reporting. Compliance w/NAAQS.	AQI reporting. Compliance w/NAAQS..	Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Population exposure	Population exposure
Scale:	Neighborhood	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	No	Yes	No
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes - RFPS-1006-145	Yes - RFPS-1006-145	Yes - RFPS-1006-145
Meets Requirements of Part 58 Appendix D:	No – not a required monitor	No – not a required monitor	No – not a required monitor
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Method changed 1/1/2016	Method changed 1/1/2016 and will change 7/1/2016	Method changed 1/1/2016

[a] All monitors use an R & P Model 2025 PM2.5 Sequential Monitor with a very sharp cut cyclone, Air Quality System, AQS method code 145. All monitors operate year-round.

Table 40 The 2016-2017 NAAQS Fine Particle Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA [a]

AQS Site Id Number:	37-121-0004	37-123-0001	37-173-0002
Site Name:	Spruce Pine	Candor	Bryson City
Street Address:	138 Highland Avenue	112 Perry Drive	Parks & Rec Bldg, Center Street
City:	Spruce Pine	Candor	Bryson City
Latitude:	35.912487	35.262490	35.434767
Longitude:	-82.062082	-79.836613	-83.442133
MSA, CSA or CBSA represented:	Not in an MSA	Not in an MSA	Not in an MSA
Monitor Type:	SLAMS	SLAMS	SLAMS
Operating Schedule:	1-in-3 day	Hourly	Hourly
Statement of Purpose:	Compliance with NAAQS.	Required general/ background monitor for North Carolina	Required transport monitor for North Carolina. Compliance w/NAAQS. Air quality forecasting.
Monitoring Objective:	Population exposure	Welfare related impacts/ general/ background	Regional transport/ population exposure

Table 40 The 2016-2017 NAAQS Fine Particle Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA [a]

AQS Site Id Number:	37-121-0004	37-123-0001	37-173-0002
Site Name:	Spruce Pine	Candor	Bryson City
Scale:	Neighborhood	Regional	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes - RFPS-1006-145	Yes – EQPM-0308-170	Yes – EQPM-0308-170
Meets Requirements of Part 58 Appendix D:	No – not required	Yes –required background monitor.	Yes – required transport monitor
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Method changed 1/1/2016	None	None

[a] The Spruce Pine monitor uses an R & P Model 2025 PM2.5 Sequential Monitor with a very sharp cut cyclone, Air Quality System, AQS method code 145. The other monitors use a Met One BAM-1020 Monitor, AQS method code 170. All monitors operate year-round.

The DAQ evaluated each MSA with more than the required monitors to determine if all of the current monitors in the MSA are still needed and providing valuable information. Only one MSA is left in 2016 with more than the required monitors excluding the monitors operated by the local programs. This MSA is the Winston-Salem MSA and the monitor is the Lexington monitor, 37-057-0002. However, the Lexington monitor is the design value monitor for the MSA and Lexington is in a fine particle maintenance area. As a result, the DAQ determined this monitor is necessary to demonstrate continuing maintenance of the standard and for the staff of DAQ to make informed decisions with regard to development of state implementation plans and to provide air quality information to the public to ensure public health and welfare.

B. Continuous Fine Particle Monitoring Network

The North Carolina Division of Air Quality, DAQ, currently operates 12 continuous fine particle monitoring sites and the local programs operate five. These monitors are used to meet federal requirements for air quality forecasting, providing real-time data to the public and meeting air quality index reporting requirements. Three of these monitors have been approved by the United States Environmental Protection Agency, EPA, for determining compliance with the national ambient air quality standards, NAAQS. Five of these monitors are also required by 40 CFR 58 Appendix D 4.7.2, which states:

> "Requirement for Continuous $PM_{2.5}$ Monitoring. The state, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D-5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies."

According to Table 34, a continuous monitor collocated with an FRM is required in Charlotte (operated by the local program), Raleigh, Greensboro, Winston-Salem (operated by the local program) and Durham. A second continuous monitor is currently required in Raleigh because the design value is currently 89 percent of the standard. That monitor will be added at the West Johnston site during 2016.

Besides being required by 40 CFR 58 Appendix D 4.7.2, continuous fine particle monitors are also required for real-time reporting (40 CFR 58 Appendix D 1.1(a), air quality forecasting and air quality index reporting (40 CFR 58 Appendix G 3). The DAQ is required by 40 CFR 58 Appendix G to do air quality index reporting in three MSAs that are not required to have a continuous monitor by 40 CFR 58 Appendix D: Asheville (operated by the local program), Fayetteville and Hickory. Thus, these three continuous monitors are needed to meet Appendix G requirements. Of the nine remaining continuous monitors, two are FEMs (Bryson City and Candor) included in the FRM/FEM network and were evaluated earlier as part of that network. Two are operated by local programs. The DAQ evaluated the remaining five continuous monitors operated by the DAQ to determine if they still add value to the network and should continue operating.

The DAQ is currently evaluating the Met One BAM 1020 FEM to replace the 2025 sequential FRM monitors currently used in the FRM/FEM fine particle network at two sites. The evaluation process requires operating the collocated BAM and FRM for a period of 12 to 24 months. Currently, two BAM 1020s, one each at Castle Hayne and Lexington are in the process of being evaluated. The DAQ is also evaluating the Met One BAM 1022 FEM to replace the 2025 monitor at the Pitt County Agricultural Center. Later in 2016, additional BAM 1022s, one each, will be added to the network for evaluation at: West Johnston, new continuous fine particle site, and Spruce Pine. On-site evaluation is necessary for the BAM because its performance is dependent on the locale where it is operating. Thus the DAQ determined that the three continuous monitors involved in this evaluation need to continue operating.

The last two of the 12 continuous fine particle sites to be evaluated are Blackstone and Leggett. The Blackstone site is a special purpose site established as part of a study commissioned by the NC legislature to measure background air quality in Lee County before shale gas development begins in that area. The fine particle special purpose, non-regulatory, continuous monitor started operating on Jan. 1, 2014 and is scheduled to run until shale gas development begins in that area or the study is ended. The Leggett fine particle continuous monitor is required for air quality forecasting in the Rocky Mount area, thus the DAQ cannot shut this monitor down as long as air quality forecasting continues for this area.

Table 41 through Table 46 lists the sites in the North Carolina fine particle monitoring network with continuous monitors, their sampling schedules, monitoring objectives, scale of representation and statement of purpose. These tables also indicate whether the monitor is suitable for comparison to the NAAQS, it meets 40 CFR 58 Appendix A, C, D and E requirements and any proposed changes.

Table 41 The 2016-2017 Continuous Fine Particle Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041	37-119-0042	37-119-0045
Site Name:	Garinger	Montclaire	Remount Road
Street Address:	1130 Eastway Drive	1935 Emerywood Drive	902 Remount Road
City:	Charlotte	Charlotte	Charlotte
Latitude:	35.2401	35.151283	35.212657
Longitude:	-80.7857	-80.866983	-80.874401
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	Special purpose / NCore	SLAMS	SLAMS
Operating Schedule:	Hourly	Hourly	Hourly
Statement of Purpose:	Required by Appendix D for NCore sites. Required monitor for the Charlotte-Concord-Gastonia MSA. Real-time data reporting. Fine particle forecasting.	Real-time data reporting. Fine particle forecasting.	Near road monitoring site. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Population exposure	Source oriented
Scale:	Neighborhood	Neighborhood	Microscale
Suitable for Comparison to NAAQS:	No	No	No
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes – EQPM-0308-170	No – AQS method code 717	Yes – EQPM-1013-209
Meets Requirements of Part 58 Appendix D:	Yes- 1 of 1 required monitors for the Charlotte-Concord-Gastonia MSA. Also required for NCore	No – not a required monitor.	Yes –near road
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Method changed 4/1/2016	Method will change	Will start 1/1/2017

[a] Both monitors that are not near-road use an R & P Model 1400A PM2.5 Tapered-Element Oscillating Microbalance operated with the inlet heated to 50 degrees. The near-road monitor will use a BAM 1022. All monitors operate year-round and provide real-time air quality data to the public through AirNow and the state and local program websites. All monitors are operated by Mecklenburg County Air Quality, AQS reporting agency 0669.

Table 42 The 2016-2017 Continuous Fine Particle Monitoring Network for the Raleigh and Greensboro-High Point MSA [a]

AQS Site Id Number:	37-101-0002	37-183-0014	37-183-0021	37-081-0013
Site Name:	West Johnston	Millbrook	Triple Oak Road	Mendenhall
Street Address:	1338 Jack Road [c]	3801 Spring Forest Road	2826 Triple Oak Road	205 Willoughby Blvd.
City:	Clayton	Raleigh	Cary	Greensboro
Latitude:	35.590833	35.8561	35.8654	36.109167
Longitude:	-78.461944	-78.5742	-78.8195	-79.801111
MSA, CSA or CBSA represented:	Raleigh	Raleigh	Raleigh	Greensboro-High Point
Monitor Type:	Special purpose	SLAMS / NCore	SLAMS	Special purpose
Operating Schedule:	Hourly	Hourly	Hourly	Hourly
Statement of Purpose:	Required monitor for the Raleigh MSA. Real-time AQI reporting for the Raleigh MSA. Forecasting	Required monitor for the Raleigh MSA. Real-time AQI reporting for the Raleigh MSA. Forecasting	Near road monitoring site. AQI reporting. Compliance w/NAAQS.	Required monitor for the Greensboro-High Point MSA. Real-time AQI reporting for the Greensboro-Winston-Salem-High-Point CSA. Forecasting
Monitoring Objective:	Population exposure	Population exposure	Source oriented	Population exposure / general / background
Scale:	Neighborhood	Neighborhood	Micro-scale	Neighborhood
Suitable for Comparison to NAAQS:	No	No	Yes	No
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes – EQPM-1013-209	Yes – EQPM-0308-170	Yes – EQPM-1013-209	Yes – EQPM-1013-209
Meets Requirements of Part 58 Appendix D:	Yes	Yes - NCore	Yes –near road	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Will start in 2016	Will change to AQI monitor 7/1/2016	Will start 1/1/2017	Started 11/4/2015

[a] Monitors at West Johnston, Triple Oak and Mendenhall use a BAM 1022 monitor. The monitor at Millbrook is a BAM 1020

Table 43 The 2016-2017 Continuous Fine Particle Monitoring Network for the Winston-Salem MSA [a]

AQS Site Id Number:	370570002	37-067-0022[b]	37-067-0030 [b]
Site Name:	Lexington Water Tower	Hattie Avenue	Clemmons School
Street Address:	938 South Salisbury Street	1300 block of Hattie Avenue	Fraternity Church Road
City:	Lexington	Winston-Salem	Clemmons
Latitude:	35.814444	36.110556	36.026000
Longitude:	-80.262500	-80.226667	-80.342000
MSA, CSA or CBSA represented:	Winston-Salem	Winston-Salem	Winston-Salem
Monitor Type:	Special purpose	Other	SLAMS
Operating Schedule:	Hourly	Hourly	Hourly
Statement of Purpose:	Real-time data reporting. Fine particle forecasting.	Required monitor for the Winston-Salem MSA. Real-time AQI reporting for the Greensboro-Winston-Salem-High Point CSA.	. Real-time AQI reporting for the Greensboro-Winston-Salem-High Point CSA.
Monitoring Objective:	Population exposure	Population exposure	Population exposure
Scale:	Neighborhood	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	No	No	No
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes – EQPM-0308-170	No – AQS method code 702	No – AQS method code 702
Meets Requirements of Part 58 Appendix D:	No – not a required monitor	Yes – required monitor	No – not a required monitor
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Will become an AQI monitor 7/1/2016	None	None

[a] The Forsyth County monitors use an R & P Model 1400A PM2.5 Tapered-Element Oscillating Microbalance operated with the inlet heated to 50 degrees. The Lexington monitor is a BAM 1020. All monitors operate year-round. All monitors provide real-time air quality data to the public through AirNow and the state and local program websites.

[b] Operated by Forsyth County Office of Environmental Assistance and Protection, AQS primary quality assurance organization and reporting agency 0403

Table 44 The 2016-2017 Continuous Fine Particle Monitoring Network for the Durham-Chapel Hill, Asheville, Fayetteville and Hickory MSAs [a]

AQS Site Id Number:	37-063-0015	37-021-0034[b]	37-051-0009	37-035-0004
Site Name:	Durham Armory	Board of Education	William Owen	Hickory
Street Address:	801 Stadium Drive	175 Bingham Road	4533 Raeford Road	Water Tank 15 First Avenue
City:	Durham	Asheville	Fayetteville	Hickory
Latitude:	36.032944	35.607500	35.041416	35.728889
Longitude:	-78.905417	-82.583333	-78.953112	-81.365556
MSA, CSA or CBSA represented:	Durham-Chapel Hill	Asheville	Fayetteville	Hickory
Monitor Type:	Special purpose	SLAMS	Special purpose	Special purpose
Operating Schedule:	Hourly	Hourly	Hourly	Hourly
Statement of Purpose:	Required monitor for the Durham-Chapel Hill MSA Real-time AQI reporting for the Durham-Chapel Hill MSA.	Air quality index reporting. Fine particle forecasting.	Air quality index reporting. Fine particle forecasting.	Air quality index reporting. Fine particle forecasting.
Monitoring Objective:	Population exposure	Population exposure	Population exposure	Population exposure
Scale:	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	Yes	No	No	No
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes – EQPM-0308-170	No – AQS method code 702	Yes – EQPM-1013-209	Yes – EQPM-0308-170 Yes – EQPM-1013-209
Meets Requirements of Part 58 Appendix D:	Yes – required monitor	No – not a required monitor	No – not a required monitor	No – not a required monitor
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Method changed 6/1/15	Method will change in 2016	Method changed 1/1/2016	EQPM-1013-209 will become primary 1/1/2017; EQPM-0308-170 will shut down

[a] The WNC monitor uses an R & P Model 1400A PM2.5 Tapered-Element Oscillating Microbalance operated with the inlet heated to 50 degrees. The Durham monitor is a BAM 1020. The Fayetteville monitor is a BAM 1022. All monitors operate year-round. All monitors provide real-time air quality data to the public through AirNow and the state websites.

[b] Operated by the Western North Carolina Regional Air Quality Agency, AQS reporting agency 0779.

Table 45 The 2016-2017 Continuous Fine Particle Monitoring Network for the Wilmington, Greenville and Rocky Mount MSAs [a]

AQS Site Id Number:	37-129-0002	37-147-0006	37-065-0099
Site Name:	Castle Hayne	Pitt County Ag Center	Leggett
Street Address:	6028 Holly Shelter Road	403 Government Circle	7589 NC Hwy 33-NW
City:	Castle Hayne	Greenville	Leggett
Latitude:	34.364167	35.638610	35.988333
Longitude:	-77.838611	-77.358050	-77.582778
MSA, CSA or CBSA represented:	Wilmington	Greenville	Rocky Mount
Monitor Type:	SLAMS	Special purpose	Special purpose
Operating Schedule:	Hourly	Hourly	Hourly
Statement of Purpose:	Real-time AQI reporting. Compliance w/NAAQS.	Real-time AQI reporting. Fine particle forecasting.	Real-time AQI reporting. Fine particle forecasting.
Monitoring Objective:	Population exposure	Population exposure	General/ background
Scale:	Neighborhood	Neighborhood	Urban
Suitable for Comparison to NAAQS:	Yes	No	No
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes – EQPM-0308-170	Yes – EQPM-1013-209	No – AQS method code 171
Meets Requirements of Part 58 Appendix D:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Will become NAAQS monitor 7/1/2016	Started 4/8/2016	Method changed 1/1/2016

[a] The Castle Hayne monitor is a BAM 1020. The other monitors are BAM 1022s.

Table 46 The 2016-2017 Continuous Fine Particle Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA [a]

AQS Site Id Number:	37-105-0002	37-121-0004	37-123-0001	37-173-0002
Site Name:	Blackstone	Spruce Pine	Candor	Bryson City
Street Address:	4110 Blackstone Drive	138 Highland Avenue	112 Perry Drive	Parks & Rec Bldg, Center Street
City:	Sanford	Spruce Pine	Candor	Bryson City
Latitude:	35.432500	35.912487	35.262490	35.434767
Longitude:	-79.288700	-82.062082	-79.836613	-83.442133
MSA, CSA or CBSA represented:	Not in an MSA	Not in an MSA	Not in an MSA	Not in an MSA
Monitor Type:	Special purpose	Special purpose	SLAMS	SLAMS
Operating	Hourly	Hourly	Hourly	Hourly

Table 46 The 2016-2017 Continuous Fine Particle Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA [a]

AQS Site Id Number:	37-105-0002	37-121-0004	37-123-0001	37-173-0002
Site Name:	Blackstone	Spruce Pine	Candor	Bryson City
Schedule:				
Statement of Purpose:	General/ background site for shale gas development study.	Real-time AQI reporting.	General background site. Real-time AQI reporting. Compliance w/NAAQS.	Regional transport site. Low elevation (valley) mountain site on the NC side of the Great Smokey Mountains National Park. Forecasting. Compliance w/NAAQS.
Monitoring Objective:	General/ background	Population exposure	General background/ population exposure	Regional transport/ population exposure
Scale:	Neighborhood	Neighborhood	Regional	Neighborhood
Suitable for Comparison to NAAQS:	No	No	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes – EQPM-0308-170	Yes – EQPM-1013-209	Yes – EQPM-0308-170	Yes – EQPM-0308-170
Meets Requirements of Part 58 Appendix D:	No – not required	No – not required	Yes –required background monitor.	Yes – required transport monitor
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Became an AQI monitor 1/1/2016	Will start in 2016	None	None

[a] The Spruce Pine monitor is a BAM 1022. The other monitors are BAM 1020s.

C. Manual Speciation Fine Particle Monitoring Network

The North Carolina Division of Air Quality, DAQ, currently operates one manual speciation fine particle monitoring site and the local programs operate two. These monitors are used to meet federal requirements for the speciation trend network, STN, and for national core, NCore, monitoring stations as well as to provide Forsyth County with information on the composition of fine particles in Winston-Salem. The monitor at Garinger is required by 40 CFR 58 Appendix D 4.7.4, which requires the agency to continue operating STN monitors. The monitors at Garinger and Millbrook are required by 40 CFR 58 Appendix D 3(b), which lists the required monitors at NCore sites.

In January 2015 the EPA ended funding for the monitors in Asheville, Rockwell, Lexington and Hickory. As a result, the monitors in Asheville, Rockwell and Lexington were shut down in January 2015. The Super Speciation Air Sampling System, SASS,™ monitor at Hickory broke during the first half of 2014 so DAQ shut it down in June 2014. Table 47 lists the sites in the North Carolina manual speciation fine particle monitoring network with their sampling schedules, monitoring objectives, scale of representation and statement of purpose. Table 47 also indicates whether the monitor is suitable for comparison to the NAAQS, it meets 40 CFR 58 Appendix A, C, D and E requirements and any proposed changes.

Table 47 The 2016-2017 Fine Particle Manual Speciation Monitoring Network for the Charlotte-Concord-Gastonia, Raleigh and Winston-Salem MSAs [a]

AQS Site Id Number:	37-119-0041 [b]	37-183-0014	37-067-0022 [c]
Site Name:	Garinger	Millbrook	Hattie Avenue
Street Address:	1130 Eastway Drive	3801 Spring Forest Road	1300 block of Hattie Avenue
City:	Charlotte	Raleigh	Winston-Salem
Latitude:	35.2401	35.8561	36.110556
Longitude:	-80.7857	-78.5742	-80.226667
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Raleigh	Winston-Salem
Monitor Type:	Speciation Trend Network / NCore	Supplemental Speciation / NCore	Supplemental Speciation
Operating Schedule:	1-in-3 day, 24-hour	1-in-3 day, 24-hour	1-in-6 day, 24-hour
Statement of Purpose:	Required Monitor for NCore	Required Monitor for NCore	Provide speciation data for Winston-Salem
Monitoring Objective:	Population exposure	Population exposure	Population exposure
Scale:	Neighborhood	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	No	No	No
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	No – AQS method codes 810-812, 838-842	No – AQS method codes 810-812, 838-842	No – AQS method codes 810-812, 838-842
Meets Requirements of Part 58 Appendix D:	Yes- This site is a speciation trend network site & NCore.	Yes - NCore	No – not a required monitor
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None

[a] All monitors use a Met One SuperSASS for metals and ions and an URG 3000N for elemental and organic carbon.
[b] Operated by Mecklenburg County Air Quality, AQS reporting agency 0669
[c] Operated by Forsyth County Office of Environmental Assistance and Protection, AQS reporting agency 0403

VIII. Lead Monitoring Network

The North Carolina Division of Air Quality, DAQ, currently does not operate any lead monitors. The lead monitor located at the Raleigh Millbrook National Core, NCore, monitoring site was shut down on Apr. 30, 2016.

In 2008 the United States Environmental Protection Agency, EPA, lowered the lead national ambient air quality standard, NAAQS, to 0.15 micrograms per cubic meter and expanded the lead monitoring network to support the new standard.[26] In December 2010, the EPA finalized changes to the lead monitoring network.[27] These changes included lowering the threshold for fence line monitoring for lead-emitting facilities from one ton of lead per year to 0.5 tons of lead per year and changing the population oriented monitoring from urban areas with populations greater than 500,000 to NCore monitoring sites in urban areas with populations greater than 500,000. Fence line monitoring at facilities emitting more than one ton of lead per year or that impact the ambient concentrations surrounding the facility such that ambient levels are at one half of the NAAQS or greater started on Jan. 1, 2010. Fence line monitoring at facilities emitting more than 0.5 ton of lead per year and population oriented monitoring at required NCore sites started on Dec. 27, 2011. In 2016 the EPA finalized changes to ambient monitoring quality assurance and other requirements, which removed the requirement for lead monitoring at NCore monitoring stations in urban areas with populations greater than 500,000.[28]

In 2009 the DAQ requested and received permission to not do fence-line lead monitoring at three facilities which were listed in the 2005 National Emission Inventory, NEI, or the 2007 Toxic Release Inventory, TRI, as emitting over one ton of lead per year. These facilities are:

- International Resistive Company, IRC, located in Boone, NC,
- Nucor Steel located in Cofield, NC and
- Carolina Power and Light Company, Progress Energy, Roxboro Steam Station located in Semora, NC,

The EPA granted the request and did not require the DAQ to monitor at any of these facilities because none of the facilities actually emitted one ton or more of lead per year. A copy of the EPA approval letter is provided in Appendix P. 2010 Network Plan EPA Approval Letter.

In 2011 the EPA listed eight facilities in North Carolina as emitting over 0.5 tons of lead per year based either on the 2008 NEI or the 2009 TRI. These facilities are:

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[26] National Ambient Air Quality Standards for Lead, Federal Register, Vol. 73, No. 219, \ Wednesday, Nov. 12, 2008, p. 66964, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2008-11-12/pdf/E8-25654.pdf.
[27] Revisions to Lead Ambient Air Monitoring Requirements, Federal Register, Vol. 75, No. 247, Monday, Dec. 27, 2010, p. 81126, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2010-12-27/pdf/2010-32153.pdf#page=1.
[28] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, Mar. 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

- Duke Energy Carolinas, LLC - Belews Creek Steam Station, located in Stokes County;
- Progress Energy - Roxboro Plant, located in Person County;
- Duke Energy Carolinas, LLC - Marshall Steam Station, in Catawba County;
- U.S. Army Fort Bragg, located in Cumberland County;
- Blue Ridge Paper Products Inc., located in Canton, North Carolina (Haywood County);
- Duke Power Company, LLC - Allen Steam Station, located in Gaston County;
- Royal Development Co., located in High Point, North Carolina (Guilford County); and
- U.S. Marine Corps Camp Lejeune Marine Corps Base, located in Onslow County.

In addition to the eight facilities on the EPA list, the DAQ identified an additional facility, Saint-Gobain Containers, now doing business as Ardagh Glass, Incorporated, located in Wilson, NC (Wilson County), with reported 2009 lead emissions greater than 0.5 tons.

As mentioned earlier, the DAQ received permission not to monitor at one of these facilities, Progress Energy - Roxboro Plant in 2009. In 2011 the DAQ requested that this facility and six other of these facilities, Fort Bragg, Camp Lejeune, Royal Development Co., the Duke Energy Carolinas, LLC - Belews Creek Steam Station, the Duke Energy Carolinas, LLC - Marshall Steam Station and the Duke Power Company, LLC - Allen Steam Station, be removed from the list because they emit less than 0.5 tons per year and requested waivers for the other two, Blue Ridge Paper Products, Inc. and St. Gobain Containers, based on results of modeling. The EPA granted this request and did not require the DAQ to monitor at any of these facilities. A copy of the EPA approval letter is provided in Appendix I. 2011 Network Plan EPA Approval Letter.

In 2013, Fort Bragg again reported over 0.5 tons of fugitive lead emissions in the TRI. Calculation of the 2014 fugitive lead emissions using AP-42 emission factors resulted in 2014 emissions of less than 0.5 tons. As a result, in 2015 DAQ requested a waiver from lead monitoring at Fort Bragg. The EPA did not grant the waiver because the lead emissions were less than 0.5 tons. However, in 2015 the EPA did renew the waiver for Saint-Gobain Containers even though its lead emissions are currently less the 0.5 tons.

Under the 2010 lead monitoring rule, North Carolina was required to operate two population-oriented lead monitors located at the NCore monitoring sites–in Charlotte at Garinger High School and in Raleigh at Millbrook East Middle School. Both monitors started operation on Dec. 27, 2011. The first sampling day was Dec. 29. These monitors operated on a 1-in-6-day schedule and measure lead concentrations by analyzing the filters from the low volume PM_{10} monitors that operate at the site. The samples were analyzed in batches of 50-80 using x-ray fluorescence, which is the federal reference method for the low-volume PM_{10} lead monitoring method. Maximum lead concentrations measured at the site are shown in Figure 51.

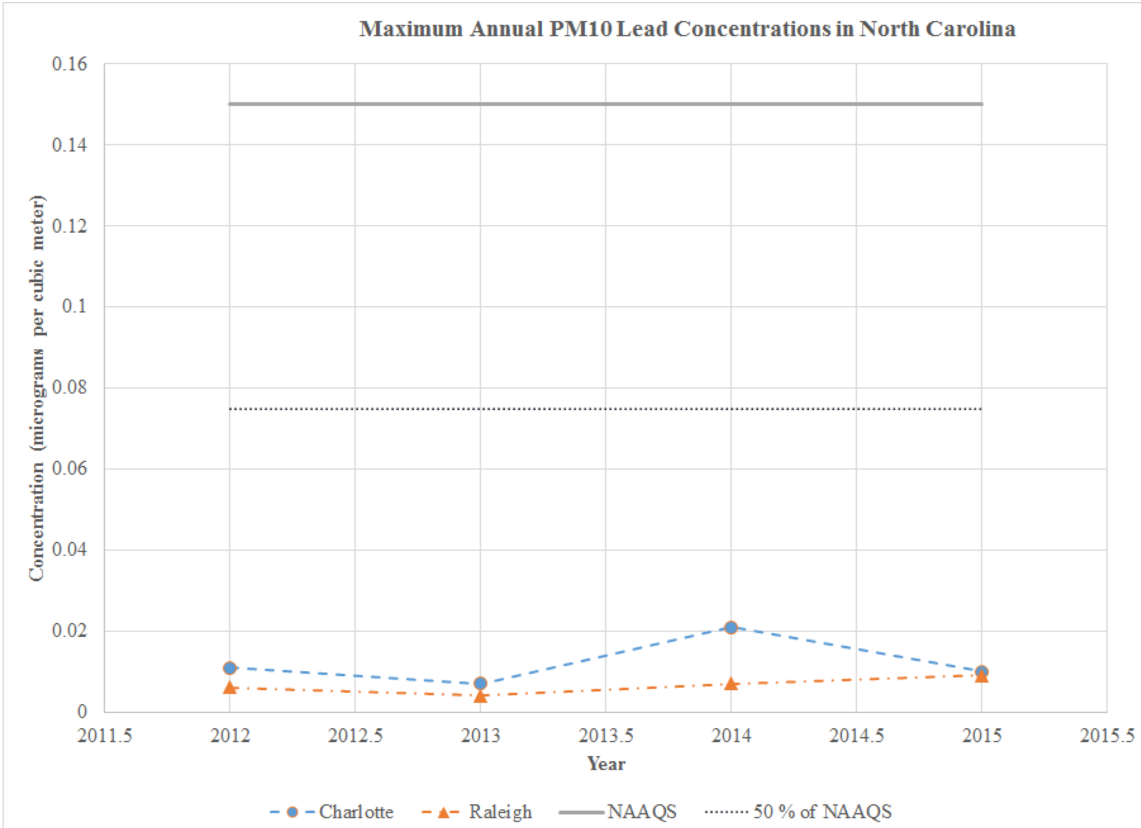

Figure 51. Maximum annual lead concentrations measured at North Carolina NCore Stations

As mentioned earlier, in 2016 the EPA finalized changes to ambient monitoring quality assurance and other requirements to remove the requirement for lead monitoring at NCore monitoring stations. The measured lead concentrations at the North Carolina NCore stations are well below 50 percent of the standard as Figure 51 clearly demonstrates. Because the measured lead levels were so low, EPA Region 4 granted DAQ permission to end the lead monitoring at the Millbrook NCore station as soon as the new requirements became effective on Apr. 27, 2016.

The locations of the PM_{10} lead-monitoring sites are provided in Table 48. Both monitors listed in Table 48 were suitable for determining a violation of the national ambient air quality standards, NAAQS. Both of the monitors met the requirements of Appendices A, C, D and E of 40 CFR 58 after the quality assurance project plan and standard operating procedures were submitted to the EPA and the procedures were approved by the EPA.   Both of these monitors used the EPA reference method designations RFPS-1298-127 and RFLQ-1108-804.

Table 48 provides the monitor type, operating schedules, monitoring objectives, scales and statement of purpose for both of the monitors in the North Carolina PM_{10} lead monitoring network. Both monitors operated on a 24-hour schedule from midnight to midnight on each scheduled sampling day. Both of the monitors operated year-round. Table 48 summarizes the status for each required monitoring site regarding whether it was suitable for comparison to the NAAQS and met the requirements in 40 CFR58 Appendices A, C, D and E and also provides the proposed changes to the network.

Table 48 The 2016-2017 Lead Monitoring Network for the Charlotte-Concord-Gastonia and Raleigh MSAs [a]

AQS Site Id Number:	37-119-0041 [b]	37-183-0014
Site Name:	Garinger	Millbrook
Street Address:	1130 Eastway Drive	3801 Spring Forest Road
City:	Charlotte	Raleigh
Latitude:	35.2401	35.8561
Longitude:	-80.7857	-78.5742
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Raleigh
Monitor Type:	SLAMS / NCore	SLAMS / NCore
Operating Schedule:	24-hour, 1-in-6 day	24-hour, 1-in-6 day
Statement of Purpose:	1 of 2 required population exposure monitors in North Carolina. AQI reporting. Compliance w/NAAQS.	1 of 2 required population exposure monitors in North Carolina. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Population exposure
Scale:	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes – RFPS-1298-127 and RFLQ-1108-804	Yes – RFPS-1298-127 and RFLQ-1108-804
Meets Requirements of Part 58 Appendix D:	No – requirement ended 4/27/2016	No – requirement ended 4/27/2016
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	Monitoring ended 4/30/2016	Monitoring ended 4/30/2016

[a] Both monitors use an R & P Model 2025 PM2.5 Sequential Monitor with a PM_{10} down tube, Air Quality System, AQS, method code 811. All monitors listed in this table are suitable for comparison to the national ambient air quality standards. All monitors in this table meet the requirements of Appendices A, C, D and E of 40 CFR 58. All monitors use the EPA reference method designations RFPS-1298-127 and RFLQ-1108-804.

[b] Operated by Mecklenburg County Air Quality, AQS reporting agency 0669

IX. Urban Air Toxics Monitoring Network

Monitoring for urban air toxics, UAT, is conducted by the North Carolina Division of Air Quality, DAQ, at four sites operated by DAQ and at three sites operated by local programs. Currently, DAQ collects whole air samples in stainless steel six liter-pressurized canisters at all seven sites. The samples are then analyzed using pre-concentration gas chromatography with mass spectrometric detection, GC/MS, via the Compendium Method for Toxic Organics, TO, 15 for the 65 compounds in Table 49.

Table 49 List of Measured and Reported Urban Air Toxic Volatile Organic Compounds, VOC

Propene	Hexane	cis-1,3 Dichloropropene 1,1,2-Trichloroethane
Freon 12	Methacrolein	Ethylpropylketone
Freon 22	Vinyl Acetate	Tetrachloroethylene
Freon 114	1,1-Dichloroethane	Methyl Butyl Ketone
Chloromethane	Methyl Vinyl Ketone	Dibromoethane
Isobutene	Methyl Ethyl Ketone	Chlorobenzene
Vinyl chloride	1,2 Dichloroethene	Ethylbenzene
1,3-Butadiene	Chloroform	m- & p-Xylene
Bromomethane	1,1,1-Trichloroethane	o-Xylene
Chloroethane	Cyclohexane	Styrene
Freon 11	Carbon Tetrachloride	Bromoform
Pentane	Benzene	1,1,2,2-Tetrachloroethane
Isoprene	1,2-Dichloroethane	1,3,5-Trimethylbenzene
Acrolein	Trichloroethylene	1,2,4-Trimethylbenzene
1,1-Dichloroethene	2-Pentanone	m-Dichlorobenzene
Freon 113	3-Pentanone	1,2,3-Trimethylbenzene
Methyl Iodide	1,2-Dichloropropane	p-Dichlorobenzene
Carbon Disulfide	1,4-Dioxane	Benzylchloride
Acetonitrile	Bromodichloromethane	o-Dichlorobenzene
Methylene chloride	trans-1,3 Dichloropropene	1,2,4-Trichlorobenzene
Cyclopentane	Methyl Isobutyl Ketone	
MTBE	Toluene	

The DAQ collects air samples on silica-2,4-dinitrophenylhydrazine, DNPH, cartridges with potassium iodide, KI, ozone scrubbing at three sites. The cartridges are extracted and analyzed using ultra high pressure liquid chromatography, UHPLC, with ultraviolet, UV, detection via TO 11a for the list of compounds in Table 50.

Table 50. List of Measured and Reported Urban Air Toxic Carbonyl Compounds

Acetaldehyde	2,5-Dimethylbenzaldehyde	Methacrolein
Benzaldehyde	Formaldehyde	Methyl Ethyl Ketone
Butyraldehyde	Hexaldehyde	Propionaldehyde
Crotonaldehyde	Isovaleraldehyde	Tolualdehydes *(o-, m-, p)*

The DAQ established and operates an UAT monitoring network in conjunction with a national program originally proposed and designed by the EPA in 1999. The DAQ recognizes the importance of this network and supports the continuation of the program. Currently, the North Carolina program has six urban sites and one rural site. The objectives of the network proposed by the EPA in 1999 were stated as follows:

1. Measure pollutants of concern to the air toxics program;

2. Use scientifically sound monitoring protocols to ensure nationally consistent data of high quality;
3. Collect a sufficient amount of data to estimate annual average concentrations;
4. Complement existing national and state/local monitoring programs;
5. Reflect “community-oriented,” i.e. neighborhood-scale, population exposure; and
6. Represent geographic variability in annual average ambient concentrations.

The North Carolina network was developed with these objectives in mind to focus on the urban areas within the state and to work in collaboration with the three local air quality agencies that regulate air quality programs in the metropolitan areas within their respective jurisdiction. The network should complement the air toxics programs of each agency and provide a “flexible approach” to address air toxics issues in the local areas and to provide a framework to conduct more dedicated monitoring to characterize the spatial concentration patterns of specific toxic air pollutants within an urban area and to concentrate on problem areas.

The number of monitoring sites was chosen based on available funds, equipment and personnel including those in local programs and regional offices. The locations were chosen based on size of metropolitan statistical areas, MSAs, in North Carolina, existing sites in urban areas and support of local programs. The sites selected for the North Carolina UAT network were established in predominately urban areas as designated by the US Census Bureau, 2000 census. An “urban” area has been defined by EPA as a county with either a MSA population of at least 250,000 or in a county with at least 50 percent urbanization as described by the census. A “rural” county is defined as a county that has less than 50 percent urbanization as designated by the census.

Because there are no NAAQS for UAT, the EPA does not require the DAQ and local programs to operate a minimum number of required monitors.

The DAQ made the following changes during the last few years to the UAT monitoring network. The Research Triangle Park site shared with EPA was closed when a major road project forced EPA to move the building. When EPA re-established the site a safe distance from the road construction, DAQ decided to seek other possibly better located sites for the UAT monitoring that might be more representative of urban populations in North Carolina. At all North Carolina UAT sites monitoring has been discontinued for semi-volatile organic compounds, SVOCs, and carbonyl compounds by methods TO-13 and TO-11, respectively. However, sampling for carbonyl compounds by TO-11a resumed in July 2013 at two sites – Millbrook in Raleigh and Candor – and started at the Blackstone site in Nov. 2013. One GC/MS system used for VOCs analysis by method TO-15 has been upgraded to lower detection limits. The Blackstone site is a special purpose monitoring site for monitoring VOCs and aldehyde concentrations prior to any shale gas development in this area.

Table 51 through Table 53 provide locations, the monitor type, operating schedules, monitoring objectives, scales and statement of purpose of the current air toxic-monitoring sites, as well as the status for each monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D and E of 40 CFR 58. These tables also provide any proposed changes to the existing network. Sometime in the future DAQ may add a VOC monitoring site in Greensboro, Durham or Greenville. A specific location has not yet been identified so the proposed site is not included in the table. All monitors meet the requirements of Appendices A and E of 40 CFR 58. Appendix C and D requirements do not apply to UAT monitoring. All monitors are special purpose, non-regulatory monitors because there are no NAAQS for air toxic compounds. All monitors operate year-round on the EPA's national 1 in 6-day schedule.

Table 51 The 2016-2017 Air Toxics Monitoring Network for the Charlotte-Concord-Gastonia, Raleigh and Winston-Salem MSAs

AQS Site Id Number:	37-119-0041 [a]	37-183-0014	37-067-0022 [b]
Site Name:	Garinger	Millbrook	Hattie Avenue
Street Address:	1130 Eastway Drive	3801 Spring Forest Road	1300 block of Hattie Avenue
City:	Charlotte	Raleigh	Winston-Salem
Latitude:	35.2401	35.8561	36.110556
Longitude:	-80.7857	-78.5742	-80.226667
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Raleigh	Winston-Salem
Monitor Type:	Non-regulatory	Non-regulatory	Non-regulatory
Operating Schedule:	24-hour, midnight to midnight, 1 in 6 day	24-hour, midnight to midnight, 1 in 6 day	24-hour, midnight to midnight, 1 in 6 day
Statement of Purpose:	Monitor as many HAPs as possible.	Monitor as many HAPs as possible.	Monitor as many HAPs as possible.
Monitoring Objective:	Population exposure	Population exposure; general/ background	Population exposure
Scale:	Neighborhood	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	Not applicable	Not applicable	Not applicable
Meets Requirements of Part 58 Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Not applicable – uses AQS method code 150 [c]	Not applicable – uses AQS method code 150 and 202 [d]	Not applicable – uses AQS method code 150 [c]
Meets Requirements of Part 58 Appendix D:	Not applicable	Not applicable	Not applicable
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None

[a] Operated by Mecklenburg County Air Quality, AQS primary quality assurance organization and reporting agency 0669

[b] Operated by Forsyth County Office of Environmental Assistance and Protection, AQS primary quality assurance organization and reporting agency 0403.

[c] AQS method code 150, sample collection in a stainless steel six liter- pressurized canister and analysis using pre-concentration gas chromatography with mass spectrometric detection, for VOCs.

[d] AQS method code 150, sample collection in a stainless steel six liter- pressurized canister and analysis using pre-concentration gas chromatography with mass spectrometric detection, for VOCs and 202, sample collection on a silica-DNPH-cartridge with KI O3 scrubber and analysis using HPLC ultraviolet absorption, for carbonyls.

Table 52 The 2016-2017 Air Toxics Monitoring Network for the Asheville and Wilmington MSAs

AQS Site Id Number:	37-021-0035 [c]	37-129-0010
Site Name:	AB Tech [a]	Battleship Site
Street Address:	AB Tech College	Battleship Drive
City:	Asheville	Wilmington
Latitude:	35.572222	34.235556
Longitude:	-82.558611	-77.955833
MSA, CSA or CBSA represented:	Asheville	Wilmington
Monitor Type:	Non-regulatory	Non-regulatory
Operating Schedule:	24-hour, midnight to midnight, 1 in 6 day	24-hour, midnight to midnight, 1 in 6 day
Statement of Purpose:	Monitor as many HAPs as possible.	Monitor as many HAPs as possible.
Monitoring Objective:	Population exposure	Population exposure
Scale:	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	Not applicable	Not applicable
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Not applicable – uses AQS method code 150 [b]	Not applicable – uses AQS method code 150 [b]
Meets Requirements of Part 58 Appendix D:	Not applicable	Not applicable
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	None

[a] Operated by the Western North Carolina Regional Air Quality Agency, AQS reporting agency 0779.
[b] AQS method code 150, sample collection in a stainless steel six liter- pressurized canister and analysis using pre-concentration gas chromatography with mass spectrometric detection, for VOCs.

Table 53 The 2016-2017 Air Toxics Monitoring Network for Areas not in MSAs

AQS Site Id Number:	37-105-0002	37-123-0001
Site Name:	Blackstone	Candor
Street Address:	4110 Blackstone Drive	112 Perry Drive
City:	Sanford	Candor
Latitude:	35.432500	35.262490
Longitude:	-79.288700	-79.836613
MSA, CSA or CBSA represented:	Sanford	Not in an MSA
Monitor Type:	Special purpose	Non-regulatory
Operating Schedule:	24-hour, midnight to midnight, 1 in 6 day	24-hour, midnight to midnight, 1 in 6 day
Statement of Purpose:	Monitor as many HAPs as possible.	Monitor as many HAPs as possible.
Monitoring Objective:	General/ background	General/ background
Scale:	Urban	Regional
Suitable for Comparison to NAAQS:	Not applicable	Not applicable
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Not applicable – uses AQS method code 150 and 202 [a]	Not applicable – uses AQS method code 150 and 202 [a]
Meets Requirements of Part 58 Appendix D:	Not applicable	Not applicable
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	None

[a] AQS method code 150, sample collection in a stainless steel six liter- pressurized canister and analysis using pre-concentration gas chromatography with mass spectrometric detection, for VOCs and 202, sample collection on a silica-DNPH-cartridge with KI O3 scrubber and analysis using HPLC ultraviolet absorption, for carbonyls.

X. DAQ NCore Monitoring Network

This section provides information on the North Carolina Division of Air Quality national core, NCore, monitoring network. For information on the NCore site operated by Mecklenburg County Air Quality, see Appendix B. 2016 Annual Monitoring Network Plan for Mecklenburg County Air Quality. The East Millbrook Middle School NCore site was approved by the EPA on Oct. 30, 2009. See **Appendix Q. NCore Monitoring Plan Approval Letter**.

A. Overview

The NCore site operated by the DAQ is located at the East Millbrook Middle School site. Specifics for this site are provided below.

Parameter	Description
A) AQS identification number	37-183-0014
B) Site Name	Millbrook
C) Address	3801 Spring Forest Road, Raleigh, N.C.
D) Longitude/Latitude	-78.574167/ 35.856111 decimal degrees
E) Scale of Representation	Neighborhood
F) Monitoring Objective	Population oriented
G) Proximity to Local Emissions	None within 500 meters
H) MSA Description	Raleigh
I) Land Use	Urban

The DAQ has been operating monitors at this site since Sept. 16, 1998, and has no plans to relocate this site. The site is located at a school and the school has been very cooperative in allowing DAQ to make necessary changes at the site so that the site will meet 40 CFR 58 Appendix E requirements. The school property is fully developed and the DAQ does not anticipate that the Wake County School System will need to develop the area where the monitoring site is located or will evict us from their property anytime in the next 18 months or later.

B. Monitor Siting Considerations

This site was modified as necessary to meet the entire EPA monitor siting criteria in 40 CFR 58 Appendix E. The following issues were addressed:

1) Trees were removed or trimmed such that all probe inlets are > 10 meters from any tree drip line.

2) All particulate matter monitors (filter based and continuous) are located on a 16’x16’ wooden deck constructed in 2009. All inlets are within one to four meters of each other, all inlets are within one meter vertically of each other,

all inlets are between two and 15 meters above ground and all inlets are more than 20 meters from any roadway.

3) All continuous gaseous monitors (SO_2, NO_y, CO and O_3) are housed in a temperature controlled walk-in shelter, which meets all of the EPA siting criteria.

With the changes made to the monitoring site by removing the trees and building the deck, the site is suitable for monitoring for fine particles for the purpose of comparing the measured concentrations to the national ambient air quality standards. The platform is far enough from the road so that the site will meet the necessary neighborhood scale requirements for population oriented monitoring.

C. Monitors/Methods

This NCore site has the following monitors in place and operating since Jan. 1, 2011, or before, except for lead, which began Dec. 27, 2011, and ended Apr. 30, 2016, and nitrogen dioxide, NO_2, which began Dec. 10, 2013:

Parameter	**Monitoring Objective**	**Scale of Representation**	**Operating Schedule**	**AQS Method Code**
Trace level sulfur dioxide, SO_2	Population exposure	Neighborhood	Hourly data year round	560
Trace level carbon monoxide, CO	Population exposure	Neighborhood	Hourly data year round	554
Trace level reactive oxides of nitrogen, NO_y	Population exposure	Neighborhood	Hourly data year round	674
Nitrogen dioxide, NO_2	Population exposure	Neighborhood	Hourly data year round	200
Ozone, O_3	Population exposure	Neighborhood	Hourly data year round	047
$PM_{2.5}$, fine PM, filter based	Population exposure	Neighborhood	24-hour data on a 1-in-3 day schedule year round	118
$PM_{2.5}$, fine PM, continuous	Population exposure	Neighborhood	Hourly data year round	733
Speciated $PM_{2.5}$, filter based	Population exposure	Neighborhood	24-hour data on a 1-in-3 day schedule year round	810-812, 838-842
PM_{10}, filter based low	Population	Neighborhood	24-hour data on a	127

Parameter	Monitoring Objective	Scale of Representation	Operating Schedule	AQS Method Code
volume sampler	exposure		1-in-3 day schedule year round	
$PM_{10-2.5}$, coarse PM, by difference, PM_{10}-$PM_{2.5}$	Population exposure	Neighborhood	24-hour data on a 1-in-3 day schedule year round	176
PM_{10} lead, filter-based low volume sampler	Population exposure	Neighborhood	24-hour data on a 1-in-6 day schedule year round	127
Meteorological measurements of:				
Wind speed	Population exposure	Neighborhood	Hourly data year round	020
Wind direction	Population exposure	Neighborhood	Hourly data year round	020
Relative humidity	Population exposure	Neighborhood	Hourly data year round	020
Ambient temperature	Population exposure	Neighborhood	Hourly data year round	020

The monitor regulations were modified in 2012 to remove the requirement that all NCore sites monitor for speciated $PM_{10-2.5}$, course PM, filter based. The DAQ has no plans to add a speciated $PM_{10-2.5}$ monitor to the site. In 2016 the monitoring regulations were modified to remove the requirement that all NCore sites monitor for PM_{10} lead.[29] As a result DAQ ended the PM_{10} lead analysis on Apr. 30, 2016.

D. Readiness Preparation

In preparation for the installation of the NCore monitors, the following tasks were addressed:

Parameter	Status
A) Acquisition of trace level gaseous monitors	Completed
B) Acquisition of low concentration gas dilution calibrators	Completed
C) Certification of clean air generators	Completed
D) Method detection limit studies for trace level monitors	Completed
E) Installation of 10 meter NO_y Tower	Completed

[29] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, Mar. 28, 2016, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

F) Installation of filter based and continuous PM monitors — Completed
G) Installation of trace level gaseous monitors — Completed
H) Preparation of trace level gaseous monitor QAPP/SOPs — Completed
I) Meteorological tower — existing
J) Ozone monitor — existing

E. Waiver Requests

Subject to the review of the administrator, DAQ requested and received the following waivers from the specific minimum requirements for NCore sites. The EPA approval letter is provided in Appendix I. 2011 Network Plan EPA Approval Letter.

1. Millbrook Meteorological Tower

The sampling site located at the Millbrook Middle School has been designated as an EPA NCore site. In addition to specified monitor types, the collection of meteorological data is also required and includes, at a minimum, wind speed, wind direction, relative humidity and ambient temperature. The Millbrook site has been in operation since 1989 and the meteorological tower has the required sensors in place.

The tower is located approximately due south and 15.5 meters from the shelters that house the various monitors, see Figure 52. The wind direction/speed sensors are located at a height of 10 meters above ground and the relative humidity sensor is located at two meters. Ambient temperature sensors are located at two meters and 10 meters above ground. The tower is located in an open, grassy area that is free from any obstructions in a 270º arc to the prevailing winds that come from the south/west direction. The tower is positioned 15.5 meters from the shelters on a 3% uphill grade. This grade adds approximately one meter to the height of the tower above the shelters. This siting does not meet the EPA requirement for the tower being a distance of 10 times the height of the shelter (3.7 meters). Additionally, a single tree, approximately seven meters tall, is located 18 meters to the south southwest of the tower.

Figure 52. Millbrook NCore Site
(from City of Raleigh and Wake County iMAPS, http://maps.raleighnc.gov/iMAPS/)

Since the position of the meteorological tower is free from any obstructions in a 270º arc to the prevailing winds that come from the south and west direction, DAQ is confident the measurements provided will be representative of meteorological conditions in the area of interest. The state, therefore, requested and the EPA granted a waiver and deemed the position of the tower to be acceptable.

2. *NO_y probe inlet placement*

NCore probe siting guidance for NO_y is a suggested probe inlet height of 10 meters. The NO_y probe inlet was initially mounted at a height of 5.08 meters from the ground at the proposed NCore site. DAQ requested and received a waiver of the 10-meter probe height requirement primarily for safety considerations and also to facilitate maintenance on the sampling inlet (cleaning of the cross fitting) and to provide access for performance of calibration test points under reduced multi-gas calibrator system pressures (near ambient conditions).

The monitoring site is located at a middle school and elementary school and next to a day care. The converter box for the NO_y monitor is very heavy and requires a special tower to support the weight in winds above 40 miles per hour or a tower with guy wires. Because the tower needs to be located next to the monitoring shelter to minimize the length of tubing involved to transport sample from the converter box to the monitor, there is no space at the site for guy wires to stabilize the tower. The guy wires would block ingress and egress from the monitoring shelter and create a safety hazard for the monitoring technicians. The DAQ was concerned that placing the converter box on a 10-m tower without guy wires at this site would be too dangerous because winds often gust to over 40 miles per hours during thunderstorms, hurricanes and other severe weather events.

Later the DAQ decided to invest resources installing a new tower at the site because the difference in cost between properly grounding the existing tower and installing a new tower rated to hold the weight of the converter box without guy wires was small compared to the cost of properly grounding the tower. Thus, after the new tower was installed in late 2010, the DAQ increased the height of the probe inlet from 5.08 meters to 10 meters.

XI. Nitrogen Dioxide Monitoring Network

The North Carolina Division of Air Quality, DAQ, currently operates three nitrogen dioxide monitors. Mecklenburg County Air Quality operates two nitrogen dioxide monitors and Forsyth County Office of Environmental Assistance and Protection, Forsyth County, operates one nitrogen dioxide monitor. In 2010 the EPA changed the nitrogen dioxide primary NAAQS from an annual to an hourly standard of 100 parts per billion and established a new nitrogen dioxide monitoring network to support the new standard.[30] The new network has three types of monitoring sites:

- Near road sites – micro-scale near-road nitrogen dioxide monitoring stations in each CBSA with a population of 500,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road with high average annual daily traffic, AADT, counts.
- Area wide sites – monitoring stations in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected highest nitrogen dioxide concentrations representing the neighborhood or larger spatial scales.
- Regional administrator required monitoring – additional nitrogen dioxide monitoring stations nationwide in any area, inside or outside of CBSAs, above the minimum monitoring requirements, selected by the regional administrators, in collaboration with states, with a primary focus on siting these monitors in locations to protect susceptible and vulnerable populations.

North Carolina has five CBSAs that are larger than 500,000 or more persons and two CBSAs that are larger than 1,000,000 or more persons, not counting Virginia Beach-Norfolk-New Port News. Thus, North Carolina is required to have near road monitoring stations in the Charlotte, Raleigh, Greensboro, Winston-Salem and Durham areas and area wide sites in the Charlotte and Raleigh areas. However, based on the latest information and guidance provided by the EPA, DAQ understands that the requirement for a near-road site by Jan. 1, 2017, in CBSA's of populations between 500,000 and 1,000,000 is under reconsideration. In fact, the EPA signed a proposal on May 6, 2016, that would remove this NO2 monitoring requirement (also known as Phase 3 of the near-road network) from Appendix D of 40 CFR Part 58 https://www3.epa.gov/airquality/nitrogenoxides/pdfs/nr_no2_rev_050516.pdf. Accordingly, and with the concurrence of EPA Region 4, DAQ has placed a hold on the planning activities for the Greensboro and Durham sites. It is DAQ's understanding that the EPA plans on completing the associated final rule before the Jan. 1, 2017, deadline for Phase 3 operations. The DAQ will continue to follow this issue and adjust plans, if needed, as further information becomes available from the EPA. In addition to the near-road and area-wide sites, the site operated by Forsyth County at Hattie Avenue was selected by the region 4 administrator for regional administrator required monitoring.[31]

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[30] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register, Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.

[31] The list of NO_2 monitors selected for regional administrator required monitoring is available on the worldwide web at https://www3.epa.gov/ttn/amtic/svpop.html.

A. *Near Road Monitoring*

For information on the near road monitoring site in the Charlotte area see Appendix B. 2016 Annual Monitoring Network Plan for Mecklenburg County Air Quality. Site selection for the Raleigh, Greensboro and Durham areas are described in the following subsections.

1. *Raleigh Core Based Statistical Area*

The EPA approved the Triple Oak Road near road site for the Raleigh CBSA in 2012. Appendix R. 2012 Network Plan EPA Approval Letter provides the approval letter from the EPA. For details on the selection of Triple Oak Road and other locations that were considered see the 2012 Annual Monitoring Network Plan for the North Carolina Division of Air Quality.[32] Table 54 provides the most recently available traffic information for the area from the North Carolina Department of Transportation. Table 55 provides the most recently available traffic information using the traffic sensor located at the site. Using actual traffic data confirms that the monitor is in the area with the highest traffic.

Table 54. Fleet Equivalent Average Annual Daily Traffic for Selected Road Segments in the Raleigh Metropolitan Statistical Area[33]

Station	Route	Location	Station	Percent Passenger	2014 AADT	Fleet Equivalent AADT
813	I-40	From Exit 285 to 287	09MC0031	94	162,000	249,480
1	I-40	From Exit 287 to 289	09MC0031	94	157,000	241,780
807	I-40	From Exit 283 to 284	09MC0031	94	149,000	229,460
811	I-40	From Exit 284 to 285	09MC0031	94	146,000	224,840
634	I-40	From Exit 297 to 298	09MC0033	92	119,000	204,680
895	US 1-64	West of I-40	10MC0009	95	137,000	198,650
889	I-40	From Exit 300 to 301	10MC0021	91	104,000	188,240
169	I-440	From Exit 7 to 8	09MC0048	96	138,000	187,680

Table 55. Fleet Equivalent Average Annual Daily Traffic for Road Segments in the Raleigh Metropolitan Statistical Area Using Microwave Radar Data

Route	Location	2013 Traffic Monitor Data			2014 Traffic Monitor Data		
		Percent Passenger	AADT	Fleet Equivalent AADT	Percent Passenger	AADT	Fleet Equivalent AADT
I-40	Exit 283 to 284	95	140,133	205,797	95	142,442	209,166
I-40	Exit 284 to 285	95	133,655	192,580	95	135,694	195,828
I-40	Exit 287 to 289	96	130,419	182,003	96	134,040	186,343
I-40	Exit 285 to 287	98	141,006	166,657	98	143,633	168,415
I-440	Exit 7 to 8	97	111,733	140,247	99	127,376	139,201
I-40	Exit 301 to 302	98	137,314	167,224	97	104,622	133,486
I-440	Exit 9 to Exit 10	99	116,082	132,321	98	115,369	132,133
I-40	Exit 297 to 298	97	114,740	143,302	97	100,657	127,177
I440	Exit 6 to 7	99	107,115	119,403	99	106,478	119,094
I-440	Exit 8 to 9	99	109,108	117,890	99	109,698	118,789

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[32] The 2012 network plan is available at https://www3.epa.gov/ttn/amtic/files/networkplans/NCNetwork2012plan.pdf.

[33] Average annual daily traffic data is available from the NC Department of Transportation at http://www.ncdot.gov/projects/trafficsurvey/.

An aerial view of the location is shown in Figure 53. The monitoring probe is located 18 meters from the edge of I-40 and 4.3 meters above the ground. The monitoring station is approximately one kilometer from I-540 and 0.5 kilometers from Airport Boulevard. The Airport Boulevard ramp ends approximately 300 meters southeast from the monitoring site. The location is at grade with the roadway. There are no barriers between the road and the monitoring station.

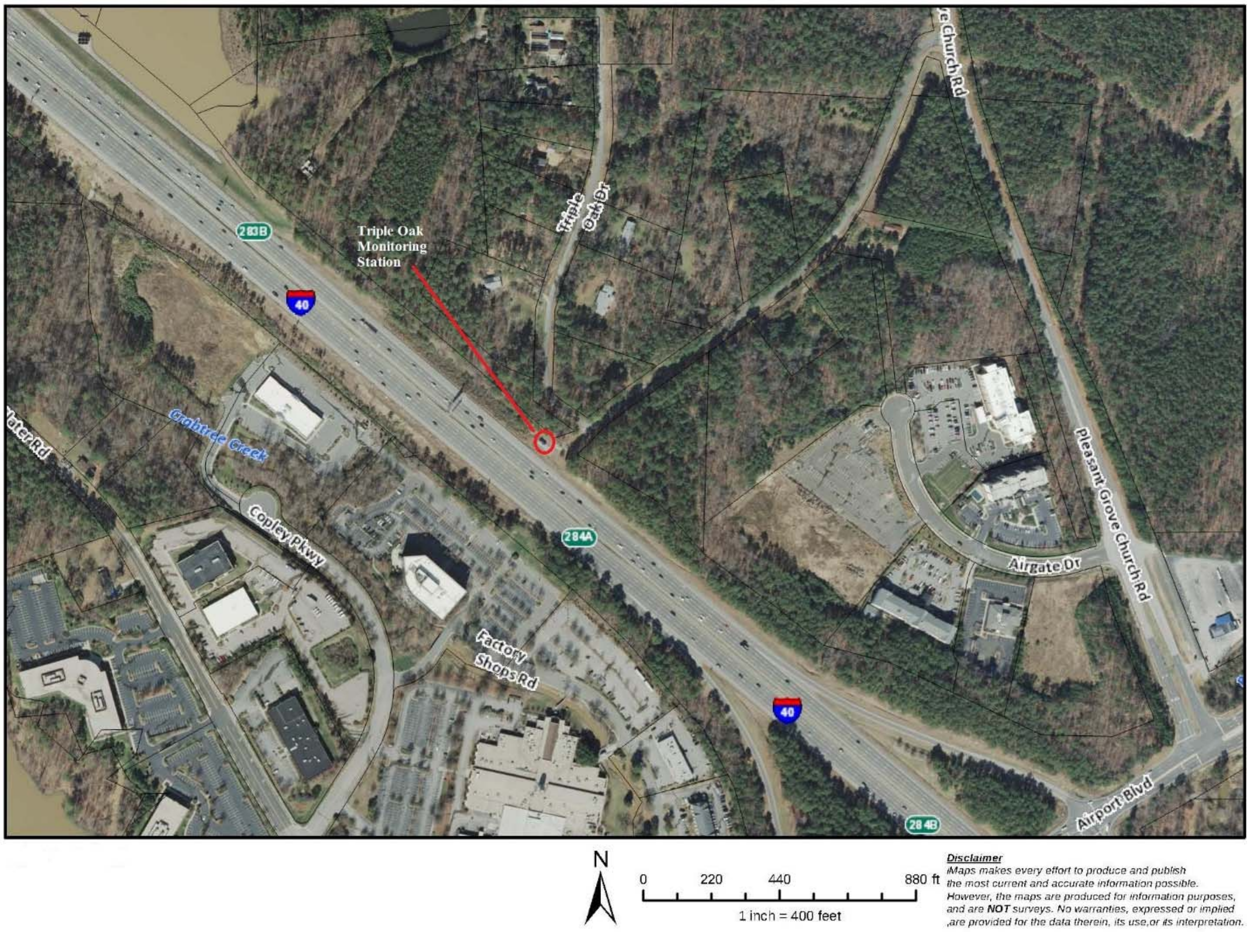

Figure 53 Wake County Near-Road Monitoring Station Location (red circle)

2. *Greensboro-High Point Core Based Statistical Area*

Preliminary analysis of the road segments in the Greensboro-High Point MSA using highest AADT values adjusted for fleet mix indicates the monitoring station should be located along Knox Road near Exit 132. The segments in the Greensboro-High Point MSA with the highest average annual daily traffic adjusted for fleet mix are shown in Table 56.

Table 56. Fleet Equivalent Average Annual Daily Traffic for Selected Road Segments in the Greensboro-High Point MSA

Station	Route	Location	Station	Percent Passenger	2014 AADT	Fleet Equivalent AADT
(A) 340	I-85 BUS	From Exit 37 to Exit 39	09MC0066	88	133,000	276,640
(B)3400	I-85	From Exit 131 To Exit 132	Extrapolate	85	115,000	270,250
(C)697	I-85	From Exit 132 To Exit 135	Extrapolate	85	115,000	270,250
(D)811	I-85	From Exit 135 To Exit 138	Extrapolate	85	113,000	265,550
(E)813	I-85	From Exit 138 To Exit 140	10MC0001	85	112,000	263,200
(F) 341	I-85 BUS	From Exit 36B to Exit 37	09MC0065	90	133,000	252,700
(G)508	I-40	From Exit 211 To Exit 212	09MC0023	89	126,000	250,740
503	I-40	From Exit 210 to Exit 211	09MC0023	89	120,000	238,800
(H)902	I-40	From Exit 206 To Exit 208	09MC0022	88	114,000	237,120
604	I-40	From Exit 208 to Exit 210	09MC0022	88	114,000	237,120

The locations of these segments are shown with lettered black squares in Figure 54. They stretch from the eastern part of Guilford County to the western part with heaviest fleet adjusted average annual daily traffic beginning in central Greensboro going east toward Burlington. If the EPA does not finalize their proposal to remove near road nitrogen dioxide monitoring requirements for the Greensboro MSA, the DAQ will move forward with placing the monitor along Knox Road by exit 132 on I-85, Square B. This location is desirable because it is the segment with the highest fleet adjusted AADT and it is easily accessible from Knox Road. This location should also meet all of the additional criteria such as congestion patterns, roadway design, terrain and meteorology listed in the near road siting guidance document.[34]

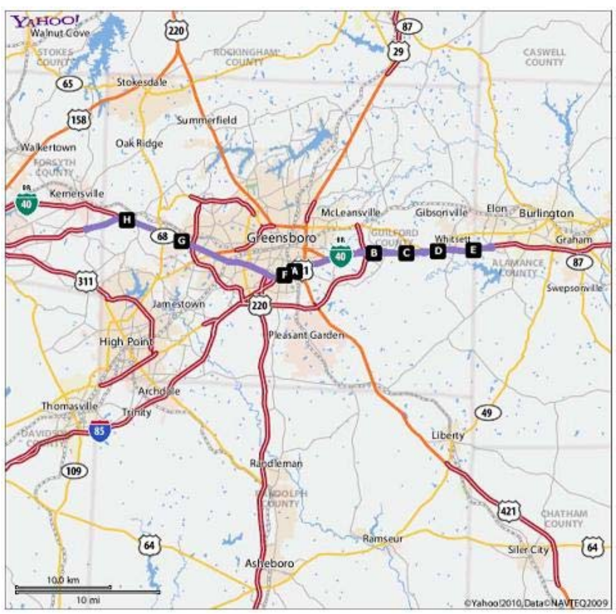

Figure 54. Possible Locations of Future Greensboro Near-Roadway Monitors

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[34] Near-road NO_2 Monitoring Technical Assistance Document, available on the worldwide web at https://www3.epa.gov/ttn/amtic/files/nearroad/NearRoadTAD.pdf.

3. *Durham-Chapel Hill Core Based Statistical Area*

Preliminary analysis of the road segments in the Durham-Chapel Hill MSA using highest AADT values adjusted for fleet mix indicates the monitoring station should be located near the Page Road exit along I-40. The segments in the Durham-Chapel Hill MSA with the highest AADT adjusted for fleet mix are listed in Table 57 and Table 58.

Table 57. Fleet Equivalent Average Annual Daily Traffic for Road Segments in the Durham-Chapel Hill Metropolitan Statistical Area Using Published NCDOT Data

Station	Route	Location	Station	Percent Passenger	2014 AADT	Fleet Equivalent AADT
(A)1011	I-40	From Exit 282 To Exit 283	09MC0030	90%	180,000	342,000
(B)947	I-40	From Exit 281 To Exit 282	09MC0030	90%	174,000	330,600
(C)547	I-40	From Exit 280 To Exit 281	09MC0030	90%	162,000	307,800
(D)553	I-40	From Exit 279 To Exit 280	10MC0005	94%	156,000	240,240
(E)942	I-40	From Exit 273 To Exit 274	09MC0028	90%	120,000	228,000
941	I-40	From Exit 274 to Exit 276	09MC0028	90 %	117,000	222,300
(G)6	I-85	From Exit 160 To Exit 161	09MC0069	88%	103,000	214,240
(I)91	I-85	From Exit 161 To Exit 163	09MC0069	88%	99,000	205,920
(J)5	I-85	From Exit 157 To Exit 160	09MC0069	88%	98,000	203,840
(F)727	I-40	From Exit 278 To Exit 279	10MC0005	94%	128,000	197,120
202	I-85	From Exit 174B to Exit 174	09MC0069	88 %	94,000	195,520
(H)940	I-40	From Exit 276 To Exit 278	10MC0005	94%	126,000	194,040

Table 58. Fleet Equivalent Average Annual Daily Traffic for Road Segments in the Durham-Chapel Hill Metropolitan Statistical Area Using Microwave Radar Data

		2013 Traffic Monitor Data			2014 Traffic Monitor Data		
Route	Location	Percent Passenger	AADT	Fleet Equivalent AADT	Percent Passenger	AADT	Fleet Equivalent AADT
(B)I-40	Exit 281 to 282	95 %	157,673	235,806	95 %	152,803	221,736
(C)I-40	Exit 280 to 281	97 %	147,546	185,472	97 %	147,934	183,947
(D)I-40	Exit 279 to 280	97 %	127,371	167,573	98 %	137,153	166,776
(F)I-40	Exit 278 to 279	98 %	137,314	167,224	96 %	118,952	156,811
(H)I-40	Exit 276 to 278	97 %	114,740	143,302	97 %	117,298	145,941
(E)I-40	Exit 273 to 274	97 %	111,733	140,247	97 %	105,718	132,735
(K)I-40	Exit 274 to 276	98 %	101,687	121,505	98 %	109,205	130,830
(L)I-40	Exit 270 to 273	96 %	83,527	113,511	96 %	86,083	117,350

The locations of these segments are shown with lettered symbols in Figure 55. They stretch from the eastern part of Durham County into central Orange County with heaviest fleet adjusted AADT being along I-40 near the Durham-Wake County line. Because the highest ranked sites are within two miles of the Raleigh near road monitoring site off of Triple Oak Road along I-40 between Exit 283 and Exit 284 and have similar traffic counts and heavy duty vehicle make-up, DAQ is requesting a waiver for the near road Durham-Chapel Hill monitoring site if the EPA proposal to eliminate this monitoring requirement is not finalized.

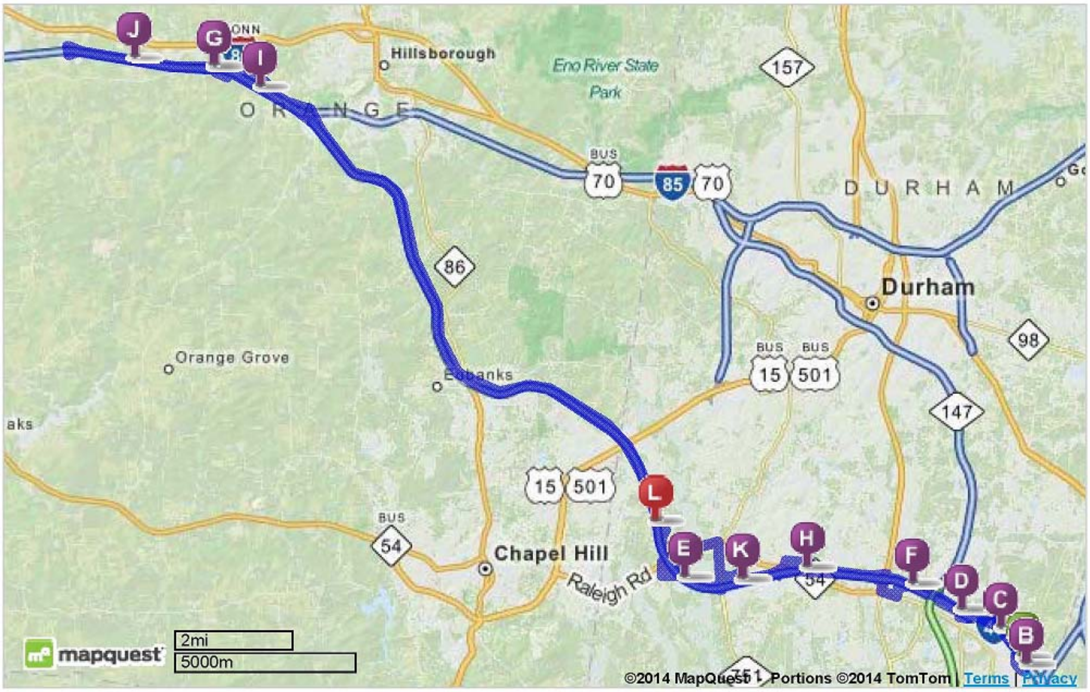

Figure 55. Locations of segments with highest fleet adjusted AADT in the Durham-Chapel Hill MSA

B. Area wide sites

The area wide sites are located at the NCore sites in Charlotte and Raleigh. Mecklenburg County Air Quality operated a nitrogen dioxide monitor at the Garinger site since Nov. 12, 1999. The DAQ began operating a nitrogen dioxide monitor at the Millbrook site on Dec. 10, 2013.

C. Regional Administrator Required Monitoring

For information on the Hattie Avenue regional administrator required monitoring site see Appendix C. 2016 Annual Monitoring Network Plan for Forsyth County Office of Environmental Assistance and Protection.

Table 59 and Table 60 provide the location, the statement of purpose, the status for each monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D and E of 40 CFR 58 and a summary of proposed and planned changes to the nitrogen dioxide monitoring network in the Charlotte-Concord-Gastonia and Raleigh MSAs, respectively. Table 61 provides the proposed location, statement of purpose, status for each monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D and E of 40 CFR 58 and a summary of proposed and planned changes to the nitrogen dioxide monitoring network for potential near-road sites that would be operated by DAQ. Table 62 and Table 63 provide the location, the statement of purpose, the status for each monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D and E of 40 CFR 58 and a summary of proposed and planned changes to the nitrogen dioxide monitoring network in the Winston-Salem MSA and in other areas in North Carolina that are outside of MSAs, respectively.

Table 59 The 2016-2017 Nitrogen Dioxide Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041	37-119-0045
Site Name:	Garinger	Remount Road
Street Address:	1130 Eastway Drive	902 Remount Road
City:	Charlotte	Charlotte
Latitude:	35.2401	35.212657
Longitude:	-80.7857	-80.874401
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly	Hourly
Statement of Purpose:	Area wide site in Charlotte-Concord-Gastonia MSA. AQI reporting. Compliance w/NAAQS.	Near road monitoring site. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Source oriented
Scale:	Neighborhood	Microscale
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes – RFNA-1289-074	Yes – EQNA-0512-200
Meets Requirements of Part 58 Appendix D:	Yes- area wide	Yes –near road
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	None

[a] The near road monitor uses a chemiluminesence detector with a photolytic convertor, Air Quality System, AQS, method code 200. The area wide monitor uses a Thermo 42i, AQS method code 074. Both monitors are operated by Mecklenburg County Air Quality, AQS primary quality assurance and reporting agency 0669

Table 60 The 2016-2017 Nitrogen Dioxide Monitoring Network for the Raleigh MSA [a]

AQS Site Id Number:	37-183-0014	37-183-0021
Site Name:	Millbrook	Triple Oak Road
Street Address:	3801 Spring Forest Road	2826 Triple Oak Road
City:	Raleigh	Cary
Latitude:	35.8561	35.8654
Longitude:	-78.5742	-78.8195
MSA, CSA or CBSA represented:	Raleigh	Raleigh
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly	Hourly
Statement of Purpose:	Area wide site in Raleigh MSA. AQI reporting. Compliance w/NAAQS.	Near road monitoring site. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure; general/ background	Source oriented
Scale:	Neighborhood	Microscale
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes – EQNA-0512-200	Yes – EQNA-0512-200
Meets Requirements of Part 58 Appendix D:	Yes- area wide	Yes –near road
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	None

[a] Both monitors use a chemiluminesence detector with a photolytic convertor, Air Quality System, AQS, method code 200

Table 61 Possible 2016-2017 Nitrogen Dioxide Monitoring Network for the Greensboro and Durham MSAs if Near Road Monitoring Proposal is Not Finalized [a]

AQS Site Id Number:	37-081-0015	37-119-0044
Site Name:	Knox Road	Page Road
Street Address:	Knox Road	Page Road
City:	Greensboro	Durham
Latitude:	36.0598	35.8858
Longitude:	-79.6627	-78.8425
MSA, CSA or CBSA represented:	Greensboro-High Point	Durham-Chapel Hill
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly	Hourly
Statement of Purpose:	Near road monitoring site. AQI reporting. Compliance w/NAAQS	Near road monitoring site. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Source oriented	Source oriented
Scale:	Microscale	Microscale
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes – EQNA-0512-200	Yes – EQNA-0512-200
Meets Requirements of Part 58 Appendix D:	Yes –near road	Yes –near road
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	May start 1/1/2017	May start 1/1/2017

[a] Both monitors use a chemiluminesence detector with a photolytic convertor, Air Quality System, AQS, method code 200

Table 62 The 2016-2017 Winston-Salem MSA Nitrogen Dioxide Monitoring Network [a]

AQS Site Id Number:	37-067-0022	37-067-0031
Site Name:	Hattie Avenue	To be determined
Street Address:	Corner of 13^{th} & Hattie Avenue	To be determined
City:	Winston-Salem	Winston-Salem
Latitude:	36.110556	To be determined
Longitude:	-80.226667	To be determined
MSA, CSA or CBSA represented:	Winston-Salem	Winston-Salem
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly	Hourly
Statement of Purpose:	Regional administrator required monitor for Region 4. AQI reporting. Compliance w/NAAQS.	Near road monitoring site. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Source oriented
Scale:	Neighborhood	Microscale
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58 Appendix A:	Yes	Yes
Meets Requirements of Part 58 Appendix C:	Yes – RFNA-1194-099	To be determined
Meets Requirements of Part 58 Appendix D:	Yes – required regional administrator monitor.	Yes –near road
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	May start 1/1/2017

[a] The monitor uses a chemiluminesence detector with a catalytic convertor, Air Quality System, AQS, method code 099 and is operated by Forsyth County Office of Environmental Assistance and Protection, AQS reporting agency 0403.

Table 63 The 2016-2017 Nitrogen Dioxide Monitoring Network for Areas not in MSAs [a]

AQS Site Id Number:	37-105-0002
Site Name:	Blackstone
Street Address:	4110 Blackstone Drive
City:	Sanford
Latitude:	35.432500
Longitude:	-79.288700
MSA, CSA or CBSA represented:	None
Monitor Type:	Special purpose
Operating Schedule:	Hourly
Statement of Purpose:	General/background site for shale gas development study
Monitoring Objective:	General/ background
Scale:	Urban
Suitable for Comparison to NAAQS:	Yes
Meets Requirements of Part 58 Appendix A:	Yes
Meets Requirements of Part 58 Appendix C:	Yes – EQNA-0512-200
Meets Requirements of Part 58 Appendix D:	No
Meets Requirements of Part 58 Appendix E:	Yes
Proposal to Move or Change:	None

[a] Monitor uses a chemiluminesence detector with a photolytic convertor, Air Quality System, AQS, method code 200

XII. EPA Approval Dates for Quality Management Plan and Quality Assurance Project Plans

The dates the United States Environmental Protection Agency, EPA, approved the quality management plan and quality assurance project plans, QAPP, for the North Carolina Division of Air Quality, DAQ, are provided in Table 64.

Table 64. Dates the EPA Approved the Quality Management Plan and Quality Assurance Project Plans

Document	Date Approved by EPA
Quality Management Plan	Aug. 18, 2011
Quality Assurance Project Plan for PM 2.5 Monitoring	Jan. 16, 2002
Quality Assurance Project Plan for Criteria Pollutant Monitoring	Nov. 6, 2006
Quality Assurance Project Plan for NCore Monitoring	(submitted Oct. 12, 2010)

The DAQ is currently in the process of revising the PM 2.5 and Criteria Monitoring QAPPs. The NCore and Criteria Pollutant QAPPs were revised and combined into one document and submitted to the EPA for approval on Dec. 14, 2015. The EPA provided DAQ with comments on Mar. 14, 2016. The DAQ is currently revising the QAPP based on EPA's comments and plans to resubmit it for approval in June.

Concurrence and Approvals

(1)	Name	**Sheila Holman**	Phone	(919) 733-3340
	Title	Director, Division of Air Quality		
	Signature		Date	6-13-11
(2)	Name	**Terry Pierce**	Phone	(919) 733-0711
	Title	Director, Division of Environmental Health		
	Signature		Date	06/15/11
(3)	Name	**Dexter Matthews**	Phone	(919) 508-8414
	Title	Director, Division of Waste Management		
	Signature		Date	6-7-11
(4)	Name	**Coleen Sullins**	Phone	(919) 807-6300
	Title	Director, Division of Water Quality		
	Signature		Date	6/23/11

Approval for Departmental Implementation

(8)	Name	**Robin Smith**	Phone	(919) 715-4141
	Title	Assistant Secretary		
	Signature		Date	7/15/11
(9)	Name	**Dee Freeman**	Phone	(919) 733-4984
	Title	Secretary, Department of Environment and Natural Resources		
	Signature		Date	7.15.11

Approval for Environmental Protection Agency

(10)	Name	**Danny France**	Phone	(706) 355-8738
	Title	Quality Assurance Manager, EPA Region 4		
	Signature		Date	8/18/11

Figure 56. Signature Page from the DEQ Quality Management Plan

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

Science and Ecosystem Support Division
980 College Station Road
Athens, Georgia 30605-2720

RECEIVED
JAN 23 2002
AMBIENT PA

JAN 15 2002

Mr. Hoke P. Kimball, Chief
NCDENR
Division Of Air Quality
Ambient Monitoring Section
1641 Mail Service Center
Raleigh, North Carolina 27699-1641
Project No. 02-0225

Dear Mr. Kimball:

We have received your letter dated December 11, 2001, requesting EPA approval, and transmitting the Quality Assurance Project Plan (QAPjP): the $PM_{2.5}$ Speciation QA Plan, Section I, Electronic Calibrations Branch Responsibilities and Section II, Operator Responsibilities; as well as the signed Identification and Approval, Section 1.0 Title Page.

In accordance with your request, EPA Region 4 hereby approve these additions to the NC-DAQ $PM_{2.5}$ QAPjP and has enclosed the signed QAPjP Identification and Approval sheet. Should you or your staff have any question(s), please give Herbert Barden a call at 706) 355-8737.

Sincerely,

Gary Bennett
Office of Quality Assurance and
Data Integration

cc: Ed Carreras
Herbert Barden

(Brod Copied 11/13)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

Science and Ecosystem Support Division
980 College Station Road
Athens, Georgia 30605-2720

NOV 06 2006

RECEIVED
NOV 8 2006
AMBIENT P/L

Mr. Hoke P. Kimball
NC Department of Environment, Health,
And Natural Resources
1641 Mail Service Center
Raleigh, NC 27699-1641

SESD Project #07-0065

Dear Mr. Kimball:

We have reviewed the Criteria Pollutants Quality Assurance Project Plan (QAPP) for the North Carolina Division of Air Quality ambient air monitoring program. This QAPP is:

- **Quality Assurance Project Plan for the North Carolina Division of Air Quality Ambient Air Quality Monitoring Program, Revision 0, dated September 30, 2006.**

EPA hereby approves this QAPP. Enclosed is the signature page of the QAPP which has been signed to indicate Region 4 approval. If you have any questions or comments, please contact Jerry W. Berger at (706) 355-8739.

Sincerely,

Marilyn Thornton

Marilyn Thornton, Chief
Office of Quality Assurance and
Data Integration

Enclosure

cc: Doug Neeley
Stephanie Wimpey

From: Redmond, Donnie
Sent: Tuesday, October 12, 2010 8:16 AM
To: Garver.daniel@epa.gov; Sciera.Katherine@epamail.epa.gov
Cc: Steger, Joette
Subject: NCDAQ NCore QAPP
Attachments: NCore QAPP_final 10_08_2010.pdf

Daniel,

Attached for EPA review and approval is NC DAQ's NCore QAPP. This electronic version is our submittal – no hard copy will be mailed unless specifically required.

Our Air Planning Agreement says to submit such changes to you. If you're not the correct contact, please let me know who is.

Thanks,
Donnie

Please note new email address: donnie.redmond@ncdenr.gov

Donnie Redmond, Ambient Monitoring Section Chief
NC DENR, Division of Air Quality
Ambient Monitoring Section
1641 Mail Service Center
Raleigh, NC 27699-1641
Phone: 919-733-1487
Fax: 919-715-7476
www.ncair.org

****
E-mail correspondence to and from this address may be subject to the
North Carolina Public Records Law and may be disclosed to third parties.
****

Figure 57. NCore QAPP Submittal Documentation

XIII. Equipment Condition of North Carolina Monitoring Sites

Ozone calibrators Thermo 49 CPS are in good condition. The Electronics and Calibration Branch, ECB, is currently using four calibrators for audit devices and lab standards. The manufacturer stopped support for this equipment in August 2015. The calibrators will be replaced in the next two to three years as the division acquires new Thermo 49iPS calibrators.

Ozone analyzers Thermo 49i and calibrators Thermo 49iPS are new (2013 and 2014) and in good condition. The Division of Air Quality, DAQ, has acquired 45 each and has deployed them to the field since the beginning of the 2015 ozone season. Currently we have 28 sites in operation and audit eight sites for the local and tribal programs.

Environics Model 7000 Zero Air Generators, ZAG, are new (2014) and in good condition. ECB has five units and they are used in the maintenance lab at the technicians work benches.

API Teledyne Model 701 ZAGs are new (2014 and 2015) and in good condition. ECB has 73 of these ZAGs and deployed them starting in 2015 to all DAQ sites requiring zero air.

API Teledyne Model 751H Portable ZAG is new (2014 and 2015) and in good condition. ECB has 2 of these ZAGs and uses them to conduct audits.

The ECB zero air supply, ZAS, were removed at the end of the 2014 ozone season. ECB will keep two to five on hand as backup to the ZAGs. All of the other units were surplused in 2015.

SO_2 analyzers Thermo 43C (are between 11 and 15 years old) and are in fair condition. The manufacturer stopped support for this equipment in August 2015. The analyzers will be replaced in the next year as the division replaces them with 43i's.

SO_2 analyzers Thermo 43i are new (2015) and in good condition. ECB has 11 - 43i's and two - 43i-TLE analyzers. They are currently supporting seven year-round sites (two are data requirement rule sites), five three-year rotating sites and two audit sites for the data requirements rule.

CO analyzers Thermo 48C are at the end of their lifecycle and are being replaced in the next 6 – 12 months with 48i-TLE's. The manufacturer stopped support for this equipment in August 2015.

CO analyzers Thermo 48i-TLE (three in 2006, one in 2012, two in 2015) are in fair to new condition. Parts are hard to acquire for the older 48i's. The analyzers support three sites in DAQ and Mecklenburg County.

NO_y Reactive Nitrogen Thermo 42i analyzers (three – 2007, one – 2012) are in fair to good condition. DAQ is working to purchase additional units in the future.

Thermo 146C calibrators used with SO_2, CO and NO_y are in fair to poor condition and were only supported by the manufacturer until August 2015. The division will work to replace them in the next one to two years.

Thermo 146i calibrators used with SO_2, CO and NO_y are new (2015) and in good condition. The division has 12 and will work to replace the 146C models in the next one to two years.

NH_3 Ammonia monitors - Model 17C; DAQ stopped monitoring for this pollutant in June 2015. The older three pieces of equipment were surplused in 2015. ECB kept the two newer units for any future requirements.

NO2 Nitrogen Dioxide Teledyne T200UP analyzers are in good condition. DAQ has six (2013 and 2014) units. ECB is looking at replacing them with CAPS Monitors in the future.

NO2 Nitrogen Dioxide Teledyne T700U calibrators are in good condition. DAQ has five (three – 2012, one – 2013 and one – 2014) units. DAQ is working to purchase additional units in the future.

NO3 nitrate analyzers and generators – R&P Model 8400N; DAQ owns two each (2003), one operates at the Rockwell continuous speciation site, CSS, the other is at the Millbrook CSS; both are in fair condition. Their future is dependent on the availability of the nichrome strips that are no longer supported by the manufacturer. DAQ was able to find an independent supplier for the nichrome strips in 2014. DAQ buys maintenance parts annually for this equipment.

SO4 sulfate analyzers – Thermo Model 5020c; DAQ owns two (2005); one is operating at the Millbrook CSS and is in fair to good condition. They will no longer be supported by Thermo after 2015. DAQ buys maintenance parts annually for this equipment. The Model 5020c SO4 monitor at the Millbrook CSS was replaced with the new unit in late 2013. The one removed from the Millbrook CSS is on the shelf at ECB for a spare.

Anderson particulate machines, DAQ has kept two (1987) in its inventory, they are in fair condition and can be maintained by ECB.

Total suspended particulate, TSP, DAQ has kept 6 (1996) in its inventory, they are in fair condition and can be maintained by ECB. ECB surplused the other systems in 2015.

Wedding PM_{10} monitors, DAQ has kept one (1991) in its inventory and it is in fair condition and can be maintained by ECB. ECB will be surplusing 23 Weddings in 2016.

URG 3000N particulate monitors, DAQ owns five (2010) two are in good condition and the other three are used as spares to support the remaining units

Met One SASS 9800 particulate monitors, DAQ owns five older units and one (2016) are in fair condition to new condition. The older units will be used a spares to maintain the remaining units.

Thermo Partisol 2025 $PM_{2.5}$ units; DAQ owns 39 (1998 – 2001); as a whole, while showing some age, they are in poor to fair condition. We are waiting on purchase requests for parts to get more spare units repaired. ECB is surplusing 10 units in 2016 as we work to go to a continuous monitoring equipment network.

Thermo Partisol 2025i $PM_{2.5}$ units; DAQ owns four; they are in new condition. The two received in 2015 do not have cold weather kits and it is too expensive to upgrade them, they will be used for spare parts. The two received in 2016; one will be installed at the Millbrook site and the second one will go to Mecklenburg County. DAQ is working to purchase additional units in the future as required.

Beta attenuation monitors, BAM, Model 1020 – DAQ owns 29; units were acquired between 2008 and 2015; equipment is in good to new condition. DAQ is working to purchase additional units in the future.

Beta attenuation monitors, BAM, Model 1022 – DAQ owns 13, equipment was new (2015 and 2016) and in good condition. DAQ is working to purchase additional units in the future.

Tapered element oscillating microbalance, TEOM, monitors are in poor condition, no longer supported by the manufacturer and have been replaced in the field with BAMs. The equipment will be surplused in 2016.

Xontek 911 VOC samplers are in fair to good condition after some reconditioning and replacement of obsolete pumps and circuit boards. There are 16 units that are over 20 years old and six that were purchased in 2014. DAQ is working to purchase additional units in the future.

ATEC 2200-1C aldehyde samplers are in fair to poor condition. Some are serviceable but in need of replacement. DAQ is working to purchase additional units in the future.

XIV. Resources

1. Title 40 Code of Federal Regulations Part 58, Ambient Air Quality Surveillance. Part 58 and Part 58 Amended: Federal Register/Vol. 71 No. 200/Tuesday, Oct. 17, 2006/Rules and Regulations.

2. Title 40 Code of Federal Regulations Part 58, Ambient Air Quality Surveillance. APPENDIX A TO PART 58—QUALITY ASSURANCE REQUIREMENTS FOR MONITORS USED IN EVALUATIONS OF NATIONAL AMBIENT AIR QUALITY STANDARDS: Electronic Code Of Federal Regulations, May 19, 2016, available on the worldwide web at http://www.ecfr.gov/cgi-bin/text-idx?SID=87c8d2b6f9ef2f4c8b11437b1077746b&mc=true&node=ap40.6.58_161.a&rgn=div9.

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Appendix A. Summary of Monitoring Sites and Types of Monitors

Table A- 1 Summary of Monitoring Sites and Types of Monitors

Site ID	CO		SO_2		NO_y					PM_{10}		$PM_{2.5}$			Meteorology			
Site Name	**R**	**T**	**R**	**T**	**H**	**T**	**NO_2**	**O_3**	**Pb**	**M**	**C**	**M**	**C**	**S**	**WS/WD**	**AT/RH**	**RF/SR**	**UAT**
370030005 Taylorsville-Liledoun								X			X						UV	
370110002 Linville Falls								X									UV	
370130151 Bayview Ferry			X												X			
370210030[a] Bent Creek								X										
370210034 [a] Board of Ed												X	X					
370210035 [a] AB Tech College																		VOC
370270003 Lenoir			X					X									UV	
370330001 Cherry Grove								X			X				X		UV	
370350004 Hickory Water Tower												X	X					
370510008 Wade								X									UV	
370510009 Wm Owen											X	X	X					
370510010 Honeycutt			X					X										
370570002 Lexington Water Tower												X	X					
370630015 Durham Armory			X					X			X	X	X				UV	
370650099 Leggett								X					X				UV	
370670022[b] Hattie Ave.			X				X	X			X	X	X	X				VOC
370670030 [b] Clemmons								X				E	X					
370671008 [b] Union Cross								X							X	AT		
370750001[c] Joanna Bald								X									SR	
370770001 Butner								X									SR	
370810013 Mendenhall								X			X	X	X				SR	
370870008 Waynesville E.S.								X									SR	

Table A- 1 Summary of Monitoring Sites and Types of Monitors

Site ID	CO		SO_2		NO_y					PM_{10}		$PM_{2.5}$			Meteorology			
Site Name	**R**	**T**	**R**	**T**	**H**	**T**	**NO_2**	**O_3**	**Pb**	**M**	**C**	**M**	**C**	**S**	**WS/WD**	**AT/RH**	**RF/SR**	**UAT**
370870035 Fry Pan								X									SR	
370870036 Purchase Knob								X									SR	
371010002 West Johnston								X				X	P				SR	
371050002 Blackstone				X			X	X					X		X	X	SR	VOC ALD
371070004 Lenoir Community College								X			X						SR	
371090004 Crouse								X									SR	
371170001 Jamesville			X					X			X						SR	
371190003 [d] #11 Fire Station										E								
371190041 [d] Garinger	X	X		X		X	X	X	X	X		X	X	X	X	X	X	VOC
371190042 [d] Montclaire										X		X	X					
371190043 [d] Oakdale												E						
371190044 Redmont Rd		P					X					P	P					
371190046[d] University Meadows								X										
371210004 Spruce Pine Hospital												X	P					
371230001 Candor											X	X	X		X	X		VOC ALD
371290002 Castle Hayne								X			X	X	X				SR	
371290006 New Hanover			X															
371290010 Battleship																		VOC
371450003 Bushy Fork								X									SR	
371470006 Pitt Co Ag Cen								X				X	P				SR	
371570099 Bethany			X					X									SR	
371590021 Rockwell						X		X							X		SR	
371730002 Bryson City								X					X		X	X	X	

Table A- 1 Summary of Monitoring Sites and Types of Monitors

Site ID Site Name	CO		SO_2		NO_y					PM_{10}		$PM_{2.5}$			Meteorology			
	R	T	R	T	H	T	NO_2	O_3	Pb	M	C	M	C	S	WS/WD	AT/RH	RF/SR	UAT
371790003 Monroe M. S.								X									SR	
371830014 Millbrook		X		X		X	X	X	X	X		X	X	X	X	X	X	VOC ALD
371830021 Triple Oak Rd		P					X						P					
371990004 Mt Mitchell								X									SR	

CO = Carbon monoxide
SO_2 = Sulfur dioxide
NO_y = Reactive oxides of nitrogen
O_3 = Ozone
Pb = Lead
PM_{10} = Particles of 10 micrometers or less in aerodynamic diameter
$PM_{2.5}$ = Fine particles
X = monitor operating at site
E = monitor at site will end
P = monitoring proposed to start at site
R = 48C monitor for CO, 43C monitor for SO_2
T = 48i or Teledyne API (TAPI) 300EU monitor for CO, 43 TLE monitor for SO_2
M = Wedding or GMW 1200 for PM_{10}, 2025 Sequential for $PM_{2.5}$
C = TEOM or BAM
S = Met One SASS monitor and URG 3000N
WS/WD = Wind speed & direction
AT/RH = air temperature & relative humidity
RF/SR = Rainfall & solar radiation
UAT = Urban air toxics
VOC = Volatile organic compounds
ALD = Aldehydes and ketones

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[a] Operated by the Western North Carolina Regional Air Quality Agency
[b] Operated by the Forsyth County Office of Environmental Assistance and Protection
[c] This monitor is owned by the United States Forest Service and operated by the North Carolina Division of Air Quality
[d] Operated by the Mecklenburg County Air Quality

Appendix B. 2016 Annual Monitoring Network Plan for Mecklenburg County Air Quality

Please see the following internet web address:

http://www.charmeck.org/Departments/LUESA/Air+Quality/Air+Quality+Data/Home.htm

Appendix C. 2016 Annual Monitoring Network Plan for Forsyth County Office of Environmental Assistance and Protection

Please see the following internet web address:

http://daq.state.nc.us/monitor/monitoring_plan/Forsyth_2011_Plan.pdf

Appendix D. Duke Energy Roxboro Siting Analysis and Additional Site Information

Duke Energy Roxboro SO_2 Modeling for Monitor Placement

Introduction

On June 22, 2010, the EPA revised the primary sulfur dioxide (SO_2) National Ambient Air Quality Standard (NAAQS) (75 FR 35520). The EPA promulgated a new 1-hour daily maximum primary SO_2 standard at a level of 75 parts per billion (ppb), based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations.

On May 13, 2014, the EPA proposed the Data Requirements Rule (DRR) for the 1-Hour SO_2 NAAQS (79 FR 27445). The final DRR was promulgated on Aug. 21, 2015 (80 FR 51051) and requires states to gather and submit to the EPA additional information characterizing SO_2 air quality in areas with larger sources of SO_2 emissions. In the DRR, air agencies have the choice to use either monitoring or modeling to characterize SO_2 air quality in the vicinity of priority SO_2 sources and submit the modeling and/or monitoring to the EPA on a schedule specified by the rule.

This analysis was conducted to identify a suitable 1-hour SO_2 source-oriented monitoring site location for the 2017-2019 monitoring period intended to satisfy the DRR for Duke Energy Roxboro. Currently, the closest SO_2 monitor with a design value is about 80 kilometers southwest of Duke Energy Roxboro, located at 3801 Spring Forest Road, Raleigh, NC. The 1-hour background monitored air concentration for the area based on 2012-2014 data from that monitor is 9 ppb (23.58 $\mu g/m^3$).

Duke Energy Roxboro

Duke Energy's Roxboro Plant is a coal-fired electric generating facility located at 1700 Dunnaway Road outside of Roxboro, Person County, NC. The facility produces steam in four coal-fired combustion units (Units 1-4) and the steam is routed to steam turbines that produce electricity to sell to residential or industrial consumers. The facility is a significant source of SO_2 emissions, emitting in excess of the 2,000 tons per year threshold specified in the DRR for determining which sources need to be evaluated in determining area NAAQS compliance designations.

A part of the requirements for the DRR is the consideration of other sources of SO_2 emissions in the vicinity of the facility. In an initial analysis the impact of SO_2 emissions from the Mayo Generating Facility also in Person County were examined. The analysis determined that the cumulative impacts of the two facilities were insignificant compared to the impact from the Duke Energy Roxboro facility alone.

AERMOD Modeling

As described in the EPA SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document (Monitoring TAD),[35] DAQ's modeling followed the recommendations of the SO_2 NAAQS Designations Modeling Technical Assistance Document (Modeling TAD).[36] According to the Modeling TAD, given the source-oriented nature of SO_2, dispersion models are appropriate air quality modeling tools to predict the near-field concentrations. The AMS/EPA Regulatory Model (AERMOD) was used, as suggested in the Monitoring TAD. AERMOD is the preferred air dispersion model because it is capable of handling rural and urban areas, flat and complex terrain, surface and elevated releases and multiple sources (including, point, area and volume sources) to address ambient impacts for the designations process.

Three years of hourly SO_2 Continuous Emissions Monitor (CEM) data for each of the four stacks at the Duke Energy Roxboro facility was used in the modeling. Following the example in Appendix A of the Monitoring TAD, normalized emission rates were used as input to the model. Because of the linear scalability of emissions to modeled concentrations, the relative model results using normalized emissions can be used to predict the location of maximum concentration gradients. The CEM emissions rates were normalized by dividing each hour's rate by the highest overall rate over all stacks throughout the period. Building locations, sizes and orientations relative to stacks were input into BPIP-PRIME to calculate building parameters for AERMOD. Table D-1 provides the stack parameters used in the modeling analysis.

Table D-1. Parameters for Duke Energy Roxboro SO_2 Modeling for Monitor Placement

Source ID	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
UNIT1	121.92	325.37	14.22	6.71
UNIT2	121.92	325.93	15.32	8.69
UNIT3	121.92	326.48	14.32	9.3
UNIT4	121.92	325.91	14.32	9.3

Receptors were spaced 100 meters apart along the fence line. A set of nested Cartesian grid receptors were generated extending outward from the fence line. The receptors were spaced 100 meters apart out to 3 km from the facility center, 500 meters apart from 3 to 5 km out and 1000 meters apart from 5 to 10 km out. Receptors were removed from the model if they were within the fence line of the facility or in areas not suitable for the placement of a permanent monitor such as open water. The following figures are included to show the facility and modeling inputs. Figure D-1 is an aerial photo of the facility, Figure D-2 shows the emissions point and building locations and Figure D-3 shows the receptor placement.

[35] http://www3.epa.gov/airquality/sulfurdioxide/pdfs/SO2MonitoringTAD.pdf
[36] http://www3.epa.gov/airquality/sulfurdioxide/pdfs/SO2ModelingTAD.pdf

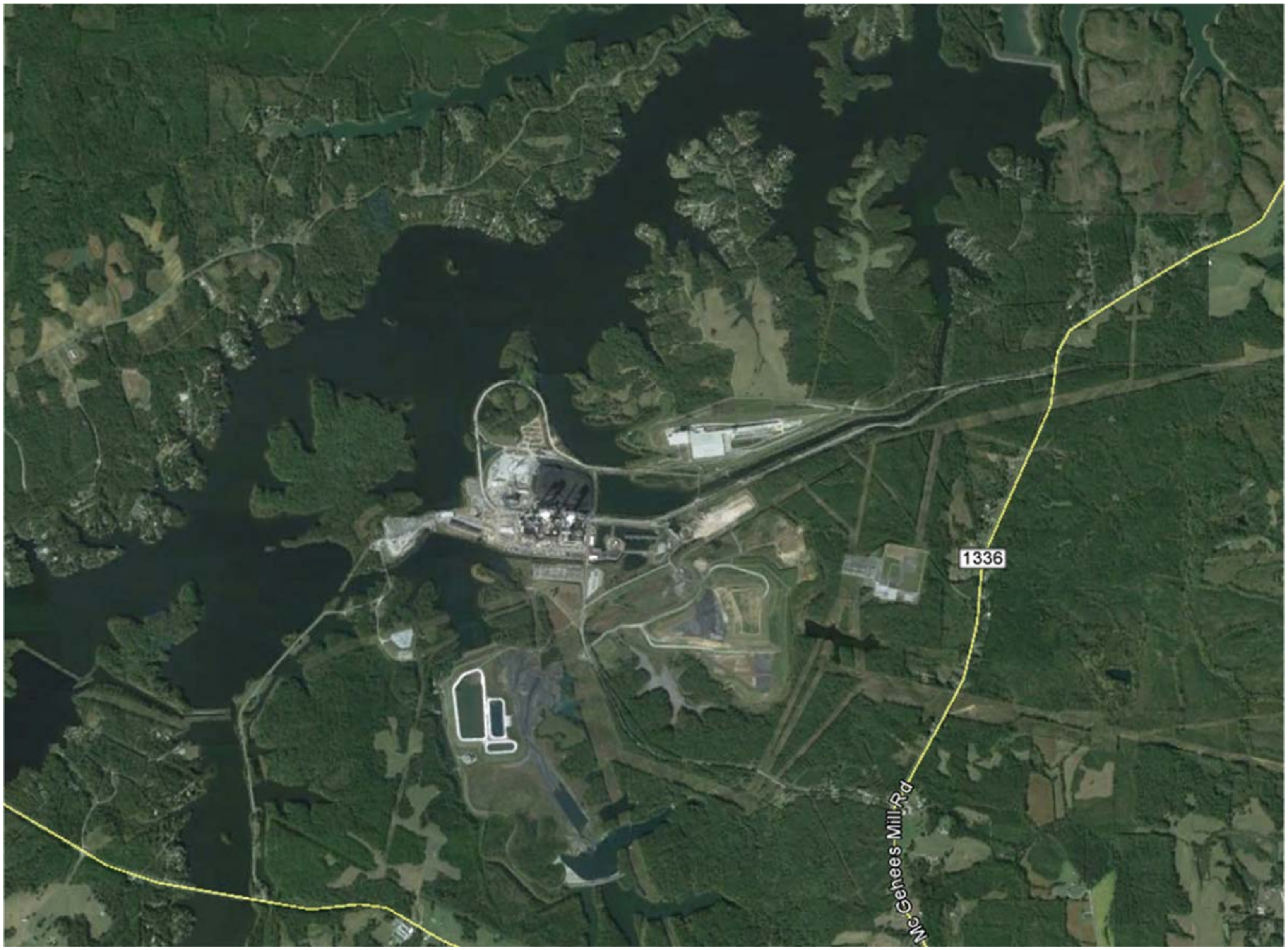

Figure D-1. Aerial View of Duke Energy Roxboro and Surrounding Areas

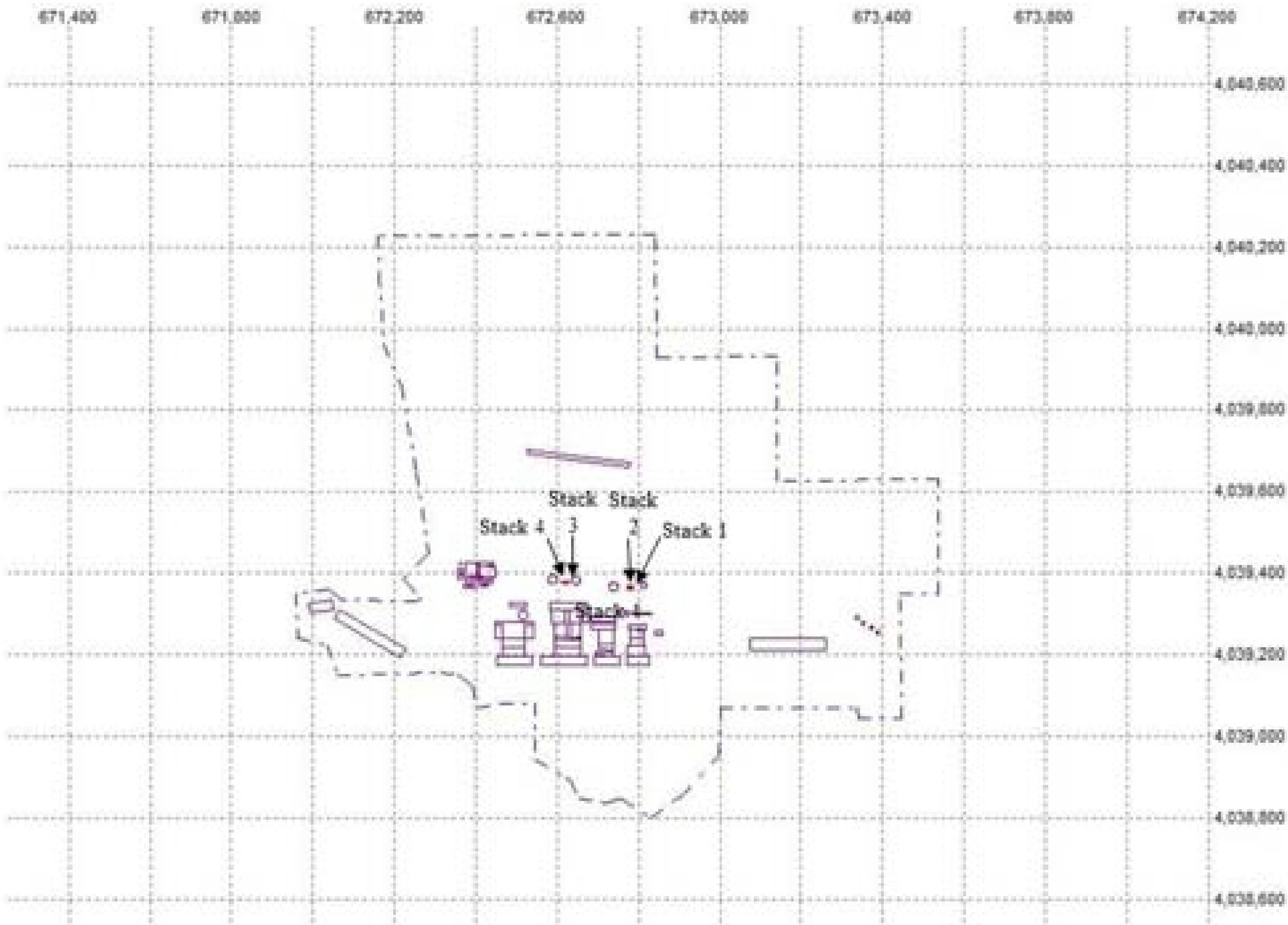

Figure D-2. Locations in Duke Energy Roxboro SO_2 Modeling for Monitor Placement (UTM NAD 83 Coordinates in Meters, Zone 17)

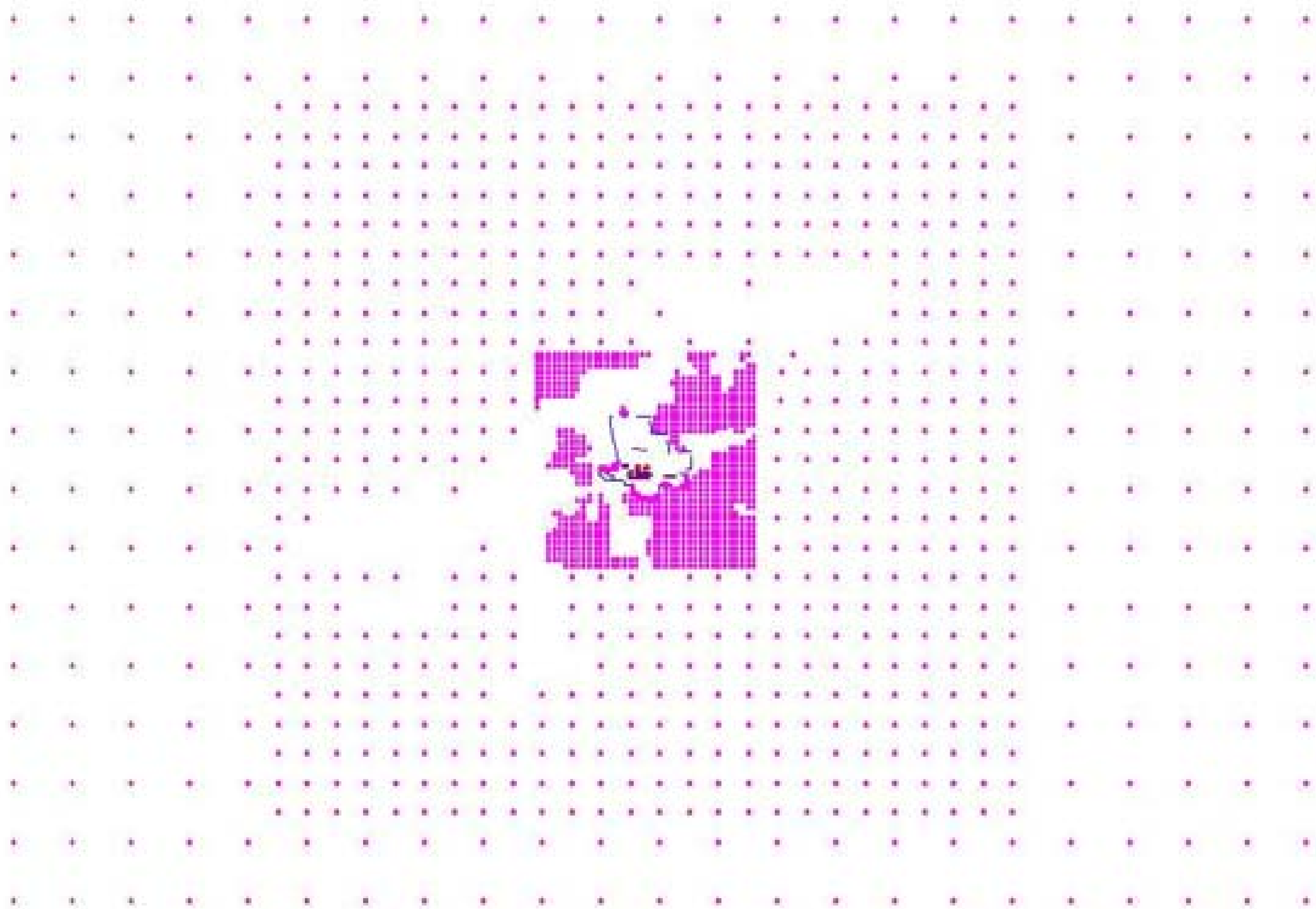

Figure D-3. Receptor Grids in Duke Energy Roxboro SO_2 Modeling for Monitor Placement Receptor

Terrain data used in the analysis was obtained from the USGS Seamless Data Server at http://viewer.nationalmap.gov/viewer/. The 1 arc-second NED data was obtained in the GeoTIFF format and used in determining receptor elevations and hill heights using AERMAP. National Weather Service (NWS) Automated Surface Observation Station (ASOS) data for 2012 to 2014 for the station located at Danville, VA was processed using AERMET together with upper air data for the same period from Greensboro, NC. AERMinute was also used in processing the data to incorporate additional wind data.

Modeling Results and Ranking Methodology

Following the guidance outlined in Appendix A of the Monitoring TAD, normalized modeled impacts were used to determine suitable locations for installing an SO_2 monitor near Duke Energy Roxboro. The three-year average of each year's 4th daily highest 1-hour maximum concentration (99th percentile of daily 1-hour maximum concentrations) was calculated for each receptor. This value is commonly referred to as the design value (DV). Because normalized emissions were used to calculate these values, the results are referred to as normalized design values (NDVs) in this analysis.

Figure D-4 shows the NDVs for the receptors near Duke Energy Roxboro. To better understand the relative difference between the NDVs, Figure D-5 shows the ratio of the NDV at each receptor to that of the overall maximum NDV. In the figures, the receptors with the highest values are in the black area surrounded by the darker purple, just northeast of the facility. From the NDV ratio results, 200 receptors with the highest values were selected for further analysis. The receptors having the top 200 and top 50 NDVs, are shown in Figures D-6 and D-7, respectively. The highest NDVs in the figures are shown in purple.

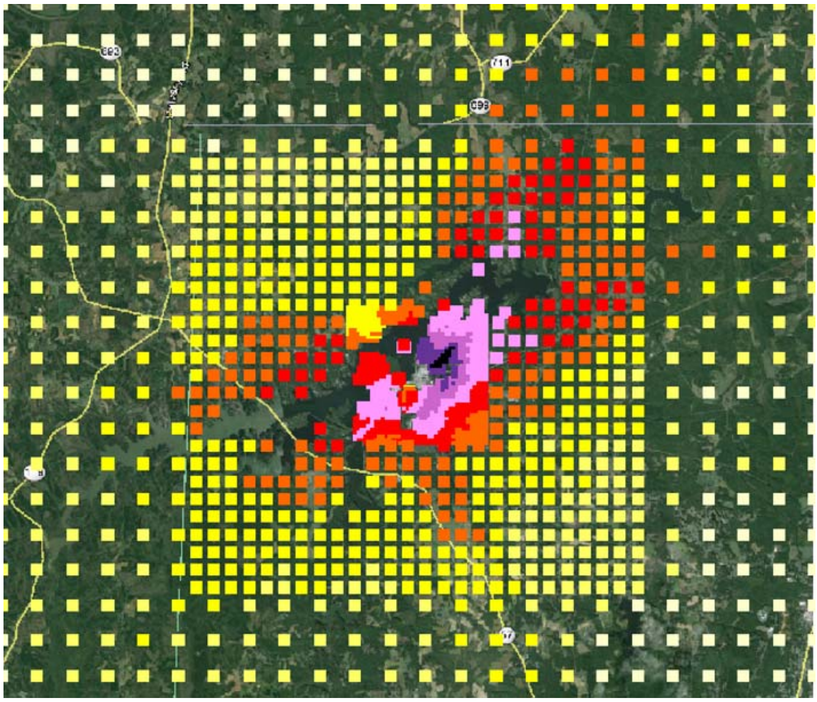

Figure D-4. Modeled NDVs for Each Receptor at Duke Energy Roxboro: Values increase as colors go from yellow through red and purple

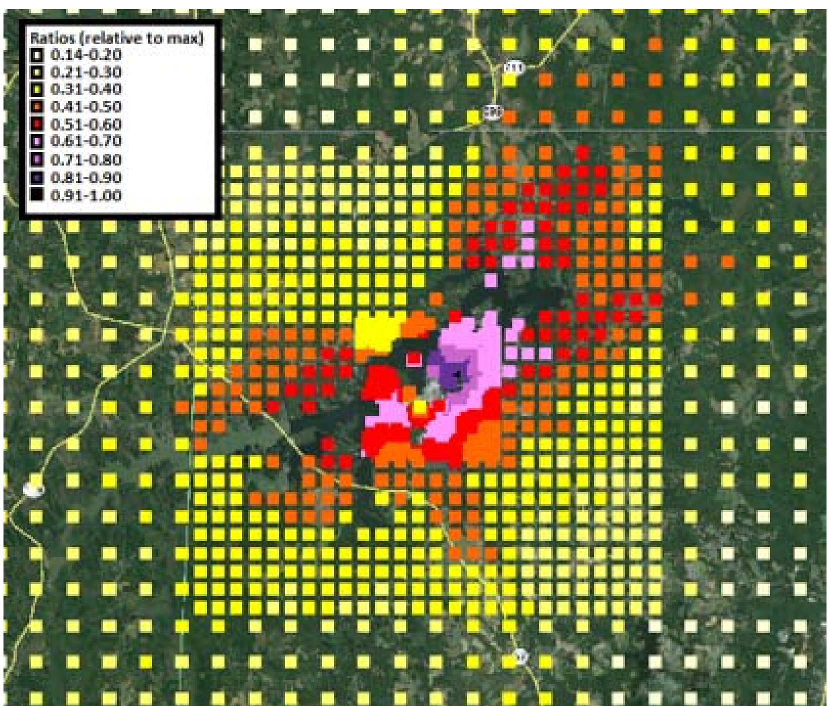

Figure D-5. Ratios of Individual Receptor's NDV to the Overall Maximum NDV at Duke Energy Roxboro: Values increase as colors go from yellow through red and purple

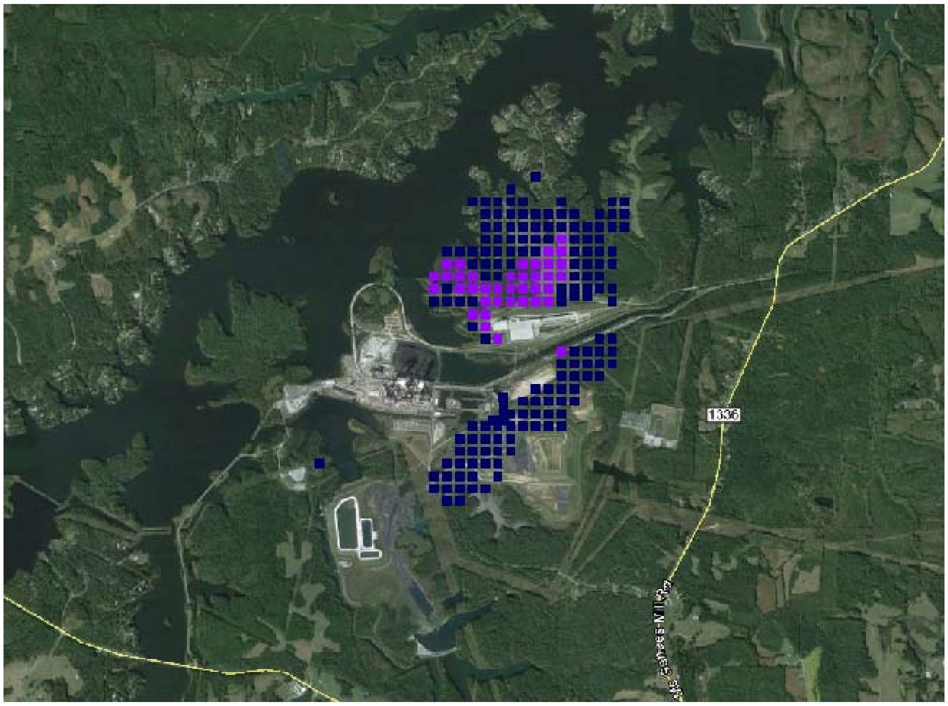

Figure D-6. Locations of Top 200 NDVs for Duke Energy Roxboro: Highest Values are in Purple

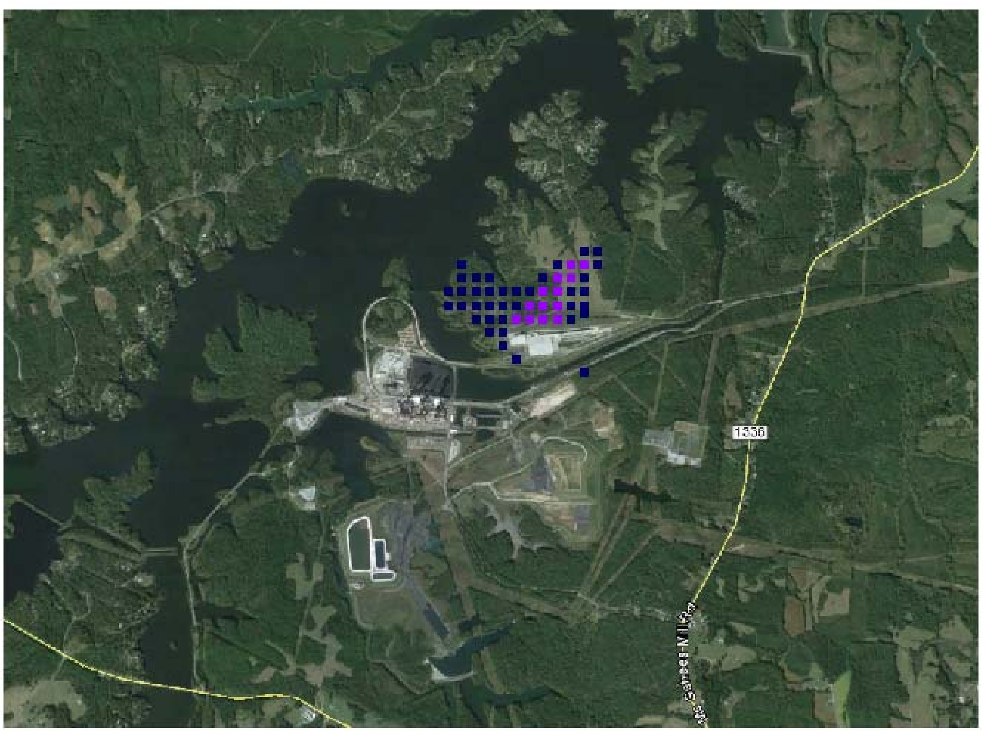

Figure D-7. Locations of Top 50 NDVs for Duke Energy Roxboro: Highest Values are in Purple

Figures D-6 and D-7 show the prioritized locations that were first evaluated to select a monitor location. The primary objective of this analysis was to find a sufficient number of feasible locations with predicted peak and/or relatively high SO_2 concentrations where a permanent monitoring site could be located. However; according to Appendix A of the Monitoring TAD, the site selection process also needed to account for the frequency in which a receptor has the daily maximum concentrations. The frequency is the number of times each receptor was estimated to have the maximum daily 1-hour concentration. Figure D-8 shows the results of the frequency analysis.

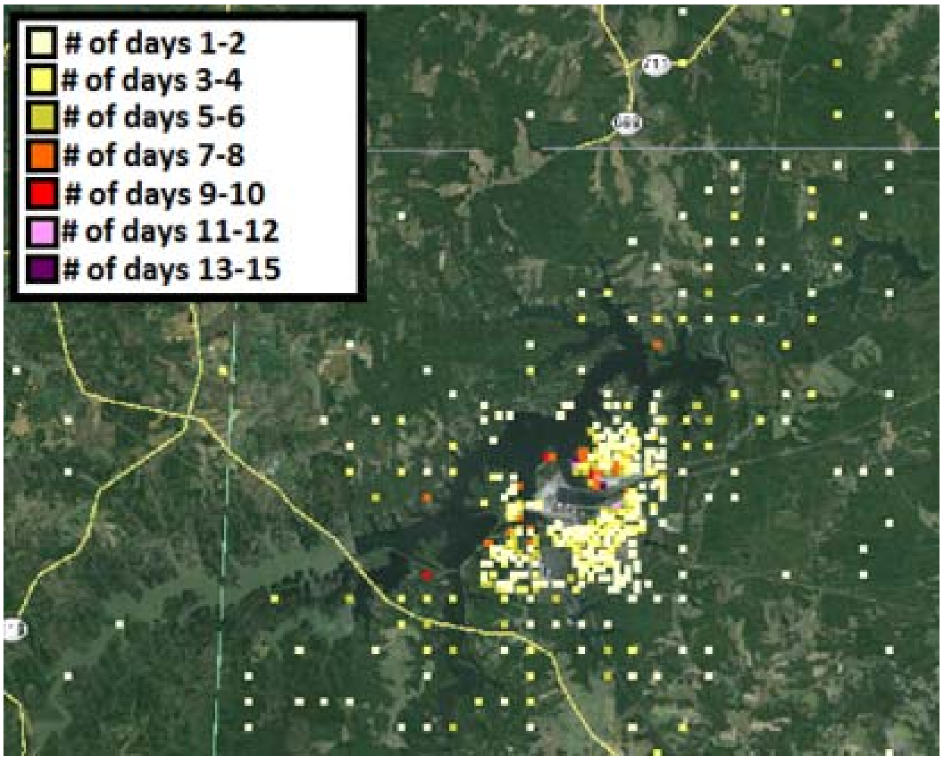

Figure D-8. Frequency of Daily Maximum Concentrations for Duke Energy Roxboro

Each receptor's frequency value was used with its NDV to create a relative prioritized list of receptor locations. This process is referred to in Appendix A of the Monitoring TAD as a scoring strategy. The list of receptors was developed through the following steps:

1. The NDVs were ranked from highest to lowest. Rank 1 means the highest NDV.
2. The frequencies for the 200 receptors were ranked from the highest to lowest. Rank 1 means the highest number of days having the daily maximum value.
3. The NDV rank and the frequency rank were added together to obtain a score.
4. The scores were ranked from lowest to highest. The receptors with the lowest scores were identified as the most favorable locations for the monitor.

Ranking Results and Discussion of Proposed Monitor Site

Table 2 shows a summary of the ranking results for the top 64 receptors and the proposed monitor location. Figure 9 shows the receptor locations that ranked in the top 100. The proposed monitor location resulted from a site visit conducted using information from the scoring strategy.

DAQ staff, in conjunction with Duke Energy staff and a representative from EPA Region 4, conducted an in-situ survey in the vicinity of the Duke Energy Roxboro facility to select a suitable location for SO_2 monitor placement. Focusing on the area to the northeast of the Roxboro facility where the majority of the maximum NDVs occurred, the on-site visit confirmed that a majority of the area is heavily wooded and currently undeveloped as indicated from Google Earth satellite imagery. When selecting adequate locations for the proposed monitor, considerations were made regarding the availability of electrical power, security of the monitor, accessibility, proper instrument exposure and assurance of long-term use of the site. This last point was especially important, given the tight timelines in the rule. Most of the nearby clear area is privately-owned and there was no guarantee that we could keep the monitor there for at least three years to get a design value.

During the site visit, a number of the receptor locations, including the highest ranking ones, were deemed to not meet monitor siting criteria. The primary reasons being the terrain placing them in a deep depressed area (not apparent from Google imagery) or the location having no clear path between the facility and the monitor (tree lines). The proposed site has a clear, unobstructed path, as seen in the photo shown in Figure D-9.

Figure D-9. View of Duke Energy Roxboro from the Proposed Monitor Location

A proposed location was selected northeast of the facility along Shore Road and approximately 550 meters from the property line of the Roxboro facility. This location is adjacent to a paved roadway, in an open location free of trees or other vegetation and the property is owned by the CertainTeed Corporation which has agreed to allow DAQ to place and operate a monitor there. The selected location has a score ranking of #64 as indicated in Table D-2. The location is within the area of highest ranked receptors, approximately 300 meters to the east of the #1 receptor. Based on this information, DAQ believes that the proposed location is highly suitable for operating an SO_2 monitor.

Table D-2. Selected Ranking Results from the Duke Energy Roxboro SO_2 Modeling for Monitor Placement

Easting (m)	Northing (m)	Normalized Design Value (NDV)	NDV Rank	Freq. Count	Freq. Rank	Score	Score Rank	Comments on Location
673,600	4,040,000	0.5724	2	12	3	5	1	Trees/ in hole
673,700	4,040,200	0.5592	7	7	10	17	2	Ownership
673,300	4,039,900	0.5335	14	11	4	18	3	Trees
673,600	4,040,100	0.5645	6	5	15	21	4	Ownership
673,700	4,040,000	0.5455	11	7	11	22	5	Access
673,400	4,040,000	0.5467	9	5	16	25	6	Ownership
672,900	4,040,200	0.5128	24	13	2	26	7	Ownership
673,500	4,040,000	0.5813	1	4	25	26	8	Ownership
673,700	4,040,100	0.5456	10	5	17	27	9	Ownership
673,000	4,040,200	0.5155	22	8	8	30	10	Ownership
673,600	4,040,200	0.5687	5	4	26	31	11	Ownership
673,300	4,040,000	0.5161	21	6	13	34	12	Ownership
673,900	4,040,300	0.5254	16	5	18	34	13	Ownership
673,400	4,039,700	0.5027	34	15	1	35	14	Trees
673,200	4,039,900	0.5057	30	9	7	37	15	Trees
672,900	4,040,100	0.5043	33	11	5	38	16	Ownership
673,800	4,040,100	0.5191	19	5	19	38	17	Ownership
673,000	4,040,300	0.5118	25	6	14	39	18	Ownership
673,800	4,040,300	0.5532	8	3	35	43	19	Ownership
673,800	4,040,000	0.5236	18	4	27	45	20	Access
673,900	4,039,600	0.5019	35	7	12	47	21	Access
673,100	4,040,200	0.5068	28	5	20	48	22	Ownership
673,800	4,040,400	0.5435	12	3	36	48	23	Ownership
673,200	4,040,200	0.5074	27	4	28	55	24	Ownership
673,300	4,039,800	0.5016	36	5	21	57	25	Trees
673,900	4,040,400	0.5369	13	2	44	57	26	Ownership

Table D-2. Selected Ranking Results from the Duke Energy Roxboro SO_2 Modeling for Monitor Placement

Easting (m)	Northing (m)	Normalized Design Value (NDV)	NDV Rank	Freq. Count	Freq. Rank	Score	Score Rank	Comments on Location
673,800	4,040,200	0.5295	15	2	45	60	27	Ownership
673,300	4,040,100	0.5117	26	3	37	63	28	Ownership
673,500	4,040,200	0.5250	17	2	46	63	29	Ownership
673,500	4,040,100	0.5712	3	1	60	63	30	Ownership
673,700	4,040,300	0.5697	4	1	61	65	31	Ownership
673,000	4,040,400	0.4942	44	5	22	66	32	Ownership
673,700	4,039,300	0.4779	62	11	6	68	33	Railroad
673,100	4,040,000	0.4981	39	4	29	68	34	Ownership
673,000	4,040,000	0.4762	66	8	9	75	35	Ownership
673,100	4,040,400	0.4856	53	5	23	76	36	Ownership
673,300	4,039,700	0.4830	55	5	24	79	37	Access
673,900	4,040,200	0.5051	32	2	47	79	38	Ownership
673,100	4,040,100	0.5014	37	2	48	85	39	Ownership
673,400	4,040,100	0.5138	23	1	62	85	40	Ownership
673,700	4,040,400	0.4927	48	3	38	86	41	Ownership
673,000	4,040,100	0.4973	41	2	49	90	42	Ownership
673,400	4,040,200	0.4971	42	2	50	92	43	Ownership
673,900	4,040,500	0.5058	29	1	63	92	44	Ownership
673,400	4,040,300	0.4776	63	4	30	93	45	Ownership
673,900	4,040,100	0.4966	43	2	51	94	46	Ownership
673,300	4,040,400	0.4822	56	3	39	95	47	Ownership
673,200	4,039,800	0.4816	57	3	40	97	48	Trees
673,200	4,040,100	0.5167	20	0	78	98	49	Ownership
673,900	4,039,400	0.4725	69	4	31	100	50	Railroad
674,000	4,040,400	0.4900	50	2	52	102	51	Ownership
673,900	4,040,000	0.4862	51	2	53	104	52	Trees
673,600	4,039,200	0.4766	65	3	41	106	53	Access
674,000	4,039,600	0.4859	52	2	54	106	54	Trees
673,300	4,040,300	0.4833	54	2	55	109	55	Ownership
673,600	4,040,300	0.5056	31	0	79	110	56	Ownership
672,900	4,040,000	0.4641	79	4	32	111	57	Ownership
673,200	4,040,300	0.4933	47	1	64	111	58	Ownership
673,300	4,040,600	0.4626	82	4	33	115	59	Ownership
673,100	4,040,300	0.5000	38	0	80	118	60	Ownership

Table D-2. Selected Ranking Results from the Duke Energy Roxboro SO_2 Modeling for Monitor Placement

Easting (m)	Northing (m)	Normalized Design Value (NDV)	NDV Rank	Freq. Count	Freq. Rank	Score	Score Rank	Comments on Location
673,700	4,039,200	0.4618	85	4	34	119	61	Access
674,000	4,040,500	0.4974	40	0	81	121	62	Ownership
673,500	4,040,300	0.4799	59	1	65	124	63	Ownership
Proposed Monitor Location								
673,897	**4,040,042**	**0.4940**	**45**	**0**	**82**	**127**	**64**	**Optimal**

Note to Table 2: Comments show reasons higher ranked locations were not selected. Ownership means that the landowners were identified as private individuals where it was less likely a three-year dataset could be obtained. In Figure D-10, all locations north of the road north of the proposed location were not selected because of ownership.

Figure D-10. Locations of Top 100 NDVs for Duke Energy Roxboro with Ranked Values

Region 4 Requested Information for Proposed Sites (Duke Energy Progress – Roxboro)

In 2015, the North Carolina Division of Air Quality, DAQ, began working with Duke Energy Progress to establish a sulfur dioxide monitoring station in Semora, North Carolina, to characterize the ambient sulfur dioxide concentrations near the Roxboro steam station as required by the data requirements rule for sulfur dioxide.[37] The area chosen for placement of the monitor was selected using the results of modeling done as described in the technical assistance document[38] and is reported in Appendix D. Duke Energy Roxboro Siting Analysis and Additional Site Information

Duke Energy Roxboro SO2 Modeling for Monitor Placement. An aerial view of the proposed monitoring location identified based on the considerations reported earlier is shown in Figure 58.

[37] Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide Primary National Ambient Air Quality Standard, Federal Register of Aug. 21, 2015, (80 FR 51052) (FRL-9928-18-OAR), 2015-20367.

[38] SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, Air Quality Assessment Division, December 2013, Draft.

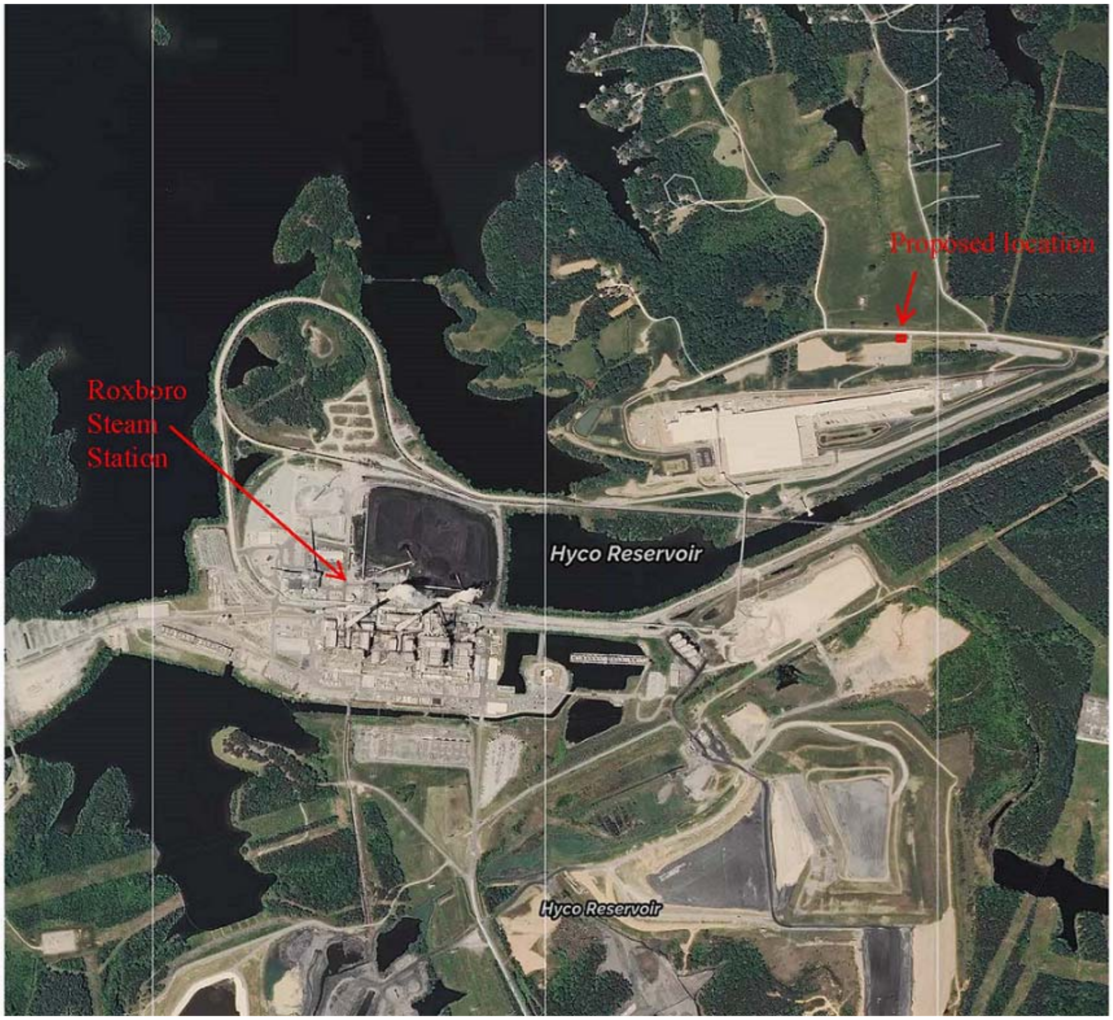

Figure 58. Aerial view showing the location of the proposed Semora DRR monitoring station

The Air Quality System identification number for this monitor will be 37-145-0004-42401-1. DAQ will operate this monitor in collaboration with Duke Energy Progress to ensure the air in the Semora area complies with the national ambient air quality standards for sulfur dioxide. Duke Energy Progress will operate the monitor following the DAQ quality assurance project plan and the monitor will be part of the DAQ primary quality assurance organization. Figure 59 through Figure 62 show views from the proposed site looking north, east, south and west.

Figure 59. Looking north from the proposed Semora DRR location

Figure 60. Looking west from the proposed Semora DRR location

Figure 61. Looking east from the proposed Semora DRR location

Figure 62. Looking south from the proposed Semora DRR location

The proposed monitoring site is located 27 meters from the trees to the southeast. The tallest trees are estimated to be 15 meters in height. The nearest road is Shore Road located approximately 27 meters to the north. This road does not have traffic count data; however, as shown in Figure 63, secondary road number 1336, Ceffo Road, had an average annual daily traffic count of 2,500 north of Ceffo in 2014. The probe height will be approximately 3.6 meters.

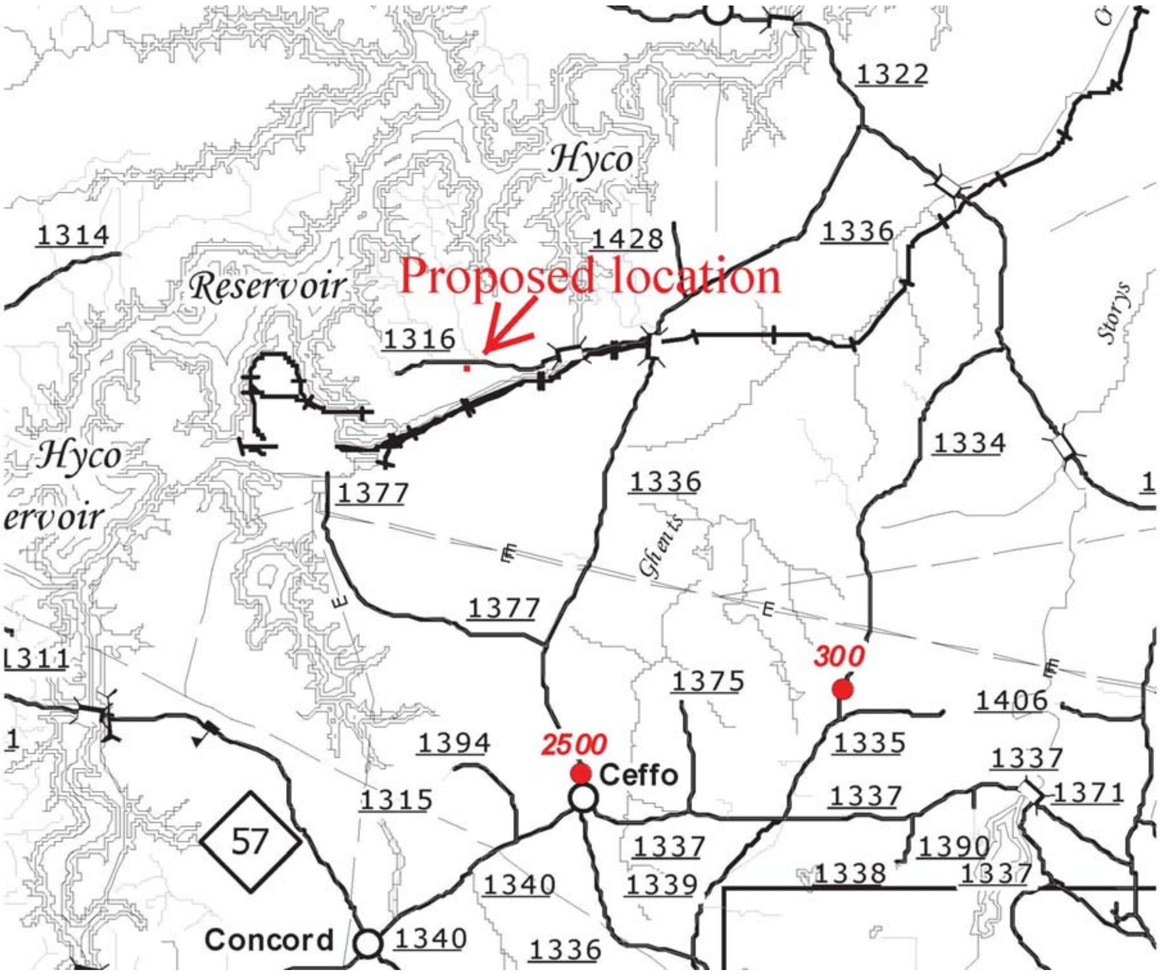

Figure 63. 2014 Traffic count map for the Semora area (from NC DOT)

The Air Quality System, AQS, identification number and street address for the site will be: 37-145-0004 and Shore Drive Air Monitor, Roxboro Plant, Semora, North Carolina. The latitude and longitude will be 36.489943 and -79.058523. The sampling and analysis method will be AQS code 060, Thermo Electron 43i pulsed fluorescent instrument, EQSA-0486-060, and the operating schedule will be hourly. The monitoring objective will be source oriented. Figure 64 shows the location of the monitoring station relative to the population center of Person County in the Semora area.

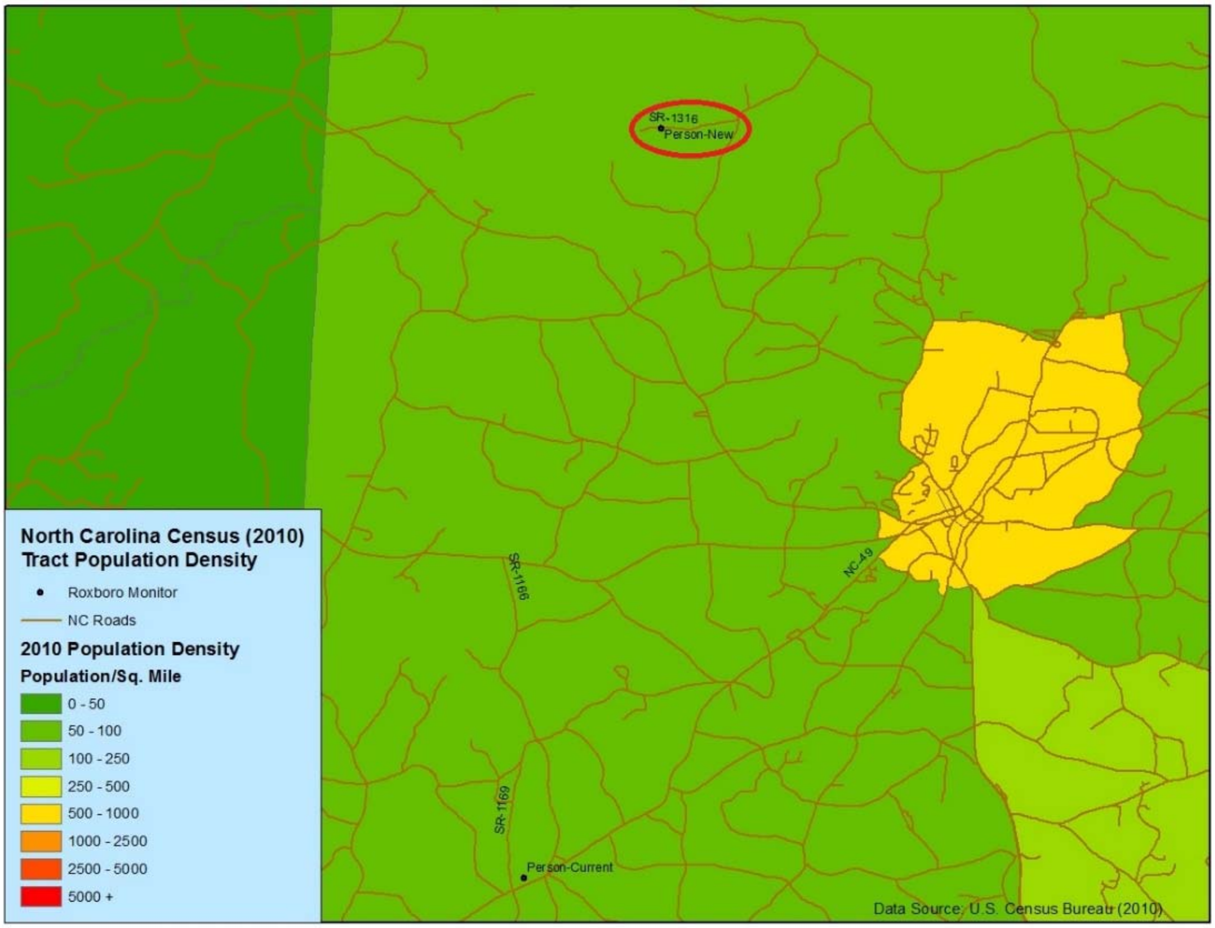

Figure 64. Location of the proposed monitoring station relative to the population of the Semora area in Person County

Based on the wind roses in Figure 65 and Figure 66, the proposed monitoring station is located downwind of the Roxboro plant. Figure 65 is a wind rose representing the 3-year period (2012 to 2014) for Danville, VA, surface meteorological data and for comparative purposes, Figure 66 is a second wind rose for RDU (Raleigh Durham NWS Airport) surface met data that represents wind speed and direction frequency for the same 3-year period. The second RDU wind rose identifies similarities between the Danville, VA, and RDU met data for the 3-year period between 2012 and 2014. As expected, the greatest frequency of occurrence or tendency of wind speed and direction occurred within the southwest quadrant for both met stations. This high frequency of wind speed and direction from the southwest is consistent with the direction of prevailing wind flow patterns for this part of the country. Note both stations also show a secondary high frequency of winds from the northeast direction which likely coincides with colder ridge air masses to the north/northeast and coastal low pressure systems off the coast during winter and early spring.

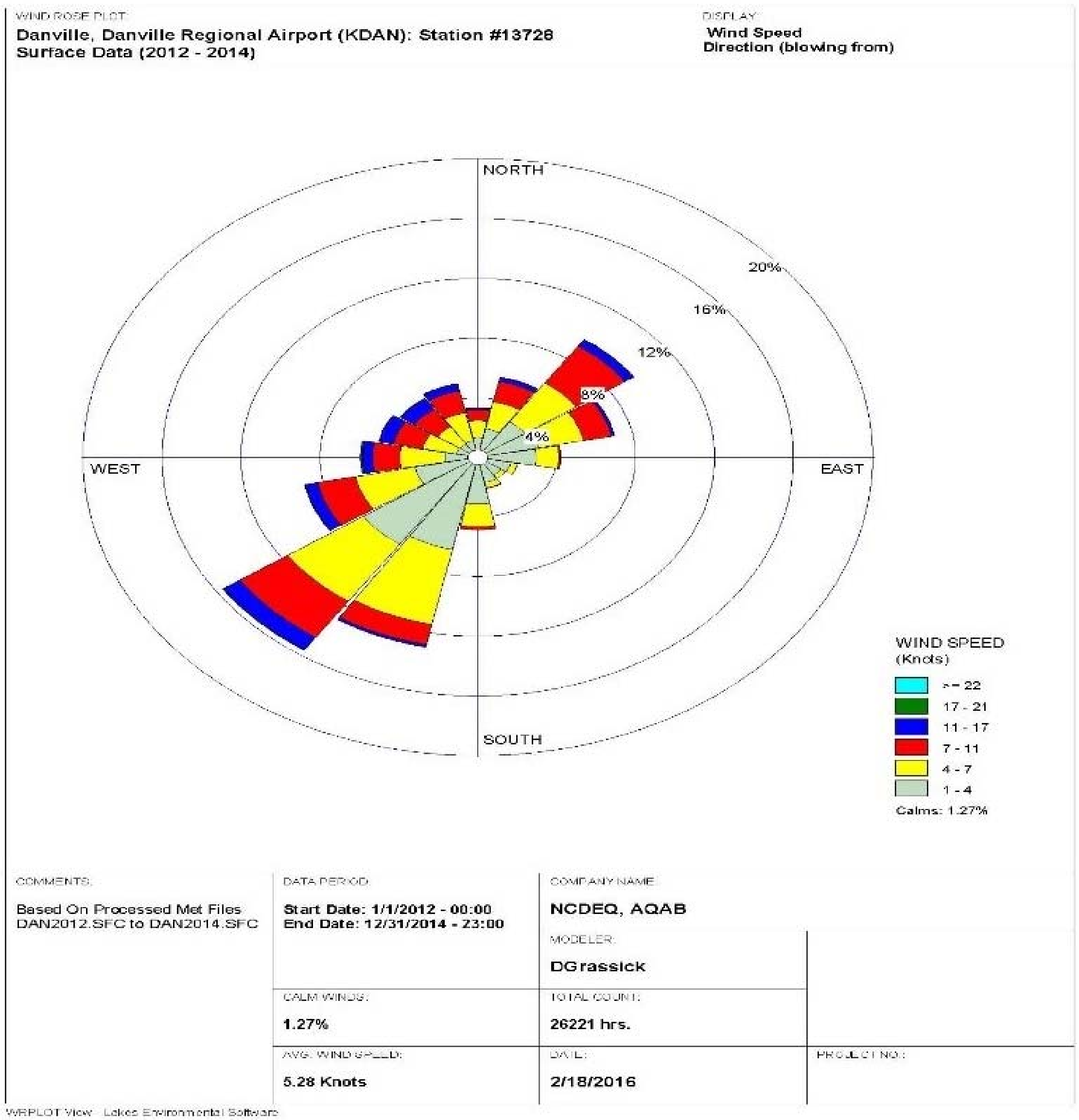

Figure 65. Wind rose from the Danville Regional Airport for 2012 to 2014

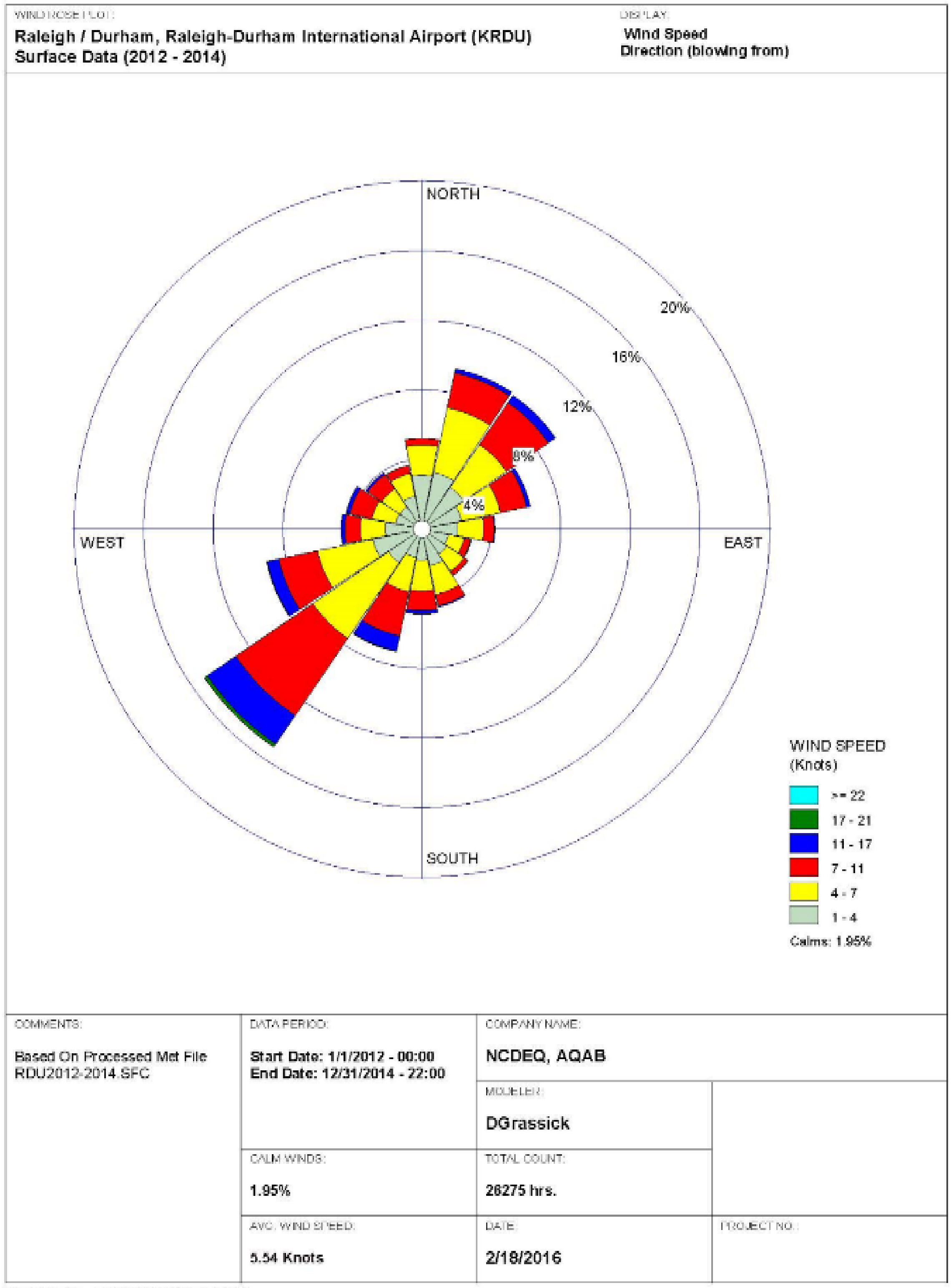

Figure 66. Raleigh Durham Airport wind rose for 2012 to 2014

The spatial scale of representativeness for the monitor will be neighborhood based on the distance of the monitor from the source. The monitor will be located approximately 550 meters northeast from the property line of the facility. This monitor is located in the Durham-Chapel Hill metropolitan statistical area and is representative of the air quality downwind from the fence line of the Roxboro Steam Station.

Table 65 summarizes other factors DAQ evaluated when choosing the proposed location for the monitoring station.

Table 65. Other considerations selection of the Semora DRR site

Factor	Evaluation
Long-term Site Commitment	CertainTeed is willing to provide Duke with a long-term lease agreement and does not plan to develop the current area any time in the next three years
Sufficient Operating Space	100 meter by 150 meter open area free of trees and buildings
Access and Security	The building will be inside a fenced area within the fenced area of the CertainTeed property so it will be secure from possible vandalism. The building is located by a driveway and gate into the CertainTeed property so it has easy access.
Safety	Appropriate electrical permits will be obtained.
Power	Overhead powerlines are located 27 meters north of the site.
Environmental Control	The monitoring shelter will be placed with the door to the north so that sunlight will not shine in through the window and warm up the building.
Exposure	The monitoring station will be at least 20 meters from the driplines of trees and will not be near any trees or buildings that could be an obstacle to air flow.
Distance from Nearby Emitters	There are two permitted facilities within 0.5 miles of the proposed location: **CertainTeed Roxboro Wallboard Facility**, located at 921 Shore Road, 100 meters south of the proposed monitoring station, emitted 0.4 tons of SO_2, 97.5 tons of NO_x, 3.4 tons of VOC and 47.4 tons of TSP in 2014. **Dawkins Concrete**, also located at 921 Shore Road, 100 meters south of the proposed monitoring station, has not reported emitting any pollutants.
Proximity to Other Measurements	The proposed monitoring station is located about 22 kilometers northwest of the Person County Airport and 21 kilometers north of the Bushy Fork ozone monitoring station.

Appendix E. Evergreen Packaging Canton Siting Analysis and Additional Site Information

Siting Analysis for Proposed Sites (Evergreen Packaging -- Canton)

FINAL REPORT

SO_2 DATA REQUIREMENTS RULE MONITOR SITING ANALYSIS

Evergreen Packaging – Canton Mill
Permit No. 08961T17
Facility ID No. 4400159
Canton, North Carolina

Prepared for:

Evergreen Packaging
P.O. Box 4000
Canton, NC 28716

Prepared by:

AECOM Technical Services of North Carolina, Inc.
1600 Perimeter Park Drive, Suite 400
Morrisville, NC 27560

March 2016

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1.0 INTRODUCTION

On June 22, 2010, the EPA revised the primary sulfur dioxide (SO_2) National Ambient Air Quality Standard (NAAQS) (75 FR 35520). The EPA promulgated a new 1-hour daily maximum primary SO_2 standard at a level of 75 parts per billion (ppb), based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations.

On May 13, 2014, the EPA proposed the Data Requirements Rule (DRR) for the 1-Hour SO_2 NAAQS (79 FR 27445). The final DRR was promulgated on August 21, 2015 (80 FR 51051) and requires states to gather and submit to the EPA additional information characterizing SO_2 air quality in areas with larger sources of SO_2 emissions. In the DRR, air agencies have the choice to use either monitoring or modeling to characterize SO_2 air quality in the vicinity of priority SO_2 sources, and submit the modeling and/or monitoring to the EPA on a schedule specified by the rule.

This analysis was conducted to identify a suitable 1-hour SO_2 source-oriented monitoring site location for the 2017-2019 monitoring period intended to satisfy the DRR for Evergreen Packaging Canton (EP Canton). Currently, the two closest SO_2 monitors with valid design values are about 90 kilometers southwest and 90 kilometers southeast of EP Canton, located at 133 Perry Avenue, Greenville, SC and on Round Mountain Tower Road, Long Creek, SC. The 1-hour background monitored air concentrations for these monitors, based on 2012-2014 data are 7 ppb (18.29 $\mu g/m^3$) at the Greenville, SC monitor and 3 ppb (7.84 $\mu g/m^3$) at the Long Creek, SC monitor.

The purpose of this report is to provide a summary of modeling that was performed to estimate locations for a future SO_2 monitor near the EP Canton Mill.

2.0 FACILITY INFORMATION

2.1 Facility Description and Location

Evergreen Packaging owns and operates an integrated bleached Kraft pulp and paper mill in Canton, North Carolina. Primary operations at the mill include 5 solid fuel-fired industrial boilers, wood pulping operations, chemical recovery operations, bleaching operations, papermaking, and additional operations and equipment necessary to support these operations. The Mill started up in 1908 and produces a nominal 600,000 tons per year of uncoated fine paper and bleached paperboard.

The Canton Mill is located in Haywood County. The Mill site is located approximately 25 kilometers (km) west of Asheville, North Carolina. Figure 2-1 shows the site location and current SO_2 monitors within 200 km of the Mill.

3.0 MONITOR SITING ANALYSIS

3.1 Analysis Approach and Model Selection

As described in the EPA SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document (Monitoring TAD), the modeling followed the recommendations of the SO_2 NAAQS Designations Modeling Technical Assistance Document (Modeling TAD). According to the Modeling TAD, given the source-oriented nature of SO_2, dispersion models are appropriate air quality modeling tools to predict the near-field concentrations. The AMS/EPA Regulatory Model (AERMOD version 15181) was used, as suggested in the Monitoring TAD. AERMOD is the preferred air dispersion model because it is capable of handling rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including, point, area, and volume sources) to address ambient impacts for the designations process.

3.1.1 Meteorological Data

The EP Canton Mill is located in Canton, North Carolina approximately 25 kilometers west of Asheville in an area of complex terrain. Meteorological data for this area is not available for download on the NC DAQ website. AERMOD-ready meteorological data was created by processing surface data from the Asheville Regional Airport, upper air data from the Peachtree City, Georgia National Weather Service (NWS) site, and onsite meteorological data. The DRR requires modeling to be performed for the most recent three year period. Since the 2015 meteorological data has not been fully quality assured, meteorological data for the 2012-2014 period was processed.

3.1.2 Receptors

The dispersion modeling receptor grids were developed following procedures outlined in the *New Source Review Workshop Manual* (October 1990), the *North Carolina PSD Modeling Guidance* (January 2012), and the Modeling TAD. A detailed discrete receptor grid system was created to assess air quality impacts in all directions from the EP Canton Mill to a distance of up to 10 km from the property boundary.

Discrete receptors were placed along the property line at 50-meter intervals. A 100-meter grid spacing was used from the property line out to a distance of approximately 500 meters and 500-meter grid spacing from 500 m to 5,000 m. The remaining grid from 5,000 m to approximately 10,000 m used a 1,000-meter grid spacing. According to the Modeling TAD, receptors should only be placed where it is suitable for the placement of a permanent monitor; therefore receptors on Evergreen Packaging property and over water were removed. Figure 3-1 presents the full modeling receptor grid, while Figure 3-2 presents the near-field receptor grid along with the Evergreen Packaging property boundaries.

Terrain data used in the analysis was obtained from the USGS Seamless Data Server at http://viewer.nationalmap.gov/viewer/. The 1 arc-second NED data was obtained in the GeoTIFF format and used in determining receptor elevations and hill heights using AERMAP.

3.1.3 Sources

There are multiple SO_2 emissions sources present at the EP Canton Mill, all of which were modeled as point sources. Intermittent sources such as emergency generators were not included in the modeling as they typically do not run for an hour except during emergency situations.

The AERMOD model uses a steady-state Gaussian plume equation to model emissions from point sources such as stacks and vents. All point sources were modeled using actual stack exhaust parameters. The following parameters were used for modeling the point sources: emission rates (grams/sec), stack height (m), stack diameter (m), stack exit velocity (m/sec), stack exhaust temperature (K), and direction-specific building dimensions (m). Building locations, sizes, and orientations relative to stacks were input into BPIP-PRIME to calculate building parameters for AERMOD. Table 3-1 presents a list of the modeled facility point sources and their associated parameters. The source and building layout for modeling is shown in Figure 3-3.

Table 3-1. Modeled Stack Parameters

Source ID	Source Description	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	Normalized Emission Rate (g/s)
BLOXRTO	RTO	30.5	324.8	8.53	1.2	$2.5x10^{-4}$
#5LIME	No. 5 Lime Kiln	62.2	335.9	8.80	1.5	$1.3x10^{-4}$
#4LIME	No. 4 Lime Kiln	58.0	337.6	9.80	1.2	$5.0x10^{-4}$
#11REC	No. 11 Recovery Boiler	61.7	413.2	18.30	3.7	$1.1x10^{-1}$
#10REC	No. 10 Recovery Boiler	61.7	410.9	17.90	3.7	$1.3x10^{-1}$
#10SDT	No. 10 Smelt Dissolving Tank	61.7	341.5	8.80	1.2	$2.5x10^{-4}$
#11SDT	No. 11 Smelt Dissolving Tank	61.7	342.0	9.10	1.2	$2.5x10^{-4}$
PMNO19A	No. 19 Paper Machine Calendar Nip Heater	20.1	499.8	0.30	0.5	$2.5x10^{-6}$
PMNO19B	No. 19 Paper Machine Calendar Nip Heater	20.1	499.8	0.30	0.5	$2.5x10^{-6}$
225NGBLS	Natural Gas Package Boilers	50.3	435.9	1.46	2.4	$2.5x10^{-4}$
RLBARKCTRL	Riley Bark Boiler	34.8	332.0	17.92	2.4	$1.0x10^{-1}$
RLCOAL#4P	No. 4 Power Boiler/Riley Coal Boiler Common Stack	79.2	327.6	19.00	3.0	4.6x10-2

3.1.4 Modeled Emissions

Hourly data was not available; therefore, maximum actual emissions for each source were used in the modeling. Following the example in Appendix A of the Monitoring TAD, normalized emission rates were used as input to the model (Table 3-1). Because of the linear scalability of emissions to modeled concentrations, the relative model results using normalized emissions can be used to predict the location of maximum concentration gradients. The emissions rates were normalized by dividing each source's emission rate by the highest overall emission rate over all stacks.

3.2 Modeling Results and Ranking Methodology

Following the guidance outlined in Appendix A of the Monitoring TAD, normalized modeled impacts were used to determine suitable locations for installing an SO_2 monitor near the EP Canton Mill. The three year average of each year's 4th daily highest 1-hour maximum concentration (99th percentile of daily 1-hour maximum concentrations) was calculated for each receptor. This value is commonly referred to as the design value (DV). Because normalized emissions were used to calculate these values, the results are referred to as normalized design values (NDVs) in this analysis.

Figure 3-4 shows the NDVs for the receptors near EP Canton. To better understand the relative difference between the NDVs, Figure 3-5 shows the ratio of the NDV at each receptor to that of the overall maximum NDV. In the figures, the receptors with the highest values are in the black area surrounded by the darker purple. From the NDV ratio results, 200 receptors with the highest values were selected for further analysis. The receptors having the top 200 and top 50 NDVs are shown in Figures 3-6 and 3-7, respectively. The highest NDVs in the figures are shown in purple.

Figures 3-6 and 3-7 show the prioritized locations that were first evaluated to select a monitor location. The primary objective of this analysis was to find a sufficient number of feasible locations with predicted peak and/or relatively high SO_2 concentrations where a permanent monitoring site could be located. However; according to Appendix A of the Monitoring TAD, the site selection process also needed to account for the frequency in which a receptor has the daily maximum concentrations. The frequency is the number of times each receptor was estimated to have the maximum daily 1-hour concentration. Figure 3-8 shows the results of the frequency analysis.

Each receptor's frequency value was used with its NDV to create a relative prioritized list of receptor locations. This process is referred to in Appendix A of the Monitoring TAD as a scoring strategy. The list of receptors was developed through the following steps:

1. The NDVs were ranked from highest to lowest. Rank 1 means the highest NDV.
2. The frequencies for the receptors were ranked from the highest to lowest. Rank 1 means the highest number of days having the daily maximum value.
3. The NDV rank and the frequency rank were added together to obtain a score.
4. The scores were ranked from lowest to highest. The receptors with the lowest scores were identified as the most favorable locations for the monitor.

3.2.1 Ranking Results

Table 3-2 shows a summary of the ranking results for the top 10 receptors. Figure 3-9 shows the receptor locations that ranked in the top 50 (note that as shown in Table 3-2 there were some ties in rankings). Figures 10 through 12 show a pair of plots with a closer view of the three areas with the highest receptor rankings. The first plot (a), shows the frequency of the daily maximums, while the second plot (b), shows the score rankings.

To aid NCDAQ and EPA monitor siting staff, on-property receptors were added in Areas 2 and 3 on the frequency plots. The Area 2 plot (Figure 11a) shows the low frequency of daily maximums over the EP property between School Street and High Street. The Area 3 plot (Figure 12a) shows low frequencies of daily maxima along the edge of the fenced parking lot off of Bridge Street, and no daily maxima occurrences over the parking lot. It should be noted that the both of these areas are periodically patrolled by Mill security guards.

NCDAQ staff, in conjunction with Evergreen Packaging staff and a representative from EPA Region 4, conducted a survey in the vicinity of the EP Canton Mill to evaluate potential locations for SO_2 monitor placement. The survey focused on the three areas where the majority of the maximum NDVs occurred. When selecting adequate locations for the proposed monitor, considerations will be made regarding the availability of electrical power, security of the monitor, accessibility, proper instrument exposure, and assurance of long-term use of the site. This last point will be especially important, given the tight timelines in the rule. Additional consideration for frequency of impact will need to be considered for determining the need of any secondary monitors.

Table 3-2. Top 10 Ranking Receptors by Score

UTM Zone 17 (NAD83)		Normalized Design Value (NDV)	NDV Rank	Frequency Count	Frequency Rank	Score	Score Rank	Comments on Location
Easting (m)	Northing (m)							
332512.3	3933970.5	1.31	2	70	1	3	1	Edge of EP Property, east of Blackwell Drive (Area 1)
332493.3	3933945.2	1.32	1	60	3	4	2	
332474.3	3933919.8	1.29	3	31	9	12	3	
332534.3	3933998.7	1.17	8	35	6	14	4	
333387.3	3934178.5	1.14	13	15	19	32	5	Edge of EP Property, on edge of School St. (Area 2)
332417.2	3934010.6	1.02	31	48	4	35	6	Private property, west of Blackwell Drive (Area 1)
333311.7	3934353.1	1.17	10	12	26	36	7	On Blackwell Drive (Area 1)
332517.2	3934010.5	1.09	22	19	14	36	7	Edge of EP Property, on edge of High St. (Area 2)
333596.8	3933934.4	1.06	23	16	17	40	9	Corner of EP Property & private property, on edge of Plum St. (Area 3)
332317.2	3933910.6	1.13	16	13	25	41	10	Private property, west of Blackwell Drive (Area 1)

Figures

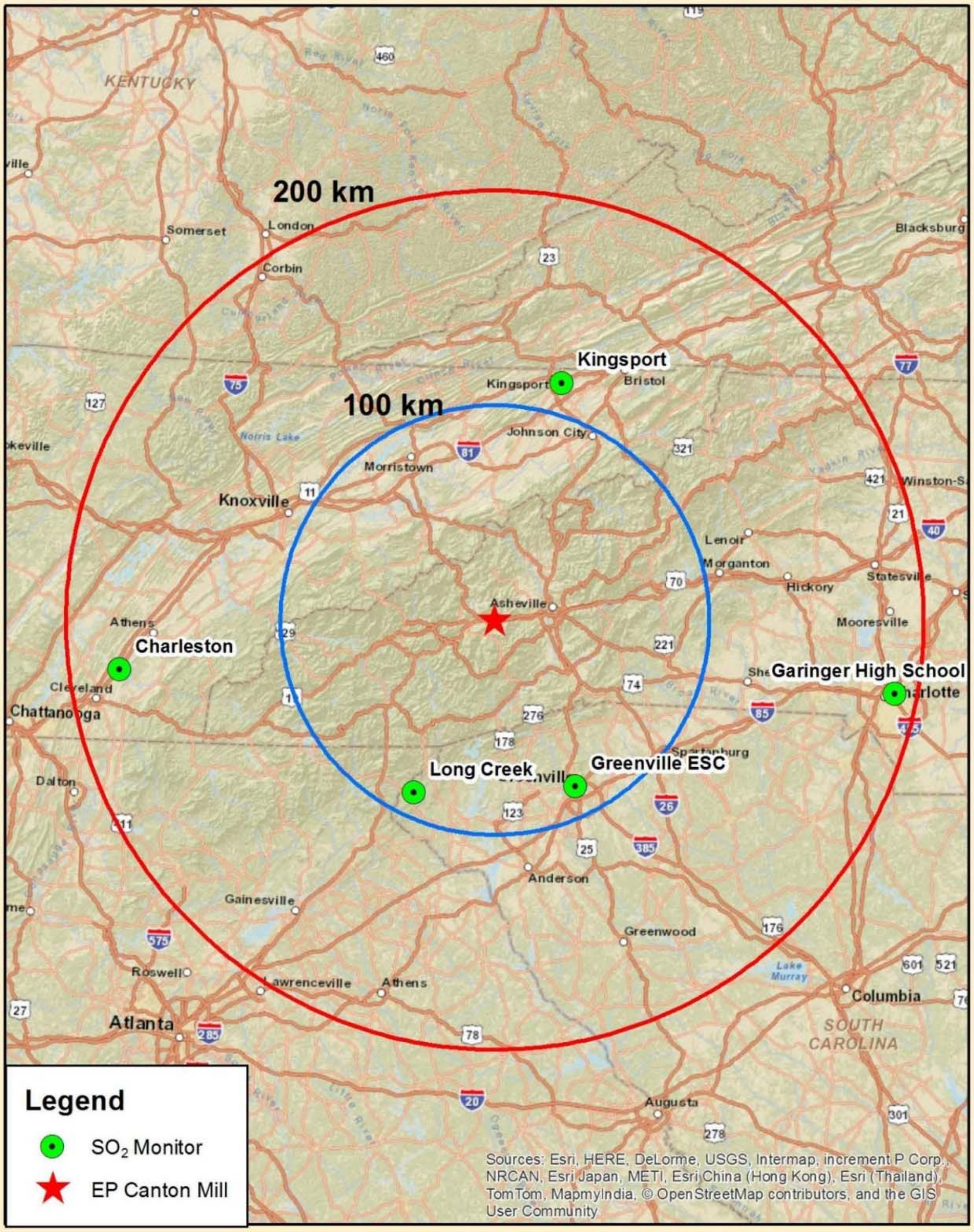

Figure 2-1
Evergreen Packaging - Canton Mill Site and SO_2 Monitor Locations

0 25 50 100 Kilometers
N

AECOM

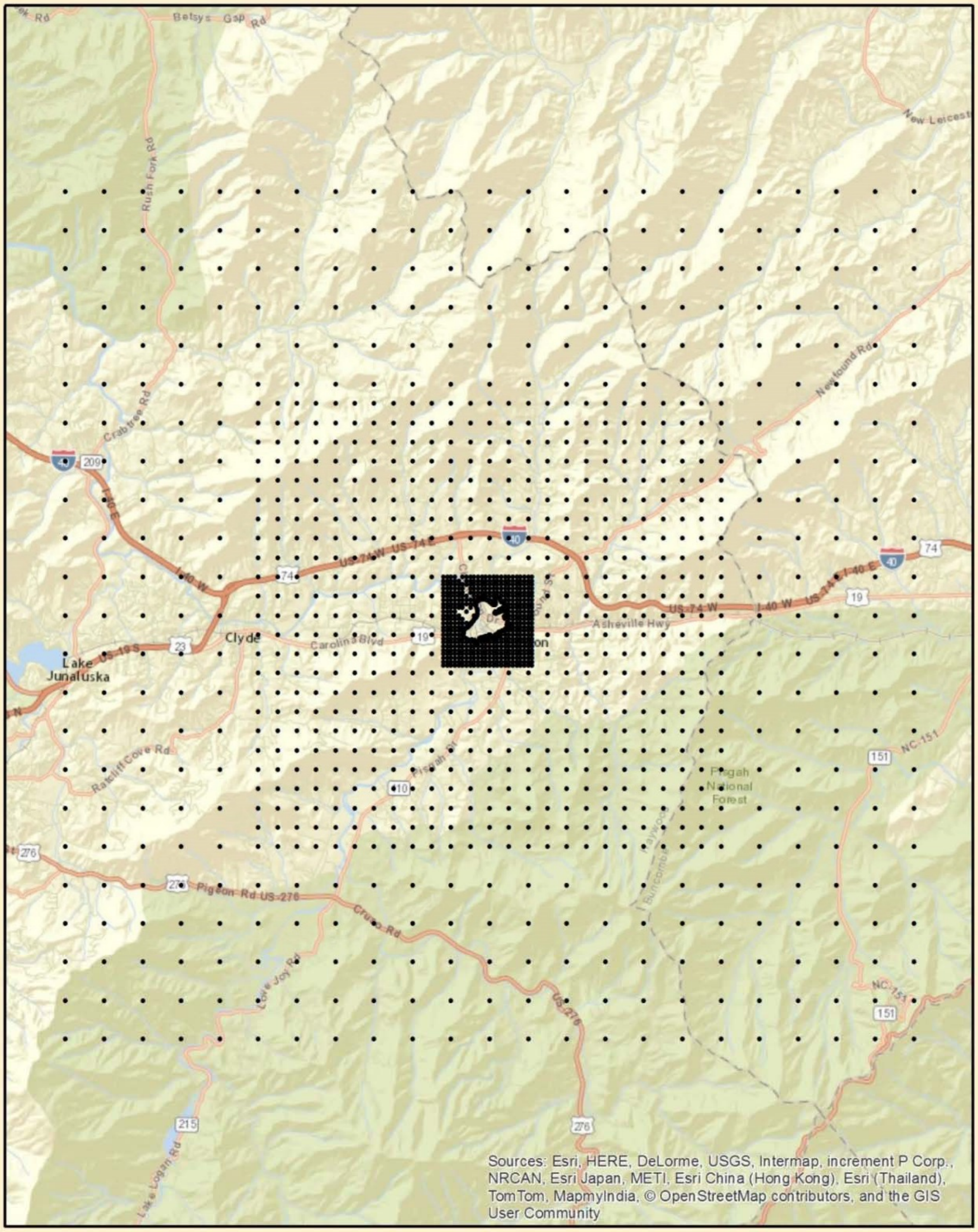

Figure 3-1
Evergreen Packaging - Canton Mill
SO_2 DRR Full Receptor Grid

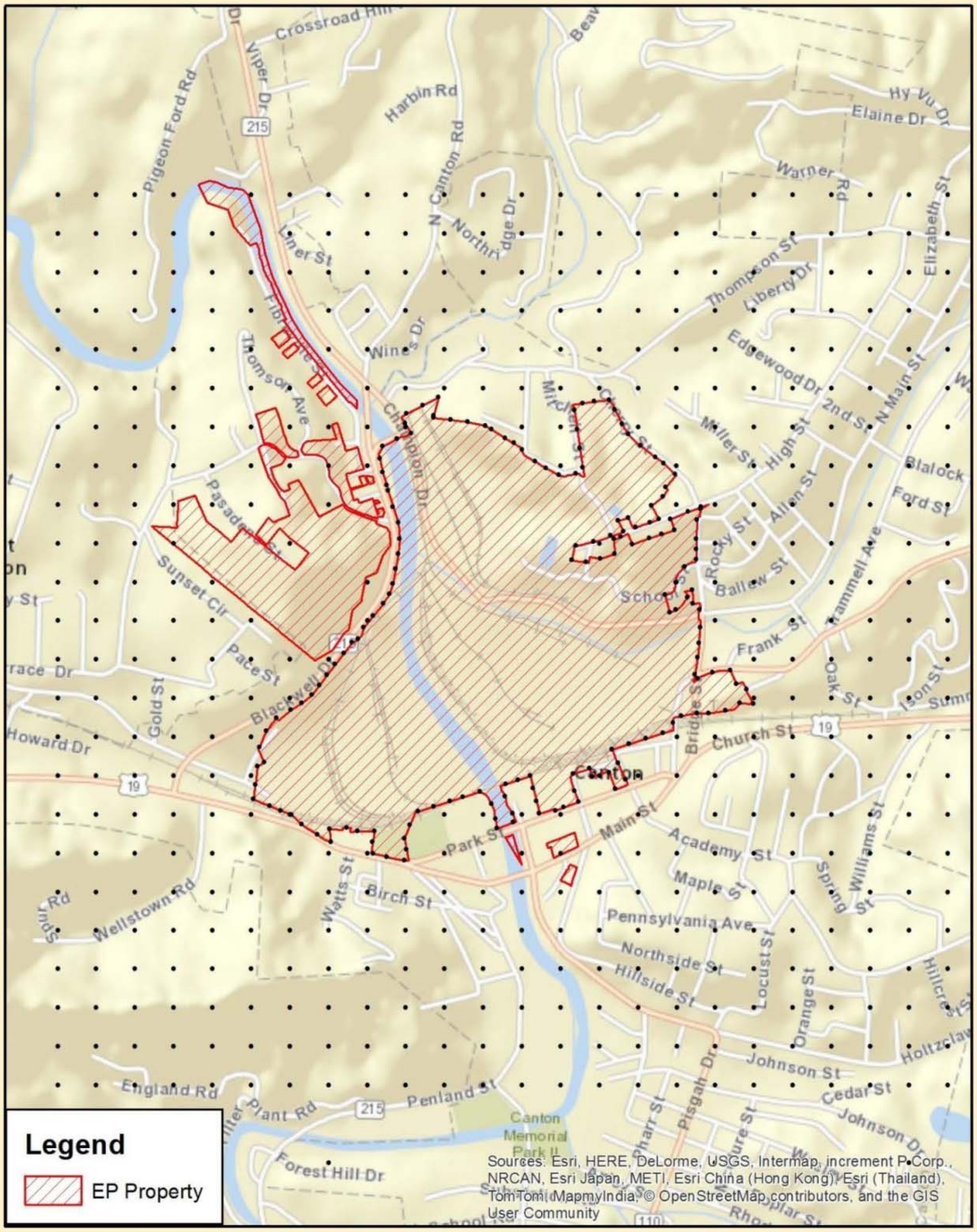

Figure 3-2
Evergreen Packaging - Canton Mill
SO_2 DRR Near Receptor Grid

0 0.125 0.25 0.5 Kilometers

N

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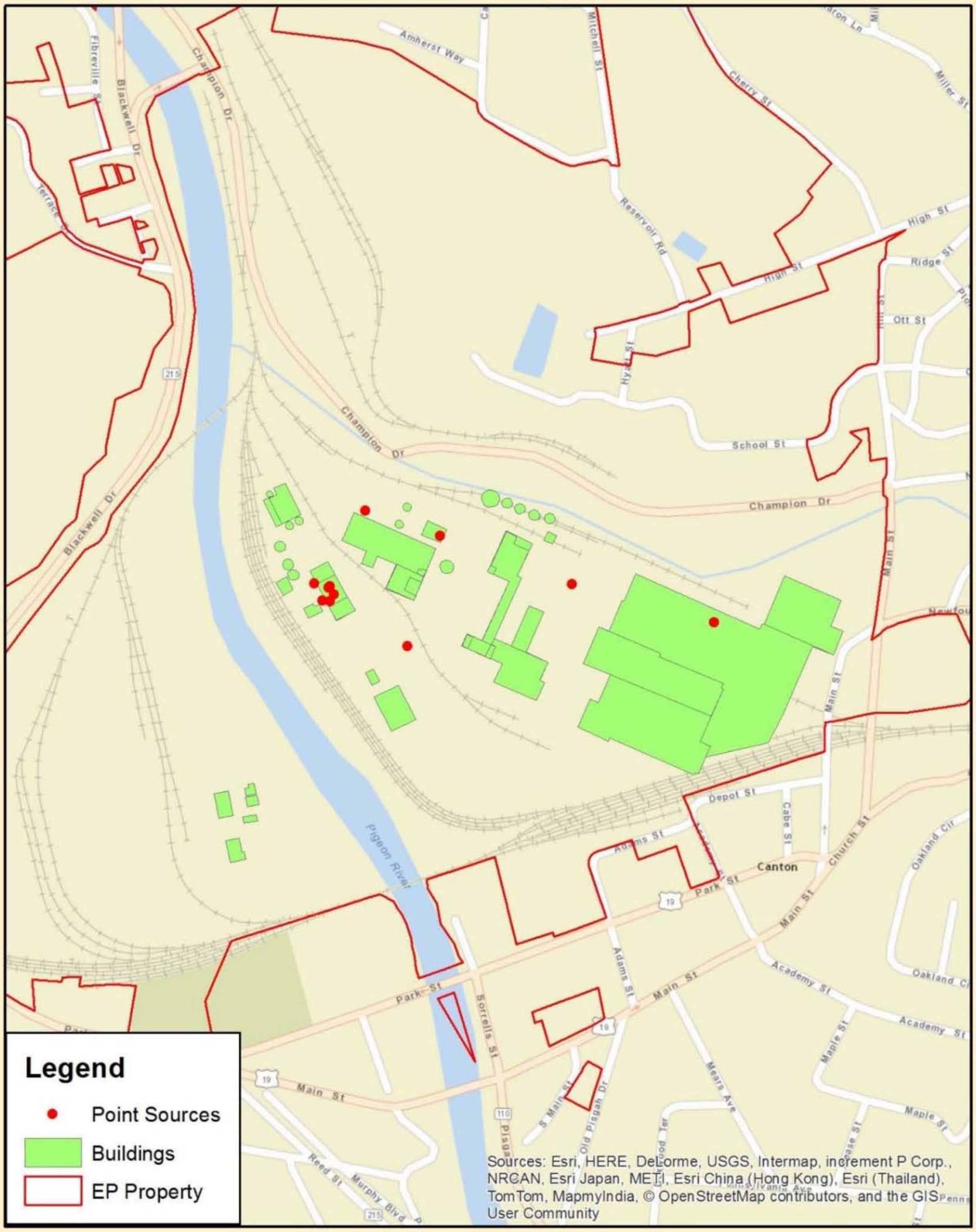

Figure 3-3
Evergreen Packaging - Canton Mill
Source and Building Layout

0 0.05 0.1 0.2 Kilometers

N

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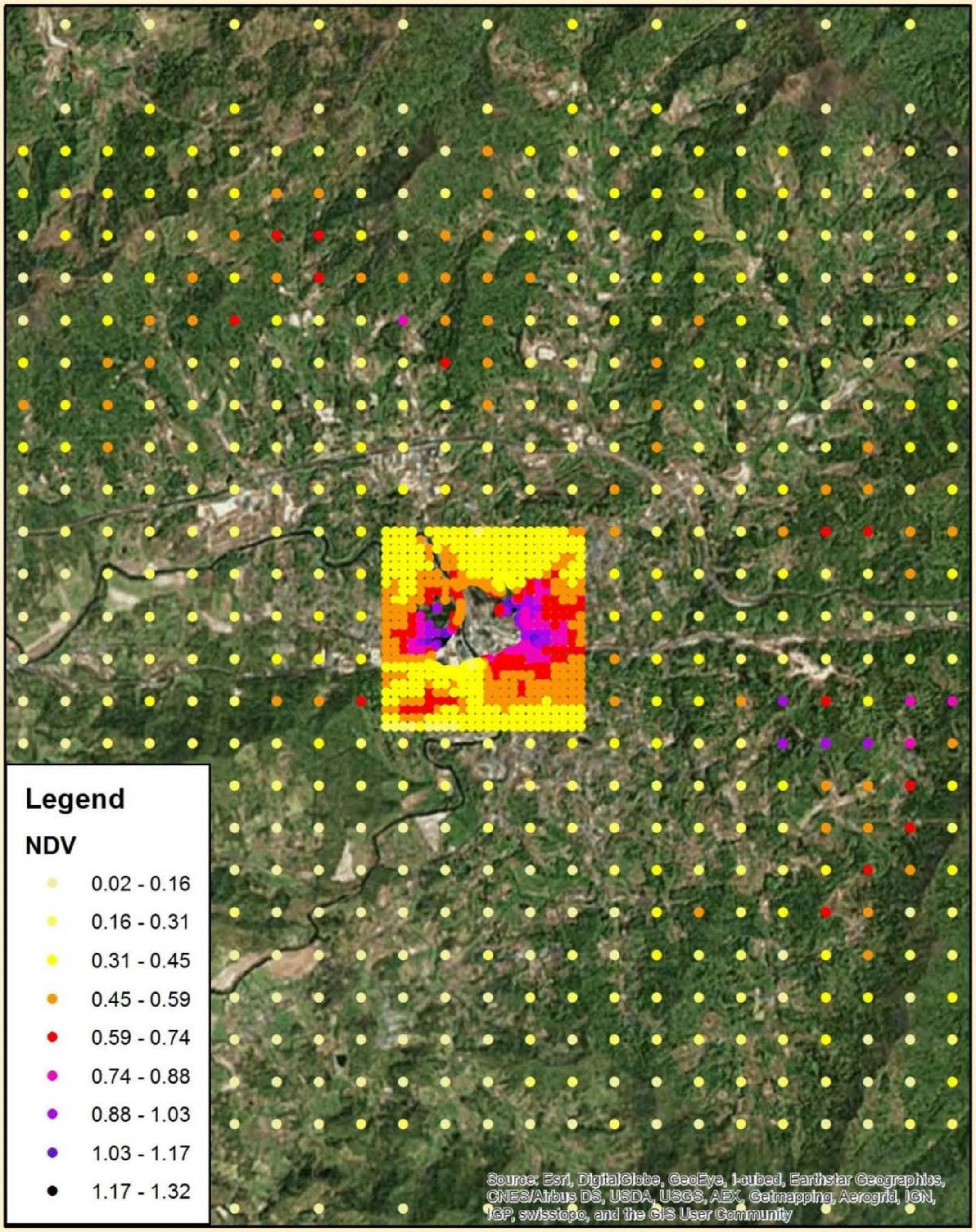


Figure 3-4
Evergreen Packaging - Canton Mill
Modeled NDVs

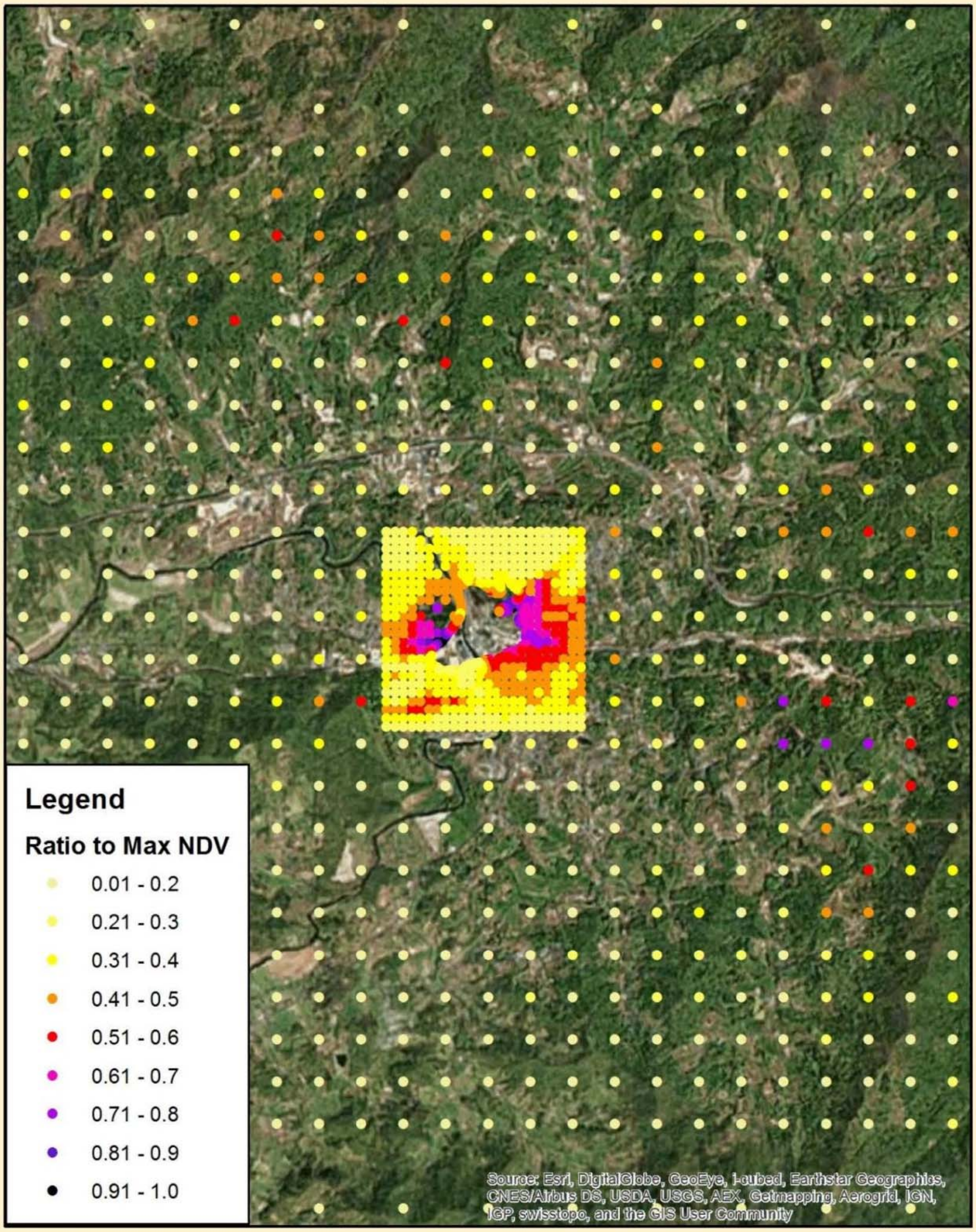


Figure 3-5
Evergreen Packaging - Canton Mill
Receptor NDV Ratio to Max NDV

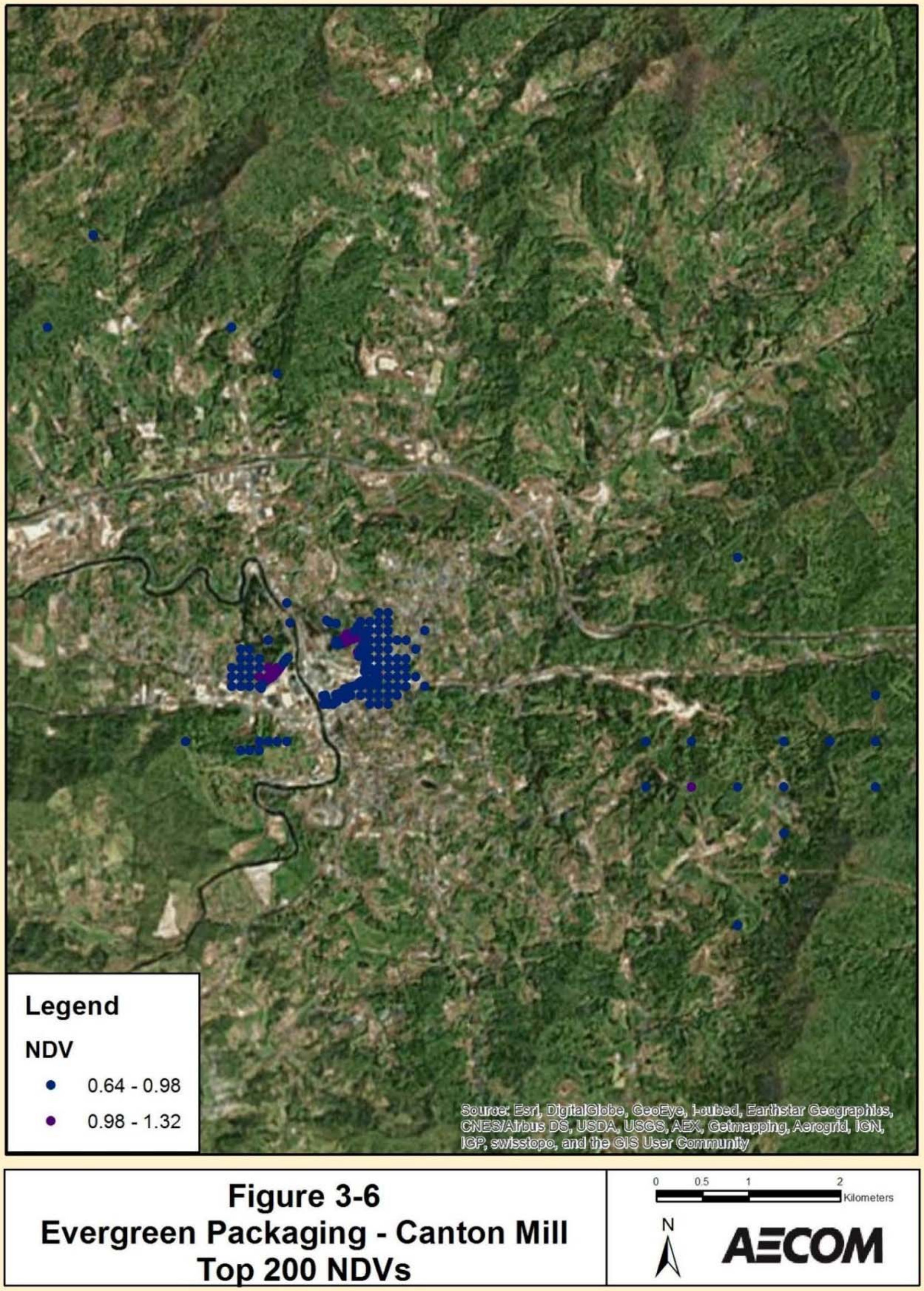


Figure 3-6
Evergreen Packaging - Canton Mill
Top 200 NDVs

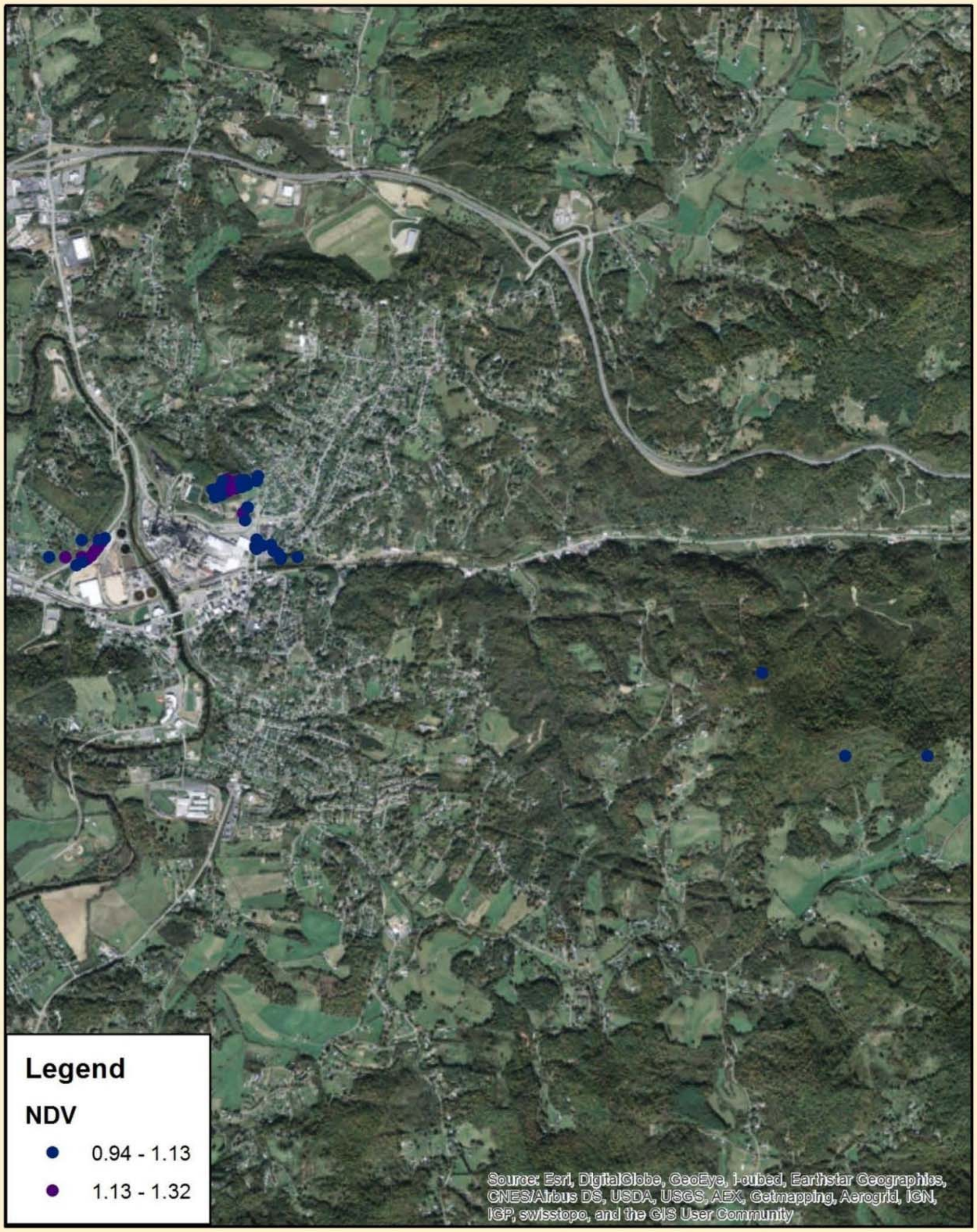


Figure 3-7
Evergreen Packaging - Canton Mill
Top 50 NDVs

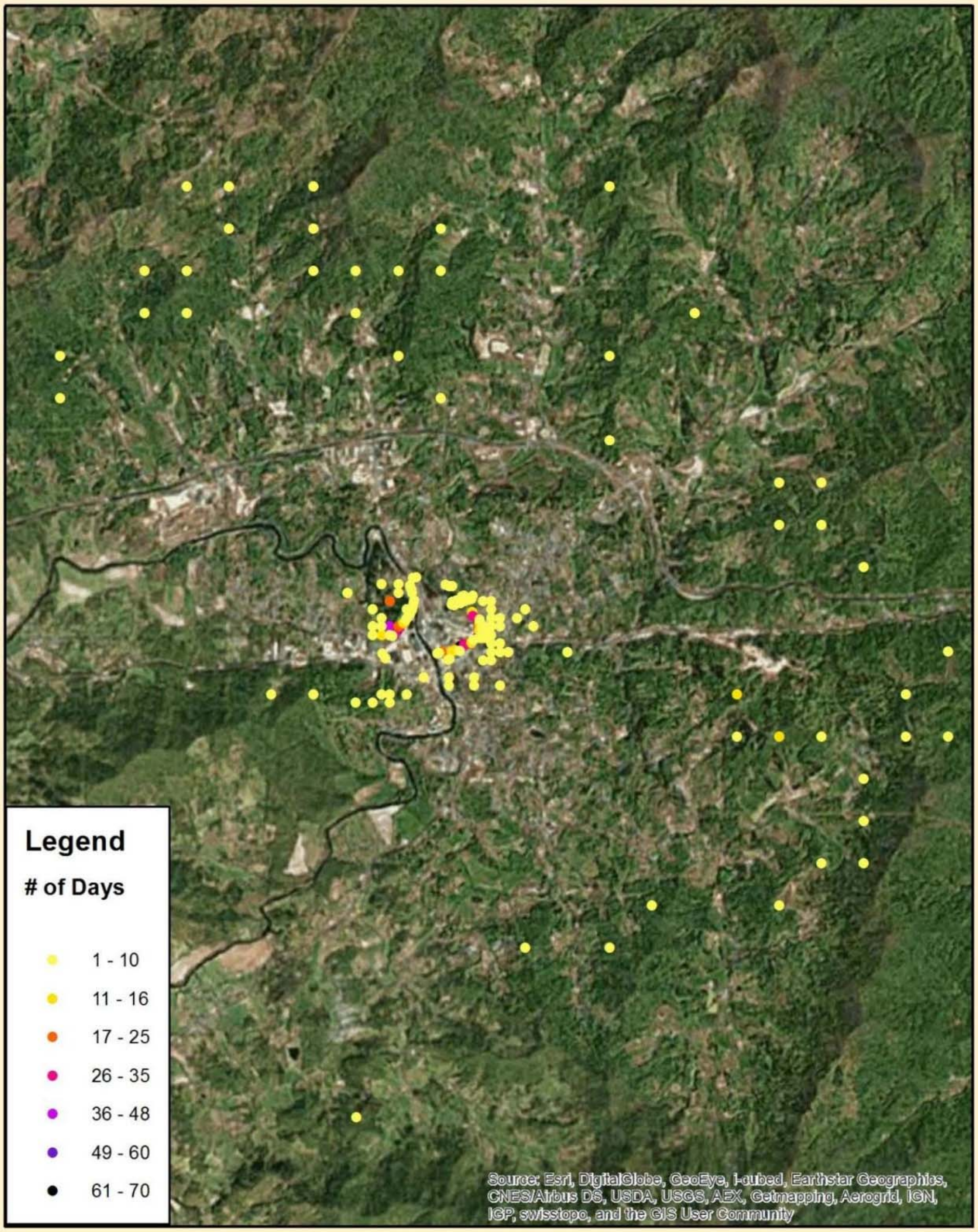


Figure 3-8
Evergreen Packaging - Canton Mill
Frequency of Daily Maximums

0 0.5 1 2 Kilometers

N

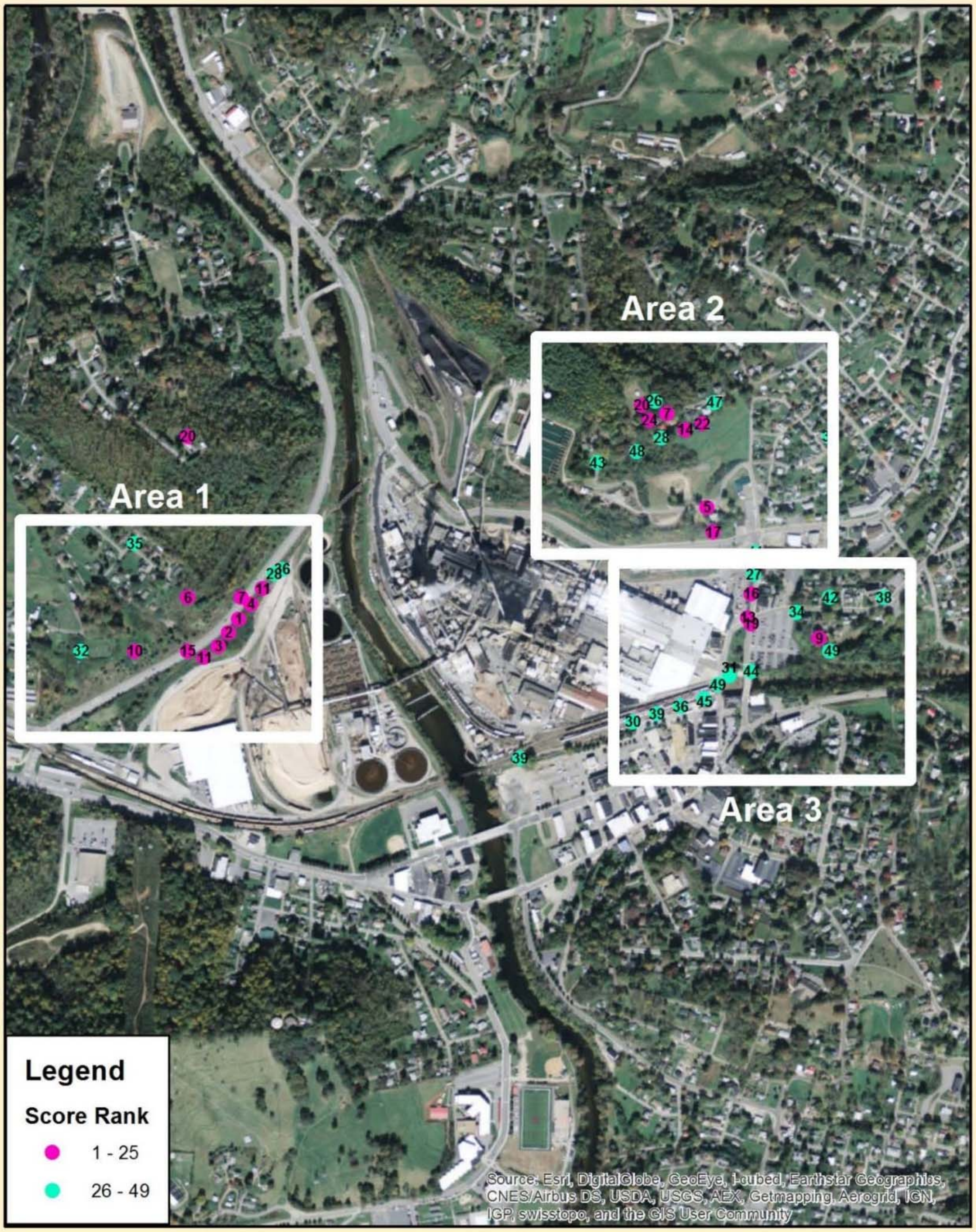


Figure 3-9
Evergreen Packaging - Canton Mill
Locations of Top 50 Ranked Receptors

0 0.1 0.2 0.4 Kilometers

N

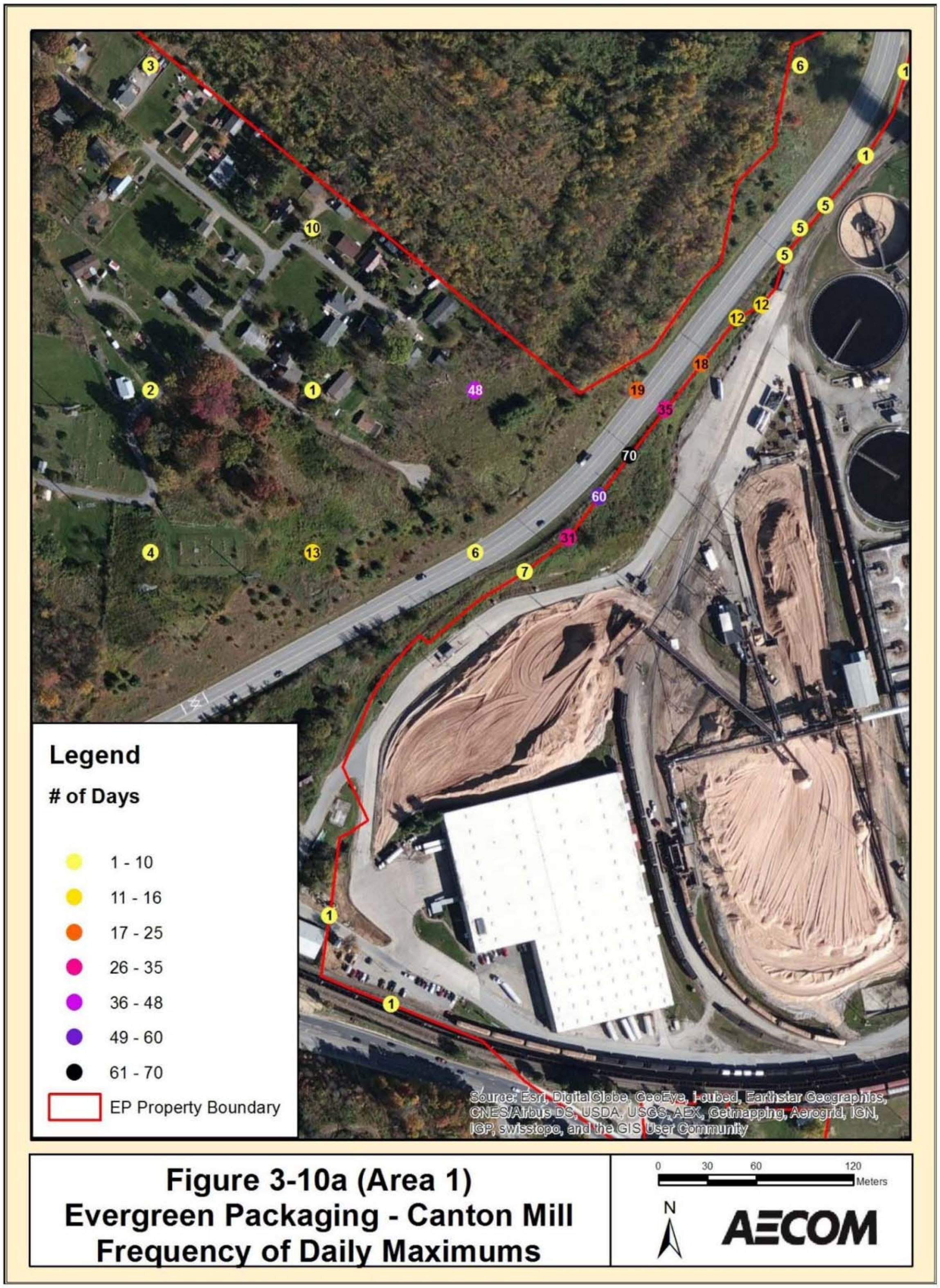


Figure 3-10a (Area 1)
Evergreen Packaging - Canton Mill
Frequency of Daily Maximums

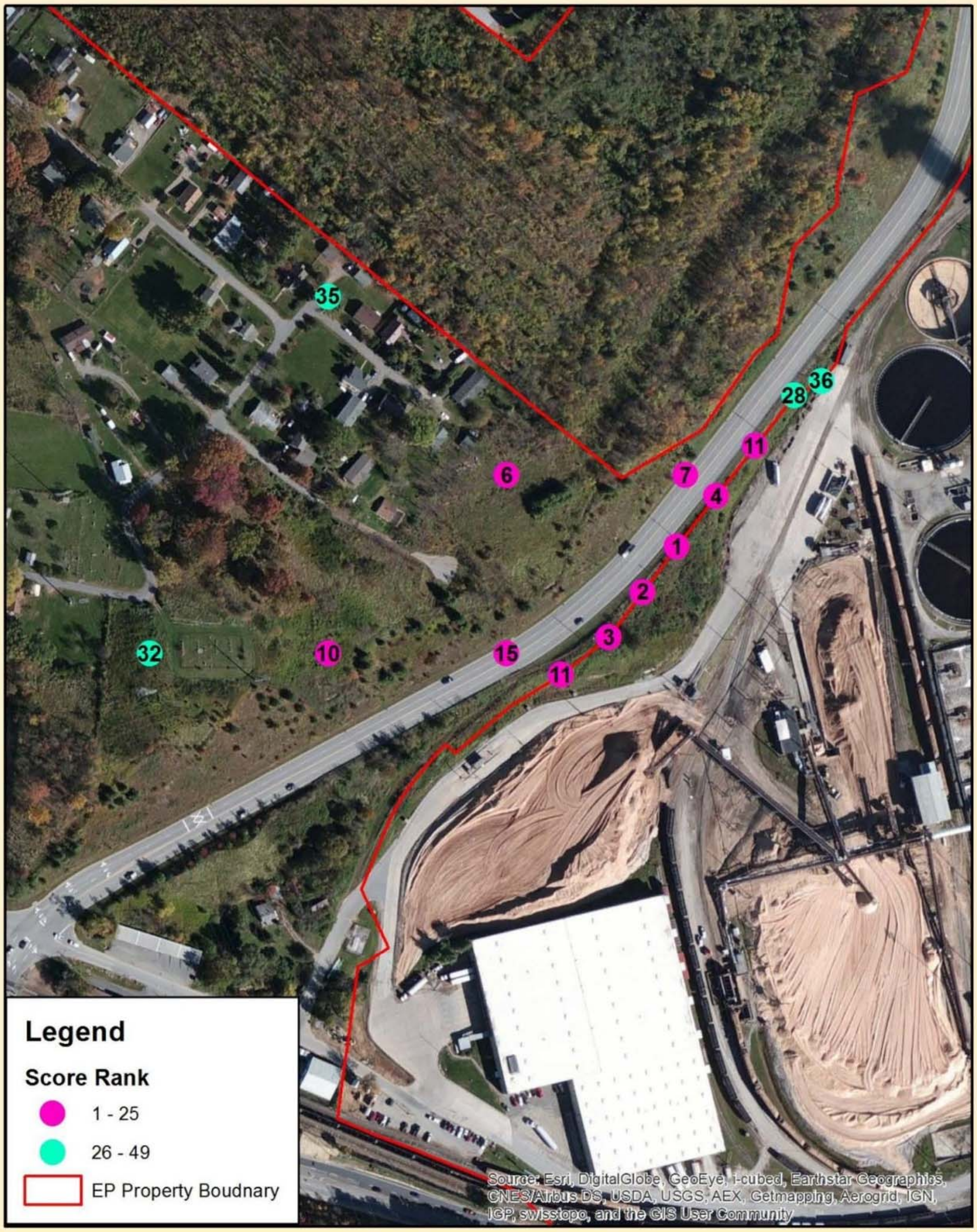


Figure 3-10b (Area 1)
Evergreen Packaging - Canton Mill
Locations of Top 50 Ranked Receptors

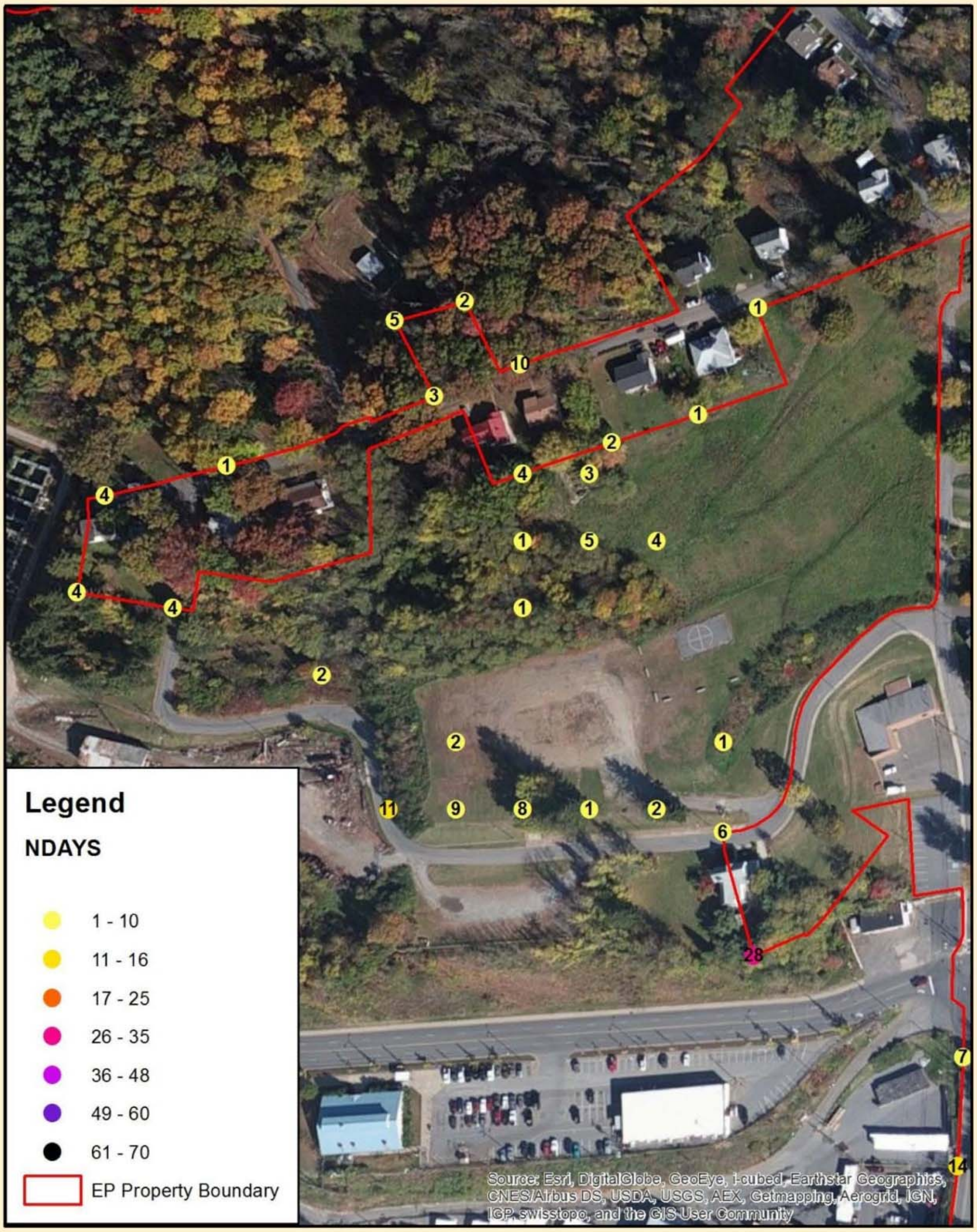


Figure 3-11a (Area 2)
Evergreen Packaging - Canton Mill
Frequency of Daily Maximums

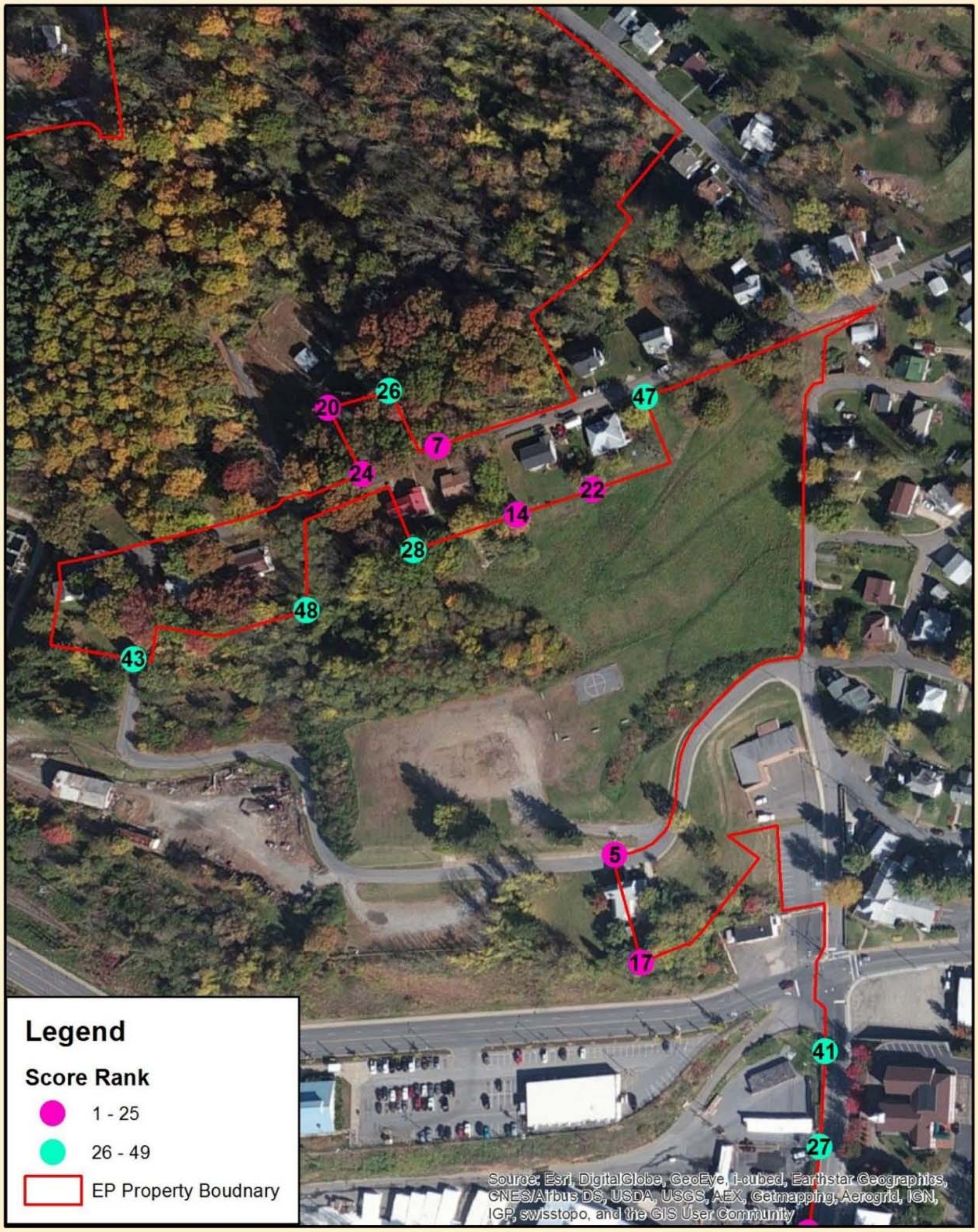


Figure 3-11b (Area 2)
Evergreen Packaging - Canton Mill
Locations of Top 50 Ranked Receptors

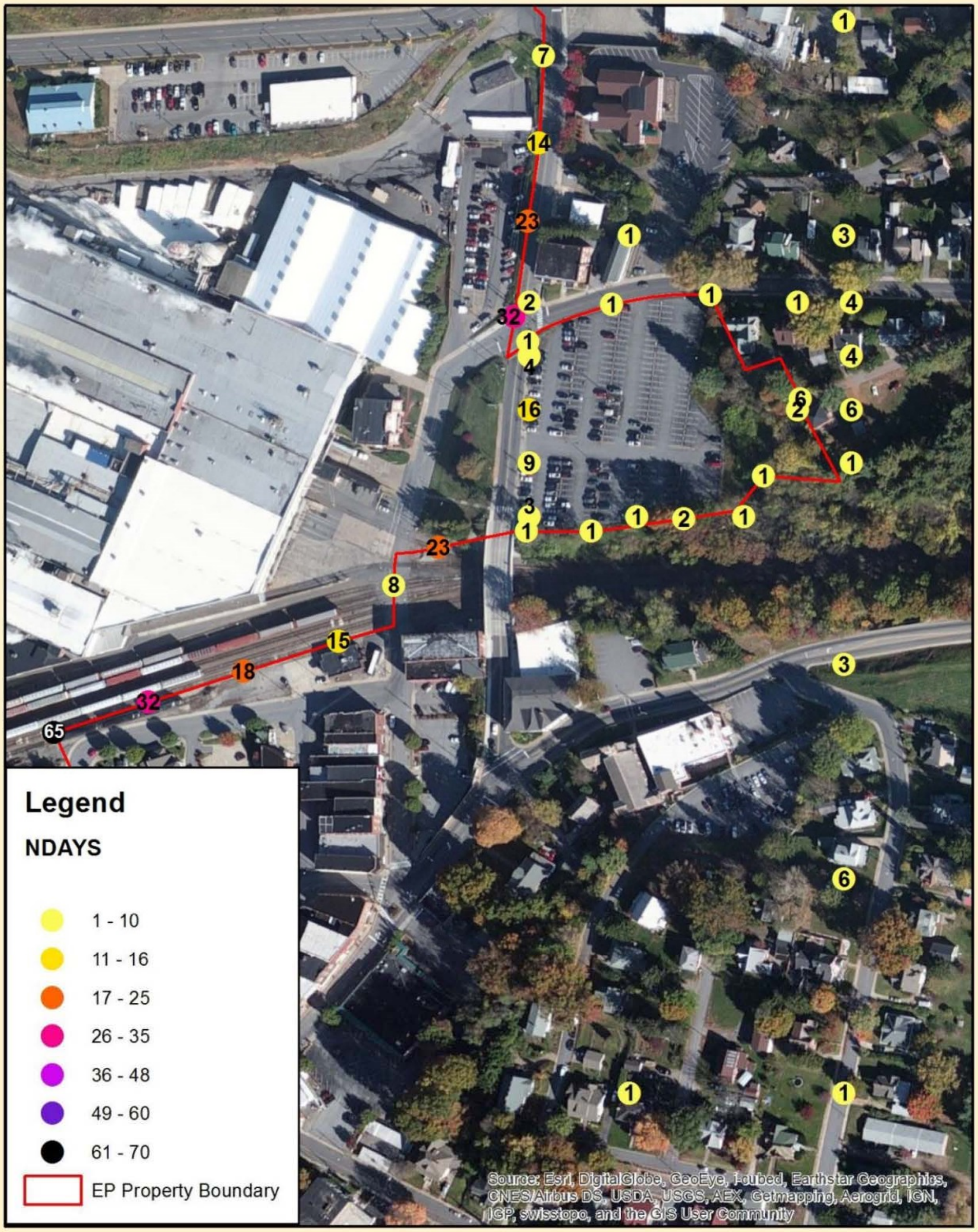


Figure 3-12a (Area 3)
Evergreen Packaging - Canton Mill
Frequency of Daily Maximums

Figure 3-12b (Area 3)
Evergreen Packaging - Canton Mill
Locations of Top 50 Ranked Receptors

Region 4 Requested Information for Proposed Sites (Evergreen Packaging – Canton)

In 2015, the North Carolina Division of Air Quality, DAQ, began working with Evergreen/Blue Ridge Paper to establish a sulfur dioxide monitoring station in Canton, North Carolina, to characterize the ambient sulfur dioxide concentrations near the Evergreen/Blue Ridge Paper facility as required by the data requirements rule for sulfur dioxide.[39] The area chosen for placement of the monitor was selected using the results of modeling done as described in the technical assistance document[40] and is reported in the body of this document. An aerial view of the proposed monitoring location identified based on the earlier reported considerations is shown in Figure 77. The facility is located to the east.

Figure 67. Aerial view showing the location of the proposed monitoring station

The Air Quality System identification number for this monitor will be 37-087-0013-42401-1. DAQ will operate this monitor in collaboration with Evergreen to ensure the air in the Asheville area complies with the national ambient air quality standards for sulfur dioxide. The DAQ Asheville Regional Office staff will operate the monitor following the DAQ quality assurance project plan and the monitor will be part of the DAQ primary quality assurance organization. Figure 78 through Figure 81 show the location of the proposed site and views from the proposed site looking north, east, south and west.

[39] Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide Primary National Ambient Air Quality Standard, Federal Register of Aug. 21, 2015, (80 FR 51052) (FRL-9928-18-OAR), 2015-20367.

[40] SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, Air Quality Assessment Division, December 2013, Draft.

Figure 68. Proposed Canton DRR site location

Figure 69. Looking north from proposed Canton DRR location

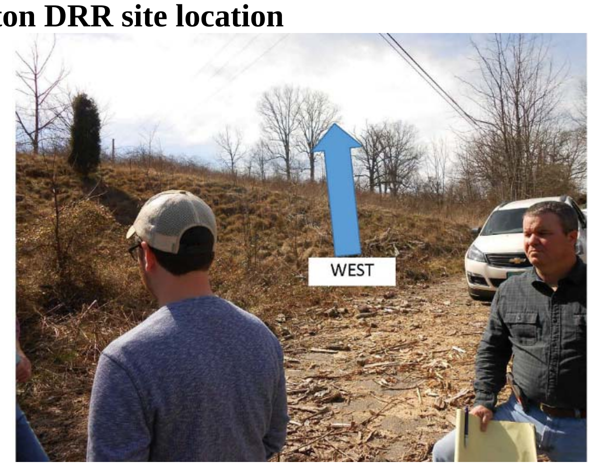


Figure 70. Looking west from the proposed Canton DRR location

Figure 71. Looking east from the proposed Canton DRR location

Figure 72. Looking south from the proposed Canton DRR location

The DAQ proposes to remove any trees or brush within 10 meters of the proposed monitoring location. The nearest road is Pace Street, a dead end road, located approximately 10 meters to the west northwest. This road does not have traffic count data; however, as shown in Figure 82, Gold Street, secondary road number 1560, had an annual average daily traffic count of 340 in 2014. Thus, the annual average daily traffic count on Pace Street is probably much less than 340. The monitor will be about 40 meters northwest of Blackwell Drive, which had an average annual daily traffic count of 9,500 in 2014. The probe height will be approximately 3.6 meters.

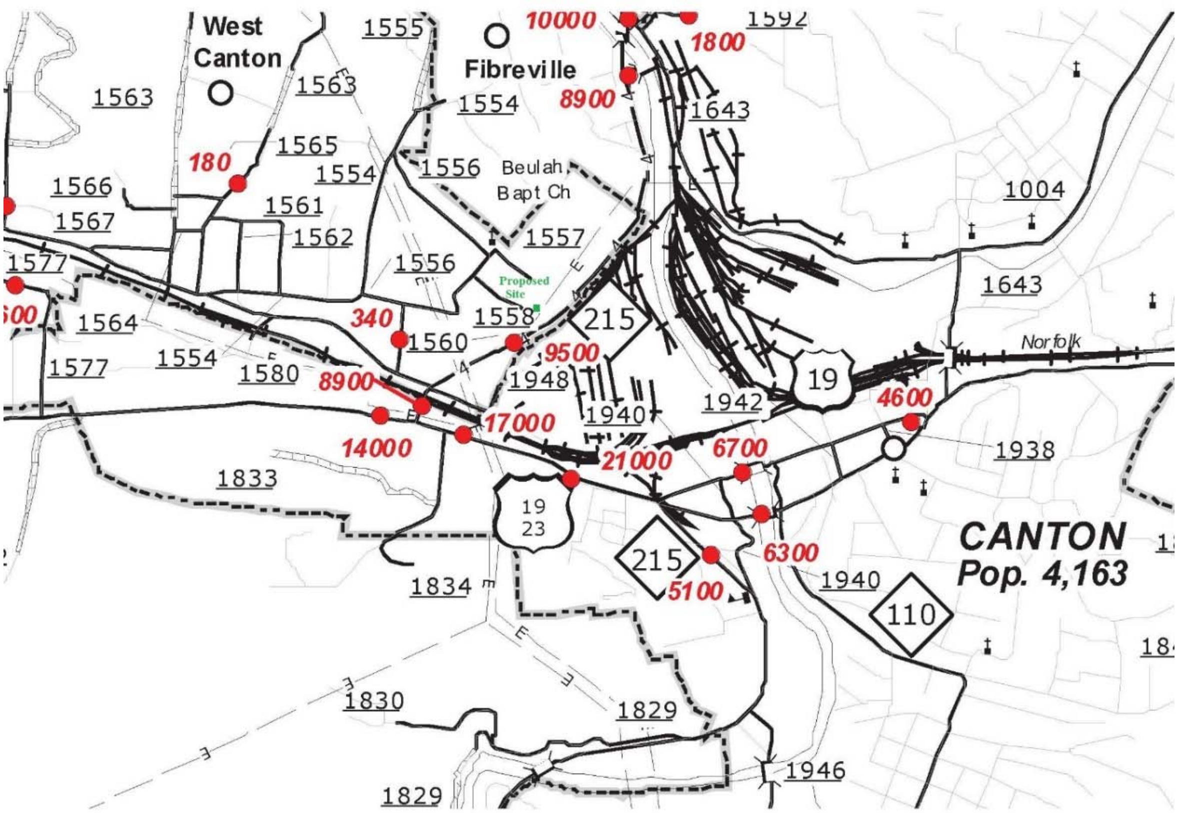


Figure 73. 2014 Traffic count map for Canton (from NC DOT)

The Air Quality System, AQS, identification number and street address for the site will be: 37-087-0013 and Pace Street Air Monitor, Evergreen Plant, Canton, North Carolina. The latitude and longitude will be 35.534 and -82.853. The sampling and analysis method will be AQS code 060, Thermo Electron 43i pulsed fluorescent instrument, EQSA-0486-060, and the operating schedule will be hourly. The monitoring objective will be source oriented. Figure 83 shows the location of the monitoring station relative to the population center of Haywood County in the Canton area. Based on the wind roses in Figure 84 through Figure 76, the proposed monitoring station is located downwind of the Evergreen Packaging plant. The spatial scale of representativeness for the monitor will be middle scale based on the distance of the monitor from the source. The monitor will be located approximately 450 meters west of the property line for the facility.

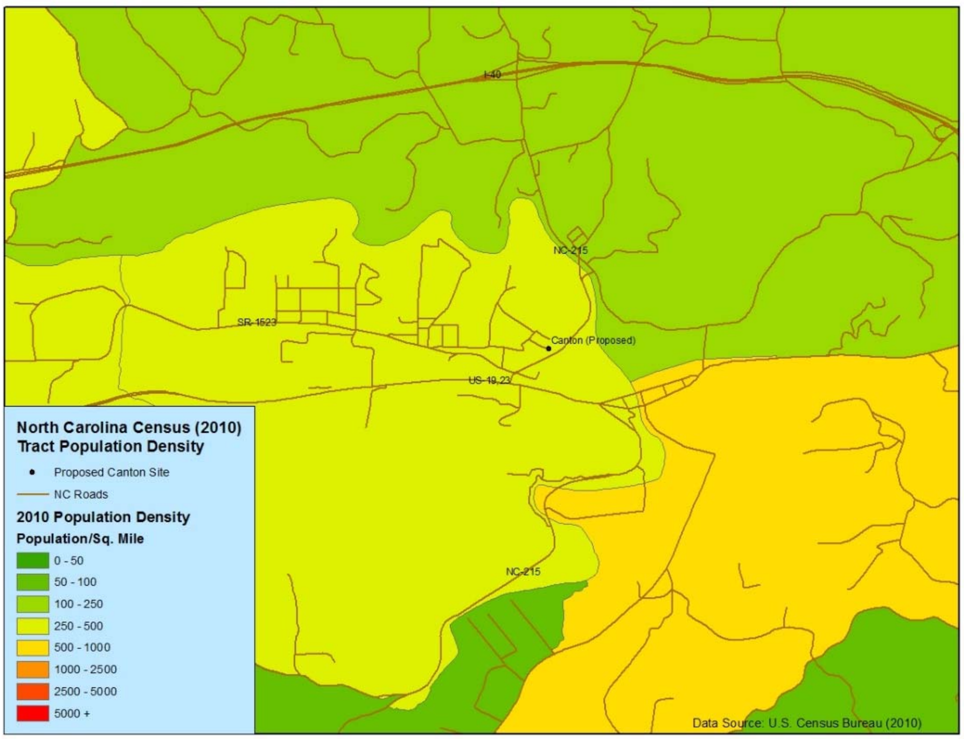


Figure 74. Location of the proposed monitoring station relative to the population of Canton in Haywood County

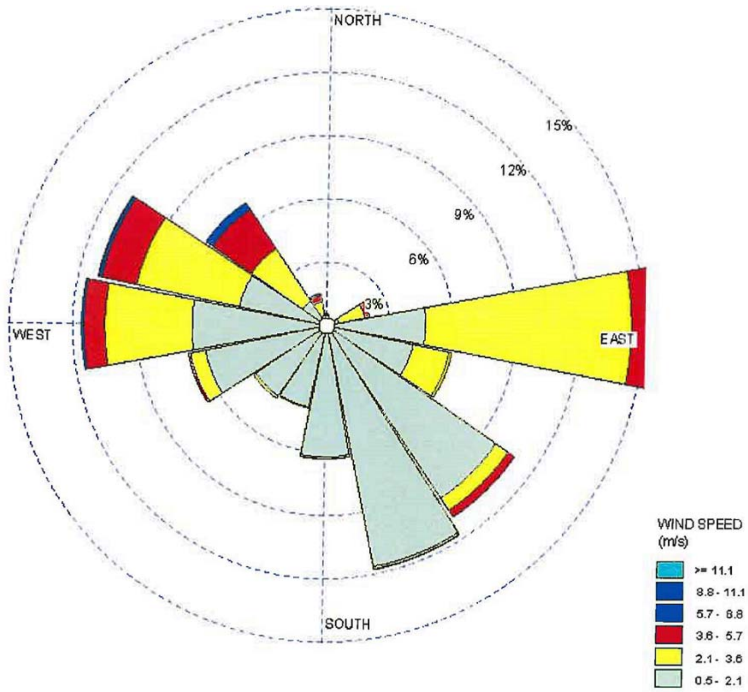


Figure 75. Wind rose for Canton using 1993 data (from Evergreen Packaging)

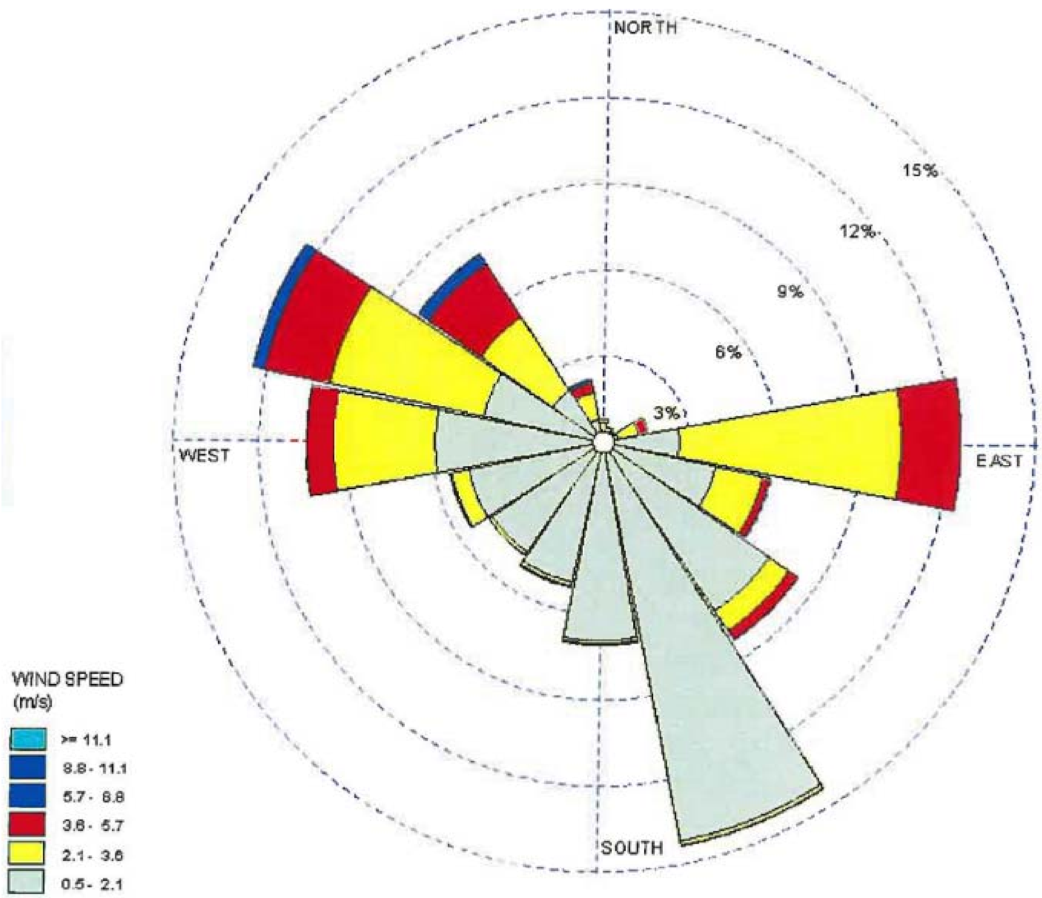


Figure 76. Canton 2012-2014 wind rose (from Evergreen Packaging)

This monitor is located in the Asheville metropolitan statistical area and is representative of the air quality downwind from the fence line of the Evergreen Packaging facility.
The proposed monitoring site will be provided to the public for comment during 30 days in May or June 2016 as part of the 2016-2017 network monitoring plan.

Table 66 summarizes other factors DAQ evaluated when choosing the proposed location for the monitoring station.

Table 66. Other considerations in selection of the Canton DRR site

Factor	**Evaluation**
Long-term Site Commitment	The proposed location is on right-of-way owned by NC DOT and NC DOT does not plan to develop the current area any time in the next three years
Sufficient Operating Space	Potential 20 meter by 20 meter open area free of trees and buildings with no obstructions to the source
Access and Security	The building will be inside a fenced area so it will be secure from possible vandalism.
Safety	Appropriate electrical permits will be obtained.
Power	Overhead powerlines are located 20 meters west of the site.
Environmental Control	The monitoring shelter will be placed with the door to the north so that sunlight will not shine in through the window and warm up the building.
Exposure	The monitoring station will be at least 10 meters from the driplines of trees and will not be near any trees or buildings that could be an obstacle to air flow.
Distance from Nearby Emitters	There are no other permitted facilities within 0.5 miles of the proposed location.
Proximity to Other Measurements	The proposed monitoring station is located about 10 kilometers east of the Waynesville ozone monitoring station.

Appendix F. Region 4 Requested Siting Information for the Pitt County Agricultural Center Site Relocation

On Aug. 7, 2015, Tim Corley, with Pitt County, called the North Carolina Division of Air Quality (DAQ) about the potential leasing of the property near or on which the DAQ Pitt Ag ambient air monitoring station is located in Greenville, North Carolina. Further conversations with Mr. Corley indicated that the organization leasing the property would be building a building that would create an obstruction for the current monitoring station. As a result on Sep. 30, DAQ contacted Mr. Corley to see if the building could be relocated approximately 325 meters to the other side of the property as shown in Figure 77. Mr. Corley agreed to this location on Oct. 21, 2015.

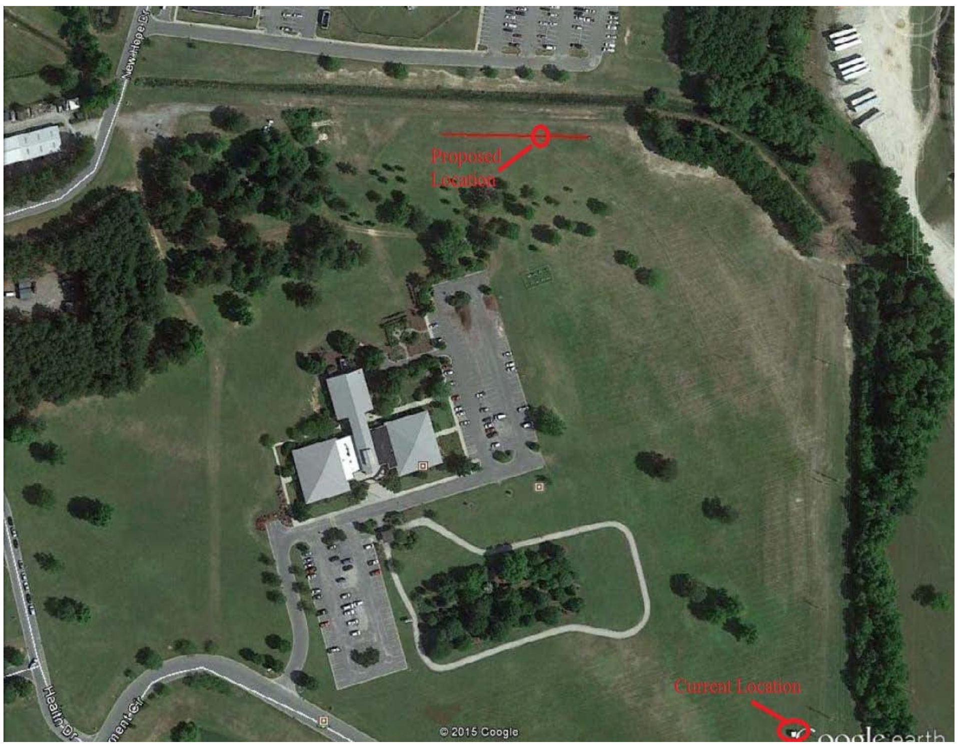


Figure 77. Locations of current and proposed monitoring stations

The monitors affected by this relocation are 37-147-0006-44201-1 and 37-146-0006-88101-1. The DAQ operates these monitors to ensure that the air in the Greenville area complies with the national ambient air quality standards. The fine particle monitor is suitable for comparison to the annual fine particle national ambient air quality standard. Views from the proposed site looking north, east, south and west are shown in Figure 78 through Figure 81.

Figure 78. Looking north from the new Pitt County Agriculture Center location

Figure 79. Looking west from the new Pitt County Agriculture Center location

Figure 80. Looking east from the new Pitt County Agriculture Center location

Figure 81. Looking south from the new Pitt County Agriculture Center location

The proposed monitoring site is located 35 meters from the trees to the north, 55 meters from the trees to the east, 30 meters from the trees to the south and 119 meters from the trees to the west. The tallest trees are estimated to be 15 meters in height. More precise measurements will be available after the shelter is located on the site. The nearest road is New Hope/Detention Drive located approximately 200 meters to the west. This road does not have any traffic count data; however, as shown in Figure 82, N. Greene Street, located approximately 650 meters west, had an average annual daily traffic count of 8,700 in 2012. Old Creek Road, located approximately 375 meters to the south southeast, had an average annual daily traffic count of 3,100 in 2012. The probe and inlet heights for the proposed monitoring station are expected to be similar to the probe and inlet heights for the current monitoring station, approximately 3.8 meters for ozone and 2.3 meters for fine particles.

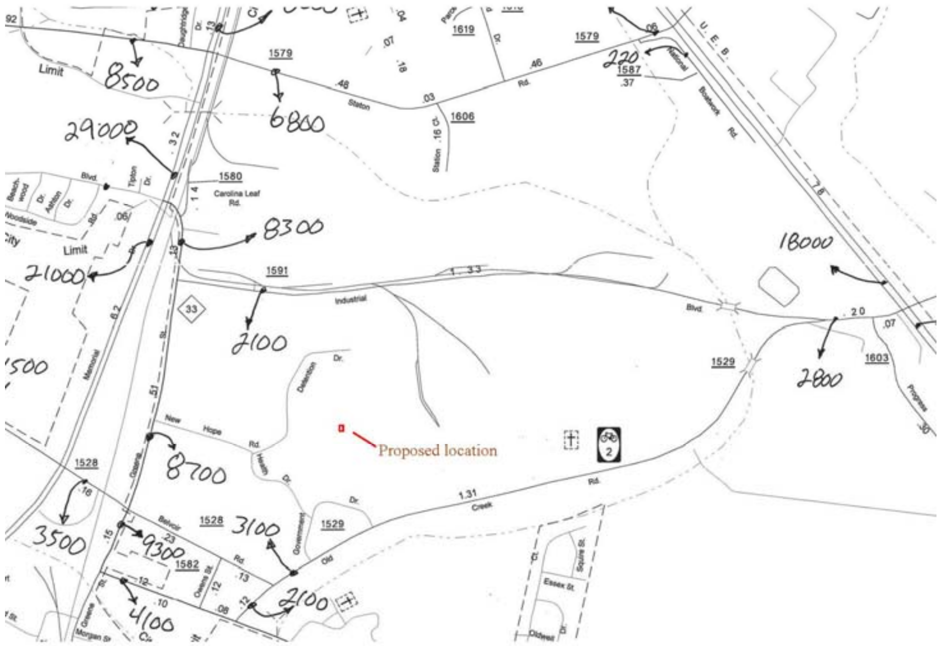


Figure 82. 2012 Traffic count map near the Pitt County Agriculture Center (from DOT)

The Air Quality System identification number and street address for the site will remain the same: 37-147-0006 and 403 Government Circle, Greenville, North Carolina. The new latitude and longitude will be 35.641276 and -77.360358 (subject to change slightly depending on the exact placement of the building). The sampling and analysis methods (AQS codes 047 for ozone and 118 for fine particles) and operating schedules (hourly for ozone and one-in-three day for fine particles) for both monitors will remain the same. The monitoring objective for both monitors will continue to be population exposure. Figure 83 shows the location of the monitoring station relative to the population center of Greenville. Based on the wind roses in Figure 84 through Figure 88, the proposed monitoring station is located downwind of Greenville during springtime and summer when the ozone concentrations are the highest. The spatial scale of representativeness for both monitors will be urban based on the location of the roadways and the amount of traffic on those roads. (See Figure 89 and Table 67.)

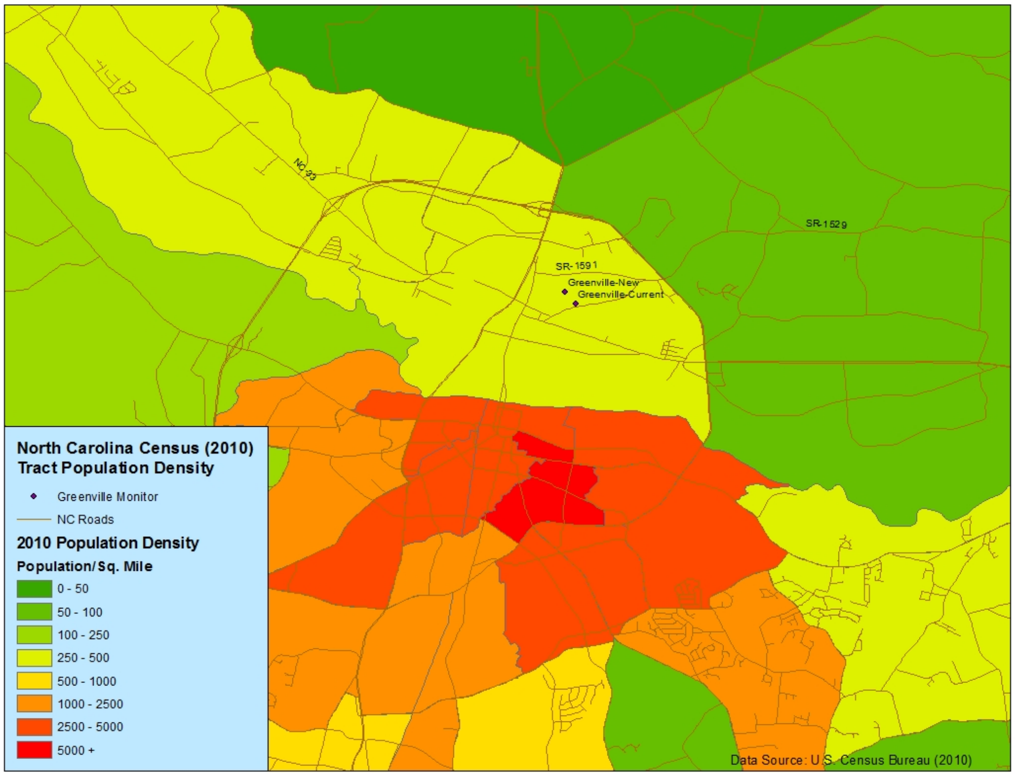


Figure 83. Location of the proposed monitoring station relative to the population of Greenville

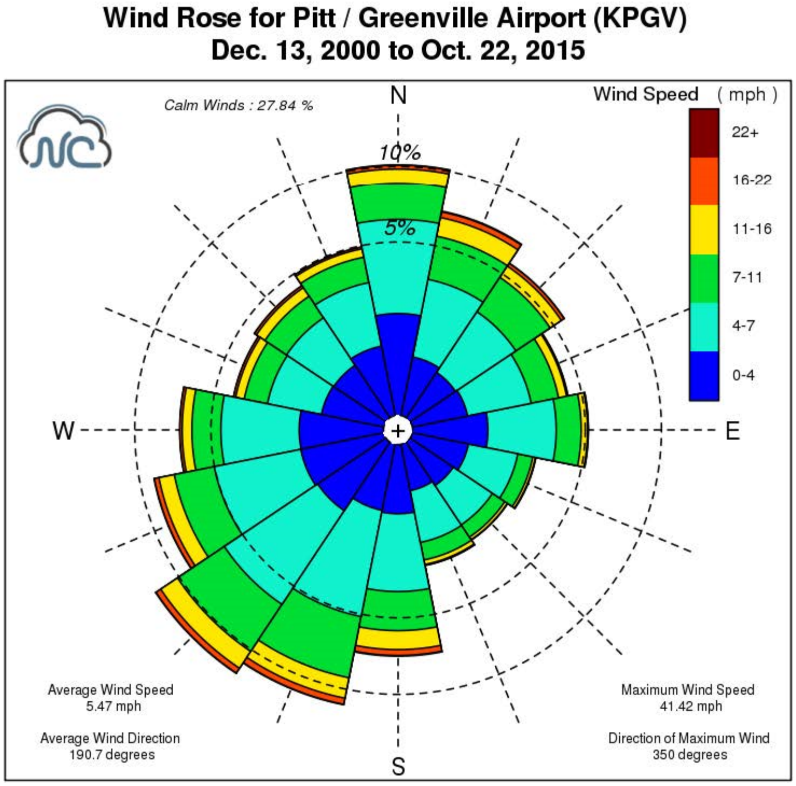


Figure 84. Windrose for Greenville using all data (from NC State Climate Office)

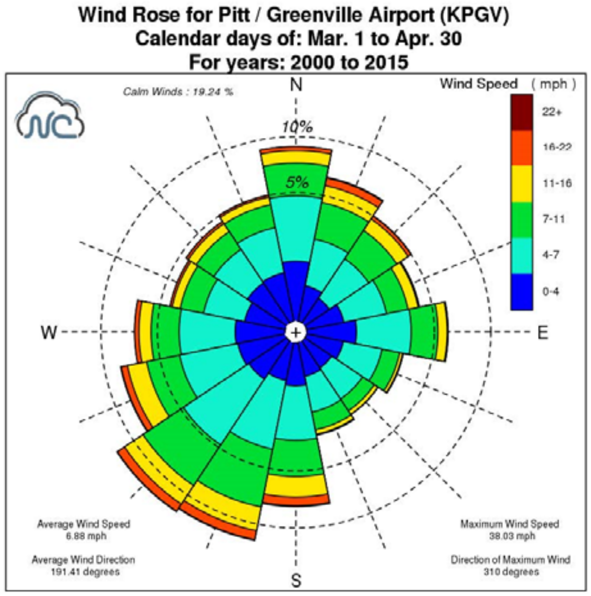


Figure 85. Greenville springtime wind rose (from NC State Climate Office)

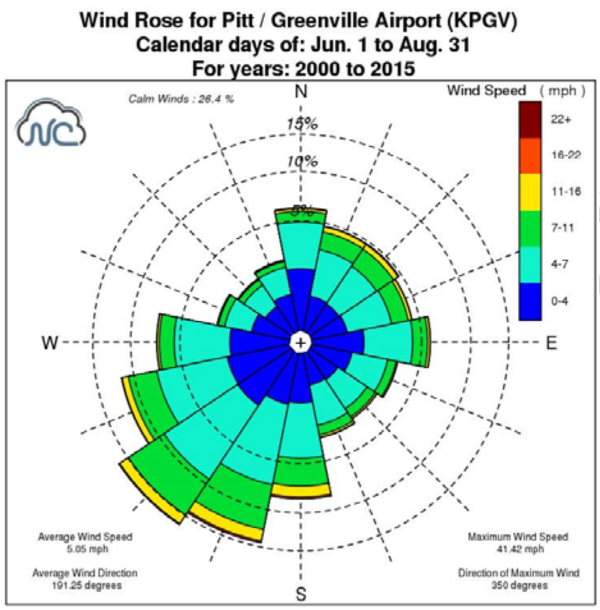


Figure 86. Greenville summertime wind rose (from NC State Climate Office)

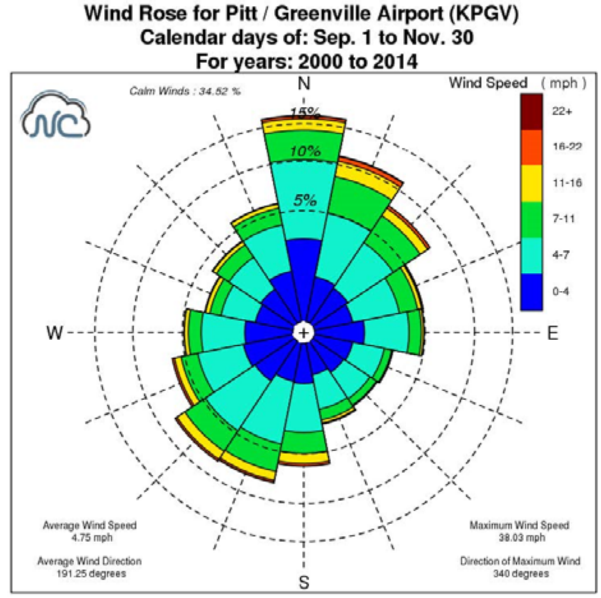


Figure 87. Greenville fall time wind rose (from NC State Climate Office)

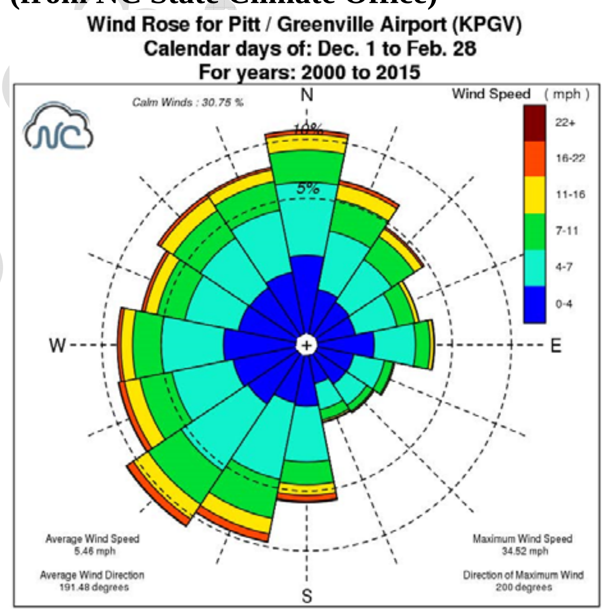


Figure 88. Greenville wintertime wind rose (from NC State Climate Office)

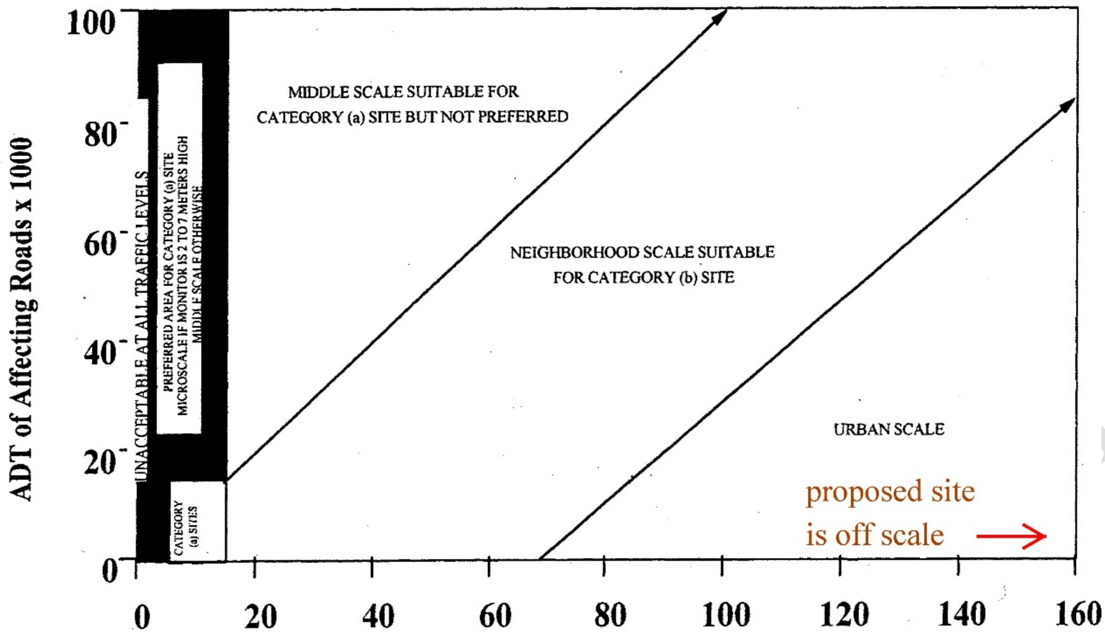


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Figure 89. Figure E-1 from Appendix E used to determine spatial scale of representativeness for particle monitors

Table 67. TABLE E-1 OF APPENDIX E TO PART 58—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES OR MONITORING PATHS FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O_3) AND OXIDES OF NITROGEN (NO, NO_2, NO_X, NO_Y)

Roadway average daily traffic, vehicles per day	Minimum distance[1] (meters)	Minimum distance[1 2] (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

[1]Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.
[2]Applicable for ozone monitors whose placement has not already been approved as of Dec. 18, 2006.

These two monitors are representative of air quality in the Greenville metropolitan statistical area.

The proposed monitoring site was not provided to the public for comment because the proposed location for the monitors is on the same property. As a result, the move was not considered a significant enough change to warrant providing it to the public for comment.

Table 68 summarizes other factors DAQ evaluated when choosing the proposed location for the monitoring station. Location of permitted facilities are shown in Figure 90.

Table 68. Other considerations in selection of the Pitt County Agriculture Center Site

Factor	Evaluation
Long-term Site Commitment	Pitt County is willing to provide DAQ with a long-term lease agreement and does not plan to develop the current area any time in the near future
Sufficient Operating Space	300 meter by 50 meter open area free of trees and buildings
Access and Security	Current building and outdoor monitor have not been vandalized. Proposed location is near a walking trail. The outdoor monitor will be inside a locked fence.
Safety	Appropriate electrical permits will be obtained.
Power	Overhead powerlines are located 325 meters east of the site. Overhead power can be brought in from there or from the detention center parking lot approximately 50 meters to the north.
Environmental Control	The monitoring shelter will be placed with the door to the north so that sunlight will not shine in through the window and warm up the building.
Exposure	The monitoring station will be at least 20 meters from the driplines of trees and will not be near any trees or buildings that could be an obstacle to air flow.
Distance from Nearby Emitters	There are two permitted facilities with 0.5 miles of the proposed location: **Metallix Refining, Inc.**, located at 251 Industrial Blvd, 467 meters north northwest of the proposed monitoring station, emitted 1.5 tons of NOx, 0.1 tons of VOC and 0.2 tons of fine particles in 2011. **Attends Health Care Products, Inc.**, located at 1029 Old Creek Road, 567 meters east of the proposed monitoring station, emitted 20.7 tons of PM10 in 2011.
Proximity to Other Measurements	The proposed monitoring station is located about 2 kilometers from the Pitt-Greenville Airport.

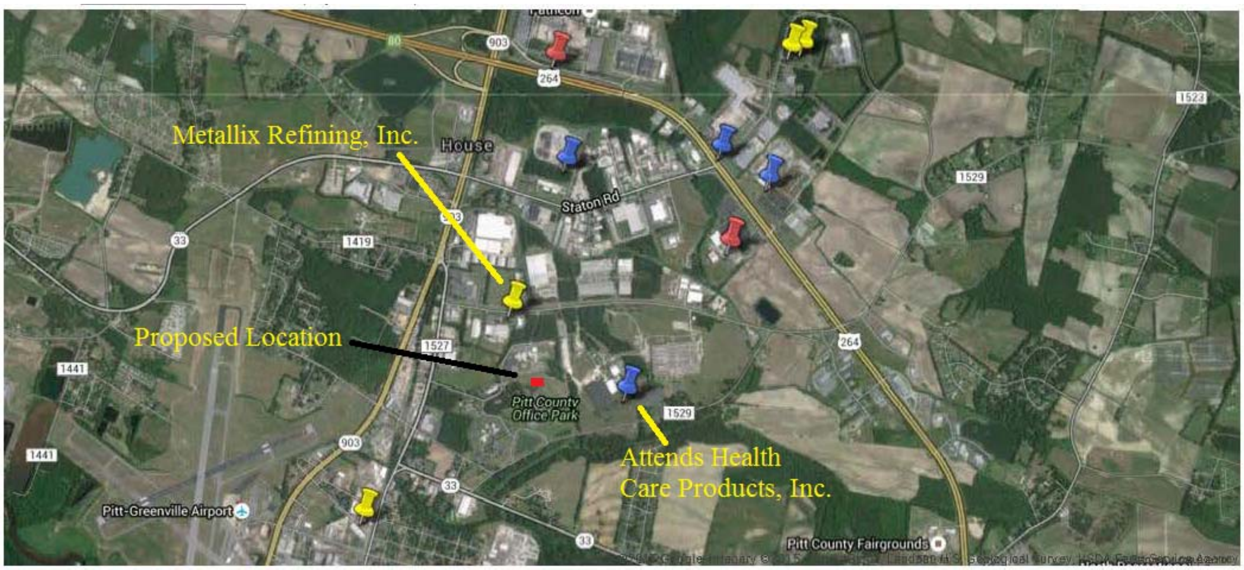


Figure 90. Location of proposed monitoring station relative to permitted facilities
(yellow pins are small, blue pins are synthetic minor and red pins are Title V facilities)

Appendix G. 2014-2015 Network Plan EPA Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

JUL 1 6 2015

Ms. Sheila C. Holman
Director
Division of Air Quality
North Carolina Department of
Environment and Natural Resources
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Dear Ms. Holman:

Thank you for submitting the state of North Carolina's 2014 annual ambient air monitoring network plan (Network Plan), dated October 10, 2014. The Network Plan is required by 40 Code of Federal Regulations (CFR) §58.10. The Network Plan covers the ambient air monitoring network for the North Carolina Division of Air Quality (NC-DAQ) and the local air quality agencies in North Carolina.

The U.S. Environmental Protection Agency understands that the NC-DAQ provided a 30-day public comment period and received two public comments on the Network Plan. According to 40 CFR §58.10(a)(2), since public inspection and comment have already been solicited, the EPA is not required to offer another comment period.

The EPA approves North Carolina's 2014 Network Plan with the exceptions noted below. The Network Plan requested the permanent discontinuation of ten monitors. The EPA approves the shutdown of eight of these ten monitors: six $PM_{2.5}$ monitors, one ozone monitor, and one PM_{10} monitor. However, the EPA does not approve the shutdown of two of the monitors, which are both ozone monitors (Franklinton and Bushy Fork). Both monitors have recorded ozone levels that are within the range of the proposed ozone National Ambient Air Quality Standard. Additionally, the EPA approves the temporary shutdown of one ozone monitor (Arrowood), the relocation of one ozone monitor (Honeycutt), and the shutdown of five Chemical Speciation Network (CSN) $PM_{2.5}$ monitors (defunded by EPA). Discussions of each of these proposed monitor changes is included in the enclosure.

Also, North Carolina's proposed O_3 monitoring network does not meet the minimum requirements for the Myrtle Beach-Conway-North Myrtle Beach MSA. The boundary for the area was changed in February of 2013 and this change has triggered the requirement for an O_3 monitor in this MSA. The 2014 Network Plan indicates that NC-DAQ has entered into discussions with South Carolina and other stakeholders to identify an appropriate location for a new monitoring site. Once a suitable monitoring location is identified, information regarding the site can be provided as an amendment to the most current Network Plan.

Thank you for working with us to monitor air pollution and promote healthy air quality in North Carolina and the nation. If you have any questions or concerns, please contact Gregg Worley at (404) 562-9141 or Ryan Brown at (404) 562-9147.

Sincerely,

Beverly H. Banister
Director
Air, Pesticides and Toxics Management Division

Enclosure

cc: Mr. Donnie Redmond
Ambient Monitoring Section Chief, NC-DAQ

Ms. Leslie Rhodes, Director
Mecklenburg County Land Use and
Environmental Services Agency

Mr. William M. Barnette, Director
Forsyth County Environmental Affairs Department

Mr. David Brigman, Director
Western North Carolina Regional Air Quality Agency

2014 State of North Carolina Ambient Air Monitoring Network Plan
The U.S. EPA Region 4 Comments and Recommendations

This document contains the U. S Environmental Protection Agency's comments and recommendations on the state of North Carolina's 2014 ambient air monitoring network plan (Network Plan). Ambient air monitoring rules, which include regulatory requirements that address network plans, data certification, and minimum monitoring requirements, among other requirements, are found in 40 CFR Part 58. Minimum monitoring requirements for criteria pollutants are listed in 40 CFR Part 58, Appendix D. Minimum monitoring requirements are listed for ozone (O_3), particulate matter less than 2.5 microns ($PM_{2.5}$), particulate matter less than 10 microns (PM_{10}), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and lead (Pb).

The minimum monitoring requirements are based on core based statistical area (CBSA) boundaries as defined by the U.S. Office of Management and Budget (OMB), July 1, 2013, population estimates from the U.S. Census Bureau, and historical ambient air monitoring data. Minimum monitoring requirements for O_3, $PM_{2.5}$, PM_{10}, only apply to metropolitan statistical areas (MSAs), which are a subset of CBSAs. OMB currently defines 17 MSAs in the state of North Carolina. On February 1, 2013, OMB redefined the CBSA boundaries based on 2010 census data. In North Carolina, there are two recently defined MSA's: Myrtle Beach-Conway-North Myrtle Beach, SC-NC and New Bern, NC that were previously defined as micropolitan CBSAs. Additionally, some MSA populations changed due to the inclusion and/or exclusion of counties from OMB's February 2013 MSA delineations. The July 1, 2013 population estimates from the U.S. Census Bureau are shown in Table 1.

Table 1: Metropolitan Statistical Areas and Populations

MSA Name	2014 Population
Charlotte-Concord-Gastonia, NC-SC	2,335,358
Virginia Beach-Norfolk-Newport News, VA-NC	1,707,369
Raleigh, NC	1,214,516
Greensboro-High Point, NC	741,065
Winston-Salem, NC	650,820
Durham-Chapel Hill, NC	534,578
Asheville, NC	437,657
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	404,951
Fayetteville, NC	377,193
Hickory-Lenoir-Morganton, NC	363,572
Wilmington, NC	268,601
Jacksonville, NC	185,220
Greenville, NC	174,263
Burlington, NC	154,378
Rocky Mount, NC	150,667
New Bern, NC	127,657
Goldsboro, NC	124,583

Minimum O_3 Monitoring Requirements
40 CFR Part 58, Appendix D, Table D-2

The state of North Carolina's proposed O_3 monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-2 for all MSAs, except the Myrtle Beach-Conway-North Myrtle Beach MSA.

OMB changed several MSA boundaries in February of 2013, including adding Brunswick County, North Carolina to the Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA. This change has triggered the requirement for an O_3 monitor in this MSA. The 2014 Network Plan indicates that NC-DAQ has entered into discussions with the South Carolina Department of Health and Environmental Control (SC DHEC) and other stakeholders to identify an appropriate location for a new monitoring site. Once a suitable monitoring location is identified, information regarding the site can be provided as an amendment to the most current Network Plan.

The Network Plan also proposes to shutdown three O_3 monitors: Franklinton (AQS ID 37-069-0001), Bushy Fork (AQS ID 37-145-0003), and Mocksville (AQS ID 37-059-0003). The EPA approves the shutdown of the Mocksville monitor. The Mocksville monitor is upwind of Forsyth County in the Winston-Salem MSA and has read consistently lower than the other ozone monitors in the MSA. When the Mocksville monitor is shutdown, the Winston-Salem, NC MSA will still meet the minimum ozone monitoring requirements found in 40 CFR Part 58, Appendix D. The EPA has already notified NC-DAQ of its preliminary approval to discontinue the Mocksville ozone monitor.

The EPA does not approve the shutdown of the Bushy Fork and Franklinton O_3 monitors. The EPA looked at historical comparisons of ozone concentrations, meteorology, and the spatial distribution of O_3 monitors in the Durham-Chapel Hill, NC and Raleigh, NC MSAs to make this determination. The EPA does not approve the shutdown of the Bushy Fork O_3 monitor because it has consistently recorded the highest ozone concentrations in the Durham-Chapel Hill, NC MSA. Additionally, the Bushy Fork O_3 monitor has recorded ozone design values in the range of the EPA's proposed O_3 standard (65-70 ppb). The EPA also does not approve of the shutdown of the Franklinton O_3 monitor because it is the only downwind monitor of the Raleigh metropolitan area and because its recent design values have been near the range of the EPA's proposed O_3 standard (65-70 ppb).

The Network Plan and the letter from NC-DAQ dated December 16, 2014 proposes to relocate the Golfview (AQS ID 37-051-1003) O_3 monitoring site to a new location. The NC-DAQ no longer has property access to the Golfview site and had to find an alternate O_3 monitoring site. The new site is named Honeycutt (AQS ID 37-051-0010) and is within three miles of the Golfview site. Both the new and old sites are located in Cumberland County in the Fayetteville, NC MSA. The EPA has reviewed the NC-DAQ's request to relocate the Golfview O_3 site and determined that this monitor meets the relocation requirements of 40 CFR § 58.14(c)(6). The Honeycutt site should be representative of the same spatial scale as the Golfview site.

The Mecklenburg County Air Quality (MCAQ) agency through the Network Plan and other communications informed the EPA that it discontinued operation of the O_3 monitor at its Arrowood site (AQS ID 37-119-1005). The property for the Arrowood site was sold and MCAQ's lease was not renewed. MCAQ searched for a new location for the monitor but has not found a suitable location.

MCAQ will evaluate the need to replace this monitor in its 2015 Network Assessment and Network Plan.

The EPA reviewed meteorology and historical ozone concentrations in the Charlotte area. The Arrowood site is typically upwind of the Charlotte urban area and has recorded lower ozone values than the other ozone monitors in the area. Without the Arrowood ozone monitor operating, the Charlotte-Concord-Gastonia MSA still meets the minimum ozone monitoring requirements found in 40 CFR Part 58, Appendix D. The EPA approves the temporary shutdown of the Arrowood ozone monitor for the 2015 ozone season. The EPA will evaluate and respond to the information the MCAQ provides in its 2015 North Carolina Network Plan and Network Assessment about whether to replace the Arrowood O_3 monitor.

Minimum PM_{10} Monitoring Requirements
40 CFR Part 58, Appendix A, 3.3.1
40 CFR Part 58, Appendix D, Table D-4

In the 2014 Network Plan, NC-DAQ requested to shutdown the PM_{10} monitor at the Hickory site (AQS ID 37-035-0004). The measured concentrations are less than 40 percent of the standard and trending downward. Also the Hickory, NC MSA's population is less than 500,000 and therefore a monitor is not required to meet minimum PM_{10} monitoring requirements. The EPA approves the shutdown of Hickory PM_{10} monitor.

The state of North Carolina's current PM_{10} primary monitoring network meets the minimum requirements for all areas. All PM_{10} collocation requirements for manual methods found in 40 CFR Part 58, Appendix A, 3.3.1 are currently being met. These include the requirement that 15 percent of each network of manual PM_{10} methods (at least one site) must be collocated.

Minimum $PM_{2.5}$ Monitoring Requirements
40 CFR Part 58, Appendix A, 3.2.5
40 CFR Part 58, Appendix D, Table D-5

The state of North Carolina's current $PM_{2.5}$ monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-5 for all MSAs. Manual $PM_{2.5}$ collocation requirements are found in 40 CFR Part 58, Appendix A, 3.2.5. These include the requirement that 15 percent of each network of manual $PM_{2.5}$ methods (at least one site) must be collocated. The manual collocation requirements for $PM_{2.5}$ are currently being met in the Network Plan.

The Network Plan proposes to shutdown six $PM_{2.5}$ monitors, which are listed in the Table 2 below.

Table 2: $PM_{2.5}$ Monitors Proposed for Discontinuation

AQS ID	Site Name	County	MSA
37-071-0016	Grier School	Gaston	Charlotte-Concord-Gastonia
37-081-0014	Colfax	Guilford	Greensboro-High Point
37-037-0004	Pittsboro	Chatham	Durham-Chapel Hill
37-001-0002	Hopedale	Alamance	Burlington
37-155-0005	Linkhaw	Robeson	Not an MSA
37-191-0005	Dillard School	Wayne	Goldsboro

The EPA reviewed historical design values, annual $PM_{2.5}$ trends, nearby monitor correlations, meteorology, and spatial coverage when evaluating the requests to shutdown these monitors. The Grier School monitor is upwind of the Charlotte urban area and has consistently recorded lower concentrations than nearby monitors. The $PM_{2.5}$ concentrations at the Colfax site correlate well with concentrations at the Mendenhall site, which is nearby and also in Gulliford County, NC. The Pittsboro monitor is upwind of the Durham-Chapel Hill area and has consistently recorded lower concentrations than nearby monitors. $PM_{2.5}$ concentrations at Hopedale correlate well with the nearby monitors and the Hopedale site is spatially surrounded by other monitors. The Linkhaw monitor has consistently recorded lower $PM_{2.5}$ concentrations than nearby monitors, is not in an MSA, and is upwind of urban areas.

The Dillard School monitor, which is located in the Goldsboro, NC CBSA, is not required as part of the minimally required PM2.5 network based on the CBSA's population. In addition, PM2.5 concentrations measured by the monitor have been significantly lower than the NAAQS. It should be noted, however, that an EPA review of data found that the Dillard School monitor has consistently recorded higher concentrations than nearby monitors and that the concentrations do not correlate well with the other nearby monitors. The EPA recommends that NC-DAQ investigate why the Dillard School PM2.5 concentrations have been historically higher than concentrations at surrounding, more urbanized areas. The higher levels could indicate a local source effect in the Goldsboro area that is not recorded at other nearby monitors.

For the reasons above, the EPA approves the shutdown of $PM_{2.5}$ monitors at these six requested sites: Grier School, Colfax, Pittsboro, Hopedale, Linkhaw, and Dillard. After the shutdown of these $PM_{2.5}$ monitors, the state's network will still meet the minimum monitoring requirements found in 40 CFR Part 58, Appendix D.

The Network Plan also proposes to shutdown the $PM_{2.5}$ FRM monitor at the Board of Education site (AQS ID 37-021-0034) in Asheville, NC. Based on communications with Western North Carolina Regional Air Quality Agency (WNCRAQA) staff, it is the EPA's understanding that the WNCRAQA has decided to continue to operate this monitor in 2015. Thus, the EPA considers this request withdrawn and neither approves nor disapproves the shutdown of the $PM_{2.5}$ FRM at the Board of Education site.

$PM_{2.5}$ Continuous Monitoring Requirements
40 CFR Part 58, Appendix D, 4.7.2

Regulatory requirements for continuous $PM_{2.5}$ monitoring require that "...State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D–5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM [federal reference method/federal equivalent method/approved regional method] monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies." These minimum continuous $PM_{2.5}$ monitoring requirements are currently met in the all MSAs in the state. Also, the continuous $PM_{2.5}$ collocation requirements are currently met in all MSAs. Therefore, the continuous $PM_{2.5}$ monitoring network described in the 2014 Network Plan meets all of the design criteria of 40 CFR Part 58.

As part of the 2013 revisions to the $PM_{2.5}$ NAAQS, the EPA created new procedures for handling data collected using continuous $PM_{2.5}$ FEMs. These procedures are found at 40 CFR § 58.10(e). If an agency can demonstrate that the FEM data are not of sufficient comparability to a collocated FRM, then the monitoring agency may request that the FEM data not be used in comparison to the NAAQS.

In its Network Plan, the NC-DAQ has demonstrated that the $PM_{2.5}$ continuous FEMs at four sites are not of sufficient comparability to a collocated FRM. The EPA approves NC-DAQ's request that these FEM monitors not be considered comparable to the $PM_{2.5}$ NAAQS at the following sites: Kenansville (AQS ID 37-061-0002); Jamesville (AQS ID 37-117-0001); Castle Hayne (AQS ID 37-129-0002); and Dillard School (AQS ID 37-191-0005).

NC-DAQ also requested that the $PM_{2.5}$ FEM at the Blackstone site (AQS ID 37-105-0002) not be considered comparable to the NAAQS. This monitor is not collocated with an FRM. However, the other four FEMs that the NC-DAQ requested to not be comparable to the NAAQS do not show sufficient comparability with collocated FRMs and the Blackstone FEM is the same make and model of FEM as the other four monitors that are collocated. Thus, the EPA also approves the request to consider the Blackstone FEM not comparable to the NAAQS.

The EPA requests that the NC-DAQ report the data from these monitors to the AQS parameter code 88502. This approval also includes the historical data collected at these monitors (approximately three years), so the historical data can be reassigned to parameter code 88502 as well. Also, the minimum $PM_{2.5}$ monitoring requirements will continue to be met without counting these continuous monitors.

$PM_{2.5}$ Background and Transport Sites
40 CFR Part 58, Appendix D, 4.7.3

40 CFR Part 58, Appendix D, 4.7.3 requires that "each State shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor for regional transport." The Network Plan identifies six $PM_{2.5}$ sites as general background sites that include: Mendenhall (AQS ID: 37-081-0013), Cherry Grove (AQS ID: 37-033-0001), Kenansville (AQS ID: 37-061-0002), Boone (AQS ID: 37-189-0003), Candor (AQS ID: 37-123-0001), and Jamesville (AQS ID: 37-117-0001). The Network Plan identifies three regional transport sites for $PM_{2.5}$ identified as: Cherry Grove (AQS ID: 37-033-0001), Jamesville (AQS ID: 37-117-0001), and Bryson City (AQS ID: 37-173-0002). Therefore, the NC-DAQ has satisfied the requirements of 40 CFR Part 58 for background and transport sites.

$PM_{2.5}$ Chemical Speciation Network

The EPA conducted an assessment of the $PM_{2.5}$ Chemical Speciation Network (CSN) in an effort to optimize the network and to create a network that is sustainable going forward. As a result of this assessment, the EPA is defunding a number of monitoring sites, eliminating the CSN $PM_{2.5}$ mass measurement, reducing the frequency of carbon blanks, reducing sample frequency at some monitoring sites, and reducing the number of the packs in shipment during the cooler months of the year.

The EPA defunded four CSN monitors at sites in North Carolina: Rockwell (AQS ID: 37-159-0021); Lexington Water Tower (AQS ID 37-057-0002); Hattie Avenue (AQS ID 37-067-0022); Asheville's Board of Education (AQS ID 37-021-0034); and Hickory Water Tower (AQS ID 37-035-0004). CSN monitors at these sites were shutdown on December 31, 2014.

Pb Monitoring Requirements 7

40 CFR Part 58, Appendix D, 4.5 requires that "At a minimum, there must be one source-oriented SLAMS [state and local air monitoring station] site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year..."
Section 4.5(a)(ii) of Appendix D to 40 CFR Part 58 provides the following provisions for a waiver of the Pb monitoring requirements:

> "(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50% of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under 58.10(d)."

In its approval of the state's 2011 Network Plan, pursuant the provisions of the above section, the EPA granted the waivers of the source-oriented ambient air monitoring requirements at two sources: Blue Ridge Paper Products, Inc. in Canton, NC and Saint Gobain Containers in Wilson, NC. The waivers must be renewed every five years as part of the network assessment required under 40 CFR §58.10(d). The next network assessment is due in 2015 and should include a renewal request for these waivers or a plan to monitor near the two Pb sources.

40 CFR Part 58, Appendix D, 3(b) requires that "NCore sites in CBSAs with a population of 500,000 people (as determined in the latest census) or greater shall also measure Pb either as Pb-TSP or Pb-PM_{10}." This monitoring was required to begin December 27, 2011. The Network Plan indicates that Pb-PM_{10} sampling is ongoing at the Charlotte NCore site (AQS ID: 37-119-0041) and the Raleigh NCore site (AQS ID: 37-183-0014). As a result, the Pb monitoring network described in the Network Plan meets the design criteria of 40 CFR Part 58.

SO_2 Monitoring Requirements
40 CFR Part 58, Appendix D, 4.4

Ambient air monitoring network design criteria for SO_2 are found in Section 4.4 of Appendix D to 40 CFR Part 58. This section requires that "The population weighted emissions index (PWEI) shall be calculated by states for each core based statistical area (CBSA)." As a result, the SO_2 monitoring site(s) required in each CBSA will satisfy minimum monitoring requirements if the monitor(s) is sited within the boundaries of the parent CBSA and is one of the following site types: population exposure, maximum concentration, source-oriented, general background, or regional transport. An SO_2 monitor at an NCore station may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors consistent with Appendix D, 4.4.

Table 3 shows the required SO_2 monitors based on the 2012 PWEI. Existing SO_2 monitoring sites described in the Network Plan meet the minimum requirements of 40 CFR Part 58. The NC-DAQ operates regulatory SO_2 monitors in the Charlotte-Gastonia-Concord, NC-SC; Durham, NC; and Wilmington, NC CBSAs to meet the PWEI requirements. The Virginia Department of Environmental Quality operates a regulatory SO_2 monitor in the Virginia Beach-Norfolk-Newport News, VA-NC CBSA. The EPA recommends that North Carolina update its MSA agreement with Virginia to include sharing the SO_2 minimum monitoring requirements for the Virginia Beach-Norfolk CBSA and include this update in the 2015 Network Plan.

Table 3: PWEI and SO_2 Required Monitors in North Carolina

CBSA Name	July 2012 PWEI Values	July 2012 PWEI Required Monitors
Virginia Beach-Norfolk-Newport News, VA-NC	78,540	1
Charlotte-Gastonia-Concord, NC-SC	34,426	1
Durham, NC	16,885	1
Wilmington, NC	10,045	1

NO_2 Monitoring Requirements
40 CFR Part 58, Appendix D, 4.4

Ambient air monitoring network design criteria for NO_2 are found in Section 4.3 of Appendix D to 40 CFR Part 58. There are three types of required NO_2 monitoring: near-road, area-wide, and Regional Administrator required. These types of NO_2 monitoring are described in sections 4.3.2, 4.3.3, and 4.3.4, respectively.

The EPA previously approved the Triple Oak site (AQS ID 37-183-0021) and the Remount Road site (AQS ID 37-119-0045) in fulfillment of the near-road NO_2 requirements for the Raleigh CBSA and the Charlotte-Concord-Gastonia CBSA.

The Greensboro-High Point, NC; Winston-Salem, NC; and Durham-Chapel Hill, NC CBSAs are currently required to have near-road NO_2 monitoring by January 1, 2017. A new NO_2 monitoring rule is expected to be promulgated in 2016. The new rule may change the NO_2 near-road monitoring requirements for CBSA's with a populations between 500,000 and 1,000,000 people, such as the Greensboro-High Point, NC; Winston-Salem, NC; and Durham-Chapel Hill, NC CBSAs.

The EPA previously approved the selection of the Garinger (AQS ID: 37-119-0041) and Millbrook (AQS ID: 37-183-0014) sites in fulfillment of the area-wide NO_2 monitoring requirement for the Charlotte-Concord-Gastonia and Raleigh CBSAs.

The EPA also previously selected the Hattie Avenue site (AQS ID 37-067-0022) operated by Forsyth County Office of Environmental Assistance and Protection as a location for a Regional Administrator required NO_2 monitor to help protect susceptible and vulnerable populations. The full list of NO_2 monitors identified by the EPA's Regional Administrators can be found on the EPA's website at http://www.epa.gov/ttnamti1/svpop.html.

Air Quality Index (AQI) Reporting
40 CFR §58.50

AQI reporting is required in MSAs with populations over 350,000. There are 10 MSAs in the state required to report an AQI: Charlotte-Gastonia-Concord, Virginia Beach-Norfolk-Newport News, Raleigh-Cary, Greensboro-High Point, Durham-Chapel Hill, Winston-Salem, Asheville, Hickory-Lenoir-Morganton, Fayetteville, and Wilmington. NC-DAQ meets these AQI reporting requirements.

National Core (NCore) Monitoring Network

Ambient air monitoring network criteria for NCore sites are found in Section 3 of Appendix D to 40 CFR Part 58. NC-DAQ designated two NCore sites in the 2014 Network Plan. The first site (AQS ID 37-183-0014) is located at the East Millbrook Middle School site in Raleigh, NC. The second site (AQS ID 37-119-0041) is located at the Garinger site in Charlotte, NC and is operated by the Mecklenburg County Air Quality (MCAQ), a Division of the Mecklenburg County Land Use and Environmental Services Agency. The EPA approval of these sites was granted on October 30, 2009. The 2014 Network Plan meets the minimum monitoring requirements for NCore sites.

Monitoring Network Changes Proposed by NC-DAQ

The NC-DAQ received comments on the Network Plan from the Medical Advocates for Healthy Air and the Southern Environmental Law Center on behalf of itself, the North Carolina League of Conservation Voters, the Sierra Club, the Southern Alliance for Clean Energy, and the Western North Carolina Alliance. The NC-DAQ provided a response to these comments as part of its final Network Plan. The public comments expressed concern over the numerous monitor shutdown requests in the Network Plan. The EPA conducted its own analysis of North Carolina's ambient air monitoring network including historical design values, annual $PM_{2.5}$ and O_3 trends, nearby monitor correlations, meteorology, and spatial coverage when evaluating the requests to discontinue the requested regulatory monitors. The EPA's rationale for approval or disapproval of specific network changes can be found above in the pollutant sections of this document.

Monitors proposed for discontinuation or relocation and the EPA's determination are summarized in Table 4.

Table 4: Monitors Proposed for Discontinuation

AQS ID	Site Name	Pollutant	Type	Comments
37-119-1005	Arrowood	O_3	SLAMS	Approved: Temporary shutdown for 2015 only; MCAQ property lease not renewed; MCAQ will provide justification for permanent relocation or shutdown in 2015 Network Plan.
37-069-0001	Franklinton	O_3	SLAMS	Not Approved
37-051-1003	Golfview	O_3	SLAMS	Approved: Monitor will be relocated to the Honeycutt site.
37-059-0003	Mocksville	O_3	SLAMS	Approved: Monitor shutdown at the end of the 2014 O_3 season
37-145-0003	Bushy Fork	O_3	SLAMS	Not Approved
37-071-0016	Grier School	$PM_{2.5}$	SLAMS	Approved: Monitor shutdown 12/31/2014
37-081-0014	Colfax	$PM_{2.5}$	SLAMS	Approved: Monitor shutdown 12/31/2014
37-037-0004	Pittsboro	$PM_{2.5}$	SLAMS	Approved: Monitor shutdown 12/31/2014

37-001-0002	Hopedale	$PM_{2.5}$	SLAMS	Approved: Monitor shutdown 12/31/2014
37-155-0005	Linkhaw	$PM_{2.5}$	SLAMS	Approved: Monitor shutdown
37-191-0005	Dillard School	$PM_{2.5}$	SLAMS	Approved
37-035-0004	Hickory	PM_{10}	SLAMS	Approved: Monitor shutdown 12/31/2014
37-035-0004	Hickory Water Tower	$PM_{2.5}$ Speciation	CSN	Monitor shutdown 12/31/2014; Defunded by the EPA
37-021-0034	Board of Education	$PM_{2.5}$ Speciation	CSN	Monitor shutdown 12/31/2014; Defunded by the EPA
37-067-0022	Hattie Avenue	$PM_{2.5}$ Speciation	CSN	Monitor shutdown 12/31/2014; Defunded by the EPA
37-057-0002	Lexington Water Tower	$PM_{2.5}$ Speciation	CSN	Monitor shutdown 12/31/2014; Defunded by the EPA
37-159-0021	Rockwell	$PM_{2.5}$ Speciation	CSN	Monitor shutdown 12/31/2014; Defunded by the EPA

The EPA reviewed these requests for monitor discontinuation or relocation and determined that the approved requests meet the requirements of 40 CFR §58.14(c) for monitor discontinuation and relocation. The minimum monitoring requirements for $PM_{2.5}$, PM_{10}, and O_3 found in Appendix D to 40 CFR Part 58 will continue to be met for the respective MSAs after the approved monitors are discontinued or relocated.

The EPA also has reviewed and approves the location for the startup of the monitor listed in Table 5.

Table 5: Monitors Proposed for Relocation/Startup

AQS ID	Site Name	Pollutant	Type	Comments
37-051-0010	Honeycutt	Ozone	SLAMS	Approved: will replace Golfview site

Appendix H. Request for Exclusion of PM2.5 Continuous FEM data from Comparison to the NAAQS

Introduction:

The North Carolina Division of Air Quality, DAQ, monitoring program has historically operated fine particle, $PM_{2.5}$, continuous monitors primarily to support forecasting and reporting of the air quality index, AQI. These monitors supply data every hour to update the AQI on our web site as well as on national web sites such as AIRNow (www.airnow.gov). We have been using these monitors since the early part of the last decade as we implemented the $PM_{2.5}$ monitoring program. Over the last few years, a number of $PM_{2.5}$ continuous monitors have been approved as federal equivalent methods, FEMs. By utilizing an approved FEM, any subsequent data produced from the method may be eligible for comparison to the United States Environmental Protection Agency's, EPA's, health based standard known as the national ambient air quality standard, NAAQS. The primary advantage of operating a $PM_{2.5}$ continuous FEM is that it can support both the AQI, while also supplying data that are eligible for comparison to the NAAQS. Thus, a network utilizing $PM_{2.5}$ continuous FEMs can minimize the number of filter-based FRMs operated in the network, which are primarily used for comparison to the NAAQS. These filter-based FRMs are resource intensive in that they require field operations as well as pre- and post-sampling laboratory analysis which results in data not being available for approximately 2-4 weeks after sample collection.

Our monitoring program has been working with $PM_{2.5}$ continuous FEMs including deployment at several sites to evaluate their performance. Although the $PM_{2.5}$ continuous FEMs are automated methods, these methods still require careful attention in their set-up, operation and validation of data. Once we were able to collect enough data we began to evaluate the performance of these methods compared to collocated FRMs. That evaluation is explained further below and includes our recommendations on the use of the data from these methods.

Request for Exclusion of $PM_{2.5}$ Continuous FEM data from Comparison to the NAAQS:

In accordance with the PM NAAQS rule published on Jan. 15, 2013 (78 FR 3086) and specific to the provisions detailed in §58.10 (b)(13) and §58.11 (e) we are requesting that data from the following monitors be set aside for comparison to the NAAQS. While our agency is working to optimize the monitoring instrumentation we use to meet all of our monitoring objectives, we are not yet at a point where the comparability of the $PM_{2.5}$ continuous FEMs operated in our network (or a sub-set of our network) compared to collocated FRMs is acceptable such that we are comfortable using the continuous FEM data for comparison to the NAAQS. We intend to continue working with the vendor to improve the continuous FEM performance, including revised procedures, software upgrades or retrofit of improved components (as long as such changes do not void its FEM status). After assessing the comparability of the $PM_{2.5}$ FEMs to the collocated FRMs for our network, we have determined that the sites listed below do not meet the comparability requirements. Detailed one-page assessments from which the information described below was obtained are included at the end of this section.

Table 69. Request for Exclusion of PM2.5 Continuous FEM Data

Sites with PM2.5 continuous FEMs that are collocated with FRMs:

Site Name	City	Site ID	Cont. POC	Method Description	PM2.5 Cont. Begin Date	PM2.5 Cont. End Date	Continuous/ FRM Sampler pairs per season	Slope (m)	Intercept (y)	Meets bias requirement	Correlation (r)
Hickory	Hickory	37-035-0004	3	Met One BAM-1020 Mass Monitor w/VSCC	12/11/2014	12/31/2015	Winter = 31 Spring = 28 Summer = 28 Fall = 33 Total = 120	1.10	0.17	No	0.94
Lexington	Lexington	37-057-0002	3	Met One BAM-1020 Mass Monitor w/VSCC	7/22/2014	12/31/2015	Winter = 29 Spring = 28 Summer = 45 Fall = 57 Total = 159	1.12	0.83	No	0.94
Millbrook	Raleigh	37-183-0014	3	Met One BAM-1020 Mass Monitor w/VSCC	6/1/2009	12/31/2015	Winter = 85 Spring = 73 Summer = 84 Fall = 84 Total = 326	0.94	2.98	No	0.85

Sites with PM2.5 continuous FEMs that are not collocated with FRMs:

Site Name	City	Site ID	Cont. POC	Method Description	PM2.5 Cont. Begin Date	PM2.5 Cont. End Date
Blackstone	Not in a City	37-105-0002	3	Met One BAM-1020 Mass Monitor w/VSCC	1/1/2014	12/31/2015

Period of Exclusion of Data from the PM2.5 Continuous FEMs:

The above table details the period of available data by monitor for which we are basing our recommendation to exclude $PM_{2.5}$ continuous FEM data. Per EPA Regional Office approval, we will load or move as necessary these data to EPA's AQS database in a manner where the data are only used for the appropriate monitoring objective(s) (i.e., use data for both the NAAQS and AQI, just the AQI or neither the NAAQS or AQI). Additionally, we will continue to load any new data generated for the next 18 months (intended to represent the period until Dec. 31, 2017) in the same manner or until such time as we request and receive approval from the EPA Regional Office to change the monitoring objectives that the data from the PM2.5 continuous FEMs can support.

PM2.5 Continuous FEM data for Reporting the AQI:

While we are requesting the monitors above not be used for comparison to the NAAQS, we do believe that the data are of sufficient comparability to collocated FRMs that they be used in AQI reporting. Therefore, with EPA Regional Office approval we will report these data on our web site and to AIRNow (www.airnow.gov). Additionally, we intend to store the data in EPA's AQS database that is used for "acceptable AQI" reporting (i.e., parameter code 88502) so that data users will know that these data are appropriate for use in AQI calculations.

Continued Operation of $PM_{2.5}$ Monitors to Support NAAQS and AQI Reporting

While we are requesting that data from the monitors listed above be set aside for comparison to the NAAQS, we will continue to operate $PM_{2.5}$ FRMs to support the objective of comparison to the NAAQS. We will also operate our $PM_{2.5}$ continuous monitors for use in AQI reporting. Each of these FRM and $PM_{2.5}$ continuous monitors will be operated at the locations previously described in this plan and at the locations that meet the objectives of the network design criteria for ambient air quality monitoring described in Appendix D to Part 58.

Assessments:

The one-page assessments provided as Figure 91 to Figure 93 are locations where our agency has collocated $PM_{2.5}$ FRM and continuous FEM monitors. Each of these assessments is represented in "Table 69. Request for Exclusion of PM2.5 Continuous FEM Data**"** above.

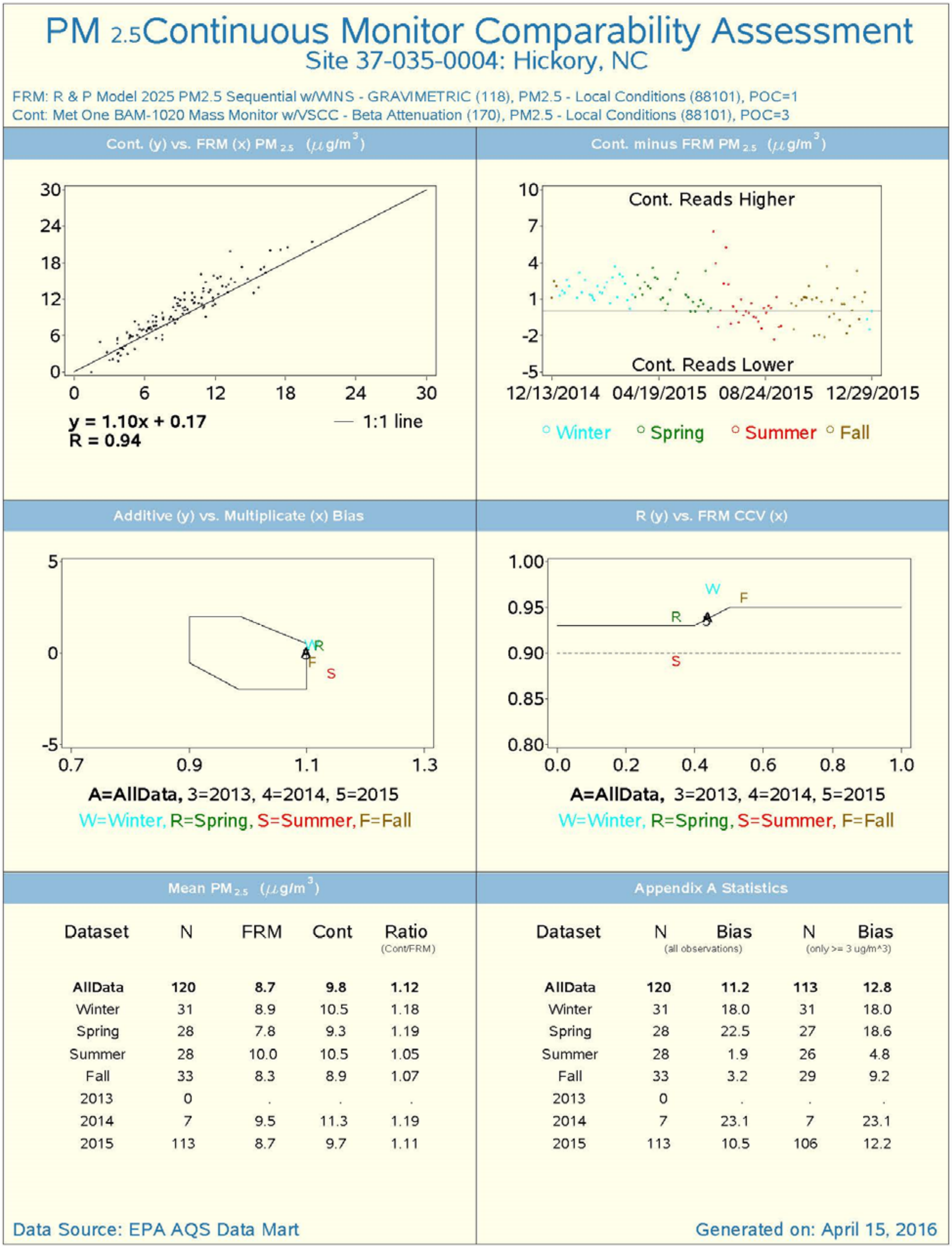
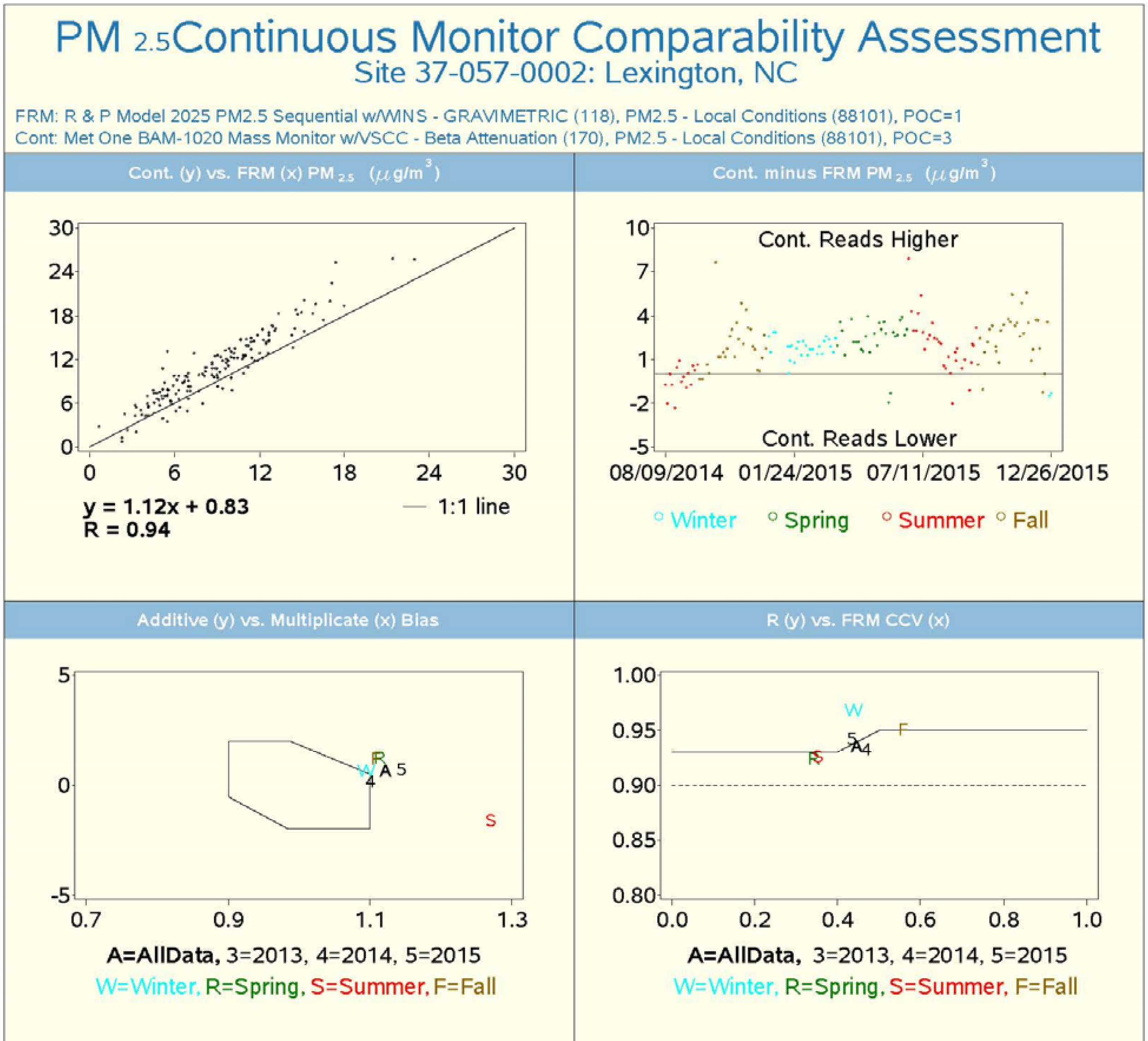


Figure 91. Comparison of the beta attenuation monitor with the federal reference monitor at Hickory



Mean PM2.5 (µg/m3)

Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**159**	**8.9**	**10.8**	**1.22**
Winter	29	8.5	10.1	1.19
Spring	28	8.6	11.0	1.28
Summer	45	10.0	11.3	1.13
Fall	57	8.4	10.7	1.27
2013	0	.	.	.
2014	46	9.3	10.6	1.14
2015	113	8.7	10.9	1.25

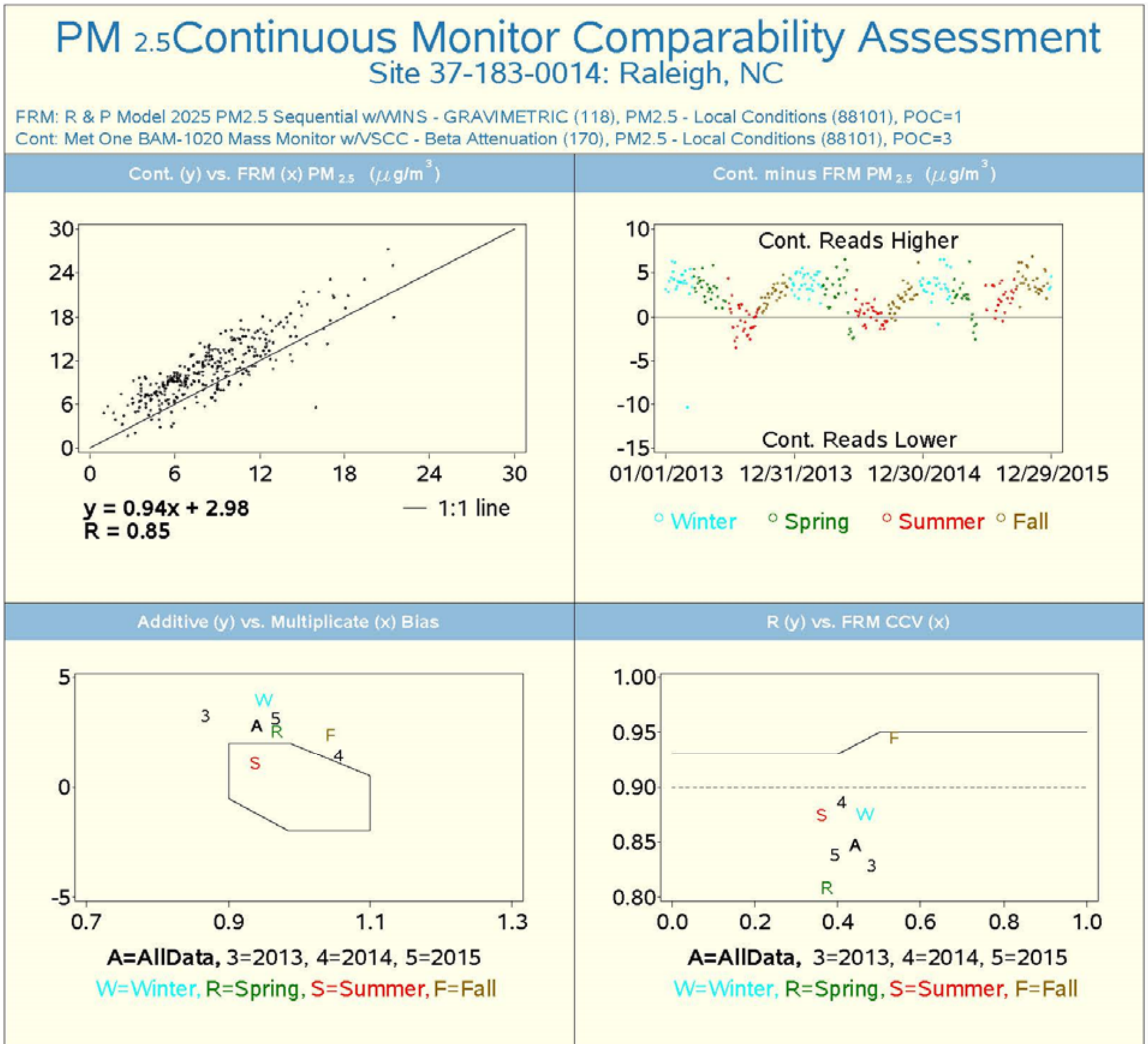
Appendix A Statistics

Dataset	N (all observations)	Bias	N (only >= 3 ug/m^3)	Bias
AllData	**159**	**25.0**	**153**	**24.4**
Winter	29	19.3	28	22.3
Spring	28	31.3	28	31.3
Summer	45	12.4	44	10.8
Fall	57	34.7	53	33.1
2013	0	.	.	.
2014	46	16.0	45	16.6
2015	113	28.7	108	27.6

Data Source: EPA AQS Data Mart

Generated on: April 15, 2016

Figure 92. Comparison of the beta attenuation monitor with the federal reference monitor at Lexington



Mean $PM_{2.5}$ ($\mu g/m^3$)

Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**326**	**8.4**	**10.9**	**1.29**
Winter	85	8.0	11.8	1.47
Spring	73	8.1	10.6	1.31
Summer	84	9.4	10.1	1.07
Fall	84	8.1	11.0	1.36
2013	112	8.5	10.8	1.27
2014	115	9.2	11.3	1.23
2015	99	7.5	10.5	1.41

Appendix A Statistics

Dataset	N (all observations)	Bias (all observations)	N (only >= 3 ug/m^3)	Bias (only >= 3 ug/m^3)
AllData	**326**	**38.9**	**315**	**35.8**
Winter	85	61.1	81	53.6
Spring	73	36.1	72	35.0
Summer	84	7.9	81	9.6
Fall	84	49.9	81	45.0
2013	112	39.3	106	35.2
2014	115	26.9	112	26.1
2015	99	52.5	97	47.7

Data Source: EPA AQS Data Mart

Generated on: April 15, 2016

Figure 93. Comparison of the beta attenuation monitor with the federal reference monitor at Millbrook

Appendix I. 2011 Network Plan EPA Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

OCT 20 2011

RECEIVED OCT 31 2011

Ms. Sheila C. Holman
Director
Division of Air Quality
North Carolina Department of
Environment and Natural Resources
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Dear Ms. Holman:

Thank you for submitting the State of North Carolina's 2011 annual ambient air monitoring network plan (Network Plan), dated July 1, 2011. The Network Plan is required by 40 Code of Federal Regulations (CFR) §58.10. The Network Plan covers the ambient air monitoring network for the North Carolina Division of Air Quality and its local agencies.

The U. S. Environmental Protection Agency Region 4 understands that the NC-DAQ provided a 30-day public comment period and did not receive any public comments. According to 40 CFR §58.10(a)(2), since public inspection and comment have already been solicited, EPA Region 4 is not required to offer another comment period.

Based upon our review of the Network Plan, EPA Region 4 has determined that the plan satisfies the applicable requirements of 40 CFR part 58. Therefore the Network Plan is approved.

Thank you for working with us to monitor air pollution and promote healthy air quality in North Carolina and the nation. If you have any questions or concerns, please contact Doug Neeley at (404) 562-9097 or Katherine Snyder at (404) 562-9840.

Sincerely,

Gwendolyn Keyes Fleming
Regional Administrator

Enclosures

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cc: Mr. Donnie Redmond
Supervisor IV, North Carolina Dept. of Air Quality

Mr. Don R. Willard
Director, Mecklenburg County Land Use and Environmental Services Agency

Mr. William M. Barnette, Director
Director, Forsyth County Environmental Affairs Department

Mr. David Brigman
Director, Western North Carolina Regional Air Quality Agency

FY 2011 State of North Carolina Ambient Air Monitoring Network Plan
U.S. EPA Region 4 Comments and Recommendations

This document contains U.S. EPA Region 4 comments and recommendations on the State of North Carolina's 2011 ambient air monitoring network plan (Network Plan). Ambient air monitoring rules, which include regulatory requirements that address network plans, data certification, and minimum monitoring requirements, among other requirements, are found in 40 CFR Part 58. Minimum monitoring requirements for criteria pollutants are listed in 40 CFR Part 58, Appendix D. Minimum monitoring requirements do not exist for carbon monoxide (CO) unless required by the establishment of a National Core (NCore) multi-pollutant monitoring station, and/or a state implementation plan. However, new national ambient air quality standards (NAAQS) were promulgated in 2010 for nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) with minimum monitoring requirements effective January 1, 2013. Minimum monitoring requirements for nitrogen dioxide (NO_2) will be addressed in the 2012 network plans. Minimum monitoring requirements are listed in this document for ozone (O_3), particulate matter less than 2.5 microns ($PM_{2.5}$), particulate matter less than 10 microns (PM_{10}), sulfur dioxide (SO_2), and lead (Pb).

The minimum monitoring requirements are based on metropolitan statistical area (MSA) boundaries as defined by the U.S. Office of Management and Budget (OMB), July 1, 2009, population estimates from the U.S. Census Bureau, and historical ambient air monitoring data. OMB currently defines 15 MSAs in the State of North Carolina. These MSAs and the respective July 1, 2009, population estimates from the U.S. Census Bureau are shown in Table 1.

Table 1: Metropolitan Statistical Areas and Populations

MSA Name	Population
Charlotte-Gastonia-Concord, NC-SC	1,745,524
Virginia Beach-Norfolk-Newport News, VA-NC	1,674,498
Raleigh-Cary, NC	1,125,827
Greensboro-High Point, NC	714,765
Durham-Chapel Hill, NC	501,228
Winston-Salem, NC	484,921
Asheville, NC	412,672
Hickory-Lenoir-Morganton, NC	365,364
Fayetteville, NC	360,355
Wilmington, NC	354,525
Greenville, NC	179,715
Jacksonville, NC	173,064
Burlington, NC	150,358
Rocky Mount, NC	146,536
Goldsboro, NC	113,811

Minimum Ozone Monitoring Requirements
40 CFR Part 58, Appendix D, Table D-2

The network described in the 2011 Network Plan meets the minimum O_3 monitoring requirements specified by 40 CFR Part 58, Appendix D, Table D-2 in all areas except for the Asheville and Hickory MSAs. The Asheville and Hickory MSAs each have the correct number of required ozone monitors (two), but only one of those is designated as a State and Local Air Monitoring Station (SLAMS) and the second monitor is designated as "other." For a monitor to contribute to the minimum monitoring requirement, it must be classified as a SLAMs monitor in EPA's Air Quality System (AQS), thus the monitor classifications should be updated in AQS.

In addition, a supplemental request to the Network Plan was submitted via email on August 23, 2011 seeking to shutdown the Frying Pan monitor (AQS ID: 37-087-0035) 2-3 weeks prior to October 31. The Frying Pan monitor is operated year round by the National Park Service (NPS) in Great Smoky Mountains National Park. The NPS wants to shutdown the monitor because it needs to replace the monitor's shelter. Replacing the shelter needs to be done before winter weather in the mountainous area makes the task too difficult. Getting this work done in October will help ensure that the monitor is operational by the beginning of the 2012 ozone monitoring season. EPA concurs that this is necessary and any impact to data completeness during this time frame will be noted appropriately by EPA.

Minimum PM_{10} Monitoring Requirements
40 CFR Part 58, Appendix A, 3.3.1
40 CFR Part 58, Appendix D, Table D-4

The State of North Carolina's current PM_{10} primary monitoring network meets the minimum requirements for all areas. All PM_{10} collocation requirements for manual methods found in 40 CFR Part 58, Appendix A, 3.3.1 are currently being met. These include the requirement that fifteen percent of each network of manual PM_{10} methods (at least one site) must be collocated.

Minimum $PM_{2.5}$ Monitoring Requirements
40 CFR Part 58, Appendix A, 3.2.5
40 CFR Part 58, Appendix D, Table D-5

The State of North Carolina's current $PM_{2.5}$ monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-5 for all MSAs. Manual $PM_{2.5}$ collocation requirements are found in 40 CFR Part 58, Appendix A, 3.2.5. These include the requirement that fifteen percent of each network of manual $PM_{2.5}$ methods (at least one site) must be collocated. The manual collocation requirements for $PM_{2.5}$ are currently being met in the Network Plan.

$PM_{2.5}$ Continuous Monitoring Requirements
40 CFR Part 58, Appendix D, 4.7.2

Regulatory requirements for continuous $PM_{2.5}$ monitoring require that "...State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D–5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM [Federal Reference Method/Federal Equivalent Method/Approved Regional Method] monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies." These minimum continuous $PM_{2.5}$ monitoring requirements are currently met in the all of the MSAs in the State. Also, the continuous $PM_{2.5}$ collocation requirements are currently met in all MSAs. Therefore, the continuous $PM_{2.5}$ monitoring network described in the 2011 Network Plan meets all of the design criteria of 40 CFR Part 58.

$PM_{2.5}$ Background and Transport Sites
40 CFR Part 58, Appendix D, 4.7.3

40 CFR Part 58, Appendix D, 4.7.3 requires that "each State shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor for regional transport." The 2011 Network Plan identifies seven $PM_{2.5}$ sites as regional transport sites that include: Mendenhall (AQS ID: 37-081-0013), Cherry Grove (AQS ID: 37-033-0001), Springfield Road (AQS ID: 37-065-0004), Kenansville (AQS ID: 37-061-0002), Boone (AQS ID: 37-189-0003), Candor (AQS ID: 37-123-0001), and Jamesville (AQS ID: 37-117-0001). The Network Plan identifies three regional transport sites for $PM_{2.5}$ identified as: Cherry Grove (AQS ID: 37-033-0001), Jamesville (AQS ID: 37-117-0001), and Bryson City (AQS ID: 37-173-0002). Therefore, NC-DAQ has satisfied the requirements of 40 CFR Part 58 for background and transport sites.

Lead Monitoring Requirements
40 CFR Part 58, Appendix D, 4.5

EPA recently revised the monitoring requirements for Pb found at 40 CFR Part 58, Appendix D, Section 4.5 (see 75 Federal Register 81126). These revisions reduced the emissions threshold for facilities near which source oriented Pb monitoring is required from 1.0 tons per year (tpy) to 0.5 tpy. The rule also removed population-based monitoring requirements for Pb and replaced them with a requirement to monitor for Pb at urban NCore sites.

40 CFR Part 58, Appendix D, 4.5 requires that "At a minimum, there must be one source-oriented SLAMS [state and local air monitoring station] site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year…"

In its network plan, North Carolina has requested that EPA grant a waiver of source-oriented Pb monitoring requirements for two sources. Section 4.5(a)(ii) of Appendix D to 40 CFR Part 58 provides the following provisions for a waiver of the Pb monitoring requirements:

> "(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50% of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under 58.10(d)."

North Carolina has submitted air modeling indicating that the following sources will not contribute to a maximum Pb concentration in the ambient air in excess of 50% the NAAQS:

Blue Ridge Paper Products, Inc.
Canton, North Carolina

Saint Gobain Containers
Wilson, North Carolina

EPA has reviewed this information and concurs that the Pb emissions from each of these sources will not contribute to a maximum Pb concentration in the ambient air in excess of 50% of the NAAQS. Therefore, EPA is granting the waivers of the source-oriented ambient air monitoring requirements at these sources. The waivers must be renewed once every five years as part of the network assessment required under 40 CFR §58.10(d).

North Carolina has also requested that EPA consider revised emissions data related to source-oriented Pb monitoring requirements. North Carolina has submitted information indicating that the actual Pb emissions from the following sources are below 0.50 tpy:

Duke Energy Carolinas, LLC
Belews Creek Steam Station
Belews Creek, NC

Duke Energy Carolinas, LLC
Marshall Steam Station
Terrell, NC

Duke Energy Carolinas, LLC
Allen Steam Station
Belmont, NC

Progress Energy
Roxboro Plant
Semora, NC

Royal Development Co
High Point, NC

U.S. Army Fort Bragg
Cumberland County, NC

U.S. Marine Corps Camp Lejeune
Onslow County, NC

EPA has reviewed this information and concurs that the actual Pb emissions from these sources are below 0.50 tpy. Therefore, ambient air monitoring is not required at these sources. Population oriented monitoring is still required at urban NCore sites beginning on December 27, 2011. Based on the 2011 Network Plan, North Carolina will satisfy the minimum monitoring requirements for Pb.

Sulfur Dioxide Monitoring Requirements
40 CFR Part 58, Appendix D, 4.4

Ambient air monitoring network design criteria for SO_2 are found in Section 4.4 of Appendix D to 40 CFR Part 58. This section requires that "The population weighted emissions index (PWEI) shall be calculated by States for each core based statistical area (CBSA)." As a result, the SO_2 monitoring site(s) required in each CBSA will satisfy minimum monitoring requirements if the monitor(s) is sited within the boundaries of the parent CBSA and is one of the following site types: population exposure, maximum concentration, source-oriented, general background, or regional transport. An SO_2 monitor at a NCore station may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors consistent with Appendix D, 4.4.

The SO_2 network is to be operational beginning January 1, 2013. The Charlotte-Gastonia-Concord CBSA is required to have a total of two SO_2 monitors. Currently, there is only one operating SO_2 monitor in the CBSA, located at the Garinger site (AQS ID: 37-119-0041). In an e-mail dated September 20, 2011, South Carolina Department of Health and Environmental Control committed to establishing a SO_2 monitor at the York site (AQS ID: 45-091-0006) to assist in meeting the minimum monitoring requirements for this CBSA. Once the SO_2 monitor at the York monitoring site in South

Carolina becomes operational, the Charlotte-Gastonia-Concord CBSA will meet the minimum monitoring requirements under 40 CFR Part 58. Similarly, once the additional SO_2 monitor at Mendenhall (AQS ID: 37-081-0013) becomes operational, the Greensboro-High Point CBSA will meet the minimum monitoring requirements under 40 CFR Part 58. All the other CBSAs meet the minimum monitoring requirements based on the information provided in the 2011 Network Plan.

Air Quality Index (AQI) Reporting
40 CFR §58.50

AQI reporting is required in MSAs with populations over 350,000. There are 10 MSAs in the State of North Carolina required to report an AQI: Charlotte-Gasonia-Concord, Virginia Beach-Norfolk-Newport News, Raleigh-Cary, Greensboro-High Point, Durham-Chapel Hill, Winston-Salem, Asheville, Hickory-Lenoir-Morganton, Fayetteville, and Wilmington. NC-DAQ meets these AQI reporting requirements.

Monitoring Network Changes Proposed by NC-DAQ

NC-DAQ has proposed several monitoring network changes in its 2011 Network Plan. Monitors proposed for discontinuation are summarized in Table 2.

Table 2: Monitors proposed for discontinuation/location change

AQS ID	Pollutant	Type	Comments
37-183-0018	Carbon Monoxide	SLAMS	Will use the FRM CO monitor at the Millbrook site to fulfill the SIP requirements
37-173-0002	$PM_{2.5}$	SLAMS – Regional transport	Monitor will be shut down at completion of 20 month BAM study (5/2011)

EPA has reviewed these requests for discontinuation or monitor relocation and determined that all of the requested monitors, in Table 2, meet the requirements of 40 CFR §58.14(c)(6) for monitor discontinuation. The minimum monitoring requirements for $PM_{2.5}$ and O_3 found in Appendix D to 40 CFR Part 58 will continue to be met for the respective MSAs after these monitors are discontinued.

NC-DAQ also requested to change the monitoring frequency at AQS IDs 37-081-0013, 37-071-0016, 37-051-0009, and 37-001-0001 to 1 in 6 day for $PM_{2.5}$ sampling. At this proposed frequency, the monitors will meet the $PM_{2.5}$ operating schedule requirements under 40 CFR §58.12(d)(1)(i). Therefore, EPA approves the change in monitoring frequency at these sites.

National Core (NCore) Monitoring Network

Ambient air monitoring network criteria for NCore sites are found in Section 3 of Appendix D to 40 CFR Part 58. NC-DAQ has designated two NCore sites in the 2011 Network Plan. The first site (AQS ID 37-183-0014) is located at the East Millbrook Middle School site in Raleigh, NC. The second site (AQS ID 37-119-0041) is located at the Garinger site in Charlotte, NC and is operated by the Mecklenburg County Land Use and Environmental Services Agency. Official EPA approval was granted for these sites on October 30, 2009. The 2011 Network Plan meets the minimum monitoring requirements for NCore sites.

Air Quality System (AQS)

During the review of the 2011 Network Plan, there were a few discrepancies identified between information in the Network Plan and in AQS. The State is responsible for updating monitor type classifications in AQS. Based on listings of monitor types in the Network Plan, NC-DAQ has several monitors that are listed as "other." EPA encourages the State to be more specific in their monitor types in AQS. Monitors that are listed as "other" will be treated as a SLAMS monitor for regulatory evaluations. For a monitor to count toward the minimum monitoring requirement (e.g. ozone requirements above), it must be classified as a SLAMs monitor in AQS, thus the monitor classifications should be updated in AQS (Waggin Trail AQS ID: 37-003-0004).

Also, the State should verify that monitor types in AQS match those in the Network Plan. For example, the ozone monitor at Waynesville (AQS ID 37-087-0004) is listed as a SLAMS monitor in the Network Plan, but as "other" in AQS. In addition, there are discrepancies in monitor type in AQS and the Network Plan for the following sites, AQS IDs: 31-159-0021-42101-1, 37-159-0021-44201-1, and 37-179-003-44201-1.

In addition, the State should verify the $PM_{2.5}$ background monitor designations in AQS. There are two sites in AQS designated as $PM_{2.5}$ background sites that are not designated in the network plan as background sites. These sites include: Pittsboro (AQS ID: 37-037-0004) and West Johnston (AQS ID: 37-101-0002).

Appendix J. 2013 Network Plan EPA Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

NOV 25 2013

Ms. Sheila C. Holman
Director
Division of Air Quality
North Carolina Department of
Environment and Natural Resources
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Dear Ms. Holman:

Thank you for submitting the state of North Carolina's 2013 annual ambient air monitoring network plan (Network Plan), dated July 2, 2013. The Network Plan is required by 40 Code of Federal Regulations (CFR) §58.10. The Network Plan covers the ambient air monitoring network for the North Carolina Division of Air Quality (NC-DAQ) and the local air quality agencies in North Carolina.

The U.S. Environmental Protection Agency understands that the NC-DAQ provided a 30-day public comment period and did not receive any public comments. According to 40 CFR §58.10(a)(2), since public inspection and comment have already been solicited, the EPA is not required to offer another comment period. The EPA approves North Carolina's 2013 Network Plan.

Thank you for working with us to monitor air pollution and promote healthy air quality in North Carolina and the nation. If you have any questions or concerns, please contact Gregg Worley at (404) 562-9141 or Ryan Brown at (404) 562-9147.

Sincerely,

Beverly A. Spagg

Jeaneanne M. Gettle,
Acting Director
Air, Pesticides and Toxics
Management Division

Enclosure

cc: Mr. Donnie Redmond
Ambient Monitoring Section Chief, NC-DAQ

Mr. Leslie Rhodes
Director, Mecklenburg County Land Use and
Environmental Services Agency

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Mr. William M. Barnette, Director
Forsyth County Environmental Affairs Department

Mr. David Brigman, Director
Western North Carolina Regional Air Quality Agency

FY 2013 State of North Carolina Ambient Air Monitoring Network Plan
U.S. EPA Region 4 Comments and Recommendations

This document contains the U.S. EPA comments and recommendations on the state of North Carolina's 2013 ambient air monitoring network plan (Network Plan). Ambient air monitoring rules, which include regulatory requirements that address network plans, data certification, and minimum monitoring requirements, among other requirements, are found in 40 CFR Part 58. Minimum monitoring requirements for criteria pollutants are listed in 40 CFR Part 58, Appendix D. Minimum monitoring requirements are listed for ozone (O_3), particulate matter less than 2.5 microns ($PM_{2.5}$), particulate matter less than 10 microns (PM_{10}), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and lead (Pb).

The minimum monitoring requirements are based on core based statistical area (CBSA) boundaries as defined by the U.S. Office of Management and Budget, July 1, 2011, population estimates from the U.S. Census Bureau, and historical ambient air monitoring data. Minimum monitoring requirements for O_3, $PM_{2.5}$, PM_{10}, only apply to metropolitan statistical areas (MSAs), which are a subset of CBSAs. OMB currently defines 17 MSAs in the state of North Carolina. On February 1, 2013, OMB redefined the CBSA boundaries based on 2010 census data. In North Carolina, there are two newly defined MSA's: Myrtle Beach-Conway-North Myrtle Beach, SC-NC and New Bern, NC that were previously defined as micropolitan CBSAs. Additionally, some MSA populations changed due to the inclusion and/or exclusion of counties from OMB's February 2013 MSA delineations. The 2009 and 2013 defined MSAs and the respective July 1, 2011, and 2012 population estimates from the U.S. Census Bureau are shown in Table 1.

Table 1: Metropolitan Statistical Areas and Populations

MSA Name	2011 Population *2009 MSA definition*	2012 Population *2013 MSA definition*
Charlotte-Concord-Gastonia, NC-SC	1,795,472	2,296,569
Virginia Beach-Norfolk-Newport News, VA-NC	1,679,894	1,699,925
Raleigh, NC	1,163,515	1,188,564
Greensboro-High Point, NC	730,966	736,065
Winston-Salem, NC	482,025	647,697
Durham-Chapel Hill, NC	512,979	522,826
Asheville, NC	429,017	432,406
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	NA*	394,542
Fayetteville, NC	374,157	374,585
Hickory-Lenoir-Morganton, NC	369,685	363,627
Wilmington, NC	364,567	263,429
Jacksonville, NC	192,690	183,263
Greenville, NC	179,719	172,554
Burlington, NC	153,291	153,920
Rocky Mount, NC	152,157	151,662
New Bern, NC	NA*	128,119
Goldsboro, NC	123,697	124,246

*previously micropolitan CBSA

Minimum O_3 Monitoring Requirements
40 CFR Part 58, Appendix D, Table D-2

The state of North Carolina's proposed O_3 monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-2 for all MSAs, except the Myrtle Beach-Conway-North Myrtle Beach MSA.

Due to changes that OMB made to MSA boundaries in February of 2013, Brunswick County, North Carolina has been added to the Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA. This change has triggered the requirement for an O_3 monitor in this MSA. The 2013 Network Plan indicates that NC-DAQ has entered into discussions with the SC Department of Health and Environmental Control (SC DHEC) and other stakeholders to identify an appropriate location for a new monitoring site. Once a suitable monitoring location is identified, information regarding the site can be provided either as an amendment to the current Network Plan or in next year's Network Plan.

The Network Plan also proposes to shutdown the O_3 monitor at the Enochville site (AQS ID 37-159-0022). EPA approves the shutdown of this monitor. The EPA reviewed historical data and other information to make this determination. The O_3 monitor at the Rockwell site (AQS ID 37-159-0021) is in the same county and has recorded similar values compared to the Enochville monitor over the last five years. After the Enochville monitor is shutdown, the Charlotte-Concord-Gastonia, NC-SC MSA would still meet the minimum monitoring requirements found in 40 CFR Part 58, Appendix D.

Additionally, the Network Plan proposes to relocate two O_3 monitoring sites: Waggin Trail (AQS ID 37-003-0004) and Bent Creek (AQS ID 37-021-0030). The EPA approved the relocation of the Bent Creek ozone site in a letter to the Western North Carolina Regional Air Quality Agency dated April 29, 2013. The new Bent Creek location is less than a mile from the previous site and has the same AQS ID.

The EPA also approves the relocation of the Waggin Trail site to a new location that will be named Taylorsville 2013 with an AQS ID of 37-003-0005. The EPA has reviewed the North Carolina Division of Air Quality's (NC-DAQ) request to relocate the Waggin Trail O_3 site and determined that this monitor meets the relocation requirements of 40 CFR § 58.14(c)(6). The Taylorsville 2013 site is nearby the Waggin Trail site and should be representative of the same spatial scale as the Waggin Trail site.

Minimum PM_{10} Monitoring Requirements
40 CFR Part 58, Appendix A, 3.3.1
40 CFR Part 58, Appendix D, Table D-4

The state of North Carolina's current PM_{10} primary monitoring network meets the minimum requirements for all areas. All PM_{10} collocation requirements for manual methods found in 40 CFR Part 58, Appendix A, 3.3.1 are currently being met. These include the requirement that fifteen percent of each network of manual PM_{10} methods (at least one site) must be collocated.

Minimum $PM_{2.5}$ Monitoring Requirements
40 CFR Part 58, Appendix A, 3.2.5
40 CFR Part 58, Appendix D, Table D-5

The state of North Carolina's current $PM_{2.5}$ monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-5 for all MSAs. Manual $PM_{2.5}$ collocation requirements are found in 40 CFR Part 58, Appendix A, 3.2.5. These include the requirement that fifteen percent of each network of manual $PM_{2.5}$ methods (at least one site) must be collocated. The manual collocation requirements for $PM_{2.5}$ are currently being met in the Network Plan.

The Network Plan proposes to shut down three $PM_{2.5}$ monitors at the end of 2013: Finely Farm (AQS ID 37-183-0020), Springfield Rd (AQS ID 37-065-0004), and Lenoir Community College (AQS ID 37-107-0004). The design values for all three $PM_{2.5}$ monitors have been trending down in recent years and are all well below the NAAQS. The most recent design values (2009-2012) for these monitors are 9.3, 8.9, and 9.0 micrograms per cubic meter, respectively. After the shutdown of these $PM_{2.5}$ monitors, the state's network would still meet the minimum monitoring requirements found in 40 CFR Part 58, Appendix D. Therefore, the EPA approves the shutdown of the Finley Farm, Springfield Rd, and Lenoir Community College $PM_{2.5}$ monitors.

After submission of the Network Plan, NC-DAQ sent a formal request, dated October 1, 2013 to relocate the Spruce Pine (AQS ID 37-121-0001) $PM_{2.5}$ monitor. The EPA has reviewed ND-DAQ's request to relocate the Spruce Pine $PM_{2.5}$ monitor and determined that this monitor meets the relocation requirements of 40 CFR § 58.14(c)(6). The proposed BRR Hospital site is nearby the existing Spruce Pine site and should be representative of the same spatial scale as the Spruce Pine site. The EPA approves the relocation of the Spruce Pine $PM_{2.5}$ monitor to the proposed BRR Hospital site, which will have the AQS ID of 37-121-0004.

$PM_{2.5}$ Continuous Monitoring Requirements
40 CFR Part 58, Appendix D, 4.7.2

Regulatory requirements for continuous $PM_{2.5}$ monitoring require that "...State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D–5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM [federal reference method/federal equivalent method/approved regional method] monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies." These minimum continuous $PM_{2.5}$ monitoring requirements are currently met in the all MSAs in the state. Also, the continuous $PM_{2.5}$ collocation requirements are currently met in all MSAs. Therefore, the continuous $PM_{2.5}$ monitoring network described in the 2013 Network Plan meets all of the design criteria of 40 CFR Part 58.

$PM_{2.5}$ Background and Transport Sites
40 CFR Part 58, Appendix D, 4.7.3

40 CFR Part 58, Appendix D, 4.7.3 requires that "each State shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor for regional transport." The Network Plan identifies six $PM_{2.5}$ sites as general background sites that include: Mendenhall (AQS ID: 37-081-0013), Cherry Grove (AQS ID: 37-033-0001, Kenansville (AQS ID: 37-061-0002), Boone (AQS ID: 37-189-0003), Candor (AQS ID: 37-123-0001), and Jamesville (AQS ID: 37-117-0001). The Network Plan identifies three regional transport sites for $PM_{2.5}$ identified as: Cherry Grove (AQS ID: 37-033-0001), Jamesville (AQS ID: 37-117-0001), and Bryson City (AQS ID: 37-173-0002). Therefore, NC-DAQ has satisfied the requirements of 40 CFR Part 58 for background and transport sites.

Pb Monitoring Requirements
40 CFR Part 58, Appendix D, 4.5

40 CFR Part 58, Appendix D, 4.5 requires that "At a minimum, there must be one source-oriented SLAMS [state and local air monitoring station] site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year..."

Section 4.5(a)(ii) of Appendix D to 40 CFR Part 58 provides the following provisions for a waiver of the Pb monitoring requirements:

> "(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50% of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under 58.10(d)."

In its approval of the state's 2011 Network Plan, pursuant the provisions of the above section, The EPA granted the waivers of the source-oriented ambient air monitoring requirements at two sources: Blue Ridge Paper Products, Inc. in Canton, North Carolina and Saint Gobain Containers in Wilson, North Carolina. The waivers must be renewed every five years as part of the network assessment required under 40 CFR §58.10(d).

40 CFR Part 58, Appendix D, 3(b) requires that "NCore sites in CBSA with a population of 500,000 people (as determined in the latest Census) or greater shall also measure Pb either as Pb-TSP or Pb-PM_{10}." This monitoring was required to begin December 27, 2011. The Network Plan indicates that Pb-PM_{10} sampling is ongoing at the Charlotte NCore site (AQS ID: 37-119-0041) and the Raleigh NCore site (AQS ID: 37-183-0014). As a result, the Pb monitoring network described in the Network Plan meets all of the design criteria of 40 CFR Part 58.

SO_2 Monitoring Requirements
40 CFR Part 58, Appendix D, 4.4

Ambient air monitoring network design criteria for SO_2 are found in Section 4.4 of Appendix D to 40 CFR Part 58. This section requires that "The population weighted emissions index (PWEI) shall be calculated by States for each core based statistical area (CBSA)." As a result, the SO_2 monitoring site(s) required in each CBSA will satisfy minimum monitoring requirements if the monitor(s) is sited within the boundaries of the parent CBSA and is one of the following site types: population exposure, maximum concentration, source-oriented, general background, or regional transport. An SO_2 monitor at a NCore station may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors consistent with Appendix D, 4.4.

Table 2 shows the required SO_2 monitors based on the 2012 PWEI. Existing SO_2 monitoring sites described in the Network Plan meet the minimum requirements of 40 CFR Part 58.

Table 2: PWEI and SO_2 Required Monitors in North Carolina

CBSA Name	July 2012 PWEI Values	July 2012 PWEI Required Monitors
Virginia Beach-Norfolk-Newport News, VA-NC	78,540	1
Charlotte-Gastonia-Concord, NC-SC	34,426	1
Durham, NC	16,885	1
Wilmington, NC	10,045	1

NO_2 Monitoring Requirements
40 CFR Part 58, Appendix D, 4.4

Ambient air monitoring network design criteria for NO_2 are found in Section 4.3 of Appendix D to 40 CFR Part 58. There are three types of required NO_2 monitoring: near-road, area-wide, and Regional Administrator required. These types of NO_2 monitoring are described in sections 4.3.2, 4.3.3, and 4.3.4 respectively.

Any CBSA with a population of 500,000 or more persons is required to have a near-road NO_2 monitoring station that monitors expected maximum hourly concentrations near a major road. Any CBSA with a population of 2,500,000 or more persons or that has one or more roadway segments with a 250,000 or greater annual average daily traffic (AADT) count is required to have an additional near-road NO_2 monitoring station. The *Near-road NO_2 Monitoring Technical Assistance Document* (TAD) provides guidance to state and local agencies in selecting an appropriate near-road NO_2 monitoring location. This document can be found on the internet at http://www.epa.gov/ttnamti1/files/nearroad/NearRoadTAD.pdf.

Ambient air monitoring network design criteria for area-wide NO_2 sites are found in Section 4.3.3 of Appendix D to 40 CFR Part 58. Any CBSA with a population of 1,000,000 or more persons is required to monitor a location of expected highest NO_2 concentrations representing the neighborhood or larger spatial scales.

Ambient air monitoring network design criteria for Regional Administrator required NO_2 monitoring, often referred to as RA-40 monitoring, are found in Section 4.3.4 of Appendix D to 40 CFR Part 58. This section states that "the Regional Administrators, in collaboration with States, must require a minimum of forty additional NO_2 monitoring stations nationwide in any area, inside or outside of CBSAs, above the minimum monitoring requirements, with a primary focus on siting these monitors in locations to protect susceptible and vulnerable populations. The Regional Administrators, working with States, may also consider additional factors ... to require monitors beyond the minimum network requirement."

The EPA Region 4 approves the selection of the Triple Oak (AQS ID 37-183-0021) site in fulfillment of the near-road NO_2 requirement for the Raleigh, NC CBSA. In the Network Plan, Mecklenburg County Air Quality (MCAQ) proposed two potential sites to meet the requirement for the near-road NO_2 requirement in the Charlotte-Concord-Gastonia, NC-SC. In July of 2013, the EPA Region 4 staff visited MCAQ's proposed location on Remount Road. MCAQ communicated that due to site access and siting issues the proposed site near Remount Road would be preferable to the proposed site located on Toomey

Avenue. The EPA approves the selection of the near-road site on Remount Road (AQS ID 37-119-0045) in fulfillment of the near-road NO_2 requirement. As discussed in the Network Plan, the Greensboro-High Point, NC; Winston-Salem, NC; and Durham-Chapel Hill, NC CBSAs will be required to have near-road NO_2 monitoring by January 1, 2017.

The EPA approves the selection of the Garinger (AQS ID: 37-119-0041) and Millbrook (AQS ID: 37-183-0014) sites in fulfillment of the area-wide NO_2 monitoring requirement for the Charlotte-Gastonia-Rock Hill and Raleigh-Cary CBSAs.

The EPA selects the Hattie Avenue site (AQS ID 450-045-0015) operated by Forsyth County Office of Environmental Assistance and Protection as a location for a Regional Administrator required NO_2 monitor to help protect susceptible and vulnerable populations. The full list of NO_2 monitors identified by the EPA's Regional Administrators can be found on the EPA's website at http://www.epa.gov/ttnamti1/svpop.html.

Air Quality Index (AQI) Reporting
40 CFR §58.50

AQI reporting is required in MSAs with populations over 350,000. There are 10 MSAs in the state of North Carolina required to report an AQI: Charlotte-Gastonia-Concord, Virginia Beach-Norfolk-Newport News, Raleigh-Cary, Greensboro-High Point, Durham-Chapel Hill, Winston-Salem, Asheville, Hickory-Lenoir-Morganton, Fayetteville, and Wilmington. NC-DAQ meets these AQI reporting requirements.

Monitoring Network Changes Proposed by NC-DAQ

NC-DAQ has proposed several monitoring network changes in its 2013 Network Plan. Monitors proposed for discontinuation or relocation are summarized in Table 3.

Table 3: Monitors Proposed for Discontinuation/Relocation

AQS ID	Site Name	Pollutant	Type	Comments
37-159-0022	Enochville	O_3	SLAMS	Approved: Monitor will be shutdown at the end of the 2013 O_3 season
37-003-0004	Waggin Trail	O_3	SLAMS	Approved: Monitor will shutdown at the end of the 2013 O_3 season and will be replaced with a nearby O_3 monitor – Taylorsville 2013 (AQS ID 37-003-0005)
37-183-0020	Finley Farm	$PM_{2.5}$	SLAMS	Approved: Monitor will shut down 12/31/2013
37-065-0004	Springfield Rd	$PM_{2.5}$	SLAMS	Approved: Monitor will shut down 12/31/2013
37-107-0004	Lenoir Community College	$PM_{2.5}$	SLAMS	Approved: Monitor will shut down 12/31/2013
37-121-0001	Spruce Pine	$PM_{2.5}$	SLAMS	Approved: Monitor will be relocated less than a mile from the existing site and will have a new AQS ID 37-121-0004

The EPA reviewed these requests for monitor discontinuation or relocation and determined that they all meet the requirements of 40 CFR §58.14(c) for monitor discontinuation and relocation. The minimum monitoring requirements for $PM_{2.5}$ and O_3 found in Appendix D to 40 CFR Part 58 will continue to be met for the respective MSAs after these monitors are discontinued or relocated.

The EPA also has reviewed and approves the location for the startup of the all monitors listed in Table 4.

Table 4: Monitors Proposed for Startup

AQS ID	Site Name	Pollutant	Type	Comments
37-183-0021	Triple Oak	NO_2	SLAMS – near-road	Approved: site establishment for near-road NO_2 monitoring
37-119-0045	Remount Road	NO_2	SLAMS – near-road	Approved: site establishment for near-road NO_2 monitoring
37-003-0005	Taylorsville 2013	Ozone	SLAMS	Approved: will replace Waggin Trail site
37-121-0004	BRR Hospital	$PM_{2.5}$	SLAMS	Approved: will replace the Spruce Pine site

National Core (NCore) Monitoring Network

Ambient air monitoring network criteria for NCore sites are found in Section 3 of Appendix D to 40 CFR Part 58. NC-DAQ designated two NCore sites in the 2013 Network Plan. The first site (AQS ID 37-183-0014) is located at the East Millbrook Middle School site in Raleigh, NC. The second site (AQS ID 37-119-0041) is located at the Garinger site in Charlotte, NC and is operated by MCAQ. Official The EPA approval was granted for these sites on October 30, 2009. The 2013 Network Plan meets the minimum monitoring requirements for NCore sites.

Appendix K. PCS Phosphate, Inc. – Aurora Siting Analysis and Additional Site Information

Siting Analysis for Proposed Sites (PCS Phosphate -- Aurora)

SO_2 DATA REQUIREMENTS RULE MONITOR SITING ANALYSIS

PCS Phosphate Company, Inc. – Aurora Facility
Permit No. 04176T53
Facility ID No. 0700071
Aurora, North Carolina

Prepared for:

PCS Phosphate AURORA DIVISION

PCS Phosphate Company, Inc.
1530 NC Highway 306 South
Aurora, NC 27806

Prepared by:

AECOM

AECOM Technical Services of North Carolina, Inc.
1600 Perimeter Park Drive, Suite 400
Morrisville, NC 27560

April 2016

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1.0 INTRODUCTION

On June 22, 2010, the EPA revised the primary sulfur dioxide (SO_2) National Ambient Air Quality Standard (NAAQS) (75 FR 35520). The EPA promulgated a new 1-hour daily maximum primary SO_2 standard at a level of 75 parts per billion (ppb), based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations.

On May 13, 2014, the EPA proposed the Data Requirements Rule (DRR) for the 1-Hour SO_2 NAAQS (79 FR 27445). The final DRR was promulgated on August 21, 2015 (80 FR 51051) and requires states to gather and submit to the EPA additional information characterizing SO_2 air quality in areas with larger sources of SO_2 emissions. In the DRR, air agencies have the choice to use either monitoring or modeling to characterize SO_2 air quality in the vicinity of priority SO_2 sources, and submit the modeling and/or monitoring to the EPA on a schedule specified by the rule.

This analysis was conducted to identify a suitable 1-hour SO_2 source-oriented monitoring site location to satisfy the DRR for PCS Phosphate Company's Aurora Facility (PCS Aurora). Currently, there is an SO_2 monitor located about 6 kilometers (km) to the northeast of PCS Aurora, located at 229 NC Highway 306 North, Bath, NC. The 1-hour background monitored air concentration for this monitor, based on 2012-2014 data is 23 ppb (60.1 μg/m^3).

This report provides a summary of modeling results and associated analyses of these results using methodologies discussed in EPA's SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document (Monitoring TAD) that indicates the suitability of locating a monitoring station in vicinity of the PCS Phosphate, Inc. Aurora, NC facility (PCS Aurora facility). Results of this monitor siting analysis indicate that the Bayview monitor that is currently operating near the facility and was originally sited by the North Carolina Division of Air Quality (NC DAQ) for the purposes of monitoring SO_2 concentrations in the vicinity of the PCS Aurora facility is very highly ranked in accordance with the Monitoring TAD and is suitably located to provide a reliable indication of ambient air quality in the vicinity of the PCS Aurora facility.

2.0 FACILITY INFORMATION

2.1 Facility Description and Location

The PCS Aurora facility mines phosphate ore and manufactures products including sulfuric acid, phosphoric acid, solid and liquid fertilizers, animal feed supplements, and food grade, purified phosphoric acid.

The PCS Aurora facility operates under the terms and conditions of Permit No. 04176T53 issued by NCDEQ DAQ (effective date September 24, 2015). Permitted sources of SO_2 at the PCS Aurora facility consist of three double-absorption sulfuric acid plants, one distillate oil-fired boiler, six vertical fluidized bed phosphate rock calciner units, one phosphate rock dryer, one coal/coke pulverizer and thermal dryer system, two diammonium phosphate plants, four superphosphoric acid plants, four phosphoric acid trains, two pug mills, one defluorination kiln, and one diesel-fired emergency engine.

PCS Aurora is located in Aurora, North Carolina in Beaufort County. The facility is approximately 7 km north of the town of Aurora along the shore of the Pamlico River. The NAD83 UTM Zone 18 coordinates of the facility are 338705 meters Easting and 3916240 meters Northing. Figure 2-1 shows the site location and the location of the current SO_2 monitor, known as the Bayview monitor.

3.0 MONITOR SITING ANALYSIS

3.1 Analysis Approach and Model Selection

As suggested by the Monitoring TAD, the modeling followed the recommendations of the SO_2 NAAQS Designations Modeling Technical Assistance Document (Modeling TAD). According to the Modeling TAD, given the source-oriented nature of SO_2, dispersion models are appropriate air quality modeling tools to estimate near-field concentrations. The AMS/EPA Regulatory Model (AERMOD version 15181) was used, as suggested in the Monitoring TAD. AERMOD is the preferred air dispersion model because it is capable of handling rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including, point, area, and volume sources) to address ambient impacts for the designations process.

3.1.1 Meteorological Data

AERMOD-ready meteorological data was created by processing surface data from the Marine Corps Air Station (MCAS) in Cherry Point, upper air data from the Newport, NC National Weather Service (NWS) site, and onsite meteorological data collected by PCS. The DRR requires modeling to be performed for the most recent three year period. The most recent quality-assured dataset at this time is the 2012-2014 meteorological data.

3.1.2 Receptors

The dispersion modeling receptor grids were developed following procedures outlined in the *New Source Review Workshop Manual* (October 1990), the *North Carolina PSD Modeling Guidance* (January 2012), and the Modeling TAD. A detailed discrete receptor grid system was created to assess air quality impacts in all directions from the PCS Aurora facility to a distance of up to 21.5 km from the property boundary.

Discrete receptors were placed along the property line at 100-meter intervals. A 100-meter grid spacing was used from the property line out to a distance of approximately 1 km, 250-meter grid spacing from 1 km to 3 km, 500-meter grid spacing from 3 km to 5 km, 1 km grid spacing from 5 km to 10 km. The remaining grid from 10 km to approximately 20 km used 2 km grid spacing. According to the Modeling TAD, receptors should only be placed where it is suitable for the placement of a permanent monitor; therefore receptors on PCS property and over water were removed. Figure 3-1 presents the full modeling receptor grid, while Figure 3-2 presents the near-field receptor grid along with the PCS Aurora property boundaries.

Terrain data used in the analysis was obtained from the USGS Seamless Data Server at http://viewer.nationalmap.gov/viewer/. The 1 arc-second NED data was obtained in the GeoTIFF format and used in determining receptor elevations and hill heights using AERMAP.

3.1.3 Sources

There are multiple SO_2 emissions sources present at the PCS Aurora facility, all of which were modeled as point sources.

The AERMOD model uses a steady-state Gaussian plume equation to model emissions from point sources such as stacks and vents. All point sources were modeled using actual stack exhaust parameters. The following parameters were used for modeling the point sources: emission rates (grams/sec), stack height (m), stack diameter (m), stack exit velocity (m/sec), stack exhaust temperature (K), and direction-specific building/structure dimensions (m). Building/structure locations, sizes, and orientations relative to stacks were input into BPIP-PRIME to calculate building parameters for AERMOD. Table 3-1 presents a list of the modeled facility point sources and their associated parameters. The source and building/structure layout for modeling is shown in Figure 3-3.

Table 3-1. Modeled Stack Parameters

Source ID	Source Description	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	Normalized Emission Rate (g/s)
103SO	SA Plant No. 5	44.2	346.43	10.25	3.2004	hourly varying
104SO	SA Plant No. 6	49.99	343.37	10.66	2.9718	hourly varying
105SO	SA Plant No. 7	50.3	349.8	9.73	3.66	hourly varying
110NEW	Auxiliary Boiler	15.2	402.8	11.55	1.34	annually varying
201SO	Calciner #1	30.5	347.8	13.11	1.8288	annually varying
202SO	Calciner #2	30.5	346.5	13.13	1.8288	annually varying
203SO	Calciner #3	30.5	348.3	13.62	1.8288	annually varying
204SO	Calciner #4	30.5	347.2	14.02	1.8288	annually varying
205SO	Calciner #5	30.5	348.7	12.62	1.8288	annually varying
206SO	Calciner #6	30.5	347.9	12.83	1.8288	annually varying
210SO	Rock Dryer	30.5	336.65	15.09	1.8288	annually varying
215SO	Coal Pulverizer/Dryer Baghouses	30.5	339.98	17.89	0.7376	annually varying
302SO	DAP No.3 Plant	44.2	330.26	9.58	2.7432	annually varying
303SO	DAP No.2 Plant	41.45	341.32	13.96	2.74	annually varying
330SO	SPA #1	30.05	300.82	2.62	0.51	annually varying
331SO	SPA #2	30.05	297.15	1.52	0.51	annually varying
332SO	SPA #3/#4	30.02	296.37	1.49	0.61	annually varying
401SO	PA#1 Crossflow/Venturi Scrubber Stack	39.62	308.98	18.082	1.01	annually varying
404SO	PA#2 Crossflow Scrubber Stack	39.62	314.32	15.749	1.01	annually varying
406SO	PA#3 Crossflow Scrubber Stack	30.48	320.26	19.832	1.01	annually varying
409SO	PA#4 Crossflow Scrubber Stack	39.62	321.04	16.332	1.01	annually varying
701SO	DFP Kiln Stack	60.35	349.3	17.94	1.68	annually varying
801SO	Mill Area Generator	3.7	778.7	74.58	0.3	annually varying
802SO	Calciner Building Diesel Generator	3.7	778.7	74.58	0.3	annually varying

3.1.4 Modeled Emissions

Hourly data was available for the three Sulfuric Acid Plants (103SO, 104SO, and 105SO) from CEMS monitors. Sulfur dioxide emissions from these sources comprise over 96% of the total annual emissions from the facility. Hourly data for other sources was not available; therefore, average hourly emission rates for each source were used in the modeling. Following the example in Appendix A of the Monitoring TAD, these emission rates were normalized and used as inputs to the model (Table 3-1). Because of the linear scalability of emissions to modeled concentrations, the relative model results using normalized emissions can be used to predict the location of maximum concentration gradients. The emissions rates were normalized by dividing each source's hourly emission rate by the highest overall hourly emission rate over all stacks.

3.2 Modeling Results and Ranking Methodology

Following the guidance outlined in Appendix A of the Monitoring TAD, normalized modeled impacts were used to determine suitable locations for an SO_2 monitor near PCS Aurora. The three-year average of each year's 4th daily highest 1-hour maximum concentration (99th percentile of daily 1-hour maximum concentrations) was calculated for each receptor. This value is commonly referred to as the design value (DV). Because normalized emissions were used to calculate these values, the results are referred to as normalized design values (NDVs) in this analysis.

Figure 3-4 shows the NDVs for the receptors near PCS Aurora, totaling 12,571 receptors within the modeling domain. To better understand the relative difference between the NDVs, Figure 3-5 shows the ratio of the NDV at each receptor to that of the overall maximum NDV. In the figures, the receptors with the highest values are in the black area surrounded by the darker purple. From the NDV ratio results, 200 receptors with the highest values were selected for further analysis. The receptors having the top 200 and top 50 NDVs are shown in Figures 3-6 and 3-7, respectively. The highest NDVs in the figures are shown in black.

Figures 3-6 and 3-7 show the prioritized locations that were first evaluated to select a monitor location. The primary objective of this analysis was to find a sufficient number of feasible locations with predicted peak and/or relatively high SO_2 concentrations where a permanent monitoring site could be located. However; according to Appendix A of the Monitoring TAD, the site selection process also needed to account for the frequency in which a receptor has the daily maximum concentrations. The frequency is the number of times each receptor was estimated to have the maximum daily 1-hour concentration. Figure 3-8 shows the results of the frequency analysis.

Each receptor's frequency value was used with its NDV to create a relative prioritized list of receptor locations. This process is referred to in Appendix A of the Monitoring TAD as a scoring strategy. The list of receptors was developed through the following steps:

1. The NDVs were ranked from highest to lowest. Rank 1 means the highest NDV.
2. The frequencies for the receptors were ranked from the highest to lowest. Rank 1 means the highest number of days having the daily maximum value.

3. The NDV rank and the frequency rank were added together to obtain a score.
4. The scores were ranked from lowest to highest. The receptors with the lowest scores were identified as the most favorable locations for the monitor.

3.2.1 Ranking Results

Table 3-2 shows a summary of the ranking results for the top 20 receptors. Figure 3-9a shows the receptor locations that ranked in the top 50 (note that as shown in Table 3-2 there were some ties in rankings). Figures 3-9b, c, and d show a closer view of the three areas with the highest receptor rankings.

When selecting an adequate location for a monitor, considerations should be made regarding the availability of electrical power, security of the monitor, accessibility, proper instrument exposure, and assurance of long term use of the site.

The location of the current Bayview monitor is the highest ranking location (15 out of 12,571) to be free of concerns. Since the monitor has been operating in its current location since 2010, electrical power, security, accessibility, instrument exposure, and long term use of the site are in good standing in this location. The higher ranking locations are either in heavily forested areas, on private property, or do not have an uninhibited sight-line to the facility.

In 2010, the DAQ moved the SO_2 monitor located just off PCS property to its current location. The current site was chosen due to more people living on the north side of the river and due to the fact that the location is downwind of the PCS Phosphate facility[1].

[1] *2015-2016 Annual Monitoring Network Plan for the North Carolina Division of Air Quality*. Volume 2. July 23, 2015.

Table 3-2. Top 20 Ranking Receptors by Score

UTM Zone 17 (NAD83)		Normalized Design Value (NDV)	NDV Rank	Frequency Count	Frequency Rank	Score	Score Rank	Comments on Location	Siting Concerns
Easting (m)	Northing (m)								
334213.65	3913970.37	0.83	2	23	3	5	1	Border of PCS and private property, SE of Louden Rd.	Property owner permission; power; heavily forested area
334266.51	3914037.05	0.84	1	12	12	13	2		
334465.88	3914583.32	0.80	17	12	13	30	3		
334297.73	3914255.81	0.77	34	22	18	52	4		
340881.8	3916405.2	0.75	56	35	1	57	5	Border of PCS and NCDOT property, north of Hwy. 306	Heavily forested area, very close to the river bank.
340000	3922500	0.75	53	17	6	59	6	Private property, south of Hwy. 92	Heavily forested area
340500	3922250	0.78	29	8	31	60	7		Property owner permission; power
333966.75	3913800.31	0.81	14	5	48	62	8	Border of PCS and private property, SE of Louden Rd.	Property owner permission; power; heavily forested area
334289	3914773.78	0.77	36	9	26	62	8	Border of PCS and private property, west of Bonnerton Rd.	
343250	3921750	0.75	54	14	9	63	10	Private property, south of Hwy. 99	Property owner permission; power; trees
343000	3921750	0.76	45	10	21	66	11		
340250	3922500	0.74	62	13	10	72	12	Private property, south of Hwy. 92	Heavily forested area
340300	3921000	0.72	72	30	2	74	13	Private property, end of Gum Point Rd.	Property owner permission; power
335521.8	3909263.5	0.72	71	20	4	75	14	Border of PCS and private property, west of Hwy. 306	Property owner permission; power; near railroad tracks
342045	3921898	0.74	61	10	22	83	15	Site of Bayview Monitor	Location of current monitor
342750	3922000	0.75	51	7	34	85	16	Private property, south of Hwy. 99	Heavily forested area
334347.68	3914675.34	0.81	9	3	80	89	17	Border of PCS and private property, west of Bonnerton Rd.	Property owner permission; power
334284.47	3914856.14	0.76	50	6	39	89	17		
336245.15	3909815.98	0.72	90	15	7	97	19	On PCS property, north of Brantley Swamp Rd.	On PCS property; wetlands area
342500	3922000	0.72	74	9	27	101	20	Private property, south of Hwy. 99	Heavily forested area

Figures

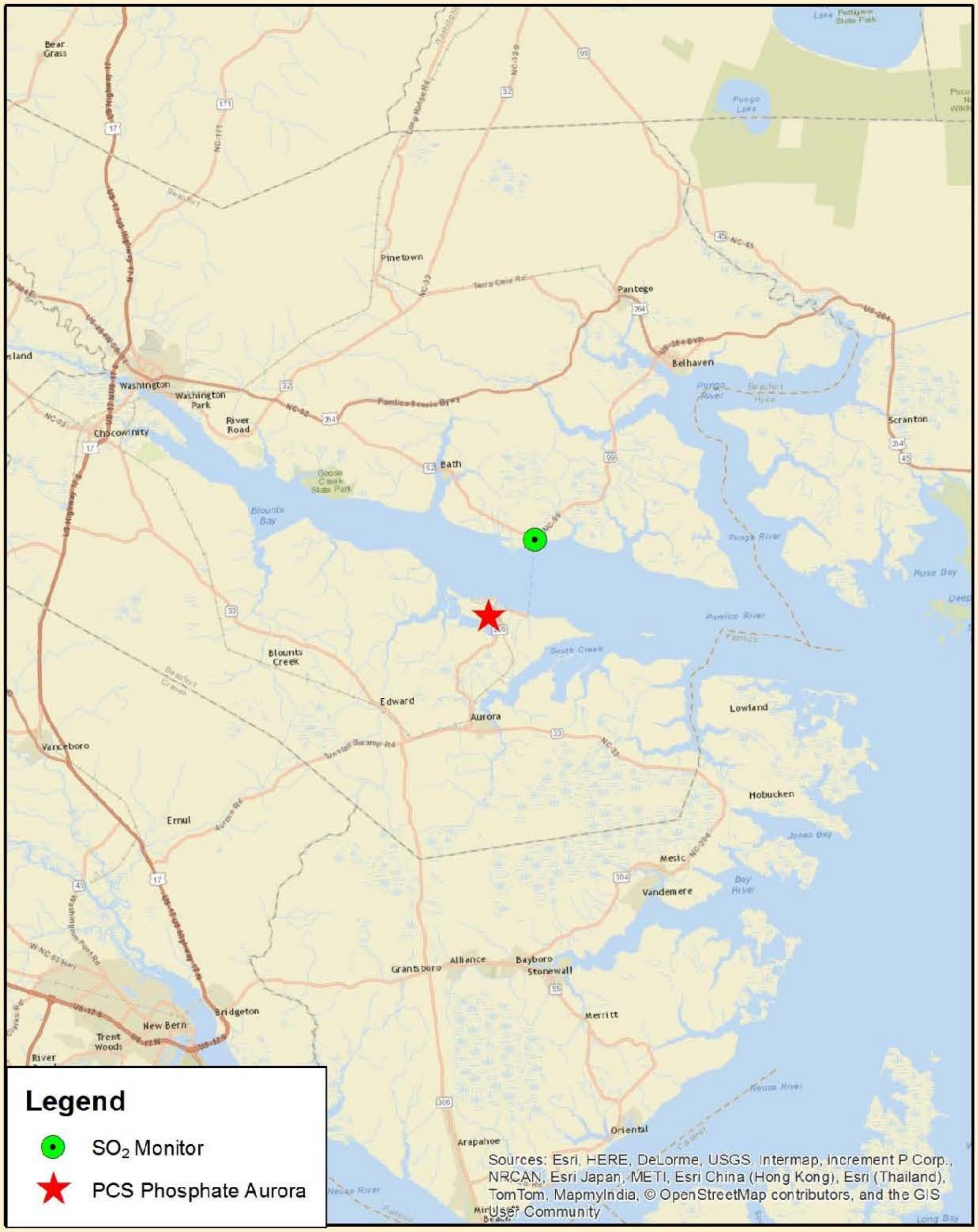

Figure 2-1
PCS Phosphate Inc. - Aurora Facility Site and SO_2 Monitor Locations

0 4.25 8.5 17 Kilometers

N

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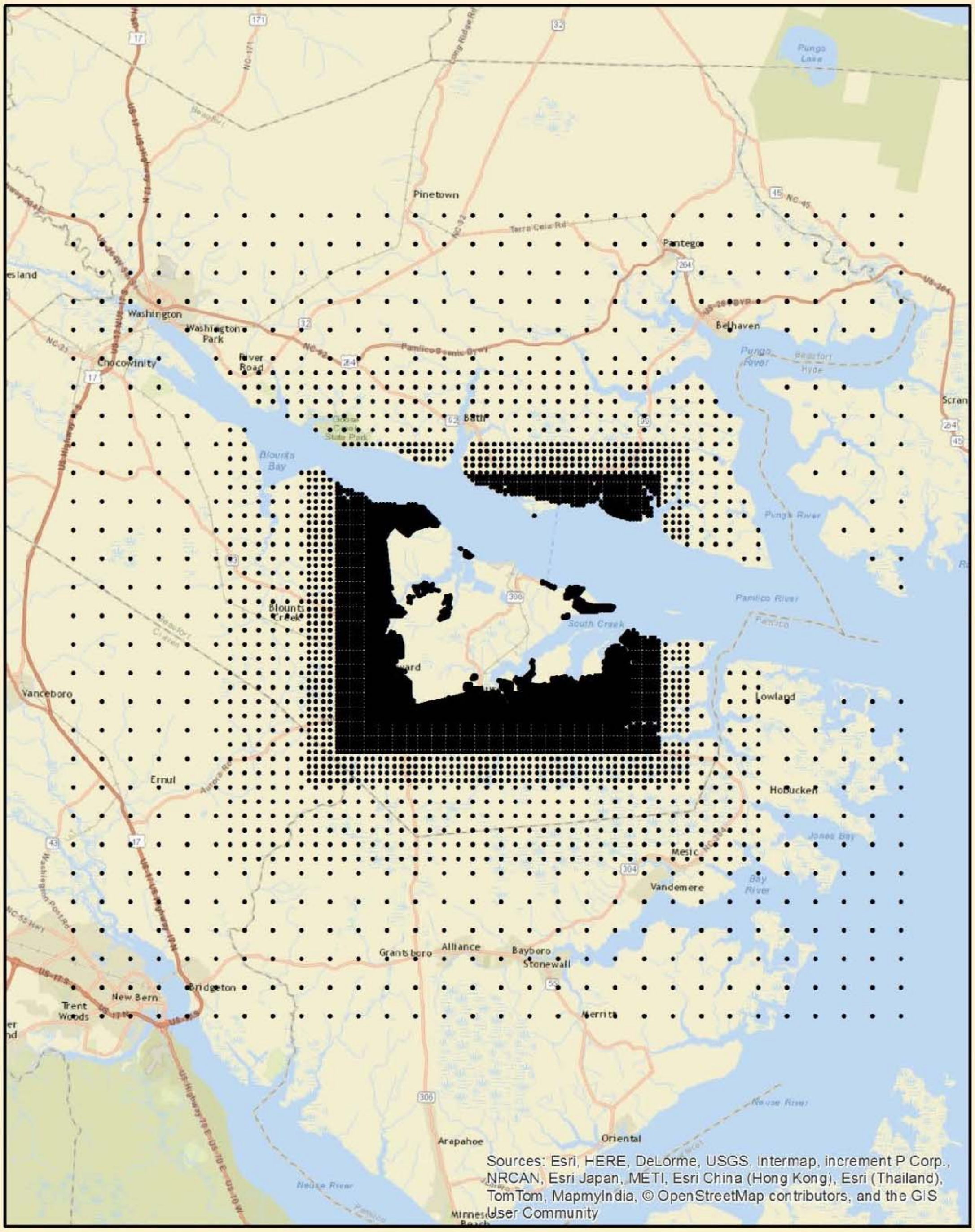

Figure 3-1
PCS Phosphate Inc. - Aurora Facility
SO_2 DRR Full Receptor Grid

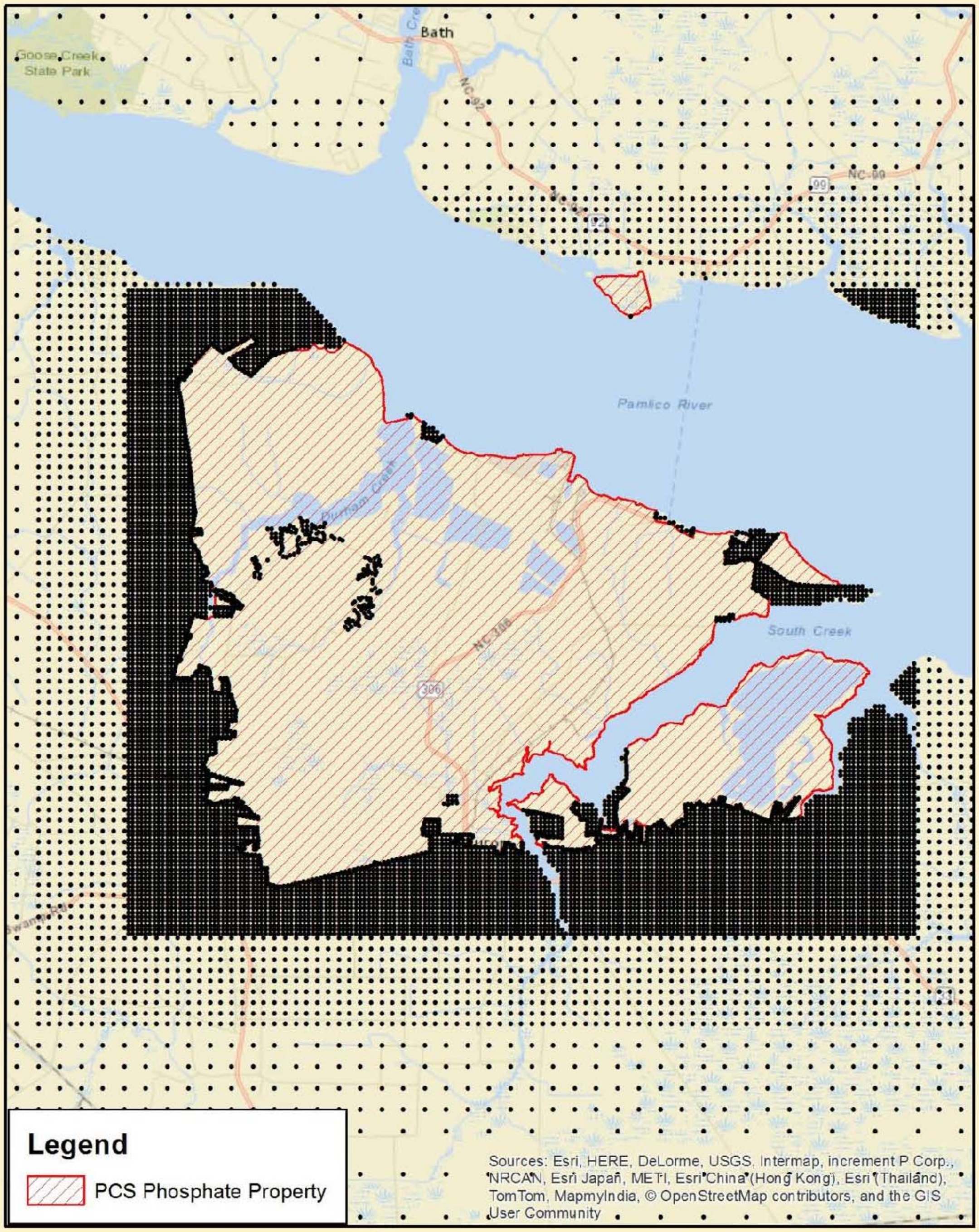

Figure 3-2
PCS Phosphate Inc. - Aurora Facility
SO_2 DRR Near Receptor Grid

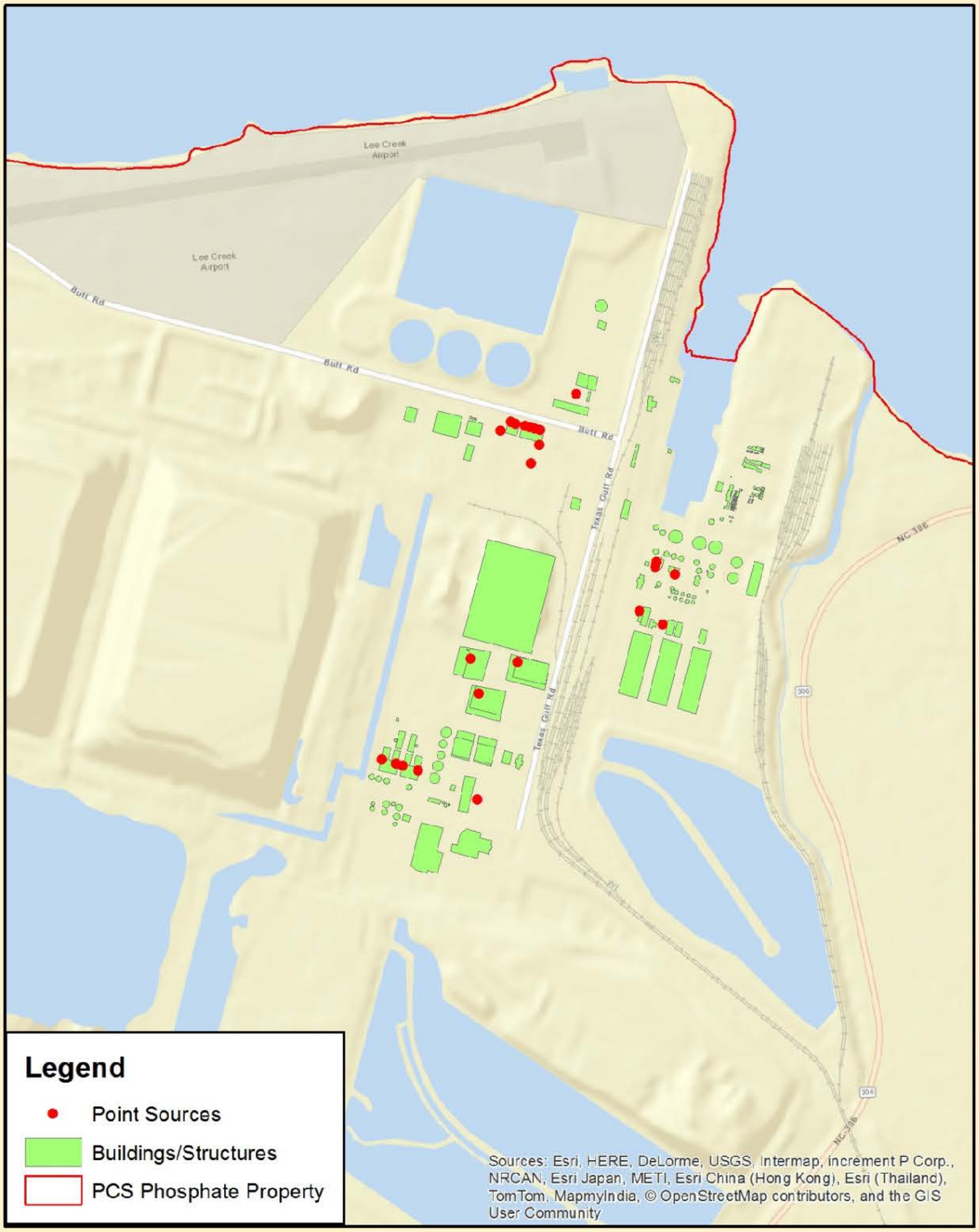

Figure 3-3
PCS Phosphate Inc. - Aurora Facility Source and Building/Structure Layout

0 0.125 0.25 0.5 Kilometers

N

AECOM

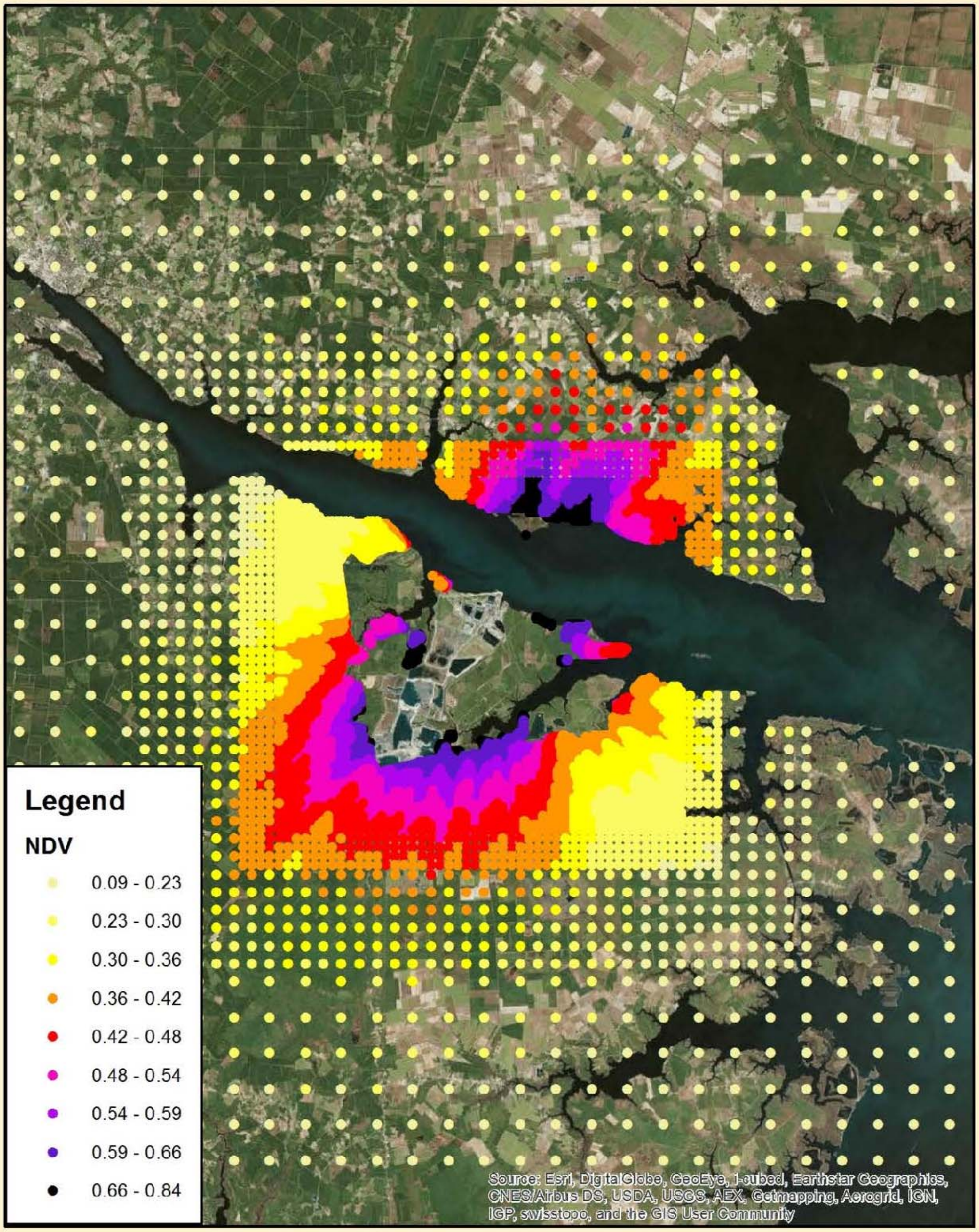

Figure 3-4
PCS Phosphate Inc. - Aurora Facility
Modeled NDVs

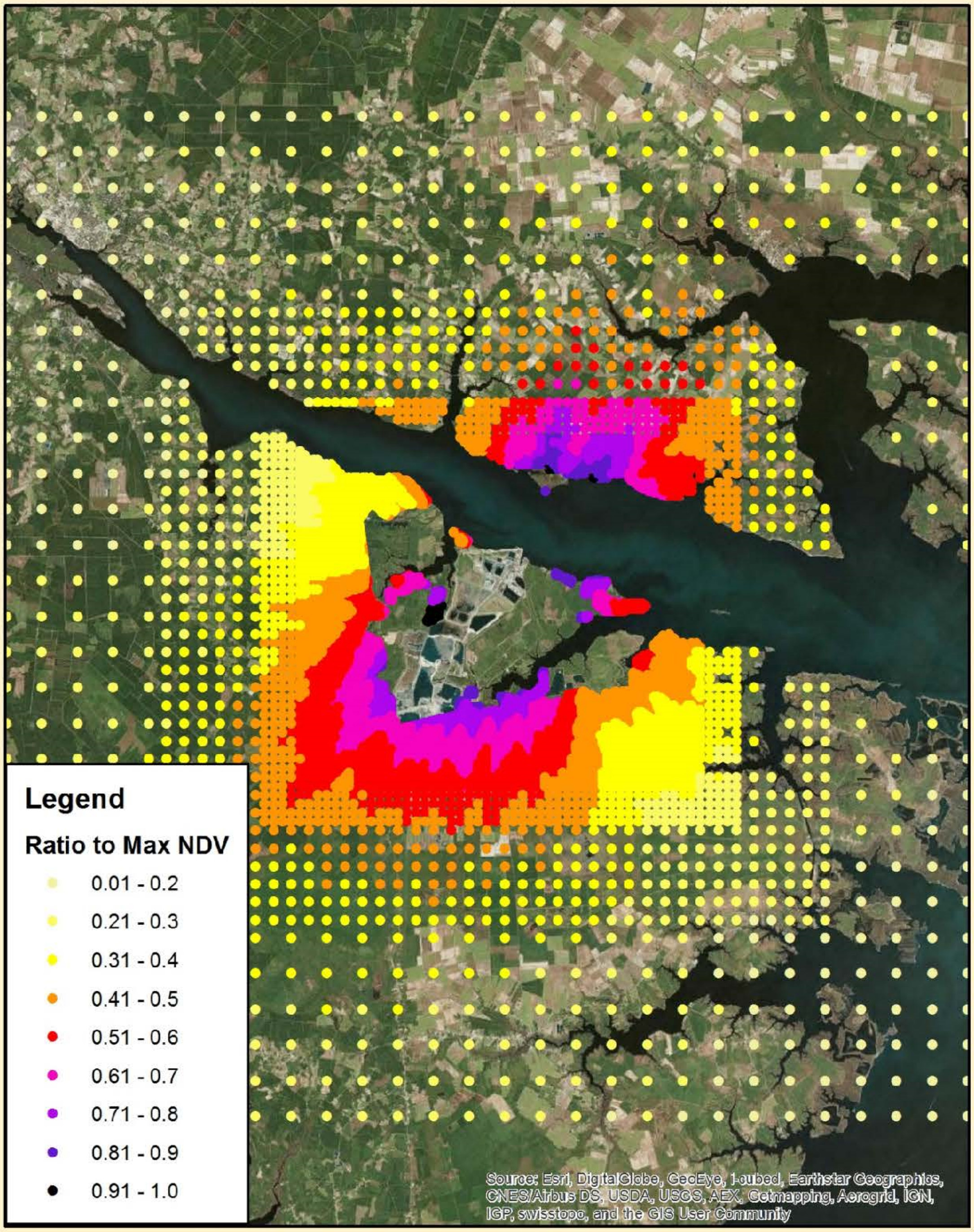

Figure 3-5
PCS Phosphate Inc. - Aurora Facility
Receptor NDV Ratio to Max NDV

0 3 6 12 Kilometers

N

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Figure 3-6
PCS Phosphate Inc. - Aurora Facility
Top 200 NDVs

Figure 3-7
PCS Phosphate Inc. - Aurora Facility
Top 50 NDVs

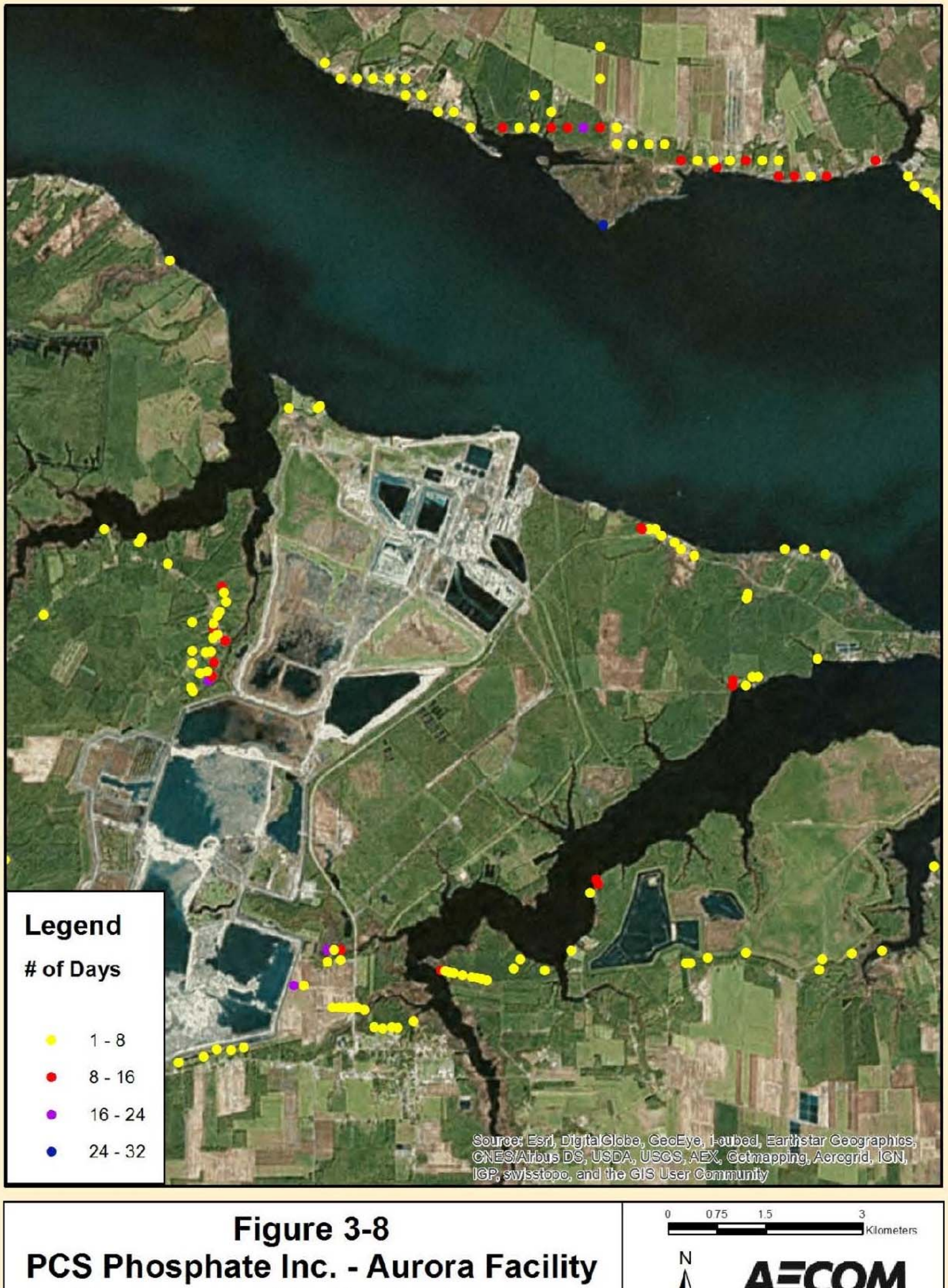


Figure 3-8
PCS Phosphate Inc. - Aurora Facility
Frequency of Daily Maximums

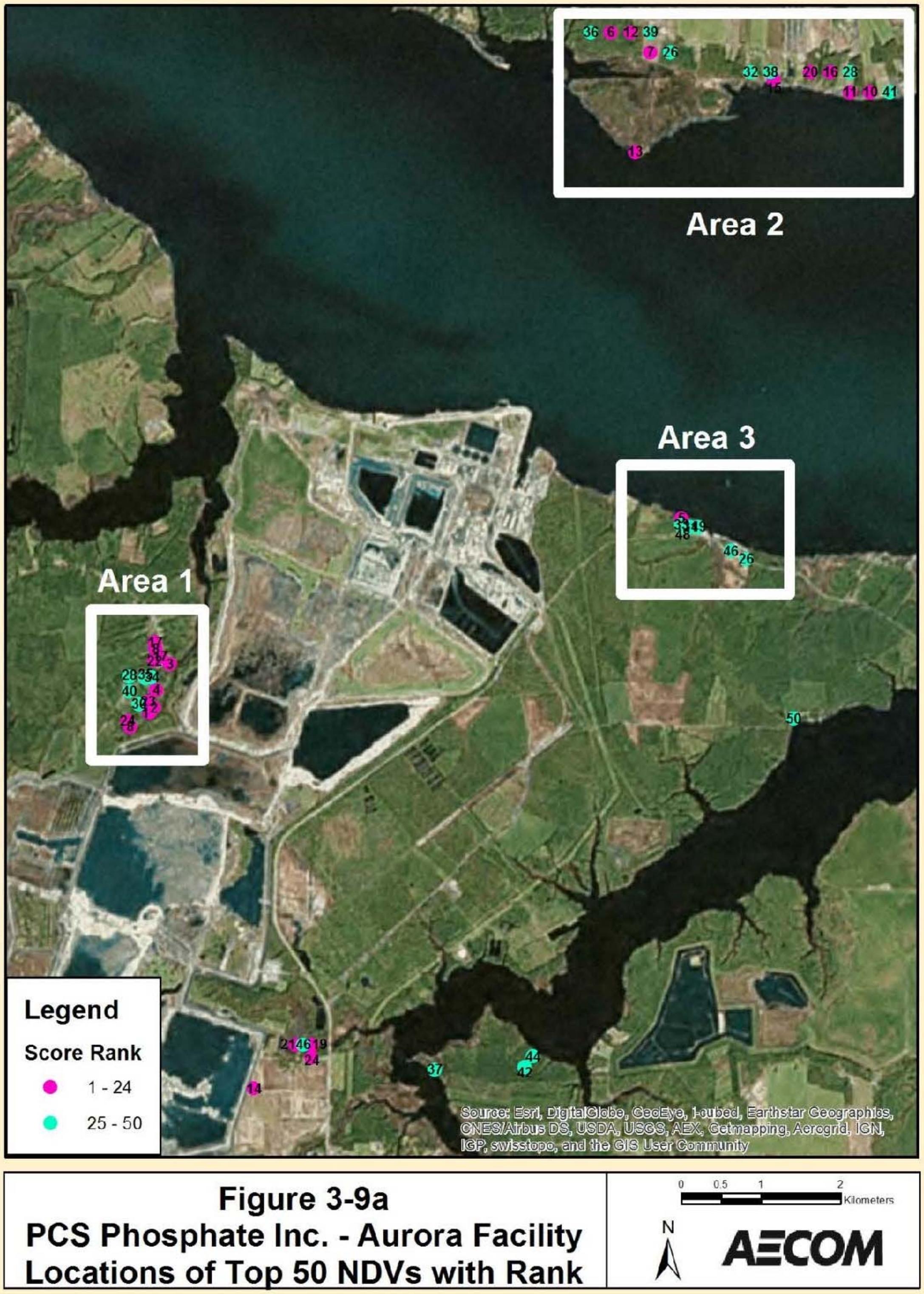


Figure 3-9a
PCS Phosphate Inc. - Aurora Facility
Locations of Top 50 NDVs with Rank

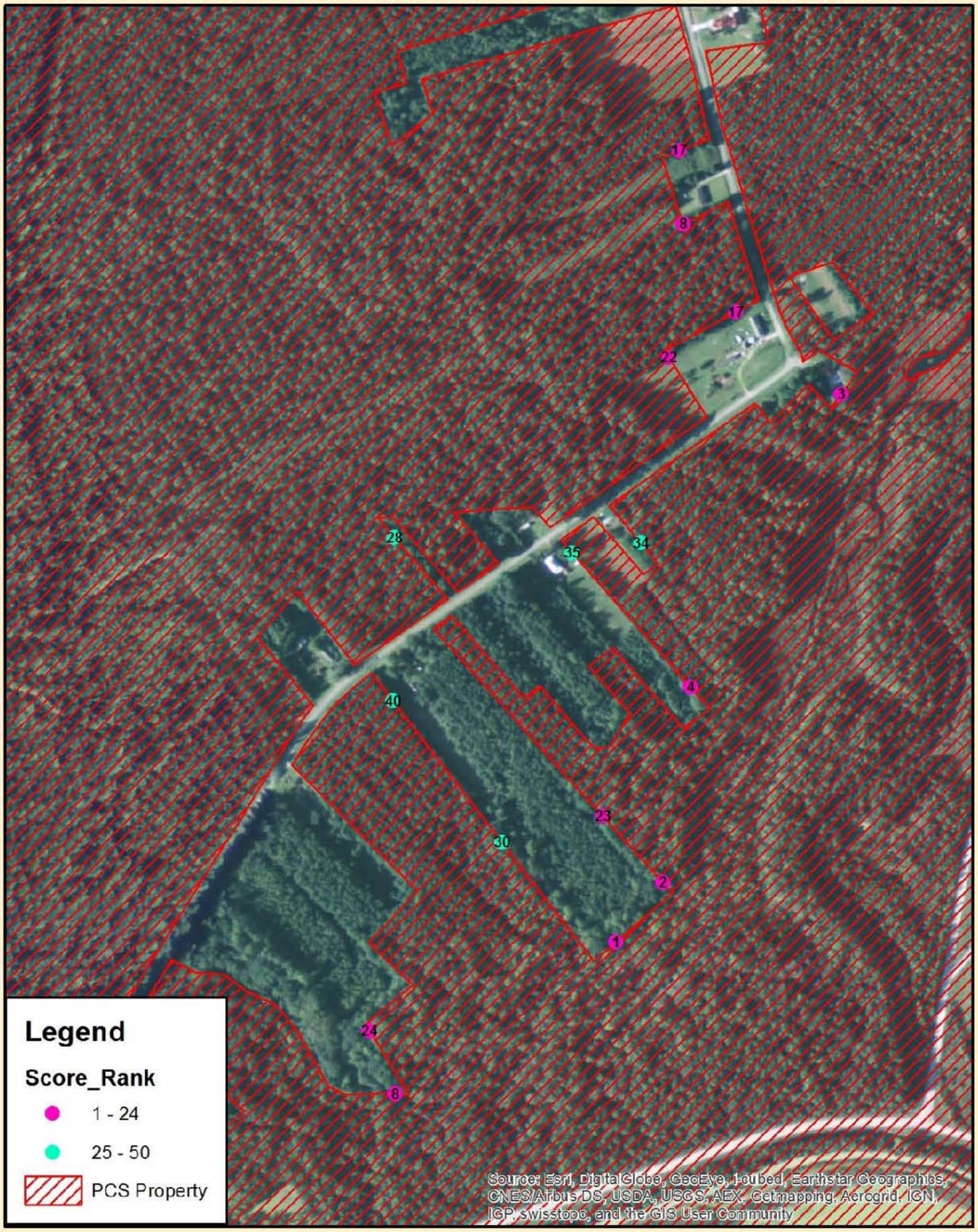


Figure 3-9b (Area 1)
PCS Phosphate Inc. - Aurora Facility
Locations of Top 50 NDVs with Rank

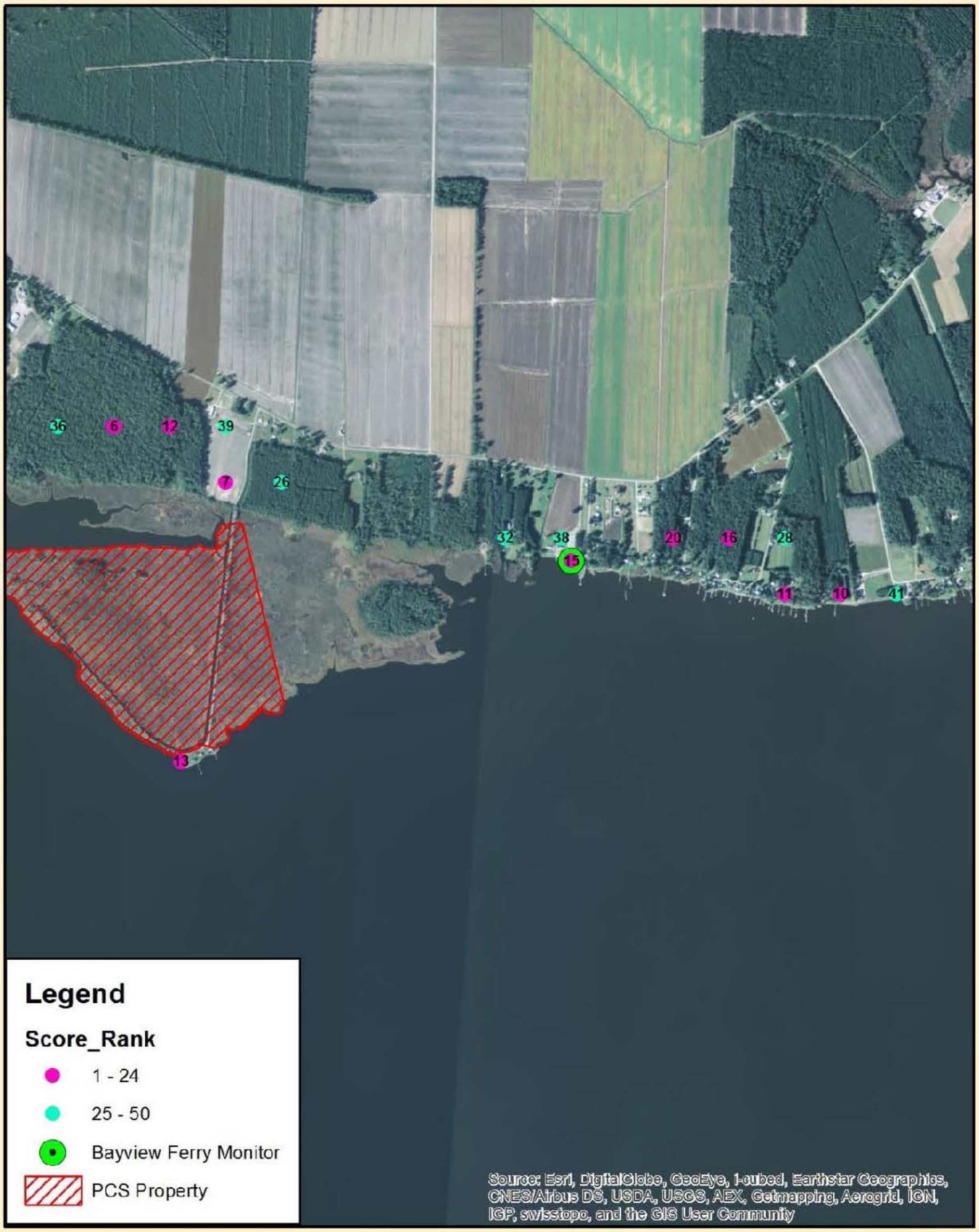


Figure 3-9c (Area 2)
PCS Phosphate Inc. - Aurora Facility
Locations of Top 50 NDVs with Rank

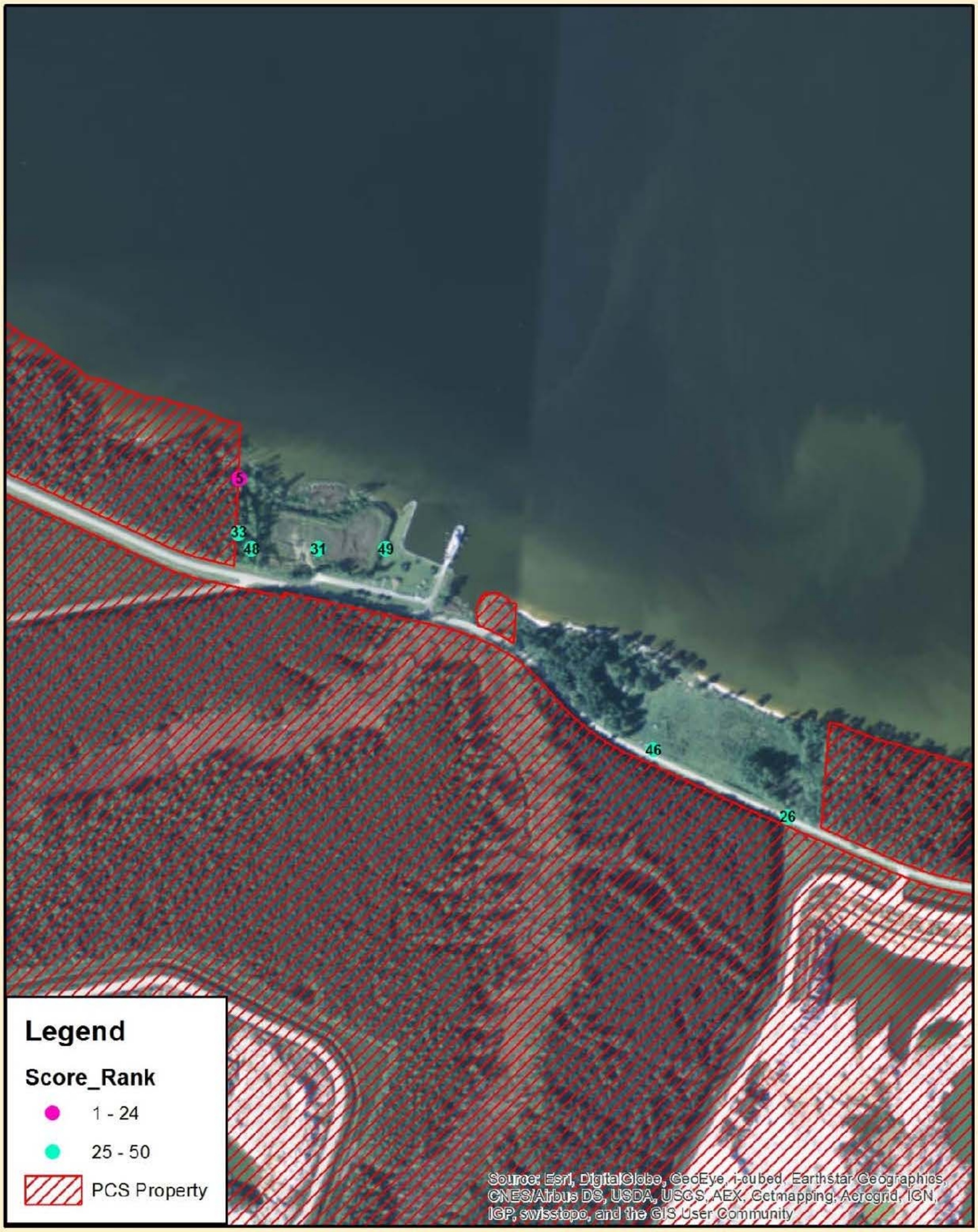
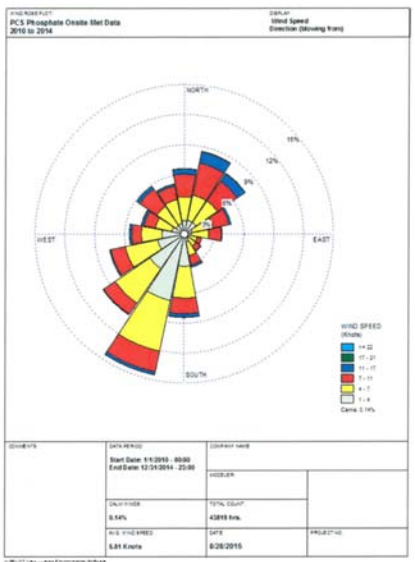


Figure 3-9d (Area 3)
PCS Phosphate Inc. - Aurora Facility
Locations of Top 50 NDVs with Rank

Region 4 Requested Information for Proposed Sites (PCS Phosphate -- Aurora)

NOTE: The proposed SO2 DRR monitoring site for PCS Phosphate is the existing Bayview site located directly across the Pamlico River from the facility. For details on this site, refer to Volume 2, F., The Washington Monitoring Region, pp. F11-12 and F22-23.

The onsite wind rose and aerial photo below show the monitor to be directly downwind of the facility.



Appendix L. CPI Southport Siting Analysis and Additional Site Information

Note: As of this writing (May 27, 2016), several parcels of land near the subject facility are being considered for the potential monitoring site, but no owner’s permission has yet been secured. An addendum to the network plan will be submitted after a separate 30-day public comment period once the location of the monitoring site is finalized.

Appendix M. 2015-2016 Network Plan Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

NOV 1 9 2015

Ms. Sheila C. Holman
Director
Division of Air Quality
North Carolina Department of
Environmental Quality
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Dear Ms. Holman:

Thank you for submitting the state of North Carolina's 2015 annual ambient air monitoring network plan (Network Plan), dated July 23, 2015. The Network Plan is required by 40 Code of Federal Regulations (CFR) §58.10. The Network Plan covers the ambient air monitoring network for the North Carolina Division of Air Quality (NC-DAQ) and the local air quality agencies in North Carolina.

The U.S. Environmental Protection Agency Region 4 understands that the NC-DAQ provided the public a 30-day review period for its draft Network Plan. Comments on the draft plan were submitted by several stakeholders and the final Network Plan includes the NC-DAQ responses to these comments. According to 40 CFR §58.10(a)(2), since public inspection and comment have already been solicited, the EPA is not required to offer another comment period.

The EPA approves North Carolina's 2015 Network Plan. The Network Plan requested the permanent discontinuation of fifteen regulatory monitors: nine fine particulate monitors, five ozone monitors, and one carbon monoxide monitor. The EPA approves the discontinuation of all of the proposed monitors in the Network Plan. Details regarding the EPA's review of the Network Plan are provided in the enclosed comments.

Thank you for working with us to monitor air pollution and promote healthy air quality in North Carolina and the nation. If you have any questions or concerns, please contact Gregg Worley at (404) 562-9141 or Ryan Brown at (404) 562-9147.

Sincerely,

Beverly H. Banister
Director
Air, Pesticides and Toxics Management Division

Enclosure

cc: Mr. Donnie Redmond
Ambient Monitoring Section Chief, NC-DAQ

Ms. Leslie Rhodes, Director
Mecklenburg County Land Use and
Environmental Services Agency

Mr. William M. Barnette, Director
Forsyth County Environmental Affairs Department

Mr. David Brigman, Director
Western North Carolina Regional Air Quality Agency

2015 State of North Carolina Ambient Air Monitoring Network Plan
The U. S. EPA Region 4 Comments and Recommendations

This document contains the U. S. EPA comments and recommendations on the state of North Carolina's 2015 ambient air monitoring network plan (Network Plan). Ambient air monitoring rules, which include regulatory requirements that address network plans, data certification, and minimum monitoring requirements, among other requirements, are found in 40 CFR Part 58. Minimum monitoring requirements for criteria pollutants are listed in 40 CFR Part 58, Appendix D. Minimum monitoring requirements are listed for ozone (O_3), particulate matter less than 2.5 microns ($PM_{2.5}$), particulate matter less than 10 microns (PM_{10}), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and lead (Pb).

The minimum monitoring requirements are based on core based statistical area (CBSA) boundaries as defined by the U.S. Office of Management and Budget (OMB), July 1, 2014, population estimates from the U.S. Census Bureau, and historical ambient air monitoring data. Minimum monitoring requirements for O_3, $PM_{2.5}$, and PM_{10}, only apply to metropolitan statistical areas (MSAs), which are a subset of CBSAs. OMB currently defines 17 MSAs in the state of North Carolina. On February 1, 2013, OMB redefined the CBSA boundaries based on 2010 census data. In North Carolina, there are two recently defined MSA's: Myrtle Beach-Conway-North Myrtle Beach, SC-NC and New Bern, NC that were previously defined as micropolitan CBSAs. Additionally, the composition of some MSA populations changed due to the inclusion and/or exclusion of counties from OMB's February 2013 MSA delineations. The July 1, 2014 population estimates from the U.S. Census Bureau are shown in Table 1.

Table 1: Metropolitan Statistical Areas and Populations

MSA Name	2014 Population
Charlotte-Concord-Gastonia, NC-SC	2,380,314
Virginia Beach-Norfolk-Newport News, VA-NC	1,716,624
Raleigh, NC	1,242,974
Greensboro-High Point, NC	746,593
Winston-Salem, NC	655,015
Durham-Chapel Hill, NC	542,710
Asheville, NC	442,316
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	417,668
Fayetteville, NC	377,939
Hickory-Lenoir-Morganton, NC	362,896
Wilmington, NC	272,548
Jacksonville, NC	187,589
Greenville, NC	175,354
Burlington, NC	155,792
Rocky Mount, NC	149,290
New Bern, NC	134,760
Goldsboro, NC	124,456

Monitoring Network Changes Proposed by NC-DAQ

The NC-DAQ received internal comments on the Network Plan as well as from six commenters including the Southern Environmental Law Center on behalf of the North Carolina League of Conservation Voters, the Sierra Club, the Southern Alliance for Clean Energy, and the Western North

Carolina Alliance. The NC-DAQ provided a response to the comments as part of its final Network Plan. The public comments expressed concern over the numerous monitor shutdown requests in the Network Plan and the number of monitor shutdowns in recent years. The EPA conducted its own analysis of North Carolina's ambient air monitoring network including historical design values (DVs), annual $PM_{2.5}$ and O_3 trends, nearby monitor correlations, meteorology, and spatial coverage when evaluating the requests to discontinue the requested regulatory monitors.

Since 2012, $PM_{2.5}$ concentrations in North Carolina have decreased. Because the $PM_{2.5}$ levels have remained lower for the last four years, the EPA is approving a significantly reduced $PM_{2.5}$ monitoring network. Many of the $PM_{2.5}$ monitors to be shutdown are not located in CBSAs and were sited to measure general background or regional transport. Also, the EPA is approving the shutdown of several monitors located in CBSAs where the network exceeds the minimum requirements. These "over minimum requirement" monitors that are approved for shutdown read similarly to other nearby monitors or have consistently recorded concentrations lower than nearby monitors.

Ozone levels across the state have also been lower in the last three years. The EPA is approving reductions in the O_3 ambient air monitoring network for monitors that have consistently been below the standard and consistently measured lower concentrations than nearby monitors.

Further rationale for the EPA's approval of specific network changes can be found below in the pollutant sections of this document. Monitors proposed for discontinuation or relocation and the EPA's determination are summarized in Table 2.

Table 2: Monitors Proposed for Discontinuation

AQS ID	Site Name	Pollutant	Type	Comments
37-119-1005	Arrowood	O_3	SLAMS	Approved
37-069-0001	Franklinton	O_3	SLAMS	Approved
37-183-0016	Fuquay	O_3	SLAMS	Approved
37-037-0004	Pittsboro	O_3	SLAMS	Approved
37-067-0028	Shiloh Church	O_3	SLAMS	Approved
37-189-0003	Boone	$PM_{2.5}$	SLAMS	Approved
37-033-0001	Cherry Grove	$PM_{2.5}$	SLAMS	Approved
37-191-0005	Dillard School	$PM_{2.5}$	SLAMS	Approved in 2014 Network Plan
37-117-0001	Jamesville	$PM_{2.5}$	SLAMS	Approved
37-061-0002	Kenansville	$PM_{2.5}$	SLAMS	Approved
37-111-0004	Marion	$PM_{2.5}$	SLAMS	Approved
37-159-0021	Rockwell	$PM_{2.5}$	SLAMS	Approved
37-087-0012	Waynesville	$PM_{2.5}$	SLAMS	Approved
37-067-0030	Clemmons Middle	$PM_{2.5}$	SLAMS	Approved
37-067-0023	Peter's Creek	CO	SLAMS	Approved

On October 23, 2015, NC-DAQ submitted a letter to the EPA to move the Pitt County Ag Center monitoring site (AQS ID 37-147-0006) a distance of 350 meters to a location on the same property. The EPA reviewed this request and approves the relocation of the Pitt County Ag Center Site (see Table 3).

Table 3: Monitors Proposed for Relocation/Startup

AQS ID	Site Name	Pollutant	Type	Comments
37-147-0006	Pitt Ag. Center	$PM_{2.5}$ and O_3	SLAMS	Approved – relocation of monitoring site ~350 meters from existing site

The EPA reviewed these requests for monitor discontinuation or relocation and determined that they meet the requirements of 40 CFR §58.14(c) for monitor discontinuation and relocation. The minimum monitoring requirements for $PM_{2.5}$, CO, and O_3 found in 40 CFR Part 58, Appendix D will continue to be met for the respective CBSAs, if the monitors are located in CBSAs, after the monitors are discontinued or relocated.

Air Quality Index (AQI) Reporting
40 CFR §58.50

AQI reporting is required in MSAs with populations over 350,000. There are 10 MSAs in the state required to report an AQI: Charlotte-Gastonia-Concord, Virginia Beach-Norfolk-Newport News, Raleigh-Cary, Greensboro-High Point, Durham-Chapel Hill, Winston-Salem, Asheville, Hickory-Lenoir-Morganton, Fayetteville, and Wilmington. NC-DAQ meets these AQI reporting requirements.

National Core (NCore) Monitoring Network
40 CFR Part 58, Appendix D, 3.0

Ambient air monitoring network criteria for NCore sites are found in 40 CFR Part 58, Appendix D, 3. NC-DAQ lists two NCore sites in the Network Plan. The first site (AQS ID 37-183-0014) is located at the East Millbrook Middle School site in Raleigh, NC and is operated by NC-DAQ. The second site (AQS ID 37-119-0041) is located at the Garinger site in Charlotte, NC and is operated by the Mecklenburg County Air Quality (MCAQ) agency. The EPA approval of these sites was granted on October 30, 2009. The 2015 Network Plan meets the minimum monitoring requirements for NCore sites.

Minimum O_3 Monitoring Requirements
40 CFR Part 58, Appendix D, Table D-2

The state of North Carolina's proposed O_3 monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-2 for all MSAs, except the Myrtle Beach-Conway-North Myrtle Beach MSA (see discussion below).

OMB changed the composition of several MSA boundaries in February of 2013, including adding Brunswick County, North Carolina to the Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA. This change has triggered the requirement to establish an O_3 monitor in this MSA. NC-DAQ provided a memorandum of agreement with South Carolina Department of Health and Environmental Control (SC DHEC) to collectively meet the O_3 monitoring requirements for this MSA. The SC DHEC 2015 Annual Monitoring Network Plan identifies a location for a new O_3 monitor to meet this requirement. However, SC DHEC did not provide adequate and sufficient information for the EPA to approve its proposed location. The EPA has requested that SC DHEQ provide an addendum to its Network Plan with additional information on the proposed O_3 monitoring location in the Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA.

The Network Plan also proposes to shutdown five O_3 monitors: Franklinton (AQS ID 37-069-0001), Pittsboro (AQS ID 37-037-0004), Fuquay (AQS ID 37-183-0016), Arrowood (AQS ID 37-119-1005), and Shiloh Church (AQS ID 37-067-0028) (listed in Table 2 above).

The EPA approves the shutdown of the Pittsboro, Franklinton, and Fuquay monitors in the Raleigh and Durham areas of North Carolina. The EPA looked at historical comparisons of O_3 concentrations, meteorology, and the spatial distribution of O_3 monitors in the Durham-Chapel Hill and Raleigh MSAs to make this determination. O_3 levels have been below the new standard of 70 ppb for the last three years (2013, 2014, and 2015) for this entire region. The Pittsboro monitor is upwind of the Durham MSA and has read consistently lower than the other O_3 monitors in the MSA. The Franklinton O_3 monitor is located downwind of the Raleigh urban core, however concentrations at the Franklinton monitor have consistently been similar or lower than the O_3 concentrations measured at the Millbrook monitor in Raleigh. The Fuquay monitor is the upwind monitor for the Raleigh MSA. This monitor has consistently measured O_3 concentrations similar to and slightly lower than the Millbrook O_3 monitor. When these monitors are shutdown, the Durham-Chapel Hill and the Raleigh MSAs will still meet the minimum O_3 monitoring requirements found in 40 CFR Part 58, Appendix D.

The EPA also approves the shutdown of the Arrowood O_3 monitor, operated by the MCAQ. In 2014, the property for the Arrowood site was sold and the MCAQ's lease was not renewed. The EPA previously approved the temporary shutdown of the Arrowood O_3 monitor for the 2015 O_3 season, while the MCAQ evaluated whether to replace/relocate the Arrowood O_3 monitor. The MCAQ ultimately decided not to replace this monitor and proposed the permanent shutdown of Arrowood instead of relocating the monitor to a nearby area. The EPA reviewed meteorology and historical O_3 concentrations in the Charlotte area. The Arrowood site is typically upwind of the Charlotte urban area and has recorded lower O_3 values than the other O_3 monitors in the area. Without the Arrowood O_3 monitor operating, the Charlotte-Concord-Gastonia MSA still meets the minimum O_3 monitoring requirements found in 40 CFR Part 58, Appendix D.

The EPA also approves the permanent shutdown of the Shiloh Church O_3 monitor, operated by the Forsyth County Office of Environmental Assistance and Protection (OEAP). This monitor has consistently measured the lowest concentrations in the Winston-Salem MSA. When this monitor is shutdown, the Winston-Salem MSA will still meet the minimum O_3 monitoring requirements found in 40 CFR Part 58, Appendix D.

CO Monitoring Requirements
40 CFR Part 58, Appendix D, 4.2

Ambient air monitoring network design criteria for CO are found in 40 CFR Part 58, Appendix D, 4.2. CBSAs with populations over one million are required to operate one CO monitor collocated with a near-road NO_2 site. For both the Raleigh CBSA and the Charlotte CBSA, CO monitors are required to operate by January 1, 2017 as indicated in 40 CFR §58.13(e)(2). This requirement will apply to the Triple Oak near-road site (AQS ID 37-183-0021) in the Raleigh CBSA and the Remount Road near-road site (AQS ID 37-119-0045) in the Charlotte CBSA.

The Forsyth County OEAP requested in an appendix to the Network Plan to shutdown the Peter's Creek CO monitoring site (AQS ID 37-067-0023). This monitor has been required to operate as part of a CO maintenance plan, which expired November 7, 2015. The highest DV measured at the Peter's Creek site in the last five year was 26% of the NAAQS. This monitor meets the requirements of 40 CFR §58.14(c)(1) for shutdown eligibility and the CO monitoring requirements found in 40 CFR Part 58, Appendix D will continue to be met in the Winston-Salem CBSA. EPA approves the shutdown of the Peter's Creek CO monitor, once it is no longer required by the maintenance plan.

NO_2 Monitoring Requirements
40 CFR Part 58, Appendix D, 4.4

Ambient air monitoring network design criteria for NO_2 are found in 40 CFR Part 58, Appendix D, 4.3. There are three types of required NO_2 monitoring: near-road, area-wide, and Regional Administrator required. These types of NO_2 monitoring are described in Sections 4.3.2, 4.3.3, and 4.3.4, respectively.

The EPA previously approved the Triple Oak site (AQS ID 37-183-0021) and the Remount Road site (AQS ID 37-119-0045) in fulfillment of the near-road NO_2 requirements for the Raleigh CBSA and the Charlotte-Concord-Gastonia CBSA.

The Greensboro-High Point, NC; Winston-Salem, NC; and Durham-Chapel Hill, NC CBSAs are required to have near-road NO_2 monitoring by January 1, 2017. A new NO_2 monitoring rule is expected to be promulgated in 2016. The new rule may change the NO_2 near-road monitoring requirements for CBSAs with populations between 500,000 and 1,000,000 people, such as the Greensboro-High Point; Winston-Salem; and Durham-Chapel Hill CBSAs.

The EPA previously approved the selection of the Garinger (AQS ID 37-119-0041) and Millbrook (AQS ID 37-183-0014) sites in fulfillment of the area-wide NO_2 monitoring requirement for the Charlotte-Concord-Gastonia and Raleigh CBSAs.

The EPA also previously selected the Hattie Avenue site (AQS ID 37-067-0022) operated by Forsyth County OEAP as a location for a Regional Administrator required NO_2 monitor to help protect susceptible and vulnerable populations. The full list of NO_2 monitors identified by the EPA's Regional Administrators can be found on the EPA's website at http://www.the EPA.gov/ttnamti1/svpop.html.

SO_2 Monitoring Requirements
40 CFR Part 58, Appendix D, 4.4

Ambient air monitoring network design criteria for SO_2 are found in 40 CFR Part 58, Appendix D, 4.4. This section requires that "The population weighted emissions index (PWEI) shall be calculated by states for each core based statistical area (CBSA)." As a result, the SO_2 monitoring site(s) required in each CBSA will satisfy minimum monitoring requirements if the monitor(s) is sited within the boundaries of the parent CBSA and is one of the following site types: population exposure, maximum concentration, source-oriented, general background, or regional transport. An SO_2 monitor at an NCore station may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors consistent with Appendix D, 4.4.

Table 4 shows the location on required SO_2 monitors based on the 2012 PWEI. Existing SO_2 monitoring sites described in the Network Plan meet the minimum requirements of 40 CFR Part 58. The NC-DAQ operates regulatory SO_2 monitors in the Charlotte-Gastonia-Concord, NC-SC; Durham, NC; and Wilmington, NC CBSAs to meet the PWEI requirements. The Virginia Department of Environmental Quality operates a regulatory SO_2 monitor in the Virginia Beach-Norfolk-Newport News, VA-NC

CBSA. The EPA recommends that North Carolina update its MSA agreement with Virginia to include sharing the SO_2 minimum monitoring requirements for the Virginia Beach-Norfolk CBSA and include this update in its 2016 Network Plan.

Table 4: PWEI and SO_2 Required Monitors in North Carolina

CBSA Name	July 2012 PWEI Values	July 2012 PWEI Required Monitors
Virginia Beach-Norfolk-Newport News, VA-NC	78,540	1
Charlotte-Gastonia-Concord, NC-SC	34,426	1
Durham, NC	16,885	1
Wilmington, NC	10,045	1

The EPA finalized the SO_2 Data Requirements Rule (DRR) on August 10, 2015. This rule will require characterization of the air quality near sources with SO_2 emissions greater than 2,000 tons per year (tpy) by conducting ambient air monitoring or modeling. We encourage your agency to begin having conversations with affected sources in the state of North Carolina to determine an agreed upon approach for meeting the DRR requirements. By January 15, 2016, NC-DAQ must submit a final list of sources to the EPA Region 4 identifying the sources in the state around which SO_2 air quality must be characterized. For sources that NC-DAQ decides to evaluate using ambient air monitoring, new site proposals must be included in the 2016 Network Plan. The location of these monitoring sites should be selected using the process outlined in the SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document[1].

The Network Plan requests a waiver of the requirement for a PWEI SO_2 monitor in the Asheville CBSA, due to an increase in Asheville's population. The PWEI calculated by NC-DAQ is 5,074. Forty CFR Part 58, Appendix D, 4.4 states that "For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO_2 monitor is required within that CBSA." The EPA's previous calculations show the Asheville PWEI to be below the PWEI threshold for requiring an SO_2 monitor. NC-DAQ may elect to conduct SO_2 monitoring in the Ashville CBSA beginning in 2017 under the DRR. The EPA will work with NC-DAQ to determine the appropriate requirements for this CBSA. The EPA grants a waiver of this SO_2 monitoring requirement for 2016, so that the NC-DAQ, the Western North Carolina Regional Air Quality Agency (WNCRAQA), and the EPA can determine the appropriate requirements for this CBSA. NC-DAQ should address SO_2 monitoring requirements for the Asheville CBSA in the 2016 Network Plan

Pb Monitoring Requirements
40 CFR Part 58, Appendix D, 4.5

40 CFR Part 58, Appendix D, 4.5 requires that "At a minimum, there must be one source-oriented SLAMS [state and local air monitoring station] site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and

[1] SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document. U.S. EPA Office of Air Quality Planning and Standards Air Quality Assessment Division, Draft December 2013. http://www3.epa.gov/airquality/sulfurdioxide/pdfs/SO2MonitoringTAD.pdf

from each airport which emits 1.0 or more tons per year…" Section 4.5(a)(ii) provides the following provisions for a waiver of the Pb monitoring requirements:

> "(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50% of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under 58.10(d)."

In its approval of the state's 2011 Network Plan, pursuant the provisions of the above section, the EPA granted waivers of the source-oriented ambient air monitoring requirements at two sources: Blue Ridge Paper Products, Inc. in Canton, NC and Saint Gobain Containers in Wilson, NC. The waivers must be renewed every five years as part of the network assessment required under 40 CFR §58.10(d).

The Saint Gobain Containers facility is the only facility in North Carolina with 2011 NEI Pb emissions over 0.5 tpy. This facility is estimated to emit 0.53 tpy. The 2011 modeling of this facility used Pb emissions of 1.3 tpy. The EPA believes that the previously submitted modeling is sufficiently conservative and is approving the renewal of the source-oriented ambient air Pb monitoring requirements at Saint Gobain Containers in Wilson, NC for five years, until 2020.

Based on the 2011 NEI, Blue Ridge Paper Products, Inc. in Canton, NC emitted less than 0.5 tpy of Pb. Thus, Blue Ridge Paper Products is not subject to the Pb monitoring requirements. A waiver of the source-oriented ambient air Pb monitoring requirements is no longer required for this facility. If in the future this facility is estimated to emit more than 0.5 tpy, then NC-DAQ will need to submit a new waiver request or monitor for Pb near the facility. At this time, no other facilities in North Carolina emit more than 0.5 tpy of Pb and are subject to required Pb source-oriented monitoring.

Forty CFR Part 58, Appendix D, 3(b) requires that "NCore sites in CBSAs with a population of 500,000 people (as determined in the latest census) or greater shall also measure Pb either as Pb-TSP or Pb-PM_{10}." This monitoring was required to begin December 27, 2011. The Network Plan indicates that Pb-PM_{10} sampling is ongoing at the Charlotte NCore site (AQS ID 37-119-0041) and the Raleigh NCore site (AQS ID 37-183-0014). As a result, the Pb monitoring network described in the Network Plan meets the design criteria of 40 CFR Part 58.

Minimum PM_{10} Monitoring Requirements
40 CFR Part 58, Appendix A, 3.3.1
40 CFR Part 58, Appendix D, Table D-4

The state of North Carolina's current PM_{10} primary monitoring network meets the minimum requirements for all areas. All PM_{10} collocation requirements for manual methods found in 40 CFR Part 58, Appendix A, 3.3.1 are being met. These include the requirement that 15 percent of each network of manual PM_{10} methods (at least one site) must be collocated. The Network Plan requested a waiver of the requirements to operate a second PM_{10} monitor in Raleigh. Since PM_{10} levels have been significantly lower than the NAAQS for the last decade, the EPA grants a waiver of the requirement for a second PM_{10} monitor in the Raleigh MSA.

Minimum $PM_{2.5}$ Monitoring Requirements
40 CFR Part 58, Appendix A, 3.2.5
40 CFR Part 58, Appendix D, Table D-5

The state proposed to shutdown nine $PM_{2.5}$ monitors. These monitors are listed in the Table 5 below.

Table 5: $PM_{2.5}$ Monitors Proposed for Discontinuation

AQS ID	Site Name	County	MSA
37-033-0001	Cherry Grove	Caswell	Not in a MSA
37-061-0002	Kenansville	Duplin	Not in a MSA
37-087-0012	Waynesville	Haywood	Asheville, NC
37-111-0004	Marion	McDowell	Not in a MSA
37-117-0001	Jamesville	Martin	Not in a MSA
37-159-0021	Rockwell	Rowan	Charlotte-Concord-Gastonia, NC-SC
37-189-0003	Boone	Watauga	Boone, NC
37-191-0005	Dillard School	Wayne	Goldsboro, NC
37-067-0030	Clemmons	Forsyth	Winston-Salem, NC

The EPA reviewed historical DVs, annual $PM_{2.5}$ trends, nearby monitor correlations, meteorology, and spatial coverage when evaluating the requests to shutdown these monitors. The $PM_{2.5}$ levels have continued to remain low for the last four years, thus allowing the EPA to approve a reduced $PM_{2.5}$ monitoring network in North Carolina.

The Network Plan demonstrates that Cherry Grove, Kenansville, Jamesville, and Boone $PM_{2.5}$ sites meet EPA's guidance for determining shutdown eligibility and the requirements of 40 CFR 58.14(c)(1). Thus, EPA approves the discontinuation of these four monitors.

The Rockwell monitor is downwind of Charlotte, however it has consistently recorded lower $PM_{2.5}$ concentrations than the other monitors in the Charlotte-Concord-Gastonia MSA. Additionally, the Rockwell monitor has measured $PM_{2.5}$ annual average concentrations about 9 $\mu g/m^3$ since 2012. This is 3 $\mu g/m^3$ below the annual standard. With the shutdown of the Rockwell monitor, the Charlotte CBSA will continue to meet the minimum monitoring requirements in 40 CFR Part 58, Appendix D. The EPA approves the discontinuation of the Rockwell $PM_{2.5}$ monitor.

The Marion $PM_{2.5}$ monitor is not in a MSA with minimum monitoring requirements and has measured annual average $PM_{2.5}$ values well below the annual standard for the last five years. The EPA approves the discontinuation of $PM_{2.5}$ measurement at the Marion site. Because the EPA previously approved the shutdown of the Dillard $PM_{2.5}$ monitor, no additional approval is needed.

The Waynesville $PM_{2.5}$ monitor operated by the NC-DAQ is located in Haywood County in the Asheville MSA. The WNCRAQA operates $PM_{2.5}$ monitors at the Board of Education site (AQS ID 37-087-0012) in Buncombe County, NC, also in the Asheville MSA. The Waynesville monitor has consistently measured both higher annual average $PM_{2.5}$ concentrations and daily average concentrations than the Board of Education site. The daily average measurements at each site do not correlate well, indicating that they measure different airsheds, and different local air pollution sources and events. This might be expected since the Waynesville and Board of Education sites are located in separate valleys of the regional mountainous terrain.

The most recent DV for the Waynesville site is 8.7 µg/m^3. Previously, the Asheville MSA had been required to operate one $PM_{2.5}$ monitor (per 40 CFR Part 58, Appendix D, Table D-5), but now it does not have a minimum monitoring requirement since the most recent DV is less than 85% of the NAAQS and the MSA's population is under 500,000 people. The Waynesville $PM_{2.5}$ DV has been less than 85% of the 2012 $PM_{2.5}$ NAAQS (12 µg/m^3) since 2011. The EPA approves the shutdown of the Waynesville monitor. However, the EPA recommends that NC-DAQ consider operating a $PM_{2.5}$ monitor in Waynesville, even if it is non-regulatory.

The EPA compared $PM_{2.5}$ concentrations at the Clemmons site operated by the Forsyth County OEAP, with the nearby Hattie Avenue $PM_{2.5}$ site, also operated by the Forsyth County OEAP. The measurements at the two sites correlate well, indicating that they measure very similar airsheds. Also, the Clemmons $PM_{2.5}$ site has typically measured slightly lower $PM_{2.5}$ daily average concentrations than the Hattie Avenue $PM_{2.5}$ monitor measured. Thus, the EPA approves shutting down the $PM_{2.5}$ monitoring at the Clemmons site.

Forty CFR Part 58, Appendix D, Table D-5 requires MSAs with over one million people, like Raleigh, to operate three $PM_{2.5}$ monitors, if the most recent DV is greater than or equal to 85% of the NAAQS. The 2012-2014 $PM_{2.5}$ DV at the Millbrook site is 86% of the NAAQS. There are currently two $PM_{2.5}$ monitoring sites operating in the Raleigh MSA: Millbrook (AQS ID 37-183-0014) and West Johnson Co. (AQS ID 37-101-0002). By 2017, the NC-DAQ is required to operate a $PM_{2.5}$ monitor at the Triple Oak (AQS ID 37-183-0021) near-road site (see the next section). Once operating, the $PM_{2.5}$ monitor at the Triple Oak site will be the third $PM_{2.5}$ site in the Raleigh MSA and the MSA will meet the minimum monitoring requirements found in 40 CFR Part 58, Appendix D.

The state of North Carolina's current $PM_{2.5}$ monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-5 for all MSAs, except the Raleigh MSA. Manual $PM_{2.5}$ collocation requirements are found in 40 CFR Part 58, Appendix A, 3.2.5. These include the requirement that 15 percent of each network of manual $PM_{2.5}$ methods (at least one site) must be collocated. The manual collocation requirements for $PM_{2.5}$ are currently being met in the Network Plan.

$PM_{2.5}$ Near-road Monitoring Requirements
40 CFR Part 58, Appendix D, 4.7.1(b)(2)

Regulatory requirements in 40 CFR Part 58, Appendix D, Section 4.7.1(b)(2) require that "CBSAs with a population of 1,000,000 or more persons, at least one $PM_{2.5}$ monitor is to be collocated at a near-road NO_2 station." $PM_{2.5}$ near-road monitoring is required in the Charlotte-Concord-Gastonia, NC-SC and Raleigh, NC CBSAs, by January 1, 2017.

$PM_{2.5}$ Continuous Monitoring Requirements
40 CFR Part 58, Appendix D, 4.7.2

Regulatory requirements for continuous $PM_{2.5}$ monitoring require that "...State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D-5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM [federal reference method/federal equivalent method/approved regional method] monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies." These minimum continuous $PM_{2.5}$ monitoring requirements are met in all MSAs in the state. Also, the continuous $PM_{2.5}$ collocation requirements are met in all MSAs. Therefore, the continuous $PM_{2.5}$ monitoring network described in the 2015 Network Plan meets all of the design criteria of 40 CFR Part 58.

$PM_{2.5}$ Continuous Federal Equivalent Methods
40 CFR § 58.10(e)

EPA regulations contain provisions for handling data collected using continuous $PM_{2.5}$ FEMs. These procedures are found at 40 CFR § 58.10(e). If an agency can demonstrate that the FEM data are not of sufficient comparability to a collocated FRM, then the monitoring agency may request that the FEM data not be used in comparison to the NAAQS.

In response to the 2014 Network Plan, the EPA approved five FEM monitors which are not considered comparable to the $PM_{2.5}$ NAAQS at the following sites: Kenansville (AQS ID 37-061-0002); Jamesville (AQS ID 37-117-0001); Castle Hayne (AQS ID 37-129-0002); Dillard School (AQS ID 37-191-0005); and Blackstone (AQS ID 37-105-0002). NC-DAQ currently reports the data from these monitors to the AQS parameter code 88502.

$PM_{2.5}$ Background and Transport Sites
40 CFR Part 58, Appendix D, 4.7.3

Forty CFR Part 58, Appendix D, 4.7.3 requires that "each State shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor for regional transport." The Network Plan identifies two $PM_{2.5}$ sites as general background sites: Mendenhall (AQS ID 37-081-0013), and Candor (AQS ID 37-123-0001). The Network Plan identifies the Bryson City site (AQS ID 37-173-0002) as a regional transport site for $PM_{2.5}$. Therefore, the NC-DAQ has satisfied the requirements of 40 CFR Part 58 for background and transport sites.

$PM_{2.5}$ Chemical Speciation Network (CSN)
40 CFR Part 58, Appendix D, 4.7.4

The EPA conducted an assessment of the $PM_{2.5}$ CSN in an effort to optimize the network and to create a network that is sustainable going forward. As a result of this assessment, the EPA has defunded a number of monitoring sites, eliminated the CSN $PM_{2.5}$ mass measurement, reduced the frequency of carbon blanks, reduced sample frequency at some monitoring sites, and reduced the number of the packs in shipment during the cooler months of the year.

The EPA defunded four CSN monitors at sites in North Carolina: Rockwell (AQS ID 37-159-0021); Lexington Water Tower (AQS ID 37-057-0002); Asheville's Board of Education (AQS ID 37-021-0034); and Hickory Water Tower (AQS ID 37-035-0004). CSN monitors at these sites were shutdown on December 31, 2014. EPA continues to fund three CSN monitors in North Carolina: Garinger (AQS ID 37-119-0041), operated by MCAQ; Hattie Avenue (AQS ID 37-067-0022), operated by Forsyth County OEAP; and Millbrook (AQS ID 37-183-0014), operated by NC-DAQ.

Photochemical Assessment Monitoring Station (PAMS)
40 CFR Part 58, Appendix D, 5.0

With the recent passage of a new ozone NAAQS on October 1, 2015, the EPA also finalized changes to the PAMS program. By June 1, 2019, the NCore sites in Raleigh and Charlotte will be required to implement PAMS monitoring. The EPA recognizes there are several implementation challenges to work through and we commit to working closely with NC-DAQ and MCAQ to minimize the burden of implementing this new monitoring program. At this time, however, the PAMS requirement is being met in the state of North Carolina.

Appendix N. Monitoring Agreement between Virginia and North Carolina for the Virginia Beach-Norfolk-New Port News Metropolitan Statistical Area

MEMORANDUM OF AGREEMENT

ON AIR QUALITY MONITORING FOR CRITERIA POLLUTANTS FOR

THE VIRGINIA BEACH-NORFOLK-NEWPORT NEWS, VA-NC

METROPOLITAN STATISTICAL AREA (MSA)

Date: April 5, 2016

Participating Agencies:

North Carolina
Department of Environmental Quality (NCDEQ)
Division of Air Quality (NCDAQ)

Virginia
Department of Environmental Quality (VADEQ)
Air Division

I. PURPOSE/OBJECTIVES/GOALS

The purpose of this Memorandum of Agreement (MOA) is to establish the Virginia Beach-Norfolk-Newport News Metropolitan Statistical Area (MSA) Criteria Pollutant Air Quality Monitoring Agreement between NCDEQ and VADEQ (collectively referred to as the "affected agencies") to collectively meet United States Environmental Protection Agency (EPA) minimum monitoring requirements for criteria pollutants deemed necessary to meet the needs of the MSA as determined reasonable by all parties. This MOA will establish the terms and conditions of this collective agreement to provide adequate criteria pollutant monitoring for the Virginia Beach-Norfolk-Newport News MSA as required by 40 CFR 58 Appendix D, Section 2(e).

II. BACKGROUND

The Virginia Beach-Norfolk-Newport News MSA consists of:

Counties	Cities
Currituck County, NC	Chesapeake, VA
Gates County, NC	Hampton, VA
Gloucester County, VA	Newport News, VA
Isle of Wight County, VA	Norfolk, VA
James City County, VA	Poquoson, VA
Mathews County, VA	Portsmouth, VA
York County, VA	Suffolk, VA
	Virginia Beach, VA
	Williamsburg, VA

NCDEQ has jurisdiction over Currituck County and Gates County; VADEQ has jurisdiction over the others.

The NCDEQ and VADEQ are required by the Clean Air Act to measure for certain criteria pollutants in the ambient air in the Virginia Beach-Norfolk-Newport News MSA. The EPA has established minimum monitoring requirements based on the size of the MSA and the quality of the air in the MSA.

40 CFR 58 Appendix D, Section 2 (e) states (in part):

> "... The EPA recognizes that State or local agencies must consider MSA/CSA boundaries and their own political boundaries and geographical characteristics in designing their air monitoring networks. The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or to divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator."

Currently each air pollution control agency (affected agency) conducts monitoring in its respective jurisdiction and coordinates monitoring with the other air pollution control agencies within the MSA.

III. ROLES AND RESPONSIBILITIES

The parties agree to the following terms and conditions:

- NCDEQ and VADEQ (the "affected agencies") commit to conducting appropriate monitoring in their respective jurisdictions of the MSA, as needed, to collectively meet EPA minimum monitoring requirements for the entire MSA for criteria air pollutant monitoring deemed necessary to meet the needs of the MSA as determined reasonable by both affected agencies. The minimum air quality monitoring requirements for the MSA shall apply to the MSA in its entirety and shall not apply to any sole affected agency within the MSA unless agreed upon by all affected agencies.

- The affected agencies commit to coordinating monitoring responsibilities and requirements to achieve an effective network design regarding criteria air pollutant monitoring conducted in the MSA and commit to communicate unexpected or unplanned changes in monitoring activities within their jurisdictions to the other affected agency. As conditions warrant, the affected agencies may conduct telephone conference calls, meetings, or other communications to discuss monitoring activities for the MSA. Each affected party shall inform the other via telephone or e-mail of any monitoring changes occurring in its jurisdiction of the MSA at its earliest convenience after learning of the need for the change or making the changes. Such unforeseen changes may include evictions from monitoring sites, destruction of monitoring sites due to natural disaster, or similar occurrences that result in extended (greater than one quarter) or permanent change in the monitoring network. At least once a year in the second quarter or before June 15^{th}, each agency shall deliver to the other agency a copy of its proposed monitoring plan for its jurisdiction within the MSA for the next year.

IV. LIMITATIONS

A. All commitments made in this MOA are subject to the availability of funds and each party's budget priorities. Nothing in this MOA, in and of itself, obligates NCDEQ or VADEQ to expend funds or to enter into any contract, assistance agreement, interagency agreement, or other financial obligation. Nothing herein shall be construed as a promise by either party to indemnify or hold harmless the other party.

B. This MOA is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties to this MOA will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate subsidiary agreements what will be effected in writing by representatives of the parties.

C. Except as provided in Section III, this MOA does not create any right or benefit, substantive or procedural, enforceable by law or equity against NCDEQ or VADEQ, their officers or employees, or any other person. This MOA does not direct or apply to any person outside NCDEQ or VADEQ.

V. PROPRIETARY INFORMATION AND INTELLUCTUAL PROPERTY

No proprietary information or intellectual property is anticipated to arise out of this MOA.

VI. POINTS OF CONTACT

The following individuals are designated points of contact for the MOA:

NCDEQ DAQ:	Donnie Redmond, Ambient Monitoring Section Chief NC DENR Division of Air Quality 1641 Mail Service Center Raleigh, NC 27699-1641 donnie.redmond@ncdenr.gov Voice/fax: 919-707-8468
VADEQ:	Chuck Turner, Director of Air Quality Monitoring VADEQ Air Quality Division P.O. Box 1105 Richmond, VA 23218 Charles.Turner@deq.virginia.gov Voice: (804) 527-5178

VII. MODIFICATION/DURATION/TERMINATION

This MOA will be effective when signed by all parties. This MOA may be amended at any time by the mutual written consent of all parties. The parties will review this MOA at least once every 10 years to determine whether it should be revised, renewed, or cancelled. This MOA may be revoked or terminated by an affected party at any time and for any reason by giving thirty (30) days written notice prior to the date of termination.

VIII. REFERENCE

United States Environmental Protection Agency, Title 40 Code of Federal Regulations, Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 2 (e), "General Monitoring Requirements"

IX. APPROVALS

North Carolina Department of Environmental Quality (NCDEQ)
Division of Air Quality

BY: Sheila C. Holman

TITLE: Director

DATE: 4/26/2016

Virginia Department of Environmental Quality (VADEQ)
Air Quality Division

BY: [signature]

TITLE: Director, Air Division

DATE: 5/9/16

Appendix O. Monitoring Agreement for the Myrtle Beach-Conway-North Myrtle Beach Metropolitan Statistical Area

MEMORANDUM OF AGREEMENT

ON AIR QUALITY MONITORING FOR CRITERIA POLLUTANTS FOR

THE MYRTLE BEACH-CONWAY-NORTH MYRTLE BEACH

METROPOLITAN STATISTICAL AREA (MSA)

July 1, 2015

Participating Agencies:

North Carolina
Department of Environment and Natural Resources (NCDENR)
Division of Air Quality (NCDAQ)

South Carolina
Department of Health and Environmental Control (SCDHEC)
Bureau of Air Quality

I. PURPOSE/OBJECTIVES/GOALS

The purpose of this Memorandum of Agreement (MOA) is to establish the Myrtle Beach-Conway-North Myrtle Beach Metropolitan Statistical Area (MSA) Criteria Pollutant Air Quality Monitoring Agreement between NCDAQ and SCDHEC (collectively referred to as the "affected agencies") to collectively meet United States Environmental Protection Agency (EPA) minimum monitoring requirements for ozone, as well as other criteria pollutants air quality monitoring deemed necessary to meet the needs of the MSA as determined reasonable by all parties. This MOA will establish the terms and conditions of this collective agreement to provide adequate criteria pollutant monitoring for the Myrtle Beach-Conway-North Myrtle Beach MSA as required by 40 CFR 58 Appendix D, Section 2(e).

II. BACKGROUND

The Myrtle Beach-Conway-North Myrtle Beach MSA consists of Horry County and Brunswick County. NCDAQ has jurisdiction over Brunswick County and SCDHEC has jurisdiction over Horry County. Brunswick County was previously included in the Wilmington (NC) MSA with New Hanover and Pender Counties. However, the United States Office of Management and Budget revised the geographic delineation in February 2013 to include Brunswick County in the Myrtle Beach-Conway-North Myrtle Beach MSA instead.

The NCDAQ and SCDHEC are required by the Clean Air Act to measure for certain criteria pollutants in the ambient air in the Myrtle Beach-Conway-North Myrtle Beach MSA. The EPA has established minimum monitoring requirements based on the size of the MSA and the quality of the air in the MSA for ozone.

40 CFR 58 Appendix D, Section 2 (e) states (in part):

> "... The EPA recognizes that State or local agencies must consider MSA/CSA boundaries and their own political boundaries and geographical characteristics in designing their air monitoring networks. The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or to

divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator."

Currently each air pollution control agency (affected agency) conducts monitoring in its respective jurisdiction and coordinates monitoring with the other air pollution control agencies with the MSA.

III. ROLES AND RESPONSIBILITIES

The parties agree to the following terms and conditions:

- NCDAQ and SCDHEC (the "affected agencies") commit to conducting appropriate monitoring in their respective jurisdictions of the MSA; as needed, to collectively meet EPA minimum monitoring requirements for the entire MSA for ozone, as well as other criteria air pollutant monitoring deemed necessary to meet the needs of the MSA as determined reasonable by both affected agencies. The minimum air quality monitoring requirements for the MSA shall apply to the MSA in its entirety and shall not apply to any sole affected agency within the MSA unless agreed upon by all affected agencies.

- The affected agencies commit to coordinating monitoring responsibilities and requirements to achieve an effective network design regarding criteria air pollutant monitoring conducted in the MSA and commit to communicate unexpected or unplanned changes in monitoring activities within their jurisdictions to the other affected agency. As conditions warrant, the affected agencies may conduct telephone conference calls, meetings, or other communications to discuss monitoring activities for the MSA. Each affected party shall inform the other via telephone or e-mail of any monitoring changes occurring in its jurisdiction of the MSA at its earliest convenience after learning of the need for the change or making the changes. Such unforeseen changes may include evictions from monitoring sites, destruction of monitoring sites due to natural disaster, or similar occurrences that result in extend (greater than one quarter) or permanent change in the monitoring network. At least once a year in the second quarter or before June 15th, each agency shall deliver to the other agency a copy of its proposed monitoring plan for its jurisdiction with the MSA for the next year.

- Each party reserves the right to revoke or terminate this MOA at any time for any reason by giving thirty (30) days written notice prior to the date of termination.

IV. LIMITATIONS

A. All commitments made in this MOA are subject to the availability of funds and each party's budget priorities. Nothing in this MOA, in and of itself, obligates NCDAQ or SCDHEC to expend funds or to enter into any contract, assistance agreement, interagency agreement, or other financial obligation.

B. This MOA is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties to this MOA will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate subsidiary agreements what will be effected in writing by representatives of the parties.

C. Except as provided in Section III, this MOA does not create any right or benefit, substantive or procedural, enforceable by law or equity against NCDAQ or SCDHEC, their officers or employees, or any other person. This MOA does not direct or apply to any person outside NCDAQ or SCDHEC.

V. PROPRIETARY INFORMATION AND INTELLUCTUAL PROPERTY

No proprietary information or intellectual property is anticipated to arise out of this MOA.

VI. POINTS OF CONTACT

The following individuals are designated points of contact for the MOA:

NC DENR DAQ: Donnie Redmond
NC DENR Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641

donnie.redmond@ncdenr.gov
Voice/fax: 919-707-8468

SCDHEC: Scott Reynolds
SCDHEC Bureau of Air Quality
2600 Bull Street
Columbia, SC 29201

reynolds@dhec.sc.gov
Voice: 803-896-0902

VII. MODIFICATION/DURATION/TERMINATION

This MOA will be effective when signed by all parties. This MOA may be amended at any time by the mutual written consent of all parties. The parties will review this MOA at least once every 10 years to determine whether it should be revised, renewed, or cancelled. This MOA may be revoked or terminated by an affected party at any time and for any reason by giving thirty (30) days written notice prior to the date of termination.

VIII. REFERENCE

United States Environmental Protection Agency, Title 40 Code of Federal Regulations, Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 2 (e), "General Monitoring Requirements"

IX. APPROVALS

North Carolina Department of Environment and Natural Resources
Division of Air Quality (NCDAQ)

BY: Sheila C. Holman

TITLE: Director, Division of Air Quality

DATE: 6/12/2015

South Carolina Department of Health and Environmental Control (SCDHEC)
Bureau of Air Quality

BY: Myra C. Reece

TITLE: Bureau Chief, Bureau of Air Quality

DATE: 6/22/15

Appendix P. 2010 Network Plan EPA Approval Letter

Donni

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

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AIR QUALITY DIVISI
DIRECTORS OFFICE

Ms. Sheila C. Holman
Director
Division of Air Quality
North Carolina Department of
Environment and Natural Resources
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Dear ~~Ms. Holman~~ Sheila:

Thank you for submitting the State of North Carolina's 2010 annual ambient air monitoring network plan (Network Plan), dated July 1, 2010. The Network Plan is required by 40 Code of Federal Regulations (CFR) §58.10. The Network Plan covers the ambient air monitoring network for the North Carolina Division of Air Quality (NC-DAQ) and its local agencies.

The Environmental Protection Agency (EPA) Region 4 understands that the NC-DAQ provided a 30-day public comment period and received comments from PCS Phosphate Company, Inc. and Mr. Clayton Moore. EPA found that NC-DAQ sufficiently considered and responded to the comments. According to 40 CFR §58.10(a)(2), since public inspection and comment have already been solicited, the EPA Region 4 is not required to offer another comment period.

Based upon our review of the Network Plan, EPA Region 4 has determined that the document satisfies the applicable requirements of 40 CFR Part 58. The Network Plan is approved. Comments and recommendations are enclosed.

Thank you for your work with us to monitor air pollution and promote healthy air quality in North Carolina and the nation. If you have any questions or concerns, please contact Doug Neeley at (404) 562-9097 or Katherine Sciera at (404) 562-9840.

Sincerely,

Gwendolyn Keyes Fleming
Regional Administrator

Enclosure

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cc: Mr. Donnie Redmond
Supervisor IV, North Carolina Dept. of Air Quality

Mr. Don R. Willard
Director, Mecklenburg County Land Use and Environmental Services Agency

Mr. Robert R. Fulp
Director, Forsyth County Environmental Affairs Department

Mr. David Brigman
Director, Western North Carolina Regional Air Quality Agency

FY 2010 State of North Carolina Ambient Air Monitoring Network Plan
U.S. EPA Region 4 Comments and Recommendations

This document contains U.S. EPA Region 4 comments and recommendations to the State of North Carolina's 2010 ambient air monitoring network plan (Network Plan). Ambient air monitoring rules, which include regulatory requirements that address network plans, data certification, and minimum monitoring requirements, among other requirements, are found in 40 CFR Part 58. Minimum monitoring requirements for criteria pollutants are listed in 40 CFR Part 58, Appendix D. Minimum monitoring requirements do not exist for carbon monoxide (CO) unless required by the establishment of a National Core (NCore) multi-pollutant monitoring station, and/or a state implementation plan. However, new national ambient air quality standards (NAAQS) were promulgated this year for nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) with minimum monitoring requirements effective January 1, 2013. Minimum monitoring requirements are listed for ozone (O_3), particulate matter less than 2.5 microns ($PM_{2.5}$), particulate matter less than 10 microns (PM_{10}), and lead (Pb).

The minimum monitoring requirements are based on metropolitan statistical area (MSA) boundaries as defined by the U.S. Office of Management and Budget (OMB), July 1, 2009, population estimates from the U.S. Census Bureau, and historical ambient air monitoring data. OMB currently defines 15 MSAs in the State of North Carolina. These MSAs and the respective July 1, 2009, population estimates from the U.S. Census Bureau are shown in Table 1.

Table 1: Metropolitan Statistical Areas and Populations

MSA Name	Population
Charlotte-Gastonia-Concord, NC-SC	1,745,524
Virginia Beach-Norfolk-Newport News, VA-NC	1,674,498
Raleigh-Cary, NC	1,125,827
Greensboro-High Point, NC	714,765
Durham-Chapel Hill, NC	501,228
Winston-Salem, NC	484,921
Asheville, NC	412,672
Hickory-Lenoir-Morganton, NC	365,364
Fayetteville, NC	360,355
Wilmington, NC	354,525
Greenville, NC	179,715
Jacksonville, NC	173,064
Burlington, NC	150,358
Rocky Mount, NC	146,536
Goldsboro, NC	113,811

Minimum Ozone Monitoring Requirements
40 CFR Part 58, Appendix D, Table D-2

The network described in the 2010 Network Plan meets the minimum O_3 monitoring requirements specified by 40 CFR Part 58, Appendix D, Table D-2 in all areas.

Minimum PM_{10} Monitoring Requirements
40 CFR Part 58, Appendix A 3.3.1
40 CFR Part 58, Appendix D, Table D-4

The State of North Carolina's current PM_{10} primary monitoring network meets the minimum requirements for all areas. All PM_{10} collocation requirements for manual methods found in 40 CFR Part 58, Appendix A, 3.3.1 are currently being met. Fifteen percent of each network of manual PM_{10} methods (at least one site) must be collocated. Also, the sites with collocated monitors should be among those measuring annual mean concentrations in the highest 25 percent of the network. These collocation requirements are met in the Network Plan for manual PM_{10} sampling.

Minimum $PM_{2.5}$ Monitoring Requirements
40 CFR Part 58, Appendix A 3.2.5
40 CFR Part 58, Appendix D, Table D-5

The State of North Carolina's current $PM_{2.5}$ monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-5 for all MSAs. Manual $PM_{2.5}$ collocation requirements are found in 40 CFR Part 58, Appendix A, section 3.2.5. Fifteen percent of each network of manual $PM_{2.5}$ methods (at least one site) must be collocated. The manual collocation requirement for $PM_{2.5}$ is currently being met in the Network Plan. In addition, there is a requirement for 80% of these collocated monitors to be at sites that are $\pm$ 20% of the NAAQS. Currently, only 20% of the collocated monitors are at sites $\pm$ 20% of the NAAQS. EPA recommends that the collocated sites be moved to the appropriate sites to meet this requirement. The following monitoring sites currently have $PM_{2.5}$ design values within $\pm$ 20 percent of the NAAQS and are recommended for consideration as collocation monitors: Air Quality System (AQS) ID 37-035-004, AQS ID 37-057-0002, AQS ID 37-063-0001, AQS ID 37-071-0016, AQS ID 37-087-0010, AQS ID 37-119-0041, AQS ID 37-119-0042, AQS-ID 37-119-0043, AQS ID 37-135-0007, and AQS ID 37-159-0021.

$PM_{2.5}$ Continuous Monitoring Requirements
40 CFR Part 58, Appendix D 4.7.2

Regulatory requirements for continuous $PM_{2.5}$ monitoring require that "...State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D–5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required [Federal Reference Method (FRM)/Federal Equivalent Method (FEM)/Approved Regional Method (ARM)] monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies." These minimum continuous $PM_{2.5}$ monitoring requirements are currently met in the all of the MSAs in the State. Also, the continuous $PM_{2.5}$ collocation requirements are currently met in all MSAs. Therefore, the continuous $PM_{2.5}$ monitoring network described in the 2010 Network Plan meets all of the design criteria of 40 CFR Part 58.

$PM_{2.5}$ Background and Transport Sites
40 CFR Part 58, Appendix D 4.7.3

40 CFR Part 58, Appendix D, 4.7.3 requires that "each State shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor for regional transport." The 2010 Network Plan identifies the $PM_{2.5}$ sites at Mendenhall (AQS ID: 37-081-0013), Cherry Grove (AQS ID: 37-033-0001), and Jamesville (AQS ID: 37-117-0001) as background sites and the $PM_{2.5}$ sites at Cherry Grove (AQS ID: 37-033-0001), Jamesville (AQS ID: 37-117-0001), and Bryson City (AQS ID: 37-173-0002) as regional transport sites. Therefore, NC-DAQ has satisfied the requirements of 40 CFR Part 58 for background and transport sites.

Lead (Pb) Monitoring Requirements
40 CFR Part 58, Appendix D 4.5

Ambient air monitoring network design criteria for Pb are found at section 4.5 of Appendix D to 40 CFR Part 58.. This section requires that, at a minimum, there must be one source-oriented state and local air monitoring station (SLAMS) located to measure the maximum Pb concentration in ambient air resulting from each Pb source which emits 1.0 or more tons per year (t/yr).

NC-DAQ was not required to conduct ambient air monitoring at three sources (see list below) based upon submitted information in the 2009 and 2010 Network Plans indicating that the following sources will not contribute more than 1.0 t/yr. EPA concurs with this assessment and will not require ambient air monitoring at these sources in the 2010 Network Plan.

International Resistive Company (IRC)
736 Greenway Road
Boone, NC 28607

Nucor Steel
1505 River Road
Cofield, NC 27922

Carolina Power and Light Company (Progress Energy) Roxboro Steam Station
1700 Dunnaway Road
Semora, NC 27343

Air Quality Index (AQI) Reporting
40 CFR §58.50

AQI reporting is required in MSAs with populations over 350,000. There are 10 MSAs in the State of North Carolina required to report an AQI: Charlotte-Gasonia-Concord, Virginia Beach-Norfolk-Newport News, Raleigh-Cary, Greensboro-High Point, Durham-Chapel Hill, Winston-Salem, Asheville, Hickory-Lenoir-Morganton, Fayetteville, and Wilmington. NC-DAQ meets these AQI reporting requirements.

Monitoring Network Changes Proposed by NC-DAQ

NC-DAQ has proposed several monitoring network changes in the 2010 Network Plan. Any monitors listed in the Network Plan as possibly being relocated or discontinued are subject to a case-by-case evaluation by a letter request from NC-DAQ when NC-DAQ has a proposed shut-down date for that particular monitor or an approved regional method. Monitors proposed for discontinuation are summarized in Table 2.

Table 2: Monitors proposed for discontinuation/location change

AQS ID	Pollutant	Type	Comments
37-173-0002	SO_2	SLAMS	Monitor was shut down after EPA approval dated June 24, 2010
37-081-0013	$PM_{2.5}$	QA Collocated	Collocated monitor shut down
37-087-0004	Ozone	SLAMS	Evicted from property, moving site across the road to Junaluska Elementary School, keep AQS ID the same for 250 meter location move
37-061-0002	PM_{10}	PSD	PSD monitor shut down and convert to special purpose monitor operating every third year
37-107-0004	Ozone	SLAMS	Relocate monitor on property due to structure that obstructs air flow to monitor
37-069-0001	Ozone	SLAMS	Relocate monitor or shut down due to road construction

EPA has reviewed these requests for discontinuation or monitor relocation and determined that all of the requested monitors meet the requirements of 40 CFR §58.14(c)(6) for monitor relocation or are requests to shut down PSD or QA monitors, which are not subject to EPA Region 4 approval. EPA Region 4 encourages NC-DAQ to maintain the AQS ID 37-087-0004 instead of assigning a new AQS ID for this site because the site is only moved 250 meters. By maintaining the AQS ID, the NAAQS design values can be calculated continuously. The minimum monitoring requirements for PM_{10}, $PM_{2.5}$, and O_3 found in Appendix D to 40 CFR Part 58 will continue to be met for the respective MSAs after these monitors are discontinued or relocated.

NC-DAQ also requested to change the monitoring frequency at AQS ID 37-081-0013 (primary monitor) to 1-in-3 days. At this proposed frequency, the monitors will meet the $PM_{2.5}$ operating schedule requirements under 40 CFR §58.12(d)(1)(i). Therefore, EPA approves the change to 1-in-3 day monitoring at these sites.

National Core (NCore) Monitoring Network

NC-DAQ has designated two NCore sites, AQS ID 37-183-0014 and AQS ID 37-119-0041, in the 2010 Network Plan. The first site (AQS ID 37-183-0014) is located at the East Millbrook Middle School site in Raleigh, NC. The second site (AQS ID 37-119-0041) is located at the Garinger site in Charlotte, NC and is operated by the Mecklenburg County Land Use and Environmental Services Agency. Official EPA approval was granted on October 30, 2009. All quality assurance procedures shall be implemented in accordance with 40 CFR Part 58, Appendix A.

Air Quality System (AQS)

Based on listings of monitor types in the Network Plan, NC-DAQ has several monitors that are listed as "other." EPA encourages the State to be more specific in their monitor types in AQS. Monitors that are listed as "other" will be treated as a SLAMS monitor for regulatory evaluations. Secondly, the State should verify that monitor types in AQS match those in the Network Plan. For example, the SO_2 monitor at AQS ID 37-051-1003 is listed as a special purpose monitor in the Network Plan, but as a SLAMS monitor in AQS. A similar case exists for PM_{10} monitor AQS ID 37-081-0013, which is listed as "other" in the Network Plan, but as a SLAMS monitor in AQS. EPA uses the AQS designation for regulatory purposes and will consider both of these monitors SLAMS until approved otherwise. The State is responsible for maintaining current monitor type classifications in AQS.

Appendix Q. NCore Monitoring Plan Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

Donnie
Gayle Sheila

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AND STANDARDS

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AIR QUALITY DIVISION
DIRECTORS OFFICE

Mr. Keith Overcash, Director
Division of Air Quality
NC Department of Environment & Natural Resources
1641 Mail Service Center
Raleigh, NC 27699-1641

Dear Mr. Overcash:

This letter transmits our approval of North Carolina's proposed NCore station at East Millbrook Middle School in Raleigh, AQS# 37-183-0014, as required by the Ambient Air Monitoring Regulations. According to these rules (see 40 CFR 58.11(c)), NCore network design and changes must be approved by the Environmental Protection Agency's (EPA) Administrator. This authority has been delegated to the Director of the Air Quality Assessment Division in EPA's Office of Air Quality Planning and Standards.

In considering your proposed NCore monitoring station, we worked with your Regional Office on a review of your annual monitoring network plan and an assessment of the proposed location and characteristics of the area to be monitored. After careful consideration of your proposal, we are pleased to approve this station as part of the NCore network.

In your agency's plan for NCore, a request was made to waive measuring NOy, which is a required measurement. After assessing available NOy observations and modeling outputs and to assure consistency across all NCore stations, we are affirming the requirement to measure NOy at all NCore stations. Please make arrangements with your Regional Office on a schedule to implement the measurement of NOy at your NCore station.

By EPA's rules (see 40 CFR 58.13), an approved NCore station is expected to be operating with all required measurements by January 1, 2011. Enclosure A provides an update on required measurements and Enclosure B provides EPA's Air Quality System instructions on coding for NCore monitors and data. Please share this information with your staff responsible for the NCore station measurements and data submission.

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2

Thank you for your program's efforts in developing the NCore station plan and establishing the site. For questions, you may contact Tim Hanley at hanley.tim@epa.gov and 919-541-4417, or David Shelow at shelow.david@epa.gov and 919-541-3776.

Sincerely,

Richard A. Wayland
Director
Air Quality Assessment Division

2 Enclosures

cc: Doug Neeley, EPA Region 4

Appendix R. 2012 Network Plan EPA Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
SAM NUNN
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA GEORGIA 30303-8960

SEP 21 2012

Ms. Sheila C. Holman
Director
Division of Air Quality
North Carolina Department of
Environment and Natural Resources
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Dear Ms. Holman:

Thank you for submitting the state of North Carolina's 2012 annual ambient air monitoring network plan (Network Plan), dated July 2, 2012. The Network Plan is required by 40 Code of Federal Regulations (CFR) §58.10. The Network Plan covers the ambient air monitoring network for the North Carolina Division of Air Quality and its local agencies.

The U.S. Environmental Protection Agency Region 4 understands that the NC-DAQ provided a 30-day public comment period and did not receive any public comments. According to 40 CFR §58.10(a)(2), since public inspection and comment have already been solicited, EPA Region 4 is not required to offer another comment period.

With this letter, EPA Region 4 is approving the North Carolina Network Plan with the exception of the NO_2 monitoring plans. The state will need to provide additional information on NO_2 monitoring as described in the enclosure. Once EPA Region 4 is in agreement with the additional information provided, the state will need to make the information available for public inspection. Upon completion of the public inspection process, EPA Region 4 will submit the NO_2 addendum to the Network Plan to the EPA Administrator for approval per 40 CFR 58.10(a)(5). We have enclosed comments on your network plan and will continue to work with your agency on the remaining portions of the plan that have not been approved with this letter.

Thank you for working with us to monitor air pollution and promote healthy air quality in North Carolina and the nation. If you have any questions or concerns, please contact Doug Neeley at (404) 562-9097 or Ryan Brown at (404) 562-9147.

Sincerely,

Beverly A. Spagg
Beverly H. Banister
Director
Air, Pesticides and Toxics
Management Division

Enclosure

cc: Mr. Donnie Redmond, Supervisor IV
North Carolina Department of Air Quality

Mr. Don R. Willard, Director
Mecklenburg County Land Use and Environmental Services Agency

Mr. William M. Barnette, Director
Forsyth County Environmental Affairs Department

Mr. David Brigman, Director
Western North Carolina Regional Air Quality Agency

Mr. Mike Peyton
Director, EPA Region 4 Science and Ecosystems Support Division

CY 2012 State of North Carolina Ambient Air Monitoring Network Plan
U.S. EPA Region 4 Comments and Recommendations

This document contains U.S. EPA Region 4 comments and recommendations on the state of North Carolina's 2012 ambient air monitoring network plan (Network Plan). Ambient air monitoring rules, which include regulatory requirements that address network plans, data certification, and minimum monitoring requirements, among other requirements, are found in 40 CFR Part 58. Minimum monitoring requirements for criteria pollutants are listed in 40 CFR Part 58, Appendix D. Minimum monitoring requirements are listed for ozone (O_3), particulate matter less than 2.5 microns ($PM_{2.5}$), particulate matter less than 10 microns (PM_{10}), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and lead (Pb).

The minimum monitoring requirements are based on core based statistical area (CBSA) boundaries, as defined by the U.S. Office of Management and Budget (OMB); July 1, 2011, population estimates from the U.S. Census Bureau; and historical ambient air monitoring data. Minimum monitoring requirements for O_3, $PM_{2.5}$, PM_{10}, only apply to metropolitan statistical areas (MSAs), which are a subset of CBSAs that contain an urban core of 50,000 or more population. OMB currently defines 15 MSAs in the state of North Carolina. These MSAs and the respective July 1, 2011, population estimates from the U.S. Census Bureau are shown in Table 1.

Table 1: Metropolitan Statistical Areas and Populations

MSA Name	Population
Charlotte-Gastonia-Rock Hill, NC-SC	1,795,472
Virginia Beach-Norfolk-Newport News, VA-NC	1,679,894
Raleigh-Cary, NC	1,163,515
Greensboro-High Point, NC	730,966
Durham-Chapel Hill, NC	512,979
Winston-Salem, NC	482,025
Asheville, NC	429,017
Fayetteville, NC	374,157
Wilmington, NC	369,685
Hickory-Lenoir-Morganton, NC	364,567
Greenville, NC	192,690
Jacksonville, NC	179,719
Burlington, NC	153,291
Rocky Mount, NC	152,157
Goldsboro, NC	123,697

Minimum O_3 Monitoring Requirements
40 CFR Part 58, Appendix D, Table D-2

The state of North Carolina's proposed O_3 monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-2 for all MSAs. Additionally, the proposed O_3 monitoring network described in the Network Plan meets all of the design criteria of 40 CFR Part 58.

The Network Plan discusses that NC-DAQ may consider, depending on available resources, shutting down three O_3 monitors that are in excess of the required minimum monitoring. If NC-DAQ decides it would like to shutdown the monitors it will need to send a formal request to EPA.

Minimum PM_{10} Monitoring Requirements
40 CFR Part 58, Appendix A, 3.3.1
40 CFR Part 58, Appendix D, Table D-4

The state of North Carolina's current PM_{10} primary monitoring network meets the minimum requirements for all areas. All PM_{10} collocation requirements for manual methods found in 40 CFR Part 58, Appendix A, 3.3.1 are currently being met. These include the requirement that fifteen percent of each network of manual PM_{10} methods (at least one site) must be collocated.

Minimum $PM_{2.5}$ Monitoring Requirements
40 CFR Part 58, Appendix A, 3.2.5
40 CFR Part 58, Appendix D, Table D-5

The state of North Carolina's current $PM_{2.5}$ monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-5 for all MSAs. Manual $PM_{2.5}$ collocation requirements are found in 40 CFR Part 58, Appendix A, 3.2.5. These include the requirement that fifteen percent of each network of manual $PM_{2.5}$ methods (at least one site) must be collocated. The manual collocation requirements for $PM_{2.5}$ are currently being met in the Network Plan.

The Network Plan discusses that NC-DAQ may consider, depending on available resources, shutting down two $PM_{2.5}$ monitors. If NC-DAQ decides it would like to shutdown the monitors it will need to send a formal request to EPA.

$PM_{2.5}$ Continuous Monitoring Requirements
40 CFR Part 58, Appendix D, 4.7.2

Regulatory requirements for continuous $PM_{2.5}$ monitoring require that "...State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D–5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM [federal reference method/federal equivalent method/approved regional method] monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies." These minimum continuous $PM_{2.5}$ monitoring requirements are currently met in the all MSAs in the state. Also, the continuous $PM_{2.5}$ collocation requirements are currently met in all MSAs. Therefore, the continuous $PM_{2.5}$ monitoring network described in the 2012 Network Plan meets all of the design criteria of 40 CFR Part 58.

$PM_{2.5}$ Background and Transport Sites
40 CFR Part 58, Appendix D, 4.7.3

Forty (40) CFR Part 58, Appendix D, 4.7.3 requires that "each state shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor for regional transport." The Network Plan identifies seven $PM_{2.5}$ sites as general background sites that include: Mendenhall (AQS ID: 37-081-0013), Cherry Grove (AQS ID: 37-033-0001), Springfield Road (AQS ID: 37-065-0004), Kenansville (AQS ID: 37-061-0002), Boone (AQS ID: 37-189-0003), Candor (AQS

ID: 37-123-0001), and Jamesville (AQS ID: 37-117-0001). The Network Plan identifies three regional transport sites for $PM_{2.5}$ identified as: Cherry Grove (AQS ID: 37-033-0001), Jamesville (AQS ID: 37-117-0001), and Bryson City (AQS ID: 37-173-0002). Therefore, NC-DAQ has satisfied the requirements of 40 CFR Part 58 for background and transport sites.

The Network Plan discusses that NC-DAQ may consider, depending on available resources, shutting down two regional transport/general background $PM_{2.5}$ monitors and replacing them with BAMs. NC-DAQ will need to send a formal request to shut down these monitors to EPA, when it has finalized its decision. EPA will then consider the request.

Lead Monitoring Requirements
40 CFR Part 58, Appendix D, 4.5

Forty (40) CFR Part 58, Appendix D, 4.5 requires that "At a minimum, there must be one source-oriented SLAMS [state and local air monitoring station] site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year..."

Section 4.5(a)(ii) of Appendix D to 40 CFR Part 58 provides the following provisions for a waiver of the Pb monitoring requirements:

> "(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the state or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under 58.10(d)."

In approving the state's 2011 Network Plan, pursuant the provisions of the above section, EPA granted waivers of the source-oriented ambient air monitoring requirements at two sources: Blue Ridge Paper Products, Inc. in Canton, North Carolina and Saint Gobain Containers in Wilson, North Carolina. The waivers must be renewed every five years as part of the network assessment required under 40 CFR §58.10(d). There are no sources in North Carolina that are required to have source-oriented Pb monitoring at this time.

Forty (40) CFR Part 58, Appendix D, 3(b) requires that "NCore sites in CBSAs with a population of 500,000 people (as determined in the latest Census) or greater shall also measure Pb either as Pb-TSP or Pb-PM_{10}." This monitoring was required to begin December 27, 2011. The Network Plan indicates that Pb-PM_{10} sampling is ongoing at the Charlotte NCore site (AQS ID: 37-119-0041) and the Raleigh NCore site (AQS ID: 37-183-0014). The Pb monitoring network described in the Network Plan meets all of the design criteria of 40 CFR Part 58.

Sulfur Dioxide Monitoring Requirements
40 CFR Part 58, Appendix D, 4.4

Ambient air monitoring network design criteria for SO_2 are found in Section 4.4 of Appendix D to 40 CFR Part 58. This section requires that "The population weighted emissions index (PWEI) shall be calculated by states for each core based statistical area (CBSA)." As a result, the SO_2 monitoring site(s) required in each CBSA will satisfy minimum monitoring requirements if the monitor(s) is sited within the boundaries of the parent CBSA and is one of the following site types: population exposure, maximum concentration, source-oriented, general background, or regional transport. An SO_2 monitor at a NCore station may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors consistent with Appendix D, 4.4.

EPA's Office of Air Quality Planning and Standards (OAQPS) have updated the PWEI calculations using the latest available emissions inventory data and population estimates. Several areas in Region 4 have decreased monitoring requirements as a result of these new calculations, including four CBSAs in North Carolina. The Virginia Beach-Norfolk-Newport News and Charlotte-Gastonia-Concorde CBSAs will be required to operate one monitor instead of two. The Greensboro-High Point and Winston-Salem CBSAs will be required to operate minimally no monitors instead of one. The requirements did not change for the Durham or Wilmington CBSAs. The SO_2 requirements and discussed monitoring requirement changes are shown in Table 2 below.

Table 2: PWEI and SO_2 Required Monitors in North Carolina

CBSA Name	Sept 2011 PWEI Values	Sept 2011 PWEI Required Monitors	July 2012 PWEI Values	July 2011 PWEI Required Monitors	Change in Monitors Required
Virginia Beach-Norfolk-Newport News, VA-NC	100,711	2	78,540	1	-1
Charlotte-Gastonia-Concord, NC-SC	127,397	2	34,426	1	-1
Durham, NC	28,837	1	16,885	1	0
Wilmington, NC	12,246	1	10,045	1	0
Greensboro-High Point, NC	6,576	1	2,897	0	-1
Winston-Salem, NC	8,894	1	2,691	0	-1

The SO_2 network is to be operational beginning January 1, 2013. Existing SO_2 monitoring sites described in the Network Plan meet the minimum requirements of 40 CFR Part 58, in all areas except the Durham CBSA. North Carolina has proposed to install a new SO_2 monitor at the Durham Armory site (AQS ID: 37-063-0015) to meet the PWEI requirement in this area. EPA approves this request.

Nitrogen Dioxide (NO_2) Monitoring Requirements
40 CFR Part 58, Appendix D, 4.4

Ambient air monitoring network design criteria for NO_2 are found in Section 4.3 of Appendix D to 40 CFR Part 58. There are three types of required NO_2 monitoring: near-road, area-wide, and Regional Administrator required. These types of NO_2 monitoring are described in sections 4.3.2, 4.3.3, and 4.3.4, respectively.

Any CBSA with a population of 500,000 or more persons is required to have a near-road NO_2 monitoring station that monitors expected maximum hourly concentrations near a major road. Any CBSA with a population of 2,500,000 or more persons or that has one or more roadway segments with a 250,000 or greater annual average daily traffic (AADT) count is required to have an additional near-road NO_2 monitoring station. The *Near-road NO_2 Monitoring Technical Assistance Document* (TAD) provides guidance to state and local agencies in selecting an appropriate near-road NO_2 monitoring location. This document can be found on the internet at http://www.epa.gov/ttnamti1/files/nearroad/NearRoadTAD.pdf.

Ambient air monitoring network design criteria for area-wide NO_2 sites are found in Section 4.3.3 of Appendix D to 40 CFR Part 58. Any CBSA with a population of 1,000,000 or more persons is required to monitor a location of expected highest NO_2 concentrations representing the neighborhood or larger spatial scales.

Ambient air monitoring network design criteria for Regional Administrator required NO_2 monitoring, often referred to as RA-40 monitoring, are found in Section 4.3.4 of Appendix D to 40 CFR Part 58. This section states, "the Regional Administrators, in collaboration with states, must require a minimum of forty additional NO_2 monitoring stations nationwide in any area, inside or outside of CBSAs, above the minimum monitoring requirements, with a primary focus on siting these monitors in locations to protect susceptible and vulnerable populations. The Regional Administrators, working with states, may also consider additional factors … to require monitors beyond the minimum network requirement."

Pending action by the EPA Administrator, EPA Region 4 supports the selection of the Garinger (AQS ID: 37-119-0041) and Millbrook (AQS ID: 37-183-0014) sites in fulfillment of the area-wide NO_2 monitoring requirement for the Charlotte-Gastonia-Rock Hill and Raleigh-Cary CBSAs. We note your acknowledgement that the Hattie Avenue site (AQS ID: 37-067-0022) should be considered among the NO_2 monitors intended to help protect susceptible and vulnerable populations. EPA Region 4 also supports the proposed near-road NO_2 site located at Triple Oak Road in the Raleigh-Cary CBSA and required by 40 CFR 58, Appendix D, 4.3.2.

The state will need to provide EPA with an addendum to its Network Plan containing additional information on its near-road NO_2 monitoring plans in the Charlotte-Gastonia-Rock Hill CBSA.

The addendum should also include additional information about the proposed near-road monitoring site. Section 13.5 of the near-road NO_2 TAD and Table 13.1 of the TAD discuss important site and road parameters when evaluating a near-road site. Using the TAD as a reference, additional information provided on near-road NO_2 monitoring should include; at minimum, the following information for each site:

- Proposed AQS ID
- Street address and site geographical coordinates (longitude and latitude)
- Target road segment description including type of road
- Site pictures facing 4-8 directions – N, S, E, W, NE, NW, SE, SW
- Probable distance between the inlet probe and the outside nearest edge of the target road
- Site property description including property owner and feasibility of site access
- Roadway design and configuration
- Presence of any roadside structures
- Nearest windrose representative of the site and orientation of the site with respect to the predominate wind direction
- Traffic data and ranking information (see Table 6-3 of the Technical Assistance Document), as well as the source and vintage of the data
- Sampling and analysis method(s) for each measured parameter
- Operating schedules for each monitor at the site.

- Monitoring objective and spatial scale of representativeness for each monitor at the site.
- MSA, CBSA, CSA or other area represented by the monitor
- Discussion of other siting criteria

Once EPA Region 4 is in agreement with the proposed near-road site, the state will need to make the information available for public inspection. Upon completion of the public inspection process, EPA Region 4 will submit the NO_2 addendum to the Network Plan to the EPA Administrator for approval per 40 CFR 58.10(a)(5). We will continue to work with your agency as needed to get the near-road NO_2 site operational as expeditiously as possible.

Air Quality Index (AQI) Reporting
40 CFR §58.50

AQI reporting is required in MSAs with populations over 350,000. There are 10 MSAs in the state of North Carolina required to report an AQI: Charlotte-Gasonia-Concord, Virginia Beach-Norfolk-Newport News, Raleigh-Cary, Greensboro-High Point, Durham-Chapel Hill, Winston-Salem, Asheville, Hickory-Lenoir-Morganton, Fayetteville, and Wilmington. NC-DAQ meets these AQI reporting requirements.

Monitoring Network Changes Proposed by NC-DAQ

In the Network Plan, NC-DAQ has proposed to discontinue monitoring for CO at the Rockwell site (AQS ID: 37-159-0021). EPA has reviewed this request for discontinuation and determined that it meets the requirements of 40 CFR §58.14(c)(6) for monitor discontinuation.

National Core (NCore) Monitoring Network

Ambient air monitoring network criteria for NCore sites are found in Section 3 of Appendix D to 40 CFR Part 58. NC-DAQ designated two NCore sites in the Network Plan. The first site (AQS ID 37-183-0014) is located at the East Millbrook Middle School site in Raleigh, NC. The second site (AQS ID 37-119-0041) is located at the Garinger site in Charlotte, NC and is operated by the Mecklenburg County Land Use and Environmental Services Agency. Official EPA approval was granted for these sites on October 30, 2009. The 2012 Network Plan meets the minimum monitoring requirements for NCore sites.

Appendix S. Public Notice of Availability of Network Plan

Public notice of availability of the network plan was provided on the North Carolina Division of Air Quality website from May 27 through June 26, 2016. In addition, notification was sent out via public e-mail distribution lists maintained for permitting, rules, ambient monitoring and air toxics.

From:	Burleson, Joelle
Sent:	Friday, May 27, 2016 3:13 PM
To:	Burleson, Joelle
Cc:	Steger, Joette
Subject:	Ambient Monitoring Network Plan Available for Public Comment

Note: This message has been formatted such that replies will go to, Joette Steger in the Ambient Monitoring Section.

Hello Air Quality Stakeholders:

NC DAQ's annual monitoring network plan update is posted on the web site and is open for public comment through June 26, 2016.
Here are the links to the public notice and the summary page:

https://deq.nc.gov/event/public-notice-changes-ambient-air-quality-network-plan

http://deq.nc.gov/about/divisions/air-quality/air-quality-data/annual-network-plan/2015-2016-annual-monitoring-network-plan-for-north-carolina-air-quality

If you have any questions, please contact Donnie Redmond at (919) 707-8468 or Donnie.Redmond@ncdenr.gov or Joette Steger at 919 707-8449 or Joette.Steger@ncdenr.gov .

Have a nice day.

Joelle Burleson, EIT, CPM
Rules Development Branch Supervisor
Division of Air Quality, Planning Section
North Carolina Department of Environmental Quality

919 707 8720   office
joelle.burleson@ncdenr.gov

217 West Jones Street
1641 Mail Service Center
Raleigh, NC 27699-1641

NC Nothing Compares

From: Gatano, Betty
Sent: Friday, May 27, 2016 3:08 PM
To: NCDENR.DENR.DAQ.Stakeholders.Outside_Involvement_Committee
Cc: Steger, Joette
Subject: DAQ's Annual Network Monitoring Plan is Available for Public Comment

Changes to the division's Ambient Air Quality Monitoring Network planned during 2016 and 2017 will be available for public comments from May 27 to June 26, 2016. The public notice is available at https://deq.nc.gov/event/public-notice-changes-ambient-air-quality-network-plan.

If you have any questions, please contact Donald D. Redmond at (919) 707-8468 or Donnie.Redmond@ncdenr.gov.

Thank you,

Betty

Betty Gatano, P.E.
Advanced Engineer
Division of Air Quality
North Carolina Department of Environmental Quality

919 707 8736 office
betty.gatano@ncdenr.gov

217 West Jones Street
1641 Mail Service Center
Raleigh, NC 27699-1641

Nothing Compares

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Steger, Joette
Sent: Friday, May 27, 2016 3:03 PM
To: Steger, Joette
Subject: Annual Network Monitoring Plan available for public comment

North Carolina Department of Environmental Quality
North Carolina Division of Air Quality
Public Notice
Changes to the division's Ambient Air Quality Monitoring Network planned during 2016 and 2017 will be available for public comments from *May 27 to June 26, 2016*. The proposed changes are required to be submitted to the U.S. Environmental Protection Agency (EPA) annually.

INFORMATION: The Ambient Air Monitoring Annual Network Monitoring Plan will be posted for 30 days on the division's website at http://deq.nc.gov/about/divisions/air-quality/air-quality-data/annual-network-plan starting on Friday, May 27, 2016. It will also be available for review at the Division of Air Quality Raleigh Central Office located at 217 West Jones Street, Raleigh, North Carolina. Copies may also be obtained from Donald D. Redmond at the address below.

COMMENT PROCEDURES: All persons interested in these matters are invited to comment. Email comments to: DENR.DAQ.Ask_Ambient@lists.ncmail.net

Or mail to:

Donald D. Redmond
NC Division of Air Quality
1641 Mail Service Center
Raleigh, North Carolina 27699-1641
(919)-707-8468
(919)-707-8468 Fax

Joette Steger
Environmental Program Supervisor
Division of Air Quality, Ambient Monitoring Section
Department of Environmental Quality

919 707 8449 office
919 707 8449 fax
Joette.Steger@ncdenr.gov

217 W. Jones Street
1641 Mail Service Center
Raleigh, NC 27699-1641

Public Notice for Changes to Ambient Air Quality Network Plan +

Public Notice for Changes to Ambient Air Quality Network Plan

Event Description

North Carolina Department of Environment and Natural Resources
North Carolina Division of Air Quality
Public Notice
Changes to the division's Ambient Air Quality Monitoring Network planned during 2016 and 2017 will be available for public comments from ***May 27 to June 26, 2016***. The proposed changes are required to be submitted to the U.S. Environmental Protection Agency (EPA) annually.

INFORMATION: The Ambient Air Monitoring Annual Network Monitoring Plan will be posted for 30 days on the division's website at http://deq.nc.gov/about/divisions/air-quality/air-quality-data/annual-network-plan (https://deq.nc.gov/about/divisions/air-quality/air-quality-data/annual-network-plan) starting on Friday, May 27, 2016. It will also be available for review at the Division of Air Quality Raleigh Central Office located at 217 West Jones Street, Raleigh, North Carolina. Copies may also be obtained from Donald D. Redmond at the address below.

COMMENT PROCEDURES: All persons interested in these matters are invited to comment. Email comments to: DENR.DAQ.Ask_Ambient@lists.ncmail.net (mailto:DENR.DAQ.Ask_Ambient@lists.ncmail.net?subject=2016-2017%20Annual%20Monitoring%20Network%20Plan%20for%20North%20Carolina%20Air%20Quality)

Or mail to:

Donald D. Redmond
NC Division of Air Quality
1641 Mail Service Center
Raleigh, North Carolina 27699-1641
(919)-707-8468

Appendix T. Public Comments Received

Three public comments were received by e-mail. One commenter identified an error in the text and requested clarification of a heading in one of the tables. This comment is provided in Figure 95. The errors in the text were corrected and clarified. A second commenter expressed support for continuing to have real time air quality and pollen data available in the Charlotte area. He likes receiving e-mails alerting him of the air quality and pollen levels because it helps him manage his asthma and allergies. This comment is provided in Figure 96. Since monitoring is required in the Charlotte area, no response is required. The third comment document was submitted by the Southern Environmental Law Center (SELC) on behalf of itself and other environmental organizations. They expressed concern about the decrease of criteria pollutant monitors in the network, the process for relocating monitors, the use of monitoring instead of modeling to determine compliance with the sulfur dioxide one-hour standard, and the shutdown of the lead monitors in Raleigh and Charlotte. The e-mail used to submit these comments is provided in Figure 97 and the comment letter is provided after Figure 97.

<u>Changes Made to Monitoring Plan</u>

Four changes were made to the network plan after it went out for public comment in addition to adding information on public notice and public comments received (Appendices S and T). All four changes were to correct typographical errors. The first change was to remove a reference to a non-existent monitoring station in Volume 2 A. The second change was to replace Figure 64 in Volume 1 with the correct figure. The third change was to remove the column in Table D-1 labelled SO_2 Emissions (Missing Hours) because the information in this column was not used because there were no missing hours. The fourth change was to correct the AQS site ID for County Line in Table 3.

<u>Recent Reduction in the Number of Monitors in North Carolina</u>

The DAQ and MCAQ make the following response to the comments by SELC and other environmental organizations. The commenter's assessment of the of the monitoring network is inaccurate. Figure 94 shows the number of state and local program sites monitoring for each criteria pollutant in North Carolina from 2010 to 2016 and the projected sites for 2017. The EPA has approved each change made to the monitoring network and concluded that North Carolina continues to have an adequate monitoring network. It should be noted that the biggest change is in the number of fine particle monitors. It should also be noted that ambient concentrations of PM2.5 are about half of what they were 10 years ago, and are well below the NAAQS across the state. These low PM levels are due to significant and permanent reductions in NOx and SO2 emissions, especially by coal-burning power plants.

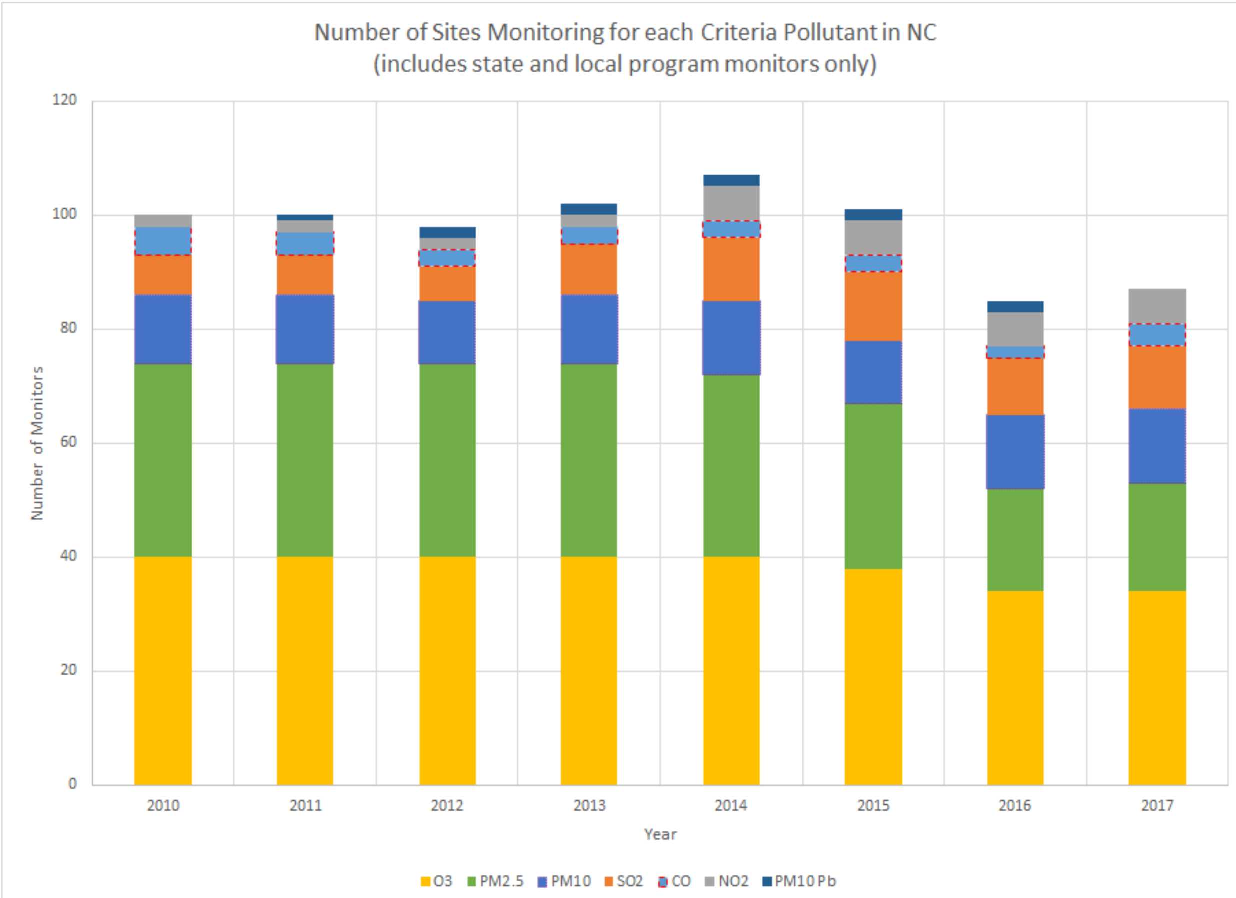

Figure 94. Criteria pollutant monitoring sites by criteria pollutant operated by the state and local programs (multi-pollutant sites are counted multiple times)

<u>Relocation of Lenoir and Pitt Ag Sites</u>

Relocation of the Lenoir and Pitt Ag sites by DAQ followed EPA guidance. Because the distances involved, 4 feet and 325 meters respectively, were insubstantial and both monitors remained on the same piece of property, measuring the same air mass, no public comment or input was required. DAQ notifies the EPA Region 4 as soon as it is are aware of the need to relocate a monitor, and works with them throughout the process, particularly when it occurs outside of the normal network plan submittal cycle. Provided below is additional information relative to the comments concerning monitors in the Mecklenburg County Air Quality, MCAQ, network.

<u>Relocation of County Line monitoring site (37-119-1009) to University Meadows (37-119-0046)</u>

MCAQ was required by the property owner of the former County Line monitoring site to remove the monitor from the property. In response to this unavoidable loss of an important ozone monitoring site, MCAQ staff worked diligently to ensure that the County Line ozone monitor would be relocated to a comparable site where the design value could be combined with previous years' data and begin monitoring prior to the 2016 ozone season. In addition to the federal requirements, one of the criteria for locating a new site was that it be county-owned property to reduce the risk of future relocation.

The property where the new monitor was located is owned and operated by Mecklenburg County Park and Recreation.

Relocating, rather than discontinuing, the County Line ozone monitor site was a priority for MCAQ and was important in assessing compliance with the 2015 National Ambient Air Quality Standard (NAAQS) for ozone in the Charlotte region. There are currently six ozone monitors in the Charlotte Core Based Statistical Area, CBSA. Table D-2 of Appendix D to 40 CFR Part 58 requires a minimum of two.

Timeline of Approved Relocation:

Date	Activity
10/15	MCAQ was notified that the property where County Line monitoring site was located was under contract to be sold and that the equipment needed to be removed.
10/15-1/16	MCAQ worked with USEPA and NCDAQ to locate a replacement site for the County Line ozone monitor.
10/31/15	Monitoring of ozone at County Line stopped on 10/31/15, as it does each year at the end of ozone season.
2/17/16	MCAQ officially notified USEPA in writing of the proposed relocation of the County Line ozone site.
2/17/16	MCAQ released the required Addendum to the Mecklenburg County Monitoring Network Plan for a 30-day public comment period.
2/22/16	MCAQ provided a presentation to the Mecklenburg County Air Quality Commission concerning the relocation of the County Line ozone site.
3/18/16	Comment period for Addendum closed. No comments were received.
3/18/16	MCAQ submitted a written request to USEPA for relocation of the County Line monitor to University Meadows Park and approval to combine ozone data from County Line and University Meadows.
4/1/16	Ozone monitoring began at the University Meadows site.
5/19/16	USEPA approved in writing the relocation to University Meadows and approved the combining of ozone data with County Line for purposes of calculating a complete design value for ozone.

Comparison of County Line to University Meadows:

Description	**County Line** (37-119-1009)	**University Meadows** (37-119-0046)
Distance from Central Business District	20 kilometers NE	15 kilometers NE
Site Elevation	216 meters	216 meters
Distance to nearest road	128 meters	50 meters
Orientation	Along primary summer wind vector (SW to NE)	Along primary summer wind vector (SW to NE)
Distance from County Line Site	-	4.3 kilometers
Scale or representativeness	Urban (4 km – 50 km diameter)	Urban (4 km – 50 km diameter)

Fine Particulate Monitoring

The MCAQ PM2.5 network is comprised of 3 monitoring sites. A minimum of two PM2.5 sites are required for the MSA. Currently, the PM2.5 monitoring network operated by MCAQ meets and exceeds the minimum monitoring requirements of 40 CFR 58 Appendix D.

The Oakdale site (37-119-0043) is not required and has the lowest values in the MCAQ PM2.5 network. The equipment and personnel required to run the Oakdale site will be used to start up and operate the federally required near-road PM2.5 monitor at Remount (37-119-0045) beginning in January 2017. Therefore, the number of PM2.5 monitors in the MCAQ network will remain the same.

PM-10 Monitoring at Fire Station #11 (37-119-0003)

The 2015 Ambient Air Quality Monitoring 5-Year Network Assessment for Mecklenburg County Air Quality stated the following:

> *3.6.3 Need to Terminate Existing Sites*
> *MCAQ is operating 3 PM10 sites. MCAQ will continue to operate these stations in 2015. However, concentrations monitored at these sites are well below the NAAQS. In an on-going evaluation of the network, MCAQ may reduce the network to 2 sites within the next 5 years.*

PM10 monitoring at Fire Station 11 indicates concentrations well below the NAAQS (NAAQS=150 µg/m3). During the previous 5-year period (2011-2015) the maximum concentration measured was 55 µg/m3, <37% of the NAAQS. The maximum annual arithmetic mean during the 5-year period 2011-2015 was 19.8µg/m3, <14% of the NAAQS.

Considering the low concentrations recorded at this monitoring station; and that monitoring requirements can be met by other monitoring stations within the network, monitoring will be terminated at this location on June 30, 2016.

SO_2 Monitoring

The SELC's comments do not accurately describe the siting of the SO2 sites. The selection of the four source-oriented sulfur dioxide monitoring locations at Canton, Semora, Bayview, and Southport followed EPA guidance contained in the Monitoring Technical Assistance Document and have been sited according to where the models indicate the highest concentrations are expected. Summary results of the modeling were included in the network plan for public review, and the modeling input/output files were submitted to the EPA. The DAQ is continuing to follow the Data Requirements Rule guiding the implementation of the 2010 SO_2 standard. Modeling is anticipated for some of the affected facilities under the SO_2 Data Requirements Rule. Therefore, DAQ anticipates using a combination of modeling and monitoring to address the 2010 SO_2 standard, consistent with the flexibility allowed under EPA's Data Requirements Rule. The existing PWEI SO_2 sites are located based on population and emissions rather than modeling per the EPA regulations and EPA guidance. By their nature, background SO_2 sites for PSD purposes are intentionally located away from major sources so as to not be influenced by them.

Shut Down of Lead Monitors

After analysis of lead data collected at NCore sites throughout the nation, the EPA proposed and finalized regulation to eliminate lead monitoring at NCore sites. The DAQ and MCAQ followed EPA's recommended change and shut down the lead monitors. The lead concentrations are extremely low and there are no major sources of lead in North Carolina.

Conclusion

In conclusion, DAQ and MCAQ have done a comprehensive review of the ambient network and believe the recommended changes are appropriate. DAQ and MCAQ believe the resulting network for 2016 and 2017 is adequate for characterizing the air quality across North Carolina and for protecting the health of the citizens of the state.

From: Knudsen, Kris W <Kris.Knudsen@duke-energy.com>
Sent: Wednesday, June 1, 2016 6:02 PM
To: Redmond, Donnie
Subject: FW: DAQ's Annual Network Monitoring Plan is Available for Public Comment

Donnie, I have reviewed the draft annual monitoring plan that was posted to DAQ's web site for public review. I just have a couple of comments on Appendix D that covers the SO2 ambient monitoring site near the Roxboro Station.

- Figure 64: The population density chart you have included appears to be for the Greenville monitoring site rather than Semora.
- Table D-1: I'm not sure what you mean in the column labeled "SO2 Emissions (Missing Data)." Does that mean the values exclude periods of substituted missing data values? Should the parentheses read "normalized?" The text states that CEMS values were normalized.

Thank you for the opportunity to comment. I have also asked Pat Coughlin, our internal air quality modeler, to take a look at the siting criteria to see if he has any additional comments. If so, we will pass those along to you as soon as possible ahead of the June 26 deadline.

Kris Knudsen

980-373-3225 (office)
704-996-5831 (cell)

Figure 95. Comment letter from Kris Knudsen with Duke Energy

From:	Charles McDevitt <charliemcdevitt@windstream.net>
Sent:	Wednesday, June 01, 2016 7:32 PM
To:	NCDENR.DENR.DAQ.Ask_Ambient
Subject:	2016-2017 Annual Monitoring Network Plan for North Carolina Air Quality
Attachments:	ATT00001.txt

I have asthma and allergies. Therefore information about NC air quality is important to me.
E-mails to alert me about high ozone levels and pollen counts in the Charlotte area are very useful.

Figure 96. Comment by user of air quality and pollen data in the Charlotte area

From: Myra Blake <mblake@selcnc.org>
Sent: Monday, June 27, 2016 4:57 PM
To: NCDENR.DENR.DAQ.Ask_Ambient
Cc: 'Worley.gregg@Epa.gov'
Subject: Comments on the proposed 2016-2017 Annual Monitoring Network Plan
Attachments: Attachment F - Klafka, Mayo Electric Generating Station, Eva....PDF; Attachment E - Klafka, Marshall Steam Station, Evaluation of....PDF; Attachment D - Klafka, Roxboro Steam Electric Plant, Evaluat....PDF; Attachment C Klafka, Asheville Steam Electric Plant, Evalu....PDF; Attachment B - Klafka, Allen Steam Station, Evaluation of Co....PDF; Attachment A, 2015-07-15 Dr. Neufeld Letter to Representative Chuck McGrady.DOCX; 2016 06 27 comments to DAQ re monitoring.pdf; ATT00001.txt

Dear Mr. Redmond,

Please find attached comments submitted by Clean Air Carolina, North Carolina Conservation Network, Medical Advocates for Healthy Air, Mothers & Others for Clean Air, MountainTrue, the Southern Alliance for Clean Energy, and the Southern Environmental Law Center on North Carolina's proposed 2016-2017 Annual Monitoring Network Plan. A hard copy will follow in the mail. We are also submitting electronic copies of the attachments to the comments for your reference.

Myra Blake
Staff Attorney | Southern Environmental Law Center
601 West Rosemary Street, Suite 220 | Chapel Hill, NC 27516-2356
T: 919-967-1450 Ext. 117
F: 919-929-9421
E: mblake@selcnc.org
http://www.southernenvironment.org

Figure 97. E-mail used to submit comments from the Southern Environmental Law Center and others

SOUTHERN ENVIRONMENTAL LAW CENTER

Telephone 919-967-1450 | 601 WEST ROSEMARY STREET, SUITE 220
CHAPEL HILL, NC 27516-2356 | Facsimile 919-929-9421

June 27, 2016

Via First-class Mail and Electronic Mail
Donald D. Redmond
North Carolina Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641
DENR.DAQ.Ask_Ambient@lists.ncmail.net

Re: Comments Opposing the Proposed 2016-2017 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Dear Mr. Redmond:

The Southern Environmental Law Center, on behalf of itself, Clean Air Carolina, North Carolina Conservation Network, Medical Advocates for Healthy Air, Mothers & Others for Clean Air, MountainTrue, and the Southern Alliance for Clean Energy (collectively, the "Conservation Groups"), respectfully submits the following comments on the 2016-2017 Annual Monitoring Network Plans proposed by the North Carolina Division of Air Quality and the Mecklenburg County Air Quality agencies (collectively, the "air agencies"). Over the past several years, DAQ has dramatically reduced the State's longstanding air quality monitoring network. The latest proposal would shut down or relocate seven additional air quality monitors across the state. If the air agencies go forward with this proposal, they will have eliminated approximately one out of every four air quality monitors that stood in 2010. The air agencies need to revise their plan and retain these critical monitors for all of the following reasons:

- First, eliminating these monitors would deprive the public of information about concentrations of dangerous air pollutants that can cause premature death, asthma, heart attacks, damage to lungs, and numerous other health problems.
- Second, many of the monitors that would be removed or relocated are sited near areas that have historically poor air quality, major sources of pollution, and at-risk populations.
- Third, State and regional air agencies are proposing to modify, and in some cases have already modified, air monitors without sufficient regulatory justification.

- Fourth, DAQ's plan fails to protect people from sulfur dioxide emissions from coal plants and other large emitters, further demonstrating that modeling is necessary to reveal the full extent of exceedances of the sulfur dioxide standard.
- Fifth, the air agencies have failed to provide sufficient regulatory justification for shutting down nearly all lead monitors in North Carolina.

The Conservation Groups request that the air agencies promptly provide their response to these comments, as well as any response by EPA to the proposals, to the individuals listed in the signature block below.

Summary of the Proposed Monitoring Network Plan:

The air agencies' proposals would shut down five pollutant monitors and relocate two monitors, further dismantling North Carolina's already decimated air quality monitoring network.[1] It is important to view these cutbacks in the context of the removal of monitors in previous years. In 2013, DAQ proposed to shutter three fine particle and one ozone monitor.[2] In 2014, DAQ proposed to close seven fine particle and three ozone monitors.[3] In 2015, DAQ eliminated fifteen ozone and fine particles monitors.[4] If its proposal is approved, DAQ will have shuttered approximately 40 of North Carolina's monitors since 2010, the majority targeting ozone and fine particulates.[5]

The specific monitors that are eliminated or relocated in the 2016-2017 plans are shown below in Table 1.

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[1] North Carolina Division of Air Quality, *2016-17 Annual Monitoring Network Plan* (hereinafter "2016 Statewide Plan"), pp. 16–18 (July 2015), https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/monitor/monitoring_plan/new_plan/NC%20Network%20Plan.pdf.
[2] North Carolina Division of Air Quality, *2015-16 Annual Monitoring Network Plan* (hereinafter "2015 Statewide Plan"), p. 200 (proposed June 2, 2015).
[3] North Carolina Division of Air Quality, *2014-15 Annual Monitoring Network Plan* (hereinafter "2014 Statewide Plan"), pp. 13–15 (proposed Aug. 26, 2014).
[4] 2015 Statewide Plan, pp. 14–15.
[5] *See* 2016 Statewide Plan (2016-17 five shutdowns approved (pp.16-18); 2015-16 fifteen shutdowns approved (p. 271); 2014-15 eight shutdowns approved (p. 211); 2013-14 six shutdowns approved (p. 243); 2012-13 one shutdown approved (p. 308); 2011-2012: two shutdowns approved (p. 234); 2010-11 three shutdowns approved (p. 297)).

Table 1: Monitors Removed or Relocated in the 2016-2017 Air Quality Monitoring Plans							
Monitor Site Name	**Pollut.**	**MSA**	**County**	**Address**	**Site ID**	**Date**	**Proposed Change**
#11 Fire Station	PM10	Charlotte-Concord-Gastonia	Meck.	620 W. 28th St.	371190003	6/30/16	Site Shut Down
Oakdale	PM2.5	CCG	Meck.	513 Radio Rd.	371190043	4/30/16	Site Shut Down (Remount relocation)
County Line	Ozone	CCG	Meck.	N35.348752º, W80.693402º[6]	371191009[7]	10/31/15	Site Shut Down (evicted)
Garinger	PM10 Lead	CCG	Meck.	1130 Eastway Dr	371190041	4/30/16	Monitoring Ended
Millbrook	PM10 Lead	Raleigh	Wake	3801 Spring Forest Rd.	371830014	4/30/16	Monitoring Ended
Lenoir	Ozone; SO2	Hickory	Caldwell	219 Nuway Circle	370270003	1/1/16	Relocate
Pitt County Ag. Center	Ozone; PM2.5	Greenville	Pitt	403 Government Circle	371470006	1/1/16	Relocate

I. <u>Fine Particles, Ozone, and Lead Cause an Array of Health Problems and Must Be Monitored Comprehensively.</u>

Over the past several years, DAQ has proposed its most drastic cutbacks in monitors for ozone and fine particles. These two pollutants contribute to over 200,000 premature deaths in the United States each year.[8] Their effects are felt most severely by children, the elderly, people

[6] Mecklenburg County Air Quality, *Addendum to the 2015 Annual Monitoring Network Plan for Mecklenburg County Air Quality* (hereinafter "County Line Addendum"), p. 8 (Mar. 28, 2016), http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7805.

[7] Page 18 of the 2016 Statewide Plan lists in error the *County Line* Site ID as 371191005; per page 15 of the Mecklenburg County 5-Year Plan, the *County Line* site ID is 371191009 and a site that was shut down due to eviction, *Arrowood*, as 371191005. Mecklenburg County Air Quality, *2015 Ambient Air Quality Monitoring 5-Year Network Assessment*, p. 15 (July 2015), https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/monitor/monitoring_plan/5_year_Network_assessment_MCAQ_2015.pdf.

[8] *See* Steven R.H. Barrett et al., *Air Pollution and Early Deaths in the United States Part I: Quantifying the Impact of Major Sectors in 2005*, 79 Atmospheric Environment 198, 198 (2013) (modeling particulate matter and ozone

with pre-existing conditions including asthma, and otherwise healthy adults engaged in strenuous or frequent outdoor activity or work.[9]

Fine particles also cause health problems such as heart attacks, aggravated asthma, decreased lung function, and irregular heartbeats.[10] Exposure to fine particle concentrations as low as 10 micrograms per cubic meter ($\mu g/m^3$)—which is lower than the current federal standard—is associated with a 2% increase in premature deaths for exposures as brief as two days, and a 7 to 9% increase in the long term.[11] Decreases in fine particle concentrations add months, if not years, onto people's lives.[12] Studies show that in major cities like Charlotte and Raleigh, decreases in fine particle concentrations are responsible for 15% of the overall increased life expectancy in recent decades.[13]

Ozone exposure "can result in health effects that are observed in broad segments of the population, including respiratory symptoms, reduced lung function, and airway inflammation, as well as more serious effects such as increased hospital admissions and increased daily mortality. Respiratory symptoms can include coughing; throat irritation; pain, burning, or discomfort in the chest when taking a deep breath; chest tightness, wheezing, or shortness of breath."[14] Ozone forms when nitrogen oxides react with volatile organic compounds.[15] Because the reaction is catalyzed by heat and sunlight, high ozone days occur most frequently during hot stagnant summers.[16] Coal-fired power plants, motor vehicle traffic, and industrial facilities are all sources of ozone precursors.[17] "Ironically, people living in many rural areas suffer from ozone overexposure more than many people living in cities . . . because ozone levels are generally higher downwind of ozone precursor sources, at distances of hundreds or even thousands of kilometers, so ozone concentrations in rural areas can be higher than in urban areas."[18]

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emissions from combustion sectors and concluding that these pollutants result in approximately 200,000 premature deaths in the United States annually).

[9] *See* EPA, *Health Effects of Ozone Pollution*, https://www.epa.gov/ozone-pollution/health-effects-ozone-pollution (last visited June 16, 2016).

[10] *See generally* EPA, *Particulate Matter (PM) Health*, https://www3.epa.gov/pm/health.html (last visited June 16, 2016).

[11] Liuhua Shi et al., *Low-Concentration $PM_{2.5}$ and Mortality: Estimating Acute and Chronic Effects in a Population-Based Study*, Envtl. Health Persp. (Jan. 2016), http://ehp.niehs.nih.gov/1409111/.

[12] *See* C. Arden Pope III et al., *Fine-Particulate Air Pollution and Life Expectancy in the United States*, 360(4) New Eng. J. Med. 2009 376, 382–84 (Jan. 22, 2009), http://www.nejm.org/doi/pdf/10.1056/NEJMsa0805646.

[13] *Id.*

[14] EPA, *Ozone and Your Patients' Health: Course Outline/Key Points*, https://www3.epa.gov/apti/ozonehealth/keypoints.html#introduction (last visited June 16, 2016).

[15] NASA, *Chemistry of Ozone Formation*, http://earthobservatory.nasa.gov/Features/ChemistrySunlight/chemistry_sunlight3.php (last visited June 16, 2016) (describing tropospheric ozone production).

[16] *See Id.*; *see also* Jeannie Allen, *The Ozone We Breathe*, NASA (Apr. 19, 2002), http://earthobservatory.nasa.gov/Features/OzoneWeBreathe/ (last visited June 16, 2016).

[17] *See Id.*

[18] *Id.*

Higher ozone concentrations also be detrimental to agriculture, since ozone is the most toxic air pollutant to crops and our natural ecosystems.[19] Elevated ozone causes trees to lose excessive amounts of water, which can lead to the drying out of entire watersheds.[20] This excessive water loss slows tree growth, and drier forests can also become fire hazards.[21]

There is no evidence of a safe level of exposure for either of these pollutants, and both have health effects even below the current National Ambient Air Quality Standards (NAAQS).[22] In response to evidence of health problems caused by these pollutants at lower and lower levels, EPA has repeatedly strengthened both the fine-particle and ozone NAAQS in recent years. EPA lowered the annual standard for fine particle pollution to 12 $\mu g/m^3$ in 2013.[23] In 1997 the ozone standard was lowered to 80 parts per billion (ppb) and in 2008 it was again dropped to 75 ppb. The level is currently 70 ppb, which went into effect in December 2015.[24]

Lead is a particularly damaging pollutant that causes accumulation in bones, developmental defects in fetuses and children, and decreased kidney and reproductive functions in adults.[25] There is no safe level of exposure to lead for children.[26]

II. **<u>The Monitors Provide Important Data to Areas That Have Historically Poor Air Quality, Major Sources of Pollution, and At-Risk Populations.</u>**

Many of the proposed monitor removals are in counties that have recently exhibited poor air quality. For ozone in particular, "[o]nly 12 of the 38 monitors operating statewide in 2015 have met an 8-hour ozone design value of 0.070 parts per million [70 ppb] for the past five years."[27] In the most recent county-wide data available, Mecklenburg County, where the majority of the monitors are being removed, showed an average value between 2011-2013 of 78 ppb, violating the previous 2008 8-hour ozone standard.[28] An additional seven counties,

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[19] Attachment A, Letter from Dr. Neufeld to Rep. Chuck McGrady (July 13, 2015).
[20] *Id.*
[21] *Id.*
[22] *See Am. Trucking Associations, Inc. v. EPA*, 283 F.3d 355, 360 (D.C. Cir. 2002) (internal quotation marks and alterations omitted) (recognizing the "lack of a threshold concentration below which [particulate matter and ozone] are known to be harmless."); EPA, *NAAQS for Particulate Matter*, 78 Fed. Reg. 3086, 3098 (Jan. 15, 2013) (explaining that there is "no population threshold, below which it can be concluded with confidence that $PM_{2.5}$ related effects do not occur"); Brief of Appellee State of North Carolina at 17, 62–64, *North Carolina v. TVA*, 615 F.3d 291 (4th Cir. 2010) (No. 09-1623) (reiterating that "the testimony of North Carolina's public health expert… provided ample evidence to support the court's findings of fact on health impacts at the population level below the NAAQS") (citations omitted).
[23] *See* National Ambient Air Quality Standards for Particulate Matter, 78 Fed. Reg. 3086, 3088 (Jan. 15, 2013).
[24] National Ambient Air Quality Standards for Ozone, 80 Fed. Reg. 65,291, 65,292 (Oct. 26, 2015) https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf; EPA, *NAAQS Table*, https://www.epa.gov/criteria-air-pollutants/naaqs-table#3.
[25] EPA, "Learn About Lead," https://www.epa.gov/lead/learn-about-lead#effects.
[26] U.S. Dep't of Health and Human Servs., Centers for Disease Control and Prevention, Lead, http://www.cdc.gov/nceh/lead/ (last visited June 27, 2016).
[27] 2016 Statewide Plan, p. 51.
[28] County-wide statistics are provided online, with 2011-2013 the most recent averaged period. Department of Environmental Quality, *North Carolina Counties with 8-Hour Ozone Violations, 2011-2013*,

including Wake, violated the current standard of 70 ppb in the same period.[29] Alteration of these monitors will impair the public's ability to know if and when an area falls back into non-attainment.

Additionally, a number of the monitors slated for removal are sited near major sources of air pollution. The *County Line* site, for example, is located downwind from the central business district of Charlotte, and has been monitoring ozone since 1979.[30] The *Fire Station* site is also roughly seven miles closer to the Medical Center in Charlotte than the *University Meadows* site that is supposed to replace its ozone monitoring.[31] As described above, ozone and fine particles have amplified health effects on the children, the sick, and the elderly. Knowing the exact concentration of these harmful pollutants at the sites most frequented by these at-risk populations is necessary to avoid harmful exposures and needless health problems.

There is good reason to be careful about the proper location of air monitors. Transient weather events have a large influence over the concentration of ozone near the earth's surface. Hot, dry summers yield higher ozone levels than those seasons that are cool, wet, and windy.[32] North Carolina experienced abnormally cool summers in both 2013[33] and 2014,[34] and May to October 2013 was much wetter than normal.[35] The summer of 2015, comparatively, rose to "much above average," the second-highest level behind "record warmest" as measured by NOAA.[36] Absent hard evidence of significant, quantified, permanent reductions in ozone precursor emissions, temporary weather patterns remain the most probable cause of recent pollution reductions. As the temperature continues to increase, ozone concentrations are expected to increase as well. Basing the shutdown of a large percentage of the State's network on such unpredictable and uncontrollable fluctuations will leave the system ill-prepared to deal with hot summers to come.

These monitors are situated in and around major urban areas in North Carolina—Charlotte, Raleigh, and Greenville—where significant additional pollution sources are expected

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https://deq.nc.gov/about/divisions/air-quality/air-quality-data/data-archives-statistical-summaries/detailed-raw-ozone-data/north-carolina-counties-8-hour-ozone-violations-2011-2013 (last visited June 20, 2016) (total .070ppm exceedances include Mecklenburg, Forsyth, Guilford, Johnston, Lincoln, Rowan, Union, and Wake).

[29] *Id.*

[30] County Line Addendum, p. 8.

[31] *Fire Station (*620 W 28th St.*)* is roughly three miles from the Carolinas Medical Center in Charlotte (1000 Blythe Blvd.), and University Meadows (1660 Pavilion Blvd.) is about 10 miles.

[32] EPA, *Trends in Ozone Adjusted for Weather Conditions*, http://www.epa.gov/airtrends/weather.html (last updated Oct. 8, 2014).

[33] *See* June-August 2013 Statewide Ranks, National Climate Data Center, http://www.ncdc.noaa.gov/sotc/service/national/Statewidetrank/201306-201308.gif (last visited June 24, 2016).

[34] *See* Statewide Average Temperature Ranks, NOAA, http://www.ncdc.noaa.gov/sotc/service/national/statewidetavgrank/201406-201408.gif (last visited June 24, 2016).

[35] National Centers for Environmental Information, *Statewide Ranks - Precipitation*, May–October 2013 available at http://www.ncdc.noaa.gov/sotc/service/national/statewidepcpnrank/201305-201310.gif (last visited June 21, 2016).

[36] National Centers for Environmental Information, *National Temperature and Precipitation Maps*, June-August 2015, https://www.ncdc.noaa.gov/monitoring-content/sotc/national/statewidetavgrank/statewidetavgrank-201506-201508.gif (last visited June 21, 2016).

in the coming years. For example, Charlotte and Raleigh are projected to grow by 71% over the next 15 years—the fastest growth of any large city in the United States.[37] Given expected growth and temperature increases, there is great need for continuous, reliable monitoring in these areas. Recent changes in the law may also exacerbate the effects of pollution; for example, many restrictions on open burning have been eliminated in North Carolina, allowing more types of material to be burned in more locations,[38] thereby increasing pollution.

III. The Air Agencies Plan to Remove Monitors That Are Required by Law to Remain in Place.

The Clean Air Act requires EPA to set NAAQS for pervasive pollutants that are known to be harmful to public health and the environment. These pervasive pollutants include carbon monoxide, lead, nitrogen dioxide, ozone, particle pollution, and sulfur dioxide.[39] State or local air agencies must monitor the presence of these pollutants in the outdoor air in certain locations throughout each state, based on "core based statistical areas," population estimates, and historical air monitoring data.[40] State, local, and tribal agencies then "use this information in developing emission reduction strategies, plans and programs to assure they attain and maintain the National Ambient Air Quality Standards (NAAQS)."[41]

Federal regulations specify when the State's monitor network may be modified.[42] The regulations generally require that monitors within the network remain in operation unless past data indicate no significant chance of future exceedances.[43] The regulations prohibit modification of a monitor if it has measured an exceedance of the NAAQS within the past five years, *or* if its past readings indicate more than a 10% chance of exceeding 80% of the NAAQS in the next three years.[44] In guidance, EPA has provided the following formula for calculating

[37] See John Chesser, "Charlotte and Raleigh top U.N. list of fastest growing large U.S. Cities," UNC Charlotte Urban Institute (Aug. 27, 2014), https://ui.uncc.edu/story/charlotte-and-raleigh-are-fastest-growing-large-cities-un-projections (last visited June 21, 2016).
[38] *See* Regulatory Reform Act of 2013 § 28 (allowing vegetative matter to be transported offsite for outdoor burning), http://www.ncoah.com/rules/H74RegulatoryReformActof2013.pdf; Regulatory Reform Act of 2014 § 24 (removing restriction on burning larger stumps and logs, and providing that such burning cannot be considered a nuisance), http://www.ncleg.net/Sessions/2013/Bills/Senate/PDF/S734v8.pdf; *see also* Senate Bill 513 § 15 (removing requirement to obtain an air permit to burn polyethylene agricultural plastic), http://www.ncleg.net/Sessions/2015/Bills/Senate/PDF/S513v5.pdf .
[39] *See* EPA, *NAAQS Table*, https://www.epa.gov/criteria-air-pollutants/naaqs-table (summarizing CAA NAAQS requirements).
[40] 2016 Statewide Plan, p. 213 (EPA Approval Letter for 2014 describing minimum monitoring requirements in 40 C.F.R. Part 58)
[41] EPA, *NAAQS Table*.
[42] 40 C.F.R. § 58.14.
[43] *See* 40 C.F.R. § 58.14(c) (listing six instances when monitors may be modified, which generally include removing a monitor based on previous readings that show no likelihood of exceedances, redundant or compatible monitoring methods in the same location, or logistical issues compromising data).
[44] 40 C.F.R. § 58.14(c)(1).

whether a monitor shows more than a 10% chance of exceeding 80% of the NAAQS in the next three years[45]:

$$\overline{X} + \frac{t * s}{\sqrt{n}} < 0.8 * NAAQS$$

In this equation, X is the average design value[46] over the previous five years, *t* is the student's t value for n-1 degrees of freedom at the 90% confidence level,[47] *s* is the standard deviation of the design values, *n* is the sample size (i.e., the number of design values), and NAAQS is the relevant standard.[48] This formula is referred to in these comments as "EPA Risk Test," and the value resulting from the left side of the equation is referred to as the monitor's "risk value."

A. Proposed Relocation and Discontinuation of Ozone Monitors

The Conservation Groups are concerned about the additional ozone monitors that would be lost under the air agencies' latest plans. As shown in Table 2 below, there remains a strong possibility that these areas may exceed the ozone health protection standard in the future.

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[45] EPA, *Ambient Air Monitoring Network Assessment Guidance*, 4-1 (2007) [hereinafter "Monitoring Network Guidance"], http://www.epa.gov/ttnamti1/files/ambient/pm25/datamang/network-assessment-guidance.pdf.

[46] Monitor readings are reported as "design values" for purposes of determining compliance with the NAAQS. For annual fine particles, a site's design value is measured as the three year average of the weighted arithmetic mean of each year's recordings. For ozone, the design value is the average of the fourth highest eight-hour value for three consecutive years.

[47] EPA's guidance document suggests a *t*-value of 2.13. *See* EPA, *Monitoring Network Guidance*, p. 4-3. DAQ, on the other hand, has used a *t*-value of 1.53 in its Proposals. *See* 2015-16 Annual Plan, 100 tbl.32. Even applying the lower *t*-value, the monitors discussed below still fail to meet EPA's removal requirements.

[48] The current NAAQS are: 8-hour ozone = 70 ppb; annual $PM_{2.5}$ = 12 µg/m^3; 24-hour $PM_{2.5}$ = 35 µg/m^3. Eighty percent of these values are respectively: 56 ppb 8-hour ozone; 9.6 µg/m^3 annual $PM_{2.5}$; and 28 µg/m^3 24-hour $PM_{2.5}$. *See* EPA, *NAAQS Table*.

Table 2: Historical Air Quality Design Values at Ozone Monitors Slated for Removal, and Comparison to the Removal Limit							
Monitor	**2009-11 Design Value (ppb)**	**2010-12 Design Value (ppb)**	**2011-13 Design Value (ppb)**	**2012-14 Design Value (ppb)**	**2013-15 Design Value (ppb)**	**EPA Risk Test Result (ppb)[49]**	**80% NAAQS limit (ppb)**
County Line (shutdown)	79	83	78	73	68	80	56
Lenoir (relocated)	67	67	64	62	63	66	56
Pitt Co. Ag. Center (relocated)	70	71	69	66	62	70	56

The plan lists one ozone monitor for shutdown (the *County Line* monitor near Charlotte) and two for relocation (the *Lenoir* monitor in Hickory, and the *Pitt Co. Ag. Center* in Greenville). Each of these monitors has recorded annual design value exceedances above or near the current ozone standard (70 ppb) over the previous five years,[50] and each fails to meet the EPA Risk Test that would allow these monitors to be considered for removal.

Shutting down these additional three ozone monitoring locations makes it difficult to track long-term ozone concentration trends. Even if these ozone monitors are replaced with monitors in different locations, the disruption in the monitoring locations impedes the State's ability to establish attainment or non-attainment of the ozone standard.

Furthermore, ground-level ozone "is projected to increase in the 19 largest urban areas of the Southeast, leading to an increase in deaths," and regional temperatures are estimated to increase between four to eight degrees through the end of the century, depending on low and high emissions scenarios, with increases in interior areas higher than coastal areas.[51] North Carolina citizens living in urban areas thus seem to be at risk of air pollution exposure, and the

[49] EPA's guidance document suggests a *t*-value of 2.13. *See* EPA, *Monitoring Network Guidance*, p. 4-3. DAQ, on the other hand, has used a *t*-value of 1.53 in its Proposals. *See* 2015-16 Annual Plan, 100 tbl.32. The values in Table 2 are based on DAQ's lower t-value of 1.53. Using EPA's t-value, the results would be even higher.
[50] *See* EPA, *NAAQS Table* (listing as the required form for ozone: "[a]nnual fourth-highest daily maximum 8-hour concentration, averaged over 3 years").
[51] Carter, L. M. et al., *National Climate Assessment—Chapter 17, Southeast and the Caribbean*, 403 (Oct. 2014), http://s3.amazonaws.com/nca2014/low/NCA3_Full_Report_17_Southeast_LowRes.pdf?download=1; *Id.* at 399 ("[a]lthough projected increases for some parts of the region by the year 2100 are generally smaller than for other regions of the United States, projected increases for interior states of the region are larger than coastal regions by 1°F to 2°F. Regional average increases are in the range of 4°F to 8°F (combined 25th to 75th percentile range for A2 and B1 emissions scenarios)").

State should take more proactive steps to maintain and develop its fleet of monitors around these areas to ensure researchers and regulators have sufficient data to make informed and effective conclusions regarding public health.

Recognizing these problems, experts have advised against additional interruptions in the State's monitoring network. Dr. Howard Neufeld, a professor and former consulting member of EPA's Clean Air Scientific Advisory Committee on Ozone, has warned that cutbacks in the State's ozone monitors can have significant negative impacts. As Dr. Neufeld explains, "[l]ong-term monitoring of air quality is crucial for establishing baselines against which researchers can determine if air quality is changing. . . . [and] is necessary to protect the health of North Carolina citizens and to establish those temporal trends that lead to the most efficient and cost-effective means of mitigating the adverse consequences of these pollutants."[52]

Nonetheless, the air agencies have already undertaken modifications to these monitors between ozone seasons and annual plan intervals.[53] This is now the second year in a row that a monitor—in this case, Charlotte's *County Line* monitor—has been evicted from a property between ozone seasons, skirting the application of measurement-based grounds for modification, and compromising the ability of the State to gather continuous air quality data pursuant to the Clean Air Act.[54] The *Arrowood* site, which was previously removed due to an eviction,[55] had been active for decades, operating since June of 1980.[56]

The regulations do give the State some ability to modify systems "if logistical problems beyond the State's control make it impossible to continue operation at its current site."[57] However, the regulations still require that "[t]hese modifications must address changes invoked by a new census and changes due to changing air quality levels."[58] The 2016-2017 Mecklenburg

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[52] Attachment A, Letter from Dr. Neufeld to Rep. Chuck McGrady (July 13, 2015).

[53] 2016 Statewide Plan, pp. 18–19 (describing Lenoir shelter relocation by four feet, which occurred in January 2016, and Pitt Co. Ag. Center relocation "approximately 325 meters to the other side of the property," which occurred on October 26, 2015 and was completed between January and April 2016).

[54] MCAQ, *5-Year Network Assessment*, p. 14 ("[t]here are currently 6 ozone monitoring stations operating in the MSA. A seventh station, 37-119-1005 (Arrowood) operated through 2014. This station was discontinued on 11/01/2014 as a result of the loss of the leasing agreement with the site property owner.").

[55] Mecklenburg County Air Quality, *2015 Annual Monitoring Network Plan* (hereinafter "2015 Mecklenburg Plan"), http://charmeck.org/mecklenburg/county/LUESA/AirQuality/EducationandOutreach/Documents/2015NetworkPlan_20150701.pdf, pp. 20–21 ("[o]n November 19, 2014 MCAQ was informed by the owner of the property where the monitoring site (37-119-1005) is located that the lease would not be renewed. MCAQ was asked to vacate the premises prior to December 31, 2014. MCAQ informed USEPA Region 4 of this situation by telephone on November 19, 2014 and via e-mail on November 26, 2014. Equipment was removed from the location prior to December 31, 2014. . . . 37-119-1005 (Arrowood) was discontinued at the close of the 2014 ozone monitoring season (April 1 – October 31) and is not being relocated at this time.").

[56] 2015 Mecklenburg Plan, p. 27.

[57] 40 C.F.R. § 58.14(c)(6); *see also* § 58.14(b) ("[n]othing in this section shall preclude the State, or where appropriate local, agency from making modifications to the SLAMS network for reasons other than those resulting from the periodic network assessments. . . . Each monitoring network may make or be required to make changes between the 5-year assessment periods, including for example, site relocations or the addition of PAMS networks in bumped-up ozone nonattainment areas.").

[58] § 58.14(b).

County Air Quality Plan does not even address the discontinuation of *County Line*, and the statewide 2016-2017 Plan merely links to an addendum to the 2016-17 MCAQ Plan via footnote.[59] The addendum is a "*proposal* to relocate the County Line ozone monitoring station,"[60] yet it was only transmitted to the EPA on March 28, 2016, after actual monitoring at the site ceased in October 2015.[61] Furthermore, the most recent EPA document provided by the DAQ is a November 2015 approval letter, which predates the addendum and shows no knowledge of the proposed relocation. Additionally, the most recent five-year plan for Mecklenburg County explicitly states that "[s]tations 37-119-0041 [(*Garinger*, also proposed for shut down)] and 37-119-1009 [(*County Line*)] should continue operating in the MCAQ network."[62]

Moreover, DAQ's ozone monitors were discontinued prior to public notice and comment. MCAQ posted a 30-day notice for comment from February to March of 2016 regarding the *County Line* discontinuation and relocation to *University Meadows*; however, *County Line* monitoring ended at the close of October 2015, long before the public comment period began.[63] Furthermore, apart from noting that "EPA Region 4 and NCDAQ have inspected the proposed location and have provided input indicating the proposed location is an acceptable replacement,"[64] no details about EPA's knowledge, position, or requirements for the new site are given.

It is difficult to see how DAQ and regional air agencies expect to receive meaningful comments after these changes have already occurred, with little notice between ozone seasons, explanations dispersed through addenda to annual plans, and minimal information provided about the communications between the State and EPA or the compatibility of the two sites. The State must take additional action to protect its leases at current monitor locations, and prevent evictions that can jeopardize the accuracy and continuity of data required by the Clean Air Act.

Specifically for *County Line*, the annual plan inadequately justifies how the *University Meadows* site will be an adequate replacement, and what measures the air agencies will take to ensure its contracts with site owners do not run future eviction risks. The 2016-17 Plan merely recognizes that these changes already occurred between the 2015 and 2016 ozone seasons, giving

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[59] *See* Mecklenburg County Air Quality, *2016-2017 Annual Monitoring Network Plan* (hereinafter "2016 Mecklenburg Plan"), https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/monitor/monitoring_plan/new_plan/Mecklenburg.pdf, p. 17 (summarizing networks with *University Meadows* already replacing *County Line*), pp. 46–47 (describing *University Meadows* site, without mentioning *County Line* replacement); 2016 Statewide Annual Plan, p. 18.

[60] County Line Addendum, p. 1 (emphasis added).

[61] *See id.* (dated March 28, 2016); DAQ, *2016-2017 Annual Monitoring Network Plan Vol. 2, Mooresville Monitoring Region,* (May 2016), https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/monitor/monitoring_plan/new_plan/MRO.pdf, p. C15 ("[a]t the end of the 2014 ozone season MCAQ was evicted from the Arrowood site (Mecklenburg County) and at the end of the 2015 ozone season MCAQ was evicted from the County Line site (Mecklenburg County). Mecklenburg County Air Quality established the University Meadows site on Apr. 1, 2016, to replace the County Line site.").

[62] MCAQ, *5-Year Network Assessment*, pp. 20–21.

[63] 2016 Statewide Plan, p. 18.

[64] County Line Addendum, p. 3.

little additional information about the change.[65] The *County Line* site was an important monitor: active since 1979,[66] located in heavily urbanized Mecklenburg County, and repeatedly showed violations of the 8-hour ozone average, only meeting the standard as recently as 2015.[67]

The Conservation Groups are concerned that continually eliminating and shifting monitors in this manner—through plan addendums for reasons unrelated to data analyses—fails to provide the EPA or public with substantial notice to changes in the network, and inhibits the ability of the public to view and utilize accurate data.[68] It is doubtful that the EPA or public can have any influence on protecting the continuity of site monitoring when the proposal for a change is submitted after the State is evicted and monitoring discontinued.[69] This is not to say that the State can never modify its network due to logistical reasons; however, the State should work harder to ensure that (1) monitor site leases are negotiated to preclude eviction without advance notice, and (2) site relocations are justified by reference to data compatibility and continuity reasons, and not merely the State's failures in logistical planning. Without these monitors in place for the required durations, local populations will be left oblivious to the state of the air around their homes, and North Carolina will jeopardize its ability to meet the goals of the Clean Air Act.

B. Proposed Relocations and Discontinuations of Fine Particle Monitoring

Table 3: Historical Air Quality Design Values at Fine Particle Monitors Slated for Removal, and Comparison to the Removal Limit							
	Average Annual Concentration (µg/m3)						
Monitor	**2009-11**	**2010-12**	**2011-13**	**2012-14**	**2013-15**	**EPA Risk Equation [70] (µg/m3)**	**80% NAAQS limit (µg/m3)**
Oakdale $PM_{2.5}$ (shutdown/ relocation)	10.37	9.97	9.13	8.63	8.47	9.88	9.6

[65] 2016 Statewide Plan, p. 18 ("[b]etween the 2015 and 2016 ozone seasons Mecklenburg County Air Quality moved an ozone site to a new location. Information on this move was posted for a 30-day public comment period. The DAQ also relocated one ozone and sulfur dioxide monitoring site and one ozone and fine particle monitoring site. Both sites were relocated on the same property when new monitoring shelters were installed").
[66] County Line Addendum, p. 8.
[67] County Line Addendum, p. 2 (table "Ozone Air Quality, 1999-2015").
[68] *See* County Line Addendum, p. 1 ("[t]he MCAQ-Plan was made available for public comment for thirty (30) days from February 17, 2016 to March 18, 2016 on the Mecklenburg County Land Use and Environmental Services Agency - Air Quality (MCAQ) webpage. No public comments were received.")
[69] *See supra*, notes 62–64.
[70] EPA's guidance document suggests a *t*-value of 2.13. *See* EPA, *Monitoring Network Guidance*, p. 4-3. DAQ, on the other hand, has used a *t*-value of 1.53 in its Proposals. *See* 2015-16 Annual Plan, 100 tbl. 32. The values in Table 3 are based on DAQ's lower t-value of 1.53. Using EPA's t-value, the results would be even higher.

The *Oakdale* $PM_{2.5}$ monitor near Charlotte similarly fails to meet the EPA Risk Formula for modification. Removal of this monitor is especially concerning given the high levels of fine particles detected over the years at this site. As noted above, exposure to fine particle concentrations as low as 10 $\mu g/m^3$ can lead to a significant increase in premature deaths over the short term, and even more premature deaths over the long term.[71] Charlotte's *Oakdale* has detected fine particles in this range in recent years, and the risk of future violations of the standard is too high for this monitor to be deleted.

The statewide plan provides no explanation for the change,[72] while the Mecklenburg Plan merely references the relocation to *Remount* "per the 2015 Annual Monitoring Network Plan."[73] The 2015 Plan also fails to justify or explain the relocation, stating only that "[a] new near-road PM2.5 monitor will become operational on January 1, 2017. The Oakdale site will be replaced by the new near-road station when it is established."[74] The unexplained change is especially concerning given that the two sites are classified at different scales (neighborhood scale versus microscale).[75]

The actions of air agencies regarding other particulate monitors is also concerning. For example, MCAQ states that, in terminating monitoring at *#11 Fire Station*, "[s]afety concerns have been identified at the monitoring location which will require significant investments in infrastructure. Considering the relatively low concentrations recorded at this monitoring station; and that monitoring requirements can be met by other monitoring stations within the network, monitoring will be terminated at this location on June 30, 2016."[76] The agency does not identify the safety concerns or provide sufficient detail to justify this basis for removing yet another of North Carolina's remaining particulate monitors. DAQ and regional air agencies must provide an explanation pursuant to the regulations of system modification under 40 C.F.R. § 58.14(c).

IV. **DAQ's Plan Fails to Adequately Track Sulfur Dioxide Emissions.**

DAQ's proposal fails to fill the information gaps left by the sparse and misplaced sulfur dioxide monitors in the State, and shows that sulfur dioxide modeling is necessary to fully capture the extent of sulfur dioxide contamination in North Carolina.

Even brief exposure to sulfur dioxide as short at five minutes can cause a number of health problems, including premature death, respiratory problems, asthma attacks, heart problems, and reduced lung functioning.[77] These adverse health effects are more pronounced in

[71] Liuhua Shi et al., *Low-Concentration $PM_{2.5}$ and Mortality: Estimating Acute and Chronic Effects in a Population-Based Study*, Envtl. Health Persp. (Jan. 2016), http://ehp.niehs.nih.gov/1409111/.
[72] 2016 Statewide Plan, p. 16 (merely listing Oakdale site as one that will shut down).
[73] 2016 Mecklenburg Plan, p. 21.
[74] 2015 Mecklenburg Plan, p. 45.
[75] *Id.* at 45 (classifying *Oakdale* site as neighborhood scale), 48 (classifying *Remount* site as a microscale site).
[76] 2016 Mecklenburg Plan, p. 21.
[77] EPA, *Sulfur Dioxide –Health*, http://www.epa.gov/airquality/sulfurdioxide/health.html; EPA, EPA/600/R-08/047F, *Integrated Science Assessment for Sulfur Oxides-Health Criteria* ch. 5 tbls. 5-1, 5-2 (2008); EPA, *Primary National Ambient Air Quality Standard for Sulfur Dioxide Final Rule*, 75 Fed. Reg. 35,520, 35,525 (June 22, 2010);

people who exercise and play outdoors, especially those with asthma. Studies also show a connection between short-term sulfur dioxide exposure and increased hospitalizations, particularly in at-risk populations such as children, the elderly, and asthmatics.[78]

In response to these significant health concerns, EPA established a short-term, one-hour standard for sulfur dioxide of 75 ppb in 2010 (equal to 196.2 ug/m^3). Six years later, North Carolina still has yet to perform the necessary analysis to show whether it is meeting this standard. DAQ's latest monitoring plan does nothing to correct this omission.

This is especially problematic considering that North Carolina has many large sources of sulfur dioxide. Nationally, large point sources account for 95 percent of sulfur dioxide emissions, 66 percent of which come from fossil fuel combustion at electric facilities.[79] Of the sulfur dioxide emissions generated in North Carolina, 64 percent are caused by coal-fired power plants alone (based on 2011 National Emissions Inventory Data).[80] Specifically, the following coal-fired power plants are major sources of sulfur dioxide emissions in North Carolina: Allen Steam Station in Belmont, Asheville Steam Electric Plant in Arden, Belews Creek Steam Station in Stokes County, Marshall Steam Station in Terrell, Mayo Electric Generating Station in Roxboro, and Roxboro Steam Electric Plant in Semora.

Although states may have the option to show compliance with the sulfur dioxide standard using monitoring, modeling is the more comprehensive and preferred method for demonstrating compliance with the NAAQS. In the sulfur dioxide NAAQS rule, EPA stressed that air dispersion modeling is the best method for evaluating the short-term impacts of large sulfur dioxide sources.[81] EPA properly recognized the "strong source-oriented nature of SO2 ambient impacts,"[82] and concluded that dispersion modeling is "the most technically appropriate, efficient and readily available method for assessing short-term ambient SO2 concentrations in areas with large point sources."[83] Accordingly, in promulgating the 2010 sulfur dioxide NAAQS, EPA explained that, for the one-hour standard, "it is more appropriate and efficient to principally use modeling to assess compliance for medium to larger sources, and to rely more on monitoring for groups of smaller sources and sources not as conducive to modeling."[84] EPA similarly explained in its white paper on the subject that using modeling to determine attainment for the sulfur dioxide standard "could better address several potentially problematic issues than would the narrower monitoring-focused approach discussed in the proposal for the SO2 NAAQS, including the unique source-specific impacts of SO2 emissions and the special challenges SO2 emissions

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EPA, *Our Nation's Air: Status and Trends Through 2008* at 4 (2010), http://www.epa.gov/airtrends/2010/report/fullrepmi.pdf.

[78] EPA, Sulfur Dioxide - Health, http://www.epa.gov/airquality/sulfurdioxide/health.htm; 75 Fed. Reg. at 35,525.

[79] *Id.* at 35,524.

[80] *See* EPA, 2011 National Emissions Inventory, http://www.epa.gov/ttn/chief/net/2011inventory.html.

[81] 75 Fed. Reg. at 35,551

[82] *Id.* at 35,570.

[83] *Id.* at 35,551.

[84] *Id.* at 35,570.

have historically presented in terms of monitoring short-term SO2 levels for comparison with the NAAQS in many situations (75 FR 35550)."[85]

EPA's preference for modeling recognizes the limitations of monitoring. For example, as John C. Vimont, EPA Region 9's Regional Meteorologist, has stated under oath:

> EPA does recognize the usefulness of ambient measurements for information on background concentrations, provided reliable monitoring techniques are available. EPA does not recommend, however, that ambient measurements be used as the sole basis of setting emission limitations or determining the ambient concentrations resulting from emissions from an industrial source. These should be based on an appropriate modeling analysis.[86]

Similarly, Roger Brode is a physical scientist in EPA's Air Quality Modeling Group and co-chairs the AMS/EPA Regulatory Model Improvement Committee (AERMIC) and the AERMOD Implementation Workgroup.[87] Mr. Brode has stated under oath that AERMOD is "readily capable of accurately predicting whether the revised primary SO2 NAAQS is attained and whether individual sources cause or contribute to a violation of the SO2 NAAQS."[88]

In recognition of the limitations of monitoring alone, EPA has historically used modeling in determining attainment for the sulfur dioxide standard.[89] For example, in EPA's 1994 SO2 Guideline Document, EPA noted that "for SO2 attainment demonstrations, monitoring data alone will generally not be adequate,"[90]and that "[a]ttainment determinations for SO2 will generally not rely on ambient monitoring data alone, but instead will be supported by an acceptable modeling analysis which quantifies that the SIP strategy is sound and that enforceable emission limits are responsible for attainment."[91] The 1994 SO2 Guideline Document goes on to note that monitoring alone is likely to be inadequate: "[f]or SO2, dispersion modeling will generally be necessary to evaluate comprehensively a source's impacts and to determine the areas of expected high concentrations based upon current conditions."[92]

Courts have upheld the use of modeling in similar situations. For example, in the *Montana Sulphur* case, a company challenged a SIP call, a SIP disapproval, and a Federal Implementation Plan ("FIP") promulgation, because they were premised on a modeling analysis

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[85] EPA White Paper at 3-4.
[86] Declaration of John C. Vimont at 1, 11 (emphasis added).
[87] Declaration of Roger W. Brode at 1, 2.
[88] *Id.* at 2.
[89] *See e.g.*, EPA, *Implementation of the 1-Hour SO2 NAAQS Draft White Paper for Discussion* at 3, fn. 1, *available at* http://www.epa.gov/airquality/sulfurdioxide/pdfs/20120522whitepaper.pdf; *see also* Respondent's Opposition to Motion of the State of North Dakota for a Stay of EPA's 1-Hour Sulfur Dioxide Ambient Standard Rule at 3, National Environmental Development Association's Clean Air Project v. EPA (D.C. Cir. 2010) (No. 10-1252) ("the Agency has historically relied on modeling to make designations for sulfur dioxide").
[90] EPA, *1994 SO2 Guideline Document*, http://www.epa.gov/ttn/oarpg/t1/memoranda/so2_guide_092109.pdf, at 2-5.
[91] *Id.* at 2-1.
[92] *Id.* at 2-3.

that showed the Billings/Laurel, Montana area was in nonattainment for SO2.[93] The court rejected Montana Sulphur's argument that EPA's reliance on modeling was arbitrary and capricious or otherwise unlawful.[94] Further demonstrating the superiority of modeling, the D.C. Circuit has acknowledged the inherent problem of using monitored data for criteria pollutants, namely that "a monitor only measures air quality in its immediate vicinity."[95] EPA's use of air dispersion modeling and AERMOD in particular was recently upheld in the context of a Clean Air Act § 126 petition for cross-state impacts.[96] In this case, the EPA granted the New Jersey Department of Environmental Protection's 126 petition, finding that trans-boundary sulfur dioxide emissions from the Portland coal-fired power plant in Pennsylvania were significantly contributing to nonattainment and interference with the maintenance of the one-hour SO2 NAAQS in New Jersey.[97] The EPA based its finding on a review of the AERMOD dispersion modeling submitted by New Jersey, its independent assessment of AERMOD, and other highly technical analyses.[98] The court upheld the EPA's decision after examining the record, which showed that EPA had thoroughly examined the relevant scientific data and clearly articulated a satisfactory explanation of the action that established a rational connection between the facts found and the choice made.[99]

In North Carolina, modeling demonstrates that large coal-fired power plants currently lack emission limits that prevent exceedances of the 2010 sulfur dioxide NAAQS.[100] Yet DAQ has insisted that it plans to use monitoring alone to investigate compliance with the sulfur dioxide NAAQS. In spite of the overwhelming evidence showing the need for modeling, North Carolina has taken the position that "ambient monitoring data should be the basis of designations, and that modeling should not be relied on to designate areas as nonattainment."[101] This approach cannot be justified. DAQ must consider modeling as well as monitoring data when determining compliance with the 2010 sulfur dioxide NAAQS.

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93 666 F.3d at 1184.
94 *Id.* at 1185; see also *Sierra Club v. Costle*, 657 F.2d 298, 332 (D.C. Cir. 1981) ("Realistically, computer modeling is a useful and often essential tool for performing the Herculean labors Congress imposed on EPA in the Clean Air Act"); *Republic Steel Corp. v. Costle*, 621 F.2d 797, 805 (6th Cir. 1980) (approving use of modeling to predict future violations and incorporating "worst-case" assumptions regarding weather and full capacity operations of pollutant sources).
95 *Catawba County v. EPA*, 571 F.3d 20, 30 (D.C. Cir 2009).
96 See *Genon Rema, LLC v. U.S. EPA*, 722 F.3d 513, 526 (3rd Cir. 2013).
97 *Id.* at 518.
98 *Id.*
99 *Id.* at 525-28.
100 See Attachment B, Steven Klafka, Allen Steam Station, Belmont, North Carolina, Evaluation of Compliance with 1-hour SO2 NAAQS (Dec. 23, 2013), [hereinafter "Allen Modeling Report"]; Attachment C, Steven Klafka, Asheville Steam Electric Plant, Arden, North Carolina, Evaluation of Compliance with 1-hour SO2 NAAQS (July 5, 2012), [hereinafter "Asheville Modeling Report"]; Attachment D, Steven Klafka, Roxboro Steam Electric Plant, Semora, North Carolina, Evaluation of Compliance with 1-hour SO2 NAAQS (Dec. 5, 2013), [hereinafter "Roxboro Modeling Report"]; Attachment E, Steven Klafka, Marshall Steam Station, Terrell, North Carolina, Evaluation of Compliance with 1-hour SO2 NAAQS (Dec. 23, 2013), [hereinafter "Marshall Modeling Report"], Attachment F; Steven Klafka, Mayo Electric Generating Station, Roxboro, North Carolina, Evaluation of Compliance with 1-hour SO2 NAAQS (Dec. 23, 2013), [hereinafter "Mayo Modeling Report"].
101 Letter from Don van der Vaart, Secretary of the Department of Environmental Quality, to Heather McTeer Toney, EPA Region 4 Administrator (Sept. 18, 2015).

Even if a state elects to use monitoring, EPA "strongly suggests" that any available modeling information be used in determining where to site SO2 monitors.[102] Yet North Carolina has failed to use modeling to guide the placement of monitors, and has instead placed monitors in the areas where they are least needed. For example, the nearest sulfur dioxide monitor to the Allen coal plant is located approximately 15 miles east of the plant, at the Garinger in Charlotte.[103] Modeling conducted for the Allen site shows that this monitor is located *just outside of the boundary of the potential sulfur dioxide exceedance plume created by the Allen facility.* This modeling reveals that in areas closer to the Allen site, the coal plant's air permit allows for exceedances of the sulfur dioxide standard, as shown in Figure 1 below.[104] More troublingly, the actual emissions from the plant in recent years are also high enough to cause exceedances of the standard.[105]

[102] EPA, *SO_2 NAAQS Designations Source-Oriented MonitoringTechnical Assistance Document*, p. 5 (Draft, Feb. 2016), https://www3.epa.gov/airquality/sulfurdioxide/pdfs/SO2MonitoringTAD.pdf.
[103] The Garinger site is located at 1120 Eastway Drive, Charlotte NC, Mecklenburg County.
[104] *See* Attachment B, Allen Modeling Report.
[105] *See id.*

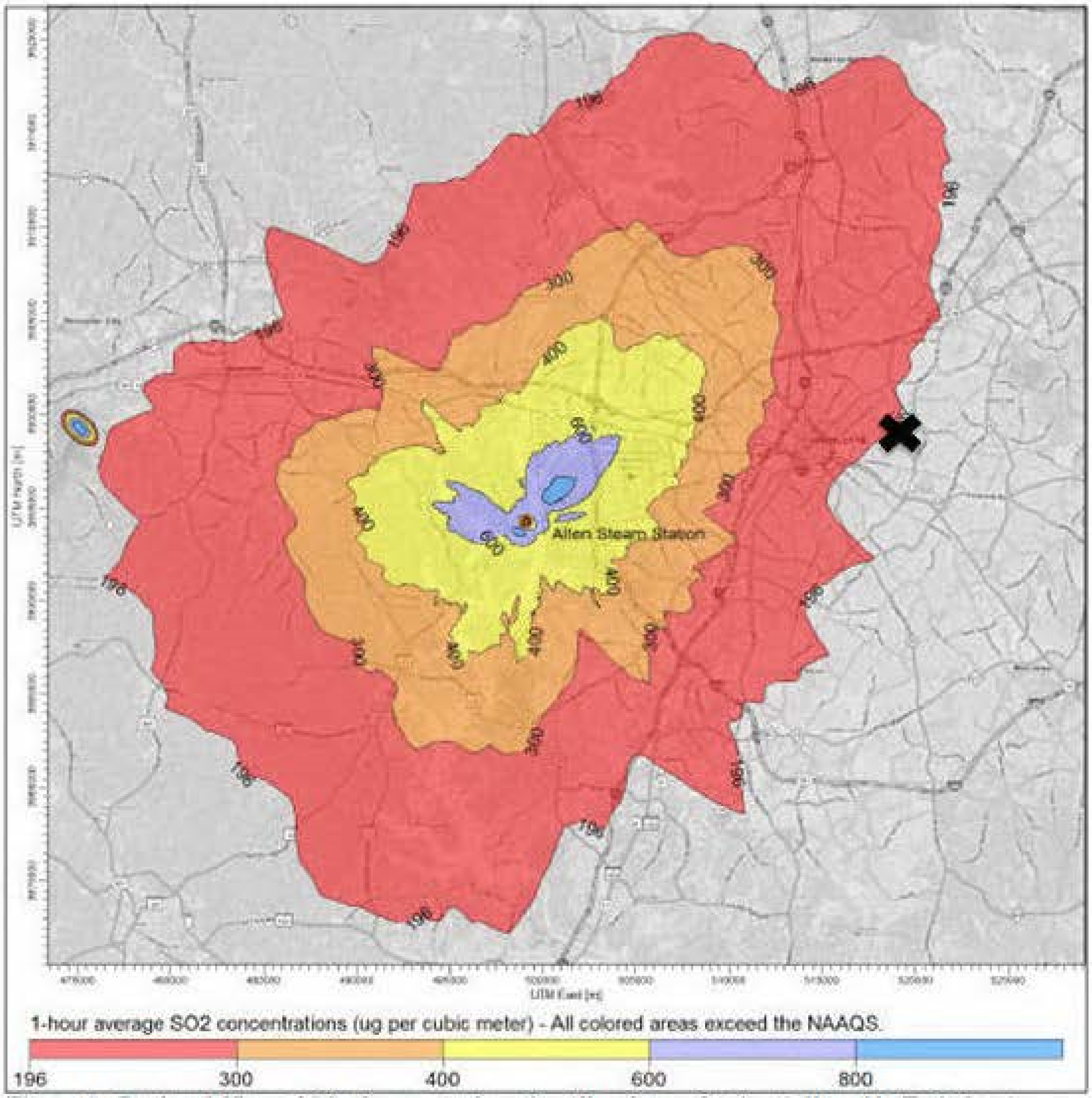

Figure 1 - Regional View of SO_2 Concentrations for Allen Steam Station (Allowable Emissions)

✖ = the approximate location of the sole SO2 monitor near Allen.

Table 4: Sulfur Dioxide Modeling Results for the Allen Steam Station

Emission Rates
Allowable

For other coal plants, sulfur dioxide monitors are even farther away from the expected sulfur dioxide contamination plume. For example, the nearest sulfur dioxide monitor to the Cliffside coal plant is nearly 70 miles away; for the Mayo coal plant, nearly 40 miles away; for the Marshall coal plant, nearly 30 miles away; and for the Belews Creek coal plant, nearly 20 miles away. These distant monitors do nothing to help characterize the air quality for the people living near these large sources of sulfur dioxide.

DAQ's latest monitoring plan fails to remedy the poor monitoring location choices for these sites. Although the proposal would add three sulfur dioxide monitors, none of these additional monitors are located in the vicinity of the coal plants listed above. And although one of the new monitors is located closer to the Asheville coal plant, it is still approximately 20 miles away from that site. This new monitor is therefore insufficient to characterize the sulfur dioxide emissions from the Asheville plant, which modeling has demonstrated to exceed the sulfur dioxide NAAQS. DAQ's plan therefore confirms that modeling must be considered when determining sulfur dioxide compliance for these sites.

Finally, the single sulfur dioxide monitor that DAQ proposes to add near the Roxboro coal plant is insufficient to capture the full extent of exceedances near the site. The Roxboro plant "is one of the largest power plants in the United States,"[106] and "a significant source of SO2 emissions, emitting in excess of the 2,000 tons per year threshold specified in the DRR [data requirements rule]."[107] Additionally, the monitor location as planned is in extremely close proximity to the plant, within 2km,[108] while the nearest other monitor "is about 80 kilometers southwest of Duke Energy Roxboro, located at 3801 Spring Forest Road, Raleigh."[109] This would leave a significant gap in monitored air quality consistent with the D.C. Circuit's criticism above, further supporting use of modeling. The small number of monitors in this wide area is insufficient, given the EPA's guidance that "[a] small number of ambient SO2 monitors usually is not representative of the air quality for an entire area," and that "[f]or SO2, dispersion modeling will generally be necessary to evaluate comprehensively a source's impacts and to determine the areas of expected high concentrations based upon current conditions."[110]

In addition to modeling near coal plants, modeling is also necessary for other large industrial sources of sulfur dioxide in the State. Instead, DAQ has proposed to install minimal monitors near the *Canton* and *Southport* sites. For the *Canton* site, the two closest sulfur dioxide monitors are 90km away from the EP Canton mill,[111] while this proposed monitor is even closer to the facility than the Roxboro monitor, "approximately 450 meters west of the property

[106] Duke Energy, "Coal-Fired Plants: Roxboro Plant," https://www.duke-energy.com/power-plants/coal-fired/roxboro.asp.
[107] 2016 Statewide Plan, p. 151.
[108] The monitor is planned to be located at 36.489943, -79.058523; the Roxboro facility is located at 1700 Dunnaway Rd, Person County, NC. Main Statewide Plan 2016-17, p. 151, 167. *See attached* "Semora Monitor—Roxboro Plant" (showing monitor's planned location to be 1.4km from the power plant).
[109] 2016 Statewide Plan, 151.
[110] *See supra, SO2 Guidance.*
[111] 2016 Statewide Plan, 174.

line."[112] Again, the agency is creating a data gap between the immediate vicinity of the facility and the surrounding area that should be closed through modeling, especially given that the EP Mill is only "approximately 25km west of Asheville,"[113] and emits 7,593.86tpy of sulfur dioxide, over three times the 2,000tpy regulatory threshold.[114] DAQ has suggested that it will pursue monitoring specifically at the *Canton* site because "[m]odeling is questionable in complex terrain."[115] To the contrary, complex terrains are even more reason to include modeling to fully characterize a site, rather than a single monitor that might miss pockets of contamination.

For the Southport site, DAQ has not yet even released specific site information,[116] but the State has identified the facility's annual SO2 emissions as doubling the regulatory threshold of 2,000tpy.[117] The nearest existing monitor in North Carolina appears to be the New Hanover site, which is about 36km away.[118] Again, this type of sparse monitoring is insufficient to fully protect the public.

DAQ also should not use the addition of sulfur dioxide monitors as an attempt to justify the removal of other pollutant monitors. As noted above, since 2010 the DAQ had shut down 40 monitors.[119] Of these monitors, nine were for ozone, three for PM_{10}, and 22 for $PM_{2.5}$.[120] Given projected temperature and population increases in North Carolina's urban areas over the next decades, it is troubling that the State has so divested itself of its fleet of monitors for pollutants like ozone and fine particulates that can accumulate in hot spots at peak times.[121] The addition of sulfur dioxide monitors offers no protection against these other common pollutants.

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[112] 2016 Statewide Plan, 200 (also giving monitor location as "35.534 and -82.853"); *see attached* "Canton Monitor—Evergreen Packaging Plant" (showing monitor's planned location to be 1.16km from the Mill).
[113] 2016 Statewide Plan, 176.
[114] DEQ, *List of Facilities Subject to SO2 Data Requirements Rule*, p. 3 (Jan. 15, 2016), https://www3.epa.gov/airquality/sulfurdioxide/drr/nc.pdf.
[115] 2016 Statewide Plan, p. 44.
[116] 2016 Statewide Plan, 270 ("[a]s of this writing (May 27, 2016), several parcels of land near the subject facility are being considered for the potential monitoring site, but no owner's permission has yet been secured. An addendum to the network plan will be submitted after a separate 30-day public comment period once the location of the monitoring site is finalized").
[117] DEQ, *List of Facilities*, p. 3 (listing Southport facility annual emissions as 4,090tpy).
[118] Environmental Management Commission, *Special Order by Consent*, p. 1 ("[t]he COMPANY operates an electric power generating facility (the "Facility") (SIC code 4911) at 1281 Powerhouse Drive SE, Southport, Brunswick County, North Carolina"); *see* 2016 Statewide Plan, p. 49 (listing New Hanover monitor in Wilmington MSA, parts of which include and are adjacent to Brunswick County).
[119] *See* 2016 Statewide Plan (2016-17 five shutdowns (pp.16-18); 2015-16 fifteen shutdowns (271); 2014-15 eight shutdowns (211); 2013-14 six shutdowns (243); 2012-13 one shutdown (308); 2011-2012: two shutdowns (234); 2010-11 three shutdowns (297)).
[120] *See Id.*(2016-17—1 Ozone, 1 PM_{10}, 2 PM_{10} Lead, 1 $PM_{2.5}$; 2015-16—9 $PM_{2.5}$, 5 Ozone, 1 CO; 2014-15—6 $PM_{2.5}$, 1 Ozone, 1 PM_{10}; 2013-14—2 Ozone, 4 $PM_{2.5}$; 2012-13—1 CO; 2011-12—1 CO, 1 $PM_{2.5}$; 2010-11—1 SO2, 1 $PM_{2.5}$, 1 PM_{10}).
[121] *See supra*, notes 36-41; *see also* Carter, L. M. et al., *National Climate Assessment—Chapter 17, Southeast and the Caribbean*, p. 399 (Oct. 2014), http://s3.amazonaws.com/nca2014/low/NCA3_Full_Report_17_Southeast_LowRes.pdf?download=1.

In sum, modeling is the preferred methodology for measuring sulfur dioxide near large sources like coal plants. Sulfur dioxide modeling is less expensive, better at detecting exceedances across wide areas, and is already being conducted for many areas in the State.[122] Sulfur dioxide concentrations are particularly straightforward to model because sulfur dioxide comes primarily from fuel-combusting power plants.[123] As such, a few large sources contribute the bulk of sulfur dioxide emissions in the State. EPA has reiterated that air-dispersion modeling is the best method for evaluating short-term impacts of sulfur dioxide.[124] Instead of spending constrained resources to establish a sulfur dioxide monitoring network, DAQ should rely on modeling and allow the existing monitors to continue to evaluate ozone and fine particles.

V. The Air Agencies Should Not Eliminate the State's Only Lead Monitors.

The proposed plans would shut down lead monitoring in Raleigh (the *Millbrook* site) and Charlotte (the *Garinge*r site), eliminating the only monitors in the State designed to protect the public from lead in the air.[125] These monitors provide valuable information on lead exposure in densely populated areas, and should not be removed.

In an attempt to justify the elimination of urban lead monitoring in North Carolina, the air agencies point to recent changes in federal monitoring requirements for lead.[126] But although EPA has repealed the requirement to monitor lead at these sites, EPA's reasoning does not apply in this instance. EPA explained that its weakening of the lead monitoring requirements for urban "NCore" sites, such as the *Millbrook* and *Garinger* sites, was proper because over 300 monitoring sites for lead would still remain in operation. But in North Carolina in particular, **zero** monitoring sites would remain. As a result, the public will have no way to know if lead in the air increases to dangerous levels at any point in the future.

Monitoring and public disclosure of lead levels is especially important in light of the recent events and discovery of lead contamination in Flint, Michigan. In Flint, the problem of serious lead contamination was exacerbated by the failure of officials to provide the public with full and transparent information about the amount of lead they were exposed to.

Given the serious health effects of lead exposure—which has no safe exposure level for children[127]—the air agencies cannot justify their decision to eliminate lead monitoring in North Carolina cities and deprive its citizens of valuable data regarding potential impacts to their health.

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[122] *See* Primary National Ambient Air Quality Standard for Sulfur Dioxide, 75 Fed. Reg. 35,520, 35,551 (June 22, 2010) ("for a short-term 1-hour standard it is more technically appropriate, efficient, and effective to use modeling as the principle [sic] means of assessing compliance for medium to larger sources").
[123] EPA, *Air Emission Sources: Sulfur Dioxide*, https://www3.epa.gov/cgi-bin/broker?_service=data&_debug=0&_program=dataprog.national_1.sas&polchoice=SO2 (last visited June 21, 2016).
[124] *See* 75 Fed. Reg. at 35,551.
[125] 2016 Statewide Plan, 114; 2016 Mecklenburg Plan, p. 21.
[126] 2016 Statewide Plan, 114; 2016 Mecklenburg Plan, p. 21.
[127] EPA, "Learn About Lead," https://www.epa.gov/lead/learn-about-lead#effects.

Conclusion

For the reasons described above, DAQ must revise the 2016-2017 Annual Monitoring Network Plan to maintain and expand fine particle and ozone monitors rather than depleting the existing network. And DAQ must conduct and accept sulfur dioxide modeling to fill the gaps left by the inadequate and misplaced sulfur dioxide monitors in the State. Finally, DAQ should not deprive North Carolina of its only airborne lead monitors.

We appreciate the opportunity to submit these comments.

Respectfully submitted,

Myra Blake
mblake@selcnc.org
SOUTHERN ENVIRONMENTAL LAW CENTER
601 W. Rosemary Street, Suite 220
Chapel Hill, NC 27516-2356
Telephone: (919) 967-1450
Facsimile: (919) 929-9421

cc (via e-mail):

Gregg Worley, Air Toxics and Monitoring Branch Chief, EPA Region 4,
Worley.gregg@Epa.gov

July 13, 2015

The Honorable Representative Chuck McGrady,
North Carolina House of Representatives
300 N. Salisbury Street, Room 304
Raleigh, NC 27603-5925

Dear Representative McGrady,

I am writing this letter to ask for your support in maintaining the current suite of air quality monitors operated by the Division of Air Quality in North Carolina. Please also share these comments with any of your colleagues in the General Assembly you feel may benefit from the information provided herein.

As a former consulting member of the U.S. EPA's most recent Clean Air Scientific Advisory Committee on Ozone, and as an air pollution effects researcher at Appalachian State University, in Boone, NC, I have been intimately involved with air quality monitoring and the value that it provides to the citizens of this state and region. It is important that we continue operating the current air quality monitoring network in North Carolina, as the data provided contribute to the well-being of our citizens as well as help us to prepare for future changes in air quality that may arise from future industrial development, population growth, and/or changes in prevailing regional weather patterns.

Long-term monitoring of air quality is crucial for establishing baselines against which researchers can determine if air quality is changing. North Carolina's diverse geography, from sea level in the eastern coastal plain to Mt. Mitchell, the highest peak east of the Mississippi, gives rise to an air quality climate that is varied and complex. Successfully monitoring the air for the benefit of all the citizens of this state therefore requires an extensive network of monitors that are positioned all across the state.

Currently, the state of North Carolina operates 40 ozone monitors in its air quality network (https://xapps.ncdenr.org/aq/ambient/AmbtPollutant.jsp?pollutant=O3&date=07%2F13%2F2015). Most of these monitors were established less than 20 years ago in response to mandates from the EPA. Considering that climate scientists traditionally use a 30 year interval of weather to establish the average climate of a region, it is clear that we do not yet have a long enough span of data to establish ozone and air quality climates for most of NC. Maintaining the current monitoring system will allow those patterns to be elucidated. Those data can then contribute to more efficient means for dealing with issues related to the non-attainment of the National Ambient Air Quality Standards (NAAQS) as mandated by the Clean Air Act and its amendments of 1990. The Division of Air Quality writes in their draft monitoring plan that the bill being proposed in the legislature would eliminate 8 ozone monitors, the only ammonia monitor, 17 $PM_{2.5}$ monitors, and the entire Air Toxics Monitoring Network. This would be devastating to the public and would jeopardize the ability of the state to monitor the status of its air quality.

As but one example of the benefits of long-term air quality monitoring, monitors in and around Great Smoky Mountains National Park began recording dramatic increases in ozone that peaked between 1999 and 2002. Hourly ozone values sometimes exceeded 100 ppb and in some years the Park had more exceedances of the NAAQS than did Atlanta, GA. These extremely high concentrations, also seen throughout NC, contributed to the passing of the Clean Smokestacks Act by the General Assembly in 2002, and a year later, the EPA issued the NOx State Implementation Plan Call to reduce emissions that contribute to ozone formation. These two acts put great pressure on the TVA to reduce NOx emissions that were drifting into the state from its power plants, and since their implementation emissions have been reduced by over 91% since 1995 (http://www.tva.com/environment/air/nox.htm).

Continued monitoring has definitively shown that these reductions have led to dramatically lower ozone pollution in the state. Ozone is now considerably reduced in the Park and throughout all of NC. There have been no concentrations above 100 ppb in the Park since 2007 and considerably fewer above 80 ppb. Bryson City, located adjacent to the Park, now has the cleanest air in the state, with ozone concentrations less than 60 ppb over 97% of the time, something we know only because we have maintained the ozone monitors there over these past two decades. Without the extensive network of air quality monitors that we now have in our state, we would not have been able to report this good news, nor to have known how bad it had been in previous years. And without that knowledge, the Smokestacks Act might never have been passed, reducing the need for local controls that can have serious consequences for the local economy.

Maintaining and improving upon these air quality successes begins with our ability to monitor conditions over time to assure our citizens the air is healthy and the environment protected, or in a worse-case scenario, to provide an early warning if conditions change for reasons that are not predictable. The costs of monitoring are low relative to the peace of mind provided.

Only by assessing the monitoring that has been done up to now do we know that these emission control acts have resulted in the cleaner air that we all now breathe. Risk-benefit analyses show that lower ozone significantly reduces respiratory distress in the elderly and in children suffering from asthma, the outcome of which is lower mortality and reduced health care costs. Lower ozone concentrations also benefit agriculture, since ozone is the most toxic air pollutant to crops and our natural ecosystems. Studies have shown that elevated ozone causes trees to lose excessive amounts of water, which when scaled up can lead to the drying out of entire watersheds. This excessive water loss reduces tree growth while drier forests can become fire hazards.

Finally, studies of long-term monitoring in other locations around the country show that maintenance of such networks have a highly positive benefit:cost ratio. The National Acid Deposition Network, which arises from Title IX of the Clean Air Act to protect against excessive N and S inputs to ecosystems, has documented significant reductions in NOx and SO_2 emissions from the power industry. The most recent analysis showed that benefits to agriculture, forests, and human health, totaled more than $122 billion while compliance with the Act cost industry only ~$3 billion dollars, an astounding 41:1 benefit:cost ratio. When all monitoring programs in Title IX are totaled up, monitoring costs a mere 0.4% of implementation costs (Lovett et al. 2009. Who needs environmental monitoring? [www.frontiersinecology.org]).

In conclusion, I urge you and your colleagues to continue to support the current air quality monitoring network, and not only for ozone, but also for the other mandated criteria pollutants, such as $PM_{2.5}$, SO_2, NOx, lead, and CO. Long-term air quality monitoring is necessary to protect the health of North Carolina citizens and to establish those temporal trends that lead to the most efficient and cost-effective means of mitigating the adverse consequences of these pollutants.

Thank you for your time and thoughtfulness regarding this important issue.

Sincerely,

Howard S. Neufeld

Dr. Howard S. Neufeld, Professor of Biology, and
Chair, Appalachian State University's Atmospheric Interdisciplinary Research Group, and
Director, Southern Appalachian Environmental Research and Education Center, ASU

Allen Steam Station

Belmont, North Carolina

Sierra Club Evaluation of Compliance with the 1-hour NAAQS for SO_2

December 23, 2013

Conducted by:

Steven Klafka, P.E., BCEE

Wingra Engineering, S.C.

Madison, Wisconsin

1. Introduction

Wingra Engineering, S.C. was hired by the Sierra Club to conduct an air modeling impact analysis to help USEPA, state and local air agencies identify facilities that are likely causing violations of the 1-hour sulfur dioxide (SO_2) national ambient air quality standard (NAAQS). This document describes the results and procedures for an evaluation conducted for the Allen Steam Station located in Belmont, North Carolina.

The dispersion modeling analysis predicted ambient air concentrations for comparison with the one hour SO_2 NAAQS. The modeling was performed using the most recent version of AERMOD, AERMET, and AERMINUTE, with data provided to the Sierra Club by regulatory air agencies and through other publicly-available sources as documented below. The analysis was conducted in adherence to all available USEPA guidance for evaluating source impacts on attainment of the 1-hour SO_2 NAAQS via aerial dispersion modeling, including the AERMOD Implementation Guide; USEPA's Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010; modeling guidance promulgated by USEPA in Appendix W to 40 CFR Part 51; and, USEPA's March 2011 Modeling Guidance for SO_2 NAAQS Designations.[1]

2. Compliance with the 1-hour SO_2 NAAQS

2.1 1-hour SO_2 NAAQS

The 1-hour SO_2 NAAQS takes the form of a three-year average of the 99th-percentile of the annual distribution of daily maximum 1-hour concentrations, which cannot exceed 75 ppb.[2] Compliance with this standard was verified using USEPA's AERMOD air dispersion model, which produces air concentrations in units of $\mu g/m^3$. The 1-hour SO_2 NAAQS of 75 ppb equals 196.2 $\mu g/m^3$, and this is the value used for determining whether modeled impacts exceed the NAAQS.[3] The 99th-percentile of the annual distribution of daily maximum 1-hour concentrations corresponds to the fourth-highest value at each receptor for a given year.

2.2 Modeling Results

Modeling results for Allen Steam Station are summarized in Table 1. It was determined that based on either currently permitted emissions or measured actual emissions, the Allen Steam Station is estimated to create downwind SO_2 concentrations which exceed the 1-hour NAAQS.

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[1] http://www.epa.gov/scram001/so2_modeling_guidance.htm
[2] USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010.
[3] The ppb to $\mu g/m^3$ conversion is found in the source code to AERMOD v. 12345, subroutine Modules. The conversion calculation is 75/0.3823 = 196.2 $\mu g/m^3$.

For the modeling results presented in Table 1, the evaluated emission rates include the allowable and maximum. "Allowable" is the peak emission rate from each unit as approved by the current air quality operation permit for the facility. "Maximum" is the highest combined emission rate from all units during any single hour as measured during 2012.

Air quality impacts in North Carolina are based on a background concentration of 13.1 µg/m^3. This is the 2010-12 design value for Swain County, North Carolina - the lowest measured background concentration in the state. This is the most recently available design value.

Table 1 - SO_2 Modeling Results for Allen Steam Station Modeling Analysis

Emission Rates	Averaging Period	99th Percentile 1-hour Daily Maximum (µg/m^3)				Complies with NAAQS?
		Impact	Background	Total	NAAQS	
Allowable	1-hour	1,094.5	13.1	1,107.6	196.2	No
Maximum	1-hour	305.5	13.1	318.6	196.2	No

The currently permitted emissions and measured maximum emissions used for the modeling analysis are summarized in Table 2.

Table 2 - Modeled SO_2 Emissions from Allen Steam Station [4,5]

Stack ID	Unit ID	Allowable Emissions 24-hour Average (lbs/hr)	Maximum Emissions 1-hour Average (lbs/hr)
CS125	Unit 1	1,980	903
	Unit 2	1,980	865
	Unit 5	3,390	1,565
	Subtotal	7,350	3,333
CS34	Unit 3	3,390	314
	Unit 4	3,390	358
	Subtotal	6,780	672
Facility Total	All Units	14,130	4,005

Based on the modeling results, emission reductions from current rates considered necessary to achieve compliance with the 1-hour NAAQS were calculated and presented in Table 3.

[4] Allowable emissions from all five units are 1.0 lbs/mmbtu heat input. North Carolina Department of Environment and Natural Resources, Permit No. 03757T37, October 6, 2011.
[5] Maximum emissions are measured hourly rates reported for 2012 in USEPA, Clean Air Markets - Data and Maps.

Table 3 - Required Emission Reductions for Compliance with the 1-hour NAAQS for SO_2

Acceptable Impact (NAAQS - Background) 99th Percentile 1-hour Daily Max ($\mu g/m^3$)	Required Total Facility Reduction Based on Allowable Emissions (%)	Required Total Facility Emission Rate (lbs/hr)	Required Total Facility 1-hour Average Emission Rate (lbs/mmbtu)
183.1	83.3%	2,363	0.17

Predicted exceedences of the 1-hour NAAQS for SO_2 extend throughout the region to a maximum distance of 50 kilometers.

Figure 1 shows the extent of NAAQS violations throughout the entire 50 kilometer modeling domain.

Figure 2 provides a close-up local view of NAAQS violations.

2.3 Conservative Modeling Assumptions

A dispersion modeling analysis requires the selection of numerous parameters which affect the predicted concentrations. For the enclosed analysis, several parameters were selected which under-predict facility impacts.

Assumptions used in this modeling analysis which likely under-estimate concentrations include the following:

- Allowable emissions are based on a limitation with an averaging period which is greater than the 1-hour average used for the SO_2 air quality standard. Emissions and impacts during any 1-hour period may be higher than assumed for the modeling analysis.
- No consideration of facility operation at less than 100% load. Stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts.
- No consideration of building or structure downwash. These downwash effects typically increase predicted concentrations near the facility.
- The two facility stacks are 365 feet tall. There has been no evaluation to determine if this stack height exceeds Good Engineering Practice or GEP regulations. If the GEP height is lower, the predicted impacts would increase.
- No consideration of off-site sources. These other sources of SO_2 will increase the predicted impacts.

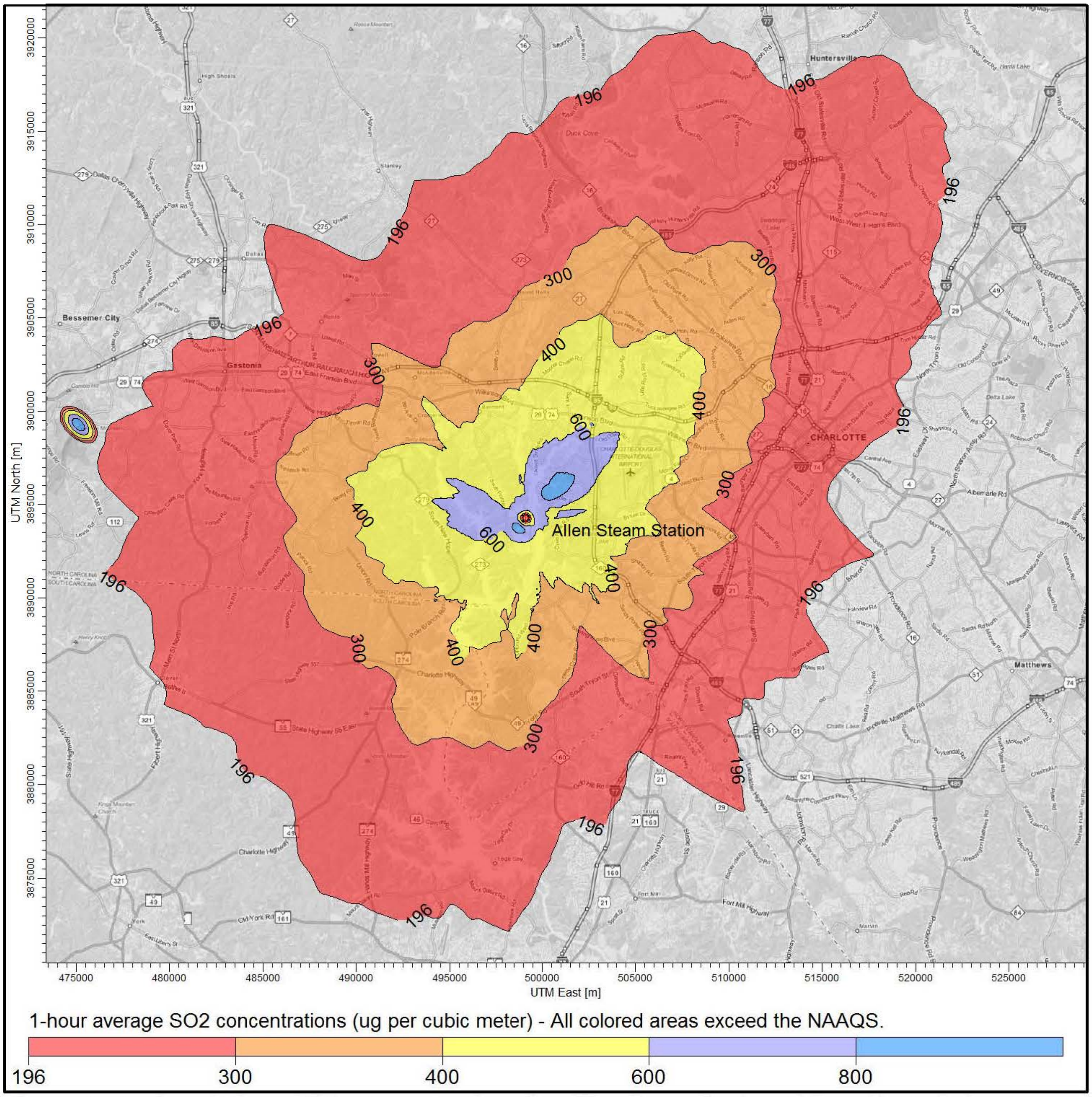

Figure 1 - Regional View of SO_2 Concentrations for Allen Steam Station (Allowable Emissions)

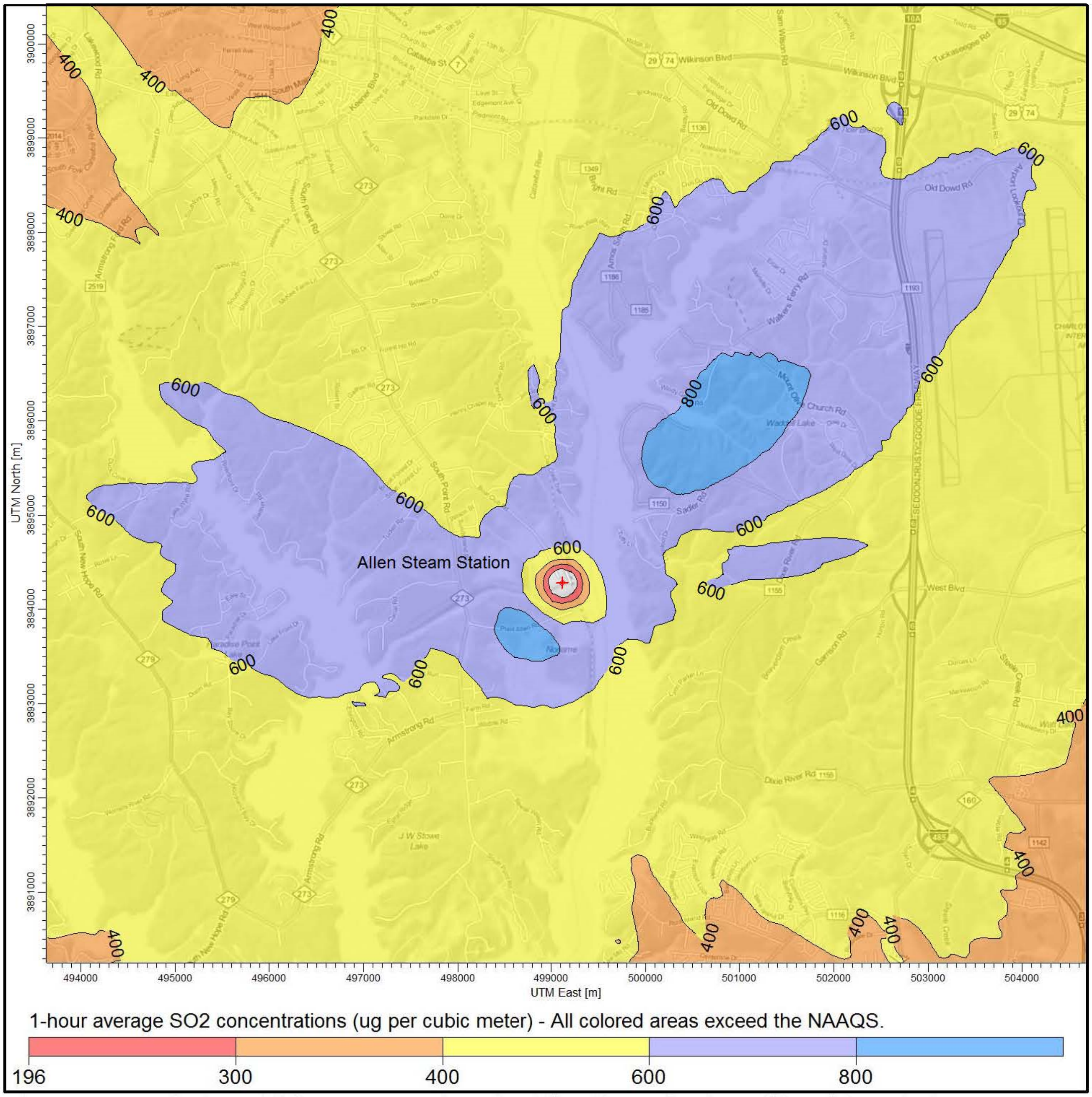

Figure 2 - Local View of SO_2 Concentrations for Allen Steam Station (Allowable Emissions)

3. Modeling Methodology

3.1 Air Dispersion Model

The modeling analysis used USEPA's AERMOD program, v. 12345. AERMOD, as available from the Support Center for Regulatory Atmospheric Modeling (SCRAM) website, was used in conjunction with a third-party modeling software program, *AERMOD View*, sold by Lakes Environmental Software.

3.2 Control Options

The AERMOD model was run with the following control options:

- 1-hour average air concentrations
- Regulatory defaults
- Flagpole receptors

To reflect a representative inhalation level, a flagpole height of 1.5 meters was used for all modeled receptors. This parameter was added to the receptor file when running AERMAP, as described in Section 4.4.

An evaluation was conducted to determine if the modeled facility was located in a rural or urban setting using USEPA's methodology outlined in Section 7.2.3 of the Guideline on Air Quality Models.[6] For urban sources, the URBANOPT option is used in conjunction with the urban population from an appropriate nearby city and a default surface roughness of 1.0 meter. Methods described in Section 4.1 were used to determine whether rural or urban dispersion coefficients were appropriate for the modeling analysis.

3.3 Output Options

The AERMOD analysis was based on five years of recent meteorological data. The modeling analyses used one run with five years of sequential meteorological data from 2008-2012. Consistent with USEPA's Modeling Guidance for SO_2 NAAQS Designations, AERMOD provided a table of fourth-high 1-hour SO_2 impacts concentrations consistent with the form of the 1-hour SO_2 NAAQS.[7]

Please refer to Table 1 for the modeling results.

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[6] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.
[7] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 24-26.

4. Model Inputs

4.1 Geographical Inputs

The "ground floor" of all air dispersion modeling analyses is establishing a coordinate system for identifying the geographical location of emission sources and receptors. These geographical locations are used to determine local characteristics (such as land use and elevation), and also to ascertain source to receptor distances and relationships.

The Universal Transverse Mercator (UTM) NAD83 coordinate system was used for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. Stack locations were obtained from facility permits and prior modeling files provided by the state regulatory agency. The stack locations were then verified using aerial photographs.

The facility was evaluated to determine if it should be modeled using the rural or urban dispersion coefficient option in AERMOD. A GIS was used to determine whether rural or urban dispersion coefficients apply to a site. Land use within a three-kilometer radius circle surrounding the facility was considered. USEPA guidance states that urban dispersion coefficients are used if more than 50% of the area within 3 kilometers has urban land uses. Otherwise, rural dispersion coefficients are appropriate.[8]

USEPA's AERSURACE model v. 13016 was used to develop the meteorological data for the modeling analysis. This model was also used to evaluate surrounding land use within 3 kilometers. Based on the output from the AERSURFACE, approximately 8.2% of surrounding land use around the modeled facility was of urban land use types including Type 21 – Low Intensity Residential, Type 22 – High Intensity Residential and Type 23 – Commercial / Industrial / Transportation.

This is less than the 50% value considered appropriate for the use of urban dispersion coefficients. Based on the AERSURFACE analysis, it was concluded that the rural option would be used for the modeling summarized in this report. Please refer to Section 4.5.3 for a discussion of the AERSURFACE analysis.

[8] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 7.2.3.

4.2 Emission Rates and Source Parameters

The modeling analyses only considered SO_2 emissions from the facility. Off-site sources were not considered. Concentrations were predicted for two scenarios shown in Table 2:

1) approved or allowable emissions based on permits issued by the regulatory agency, and

2) measured actual hourly SO_2 emissions obtained from USEPA's Clean Air Markets Database. To assure realistic emission rates were used, emissions from all units at the facility were combined and the hour with the maximum total facility emissions was used to determine the actual emissions.

Stack parameters and emissions used for the modeling analysis are summarized in Table 4.

Table 4 – Facility Stack Parameters and Emissions [9]

Stack	CS125	CS34
Description	Units 1, 2 and 5	Units 3 and 4
X Coord. [m]	499110	499120
Y Coord. [m]	3894281	3894285
Base Elevation [m]	190.52	189.56
Release Height [m]	111.25	111.25
Gas Exit Temperature [°K]	325.928	327.594
Gas Exit Velocity [m/s]	11.966	10.229
Inside Diameter [m]	8.992	8.992
Allowable Emission Rate [g/s]	926.1	854.3
Maximum Emission Rate [g/s]	420	84.67

The above stack parameters and emissions were obtained from regulatory agency documents and databases identified in Section 2.3. The analysis was conducted based on 100% operating load using maximum exhaust flow rates and emission rates. Operation at less than full capacity loads was not considered. This assumption tends to under-predict impacts since stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts. Stack location, height and diameter were verified using aerial photographs, and flue gas flow rate and temperature were verified using combustion calculations.

[9] U.S. Energy Information Administration, http://www.eia.gov/electricity/data/eia860/index.html.

4.3 Building Dimensions and GEP

No building dimensions or prior downwash evaluations were available. Therefore this modeling analysis did not address the effects of downwash which may increase predicted concentrations.

4.4 Receptors

For Allen Steam Station, three receptor grids were employed:

1. A 100-meter Cartesian receptor grid centered on Allen Steam Station and extending out 5 kilometers.
2. A 500-meter Cartesian receptor grid centered on Allen Steam Station and extending out 10 kilometers.
3. A 1,000-meter Cartesian receptor grid centered on Allen Steam Station and extending out 50 kilometers. 50 kilometers is the maximum distance accepted by USEPA for the use of the AERMOD dispersion model.[10]

A flagpole height of 1.5 meters was used for all these receptors.

Elevations from stacks and receptors were obtained from National Elevation Dataset (NED) GeoTiff data. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. These elevations were extracted from 1 arc-second (30 meter) resolution NED files. The USEPA software program AERMAP v. 11103 is used for these tasks.

4.5 Meteorological Data

To improve the accuracy of the modeling analysis, recent meteorological data for the 2008-2012 period were prepared using the USEPA's program AERMET which creates the model-ready surface and profile data files required by AERMOD. Required data inputs to AERMET included surface meteorological measurements, twice-daily soundings of upper air measurements, and the micrometeorological parameters surface roughness, albedo, and Bowen ratio. One-minute ASOS data were available so USEPA methods were used to reduce calm and missing hours.[11] The USEPA software program AERMINUTE v. 13016 is used for these tasks.

Pre-processed meteorological data were provided by the North Carolina Department of Environment

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[10] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, Section A.1.(1), November 9, 2005.
[11] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, p. 19.

and Natural Resources, Division of Air Quality. The data recommended for Gaston County were downloaded from the DENR web site.[12]

This section discusses how the meteorological data was prepared for use in the 1-hour SO_2 NAAQS modeling analyses. The USEPA software program AERMET v. 12345 is used for these tasks.

4.5.1 Surface Meteorology

Surface meteorology was obtained for Gastonia Municipal Airport located near the Allen Steam Station. NCDENR obtained the Integrated Surface Hourly (ISH) data for the 2008-2012 period from the National Climatic Data Center (NCDC). The ISH surface data was processed through AERMET Stage 1, which performs data extraction and quality control checks.

4.5.2 Upper Air Data

Upper-air data are collected by a "weather balloon" that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawindsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. The upper air data were processed through AERMET Stage 1, which performs data extraction and quality control checks.

For Allen Steam Station, the concurrent 2008-2012 upper air data from twice-daily radiosonde measurements obtained at the most representative location were used. This location was the Greensboro, North Carolina measurement station. These data are in Forecast Systems Laboratory (FSL) format and were obtained by NCDENR from NOAA.[13] All reporting levels were downloaded and processed with AERMET.

4.5.3 AERSURFACE

AERSURFACE is a program that extracts surface roughness, albedo, and daytime Bowen ratio for an area surrounding a given location. AERSURFACE uses land use and land cover (LULC) data in the U.S. Geological Survey's 1992 National Land Cover Dataset to extract the necessary micrometeorological data. LULC data was used for processing meteorological data sets used as input to AERMOD.

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[12] NCDENR, AERMOD Meteorological Data Sets, http://www.ncair.org/permits/mets/metdata.shtml
[13] Available at: http://esrl.noaa.gov/raobs/

AERSURFACE v. 13016 was used to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site. AERSURFACE was used to develop surface roughness in a one kilometer radius surrounding the data collection site. Bowen ratio and albedo was developed for a 10 kilometer by 10 kilometer area centered on the meteorological data collection site. These micrometeorological data were processed for seasonal periods using 30-degree sectors. Seasonal moisture conditions were considered average with no months with continuous snow cover.

4.5.4 Data Review

Missing meteorological data were not filled as the data file met USEPA's 90% data completeness requirement.[14] The AERMOD output file shows there were 3.42% missing data.

To confirm the representativeness of the airport meteorological data, the surface characteristics of the airport data collection site and the modeled source location were compared. Since the Gastonia Municipal Airport is located close to Allen Steam Station, this meteorological data set was considered appropriate for this modeling analysis. [15] Additionally, this weather station provided high quality surface measurements for the most recent 5-year time, and had similar land use, surface characteristics, terrain features and climate. As noted, NCDENR provided preprocessed meteorological data for Gaston County and had concluded this airport weather station was representative for modeling sources in this county.

5. Background SO_2 Concentrations

Background concentrations were determined consistent with USEPA's Modeling Guidance for SO_2 NAAQS Designations.[16] To preserve the form of the 1-hour SO_2 standard, based on the 99th percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled, the <u>background</u> fourth-highest daily maximum 1-hour SO_2 concentration was added to the <u>modeled</u> fourth-highest daily maximum 1-hour SO_2 concentration.[17]

Background concentrations were based on the 2010-12 design value measured by the ambient monitors located in North Carolina.[18]

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[14] USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, Section 5.3.2, pp. 5-4 to 5-5.
[15] USEPA, AERMOD Implementation Guide, March 19, 2009, pp. 3-4.
[16] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 20-23.
[17] USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010, p. 3.
[18] http://www.epa.gov/airtrends/values.html

6. Reporting

All files from the programs used for this modeling analysis are available to regulatory agencies. These include analyses prepared with AERSURFACE, AERMET, AERMAP, and AERMOD.

Asheville Steam Electric Plant

Arden, North Carolina

Sierra Club Evaluation of Compliance with 1-hour SO_2 NAAQS

July 5, 2012

Conducted by:

Steven Klafka, P.E., BCEE

Wingra Engineering, S.C.

Madison, Wisconsin

1. Introduction

The Sierra Club prepared an air modeling impact analysis to help USEPA, state and local air agencies identify facilities that are likely causing violations of the 1-hour sulfur dioxide (SO_2) national ambient air quality standard (NAAQS). This document describes the results and procedures for an evaluation conducted for the Asheville Steam Electric Plant located in Arden, North Carolina.

The dispersion modeling analysis predicted ambient air concentrations for comparison with the one hour SO_2 NAAQS. The modeling was performed using the most recent version of AERMOD, AERMET, and AERMINUTE, with data provided to the Sierra Club by regulatory air agencies and through other publicly-available sources as documented below. The analysis was conducted in adherence to all available USEPA guidance for evaluating source impacts on attainment of the 1-hour SO_2 NAAQS via aerial dispersion modeling, including the AERMOD Implementation Guide; USEPA's Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010; modeling guidance promulgated by USEPA in Appendix W to 40 CFR Part 51; and, USEPA's March 2011 Modeling Guidance for SO_2 NAAQS Designations, available at http://www.epa.gov/ttn/scram/SO2%20Designations%20Guidance%202011.pdf.

2. Compliance with the 1-hour SO_2 NAAQS

2.1 1-hour SO_2 NAAQS

The 1-hour SO_2 NAAQS takes the form of a three-year average of the 99^{th}-percentile of the annual distribution of daily maximum 1-hour concentrations, which cannot exceed 75 ppb.[1] Compliance with this standard was verified using USEPA's AERMOD air dispersion model, which produces air concentrations in units of $\mu g/m^3$. The 1-hour SO_2 NAAQS of 75 ppb equals 196.2 $\mu g/m^3$, and this is the value used for determining whether modeled impacts exceed the NAAQS.[2] The 99^{th}-percentile of the annual distribution of daily maximum 1-hour concentrations corresponds to the fourth-highest value at each receptor for a given year.

2.2 Modeling Results

Modeling results for Asheville Steam Electric Plant are summarized in Table 1. It was determined that based on either currently permitted emissions or measured actual emissions, the Asheville Steam Electric Plant is estimated to create downwind SO_2 concentrations which exceed the 1-hour NAAQS.

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[1] USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010.
[2] The ppb to $\mu g/m^3$ conversion is found in the source code to AERMOD v. 11103, subroutine Modules. The conversion calculation is $75/0.3823 = 196.2\ \mu g/m^3$.

The currently permitted emissions and measured actual emissions used for the modeling analysis are summarized in Table 2. Based on the modeling results, emission reductions from current rates considered necessary to achieve compliance with the 1-hour NAAQS were calculated and presented in Table 3.

Predicted exceedences of the 1-hour NAAQS for SO_2 extend throughout the region to a maximum distance of 50 kilometers.

Figure 1 provided at the end of this report shows the extent of NAAQS violations throughout the entire 50 kilometer modeling domain.

Figure 2 provides a close-up local view of NAAQS violations.

Air quality impacts in North Carolina are based on a background concentration of 52.3 $\mu g/m^3$. This is the 2008-10 design value for Forsyth County, North Carolina - the lowest measured background concentration in the state. This is the most recently available design value.

2.3 Conservative Modeling Assumptions

A dispersion modeling analysis requires the selection of numerous parameters which affect the predicted concentrations. For the enclosed analysis, several parameters were selected which under-predict facility impacts.

Assumptions used in this modeling analysis which likely under-estimate concentrations include the following:

- Allowable emissions are based on a limitation with an averaging period which is greater than the 1-hour average used for the SO_2 air quality standard. Emissions and impacts during any 1-hour period may be higher than assumed for the modeling analysis.
- No consideration of facility operation at less than 100% load. Stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts.
- No consideration of building or structure downwash. These downwash effects typically increase predicted concentrations near the facility.
- No consideration of off-site sources. These other sources of SO_2 will increase the predicted impacts.

Table 1 - SO_2 Modeling Results for Asheville Steam Electric Plant Modeling Analysis

Emission Rates	Averaging Period	99th Percentile 1-hour Daily Maximum (μg/m³)				Complies with NAAQS?
		Impact	Background	Total	NAAQS	
Allowable	1-hour	11,429.6	52.3	11,481.9	196.2	No
Maximum	1-hour	3,647.3	52.3	3,699.6	196.2	No

Table 2 - Modeled SO_2 Emissions from Asheville Steam Electric Plant [3,4]

Stack ID	Unit ID	Allowable Emissions 24-hour Average (lbs/hr)	Maximum Emissions 1-hour Average (lbs/hr)
S01	Unit 1	4,956.5	1,752
S02	Unit 2	4,834.6	1,380
Stack Total	All Units	9,791.1	3,132

Table 3 - Required Emission Reductions for Compliance with 1-hour SO_2 NAAQS

Acceptable Impact (NAAQS - Background) 99th Percentile 1-hour Daily Max (μg/m³)	Required Total Facility Reduction Based on Allowable Emissions (%)	Required Total Facility Emission Rate (lbs/hr)	Required Total Facility Emission Rate (lbs/mmbtu)
143.9	98.7%	123.3	0.023

[3] Western North Carolina Regional Air Quality Agency, Air Quality Permit Number: 11-628-2011, January 18, 2011. Each boiler has an emission limitation of 2.3 lbs/mmbtu.
[4] Maximum emissions are measured hourly rates reported for 2011 in USEPA, Clean Air Markets - Data and Maps.

3. Modeling Methodology

3.1 Air Dispersion Model

The modeling analysis used USEPA's AERMOD program, version 12060. AERMOD, as available from the Support Center for Regulatory Atmospheric Modeling (SCRAM) website, was used in conjunction with a third-party modeling software program, *AERMOD View*, sold by Lakes Environmental Software.

3.2 Control Options

The AERMOD model was run with the following control options:

- 1-hour average air concentrations
- Regulatory defaults
- Flagpole receptors

To reflect a representative inhalation level, a flagpole height of 1.5 meters was used for all modeled receptors. This parameter was added to the receptor file when running AERMAP, as described in Section 4.4.

An evaluation was conducted to determine if the modeled facility was located in a rural or urban setting using USEPA's methodology outlined in Section 7.2.3 of the Guideline on Air Quality Models.[5] For urban sources, the URBANOPT option is used in conjunction with the urban population from an appropriate nearby city and a default surface roughness of 1.0 meter. Methods described in Section 4.1 to determine whether rural or urban dispersion coefficients were used.

3.3 Output Options

The AERMOD analysis was based on five years of recent meteorological data. The modeling analyses used one run with five years of sequential meteorological data from 2007-2011. Consistent with USEPA's Modeling Guidance for SO_2 NAAQS Designations, AERMOD provided a table of fourth-high 1-hour SO_2 impacts concentrations consistent with the form of the 1-hour SO_2 NAAQS.[6]

Please refer to Table 1 for the modeling results.

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[5] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.
[6] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 24-26.

4. Model Inputs

4.1 Geographical Inputs

The "ground floor" of all air dispersion modeling analyses is establishing a coordinate system for identifying the geographical location of emission sources and receptors. These geographical locations are used to determine local characteristics (such as land use and elevation), and also to ascertain source to receptor distances and relationships.

The Universal Transverse Mercator (UTM) NAD83 coordinate system was used for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. Stack locations were obtained from facility permits and prior modeling files provided by the state regulatory agency. The stack locations were then verified using aerial photographs.

The facility was evaluated to determine if it should be modeled using the rural or urban dispersion coefficient option in AERMOD. A GIS was used to determine whether rural or urban dispersion coefficients apply to a site. Land use within a three-kilometer radius circle surrounding the facility was considered. USEPA guidance states that urban dispersion coefficients are used if more than 50% of the area within 3 kilometers has urban land uses. Otherwise, rural dispersion coefficients are appropriate.[7]

USEPA's AERSURACE model Version 08009 was used to develop the meteorological data for the modeling analysis. This model was also used to evaluate surrounding land use within 3 kilometers. Based on the output from the AERSURFACE, approximately 14.5% of surrounding land use around the airport was of urban land use types including: 21 – Low Intensity Residential, 22 – High Intensity Residential, and 23 - Commercial/Industrial/Transportation.

This is less than the 50% value considered appropriate for the use of urban dispersion coefficients. Based on the AERSURFACE analysis, it was concluded that the rural option would be used for the modeling summarized in this report. Please refer to Section 4.5.3 for a discussion of the AERSURFACE analysis.

[7] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 7.2.3.

4.2 Emission Rates and Source Parameters

The modeling analyses only considered SO_2 emissions from the facility. Off-site sources were not considered. Concentrations were predicted for two scenarios shown in Table 2:

1) approved or allowable emissions based on permits issued by the regulatory agency, and

2) measured actual hourly SO_2 emissions obtained from USEPA's Clean Air Markets Database. To assure realistic emission rates were used, emissions from all units at the facility were combined and the hour with the maximum total facility emissions was used to determine the actual emissions.

Stack parameters and emissions used for the modeling analysis are summarized in Table 4.

Table 4 – Facility Stack Parameters and Emissions [8]

Stack	S01	S02
Description	Unit 1	Unit 2
X Coord. [m]	359953	359953
Y Coord. [m]	3926326	3926326
Base Elevation [m]	661.55	661.55
Release Height [m]	99.67	99.67
Gas Exit Temperature [°K]	322.594	321.483
Gas Exit Velocity [m/s]	17.294	17.111
Inside Diameter [m]	5.029	5.029
Allowable Emission Rate [g/s]	624.5	609.1
Maximum Emission Rate [g/s]	220.7	173.9

The above stack parameters and emissions were obtained from regulatory agency documents and databases identified in Section 2.3. The analysis was conducted based on 100% operating load using maximum exhaust flow rates and emission rates. Operation at less than full capacity loads was not considered. This assumption tends to under-predict impacts since stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts. Stack location, height and diameter were verified using aerial photographs, and flue gas flow rate and temperature were verified using combustion calculations.

[8] Email, V. Fahrere - WNCRAQA, Asheville Stack Parameter Information, June 6, 2012.

4.3 Building Dimensions and GEP

No building dimensions or prior downwash evaluations were available. Therefore this modeling analysis did not address the effects of downwash which may increase predicted concentrations.

4.4 Receptors

For Asheville Steam Electric Plant, three receptor grids were employed:

1. A 100-meter Cartesian receptor grid centered on Asheville Steam Electric Plant and extending out 5 kilometers.
2. A 500-meter Cartesian receptor grid centered on Asheville Steam Electric Plant and extending out 10 kilometers.
3. A 1,000-meter Cartesian receptor grid centered on Asheville Steam Electric Plant and extending out 50 kilometers. 50 kilometers is the maximum distance accepted by USEPA for the use of the AERMOD dispersion model.[9]

A flagpole height of 1.5 meters was used for all these receptors.

Elevations from stacks and receptors were obtained from National Elevation Dataset (NED) GeoTiff data. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. These elevations were extracted from 1 arc-second (30 meter) resolution NED files. The USEPA software program AERMAP v. 11103 is used for these tasks.

4.5 Meteorological Data

To improve the accuracy of the modeling analysis, recent meteorological data for the 2007 to 2011 period were prepared using the USEPA's program AERMET which creates the model-ready surface and profile data files required by AERMOD. Required data inputs to AERMET included surface meteorological measurements, twice-daily soundings of upper air measurements, and the micrometeorological parameters surface roughness, albedo, and Bowen ratio. One-minute ASOS data were available so USEPA methods were used to reduce calm and missing hours.[10] The USEPA software program AERMINUTE v. 11325 is used for these tasks.

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[9] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, Section A.1.(1), November 9, 2005.

[10] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, p. 19.

This section discusses how the meteorological data was prepared for use in the 1-hour SO_2 NAAQS modeling analyses. The USEPA software program AERMET v. 11059 is used for these tasks.

4.5.1 Surface Meteorology

Surface meteorology was obtained for Asheville Regional Airport located near the Asheville Steam Electric Plant. Integrated Surface Hourly (ISH) data for the 2007 to 2011 period were obtained from the National Climatic Data Center (NCDC). The ISH surface data was processed through AERMET Stage 1, which performs data extraction and quality control checks.

4.5.2 Upper Air Data

Upper-air data are collected by a "weather balloon" that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawindsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. The upper air data were processed through AERMET Stage 1, which performs data extraction and quality control checks.

For Asheville Steam Electric Plant, the concurrent 2007 through 2011 upper air data from twice-daily radiosonde measurements obtained at the most representative location were used. This location was the Greensboro, North Carolina measurement station. These data are in Forecast Systems Laboratory (FSL) format and were downloaded in ASCII text format from NOAA's FSL website.[11] All reporting levels were downloaded and processed with AERMET.

4.5.3 AERSURFACE

AERSURFACE is a non-guideline program that extracts surface roughness, albedo, and daytime Bowen ratio for an area surrounding a given location. AERSURFACE uses land use and land cover (LULC) data in the U.S. Geological Survey's 1992 National Land Cover Dataset to extract the necessary micrometeorological data. LULC data was used for processing meteorological data sets used as input to AERMOD.

AERSURFACE v. 08009 was used to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site. AERSURFACE was used to develop surface roughness in a one kilometer radius surrounding the data collection site. Bowen ratio and albedo was developed for a 10 kilometer by 10 kilometer area centered on the meteorological data collection site. These micrometeorological data were processed for seasonal

[11] Available at: http://esrl.noaa.gov/raobs/

periods using 30-degree sectors. Seasonal moisture conditions were considered average with no months with continuous snow cover.

4.5.4 Data Review

Missing meteorological data were not filled as the data file met USEPA's 90% data completeness requirement.[12] The AERMOD output file shows there were 2.4% missing data.

The representativeness of airport meteorological data is a potential concern in modeling industrial source sites.[13] The surface characteristics of the airport data collection site and the modeled source location were compared. Since the Asheville Regional Airport is located close to Asheville Steam Electric Plant, this meteorological data set was considered appropriate for this modeling analysis.

5. Background SO_2 Concentrations

Background concentrations were determined consistent with USEPA's Modeling Guidance for SO_2 NAAQS Designations.[14] To preserve the form of the 1-hour SO_2 standard, based on the 99th percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled, the background fourth-highest daily maximum 1-hour SO_2 concentration was added to the modeled fourth-highest daily maximum 1-hour SO_2 concentration.[15]

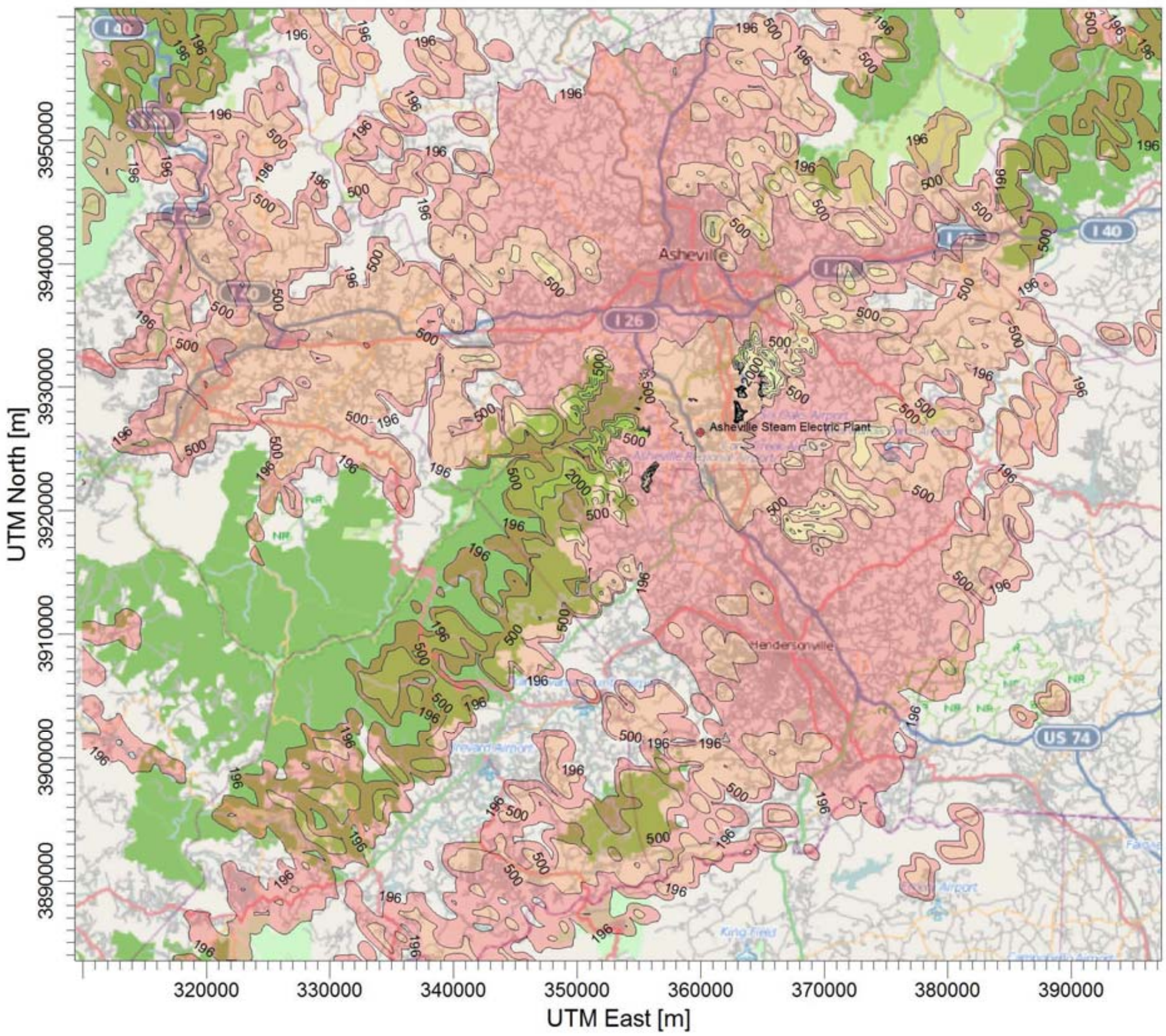
Background concentrations were based on the 2008-10 design value measured by the ambient monitors located in North Carolina.[16]

6. Reporting

All files from the programs used for this modeling analysis are available to regulatory agencies. These include analyses prepared with AERSURFACE, AERMET, AERMAP, and AERMOD.

[12] USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, Section 5.3.2, pp. 5-4 to 5-5.
[13] USEPA, AERMOD Implementation Guide, March 19, 2009, pp. 3-4.
[14] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 20-23.
[15] USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard August 23, 2010, p. 3.
[16] http://www.epa.gov/airtrends/values.html

Asheville Steam Electric Plant - Asheville, North Carolina
Evaluation of Compliance with the 1-hour NAAQS for SO2



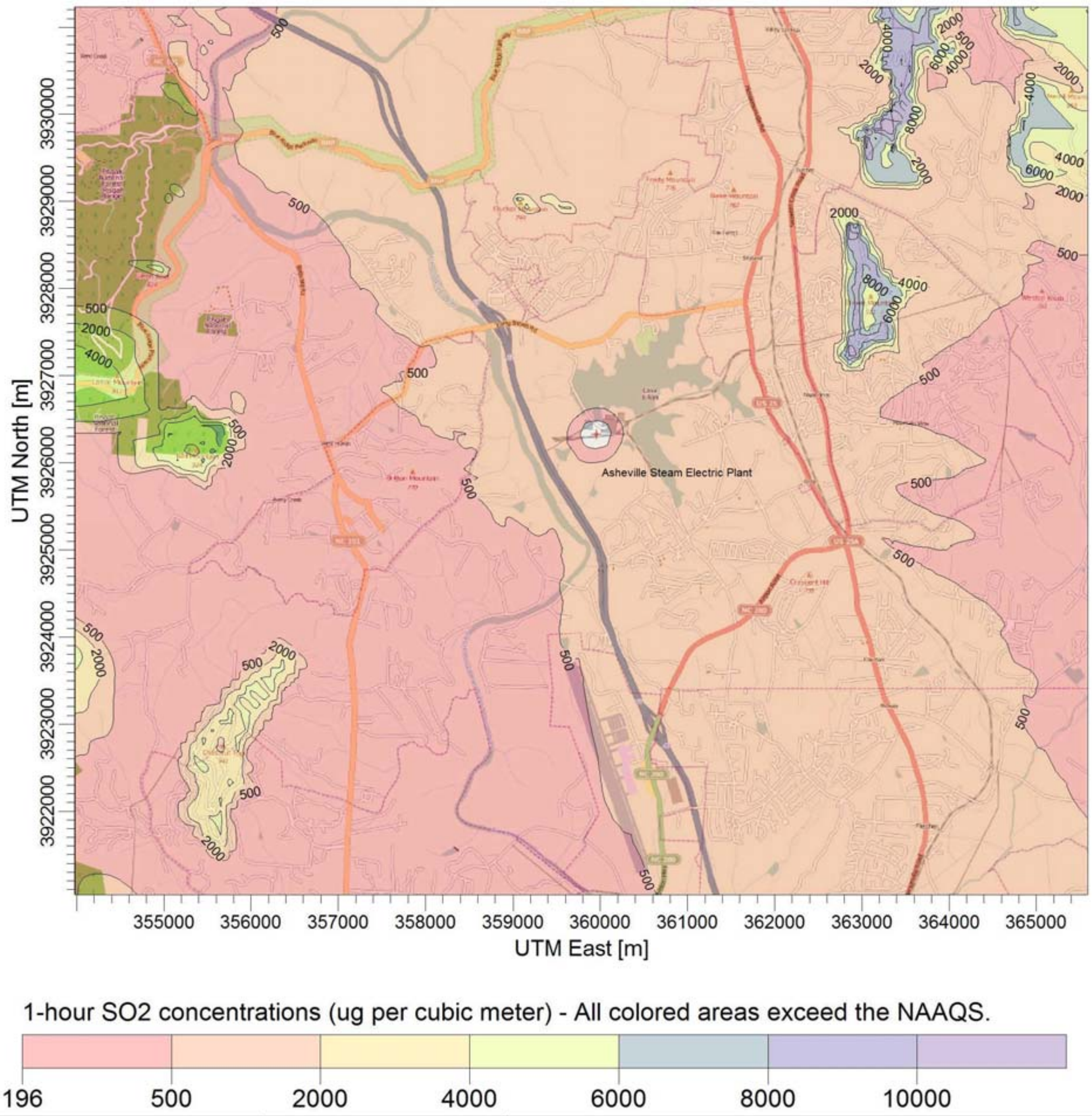
1-hour SO2 concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.

196 | 500 | 2000 | 4000 | 6000 | 8000 | 10000

All concentrations include a background of 52.3 ug/m3. This figure is based on allowable emissions.	Total Sources **4**	**Conducted on behalf of the Sierra Club**	
	Total Receptors **22083**	**by Wingra Engineering, S.C.**	
	Output Type **Concentration**	SCALE: 1:552,904 0 — 20 km	
	Maximum **11481.91488 ug/m^3**	DATE: **7/5/2012**	

AERMOD View - Lakes Environmental Software

Asheville Steam Electric Plant - Asheville, North Carolina
Evaluation of Compliance with the 1-hour NAAQS for SO2



All concentrations include a background of 52.3 ug/m3. This figure is based on allowable emissions.	Total Sources **4**	**Conducted on behalf of the Sierra Club**	
	Total Receptors **22083**	**by Wingra Engineering, S.C.**	
	Output Type **Concentration**	SCALE: 1:73,015 0 — 2 km	
	Maximum **11481.91488 ug/m^3**	DATE: **7/5/2012**	

AERMOD View - Lakes Environmental Software

Roxboro Steam Electric Plant

Semora, North Carolina

Sierra Club Evaluation of Compliance with 1-hour SO_2 NAAQS

December 5, 2012

Conducted by:

Steven Klafka, P.E., BCEE

Wingra Engineering, S.C.

Madison, Wisconsin

1. Introduction

The Sierra Club prepared an air modeling impact analysis to help USEPA, state and local air agencies identify facilities that are likely causing violations of the 1-hour sulfur dioxide (SO_2) national ambient air quality standard (NAAQS). This document describes the results and procedures for an evaluation conducted for the Roxboro Steam Electric Plant located in Semora, North Carolina.

The dispersion modeling analysis predicted ambient air concentrations for comparison with the one hour SO_2 NAAQS. The modeling was performed using the most recent version of AERMOD, AERMET, and AERMINUTE, with data provided to the Sierra Club by regulatory air agencies and through other publicly-available sources as documented below. The analysis was conducted in adherence to all available USEPA guidance for evaluating source impacts on attainment of the 1-hour SO_2 NAAQS via aerial dispersion modeling, including the AERMOD Implementation Guide; USEPA's Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010; modeling guidance promulgated by USEPA in Appendix W to 40 CFR Part 51; and, USEPA's March 2011 Modeling Guidance for SO_2 NAAQS Designations, available at http://www.epa.gov/ttn/scram/SO2%20Designations%20Guidance%202011.pdf.

2. Compliance with the 1-hour SO_2 NAAQS

2.1 1-hour SO_2 NAAQS

The 1-hour SO_2 NAAQS takes the form of a three-year average of the 99th-percentile of the annual distribution of daily maximum 1-hour concentrations, which cannot exceed 75 ppb.[1] Compliance with this standard was verified using USEPA's AERMOD air dispersion model, which produces air concentrations in units of $\mu g/m^3$. The 1-hour SO_2 NAAQS of 75 ppb equals 196.2 $\mu g/m^3$, and this is the value used for determining whether modeled impacts exceed the NAAQS.[2] The 99th-percentile of the annual distribution of daily maximum 1-hour concentrations corresponds to the fourth-highest value at each receptor for a given year.

2.2 Modeling Results

Modeling results for Roxboro Steam Electric Plant are summarized in Table 1. It was determined that based on either currently permitted emissions or measured actual emissions, the Roxboro Steam Electric Plant is estimated to create downwind SO_2 concentrations which exceed the 1-hour NAAQS.

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[1] USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010.
[2] The ppb to $\mu g/m^3$ conversion is found in the source code to AERMOD v. 11103, subroutine Modules. The conversion calculation is 75/0.3823 = 196.2 $\mu g/m^3$.

The currently permitted emissions and measured actual emissions used for the modeling analysis are summarized in Table 2. Based on the modeling results, emission reductions from current rates considered necessary to achieve compliance with the 1-hour NAAQS were calculated and presented in Table 3.

Predicted exceedences of the 1-hour NAAQS for SO_2 extend throughout the region to a maximum distance of 50 kilometers.

Figure 1 provided at the end of this report shows the extent of NAAQS violations throughout the entire 50 kilometer modeling domain.

Figure 2 provides a close-up local view of NAAQS violations.

Air quality impacts in North Carolina are based on a background concentration of 18.3 $\mu g/m^3$. This is the 2009-11 design value for Martin County, North Carolina - the lowest measured background concentration in the state. This is the most recently available design value.

2.3 Conservative Modeling Assumptions

A dispersion modeling analysis requires the selection of numerous parameters which affect the predicted concentrations. For the enclosed analysis, several parameters were selected which under-predict facility impacts.

Assumptions used in this modeling analysis which likely under-estimate concentrations include the following:

- Allowable emissions are based on a limitation with an averaging period which is greater than the 1-hour average used for the SO_2 air quality standard. Emissions and impacts during any 1-hour period may be higher than assumed for the modeling analysis.
- No consideration of facility operation at less than 100% load. Stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts.
- No consideration of building or structure downwash. These downwash effects typically increase predicted concentrations near the facility.
- No consideration of off-site sources. These other sources of SO_2 will increase the predicted impacts.

Table 1 - SO_2 Modeling Results for Roxboro Steam Electric Plant Modeling Analysis

Emission Rates	Averaging Period	99th Percentile 1-hour Daily Maximum (µg/m³)				Complies with NAAQS?
		Impact	Background	Total	NAAQS	
Allowable[3]	1-hour	721.8	18.3	740.1	196.2	No
Maximum[4]	1-hour	340.6	18.3	358.9	196.2	No

Table 2 - Modeled SO_2 Emissions from Roxboro Steam Electric Plant [3,4]

Stack ID	Unit ID	Allowable Emissions Monthly Average (lbs/hr)	Maximum Emissions 1-hour Average (lbs/hr)
S01	Unit 1	2,582.9	1,244
S02	Unit 2	3,848.1	2,071
S03	Unit 3A	2,330.8	825
	Unit 3B	2,330.8	825
S04	Unit 4A	2,242.2	2,370
	Unit 4B	2,242.2	2,370
Stack Total	All Units	15,576.8	7,335

Table 3 - Required Emission Reductions for Compliance with 1-hour SO_2 NAAQS

Acceptable Impact (NAAQS - Background) 99th Percentile 1-hour Daily Max (µg/m³)	Required Total Facility Reduction Based on Allowable Emissions (%)	Required Total Facility Emission Rate (lbs/hr)	Required Total Facility 1-hour Average Emission Rate (lbs/mmbtu)
177.9	75.4%	3,839.2	0.13

[3] North Carolina, Department of Environment and Natural Resources, Air Quality Permit No. 01001T47, Setpember 3, 2010. Allowable SO2 emissions are based on a limitation of 0.547 lbs per mmbtu for each of the six boilers at the plant.

[4] Maximum emissions are measured hourly rates reported for 2011 in USEPA, Clean Air Markets - Data and Maps.

3. Modeling Methodology

3.1 Air Dispersion Model

The modeling analysis used USEPA's AERMOD program, version 12060. AERMOD, as available from the Support Center for Regulatory Atmospheric Modeling (SCRAM) website, was used in conjunction with a third-party modeling software program, *AERMOD View*, sold by Lakes Environmental Software.

3.2 Control Options

The AERMOD model was run with the following control options:

- 1-hour average air concentrations
- Regulatory defaults
- Flagpole receptors

To reflect a representative inhalation level, a flagpole height of 1.5 meters was used for all modeled receptors. This parameter was added to the receptor file when running AERMAP, as described in Section 4.4.

An evaluation was conducted to determine if the modeled facility was located in a rural or urban setting using USEPA's methodology outlined in Section 7.2.3 of the Guideline on Air Quality Models.[5] For urban sources, the URBANOPT option is used in conjunction with the urban population from an appropriate nearby city and a default surface roughness of 1.0 meter. Methods described in Section 4.1 to determine whether rural or urban dispersion coefficients were used.

3.3 Output Options

The AERMOD analysis was based on five years of recent meteorological data. The modeling analyses used one run with five years of sequential meteorological data from 2007-2011. Consistent with USEPA's Modeling Guidance for SO_2 NAAQS Designations, AERMOD provided a table of fourth-high 1-hour SO_2 impacts concentrations consistent with the form of the 1-hour SO_2 NAAQS.[6]

Please refer to Table 1 for the modeling results.

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[5] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.
[6] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 24-26.

4. Model Inputs

4.1 Geographical Inputs

The "ground floor" of all air dispersion modeling analyses is establishing a coordinate system for identifying the geographical location of emission sources and receptors. These geographical locations are used to determine local characteristics (such as land use and elevation), and also to ascertain source to receptor distances and relationships.

The Universal Transverse Mercator (UTM) NAD83 coordinate system was used for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. Stack locations were obtained from facility permits and prior modeling files provided by the state regulatory agency. The stack locations were then verified using aerial photographs.

The facility was evaluated to determine if it should be modeled using the rural or urban dispersion coefficient option in AERMOD. A GIS was used to determine whether rural or urban dispersion coefficients apply to a site. Land use within a three-kilometer radius circle surrounding the facility was considered. USEPA guidance states that urban dispersion coefficients are used if more than 50% of the area within 3 kilometers has urban land uses. Otherwise, rural dispersion coefficients are appropriate.[7]

USEPA's AERSURACE model Version 08009 was used to develop the meteorological data for the modeling analysis. This model was also used to evaluate surrounding land use within 3 kilometers. Based on the output from the AERSURFACE, approximately 11.3% of surrounding land use around the airport was of urban land use types including: 21 – Low Intensity Residential, 22 – High Intensity Residential, and 23 - Commercial/Industrial/Transportation.

This is less than the 50% value considered appropriate for the use of urban dispersion coefficients. Based on the AERSURFACE analysis, it was concluded that the rural option would be used for the modeling summarized in this report. Please refer to Section 4.5.3 for a discussion of the AERSURFACE analysis.

[7] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 7.2.3.

4.2 Emission Rates and Source Parameters

The modeling analyses only considered SO_2 emissions from the facility. Off-site sources were not considered. Concentrations were predicted for two scenarios shown in Table 2:

1) approved or allowable emissions based on permits issued by the regulatory agency, and

2) measured actual hourly SO_2 emissions obtained from USEPA's Clean Air Markets Database. To assure realistic emission rates were used, emissions from all units at the facility were combined and the hour with the maximum total facility emissions was used to determine the actual emissions.

Stack parameters and emissions used for the modeling analysis are summarized in Table 4.

Table 4 – Facility Stack Parameters and Emissions [8]

Stack	S01	S02	S03	S04
Description	Unit 1	Unit 2	Units 3A & 3B	Units 4A & 4B
X Coord. [m]	672765.49	672758.49	672611.45	672603.45
Y Coord. [m]	4039371.46	4039371.46	4039382.44	4039382.44
Base Elevation [m]	132.48	132.39	132.05	132.12
Release Height [m]	121.92	121.92	121.92	121.92
Gas Exit Temperature [°K]	325.37	325.93	326.48	325.91
Gas Exit Velocity [m/s]	14.22	15.32	14.32	14.32
Inside Diameter [m]	6.71	8.69	9.3	9.3
Allowable Emission Rate [g/s]	325.4	484.9	587.3	565
Maximum Emission Rate [g/s]	156.7	260.9	207.9	298.6

The above stack parameters and emissions were obtained from regulatory agency documents and databases identified in Section 2.3. The analysis was conducted based on 100% operating load using maximum exhaust flow rates and emission rates. Operation at less than full capacity loads was not considered. This assumption tends to under-predict impacts since stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts. Stack location, height and diameter were verified using aerial photographs, and flue gas flow rate and temperature were verified using combustion calculations.

[8] NCDENR, Hazardous air pollutant AERMOD modeling files for Roxboro Steam Electric Plant, November 21, 2008.

4.3 Building Dimensions and GEP

No building dimensions or prior downwash evaluations were available. Therefore this modeling analysis did not address the effects of downwash which may increase predicted concentrations.

4.4 Receptors

For Roxboro Steam Electric Plant, three receptor grids were employed:

1. A 100-meter Cartesian receptor grid centered on Roxboro Steam Electric Plant and extending out 5 kilometers.
2. A 500-meter Cartesian receptor grid centered on Roxboro Steam Electric Plant and extending out 10 kilometers.
3. A 1,000-meter Cartesian receptor grid centered on Roxboro Steam Electric Plant and extending out 50 kilometers. 50 kilometers is the maximum distance accepted by USEPA for the use of the AERMOD dispersion model.[9]

A flagpole height of 1.5 meters was used for all these receptors.

Elevations from stacks and receptors were obtained from National Elevation Dataset (NED) GeoTiff data. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. These elevations were extracted from 1 arc-second (30 meter) resolution NED files. The USEPA software program AERMAP v. 11103 is used for these tasks.

4.5 Meteorological Data

To improve the accuracy of the modeling analysis, recent meteorological data for the 2007 to 2011 period were prepared using the USEPA's program AERMET which creates the model-ready surface and profile data files required by AERMOD. Required data inputs to AERMET included surface meteorological measurements, twice-daily soundings of upper air measurements, and the micrometeorological parameters surface roughness, albedo, and Bowen ratio. One-minute ASOS data were available so USEPA methods were used to reduce calm and missing hours.[10] The USEPA software program AERMINUTE v. 11325 is used for these tasks.

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[9] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, Section A.1.(1), November 9, 2005.

[10] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, p. 19.

This section discusses how the meteorological data was prepared for use in the 1-hour SO_2 NAAQS modeling analyses. The USEPA software program AERMET v. 11059 is used for these tasks.

4.5.1 Surface Meteorology

Surface meteorology was obtained for Raleigh - Durham International Airport, North Carolina located near the Roxboro Steam Electric Plant. Integrated Surface Hourly (ISH) data for the 2007 to 2011 period were obtained from the National Climatic Data Center (NCDC). The ISH surface data was processed through AERMET Stage 1, which performs data extraction and quality control checks.

4.5.2 Upper Air Data

Upper-air data are collected by a "weather balloon" that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawindsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. The upper air data were processed through AERMET Stage 1, which performs data extraction and quality control checks.

For Roxboro Steam Electric Plant, the concurrent 2007 through 2011 upper air data from twice-daily radiosonde measurements obtained at the most representative location were used. This location was the Greenboro, North Carolina measurement station. These data are in Forecast Systems Laboratory (FSL) format and were downloaded in ASCII text format from NOAA's FSL website.[11] All reporting levels were downloaded and processed with AERMET.

4.5.3 AERSURFACE

AERSURFACE is a non-guideline program that extracts surface roughness, albedo, and daytime Bowen ratio for an area surrounding a given location. AERSURFACE uses land use and land cover (LULC) data in the U.S. Geological Survey's 1992 National Land Cover Dataset to extract the necessary micrometeorological data. LULC data was used for processing meteorological data sets used as input to AERMOD.

AERSURFACE v. 08009 was used to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site. AERSURFACE was used to develop surface roughness in a one kilometer radius surrounding the data collection site. Bowen ratio and albedo was developed for a 10 kilometer by 10 kilometer area centered on the

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[11] Available at: http://esrl.noaa.gov/raobs/

meteorological data collection site. These micrometeorological data were processed for seasonal periods using 30-degree sectors. Seasonal moisture conditions were considered average with no months with continuous snow cover.

4.5.4 Data Review

Missing meteorological data were not filled as the data file met USEPA's 90% data completeness requirement.[12] The AERMOD output file shows there were 2.0% missing data.

The representativeness of airport meteorological data is a potential concern in modeling industrial source sites.[13] The surface characteristics of the airport data collection site and the modeled source location were compared. Since the Raleigh - Durham International Airport, North Carolina is located close to Roxboro Steam Electric Plant, this meteorological data set was considered appropriate for this modeling analysis.

5. Background SO_2 Concentrations

Background concentrations were determined consistent with USEPA's Modeling Guidance for SO_2 NAAQS Designations.[14] To preserve the form of the 1-hour SO_2 standard, based on the 99th percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled, the background fourth-highest daily maximum 1-hour SO_2 concentration was added to the modeled fourth-highest daily maximum 1-hour SO_2 concentration.[15]

Background concentrations were based on the 2009-11 design value measured by the ambient monitors located in North Carolina.[16]

6. Reporting

All files from the programs used for this modeling analysis are available to regulatory agencies. These include analyses prepared with AERSURFACE, AERMET, AERMAP, and AERMOD.

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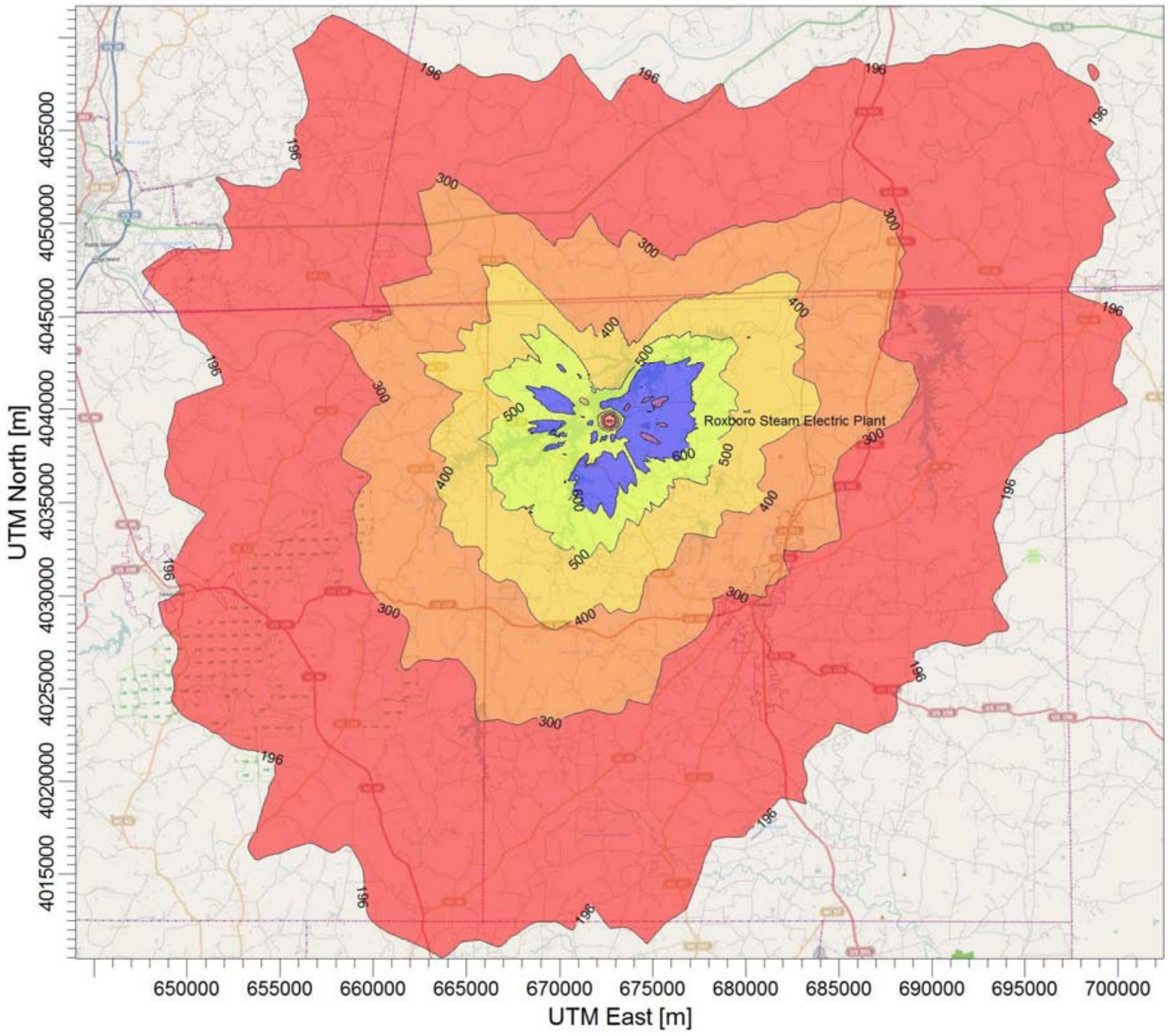
[12] USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, Section 5.3.2, pp. 5-4 to 5-5.
[13] USEPA, AERMOD Implementation Guide, March 19, 2009, pp. 3-4.
[14] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 20-23.
[15] USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010, p. 3.
[16] http://www.epa.gov/airtrends/values.html

Roxboro Steam Electric Plant - Semora, North Carolina
Evaluation of Compliance with the 1-hour NAAQS for SO2

Figure 1



1-hour average SO2 concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.

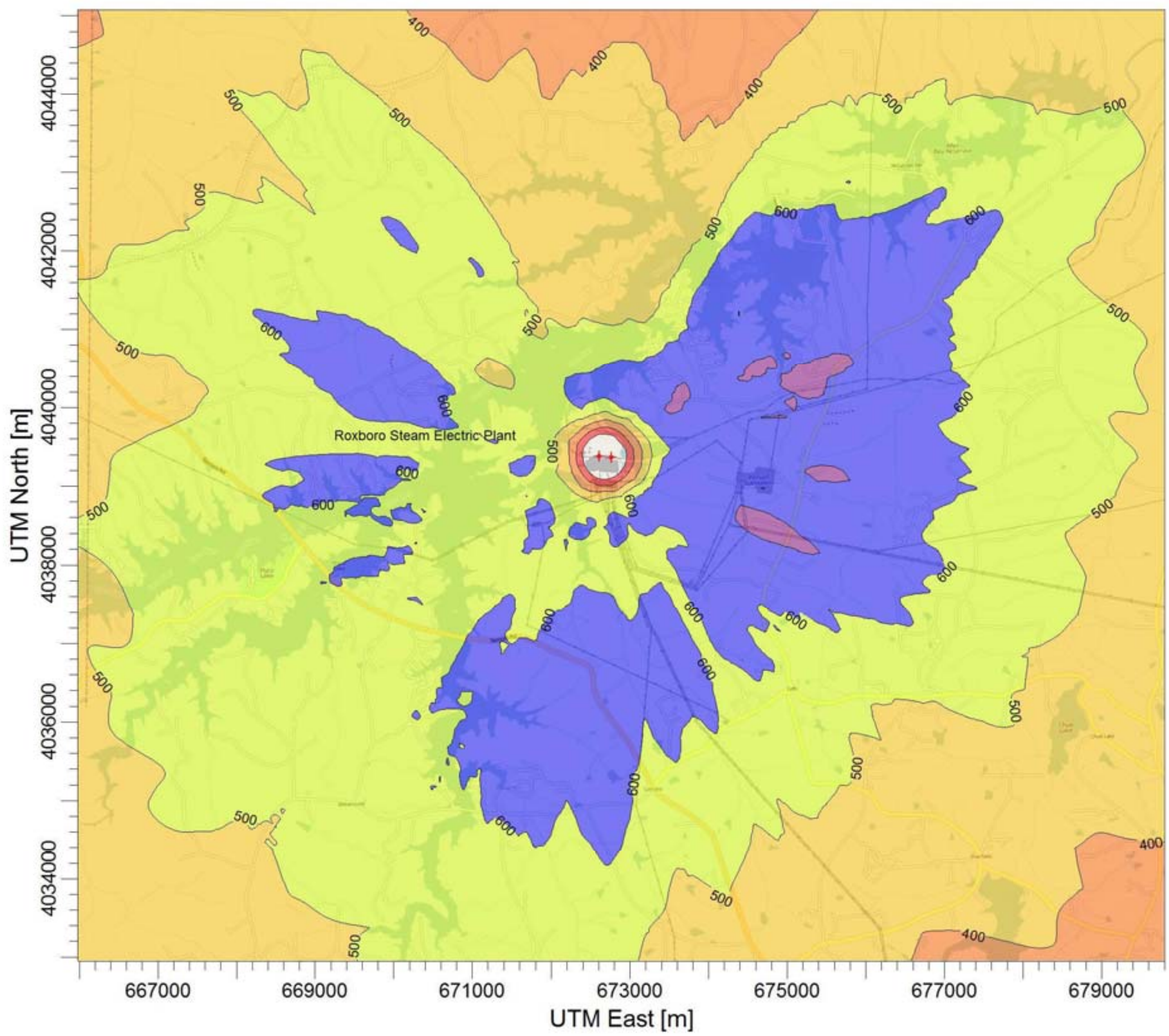
196 300 400 500 600 700

All concentrations include a background of 18.3 ug/m3. This figure is based on allowable emissions.	Total Sources **12**	**Conducted on behalf of the Sierra Club**
	Total Receptors **21201**	**by Wingra Engineering, S.C.**
	Output Type **Concentration**	SCALE: 1:367,300 0 10 km
	Maximum **740.0957 ug/m^3**	

AERMOD View - Lakes Environmental Software

Roxboro Steam Electric Plant - Semora, North Carolina
Evaluation of Compliance with the 1-hour NAAQS for SO2

Figure 2



1-hour average SO2 concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.

196 300 400 500 600 700

All concentrations include a background of 18.3 ug/m3. This figure is based on allowable emissions.	Total Sources **12**	**Conducted on behalf of the Sierra Club**	
	Total Receptors **21201**	**by Wingra Engineering, S.C.**	
	Output Type **Concentration**	SCALE: 1:86,889 0 — 3 km	
	Maximum **740.0957 ug/m^3**		

AERMOD View - Lakes Environmental Software

Marshall Steam Station

Terrell, North Carolina

Sierra Club Evaluation of Compliance with the 1-hour NAAQS for SO_2

December 23, 2013

Conducted by:

Steven Klafka, P.E., BCEE

Wingra Engineering, S.C.

Madison, Wisconsin

1. Introduction

Wingra Engineering, S.C. was hired by the Sierra Club to conduct an air modeling impact analysis to help USEPA, state and local air agencies identify facilities that are likely causing violations of the 1-hour sulfur dioxide (SO_2) national ambient air quality standard (NAAQS). This document describes the results and procedures for an evaluation conducted for the Marshall Steam Station located in Terrell, North Carolina.

The dispersion modeling analysis predicted ambient air concentrations for comparison with the one hour SO_2 NAAQS. The modeling was performed using the most recent version of AERMOD, AERMET, and AERMINUTE, with data provided to the Sierra Club by regulatory air agencies and through other publicly-available sources as documented below. The analysis was conducted in adherence to all available USEPA guidance for evaluating source impacts on attainment of the 1-hour SO_2 NAAQS via aerial dispersion modeling, including the AERMOD Implementation Guide; USEPA's Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010; modeling guidance promulgated by USEPA in Appendix W to 40 CFR Part 51; and, USEPA's March 2011 Modeling Guidance for SO_2 NAAQS Designations.[1]

2. Compliance with the 1-hour SO_2 NAAQS

2.1 1-hour SO_2 NAAQS

The 1-hour SO_2 NAAQS takes the form of a three-year average of the 99th-percentile of the annual distribution of daily maximum 1-hour concentrations, which cannot exceed 75 ppb.[2] Compliance with this standard was verified using USEPA's AERMOD air dispersion model, which produces air concentrations in units of $\mu g/m^3$. The 1-hour SO_2 NAAQS of 75 ppb equals 196.2 $\mu g/m^3$, and this is the value used for determining whether modeled impacts exceed the NAAQS.[3] The 99th-percentile of the annual distribution of daily maximum 1-hour concentrations corresponds to the fourth-highest value at each receptor for a given year.

2.2 Modeling Results

Modeling results for Marshall Steam Station are summarized in Table 1. It was determined that based on either currently permitted emissions or measured actual emissions, the Marshall Steam Station is estimated to create downwind SO_2 concentrations which exceed the 1-hour NAAQS.

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[1] http://www.epa.gov/scram001/so2_modeling_guidance.htm
[2] USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010.
[3] The ppb to $\mu g/m^3$ conversion is found in the source code to AERMOD v. 12345, subroutine Modules. The conversion calculation is 75/0.3823 = 196.2 $\mu g/m^3$.

For the modeling results presented in Table 1, the evaluated emission rates include the allowable and maximum. "Allowable" is the peak emission rate from each unit as approved by the current air quality operation permit for the facility. "Maximum" is the highest combined emission rate from all units during any single hour as measured during 2012.

Air quality impacts in North Carolina are based on a background concentration of 13.1 $\mu g/m^3$. This is the 2010-12 design value for Swain County, North Carolina - the lowest measured background concentration in the state. This is the most recently available design value.

Table 1 - SO_2 Modeling Results for Marshall Steam Station Modeling Analysis

Emission Rates	Averaging Period	99th Percentile 1-hour Daily Maximum ($\mu g/m^3$)				Complies with NAAQS?
		Impact	Background	Total	NAAQS	
Allowable	1-hour	770.7	13.1	783.8	196.2	No
Maximum	1-hour	1,607.9	13.1	1,621.0	196.2	No

The currently permitted emissions and measured maximum emissions used for the modeling analysis are summarized in Table 2.

Table 2 - Modeled SO_2 Emissions from Marshall Steam Station [4,5]

Stack ID	Unit ID	Allowable Emissions 24-hour Average (lbs/hr)	Maximum Emissions 1-hour Average (lbs/hr)
CS1	Unit 1	2,368.8	11,229.4
	Unit 2	2,368.8	14,120.0
	Subtotal	4,737.6	25,349.4
S03	Unit 3	3,981.6	708.8
S04	Unit 4	3,981.6	823.5
Stack Total	All Units	12,700.8	26,881.7

Based on the modeling results, emission reductions from current rates considered necessary to achieve compliance with the 1-hour NAAQS were calculated and presented in Table 3.

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[4] North Carolina Department of Environment and Natural Resources, Air Quality Permit No. 03676T49, January 15, 2013. The SO_2 emission limitation for each of the four boilers is 0.56 lbs/mmbtu.

[5] Maximum emissions are measured hourly rates reported for 2012 in USEPA, Clean Air Markets - Data and Maps.

Table 3 - Required Emission Reductions for Compliance with the 1-hour NAAQS for SO_2

Acceptable Impact (NAAQS - Background) 99th Percentile 1-hour Daily Max ($\mu g/m^3$)	Required Total Facility Reduction Based on Allowable Emissions (%)	Required Total Facility Emission Rate (lbs/hr)	Required Total Facility 1-hour Average Emission Rate (lbs/mmbtu)
183.1	76.2%	3,017.4	0.13

Predicted exceedences of the 1-hour NAAQS for SO_2 extend throughout the region to a maximum distance of 50 kilometers.

Figure 1 shows the extent of NAAQS violations throughout the entire 50 kilometer modeling domain.

Figure 2 provides a close-up local view of NAAQS violations.

2.3 Conservative Modeling Assumptions

A dispersion modeling analysis requires the selection of numerous parameters which affect the predicted concentrations. For the enclosed analysis, several parameters were selected which under-predict facility impacts.

Assumptions used in this modeling analysis which likely under-estimate concentrations include the following:

- Allowable emissions are based on a limitation with an averaging period which is greater than the 1-hour average used for the SO_2 air quality standard. Emissions and impacts during any 1-hour period may be higher than assumed for the modeling analysis.
- No consideration of facility operation at less than 100% load. Stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts.
- No consideration of building or structure downwash. These downwash effects typically increase predicted concentrations near the facility.
- The facility stacks are 315 feet tall. There has been no evaluation to determine if this stack height exceeds Good Engineering Practice or GEP regulations. If the GEP height is lower, the predicted impacts would increase.
- No consideration of off-site sources. These other sources of SO_2 will increase the predicted impacts.

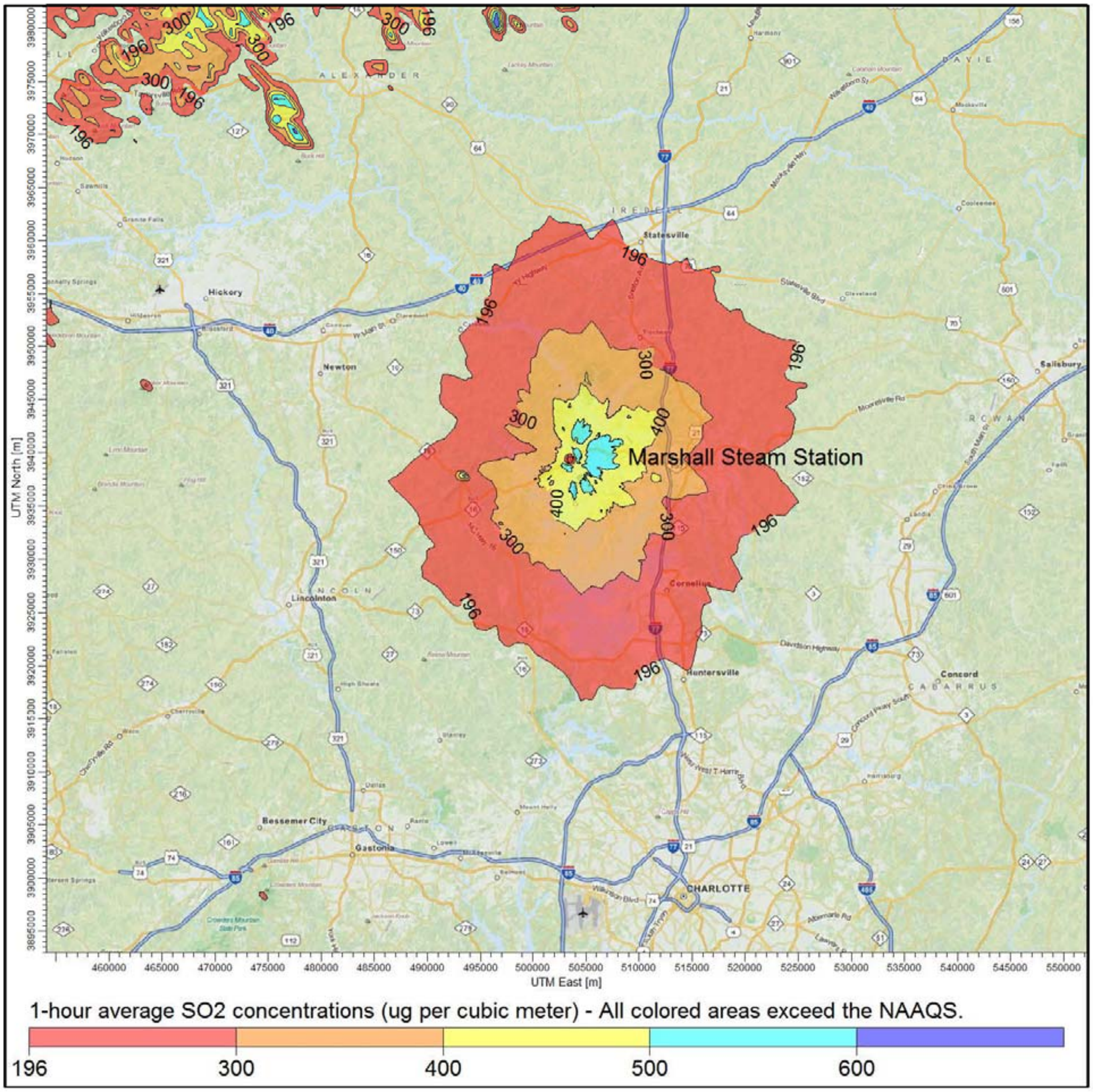

Figure 1 - Regional View for Marshall Steam Station

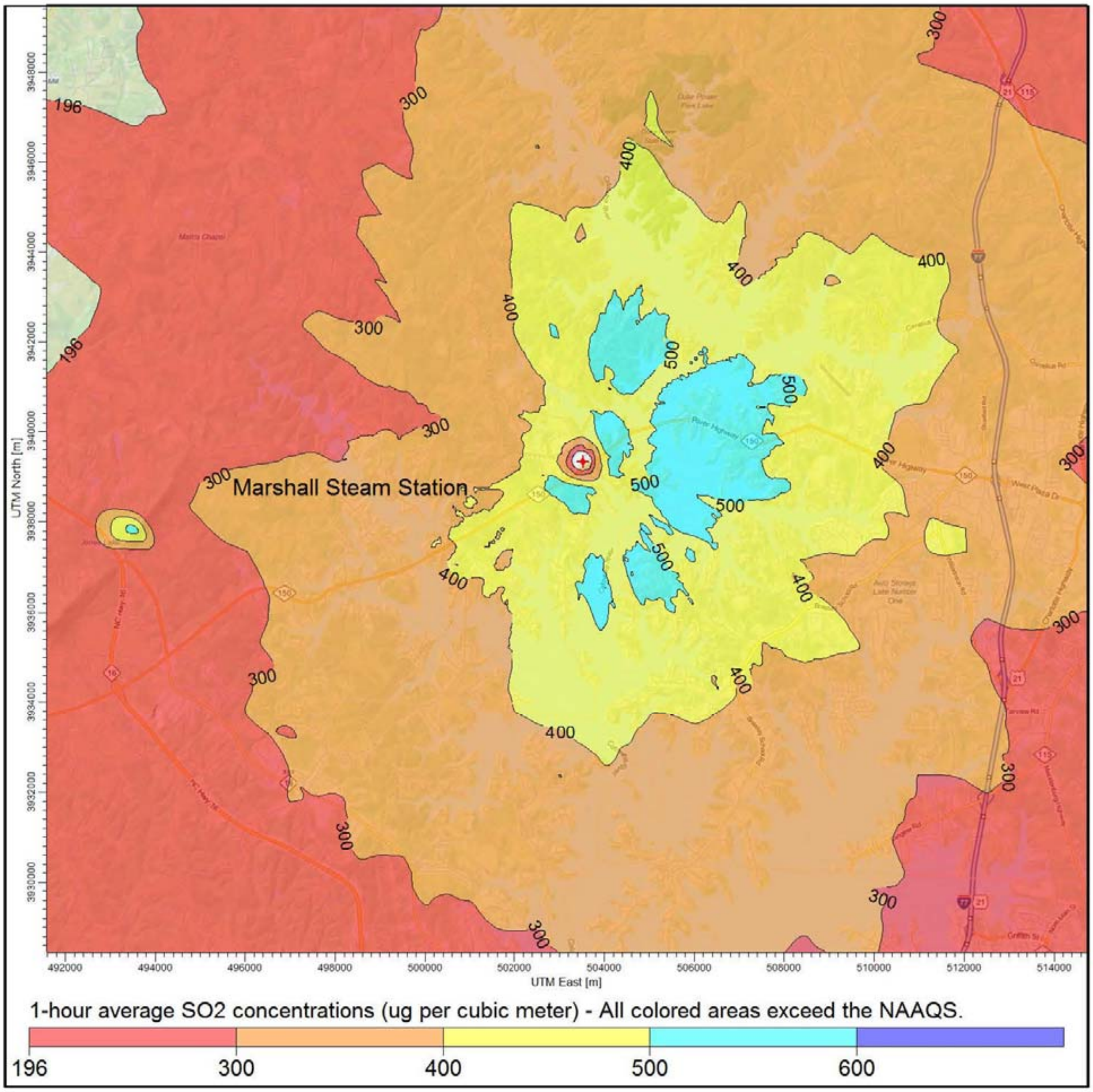

Figure 2 - Local View for Marshall Steam Station

3. Modeling Methodology

3.1 Air Dispersion Model

The modeling analysis used USEPA's AERMOD program, v. 12345. AERMOD, as available from the Support Center for Regulatory Atmospheric Modeling (SCRAM) website, was used in conjunction with a third-party modeling software program, *AERMOD View*, sold by Lakes Environmental Software.

3.2 Control Options

The AERMOD model was run with the following control options:

- 1-hour average air concentrations
- Regulatory defaults
- Flagpole receptors

To reflect a representative inhalation level, a flagpole height of 1.5 meters was used for all modeled receptors. This parameter was added to the receptor file when running AERMAP, as described in Section 4.4.

An evaluation was conducted to determine if the modeled facility was located in a rural or urban setting using USEPA's methodology outlined in Section 7.2.3 of the Guideline on Air Quality Models.[6] For urban sources, the URBANOPT option is used in conjunction with the urban population from an appropriate nearby city and a default surface roughness of 1.0 meter. Methods described in Section 4.1 were used to determine whether rural or urban dispersion coefficients were appropriate for the modeling analysis.

3.3 Output Options

The AERMOD analysis was based on five years of recent meteorological data. The modeling analyses used one run with five years of sequential meteorological data from 2008-2012. Consistent with USEPA's Modeling Guidance for SO_2 NAAQS Designations, AERMOD provided a table of fourth-high 1-hour SO_2 impacts concentrations consistent with the form of the 1-hour SO_2 NAAQS.[7]

Please refer to Table 1 for the modeling results.

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[6] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.
[7] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 24-26.

4. Model Inputs

4.1 Geographical Inputs

The "ground floor" of all air dispersion modeling analyses is establishing a coordinate system for identifying the geographical location of emission sources and receptors. These geographical locations are used to determine local characteristics (such as land use and elevation), and also to ascertain source to receptor distances and relationships.

The Universal Transverse Mercator (UTM) NAD83 coordinate system was used for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. Stack locations were obtained from facility permits and prior modeling files provided by the state regulatory agency. The stack locations were then verified using aerial photographs.

The facility was evaluated to determine if it should be modeled using the rural or urban dispersion coefficient option in AERMOD. A GIS was used to determine whether rural or urban dispersion coefficients apply to a site. Land use within a three-kilometer radius circle surrounding the facility was considered. USEPA guidance states that urban dispersion coefficients are used if more than 50% of the area within 3 kilometers has urban land uses. Otherwise, rural dispersion coefficients are appropriate.[8]

USEPA's AERSURACE model v. 13016 was used to develop the meteorological data for the modeling analysis. This model was also used to evaluate surrounding land use within 3 kilometers. Based on the output from the AERSURFACE, approximately 2.0% of surrounding land use around the modeled facility was of urban land use types including Type 21 – Low Intensity Residential, Type 22 – High Intensity Residential and Type 23 – Commercial / Industrial / Transportation.

This is less than the 50% value considered appropriate for the use of urban dispersion coefficients. Based on the AERSURFACE analysis, it was concluded that the rural option would be used for the modeling summarized in this report. Please refer to Section 4.5.3 for a discussion of the AERSURFACE analysis.

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[8] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 7.2.3.

4.2 Emission Rates and Source Parameters

The modeling analyses only considered SO_2 emissions from the facility. Off-site sources were not considered. Concentrations were predicted for two scenarios shown in Table 2:

1) approved or allowable emissions based on permits issued by the regulatory agency, and

2) measured actual hourly SO_2 emissions obtained from USEPA's Clean Air Markets Database. To assure realistic emission rates were used, emissions from all units at the facility were combined and the hour with the maximum total facility emissions was used to determine the actual emissions.

Stack parameters and emissions used for the modeling analysis are summarized in Table 4.

Table 4 – Facility Stack Parameters and Emissions [9]

Stack	CS1	S03	S04
Description	Units 1 and 2	Unit 3	Unit 4
X Coord. [m]	503518	503523	503529
Y Coord. [m]	3939340	3939350	3939340
Base Elevation [m]	258.2	258.78	259
Release Height [m]	96.01	96.01	96.01
Gas Exit Temperature [°K]	322.039	324.817	324.817
Gas Exit Velocity [m/s]	21.182	18.581	18.581
Inside Diameter [m]	8.992	8.992	8.992
Allowable Emission Rate [g/s]	596.9	501.7	501.7
Maximum Emission Rate [g/s]	3194	89.31	103.8

The above stack parameters and emissions were obtained from regulatory agency documents and databases identified in Section 2.3. The analysis was conducted based on 100% operating load using maximum exhaust flow rates and emission rates. Operation at less than full capacity loads was not considered. This assumption tends to under-predict impacts since stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts. Stack location, height and diameter were verified using aerial photographs, and flue gas flow rate and temperature were verified using combustion calculations.

[9] U.S. Energy Information Administration, http://www.eia.gov/electricity/data/eia860/index.html.

4.3 Building Dimensions and GEP

No building dimensions or prior downwash evaluations were available. Therefore this modeling analysis did not address the effects of downwash which may increase predicted concentrations.

4.4 Receptors

For Marshall Steam Station, three receptor grids were employed:

1. A 100-meter Cartesian receptor grid centered on Marshall Steam Station and extending out 5 kilometers.
2. A 500-meter Cartesian receptor grid centered on Marshall Steam Station and extending out 10 kilometers.
3. A 1,000-meter Cartesian receptor grid centered on Marshall Steam Station and extending out 50 kilometers. 50 kilometers is the maximum distance accepted by USEPA for the use of the AERMOD dispersion model.[10]

A flagpole height of 1.5 meters was used for all these receptors.

Elevations from stacks and receptors were obtained from National Elevation Dataset (NED) GeoTiff data. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. These elevations were extracted from 1 arc-second (30 meter) resolution NED files. The USEPA software program AERMAP v. 11103 is used for these tasks.

4.5 Meteorological Data

To improve the accuracy of the modeling analysis, recent meteorological data for the 2008-2012 period were prepared using the USEPA's program AERMET which creates the model-ready surface and profile data files required by AERMOD. Required data inputs to AERMET included surface meteorological measurements, twice-daily soundings of upper air measurements, and the micrometeorological parameters surface roughness, albedo, and Bowen ratio. One-minute ASOS data were available so USEPA methods were used to reduce calm and missing hours.[11] The USEPA software program AERMINUTE v. 11325 is used for these tasks.

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[10] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, Section A.1.(1), November 9, 2005.

[11] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, p. 19.

Pre-processed meteorological data were provided by the North Carolina Department of Environment and Natural Resources, Division of Air Quality. The data recommended for Catawba County were downloaded from the DENR web site.[12]

This section discusses how the meteorological data was prepared for use in the 1-hour SO_2 NAAQS modeling analyses. The USEPA software program AERMET v. 12345 is used for these tasks.

4.5.1 Surface Meteorology

Surface meteorology was obtained for Charlotte Douglas International Airport located near the Marshall Steam Station. Integrated Surface Hourly (ISH) data for the 2008-2012 period were obtained from the National Climatic Data Center (NCDC). The ISH surface data was processed through AERMET Stage 1, which performs data extraction and quality control checks.

4.5.2 Upper Air Data

Upper-air data are collected by a "weather balloon" that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawindsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. The upper air data were processed through AERMET Stage 1, which performs data extraction and quality control checks.

For Marshall Steam Station, the concurrent 2008-2012 upper air data from twice-daily radiosonde measurements obtained at the most representative location were used. This location was the Greensboro, North Carolina measurement station. These data are in Forecast Systems Laboratory (FSL) format and were obtained by NCDENR from NOAA.[13] All reporting levels were downloaded and processed with AERMET.

4.5.3 AERSURFACE

AERSURFACE is a program that extracts surface roughness, albedo, and daytime Bowen ratio for an area surrounding a given location. AERSURFACE uses land use and land cover (LULC) data in the U.S. Geological Survey's 1992 National Land Cover Dataset to extract the necessary micrometeorological data. LULC data was used for processing meteorological data sets used as input to AERMOD.

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[12] NCDENR, AERMOD Meteorological Data Sets, http://www.ncair.org/permits/mets/metdata.shtml
[13] Available at: http://esrl.noaa.gov/raobs/

AERSURFACE v. 13016 was used to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site. AERSURFACE was used to develop surface roughness in a one kilometer radius surrounding the data collection site. Bowen ratio and albedo was developed for a 10 kilometer by 10 kilometer area centered on the meteorological data collection site. These micrometeorological data were processed for seasonal periods using 30-degree sectors. Seasonal moisture conditions were considered average with no months with continuous snow cover.

4.5.4 Data Review

Missing meteorological data were not filled as the data file met USEPA's 90% data completeness requirement.[14] The AERMOD output file shows there were 1.65% missing data.

To confirm the representativeness of the airport meteorological data, the surface characteristics of the airport data collection site and the modeled source location were compared. Since the Charlotte Douglas International Airport is located close to Marshall Steam Station, this meteorological data set was considered appropriate for this modeling analysis.[15] Additionally, this weather station provided high quality surface measurements for the most recent 5-year time, and had similar land use, surface characteristics, terrain features and climate. As noted, NCDENR provided preprocessed meteorological data for Gaston County and had concluded this airport weather station was representative for modeling sources in this county.[16]

5. Background SO_2 Concentrations

Background concentrations were determined consistent with USEPA's Modeling Guidance for SO_2 NAAQS Designations.[17] To preserve the form of the 1-hour SO_2 standard, based on the 99th percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled, the <u>background</u> fourth-highest daily maximum 1-hour SO_2 concentration was added to the <u>modeled</u> fourth-highest daily maximum 1-hour SO_2 concentration.[18]

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[14] USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, Section 5.3.2, pp. 5-4 to 5-5.
[15] USEPA, AERMOD Implementation Guide, March 19, 2009, pp. 3-4.
[16] Email from T. Anderson – North Carolina Department of Environment and Natural Resources (NCDENR) to S. Klafka – Wingra Engineering, S.C., Met data for Duke Marshall, December 9, 2013.
[17] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 20-23.
[18] USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010, p. 3.

Background concentrations were based on the 2010-12 design value measured by the ambient monitors located in North Carolina.[19]

6. Reporting

All files from the programs used for this modeling analysis are available to regulatory agencies. These include analyses prepared with AERSURFACE, AERMET, AERMAP, and AERMOD.

[19] http://www.epa.gov/airtrends/values.html

Mayo Electric Generating Station

Roxboro, North Carolina

Sierra Club Evaluation of Compliance with 1-hour SO_2 NAAQS

December 23, 2013

Conducted by:

Steven Klafka, P.E., BCEE

Wingra Engineering, S.C.

Madison, Wisconsin

1. Introduction

The Sierra Club prepared an air modeling impact analysis to help USEPA, state and local air agencies identify facilities that are likely causing violations of the 1-hour sulfur dioxide (SO_2) national ambient air quality standard (NAAQS). This document describes the results and procedures for an evaluation conducted for the Mayo Electric Generating Station located in Roxboro, North Carolina.

The dispersion modeling analysis predicted ambient air concentrations for comparison with the one hour SO_2 NAAQS. The modeling was performed using the most recent version of AERMOD, AERMET, and AERMINUTE, with data provided to the Sierra Club by regulatory air agencies and through other publicly-available sources as documented below. The analysis was conducted in adherence to all available USEPA guidance for evaluating source impacts on attainment of the 1-hour SO_2 NAAQS via aerial dispersion modeling, including the AERMOD Implementation Guide; USEPA's Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010; modeling guidance promulgated by USEPA in Appendix W to 40 CFR Part 51; and, USEPA's March 2011 Modeling Guidance for SO_2 NAAQS Designations, available at http://www.epa.gov/ttn/scram/SO2%20Designations%20Guidance%202011.pdf.

2. Compliance with the 1-hour SO_2 NAAQS

2.1 1-hour SO_2 NAAQS

The 1-hour SO_2 NAAQS takes the form of a three-year average of the 99th-percentile of the annual distribution of daily maximum 1-hour concentrations, which cannot exceed 75 ppb.[1] Compliance with this standard was verified using USEPA's AERMOD air dispersion model, which produces air concentrations in units of $\mu g/m^3$. The 1-hour SO_2 NAAQS of 75 ppb equals 196.2 $\mu g/m^3$, and this is the value used for determining whether modeled impacts exceed the NAAQS.[2] The 99th-percentile of the annual distribution of daily maximum 1-hour concentrations corresponds to the fourth-highest value at each receptor for a given year.

2.2 Modeling Results

Modeling results for Mayo Electric Generating Station are summarized in Table 1. It was determined that based on either currently permitted emissions or measured actual emissions, the Mayo Electric Generating Station is estimated to create downwind SO_2 concentrations which exceed the 1-hour

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[1] USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010.
[2] The ppb to $\mu g/m^3$ conversion is found in the source code to AERMOD v. 11103, subroutine Modules. The conversion calculation is 75/0.3823 = 196.2 $\mu g/m^3$.

NAAQS.

For the modeling results presented in Table 1, the evaluated emission rates include the allowable and maximum. "Allowable" is the peak emission rate from each unit as approved by the current air quality operation permit for the facility. "Maximum" is the highest combined emission rate from all units during any single hour as measured during 2011.

The currently permitted emissions and measured actual emissions used for the modeling analysis are summarized in Table 2. Based on the modeling results, emission reductions from current rates considered necessary to achieve compliance with the 1-hour NAAQS were calculated and presented in Table 3.

Predicted exceedences of the 1-hour NAAQS for SO_2 extend throughout the region to a maximum distance of 17 kilometers.

Figure 1 provided at the end of this report shows the extent of NAAQS violations throughout the entire 50 kilometer modeling domain.

Figure 2 provides a close-up local view of NAAQS violations.

Air quality impacts in North Carolina are based on a background concentration of 18.3 $\mu g/m^3$. This is the 2009-11 design value for Martin County, North Carolina - the lowest measured background concentration in the state. This is the most recently available design value.

2.3 Conservative Modeling Assumptions

A dispersion modeling analysis requires the selection of numerous parameters which affect the predicted concentrations. For the enclosed analysis, several parameters were selected which under-predict facility impacts.

Assumptions used in this modeling analysis which likely under-estimate concentrations include the following:

- Allowable emissions are based on a limitation with an averaging period which is greater than the 1-hour average used for the SO_2 air quality standard. Emissions and impacts during any 1-hour period may be higher than assumed for the modeling analysis.
- No consideration of facility operation at less than 100% load. Stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts.
- No consideration of building or structure downwash. These downwash effects typically increase predicted concentrations near the facility.
- No consideration of off-site sources. These other sources of SO_2 will increase the predicted impacts.

Table 1 - SO_2 Modeling Results for Mayo Electric Generating Station Modeling Analysis

Emission Rates	Averaging Period	99th Percentile 1-hour Daily Maximum (µg/m³)				Complies with NAAQS?
		Impact	Background	Total	NAAQS	
Allowable	1-hour	404.6	18.3	422.9	196.2	No
Maximum	1-hour	312.3	18.3	330.6	196.2	No

Table 2 - Modeled SO_2 Emissions from Mayo Electric Generating Station [3,4]

Stack ID	Unit ID	Allowable Emissions 3-hour Average (lbs/hr)	Maximum Emissions 1-hour Average (lbs/hr)
S01	Unit 1	5,415	4,371
	Unit 2	5,415	3,988
Stack Total	All Units	10,830	8,359

Table 3 - Required Emission Reductions for Compliance with 1-hour SO_2 NAAQS

Acceptable Impact (NAAQS - Background) 99th Percentile 1-hour Daily Max (µg/m³)	Required Total Facility Reduction Based on Allowable Emissions (%)	Required Total Facility Emission Rate (lbs/hr)	Required Total Facility 1-hour Average Emission Rate (lbs/mmbtu)
177.9	56.0%	4,761.9	0.53

[3] North Carolina, Department of Environment and Natural Resources, Air Quality Permit No. 03478T37, August 22, 2012. Allowable SO2 emissions are based on a limitation of 1.2 lbs per mmbtu for each of the two boilers at the plant.

[4] Maximum emissions are measured hourly rates reported for 2011 in USEPA, Clean Air Markets - Data and Maps.

3. Modeling Methodology

3.1 Air Dispersion Model

The modeling analysis used USEPA's AERMOD program, version 12060. AERMOD, as available from the Support Center for Regulatory Atmospheric Modeling (SCRAM) website, was used in conjunction with a third-party modeling software program, *AERMOD View*, sold by Lakes Environmental Software.

3.2 Control Options

The AERMOD model was run with the following control options:

- 1-hour average air concentrations
- Regulatory defaults
- Flagpole receptors

To reflect a representative inhalation level, a flagpole height of 1.5 meters was used for all modeled receptors. This parameter was added to the receptor file when running AERMAP, as described in Section 4.4.

An evaluation was conducted to determine if the modeled facility was located in a rural or urban setting using USEPA's methodology outlined in Section 7.2.3 of the Guideline on Air Quality Models.[5] For urban sources, the URBANOPT option is used in conjunction with the urban population from an appropriate nearby city and a default surface roughness of 1.0 meter. Methods described in Section 4.1 to determine whether rural or urban dispersion coefficients were used.

3.3 Output Options

The AERMOD analysis was based on five years of recent meteorological data. The modeling analyses used one run with five years of sequential meteorological data from 2007-2011. Consistent with USEPA's Modeling Guidance for SO_2 NAAQS Designations, AERMOD provided a table of fourth-high 1-hour SO_2 impacts concentrations consistent with the form of the 1-hour SO_2 NAAQS.[6]

Please refer to Table 1 for the modeling results.

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[5] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.
[6] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 24-26.

4. Model Inputs

4.1 Geographical Inputs

The "ground floor" of all air dispersion modeling analyses is establishing a coordinate system for identifying the geographical location of emission sources and receptors. These geographical locations are used to determine local characteristics (such as land use and elevation), and also to ascertain source to receptor distances and relationships.

The Universal Transverse Mercator (UTM) NAD83 coordinate system was used for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. Stack locations were obtained from facility permits and prior modeling files provided by the state regulatory agency. The stack locations were then verified using aerial photographs.

The facility was evaluated to determine if it should be modeled using the rural or urban dispersion coefficient option in AERMOD. A GIS was used to determine whether rural or urban dispersion coefficients apply to a site. Land use within a three-kilometer radius circle surrounding the facility was considered. USEPA guidance states that urban dispersion coefficients are used if more than 50% of the area within 3 kilometers has urban land uses. Otherwise, rural dispersion coefficients are appropriate.[7]

USEPA's AERSURACE model Version 08009 was used to develop the meteorological data for the modeling analysis. This model was also used to evaluate surrounding land use within 3 kilometers. Based on the output from the AERSURFACE, approximately 11.3% of surrounding land use around the airport was of urban land use types including: 21 – Low Intensity Residential, 22 – High Intensity Residential, and 23 - Commercial/Industrial/Transportation.

This is less than the 50% value considered appropriate for the use of urban dispersion coefficients. Based on the AERSURFACE analysis, it was concluded that the rural option would be used for the modeling summarized in this report. Please refer to Section 4.5.3 for a discussion of the AERSURFACE analysis.

[7] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 7.2.3.

4.2 Emission Rates and Source Parameters

The modeling analyses only considered SO_2 emissions from the facility. Off-site sources were not considered. Concentrations were predicted for two scenarios shown in Table 2:

1) approved or allowable emissions based on permits issued by the regulatory agency, and

2) measured actual hourly SO_2 emissions obtained from USEPA's Clean Air Markets Database. To assure realistic emission rates were used, emissions from all units at the facility were combined and the hour with the maximum total facility emissions was used to determine the actual emissions.

Stack parameters and emissions used for the modeling analysis are summarized in Table 4.

Table 4 – Facility Stack Parameters and Emissions [8]

Stack	S01
Description	Units 1A and 2A
X Coord. [m]	688721.28
Y Coord. [m]	4044615.49
Base Elevation [m]	153.33
Release Height [m]	115.82
Gas Exit Temperature [°K]	324.8
Gas Exit Velocity [m/s]	20.7
Inside Diameter [m]	9.3
Allowable Emission Rate [g/s]	1,365
Maximum Emission Rate [g/s]	1,053

The above stack parameters and emissions were obtained from regulatory agency documents and databases identified in Section 2.3. The analysis was conducted based on 100% operating load using maximum exhaust flow rates and emission rates. Operation at less than full capacity loads was not considered. This assumption tends to under-predict impacts since stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts. Stack location, height and diameter were verified using aerial photographs, and flue gas flow rate and temperature were verified using combustion calculations.

[8] NCDENR, Hazardous air pollutant AERMOD modeling files for Progress Energy Carolinas, Inc. Mayo Electric Generating Plant, May 16, 2011.

4.3 Building Dimensions and GEP

No building dimensions or prior downwash evaluations were available. Therefore this modeling analysis did not address the effects of downwash which may increase predicted concentrations.

4.4 Receptors

For Mayo Electric Generating Station, three receptor grids were employed:

1. A 100-meter Cartesian receptor grid centered on Mayo Electric Generating Station and extending out 5 kilometers.
2. A 500-meter Cartesian receptor grid centered on Mayo Electric Generating Station and extending out 10 kilometers.
3. A 1,000-meter Cartesian receptor grid centered on Mayo Electric Generating Station and extending out 50 kilometers. 50 kilometers is the maximum distance accepted by USEPA for the use of the AERMOD dispersion model.[9]

A flagpole height of 1.5 meters was used for all these receptors.

Elevations from stacks and receptors were obtained from National Elevation Dataset (NED) GeoTiff data. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. These elevations were extracted from 1 arc-second (30 meter) resolution NED files. The USEPA software program AERMAP v. 11103 is used for these tasks.

4.5 Meteorological Data

To improve the accuracy of the modeling analysis, recent meteorological data for the 2007 to 2011 period were prepared using the USEPA's program AERMET which creates the model-ready surface and profile data files required by AERMOD. Required data inputs to AERMET included surface meteorological measurements, twice-daily soundings of upper air measurements, and the micrometeorological parameters surface roughness, albedo, and Bowen ratio. One-minute ASOS data were available so USEPA methods were used to reduce calm and missing hours.[10] The USEPA software program AERMINUTE v. 11325 is used for these tasks.

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[9] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, Section A.1.(1), November 9, 2005.

[10] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, p. 19.

This section discusses how the meteorological data was prepared for use in the 1-hour SO_2 NAAQS modeling analyses. The USEPA software program AERMET v. 11059 is used for these tasks.

4.5.1 Surface Meteorology

Surface meteorology was obtained for Raleigh - Durham International Airport, North Carolina located near the Mayo Electric Generating Station. Integrated Surface Hourly (ISH) data for the 2007 to 2011 period were obtained from the National Climatic Data Center (NCDC). The ISH surface data was processed through AERMET Stage 1, which performs data extraction and quality control checks.

4.5.2 Upper Air Data

Upper-air data are collected by a "weather balloon" that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawindsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. The upper air data were processed through AERMET Stage 1, which performs data extraction and quality control checks.

For Mayo Electric Generating Station, the concurrent 2007 through 2011 upper air data from twice-daily radiosonde measurements obtained at the most representative location were used. This location was the Greenboro, North Carolina measurement station. These data are in Forecast Systems Laboratory (FSL) format and were downloaded in ASCII text format from NOAA's FSL website.[11] All reporting levels were downloaded and processed with AERMET.

4.5.3 AERSURFACE

AERSURFACE is a non-guideline program that extracts surface roughness, albedo, and daytime Bowen ratio for an area surrounding a given location. AERSURFACE uses land use and land cover (LULC) data in the U.S. Geological Survey's 1992 National Land Cover Dataset to extract the necessary micrometeorological data. LULC data was used for processing meteorological data sets used as input to AERMOD.

AERSURFACE v. 08009 was used to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site. AERSURFACE was used to develop surface roughness in a one kilometer radius surrounding the data collection site. Bowen ratio and albedo was developed for a 10 kilometer by 10 kilometer area centered on the

[11] Available at: http://esrl.noaa.gov/raobs/

meteorological data collection site. These micrometeorological data were processed for seasonal periods using 30-degree sectors. Seasonal moisture conditions were considered average with no months with continuous snow cover.

4.5.4 Data Review

Missing meteorological data were not filled as the data file met USEPA's 90% data completeness requirement.[12] The AERMOD output file shows there were 2.0% missing data.

The representativeness of airport meteorological data is a potential concern in modeling industrial source sites.[13] The surface characteristics of the airport data collection site and the modeled source location were compared. Since the Raleigh - Durham International Airport, North Carolina is located close to Mayo Electric Generating Station, this meteorological data set was considered appropriate for this modeling analysis.

5. Background SO_2 Concentrations

Background concentrations were determined consistent with USEPA's Modeling Guidance for SO_2 NAAQS Designations.[14] To preserve the form of the 1-hour SO_2 standard, based on the 99th percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled, the <u>background</u> fourth-highest daily maximum 1-hour SO_2 concentration was added to the <u>modeled</u> fourth-highest daily maximum 1-hour SO_2 concentration.[15]

Background concentrations were based on the 2009-11 design value measured by the ambient monitors located in North Carolina.[16]

6. Reporting

All files from the programs used for this modeling analysis are available to regulatory agencies. These include analyses prepared with AERSURFACE, AERMET, AERMAP, and AERMOD.

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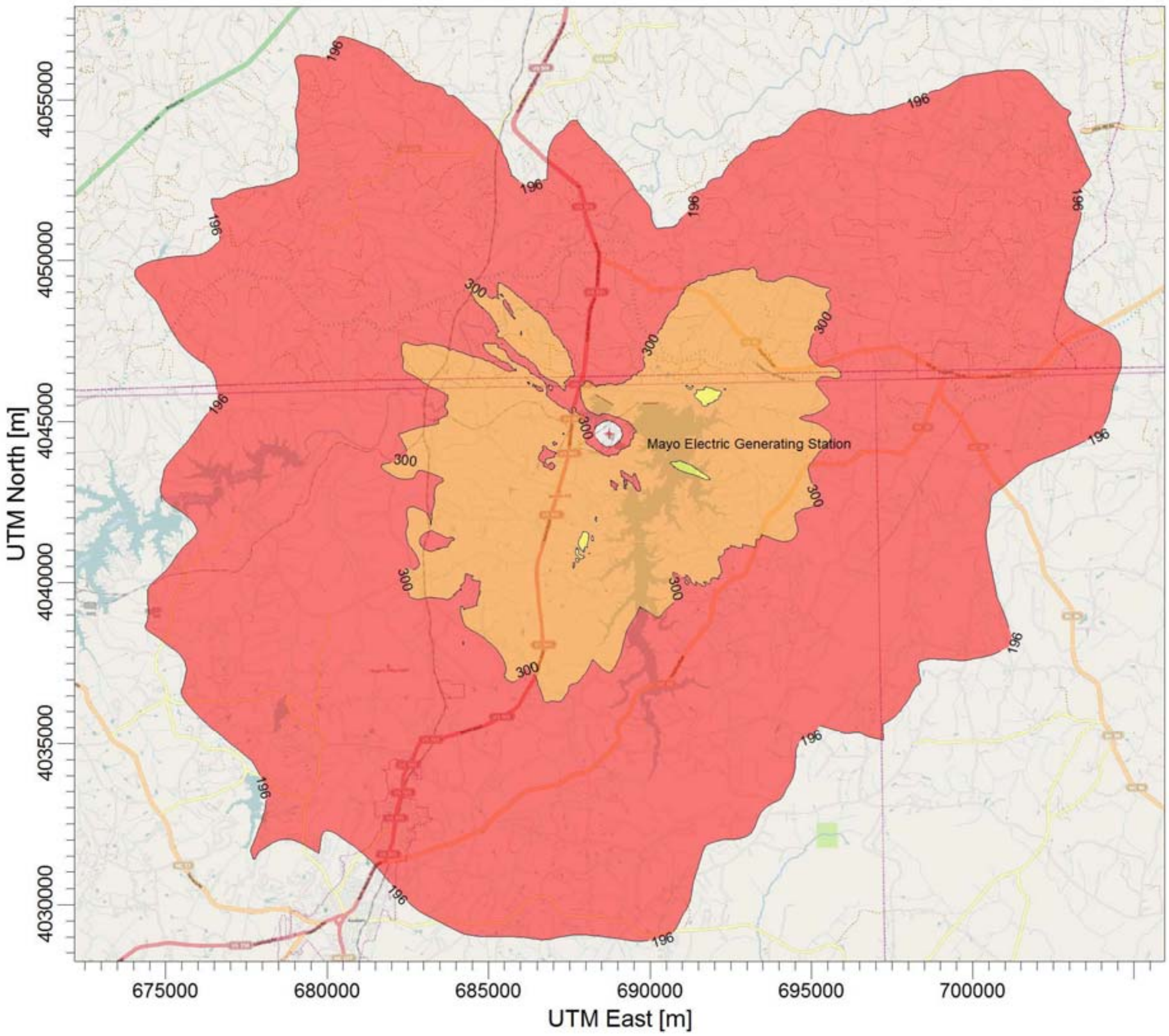
[12] USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, Section 5.3.2, pp. 5-4 to 5-5.
[13] USEPA, AERMOD Implementation Guide, March 19, 2009, pp. 3-4.
[14] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 20-23.
[15] USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010, p. 3.
[16] http://www.epa.gov/airtrends/values.html

Mayo Electric Generating Station - Roxboro, North Carolina
Evaluation of Compliance with the 1-hour NAAQS for SO2



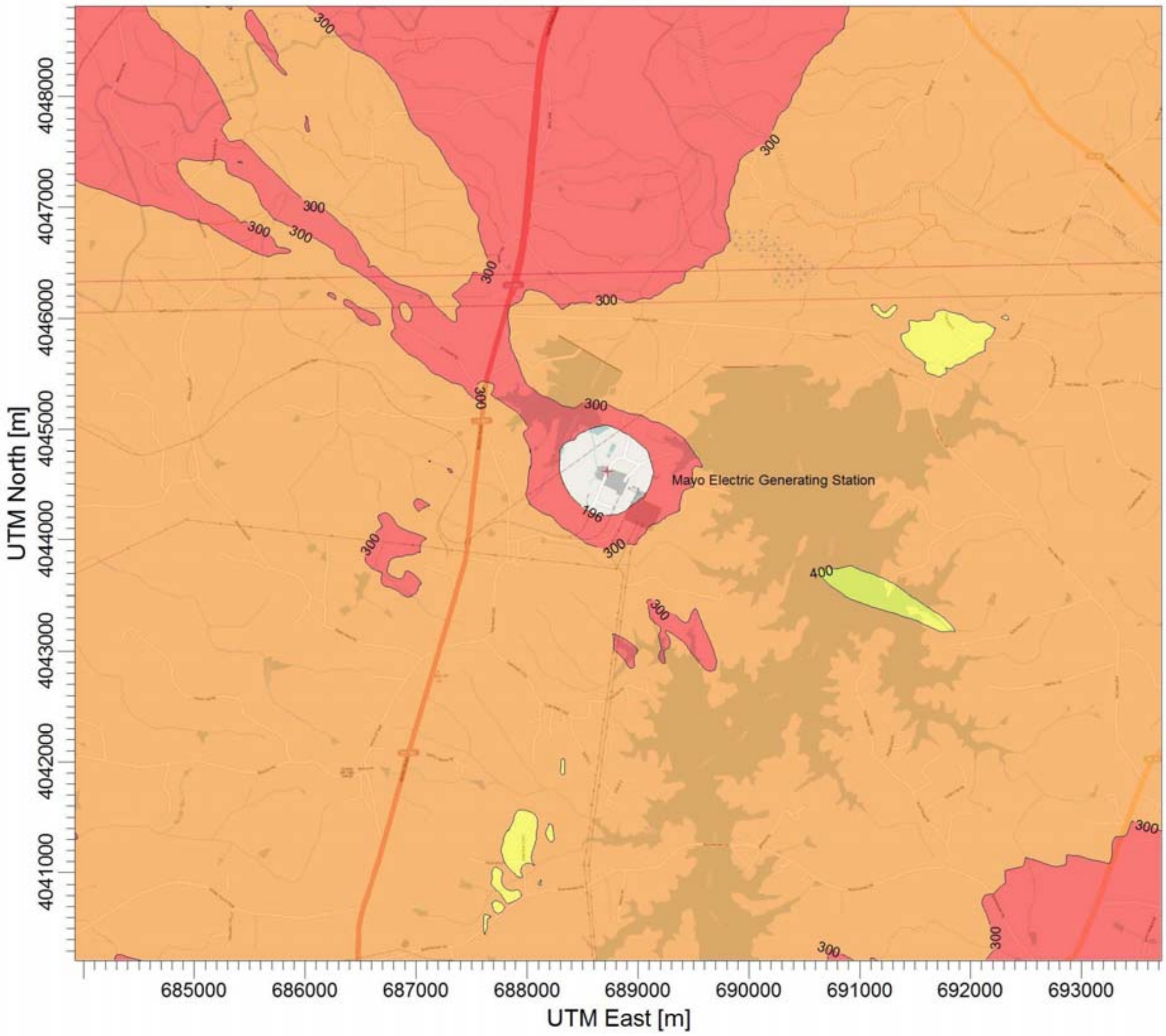
1-hour average SO2 concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.

196 | 300 | 400

All concentrations include a background of 18.3 ug/m3. This figure is based on allowable emissions.	Total Sources **3**	**Conducted on behalf of the Sierra Club**	
	Total Receptors **21201**	**by Wingra Engineering, S.C.**	
	Output Type **Concentration**	SCALE: 1:212,348 0 — 5 km	
	Maximum **422.90918 ug/m^3**	DATE: **12/5/2012**	

AERMOD View - Lakes Environmental Software

Mayo Electric Generating Station - Roxboro, North Carolina
Evaluation of Compliance with the 1-hour NAAQS for SO2



1-hour average SO2 concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.

196 300 400

All concentrations include a background of 18.3 ug/m3. This figure is based on allowable emissions.	Total Sources **3**	**Conducted on behalf of the Sierra Club**	
	Total Receptors **21201**	**by Wingra Engineering, S.C.**	
	Output Type **Concentration**	SCALE: 1:61,613 0 2 km	
	Maximum **422.90918 ug/m^3**	DATE: **12/5/2012**	

AERMOD View - Lakes Environmental Software

Glossary

AERMOD – American Meteorology/Environmental Protection Agency Regulatory Model
AMS – Ambient Monitoring Section
AQS - air quality system
AQI - air quality index
ARM - approved regional method
BAM - beta attenuation method
CSS - continuous speciation site
CO - carbon monoxide
CFR - Code of Federal Regulations
DHEC – Department of Health and Environmental Concerns
DRR – Data Requirements Rule
ECB – Electronics and Calibration Branch
EPA – U. S. Environmental Protection Agency
F - Fahrenheit
FEM – federal equivalent method
FRM - federal reference method
IMPROVE - Interagency Monitoring of Protected Visual Environments
MMIF – Mesoscale Model Interface
MSA - metropolitan statistical area
NAAQS - national ambient air quality standards
DAQ - North Carolina Division of Air Quality
NCore - national core (ambient monitoring network station)
NO2 - nitrogen dioxide
NOy – reactive oxides of nitrogen
O_3 - ozone
Pb - lead
PM - particulate matter
PM 2.5 - fine particulate (particles with aerodynamic diameters of 2.5 microns and below)
PM 10 - particles with aerodynamic diameters of 10 microns and below
PSD - prevention of significant deterioration
PWEI – population weighted emission index
QA – Quality Assurance
RRO – Raleigh Regional Office
SASS™ – Speciation Air Sampling System
SEMAP – Southeastern Modeling, Analysis and Planning
SIP – state implementation plan
SLAMs - state and local air monitoring station
SIP – state implementation plan
SO2 - sulfur dioxide
SPM - special purpose monitor
TECO - Thermo Environmental, Incorporated
TEOM - tapered element oscillating microbalance
TLE - trace level (monitor)

TSP – total suspended particulate
UCI – Upper Confidence Interval
URG – University Research Glass
VDEQ - Virginia Department of Environmental Quality
WINS - well impactor ninety-six (PM 2.5 separator)
WRF - Weather Research and Forecasting
ZAG – zero air generator
ZAS – zero air supply