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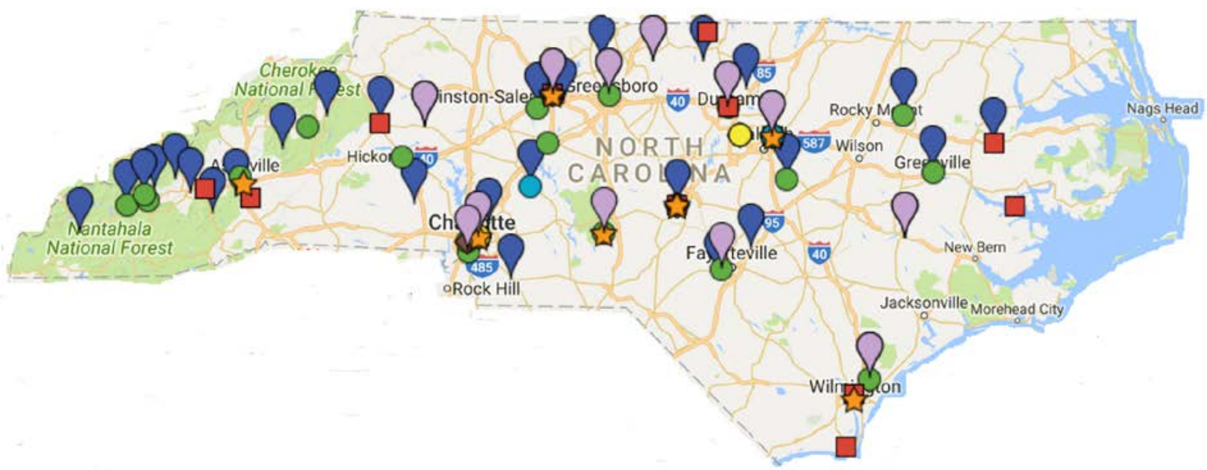
NORTH CAROLINA
Environmental Quality

2018-2019 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 1
Network Descriptions



June 29, 2018

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

NORTH CAROLINA
Department of Environmental Quality

CERTIFICATION

By the signatures below, the North Carolina Division of Air Quality, or DAQ, certifies that the information contained in the 2018-2019 Annual Monitoring Network Plan is complete and accurate at the time of submittal to the United States Environmental Protection Agency, or EPA, Region 4. However, due to circumstances that may arise during the sampling year, some network information may change. The DAQ will submit a notification of change and a request for approval to EPA Region 4 at that time.

Signature ______________________ Date 6-26-18
Patrick Butler
Ambient Monitoring Section Chief, DAQ

Signature ______________________ for MA Date 6/26/18
Michael Abraczinskas
Director, DAQ

I. Introduction

The North Carolina Division of Air Quality, or 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, or 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 outdoor air by maintaining a network of 38 monitoring stations across the state and measuring the concentration of pollutants such as ozone, lead, particles, i.e., 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, or MSA, core-based statistical area, or CBSA, combined statistical area, or CSA, or other area represented by the monitor.
- The designation of any lead, or Pb, monitors as either source-oriented or non-source-oriented as required in 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. It 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. Photochemical Assessment Monitoring Station, PAMS, Network
XIII. EPA Approval Dates for Quality Management Plan and Quality Assurance Project Plans
XIV. Equipment Condition of North Carolina Monitoring Sites

Appendix A. Summary of Monitoring Sites and Types of Monitors provides a table summarizing the monitoring network and providing the types of monitors operated at each station. The DAQ, the Western North Carolina Regional Air Quality Agency and Duke Progress Energy fill out annual network review forms each year for each operated monitoring site. These annual network review forms are attached as an appendix to each regional section in Volume 2. They are also available for review at the Division of Air Quality, 217 West Jones Street, Raleigh, North Carolina, 27603. Appendix B provides the Mecklenburg County Air Quality 2018 Annual Monitoring Network Plan. Appendix C provides the Forsyth County Office of Environmental Assistance and Protection 2018 Annual Monitoring Network Plan.

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. Regional office monitoring personnel manage the day-to-day operations of the monitors. Monitoring personnel are in each 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. The plan further subdivides each region into sections based on MSAs. 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] Due to 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 use the 2013 MSA definitions.

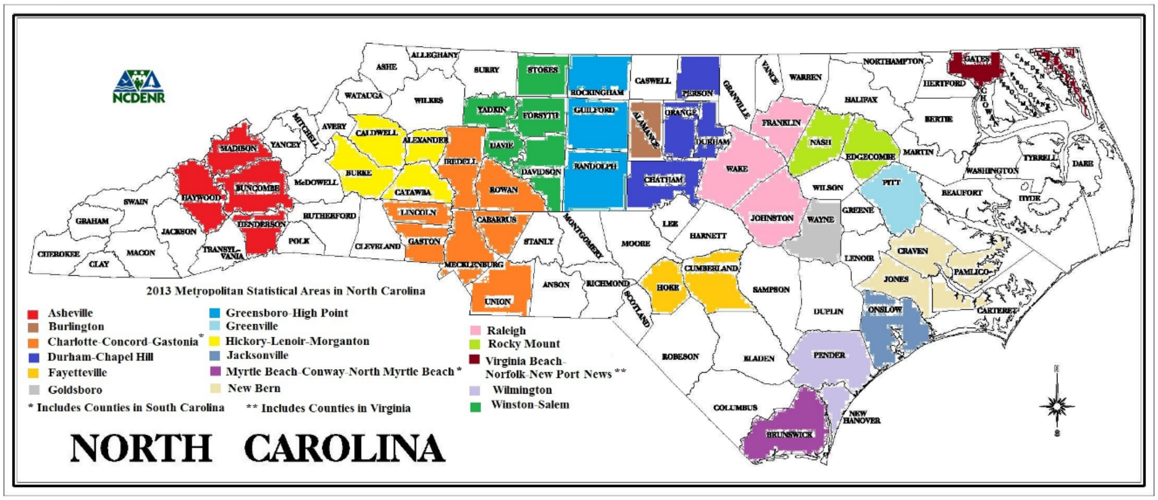


Figure 1. North Carolina metropolitan statistical areas as of February 2013

From 2007 through March 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 March 19, 2015. The Western North Carolina Regional Air Quality Agency elected to remain with the DAQ as a joint PQAO. In 2016, Duke Progress Energy decided to operate two sulfur dioxide data requirement rule sites as part of the DAQ 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 https://obamawhitehouse.archives.gov/sites/default/files/omb/bulletins/2013/b13-01.pdf, accessed May 18, 2017.

[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. 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. Figure 2 is a map that shows which counties grew the fastest in the past year and Figure 3 is a map that shows which counties are growing the fastest during this decade. This section organizes the discussion as follows:

- Monitors that were or are scheduled to start-up or shut-down in 2017, 2018 or 2019 that were not included in the 2017-2018 network plan;
- Sites to be relocated, moved or upgraded in 2018 or 2019;
- Changes to the methods used to measure fine particles for comparison to the NAAQS;
- Rotating background monitors and their operating schedules; and
- Waiver and other requests.

Table 1. Alphabetical list of fastest growing counties in North Carolina based on population change between April 1, 2010, and July 1, 2017, or July 1, 2016, and July 1, 2017.

County Name	Population Estimate July 1, 2017	State Ranking of Counties by 2017 Estimate	Reason for Selection as one of the Fastest Growing Counties in North Carolina
Brunswick	130,897	24	Growth of 3.6 percent from 2016 to 2017 and 21.8 percent from April 1, 2010, to July 1, 2017. Nation's 35th (annual) and 35th (decade) fastest growing county (percentagewise).
Cabarrus	206,872	11	Growth of 5,299 people (2.6 percent) from 2016 to 2017 and 28,861 people (16.2 percent) from April 1, 2010, to July 1, 2017. Nation's 114th (annual) and 83rd (decade) fastest growing county (percentagewise).
Chatham	71,472	37	Growth of 2.4 percent from July 1, 2016, to July 1, 2017. Nation's 162nd (annual) fastest growing county (percentagewise).
Clay	11,074	94	Growth of 2.4 percent from July 1, 2016, to July 1, 2017. Nation's 163rd (annual) fastest growing county (percentagewise).
Currituck	26,331	74	Growth of 667 people (2.6 percent) from 2016 to 2017 and 11.8 percent from April 1, 2010, to July 1, 2017. Nation's 117th (annual) fastest growing county (percentagewise).

Table 1. Alphabetical list of fastest growing counties in North Carolina based on population change between April 1, 2010, and July 1, 2017, or July 1, 2016, and July 1, 2017.

County Name	Population Estimate July 1, 2017	State Ranking of Counties by 2017 Estimate	Reason for Selection as one of the Fastest Growing Counties in North Carolina
Durham	311,640	6	Growth of 44,053 people (16.5 percent) from April 1, 2010, to July 1, 2017. Nation's 78th (decade) fastest growing county (percentagewise).
Forsyth	376,320	4	Growth of 4,706 people (1.3 percent) between July 1, 2016, and July 1, 2017, and 25,650 people (7.3 percent) between April 1, 2010, and July 1, 2017. Nation's 142nd (annual) fastest growing county.
Franklin	66,168	41	Growth of 2.3 percent between July 1, 2016, and July 1, 2017. Nation's 169th (annual) fastest growing county (percentagewise).
Guilford	526,953	3	Growth of 4,957 people (0.9 percent) between July 1, 2016, and July 1, 2017, and 38,547 people between 4/1/2010 and 7/1/2017. Nation's 119th fastest growing county (decade).
Harnett	132,754	22	Growth of 15.8 percent from April 1, 2010, to July 1, 2017. Nation's 90th (decade) fastest growing county (percentagewise).
Hoke	54,116	52	Growth of 15.3 percent from April 1, 2010, to July 1, 2017. Nation's 95th (decade) fastest growing county (percentagewise).
Johnston	196,708	12	Growth of 5,614 people (2.9 percent) from 2016 to 2017 and 27,830 (16.5 percent) from April 1, 2010, to July 1, 2017. Nation's 78th (annual) and 77th (decade) fastest growing county (percentagewise).
Mecklenburg	1,076,837	1	Growth of 19,600 people (1.9 percent) between July 1, 2016, and July 1, 2017 and 157,209 people (17.1 percent) between 4/1/2010 and 7/1/2016. Nation's 71st (decade) fastest growing county (percentagewise). Nation's 20th (annual) and 21st (decade) fastest growing county (based on number of persons).
New Hanover	227,198	9	Growth of 24,531 (12.1 percent) people from April 1, 2010, to July 1, 2017. Nation's 167th (annual) and 180th (decade) fastest growing county (based on number of persons). Nation's 174th (decade) fastest growing county (percentagewise).
Pender	60,958	45	Growth of 2,061 people (3.5 percet) from 2016 to 2017, and 8,741 people (16.7 percent) from April 1, 2010, to July 1, 2017. Nation's 42nd (annual) and 74th (decade) fastest growing county (percentagewise).

Table 1. Alphabetical list of fastest growing counties in North Carolina based on population change between April 1, 2010, and July 1, 2017, or July 1, 2016, and July 1, 2017.

County Name	Population Estimate July 1, 2017	State Ranking of Counties by 2017 Estimate	Reason for Selection as one of the Fastest Growing Counties in North Carolina
Union	231,366	8	Growth of 30,074 people (14.9 percent) from April 1, 2010, to July 1, 2017. Nation's 102nd (decade) fastest growing county.
Wake	1.072,203	2	Growth of 23,060 people (2.2 percent) from 2016-2017 and 171,210 people (19.0 percent) from April 1, 2010, to July 1, 2017. Nation's 54th (decade) fastest growing county (percentagewise). Nation's 13th (annual) and 20th (decade) fastest growing county (based on number of people).

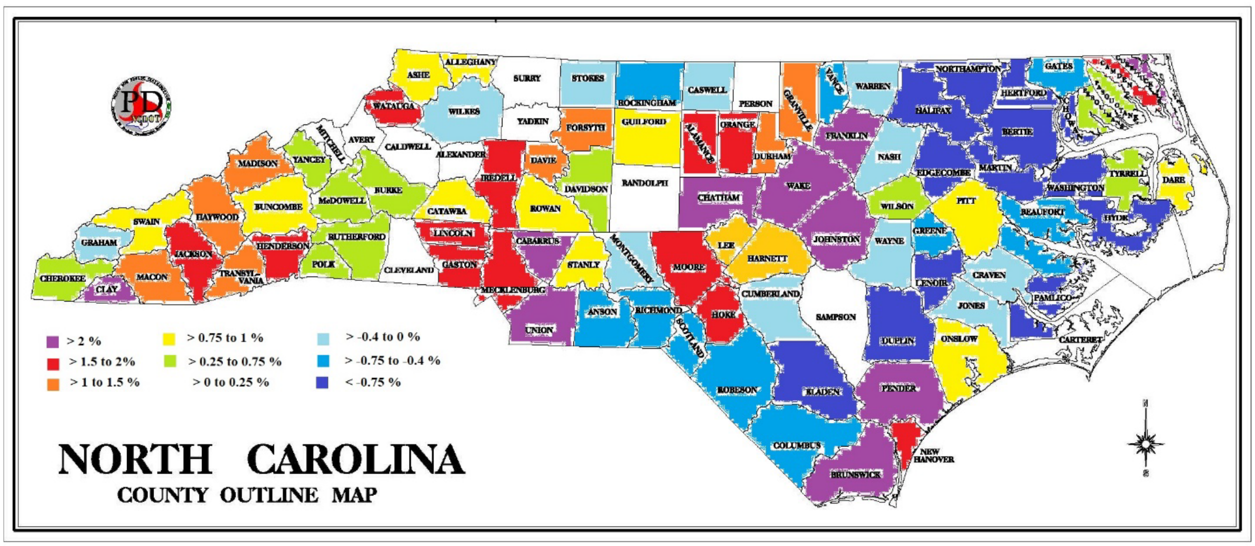

Figure 2. Estimated Percentage Growth by County from 2016 to 2017

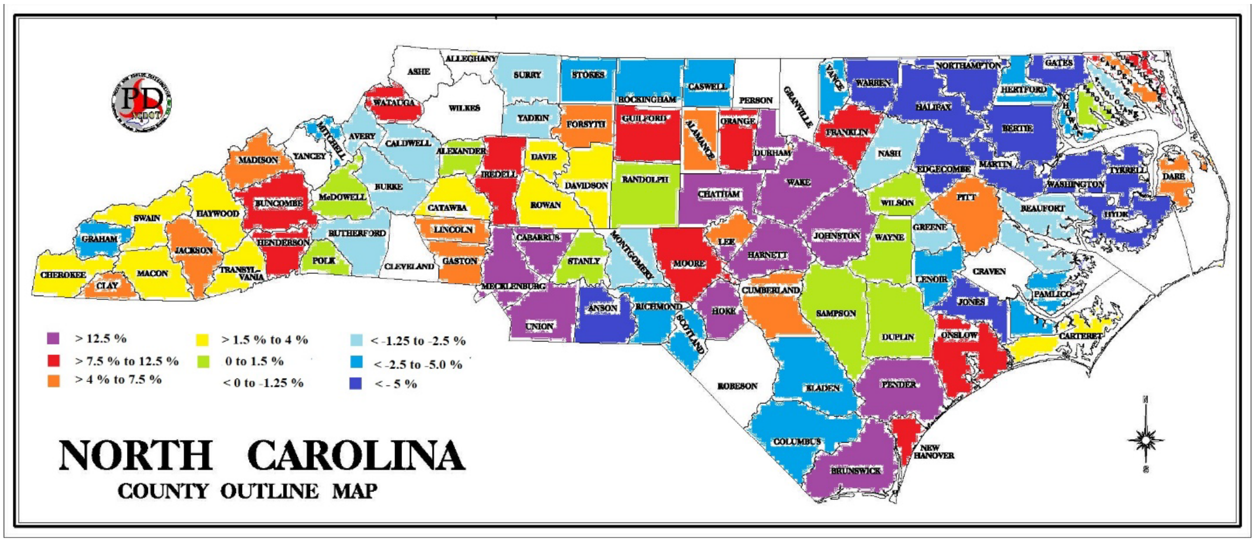

Figure 3. Estimated Rate of Growth by County from April 2010 to July 2017

A. Monitors that were or are Scheduled to Start Up or Shut Down in 2017, 2018 or 2019 that were not included in the 2017-2018 Network Plan

Table 2 presents a list of monitors DAQ either expects to or has already started up or shut down in 2017, 2018 or 2019 that were not included in the 2017-2018 network plan listed by metropolitan statistical area, MSA and Air Quality System, AQS, site identification number. Appendix B. 2018 Annual Monitoring Network Plan for Mecklenburg County Air Quality discusses changes to the monitors operated by Mecklenburg County Air Quality. Appendix C. 2018 Annual Monitoring Network Plan for Forsyth County Office of Environmental Assistance and Protection discusses changes to the monitors operated by Forsyth County. This section discusses the changes listed in the table applying to monitoring sites operated by the DAQ, Duke and WNC.

Table 2. Summary of Monitors Scheduled to Start Up or Shut Down in 2017, 2018 or 2019 that were not included in the 2017-2018 Network Plan

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Charlotte-Concord-Gastonia	371590021	Rockwell	NO_2	Monitoring will start	1/1/2019
			$PM_{2.5}$	Monitoring will start	1/1/2019
Not in an MSA	371050002	Blackstone	Ozone	Monitoring will end at this site and the site will shut down because the monitoring objective of obtaining background air quality data has been achieved	10/31/2018
			NO_2		12/31/2018
			SO_2		12/31/2018
			$PM_{2.5}$		12/31/2018
			Air Toxics		12/31/2018
			Met Tower		12/31/2018
	371310003	Northampton County	NO_2	Monitoring will start in late 2018	Late 2018
			$PM_{2.5}$		

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

The changes Mecklenburg County Air Quality made in the Charlotte-Concord-Gastonia MSA to the monitors they operate are discussed in Appendix B. 2018 Annual Monitoring Network Plan for Mecklenburg County Air Quality. This subsection discusses the two monitors in this MSA that DAQ will start in 2019.

To meet the need for background data for prevention of significant deterioration modeling and permitting, the DAQ will add a nitrogen dioxide and fine particle monitor to the **Rockwell** ozone monitoring station. These monitors will start operating by Jan. 1, 2019.

Figure 4. The Rockwell ozone monitoring site

2. *Monitoring Changes in Areas not in MSAs*

Monitoring Changes at Blackstone in Lee County

The Blackstone monitoring station is in the Sanford Micropolitan Statistical Area and the Raleigh-Durham-Chapel Hill Combined Statistical Area. The DAQ established this monitoring station in November 2013 to acquire background air quality data before the start of shale gas extraction in the Sanford area. The DAQ monitors for ozone, nitrogen dioxide, sulfur dioxide, fine particles and air toxics at this site as well as collecting meteorological data. The DAQ proposed shutting down this site in the 2017-2018 annual network plan after the DAQ analyzed the data collected for the shale gas extraction background study in 2014 through 2016. The DAQ completed this data analysis in 2017 and the published report will be available in 2018 at https://deq.nc.gov/about/divisions/air-quality/air-quality-data/special-studies.

The DAQ anticipates that shale gas extraction will not start in Lee County any time soon. According to the U.S. Energy Information Administration, North Carolina had no oil or natural gas reserves as of May 2017.[3] Without oil or natural gas reserves, there is no reason to engage in shale gas extraction. Thus, the DAQ plans to shut down the Blackstone monitor sometime during the second half of 2018 and relocate the monitoring shelter to another area of the state with potential air quality concerns. Shutting down the Blackstone monitors, which have fulfilled their purpose of measuring background air quality in Lee County, would free up resources, including a building, support equipment, operating and maintenance resources, to implement background monitoring elsewhere in the state. For these reasons, DAQ proposes shutting down this ozone monitoring site at the end of the 2018 ozone monitoring season. Appendix D. Blackstone Data Analysis for Shutting Down the Criteria Pollutant Monitors contains more detailed information.

Figure 5. The Blackstone multipollutant monitoring site

Monitoring in Northampton County

Monitoring in Northampton County started in response to public comments received from residents of Northampton County during the Northampton Compressor Station public hearing held on Nov. 15, 2017, as part of the approval process for permits associated with the establishment of the Atlantic Coast Pipeline. Based on comments DAQ received, the director considered an analysis of the area emissions inventory, socio-economic and demographic information. As a result, the director decided DAQ will establish a background monitoring station in Northampton County for fine particles, or $PM_{2.5}$, and nitrogen dioxide, or NO_2. Thus, DAQ is planning to operate one Northampton County background monitoring station starting in late 2018. The Northampton County background monitoring project is a short-term project expected to last two to five years. Currently, the DAQ is considering several potential monitoring sites. When a final site is selected, the DAQ will provide more information on that site as an addendum to this monitoring plan.

[3] https://ballotpedia.org/Fracking_in_North_Carolina, accessed May4, 2018.

B. Sites to be Relocated or Moved

The DAQ did not relocate or move any sites between the 2017 and 2018 ozone seasons. The DAQ replaced the shelter at the Honeycutt site, 37-051-0010, at the end of February 2018. The DAQ does not anticipating moving any sites in the next 18 months. However, the DAQ does anticipate replacing additional shelters at three to six sites during the next 18 months.

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 (R & P) 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 manufacturer no longer supports the TEOM so its continued operation was no longer feasible.

In early 2008, the EPA approved the Met One beta attenuation monitor, BAM 1020, as a federal equivalent method, FEM. Since 2008, the DAQ purchased numerous BAM 1020s. In 2014, the DAQ established a new site at Blackstone in Lee County and added BAM 1020s at the Lexington and Hickory sites. In 2015, the DAQ added a BAM 1020 at the Durham Armory and BAM 1022s at the Hickory, Mendenhall and William Owen sites. In 2016, the DAQ added BAMs at the Pitt County Agricultural Center, Spruce Pine and West Johnston sites. After one-to-two-year studies, the DAQ replaced five R & P Model 2025 PM2.5 sequential monitors with BAM 1020s. These BAM monitors are located at the Lexington, 37-057-0002, Candor, 37-123-0001, Wilmington Castle Hayne, 37-129-0002, and Bryson City, 37-173-0002, monitoring sites. The DAQ replaced the Hickory R & P Model 2025 PM2.5 sequential monitor with a BAM 1022. In 2018, the DAQ replaced three more R & P Model 2025 PM2.5 sequential monitors with BAM 1022s at Mendenhall, 37-081-0013, West Johnston, 37-101-0002, and Spruce Pine, 37-121-0004.

Table 3 lists the current sites where DAQ requested and received permission to not compare operating BAMs to the NAAQS. On July 16, 2015, the EPA approved operating the Blackstone BAM 1020 as an AQI monitor only.[4] On Dec. 15, 2016, the EPA approved operating the Raleigh Millbrook BAM 1020 as an AQI monitor only.[5]

Table 3. 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	Proposed Change	Time Frame
Raleigh	371830014	Millbrook	BAM 1020 converted to AQI only	1/1/2016
Durham-Chapel Hill	370630015	Durham Armory	Swapped out TEOM for a BAM 1020	5/31/2015
Asheville	370210034	Board of Education	Swapped out TEOM for a BAM 1022	1/1/2017
Fayetteville	370510009	William Owen	Swapped out TEOM for a BAM 1022	12/30/2015
Greenville	371470006	Pitt County Ag Center	Added BAM 1022	4/8/2016
None	371050002	Blackstone	BAM 1020 started	1/1/2014

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.[6] Monitors for sulfur dioxide, or SO_2, or PM_{10} rotate to these sites every three years. The DAQ selects these rotating sites to provide the greatest possible spatial coverage from the coastal plain to the foothills. Table 4 and Table 5 provide the background monitoring sites with their operating schedules.

E. Current Waivers and New Requests

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

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[4] 2014 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p5, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=6777.

[5] 2016 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p11, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=8964.

[6] **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.

Table 4 The 2018-2020 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:	Operated 5/2017 to 4/2018	Will operate 4/1/2018 to 3/31/2019	Will operate 9/1//2019 to 8//31/2020	Will operate 9/1//2019 to 8/31/2020

Table 5 The 2017-2019 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:	Will operate 5/1/2019 to 4/30/2020	Will operate 11/1/2019 to 10/31/2020	Will operate 5/1/2019 to 4/30/2020	Operated 5/1/2017 to 4/30/2018	Is operating 4/1/2018 to 3/31/2019	Operated 5/1/2017 to 4/30/2018

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

In 2015 the EPA approved the following waivers:[7]

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, or NEI, 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 for the PWEI sulfur dioxide monitoring requirement for 2016, so that the DAQ, the Western North Carolina Regional Air Quality Agency, or 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 network plan. The EPA released version 1 of the 2014 NEI in December 2016.[11] Calculations using the 2014 NEI and 2016 population estimates resulted in a PWEI value of 4188, which is below the 5,000-threshold.

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 ..."[12] Section 4.5(a)(ii) provides the following provisions for a waiver of the lead monitoring requirements:

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[7] 2015 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7450.

[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] United States Environmental Protection Agency , 2014 National Emission Inventory, Version 1, All Sectors: National-County/Tribe aggregated, Released December 2016, available on the world wide web at https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data. Accessed Jan. 4, 2017.

[12] Title 40: Protection of Environment, PART 58—AMBIENT AIR QUALITY SURVEILLANCE, APPENDIX D TO PART 58—NETWORK DESIGN CRITERIA FOR AMBIENT AIR QUALITY MONITORING,

"(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 *five* years as part of the network assessment required under 58.10(d)."[13]

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 and Saint Gobain Containers in Wilson.[14] 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.[15] 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 the modeling submitted in 2011 is sufficiently conservative and in 2015 approved the renewal of the source-oriented ambient air lead monitoring waiver at Saint Gobain Containers in Wilson for five years, until 2020.[16]

Waiver for the Second PM_{10} Monitor in Raleigh

In 2015, the DAQ requested the EPA renew the waiver for the second PM_{10} monitor in Raleigh. 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 6, all 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. As such, 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, 2015 or 2016.[17] Thus, the DAQ does not expect the PM10 concentrations in Raleigh to cause any harm to people's health and wellbeing. The DAQ point source emission inventory for PM_{10} reports 131 facilities in the Raleigh MSA emitting 529.3 tons of PM_{10} in 2015. This number is down from 143

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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.

[13] ibid.

[14] 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.

[15] 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.

[16] 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.

[17] Air quality index summary information is available on the worldwide web at https://www.epa.gov/outdoor-air-quality-data/air-quality-index-report.

facilities reporting 781.7 tons of PM_{10} emissions in 2008.[18] 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.[19]

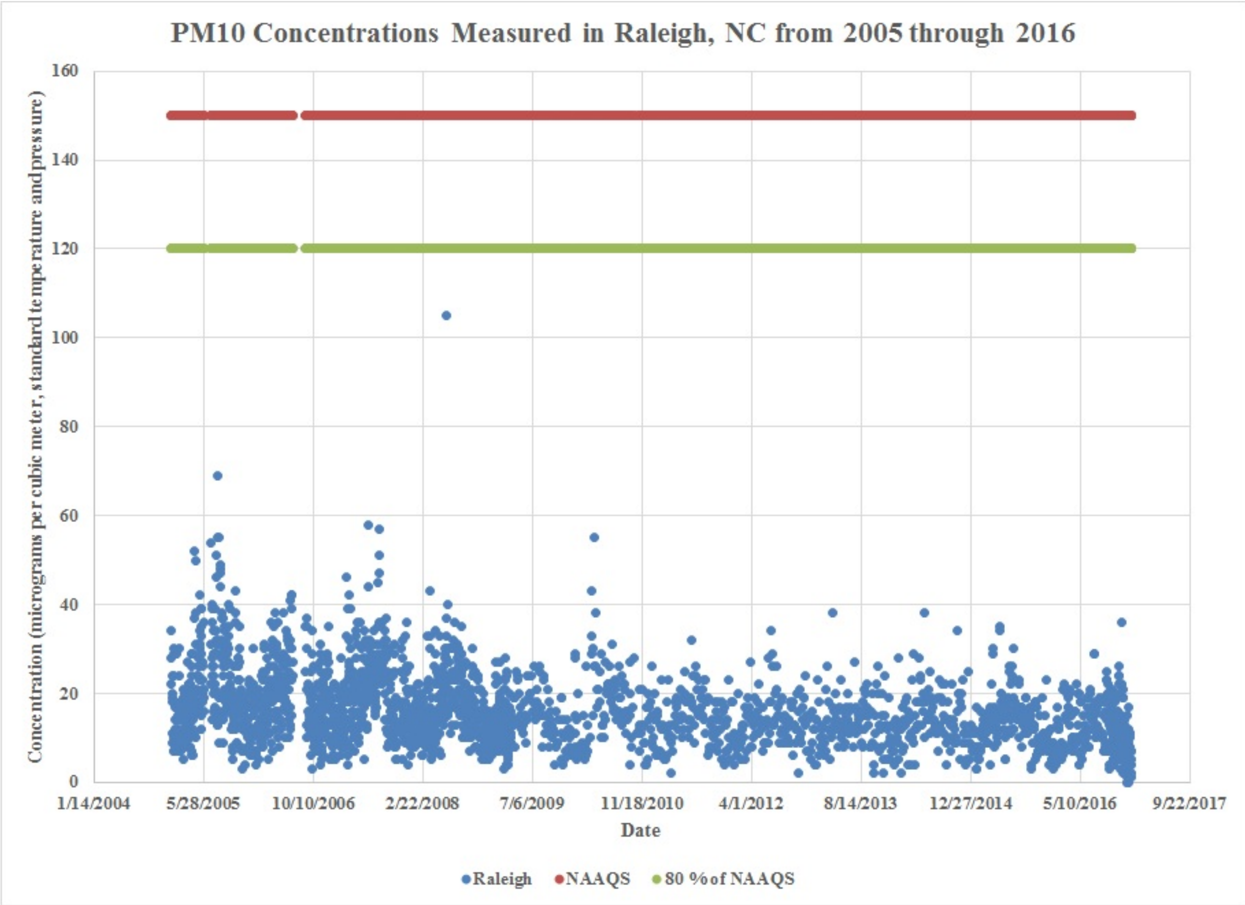

Figure 6. PM_{10} concentrations measured in Raleigh from 2005 through 2016

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 EPA required the DAQ to add a third fine particle monitor to this MSA in 2017 at the near road site, the EPA approved a waiver for the third fine particle monitor

[18] 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.

[19] 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.

for 2016.[20] The 2014-2016 and 2015-2017 design values for the MSA are below the 85 percent threshold.

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 7. The wind direction/speed sensors are located at a height of 10 meters above ground and the relative humidity sensor is located at 2 meters. Ambient temperature sensors are located at 2 meters and 10 meters above ground. The tower is 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 percent 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 10 times the height of the shelter, which is 3.7 meters. Additionally, a single tree, approximately 7 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 at the site. The state, therefore, requested that the EPA renew the waiver and deem the position of the tower to be acceptable. The EPA did renew the waiver in 2015.

Figure 7. Millbrook NCore Site
(from City of Raleigh and Wake County iMAPS, http://maps.raleighnc.gov/iMAPS/)

[20] 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.

2. *Current Waivers Approved by the EPA in 2016*

In 2016, the EPA approved the following waiver requests:[21]

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

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

DAQ's concern was 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, or 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 4 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

[21] 2016 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=8964.

during the winter, so DAQ does 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.

Based on these considerations, DAQ requested 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 limited resources.

The EPA approved DAQ's request and granted a waiver due to accessibility issues and since temperatures are typically colder in March at these sites than at other sites in the network.[22] However, the EPA requested that the DAQ begin monitoring at these sites as soon as access and weather permits but no later than April 1 of each year.

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 requested approval to combine data from the discontinued Waggin Trail site, 37-003-0004, with the relocated Taylorsville Liledoun site, 37-003-0005, for 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 8, 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 9 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).

[22] 2016 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, Dec. 16, 2016, p 2-5, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=8964.

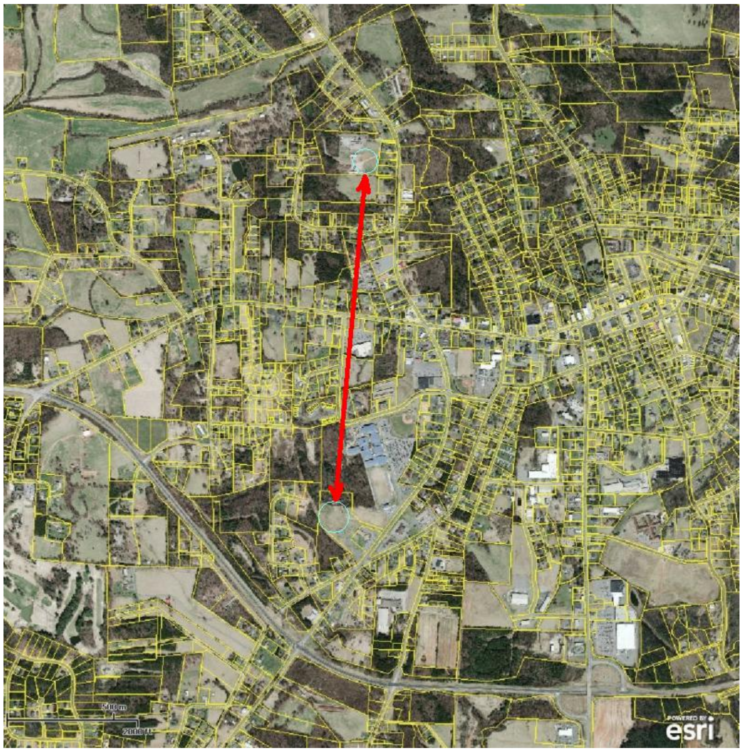

Figure 8. Relationship between Waggin Trail site and Taylorsville Liledoun Site

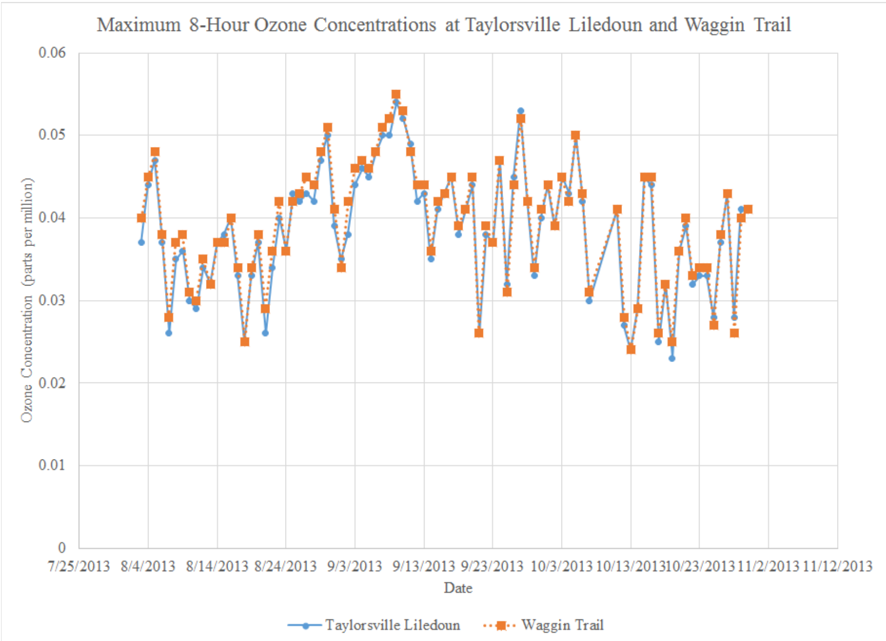

Figure 9. Comparison of maximum daily 8-hour ozone concentrations

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 calculating a design value for a relocated site in accordance with 40CFR Part 50 Appendix U(2)(c). As shown in Figure 10, the Honeycutt site is approximately 9 Kilometers northwest from where the Golfview site was located. Because of the timing of the request, the DAQ could not operate the two monitors simultaneously. 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 10. Location of Honeycutt site, no dot, in relation to Golfview, dot

3. *Waiver Requests Granted in 2017*

In 2017 the DAQ made and the EPA approved the following requests:

- A waiver for exclusion of BAM data from nonattainment determinations for William Owen, 37-051-0009, the Durham Armory, 37-063-0015, Pitt Ag Center, 37-147-0006, and Raleigh; 37-183-0014;
- For permission to operate the federal reference monitors at Board of Education, 37-021-0034, and Pitt Ag Center, 37-147-0006 on a one-in-six-day schedule; and
- A waiver for the trees behind the monitor at the Triple Oak near-road monitoring station in Raleigh.

Renewal Request for Exclusion of BAM Data from Nonattainment Determinations

DAQ requests permission to exclude BAM data from nonattainment determinations for BAMs at William Owen, 37-051-0009, the Durham Armory, 37-063-0015, Pitt Ag Center, 37-147-0006, and Raleigh; 37-183-0014. The request for excluding these data is provided in **Appendix E. Request for Exclusion of PM2.5 Continuous FEM data from Comparison to the NAAQS**.

Request to operate FRM Monitors on a One-in-Six Day Schedule

DAQ requests permission to operate the federal reference monitor at Pitt Ag Center, 37-147-0006, and WNC requests to operate the federal reference monitor at the Board of Education, 37-021-0034, on a one-in-six-day schedule.

40 Code of Federal Regulations §58.12 Operating schedules in paragraph (d)(1)(ii) states:

> For SLAMS $PM_{2.5}$ sites with both manual and continuous $PM_{2.5}$ monitors operating, the monitoring agency may request approval for a reduction to 1-in-6-day $PM_{2.5}$ sampling or for seasonal sampling from the EPA Regional Administrator. Other requests for a reduction to 1-in-6-day $PM_{2.5}$ sampling or for seasonal sampling may be approved on a case-by-case basis. The EPA Regional Administrator may grant sampling frequency reductions after consideration of factors (including but not limited to the historical $PM_{2.5}$ data quality assessments, the location of current $PM_{2.5}$ design value sites and their regulatory data needs) if the Regional Administrator determines that the reduction in sampling frequency will not compromise data needed for implementation of the NAAQS. Required SLAMS stations whose measurements determine the design value for their area and that are within ±10 percent of the annual NAAQS and all required sites where one or more 24-hour values have exceeded the 24-hour NAAQS each year for a consecutive period of at least three years are required to maintain at least a 1-in-3-day sampling frequency until the design value no longer meets these criteria for three consecutive years. A continuously operating FEM or ARM $PM_{2.5}$ monitor satisfies this requirement unless it is identified in the monitoring agency's annual monitoring network plan as not appropriate for comparison to the NAAQS and the EPA Regional Administrator has approved that the data from that monitor may be excluded from comparison to the NAAQS.

The DAQ believes both monitors are qualified to operate at a reduced schedule because both monitors are collocated with a continuous PM2.5 monitor, neither monitor is required and as shown in Figure 11 and Figure 12 both monitors have been measuring concentrations below 80 percent of the standard for six years or more. The DAQ is requesting permission to operate the continuous PM2.5 monitor in Greenville as an AQI only monitor. See Appendix E. Request for Exclusion of PM2.5 Continuous FEM data from Comparison to the NAAQS**.** The BAM 1022 at the site currently does not match the FRM at the site. The DAQ would like to maintain the collocated FRM at a reduced sampling frequency for another year to continue to get comparison data for the two monitors to continue to study why the monitors fail to compare.

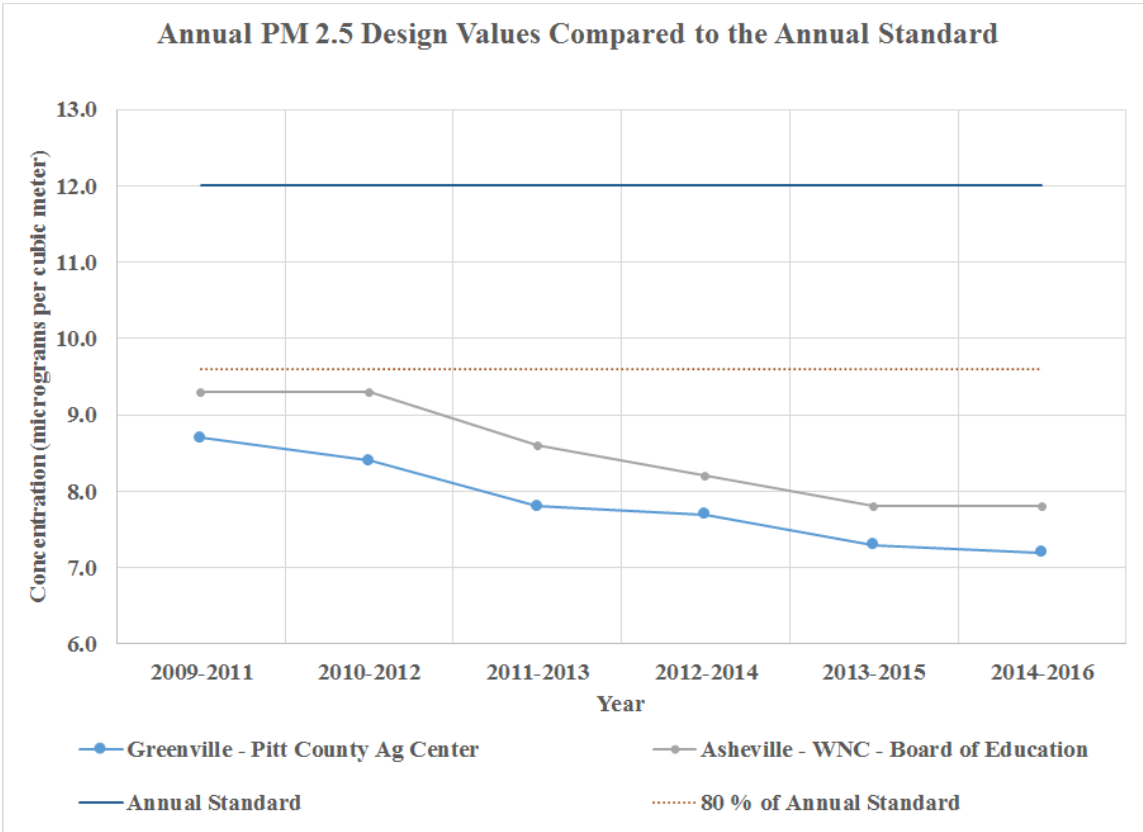

Figure 11. Annual fine particle design values for Asheville and Greenville

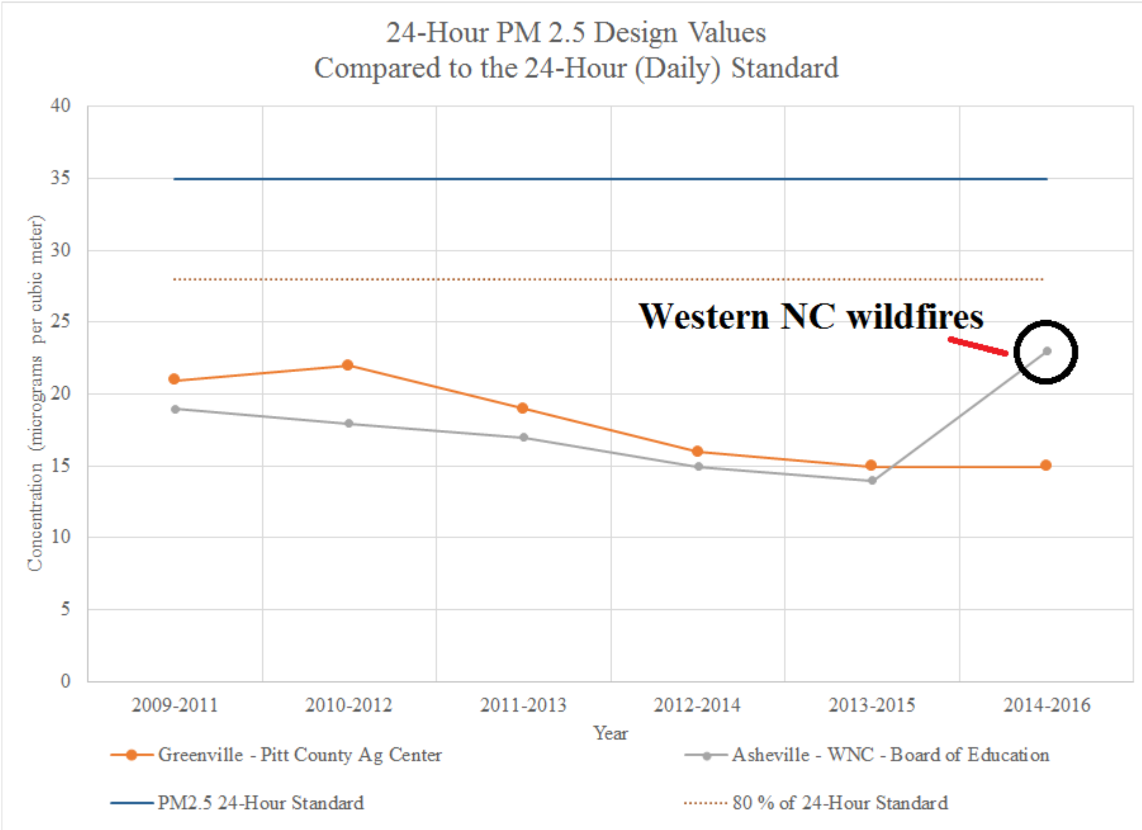

Figure 12. 24-Hour fine particle design values for Asheville and Greenville

Request for a waiver for the trees at Triple Oak Road

The DAQ requests a waiver for the trees that are on the northeast side of the building because they are an obstruction to air flow. The waiver is necessary because the trees are on private property belonging to an out-of-state trust and the owner has not provided permission to DAQ to remove the trees.

Figure 13 is an aerial photograph of the site showing the location of the monitor with regards to the surrounding trees. The photograph does not show the second building placed at the site to the southeast of the building in the photograph. However, the presence/or lack of presence of the other building does not affect the location of the trees. They are still 20 meters from the proposed monitoring location to the southeast and northwest and there are no trees between the monitor and the roadway.

Figure 13. Site diagram showing locations of trees relative to the fine particle monitoring location.

The monitor will be 10 meters from the trees to the northeast. The trees further back from the trees that are 10 meters away are taller and will act as an obstruction to air flow coming from the northeast. Those trees are 12 to 13 meters away from the proposed location of the PM2.5 inlet and about 18 meters tall. The inlet of the PM2.5 monitor will be approximately 5 meters from the ground. Thus, the trees would need to be 26 meters away to not act as an obstruction.

Predominant winds at the site are from the southwest most of the year. Figure 14 provides a wind rose using the 2011 to 2015 wind data from the Raleigh Durham Airport, which is about 2.5 Kilometers northeast of the site. Based on the wind rose, the winds come from the south, southwest and west over 50 percent of the time and from the north, northeast and east less than a third of the time.

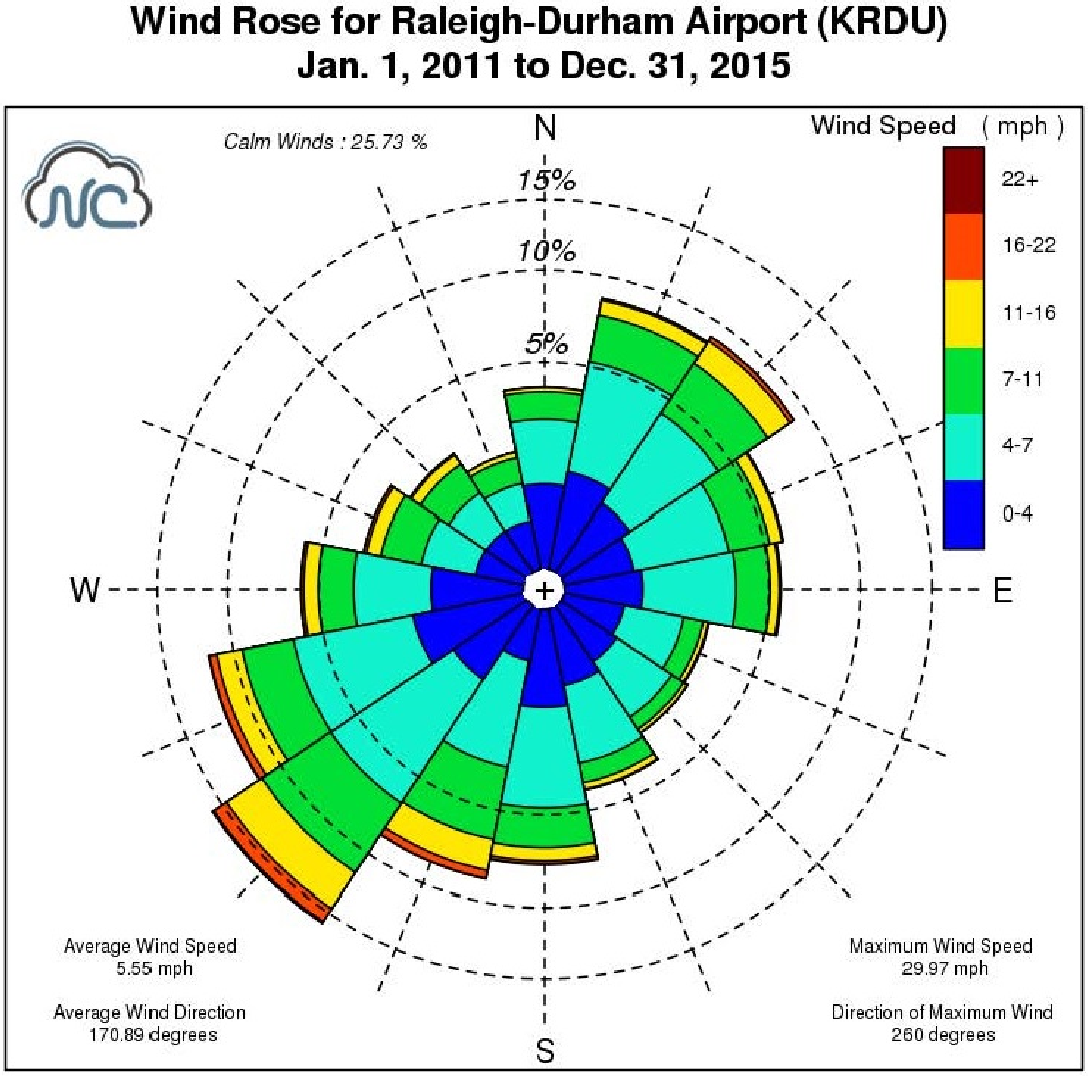

Figure 14. Wind Rose for the Raleigh-Durham Airport for 2011-2015.

Figure 15 show the trees to the north of the site. These trees are 12 to 15 meters in height and located about 12 meters from the proposed location. There is a berm that starts to rise about approximately 7 meters from where the site would be. The trees are growing on top of this berm. They will be an obstruction because they are less than twice the distance, 23.2 meters, from the proposed probe location than the difference between the height of the probe, 3.6 meters, and the height of the trees, 15.2 meters.

Because the site is a source-oriented site and the trees do not create an obstruction between the source, that is the roadway and the inlet, the trees should not impact the ability of the site to monitor fine particle emissions from the interstate highway. Thus, the DAQ requests a waiver of siting criteria regarding the trees to the northeast of the site. The other trees meet siting criteria and do not require a waiver. They are shown in Figure 16 through Figure 18.

Figure 15. Trees to the north of the site.

Figure 16. Taken from the fine particle monitor towards the east, showing trees and the monitoring shelter.

Figure 17. Taken from fine particle monitor. Shows the trees to the south and the interstate highway.

Figure 18. – Taken from the fine particle monitor towards the west.

4. *New Waiver and Other Requests*

The DAQ makes the following requests:

- A continuation of the waiver for exclusion of BAM data from nonattainment determinations for William Owen, 37-051-0009, the Durham Armory, 37-063-0015, Pitt Ag Center, 37-147-0006, and Raleigh; 37-183-0014;
- A waiver to install the relative humidity and ambient temperature sensors at 10 meters at the Millbrook NCore site; and
- A waiver for the trees behind the monitor at the Skyland DRR monitoring station in Royal Pines/Arden, North Carolina.

Renewal Request for Exclusion of BAM Data from Nonattainment Determinations

DAQ continues to request permission to exclude BAM data from nonattainment determinations for BAMs at William Owen, 37-051-0009, the Durham Armory, 37-063-0015, Pitt Ag Center, 37-147-0006, and Raleigh; 37-183-0014. **Appendix E. Request for Exclusion of PM2.5 Continuous FEM data from Comparison to the NAAQS** contains the request for excluding these data.

Request to Install the Ambient Temperature and Relative Humidity Sensors at 10 Meter at the Millbrook NCore site

DAQ requests permission to install the ambient temperature and relative humidity sensors at the Millbrook NCore site at 10 meters instead of 2 meters. The DAQ needs to make this change to the meteorological equipment because the DAQ changed to a new electronic data acquisition system, or DAS, in 2017. The new DAS is not compatible with the meteorological equipment DAQ was using. Thus, DAQ decided to purchase new all-in-one meteorological sensors that can be directly interfaced with the new DAS. However, because these sensors are all-in-one, all the meteorological components must be installed at the same height. Rather than install two all-in-one units at the Millbrook site, one at 10 meters for wind speed and wind direction and one at 2 meters for relative humidity and ambient temperature, the DAQ requests a waiver so that one all-in-one unit at 10 meters could be used at the site.

40 Code of Federal Regulations 58 Appendix D states only that sites must measure relative humidity and ambient temperature:

> 3(b) The NCore sites must measure, at a minimum, $PM_{2.5}$ particle mass using continuous and integrated/filter-based samplers, speciated $PM_{2.5}$, $PM_{10\text{-}2.5}$ particle mass, O_3, SO_2, CO, NO/NO_Y, wind speed, wind direction, relative humidity and ambient temperature.

The regulation does not state at what height the relative humidity and ambient temperature should be measured.

Since the 2-meter height for measuring relative humidity and ambient temperature is provided in EPA guidance and not in the regulations, the DAQ requests a waiver for measuring relative humidity at 2 meters so that one all-in-one unit may be used at 10 meters.

Request for a waiver for the trees at the Skyland DRR site

The DAQ requests a waiver for the trees that are on the northeast side of the building because they are an obstruction to air flow. The waiver is necessary because the trees are on private property and the owner has not provided permission to DAQ to remove the trees.

Figure 19 is an aerial photograph of the site showing the location of the monitor with regards to the surrounding trees. The site is located 18 meters northwest of Crestwood Drive. The probe is 4 meters above ground level. The land slopes downward from Crestwood drive to the site such that the site is about 4 meters lower than the road. The DAQ estimates the trees on the opposite side of the road are 12 meters tall. Thus, the DAQ estimates the trees to the northeast, which are the closest trees, protrude 12 meters above the probe, and the tree dripline is less than 24 meters from the probe, making these trees an obstruction to air flow. In addition to those trees, there is a patch of bamboo 4 meters to the northwest of the probe, which Duke estimates to be 5 meters in height. Although the bamboo is not yet an obstruction to air flow, Duke plans to trim the bamboo so that it no longer protrudes over the top of the probe.

Figure 19. Aerial view of the Skyland DRR monitoring site.

Predominant winds measured at the Asheville Regional Airport are from the north and north northwest. Figure 20 provides a wind rose using the 2013 to 2017 wind data from the Asheville Regional Airport, which is about 4 Kilometers northwest of the site. Predominant winds measured at the site are from the west northwest. Figure 21 provides a wind rose using the 2017 to 2018 wind data measured at the site.

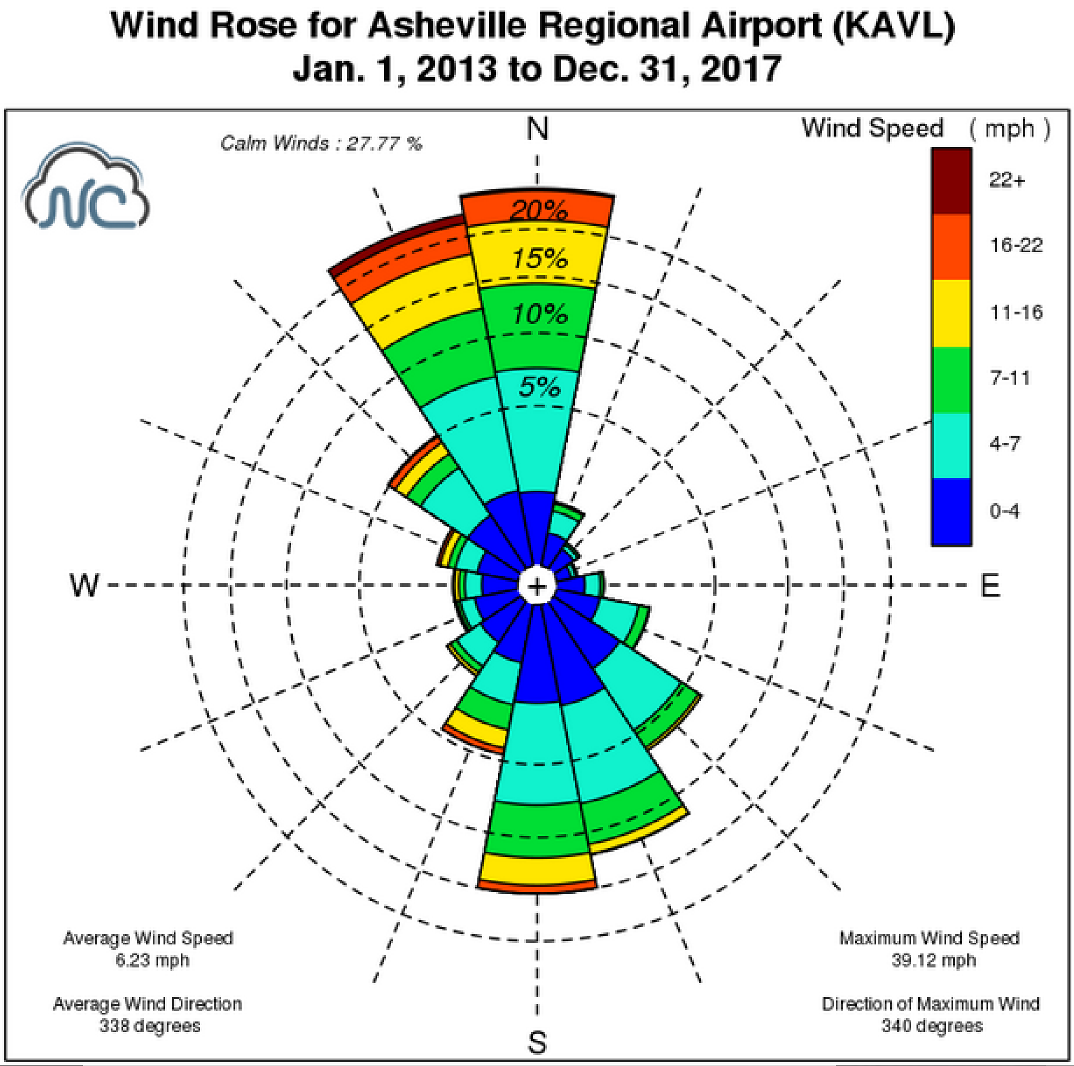

Figure 20. Wind Rose for the Asheville Regional Airport for 2013-2017.

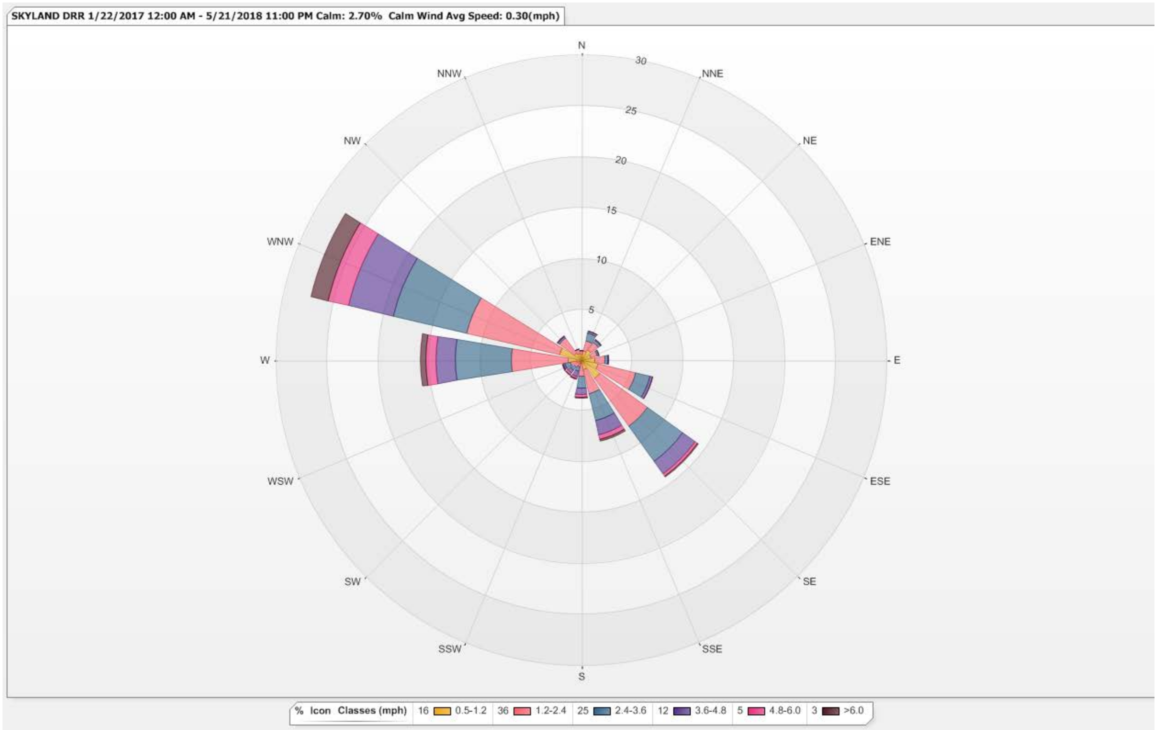

Figure 21. Wind rose using on-site meteorological data

Figure 22 shows the view looking north from the site. As Figure 22 shows, there are no obstructions to the north. Figure 23 shows the view looking from the site down the mountain toward Lake Julian and the facility. As Figure 23 shows, there are no obstructions between the site and the facility.

Because the site is a source-oriented site and the trees do not create an obstruction between the source, that is the facility and the inlet, the trees should not impact the ability of the site to monitor sulfur dioxide emissions from the facility. Thus, the DAQ requests a waiver of siting criteria regarding the trees to the northeast. The DAQ and Duke will trim the bamboo to the northwest of the site.

Figure 22. Looking North from the Skyland DRR site.


Figure 23. Looking west toward Lake Julian and the facility.

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 2017-2018 state-operated network consists of two monitors in Raleigh operated by the Division of Air Quality, or DAQ, and two monitors in Charlotte operated by Mecklenburg County Air Quality, or MCAQ. All four monitors collect data using a federal reference method for comparison to the national ambient air quality standards, also known as NAAQS. Until the end of 2015, 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, as shown in Figure 24, and the state has maintained the standard for more than 20 years, the Peters Creek Winston-Salem micro-scale site is no longer required and was shut down at the end of 2015. One monitor in Raleigh and one monitor in Charlotte are located near the instate highway. The other sites in Raleigh and Charlotte are middle and neighborhood scale sites that are part of the national core, also known as NCore, network. None of the currently operating sites reported exceedances of the 1- or 8-hour ambient air quality standards from 2013 to 2017.

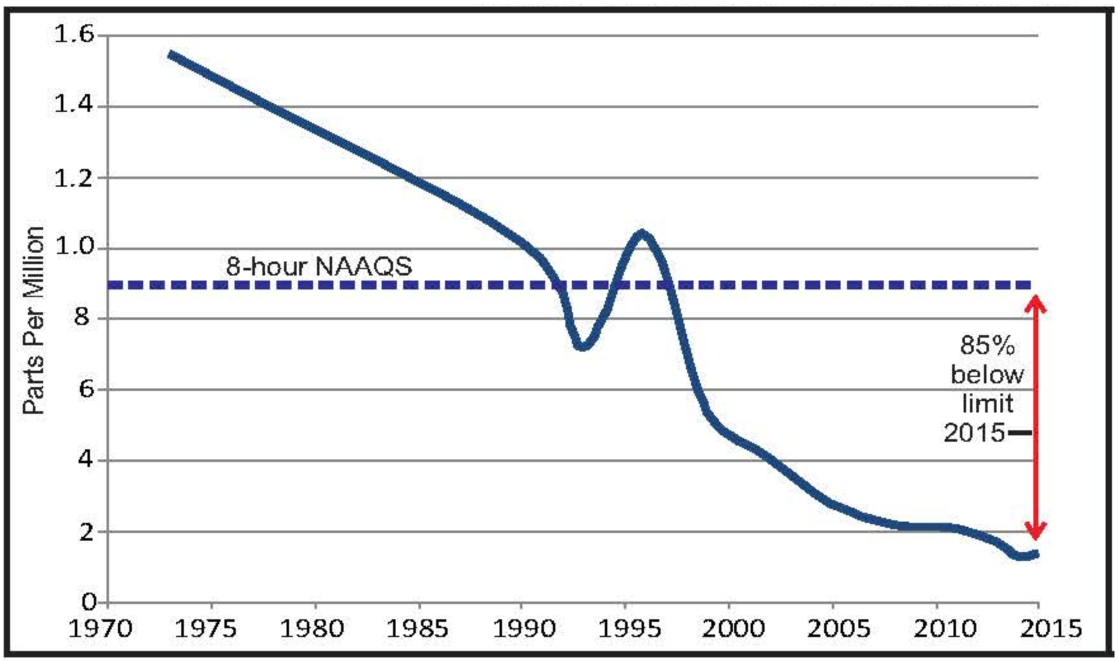

Figure 24. Statewide 8-hour carbon monoxide levels through 2015
(from *Air Quality Trends in North Carolina* located at https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/Air_Quality_Trends_in_North_Carolina.pdf)

As of the end of 2015, the state has met all the monitoring requirements in the DAQ carbon monoxide maintenance state implementation plans, also known as SIPs, for Mecklenburg, Forsyth, Durham and Wake counties. The SIP required the state to operate at least one carbon monoxide monitor in Mecklenburg, Forsyth and either Durham or

Wake counties through the end of 2015 so the data from the monitor could trigger contingency requirements.[23]

Figure 25 provides the maximum 1-hour and Figure 26 provides the maximum 8-hour concentrations for all operating sites for 2011 through 2017. 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 23 percent of the standard and occurred at Millbrook in 2016, due to smoke from November forest fires in the western mountains of North Carolina. Currently the state and local programs are operating the minimum required carbon monoxide network, that is, one carbon monoxide monitor at each NCore and each near-road site. The state and the MCAQ local program started operating a carbon monoxide monitor at the near road stations in Raleigh and Charlotte in late 2016 to meet the Jan. 1, 2017, start date.[24]

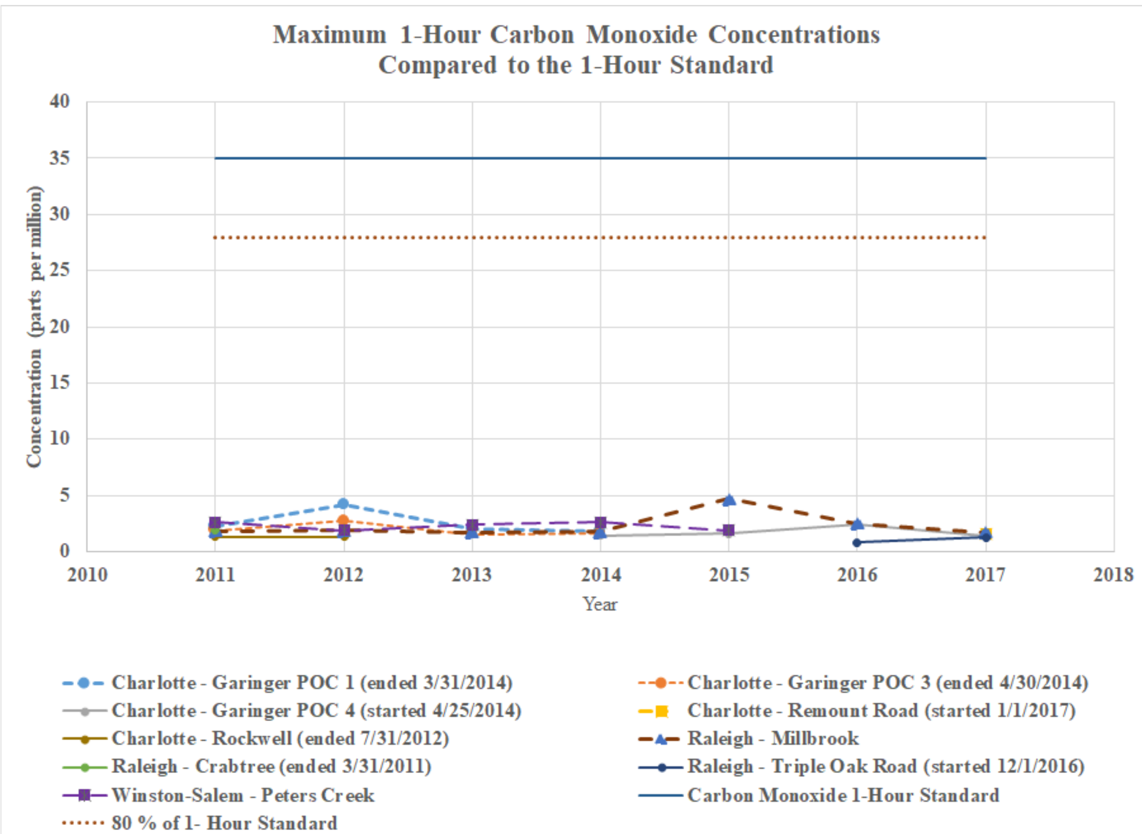

Figure 25. Maximum 1-hour carbon monoxide concentrations measured in North Carolina from 2011 to 2017

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[23] "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.

[24] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at *https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d*, accessed on April 22, 2017.

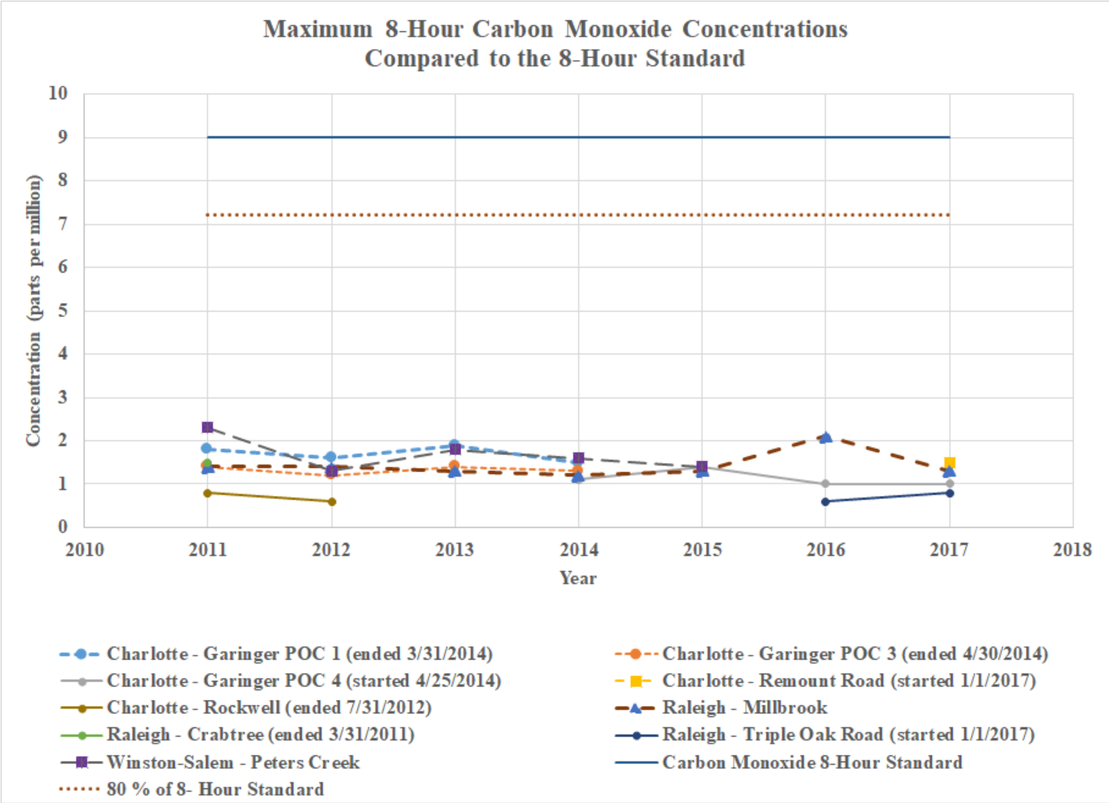

Figure 26. Maximum 8-hour carbon monoxide concentrations measured in North Carolina from 2011 to 2017

Table 6 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 7 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 6 The 2018-2019 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

Table 6 The 2018-2019 Carbon Monoxide Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041	37-119-0045
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	None

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

Table 7 The 2018-2019 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	None

[a] Both 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 11 sites operated by the North Carolina Division of Air Quality, or DAQ, and at two sites operated by local programs. From Jan. 1, 2012 through April 15, 2015, the South Carolina Department of Health and Environmental Control also operated an upwind background special purpose SO_2 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, also known as 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. Currently the state and local programs monitor four major cities for sulfur dioxide. Data from previous years, as shown in Figure 27, indicate statewide levels of sulfur dioxide in most areas are well below the 1-hour standard established by the United States Environmental Protection Agency, or EPA.

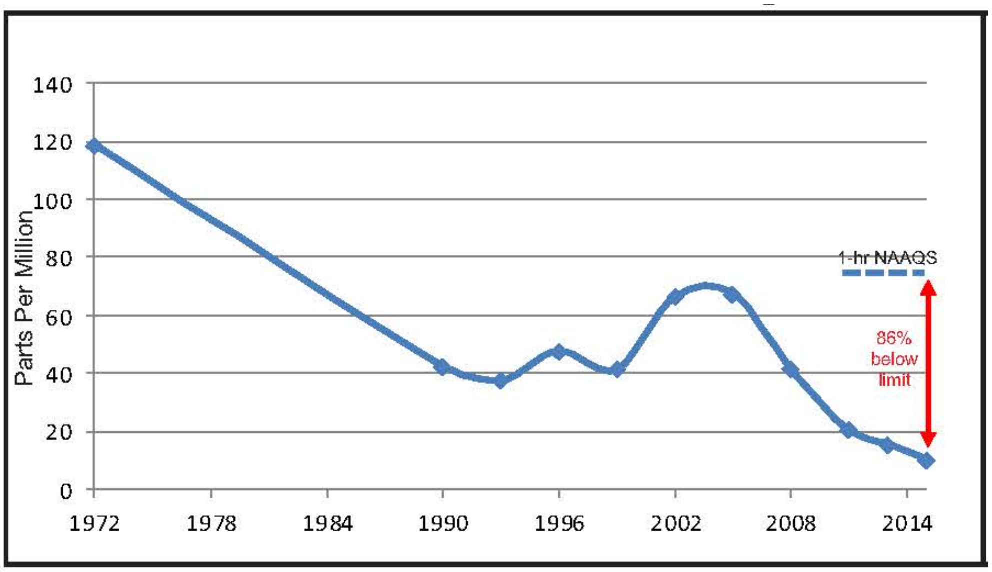

Figure 27. Statewide trends for sulfur dioxide
(from *Air Quality Trends in North Carolina* located at https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/Air_Quality_Trends_in_North_Carolina.pdf)

Figure 28 through Figure 30 show the design value or concentrations of sulfur dioxide measured in North Carolina between 2011 and 2017 as compared to the national ambient air quality standards, NAAQS. Although the design value exceeded the standard in Wilmington in 2011, in 2015 all design values in the state 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 Bushy Fork site in 2014. The industrial monitor at Southport started operating on Oct. 18, 2016. The other industrial monitors started operating in 2017. The industrial monitors at Southport and Canton reported 99 percentile 1-hour concentrations over the standard. The DAQ is working with these two facilities to reduce their sulfur dioxide emissions.

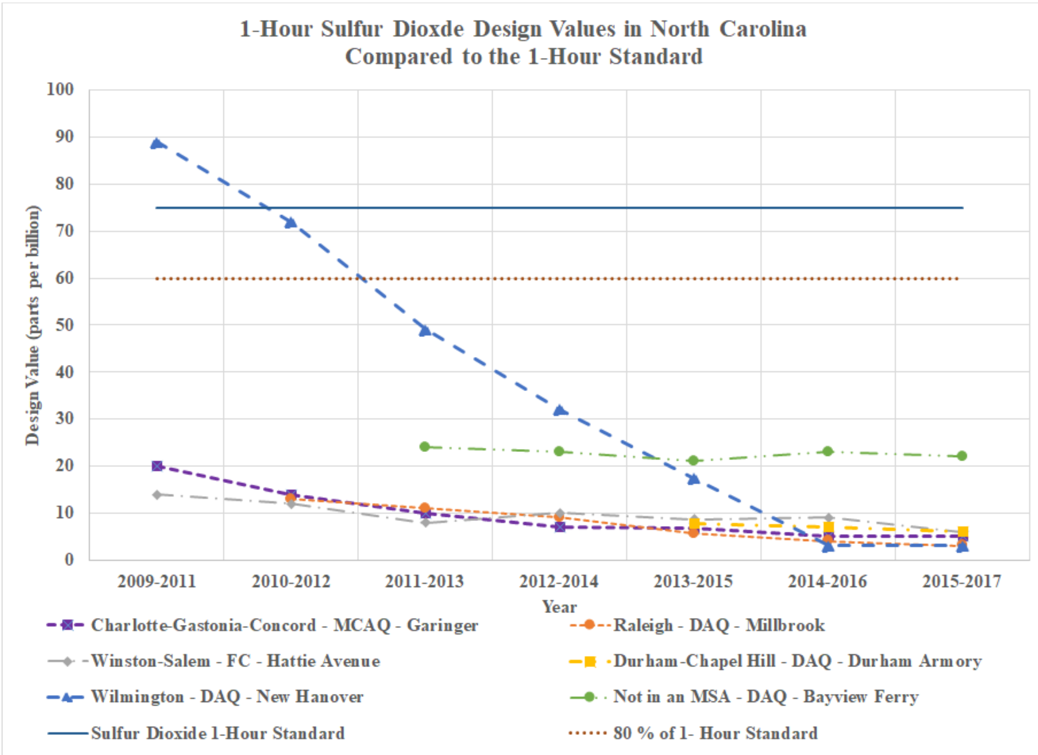

Figure 28. Sulfur dioxide 1-hour design value trends for SLAMS monitors

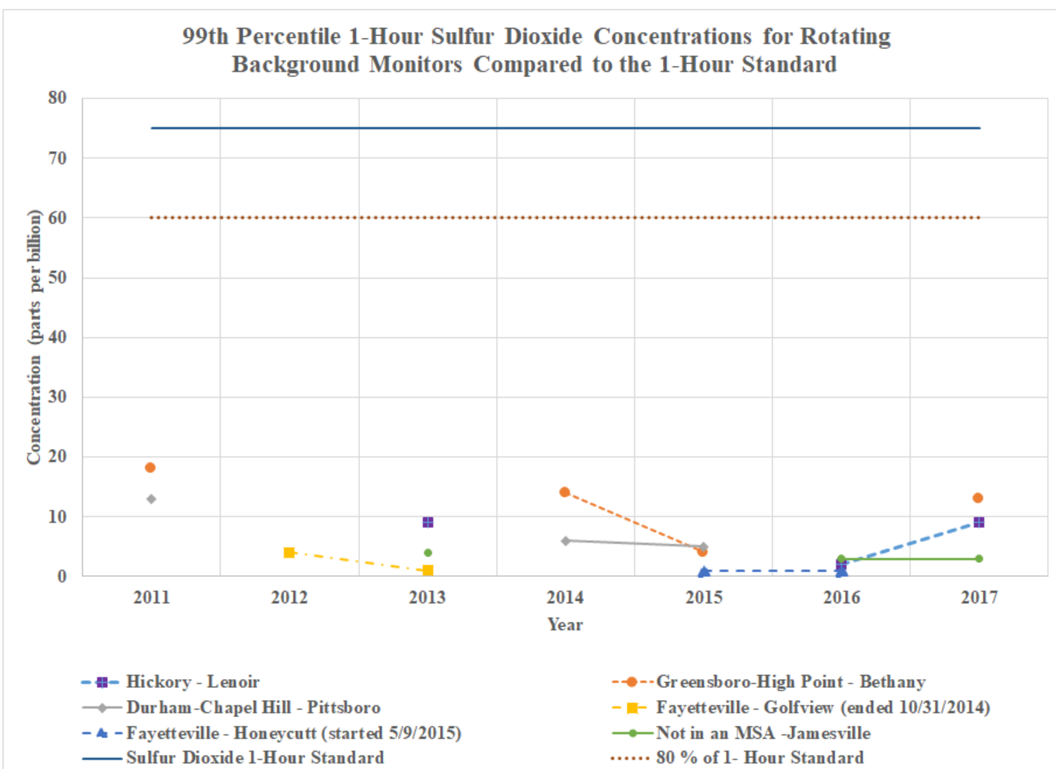

Figure 29. Background Sulfur Dioxide Concentrations

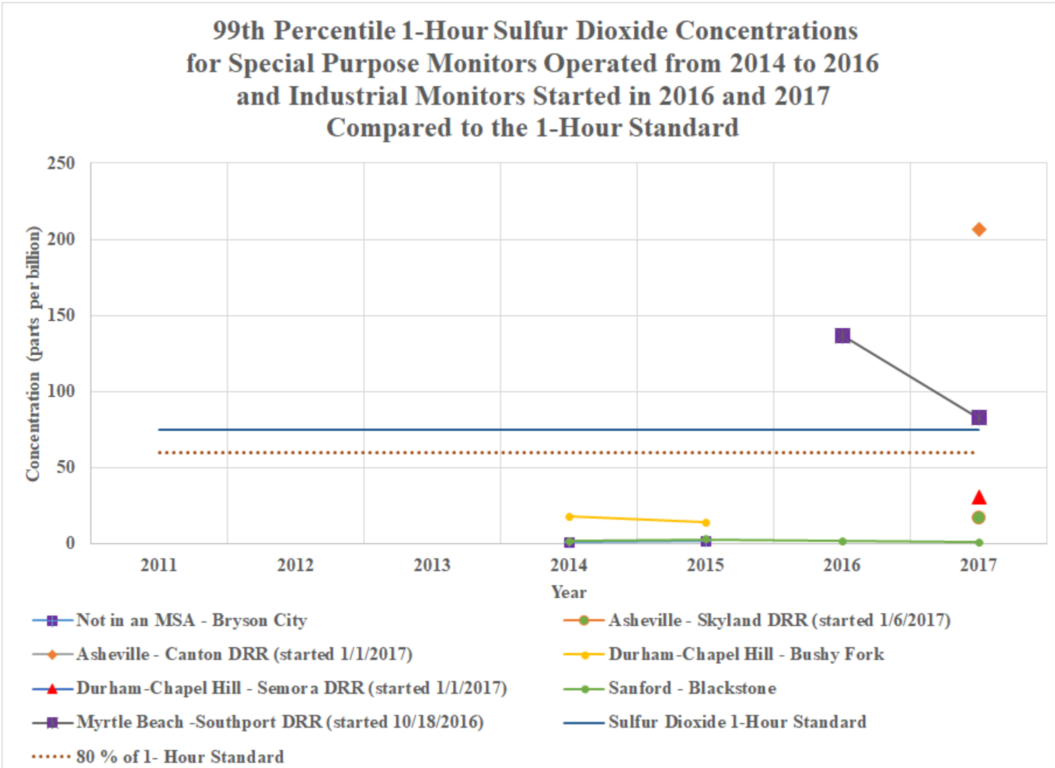

Figure 30. Sulfur Dioxide Concentrations at Special Purpose and Industrial Sites

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, also known as 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 these changes could improve the ability of DAQ to meet its obligation to provide relevant background SO_2 data for PSD modeling. In 2015, the DAQ decided to shut down the rotating PSD SO_2 monitor at Pittsboro. The DAQ no longer needed the monitor 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 31 shows the relative location of the two sites. The Bayview Ferry site began operating in January 2011.

Figure 31. Location of the Bayview Ferry Site, B, Relative to the Aurora Site, 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.[25] 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, or 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, or NEI, 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.

The SO_2 monitoring site required because 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.

[25] Primary National Ambient Air Quality Standard for Sulfur Dioxide, Final Rule, Federal Register, Vol. 75, No. 119, June 22, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/so2/fr/20100622.pdf, accessed on May 13, 2017.

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.

In December 2016, the EPA released version 1 of the 2014 NEI.[26] The DAQ calculated new PWEI values for each MSA using the 2014 NEI and 2017 population estimates.[27] Table 8 presents the newest PWEI values using the 2014 NEI and 2017 population estimates. Due to drastically lower emissions in the Wilmington area, the Wilmington PWEI monitor is no longer required and DAQ shut down the monitor at the end of 2017. However, the Winston-Salem MSA is now required to have a PWEI monitor. Figure 32 shows the locations of the three required PWEI sulfur dioxide monitoring sites based on the 2014 NEI and 2017 population estimates.

Table 8. Population-Weighted Emission Indices Using the 2014 National Emissions Inventory and 2017 Population Estimates for North Carolina Metropolitan Statistical Areas

Metropolitan Statistical Area [a]	SO_2 Emissions, tons [b]	Estimated Population, July 1, 2017	Population Weighted Emission Index	Number of SO_2 Monitors Required
Asheville	9,260.05	456,145	4,223.93	0
Burlington	98.64	162,391	16.02	0
Charlotte-Gastonia-Concord	7,624.02	2,525,305	19,252.98	1
Durham Chapel Hill	21,473.57	567,428	12,184.70	1
Fayetteville	377.73	386,662	146.05	0
Goldsboro	136.72	124,172	16.98	0
Greensboro-High Point	914.49	761,184	696.10	0
Greenville	134.05	179,042	24.00	0
Hickory	6,515.13	366,534	2,388.02	0
Jacksonville	1,120.84	193,893	217.32	0
Myrtle Beach-Conway-North Myrtle Beach	4,836.85	464,165	2,245.10	0
New Bern	1,383.04	124,864	172.69	0
Raleigh	797.44	1,335,079	1,064.65	0
Rocky Mount	164.93	146,738	24.20	0
Virginia Beach-Norfolk-Newport News	25,045.32	1,725,246	43,209.34	1
Wilmington	732.89	288,156	211.19	0

[26] 2014 National Emission Inventory, Version 1, All Sectors: National-County/Tribe aggregated, Released December 2016, available on the world wide web at https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data. Accessed Jan. 4, 2017.
[27] Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016, U.S. Census Bureau, Population Division, Released March 23, 2017, available on the world wide web at http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.

Table 8. Population-Weighted Emission Indices Using the 2014 National Emissions Inventory and 2017 Population Estimates for North Carolina Metropolitan Statistical Areas

Metropolitan Statistical Area [a]	SO_2 Emissions, tons [b]	Estimated Population, July 1, 2017	Population Weighted Emission Index	Number of SO_2 Monitors Required
Winston-Salem	8,101.27	667,733	5,409.49	1

[a] 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 https://obamawhitehouse.archives.gov/sites/default/files/omb/bulletins/2013/b13-01.pdf, accessed May 18, 2017.

[b] Source: 2014 National Emission Inventory, Version 1, All Sectors: National-County/Tribe aggregated, Released December 2016, available on the world wide web at https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data. Accessed Jan. 4, 2017.

[c] Source: Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2017, U.S. Census Bureau, Population Division, Released March 22, 2018, available on the world wide web at https://www.census.gov/data/tables/2017/demo/popest/total-metro-and-micro-statistical-areas.html.

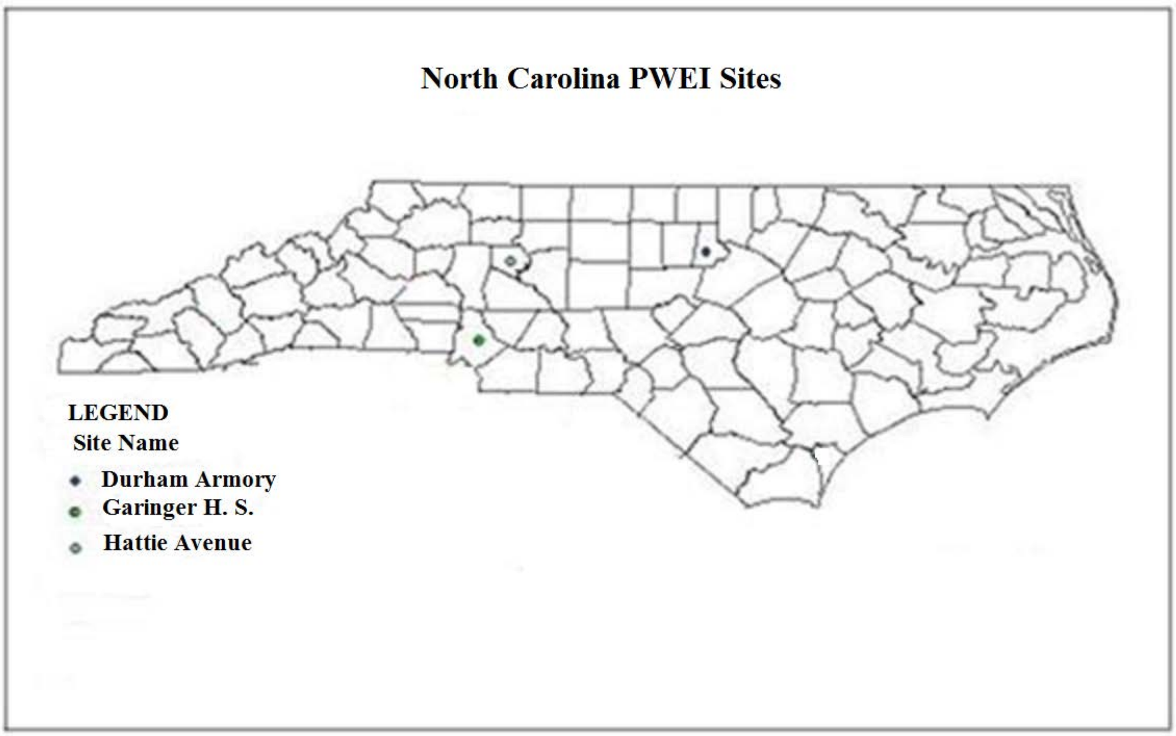

Figure 32. Location of North Carolina PWEI monitors

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.

EPA Region 4 approved these locations in 2011.[28]

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 DAQ wrote the network plan, the EPA developed revised PWEI lists, which no longer included required PWEI monitors for those three areas. Thus, the DAQ did not add PWEI monitors to the Waynesville Elementary School, Mendenhall School and Hickory sites and the EPA approved the revised 2013 network plan, reflecting a smaller PWEI network.[29]

A. Temporary Special Purpose Background Monitors

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 considered. 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. The DAQ had not collected background sulfur dioxide data 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 15, 2016, the DAQ submitted to the EPA documentation specifying the compliance path, modeling or monitoring, for each of the affected facilities.

The DAQ is using ambient monitoring to characterize air quality for the following facilities:

- Duke Energy Progress, Roxboro Plant, Facility ID 7300029;
- Duke Energy Progress, Asheville Plant, Facility ID 37-021-00628;

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[28] 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.

[29] 2013 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p5, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=4424.

- Blue Ridge Paper Products, Canton Mill, also known as Evergreen, Facility ID 4400159;
- PCS Phosphate Company, Inc. – Aurora, Facility ID 0700071; and
- CPI USA North Carolina – Southport Plant, Facility ID 1000067.

DAQ established a single SO_2 monitor at each of these facilities. Specific details for each facility are included in Volume 2, Site Descriptions by Division of Air Quality Regional Office and Metropolitan Statistical Area:

- D. The Raleigh Monitoring Region, Appendix D-3. Duke Energy Roxboro Siting Analysis and Additional Site Information;
- A. The Asheville Monitoring Region, Appendix A-3. Duke Progress Energy Skyland Siting Analysis and Additional Site Information;
- A. The Asheville Monitoring Region, Appendix A-4. Evergreen Packaging Canton Siting Analysis and Additional Site Information;
- F. The Washington Monitoring Region, Appendix F-3. PCS Phosphate, Inc. – Aurora Siting Analysis and Additional Site Information; and
- G. The Wilmington Monitoring Region, Appendix G-3. CPI Southport Siting Analysis and Additional Site Information.

Note that:

- Duke Energy operates the monitor at Roxboro and Asheville as part of DAQ's primary quality assurance organization, or PQAO. Duke provides full access to all data on an hourly basis for reporting to AIRNow and DAQ's real-time website; Duke quality assures, or QAs, the data on a daily and monthly basis. DAQ performs additional QA activities, including annual performance evaluations, technical system audits and annual certification of the data.
- DAQ operates the monitors at Evergreen's Canton mill, PCS Phosphate and CPI Southport.
- DAQ reports the data to AIRNow and EPA's Air Quality System and certifies data for all five monitors.

The rationale for the selection of the monitor location at three of the facilities follows. Full details are included in the Appendices listed above. Modeling input and output files for siting the monitors were provided to the EPA in 2016 outside of the network plan. A Region 4 representative visited each 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 Canton DRR site is located among a cluster containing seven of the top 10 ranked receptors and meets monitor siting criteria. This site has a clear view of the facility, has power nearby and is located on unoccupied state property where DAQ is 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 in an employee parking lot and may also be impacted by adjacent rail line and idling heavy-duty trucks.
- The main difference between the Canton DRR site and the alternatives is wind direction on a given day. All three are very close to the mill. The Canton DRR site is within the highest rated cluster.

<u>Duke's Roxboro plant,</u> 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 Semora DRR site (receptor #64 of +8,000) is immediately adjacent to the top 20 and within 300 meters of the #1 receptor.
- The Semora DRR site meets siting criteria, has an unobstructed view of the facility and the property owner agreed to a long-term presence (at least three years).

<u>PCS Phosphate Company, Inc. – Aurora,</u> Bayview Ferry

- 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 2 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 the 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 regarding 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 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 sulfur dioxide monitoring network in the Charlotte-Concord-Gastonia and Raleigh MSAs. 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 Greensboro, Winston-Salem and Fayetteville MSAs. 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 Durham MSA.

Table 12 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 Asheville and Hickory MSAs. Table 13 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 Myrtle Beach-Conway-North Myrtle Beach MSA. Table 14 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 areas outside of MSAs.

Table 9 The 2018-2019 Sulfur Dioxide Monitoring Network for the Charlotte-Concord-Gastonia and Raleigh MSAs [a]

AQS Site Id Number:	37-119-0041	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	SLAMS
Operating Schedule:	Hourly – every year	Hourly – every year
Statement of Purpose:	Compliance with the NAAQS; required monitor for NCore & PWEI.	Required monitor for NCore. SO_2 fine particle precursor monitoring. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	General/ background
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: EQSA-0486-060	Yes: EQSA-0486-060
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 TLE, Air Quality System, AQS, method code 560.
[b] Operated by Mecklenburg County Air Quality, AQS reporting agency 0669

Table 10 The 2018-2019 Sulfur Dioxide Monitoring Network for the Greensboro, Winston-Salem and Fayetteville MSAs [a]

AQS Site Id Number:	37-157-0099	37-067-0022[b]	37-051-0010 [b]
Site Name:	Bethany	Hattie Avenue	Honeycutt E.S.
Street Address:	6371 NC 65	1300 block of Hattie Avenue	4665 Lakewood Drive
City:	Bethany	Winston-Salem	Fayetteville
Latitude:	36.308889	36.110556	35.00
Longitude:	-79.859167	-80.226667	-78.99
MSA, CSA or CBSA represented:	Greensboro-High Point	Winston-Salem	Fayetteville
Monitor Type:	Special purpose	Other	Special purpose
Operating Schedule:	Hourly- every third year	Hourly- every year	Hourly- every third year
Statement of Purpose:	Industrial expansion monitoring for PSD modeling.	Compliance with the NAAQS; PWEI Monitor	Industrial expansion monitoring for PSD modeling.
Monitoring Objective:	General/ background	Population exposure	Population exposure
Scale:	Urban	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: EQSA-0486-060	Yes: EQSA-0486-060	Yes: EQSA-0486-060
Meets Requirements of Part 58 Appendix D:	No	Yes - PWEI	No
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Operated 4/1/2017 to 3/31/2018	None	Monitor will operate June 2018 to May 2019

[a] All 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 11 The 2018-2019 Sulfur Dioxide Monitoring Network for the Durham-Chapel Hill MSA

AQS Site Id Number:	37-063-0015 [a]	37-145-0004 [b]
Site Name:	Durham Armory	Semora DRR
Street Address:	801 Stadium Drive	Shore Drive Air Monitor, Roxboro Plant
City:	Durham	Semora
Latitude:	36.032944	36.489943
Longitude:	-78.905417	-79.058523
MSA, CSA or CBSA represented:	Durham-Chapel Hill	Durham-Chapel Hill
Monitor Type:	SLAMS	Industrial
Operating Schedule:	Hourly – every year	Hourly – every year
Statement of Purpose:	PWEI monitor for Durham-Chapel Hill MSA	Maximum concentration site near the Roxboro Plant. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Source oriented
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: EQSA-0486-060	Yes: EQSA-0486-060
Meets Requirements of Part 58 Appendix D:	Yes - PWEI	Yes – Data Requirements Rule
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	None

[a] Monitor uses an instrumental pulsed fluorescence method using a Thermo Electron 43i, Air Quality System, AQS, method code 060.
[b] Operated by Duke Progress Energy. Monitor uses an instrumental pulsed fluorescence method using a Thermo Electron 43i TLE, Air Quality System, AQS, method code 560.

Table 12 The 2018-2019 Sulfur Dioxide Monitoring Network for the Asheville and Hickory MSAs

AQS Site Id Number:	37-087-0013 [a]	37-021-0036 [b]	37-027-0003 [c]
Site Name:	Canton DRR	Skyland DRR	Lenoir
Street Address:	Pace Street, Evergreen Plant	Crestwood Drive Air Monitor, Asheville Plant	291 Nuway Circle
City:	Canton	Arden	Lenoir
Latitude:	35.534	35.481861	35.935833
Longitude:	-82.853	-82.509861	-81.530278
MSA, CSA or CBSA represented:	Asheville	Asheville	Hickory
Monitor Type:	Industrial	Industrial	Special purpose
Operating Schedule:	Hourly	Hourly – every year	Hourly – every third year
Statement of Purpose:	Maximum concentration site near the Evergreen Plant. Compliance w/NAAQS.	Maximum concentration site near the Duke Progress Energy Asheville Plant. Compliance w/NAAQS.	Industrial expansion monitoring for PSD modeling.
Monitoring Objective:	Source-oriented	Source-oriented	General/ background
Scale:	Middle	Neighborhood	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:	No – Data Requirements Rule	No – Data Requirements Rule	No
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None

[a] Monitor uses an instrumental pulsed fluorescence method using a Thermo Electron 43i TLE, Air Quality System, AQS, method code 560.
[b] Operated by Duke Progress Energy. Monitor uses an instrumental pulsed fluorescence method using a Thermo Electron 43i TLE, Air Quality System, AQS, method code 560.
[c] Monitors use an instrumental pulsed fluorescence method using a Thermo Electron 43i, Air Quality System, AQS, method code 060.

Table 13 The 2018-2019 Sulfur Dioxide Monitoring Network for the Myrtle Beach-Concord-North Myrtle Beach MSA

AQS Site Id Number:	37-019-0005
Site Name:	Southport DRR
Street Address:	5538 Rob Gandy Blvd SE
City:	Southport
Latitude:	33.942222
Longitude:	-78.019167
MSA, CSA or CBSA represented:	Myrtle Beach-Concord-North Myrtle Beach
Monitor Type:	Industrial
Operating Schedule:	Hourly – every year
Statement of Purpose:	Maximum concentration site near the CPI-Southport Plant. Compliance w/NAAQS.
Monitoring Objective:	Source-oriented
Scale:	Neighborhood
Suitable for Comparison to NAAQS:	Yes
Meets Requirements of Part 58 Appendix A:	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQSA-0486-060
Meets Requirements of Part 58 Appendix D:	Yes – Data Requirements Rule
Meets Requirements of Part 58 Appendix E:	Yes
Proposal to Move or Change:	Started Oct. 18, 2016

Monitor uses an instrumental pulsed fluorescence method using a Thermo Electron 43i TLE, Air Quality System, AQS, method code 560.

Table 14 The 2018-2019 Sulfur Dioxide Monitoring Network for areas outside MSAs [a]

AQS Site Id Number:	370130151 [b]	37-105-0002	37-117-0001
Site Name:	Bayview	Blackstone	Jamesville
Street Address:	229 NC Highway 306N	4110 Blackstone Drive	1210 Hayes Street
City:	Bath	Sanford	Jamesville
Latitude:	35.428	35.432500	35.810690
Longitude:	-76.74	-79.288700	-76.897820
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 Year-round	Hourly – every third year
Statement of Purpose:	Fence-line monitoring at PCS Phosphate facility to ensure compliance with the NAAQS	General/ background site for shale gas development study.	Industrial expansion monitoring for PSD modeling.
Monitoring Objective:	Source oriented	General/ background	Upwind/ background general/ background
Scale:	Neighborhood	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:	Yes: EQSA-0486-060	Yes: EQSA-0486-060	Yes: EQSA-0486-060
Meets Requirements of Part 58 Appendix D:	Yes – DRR monitor	No – not required	No – rotating PSD background monitor
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	Monitor will shut down 3rd quarter 2018	Monitor will operate 7/1/2019 to 6/30/2020

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

[b] This monitor is in Beaufort County on the fence line of the PCS Phosphate facility. It replaced the New Aurora Site, 370130007, which was dislocated by nearby current land clearing and future mining activities.

V. Ozone Monitoring Network

The North Carolina Division of Air Quality, or 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 could make strong arguments with the United States Environmental Protection Agency, or EPA, to prevent certain areas of the state from being designated as nonattainment and could develop effective state implementation plans. Data from previous years, as shown in Figure 33, indicate statewide-levels of ozone are below the 8-hour standard established by the EPA in 2015.

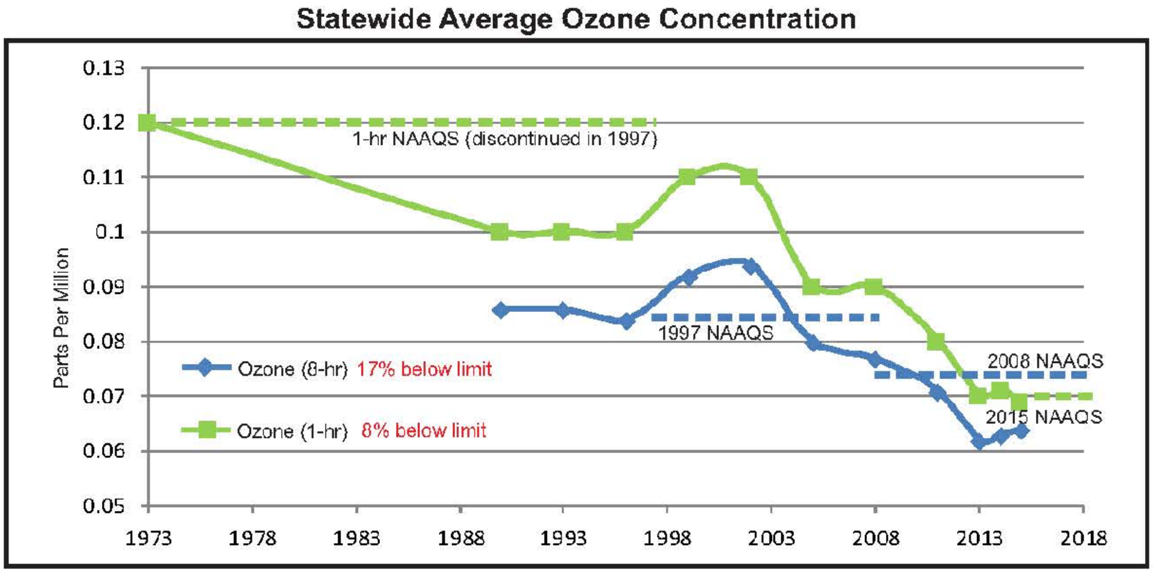

Figure 33. Statewide trends for ozone
(from *Air Quality Trends in North Carolina* located at https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/Air_Quality_Trends_in_North_Carolina.pdf)

A. Analysis of Existing Monitors

1. Analysis of Measured Concentrations Compared to NAAQS

Figure 34 through Figure 39 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. Currently 27 of the 34 monitors operated by the state and local programs in 2016 have met an 8-hour ozone design value of 0.070 parts per million for the past five years. These monitors are in:

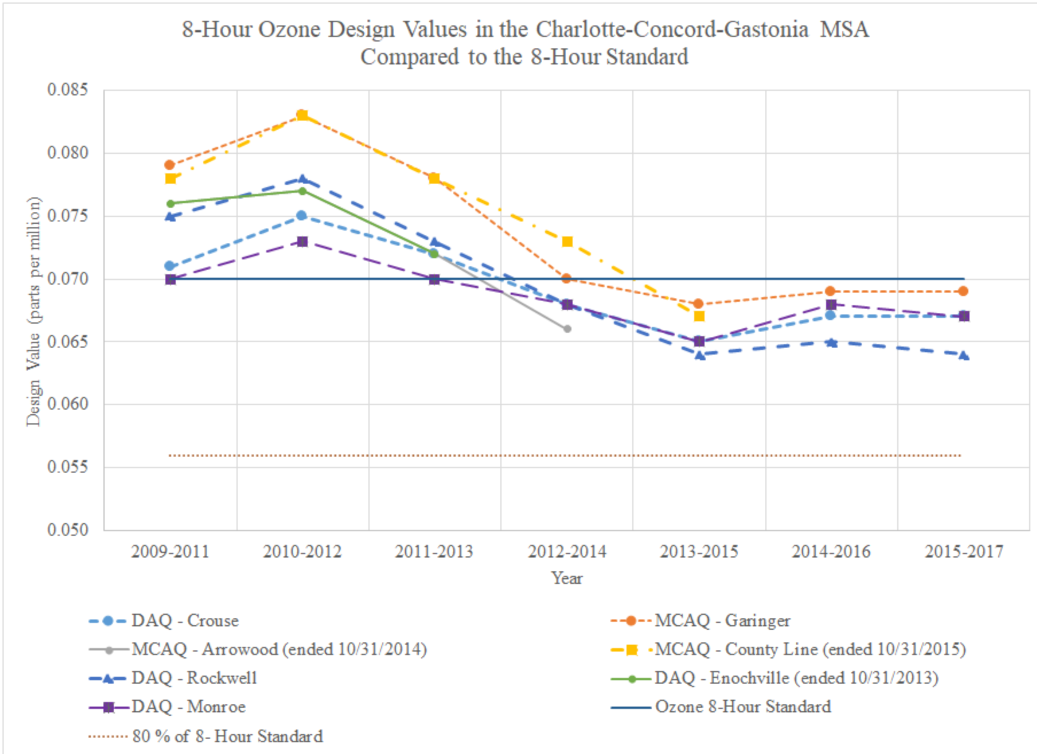

Figure 34. Ozone design values in the Charlotte-Concord-Gastonia MSA

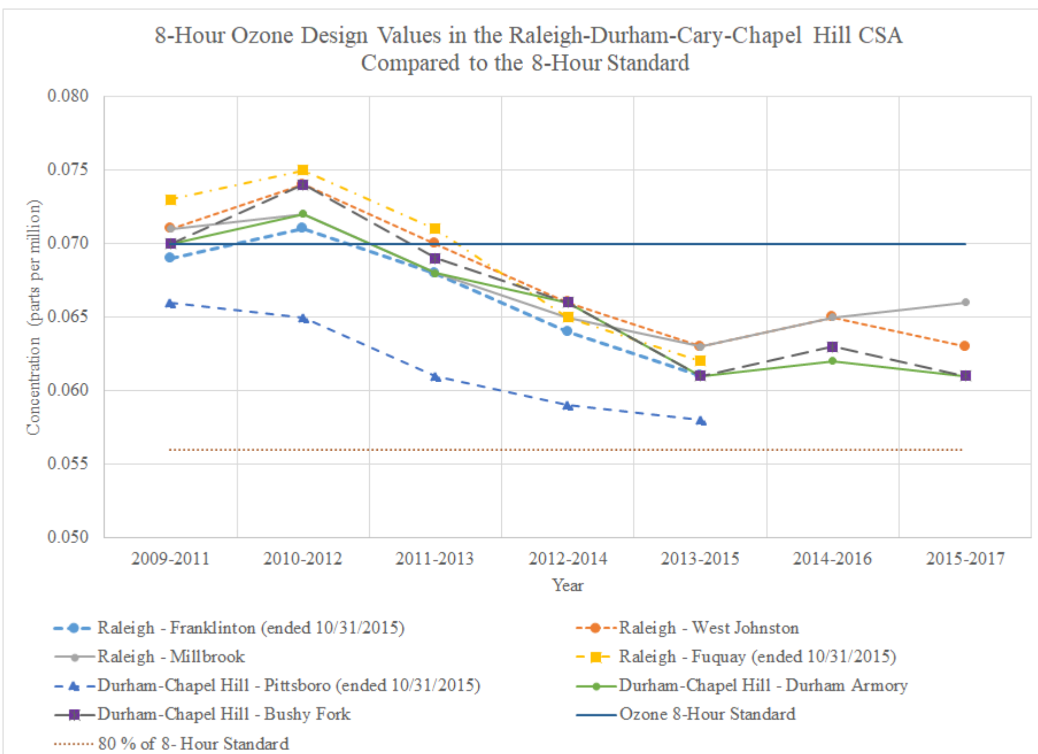

Figure 35. Ozone design values in the Raleigh and Durham-Chapel Hill MSAs

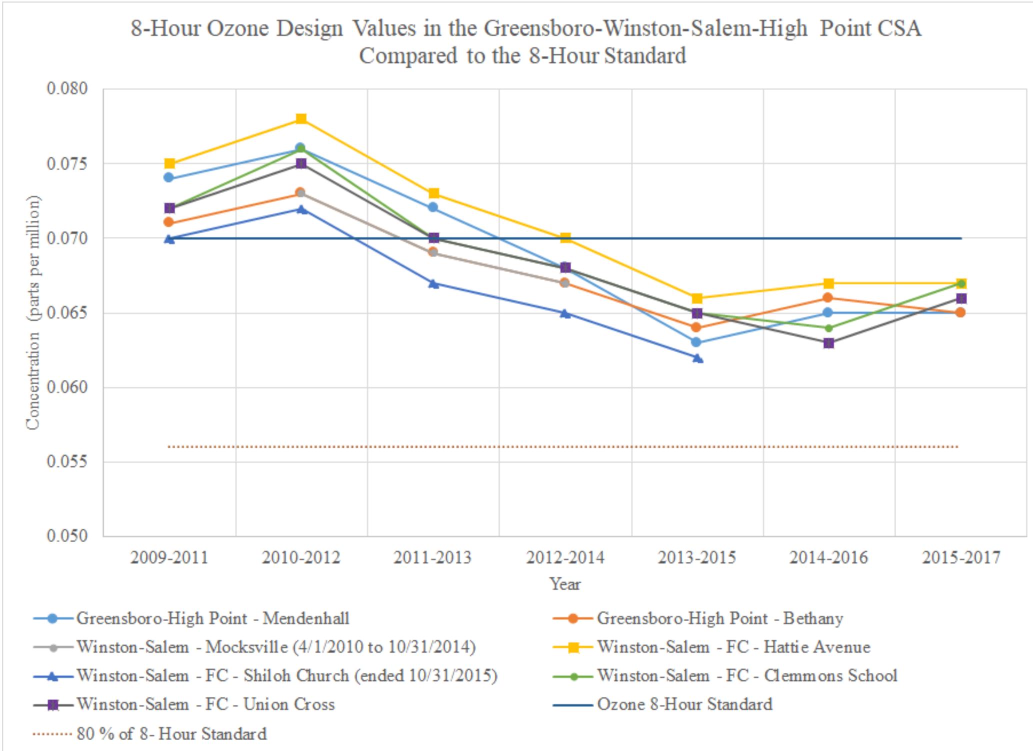

Figure 36. Ozone design values for the Greensboro-High Point and Winston-Salem MSAs

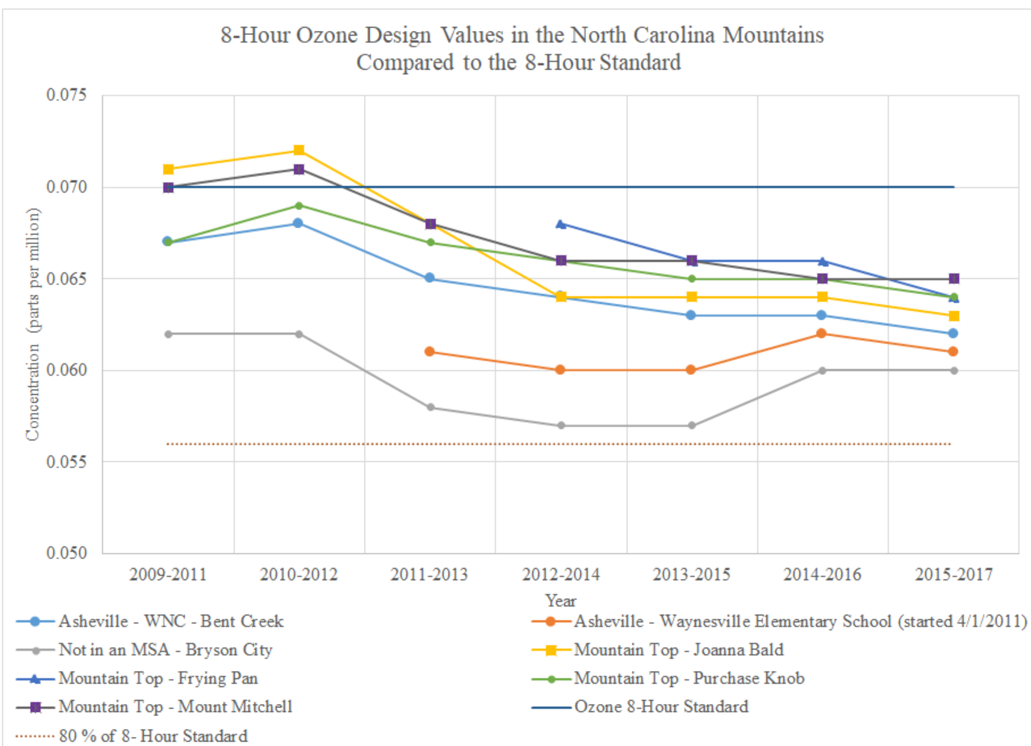

Figure 37. Ozone design values for the Asheville MSA and North Carolina mountains

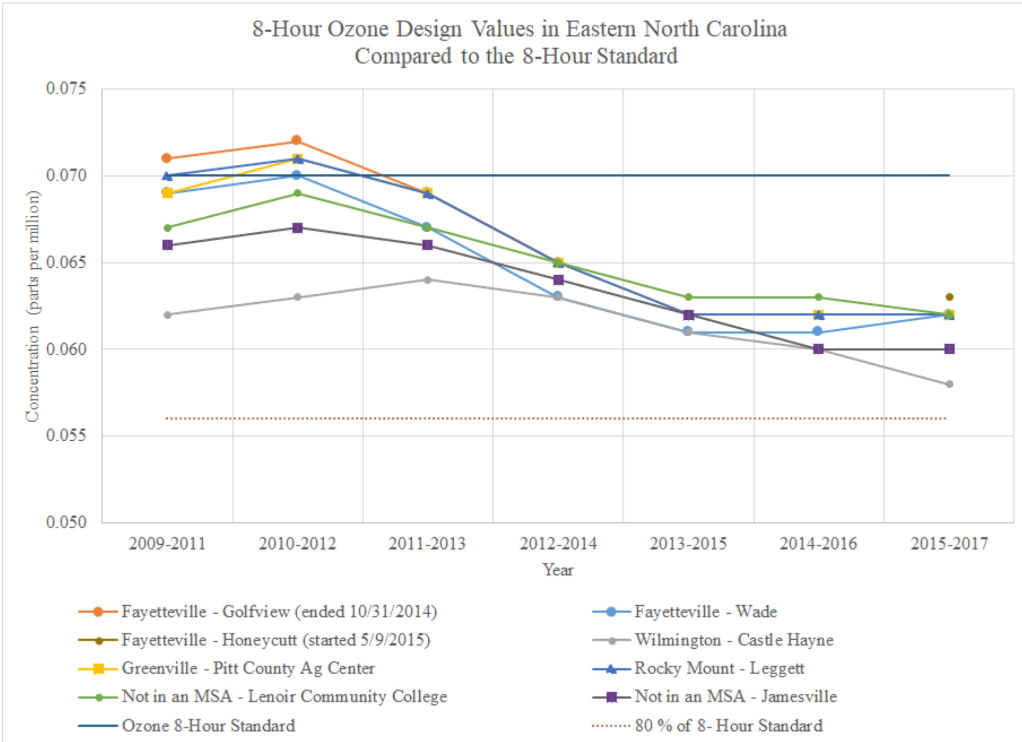

Figure 38. Ozone design values in the Fayetteville, Greenville, Rocky Mount and Wilmington MSAs and at other coastal sites

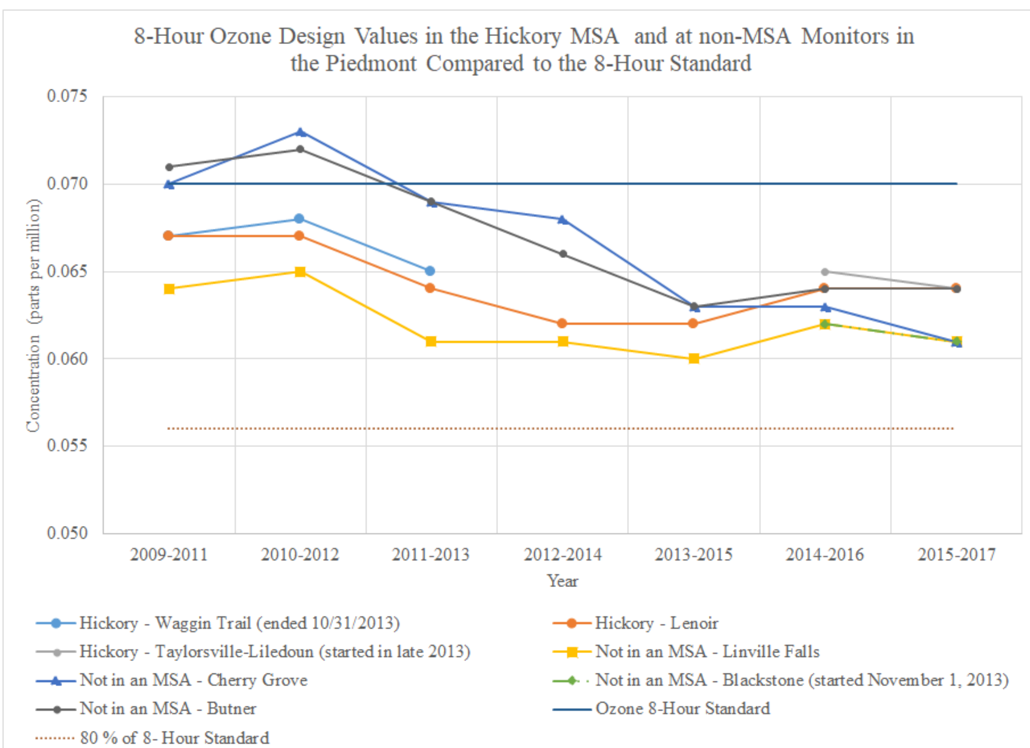

Figure 39. Ozone design values in the Hickory MSA and at other monitors in the piedmont area

- 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 Charlotte -Concord-Gastonia MSA – Monroe, 37-179-0003, in Union County;
- The Winston-Salem MSA – Clemmons School, 37-067-0030, and Union Cross, 37-067-1008, in Forsyth County;
- The Greensboro-High Point MSA- Bethany, 37-157-0099, in Rockingham County;
- The Durham-Chapel Hill MSA – Durham Armory, 37-063-0015, in Durham County and Bushy Fork, 37-145-0003, in Person County;
- The Raleigh MSA – West Johnston, 37-101-0002, in Johnston County and Millbrook, 37-183-0014, in Wake County;
- The Fayetteville MSA – Wade, 37-051-008 and Golfview 37-051-1003, replaced by Honeycutt, 37-051-0010, in Cumberland County;
- The Rocky Mount MSA – Leggett, 37-065-0099, in Edgecombe County;
- The Greenville MSA – Pitt County Agricultural Center, 37-147-0006, in Pitt County;
- The Wilmington MSA - Castle Hayne, 37-129-0002, in New Hanover County;
- Mountain Top Sites – Joanna Bald, 37-075-0001, in Graham County, Purchase Knob, 37-087-0036, and Frying Pan, 37-087-0035, in Haywood County, and Mount Mitchell, 37-199-0004, in Yancey County; and
- Valley, Piedmont and Coastal Sites not in MSAs: Bryson City, 37-173-0002, in Swain County; Cherry Grove, 37-033-0001, in Caswell County, Butner, 37-077-0001, in Granville County, Lenoir Community College, 37-107-0004, in Lenoir County; Jamesville, 37-117-0001, in Martin County; and Linville Falls, 37-011-0002, in Avery County.

None of these 27 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 years. Thus, DAQ does not propose to shut down any ozone monitors based on design values alone.

2. Analysis of Operating Monitors Compared to Appendix D Requirements

Other ozone monitors DAQ can consider 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 40. 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 40. 40 CFR 58 Appendix D Table D-2

Table 15 provides the 2017 estimated population for the MSAs in North Carolina, the design values for 2015-2017, the number of required monitors based on Appendix D and the number of current monitors operated by the DAQ and the local programs. Currently,

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

MSA	Population Estimate, 2017 [a]	2015-2017 Ozone 8-Hour Design Value (As percent of NAAQS) [b]	Number of Monitors operated in North Carolina	
			Required	Current
Charlotte-Concord- Gastonia	2,525,305	100	2	5 [c]
Virginia Beach-Norfolk-Newport News, VA-NC	1,725,246	93	2	0 [d]
Raleigh	1,335,079	94	2	2
Greensboro-High Point	761,184	93	2	2
Winston-Salem	667,733	96	2	3
Durham-Chapel Hill	567,428	87	2	2
Asheville	456,145	91	2	2
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	464,165	Estimated at 69	1	0 [e]
Fayetteville	386,662	90	2	2
Hickory-Lenoir-Morganton	366,534	91	2	2
Wilmington	288,156	83	0	1
Jacksonville	193,893	Not Available	0	0
Greenville	179,042	89	1	1
Burlington	162,391	Not Available	0	0
Rocky Mount	146,165	89	1	1

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

MSA	Population Estimate, 2017 [a]	2015-2017 Ozone 8-Hour Design Value (As percent of NAAQS) [b]	Number of Monitors operated in North Carolina	
			Required	Current
New Bern	124,864	Not Available	0	0
Goldsboro	124,172	Not Available	0	0

[a] Source: Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2017, U.S. Census Bureau, Population Division, Released March 22, 2018, available on the world wide web at https://www.census.gov/data/tables/2017/demo/popest/total-metro-and-micro-statistical-areas.html.
[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, which is equivalent to 100 percent, and below are 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 operates a monitor in Horry County, South Carolina, starting in July 2016.

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.[30]

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 DHEC started operating this monitor on July 27, 2016. The DAQ worked with DHEC to develop an appropriate monitoring agreement. Appendix G. Monitoring Agreement for the Myrtle Beach-Conway-North Myrtle Beach Metropolitan Statistical Area provides this monitoring agreement. 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 38, Castle Hayne's highest design value during the past five years was 64 ppb. The Castle Hayne monitor has never violated the ozone standard.

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

The DAQ evaluated each MSA where there are more monitors operating than what is required by the regulations. This evaluation determined if all 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, DAQ considered three monitors in this evaluation.

Monroe Middle School, 37-179-0003

Monroe Middle School, shown in Figure 41, 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 at any time in the future. Union County is one of the fastest growing counties in North Carolina and is one of the fastest growing counties in the nation. 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.

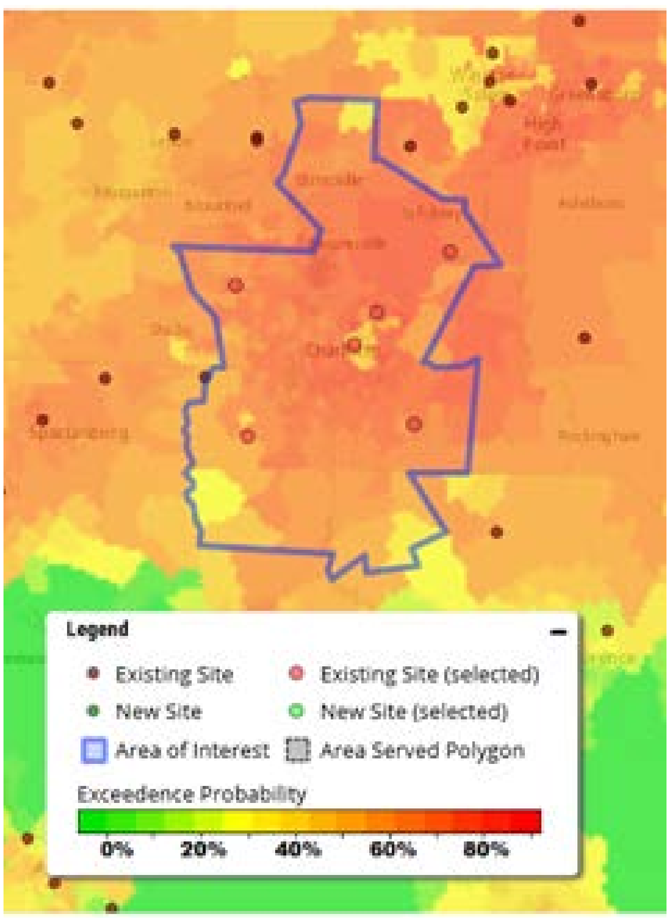

Figure 41. Ozone monitors in the Charlotte area

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.

Crouse, 37-109-0004

As shown in Figure 41, 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 in the future ever 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 41, 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 17 fastest growing counties in North Carolina listed in Table 1, nine of those counties do not have an ozone monitor.

1. Brunswick County

Brunswick County grew by 21.8 percent between April 1, 2010, and July 1, 2017. It is the 35th fastest growing county in the nation so far during this decade and it is the 35th fastest growing county in the nation during the past year. Growth in the Wilmington, North Carolina and North Myrtle Beach, South Carolina, areas impact Brunswick County. 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 42, 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 July 2016 established the Coastal Carolina monitoring site in the Myrtle Beach-Conway-North Myrtle Beach MSA.

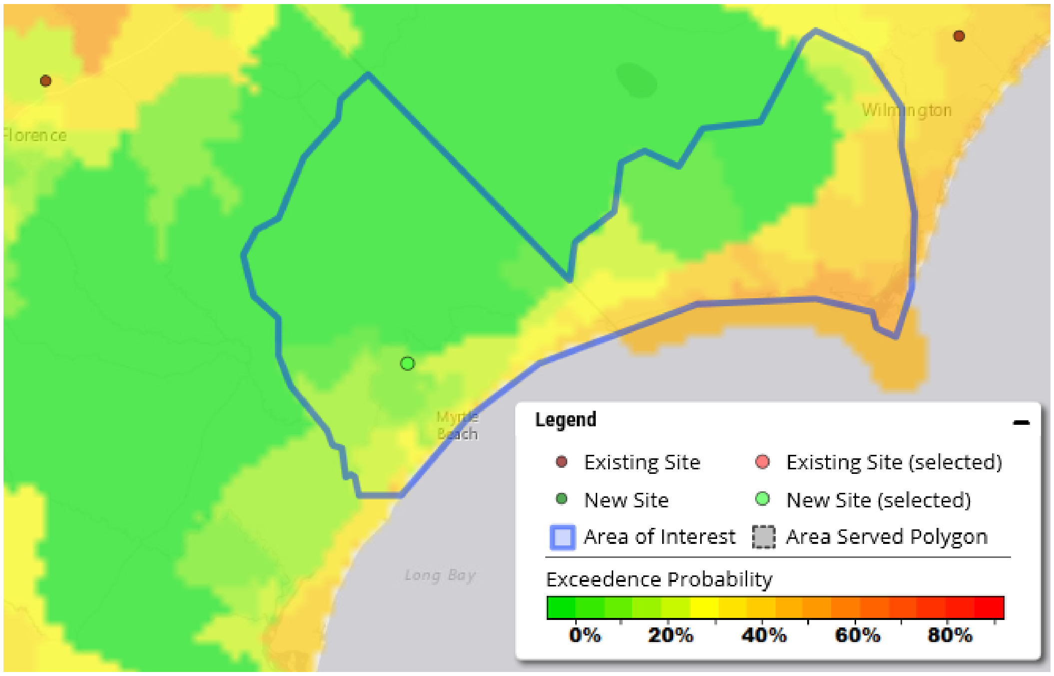

Figure 42. Probability of having one exceedance of the 70-ppb ozone standard in the Myrtle Beach-Conway-North Myrtle Beach MSA

2. Cabarrus County

Cabarrus County grew by 5,299 people or 2.6 percent between July 1, 2016, and July 1, 2017, according to census estimates. It is the 114th fastest growing county in the nation during the past year and the 83rd fastest growing county in the nation during the past decade, 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 41, 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 as likely as 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. Currently, DAQ has no plans to monitor for ozone there.

3. Chatham County

Chatham County grew by 1,648 people or 2.4 percent between July 1, 2016, and July 1, 2017, according to census estimates. It is the 163rd fastest growing county in the nation during the current decade 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 43, the ozone exceedance probability for Chatham County indicates that the probability of having one exceedance of the 70-ppb ozone standard in Chatham County is as likely as 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. Currently, DAQ has no plans to resume monitoring for ozone there.

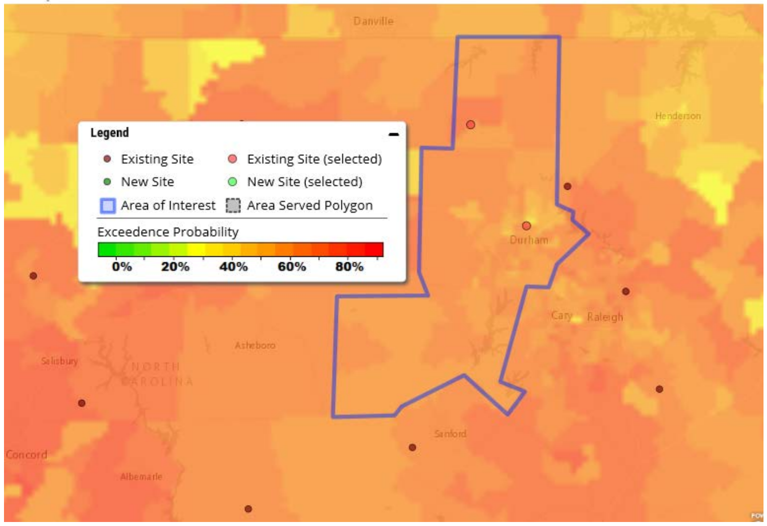

Figure 43. Probability of having one exceedance of the 70-ppb ozone standard in the Durham-Chapel Hill MSA.

4. Clay County

The Census Bureau estimates Clay County grew by 255 people or 2.4 percent between July 1, 2016, and July 1, 2017. It is the 7th fastest growing county in North Carolina during the past year percentagewise. As shown in Figure 43, Clay County is in the western part of the state and adjoins Georgia to the south. The closest monitors to Clay County are the Coweeta CASTNET monitor in Macon County, 37-113-9991, and Joanna Bald, 37-075-0001, in Graham County. The 2015-2017 ozone design value at Coweeta is 81 percent of the standard and the design value at Joanna Bald is 84 percent of the standard. The DAQ expects the ozone concentrations in Clay County to be equal to or lower than the ozone concentrations measured at the Macon and Joanna Bald monitors. Thus, these two existing monitors should adequately characterize the air quality in Clay County. Thus, DAQ has no plans to monitor for ozone there.

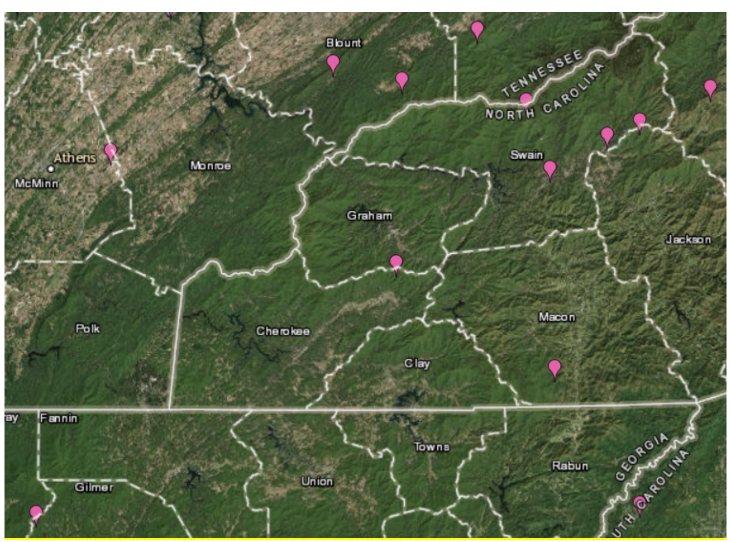

Figure 44. Ozone monitors near Clay County

(map is from https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=5f239fd3e72f424f98ef3d5def547eb5&extent=-146.2334,13.1913,-46.3896,56.5319.)

5. *Curritucк County*

The census bureau estimates Currituck County grew by 667 people or 2.6 percent between July 1, 2016, and July 1, 2017. It is the 117th fastest growing county in the nation during the past year percentagewise. Currituck County is in the Virginia Beach-Norfolk-Newport News MSA. Currently, the DAQ is required to operate two monitors in this MSA. As shown in Figure 43, VDEQ currently operates three ozone monitors in this MSA. The ozone exceedance probability for Currituck 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 one of these three monitors. Thus, the existing monitors should adequately characterize the air quality in Currituck County. DAQ has no plans to monitor for ozone there.

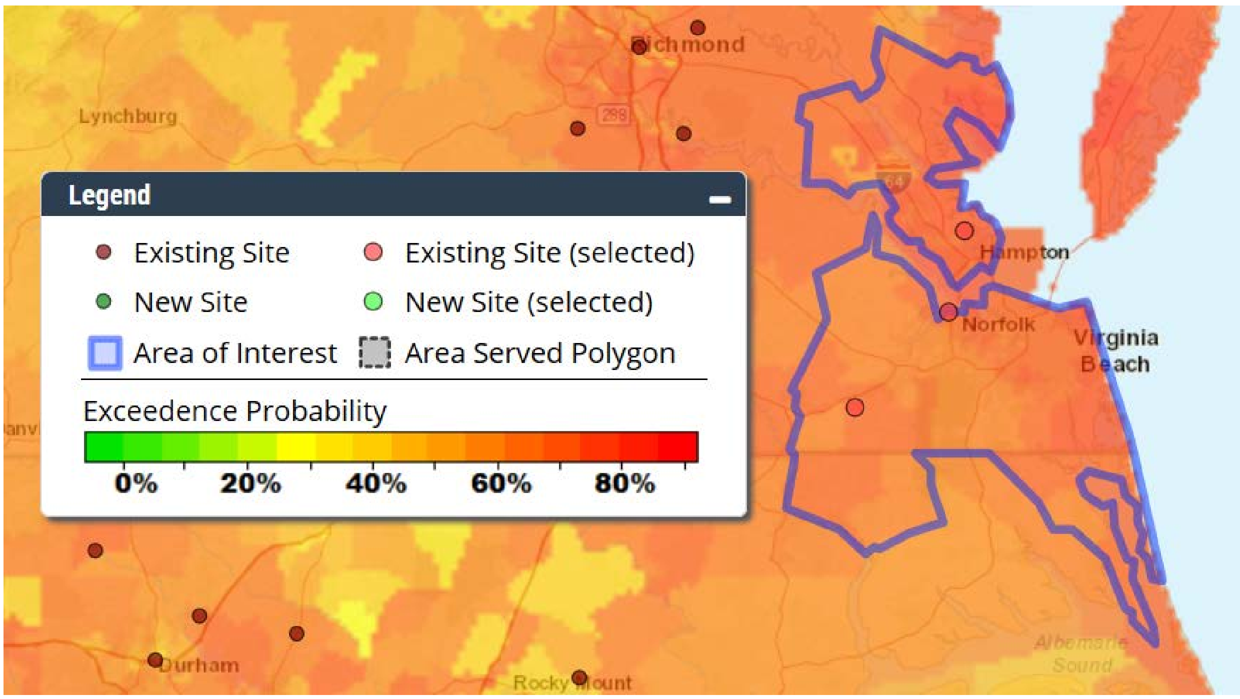

Figure 45. Probability of having one exceedance of the 70-ppb ozone standard in the Virginia Beach-Norfolk-Newport News MSA.

6. *Franklin County*

The census bureau estimates Franklin County to have grown by 768 people or 2.3 percent between July 1, 2016, and July 1, 2017. It is the 169th fastest growing county in the nation during the past year percentagewise. As shown in Figure 46, Franklin County is part of the Raleigh MSA. Currently, there are two monitors in the Raleigh MSA – Millbrook, 37-183-0014, and West Johnston, 37-101-0002. The 2015-2017 ozone design value for the Raleigh MSA is at 94 percent of the standard and EPA modeling projects it to be at 85 percent of the standard by 2020. The DAQ expects the ozone concentrations in Franklin County to be the same as or lower than the ozone concentrations measured at the two monitors in the MSA. Thus, the existing monitors should adequately characterize the air quality in Franklin County. Thus, DAQ has no plans to monitor for ozone there.

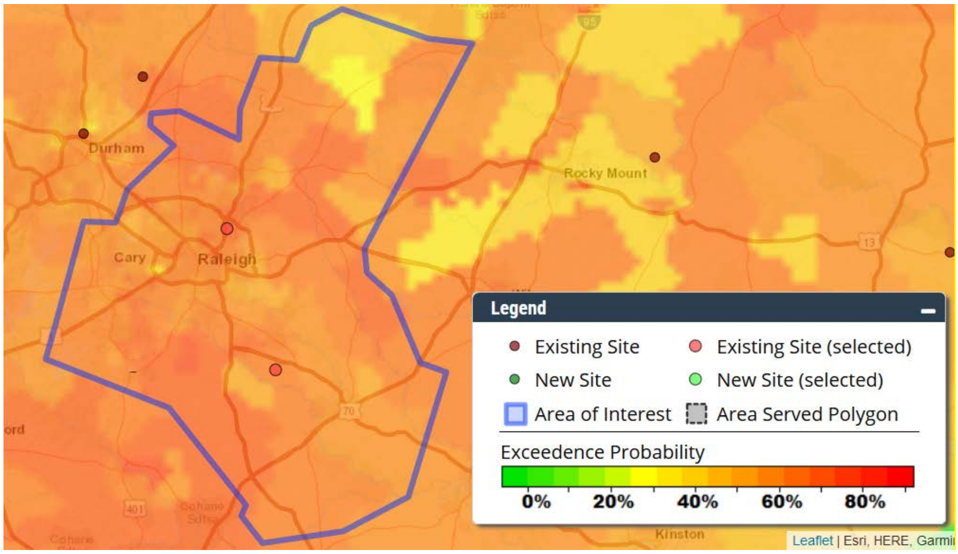

Figure 46. Ozone monitors in the Raleigh MSA

7. Harnett County

Harnett County grew by 15.8 percent between April 1, 2010, and July 1, 2017, according to census estimates. It is the 90th fastest growing county in the nation during this decade. 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 47, there are three ozone monitors surrounding Harnett County: West Johnston to the northeast, Wade to the south and Blackstone to the west. Also, Figure 47 indicates the probability for any area within the county to have one exceedance of the 70-ppb ozone standard is as likely as 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.

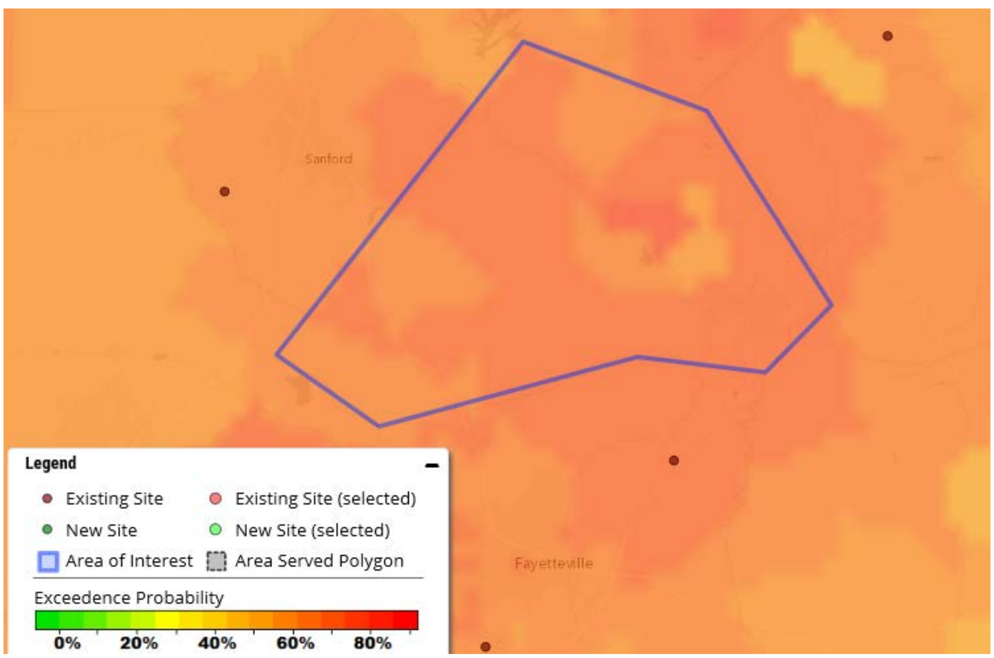

Figure 47. Ozone monitors surrounding Harnett County

8. Hoke County

Hoke County grew by 15.3 percent between April 1, 2010, and July 1, 2017, according to census estimates. It is the 95th 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, as shown in Figure 48, indicates 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 0.062 parts per million. Thus, the DAQ currently has no plans to monitor for ozone in Hoke County.

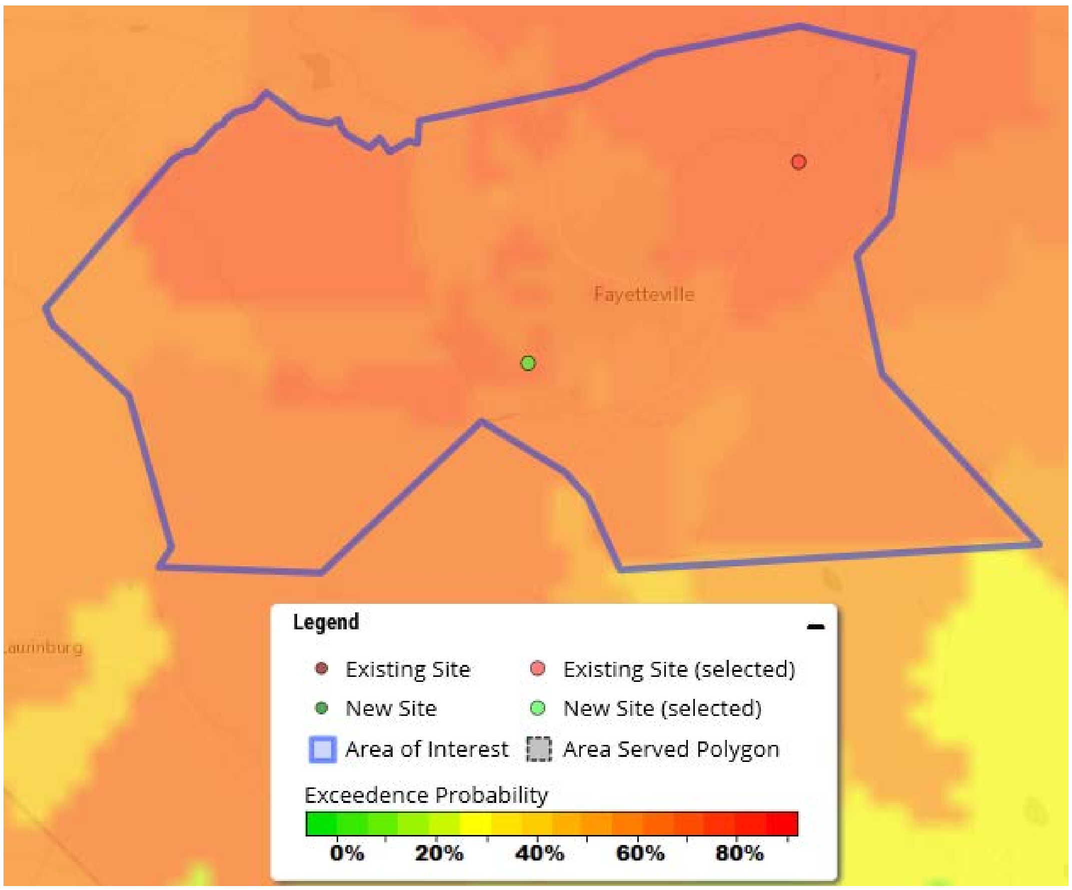

Figure 48. Probability of having one exceedance of the 70-ppb ozone standard in the Fayetteville MSA.

9. Pender County

Pender County grew by 2,061 people or 3.5 percent between July 1, 2016, and July 1, 2017, and is the 74th fastest growing county in the nation during this decade, percentagewise. Pender County is in the Wilmington MSA. Currently, the DAQ is not required to operate any ozone monitors in the MSA. However, the DAQ operates an ozone monitor at Castle Hayne in New Hanover County. The Castle Hayne monitor indicates the ozone concentrations on the coast are currently at 83 percent of the

NAAQS. The ozone exceedance probability for Pender County shown in Figure 49 indicates 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.

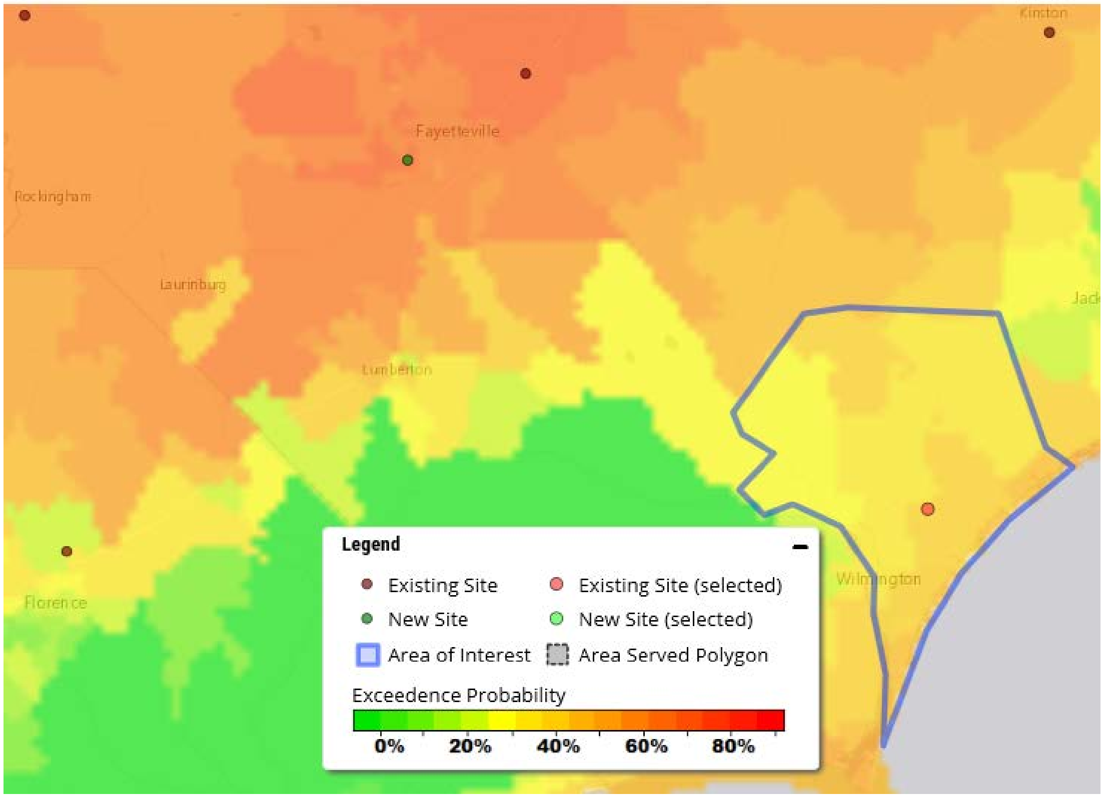

Figure 49. Probability of having one exceedance of the 70-ppb ozone standard in the Wilmington MSA

C. Changes to Existing Monitors

The DAQ plans to end ozone monitoring at the Blackstone site. See Appendix D. Blackstone Data Analysis for Shutting Down the Criteria Pollutant Monitors for additional details.

D. DAQ Recommendations

The DAQ recommends:

- Maintaining the current size of the network and all the currently operating sites, with the exception to the special purpose monitor at Blackstone;
- Not establishing any new ozone sites in 2018 or 2019; and
- After evaluating the data collected at the special purpose monitoring site in Lee County for baseline shale gas development monitoring, the DAQ determined the data collected from 2014 through 2016 met the objectives of the study. Based on

the results of the evaluation, DAQ recommends shutting down the site sometime in third quarter 2018 or no later than the end of the 2018 ozone season.

E. Network Description

Figure 50 shows the locations of the ozone monitors operating in 2018. Table 16 through Table 27 lists the locations, monitor type, operating schedules, monitoring objectives, scales, statement of purpose and any proposed change to the monitor or site. 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 these monitors use the EPA equivalent method designation EQOA-0880-047. All seasonal monitors operate on an hourly schedule from March 1 through Oct. 31 each year, except for the mountain top monitors, which will operate as soon after March 1 as the weather will allow through Oct. 31. The DAQ requested and received a waiver for the start of the monitoring season for the mountain top sites because authorities often close the roads going to the sites during February. Several of the monitors operate year-round.

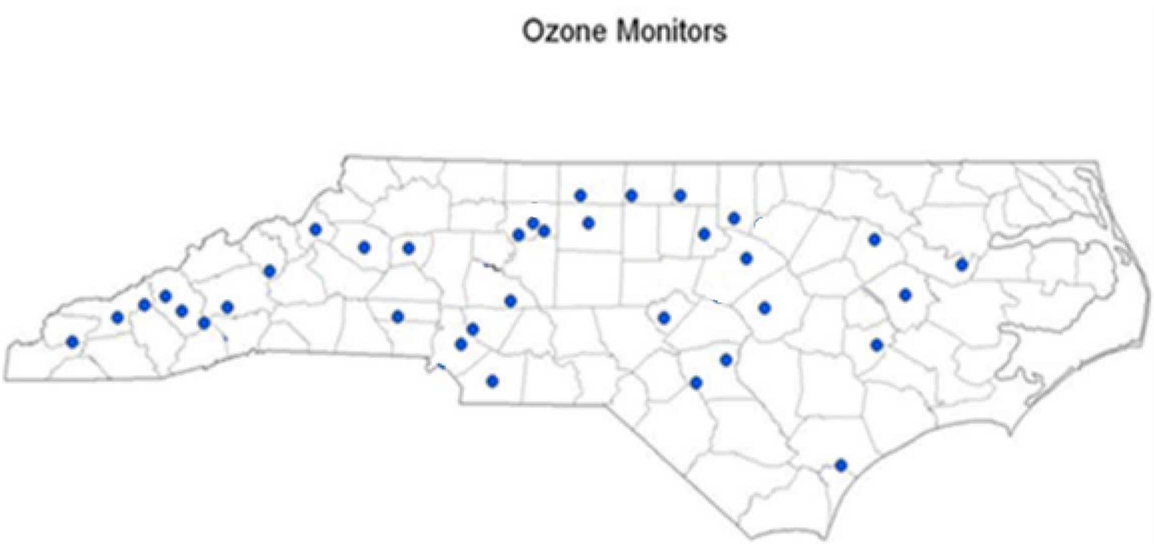

Figure 50. Location of 2018 ozone monitoring stations

Table 16 The 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; ozone precursor monitoring	AQI reporting. Compliance w/NAAQS.	Modeling; 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:	None	None	None	None	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] Operated by Mecklenburg County Air Quality, AQS primary quality assurance organization and reporting agency 0669

Table 17 The 2018-20189 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:	None	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 2018-2019 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 Greensboro-Winston-Salem-High-Point CSA	Maximum ozone concentration site downwind of the Winston-Salem MSA. Real-time AQI reporting for the Greensboro-Winston-Salem-High-Point CSA. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Highest concentration
Scale:	Urban	Urban

Table 18 The 2018-2019 Ozone Monitoring Network for the Greensboro-High Point MSA [a]

AQS Site Id Number:	37-081-0013	37-157-0099
Site Name:	Mendenhall	Bethany
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:	None	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 19 The 2018-2019 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; 3/1 to 10/31	Hourly; 3/1 to 10/31	Hourly; 3/1 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
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	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] Operated by Forsyth County Office of Environmental Assistance and Protection, AQS primary quality assurance organization and reporting agency 0403

Table 20 The 2018-2019 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. 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:	None	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 21 The 2018-2019 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 3/1 to 10/31	Hourly 3/1 to 10/31
Statement of Purpose:	Industrial expansion monitoring for PSD modeling. Real-time AQI reporting. Compliance with the NAAQS.	Low elevation, i.e., valley, site for Haywood County. Real-time AQI reporting. Modeling. Compliance w/NAAQS.

Table 21 The 2018-2019 Ozone Monitoring Network for the Asheville MSA [a]

AQS Site Id Number:	37-021-0030 [b]	37-087-0008
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:	None	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] Operated by Western North Carolina Regional Air Quality Agency, AQS reporting agency 0779.

Table 22 The 2018-2019 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 3/1 to 10/31	Hourly 3/1 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
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] 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 2018-2019 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 3/1 to 10/31	Hourly 3/1 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:	None	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 24 The 2018-2019 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	Hourly	Hourly

	3/1 to 10/31	3/1 to 10/31	3/1 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:	None	None	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 25 The 2018-2019 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, in the 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.

Table 25 The 2018-2019 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
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 Appendix D:	No	No	No	No
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	2018 ozone season will start when weather allows	2018 ozone season will start when weather allows	2018 ozone season will start when weather allows	2018 ozone season will start when weather allows

[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 2018-2019 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

Table 26 The 2018-2019 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
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 3/1 to 10/31	Hourly 3/1 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 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 Appendix D:	No	No	No	No
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None	Monitor will end in 2018

[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 2018-2019 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 Building, 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 3/1 to 10/31	Hourly 3/1 to 10/31	Hourly 3/1 to 10/31
Statement of Purpose:	Compliance w/NAAQS.	Compliance w/NAAQS.	Regional transport and general background site. Low elevation, i.e. valley, mountain site on the NC side of the GSMNP. Modeling. Forecasting. Compliance w/NAAQS.
Monitoring Objective:	General/ background	General/ background	General/ background
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: 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:	None	None	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.

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

The North Carolina Division of Air Quality, or DAQ, monitors for particles of 10 micrometers or less aerodynamic diameter, PM_{10}, in North Carolina at six sites and the local programs operate PM_{10} monitors at four sites. Analysts and modelers use these data to determine human health effect exposures in metropolitan statistical areas, also known as MSAs, with over 500,000 people and to collect background levels for prevention of significant deterioration, also known as PSD. The DAQ also uses PM_{10} as a surrogate for PSD modeling for the state standard for total suspended particulates, also known as TSP. Data from previous years, as shown in Figure 51, indicate statewide levels of PM_{10} are well below the 24-hour standard.

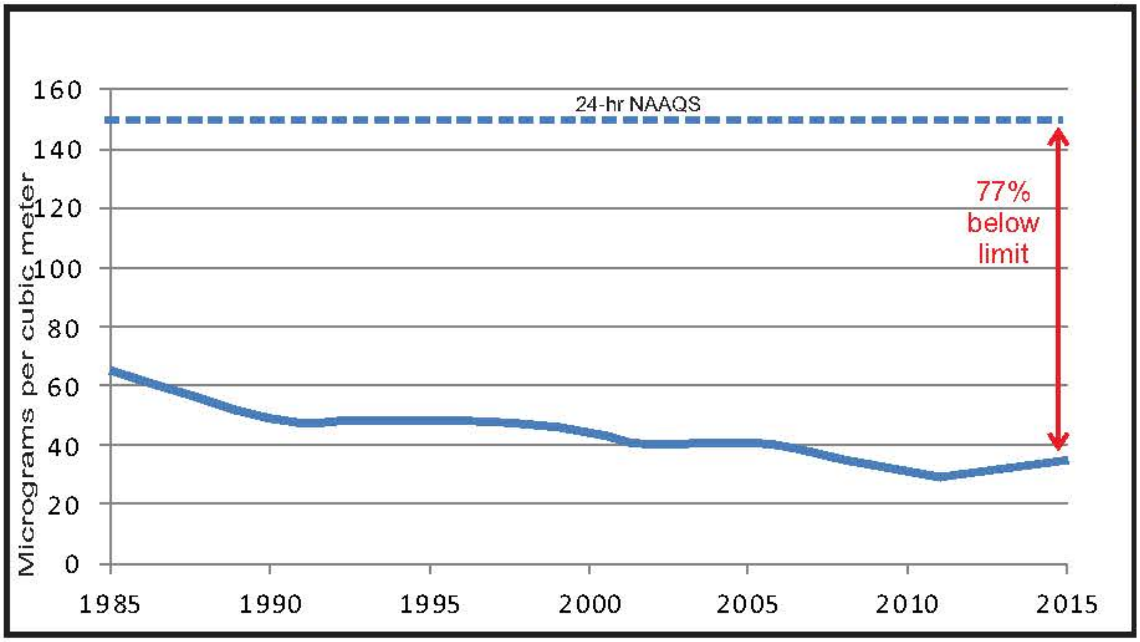

Figure 51. Statewide trends for PM_{10}
(from *Air Quality Trends in North Carolina* located at https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/Air_Quality_Trends_in_North_Carolina.pdf)

Figure 52 through Figure 54 provide the highest PM_{10} concentrations measured in North Carolina for the past seven 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 operating agency can shut down the monitor. 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 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 55 and those used to provide background data for PSD modeling.

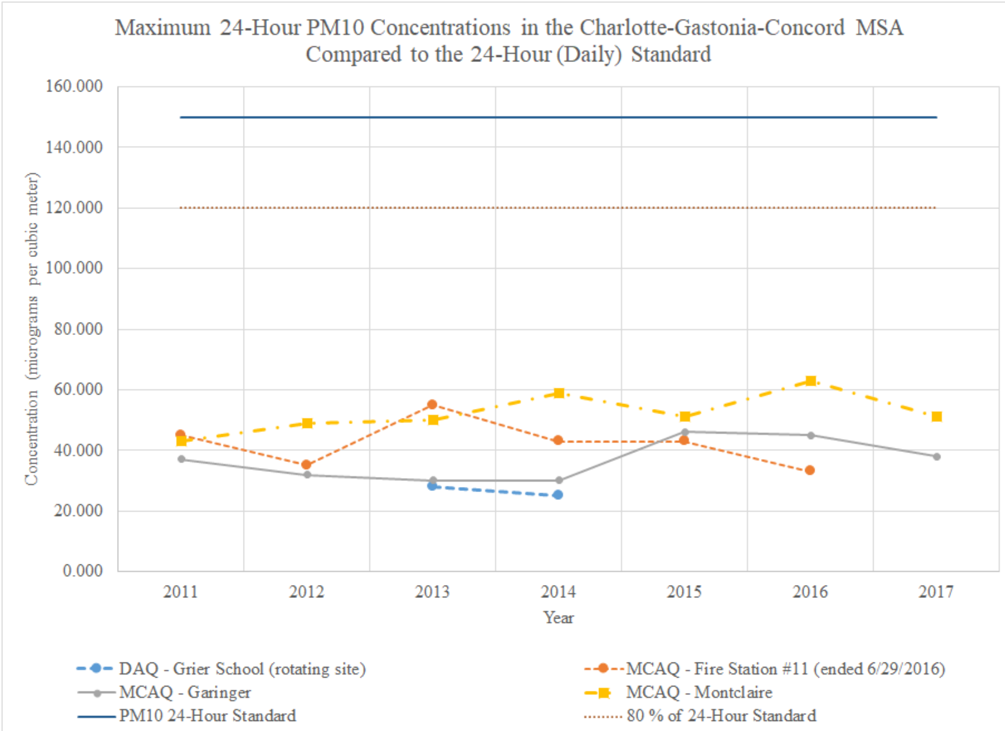

Figure 52. Maximum 24-hour PM10 concentration in the Charlotte -Concord-Gastonia MSA

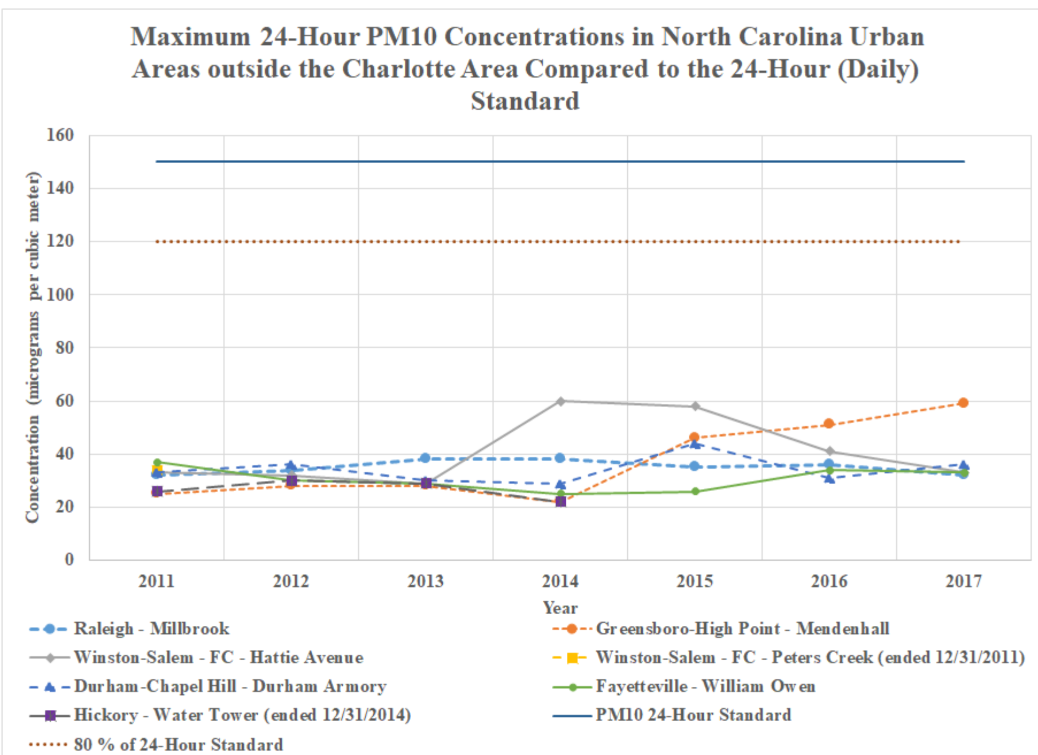

Figure 53. Maximum 24-hour PM10 concentrations in North Carolina urban areas

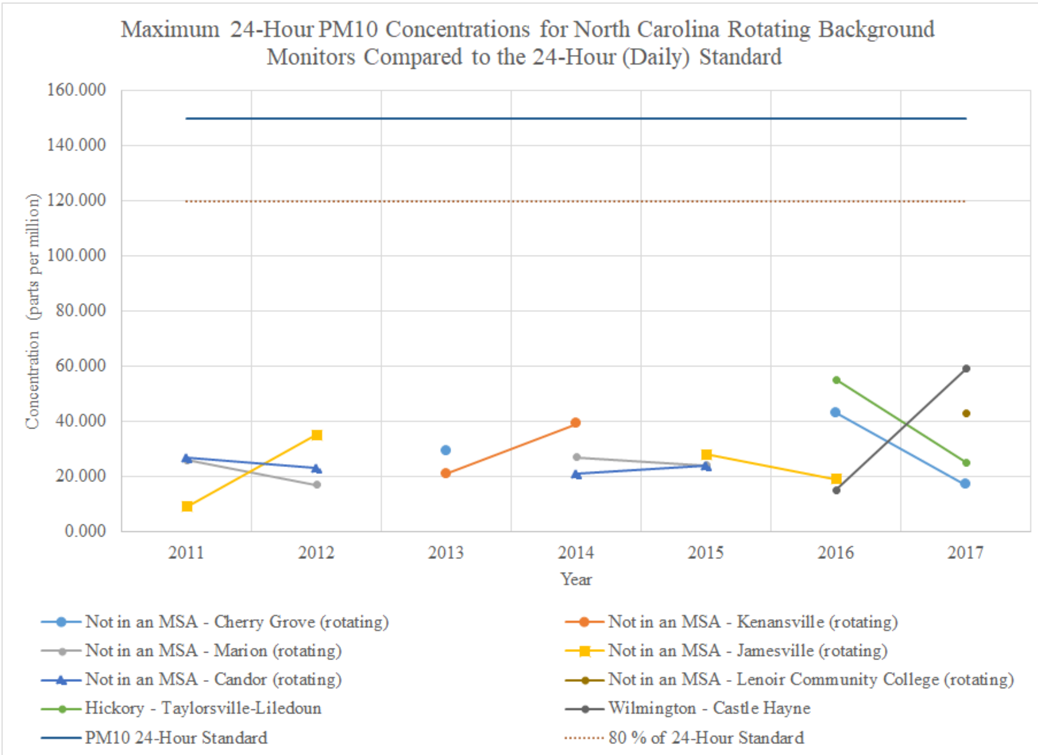

Figure 54. Maximum PM10 concentrations for rotating background monitors in North Carolina

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 55. Table D-4 from 40 CFR 58 Appendix D

The 2017 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 2017 estimated total population for the MSAs in North Carolina, the maximum ambient daily concentration values as percentage of the NAAQS for 2017, 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.[31]

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

MSA	Population Estimate, 2017 [a]	2017 PM_{10} 24-Hour Maximum Ambient Concentration, as percent of NAAQS	Number of Monitors operated in North Carolina	
			Required [b]	Current
Charlotte-Concord-Gastonia	2,525,305	34	2-4	2
Virginia Beach-Norfolk-New Port News, VA-NC	1,725,246	14	2-4	0 [c]
Raleigh	1,335,079	21	2-4	1[d]
Greensboro-High Point	761,184	39	1-2	1
Winston-Salem	667,733	22	1-2	1
Durham-Chapel Hill	567,428	24	1-2	1
Asheville	456,145	20 [e]	0-1	0
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	464,165	Not Available	0-1	0
Fayetteville	386,662	22	0-1	1
Hickory	366,534	17	0-1	rotating
Wilmington	288,156	39	0-1	rotating
Jacksonville	193,893	25 [f]	0	0
Greenville	179,042	Not Available	0	0
Burlington	162,391	Not Available	0	0
Rocky Mount	146,165	30 [g]	0	0
New Bern	124,864	Not Available	0	0
Goldsboro	124,172	21 [f]	0	0

[a] Source: Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2017, U.S. Census Bureau, Population Division, Released March 22, 2018, available on the world wide web at https://www.census.gov/data/tables/2017/demo/popest/total-metro-and-micro-statistical-areas.html.

[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 2007

[g] PM_{10} 24-hour maximum ambient concentration is from 2006

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

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 when an exceptional event on June 12, 2008, impacted the existing monitor.

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 DAQ uses the data from the William Owen monitor for PSD modeling so the DAQ will continue operating this monitor. The DAQ shut down the PM_{10} monitor at Hickory 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.

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 DAQ replaced the rotating PM_{10} monitor at Grier School with a rotating PM_{10} monitor at the Taylorsville Liledoun site. Likewise, when DAQ shut down the Marion and Kenansville particle monitoring sites, the DAQ moved the rotating PM_{10} monitors at those sites to the Lenoir Community College, LCC, site in Kinston and the Castle Hayne site in Wilmington. Thus, the six PM_{10} rotating background sites are:

- Candor and LCC, operated from May 2017 through April 2018;
- Jamesville operating from June 2018 through May 2019;
- Cherry Grove and Taylorsville Liledoun, which operated from April 2016 through March 2017 and will operate again July 2020 through June 2021 and
- Castle Hayne, operated from November 2016 until the end of October 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 one coarse particle optical monitor. By mid-January 2016, the DAQ had converted all manual PM_{10} high volume samplers to continuous PM_{10} low volume samplers.

Also, Mecklenburg County Air Quality, MCAQ, and DAQ became separate primary quality assurance organizations, PQAOs, in March 2015. The MCAQ operated the collocated low-volume PM_{10} monitor for the PQAO. Since MCAQ and the DAQ became separate PQAOs, the DAQ added a collocated low volume PM_{10} monitor at Millbrook starting Jan. 1, 2015. In 2017, the DAQ converted the low volume intermittent PM_{10} monitor at Millbrook to a continuous low-volume PM_{10} monitor at the end of first quarter. The DAQ moved the collocated low-volume PM_{10} monitor to Castle Hayne at that time where it operated until the DAQ shut down the low-volume PM10 monitors at the end of October.

Figure 56 provides the locations of the current and rotating PM_{10}-monitoring sites. 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 monitors meet the requirements of Appendices A, C and E of 40 CFR 58. All monitors operate year-round.

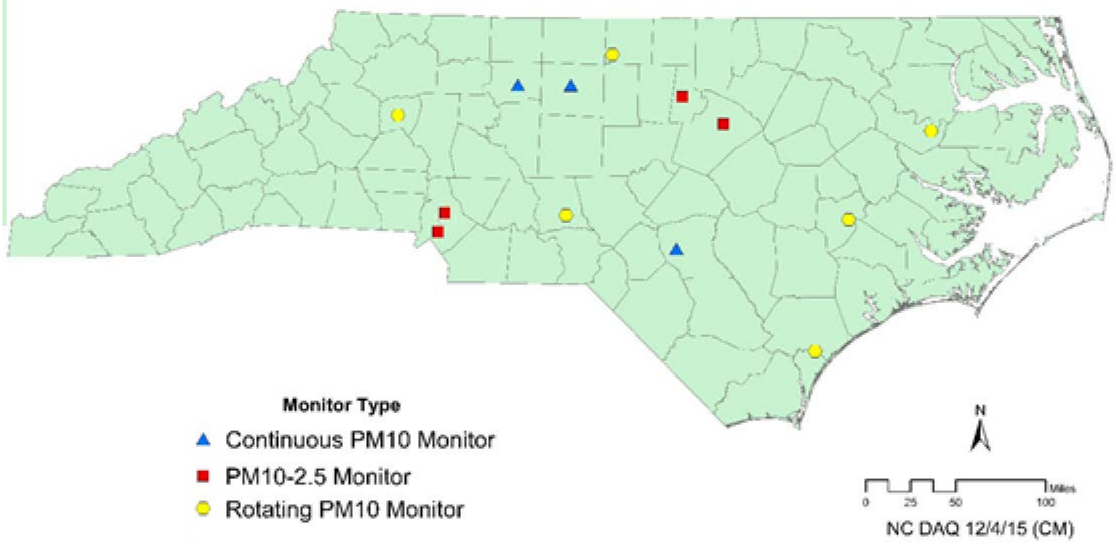

Figure 56. 2018-2019 PM_{10} Monitor Locations

Table 29 PM_{10} Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041 [d]	371190042 [c, d]
Site Name:	Garinger	Montclaire
Street Address:	1130 Eastway Drive	1935 Emerywood Drive
City:	Charlotte	Charlotte
Latitude:	35.2401	35.151283
Longitude:	-80.7857	-80.866983
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS / NCore	SLAMS
Operating Schedule:	Hourly	Hourly
Statement of Purpose:	Required by Appendix D for NCore sites. 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:	Yes: EQPM-0798-122	Yes: EQPM-0798-122

Table 29 PM_{10} Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041 [d]	371190042 [c, d]
Site Name:	Garinger	Montclaire
Meets Requirements of Part 58 Appendix D:	Yes - NCore	Yes
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	None	None

Table 30 PM_{10} Monitoring Network for the Raleigh-Durham-Cary CSA [a]

AQS Site Id Number:	37-063-0015	37-183-0014
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	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
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: EQPM-0798-122	Yes: EQPM-0798-122
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	Monitoring method will change

[a] Both monitors are a Met One 1020 beta attenuation monitor, Air Quality System, AQS, method code 122. It uses the EPA equivalent method designation EQPM-0798-122. The DAQ is also evaluating a Teledyne T640X monitor at Millbrook.

Table 31 The 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 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	RFPS-1298-127
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	Monitoring ended 3/31/2017 and will resume July 1, 2019	Monitoring ended 10/31/2017and will resume Oct. 1, 2019

[a] All monitors except the Castle Hayne monitor use a Met One 1020 beta attenuation monitor, Air Quality System, AQS, method code 122. The EPA equivalent method designation is EQPM-0798-122. The Castle Hayne monitor uses a 2025 sequential monitor, AQS method code 127.

Table 33 The PM_{10} 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:	Monitoring ended 3/31/2017 and will resume 7/1/2019	Operated 5/1/2017 to 4/30/2018	Will operate 6/1/2018 to 5/31/2019	Operated 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 contains three subsections. The first discusses the network of federal reference method, or FRM, and federal equivalent method, or FEM, fine particle monitors used to determine compliance with the national ambient air quality standards, or NAAQS. The second section discusses the continuous fine particle monitors used for air quality forecasting, real-time reporting and air quality index reporting. Twelve 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, or DAQ, currently operates 13 FRM or FEM fine particle monitoring sites and the local programs operate five. The United States Environmental Protection Agency, or EPA, has approved the monitors at these sites so DAQ can use them 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.

Data from previous years, as shown in Figure 57, indicate statewide levels of fine particles are below the 24-hour and annual standards established by the EPA.

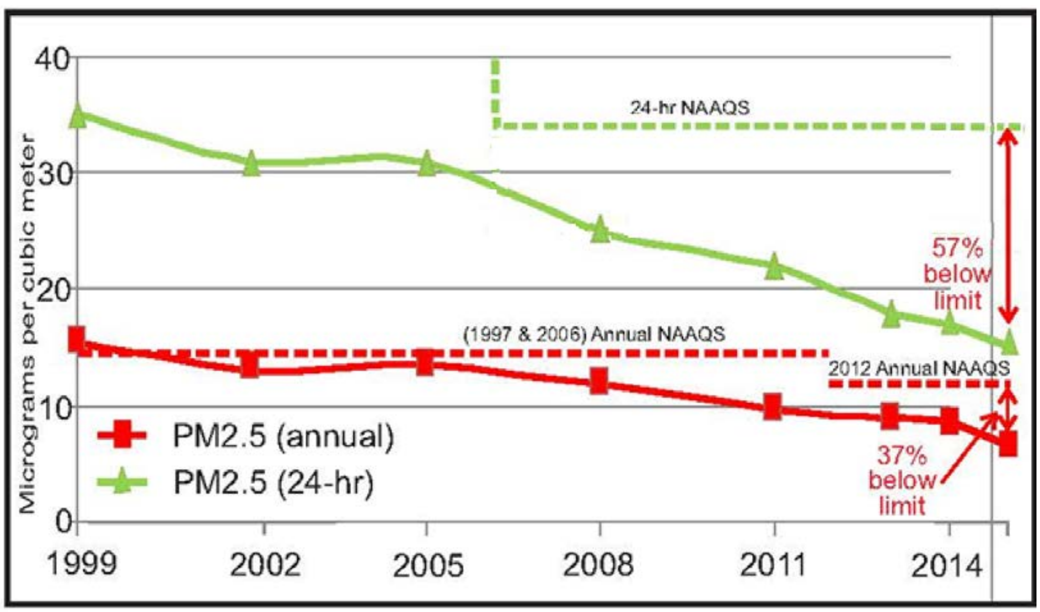

Figure 57. Statewide trends for fine particles
(from *Air Quality Trends in North Carolina* located at https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/Air_Quality_Trends_in_North_Carolina.pdf), corrected for 24-hr NAAQS

Figure 58 through Figure 69 provides the fine particle design values for the monitors in North Carolina for the past seven years. This information is important because the monitoring regulations require a monitor to be attaining the NAAQS for the past five years before the operating agency can shut down the monitor. See 40 CFR 58.14(c)(1). All the currently operating FRM/FEM monitors meet this requirement. However, 40 CFR 58 Appendix D 4.7 requires nine of these monitors:

- Garinger and Remount Road in the Charlotte-Concord-Gastonia MSA;
- Millbrook and Triple Oak 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.[32]

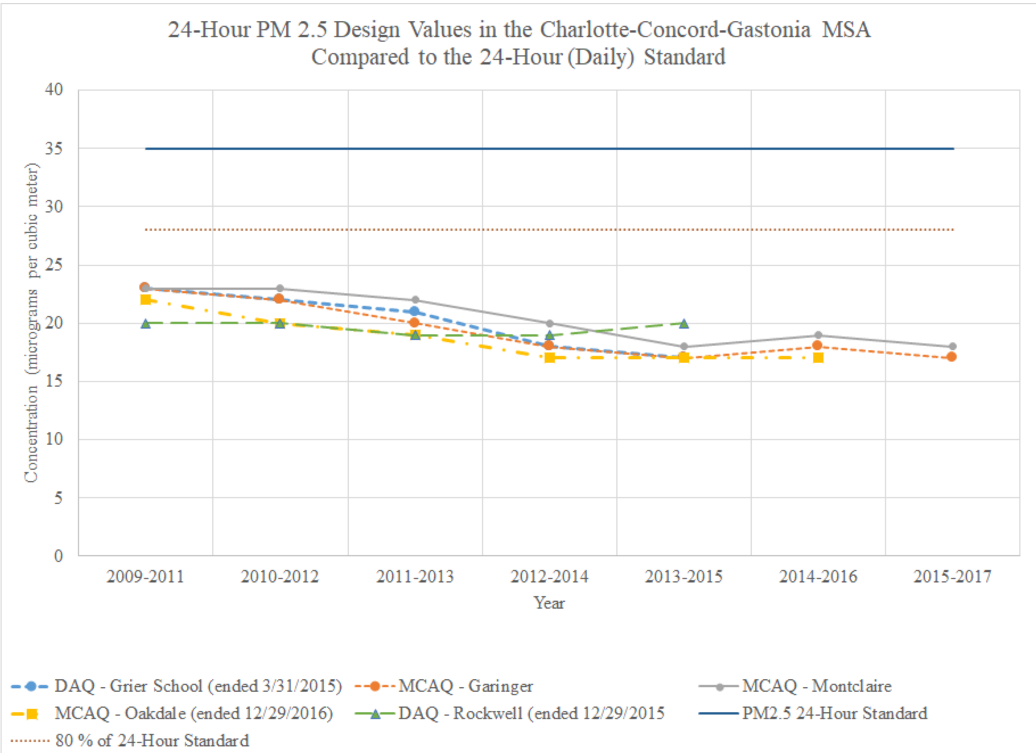

Figure 58. Measured daily fine particle design values in the Charlotte-Concord-Gastonia MSA

[32] "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.

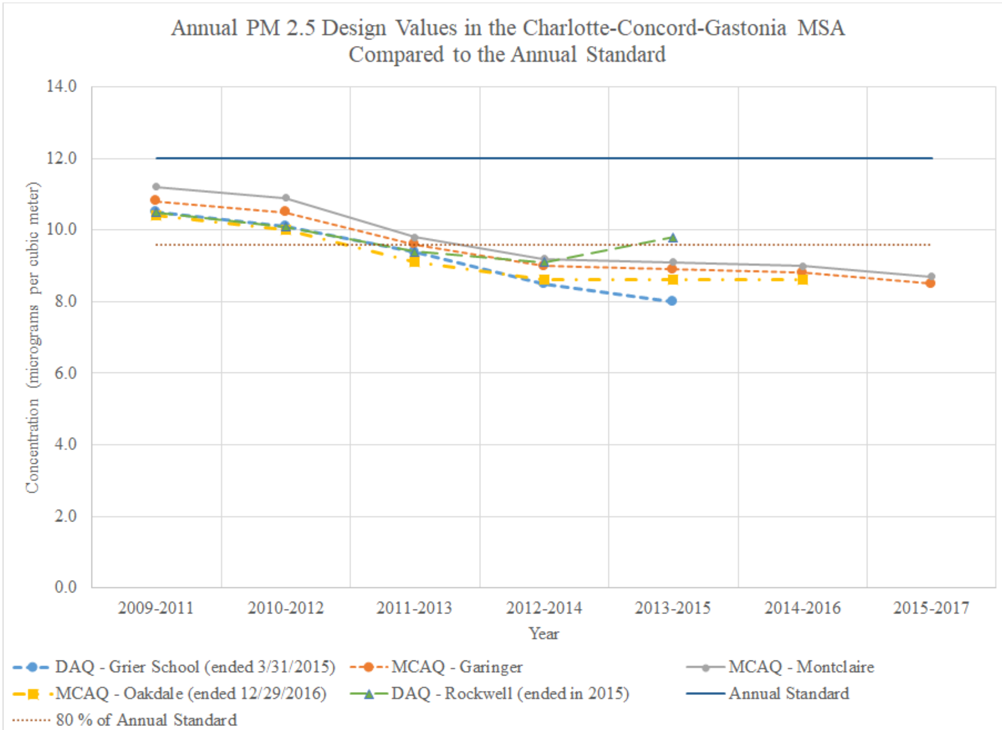

Figure 59. Annual design values measured in the Charlotte-Concord-Gastonia MSA

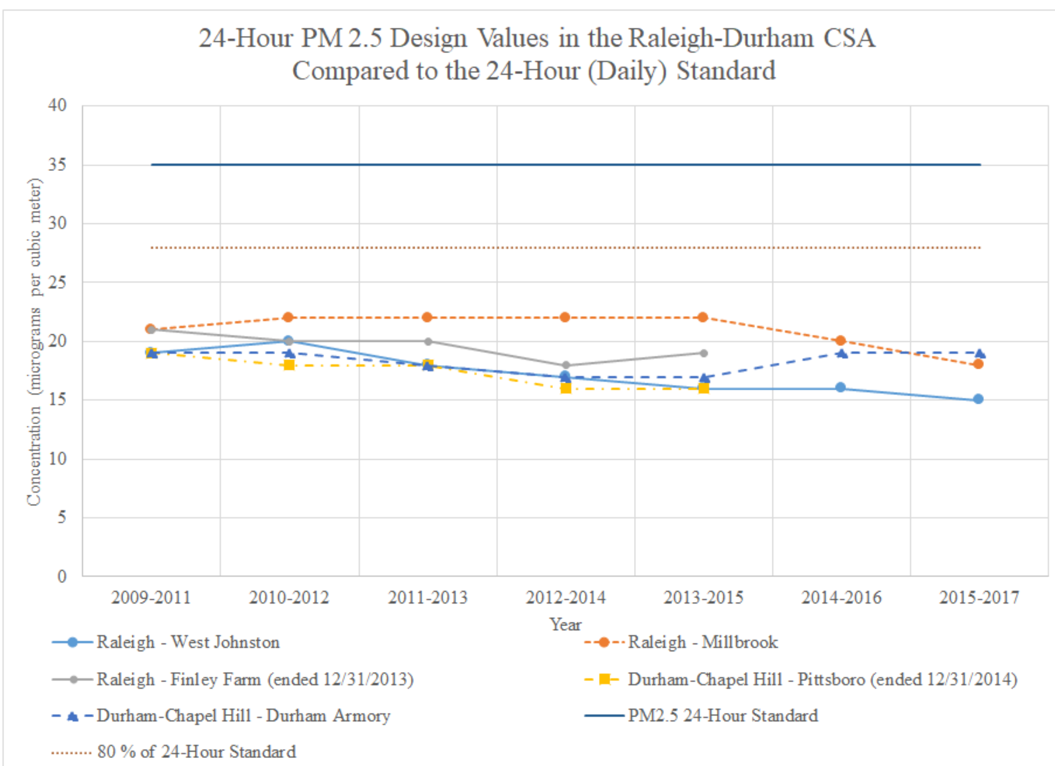

Figure 60. Daily fine particle design values measured in the Raleigh-Durham CSA

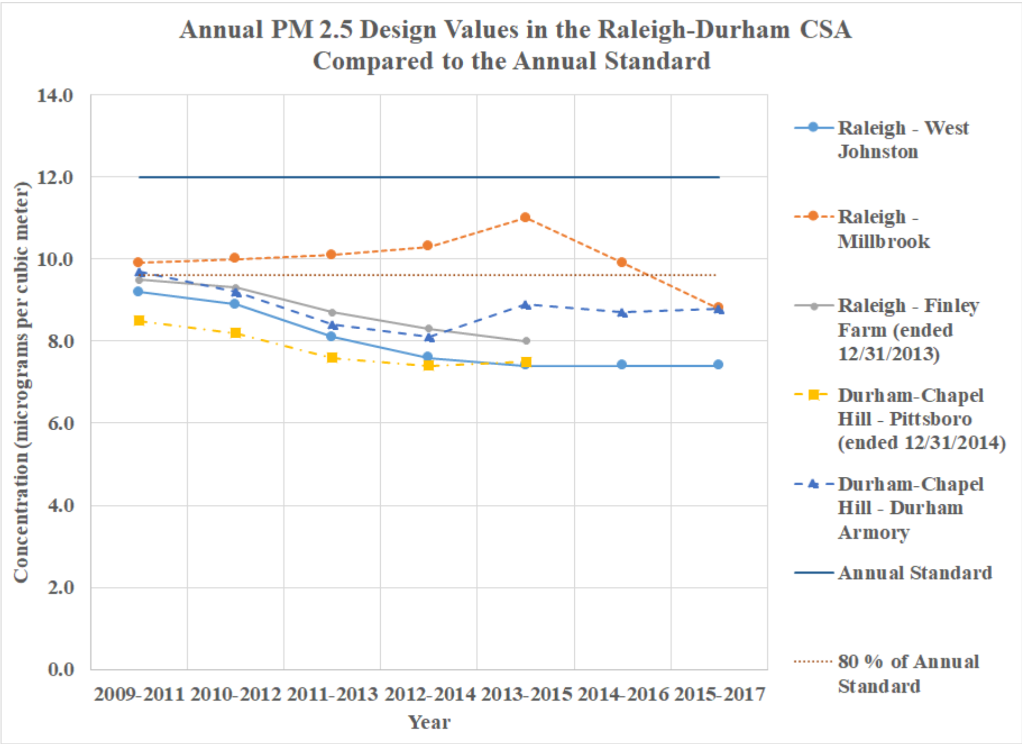

Figure 61. Annual fine particle design values measured in the Raleigh-Durham CSA

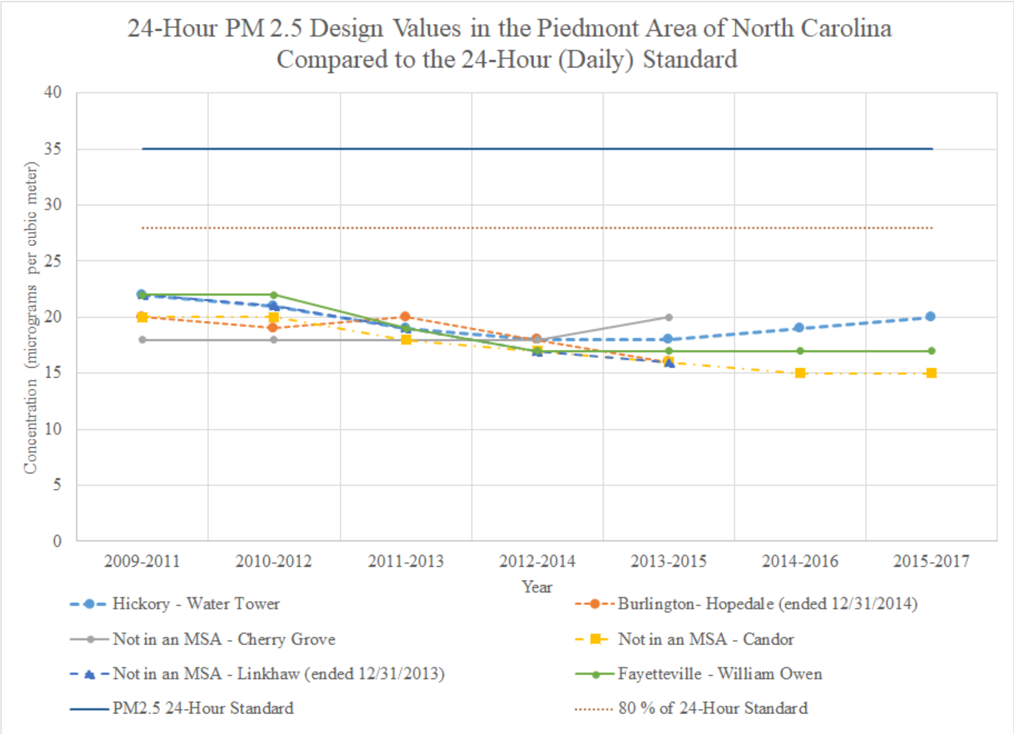

Figure 62. Daily fine particle design values measured in the Greensboro-Winston-Salem CSA

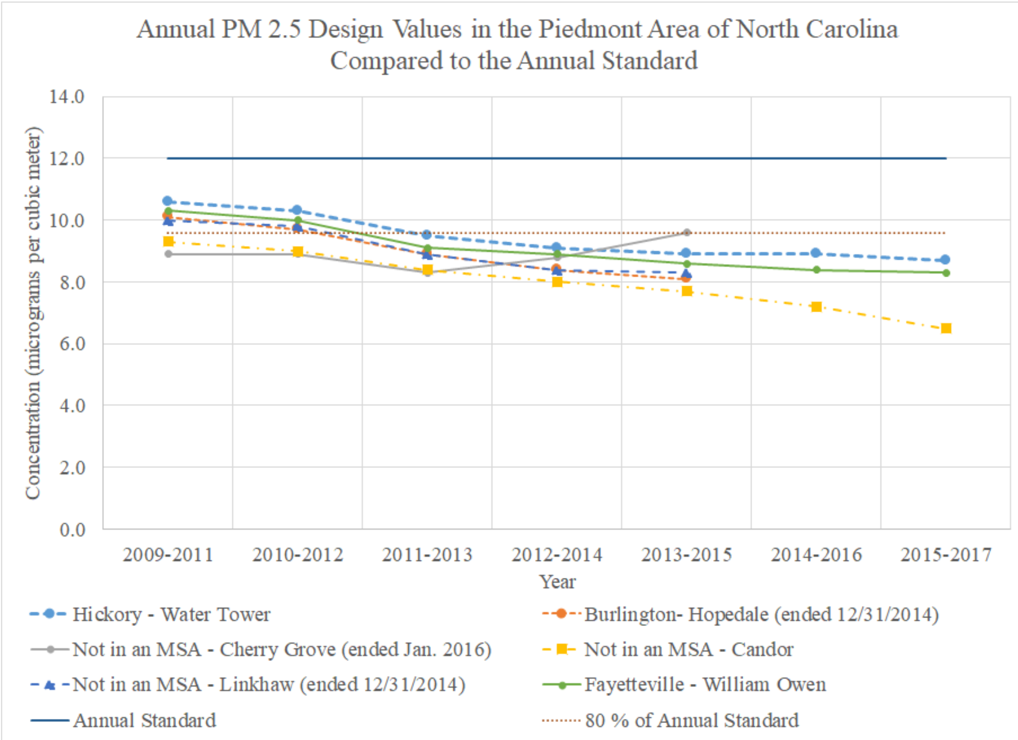

Figure 63. Annual fine particle design values measured in the Greensboro-Winston-Salem CSA

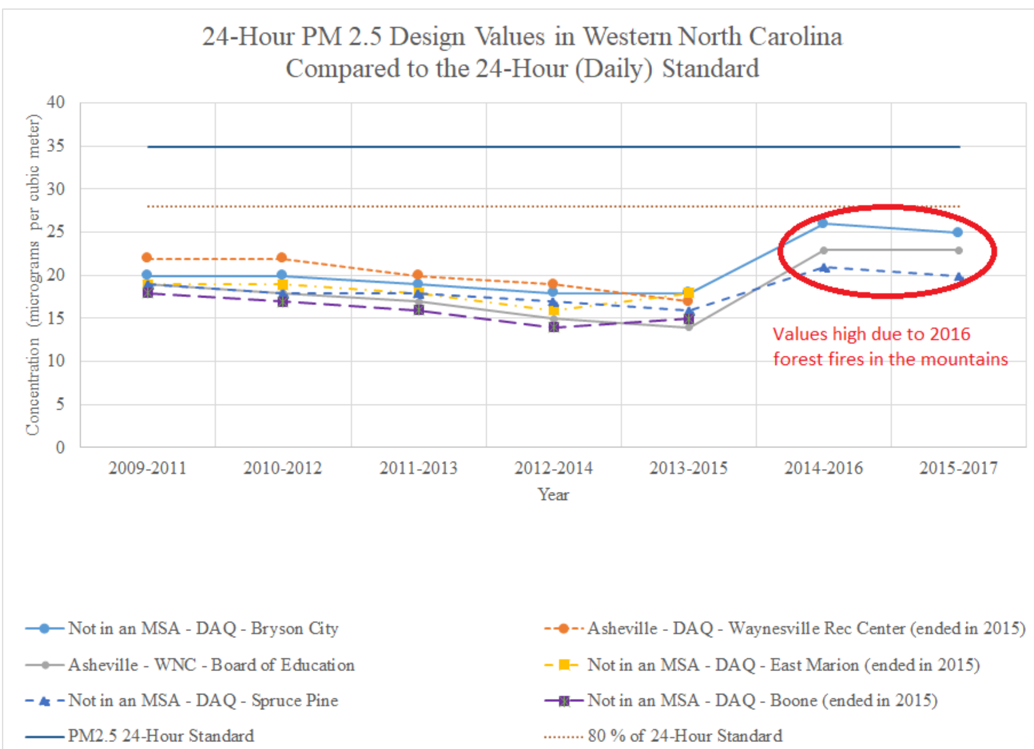

Figure 64. Daily fine particle design values measured in western North Carolina

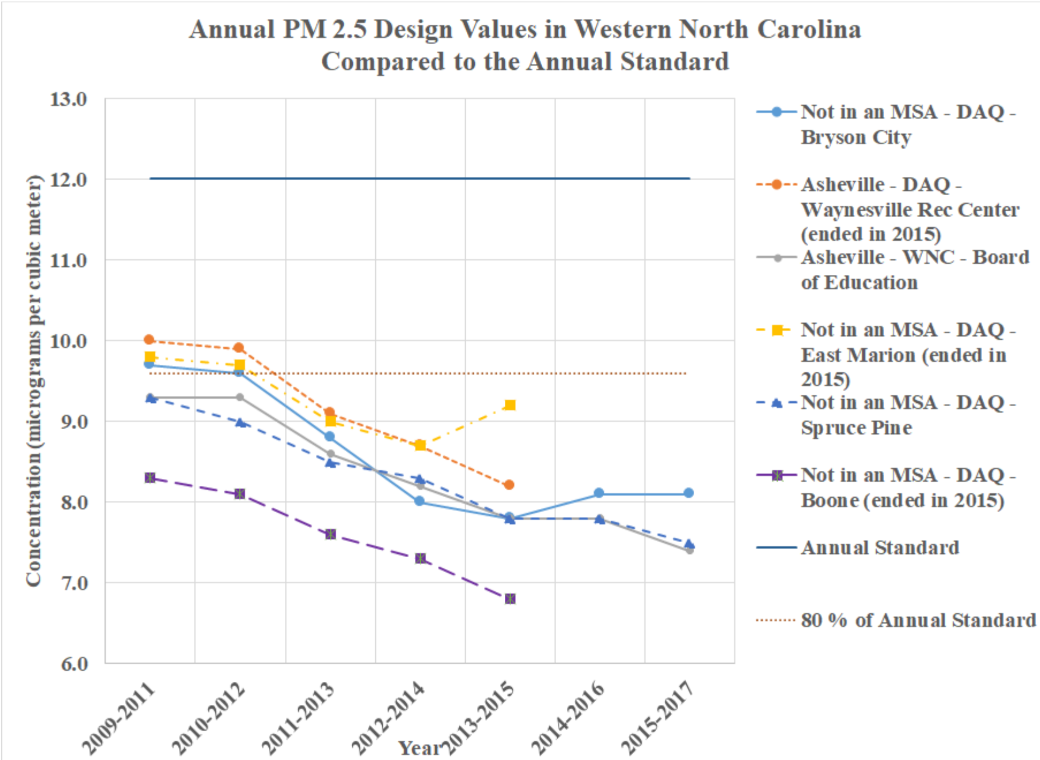

Figure 65. Annual fine particle design values measured in western North Carolina

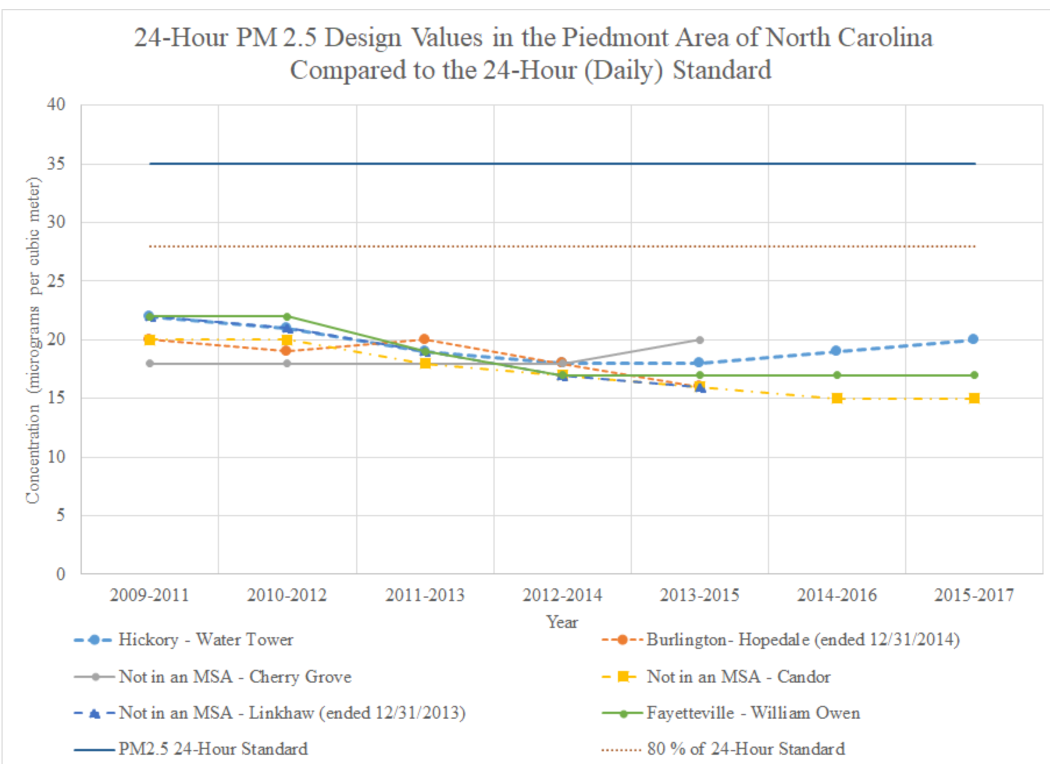

Figure 66. Daily fine particle design values measured in central North Carolina

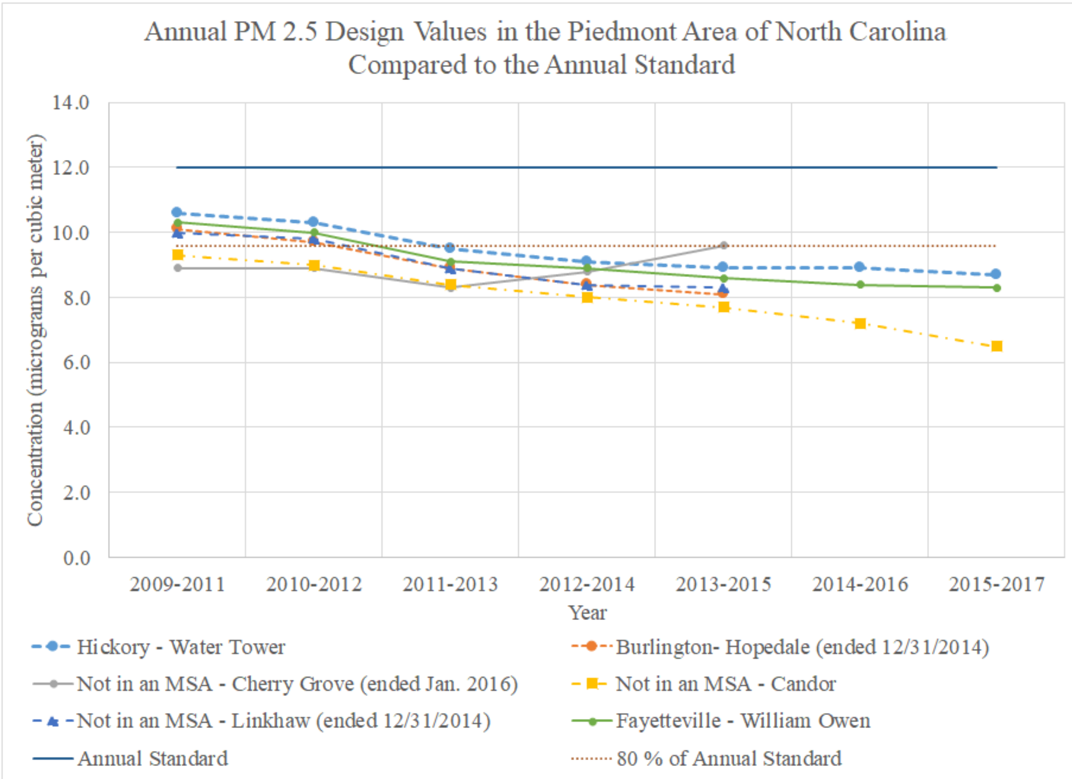

Figure 67. Annual fine particle design values measured in central North Carolina

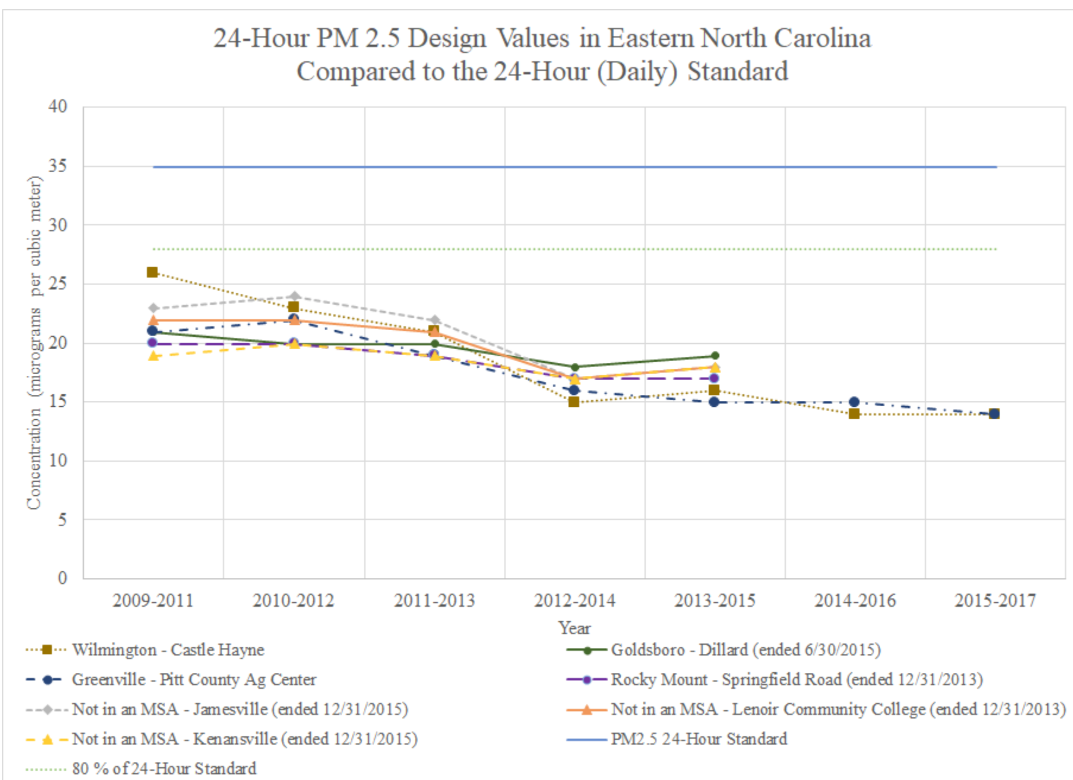

Figure 68. Daily design values measured in eastern North Carolina

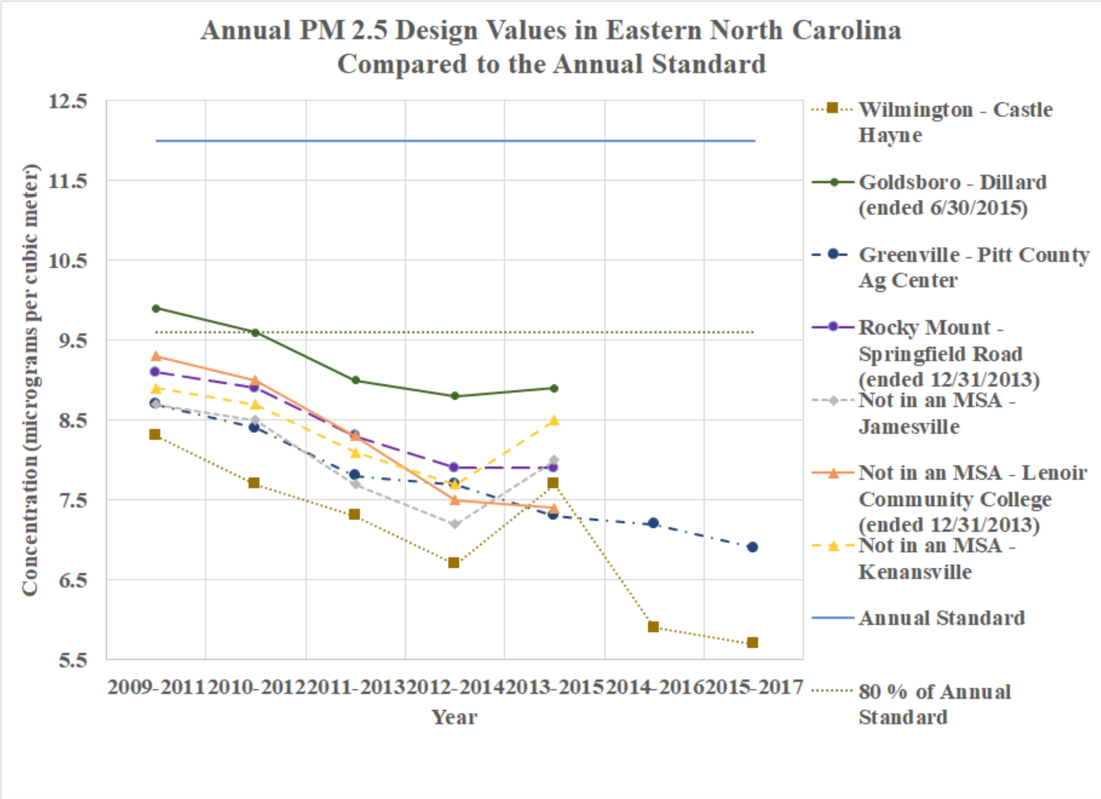

Figure 69. Annual fine particle design values measured in eastern North Carolina

The remaining seven 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, as required in 40 CFR 58.14(c)(1), based on design value trends and model predictions. Thus, there are seven monitors, two operated by local programs and five operated by DAQ, that are not required by Appendix D or by the state implementation plan and that could potentially meet all the requirements of 40 CFR 58.14(c)(1) to be shut down. The DAQ reviewed the five monitors operated by DAQ and their current monitoring objectives and determined these five monitors are still required to meet state objectives and provide an adequate background network for prevention of significant deterioration permitting and modeling. These five monitors are:

- 37-051-0009 at William Owen in the Fayetteville MSA;
- 37-101-0002 at West Johnston in the Raleigh 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 five 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 DAQ also uses the data from this monitor or 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 95th fastest growing county in the nation.

- The West Johnston, 37-101-0002, monitor is in one of the fastest growing areas of the state as well as the nation. Johnston is the nation's 78th fastest growing county on an annual basis and 77th fastest growing county for this decade.
- The Castle Hayne, 37-129-0002, monitor is in an area where there is a great deal of interest in the air quality because there were once 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 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 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 2018 fine particle network shown in Figure 70 is an adequate network to protect human health and environmental welfare and DAQ should continue to operate this network in 2019.

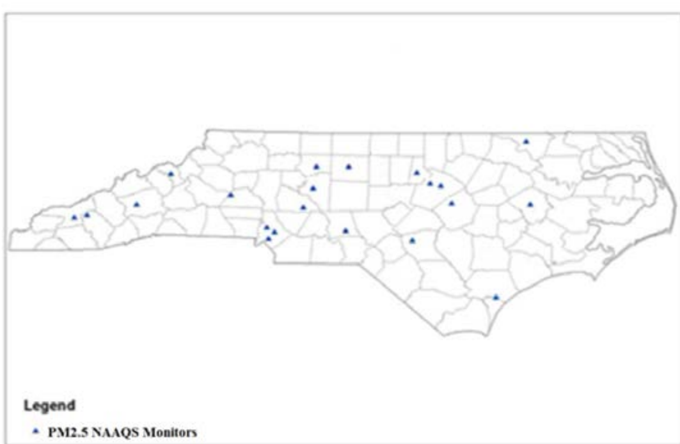

Figure 70. Current 2018 and proposed 2019 federal reference and equivalent method monitoring network

Other fine particle monitors that the DAQ could consider shutting down are those monitors that exceed the minimum number of monitors required in 40 CFR 58 Appendix D Table D-5 provided in Figure 71. The latest estimated population of the metropolitan statistical area, or 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 2017 population estimates for the MSAs in North Carolina, the design values for 2015-2017, 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 the Virginia Beach-Norfolk-New Port News 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.[33] In 2017, the annual and daily fine particle design values in North Carolina remained constant or continued to decline, maintaining or reducing the number of required monitors in MSAs throughout the state.

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 $\geq 85\%$ 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 71. 40 CFR 58 Appendix D Table D-5

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

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

MSA	Population Estimate, 2017 [a]	2017 Fine Particle Design Value, as percent of NAAQS		Number of Monitors operated in North Carolina [b]	
		24-Hour	Annual	Required [c]	Current
Charlotte-Concord-Gastonia, NC-SC	2,525,305	51	73	2	3
Virginia Beach-Norfolk-New Port News, VA-NC	1,725,246	43	59	2	0 [d]
Raleigh, NC	1,335,079	51	73	2	3
Greensboro-High Point	761,184	46	68	1	1
Winston-Salem	667,733	46	63	1	2
Durham- Chapel Hill	567,428	54	73	1	1
Asheville	456,145	66	62	0	1
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	464,165	Not available		0	0
Fayetteville	386,662	49	69	0	1
Hickory	366,534	57	73	0	1
Wilmington	288,156	40	48	0	1
Jacksonville	193,893	Not available		0	0
Greenville	179,042	40	58	0	1
Burlington	162,391	46 [f]	68 [f]	0	0
Rocky Mount	146,165	49 [f]	66 [f]	0	0
New Bern	124,864	Not available		0	0
Goldsboro	124,172	51 [f]	74 [f]	0	0

[a] Source: Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2017, U.S. Census Bureau, Population Division, Released March 22, 2018, available on the world wide web at https://www.census.gov/data/tables/2017/demo/popest/total-metro-and-micro-statistical-areas.html.
[b] Includes monitors operated by DAQ and the local programs.
[c] 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.
[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] Design value for 2013-2015

The following tables provide the information required by 40 CFR 58 to be included in the network plan. 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 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 the monitors meet the requirements of Appendices A, C, D and E of 40 CFR 58.

The monitors at the Board of Education, 37-021-0034, the Durham Armory, 37-063-0015, Millbrook, 37-183-0014, William Owen, 37-051-0009, and the Pitt County Agricultural Center, 37-147-0006, use the EPA reference method designation RFPS-1006-145, AQS method code 145. These five monitors operate on a 24-hour schedule from midnight to midnight on each scheduled sampling day. Collocated FRM monitors operate at the Board of Education and William Owen sites.

The monitors at Bryson, 37-173-0002, Lexington, 37-057-0002, Candor, 37-123-0001 and Castle Hayne, 37-129-0002, use the EPA automated equivalent method: EQPM-0308-170, AQS method code 170. The monitors at Spruce Pine, 37-121-0004, Hickory, 37-035-0004, Mendenhall, 37-081-0013, Triple Oak Road, 37-183-0021, and West Johnston, 37-101-0002, use the EPA automated equivalent method EQPM-1013-209, AQS method code 209. These nine monitors collect data each hour. Collocated FRM monitors operate at the Lexington and Hickory sites.

All 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. These tables also provide the proposed changes to the network.

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

AQS Site Id Number:	37-119-0041[b]	37-119-0042[b]	37-119-0045[b]	37-159-0021
Site Name:	Garinger	Montclaire	Remount Road	Rockwell
Street Address:	1130 Eastway Drive	1935 Emerywood Drive	902 Remount Road	301 West Street
City:	Charlotte	Charlotte	Charlotte	Rockwell
Latitude:	35.2401	35.151283	35.212657	35.551868
Longitude:	-80.7857	-80.866983	-80.874401	-80.395039
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS / NCore	SLAMS	SLAMS	Special Purpose
Operating Schedule:	Hourly, collocated with a 1-in-3 day	Hourly	Hourly, collocated with a 1-in-12 day	Hourly
Statement of Purpose:	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. 1 of 2 required monitors in Charlotte-Concord-Gastonia MSA.	AQI reporting. Compliance w/NAAQS. .
Monitoring Objective:	Population exposure	Population exposure	Source oriented	General/background
Scale:	Neighborhood	Neighborhood	Microscale	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes
Meets Requirements of	Yes	Yes	Yes	Yes

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

AQS Site Id Number:	37-119-0041[b]	37-119-0042 [b]	37-119-0045 [b]	37-159-0021
Part 58 Appendix A:				
Meets Requirements of Part 58 Appendix C:	Yes – EQPM-0308-170	Yes – EQPM-1013-209	Yes – EQPM-1013-209	Yes – EQPM-1013-209
Meets Requirements of Part 58 Appendix D:	Yes- NCore, 1 of 2 required monitors for the Charlotte-Concord-Gastonia MSA.	No, not required	Yes –near road, 1 of 2 required monitors for the Charlotte-Concord-Gastonia MSA.	No, not required
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Method changed 4/1/2018	Method changed 5/1/2018	Method changed 4/1/2018	Monitoring will start 1/1/2019

[a] All monitors that are not NCore use a Met One BAM-1022 Monitor, AQS method code 209. The NCore monitor uses a BAM 1020, AQS method code 170. All monitors operate year-round.
[b] Mecklenburg County Air Quality, AQS reporting agency 0669, operates these monitors.

Table 36 The NAAQS Fine Particle Monitoring Network for the Raleigh MSA [a]

AQS Site Id Number:	37-101-0002	37-183-0014	37-183-0021
Site Name:	West Johnston	Millbrook	Triple Oak Road
Street Address:	1338 Jack Road [c]	3801 Spring Forest Road	2826 Triple Oak Road
City:	Clayton	Raleigh	Cary
Latitude:	35.590833	35.8561	35.8654
Longitude:	-78.461944	-78.5742	-78.8195
MSA, CSA or CBSA represented:	Raleigh	Raleigh	Raleigh
Monitor Type:	SLAMS	SLAMS / NCore	SLAMS
Operating Schedule:	Hourly	1-in-3-day [f]	Hourly
Statement of Purpose:	AQI reporting. Compliance w/NAAQS.	1 of 2 required monitors in Raleigh MSA. AQI reporting. Compliance w/NAAQS. Air quality forecasting	Near road monitoring site. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Population exposure	Source oriented
Scale:	Neighborhood	Neighborhood	Micro-scale
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 – EQPM-1013-209	Yes - RFPS-1006-145	Yes – EQPM-1013-209
Meets Requirements of Part 58 Appendix D:	No – not required	Yes - 1 of 2 required monitors for the Raleigh MSA. Also required for NCore	Yes – near road; 1 of 2 required monitors for the Raleigh MSA.

Table 36 The NAAQS Fine Particle Monitoring Network for the Raleigh MSA [a]

AQS Site Id Number:	37-101-0002	37-183-0014	37-183-0021
Site Name:	West Johnston	Millbrook	Triple Oak Road
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes, with waiver for trees
Proposal to Move or Change:	None	None	None

[a] The monitor at Millbrook use a R & P Model 2025i PM2.5 Sequential Monitor with a very sharp cut cyclone, Air Quality System, AQS method code 145. The monitors at West Johnston and Triple Oak use a Met One BAM-1022 Monitor, AQS method code 209.

Table 37 The NAAQS Fine Particle Monitoring Network for the Winston-Salem and Greensboro-High Point MSAs [a]

AQS Site Id Number:	370570002	37-067-0022[b]	37-081-0013
Site Name:	Lexington Water Tower	Hattie Avenue	Mendenhall
Street Address:	938 South Salisbury Street	1300 block of Hattie Avenue	205 Willoughby Blvd.
City:	Lexington	Winston-Salem	Greensboro
Latitude:	35.814444	36.110556	36.109167
Longitude:	-80.262500	-80.226667	-79.801111
MSA, CSA or CBSA represented:	Winston-Salem	Winston-Salem	Greensboro-High Point
Monitor Type:	SLAMS	SLAMS	SLAMS
Operating Schedule:	Hourly Collocated w/1-in-6 day	1-in-3 day	Hourly
Statement of Purpose:	Required monitor for maintenance area & the Winston-Salem MSA. Compliance w/NAAQS	AQI reporting. Compliance w/NAAQS.	Required monitor in Greensboro-High Point MSA. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Population exposure	Population exposure / general / background
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 – EQPM-0308-170	Yes - RFPS-1006-145	Yes – EQPM-1013-209
Meets Requirements of Part 58 Appendix D:	Yes- Required monitor for the Winston-Salem MSA.	No – not a required monitor	Yes - required monitor for the Greensboro-High Point MSA.
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None

[a] The Hattie Avenue 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 Lexington monitor uses a BAM 1020, AQS method code 170. The monitor at Mendenhall uses a Met One BAM-1022 Monitor, AQS method code 209. 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. 2018-2019 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-6 day	Hourly, collocated w/1-in-6 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 – EQPM-1013-209
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:	May change method	Method will change 1/1/2019	None

[a] Durham Armory and Board of Education monitors use an R & P Model 2025i PM2.5 Sequential Monitor with a very sharp cut cyclone, Air Quality System, AQS method code 145. The Hickory monitor uses a Met One BAM-1022 Monitor, AQS method code 209. All monitors operate year-round.
[b] Operated by the Western North Carolina Regional Air Quality Agency, AQS reporting agency 0779.

Table 39 The 2018-2019 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	hourly	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:	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 - 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:	None	None	Method may change in 2018

[a] The monitors at William Owen and Pitt Ag use an R & P Model 2025 PM2.5 Sequential Monitor with a very sharp cut cyclone, Air Quality System, AQS method code 145. The Castle Hayne monitor uses a BAM 1020, AQS method code 170. All monitors operate year-round.

Table 40 The 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 Building, Center Street
City:	Spruce Pine	Candor	Bryson City
Latitude:	35.912487	35.263200	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:	Hourly	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 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:	None	None	None

[a] The Spruce Pine monitor uses a Met One BAM-1022 Monitor, AQS method code 209. The other monitors use a Met One BAM-1020 Monitor, AQS method code 170. All monitors operate year-round.

The DAQ evaluated each MSA operating more monitors than required by the regulations to determine if all the current monitors in the MSA are still needed and providing valuable information. There are eight MSAs in 2018 with more than the required monitors. The DAQ does not operate monitors in two of these MSAs so the DAQ did not evaluate those two MSAs and monitors. The six MSAs DAQ evaluated are the Raleigh, Winston-Salem, Fayetteville, Hickory, Wilmington and Greenville MSAs. The monitors are the West Johnston monitor, 37-101-0002, the Lexington monitor, 37-057-0002, the William Owen monitor, 37-051-0009, the Hickory monitor, 37-0035-0004, the Castle Hayne monitor, 37-129-0002, and the Pitt Ag monitor, 37-147-0006. The West Johnston monitor is in one of the fastest growing areas in the state. The Lexington monitor is the design value monitor for the Winston-Salem MSA and Lexington is in a fine particle maintenance area. Thus, the DAQ determined the Lexington monitor is necessary to demonstrate continuing maintenance of the standard and for the staff of DAQ to make informed decisions regarding development of state implementation plans and to provide air quality information to the public to ensure public health and welfare. Earlier in this subsection, the DAQ discussed the rationale for keeping the William Owen, Castle Hayne and Pitt Ag monitors. The Hickory monitor is in a fine particle maintenance area and is required by the state implementation plan.

B. *Continuous Fine Particle Monitoring Network*

The DAQ currently operates 15 continuous fine particle monitoring sites and the local programs operate six. The DAQ and local programs use these monitors to meet federal requirements for air quality forecasting, providing real-time data to the public and meeting air quality index reporting requirements. The EPA approved 12 of these monitors for determining compliance with the national ambient air quality standards, or 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."

Based on Table 34, a continuous monitor collocated with an FRM is required in Charlotte, which is operated by the local program, Raleigh, Greensboro, Winston-Salem, which is operated by the local program, and Durham.

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, DAQ needs these three continuous monitors to meet Appendix G requirements. Of the 13 remaining continuous monitors, seven are FEMs - Bryson City, Spruce Pine, Lexington, West Johnston, Castle Hayne, Triple Oak and Candor - included in the FRM/FEM network and the DAQ evaluated them earlier as part of that network. The local programs operate three. The DAQ evaluated the remaining three continuous monitors operated by the DAQ to determine if they still add value to the network and should continue operating.

The DAQ is evaluating the Met One BAM 1022 FEM to replace the 2025 monitor at the Pitt County Agricultural Center. 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 continuous monitor involved in this evaluation needs to continue operating.

The last two continuous fine particle sites DAQ evaluated are Leggett and Blackstone. 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 while air quality forecasting continues for this area.

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. The DAQ evaluated the data collected at the site from 2014 through 2016 and determined that the DAQ has collected sufficient data to adequately determine background concentrations for the area. Thus, the DAQ proposes to shut down this monitor in the third or fourth quarter of 2018.

In 2018, the DAQ plans to add two continuous fine particle monitors to the network. The Blackstone monitor will move to Northampton County to collect background data there before the Atlantic Coast Pipeline is installed. The DAQ will also add a continuous fine particle monitor to the Rockwell site to provide background data in the area between Charlotte and Winston-Salem.

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 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	37-159-0021
Site Name:	Garinger	Montclaire	Remount Road	Rockwell
Street Address:	1130 Eastway Drive	1935 Emerywood Drive	902 Remount Road	301 West Street
City:	Charlotte	Charlotte	Charlotte	Rockwell
Latitude:	35.2401	35.151283	35.212657	35.551868
Longitude:	-80.7857	-80.866983	-80.874401	-80.395039
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS / NCore	SLAMS	SLAMS	Special Purpose
Operating Schedule:	Hourly	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.	AQI reporting. Compliance w/NAAQS. .
Monitoring Objective:	Population exposure	Population exposure	Source oriented	General/background
Scale:	Neighborhood	Neighborhood	Microscale	Neighborhood
Suitable for Comparison to NAAQS:	No	No	No	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-1013-209	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	No, not required
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	None	None	Started 1/20/2017	Monitoring will start 1/1/2019

[a] The Garinger monitor uses a Met One BAM 1020 monitor. The other sites 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. Mecklenburg County Air Quality, AQS reporting agency 0669 operates all these monitors.

Table 42 The 2018-2019 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:	SLAMS	Special purpose / NCore	SLAMS	SLAMS
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:	None	Method may change in 2018	None	None

[a] Monitors at West Johnston, Triple Oak and Mendenhall use a BAM 1022 monitor. The monitor at Millbrook is a BAM 1020. The DAQ is also evaluating a Teledyne T640X monitor at Millbrook

Table 43 The 2018-2019 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:	SLAMS	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:	None	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 2018-2019 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	Special purpose	Special purpose	SLAMS
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	Yes – EQPM-1013-209	Yes – EQPM-1013-209	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:	None	None	None	None

[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 2018-2019 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:	None	None	None

[a] The Castle Hayne monitor is a BAM 1020. The other monitors are BAM 1022s. The Leggett BAM is a Met-one BAM-1022 with a PM2.5 sharp cut cyclone.

Table 46 The 2018-2019 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	37-131-0003	37-173-0002
Site Name:	Blackstone	Spruce Pine	Candor	Northampton	Bryson City
Street Address:	4110 Blackstone Drive	138 Highland Avenue	112 Perry Drive	TBD	Parks & Rec Building, Center Street
City:	Sanford	Spruce Pine	Candor	Gaston	Bryson City
Latitude:	35.432500	35.912487	35.262490	TBD	35.434767
Longitude:	-79.288700	-82.062082	-79.836613	TBD	-83.442133
MSA, CSA or CBSA represented:	Not in an MSA	Not in an MSA	Not in an MSA	Not in an MSA	Not in an MSA
Monitor Type:	Special purpose	Special purpose	SLAMS	Special purpose	SLAMS

Table 46 The 2018-2019 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	37-131-0003	37-173-0002
Site Name:	Blackstone	Spruce Pine	Candor	Northampton	Bryson City
Operating Schedule:	Hourly	Hourly	Hourly	Hourly	Hourly
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.	General/ background site for Atlantic Coast Pipe Line study.	Regional transport site. Low elevation, i.e. 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	General/ background	Regional transport/ population exposure
Scale:	Neighborhood	Neighborhood	Regional	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	No	No	Yes	No	Yes
Meets Requirements of Part 58 Appendix A:	Yes	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-1013-209	Yes – EQPM-0308-170
Meets Requirements of Part 58 Appendix D:	No – not required	No – not required	Yes –required background monitor.	No – not required	Yes – required transport monitor
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Monitor will shut down in 2018	None	None	Monitor will start in 2018	None

[a] The Spruce Pine and Northampton monitors are BAM 1022s. The other monitors are BAM 1020s.

C. *Manual Speciation Fine Particle Monitoring Network*

The DAQ operates one manual speciation fine particle monitoring site. The local programs operate two. These monitors operate to meet federal requirements for the speciation trend network, or STN, and for national core, or NCore, monitoring stations as well as to provide 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 required monitors at NCore sites.

In January 2015, the EPA ended funding for monitors in Asheville, Rockwell, Lexington and Hickory. The operators shut down the monitors in Asheville, Rockwell and Lexington in January 2015. The Hickory Super Speciation Air Sampling System, SASS,™ 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 sampling schedules, monitoring objectives, scale of representation and statement of purpose. Table 47 also indicates if the monitor is suitable for comparison to the NAAQS and meets 40 CFR 58 Appendix A, C, D and E requirements and proposed changes.

Table 47 The 2018-2019 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, or DAQ, currently does not operate any lead monitors. The DAQ shut down the lead monitor located at the Raleigh Millbrook National Core, also known as NCore, monitoring site on April 30, 2016. As shown in Figure 72 statewide lead levels have fallen and currently remain below the standard, near or below the detection limit of the method. The 2013-2015 design values for lead in Raleigh and in Charlotte were zero.

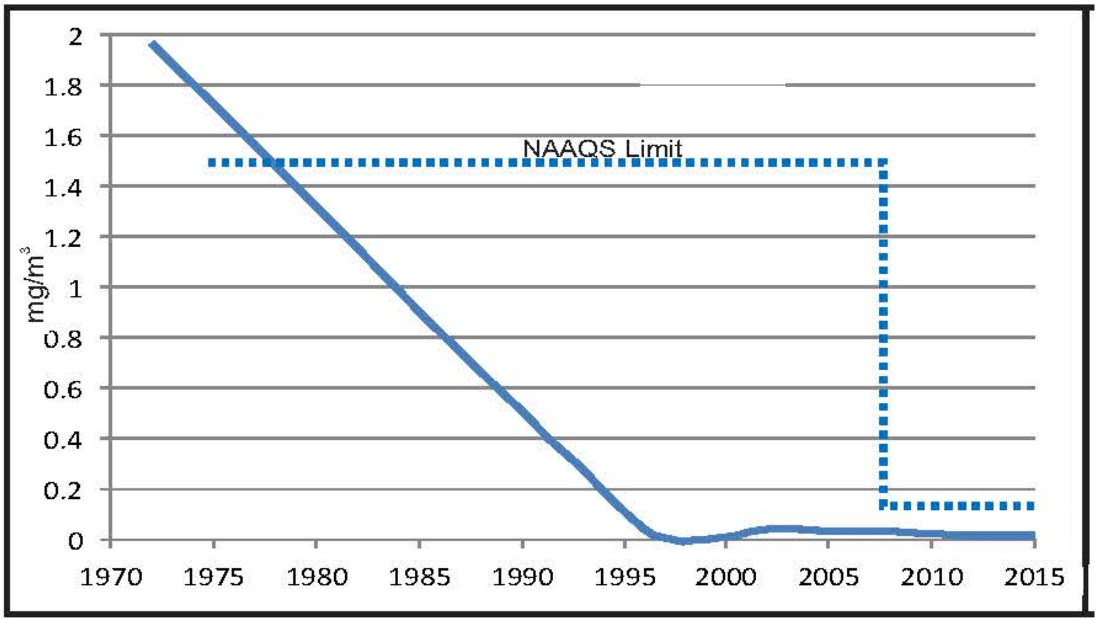

Figure 72. Statewide 24-hour lead levels through 2015
(from *Air Quality Trends in North Carolina* located at https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/Air_Quality_Trends_in_North_Carolina.pdf)

On Nov. 12, 2008, the United States Environmental Protection Agency, or EPA, lowered the lead national ambient air quality standard, also known as NAAQS, to 0.15 micrograms per cubic meter and expanded the lead monitoring network to support the new standard.[34] On Dec. 27, 2010, the EPA finalized changes to the lead monitoring network.[35] 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

[34] 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.
[35] 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.

oriented monitoring at required NCore sites started on Dec. 27, 2011. On March 28, 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.[36]

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, also known as NEI, or the 2007 Toxic Release Inventory, also known as TRI, as emitting over one ton of lead per year. These facilities are:

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

The EPA granted the request and did not require the DAQ to monitor at any of these facilities because none of the facilities emitted one ton or more of lead per year. Appendix H. 2010 Network Plan EPA Approval Letter provides a copy of the 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:

- 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, in Haywood County;
- Duke Power Company, LLC - Allen Steam Station, located in Gaston County;
- Royal Development Co., located in High Point, in 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, in 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,

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[36] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

- 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. The DAQ also 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.[37]

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. Thus, 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 than 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 operated at the site. The DAQ delivered the filters to RTI in batches of 50-80 where RTI analyzed them using x-ray fluorescence, which is the federal reference method for the low-volume PM_{10} lead monitoring method. Figure 73 shows the maximum PM_{10} lead concentrations measured at the two sites.

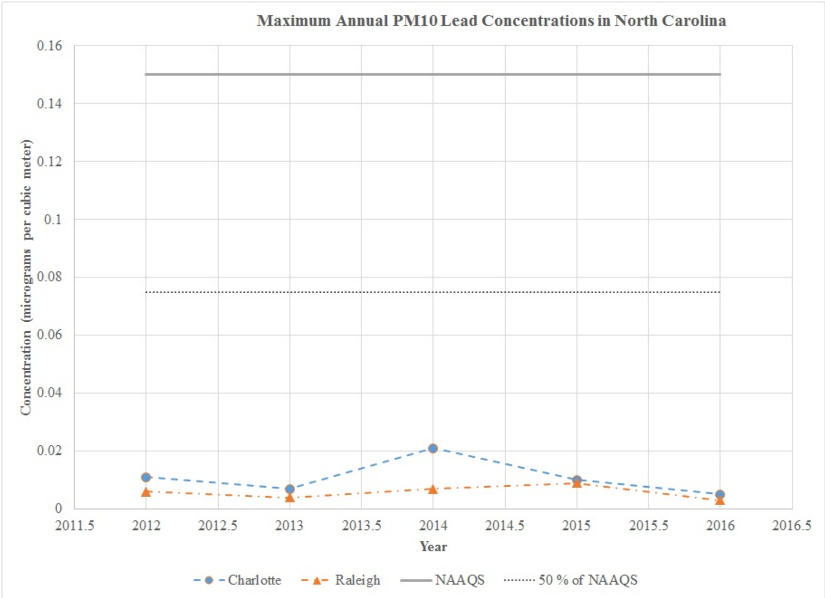

Figure 73. Maximum annual lead concentrations measured at North Carolina NCore Stations

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[37] 2011 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p3, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7843.

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 73 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 April 27, 2016.

IX. Urban Air Toxics Monitoring Network

The North Carolina Division of Air Quality, or DAQ, monitors for urban air toxics, UAT, 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 DAQ analyzes the samples 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 48.

Table 48 List of Measured and Reported Urban Air Toxic Volatile Organic Compounds, VOC

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

The DAQ collects air samples on silica-2,4-dinitrophenylhydrazine, DNPH, cartridges with potassium iodide, KI, ozone scrubbing at Blackstone, Millbrook and Candor. The cartridges are extracted and analyzed using ultra high-performance liquid chromatography (UHPLC) with ultraviolet(UV) detection for the list of compounds in Table 49.

Table 49. List of Measured and Reported Urban Air Toxic Carbonyl Compounds

Acetaldehyde	Formaldehyde	Propionaldehyde
Benzaldehyde	Hexaldehyde	Tolualdehyde(-m)
Butyraldehyde	Methacrolein	Valeraldehyde
Crotonaldehyde	Methyl Ethyl Ketone	

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 sufficient 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 DAQ developed the North Carolina network 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 DAQ chose the number of monitoring sites based on available funds, equipment and personnel including those in local programs and regional offices. The DAQ chose the locations 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. The EPA defines a "rural" county 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 DAQ closed the Research Triangle Park site, shared with EPA, when a major road project forced the EPA to move the building. When the 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. The DAQ stopped monitoring for semi-volatile organic compounds, or SVOCs, and carbonyl compounds by methods TO-13 and TO-11, respectively, at all North Carolina UAT sites. 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. The DAQ upgraded one GC/MS system used for VOCs analysis by method TO-15 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. The DAQ plans to shut down this site in either third or fourth quarter 2018.

Table 50 through Table 52 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. The DAQ has not yet identified a specific location 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 50 The 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

Table 50 The Air Toxics Monitoring Network for the Charlotte-Concord-Gastonia, Raleigh and Winston-Salem MSAs

[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 6-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 6-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 51 The 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 6-liter- pressurized canister and analysis using pre-concentration gas chromatography with mass spectrometric detection, for VOCs.

Table 52 The 2017-2018 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:	This site will shut down in 2018	None

[a] AQS method code 150, sample collection in a stainless steel 6-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, or DAQ, national core, or NCore, monitoring network. For information on the NCore site operated by Mecklenburg County Air Quality, see Appendix B. 2018 Annual Monitoring Network Plan for Mecklenburg County Air Quality. The United States Environmental Protection Agency, or EPA, approved the East Millbrook Middle School NCore site on Oct. 30, 2009. See Appendix I. 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

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

1) The DAQ removed or trimmed the trees such that all probe inlets are greater than 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 1 to 4 meters of each other, all inlets are within one meter vertically of each other, all inlets

are between 2 and 15 meters above ground and all inlets are more than 20 meters from any roadway.

3) The DAQ installed all continuous gaseous monitors, SO_2, NO_y, CO and O_3, in a temperature controlled walk-in shelter, which meets all 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 comparing the measured concentrations to the national ambient air quality standards. The platform is far enough from the road so 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 April 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	145
$PM_{2.5}$, 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}, continuous low volume sampler	Population exposure	Neighborhood	Hourly data year-round year-round	122

Parameter	Monitoring Objective	Scale of Representation	Operating Schedule	AQS Method Code
$PM_{10-2.5}$, coarse PM, by difference, PM_{10}-$PM_{2.5}$	Population exposure	Neighborhood	Hourly data year-round	186
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 EPA modified the monitor regulations 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 EPA modified the monitoring regulations to remove the requirement that all NCore sites monitor for PM_{10} lead.[38] As a result and with EPA permission, DAQ ended the PM_{10} lead analysis on April 30, 2016.

D. Readiness Preparation

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

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
F) Installation of filter based and continuous PM monitors	Completed
G) Installation of trace level gaseous monitors	Completed

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

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. Appendix I. NCore Monitoring Plan Approval Letter**.** provides the EPA approval letter.

1. Millbrook Meteorological Tower

The EPA designated the sampling site located at the Millbrook Middle School 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 74. The wind direction/speed sensors are located at a height of 10 meters above ground and the relative humidity sensor is located at 2 meters. Ambient temperature sensors are located at 2 meters and 10 meters above ground. In 2018, the DAQ plans to replace these sensors with an all-in-one sensor unit located at a height of 10 meters above the ground. The DAQ is requesting a waiver for the 2-meter height for the relative humidity and air temperature sensors. The tower is 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. DAQ positioned the tower 15.5 meters from the shelters on a 3 percent 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 at a distance 10 times the height of the shelter, which is 3.7 meters.

Figure 74. Millbrook NCore Site
(from City of Raleigh and Wake County iMAPS, http://maps.raleighnc.gov/iMAPS/)

Additionally, a single tree, approximately 7 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 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.

1. NO_y Probe Placement

NCore probe siting guidance for NO_y is a suggested probe inlet height of 10 meters. The DAQ initially mounted the NO_y probe inlet 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 to facilitate maintenance on the sampling inlet, that is cleaning of the cross fitting, and to provide access for performance of calibration test points under reduced multi-gas calibrator system pressures that are 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. 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 DAQ installed the new tower 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, or DAQ, currently operates three nitrogen dioxide, NO_2, monitors. Mecklenburg County Air Quality operates two NO_2 monitors and Forsyth County Office of Environmental Assistance and Protection, Forsyth County, operates one NO_2 monitor. As shown in Figure 75 statewide NO_2 levels have fallen and currently remain below the standard.

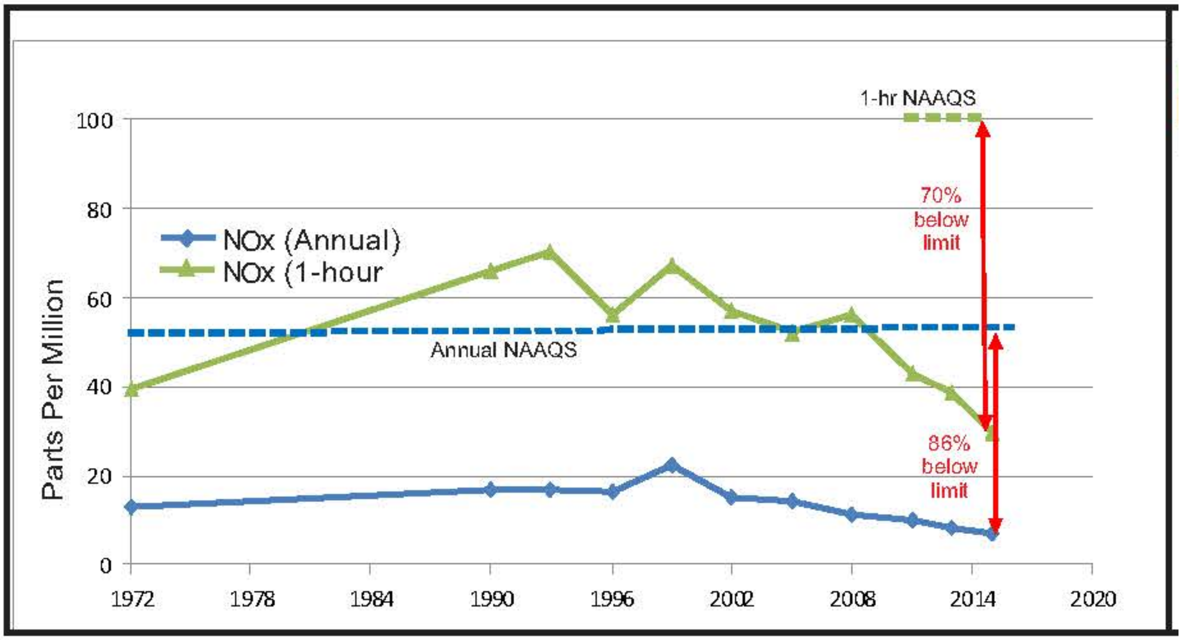

Figure 75. Statewide 1-hour and annual NO_x levels through 2015
(from *Air Quality Trends in North Carolina* located at https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/Air_Quality_Trends_in_North_Carolina.pdf)

In 2010, the United States Environmental Protection Agency, or EPA, changed the NO_2 primary National Ambient Air Quality Standards, or NAAQS, from an annual to an hourly standard of 100 parts per billion and established a new NO_2 monitoring network to support the new standard.[39] On Dec. 30, 2016, the EPA removed the requirement to establish near-road NO_2 monitoring stations in Core Based Statistical Areas, or CBSAs, having populations between 500,000 and 1,000,000 persons.[40] The 2010 NO_2 network, as modified in 2016, has three types of monitoring sites:

- Near road sites – micro-scale near-road NO_2 monitoring stations in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road with high average annual daily traffic, or AADT, counts. An additional near-road NO_2 monitoring station is required for any CBSA

[39] 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.

[40] Revision to the Near-road NO2 Minimum Monitoring Requirements, Federal Register, Vol. 81, No. 251, Dec. 30, 2016, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-12-30/pdf/2016-31645.pdf.

with a population of 2,500,000 persons or more or in any CBSA with a population of 1,000,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts to monitor a second location of expected maximum hourly concentrations.

- 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 NO_2 concentrations representing the neighborhood or larger spatial scales.
- Regional administrator required monitoring – additional NO_2 monitoring stations nationwide in any area, inside or outside of CBSAs, above the minimum monitoring requirements, selected by 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 two CBSAs 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 and area wide sites in the Charlotte and Raleigh areas. Besides the near-road and area-wide sites, the Region 4 administrator selected the Hattie Avenue site, operated by Forsyth County, for regional administrator required monitoring.[41]

A. Near Road Monitoring

For information on the near road monitoring site in the Charlotte area, see Appendix B. 2018 Annual Monitoring Network Plan for Mecklenburg County Air Quality. The Raleigh area site is discussed below.

The EPA approved the Triple Oak Road near road site for the Raleigh CBSA in 2012.[42] For details on the selection of Triple Oak Road and other considered locations, see the 2012 Annual Monitoring Network Plan for DAQ.[43] Table 53 provides the most recently available traffic information for the area from the North Carolina Department of Transportation.

Table 53. Fleet Equivalent Average Annual Daily Traffic for Selected Road Segments in the Raleigh Metropolitan Statistical Area[44]

Station	Route	Location	Station	Percent Passenger	2016 AADT	Fleet Equivalent AADT
1	I-40	From Exit 287 to 289	09MC0031	94	183,000	281,820
813	I-40	From Exit 285 to 287	09MC0031	94	176,000	271,040
807	I-40	From Exit 283 to 284	09MC0031	94	158,000	243,320
811	I-40	From Exit 284 to 285	09MC0031	94	155,000	238,700
169	I-440	From Exit 7 to 8	09MC0048	96	148,000	201,280
895	US 1-64	West of I-40	10MC0009	95	138,000	200,100

[41] 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.

[42] 2012 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p5, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=4599.

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

[44] Average annual daily traffic data is available from the NC Department of Transportation at https://connect.ncdot.gov/resources/State-Mapping/Pages/Traffic-Monitoring-Reports-Statistics.aspx.

Station	Route	Location	Station	Percent Passenger	2016 AADT	Fleet Equivalent AADT
634	I-40	From Exit 297 to 298	09MC0033	92	113,000	194,360
889	I-40	From Exit 303 to 306	10MC0021	91	103,000	186,430

Table 54 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 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

Figure 76 shows an aerial view of the location. 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 76 Wake County Near-Road Monitoring Station Location, red circle

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. 2018 Annual Monitoring Network Plan for Forsyth County Office of Environmental Assistance and Protection.

D. Other Monitoring

Besides the monitoring required by 40 CFR 58 Appendix D, the DAQ also operates a background monitor at the Blackstone monitoring site in Lee County as part of a shale gas extraction background study. Because the DAQ finished the background study, the DAQ will shut this monitor down and relocate it to Northampton County to collect background data there. The DAQ also plans to add a background monitor to the ozone monitoring site at Rockwell.

Table 55 and Table 56 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 57 and Table 58 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 55 The 2018-2019 Nitrogen Dioxide Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041	37-119-0045	37-159-0021
Site Name:	Garinger	Remount Road	Rockwell
Street Address:	1130 Eastway Drive	902 Remount Road	301 West Street
City:	Charlotte	Charlotte	Rockwell
Latitude:	35.2401	35.212657	35.551868
Longitude:	-80.7857	-80.874401	-80.395039
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS	SLAMS	Special Purpose
Operating Schedule:	Hourly	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.	AQI reporting. Compliance w/NAAQS. .
Monitoring Objective:	Population exposure	Source oriented	General/background
Scale:	Neighborhood	Microscale	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 – RFNA-1289-074	Yes – EQNA-0512-200	Yes – EQNA-0512-200
Meets Requirements of Part 58 Appendix D:	Yes- area wide	Yes –near road	No – not required
Meets Requirements of Part 58 Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	Will start 1/1/2019

[a] The near road and Rockwell monitors use 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. The near-road and area-wide monitors are operated by Mecklenburg County Air Quality, AQS primary quality assurance and reporting agency 0669

Table 56 The 2018-2019 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 57 The Winston-Salem MSA Nitrogen Dioxide Monitoring Network [a]

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

[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 58 The 2018-2019 Nitrogen Dioxide Monitoring Network for Areas not in MSAs [a]

AQS Site Id Number:	37-105-0002	37-131-0003
Site Name:	Blackstone	Northampton
Street Address:	4110 Blackstone Drive	TBD
City:	Sanford	Gaston
Latitude:	35.432500	TBD
Longitude:	-79.288700	TBD
MSA, CSA or CBSA represented:	None	None
Monitor Type:	Special purpose	Special purpose
Operating Schedule:	Hourly	Hourly
Statement of Purpose:	General/background site for shale gas development study	General/background site for Atlanta Coast Pipeline study
Monitoring Objective:	General/ background	General/ background
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 – EQNA-0512-200	Yes – EQNA-0512-200
Meets Requirements of Part 58 Appendix D:	No	No
Meets Requirements of Part 58 Appendix E:	Yes	Yes
Proposal to Move or Change:	Site will shut down in 2018	Site will start in 2018

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

XII. Photochemical Assessment Monitoring Station, PAMS, Network

On Oct. 26, 2015, the United States Environmental Protection Agency, or EPA, published a revised national ambient air quality standard, or NAAQS, for ozone. 80 Fed. Reg. 65,291 (2015). In addition to establishing a revised NAAQS for ozone, the EPA also finalized revisions to the photochemical assessment monitoring station, or PAMS, network requirements. The EPA originally established the PAMS network requirements in 1993. They required areas in certain ozone nonattainment areas to gather ambient monitoring data that would be useful in evaluating control strategies and better understand ozone formation. See 58 Fed. Reg. 8452 (Feb. 12, 1993). The 2015 revisions to the PAMS monitoring requirements significantly changed the program and imposed for the first time PAMS ambient monitoring requirements at National Core, or NCore, sites in ozone attainment areas. The provision requiring PAMS in attainment areas was not included in the proposed rulemaking. Absent granting of a waiver, North Carolina is required to install two PAMs stations – one in Charlotte at the Garinger NCore monitoring station, 37-119-0041, and one in Raleigh at the Millbrook NCore monitoring station, 37-183-0014, by June 1, 2019. Information on the Charlotte Garinger NCore monitoring station is available in Appendix B. 2018 Annual Monitoring Network Plan for Mecklenburg County Air Quality.

The North Carolina Division of Air Quality, or DAQ, must submit a PAMS monitoring plan to the EPA regional administrator no later than July 1, 2018. The submittal is required by 40 CFR 58.10 (a)(10). The DAQ PAMS monitoring plan follows:

The DAQ operates an NCore monitoring station in accordance with 40 CFR Appendix D 3. The DAQ NCore station, 37-183-0014, is in the Raleigh MSA, which has a population of 1,000,000 or more. 40 CFR 58 Appendix D, 5(a) requires PAMS at NCore stations located in core-based statistical areas with populations of 1,000,000 or more.

40 CFR 58.13 (h) states "…The Photochemical Assessment Monitoring sites required under 40 CFR part 58 Appendix D, section 5(a) must be physically established and operating under all of the requirements of this part, including the requirements of appendix A, C, D and E of this part, no later than June 1, 2019."

A. PAMS Implementation Process

The DAQ is participating in the PAMS implementation process that is being directed by the EPA and associated EPA contractors, currently EPA and Battelle, collectively – EPA. The PAMS implementation process has consisted of a series of conference calls directed by EPA to disseminate and discuss monitoring requirements, monitoring methods, monitoring logistics, quality assurance requirements and general implementation processes, i.e. – national contracts, funding, etc. – relevant to PAMS monitoring. The EPA conducted the calls over the past 24 months. The PAMS conference calls have introduced and provided a series of guidance documents, draft quality assurance procedures and information on available systems for the collection of PAMS data.

As of May 19, 2018, the EPA has not provided funding to DAQ for operations, maintenance, equipment or capital expenditures in support of the PAMS implementation. Therefore, the DAQ anticipates a delay in establishment and operation of PAMS at the DAQ NCore station.

The DAQ worked with the EPA through the implementation process. The DAQ will continue to work with the EPA to implement the requirements as soon as practical and based on the availability of resources and the ability to acquire the necessary funding, equipment and operational expertise to begin operations within a reasonable timeframe after June 1, 2019, for a select set of PAMS parameters.

B. Major Objectives

Listed below are major objectives from 40 CFR 58 Appendix D 5(a) of the PAMS program with a description of the objective and DAQ's plan to implement the stated objective.

1. Expected PAMS Monitoring Location:

The expected PAMS monitoring location for selected PAMS parameters is the NCore station operated by the DAQ at East Millbrook Middle School, AQS ID – 37-183-0014. EPA has not allocated funding for required modifications and equipment for the monitoring station, i.e. – modifying cabinetry and shelving, ventilation for auto GC, additional electrical circuitry, etc. The DAQ will work to purchase equipment and make required modifications to the monitoring station as soon as practical after the EPA provided funding and equipment becomes available to DAQ.

2. Development of a PAMS Quality Assurance Project Plan:

EPA has stated that the EPA will provide a national "PAMS Quality Assurance Project Plan," or QAPP, for agencies to implement. The EPA has not yet distributed the QAPP to monitoring agencies. The DAQ will work to revise and adapt the EPA provided QAPP for use in the DAQ program as soon as practical and after the EPA-provided QAPP, funding and equipment becomes available to DAQ.

3. Measurement of hourly averaged speciated volatile organic compounds, or VOCs:

The DAQ specified an auto gas chromatographic system, or autoGC, to EPA and further defined those specifications to EPA. EPA provided a list of available autoGC systems to DAQ. DAQ responded to the EPA with a selection.

During a March 28, 2018, PAMS implementation workgroup conference call EPA informed participants that Markes/Agilent autoGCs may be delivered by late summer. The EPA did not specify the specific timing of the delivery of the equipment. DAQ will work to install and operate the autoGC that will collect "hourly averaged speciated VOCs," measurements in the DAQ program as soon as practical and after EPA provided funding and equipment becomes available to DAQ.

4. Three 8-hour averaged carbonyl samples per day on a 1-in-3-day schedule or hourly averaged formaldehyde:

As of May 19, 2018, the EPA has not provided funding for operations, maintenance, equipment or capital expenditures in support of carbonyls monitoring. The DAQ currently collects 24-hour carbonyl samples at Millbrook in support of DAQ's urban air toxics monitoring program. To implement PAMS carbonyl monitoring the DAQ will need funding to upgrade its carbonyl equipment. The DAQ will work to install and operate PAMS carbonyls monitoring in the DAQ program as soon as practical and after EPA-provided funding and equipment becomes available to DAQ.

5. Hourly averaged ozone:

The DAQ is currently conducting ozone monitoring at the Millbrook NCore, monitoring location in accordance with this requirement.

6. Hourly averaged nitrogen oxide, or NO, true nitrogen dioxide, or NO_2, and total reactive nitrogen, or NO_y:

As of May 19, 2018, the EPA has not provided funding for operations, maintenance, equipment or capital expenditures in support of true NO_2 monitoring. The EPA stated during the March 28, 2018, PAMS implementation conference call that funding for true NO_2 monitoring will likely be available in fiscal year 2020.

The DAQ currently operates a photolytic NO_2 monitor at the Millbrook NCore site and requests a waiver from operating a true NO_2 monitor at the Millbrook NCore site. See the waiver request in section II. Summary of Proposed Changes, E. Current Waivers and New Requests, 3. Waiver Requests. If the EPA does not grant the waiver, the DAQ will work to install and operate true NO_2 monitoring in the DAQ program as soon as practical and after EPA provided funding and equipment becomes available to DAQ.

The DAQ currently operates an NO and NO_y monitor at the Millbrook NCore monitoring location in accordance with this requirement.

7. Hourly averaged ambient temperature:

The DAQ currently collects hourly averaged ambient temperatures at the Millbrook NCore monitoring location in accordance with this requirement.

8. Hourly vector-averaged wind direction:

The DAQ currently collects hourly vector-averaged wind direction at the Millbrook NCore monitoring location in accordance with this requirement.

9. Hourly vector-averaged wind speed:

The DAQ currently collects hourly vector-averaged wind speed at the Millbrook NCore monitoring location in accordance with this requirement.

10. Hourly average atmospheric pressure:

The DAQ does not currently collect hourly average atmospheric pressure at the Millbrook NCore monitoring location. The DAQ will need to add a sensor to the site to collect this measurement.

11. Hourly averaged relative humidity:

The DAQ currently collects hourly averaged relative humidity at the Millbrook NCore monitoring location.

12. Hourly precipitation:

The DAQ currently collects hourly precipitation measurements at the Millbrook NCore monitoring location in accordance with this requirement.

13. Hourly averaged mixing-height:

As of May 19, 2018, the EPA has not provided funding for operations, maintenance, equipment or capital expenditures in support of hourly averaged mixing height monitoring. The DAQ will work to install and operate hourly averaged mixing height monitoring in the DAQ program as soon as practical and after the EPA provided funding, equipment and training becomes available to DAQ.

14. Hourly averaged solar radiation:

The DAQ currently collects hourly averaged solar radiation at the Millbrook NCore monitoring location in accordance with this requirement.

15. Hourly averaged ultraviolet radiation:

As of May 19, 2018, the EPA has not provided funding for operations, maintenance, equipment or capital expenditures in support of hourly averaged ultraviolet radiation monitoring. The DAQ will work to install and operate hourly averaged ultraviolet radiation monitoring in the DAQ program as soon as practical and after the EPA provided funding and equipment becomes available to DAQ.

C. Monitors/Methods

The Millbrook NCore site has the following PAMS monitors in place and operating since Jan. 1, 2011, or before, except for NO_2, which began Dec. 10, 2013:

Parameter	**Monitoring Objective**	**Scale of Representation**	**Operating Schedule**	**AQS Method Code**
Trace level reactive oxides of nitrogen, NO_y, including NO	Population exposure	Neighborhood	Hourly data year-round	674
Nitrogen dioxide, NO_2, including NO	Population exposure	Neighborhood	Hourly data year-round	200
Ozone, O_3	Population exposure	Neighborhood	Hourly data year-round	047
Meteorological measurements of:				

Parameter	Monitoring Objective	Scale of Representation	Operating Schedule	AQS Method Code
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
Solar radiation	Maximum ozone concentration	Neighborhood	Hourly data year-round	011
Rain melt precipitation	Maximum ozone concentration	Neighborhood	Hourly data year-round	011

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

Table 59 provides the dates the United States Environmental Protection Agency, or EPA, approved the quality management plan, or QMP, and quality assurance project plans, or QAPPs, for the North Carolina Division of Air Quality, or DAQ.

Table 59. 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)
Quality Assurance Project Plan for Urban Air Toxics Monitoring	(Submitted July 2, 2014)
Quality Assurance Project Plan for Data Requirements Rule Sulfur Dioxide Monitoring	Jan. 6, 2017

The North Carolina Department of Environmental Quality, or DEQ, submitted an updated QMP to EPA Region 4 in June 2017. The EPA Region 4 had questions on the QMP. The DEQ decided to wait until the EPA's Office of Environmental Information, or OEI, approved the Region 4 QMP before addressing those questions. The EPA Region 4 expects OEI to approve the EPA Region 4 QMP on June 29, 2018. The DEQ will use the approved EPA Region 4 QMP as the basis for changes to address the remaining questions EPA Region 4 had.

In 2018, the DAQ is updating all its QAPPs. Table 60 provides the status of the QAPPs that DAQ has revised and submitted to the EPA. Besides the QAPPs listed in the table, the DAQ is revising the NCore and speciation $PM_{2.5}$ QAPPs. The DAQ is also writing QAPPs for the population weighted emission index sulfur dioxide monitoring program, meteorological data, sampling for emergent chemicals in rain water and for special sampling occurring in Duplin County. The DAQ will submit all these QAPPs later this year.

Table 60. Status of Updates to the Quality Assurance Project Plans

Quality Assurance Project Plan	Date Submitted to EPA	Date Comments Received from EPA
Ozone QAPP, Version 0	9/11/2017	4/2/2018
Urban Air Toxics Monitoring Program	3/12/2018	3/15/2018
Particulate Matter Monitoring Program, Version 0	3/7/2018	5/7/2018
Near Road Monitoring Program, Version 0	3/14/2018	5/18/2018
Northampton County Background Monitoring Program, Version 0	3/29/2018	Projected 10/15/2018
Rotating Background Monitoring Program, Version 0	3/29/2018	Projected 10/15/2018

Concurrence and Approvals

(1)	Name	**Sheila Holman**	Phone	(919) 733-3340
	Title	Director, Division of Air Quality		
	Signature	Sheila Holman	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 77. 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. 02-0235

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

(Brock copied 11/13)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

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

NOV 0 6 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. Burger 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

Figure 78. NCore QAPP Submittal Documentation

1.0 Approval Sheet

Title: Quality Assurance Project Plan for the North Carolina Division of Air Quality SO_2 Data Requirements Rule Monitoring Program

The attached *Quality Assurance Project Plan for the North Carolina Division of Air Quality SO_2 Data Requirements Rule Monitoring Program* is hereby recommended for approval and commits the State of *North Carolina*, Department of Environmental Quality (Division of Air Quality) to follow the elements described within.

1) Signature: ______________________ Date 12/29/16
   DEQ, Air Quality Division Director

2) Signature: ______________________ Date 12/29/16
   DAQ Acting Quality Assurance Manager

3) Signature: ______________________ Date 12/28/2016
   Duke Energy Project Manager

4) Signature: ______________________ Date 01/06/17
   EPA Region 4 Quality Assurance Officer

Figure 79. Signature page for the Sulfur Dioxide Data Requirements Rule Quality Assurance Project Plan

XIV. Equipment Condition of North Carolina Monitoring Sites

Ozone calibrators Thermo 49 CPS have all been retired. The Electronics and Calibration Branch, or ECB, was using four calibrators for audit devices and lab standards. The manufacturer stopped support for this equipment in August 2015. The Division of Air Quality, or DAQ replaced these calibrators with Thermo 49i-PS calibrators in 2017. The ECB uses two units for primary and backup lab standards and two for primary and backup audit devices.

Ozone analyzers Thermo 49i and calibrators Thermo 49i-PS are new. The DAQ, purchased them in 2013 and 2014 and they are in good condition. The DAQ acquired 45 each and deployed them to the field since the beginning of the 2015 ozone season. Currently DAQ operates 28 sites and audits eight sites for the local and tribal programs. Thermo will no longer support the i-Models after 2025.

Environics Model 7000 Zero Air Generators, ZAG, are new. The DAQ purchased them in 2014 and they are in good condition. ECB has five units. The DAQ uses them in the maintenance lab at the technician's work benches.

API Teledyne Model 701 ZAGs are new, having been purchased in 2014 and 2015 and are in good condition. ECB has 74 of these ZAGs and deployed them starting in 2015 to all DAQ sites requiring zero air.

API Teledyne Model 751H Portable ZAGs are new. The DAQ purchased them in 2014 and 2015 and they are in good condition. ECB has two 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 has retired all ZAS units after new air supplies have proven to meet all air supply needs.

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 DAQ replaced the analyzers with 43i's and deployed them in 2017.

SO_2 analyzers Thermo 43i are new. The DAQ purchased them in 2015 and they are in good condition. ECB has 11 - 43i's and eight - 43i-TLE analyzers. They are currently supporting six year-round sites, of which 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 the DAQ replaced them in 2017 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-Y 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. The manufacturer only supported them until August 2015. The division replaced the last one that was in operation in 2017.

Thermo 146i calibrators used with SO_2, CO and NO_y are new (2015) and in good condition. The division has 15 and replaced the last 146C model in 2017.

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

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

NO2 Nitrogen Dioxide Teledyne T700U calibrators are in good condition. DAQ has six (2012, 2013 and 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 continuous speciation site at Millbrook CSS. One unit is in fair condition. The ECB uses the other unit for spare parts.

SO4 sulfate analyzers – Thermo Model 5020c; DAQ owns two (2005); one is operating at the Millbrook CSS and is in fair to good condition. Thermo stopped supporting them in 2015. DAQ buys maintenance parts annually for this equipment. The ECB replaced the Model 5020c SO4 monitor at the Millbrook CSS 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 ECB can maintain them.

Total suspended particulate, TSP, DAQ has kept six (1996) in its inventory, they are in fair condition and ECB can maintain them. ECB sent the other systems to surplus 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 surplus unused Weddings in 2018.

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 ECB uses the older units as spares to maintain the remaining units.

Met One Super SASS-110, DAQ purchased one unit in 2018. Deployment plans have not been determined.

Thermo Partisol 2025 $PM_{2.5}$ units; DAQ owns 40 (1998 – 2001); while showing some age, they are in poor to fair condition. These units are no longer supported by the manufacturer and will be gradually replaced beginning in 2017. There are only two units remaining in the field. The ECB plans to replace them with 2025i models in 2018.

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, the ECB will use them for spare parts. The two received in 2016; ECB installed one at the Millbrook site and the second one went to Mecklenburg County. DAQ has purchased seven units for 2017 and will deploy them gradually in 2017-2018.

Beta attenuation monitors, BAM, Model 1020 – DAQ owns 24; 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 18, equipment was new (2015 and 2016) and in good condition. DAQ purchased four additional units in 2017.

E-BAM monitors, DAQ currently owns three E-BAMS that are stored at the ECB for deployment as necessary. One unit is older and in good working condition, while one unit was purchased in 2017 and the other in 2018.

Tapered element oscillating microbalance, TEOM, monitors are in poor condition. The manufacturer no longer supports them. The ECB replaced them in the field with BAMs. The ECB sent the equipment to surplus in 2017. No TEOM monitors remain in DAQ.

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 DAQ 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. To support the PAMS monitoring requirements, DAQ will need to purchase aldehyde samplers capable of collecting three 8-hour samples during a 24-hour period.

Magee Scientific Aethalometer, DAQ has retired one AE21 monitor. The DAQ currently uses an AE22 monitor in the field and that monitor is in good condition. DAQ purchased an AE33 monitor in 2018 that will replace the AE22 monitor currently in the field.

API T640, DAQ owns three monitors purchased between 2016 and 2017. DAQ is testing one unit in the field and the other two units in the lab. DAQ has plans to purchase more units in the future.

XV. 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 at http://www.ecfr.gov/cgi-bin/text-idx?SID=87c8d2b6f9ef2f4c8b11437b1077746b&mc=true&node=ap40.6.58_161.a&rgn=div9.

3. 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 at http://www.ecfr.gov/cgi-bin/textidx?SID=da14c4661eddfd14519d93a82e410ec9&mc=true&node=ap40.6.58_161.d&rgn=div9.

4. State of North Carolina, Department of Transportation. Traffic Count Information. http://www.ncdot.org/travel/statemapping/trafficvolumemaps/default.html. 1500 Mail Service Center, Raleigh, NC, 27699-1500.

5. State of North Carolina, Department of Transportation. Traffic Survey Annual Average Daily Traffic. http://www.ncdot.gov/projects/trafficsurvey/default.html. 1500 Mail Service Center, Raleigh, NC, 27699-1500.

6. List of Designated Reference and Equivalent Methods. Issue Date: Dec. 17, 2016. https://www3.epa.gov/ttn/amtic/files/ambient/criteria/AMTIC%20List%20Dec%202016-2.pdf. United States Environmental Protection Agency, National Exposure Research Laboratory, Human Exposure & Atmospheric Sciences Division (MD-D205-03), Research Triangle Park, NC 27711.

7. United States Census Bureau, Population Division. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016. Released March 23, 2017, available at http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.

8. 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 at https://obamawhitehouse.archives.gov/sites/default/files/omb/bulletins/2013/b13-01.pdf, accessed May. 18, 2017.

9. Office of Management and Budget, OMB BULLETIN NO. 15-01: Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas and Combined Statistical Areas and Guidance on Uses of the Delineations of These Areas, July. 15, 2015, available

athttps://obamawhitehouse.archives.gov/sites/default/files/omb/bulletins/2015/15-01.pdf, accessed May 18, 2017.

10. Ambient Air Monitoring Network Assessment Guidance, Analytical Techniques for Technical Assessments of Ambient Air Monitoring Networks, United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Air Quality Assessment Division, Research Triangle Park, NC; available at http://www.epa.gov/ttnamti1/files/ambient/pm25/datamang/network-assessment-guidance.pdf.

11. 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, available at https://www.gpo.gov/fdsys/pkg/FR-2015-08-

12. SO2 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.

13. 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.

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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

	CO	SO_2		NO_y			PAMS		$PM_{2.5}$				Meteorology			
Site ID Site Name	T	R	T	T	NO_2	O_3	Auto GC	PM_{10}	M	C	S	WS/ WD	AT/ RH	BP	RF/ SR	UAT
370030005 Taylorsville-Liledoun						X		X								
370110002 Linville Falls						X										
370130151 Bayview Ferry		X										X	P	P		
370190005 Southport DRR			X									X	P	P		
370210030[a] Bent Creek						X										
370210034 [a] Board of Ed									X	X						
370210035 [a] AB Tech College																VOC
370210036 [b] Skyland DRR			X									X				
370270003 Lenoir		X				X										
370330001 Cherry Grove						X		X								
370350004 Hickory Water Tower									X	X						
370510008 Wade						X										
370510009 Wm Owen								X	2	X						
370510010 Honeycutt		X				X										
370570002 Lexington Water Tower									X	X						
370630015 Durham Armory		X				X		X	X	X						
370650099 Leggett						X				X						
370670022[c] Hattie Ave.		X			X	X		X	X	X	X					VOC
370670030 [c] Clemmons						X				X						
370671008 [c] Union Cross						X						X	AT			
370750001[d] Joanna Bald						X										

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

Site ID Site Name	CO T	SO2 R	 T	NOy T	NO_2	O_3	PAMS Auto GC	PM_{10}	$PM_{2.5}$ M	 C	 S	WS/ WD	Meteorology AT/ RH	 BP	 RF/ SR	UAT
370770001 Butner						X										
370810013 Mendenhall						X		X		X					SR	
370870008 Waynesville E.S.						X										
370870013 Canton DRR			X													
370870035 Fry Pan						X										
370870036 Purchase Knob						X										
371010002 West Johnston						X				X						
371050002 Blackstone			E		E	E				E		E	E			E
371070004 Lenoir Community College						X		X								
371090004 Crouse						X										
371170001 Jamesville		X				X		X								
371190041 [e] Garinger	X		X	X	X	X	P	X	X	X	X	X	X	X	X	VOC
371190042 [e] Montclaire								X		X						
371190044 [e] Remont Rd	X				X				X	X						
371190046[e] University Meadows						X									SR	
371210004 Spruce Pine Hospital										X						
371230001 Candor								X		X		X	X	P		VOC ALD
371290002 Castle Hayne						X		X		X						
371290010 Battleship																VOC
371310003 Northampton					P					P						
371450003 Bushy Fork						X										
371450004 [b] Semora DRR		X										X				
371470006 Pitt Co Ag Cen						X			X	X						

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

Site ID Site Name	CO	SO_2		NO_y			PAMS		$PM_{2.5}$				Meteorology			
	T	R	T	T	NO_2	O_3	Auto GC	PM_{10}	M	C	S	WS/ WD	AT/ RH	BP	RF/ SR	UAT
371570099 Bethany		X				X										
371590021 Rockwell					P	X				P					SR	
371730002 Bryson City						X				X		X	X	P		
371790003 Monroe M. S.						X										
371830014 Millbrook	X		X	X	X	X	P	X	X	X	X	X	X	P	X	VOC ALD
371830021 Triple Oak Rd	X				X					X						
371990004 Mt Mitchell						X										

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, 43i monitor for SO_2
T = 48i or Teledyne API (TAPI) 300EU monitor for CO, 43i TLE monitor for SO_2
M = 2025 or 2025i Sequential
C = TEOM or BAM1020 or 1022
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

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

Appendix B. 2018 Annual Monitoring Network Plan for Mecklenburg County Air Quality

Available at:

http://charmeck.org/mecklenburg/county/LUESA/AirQuality/Air-Quality-Data/Scripts/MCAQ%20Annual%20Monitoring%20Network%20Plan_2017_2018_Public_Comment.pdf

Appendix C. 2018 Annual Monitoring Network Plan for Forsyth County Office of Environmental Assistance and Protection

Available at:

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

Appendix D. Blackstone Data Analysis for Shutting Down the Criteria Pollutant Monitors

The Blackstone, 37-105-0002, monitoring station is in the Sanford Micropolitan Statistical Area and the Raleigh-Durham-Chapel Hill Combined Statistical Area, CSA, as shown in Figure 80. The North Carolina Division of Air Quality, or DAQ, established this monitoring station in November 2013 to acquire background air quality data before the start of shale gas extraction in the Sanford area. The DAQ monitors for ozone, nitrogen dioxide, NO_2, sulfur dioxide, fine particles and air toxics at this site. The DAQ proposed shutting down this site in the 2017-2018 annual network plan after the DAQ analyzed the data collected for the shale gas extraction background study in 2014 through 2016. The DAQ completed this data analysis in 2017 and the published report will be available in 2018 at https://deq.nc.gov/about/divisions/air-quality/air-quality-data/special-studies. The rest of this appendix discusses additional analyses DAQ conducted to support shutting down the criteria pollutant monitors at this site in compliance with guidance provided by the United States Environmental Protection Agency, or EPA, Region 4.

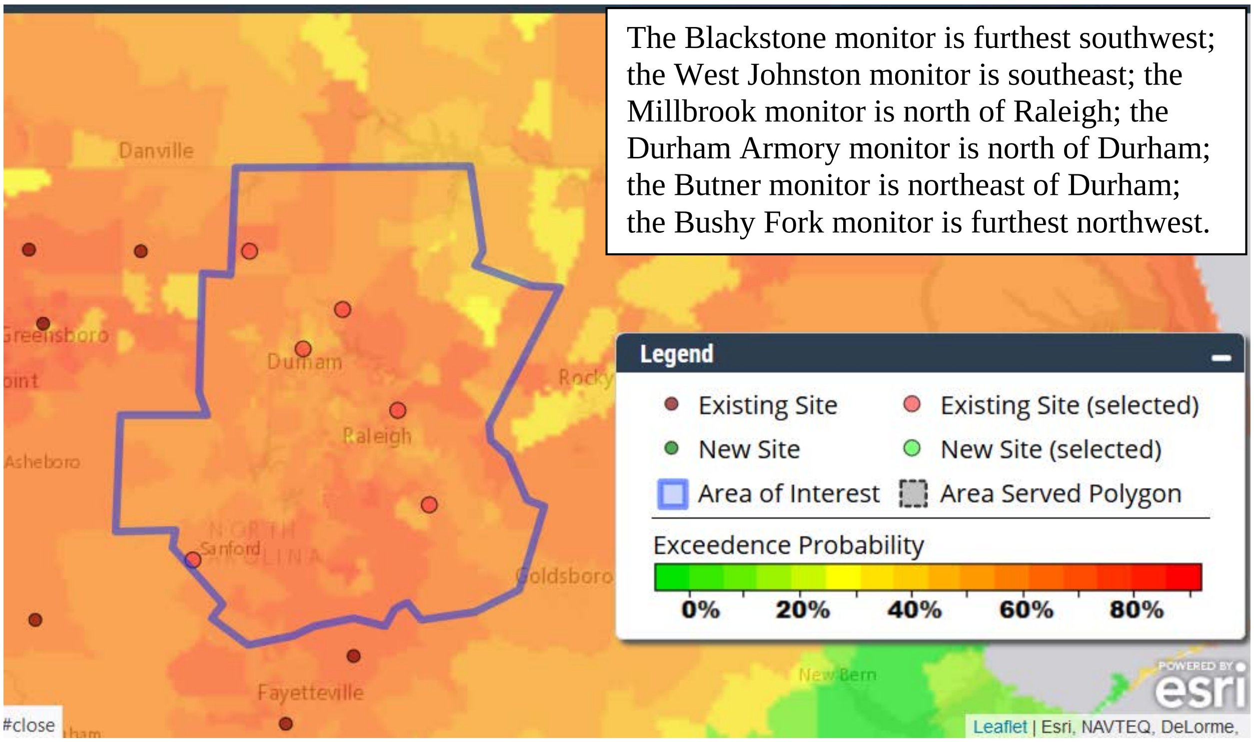


Figure 80. Raleigh-Durham-Chapel Hill CSA Ozone Monitor Locations.

Ozone Monitoring

The ozone monitor is located upwind of the Raleigh Metropolitan Statistical Area, MSA, when the wind is coming from the primary wind direction during the summer when measured ozone concentrations are the highest in the urban areas of Durham and Raleigh, see Figure 81 and Figure 82. The measured ozone concentrations are highest at Blackstone in March and April when the primary wind direction is more southerly, see Figure 82 and Figure 83. Figure 84 shows how the average maximum daily 8-hour ozone concentration varies by day of the week. Early in the week, the Blackstone monitor tracks with the Armory monitor and late in the week, it tracks with the West Johnston monitor. Figure 85 through Figure 92 show the diurnal variation overall and for each day of the week. Blackstone shows the same diurnal patterns as other nearby monitors.

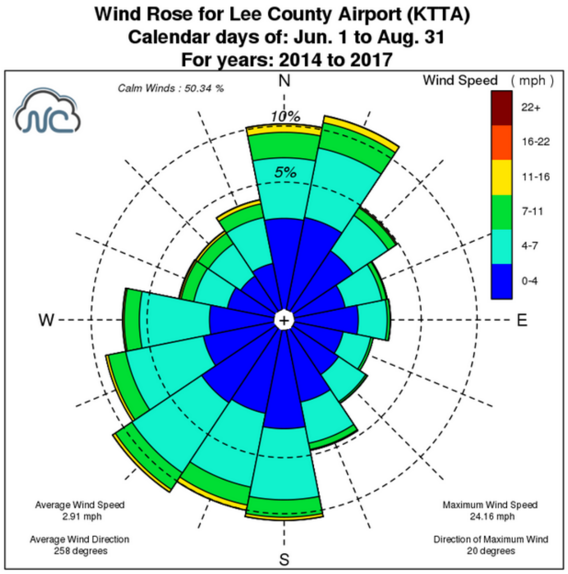


Figure 81. Wind rose for June to August, measured at the airport in Sanford

Provided by the North Carolina State Climate Office (http://www.nc-climate.ncsu.edu/windrose?state=NC&station=KTTA)

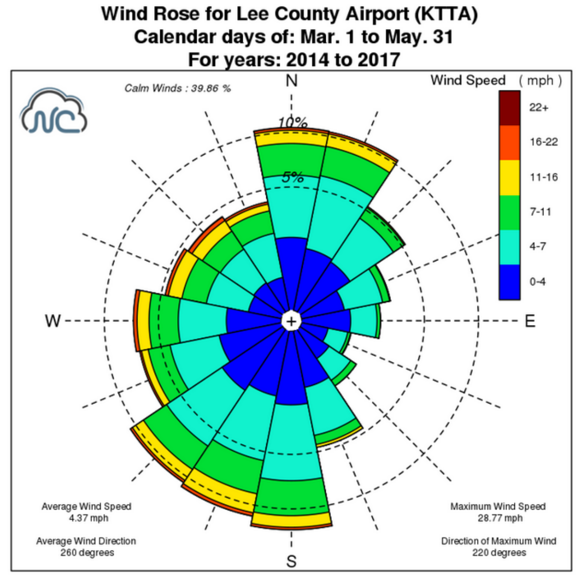


Figure 83. Wind rose for March to May, measured at the airport in Sanford

Provided by the North Carolina State Climate Office (http://www.nc-climate.ncsu.edu/windrose?state=NC&station=KTTA)

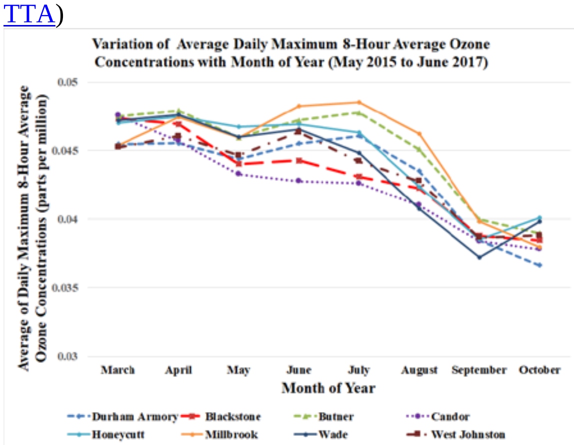


Figure 82. Variation of Average Daily Maximum 8-Hour Average Ozone Concentrations with Month of Year

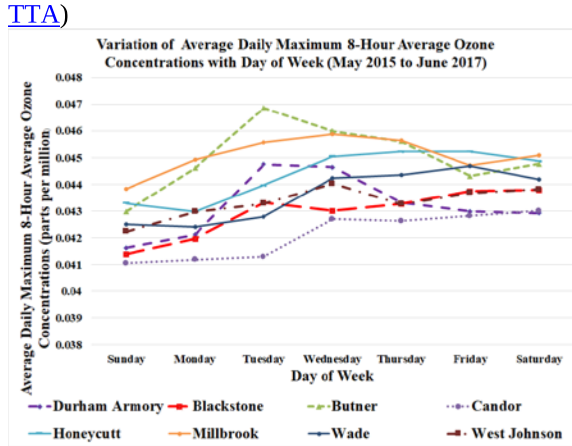


Figure 84. Variation of Average Daily Maximum Average 8-Hour Ozone Concentrations with Day of Week

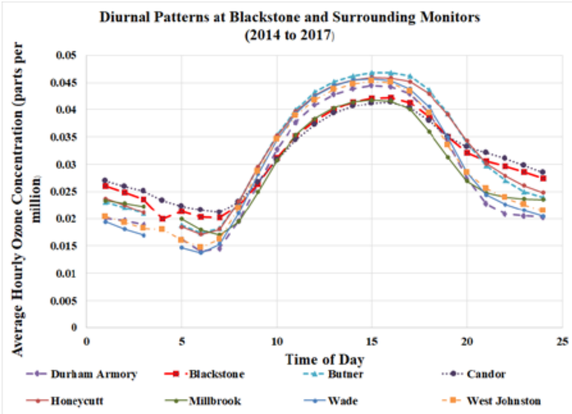


Figure 85. Diurnal variation of average ozone concentration

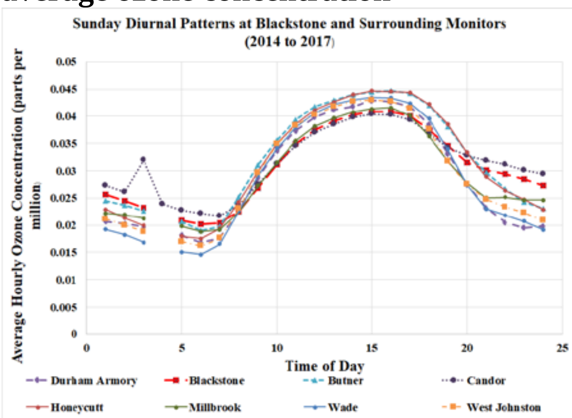


Figure 86. Sunday diurnal variations of average ozone concentration

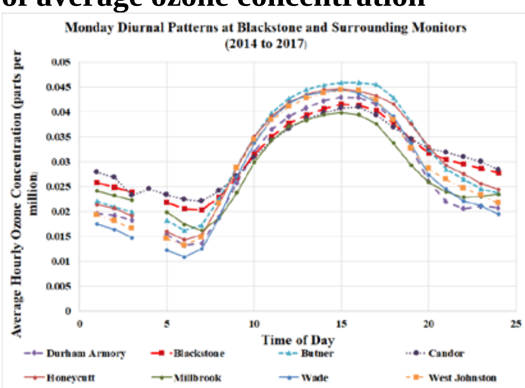


Figure 87. Monday diurnal variation of average ozone concentrations

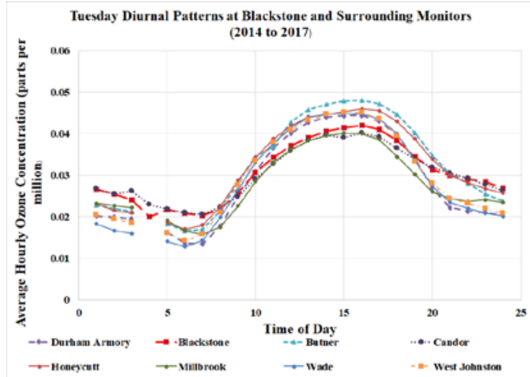


Figure 88. Tuesday diurnal variation of average ozone concentrations

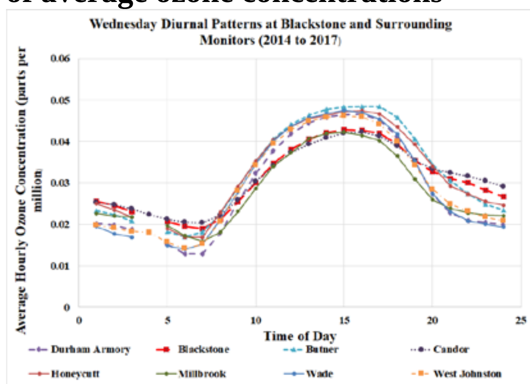


Figure 89. Wednesday diurnal variation of average ozone concentration

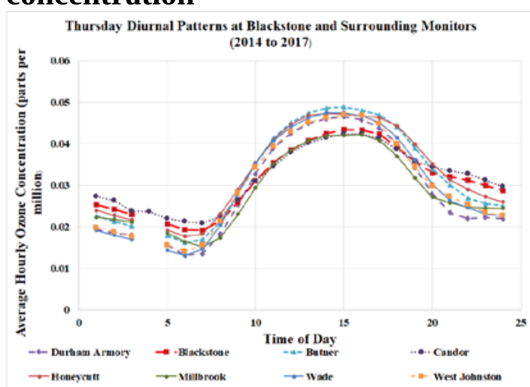


Figure 90. Thursday diurnal variation of average ozone concentration

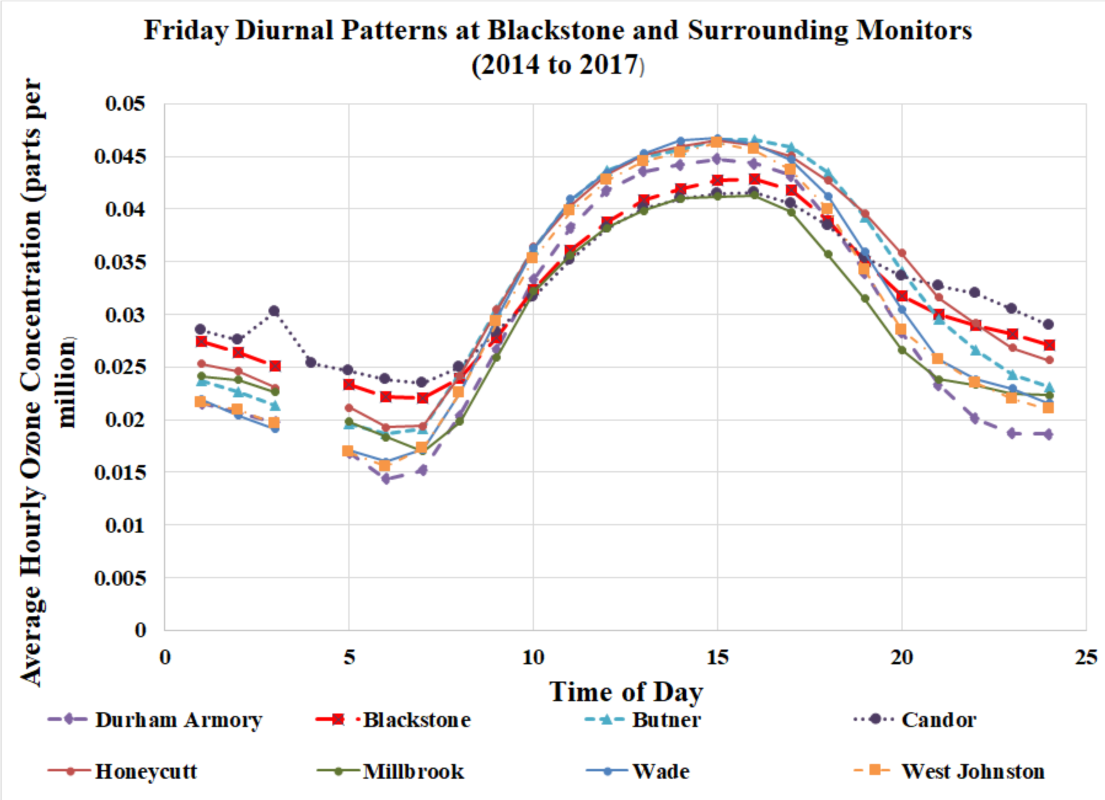


Figure 91. Friday diurnal variation of average ozone concentrations

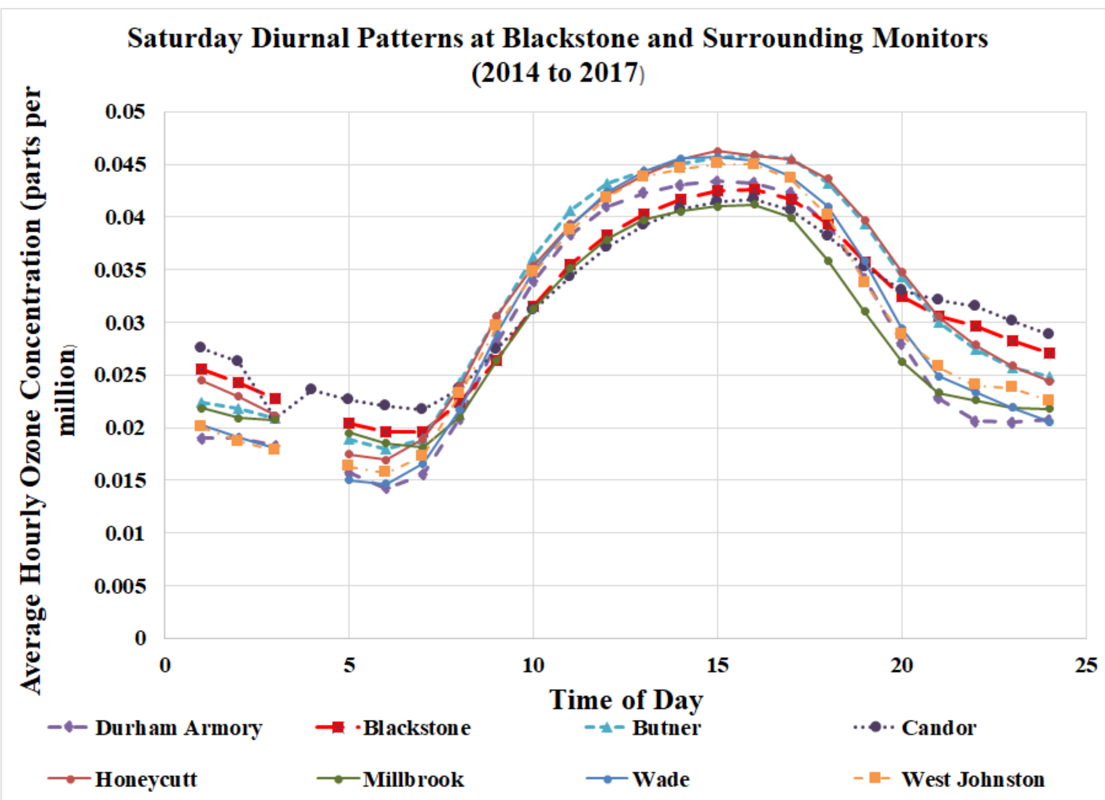


Figure 92. Saturday diurnal variation of average ozone concentrations

<u>Design value analysis</u> – The 2015-2017 design value at Blackstone is 0.061 parts per million, ppm. This is less than the 2014-2016 design value of 0.062 ppm. Figure 93 shows the design values at nearby monitors declined the past seven years. During the past two years, Blackstone followed the same trend as the CASTNET monitor at Candor and the monitors at the Durham Armory, Bushy Fork and West Johnston. Blackstone and the Durham Armory recorded the same design values for the past two years.

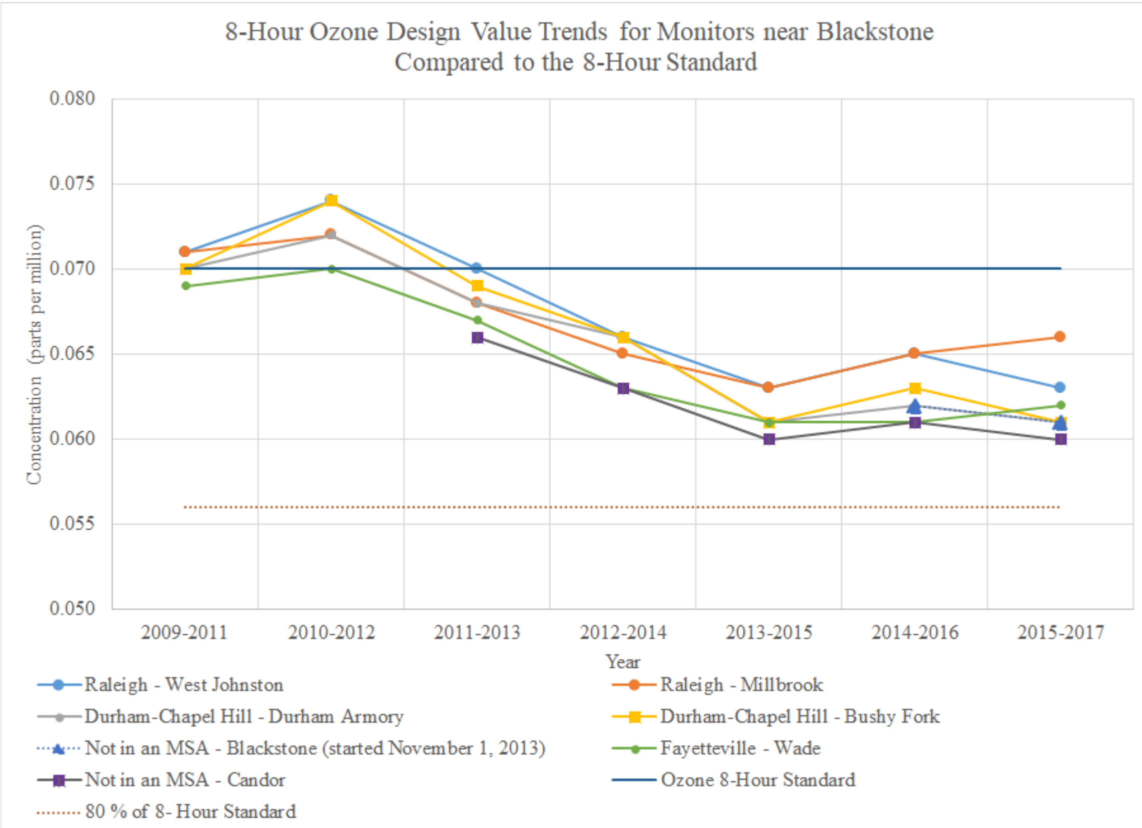


Figure 93. Ozone design value trends for ozone monitors near Blackstone

<u>AQI value analysis</u> – As shown in Table 61, the AQI measured at Blackstone was similar to the AQI measured at other nearby monitors. Blackstone matched the monitors in Cumberland and Durham most closely. The monitors at Blackstone measured good air quality 77 and moderate air quality 23 percent of the time. The ozone monitor determined the AQI 55 and the fine particle monitor 45 percent of the time.

Table 61 Comparison of 2017 AQI values in Lee County with other nearby counties

County	Days with AQI	Good Days	Moderate Days	Days Unhealthy for Sensitive Groups	AQI Maximum	AQI 90th Percentile	AQI Median
Cumberland	365	268	97		100	58	43
Durham	365	269	96		100	58	43
Granville	243	210	33		93	51	43
Johnston	365	289	76		93	56	40
Lee	360	276	84		97	58	43

Table 61 Comparison of 2017 AQI values in Lee County with other nearby counties

County	Days with AQI	Good Days	Moderate Days	Days Unhealthy for Sensitive Groups	AQI Maximum	AQI 90th Percentile	AQI Median
Montgomery	365	343	22		71	49	38
Person	361	338	22	1	110	49	35
Wake	365	252	113		100	61	44

<u>Correlation analysis</u> – Blackstone is within 100 kilometers of other sites in the Raleigh and Fayetteville regions. The daily 8-hour maximum ozone readings at Blackstone correlate well with the readings at several of these sites as shown in Figure 94 through Figure 99. The EPA assessment guidance states: "Monitors with concentrations that correlate well (e.g., $r^2 > 0.75$) with concentrations at another monitor may be redundant."[45]

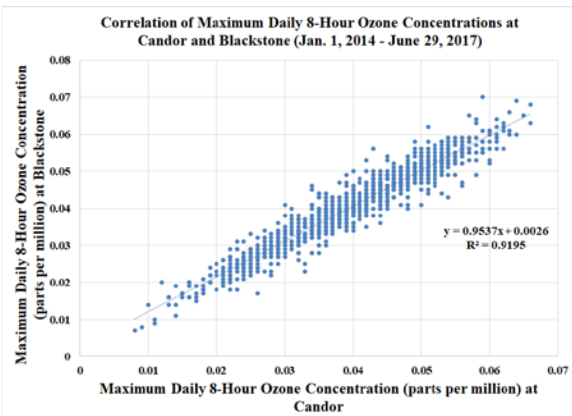


Figure 94. Correlation of Daily 8-Hour Maximum Ozone Measurements at Candor and Blackstone.

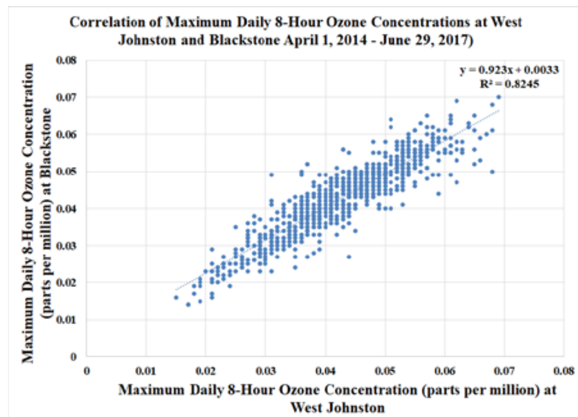


Figure 96. Correlation of Daily 8-Hour Maximum Ozone Measurements at West Johnston and Blackstone

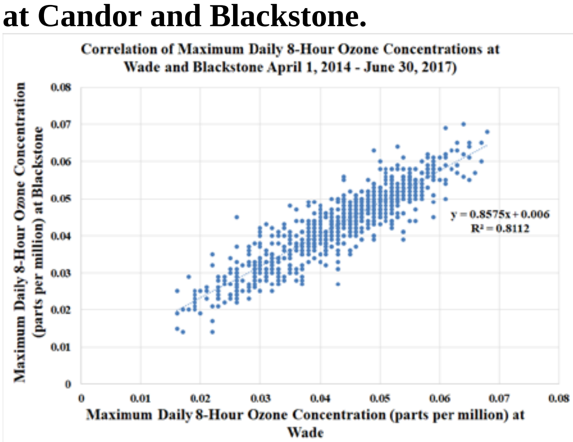


Figure 95. Correlation of Daily 8-Hour Maximum Ozone Measurements at Wade and Blackstone

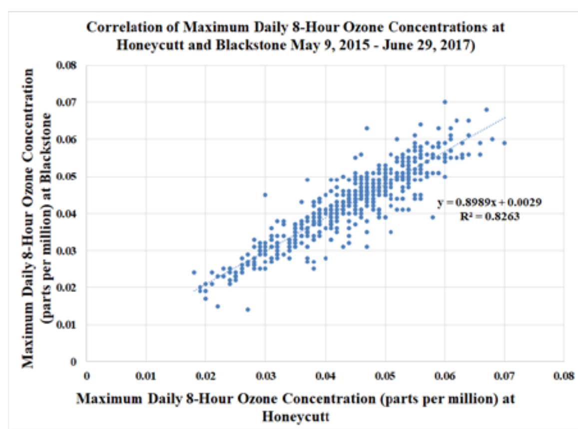


Figure 97. Correlation of Daily 8-Hour Maximum Ozone Measurements at Honeycutt and Blackstone

[45] Raffuse, Sean M., et al, Ambient Air Monitoring Network Assessment Guidance: Analytical Techniques for Technical Assessments of Ambient Air Monitoring Networks, EPA-454/D-07-001, February 2007.

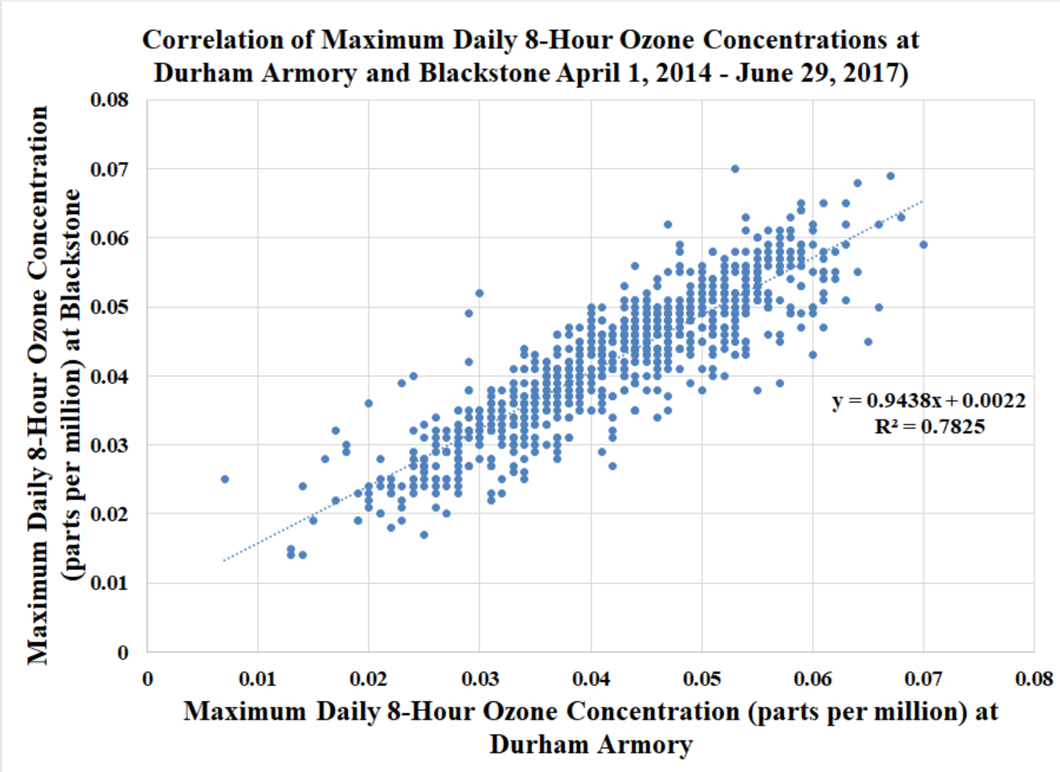


Figure 98. Correlation of Daily 8-Hour Maximum Ozone Concentrations at Durham Armory and Blackstone

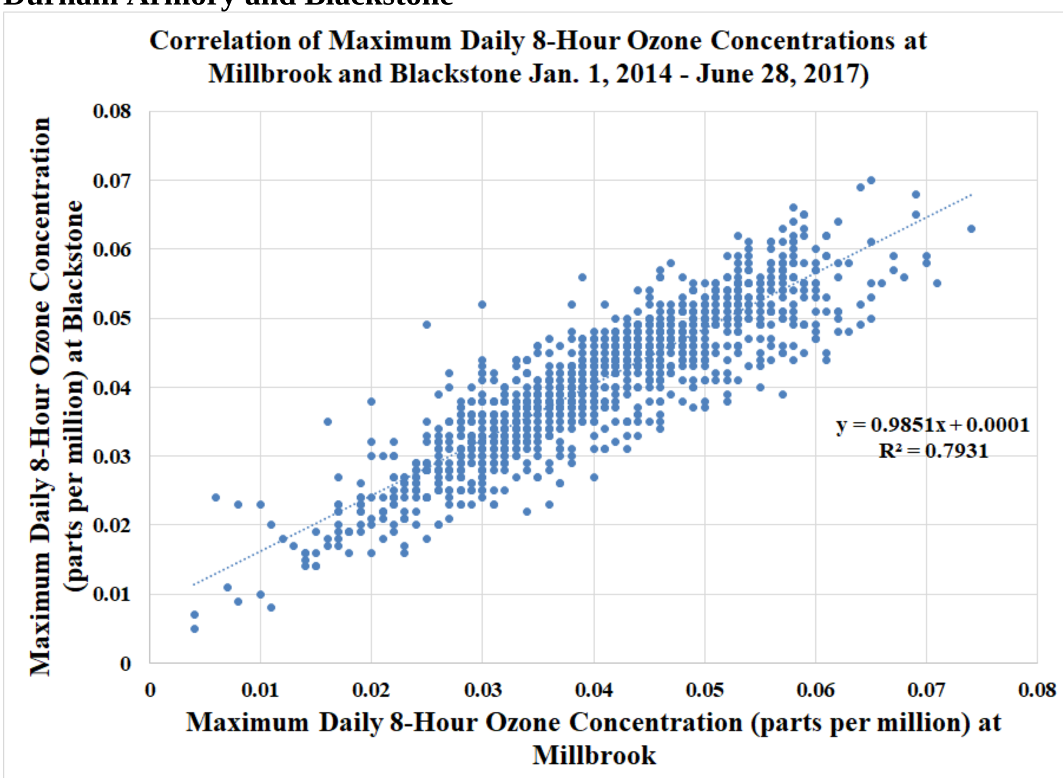


Figure 99. Correlation of Daily 8-Hour Maximum Ozone Concentrations at Millbrook and Blackstone

Figure 100 through Figure 102 show the daily maximum 8-hour ozone concentrations at Blackstone and seven nearby sites during 2015, 2016 and 2017. The Blackstone monitor was higher than or equal to the other seven monitors on 45 days out of 575 and on all but five of those 45 days, the 8-hour maximum ozone concentrations were below 0.060 parts per million. Thus, the DAQ believes the ozone concentrations measured by nearby monitors can adequately model and characterize ozone concentrations in Lee County.

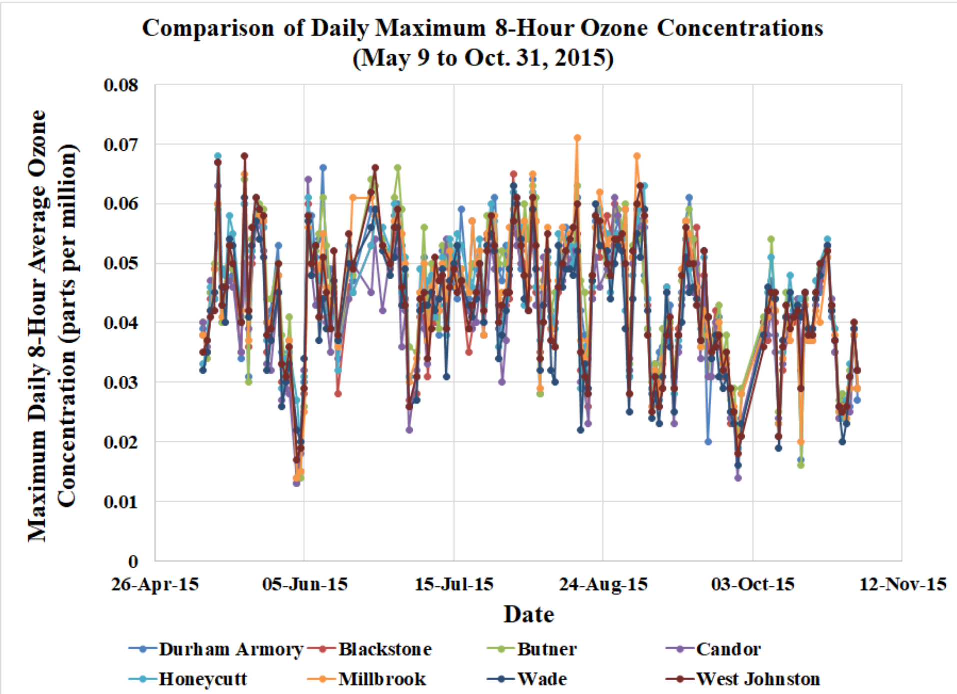


Figure 100. Comparison of 2015 Daily Maximum 8-Hour Ozone Concentrations

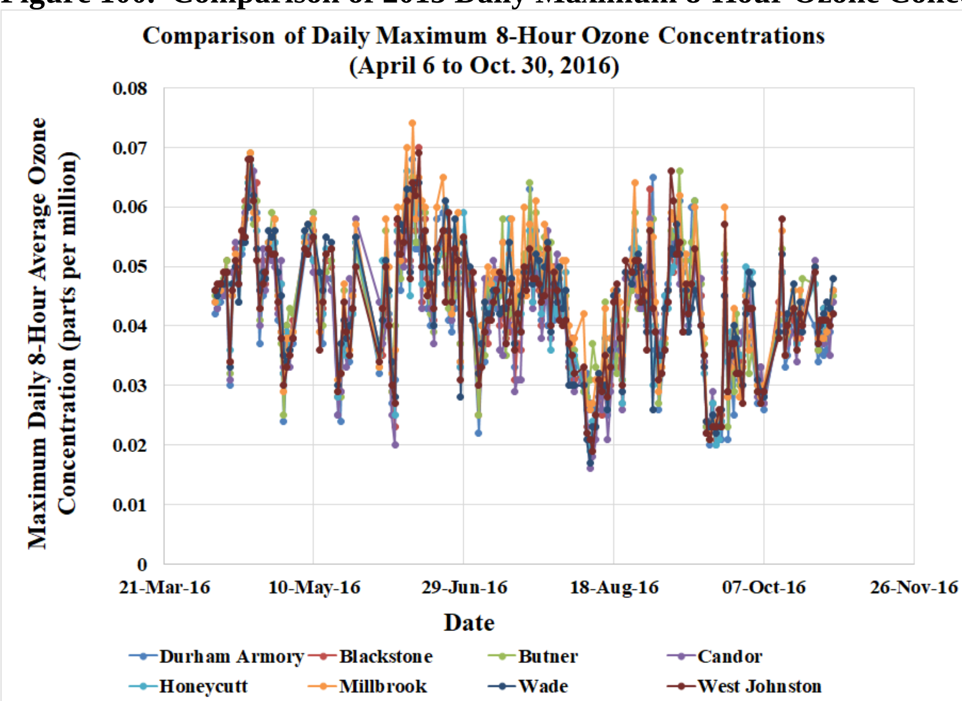


Figure 101. Comparison of 2016 Daily Maximum 8-Hour Ozone Concentrations

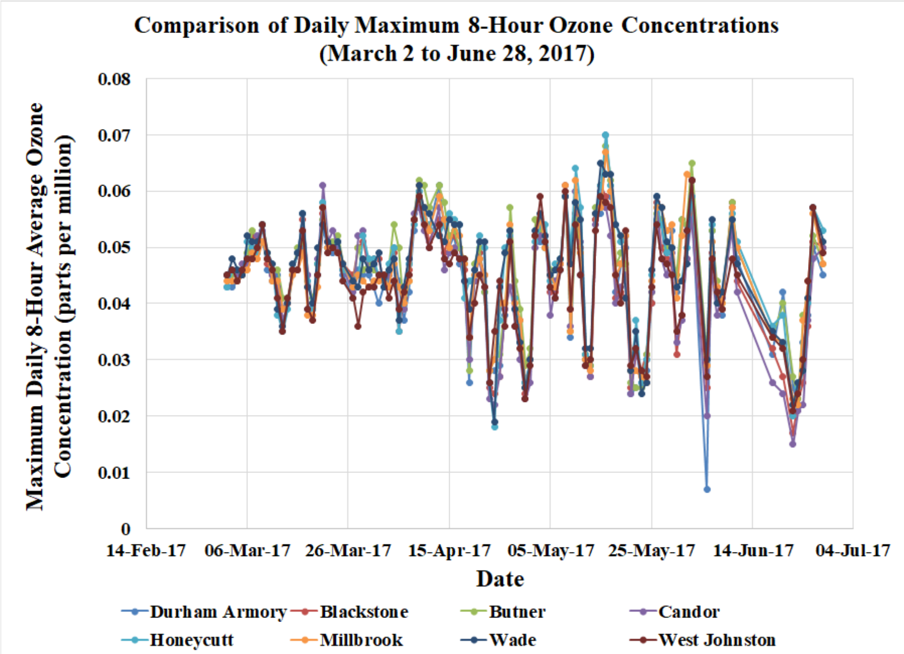


Figure 102. Comparison of 2017 Daily Maximum 8-Hour Ozone Concentrations

Nitrogen Dioxide Monitoring

As shown in Figure 103, the NO_2 concentrations at Blackstone remain constant throughout the year, with slightly higher concentrations occurring from December through February. The wind rose from the Lee County Airport, shown in Figure 104, indicates the primary wind direction in Lee County during this time of the year is from the north. Figure 105 shows the variation of the average maximum daily one-hour NO_2 concentration during the week. Concentrations measured at Blackstone do not vary much from one day of the week to another. Figure 106 through Figure 113 show the diurnal variation overall and for each day of the week. Blackstone shows a flat diurnal pattern unlike the other sites, which have peaks during morning and evening rush hours.

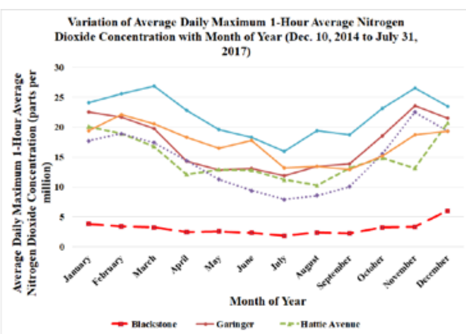


Figure 103. Variation of Average Daily Maximum 1-Hour Average NO_2 Concentrations with Month of Year

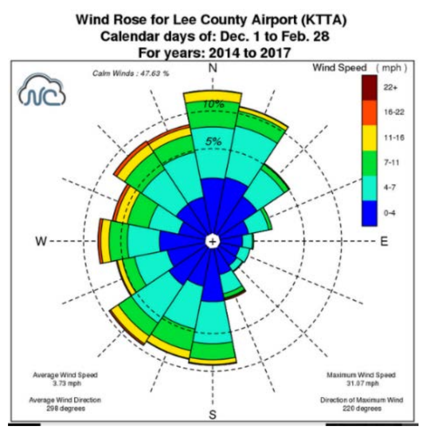


Figure 104. Wind rose for December to February, measured at the airport in Sanford

Provided by the North Carolina State Climate Office (http://www.nc-climate.ncsu.edu/windrose?state=NC&station=KTTA)

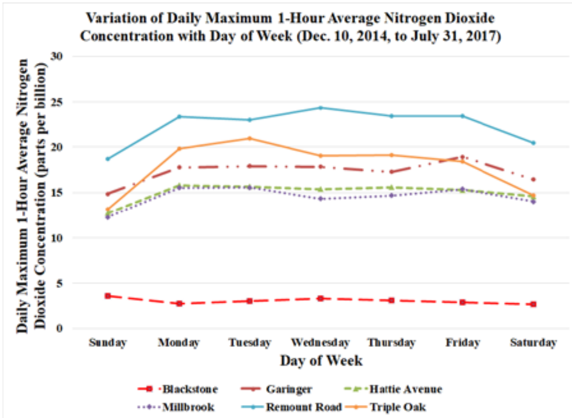


Figure 105. Variation of Average Daily Maximum 1-Hour Average NO_2 Concentrations with Day of Week

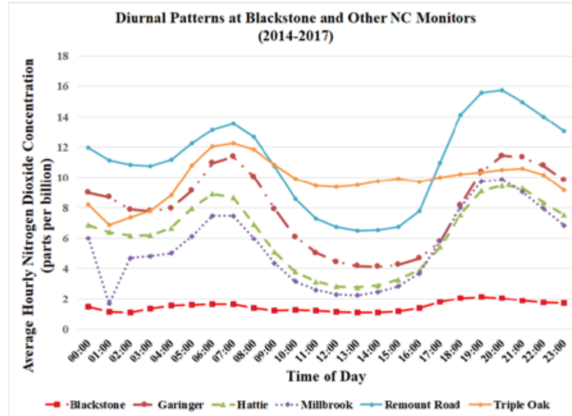


Figure 106. Diurnal variation of average NO_2 concentration

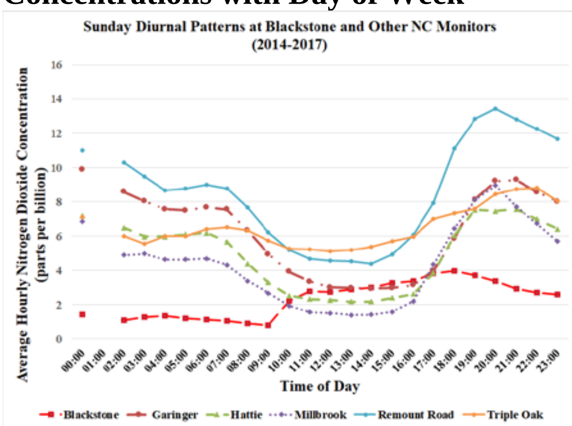


Figure 107. Sunday diurnal variations of average NO_2 concentration

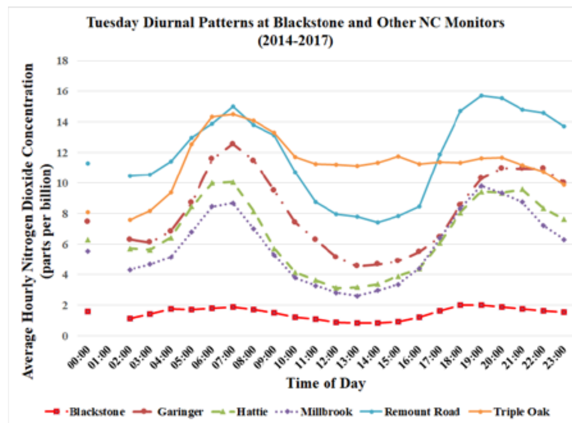


Figure 109. Tuesday diurnal variation of average NO_2 concentrations

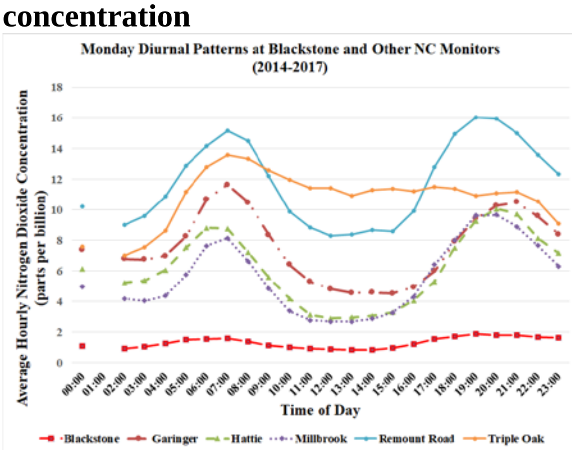


Figure 108. Monday diurnal variation of average NO_2 concentrations

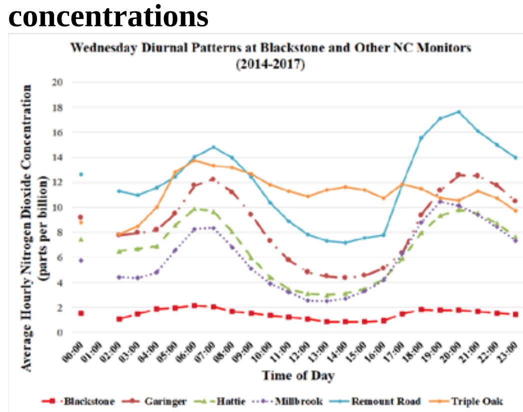


Figure 110. Wednesday diurnal variation of average NO_2 concentration

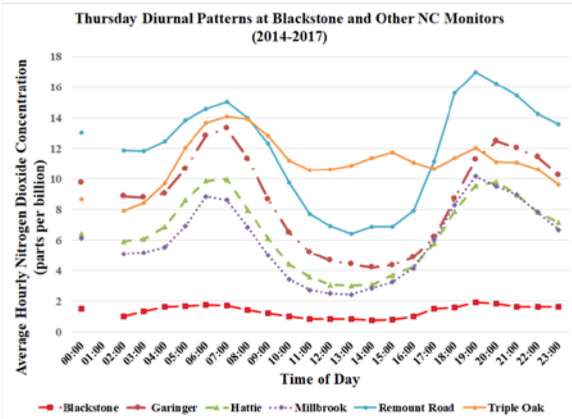


Figure 111. Thursday diurnal variation of average NO_2 concentration

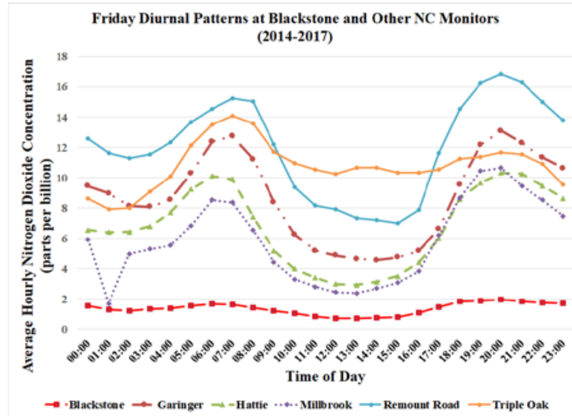


Figure 112. Friday diurnal variation of average NO_2 concentrations

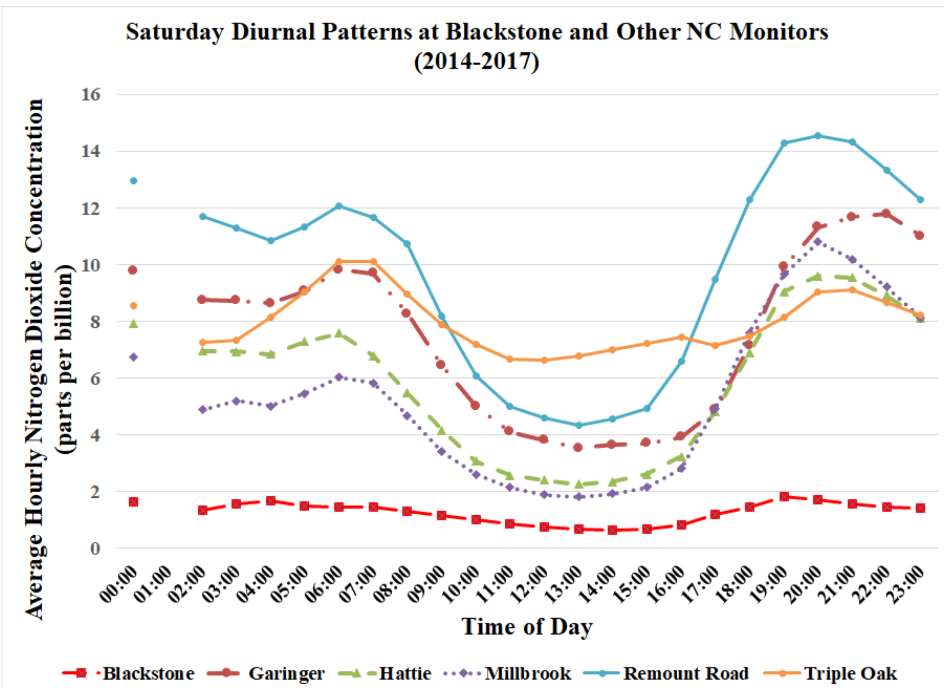


Figure 113. Saturday diurnal variation of average NO_2 concentrations

<u>Design value analysis</u> – The 2015-2017 design value at Blackstone is 8 parts per billion, which is less than one fourth of the design values measured at the other monitors in the state. As shown in Figure 114, the design values in the other areas of the state range from 34 to 39 parts per billion. With a design value of 8 percent of the standard, it is unlikely that the design value at Blackstone would ever reach 80 percent of the standard.

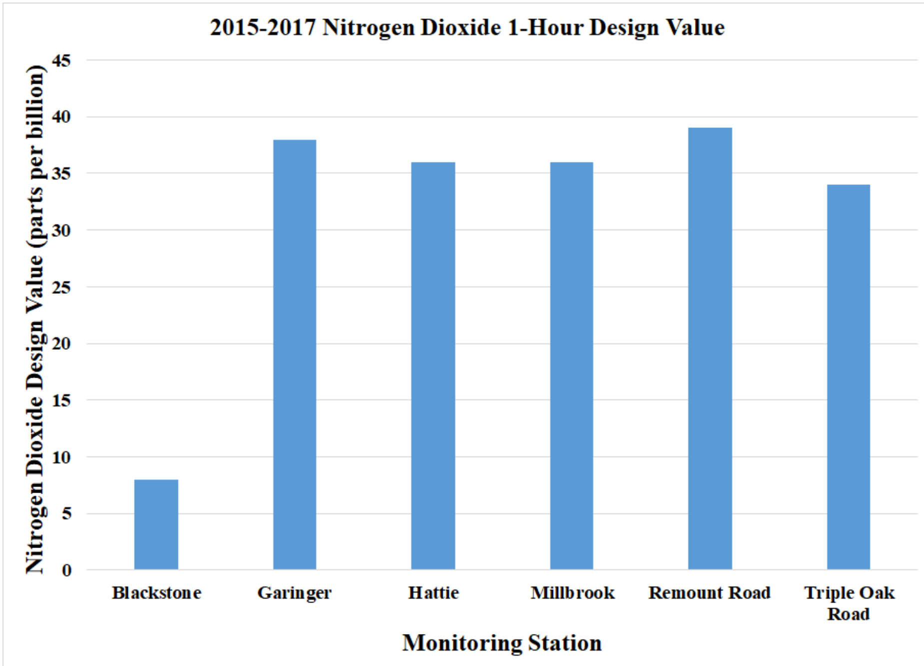


Figure 114. Nitrogen Dioxide design values for monitors in North Carolina

<u>AQI value analysis</u> – See Table 61 and the accompanying discussion. The nitrogen dioxide monitor never determined the AQI measured at Blackstone during 2017.

<u>Correlation analysis</u> – Blackstone is the only background NO_2 monitor in North Carolina. The other NO_2 monitors in North Carolina are in urban areas. Thus, it is not surprising that the daily 1-hour maximum NO_2 concentrations at Blackstone do not correlate well with the daily 1-hour maximum concentrations measured at the other sites as shown in Figure 115 through Figure 119. Based on the EPA assessment guidance, [46] the Blackstone NO_2 monitor is not redundant. Due to limited resources, the DAQ needs to move this monitor to another location to measure background concentrations there.

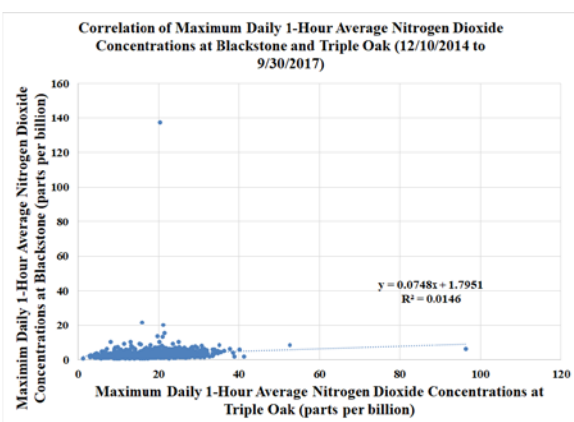


Figure 115. Correlation of Daily 1-Hour Maximum NO_2 Concentrations at Triple Oak and Blackstone.

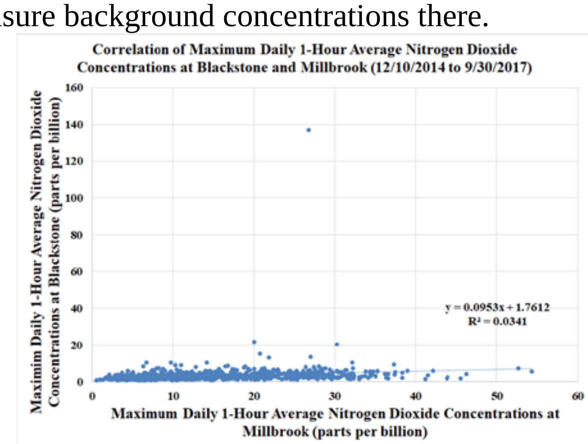


Figure 116. Correlation of Daily 1-Hour Maximum NO_2 Concentrations at Millbrook and Blackstone

[46] Raffuse, Sean M., et al, Ambient Air Monitoring Network Assessment Guidance: Analytical Techniques for Technical Assessments of Ambient Air Monitoring Networks, EPA-454/D-07-001, February 2007.

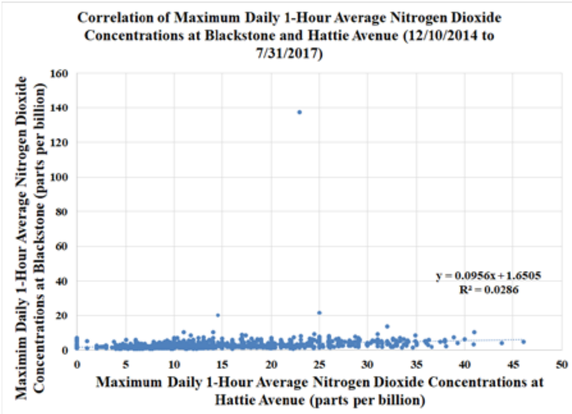


Figure 117. Correlation of Daily 1-Hour Maximum Nitrogen Dioxide Concentrations at Hattie Avenue and Blackstone

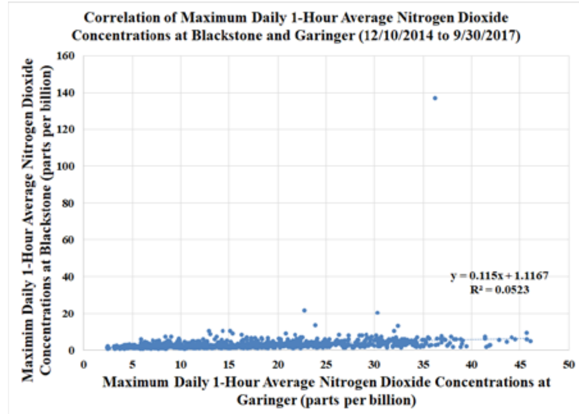


Figure 118. Correlation of Daily 1-Hour Maximum Nitrogen Dioxide Concentrations at Garinger and Blackstone

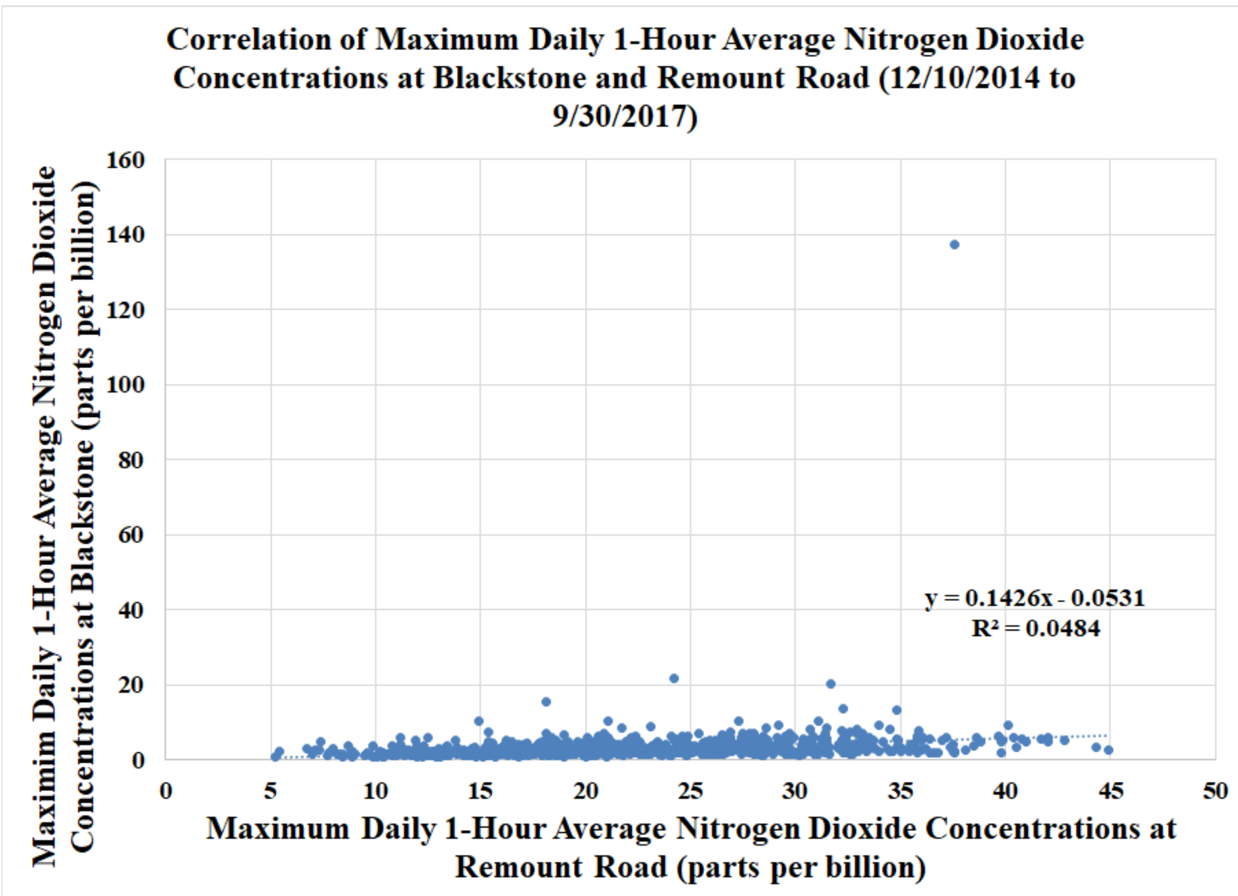


Figure 119. Correlation of Daily 1-Hour Maximum Nitrogen Dioxide Concentrations at Remount Road and Blackstone

Figure 120 shows the daily maximum 1-hour NO_2 concentrations at Blackstone and the five other sites in North Carolina between Dec. 10, 2014, and July 31, 2017. The Blackstone monitor was higher than the other five monitors only once out of 691 days. On Dec. 14, 2014, the monitor reported an exceedance of the one-hour standard of 100 parts per billion. The DAQ investigated the cause of the exceedance and concluded that it was due to unusual meteorological conditions that are unlikely to reoccur. Thus, the DAQ believes it is unlikely for another exceedance of the one-hour standard to occur in Lee County. Daily 1-hour maximum concentrations, other than the one-time exceedance, measured at Blackstone ranged from 0 to 21 parts per billion with the average being 3 parts per billion.

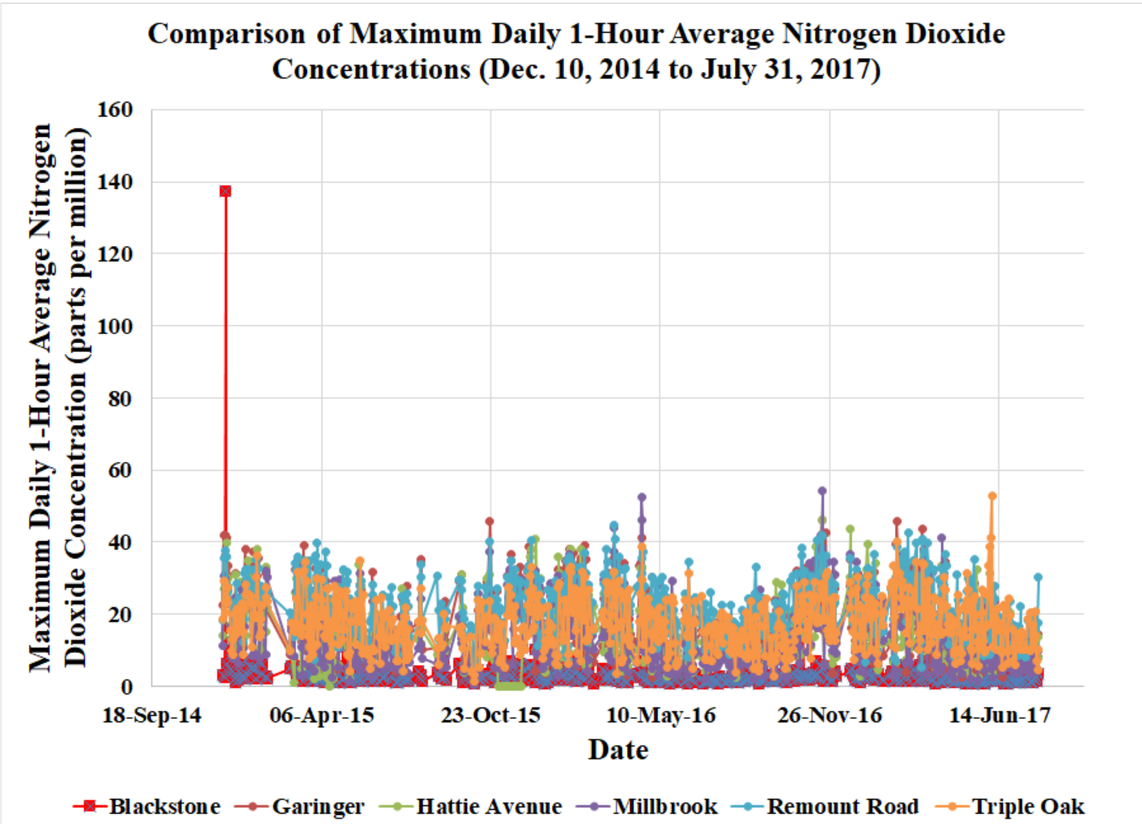


Figure 120. Comparison of Daily Maximum 1-Hour NO_2 Concentrations

Sulfur Dioxide Monitoring

As shown in Figure 121, the SO_2 concentrations at Blackstone are highest in summer and fall. The wind rose from the Lee County Airport, shown in Figure 81, indicates that the primary wind direction in Lee County during June, July and August is from the southwest. Figure 122 shows the variation in the average maximum daily one-hour SO_2 concentration by day of the week. Concentrations measured at the Blackstone monitor do not vary much from one day of the week to another. Figure 123 through Figure 130 show the diurnal variation overall and for each day of the week. Blackstone shows the same diurnal patterns as other nearby monitors.

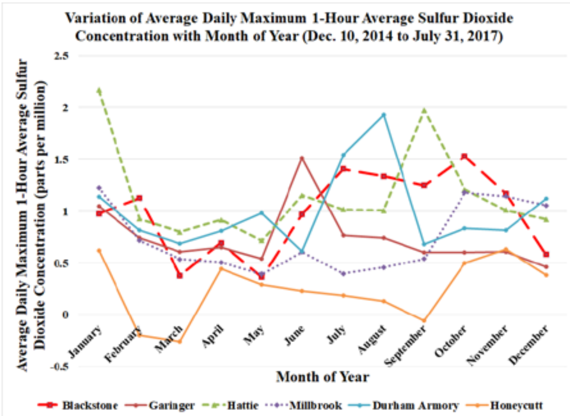


Figure 121. Variation of Average Daily Maximum 1-Hour Average SO_2 Concentrations with Month of Year

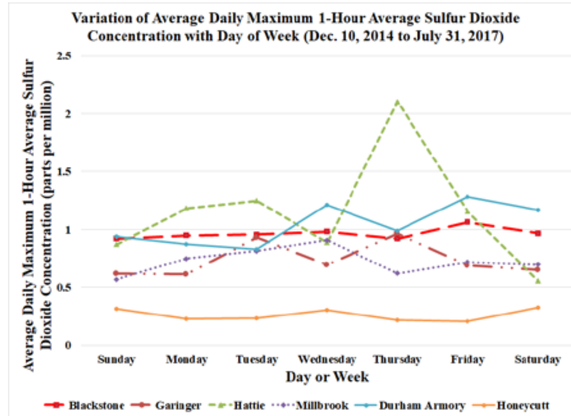


Figure 122. Variation of Average Daily Maximum 1-Hour Average SO_2 Concentrations with Day of Week

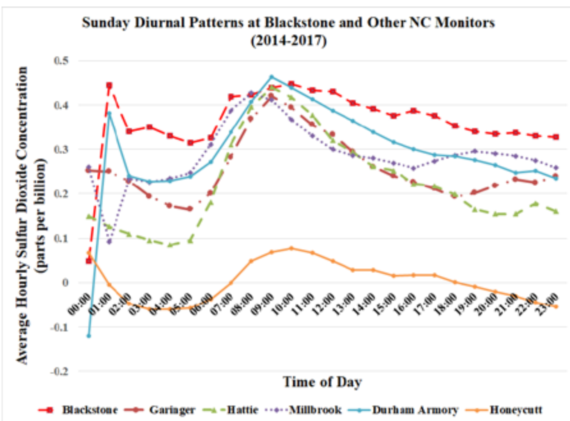


Figure 123. Diurnal variation of average SO_2 concentration

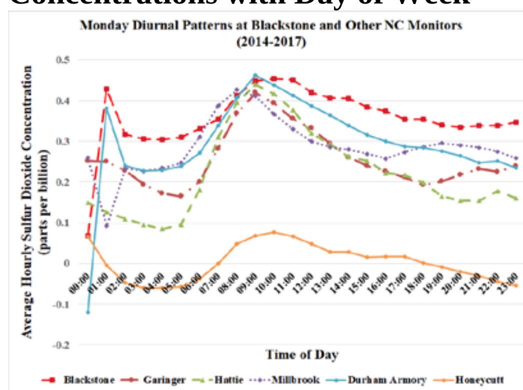


Figure 125. Monday diurnal variation of average SO_2 concentrations

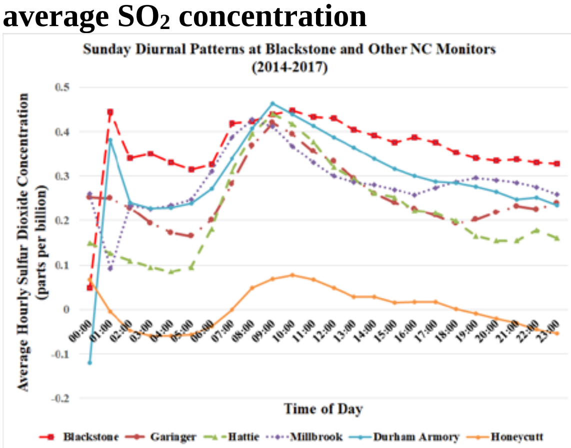


Figure 124. Sunday diurnal variations of average SO_2 concentration

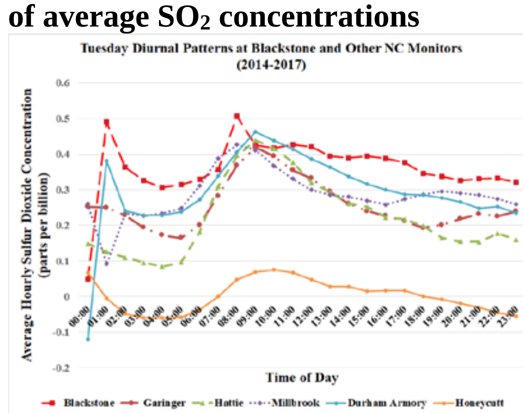


Figure 126. Tuesday diurnal variation of average SO_2 concentrations

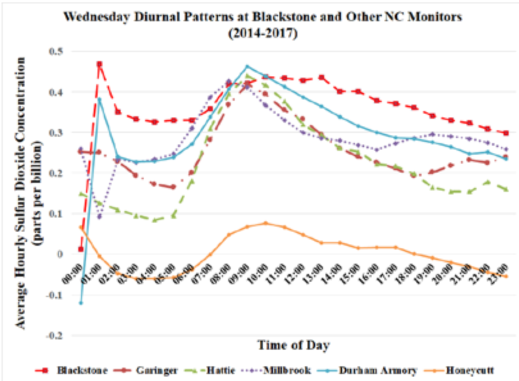


Figure 127. Wednesday diurnal variation of average SO_2 concentration

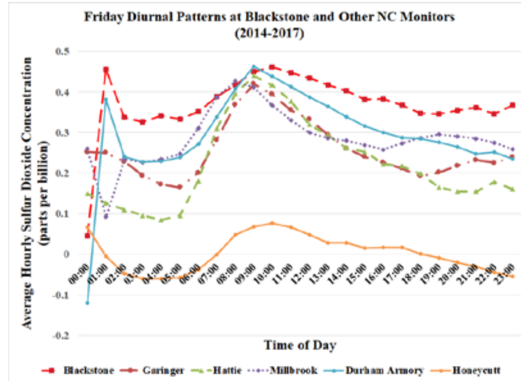


Figure 129. Friday diurnal variation of average SO_2 concentrations

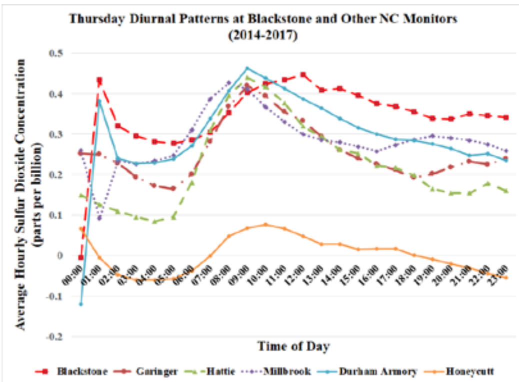


Figure 128. Thursday diurnal variation of average SO_2 concentration

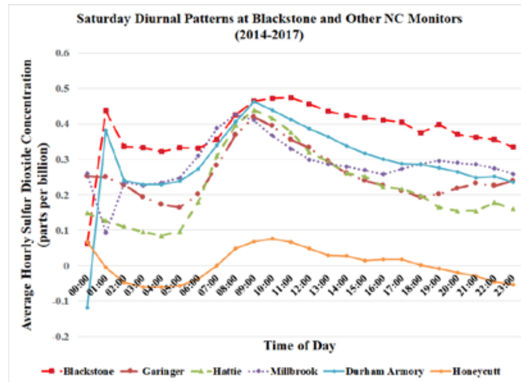


Figure 130. Saturday diurnal variation of average SO_2 concentrations

Design value analysis – The 2015-2017 design value at Blackstone is 2 parts per billion. This is less than the design values measured at other nearby monitors except for Honeycutt. Figure 131 shows the design values at nearby monitors range from 1 to 6 parts per billion. With a design value of less than 3 percent of the standard, it is unlikely the design value at Blackstone would ever reach 80 percent of the standard.

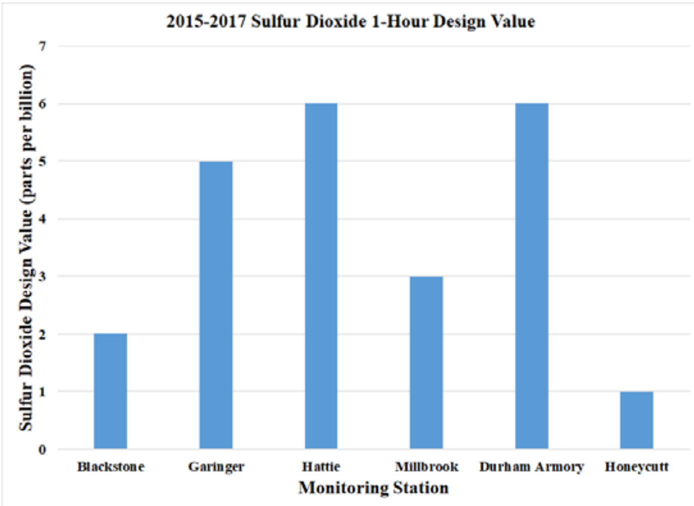


Figure 131. 2015-2017 SO_2 design values for monitors near Blackstone

AQI value analysis – See Table 61 and the accompanying discussion. The sulfur dioxide monitor never determined the AQI measured at Blackstone during 2017.

Correlation analysis – Blackstone is one of several background SO_2 monitors in North Carolina. Most SO_2 measured concentrations at background monitors in North Carolina are close to zero. Thus, it is not surprising the daily 1-hour maximum SO_2 concentrations at Blackstone do not correlate well with the daily 1-hour maximum concentrations measured at other sites as shown in Figure 132 through Figure 136. The EPA assessment guidance states: The Blackstone SO_2 monitor is not redundant based on a correlation analysis[47] but the concentrations of SO_2 are so low, the DAQ believes continued SO_2 monitor is unnecessary here.

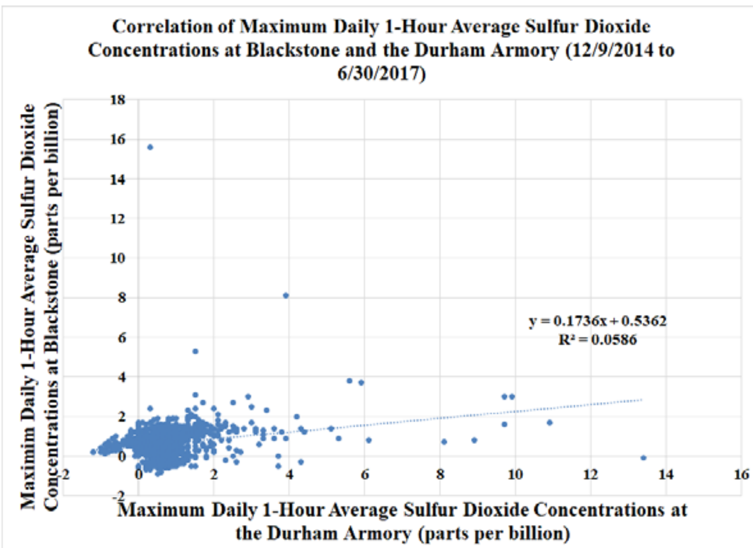


Figure 132. Correlation of Daily 1-Hour Maximum SO_2 Concentrations at Durham Armory and Blackstone

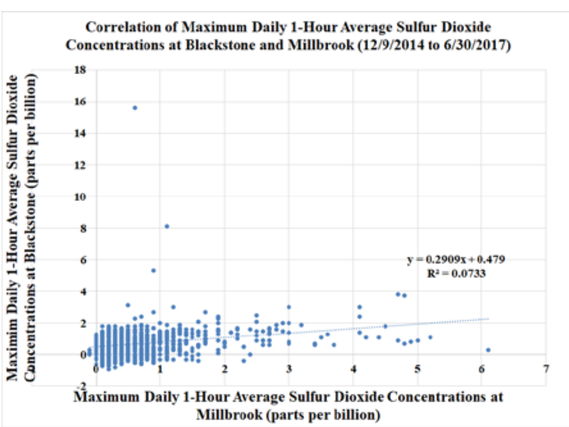


Figure 133. Correlation of Daily 1-Hour Maximum SO_2 Concentrations at Millbrook and Blackstone

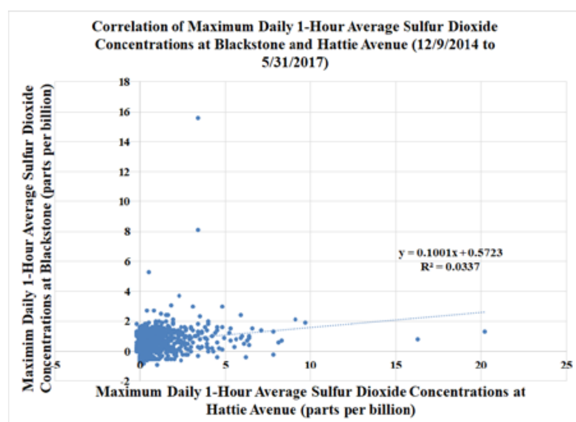


Figure 134. Correlation of Daily 1-Hour Maximum SO_2 Concentrations at Hattie Avenue and Blackstone

[47] Raffuse, Sean M., et al, Ambient Air Monitoring Network Assessment Guidance: Analytical Techniques for Technical Assessments of Ambient Air Monitoring Networks, EPA-454/D-07-001, February 2007.

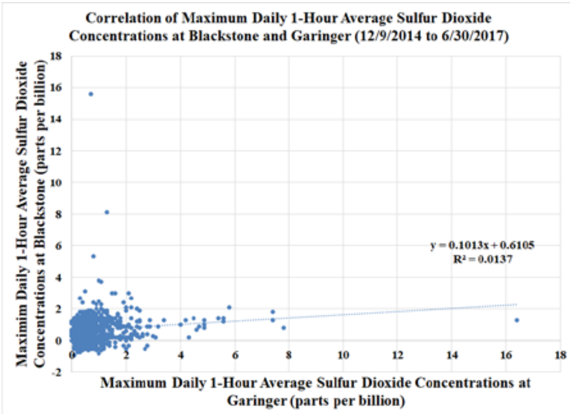


Figure 135. Correlation of Daily 1-Hour Maximum SO_2 Concentrations at Garinger and Blackstone

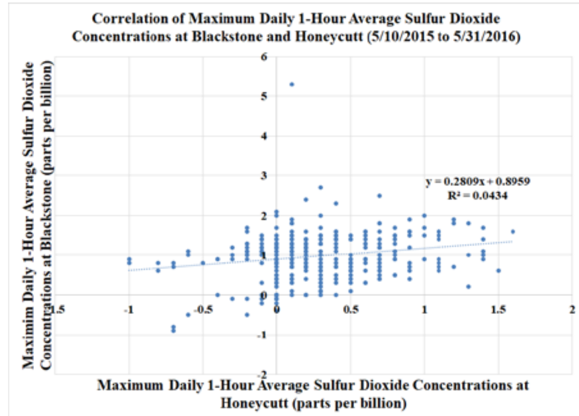


Figure 136. Correlation of Daily 1-Hour Maximum SO_2 Concentrations at Honeycutt and Blackstone

Figure 137 shows the daily maximum 1-hour SO_2 concentrations at Blackstone and five other non-source oriented sites in North Carolina between May 10, 2015, and May 31, 2016. The Blackstone monitor was higher than the other five monitors 89 times in 317 days or 41 percent of the time. Daily 1-hour maximum concentrations measured at Blackstone from Dec. 9, 2014, to June 30, 2017, ranged from -0.9 to 15.6 parts per billion.

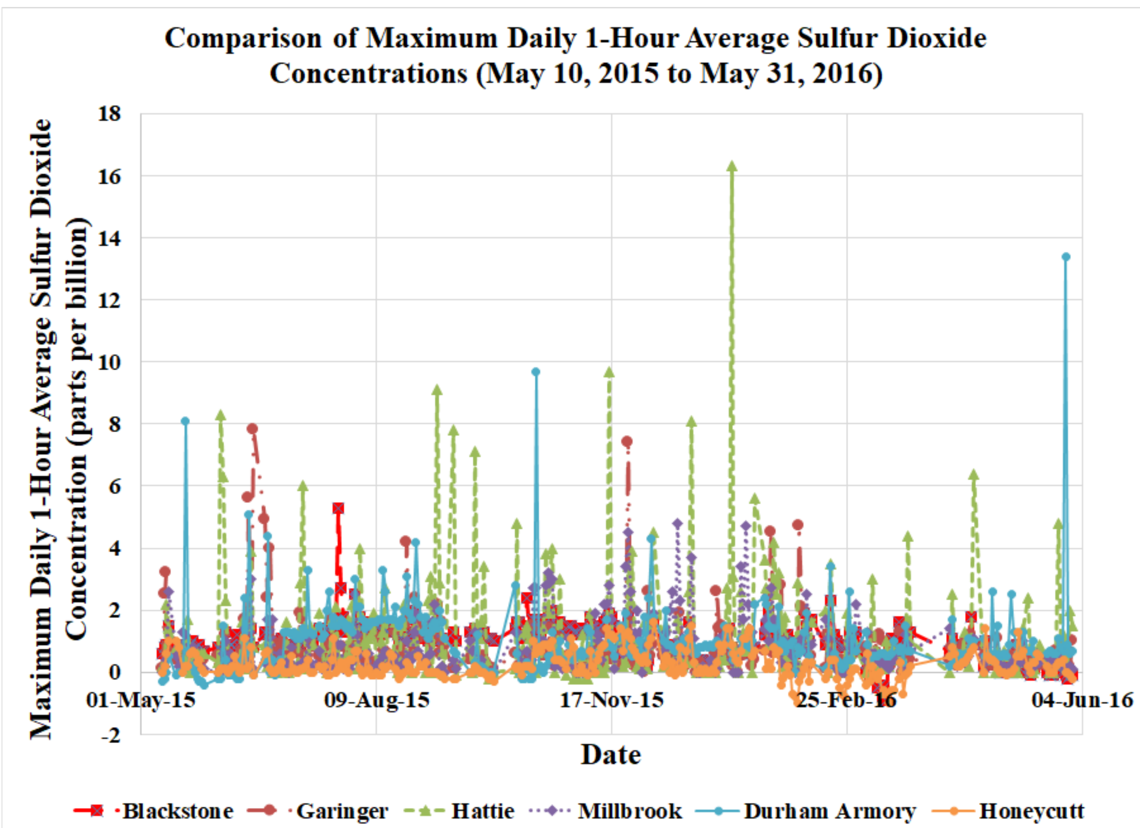


Figure 137. Comparison of Daily Maximum 1-Hour SO_2 Concentrations

Fine Particle Monitoring

As shown in Figure 138, the $PM_{2.5}$ concentrations at Blackstone are highest in November because of wildfires in the western part of the state in 2016. Figure 139 shows a pollution rose for the fine particle concentrations measured at Blackstone. The pollution rose does not indicate any local source. Figure 140 shows the variation in the average 24-hour $PM_{2.5}$ concentration by day of the week. Concentrations measured at the Blackstone monitor do not vary much from one day of the week to another; however, they do seem to peak slightly on Thursday. This pattern at Blackstone is like that at Candor and Millbrook. Figure 141 through Figure 148 show the diurnal variation overall and for each day of the week. Blackstone shows the same diurnal patterns as other nearby monitors.

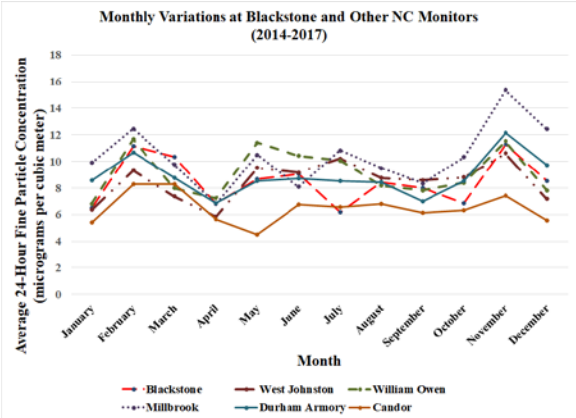


Figure 138. Variation of 24-Hour Average PM2.5 Concentrations by Month

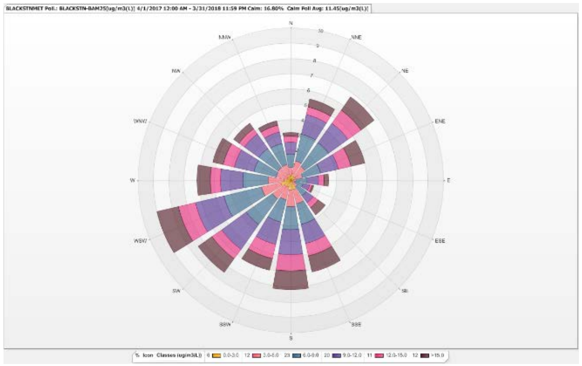


Figure 139. Pollution rose for Blackstone fine particle concentrations

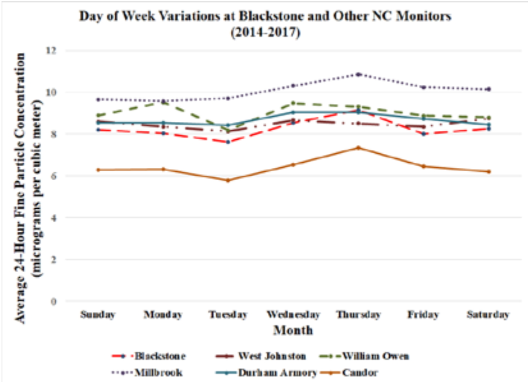


Figure 140. Variation of 24-Hour Average PM2.5 Concentrations by Day of Week

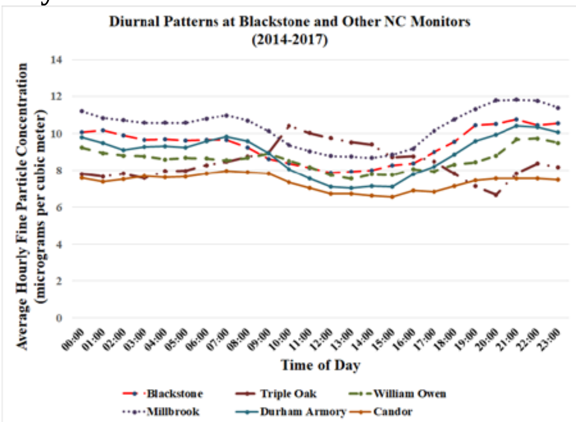


Figure 141. Diurnal variation of average $PM_{2.5}$ concentration

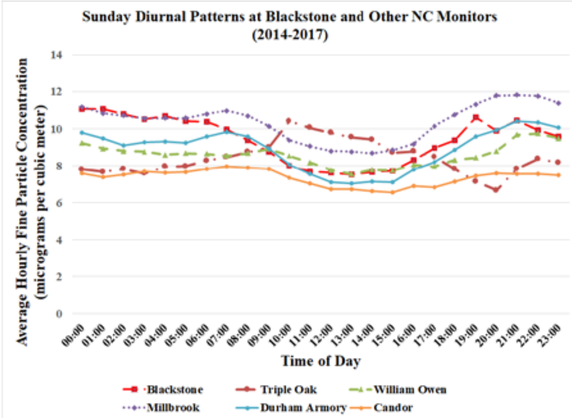


Figure 142. Sunday diurnal variations of average $PM_{2.5}$ concentration

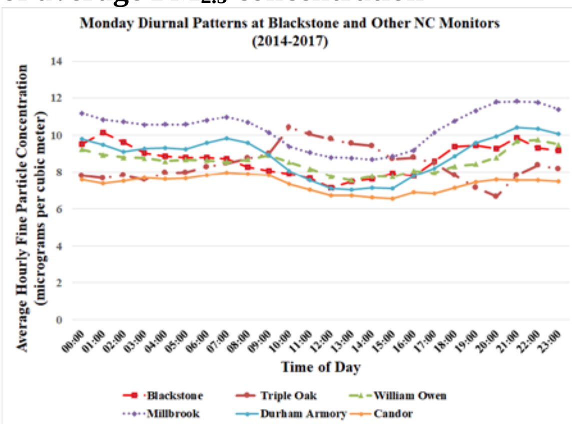


Figure 143. Monday diurnal variation of average $PM_{2.5}$ concentrations

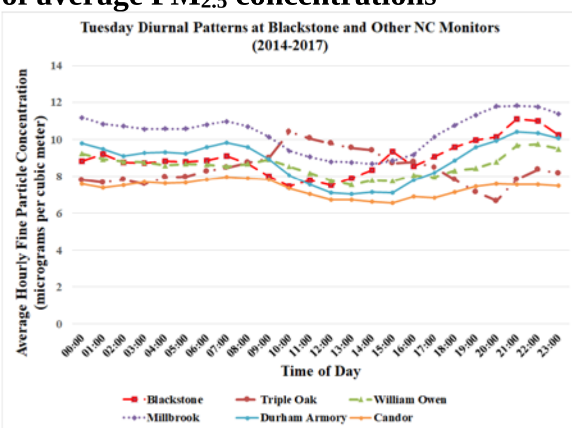


Figure 144. Tuesday diurnal variation of average $PM_{2.5}$ concentrations

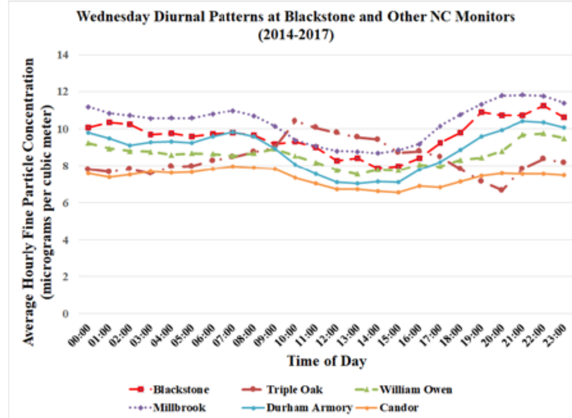


Figure 145. Wednesday diurnal variation of average $PM_{2.5}$ concentration

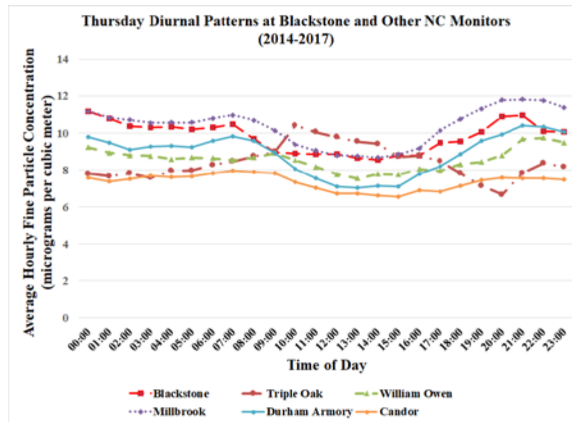


Figure 146. Thursday diurnal variation of average $PM_{2.5}$ concentration

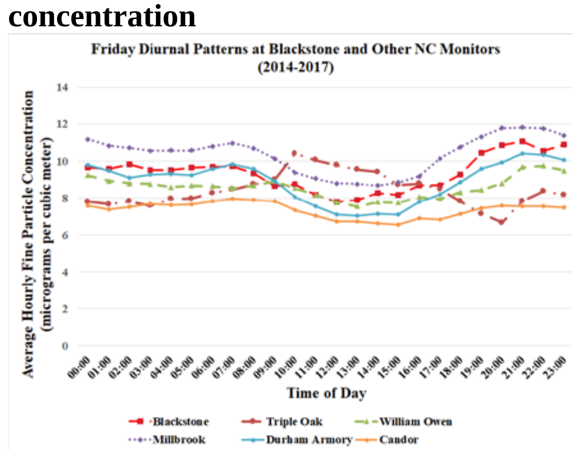


Figure 147. Friday diurnal variation of average $PM_{2.5}$ concentrations

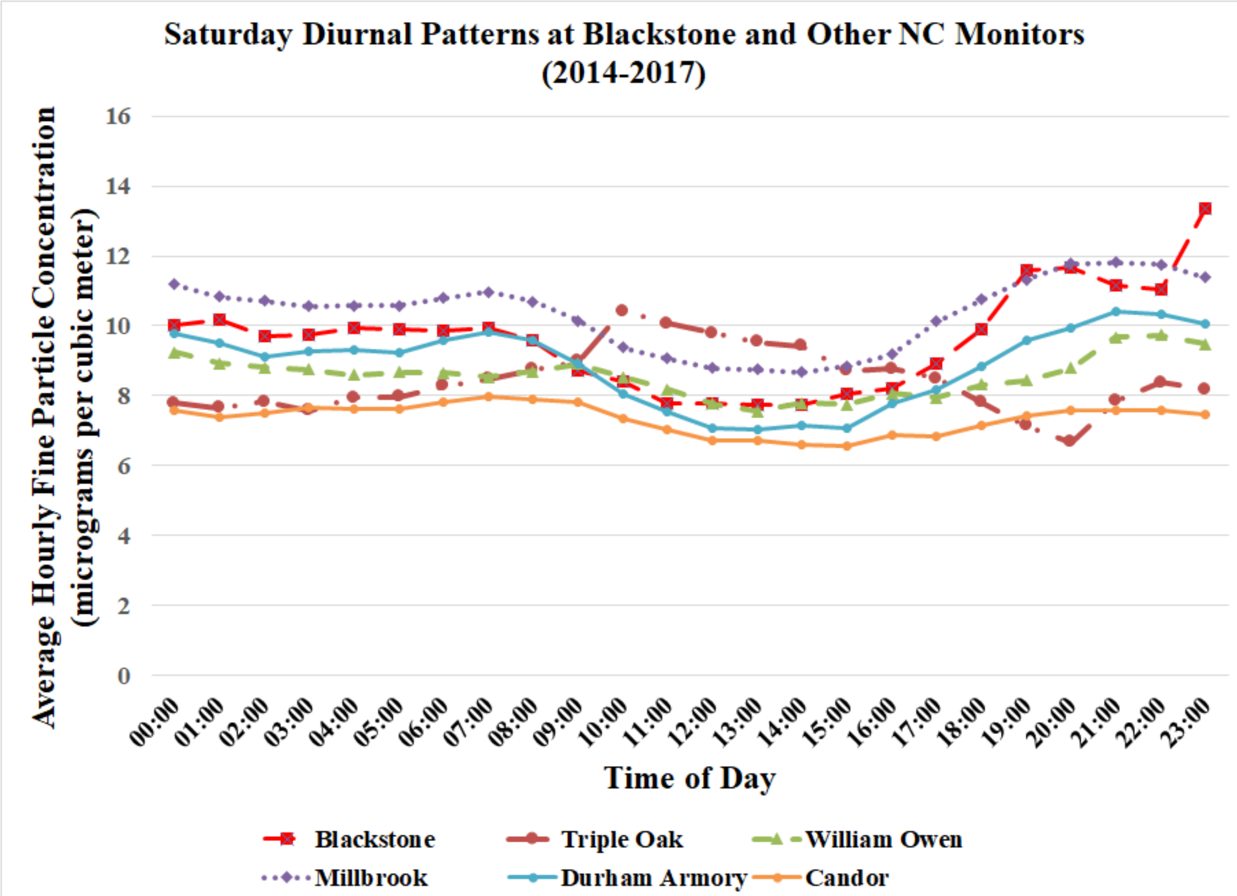


Figure 148. Saturday diurnal variation of average $PM_{2.5}$ concentrations

Design value analysis – There are no $PM_{2.5}$ design values at Blackstone. The DAQ never operated a federal reference method monitor at the site. The EPA granted the DAQ permission to operate the federal equivalent method, FEM, monitor located at the site as an AQI monitor because DAQ had data showing that other FEM monitors of that type operated by DAQ did not meet the requirements in 40 CFR Appendix C when operated in certain parts of the state. As shown in Figure 149, the 2015 summary statistics recorded at nearby monitors range from 6.9 to 10.5 micrograms per cubic meter for the weighted annual mean and from 14.2 to 22.2 micrograms per cubic meter for the 24-hour average 98th percentile concentration. With 258 complete days, Blackstone reported a weighted annual mean of 11.2 and a 24-hour average 98th percentile value of 21.1.

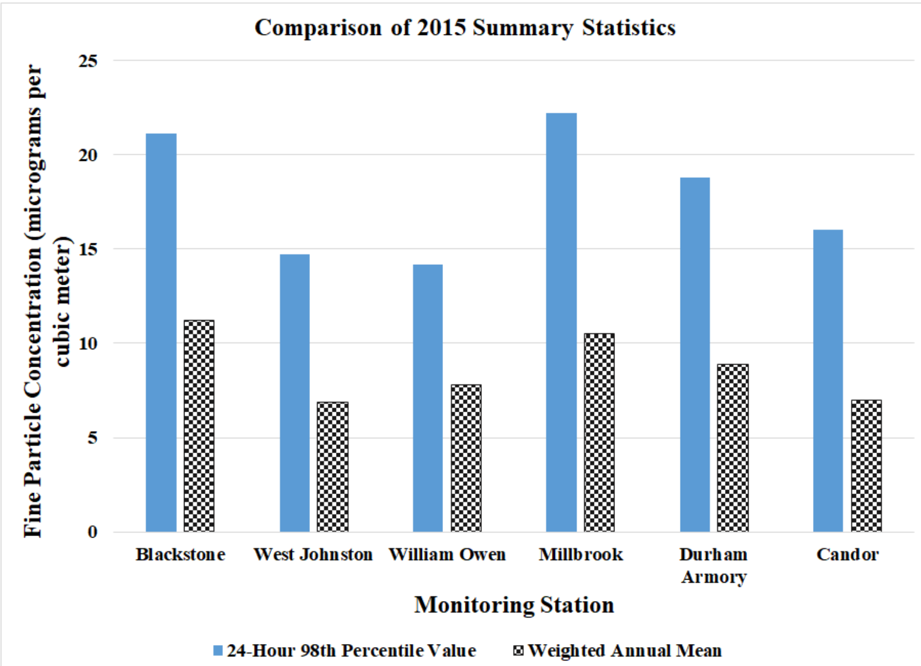


Figure 149. 2015 Summary Statistics for $PM_{2.5}$ at Blackstone and Nearby Sites

<u>AQI value analysis</u> – See Table 61 and the accompanying discussion for an analysis of the AQI. The fine particle monitor determined the AQI measured at Blackstone 45 percent of the time during 2017.

<u>Correlation analysis</u> – Blackstone is a background $PM_{2.5}$ monitor. The 24-hour average $PM_{2.5}$ concentrations at Blackstone show a small amount of correlation with the 24-hour average concentrations measured at other sites as shown in Figure 150 through Figure 155. The EPA assessment guidance states: "Monitors with concentrations that correlate well (e.g., $r^2 > 0.75$) with concentrations at another monitor may be redundant."[48] The Blackstone $PM_{2.5}$ monitor may not be redundant based on a correlation analysis but the concentrations of $PM_{2.5}$ are low enough, the DAQ believes continued $PM_{2.5}$ monitoring is unnecessary here.

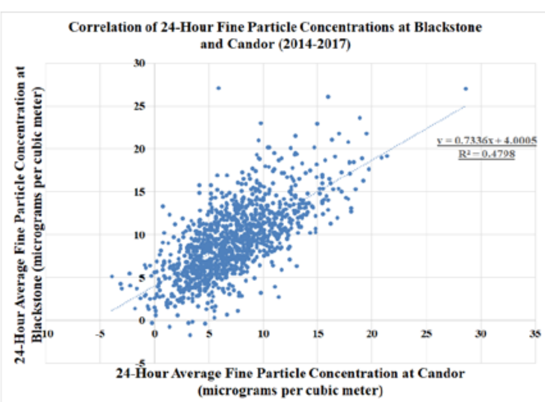


Figure 150. Correlation of daily $PM_{2.5}$ concentrations at Blackstone and Candor

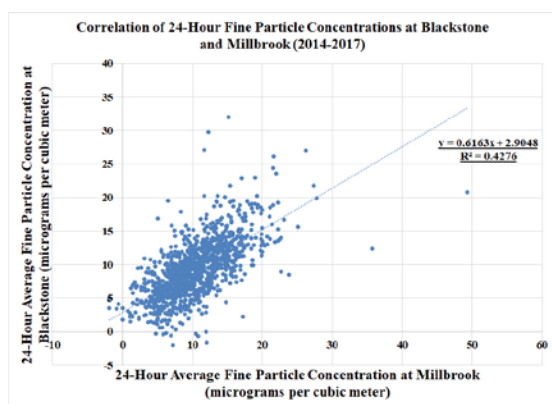


Figure 151. Correlation of $PM_{2.5}$ at Blackstone and Millbrook

[48] Raffuse, Sean M., et al, Ambient Air Monitoring Network Assessment Guidance: Analytical Techniques for Technical Assessments of Ambient Air Monitoring Networks, EPA-454/D-07-001, February 2007.

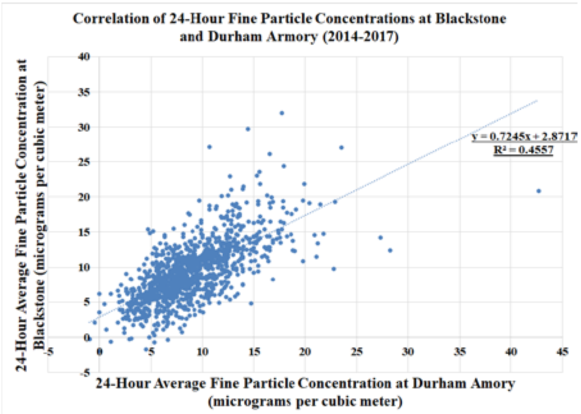


Figure 152. Correlation of fine particle concentrations at Blackstone and the Durham Armory

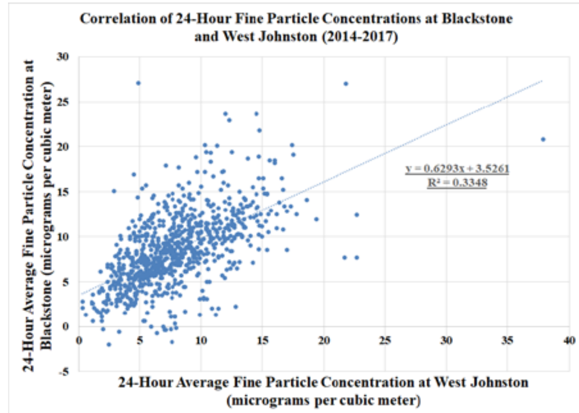


Figure 154. Correlation of fine particle concentrations at Blackstone and West Johnston

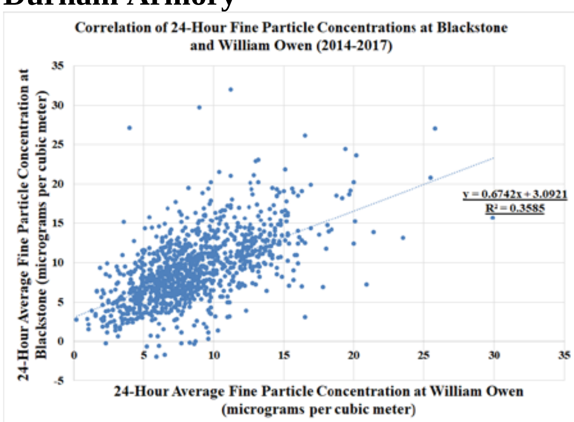


Figure 153. Correlation of fine particle concentrations at Blackstone and William Owen

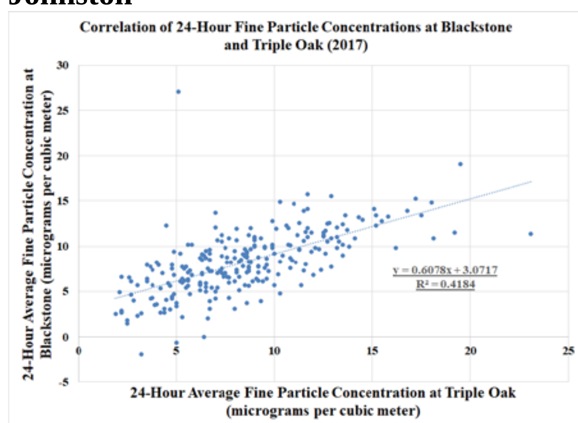


Figure 155. Correlation of fine particle concentrations at Blackstone and Triple Oak

Figure 156 shows the 24-hour average $PM_{2.5}$ concentrations at Blackstone and six other nearby sites in North Carolina between Jan. 1, 2017, and Sept. 30, 2017. The Blackstone monitor was higher than the other six monitors 21 times in 182 days or 12 percent of the time. The 24-hour average concentrations measured at Blackstone from Jan. 1, 2014, to Sept. 30, 2017, ranged from -2 to 32 micrograms per cubic meter. The monitor recorded 32 micrograms per cubic meter on July 25, 2015.

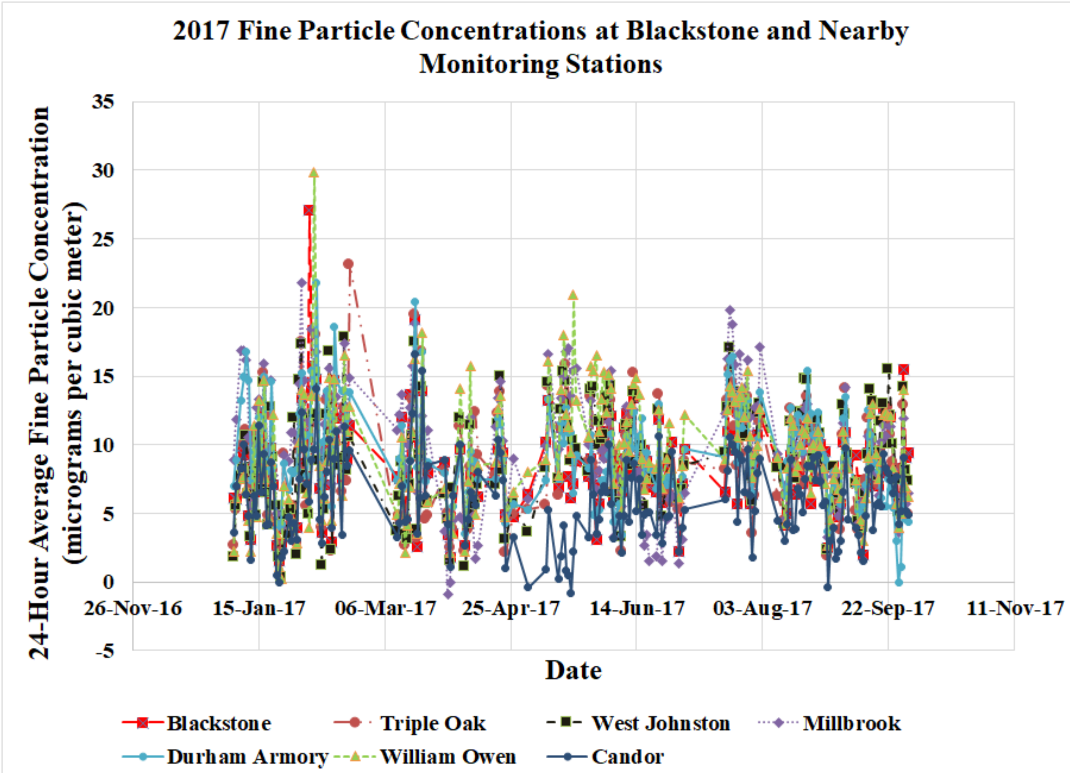


Figure 156. 24-Hour daily fine particle concentrations at Blackstone and other nearby monitors

DAQ priorities –

The DAQ does not anticipate that shale gas extraction will start in Sanford County any time soon. According to the U.S. Energy Information Administration, North Carolina had no oil or natural gas reserves as of May 2017.[49] Without oil or natural gas reserves, there is no reason to engage in shale gas extraction. As a result, the DAQ plans to shut down the Blackstone monitoring site sometime during the second half of 2018 and relocate the monitoring shelter to another area of the state with potential air quality concerns. Shutting down the Blackstone monitoring site, which has fulfilled its purpose of measuring background air quality in Lee County, would free up resources, including a building, support equipment, operating and maintenance resources, to implement background monitoring elsewhere in the state. For these reasons, DAQ proposes shutting down this monitoring site in late 2018.

[49] https://ballotpedia.org/Fracking_in_North_Carolina, accessed May4, 2018.

Appendix E. Request for Exclusion of PM2.5 Continuous FEM data from Comparison to the NAAQS

*Introduction***:**

The North Carolina Division of Air Quality, or DAQ, monitoring program has historically operated fine particle, or $PM_{2.5}$, continuous monitors primarily to support forecasting and reporting of the air quality index, or AQI. These monitors supply data every hour to update the AQI on the DAQ web site as well as on national web sites such as AIRNow (www.airnow.gov). The DAQ has used these monitors since the early part of the last decade as DAQ implemented the $PM_{2.5}$ monitoring program. Over the last few years, the United States Environmental Protection Agency, or EPA, approved some $PM_{2.5}$ continuous monitors as federal equivalent methods, or FEMs. By using an approved FEM, any subsequent data produced from the method may be eligible for comparison to the EPA's, health based standard known as the national ambient air quality standard, or 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 federal reference method, or 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 to 4 weeks after sample collection.

The DAQ 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 DAQ collected 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) the DAQ is requesting that data from the following monitors be set aside for comparison to the NAAQS. While the DAQ is working to optimize the monitoring instrumentation used to meet all our monitoring objectives, we are not yet at a point where the comparability of the $PM_{2.5}$ continuous FEMs operated in some areas 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 (unless such changes 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 DAQ obtained the information described below are included at the end of this section.

Table 62. 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)
William Owen	Fayetteville	37-051-0009	3	Met One BAM-1022 Mass Monitor w/VSCC	12/30/2015	12/31/2017	Winter = 29 Spring = 22 Summer = 23 Fall = 27 Total = 101	0.87	1.52	No	0.90
Durham Armory	Durham	37-063-0015	3	Met One BAM-1020 Mass Monitor w/VSCC	5/29/2015	12/31/2017	Winter = 64 Spring = 61 Summer = 74 Fall = 83 Total = 281	0.89	2.59	No	0.72
Pitt County Agricultural Center	Greenville	37-147-0006	3	Met One BAM-1022 Mass Monitor w/VSCC	3/09/2016	12/31/2017	Winter = 34 Spring = 55 Summer = 59 Fall = 55 Total = 203	1.11	-0.37	No	0.97
Millbrook	Raleigh	37-183-0014	3	Met One BAM-1020 Mass Monitor w/VSCC	1/1/2015	12/31/2017	Winter = 85 Spring = 78 Summer = 72 Fall = 88 Total = 323	0.95	2.55	No	0.75

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	12/31/2017

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, 2019) in the same manner or until 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 the DAQ is requesting EPA not use the monitors listed above for comparison to the NAAQS, we do believe the data are of sufficient comparability to collocated FRMs that the DAQ and the EPA can use the data for AQI reporting. Therefore, with EPA Regional Office approval the DAQ will report these data on our web site and to AIRNow (www.airnow.gov). Additionally, the DAQ intends to store the data in EPA's AQS database that EPA uses for "acceptable AQI" reporting (i.e., parameter code 88502) so that data users will know these data are appropriate for use in AQI calculations.

Continued Operation of $PM_{2.5}$ Monitors to Support NAAQS and AQI Reporting

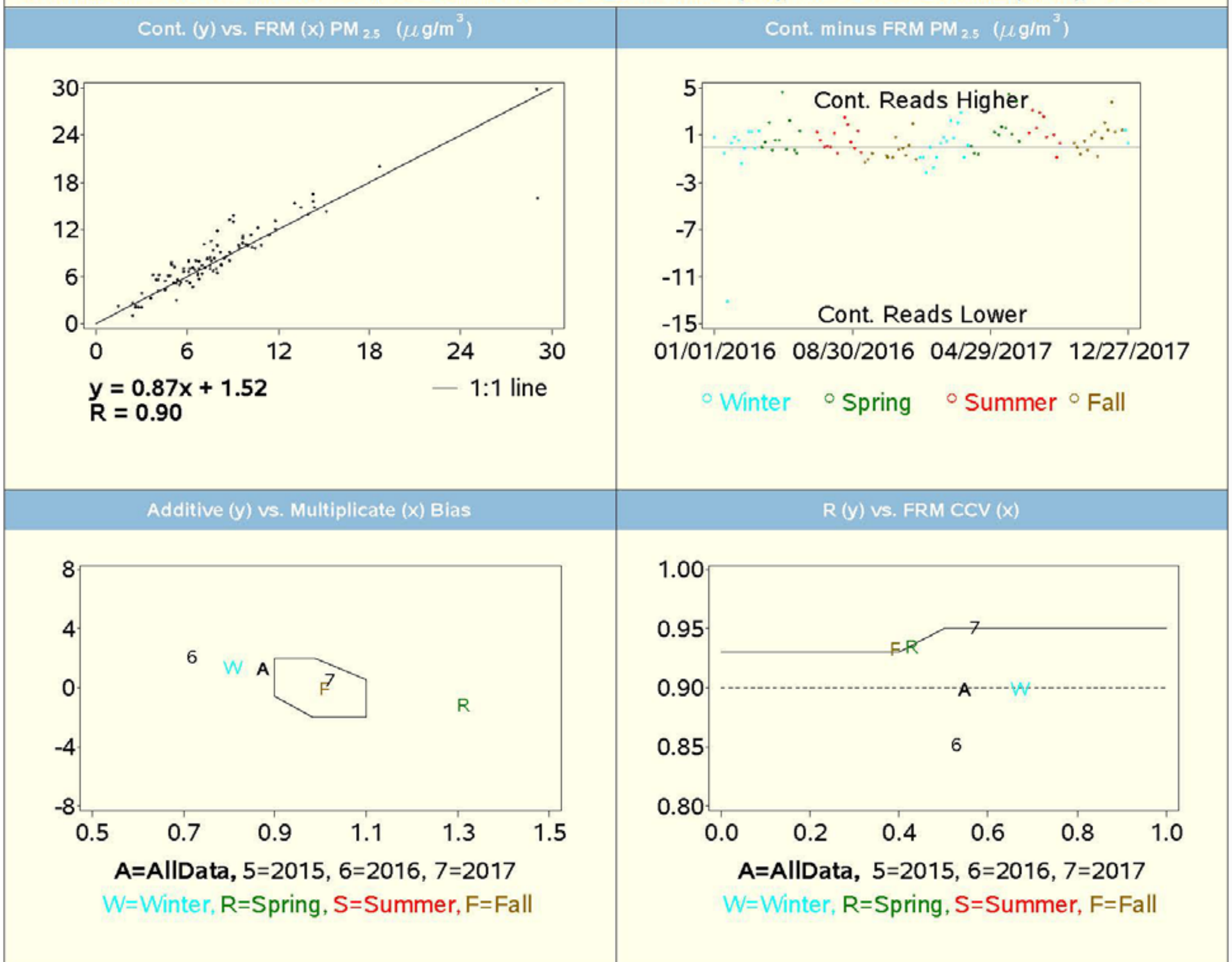
While the DAQ is requesting data from the monitors listed above be set aside for comparison to the NAAQS, we will continue to operate $PM_{2.5}$ FRMs to support the objective of comparison to the NAAQS. We will also operate our $PM_{2.5}$ continuous monitors for use in AQI reporting. The DAQ will operate each of these FRM and $PM_{2.5}$ continuous monitors 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 157 to Figure 160 are locations where our agency has collocated $PM_{2.5}$ FRM and continuous FEM monitors. Each of these assessments is represented in "Table 62. Request for Exclusion of PM2.5 Continuous FEM Data**"** above.

PM 2.5 Continuous Monitor Comparability Assessment
Site 37-051-0009: Fayetteville, NC

FRM: R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC - Gravimetric (145,118), PM2.5 - Local Conditions (88101), POC=1
Cont: Met One BAM-1022 Mass Monitor w/ VSCC or TE-PM2.5C - Beta Attenuation (209), PM2.5 - Local Conditions (88101), POC=3



Mean $PM_{2.5}$ ($\mu g/m^3$)

Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**101**	**8.0**	**8.4**	**1.06**
Winter	29	9.5	9.4	0.98
Spring	23	6.2	7.3	1.18
Summer	22	7.3	8.3	1.13
Fall	27	8.2	8.5	1.04
2015	0	.	.	.
2016	51	8.1	8.2	1.01
2017	50	7.8	8.7	1.11

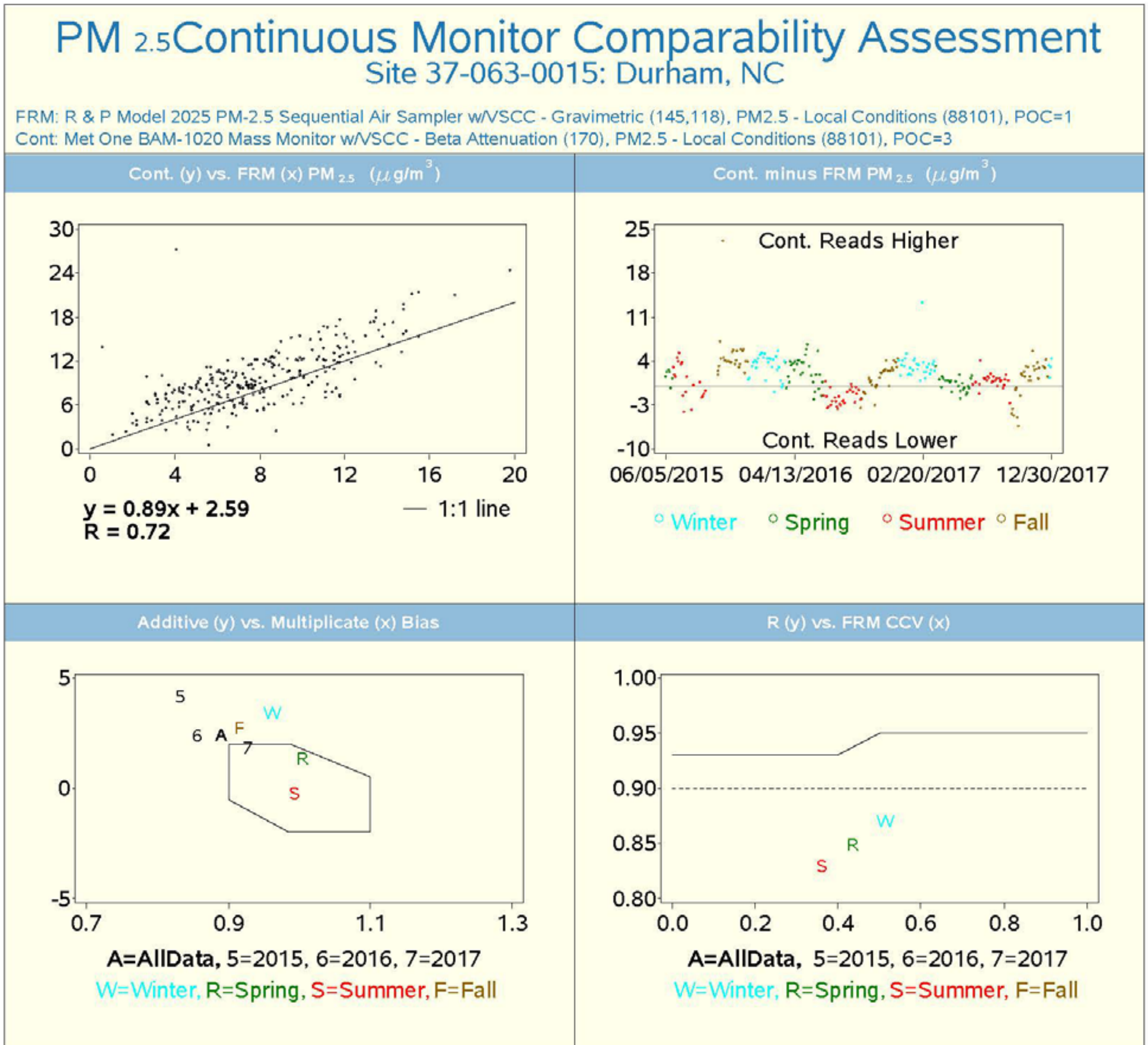
Appendix A Statistics

Dataset	N (all observations)	Bias	N (only >= 3 ug/m^3)	Bias
AllData	**101**	**8.3**	**94**	**9.6**
Winter	29	1.6	28	2.8
Spring	23	14.5	20	19.1
Summer	22	16.0	21	16.1
Fall	27	4.0	25	4.3
2015	0	.	.	.
2016	51	3.5	49	4.9
2017	50	13.2	45	14.7

Data Source: EPA AQS Data Mart

Generated on: May 16, 2018

Figure 157. Comparison of the beta attenuation monitor with the federal reference monitor at William Owen in Fayetteville



Mean PM 2.5 (µg/m3)

Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**281**	**7.8**	**9.5**	**1.22**
Winter	63	6.9	10.3	1.48
Spring	61	7.4	9.0	1.21
Summer	74	8.9	8.8	0.98
Fall	83	7.7	10.0	1.29
2015	52	8.2	11.2	1.36
2016	118	7.9	9.3	1.18
2017	111	7.5	8.9	1.20

Appendix A Statistics

Dataset	N (all observations)	Bias	N (only >= 3 ug/m^3)	Bias
AllData	**281**	**37.7**	**261**	**28.8**
Winter	63	90.4	57	54.5
Spring	61	29.3	55	23.5
Summer	74	0.0	71	0.8
Fall	83	37.6	78	39.1
2015	52	50.2	50	45.9
2016	118	26.6	110	26.3
2017	111	43.7	101	22.9

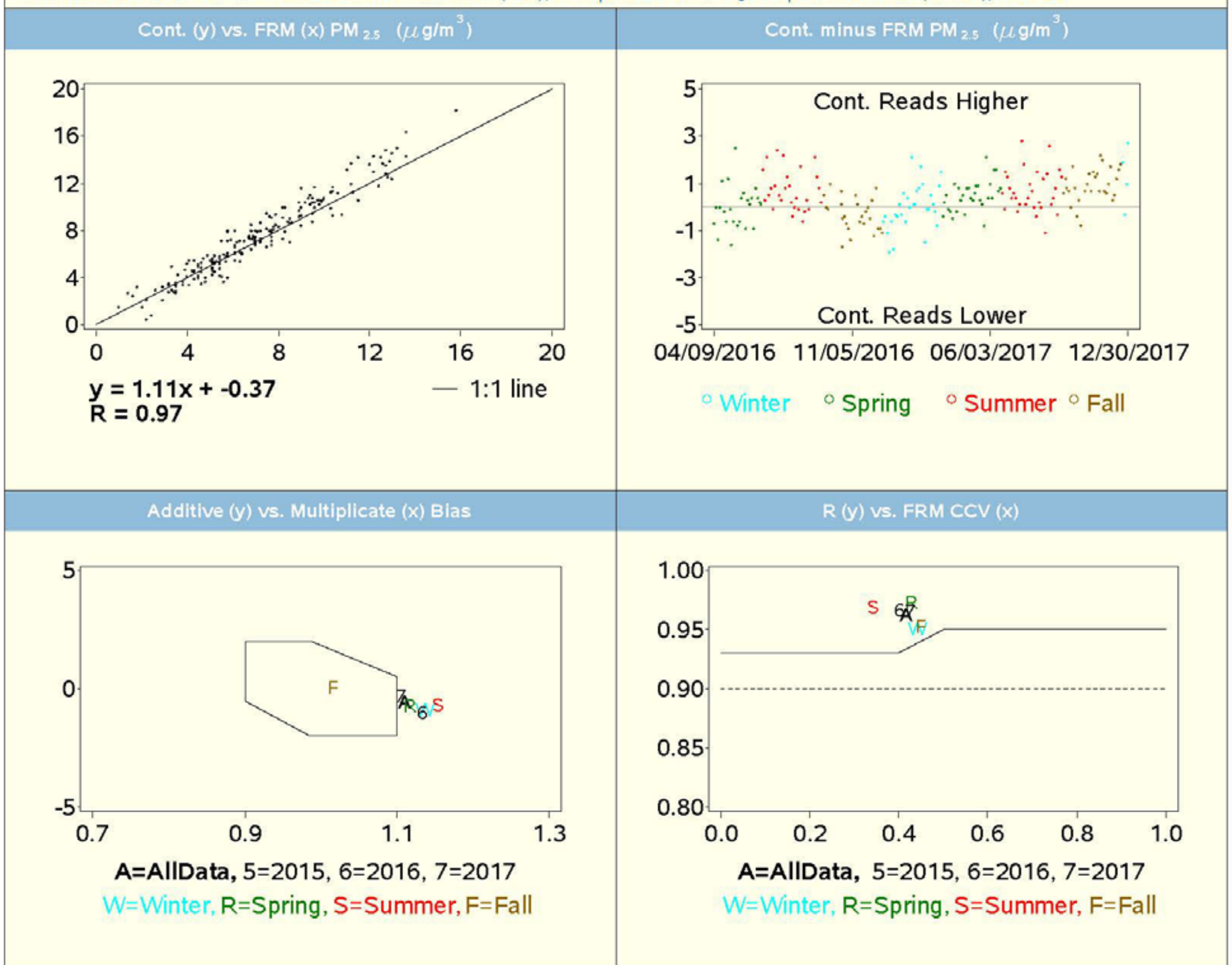
Data Source: EPA AQS Data Mart

Generated on: May 16, 2018

Figure 158. Comparison of the beta attenuation monitor with the federal reference monitor at Durham Armory in Durham, North Carolina

PM 2.5 Continuous Monitor Comparability Assessment
Site 37-147-0006: Not in a City, NC

FRM: R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC - Gravimetric (145,118), PM2.5 - Local Conditions (88101), POC=1
Cont: Met-One BAM W/PM2.5 VSCC - Beta Attenuation (733), Acceptable PM2.5 AQI & Speciation Mass (88502), POC=3



Mean PM 2.5 (µg/m3)

Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**203**	**7.0**	**7.4**	**1.06**
Winter	34	6.3	6.5	1.02
Spring	55	6.8	7.1	1.04
Summer	59	7.9	8.6	1.09
Fall	55	6.6	7.0	1.05
2015	0	.	.	.
2016	82	7.3	7.4	1.02
2017	121	6.8	7.4	1.09

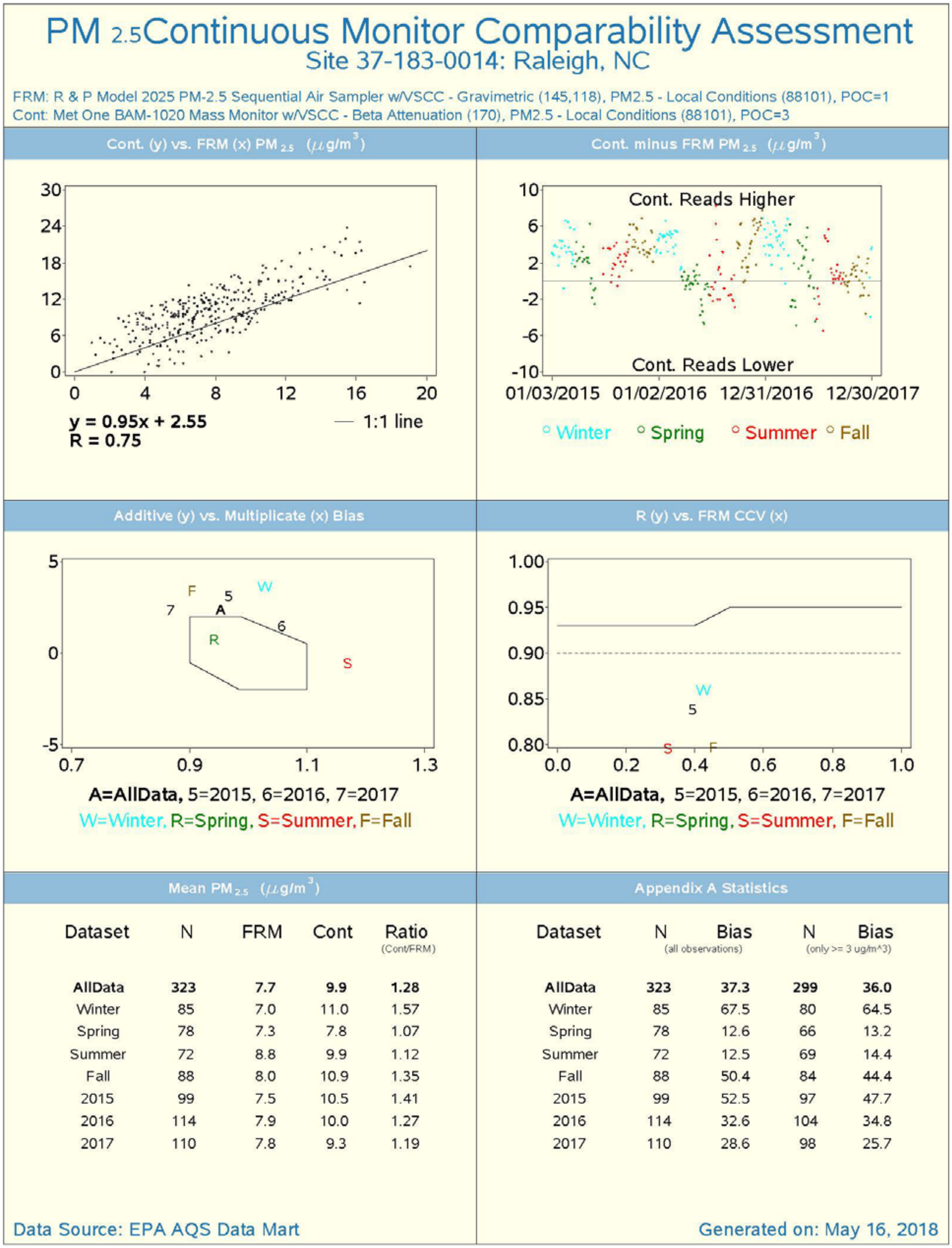
Appendix A Statistics

Dataset	N (all observations)	Bias (all observations)	N (only >= 3 ug/m^3)	Bias (only >= 3 ug/m^3)
AllData	**203**	**5.1**	**187**	**5.5**
Winter	34	0.4	31	2.4
Spring	55	2.3	49	3.6
Summer	59	9.0	58	7.8
Fall	55	6.7	49	6.5
2015	0	.	.	.
2016	82	-0.8	76	1.1
2017	121	9.2	111	8.4

Data Source: EPA AQS Data Mart

Generated on: May 16, 2018

Figure 159. Comparison of the beta attenuation monitor with the federal reference monitor at Pitt County Agricultural Center in Greenville, North Carolina



Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**323**	**7.7**	**9.9**	**1.28**
Winter	85	7.0	11.0	1.57
Spring	78	7.3	7.8	1.07
Summer	72	8.8	9.9	1.12
Fall	88	8.0	10.9	1.35
2015	99	7.5	10.5	1.41
2016	114	7.9	10.0	1.27
2017	110	7.8	9.3	1.19

Dataset	N (all observations)	Bias	N (only >= 3 ug/m^3)	Bias
AllData	**323**	**37.3**	**299**	**36.0**
Winter	85	67.5	80	64.5
Spring	78	12.6	66	13.2
Summer	72	12.5	69	14.4
Fall	88	50.4	84	44.4
2015	99	52.5	97	47.7
2016	114	32.6	104	34.8
2017	110	28.6	98	25.7

Figure 160. Comparison of the beta attenuation monitor with the federal reference monitor at Millbrook in Raleigh, North Carolina

Appendix F. 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 15th, 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: [illegible]

TITLE: Director, Air Division

DATE: 5/9/16

Appendix G. 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 H. 2010 Network Plan EPA Approval Letter

Donni

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

SEP 22 2010

RECEIVED
SEP 27 2010
AIR QUALITY DIVISI
DIRECTORS OFFICE

RECEIVED
SEP 30 2010
AMBIENT P/L

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

Internet Address (URL) • http://www.epa.gov
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5233

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 I. NCore Monitoring Plan Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

Donnie Gayle Sheila

OCT 30 2009

RECEIVED
NOV 23 2009
AMBIENT P/L

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

RECEIVED
NOV 6 2009
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.

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

Richard A. Wayland
Director
Air Quality Assessment Division

2 Enclosures

cc: Doug Neeley, EPA Region 4

Appendix J. Monitoring Agreement for the Charlotte-Concord-Gastonia Metropolitan Statistical Area

MEMORANDUM OF AGREEMENT

ON AIR QUALITY MONITORING FOR CRITERIA POLLUTANTS FOR

THE CHARLOTTE-CONCORD-GASTONIA

METROPOLITAN STATISTICAL AREA (MSA)

July 1, 2016

RECEIVED
JUL 01 2016
BUREAU OF AIR QUALITY

Participating Agencies:

North Carolina
Department of Environmental Quality (NCDEQ)
Division of Air Quality (NCDAQ)

South Carolina
Department of Health and Environmental Control (SCDHEC)
Bureau of Air Quality

Mecklenburg County, North Carolina
Land Use and Environmental Services Agency
Air Quality (MCAQ)

I. PURPOSE/OBJECTIVES/GOALS

The purpose of this Memorandum of Agreement (MOA) is to establish the Charlotte-Concord-Gastonia Metropolitan Statistical Area (MSA) Criteria Pollutant Air Quality Monitoring Agreement among NCDAQ, SCDHEC, and the MCAQ (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 renew the terms and conditions of this collective agreement to provide adequate criteria pollutant monitoring for the Charlotte-Concord-Gastonia MSA as required by 40 CFR 58 Appendix D, Section 2(e).

II. BACKGROUND

The Charlotte-Concord-Gastonia MSA consists of

Cabarrus County, NC
Gaston County, NC
Iredell County, NC
Lincoln County, NC
Mecklenburg County, NC
Rowan County, NC
Union County, NC
Chester County, SC
Lancaster County, SC

York County, SC

NCDAQ has jurisdiction over Cabarrus, Gaston, Iredell, Lincoln, Rowan, and Union Counties; SCDHEC has jurisdiction over Chester, Lancaster, and York Counties; MCAQ has jurisdiction over Mecklenburg County.

The NCDAQ, SCDHEC, and MCAQ are required by the Clean Air Act to measure for certain criteria pollutants in the ambient air in the Charlotte-Concord-Gastonia 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:

- NCDAQ, SCDHEC, and MCAQ (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 all 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 agencies. 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 others 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 change (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 make available 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, SCDHEC, or MCAQ 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, SCDHEC, or MCAQ, their officers or employees, or any other person. This MOA does not direct or apply to any person outside NCDAQ, SCDHEC, or MCAQ.

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: Joette Steger
NC DENR Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641

joette.steger@ncdenr.gov
Voice/fax: 919-707-8449

SCDHEC: Scott Reynolds
SCDHEC Bureau of Environmental Health Services
2600 Bull Street
Columbia, SC 29201

reynolds@dhec.sc.gov
Voice: 803-896-0902

MCAQ: Jeff Francis
Mecklenburg County Land Use and Environmental Services Agency – Air Quality
2145 Suttle Avenue
Charlotte, NC 28208-5237

Jeff.Francis@mecklenburgcountync.gov
Phone 704-336-5430
Fax 704-336-4391

In the event that a point of contact needs to be changed, notification may be made via email to the other parties.

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
Division of Air Quality (NCDAQ)

BY: Sheila C. Holman

TITLE: Director, Division of Air Quality

DATE: 6/27/2016

South Carolina Department of Health and Environmental Control (SCDHEC)
Bureau of Air Quality

BY: [signature]

TITLE: Chief, Bureau of Air Quality

DATE: 07/05/2016

Mecklenburg County Land Use and Environmental Services Agency – Air Quality (MCAQ)
Mecklenburg County Air Quality

BY: Leslie H Rhoades

TITLE: Director, Air Quality

DATE: 6/29/2016

MEMORANDUM

July 5, 2016

Subject: Change of Point of Contact for South Carolina

Memorandum of Agreement on Air Quality Monitoring for Criteria Pollutants for the Charlotte-Concord-Gastonia Metropolitan Statistical Area (MSA)

From: Rhonda B. Thompson, SC DHEC
Chief, Bureau of Air Quality

As of July 5, 2016, the Point of Contact for South Carolina will be Micheal Mattocks, instead of Scott Reynolds.

Micheal's contact information is below:

Micheal Mattocks
SC DHEC – Bureau of Environmental Health Services
2600 Bull Street
Columbia, SC 29201
(803)896-0856
mattock@dhec.sc.gov

Appendix K. 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 25 through June 25, 2018. In addition, notification was sent out via public e-mail distribution lists maintained for permitting, rules, ambient monitoring and air toxics.

From:	denr.daq.managers_supervisors-bounces@lists.ncmail.net on behalf of Burleson, Joelle <joelle.burleson@ncdenr.gov>
Sent:	Friday, May 25, 2018 11:42 AM
To:	Burleson, Joelle
Subject:	Ambient Air Monitoring Network Plan Available for Public Comment
Attachments:	ATT00001.txt

Please note that this email has been formatted such that replies will go directly to Patrick Butler.

Hello Air Quality Stakeholders:

NC DAQ's annual monitoring network plan update is posted on the website and is open for public comment through June 25, 2018. Here are links to the public notice and the summary page.

https://deq.nc.gov/news/events/2018-2019-annual-monitoring-network-plan-comment-period-begins

https://deq.nc.gov/about/divisions/air-quality/air-quality-data/annual-network-plan/annual-monitoring-network-plan-for-north-carolina-air-quality

If you have any questions, please contact Patrick Butler at 919 707 8719 or patrick.butler@ncdenr.gov.

Have a nice day!

Joelle Burleson, EIT, CPM
Senior Regulatory Advisor
Planning Section
NC DEQ, Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641
Phone/Fax: 919-707-8720
www.ncair.org
joelle.burleson@ncdenr.gov

From: denr.daq.managers_supervisors-bounces@lists.ncmail.net on behalf of Gatano, Betty <betty.gatano@ncdenr.gov>
Sent: Friday, May 25, 2018 11:40 AM
To: NCDENR.DENR.DAQ.Stakeholders.Outside_Involvement_Committee
Subject: DAQ Annual Ambient Air Quality Monitoring Plan comment period is from May 25, 2018 to June 25, 2018
Attachments: ATT00001.txt; ATT00002.txt

NC DAQ's annual monitoring network plan update is posted on the website and is open for public comment through June 25, 2018. The links to the public notice and the summary page are provided below.

https://deq.nc.gov/news/events/2018-2019-annual-monitoring-network-plan-comment-period-begins

https://deq.nc.gov/about/divisions/air-quality/air-quality-data/annual-network-plan/annual-monitoring-network-plan-for-north-carolina-air-quality

If you have any questions, please contact Patrick Butler at 919 707 8719 or patrick.butler@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

From: Steger, Joette
Sent: Friday, May 25, 2018 12:06 PM
To: Steger, Joette
Subject: Ambient Air Monitoring Network Plan Available for Public Comment

Hello,

NC DAQ's annual monitoring network plan update is posted on the website and is open for public comment through June 25, 2018. The links to the public notice and the summary page are provided below.

https://deq.nc.gov/news/events/2018-2019-annual-monitoring-network-plan-comment-period-begins

https://deq.nc.gov/about/divisions/air-quality/air-quality-data/annual-network-plan/annual-monitoring-network-plan-for-north-carolina-air-quality

If you have any questions, please contact Patrick Butler at 919 707 8719 or patrick.butler@ncdenr.gov.

Thank you,

OR CARO A
Environmental Quality NC DEQ

2018-2019 Annual Monitoring Network Plan Comment Period Begins

Event Description

Comment period for the Annual Ambient Air Quality Monitoring Plan is from May 25, 2018 to June 25, 2018.

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 2018 and 2019 will be available for public comments from May 25 to June 25, 2018. 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-ne... (http://deq.nc.gov/about/divisions/air-quality/air-quality-data/annual-network-plan) starting on Friday, May 25, 2018. 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 Patrick Butler 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) or mailed to

Patrick Butler

NC Division of Air Quality

1641 Mail Service Center

Raleigh, North Carolina 27699-1641

(919)-707-8719

(919)-707-8719 Fax

When and Where

When:
Friday, May 25, 2018 - 8:00a.m. to Monday, June 25, 2018 - 5:00p.m.

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Facebook (https://www.facebook.com/sharer/sharer.php?u=https%3A%2F%2Fdeq.nc.gov%2Fnews%2Fevents%2F2018-2019-annual-monitoring-network-plan-comment-period-begins)

Twitter (http://twitter.com/intent/tweet?url=https%3A%2F%2Fdeq.nc.gov%2Fnews%2Fevents%2F2018-2019-annual-monitoring-network-plan-comment-period-begins)

Appendix L. Public Comments Received

One public comment was received during the public comment period via telephone. Cynthia Vanaman-Setzer called Joette Steger on June 22, 2018, at 12:14 PM. She said she was from the Shallotte area of Brunswick County. She expressed concern about all of the growth in the area. She said one of her neighbors coughed a lot and she was concerned that the ozone in the air is bad for his health. She requested that the DAQ add a monitoring station in the Shallotte area.

The DAQ acknowledges that Brunswick County is one of the fastest growing counties in the nation – see page 16 of this document. Consequently, the DAQ evaluated the area while preparing the network plan and concluded that an ozone monitor is not needed in Brunswick County at this time – see page 74 of this document. Shallotte is 66 kilometers from the Castle Hayne, 37-129-0002, ozone monitor in New Hanover County, North Carolina, and 59 kilometers from the Coastal Carolina, 47-51-0008, ozone monitor in Horry County, South Carolina. In 2017, the fourth maximum 8-hour average ozone values were 57 ppb at New Hanover and 56 ppb at Coastal Carolina. In 2017, New Hanover County had 340 days when the air quality index was green and 25 days when the air quality index was yellow. Horry County had 350 days when the air quality index was green and four days when the air quality index was yellow. The other 10 days did not report an air quality index. Therefore, the DAQ has concluded that additional monitoring in the Shallotte area is not necessary at this time.

The only changes made to the monitoring plan after it went out for public comment are corrections of errors, including:

- Correcting the latitude for the Candor site, 37-123-0001;
- Correcting distances of the ozone and PM monitors from St. Regis Road at the Mendenhall site, 37-083-0013;
- Correcting the latitude and longitude at the Bethany site, 37-159-0099; and
- Correcting the distance of the sulfur dioxide monitor from the road at the Bethany site, 37-159-0099.

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 – United States Environmental Protection Agency
F - Fahrenheit
FEM – federal equivalent method
FRM - federal reference method
GSMNP – Great Smokey Mountains National Park
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 or 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
SO2 - sulfur dioxide
SPM - special purpose monitor
TECO - Thermo Environmental, Incorporated
TEOM - tapered element oscillating microbalance
TLE - trace level enhanced (monitor)

TSP – total suspended particulate
UCI – Upper Confidence Interval
URG – University Research Glass
VDEQ - Virginia Department of Environmental Quality
WINS - well impactor ninety-six, a type of PM 2.5 separator
WRF - Weather Research and Forecasting
ZAG – zero air generator
ZAS – zero air supply

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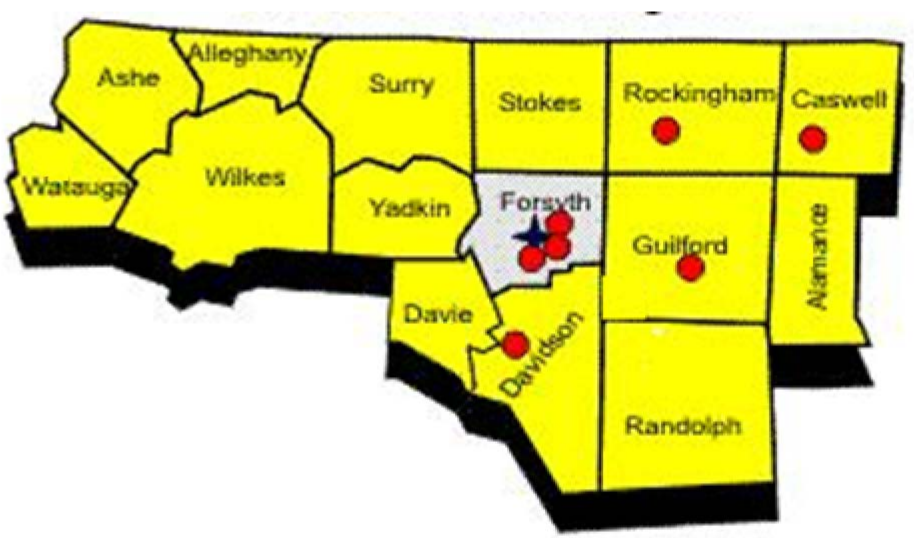
NORTH CAROLINA
Environmental Quality

2018-2019 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 2

Site Descriptions by Division of Air Quality Regional Office and Metropolitan Statistical Area

B. The Winston-Salem Monitoring Region



June 29, 2018

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The Winston-Salem Monitoring Region

The Winston-Salem monitoring region of North Carolina, shown in Figure B1, consists of five sections: (1) the eastern mountains - Alleghany, Ashe, Surry, Watauga and Wilkes counties, (2) the Winston-Salem metropolitan statistical area, MSA - Davidson, Davie, Forsyth, Stokes and Yadkin counties, (3) the Greensboro MSA - Guilford, Randolph and Rockingham counties, (4) the Burlington MSA - Alamance County and (5) Caswell County.

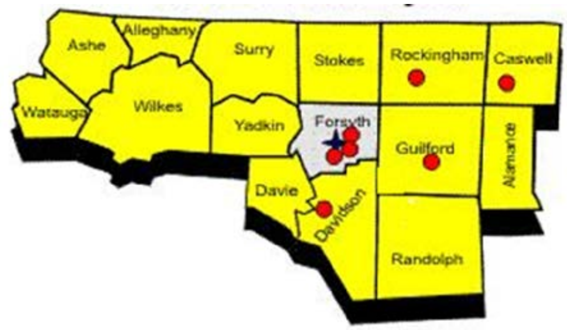

Figure B1. The Winston-Salem monitoring region
The red dots show the approximate locations of most of the monitoring sites in this region.

(1) The Eastern Mountains

The eastern mountains consist of five counties: Alleghany, Ashe, Surry, Watauga and Wilkes. There are no major metropolitan areas in this section of the North Carolina mountains. The Boone micropolitan statistical area, or MiSA, is in Watauga County, the Mount Airy MiSA is in Surry County and the North Wilkesboro MiSA is in Wilkes County. The North Carolina Division of Air Quality, or DAQ, does not operate any monitoring sites in the eastern mountains. The Boone fine particle monitoring site located at Boone in Watauga County was shut down on Dec. 31, 2015.

In 2010 the United States Environmental Protection Agency, or EPA, finalized changes to the expanded **lead monitoring** network established in 2008 to support the lower lead national ambient air quality standard, NAAQS, of 0.15 micrograms per cubic meter. [1] In 2010, the EPA focused monitoring efforts on fence line monitoring located at facilities that emit 0.5 ton or more of lead per year, at urban national core, NCore, monitoring sites and at selected airports. [2] In 2016 the requirement for monitoring at NCore sites was removed.[3] The eastern mountains do not have any permitted facilities emitting 0.5 ton or more per year of lead,[4] or any of the selected airports. Thus, the changes to the lead monitoring network requirements did not result in any lead monitoring in the eastern mountains.

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[1] 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.

[2] 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.

[3] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[4] North Carolina Point Source Emission Report, available from the world wide web at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&year=2016&physical=byCounty&overridetype=All&toxics=153&sortorder=103&viewreport=View+Report. Accessed May 1, 2018.

The 2015 **ozone monitoring** requirements did not result in additional ozone monitoring in the eastern mountains. [5] This area does not have any MSAs requiring a minimum number of monitors by 40 Code of Federal Regulations, CFR, 58 Appendix D for population exposure monitoring in urban areas.

The eastern mountains did not need to add monitors to comply with the 2010 **nitrogen dioxide monitoring** requirements.[6] The area is too small to require area-wide monitors and does not have any roadways with average annual daily traffic above the threshold for near roadway monitoring. The eastern mountain area also does not need additional monitors to meet the 2010 **sulfur dioxide monitoring** requirements because there are no large sources of sulfur dioxide emissions located within the area.[7] This area will also not be required to operate near road **carbon monoxide** and **fine particle** monitors because the population is under one million. [8]

(2) The Winston-Salem MSA

The Winston-Salem MSA consists of five counties: Davidson, Davie, Forsyth, Stokes and Yadkin. The major metropolitan area is Winston-Salem. The DAQ currently operates one monitoring site in the Winston-Salem MSA and the Forsyth County Office of Environmental Assistance and Protection, Forsyth County, operates three. These sites are located at Lexington in Davidson County and Clemmons, Union Cross and Hattie Avenue in Winston-Salem in Forsyth County. The locations of these monitors are shown in Figure B2. The Forsyth County sites and monitors are discussed in Volume 1, Appendix C. Only the DAQ site is further discussed in this subsection.

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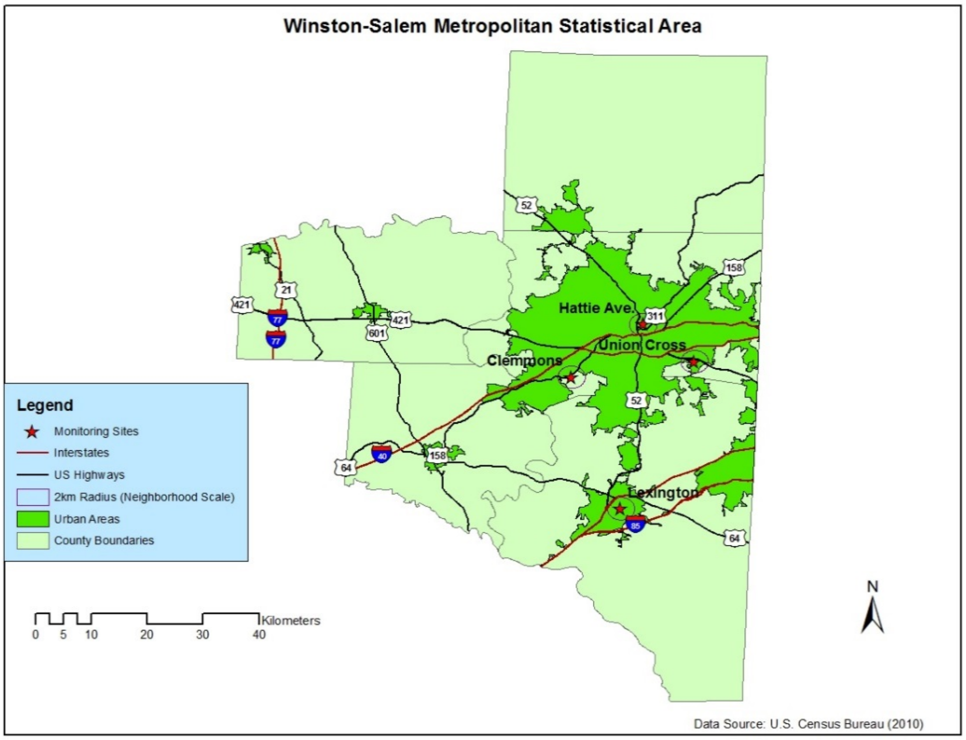
[5] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register**,** Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.
[6] Primary National Ambient Air Quality Standards for Nitrogen 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.
[7] North Carolina Point Source Emission Report, available from the world wide web at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&year=2016&physical=byCounty&overridetype=All&toxics=264&sortorder=103. Access May 1, 2018.
[8] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.



Hattie Avenue is a multi-pollutant site; Union Cross is an ozone site; Clemmons School is an ozone and fine particle site and Lexington is a fine particle site. The circles represent the scale (4 Km).

Figure B2. Location of monitoring sites in the Winston-Salem MSA

Figure B3. Lexington water tower fine particle monitoring site, 37-057-0002

At the **Lexington** site**,** 37-057-0002, the DAQ operates one-in-three-day fine particle FRM monitor and a continuous fine particle monitor. The MetOne Super SASS and URG monitors were shut down in January 2015. The site is pictured in Figure B3. Views looking north, northeast, east, south, southwest and west are provided in Figure B4 through Figure B9. Table B1 summarizes monitoring information for the site.

Figure B4. Looking north from Lexington site

Figure B5. Looking northeast from Lexington site

Figure B6. Looking west from Lexington site

Figure B8. Looking east from Lexington site

Figure B7. Looking southwest from Lexington site

Figure B9. Looking south from Lexington site

Table B1. Site Table for Lexington

Site Name:	Lexington			**AQS Site Identification Number**	37-057-0002
Location:	938 South Salisbury Street, Lexington, North Carolina				
CBSA:	Winston-Salem, NC			**CBSA #:**	49180
Latitude	35.814444	**Longitude**	-80.262500	**Datum:**	WGS84
Elevation	241 meters				

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
PM 2.5 local conditions, primary	R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC – Gravimetric Analysis	RFPS-1006-145	24-Hour	Every third day, year-round
PM 2.5 local conditions, secondary	Met One BAM-1020 Mass Monitor w/VSCC, 170	EQPM-0308-170	1-Hour	Hourly, year-round

Date Monitor Established:	PM 2.5 local conditions, primary monitor	Jan. 1, 1999
	PM 2.5 local conditions, secondary continuous monitor	July 22, 2014

Nearest Road:	South Salisbury Street	**Traffic Count:**	1000	**Year of Count:**	2016 Estimate

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
PM 2.5 local conditions, collocated	30 meters	East	SLAMS	Collocated QA monitor to meet Appendix A requirements for BAM 1020 monitors.
PM 2.5 local conditions, primary	30 meters	East	SLAMS	Required for demonstration of maintenance. Compliance w/NAAQS. Real-time AQI reporting & forecasting.

Table B1. Site Table for Lexington

Parameter Name	Monitoring Objective	Scale	Suitable for Comparison to NAAQS	Proposal to Move or Change
PM 2.5 local conditions, collocated	Population exposure	Neighborhood	Yes	None
PM 2.5 local conditions, primary	Population exposure	Neighborhood	Yes	None

Parameter Name	Meets Part 58 Requirements for:			
	Appendix A	Appendix C	Appendix D	Appendix E
PM 2.5 local conditions, collocated	Yes	Yes	Not required	Yes
PM 2.5 local conditions, primary	Yes	Yes	Not required	Yes

Parameter Name	Probe Height in meters	Distance to Support	Distance to Trees	Obstacles
PM 2.5 local conditions, collocated	2.4	2.1 meters	>20 meters	None
PM 2.5 local conditions, primary	2.4	2.1 meters	>20 meters	None

On Jan. 1, 2016, the DAQ made the continuous fine particle monitor at the site, the primary monitor to provide a collocated beta attenuation monitor, BAM 1020, and federal reference method, FRM, monitor site. A collocated BAM 1020 – FRM site was necessary to meet 40 CFR 58 Appendix A requirements. On Jan. 1, 2017, the DAQ added a second FRM to the site to provide a second FRM-FRM collocated site, if needed to meet Appendix A requirements; however, currently, the primary quality assurance organization is not operating enough primary FRMs to make a second FRM-FRM site necessary. Thus, the DAQ will continue to operate the BAM 1020 monitor as the primary monitor at the site and move the collocated FRM to another site to eventually replace the collocated FRM-FRM site at the Board of Education in Asheville. On July 1, 2018, the sampling schedule for the FRM will be reduced to one-in-six day.

In 2014 the DAQ shut down the seasonal ozone monitor at **Mocksville,** 37-059-0003, because it was not required by 40 CFR 58 Appendix D. In 2015 the FCOEAP shut down the Peters Creek carbon monoxide monitor and the Shiloh Church ozone monitor. The carbon monoxide monitor was no longer required by the state implementation plan to demonstrate compliance with the carbon monoxide standard and the ozone monitor was not required by Appendix D.

The 2010 changes to the **lead monitoring** requirements did not require lead monitoring in the Winston-Salem MSA. [9] The Winston-Salem MSA does not have any permitted facilities emitting more than 0.5 ton per year of lead.[10]

The 2015 changes to the **ozone monitoring** requirements lengthened the monitoring season so that it begins on March 1 instead of April 1 starting in 2017. [11] The ozone monitoring changes did not result in additional monitors in the Winston-Salem MSA. This MSA already exceeds the

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[9] 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.

[10] United States Environmental Protection Agency. (2018). *TRI Explorer* (2016 Dataset (released March 20178)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (April 14, 20178).

[11] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register**,** Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.

minimum number of monitors required by 40 CFR 58 Appendix D for population exposure monitoring in urban areas.

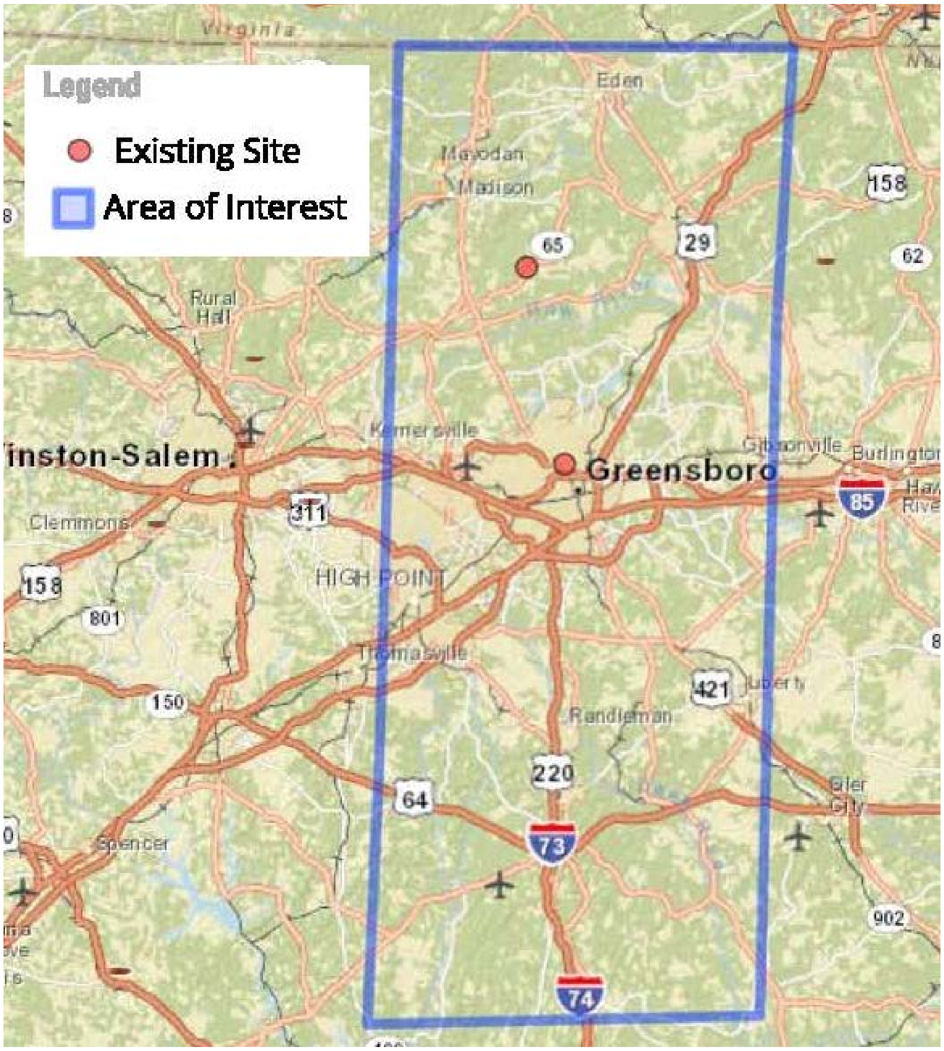
To comply with the 2010 **nitrogen dioxide monitoring** requirements, [12] based on the monitoring rules finalized on March 7, 2013, the Winston-Salem MSA was required to add a monitor by Jan. 1, 2017, because the MSA population exceeded the 500,000-threshold. However, on Dec. 30, 2016, the requirement was removed to establish near-road NO_2 monitoring stations in Core Based Statistical Areas, CBSAs, having populations between 500,000 and 1,000,000 persons.[13] Currently, the MSA is too small to require area-wide monitors. The existing nitrogen dioxide monitor at Hattie Avenue was designated as one of the monitors required by the administrator to represent vulnerable populations.

The Winston-Salem MSA will not need to add sulfur dioxide monitors to comply with the 2010 **sulfur dioxide monitoring** requirements. In August 2012, the Office of Air Quality Planning and Standards, OAQPS, calculated, based on a revised 2008 emission inventory, that population weighted emission index, PWEI, monitoring was not required in the MSA. Source oriented monitoring will also not be required at the Belews Creek Steam Station in Stokes County because the facility showed by modeling that the ambient air near the facility meets the current standard. This area will also not be required to operate near road **carbon monoxide** and **fine particle** monitors because the population is under one million. [14]

(3) The Greensboro-High Point MSA

The Greensboro-High Point MSA consists of three counties: Guilford, Randolph and Rockingham. The major metropolitan areas are the cities of Greensboro and High Point. The DAQ currently operates two monitoring sites in the Greensboro-High Point MSA. These sites are located at Mendenhall in Guilford County and Bethany in Rockingham County. The locations of these monitors are shown in Figure B10. The DAQ shut down the **Colfax,** 37-081-0014, one-in-three-day fine particle monitoring site at the end of 2014 because it was no longer required by Appendix D.

[12] 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.
[13] Revision to the Near-road NO2 Minimum Monitoring Requirements, Federal Register**,** Vol. 81, No. 251, Dec. 30, 2016, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-12-30/pdf/2016-31645.pdf.
[14] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.



The Mendenhall ozone and particle monitoring site is in the center; the Bethany ozone monitoring site is to the north.

Figure B10. Location of monitors in the Greensboro-High Point MSA

At the **Mendenhall** site**,** 37-081-0013, the DAQ operates seasonal ozone, continuous fine particle and continuous PM_{10} monitors. Figure B11 through Figure B19 show the site and views looking north, northeast, east, southeast, south, southwest, west and northwest. The Mendenhall site is the design value ozone monitoring site for the MSA. At the end of 2017, the DAQ shut down the fine particle federal reference one-in-six-day monitor. Site information is in Table B2.

Figure B11. Mendenhall ozone and particle monitoring site, 37-081-0013


Figure B12. Looking north from the Mendenhall site


Figure B14.   Looking northeast from the Mendenhall site


Figure B13. Looking northwest from the Mendenhall site


Figure B15. Looking east from the Mendenhall site


Figure B16. Looking west from the Mendenhall site


Figure B18. Looking southeast from the Mendenhall site


Figure B17. Looking southwest from the Mendenhall site


Figure B19. Looking south from the Mendenhall site

Table B2. Site Table for Mendenhall

Site Name:	Mendenhall School	**AQS Site Identification Number**	37-081-0013
Location:	205 Willoughby Blvd, Greensboro, North Carolina		

CBSA:	Greensboro-High Point, NC	**CBSA #:**	24660

Latitude	36.109167	**Longitude**	-79.801111	**Datum:**	NAD83	**Elevation**	247 meters

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
PM 2.5 local conditions, BAM	Met One BAM-1022 Mass Monitor w/ VSCC	EQPM-1013-209	1-Hour	Year-round
PM10 Total 0-10 µm STP	Met One Beta Attenuation BAM-1020	EQPM-0798-122	1-Hour	Year-round

Date Monitor Established:	Ozone	April 15, 2005
Date Monitor Established:	PM 2.5 local conditions, continuous	Dec. 14, 2001
Date Monitor Established:	PM10 Total 0-10 µm STP	Dec. 14, 2001

Nearest Road:	Saint Regis Road	**Traffic Count:**	<1,000	**Year of Count:**	2016 Estimate

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	184 meters	North northwest	SLAMS	Compliance w/ NAAQS; real-time reporting; air quality forecasting.
PM 2.5 local conditions, BAM	190 meters	North northwest	SPM; non-regulatory	Real-time reporting; air quality forecasting.
PM10 Total 0-10 µm STP	190 meters	North northwest	SLAMS	Compliance w/NAAQS

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable to Compare to NAAQS**	**Proposal to Move or Change**
Ozone	General background Population exposure	Urban	Yes	None
PM 2.5 local conditions, BAM	Population exposure General background	Neighborhood	No	Became primary monitor on Jan. 1, 2018
PM10 Total 0-10 µm STP	Population exposure General background	Urban	Yes	None

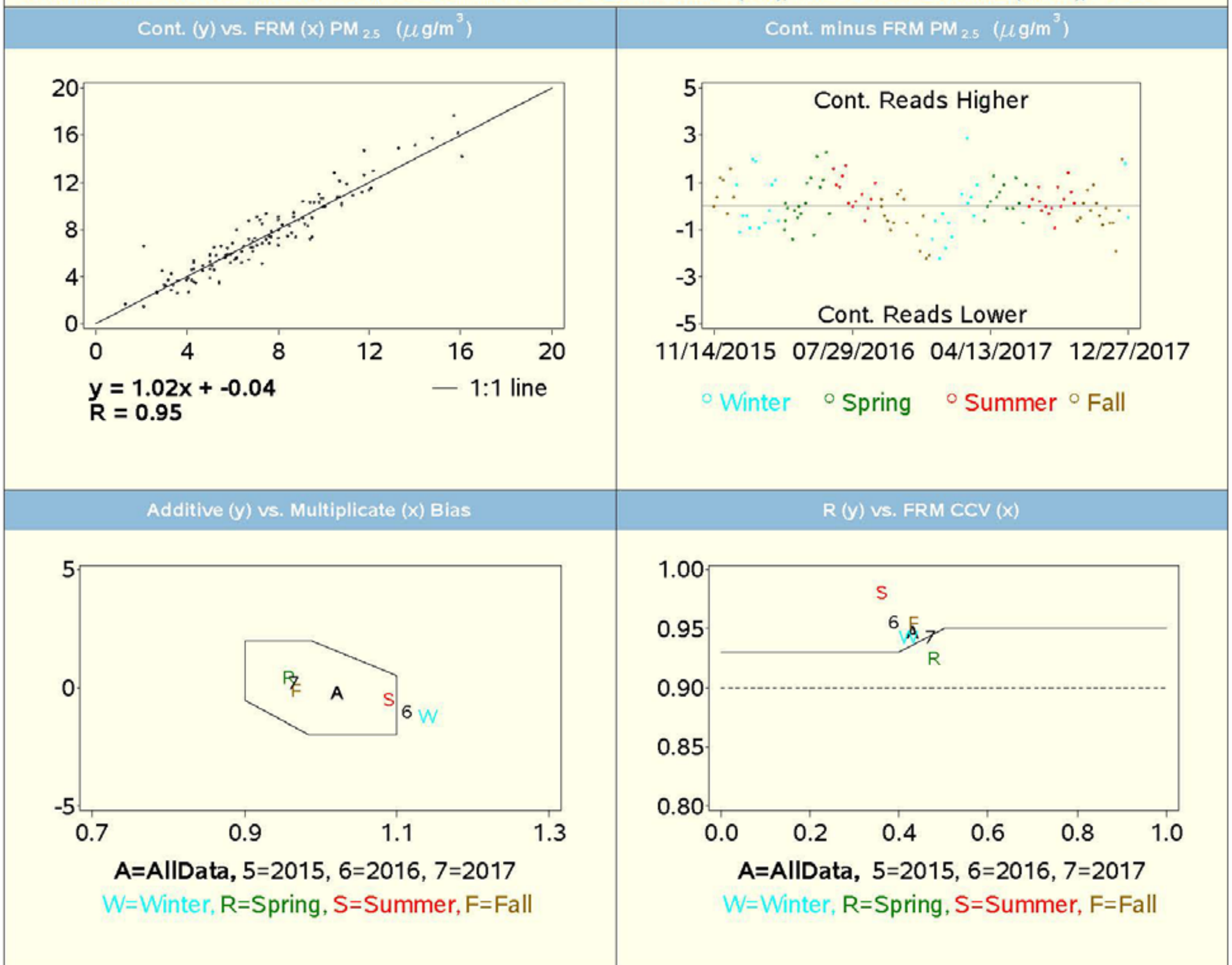
Parameter Name	**Meets Part 58 Appendix A Requirements**	**Meets Part 58 Appendix C Requirements**	**Meets Part 58 Appendix D Requirements**	**Meets Part 58 Appendix E Requirements**
Ozone	Yes	Yes	Yes	Yes
PM 2.5 local conditions, BAM	Yes	Yes	Yes	Yes
PM10 Total 0-10 µm STP	Yes	Yes	Yes	Yes

Parameter Name	**Probe Height in meters**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	3.0	1.1 meters	>20 meters	None
PM 2.5 local conditions, BAM	2.5	2.2 meters	>20 meters	None
PM10 Total 0-10 µm STP	2.5	2.2 meters	>20 meters	None

The DAQ operated a BAM 1022 monitor at the site from November 2015 to Dec. 31, 2017, to evaluate how well the BAM and the FRM compare at this location. A comparison of the two monitors is shown in Figure 20. Based on the results through the end of 2017, the two monitors compared well. Thus, the DAQ made the BAM the primary monitor at the site on Jan. 1, 2018, and shut down the FRM at the end of 2017.

PM 2.5 Continuous Monitor Comparability Assessment
Site 37-081-0013: Greensboro, NC

FRM: R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC - Gravimetric (145,118), PM2.5 - Local Conditions (88101), POC=1
Cont: Met One BAM-1022 Mass Monitor w/ VSCC or TE-PM2.5C - Beta Attenuation (209), PM2.5 - Local Conditions (88101), POC=3



Mean PM 2.5 (µg/m³)

Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**125**	**7.3**	**7.4**	**1.02**
Winter	28	7.1	7.1	0.99
Spring	32	6.2	6.6	1.06
Summer	28	8.1	8.5	1.05
Fall	37	7.6	7.4	0.97
2015	8	6.1	6.7	1.11
2016	59	7.8	7.8	1.00
2017	58	6.9	7.1	1.02

Appendix A Statistics

Dataset	N (all observations)	Bias (all observations)	N (only >= 3 ug/m^3)	Bias (only >= 3 ug/m^3)
AllData	**125**	**1.7**	**115**	**1.3**
Winter	28	-2.4	27	-2.0
Spring	32	10.5	26	6.1
Summer	28	4.4	28	4.4
Fall	37	-5.0	34	-2.3
2015	8	15.2	7	9.4
2016	59	-1.2	57	-0.1
2017	58	2.7	51	1.8

Data Source: EPA AQS Data Mart

Generated on: May 2, 2018

Figure 20. Comparison of the beta attenuation monitor with the federal reference monitor at Mendenhall

At the **Bethany** site**,** 37-157-0099, the DAQ operates a seasonal ozone monitor, the second required ozone monitoring site for the MSA. The DAQ added a background sulfur dioxide monitor for background PSD modeling to this site Jan. 1, 2011. The monitor operates for 12 months every three years. It operated from April 2017 until March 2018. A picture of the site as well as views looking north, east, south and west are provided in Figure B21 through Figure B25. Site information is in Table B3

Figure B21. Bethany ozone and sulfur dioxide monitoring site, 37-157-0099

Figure B22. Looking north from the Bethany site

Figure B24. Looking east from the Bethany site

Figure B23. Looking west from the Bethany site

Figure B25. Looking south from the Bethany site

Table B3. Site Table for Bethany School

Site Name:	Bethany School	**AQS Site Identification Number**	37-157-0099
Location:	6371 NC 65 @ Bethany School, Reidsville, NC 27320		
CBSA:	Greensboro-High Point, NC	**CBSA #:**	24660

Latitude	36.308608	**Longitude**	-79.859315	**Datum:**	WGS84	**Elevation**	277 meters

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
Sulfur dioxide	Instrumental with pulsed fluorescence, 060	EQSA-0486-060	1-Hour	12 months Every third year

Date Monitor Established:	Ozone	July 7, 1993
Date Monitor Established:	Sulfur dioxide	Jan. 1, 2011

Nearest Road:	Bethany Road	**Traffic Count:**	2000	**Year of Count:**	2012

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	15 meters	West southwest	SLAMS	Compliance w/ NAAQS; real-time reporting; air quality forecasting.
Sulfur dioxide	15 meters	West southwest	Special purpose	PSD modeling.

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable to Compare to NAAQS**	**Proposal to Move or Change**
Ozone	Population exposure, transport, welfare related impacts	Urban	Yes	None
Sulfur dioxide	General background	Urban	Yes	None

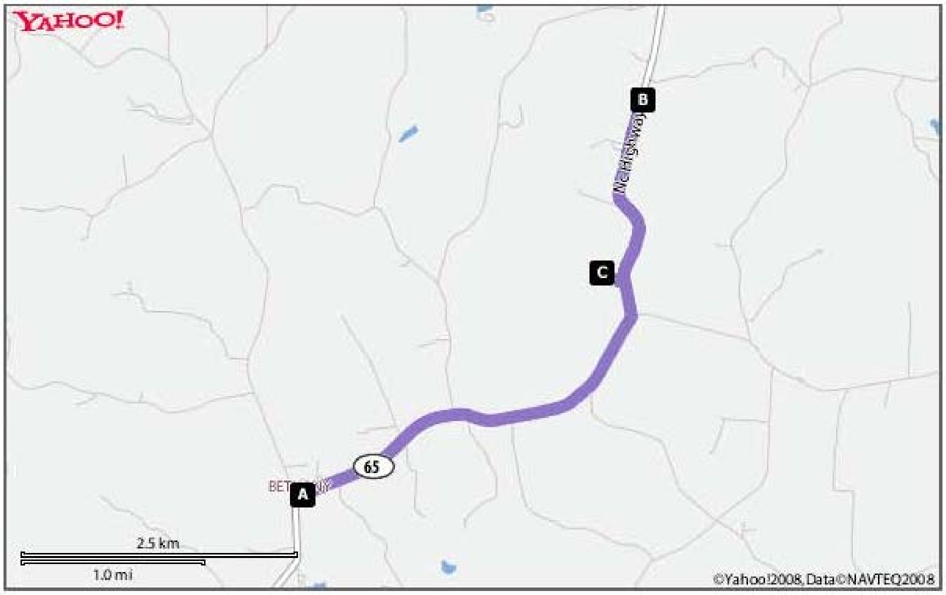
Parameter Name	**Meets Part 58 Appendix A Requirements**	**Meets Part 58 Appendix C Requirements**	**Meets Part 58 Appendix D Requirements**	**Meets Part 58 Appendix E Requirements**
Ozone	Yes	Yes	Yes	Yes
Sulfur dioxide	Yes	Yes	No requirement	Yes

Parameter Name	**Probe Height in meters**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	3	1.0 meter	>20 meters	None
Sulfur dioxide	3	1.0 meter	>20 meters	None

As shown in Figure B26 the site is located near two emission sources: Duke Energy Carolinas, LLC - Rockingham County Combustion Turbine is located about 3 kilometers to the northeast and Transcontinental Gas Pipeline Corporation - Compressor Station 160 is located about 5 kilometers to the north northeast. In 2015 the Duke Energy Carolinas facility emitted 307.3 tons of nitrogen oxides, 14.4 tons of volatile organic compounds, VOC, and four tons of sulfur dioxide.[15] Transcontinental Gas Pipeline emitted 220.2 tons of nitrogen oxides, 25.2 tons of VOC and 0 tons of sulfur dioxide.[16]

[15] **North Carolina Criteria and Toxic Air Pollutant Point Source Emissions Report.** Available from the World Wide Web at https://xapps.ncdenr.org/aq/ToxicsReport/ToxicsReportFacility.jsp?ibeam=true&year=2016&county_code=157&findfacility=4734. Accessed May 7, 2018.

[16] **North Carolina Criteria and Toxic Air Pollutant Point Source Emissions Report.** Available from the World Wide Web at https://xapps.ncdenr.org/aq/ToxicsReport/ToxicsReportFacility.jsp?ibeam=true&year=2016&county_code=157&findfacility=4445. Accessed May 7, 2018.



A is the Bethany ozone monitoring Site; B is Transcontinental Gas Pipeline Corp. - Compressor Station 160; C is Duke Energy Carolinas, LLC - Rockingham Co. Comb. Turbine

Figure B26. Location of the Bethany ozone site in relation to nearby emission sources

The DAQ issued a new permit, 10494R00, for a power greenfield plant on July 14, 2017.[17] The latitude and longitude coordinates for the facility, NTE Carolinas, are shown in relation to the location of the Bethany monitoring site in Figure B27. The Bethany monitoring site is approximately 3.2 Km southwest from where the new plant will be constructed.

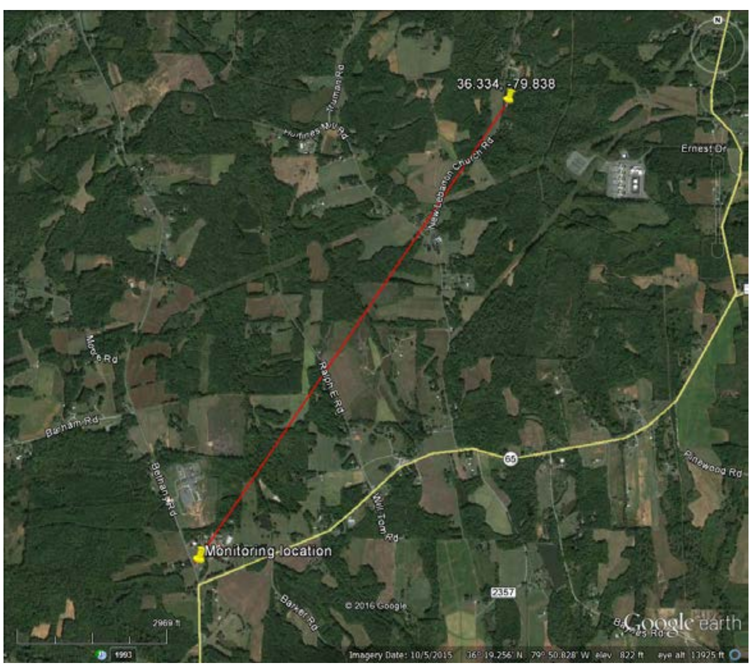


Figure B27. Location of new facility relative to the existing Bethany ozone and sulfur dioxide monitoring station

[17] North Carolina Division of Air Quality Permitted Facilities. Available on the worldwide web at https://files.nc.gov/ncdeq/Air%20Quality/permits/aapa_reports/all_permitted.pdf. Accessed May 7, 2018.

In 2008 the EPA expanded the **lead monitoring** network to support the lower lead NAAQS of 0.15 micrograms per cubic meter. [18] In 2010, the EPA focused monitoring efforts on fence line monitoring located at facilities that emit 0.5 or more tons of lead per year and at NCore monitoring sites in urban areas. [19] In 2016 the requirement for monitoring at NCore sites was removed.[20] The Greensboro-High Point MSA was not required by the revised lead monitoring requirements to do lead monitoring because it does not have any permitted facilities emitting 0.5 or more tons per year of lead.[21]

The 2015 **ozone monitoring** requirements did not result in additional monitors in the Greensboro-High Point MSA.[22] This MSA meets the minimum monitoring requirements in 40 CFR 58 Appendix D for population exposure monitoring in urban areas. However, the monitoring season will begin one month earlier on March 1 instead of April 1 starting in 2017.

To comply with the 2010 **nitrogen dioxide monitoring** requirements,[23] the monitoring rules finalized on March 7, 2013, required the Greensboro-High Point MSA to add a monitor by Jan. 1, 2017, because the MSA population exceeds the 500,000-threshold. However, on Dec. 30, 2016, the requirement was removed to establish near-road NO_2 monitoring stations in Core Based Statistical Areas, CBSAs, having populations between 500,000 and 1,000,000 persons.[24]

The 2010 **sulfur dioxide monitoring** requirements ended up not requiring additional monitoring in this area because the OAQPS released revised PWEI calculations in August 2012. The August 2012 calculations resulted in a PWEI monitor not being needed in the Greensboro MSA.

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[18] 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.

[19] 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.

[20] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[21] **North Carolina Criteria and Toxic Air Pollutant Point Source Emissions Report.** Available from the World Wide Web at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&year=2015&physical=byCounty&overridetype=All&toxics=153&sortorder=3. Accessed May 7, 2017.

[22] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register**,** Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.

[23] 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.

[24] Revision to the Near-road NO2 Minimum Monitoring Requirements, Federal Register**,** Vol. 81, No. 251, Dec. 30, 2016, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-12-30/pdf/2016-31645.pdf.

This MSA will also not be required to operate near road **carbon monoxide** and **fine particle** monitors because the population is less than one million. [25]

(4) The Burlington MSA

The Burlington MSA consists of the county of Alamance. The major metropolitan area is the city of Burlington. The DAQ currently does not operate any monitoring sites in the Burlington MSA. The Hopedale fine particle monitoring site was shut down in 2015. This fine particle monitoring site was not required by 40 CFR 58 Appendix D.

The changes made to the **lead monitoring** requirements in December 2010 did not require additional monitoring in the Burlington MSA because the MSA does not have any permitted facilities emitting 0.5 tons or more of lead per year.[26] The 2010 **nitrogen dioxide monitoring** requirements will not require the Burlington MSA to monitor for nitrogen dioxide. [27] The MSA is too small to require area-wide monitors and does not have any roadways with average annual daily traffic above the threshold for near roadway monitoring. The 2010 **sulfur dioxide monitoring** requirements will also not result in additional monitoring in the MSA because there are no large sources emitting sulfur dioxide within its bounds. This area will also not be required to operate near road **carbon monoxide** and **fine particle** monitors because the population is under one million. [28]

The DAQ does not plan to make any changes to the Burlington MSA ozone monitoring network. Currently, the DAQ does not monitor for ozone in Burlington because there are ozone monitors in the neighboring counties of Caswell, Guilford and Rockingham. Figure B28 shows the locations of these monitors in relation to the Burlington MSA. The monitor at Bushy Fork in Person County, also shown in Figure B28, was established as a downwind monitor for the Burlington MSA.

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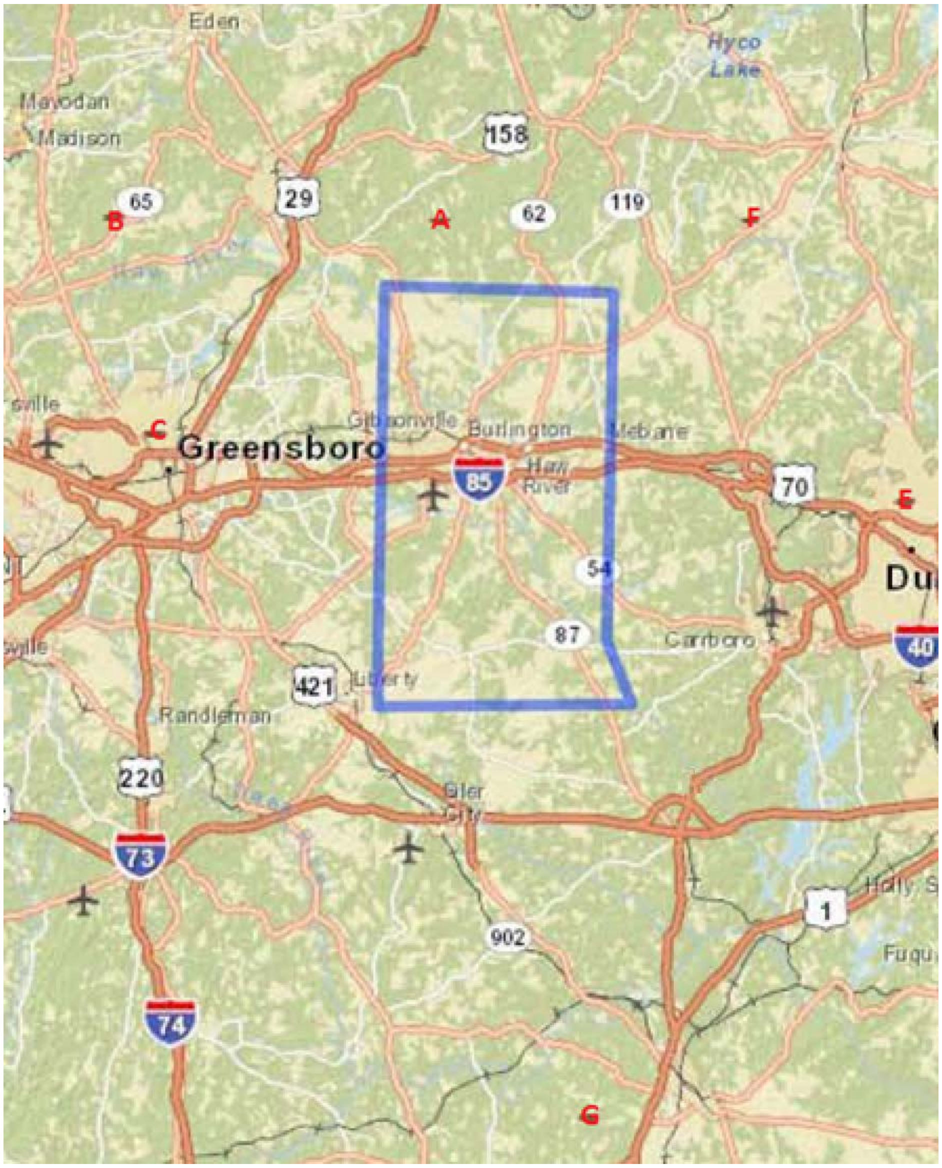
[25] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.

[26] Data obtained from the DAQ emission inventory database available from the worldwide web at http://ncair.org/.

[27] 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.

[28] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.



The Burlington MSA is outlined in heavy blue line. A, to the north, is the Cherry Grove monitor; B to the northwest, is the Bethany monitor; C, to the west, is the Mendenhall monitor; E, to the east, is the Durham monitor; F, to the northeast, is the Bushy Fork monitor; G, to the south, is the Blackstone monitor. The scale of representation for these monitors is urban, 4 to 50 Km, for all but the Durham monitor, which is neighborhood scale– 0.5 to 4 Km.

Figure B28. Locations of ozone monitors near the Burlington MSA.

(5) Caswell County

There are no metropolitan or micropolitan statistical areas in Caswell County. The DAQ currently operates one monitoring site in this county, located in Cherry Grove. Figure B29 shows the location of this ozone and rotating particle monitoring site. At the **Cherry Grove** site**,** 37-033-0001, the DAQ operates a seasonal ozone monitor and a continuous every third year PM10 monitor. Fine particle monitoring at the site ended on Jan. 5, 2016.

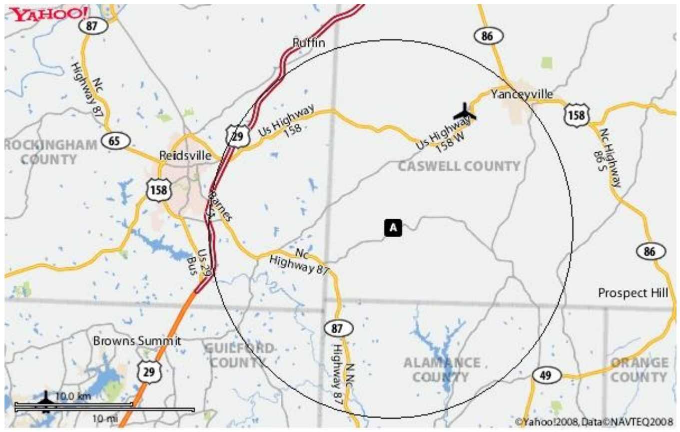


Figure B29. Location of the Cherry Grove monitoring site

A is the Cherry Grove ozone and fine particle site. The circle approximates the urban scale of representation, 4 to 50 Km, for ozone and particles.

Figure B30 shows the site. Table B4 summarizes information for the site. Views looking north, northeast, east, south, southwest and west are shown in Figure B31 through Figure B36. The DAQ operates a background PM10 monitor at this site. The monitor operates on a one-in-three-year schedule to provide data for prevention of significant deterioration modeling for industrial expansion. The PM10 monitor operated from Feb. 4, 2016, until March 3, 2017. It will operate again in 2019.

Figure B30. Cherry Grove ozone and particle monitoring Site, 37-033-0001

Table B4. Site Table for Cherry Grove

Site Name:	Cherry Grove	**AQS Site Identification Number**					37-033-0001
Location:	7074 Cherry Grove Road, Reidsville, North Carolina						
MSA:	Not in an MSA			**MSA #:**	00000		
Latitude	36.307033	**Longitude**	-79.467417	**Datum:**	WGS84	**Elevation**	241 meters

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
PM10 Total 0-10 µm STP	Met One Beta Attenuation BAM-1020	EQPM-0798-122	1-Hour	For 12 months, Every third year
Date Monitor Established:	Ozone			April 1, 1993
Date Monitor Established:	PM10 Total 0-10 µm STP			Jan. 1, 2013

Nearest Road:	Cherry Grove Road	**Traffic Count:**	1,200	**Year of Count:**	2016

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	49 meters	North	SLAMS	Compliance w/ NAAQS. Air quality forecasting.
PM10 Total 0-10 µm STP	49 meters	North	Special purpose	Industrial expansion monitoring

Table B4. Site Table for Cherry Grove

Parameter Name	Monitoring Objective	Scale	Suitable to Compare to NAAQS	Proposal to Move or Change
Ozone	Transport, welfare related impacts	Urban	Yes	None
PM10 Total 0-10 µm STP	Population exposure, general background, transport	Urban	Yes	Will operate May 1, 2019 to April 30, 2020

Parameter Name	Meets Part 58 Appendix A Requirements	Meets Part 58 Appendix C Requirements	Meets Part 58 Appendix D Requirements	Meets Part 58 Appendix E Requirements
Ozone	Yes	Yes	No requirements	Yes
PM10 Total 0-10 µm STP	Yes	Yes	No requirements	Yes

Parameter Name	Probe Height in meters	Distance to Support	Distance to Trees	Obstacles
Ozone	3	1.1 meters	>20 meters	None
PM10 Total 0-10 µm STP	2.4	2.2 meters	>20 meters	None

Figure B31. Looking north from Cherry Grove site

Figure B33. Looking west from Cherry Grove site

Figure B32. Looking northeast from Cherry Grove site

Figure B34. Looking southwest from Cherry Grove site

Figure B35. Looking east from Cherry Grove site

Figure B36. Looking south from Cherry Grove site

The **lead monitoring requirements** did not add any lead monitoring in Caswell County because the county does not have any permitted facilities located within its bounds that emit 0.5 tons or more of lead per year.[29] Caswell County also will not need additional ozone monitors to comply with the 2015 **ozone monitoring requirements**.[30] This county does not have an MSA that must meet the minimum monitoring requirements in 40 CFR 58 Appendix D for population exposure monitoring in urban areas. Ozone monitoring will be required to start on March 1 in 2017.

The 2010 **nitrogen dioxide monitoring requirements** did not result in additional monitoring in Caswell County.[31] The county is too small to require area-wide monitors and does not have any roadways with average annual daily traffic above the threshold for near roadway monitoring. This area will not need additional sulfur dioxide monitors to comply with the 2010 **sulfur dioxide monitoring** requirements because it does not have any large sulfur dioxide sources within its bounds. This area also will not be required to operate near road **carbon monoxide** and **fine particle** monitors because the population is under one million.[32]

[29] Data obtained from the DAQ emission inventory database available from the worldwide web at http://ncair.org/.
[30] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register, Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.
[31] 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.
[32] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.

Appendix B.1 Annual Network Site Review Forms for 2017

Lexington

Mendenhall in Greensboro

Bethany

Cherry Grove

Site Review Form Calendar Year 2017

Site Information

Region _WSRO	Site Name Lexington		AQS Site # 37-057-0002	
Street Address- 938 S. Salisbury St.			City Lexington, NC 27292	
Urban Area LEXINGTON		Core-based Statistical Area Winston-Salem, NC		
Enter Exact			Method of Measuring	
Longitude -80.2627	Latitude 35.814508			
In Decimal Degrees	In Decimal Degrees		___	Explanation: Google Earth
Elevation Above/below Mean Sea Level (in meters)			241.00	

Name of nearest road to inlet probe S.Salisbury Street ADT estimated1000 Year 2016

Distance of ozone probe to nearest traffic lane (m) N/A Direction from inlet to nearest traffic lane E

Comments: An estimated ADT number from 2016

Name of nearest major road South Main St. ADT 15000 Year latest available 2016

Distance of site to nearest major road (m) 120.00 Direction from site to nearest major road NNW

Comments: Traffic Volume (AADT) Maps 2016 - Davidson County

Site located near electrical substation/high voltage power lines?	Yes ☐	No ☒
Distance of site to nearest railroad track	(m) 120Direction to RR ESE	☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____	Direction ___
Distance between site and drip line of water tower (m) 3 Direction from site to water tower SSW	☐NA	

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

No

Instructions:

Address: Sometimes local addresses change. Confirm the local address of the site using a 911 locator or the address used by the local utility company, community or county to identify the site location.

Urban Area: If the monitor is located within the bounds of an urban area (an incorporated area with a population of 10,000 or more people), select the appropriate urban area from the list. Otherwise select "Not in an Urban Area".

Core-Based Statistical Area (CBSA): If the monitor is located within a county that is part of a metropolitan statistical area (MSA) or a micropolitan statistical area (MiSA), then it is located within a core-based statistical area. If the monitoring station is located in a county included in a MSA or MiSA, select the appropriate CBSA from the list. Otherwise select "None".

Longitude and Latitude: The longitude and latitude should be entered in decimal degrees. Use a conversion program, such as http://transition.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html, to convert to decimal degrees.

Road Information: For the nearest road to the inlet probe, list whatever roadway that carries vehicles that is closest to the probe, whether or not it is a named or public road and even if the road has very little traffic. Use the comments space if necessary to describe the road or the source of the annual average daily traffic (AADT) counts. If the monitor is located near an unnamed, little used, private road, use the nearest major road space to list the closest named public road to the site. Include the distance and direction of the nearest major road from the site as well as the AADT if it is available. If the closest road is a small public road but there is a large major roadway such as an interstate highway, divided highway, major thoroughfare, etc., near the monitoring station use the nearest major road space to list the information about this major roadway. Include the distance and direction of the major road from the site as well as the AADT. The AADT for state roads can be obtained from the North Carolina Division of Transportation at http://www.ncdot.gov/travel/statemapping/trafficvolumemaps/default.html. For AADT values for local roadways contact the appropriate local governments.

Any Sources of Potential Bias: Use this space to record any information about the site that is not requested elsewhere. Especially note any changes to the site that occurred near the site in the past year, such as road construction, building construction, new businesses, businesses closing, or changes in traffic patterns, crops or other agricultural activities.

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Monitor Type
Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☒General/Background____ ☐Highest Concentration____ ☒Population Exposure____ ☐Source Oriented____ ☐Transport____ ☐Welfare Related Impacts ____	☐Micro____ ☐Middle____ ☒Neighborhood ____ ☐Urban____ ☐Regional____	☐SLAMS ____ ☒SPM_FRM ☒ Nonregulatory BAM

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m_____
Actual measured distance from probe inlet to ground (meters) 2.4

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.1

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☒ (answer *'d questions) No ☐ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 1 to 4 m of each other? Yes ☒ No ☐ Give actual (meters): _____

*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters): _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☐ NA ☒

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐

*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: The second FRM PM2.5 monitor had been operated as a collocated FRM PM2.5 monitor from January 1, 2017 through June 30, 2017.

Date of Last Site Pictures: July 1, 2014 New Pictures Submitted? Yes ☐ No ☒

Reviewer Kimberly Hornberger Date: November 29, 2017

Ambient Monitoring Coordinator Chengqing Xiao Date: 01/05/2018

Joette Steger, May 8, 2018

Site Review Form Calendar Year 2017

Site Information

Region WSRO	**Site Name** Mendenhall	**AQS Site # 37-081-0013**
Street Address- 205 Willoughby Street		**City Greensboro**
Urban Area GREENSBORO	**Core-based Statistical Area** Greensboro-High Point, NC	

Enter Exact		**Method of Measuring**
Longitude -79.802314 In Decimal Degrees	**Latitude** 36.109006 In Decimal Degrees	___ **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		243

Name of nearest road to inlet probe Saint Regis Road ADT < 1000 Year estimated 2016

Comments: An estimated ADT number from 2016

Distance of site to nearest major road (m) 800.00 Direction from site to nearest major road S

Name of nearest major road W Cone Blvd ADT 21000 Year latest available 2016

Comments: "Traffic Volume (AADT) Maps Urban – Greensboro 2016"

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ______ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) ____ Direction ___

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ______ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

No

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (trace-level)	☒ General/Background____ ☐ Highest Concentration____ ☐ Max O3 Concentration____ ☒ Population Exposure____ ☐ Source Oriented____ ☐ Transport____ ☐ Upwind Background____ ☐ Welfare Related Impacts ____	☐ Micro____ ☐ Middle____ ☒ Neighborhood____ ☒ Urban____ ☐ Regional____	☒ SLAMS ____ ☐ SPM____ **Monitor Network Affiliation** ☐ NCORE____ ☐ Unofficial PAMS____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.0

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.1

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters ____

*Distance from probe to closest tree (m) ____ Direction from probe to tree ___ *Height of tree above probe (m) ____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 184 Direction from probe to nearest traffic lane NNW

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 FRM ☒ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☒General/Background ____ ☐Highest Concentration ____ ☒Population Exposure ____ ☐Source Oriented ____ ☐Transport ____ ☐Welfare Related Impacts ____	☐Micro ____ ☐Middle ____ ☒Neighborhood ____ ☐Urban ____ ☐Regional ____	☒SLAMS ____ ☐SPM____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY____

Probe inlet height (from ground) ☐ < 2 m ____ ☒ 2-7m ____ ☐ 7-15 m ____ ☐ > 15 m ____
Actual measured distance from probe inlet to ground (meters) 2.5

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.2 Yes ☒ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☒ (answer *'d questions) No ☐ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☒ No ☐ Give actual (meters) 2.2
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters) <1m

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters ____
*Distance from probe to closest tree (m) ____ Direction from probe to tree ___ *Height of tree above probe (m) ____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ___ Distance from probe inlet (m) ____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 190 Direction from probe to nearest traffic lane NNW

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective ____) No ☐-
*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐
*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures 1/14/16 New Pictures Submitted? Yes ☐ No ☒

Reviewer Kimberly Hornberger Date 12/20/2017

Ambient Monitoring Coordinator Chengqing Xiao Date01/05/2018

Joette Steger, 6/26/2018
Revised per email from
Chengqing Xiao on 5/29/2018
based on comments from Blair Palmer

Site Review Form Calendar Year 2017

Site Information

Region WSRO	**Site Name** Bethany	**AQS Site # 37-157-0009**
Street Address-6371 NC Hwy 65		**City Reidsville**
Urban Area Not in an Urban Area	**Core-based Statistical Area** Greensboro-High Point, NC	
Enter Exact		**Method of Measuring**
Longitude -79.8593 In Decimal Degrees	**Latitude** 36.3086 In Decimal Degrees	**Other (explain)** **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		**274**

Name of nearest road to inlet probe Bethany Rd ADT 2000 Year latest available 2012
Comments: Taken from NCDOT (online), note that Bethany Middel School has closed at this location beginning in 2017 and moved to another location. This school is/was adjacent to monitoring site.
Distance of site to nearest major road (m) 121.00 Direction from site to nearest major road SSE
Name of nearest major road NC Hwy 65 ADT 1600 Year latest available 2016
Comments: AADT taken from NCDOT (online)

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ________ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ______ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

None

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☒ Ozone (O_3)	☐General/Background ☐Highest Concentration ☐Max O3 Concentration ☒Population Exposure ☐Source Oriented ☒Transport ☐Upwind Background ☒Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☒Urban ☐Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.0
Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.0
Distance of outer edge of probe inlet from other gas monitoring probe inlets > 0.25 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle _____ Distance from probe inlet (m) ______ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 15 Direction from probe to nearest traffic lane WSW

Site Review Form Calendar Year 2017

obstacles, the probe or inlet must have unrestricted airflow and be located away from obstacles. The distance from the obstacle to the probe or inlet must be at least twice the height that the obstacle protrudes above the probe.

OZONE MONITOR RECOMMENDATIONS:

1) Maintain current monitor status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate monitor? Yes ☐ No ☐

Comments: ______

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ SO_2 (DRR) ☒ SO_2 (NAAQS) ☐ SO_2 (trace-level)	☒ General/Background ☐ Highest Concentration ☐ Population Exposure ☐ Source Oriented ☐ Transport ☐ Upwind Background ☐ Welfare Related Impacts	☐ Micro ☐ Middle ☐ Neighborhood ☐ Urban ☒ Regional	☐ INDUSTRIAL ☒ SLAMS ☐ SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.0

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.0

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 15 Direction from probe to nearest traffic lane WSW

SULFUR DIOXIDE MONITOR RECOMMENDATIONS:

1) Maintain current monitor status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate monitor? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures December 19, 2017 New Pictures Submitted? Yes ☒ No ☐

Reviewer Blair Palmer Date December 19, 2017

Ambient Monitoring Coordinator Chengqing Xiao Date 12/22/2017

Revised 2018-05-07 Joette Steger, May 8, 2018

Site Review Form Calendar Year 2017

Site Information

Region WSRO	**Site Name** Cherry Grove	**AQS Site #** 37-033-0001
Street Address- 7074 Cherry Grove Road		**City** Reidsville, NC 27320
Urban Area REIDSVILLE	**Core-based Statistical Area** Greensboro-High Point, NC	

Enter Exact				
Longitude	-79.467394	**Latitude**	36.307047	**Method of Measuring**
In Decimal Degrees		In Decimal Degrees		___ **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)				241

Name of nearest road to inlet probe Cherry Grove Road ADT < Year estimated

Comments: Cherry Grove nearest road (Friendly, Raccoon Ct, and Deer Trail have no ADT)

Distance of site to nearest major road (m) 87 m Direction from site to nearest major road SE

Name of nearest major road Cherry Grove Road ADT 1200 Year latest available 2016

Comments: : Nearest traffic count (ADT-1200(2016) is near intersection of Cherry Grove Road and Turner Rd

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ________ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ____________ ☒**NA**

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

NA

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	**Monitoring Objective**	**Scale**	**Monitor Type**
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☐ Population Exposure_____ ☐ Source Oriented_____ ☒ Transport_____ ☐ Upwind Background_____ ☒ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☒ Neighborhood_____ ☐ Urban_____ ☐ Regional_____	☒ SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.00

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.10

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☐ No ☐ NA ☒

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m)_____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 49 Direction from probe to nearest traffic lane N

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☒ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☐ PM2.5 Cont. (BAM)	☒General/Background ____ ☐Highest Concentration ____ ☒Population Exposure ____ ☐Source Oriented ____ ☐Transport ____ ☐Welfare Related Impacts ____	☐Micro ____ ☐Middle ____ ☒Neighborhood ____ ☐Urban ____ ☐Regional ____	☒SLAMS ____ ☐SPM____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY____

Probe inlet height (from ground) ☐ < 2 m ____ ☒ 2-7m ____ ☐ 7-15 m ____ ☐ > 15 m ____
Actual measured distance from probe inlet to ground (meters) 2.5

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.2 Yes ☒ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA ☒

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters)
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters)

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters ____
*Distance from probe to closest tree (m) ____ Direction from probe to tree ___ *Height of tree above probe (m) ____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) ____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 49 Direction from probe to nearest traffic lane N

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ____) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures 2/16 New Pictures Submitted? Yes ☐ No ☒

Reviewer Chris Bryant____ Date 01/22/2018

Ambient Monitoring Coordinator ____ Chengqing Xiao ____ Date 01/25/2018

Joette Steger, May 8, 2018

Appendix B-2. Scale of Representativeness

Each station in the monitoring network must be described in terms of the physical dimensions of the air parcel nearest the station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

a) Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.
c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.
d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.
e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station.

There are six basic exposures:

a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.
b) Sites located to determine representative concentrations in areas of high population density.
c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.
d) Sites located to determine general background concentration levels.
e) Sites located to determine the extent of regional pollutant transport among populated areas.
f) Sites located to measure air pollution impacts on visibility, vegetation damage or other welfare-based impacts and in support of secondary standards.

The design intent in siting stations is to correctly match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of the six basic objectives and the scales of representativeness are appropriate when siting monitoring stations:

Table B5. Site Type Appropriate Siting Scales

1. Highest concentration	Micro, middle, neighborhood, sometimes urban or regional for secondarily formed pollutants
2. Population oriented	Neighborhood, urban
3. Source impact	Micro, middle, neighborhood
4. General/background & regional transport	Urban, regional
5. Welfare-related impacts	Urban, regional

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL A. ABRACZINSKAS
Director

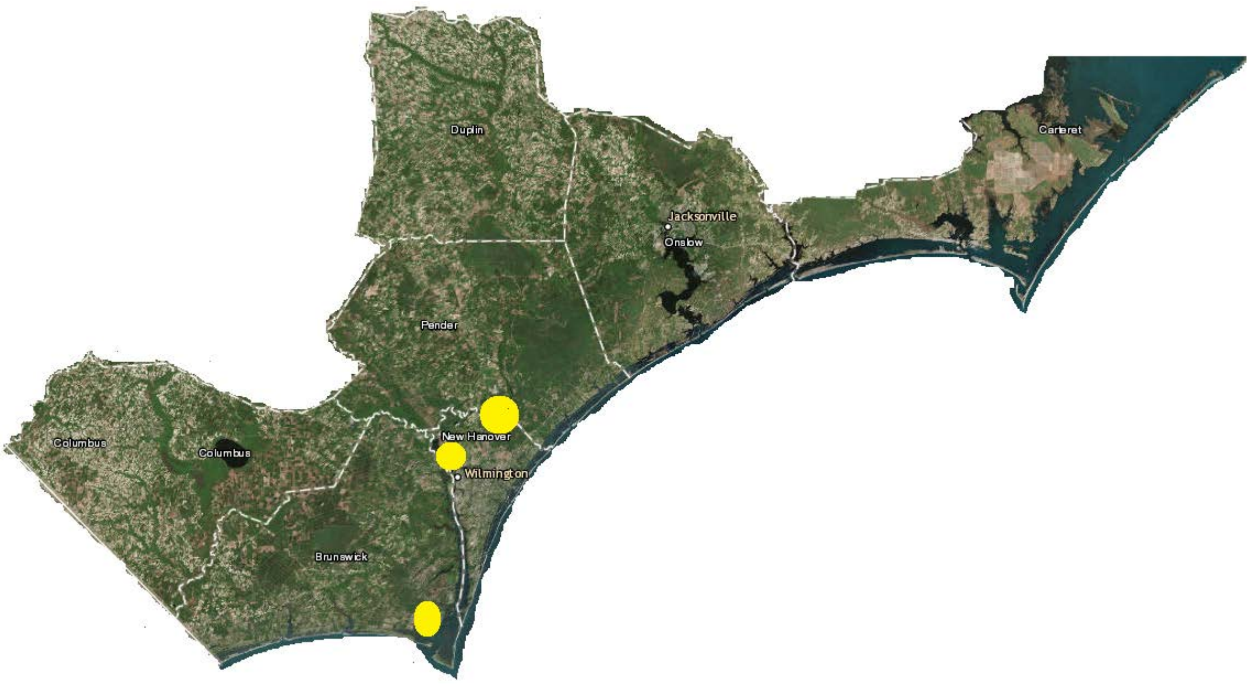
NORTH CAROLINA
Environmental Quality

2018-2019 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 2

Site Descriptions by Metropolitan Statistical Area

G. The Wilmington Monitoring Region



June 29, 2018

North Carolina Department of Environmental Quality | Division of Air Quality
217 West Jones Street, Suite 4000 | 1641 Mail Service Center | Raleigh, North Carolina 27699-1641
919.707.8400

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G. The Wilmington Monitoring Region

The Wilmington monitoring region, shown in Figure G1, has four parts: (1) the Wilmington metropolitan statistical area, MSA, consisting of New Hanover and Pender Counties, (2) the North Carolina part of the Myrtle Beach-Conway-North Myrtle Beach MSA, consisting of Brunswick County, (3) the Jacksonville MSA, consisting of Onslow County and (4) the non-MSA portion of this monitoring region, consisting of Carteret, Columbus and Duplin Counties.

Figure G1. The Wilmington monitoring region
The yellow dots show the approximate locations of the North Carolina Division of Air Quality monitoring sites in this region.

(1) The Wilmington MSA

The Wilmington MSA consists of two counties: New Hanover and Pender. The City of Wilmington is the major metropolitan area. The North Carolina Division of Air Quality, or DAQ, currently operates one criteria pollutant monitoring site and one urban air toxics monitoring site in this MSA. The criteria pollutant monitoring site is the Castle Hayne ozone and particle monitoring site. The urban air toxics site is at the Battleship.

At the **Castle Hayne** site, 37-129-0002, the DAQ operates an ozone monitor and a continuous fine particle. Figure G2 shows the site. Table G1 summarizes monitoring information for the site. Figure G3 through Figure G10 provide views looking north, northeast, east, southeast, south, southwest, west and northwest.

Figure G2. Castle Hayne ozone and particle monitoring site, 37-129-0002

Table G1. Site Table for Castle Hayne

Site Name:	Castle Hayne	**AQS Site Identification Number:**	37-129-0002
Location:	6028 Holly Shelter Road, Castle Hayne, North Carolina		

MSA:	Wilmington, NC			**MSA #:**	9200
Latitude	34.364167	**Longitude**	-77.838611	**Datum:**	WGS84
Elevation	12 meters				

Parameter Name	Method	Method Reference ID	Sample Duration	Sampling Schedule
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
PM10 Total 0-10 µm STP	R & P Model 2025 PM2.5 Sequential – gravimetric analysis, 127	RFPS-1298-127	24-Hour	12 months, every third year
PM 2.5 local conditions, FEM	Met One BAM w/VSCC, 170	EQPM-0308-170	1-Hour	Year-round

Date Monitor Established:	Ozone	Jan. 1, 1979
Date Monitor Established:	Sulfur dioxide	Jan. 1, 2005
Date Monitor Established	PM10 Total 0-10 µm STP	Aug. 1, 2016
Date Monitor Established:	PM 2.5 local conditions, federal equivalent method	July 1, 2016

Nearest Road:	Holly Shelter Road	**Traffic Count:**	5300	**Year of Count:**	2016

Parameter Name	Distance to Road	Direction to Road	Monitor Type	Statement of Purpose
Ozone	62	North northwest	SLAMS	Real-time AQI reporting. Compliance w/NAAQS.
PM10 Total 0-10 µm STP	62	North northwest	SPM	Industrial expansion monitoring for PSD modeling
PM 2.5 local conditions, FEM	62	North northwest	SLAMS	Real-time AQI reporting. Compliance w/NAAQS

Parameter Name	Monitoring Objective	Scale	Suitable to Compare to NAAQS	Proposal to Move or Change
Ozone	Population exposure	Urban	Yes	None
PM10 Total 0-10 µm STP	General/Background	Neighborhood	Yes	Will start in 2020
PM 2.5 local conditions, FEM	Population exposure	Neighborhood	Yes	None

	Meets Part 58 Requirements:			
Parameter Name	Appendix A	Appendix C	Appendix D	Appendix E
Ozone	Yes	Yes	No requirements	Yes
PM10 Total 0-10 µm STP	Yes	Yes	No requirements	Yes
PM 2.5 local conditions, FEM	Yes	Yes	No requirements	Yes

Parameter Name	Probe Height (m)	Distance to Support	Distance to Trees	Obstacles
Ozone	4.5	2.0 meters	>20 meters	None
PM10 Total 0-10 µm STP	2.2	2.03 meters	>20 meters	None
PM 2.5 local conditions, FEM	5.0	2.03 meters	>20 meters	None

Figure G3 Looking north from the Castle Hayne site

Figure G5. Looking northeast from the Castle Hayne site

Figure G4. Looking northwest from the Castle Hayne site

Figure G6. Looking east from the Castle Hayne site

Figure G7. Looking west from the Castle Hayne site

Figure G9. Looking southeast from the Castle Hayne site

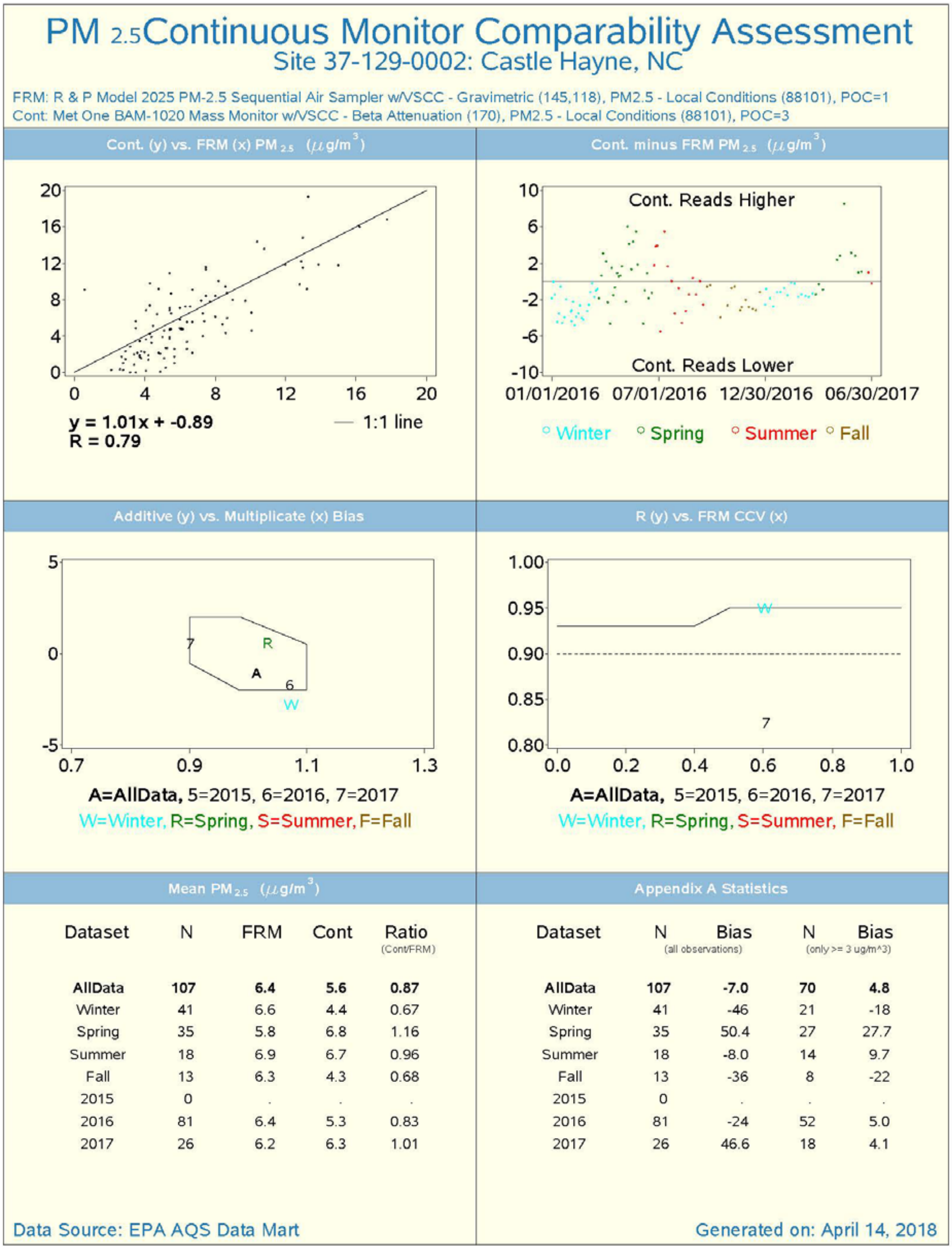
Figure G8. Looking southwest from the Castle Hayne site

Figure G10. Looking south from the Castle Hayne site

The DAQ completed one beta attenuation monitor, BAM, study in Dec. 2011. At that time, the BAM was shut down and the manual fine particle federal reference method, FRM, monitor became a state and local air monitoring station, SLAMS. In 2012, the DAQ installed another special purpose non-regulatory BAM and began a second BAM study at the site on Oct. 23, 2012. Current comparisons for the BAM and FRM monitors are available from the United States Environmental Protection Agency, or EPA, at https://www.epa.gov/outdoor-air-quality-data/pm25-continuous-monitor-comparability-assessments. On March 12, 2015, the FRM was moved to the roof of the building and the BAM was installed inside the building to help stabilize temperature and relative humidity to see if the two monitors would agree better under these conditions. The data comparison for Jan. 1, 2016, through June 30, 2017, is shown in Figure G11. Since the BAM was moved into the shelter, the BAM and FRM compare better at this site. Because of this improved agreement, the DAQ made the BAM a SLAMS and the primary monitor at this site on Jan. 1, 2016. On Jan. 1, 2016, the DAQ also made the FRM the collocated quality assurance monitor for the DAQ BAM 1020 monitoring network. However, the FRM and BAM data do not agree well enough to meet Appendix A requirements, probably because the concentrations are so low, so the DAQ shut down the collocated FRM at this site on June 30, 2017.

The DAQ requires PM_{10} data in the coastal area for Prevention of Significant Deterioration, PSD, modeling for industrial expansion. Because the DAQ shut down the PM_{10} monitoring site in Jacksonville on Dec. 31, 2007, the DAQ began manual one-in-six-day PM_{10} monitoring at the Castle Hayne site in February 2008 to provide the necessary PM_{10} data for PSD modeling for the coastal area. However, a wildfire next to the site forced the DAQ to shut down the monitor on March 31, 2008. After the wildfire was extinguished, the DAQ decided not to resume PM_{10} monitoring at Castle Hayne because of the pending construction of the Titan Cement Facility across the street from the Castle Hayne site. Modeling results indicated that Titan would contribute over 10 percent of the NAAQS to the PM_{10} concentrations measured at Castle Hayne, making Castle Hayne an unsuitable site for obtaining background data to use for PSD modeling. Thus, the PM_{10} monitor was located at Kenansville in second quarter 2009. At the end of 2010, the DAQ began operating the monitor on a one-in-three-year schedule and made the site one of six rotating background PM_{10} sites for the state. The Kenansville site collected PM_{10} data from August 2013 through July 2014. In 2016 Titan announced that they would not be building a cement facility in Castle Hayne. Since the Titan facility is no longer under consideration, DAQ collected PM_{10} data at Castle Hayne from October 2016 to October 2017.

When the Office of Management and Budget redefined the Wilmington MSA in February 2013, the estimated population of the Wilmington MSA dropped below 350,000 and was estimated to be at 288, 156 in July 2017. Thus, only one ozone monitor is required for the MSA if the ozone design value is above 85 percent of the NAAQS. The design value for 2015-2017 for Wilmington is at 83 percent of the standard so currently, no additional ozone monitors are



Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**107**	**6.4**	**5.6**	**0.87**
Winter	41	6.6	4.4	0.67
Spring	35	5.8	6.8	1.16
Summer	18	6.9	6.7	0.96
Fall	13	6.3	4.3	0.68
2015	0	.	.	.
2016	81	6.4	5.3	0.83
2017	26	6.2	6.3	1.01

Dataset	N (all observations)	Bias (all observations)	N (only >= 3 ug/m^3)	Bias (only >= 3 ug/m^3)
AllData	**107**	**-7.0**	**70**	**4.8**
Winter	41	-46	21	-18
Spring	35	50.4	27	27.7
Summer	18	-8.0	14	9.7
Fall	13	-36	8	-22
2015	0	.	.	.
2016	81	-24	52	5.0
2017	26	46.6	18	4.1

Figure G11. Comparison of BAM and FRM results at Castle Hayne after moving the BAM inside the building

needed in the MSA. As shown in Figure G12, the population in the Wilmington MSA is projected to remain under 350,000 for at least the next decade.

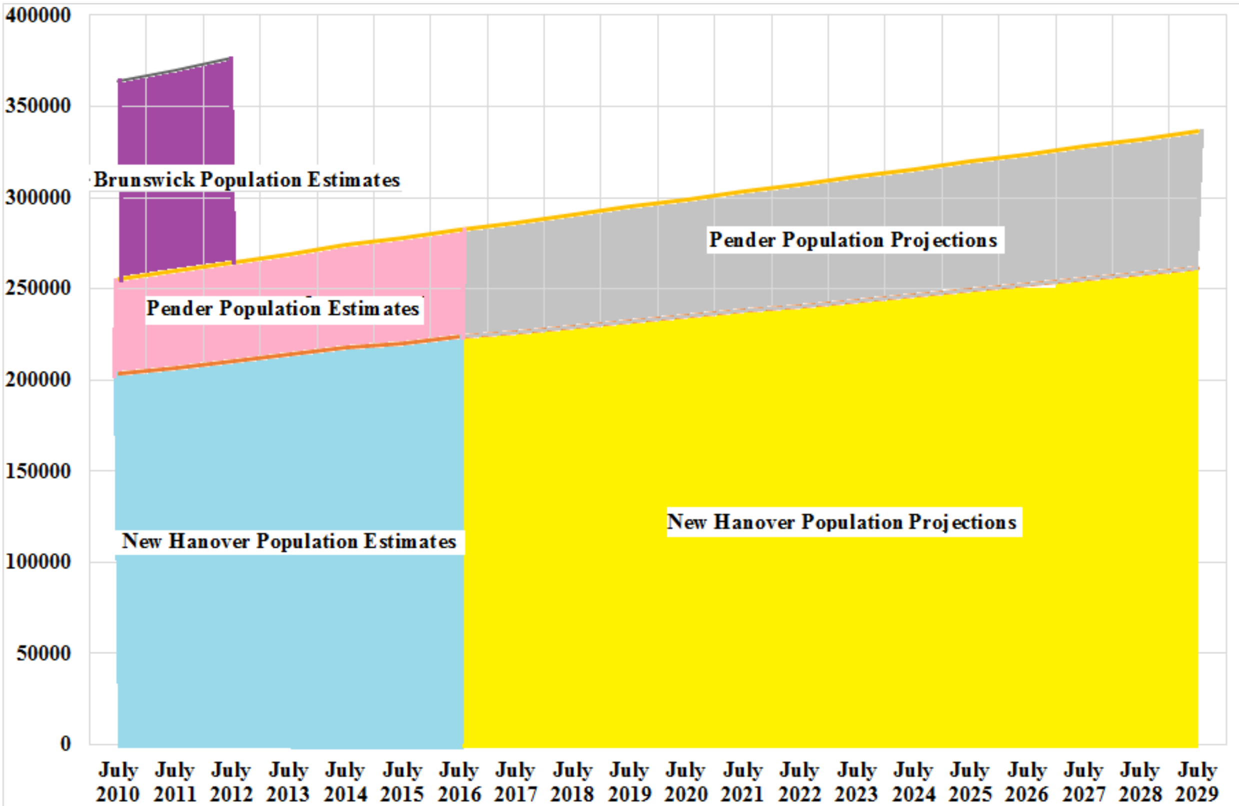


Figure G12. Population Estimates and Projections for the Wilmington MSA from 2010 to 2029
Estimates and projections are from the North Carolina Office of State Budget and Management, updated in September 2016

At the **Battleship** site, 37-129-0010, DAQ operates a year-round air toxics volatile organic compound sampler. Samples are collected in stainless steel canisters and sent to the Laboratory Analysis Branch where they are analyzed for 68 compounds using the Compendium Method for Toxic Organics 15. Figure G13 through Figure G21 show the site and views looking north, northeast, east, southeast, south, southwest, west and northwest.

Figure G13. The Battleship urban air toxics monitoring site

Figure G14. Looking north from the Battleship site

Figure G15. Looking northwest from the Battleship site

Figure G16. Looking west from the Battleship site

Figure G17. Looking northeast from the Battleship site

Figure G18. Looking east from the Battleship site

Figure G19. Looking southeast from the Battleship site

Figure G20. Looking southwest from the Battleship site

Figure G21. Looking south from the Battleship site

In 2008, EPA expanded the **lead monitoring** network to support the lower lead NAAQS of 0.15 micrograms per cubic meter.[1] The 2010 changes to the lead monitoring requirements focused monitoring efforts on fence line monitoring located at facilities that emit 0.5 tons or more of lead per year and at National Core, NCore, monitoring sites.[2] In 2016 the requirement for monitoring at NCore sites was removed.[3] These changes to the lead monitoring network requirements did not require lead monitoring in the Wilmington MSA. The MSA has no permitted facilities that emit more than 0.5 tons per year of lead.[4]

Changes to **the ozone monitoring** requirements extended the ozone season a month. In 2017 the ozone season started on March 1 instead of April 1.

The Wilmington MSA is not required by the 2010 **nitrogen dioxide monitoring** rule to have nitrogen dioxide monitors. It is too small to require area-wide monitors or near roadway monitoring. This MSA was also not required to do carbon monoxide monitoring because of the changes to the **carbon monoxide monitoring** requirements because the population is less than one million.

The Wilmington MSA has not been required by the 2010 **sulfur dioxide monitoring** rule to add additional sulfur dioxide monitors. The sulfur-dioxide monitor at the New Hanover site met the PWEI monitoring requirements for the MSA from 2011 through 2017. With the release of the

[1] 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.

[2] 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.

[3] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[4] Data obtained from the 2016 DAQ emission inventory database and the 2016 Toxics Release Inventory.

2014 National Emissions Inventory, a PWEI monitor was no longer required in this MSA so the New Hanover site was shut down at the end of 2017.

(2) The Myrtle Beach-Conway-North Myrtle Beach MSA

The Myrtle Beach-Conway-North Myrtle Beach MSA consists of Brunswick County in North Carolina and Horry County in South Carolina. The principal cities are Myrtle Beach, Conway and North Myrtle Beach. The MSA has an estimated population as of July 2017 of 464,165 people, which requires it to have an ozone monitor.[5] The DAQ operates an industrial sulfur dioxide monitoring site, Southport DRR, in this MSA. As shown in Figure G22, the South Carolina Department of Health and Environmental Control, or DHEC, started operating the Coastal Carolina ozone monitoring station on May 1, 2015. Currently, the DAQ and DHEC have signed an official agreement regarding the monitoring responsibilities for the MSA.[6]

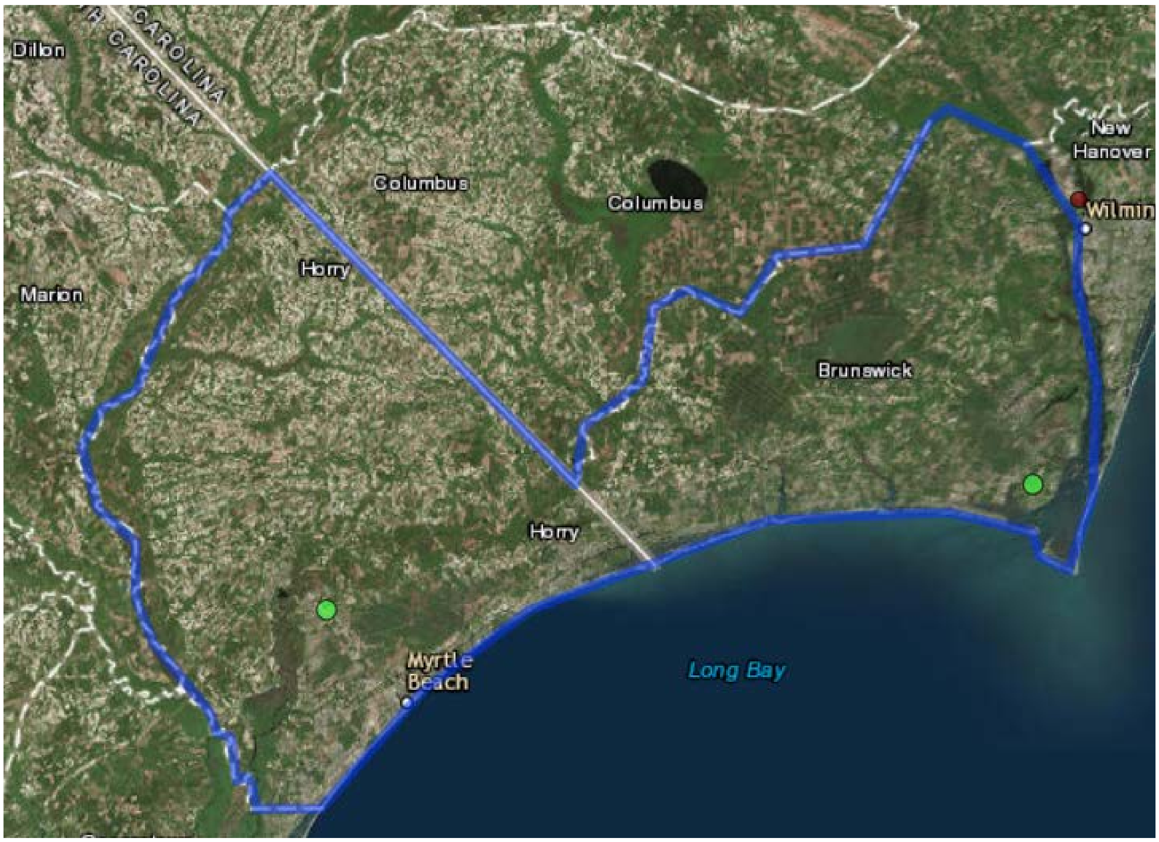


Figure G22. Monitoring sites in the Myrtle Beach-Conway-North Myrtle Beach MSA
The green dots show the locations of the Coastal Carolina ozone and the Southport DRR sulfur dioxide monitoring stations.

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[5] Source: Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2017, U.S. Census Bureau, Population Division, Released March 22, 2018, available on the world wide web at https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2017_PEPANNRES&src=pt.
[6] Memorandum of Agreement (MOA) on Criteria Monitoring Between SCDHEC and NCDENR DAQ, July 1, 2015, Available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=6786.

In 2016, the DAQ began working with CPI USA North Carolina Southport to establish a sulfur dioxide monitoring station in Southport, North Carolina, to characterize the ambient sulfur dioxide concentrations near the CPI facility as required by the data requirements rule for sulfur dioxide.[7] The area chosen for placement of the monitor was selected using the results of modeling done as described in the technical assistance document[8] and was reported in an addendum to the 2016-2017 network plan.[9] An aerial view of the monitoring location is shown in Figure G-23.

Figure G-23. Aerial view showing the location of the Southport DRR monitoring station

The Air Quality System, AQS, identification number for this monitor is 37-019-0005-42401-1. DAQ operates this monitor in collaboration with CPI Southport to ensure the air in the Southport area complies with the national ambient air quality standards for sulfur dioxide. The DAQ operates the monitor following the DAQ Sulfur Dioxide DRR quality assurance project plan and the monitor is part of the DAQ primary quality assurance organization. Figure G-24 through Figure G-32 show the site and views from the site looking north, east, south and west.

---

[7] 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.
[8] 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.
[9] Appendix L. CPI Southport Siting Analysis and Additional Site Information, North Carolina Division of Air Quality, Sep. 1, 2016. Available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=9275.

Figure G-24. Southport DRR sulfur dioxide monitoring site

Figure G-25. Southport DRR site looking north

Figure G-26. Southport DRR site looking northeast

Figure G-27. Southport DRR site looking northwest

Figure G-28. Southport DRR site looking east

Figure G-29. Southport DRR site looking west

Figure G-30. Southport DRR site looking southeast

Figure G-31. Southport DRR site looking southwest

Figure G-32. Southport DRR site looking south

The monitoring site is located 30 meters from the trees to the east. The tallest trees are estimated to be 15 meters in height. The nearest road is Rob Gandy Boulevard located 83 meters to the south southeast. This road does not have traffic count data; however, as shown in Figure G-33, secondary road number 1526, Jabbertown Road, further south than Rob Gandy Boulevard, had an average annual daily traffic count of 4,600 in 2014. The traffic on Rob Gandy Boulevard would be expected to be less than that on Jabbertown Road. The probe height is 4.8 meters.

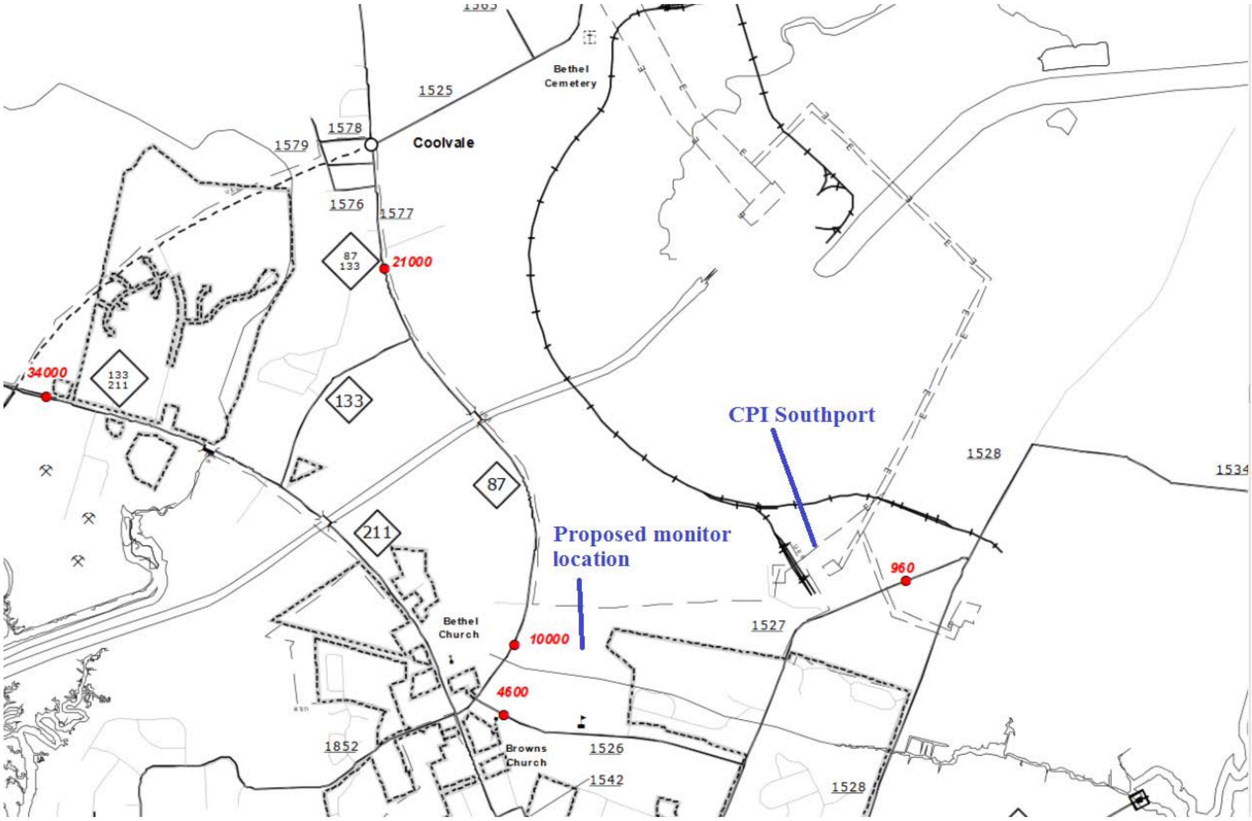

Figure G-33. 2014 Traffic count map (from NC DOT)

The AQS identification number and street address for the site is: 37-019-0005 and 5538 Rob Gandy Blvd SE, Southport, NC 28461. The latitude and longitude is 33.942288 and -78.019265. The sampling and analysis method is AQS code 560, Thermo Electron 43i-TLE pulsed fluorescent instrument, EQSA-0486-060, and the operating schedule is hourly. The monitoring objective is source oriented. Figure G-34 shows the location of the monitoring station relative to the population center of Brunswick County in the Southport area.

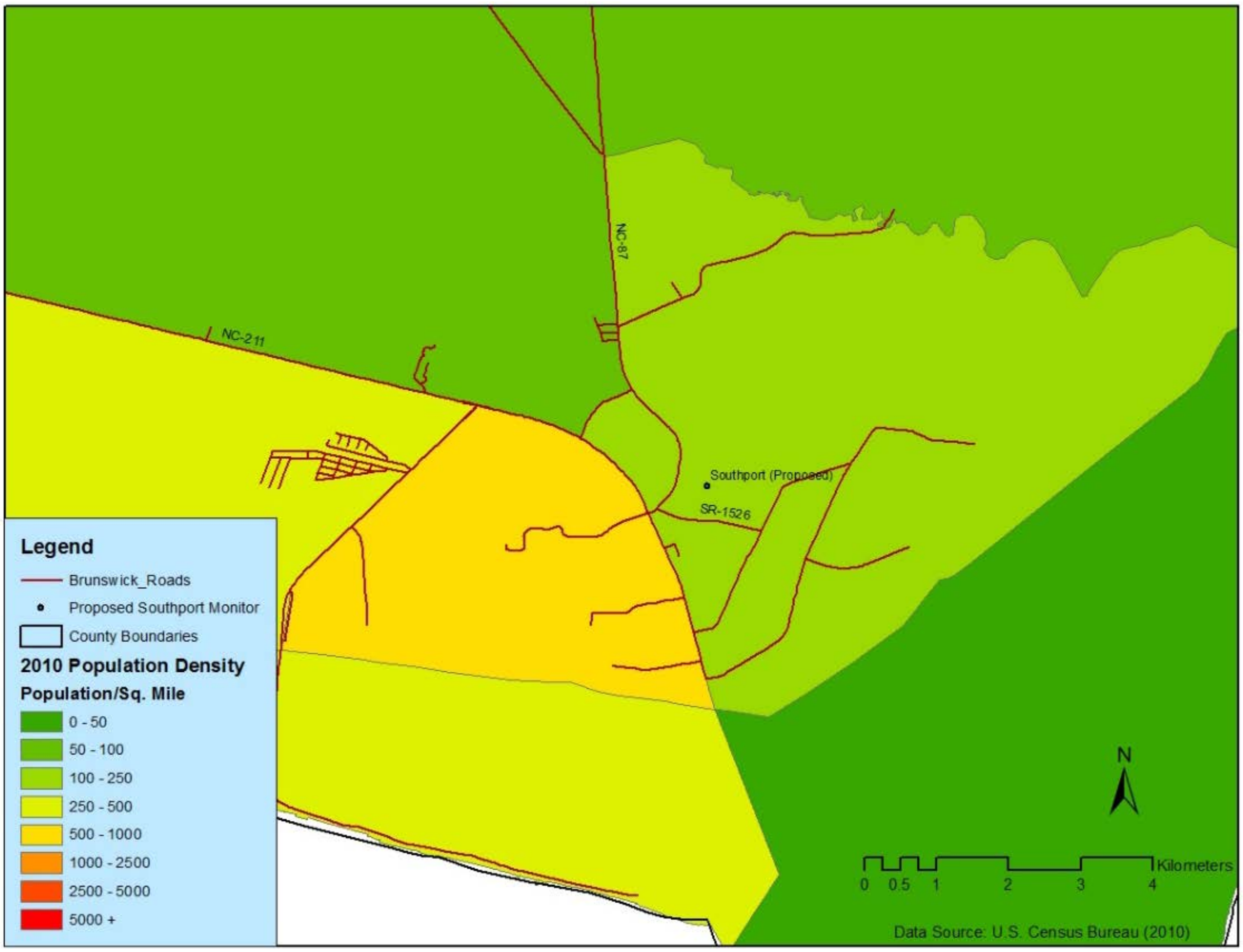

Figure G-34. Location of the Southport DRR monitoring station relative to the population of the Southport area in Brunswick County

Based on the wind rose in Figure G35, the Southport DRR monitoring station is located downwind of the CPI Southport plant. Figure G35 is a wind rose representing the 3-year period (2013 to 2015) for Wilmington, NC, surface meteorological data. As expected, the greatest frequency of occurrence or tendency of wind speed and direction occurred within the northeast quadrant. There is also a high frequency of wind speed and direction from the southwest, which is consistent with the direction of prevailing wind flow patterns for much of North Carolina. The high frequency of winds from the northeast direction likely coincides with colder ridge air masses to the north/northeast and coastal low-pressure systems off the coast during winter and early spring.

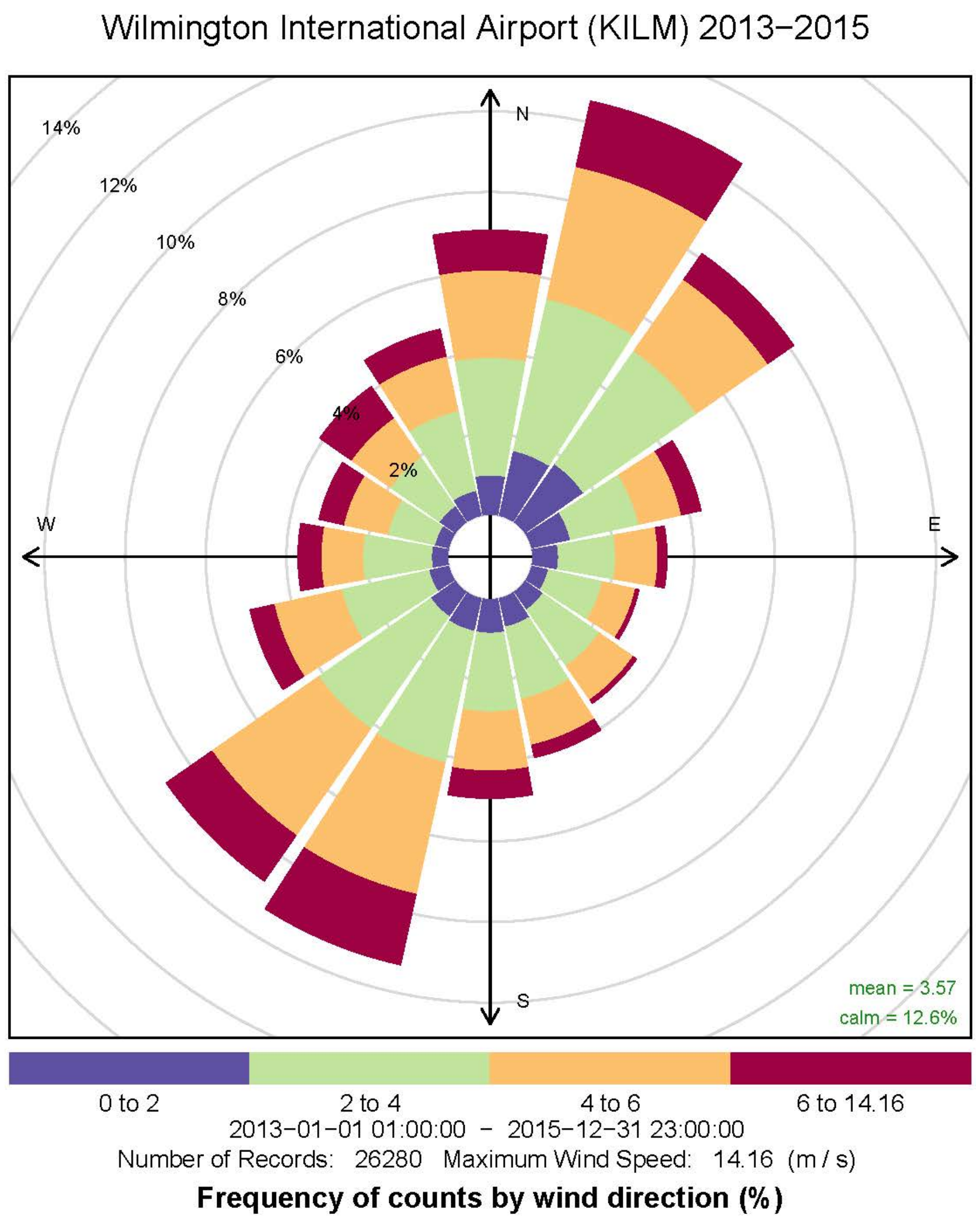

Figure G35. Wind rose from the Wilmington International Airport for 2013 to 2015

The spatial scale of representativeness for the monitor is neighborhood based on the distance of the monitor from the source. The monitor is located approximately 600 meters southwest from the property line of the CPI Southport facility. This monitor is representative of the air quality downwind from the fence line of the CPI Southport facility. Table G2 summarizes other factors DAQ evaluated when choosing the location for the monitoring station.

Table G2. Other considerations in site selection

Factor	Evaluation
Long-term Site Commitment	The property owner is willing to provide DAQ 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	10-meter by 10-meter area free of brush and 70-meter by 150-meter area free of trees and buildings
Access and Security	The building will be located by a driveway onto the property either off a lumber road or the nearby Rob Gandy Boulevard so it has easy access.
Safety	Appropriate electrical permits will be obtained.
Power	Overhead powerlines are located 130 meters northwest 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 30 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	The only permitted facility within 0.5 miles of the location is CPI Southport. There are two other facilities that are within one mile: **S & W Ready Mix Concrete**, located at 1619 N Howe Street, 960 meters west southwest of the Southport DRR monitoring station, emitted 0.4 tons of PM10 and 0.4 tons of TSP in 2014. **Duke Energy Progress – Brunswick Plant**, located at 8470 River Road, 1500 meters north northeast of the Southport DRR monitoring station, emitted 1.9 tons of SO2, 12.6 tons of NOx, 0.3 tons of VOC, 3.3 tons of CO and 0.4 tons of TSP in 2014.
Proximity to Other Measurements	The Southport DRR monitoring station is located about 4.5 kilometers east of the Brunswick County Airport.

Changes to the **lead monitoring network** requirements in 2010[10] as revised in 2016[11] did not result in additional monitoring in this MSA. Changes to the **ozone monitoring requirements** did

[10] 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.

not require additional monitoring in the Myrtle Beach-Conway-North Myrtle Beach MSA other than the ozone monitor that is already required and the extension of the ozone season by one month.

This MSA is also not required to do nitrogen dioxide monitoring by the 2010 **nitrogen dioxide monitoring** requirements. It is too small to require area-wide monitors or near roadway monitoring. The Myrtle Beach-Conway-North Myrtle Beach MSA was required to monitor for sulfur dioxide by the 2010 **sulfur dioxide monitoring** requirements because there is a facility in Brunswick County that will choose to monitor for sulfur dioxide rather than use modeling to demonstrate attainment under the data requirements rule. More information on this facility and monitor is provided in Appendix G-3. CPI Southport Siting Analysis and Additional Site Information. This MSA will not be required to monitor for carbon monoxide by the **changes to the carbon monoxide monitoring requirements** because the population is less than one million.

(3) The Jacksonville MSA

The Jacksonville MSA consists of Onslow County. The principal city is Jacksonville. The DAQ does not operate any monitoring stations in the Jacksonville MSA. The Jacksonville particle-monitoring site was shut down on Dec. 31, 2007, because the measured concentrations were less than 80 percent of the NAAQS.

Changes to the **lead monitoring network** requirements in 2010[12] as revised in 2016[13] did not result in adding lead monitors to the MSA. Jacksonville had a permitted facility that emitted 0.5 tons or more per year of lead in 2009. [14] However, lead emissions at Camp Lejeune in 2010 were below the 0.5-ton threshold. [15] The EPA concurred that actual emissions were less than 0.5 tons and did not require monitoring at the facility fence line.[16] The lead emissions in 2016 are still below 0.5 tons.[17]

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[11] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[12] 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.

[13] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[14] United States Environmental Protection Agency. 2009 Toxic Release Inventory, released March 2010, available on the worldwide web at https://iaspub.epa.gov/triexplorer/tri_release.chemical.

[15] United States Environmental Protection Agency. 2010 Toxic Release Inventory, released March 2011, available on the worldwide web at https://iaspub.epa.gov/triexplorer/tri_release.chemical.

[16] United States Environmental Protection Agency. (2011). *FY 2011 State of North Carolina Ambient Air Monitoring Network Plan, U.S. EPA Region 4 Comments and Recommendations* (Oct. 20, 2011). Available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7843

[17] United States Environmental Protection Agency. (2018). *TRI Explorer* (2016 Dataset (released March 2018)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (April 14, 2018).

Changes to the **ozone monitoring requirements** did not result in additional monitoring in the Jacksonville MSA. Its population is above the threshold for requiring population exposure monitoring in urban areas but monitoring is not required because it does not have an ozone design value. Currently, the DAQ does not monitor for ozone in Jacksonville because the ozone levels measured by the Castle Hayne monitor in New Hanover County indicate that the ozone concentrations on the coast are at 83 percent of the 2015 standard of 70 parts per billion. As shown in Figure G36, models consistently show low ozone levels in the Jacksonville MSA and lower probabilities of exceeding the standard in Jacksonville than at Castle Hayne.

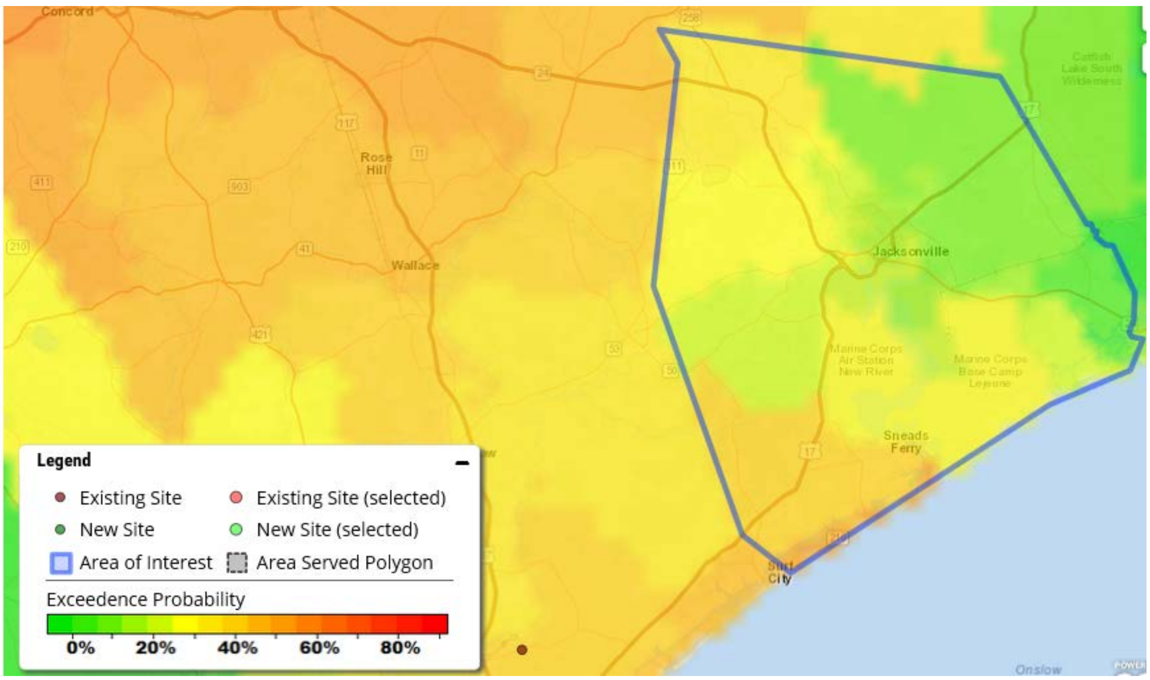

Figure G36. Probability of ozone exceeding the 2015 standard at least once in the Jacksonville MSA

The Jacksonville MSA did not add nitrogen dioxide monitors to comply with the 2010 **nitrogen dioxide monitoring** requirements. It is too small to require area-wide monitors or near roadway monitoring. The Jacksonville MSA also did not need to add monitors to comply with the 2010 **sulfur dioxide monitoring** requirements because there are no large sources of sulfur dioxide in the MSA and the population is not large enough to require a PWEI monitor. This MSA is also not required to do carbon monoxide monitoring by the changes to the **carbon monoxide monitoring** requirements because the population is less than one million people.

(4) The Non-MSA Portion of the Wilmington Monitoring Region

The non-MSA portion of the Wilmington monitoring region consists of three counties - Carteret, Columbus and Duplin. This area has no MSAs. The DAQ currently operates one monitoring site here and the EPA operates a clean air status and trends network, CASTNET, site in Beaufort in Carteret County. The CASTNET sites are discussed in the CASTNET network plan available at https://www.epa.gov/sites/production/files/2017-04/documents/draft_castnet_2017_annual_network_plan.pdf. The one DAQ site is discussed further here. The DAQ site is a Mercury Deposition Network, MDN, site at Waccamaw State Park. The Kenansville particle monitoring station was shut down Dec. 31, 2015.

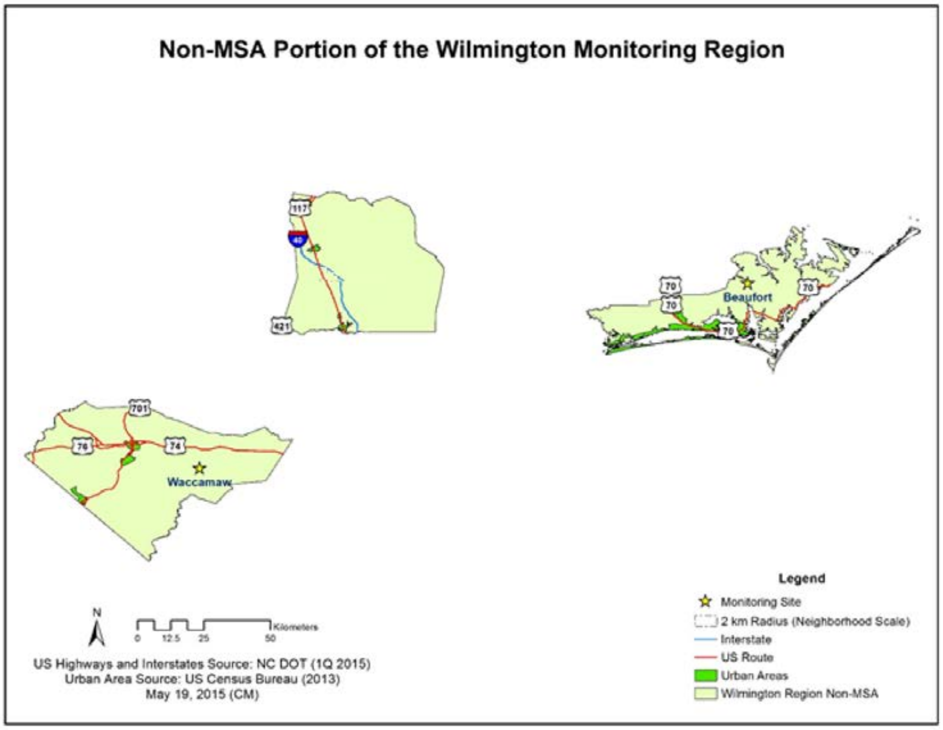

Figure G37. Monitoring site locations

At the **Waccamaw** MDN site in Columbus County, the DAQ operates a weekly mercury deposition monitor to measure total mercury, Hg, concentration and deposition in precipitation. The DAQ upgraded the site to more modern equipment in 2014. A picture of the site as well as views looking north, northeast, east, southeast, south, west and northwest are provided in Figure G38 through Figure G46.

Figure G38. The Waccamaw (NC08) MDN site

Figure G39. Looking north from the Waccamaw MDN site

Figure G41. Looking northeast from the Waccamaw MDN site

Figure G40. Looking northwest from the Waccamaw MDN site

Figure G42. Looking east from the Waccamaw MDN site

Figure G43. Looking west from the Waccamaw MDN site

Figure G45. Looking southeast from the Waccamaw MDN site

Figure G44. Looking southwest from the Waccamaw MDN site

Figure G46. Looking south from the Waccamaw MDN site

The 2010 **lead monitoring** requirements did not result in lead monitoring in these counties. There are no permitted facilities that emit 0.5 tons or more of lead per year.[18] The new **ozone monitoring** requirements did not require additional monitoring in these counties. There is no MSA so population exposure monitoring requirements for urban areas do not apply. The 2010 **nitrogen dioxide** monitoring requirements also did not add monitors to these counties. These counties are too small to require area-wide monitors or near road monitoring. These counties did not need to add monitors to meet the 2010 **sulfur dioxide monitoring** requirements because there are no large sources of sulfur dioxide in them and their populations are too small to require a PWEI monitor. The changes to the **carbon monoxide monitoring** requirements did not require monitoring in these counties because their populations are under one million.

[18] *ibid*.

Appendix G.1 Annual Network Site Review Forms for 2017

Castle Hayne

Battleship in Wilmington

Southport DRR

Site Review Form Calendar Year 2017

Site Information

Region WIRO	**Site Name** Castle Hayne	**AQS Site #** 37-129-0002
Street Address- 6028 Holly Shelter Road		**City** Castle Hayne
Urban Area Not in an Urban Area	**Core-based Statistical Area** Wilmington, NC	
Enter Exact		**Method of Measuring**
Longitude -77.838611 (In Decimal Degrees)	**Latitude** 34.364167 (In Decimal Degrees)	Other (explain) | **Explanation:** Google Earth
Elevation Above/below Mean Sea Level (in meters)		12

Name of nearest road to inlet probe Holly Shelter Road ADT 5300 Year Choose an item 2016

Comments: ______

Distance of site to nearest major road (m) 4500 Direction from site to nearest major road W

Name of nearest major road I-40 ADT 32000 Year 2015

Comments: ______

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ________ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ____________ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools. Crop Research Station (Blueberries) E to SW

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☒ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood_____ ☒ Urban_____ ☐ Regional_____	☒ SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4.5

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No

Actual measured distance from outer edge of probe to supporting structure (meters) 2.0

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 62 Direction from probe to nearest traffic lane NNW

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☐General/Background _____ ☐Highest Concentration _____ ☒Population Exposure _____ ☐Source Oriented _____ ☐Transport _____ ☐Welfare Related Impacts _____	☐Micro _____ ☐Middle _____ ☒Neighborhood _____ ☐Urban _____ ☐Regional _____	☒SLAMS BAM ☐SPM PM10 every 3 years **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) 5.0
Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.0 Yes ☒ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA ☒

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) _____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle ____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 62 Direction from probe to nearest traffic lane NNW

RECOMMENDATIONS:
1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-
*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐
*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures November 17, 2017 New Pictures Submitted? Yes ☒ No ☐

Reviewer Tony Sabetti Date December 12,2017
Ambient Monitoring Coordinator Tony Sabetti Date December 12,2017

Joette Steger, April 14, 2018

Site Review Form Calendar Year 2017

Site Information

Region WIRO	**Site Name** Battleship	**AQS Site # 37-129-0010**	
Street Address- 1 Battleship Road		**City** Wilmington	
Urban Area WILMINGTON	**Core-based Statistical Area** Wilmington, NC		
Enter Exact		**Method of Measuring**	
Longitude -77.95585	Latitude 34.23551		
In Decimal Degrees	In Decimal Degrees	Other (explain)	**Explanation:** Google Earth
Elevation Above/below Mean Sea Level (in meters)		12	

Name of nearest road to inlet probe Battleship Road ADT 5300 Year Choose an item 2016

Comments: ______

Distance of site to nearest major road (m) 255 Direction from site to nearest major road W

Name of nearest major road Hwy 421 ADT 38000 Year 2015

Comments: ______

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ________ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ________ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools. None

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☐ O_3 ☐ NH_3 ☐ Hydrocarbon ☒ Air Toxics ☐ CO (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☒ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☒ Neighborhood_____ ☐ Urban_____ ☐ Regional_____	☐ SLAMS _____ ☒ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4.0

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No

Actual measured distance from outer edge of probe to supporting structure (meters) 1.2

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 75 Direction from probe to nearest traffic lane S

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures December 19, 2017 New Pictures Submitted? Yes ☒ No ☐

Reviewer Tony Sabetti Date December 20,2017

Ambient Monitoring Coordinator Tony Sabetti Date December 20,2017

Joette Steger, April 14, 2018

Site Review Form Calendar Year 2017

Site Information

Region WIRO	**Site Name** Battleship	**AQS Site #** 37-129-0010
Street Address- 1 Battleship Road		**City** Wilmington
Urban Area WILMINGTON	**Core-based Statistical Area** Wilmington, NC	
Enter Exact		**Method of Measuring**
Longitude -77.95585 In Decimal Degrees	Latitude 34.23551 In Decimal Degrees	Other (explain) | **Explanation:** Google Earth
Elevation Above/below Mean Sea Level (in meters)		12

Name of nearest road to inlet probe Battleship Road ADT 5300 Year Choose an item 2016

Comments: ______

Distance of site to nearest major road (m) 255 Direction from site to nearest major road W

Name of nearest major road Hwy 421 ADT 38000 Year 2015

Comments: ______

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track (m) ________ Direction to RR ___	☒NA
OPTIONAL Distance of site to nearest power pole w/transformer (m) ____ Direction ___	
Distance between site and drip line of water tower (m) ______ Direction from site to water tower ________	☒**NA**

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools. None

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☐ O_3 ☐ NH_3 ☐ Hydrocarbon ☒ Air Toxics ☐ CO (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☒ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts	☐ Micro_____ ☐ Middle_____ ☒ Neighborhood_____ ☐ Urban_____ ☐ Regional_____	☐ SLAMS _____ ☒ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4.0

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No

Actual measured distance from outer edge of probe to supporting structure (meters) 1.2

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 75 Direction from probe to nearest traffic lane S

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures December 19, 2017 New Pictures Submitted? Yes ☒ No ☐

Reviewer Tony Sabetti Date December 20,2017

Ambient Monitoring Coordinator Tony Sabetti Date December 20,2017

Joette Steger, April 14, 2018

Appendix G-2. Scale of Representativeness

Each station in the monitoring network must be described in terms of the physical dimensions of the air parcel nearest the monitoring station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

a) Micro-scale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.
c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.
d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.
e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station.

There are six basic exposures:

a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.
b) Sites located to determine representative concentrations in areas of high population density.
c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.
d) Sites located to determine general background concentration levels.
e) Sites located to determine the extent of regional pollutant transport among populated areas.
f) Sites located to measure air pollution impacts on visibility, vegetation damage or other welfare-based impacts and in support of secondary standards.

The design intent in siting stations is to correctly match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of the six basic objectives and the scales of representativeness are appropriate when siting monitoring stations:

Table G3. Site Type Appropriate Siting Scales

1. Highest concentration	Micro, middle, neighborhood, sometimes urban or regional for secondarily formed pollutants
2. Population oriented	Neighborhood, urban
3. Source impact	Micro, middle, neighborhood
4. General/background & regional transport	Urban, regional
5. Welfare-related impacts	Urban, regional

Appendix G-3. CPI Southport Siting Analysis and Additional Site Information

CPI Southport SO_2 Modeling for Monitor Placement

Introduction

On June 22, 2010, the United States Environmental Protection Agency, or 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 required 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 near 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 CPI Southport. Currently, the closest SO_2 monitor with a design value is about 40 kilometers north northeast of CPI Southport, located at 2400 US Highway 421 N, Wilmington, NC. The 1-hour monitored air concentration at this site based on 2012-2014 data is 32 ppb or 83.84 $\mu g/m^3$. However, the latest 2014 1-hour concentration has dropped to 3 ppb or 7.86 $\mu g/m^3$ due to the shutdown of several large sources of SO_2 in the area near the monitor.

CPI USA North Carolina - Southport Plant

CPI USA North Carolina - Southport Plant is located at 1281 Power House Drive Southeast in Southport, Brunswick County, North Carolina. CPI has two electricity generating units consisting of six watertube design boilers. CPI Southport is a cogeneration facility that primarily burns wood, coal and tire-derived fuel to produce steam. A portion of the steam is sold to Archer Daniels Midland for process use. The remainder of the steam is used to drive two identical turbine generator units to provide electricity that is sold to Duke Energy Progress.

The facility is a significant source of SO_2 emissions under the DRR since it emits more than the 2,000 tons per year threshold specified for determining which sources need to be evaluated in determining area NAAQS compliance designations. In addition, CPI Southport is one of the facilities included in the March 2, 2015, SO_2 Designation Consent Decree.

A part of the requirements for the DRR is the consideration of other sources of SO_2 emissions near the facility. Figure G47 shows the locations and magnitude of SO_2 emissions in the vicinity. As shown in the figure, there are no large sources nearby. There are two facilities near

CPI Southport that had been included in previous modeling. However, these very small emissions sources, less than two tons per year each, do not impact the receptor ranking and were not included in the modeling for monitor placement.

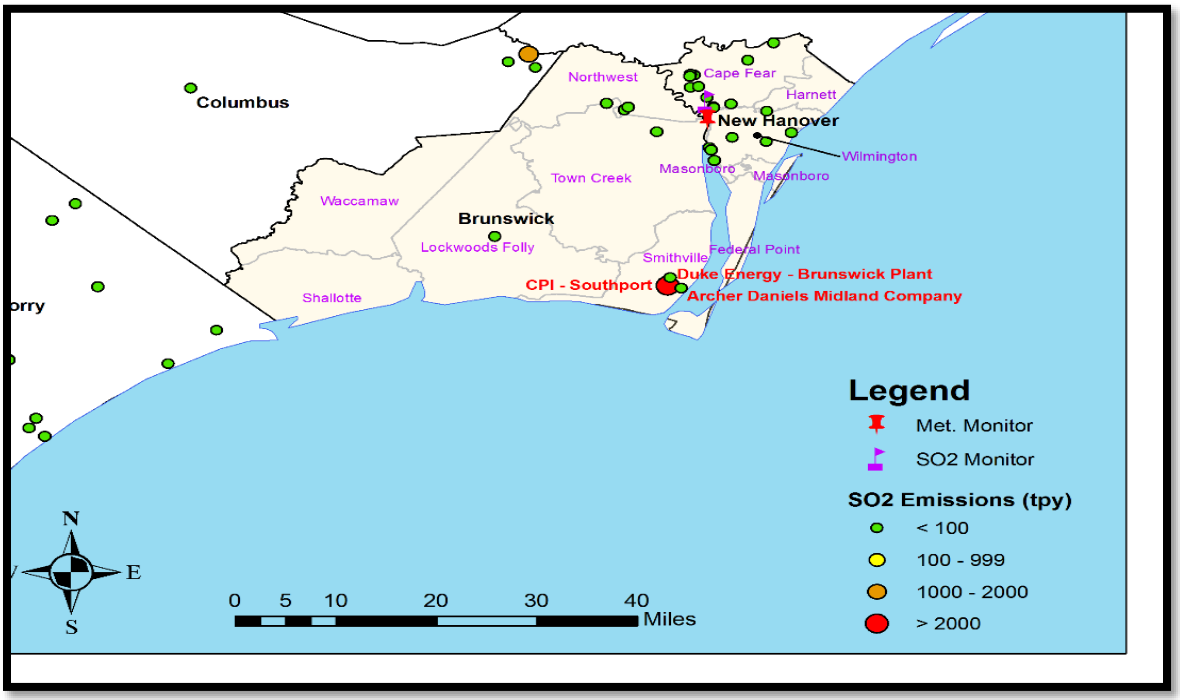

Figure G47. Sources of SO2 Emissions near CPI Southport

AERMOD Modeling

As described in the EPA SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document also known as the Monitoring TAD,[19] the North Carolina Division of Air Quality's, or DAQ's, modeling followed the recommendations of the SO_2 NAAQS Designations Modeling Technical Assistance Document, also known as the Modeling TAD.[20] 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.

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[19] 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.

[20] U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, Air Quality Assessment Division, *SO_2 NAAQS Designations Modeling Technical Assistance Document*, Draft, August 2016, available on the worldwide web at https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf, accessed on May 3, 2017

Three years (2013-2015) of hourly SO_2 continuous emissions monitor, CEM, data for each of the two stacks at the CPI facility 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. 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. The location, size and orientation of the buildings relative to the stacks were input into BPIP-PRIME to calculate building parameters for AERMOD. Table G4 provides the stack parameters used in the modeling analysis.

Table G4. Parameters for CPI Southport SO2 Modeling for Monitor Placement

Source ID	Easting (X)	Northing (Y)	Base Elevation	Stack Height	Temperature	Exit Velocity	Stack Diameter
	(m)	(m)	(m)	(m)	(K)	(m/s)	(m)
UNIT1	221,576.9	3,760,059.2	7.62	60.35	449.82	22.49	2.64
UNIT2	221,579.2	3,760,099.0	7.62	60.35	449.82	22.49	2.64

As shown in Figure G48, 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. Figure G49 and Figure G50 are included to show the facility and modeling inputs.

Figure G48. Receptor Locations Near the CPI Southport Boundary Used in Modeling

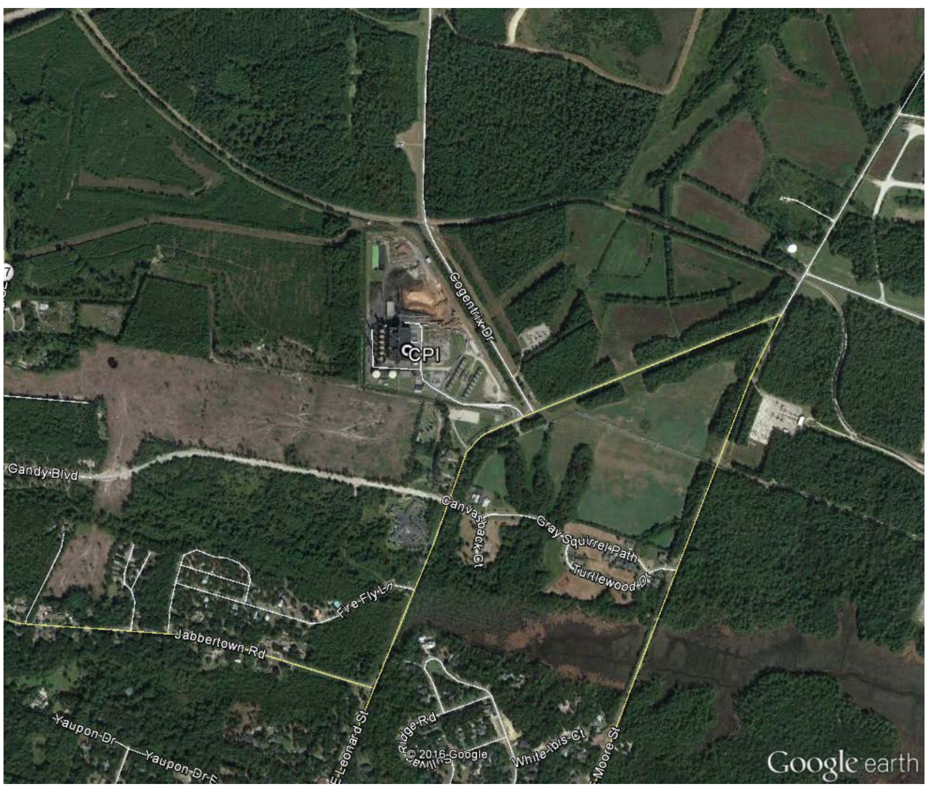

Figure G49. Aerial View of CPI Southport and Surrounding Areas

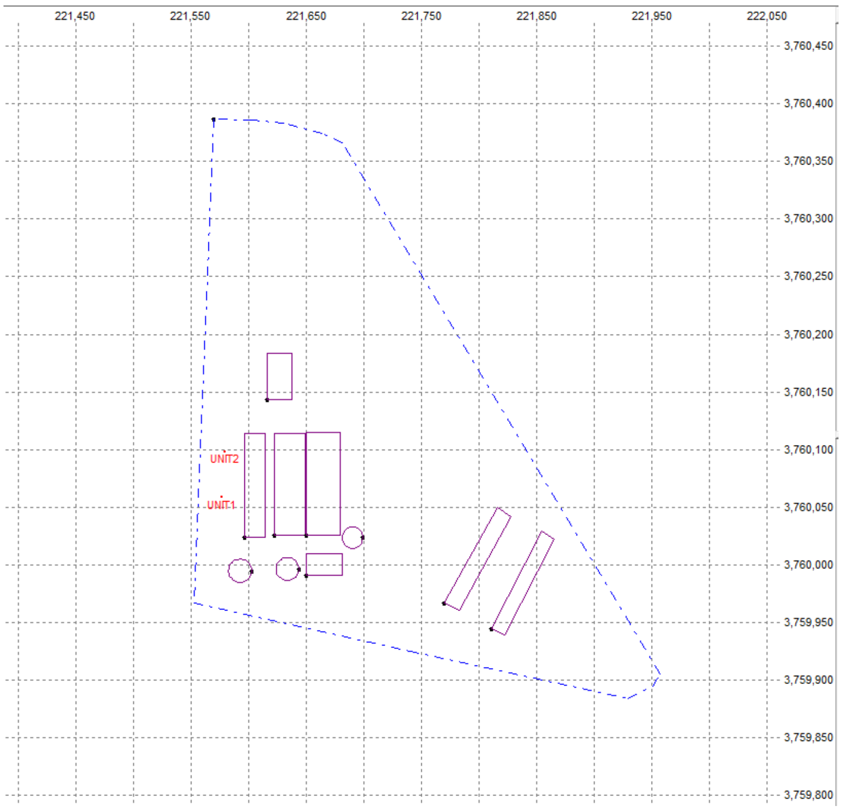

Figure G50. Locations in CPI Southport SO2 Modeling for Monitor Placement (UTM NAD 83 Coordinates in Meters, Zone 18)

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 2013 to 2015 (concurrent with the modeled emissions data) for the station located at Wilmington, NC, paired with upper air sounding data collected at Newport, NC, were used in the analysis. AERMinute was also used in processing the data to incorporate additional 1-minute wind data available for the Wilmington surface station.

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 CPI Southport. 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 or DV. Because normalized emissions were used to calculate these values, the results are referred to as normalized design values or NDVs in this analysis. Figure G51 shows a contour plot of the NDVs for the receptors near CPI Southport.

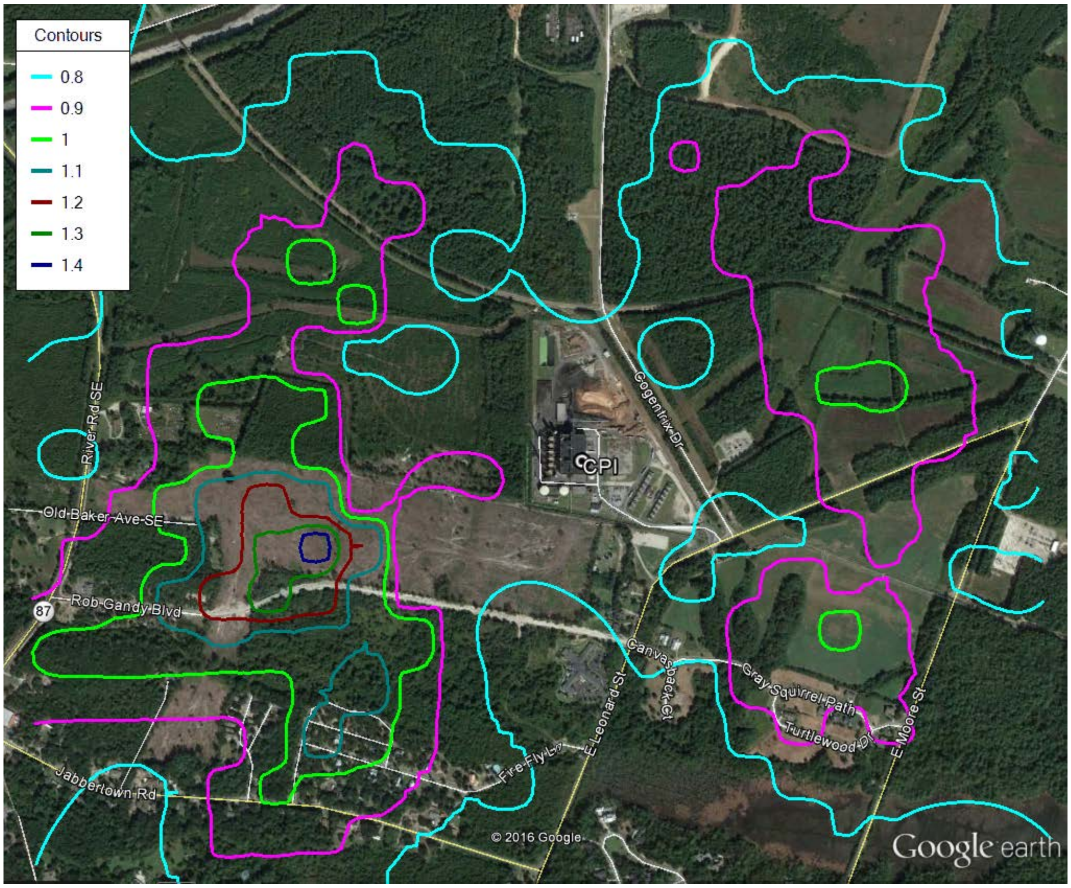

Figure G51. Modeled NDVs for CPI Southport

Based on Appendix A of the Monitoring TAD, the site selection process also needs 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 G52 shows the results of the frequency analysis.

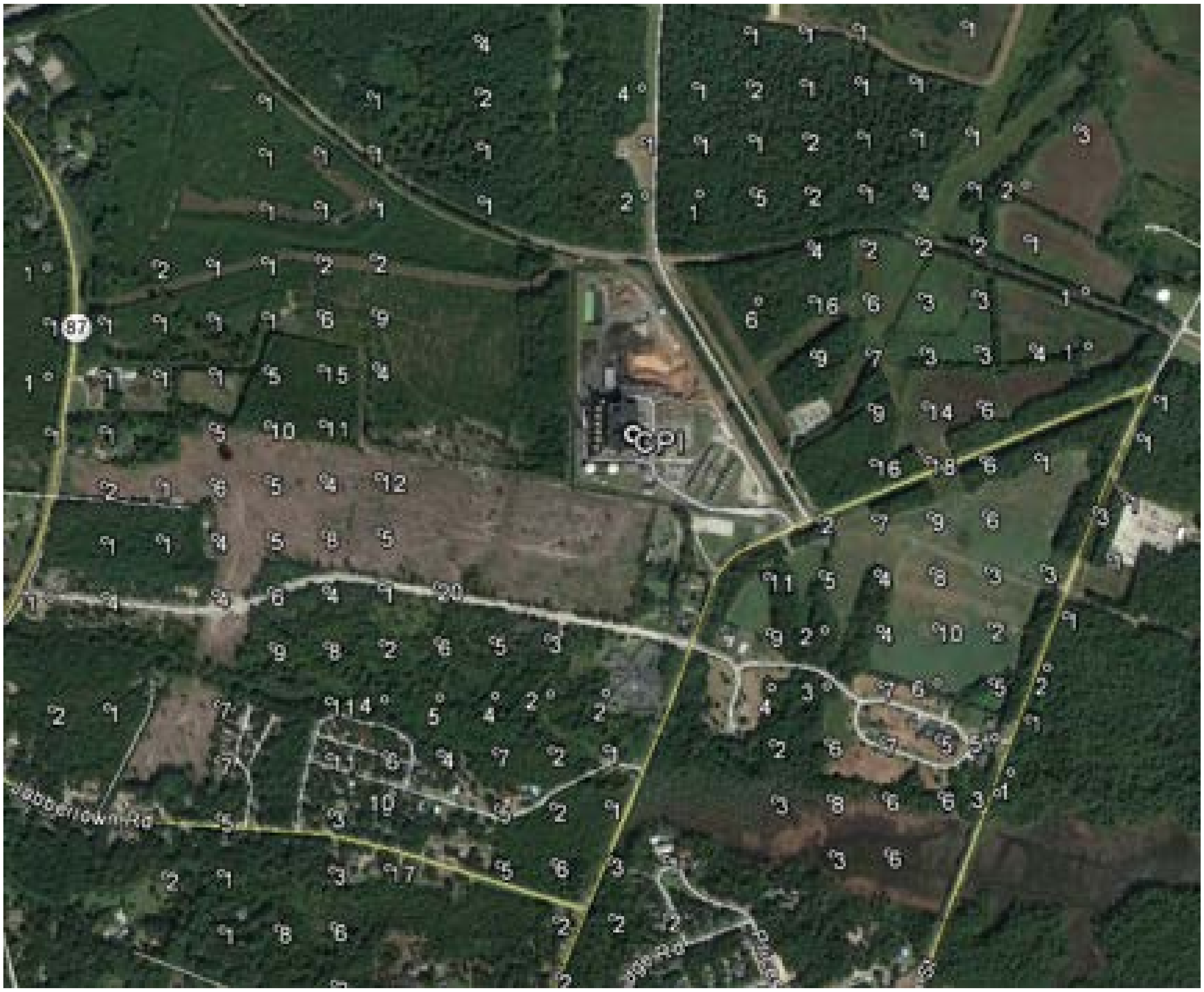

Figure G52. Frequency of Daily Maximum Concentrations for CPI Southport

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 Chosen Monitor Site

Figure G53shows the top ranked receptors. The chosen monitor location (marked with yellow pin), ranked 13th, resulted from a site visit conducted using information from the scoring strategy. This is the highest rated location that was in a clear area and for which DAQ received written permission from the property owner to site a monitor. The top 30 ranked locations are provided in Table G5 with reasons why the other 29 locations were not selected. As shown in Figure G1, this site also provides a clear view of the facility.

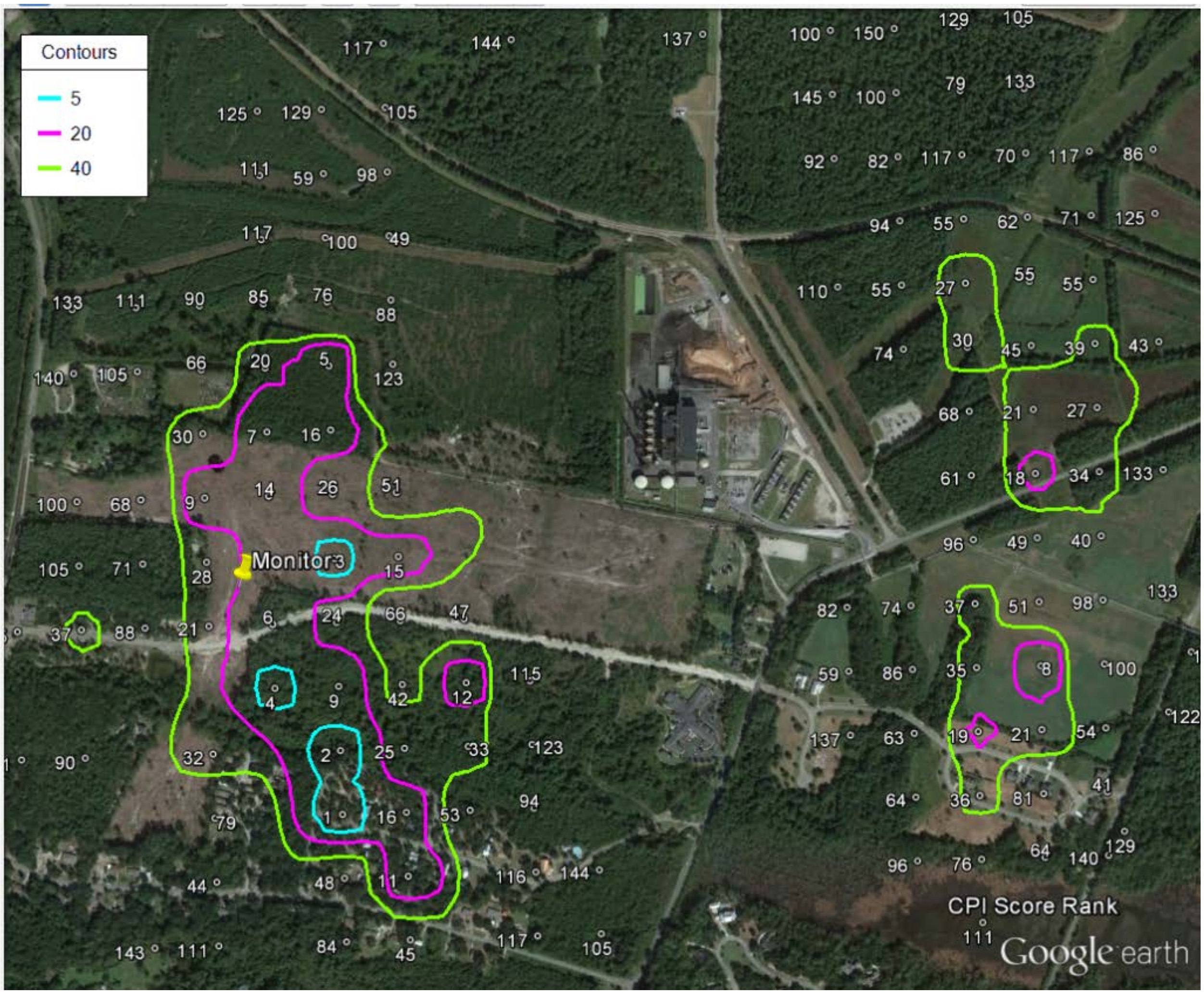

Figure G53. Locations of Top Ranked Receptors from Score Ranking for CPI Southport

Table G5. Selected Ranking Results from the CPI Southport 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
221,100	3,759,500	1.14	10	11	9	19	1	Ownership
221,100	3,759,600	1.10	14	11	9	23	2	Trees
221,100	3,759,900	1.43	1	8	22	23	3	Ownership
221,000	3,759,700	1.08	18	9	16	34	4	Trees
221,100	3,760,200	1.02	29	15	6	35	5	Trees
221,000	3,759,800	1.34	2	6	34	36	6	Ownership
221,000	3,760,100	1.04	25	10	13	38	7	Trees
222,200	3,759,700	1.03	28	10	13	41	8	Trees
221,100	3,759,700	1.07	20	8	22	42	9	Trees
220,900	3,760,000	1.19	8	6	34	42	9	Ownership
221,200	3,759,400	0.98	36	10	13	49	11	Ownership
221,300	3,759,700	1.09	16	6	34	50	12	Trees
221,000	3,759,900	1.32	3	5	51	54	13	Selected location
221,000	3,760,000	1.24	6	5	51	57	14	Ownership
221,200	3,759,900	1.20	7	5	51	58	15	Ownership
221,100	3,760,100	0.96	50	11	9	59	16	Trees
221,200	3,759,500	1.04	25	6	34	59	16	Ownership
222,200	3,760,000	0.94	59	18	2	61	18	Ownership
222,100	3,759,600	0.98	36	7	27	63	19	Ownership
221,000	3,760,200	1.08	18	5	51	69	20	Trees
222,200	3,760,100	0.93	63	14	7	70	21	Ownership
222,200	3,759,600	0.98	36	6	34	70	21	Trees
220,900	3,759,800	1.28	4	4	66	70	21	Ownership
221,100	3,759,800	1.26	5	4	66	71	24	Ownership
221,200	3,759,600	1.18	9	4	66	75	25	Trees
221,100	3,760,000	1.14	10	4	66	76	26	Ownership
222,100	3,760,300	0.97	43	6	34	77	27	Trees
222,300	3,760,100	0.97	43	6	34	77	27	Ownership
220,900	3,759,900	1.13	13	4	66	79	28	Ownership
222,100	3,760,200	0.95	56	7	27	83	30	Trees
220,900	3,760,100	0.99	32	5	51	83	30	Ownership

Note to Table G5: Comments show reasons higher ranked locations were not selected. Ownership means that the landowners were identified as private individuals, who would not respond to our inquiries and where it was less likely a three-year dataset could be obtained.

Figure G54. View of CPI Southport from the Monitor Location

DAQ staff, in conjunction with CPI Southport staff and a representative from EPA Region 4, conducted an in-situ survey in the area around CPI Southport to select a suitable location for SO_2 monitor placement. When selecting adequate locations for the 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. DAQ believes that this location was the best available location since it is highly ranked, has available electric power, will be secure, is readily accessible and provides the correct exposure.

Region 4 Requested Information for Chosen Sites

In 2016, the DAQ began working with CPI USA North Carolina Southport to establish a sulfur dioxide monitoring station in Southport, North Carolina, to characterize the ambient sulfur dioxide concentrations near the CPI facility as required by the data requirements rule for sulfur dioxide.[21] The area chosen for placement of the monitor was selected using the results of modeling done as described in the technical assistance document[22] and is reported earlier in this

[21] 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.
[22] 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.

appendix. An aerial view of the Southport DRR monitoring location identified based on the earlier reported considerations is shown in Figure G-23.

The Air Quality System, AQS, identification number for this monitor is 37-019-0005-42401-1. DAQ operates this monitor in collaboration with CPI Southport to ensure the air in the Southport area complies with the national ambient air quality standards for sulfur dioxide. The DAQ operates the monitor following the DAQ quality assurance project plan and the monitor is part of the DAQ primary quality assurance organization. Figure G-25 through Figure G-32 show views from the Southport DRR site looking north, east, south and west.

The Southport DRR monitoring site is located 30 meters from the trees to the east. The tallest trees are estimated to be 15 meters in height. The nearest road is Rob Gandy Boulevard located approximately 70 meters to the south. This road does not have traffic count data; however, as shown in Figure G-33, secondary road number 1526, Jabbertown Road, further south than Rob Gandy Boulevard, had an average annual daily traffic count of 4,600 in 2014. The traffic on Rob Gandy Boulevard would be expected to be less than that on Jabbertown Road. The probe height is 3.6 meters.

The AQS identification number and street address for the site is: 37-019-0005 and 5538 Rob Gandy Blvd SE, Southport, NC 28461. The latitude and longitude is 33.942222 and -78.019167. The sampling and analysis method is AQS code 560, Thermo Electron 43i-TLE pulsed fluorescent instrument, EQSA-0486-060, and the operating schedule is hourly. The monitoring objective is source oriented. Figure G-34 shows the location of the monitoring station relative to the population center of Brunswick County in the Southport area.

Based on the wind rose in Figure G35, the monitoring station is located downwind of the CPI Southport plant. Figure G35 is a wind rose representing the 3-year period (2013 to 2015) for Wilmington, NC, surface meteorological data. As expected, the greatest frequency of occurrence or tendency of wind speed and direction occurred within the northeast quadrant. There is also a high frequency of wind speed and direction from the southwest, which is consistent with the direction of prevailing wind flow patterns for much of North Carolina. The high frequency of winds from the northeast direction likely coincides with colder ridge air masses to the north/northeast and coastal low-pressure systems off the coast during winter and early spring.

The spatial scale of representativeness for the monitor is neighborhood based on the distance of the monitor from the source. The monitor is located approximately 600 meters southwest from the property line of the CPI Southport facility. This monitor is in the Myrtle Beach-Conway-North Myrtle Beach metropolitan statistical area and is representative of the air quality downwind from the fence line of the CPI Southport facility. The proposed monitoring site was provided to the public for comment during 30 days in August 2016 as an addendum to the 2016-2017 network monitoring plan. Table G2 summarizes other factors DAQ evaluated when choosing the location for the monitoring station. Table G6 summarizes the EPA-required information for the Southport DRR site.

Table G6 The 2016-2017 Sulfur Dioxide Monitoring Network for the Myrtle Beach-Concord-North Myrtle Beach MSA [a]

AQS Site Id Number:	37-019-0005
Site Name:	Southport DRR
Street Address:	5538 Rob Gandy Blvd SE
City:	Southport
Latitude:	33.942222
Longitude:	-78.019167
MSA, CSA or CBSA represented:	Myrtle Beach-Concord-North Myrtle Beach
Monitor Type:	Industrial
Operating Schedule:	Hourly – every year
Statement of Purpose:	Maximum concentration site near the CPI-Southport Plant. Compliance w/NAAQS.
Monitoring Objective:	Source-oriented
Scale:	Neighborhood
Suitable for Comparison to NAAQS:	Yes
Meets Requirements of Part 58 Appendix A:	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQSA-0486-060
Meets Requirements of Part 58 Appendix D:	No – Data Requirements Rule
Meets Requirements of Part 58 Appendix E:	Yes
Proposal to Move or Change:	None

[a] The monitor uses an instrumental pulsed fluorescence method using a Thermo Electron 43i-TLE, Air Quality System, AQS, method code 560.

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Secretary
MICHAEL A. ABRACZINSKAS
Director

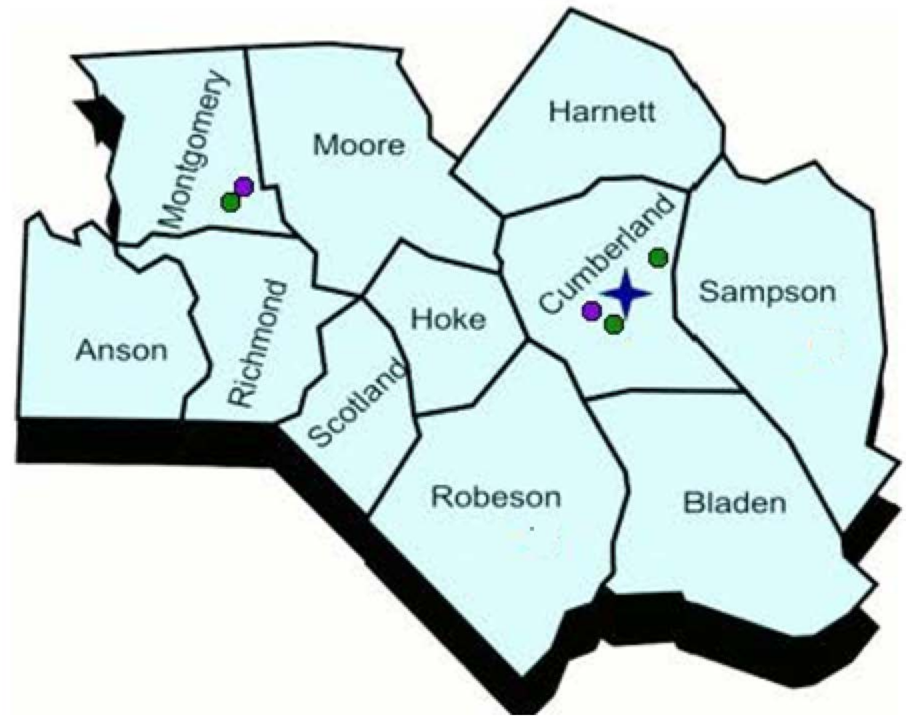
NORTH CAROLINA
Environmental Quality

2018-2019 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 2

Site Descriptions by Division of Air Quality Regional Office and Metropolitan Statistical Area

E. The Fayetteville Monitoring Region



June 29, 2018

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E. The Fayetteville Monitoring Region

The Fayetteville monitoring region, shown in Figure E1, consists of three sections: (1) the non-Metropolitan Statistical Area, or MSA, portion of the Fayetteville monitoring region - Bladen, Harnett, Montgomery, Moore, Richmond, Robeson, Sampson and Scotland counties, (2) the Fayetteville MSA, Cumberland and Hoke Counties and (3) the southeastern portion of the Charlotte-Gastonia-Concord MSA, Anson County, previously discussed as part of the Mooresville Monitoring Region in **Section C.**

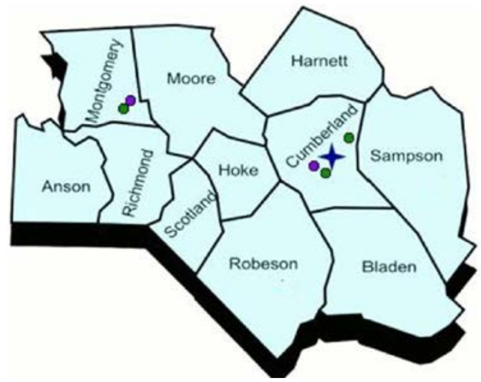


Figure E1. The Fayetteville monitoring region
The dots show the approximate locations of most of the monitoring sites in this region.

(1) The Non-MSA Portion of the Fayetteville Monitoring Region

The non-MSA portion of the Fayetteville monitoring region contains eight counties - Bladen, Harnett, Montgomery, Moore, Richmond, Robeson, Sampson and Scotland. It has no MSAs. The Southern Pines-Pinehurst Micropolitan Statistical Area is in Moore County. The Dunn Micropolitan Statistical Area is in Harnett County and the Lumberton Micropolitan Statistical Area is in Robeson County. The North Carolina Division of Air Quality, or DAQ, currently operates one monitoring site in this area of the Sand Hills at Candor in Montgomery County. The location of the Candor monitoring site is shown in Figure E2.

Figure E2. Location of the Candor monitoring site
A is the Candor fine particle, air toxic and CASTNET monitoring site.
The circle approximates the neighborhood scale, 0.5 to 4 kilometers [Km].

At the Candor site, the DAQ operates a continuous fine particle beta attenuation monitor, or BAM; a rotating every third year PM_{10} monitor; air toxics volatile organic compound and carbonyl monitors; and ambient temperature, relative humidity, wind speed and direction sensors. The DAQ also operates a weekly mercury deposition monitor at this site to measure total mercury, Hg, concentration and deposition in precipitation. Table E1 summarizes monitoring information for the site. Figure E3 through Figure E7 show the site and views looking north, east, south and west. The Candor site is collocated with a clear air status and trends network, CASTNET, site.

Table E1. Site Information Table for Candor

Site Name:	Candor			**AQS Site Identification Number**		37-123-0001	
Location:	136 Perry Drive, Candor, North Carolina						
CBSA:	Not in a CBSA			**CBSA #:**	00000	**Elevation**	173.1 meters
Latitude	35.2632	**Longitude**	-79.836613	**Datum:**	NAD83		

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
PM 2.5 local conditions, BAM	Met One BAM-1020 Mass Monitor w/VSCC, 170	EQPM-0308-170	1-hour	Year-round
PM10 total 0-10um STP	Met One Beta Attenuation BAM-1020, 122	EQPM-0798-122	1-hour	Year-round, every third year
Volatile organic compounds	SS 6L- pressurized canister w/ cryogenic preconcentration: GC/MS, 150	Not applicable	24-hour	Every sixth day, year-round
Carbonyl compounds	Silica-DNPH-CART-KI O3 Scrub HPLC, 202	Not applicable	24-hour	Every sixth day, year-round

Date Monitor Established	PM 2.5 local conditions, continuous monitor, BAM	Aug. 1, 2013
	PM10 total 0-10um STP, primary monitor	Feb. 16, 2011
	Volatile organic compounds	Jan. 26, 2002
	Carbonyl compounds	July 3, 2013

Nearest Road:	McCallum Rd	**Traffic Count:**	310	**Year of Count:**	2015

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
PM 2.5 local conditions, BAM	1079 meters	North northeast	SLAMS	Real-time data reporting. AQI reporting.
PM10 total 0-10um STP	1079 meters	North northeast	Special purpose	Prevention of significant deterioration, PSD, Modeling
Volatile organic compounds	1079 meters	North northeast	Non-regulatory	General background monitor
Carbonyl compounds	1079 meters	North northeast	Non-regulatory	General background monitor

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable for Comparison to NAAQS**	**Proposal to Move or Change**
PM 2.5 local conditions, BAM	General background; welfare related impacts	Regional	Yes	None
PM10 total 0-10um STP	General background	Regional	Yes	None
Volatile organic compounds	General background	Regional	Not applicable	None
Carbonyl compounds	General background	Regional	Not applicable	None

	Meets Part 58 Requirements for:			
Parameter Name	**Appendix A**	**Appendix C**	**Appendix D**	**Appendix E**
PM 2.5 local conditions, BAM	Yes	Yes	Yes	Yes
PM10 total 0-10um STP	Yes	Yes	Not applicable	Yes
Volatile organic compounds	Yes	Not applicable	Not applicable	Yes
Carbonyl compounds	Yes	Not applicable	Not applicable	Yes

Parameter Name	**Probe Height in meters**	**Distance to Support**	**Distance to Trees**	**Obstacles**
PM 2.5 local conditions, FRM	2.46	> 2 meters	>20 meters	None
PM10 total 0-10um STP	3.17	2.87 meters	>20 meters	None
Volatile organic compounds	3.91	1.117 meters	> 20 meters	None
Carbonyl compounds	3.91	1.117 meters	> 20 meters	None

Each CASTNET dry deposition station measures:

- Weekly average atmospheric concentrations of sulfate, nitrate, ammonium, sulfur dioxide and nitric acid; and
- Hourly concentrations of ambient ozone levels.

The CASTNET meteorological equipment was transferred to the DAQ in 2012.

The Candor site is located on the eastern edge of the Uwharrie National Forest. In 2013 the DAQ added a BAM and a one-in-six-day carbonyl sampler to support a background monitoring study. July 1, 2015, the BAM became the primary monitor at the site and the FRM was shut down.

Figure E3. The Candor CASTNET, air toxics, mercury deposition and particle monitoring site, 37-123-0001

Figure E4. Looking north from the Candor site

Figure E6. Looking east from the Candor site

Figure E5. Looking west from the Candor site

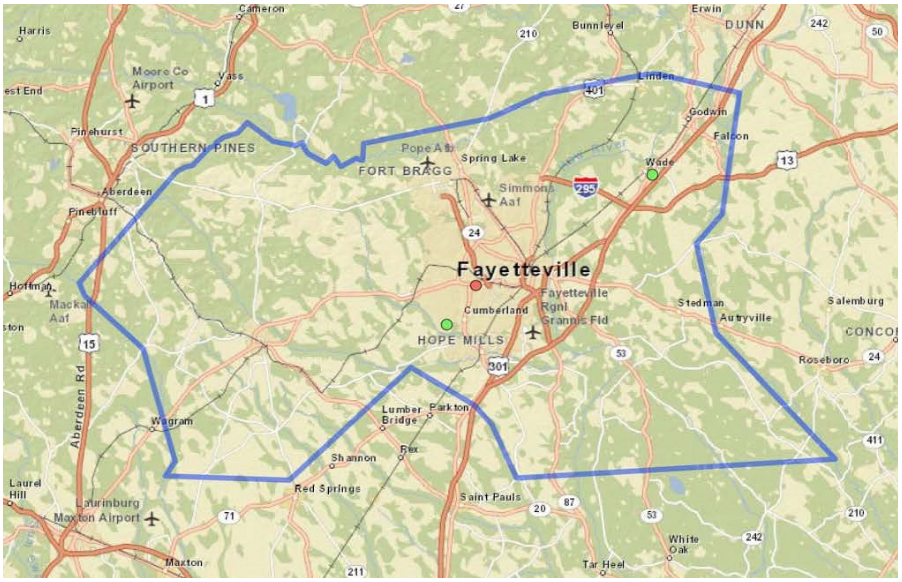
Figure E7. Looking south from the Candor site

There are no new monitoring requirements that will require additional monitoring in this area.

(2) The Fayetteville MSA

The Fayetteville MSA consists of two counties: Cumberland and Hoke. The major metropolitan area is the City of Fayetteville. The DAQ currently operates three monitoring sites in the Fayetteville MSA. These sites are all located in Cumberland County at William H. Owen

Elementary School and E. Melvin Honeycutt Elementary School in Fayetteville and at Wade. The Golfview site in Hope Mills was shut down on Oct. 31, 2014. The locations of these monitors are shown in Figure E8.



The Honeycutt ozone and sulfur dioxide monitoring site is the green dot to the south; the Wade ozone monitoring site is the green dot to the northeast the William Owen particle monitoring site is the red dot in the center.

Figure E8. Monitors located in the Fayetteville MSA

At the **Honeycutt** site, the DAQ operates a seasonal ozone monitor and a special purpose sulfur dioxide monitor that operates for 12 months every three years. DAQ established this site in April 2015. The DAQ discovered in February 2014 that the golf course where the Golfview monitoring station was located was closed and the property where the monitor was located was for sale. The property owner agreed to allow DAQ to continue using the site until the property sold. The property sold in August 2014 and the new owner requested the DAQ move the monitoring station as soon as possible. The DAQ investigated surrounding properties to identify a potential location for the monitoring station. The property abuts YMCA property on one side and city property on the other. The DAQ considered relocating the monitoring station about 100 meters southeast to the YMCA property, however, the YMCA never responded to the request. Thus, the DAQ worked with the school system to move the site to E. Melvin Honeycutt Elementary School at 4665 Lakewood Drive, Fayetteville, North Carolina. As shown in Figure E9, the school is located about 3.2 Kilometers northwest of the former Golfview location.

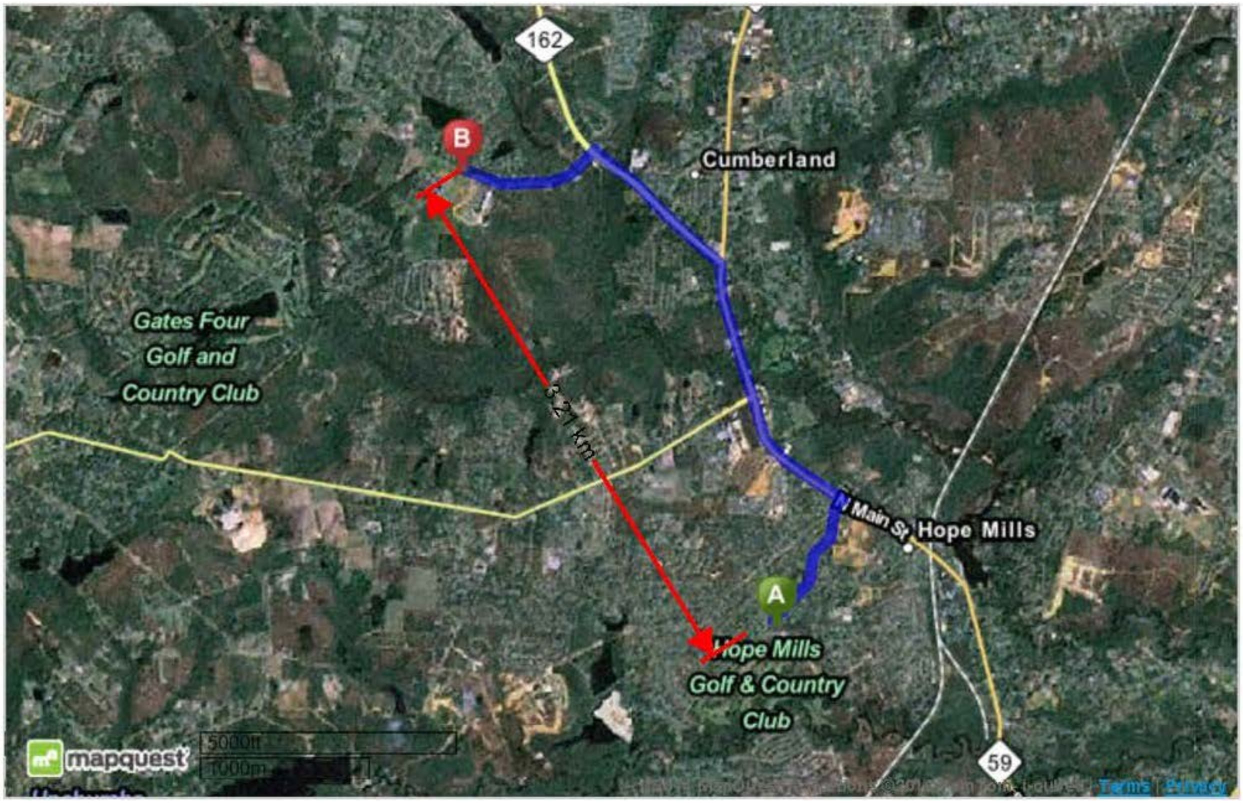


Figure E9. Location of Honeycutt site, B, relative to Golfview, A

Figure E10 through Figure E14 show the site and views looking north, east, south and west. Table E2 summarizes monitoring information for the site. The Honeycutt ozone site is the upwind site for the Fayetteville MSA. Sulfur dioxide monitoring occurs here every third year because the site is a good background site for obtaining data for Prevention of Significant Deterioration modeling requirements. This sulfur-dioxide monitor operated May 2015 to May 2016 and is operating again in 2018. In July 2017, the U.S. Census Bureau, Population Division, estimated 386,662 people lived here.


Figure E10. Honeycutt ozone and sulfur dioxide monitoring site, 37-051-0010

Figure E11. Looking north from the Honeycutt site

Figure E12. Looking east from the Honeycutt site

Figure E13. Looking west from the Honeycutt site

Figure E14. Looking south from the Honeycutt site

Table E2. Site Information Table for Honeycutt

Site Name:	Honeycutt	**AQS Site Identification Number:**	37-051-0010			
Location:	4665 Lakewood Drive, Fayetteville, North Carolina	**CBSA:**	Fayetteville, NC	**CBSA #:**	22180	
Latitude	35.00165	**Longitude**	-78.99075	**Datum:**	WGS84	
Elevation	59.1 meters					

Parameter Name	Method	Method Reference ID	Sample Duration	Sampling Schedule
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
Sulfur dioxide	Instrumental with pulsed fluorescence, 060	EQSA-0486-060	1-Hour	Year-round; every third year

Date Monitor Established:	Ozone	May 9, 2015
	Sulfur dioxide	May 9, 2015

Nearest Road:	Fisher Road	**Traffic Count:**	16,000	**Year of Count:**	2016

Parameter Name	Distance to Road	Direction to Road	Monitor Type	Statement of Purpose
Ozone	40 meters	North northeast	SLAMS	Real-time AQI reporting and forecasting. Compliance w/NAAQS.
Sulfur dioxide	40 meters	North northeast	Special purpose	Prevention of significant deterioration, PSD, modeling

Parameter Name	Monitoring Objective	Scale	Suitable for Comparison to NAAQS	Proposal to Move or Change
Ozone	Population exposure	Neighborhood	Yes	None
Sulfur dioxide	Population exposure General background	Neighborhood	Yes	None

Table E2. Site Information Table for Honeycutt

Parameter Name	Meets Part 58 Appendix A Requirements	Meets Part 58 Appendix C Requirements	Meets Part 58 Appendix D Requirements	Meets Part 58 Appendix E Requirements
Ozone	Yes	Yes	Yes	Yes
Sulfur dioxide	Yes	Yes	Not applicable	Yes
Parameter Name	**Probe Height in meters**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	4.22 meters	1.2 meters	>20 meters	None
Sulfur dioxide	4.22 meters	1.5 meters	>20 meters	None

Because 40 CFR 58 Appendix D requires MSAs with more than 350,000 people to have two ozone monitors, this site is the second required ozone site for the Fayetteville MSA.

At the Wade site, the DAQ operates a seasonal ozone monitor. A picture of the site as well as views looking north, east, south and west are provided in Figure E15 through Figure E19. Table E3 summarizes monitoring information for the site. The Wade site was established as the downwind site for the Fayetteville MSA. 40 CFR 58 Appendix D currently requires the Fayetteville MSA to have two ozone monitoring sites.

Figure E15. Wade ozone monitoring Site, 37-051-0008

Figure E16. Looking north from Wade site

Figure E18. Looking east from the Wade site

Figure E17. Looking west from the Wade site

Figure E19. Looking south from the Wade site

Table E3. Site Information Table for Wade

Site Name:	Wade	**AQS Site Identification Number:**	37-051-0008				
Location:	7112 Covington Lane, Wade, North Carolina	**CBSA:**	Fayetteville, NC	**CBSA #:**	22180		
Latitude	35.158686	**Longitude**	-78.728035	**Datum:**	WGS84	**Elevation**	45 meters

Table E3. Site Information Table for Wade

Parameter Name	Method	Method Reference ID	Sample Duration	Sampling Schedule
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31

Date Monitor Established:	Ozone	May 8, 1990

Nearest Road:	Covington Road	Traffic Count:	1300	Year of Count:	2014

Parameter Name	Distance to Road	Direction to Road	Monitor Type	Statement of Purpose
Ozone	87 meters	West	SLAMS	Compliance w/NAAQS. Real-time AQI reporting & forecasting.

Parameter Name	Monitoring Objective	Scale	Suitable for Comparison to NAAQS	Proposal to Move or Change
Ozone	Highest concentration	Urban	Yes	None

Parameter Name	Meets 40 CFR Part 58 Requirements for:			
	Appendix A	Appendix C	Appendix D	Appendix E
Ozone	Yes	Yes	Yes	Yes

Parameter Name	Probe Height in meters	Distance to Support	Distance to Trees	Obstacles
Ozone	4.22	1.2 meter	>20 meters	None

At the William Owen site, the DAQ operates two one-in-six-day fine particle FRMs and continuous fine particle and PM_{10} monitors. Figure E20 shows the site. Table E4 summarizes monitoring information for the site. Views looking north, northeast, east, southeast, south, southwest, west and northwest are provided in Figure E21 through Figure E28. The meteorological tower with wind speed and wind direction sensors, ambient temperature sensors at 10 meters and 2 meters, rainfall and solar radiation sensors was shut down on Nov. 12, 2014. In mid-January 2016, the collocated high-volume PM_{10} monitors at the site were shut down and replaced with a low-volume continuous PM_{10} monitor. At the end of 2015 the well-impactor ninety-six, WINS, on the FRM was replaced with a very sharp cut cyclone, VSCC. This change was made because the VSCC is easier and less expensive to maintain. In mid-2017, a one-in-six-day collocated fine particle FRM was added to the site.

Figure E20. The William Owen particle monitoring site

Table E4. Site Information Table for William Owen School

Site Name:	William Owen School	**AQS Site Identification Number**	37-051-0009
Location:	4533 Raeford Road, Fayetteville, North Carolina		

CBSA:	Fayetteville, NC			**CBSA #:**	22180		
Latitude	35.041416	**Longitude**	-78.953112	**Datum:**	WGS84	**Elevation**	63 meters

Parameter Name	Method	Method Reference ID	Sample Duration	Sampling Schedule
PM 2.5 local conditions, FRM	R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC – Gravimetric Analysis	RFPS-1006-145	24-Hour	Every sixth day; year-round
PM 2.5 local conditions, FRM	R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC – Gravimetric Analysis	RFPS-1006-145	24-Hour	Every sixth day; year-round
PM 2.5 local conditions, BAM	Met One BAM-1022 Mass Monitor w/ VSCC	EQPM-1013-209	1-Hour	Year-round
PM10 total 0-10um STP, primary	Met One Beta Attenuation BAM-1020	EQPM-0798-122	1-Hour	Year-round

Date Monitor Established:	PM 2.5 local conditions, primary monitor	Jan. 1, 1999
	PM 2.5 local conditions, co-located monitor	July 1, 2017
	PM 2.5 local conditions, continuous monitor	Dec. 30, 2015
	PM10 total 0-10um STP, primary monitor	Jan. 1, 1999

Nearest Road:	Raeford Road	**Traffic Count:**	40,000	**Year of Count:**	2012

Parameter Name	Distance to Road	Direction to Road	Monitor Type	Statement of Purpose
PM 2.5 local conditions, primary	210 meters	North	SLAMS	Compliance w/NAAQS. AQI reporting.
PM 2.5 local conditions, co-located	210 meters	North	SLAMS	Quality assurance – determination of bias.
PM 2.5 local conditions, continuous	210 meters	North	SLAMS	Real-time AQI reporting & forecasting.
PM10 total 0-10um STP, primary	210 meters	North	SLAMS	Compliance w/NAAQS.

Parameter Name	Monitoring Objective	Scale	Suitable for NAAQS Comparison	Proposal to Move or Change
PM 2.5 local conditions, primary	Population exposure	Urban	Yes	None
PM 2.5 local conditions, co-located	Population exposure	Urban	Yes	None
PM 2.5 local conditions, continuous	Population exposure	Urban	No	None

Table E4. Site Information Table for William Owen School

PM10 total 0-10um STP, primary	Population exposure	Urban	Yes	None
	Meets Part 58 Requirements for:			
Parameter Name	**Appendix A**	**Appendix C**	**Appendix D**	**Appendix E**
PM 2.5 local conditions, primary	Yes	Yes	No requirements	Yes
PM 2.5 local conditions, co-located	Yes	Yes	No requirements	Yes
PM 2.5 local conditions, continuous	Yes	Yes	No requirements	Yes
PM10 total 0-10um STP, primary	Yes	Yes	Yes	Yes
Parameter Name	**Probe Height in meters**	**Distance to Support**	**Distance to Trees**	**Obstacles**
PM 2.5 local conditions, primary	2.38	> 2 meters	>20 meters	None
PM 2.5 local conditions, co-located	2.38	> 2 meters	>20 meters	None
PM 2.5 local conditions, continuous	4.666	> 2 meters	>20 meters	None
PM10 total 0-10um STP, primary	2.64	2.38	>20 meters	None

Figure E21. Looking north from the William Owen site

Figure E24. Looking west from the William Owen site

Figure E22. William Owen Site looking northeast

Figure E25. William Owen Site looking southwest

Figure E23. William Owen site looking northwest

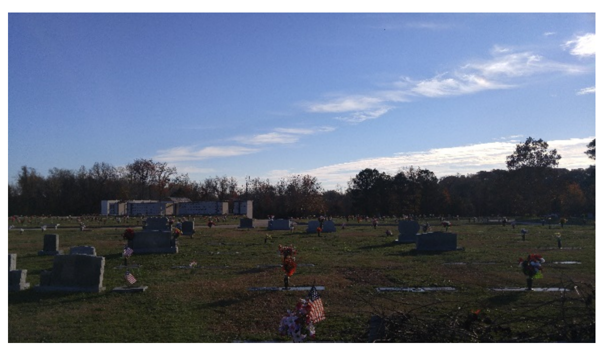


Figure E26. Looking east from the William Owen site

Figure E27. William Owen site looking southeast

Figure E28. Looking south from the William Owen site

Additional monitoring could be required in the Fayetteville MSA to comply with the 2010 **lead monitoring** requirements,[1] as revised in 2016[2]. In the 2014 toxics release inventory Fort Bragg calculated its fugitive lead emissions to the ambient air from its firing ranges using AP-42 emission factors and determined it emitted less than 0.5 tons. [3] DAQ requested a waiver from either placing a monitor at the fence line of the base or to doing modeling to show that the air beyond the fence line of the base is less than 50 percent of the standard. Because the emissions are lower than 0.5 tons, [4] the EPA is currently not requiring DAQ to do any lead monitoring. [5] There are no other new monitoring requirements that will require additional monitoring in this area.

[1] 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.

[2] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[3] United States Environmental Protection Agency. 2014 Toxic Release Inventory, released March 2015, available on the worldwide web at https://iaspub.epa.gov/triexplorer/tri_release.chemical.

[4] United States Environmental Protection Agency. (2018). *TRI Explorer* (2016 Dataset (released March 2018)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (April 14, 2018).

[5] United States Environmental Protection Agency. (2011). *FY 2011 State of North Carolina Ambient Air Monitoring Network Plan, U.S. EPA Region 4 Comments and Recommendations* (Oct. 20, 2011). Available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7843

Appendix E.1 Annual Network Site Review Forms for 2016

Candor

Honeycutt

Wade

William Owen in Fayetteville

Site Review Form Calendar Year 2017

Site Information

Region FRO	**Site Name** Candor	**AQS Site # 37-123-0001**	
Street Address-136 Perry Drive		**City** Candor	
Urban Area Not in an Urban Area		**Core-based Statistical Area** None	
Enter Exact		**Method of Measuring**	
Longitude -79.836613	**Latitude** 35.2649		
In Decimal Degrees	In Decimal Degrees	**Interpolation**	**Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		173.1	

Name of nearest road to inlet probe McCallum Road ADT 310 Year latest available 2015

Comments: ______

Distance of site to nearest major road (m) 1079.00 Direction from site to nearest major road NNE

Name of nearest major road McCallum Road ADT 310 Year 2015

Comments: ______

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) 8787 Direction to RR ENE ☐NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) 10 Direction SSW

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ____________ ☒**NA**

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

None Expected

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☐ O_3 ☐ NH_3 ☐ Hydrocarbon ☒ Air Toxics ☐ CO (trace-level)	☒ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☐ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood_____ ☐ Urban_____ ☒ Regional_____	☐ SLAMS _____ ☒ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.91

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.11

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 1079 Direction from probe to nearest traffic lane NNE

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☒General/Background ____ ☐Highest Concentration ____ ☐Population Exposure ____ ☐Source Oriented ____ ☐Transport ____ ☐Welfare Related Impacts ____	☐Micro ____ ☐Middle ____ ☐Neighborhood ____ ☐Urban ____ ☒Regional ____	☒SLAMS ____ ☐SPM____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY____

Probe inlet height (from ground) ☐ < 2 m ____ ☒ 2-7m ____ ☐ 7-15 m ____ ☐ > 15 m ____
Actual measured distance from probe inlet to ground (meters) 2.46

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 10.26 Yes ☒ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA ☒

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☐ NA ☒

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) ____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) ____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☐ NA ☒

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters ____
*Distance from probe to closest tree (m) ____ Direction from probe to tree ___ *Height of tree above probe (m) ____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) ____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 1079 Direction from probe to nearest traffic lane NNE

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ____) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale ____) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures 12/9/15____ New Pictures Submitted? Yes ☐ No ☒

Reviewer Jennifer McHone Sides Date December 15, 2017

Ambient Monitoring Coordinator Mitchell Revels Date January 29, 2018

Joette Steger

Site Review Form Calendar Year 2017

Site Information

Region FRO	Site Name Honeycutt	AQS Site # 37-051-0010
Street Address-4665 Lakewood Drive		City Fayetteville
Urban Area FAYETTEVILLE	Core-based Statistical Area Fayetteville, NC	

Enter Exact			
Longitude -78.9905	Latitude 35.0018	Method of Measuring	
In Decimal Degrees	In Decimal Degrees	Interpolation	Explanation: Google Earth
Elevation Above/below Mean Sea Level (in meters)		60.04	

Name of nearest road to inlet probe Fisher Road ADT 16000 Year latest available 2016

Distance of ozone probe to nearest traffic lane (m) 40 Direction from ozone probe to nearest traffic lane NNE

Comments: Lakewood Drive - 13,000 (2016)

Name of nearest major road Bingham Drive (NC 162) ADT 28000 Year latest available 2016

Distance of site to nearest major road (m) 953.00 Direction from site to nearest major road ENE

Comments: ______

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ________ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) 77 Direction E

Distance between site and drip line of water tower (m) _____ Direction from site to water tower ________ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

None Expected

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☐General/Background ☐Highest Concentration ☐Max O3 Concentration ☒Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☒Neighborhood ☐Urban ☐Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐
Give actual measured height from ground (meters) 4.22

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.20

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: Replace building, pictures to be submitted after building change out

Date of Last Site Pictures: December 3, 2015 New Pictures Submitted? Yes ☐ No ☒

Reviewer Jennifer McHone Sides Date: 12/15/17

Ambient Monitoring Coordinator Mitchell Revels Date: January 29, 2018

Joette Steger, 4/18/2018

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also, use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two-digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Site Review Form Calendar Year 2017

Site Information

Region FRO	Site Name Wade	AQS Site # 37-051-0008
Street Address-7712 Covington Road		City Wade
Urban Area FAYETTEVILLE	Core-based Statistical Area Fayetteville, NC	

Enter Exact		Method of Measuring	
Longitude -78.7281	Latitude 35.1587		
In Decimal Degrees	In Decimal Degrees	Interpolation	Explanation: Google Earth
Elevation Above/below Mean Sea Level (in meters)		46.00	

Name of nearest road to inlet probe Covington Road ADT 130 Year latest available 2016

Distance of ozone probe to nearest traffic lane (m) 87 Direction from ozone probe to nearest traffic lane W

Comments: Wade Stedman Road - 1600 (2016) ; Dunn Road (US 301) - 2200 (2016)

Name of nearest major road I-95 ADT 56000 Year latest available 2016

Distance of site to nearest major road (m) 792.00 Direction from site to nearest major road ESE

Comments: ______

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track	(m) 825 Direction to RR NW ☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) 91 Direction W
Distance between site and drip line of water tower (m) **153** Direction from site to water tower NW ☐NA	

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

Cultivated Fields

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☐General/Background ☒Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☒Urban ☐Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐
Give actual measured height from ground (meters) 4.22

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.20

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters ____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ____ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures: December 10, 2016 New Pictures Submitted? Yes ☐ No ☒

Reviewer Jennifer McHone Sides Date: 12/15/17

Ambient Monitoring Coordinator Mitchell Revels Date: January 29, 2018

Joette Steger, 4/18/2018

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also, use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two-digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Site Review Form Calendar Year 2017

Site Information

Region FRO	Site Name William Owen	AQS Site # 37-051-0009
Street Address-4533 Raeford Road		City Fayetteville
Urban Area FAYETTEVILLE	Core-based Statistical Area Fayetteville, NC	

Enter Exact		
Longitude -78.9531	Latitude 35.0414	Method of Measuring
In Decimal Degrees	In Decimal Degrees	Interpolation | Explanation: Google Earth
Elevation Above/below Mean Sea Level (in meters)		63.70

Name of nearest road to inlet probe Raeford Road ADT Latest available 46000 Year 2016

Distance of ozone probe to nearest traffic lane (m) 210 Direction from inlet to nearest traffic lane N

Comments: ______

Name of nearest major road Raeford Road ADT 46000 Year latest available 2016

Distance of site to nearest major road (m) 210.00 Direction from site to nearest major road N

Comments: ______

Site located near electrical substation/high voltage power lines?		Yes ☐ No ☒
Distance of site to nearest railroad track	(m) 837 Direction to RR N	☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) 28 Direction N	
Distance between site and drip line of water tower (m) _____	Direction from site to water tower ________	☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

None Expected

Instructions:

Address: Sometimes local addresses change. Confirm the local address of the site using a 911 locator or the address used by the local utility company, community or county to identify the site location.

Urban Area: If the monitor is located within the bounds of an urban area (an incorporated area with a population of 10,000 or more people), select the appropriate urban area from the list. Otherwise select "Not in an Urban Area".

Core-Based Statistical Area (CBSA): If the monitor is located within a county that is part of a metropolitan statistical area (MSA) or a micropolitan statistical area (MiSA), then it is located within a core-based statistical area. If the monitoring station is located in a county included in a MSA or MiSA, select the appropriate CBSA from the list. Otherwise select "None".

Longitude and Latitude: The longitude and latitude should be entered in decimal degrees. Use a conversion program, such as http://transition.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html, to convert to decimal degrees.

Road Information: For the nearest road to the inlet probe, list whatever roadway that carries vehicles that is closest to the probe, whether or not it is a named or public road and even if the road has very little traffic. Use the comments space if necessary to describe the road or the source of the annual average daily traffic (AADT) counts. If the monitor is located near an unnamed, little used, private road, use the nearest major road space to list the closest named public road to the site. Include the distance and direction of the nearest major road from the site as well as the AADT if it is available. If the closest road is a small public road but there is a large major roadway such as an interstate highway, divided highway, major thoroughfare, etc., near the monitoring station use the nearest major road space to list the information about this major roadway. Include the distance and direction of the major road from the site as well as the AADT. The AADT for state roads can be obtained from the North Carolina Division of Transportation at http://www.ncdot.gov/travel/statemapping/trafficvolumemaps/default.html. For AADT values for local roadways contact the appropriate local governments.

Any Sources of Potential Bias: Use this space to record any information about the site that is not requested elsewhere. Especially note any changes to the site that occurred near the site in the past year, such as road construction, building construction, new businesses, businesses closing, or changes in traffic patterns, crops or other agricultural activities.

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Monitor Type
Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 FRM ☒ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☐General/Background_____ ☐Highest Concentration_____ ☒Population Exposure_____ ☐Source Oriented_____ ☐Transport_____ ☐Welfare Related Impacts _____	☐Micro_____ ☐Middle_____ ☐Neighborhood _____ ☒Urban_____ ☐Regional_____	☒SLAMS _____ ☐SPM_____ ☐ Nonregulatory_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m_____
Actual measured distance from probe inlet to ground (meters) 2.54

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m? Yes ☐ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) None

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☒ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM 2.5 samplers (X) within 1 to 4 m of each other? Yes ☒ No ☐ Give actual (meters): 1.854
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters): _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐
* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: ___

Date of Last Site Pictures: to be submitted soon New Pictures Submitted? Yes ☐ No ☒

Reviewer Jennifer McHone Sides Date: December 15, 2017

Ambient Monitoring Coordinator Mitchell Revels Date: January 29, 2018

Joette Steger 4/18/2018

Appendix E-2. Scale of Representativeness

Each station in the monitoring network must be described in terms of the physical dimensions of the air parcel nearest the monitoring station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

a) Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.
c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.
d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.
e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station.

There are six basic exposures:

a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.
b) Sites located to determine representative concentrations in areas of high population density.
c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.
d) Sites located to determine general background concentration levels.
e) Sites located to determine the extent of regional pollutant transport among populated areas.
f) Sites located to measure air pollution impacts on visibility, vegetation damage or other welfare-based impacts and in support of secondary standards.

The design intent in siting stations is to correctly match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of the six basic objectives and the scales of representativeness are appropriate when siting monitoring stations:

Table E5. Site Type Appropriate Siting Scales

1. Highest concentration	Micro, middle, neighborhood, sometimes urban or regional for secondarily formed pollutants
2. Population oriented	Neighborhood, urban
3. Source impact	Micro, middle, neighborhood
4. General/background & regional transport	Urban, regional
5. Welfare-related impacts	Urban, regional

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL A. ABRACZINSKAS
Director

NORTH CAROLINA
Environmental Quality

2018-2019 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 2

Site Descriptions by Metropolitan Statistical Area

F. The Washington Monitoring Region

June 29, 2018

NORTH CAROLINA Department of Environmental Quality

North Carolina Department of Environmental Quality | Division of Air Quality
217 West Jones Street, Suite 4000 | 1641 Mail Service Center | Raleigh, North Carolina 27699-1641
919.707.8400

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F. The Washington Monitoring Region

The Washington monitoring region, shown in Figure F1, consists of five sections: (1) the Greenville metropolitan statistical area, or MSA, (Pitt County), (2) the Goldsboro MSA (Wayne County), (3) the New Bern MSA (Craven, Jones and Pamlico counties) (4) the non-MSA portion of the Washington monitoring region (Beaufort, Bertie, Camden, Chowan, Dare, Greene, Hertford, Hyde, Lenoir, Martin, Pasquotank, Perquimans, Tyrrell and Washington counties) and (5) the Virginia Beach-Norfolk-Newport News MSA (Currituck and Gates counties).

Figure F1. The Washington monitoring region
The red dots show the approximate locations of most of the monitoring sites in this region.

(1) The Greenville MSA

The Greenville MSA consists of Pitt County. The principal city is Greenville. The North Carolina Division of Air Quality, or DAQ, operates one monitoring site in this MSA – a collocated ozone and fine particle monitoring site at the Pitt County Agricultural Center in Greenville. Table F1 summarizes site monitoring information. Figure F2 shows the site location. Both monitors began operating April 1, 2008. Figure F3 through Figure F8 provide views of the site and views looking north, east, south and west from the site.

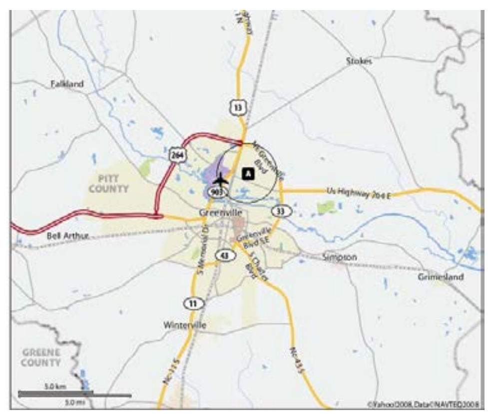

Figure F2. Locations of monitors in the Greenville MSA
A is the Pitt County Agriculture Center ozone and fine particle monitoring site. The circle represents the neighborhood scale of 4 Km.

Figure F3. Aerial view of the Pitt Co Ag Center site

Figure F4. The Pitt Co Ag Center ozone and fine particle monitoring site

Table F1. Site Table for Pitt County Agriculture Center

Site Name:		Pitt County Agriculture Center			
AQS Site Identification Number		37-147-0006			
Location:		403 Government Circle Greenville, North Carolina			
CBSA:	Greenville, NC		**CBSA #:**	24780	
Latitude	35.641276		**Datum:**	WGS84	
Longitude	-77.360126				
Elevation	7.9 meters				

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with Ultra Violet Photometry (047)	EQOA-0880-047	1-Hour	Mar. 1 to Oct. 31
PM 2.5 local conditions	R & P Model 2025 PM2.5 Sequential w/WINS – Gravimetric Analysis (145)	RFPS-1006-145	24-Hour	Every Third Day, Year-Round
PM 2.5 local conditions	Met One BAM-1022 Mass Monitor w/ VSCC	EQPM-1013-209	1-Hour	Year Round

Date Monitor Established:	Ozone	April 1, 2008
Date Monitor Established:	PM 2.5 local conditions	April 1, 2008
Date Monitor Established	PM 2.5 local conditions, continuous	April 8, 2016

Nearest Road:	New Hope/Detention / Detention Drive		
Traffic Count:	None available – estimated < 3100	**Year of Count:**	2012

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	236 meters	West	SLAMS	Real-time AQI reporting. Compliance w/NAAQS.
PM 2.5 local conditions	236 meters	West	SLAMS	Compliance w/NAAQS.
PM 2.5 local conditions	236 meters	West	SPM	Real-time AQI reporting

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable for Comparison to NAAQS**	**Proposal to Move or Change**
Ozone	Population Exposure	Neighborhood	Yes	None
PM 2.5 local conditions	Population Exposure	Neighborhood	Yes	May go to 1-in-6 day
PM 2.5 local conditions	Population Exposure	Neighborhood	No	None

Parameter Name	**Meets Part 58 Appendix A Requirements**	**Meets Part 58 Appendix C Requirements**	**Meets Part 58 Appendix D Requirements**	**Meets Part 58 Appendix E Requirements**
Ozone	Yes	Yes	Yes	Yes
PM 2.5 local conditions	Yes	Yes	No requirements	Yes
PM 2.5 local conditions	Yes	Yes	No requirements	Yes

Parameter Name	**Probe Height (m)**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	4.5	1.5 meter	>20 meters	None
PM 2.5 local conditions	2.4	2.1 meters	>20 meters	None
PM 2.5 local conditions	2.3	2 meters	>20 meters	None

Figure F5. Pitt Co Ag Center site looking north

Figure F7. Pitt Co Ag Center site looking east

Figure F6. Pitt Co Ag Center site looking west

Figure F8. Pitt Co Ag Center site looking south

In 2016 the site was relocated on the property due to the construction of a building near the original location. For details on the relocation see Appendix F-3. Region 4 Requested Siting Information for the Pitt County Agricultural Center Site Relocation. In 2016 a continuous fine particle monitor was added to the site.

The **lead monitoring network requirements** as modified in 2016[1] do not result in any lead monitors in the Greenville MSA. The Greenville MSA does not have any permitted facilities located within its bounds that emit 0.5 ton or more per year of lead.[2] Changes to the **ozone monitoring requirements** in 2015 did not result in more monitoring in the Greenville MSA. The MSA currently has the minimum number of monitors required by 40 CFR 58 Appendix D for population exposure monitoring in urban areas. Ozone monitoring began a month earlier on March 1 instead of April 1 starting in 2017. The 2010 **nitrogen dioxide monitoring requirements**[3] did not add nitrogen dioxide monitors in the Greenville MSA because the

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[1] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[2] United States Environmental Protection Agency. (2017). *TRI Explorer* (2015 Dataset (released March 2017)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (May 04, 2017).

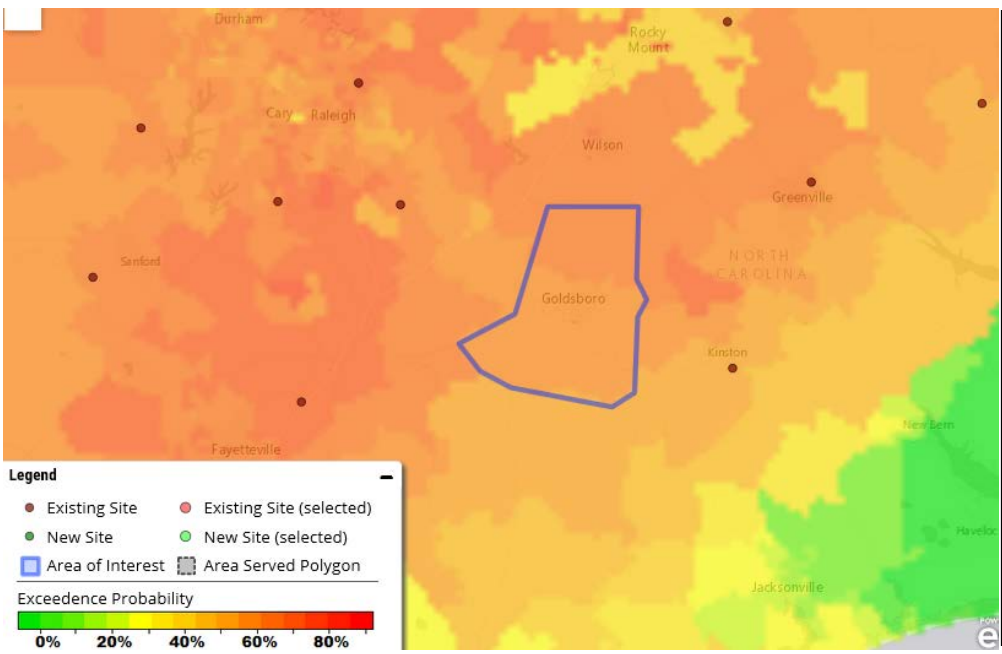
[3] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register**,** Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.

population is less than 500,000. The 2010 **sulfur dioxide monitoring requirements** also did not result in more monitoring in this area because there are no large sources of sulfur dioxide in the MSA. The changes to the **carbon monoxide monitoring requirements** did not result in additional monitoring in this MSA because the population is less than one million.

(2) The Goldsboro MSA

The Goldsboro MSA consists of Wayne County. The major metropolitan area is the City of Goldsboro. The DAQ does not operate any monitoring sites in the Goldsboro MSA. The fine-particle monitoring site located at Dillard Middle School was shut down on Dec. 31, 2015.

Currently, the DAQ does not monitor for ozone in Goldsboro because there are ozone monitors in the neighboring counties of Johnston and Lenoir. Figure F9 shows the locations of these monitors as well as the Leggett and Pitt County monitors in relation to the Goldsboro MSA. Modeling also indicates that the probability of there being an exceedance of the 2015 ozone standard in the Goldsboro area is only moderate, around 50 percent. The surrounding ozone monitors should adequately characterize the ozone concentrations in the Goldsboro area.



The Goldsboro MSA is outlined in blue. The West Johnston ozone monitor is to the west; the Leggett ozone monitor is to the north northeast; the Pitt Co Ag Center ozone monitor is to the northeast; the Lenoir Community College ozone monitor is to the east; the Wade ozone monitor is to the southwest of Goldsboro.

Figure F9. Ozone monitors surrounding the Goldsboro MSA and probability of exceeding the 2015 ozone standard

The **lead monitoring network** requirements, as modified in 2016,[4] did not add any lead monitors in the Goldsboro MSA. The Goldsboro MSA does not have any permitted facilities located within its bounds that emit 0.5 tons or more per year of lead.[5]

[4] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

The 2010 **nitrogen dioxide monitoring requirements,**[6] as modified in 2016, also did not increase the number of monitors in the Goldsboro MSA because its population is less than 1,000,000. The 2010 **sulfur dioxide monitoring requirements** did not result in additional sulfur dioxide monitors because there are not enough emissions or people in the MSA to require PWEI monitoring. The 2011 changes to the **carbon monoxide monitoring requirements** also did not result in the addition of any carbon monoxide monitors because the population is less than one million.

(3) The New Bern MSA

The New Bern MSA is made up of three counties – Craven, Jones and Pamlico counties. The DAQ currently does not operate any monitoring stations in the New Bern MSA. The current monitoring regulations do not require the DAQ to operate any monitors in this area.

The **lead monitoring** network requirements, as modified in 2016,[7] do not require lead monitors in the New Bern MSA. The MSA does not have any permitted facilities located within its bounds that emit 0.5 tons or more of lead per year.[8]

The 2015 **ozone monitoring requirements** did not require adding an ozone monitor to the New Bern MSA. As shown in Figure F10, modeling indicates that the area has a low probability of exceeding the 2015 ozone standard. The DAQ operates an ozone monitor just to the west of the MSA at Lenoir Community College, which has a higher probability of exceeding the standard than anywhere in the MSA. The U.S. Environmental Protection Agency operates a clean air status and trends network, or CASTNET, monitor just to the east of the MSA. These two monitors should adequately characterize ozone concentrations in this area.

This area also did not have to add any monitors to comply with the 2010 **nitrogen dioxide monitoring** requirements because it does not have any roadways that exceed the population threshold.[9] It also did not need to add monitors for the 2010 **sulfur dioxide monitoring requirements** because there are no facilities in the MSA emitting large enough quantities of sulfur dioxide to trigger source-oriented monitoring. This area will also not need to add monitors to comply with the **changes to the carbon monoxide monitoring requirements** because the population is less than one million.

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[5] United States Environmental Protection Agency. (2017). *TRI Explorer* (2015 Dataset (released March 2017)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (May 04, 2017).
[6] 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.
[7] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.
[8] United States Environmental Protection Agency. (2017). *TRI Explorer* (2015 Dataset (released March 2017)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (May 04, 2017).
[9] 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.

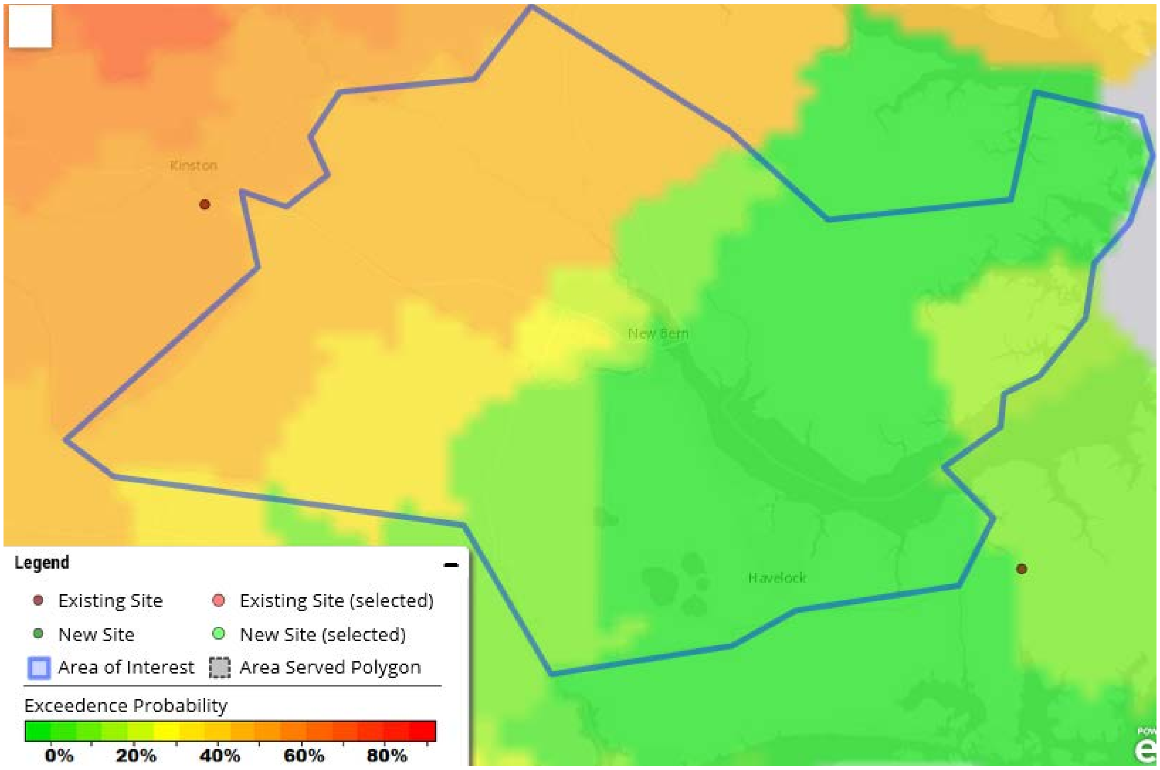

Figure F10. Map of ozone exceedance probability for the New Bern MSA

(4) The Non-MSA Portion of the Washington Monitoring Region

The non-MSA Portion of the Washington monitoring region consists of 14 counties: Beaufort, Bertie, Camden, Chowan, Dare, Greene, Hertford, Hyde, Lenoir, Martin, Pasquotank, Perquimans, Tyrrell and Washington. No MSAs are located here. The Kill Devil Hills micropolitan statistical area, MiSA, is in Dare County and the Washington MiSA is in Beaufort County. Camden, Pasquotank and Perquimans counties are included in the Elizabeth City MiSA. The Kinston MiSA is in Lenoir County. The DAQ operates three monitoring sites in this area. These sites are located at Jamesville in Martin County, at Lenoir Community College in Lenoir County and at the Bayview Ferry in Beaufort County. Figure F11 shows the location of the Jamesville monitoring site.

A is the Jamesville site. The circles approximate the scale of representation for the monitors (the ozone monitor is urban – 4 to 50 Km - inner circle; the particle monitor is regional - 50 Km plus - outer circle).

Figure F11. Location of the Jamesville monitoring site

Figure F12. Jamesville ozone, particle and sulfur dioxide monitoring site

At the **Jamesville** site, 37-117-0001, the DAQ operates a seasonal ozone monitor, a special purpose sulfur dioxide monitor that operates for 12 months every three years and a special purpose PM_{10} monitor that operates for 12 months every three years. Figure F12 through Figure F20 provide a view of the Jamesville site as well as views looking north, northeast, east, southeast, south, southwest, west and northwest from the site. The fine-particle monitors at this site were shut down on Dec. 31, 2015.

Figure F13. Looking north from the Jamesville site

Figure F14. Looking northwest from the Jamesville site

Figure F15. Looking northeast from the Jamesville site

Figure F16. Looking east from the Jamesville site

Figure F17. Looking west from the Jamesville site

Figure F19. Looking southeast from the Jamesville site

Figure F18. Looking southwest from the Jamesville site

Figure F20. Looking south from the Jamesville site

At the **Bayview** Ferry site in Beaufort County the DAQ operates a sulfur dioxide monitor. This site began operating in January 2011 to replace the Aurora sulfur dioxide monitoring site. Figure F21 shows the locations of the two sites. In 2010 the PCS Phosphate manufacturing facility started logging near the Aurora sulfur dioxide monitoring site, located on the fence-line of their manufacturing facility. Although PCS rerouted the logging trucks so they no longer went by the monitoring station and indicated the area near the monitoring site was not scheduled to be mined until sometime around 2015, the DAQ relocate the monitor across the Pamlico River to the Bayview Ferry station because more people live there and the new site is downwind of the PCS facility. Figure F22 to Figure F26 show the site and views looking north, east, south and west. This site is source-oriented, located downwind of the PCS Phosphate facility in Beaufort County.

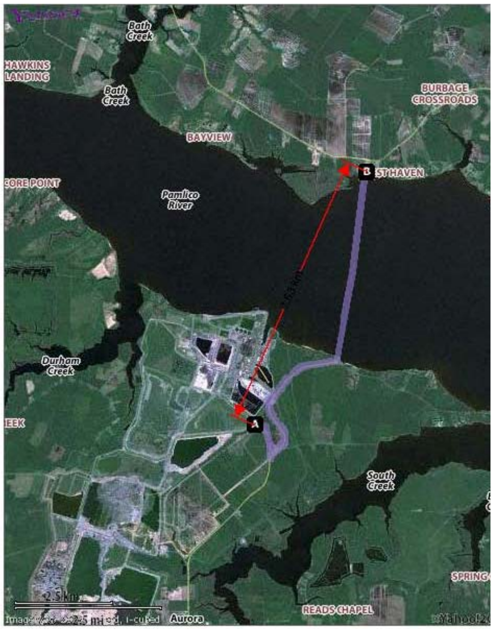

Figure F21. Location of the Bayview Ferry site (B) relative to the Aurora site (A)

Figure F22. Bayview Ferry sulfur dioxide monitoring site

Figure F23. Looking north from the Bayview Ferry site

Figure F24. Looking east from the Bayview Ferry site

Figure F25. Looking west from the Bayview Ferry site

Figure F26. Looking south from the Bayview Ferry site

At the **Lenoir Community College** site, 37-107-0004, the DAQ operates a seasonal ozone monitor and a rotating special purpose PM_{10} monitor that operates for 12 months every third year. In 2009, a screen was installed between the monitoring site and nearby baseball field to block glare from an observatory from interfering with the people playing baseball. In 2010, a large scoreboard was also installed. Thus, in 2011, the DAQ moved the site to another location on the campus. Figure F27 shows the locations of the old monitoring site and the new monitoring site to the west. The monitoring site and views looking north, east, south and west are provided in Figure F28 through Figure F32. The collocated meteorological tower measuring wind speed, wind direction, two-meter and 10-meter ambient temperature, relative humidity, solar radiation and rain fall was shut down on Nov. 3, 2014. The fine particle monitor at this site was shut down at the end of 2013.

Figure F27. New and old LCC monitoring site locations

Figure F28. Lenoir Community College ozone monitoring site

Figure F29. Looking north from the LCC site location

Figure F30. Looking northwest from the LCC site location

Figure F31. Looking west from the LCC site location

Figure F32. Looking northeast from the LCC site location

Figure F33. Looking east from the LCC site location

Figure F34. Looking southeast from the LCC site location

Figure F35. Looking southwest from the LCC site location

Figure F36. Looking south from the LCC site location

The **lead monitoring** network requirements, as modified in 2016,[10] do not require lead monitors in this area of the Washington monitoring region. The non-MSA portion of the Washington monitoring region does not have any permitted facilities located within its bounds that emit 0.5 tons or more of lead per year.[11]

2015 **ozone monitoring requirements** require monitoring to start one month earlier on March 1 instead of April 1 starting in 2017. The 2010 **nitrogen dioxide monitoring** requirements[12] did not result in additional monitoring in this area because there is not an MSA with a population of 1,000,000 or more and there are not any roadways that exceed the traffic threshold. The DAQ does not expect the 2010 **sulfur dioxide monitoring** requirements to increase the number of monitors in this area because the existing source-oriented monitor at Bayview is adequate and appropriately sited to serve as the required source-oriented monitor for the PCS Phosphate facility. The 2011 **changes to the carbon monoxide monitoring requirements** will not add additional monitors to the area because the population is under one million.

(5) The Virginia Beach-Norfolk-Newport News MSA

The North Carolina portion of the Virginia Beach-Norfolk-Newport News MSA is made up of two counties - Currituck and Gates. The DAQ currently does not operate any monitoring sites in these two counties. The DAQ has an agreement with Virginia that Virginia will fulfill all North Carolina's monitoring requirements for the Currituck and Gates County portion of the Virginia Beach-Norfolk-Newport News MSA.[13]

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[10] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[11] United States Environmental Protection Agency. (2017). *TRI Explorer* (2015 Dataset (released March 2017)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (May 04, 2017).

[12] 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.

[13] North Carolina - Virginia Monitoring Agreement, 05/09/2016, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7862.

The **lead monitoring** network requirements, as modified in 2016, [14] do not require any lead monitoring in these counties. These counties do not have any permitted facilities located within their bounds that emit 0.5 tons or more of lead per year.[15]

The 2015 **ozone monitoring requirements** did not add monitors to these counties. They are part of an MSA that already meets the population exposure monitoring requirements for urban areas.

This area is not required to add monitors to comply with the 2010 **nitrogen dioxide monitoring** requirements[16] because it does not have any roadways that exceed the traffic threshold. It also is not required to monitor by the 2010 **sulfur dioxide monitoring requirements** because there are no facilities in these counties emitting large enough quantities of sulfur dioxide to trigger source-oriented monitoring. This area will also not need to monitor to meet the **carbon monoxide monitoring requirements** because those requirements will be met by Virginia.

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[14] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[15] United States Environmental Protection Agency. (2017). *TRI Explorer* (2015 Dataset (released March 2017)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (May 04, 2017).

[16] 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.

Appendix F.1 Annual Network Site Review Forms for 2017

Pitt County Agricultural Center in Greenville

Jamesville

Bayview Ferry

Lenoir Community College in Kinston

Site Review Form Calendar Year 2017

Site Information

Region WARO	**Site Name** Pitt Ag	**AQS Site # 37-147-0006**	
Street Address-403 Government Circle		**City** Greenville	
Urban Area GREENVILLE	**Core-based Statistical Area** Greenville, NC		
Enter Exact		**Method of Measuring**	
Longitude -77.360126	**Latitude** 35.641276		
In Decimal Degrees	In Decimal Degrees	Other (explain)	**Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		7.9	

Name of nearest road to inlet probe New Hope Rd ADT 0 Year Choose an item Unknown

Comments: _____

Distance of site to nearest major road (m) 690.00 Direction from site to nearest major road WNW

Name of nearest major road HWY 33 ADT 4300 Year 2016

Comments: _____

Site located near electrical substation/high voltage power lines? Yes ☒ No ☐

Distance of site to nearest railroad track (m) 789 Direction to RR WNW ☐NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ____________ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

Contruction planned 350 meters SSW, supposed to start in 2017 however no signs of construction yet.

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA	☐ General/Background_____	☐ Micro_____	☒ SLAMS _____
☐ SO_2 (NAAQS)	☐ Highest Concentration_____	☐ Middle_____	☐ SPM_____
☐ SO_2 (trace-level)	☐ Max O3 Concentration_____	☐ Neighborhood_____	**Monitor Network Affiliation**
☐ NO_2 (NAAQS)	☒ Population Exposure_____	☒ Urban_____	☐ NCORE_____
☐ $HSNO_y$	☐ Source Oriented_____	☐ Regional_____	☐ Unofficial PAMS_____
☒ O_3	☐ Transport_____		
☐ NH_3	☐ Upwind Background_____		
☐ Hydrocarbon	☐ Welfare Related Impacts _____		
☐ Air Toxics			
☐ CO (trace-level)			

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4.50

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.50

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 236 Direction from probe to nearest traffic lane W

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☐General/Background _____ ☐Highest Concentration _____ ☒Population Exposure _____ ☐Source Oriented _____ ☐Transport _____ ☐Welfare Related Impacts _____	☐Micro _____ ☐Middle _____ ☒Neighborhood _____ ☐Urban _____ ☐Regional _____	☒SLAMS _____ ☐SPM_____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) 2.4

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.1 Yes ☒ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☒ (answer *'d questions) No ☐ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☒ No ☐ Give actual (meters) 2.09
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters) .06

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 236 Direction from probe to nearest traffic lane W

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-
*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐
*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures 2016 New Pictures Submitted? Yes ☐ No ☒

Reviewer David Harwood Date January 1, 2018

Ambient Monitoring Coordinator ______ Date______

Joette Steger, April 14, 2018

Site Review Form Calendar Year 2017

Site Information

Region WARO	**Site Name** Jamesville	**AQS Site #** 37-117-0001
Street Address-1210 Hayes Street		**City** Jamesville
Urban Area Not in an Urban Area	**Core-based Statistical Area** None	
Enter Exact		**Method of Measuring**
Longitude -76.906249	**Latitude** 35.81066	
In Decimal Degrees	In Decimal Degrees	___ **Explanation: Googel Earth**
Elevation Above/below Mean Sea Level (in meters)		**13.25**

Name of nearest road to inlet probe Hayes St. ADT n/a Year Choose an item n/a
Comments: Dead end, unpaved road (ADT not available)
Distance of site to nearest major road (m) 119.00 Direction from site to nearest major road SSW
Name of nearest major road US 64 Bypass ADT 8100 Year Choose an item 2015
Comments: No ADT data for 2016. 2017 data not available at this time.

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) 175 Direction to RR SSW ☐NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) 50 Direction NNE

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ______ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

Site surrounded by cultivated fields.

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☒ Ozone (O_3)	☒General/Background ☐Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☐Urban ☒Regional	☐SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4.50

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.60

Distance of outer edge of probe inlet from other gas monitoring probe inlets > 0.25 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 129 Direction from probe to nearest traffic lane SSW

Site Review Form Calendar Year 2017

OZONE MONITOR RECOMMENDATIONS:

1) Maintain current monitor status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate monitor? Yes ☐ No ☐

Comments: None

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ SO_2 (DRR) ☒ SO_2 (NAAQS) ☐ SO_2 (trace-level)	☒ General/Background ☐ Highest Concentration ☐ Population Exposure ☐ Source Oriented ☐ Transport ☐ Upwind Background ☐ Welfare Related Impacts	☐ Micro ☐ Middle ☐ Neighborhood ☐ Urban ☒ Regional	☐ INDUSTRIAL ☒ SLAMS ☐ SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4.5

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.8

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 129 Direction from probe to nearest traffic lane SSW

SULFUR DIOXIDE MONITOR RECOMMENDATIONS:

1) Maintain current monitor status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate monitor? Yes ☐ No ☐

Comments: JV SO2 monitor is rotational. It ran from April 2016 - April 2017. It was shut down April 1, 2017.

Date of Last Site Pictures 1-6-2017 New Pictures Submitted? Yes ☐ No ☒

Reviewer Peter Susi ______________________ Date 1-2-2017

Ambient Monitoring Coordinator ______________________ Date _____

Revised 2018-04-17 Joette Steger, 4/17/2018

Site Review Form Calendar Year 2017

Site Information

Region WARO	**Site Name** Bayview	**AQS Site #** 37-013-0151
Street Address-229 Hwy 306N	**City** Bath	
Urban Area Not in an Urban Area	**Core-based Statistical Area** None	
Enter Exact		**Method of Measuring**
Longitude -76.7624	**Latitude** 35.40217	
In Decimal Degrees	In Decimal Degrees	Other (explain) **Explanation:** Google Earth
Elevation Above/below Mean Sea Level (in meters) ____		

Name of nearest road to inlet probe HWY 306N ADT 270 Year Choose one 2016

Comments: Bayview Ferry entrance

Distance of site to nearest major road (m) 377.00 Direction from site to nearest major road N

Name of nearest major road Hwy 92 ADT 1300 Year Choose one 2016

Comments: ______

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track	(m) ________ Direction to RR ___ ☒NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____ Direction ___
Distance between site and drip line of water tower (m) ______ Direction from site to water tower ______ ☒NA	

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

thtt

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☒ SO_2 (DRR) ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level)	☐ General/Background ☐ Highest Concentration ☐ Population Exposure ☒ Source Oriented ☐ Transport ☐ Upwind Background ☐ Welfare Related Impacts	☐ Micro ☐ Middle ☐ Neighborhood ☒ Urban ☐ Regional	☒ INDUSTRIAL ☐ SLAMS ☐ SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 5.5

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.35

Distance of outer edge of probe inlet from other gas monitoring probe inlets > 0.25 m? Yes ☐ No ☐ NA ☒

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☒ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☒ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) 12.00 Direction from probe to tree E *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 70 Direction from probe to nearest traffic lane NW

Site Review Form Calendar Year 2017

SULFUR DIOXIDE MONITOR RECOMMENDATIONS:

1) Maintain current monitor status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale ______) No ☐

*4) Relocate monitor? Yes ☐ No ☐

Comments: Bayview Ferry Terminal is 65 meters to the west and is a SO2 source. A Title V industrial SO2 source is 6500 meters to the SW across the Pamlico Sound (PCS Phosphate).

Date of Last Site Pictures 2016 New Pictures Submitted? Yes ☐ No ☒

Reviewer David Harwood Date 1/1/18

Ambient Monitoring Coordinator ______ Date ______

Revised 2018-04-1714 Joette Steger, 4/17/2018

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Site Review Form Calendar Year 2017

Site Information

Region WARO	**Site Name** Lenoir Community College	**AQS Site # 37-107-0004**
Street Address-231 HWY 58 South		**City** Kinston, NC
Urban Area KINSTON	**Core-based Statistical Area** Kinston, NC	

Enter Exact		**Method of Measuring**	
Longitude -77.5668	**Latitude** 35.2322		
In Decimal Degrees	In Decimal Degrees	**Other (explain)**	**Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		**15**	

Name of nearest road to inlet probe College Dr. ADT 0 Year Choose an item 0

Comments: Campus Road, new unnamed road built this year near site.

Distance of site to nearest major road (m) 386.00 Direction from site to nearest major road N

Name of nearest major road HWY 70 ADT 16000 Year 2016

Comments: ______

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ________ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) ____ Direction ___

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ________ ☒**NA**

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☒ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood_____ ☒ Urban_____ ☐ Regional_____	☒ SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.78

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.02

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 386 Direction from probe to nearest traffic lane N

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☒ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☐ PM2.5 Cont. (BAM)	☒General/Background _____ ☐Highest Concentration _____ ☐Population Exposure _____ ☐Source Oriented _____ ☐Transport _____ ☐Welfare Related Impacts _____	☐Micro _____ ☐Middle _____ ☐Neighborhood _____ ☒Urban _____ ☐Regional _____	☒SLAMS _____ ☐SPM_____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) 2.18

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 1.98 Yes ☐ No ☒

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA ☒

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) _____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 386 Direction from probe to nearest traffic lane N

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures 2017 New Pictures Submitted? Yes ☒ No ☐

Reviewer David Harwood Date 1/1/18

Ambient Monitoring Coordinator ____________________ Date________

Joette Steger, 4/17/2018

Appendix F-2. Scale of Representativeness

Each station in the monitoring network must be described in terms of the physical dimensions of the air parcel nearest the monitoring station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

a) Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.
c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.
d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.
e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station.

There are six basic exposures:

a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.
b) Sites located to determine representative concentrations in areas of high population density.
c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.
d) Sites located to determine general background concentration levels.
e) Sites located to determine the extent of regional pollutant transport among populated areas.
f) Sites located to measure air pollution impacts on visibility, vegetation damage or other welfare-based impacts and in support of secondary standards.

The design intent in siting stations is to correctly match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of the six basic objectives and the scales of representativeness are appropriate when siting monitoring stations:

Table F2. Site Type Appropriate Siting Scales

1. Highest concentration	Micro, middle, neighborhood (sometimes urban or regional for secondarily formed pollutants)
2. Population oriented	Neighborhood, urban
3. Source impact	Micro, middle, neighborhood
4. General/background & regional transport	Urban, regional
5. Welfare-related impacts	Urban, regional

Appendix F-3. 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 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. Thus, on Sept. 30, 2015, DAQ contacted Mr. Corley to see if the monitoring building could be relocated approximately 325 meters to the other side of the property as shown in Figure F3. Mr. Corley agreed to this location on Oct. 21, 2015.

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 F5 through Figure F8.

The new 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. 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 33, 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 new monitoring station are approximately the same as the probe and inlet heights for the old monitoring station, approximately 3.8 meters for ozone and 2.3 meters for fine particles.

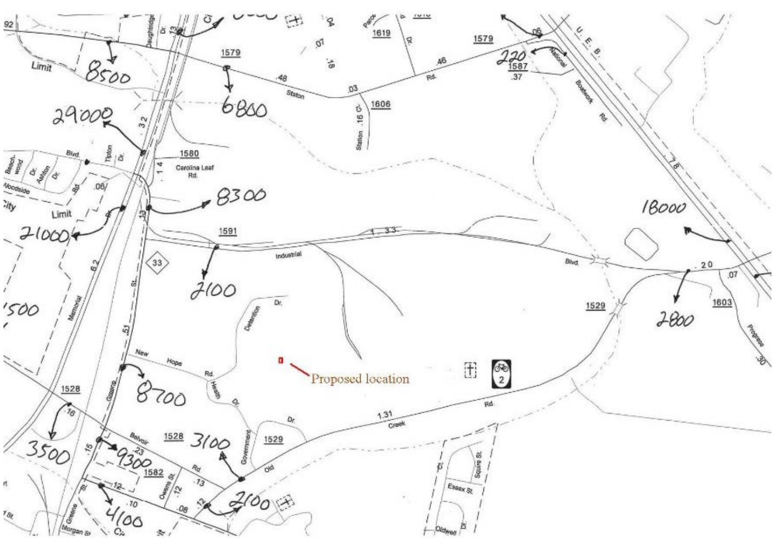

Figure 37. 2012 Traffic count map near the Pitt County Agriculture Center (from DOT)

The Air Quality System identification number and street address for the site remained the same: 37-147-0006 and 403 Government Circle, Greenville, North Carolina. The new latitude and longitude is 35.641276 and -77.360358. The sampling and analysis methods (AQS codes 047 for ozone and 145 for fine particles) and operating schedules (hourly for ozone and one-in-three day for fine particles) for both monitors remained the same. The monitoring objective for both monitors continued to be population exposure. Figure 34 shows the location of the monitoring stations relative to the population center of Greenville. Based on the wind roses in Figure 35 through Figure 39, the new 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 is be urban based on the location of the roadways and the amount of traffic on those roads. (See Figure 40 and Table 3.)

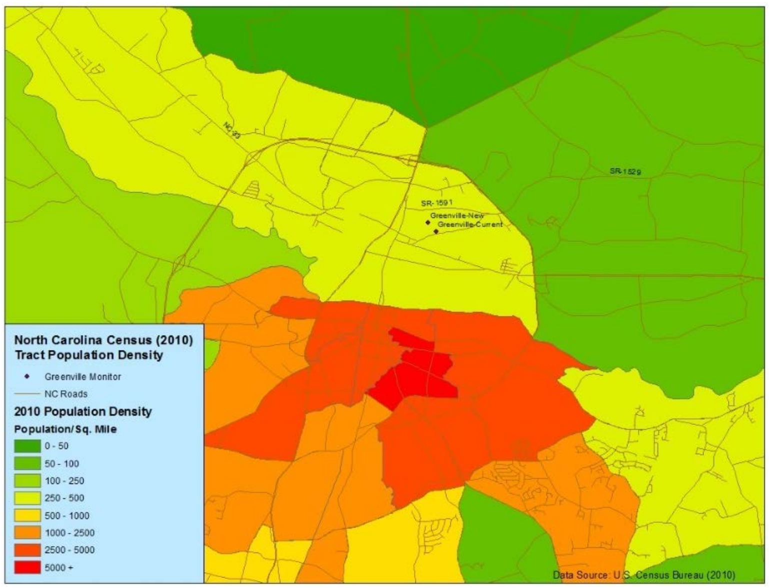

Figure 38. Location of the proposed monitoring station relative to the population of Greenville

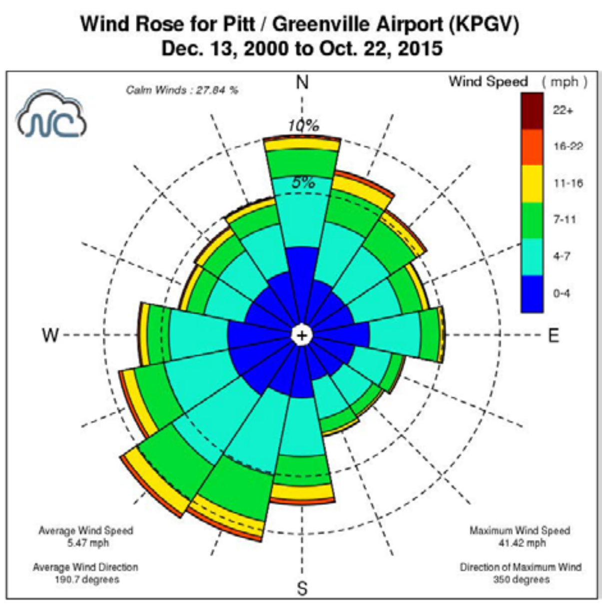

Figure 39. Wind rose for Greenville using all data (from NC State Climate Office)

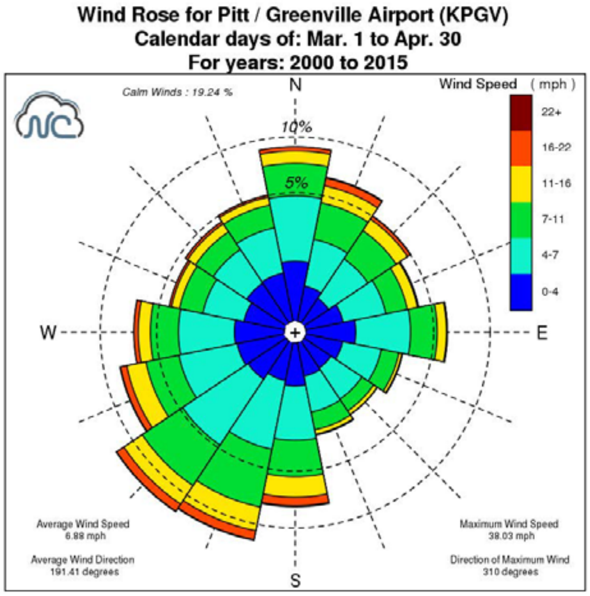

Figure 40. Greenville springtime wind rose (from NC State Climate Office)

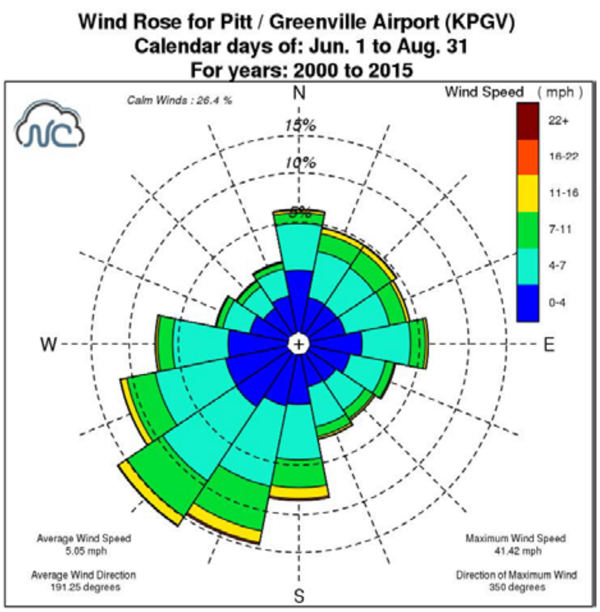

Figure 41. Greenville summertime wind rose (from NC State Climate Office)

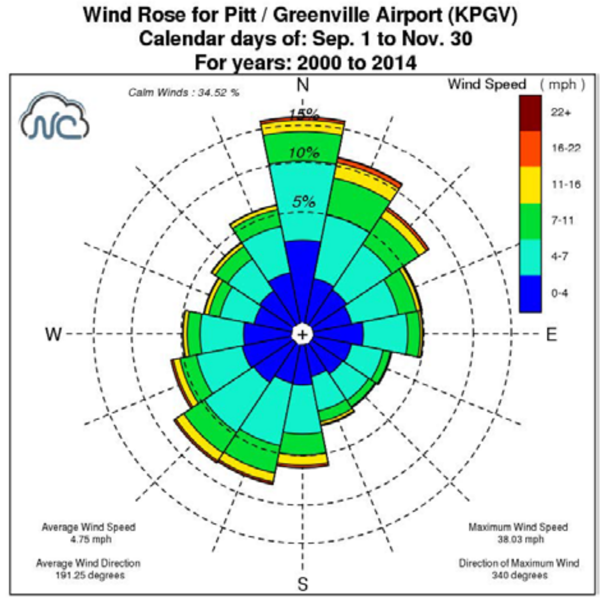

Figure 42. Greenville fall time wind rose (from NC State Climate Office)

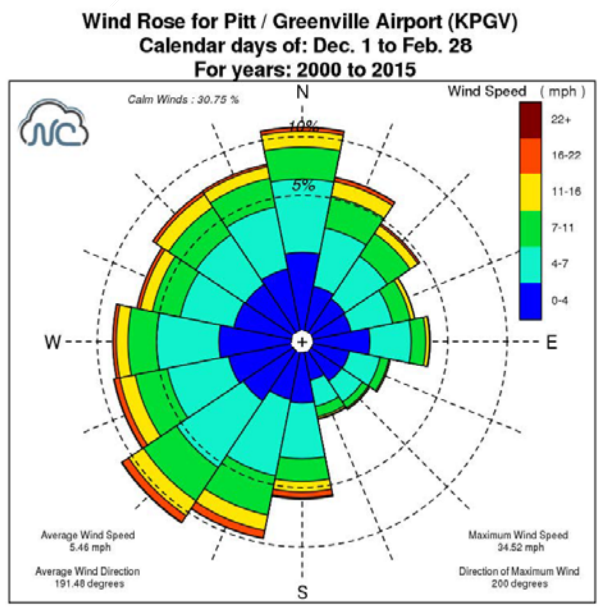

Figure 43. Greenville wintertime wind rose (from NC State Climate Office)

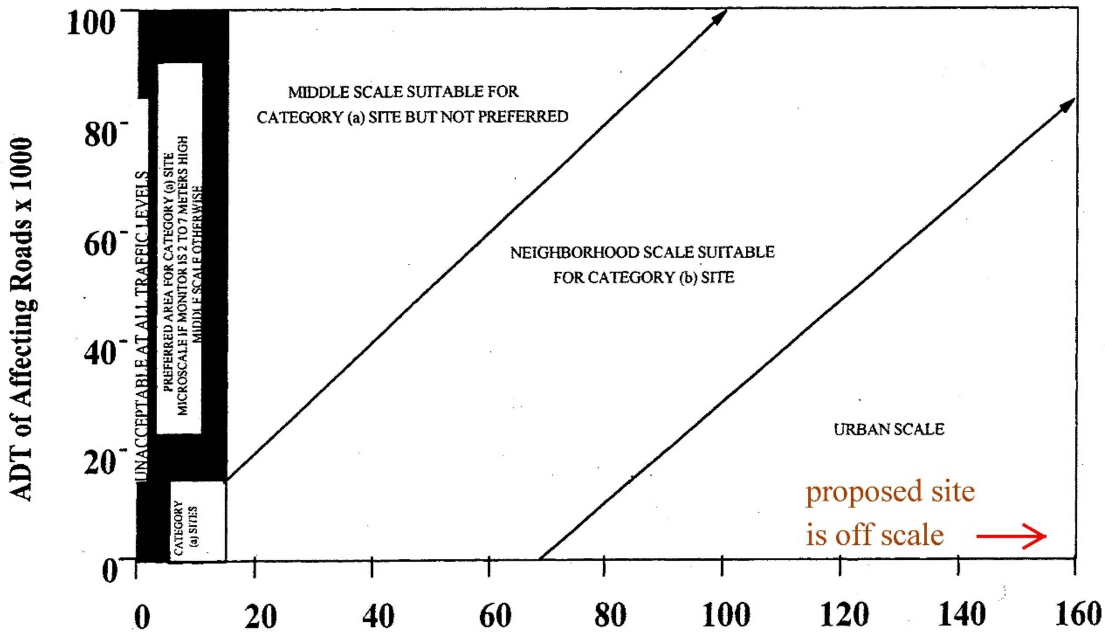

Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Figure 44. Figure E-1 from Appendix E used to determine spatial scale of representativeness for particle monitors

Table 3. 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 new monitoring site was not provided to the public for comment because the location for the monitors is on the same property. Thus, the move was not considered a significant enough change to warrant providing it to the public for comment.

Table 4 summarizes other factors DAQ evaluated when choosing the new location for the monitoring station. Location of permitted facilities are shown in Figure 41.

Table 4. Other considerations in selection of the Pitt County Agriculture Center Site

Factor	**Evaluation**
Long-term Site Commitment	Pitt County was willing to provide DAQ with a long-term lease agreement and does not plan to develop the current area any time soon
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. New location is near a walking trail. The outdoor monitor will be inside a locked fence.
Safety	Appropriate electrical permits were 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 was placed with the door to the north so that sunlight does not shine in through the window and warm up the building.
Exposure	The monitoring station is at least 20 meters from the driplines of trees and is not 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 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 monitoring station, emitted 20.7 tons of PM10 in 2011.
Proximity to Other Measurements	The monitoring station is located about 2 kilometers from the Pitt-Greenville Airport.

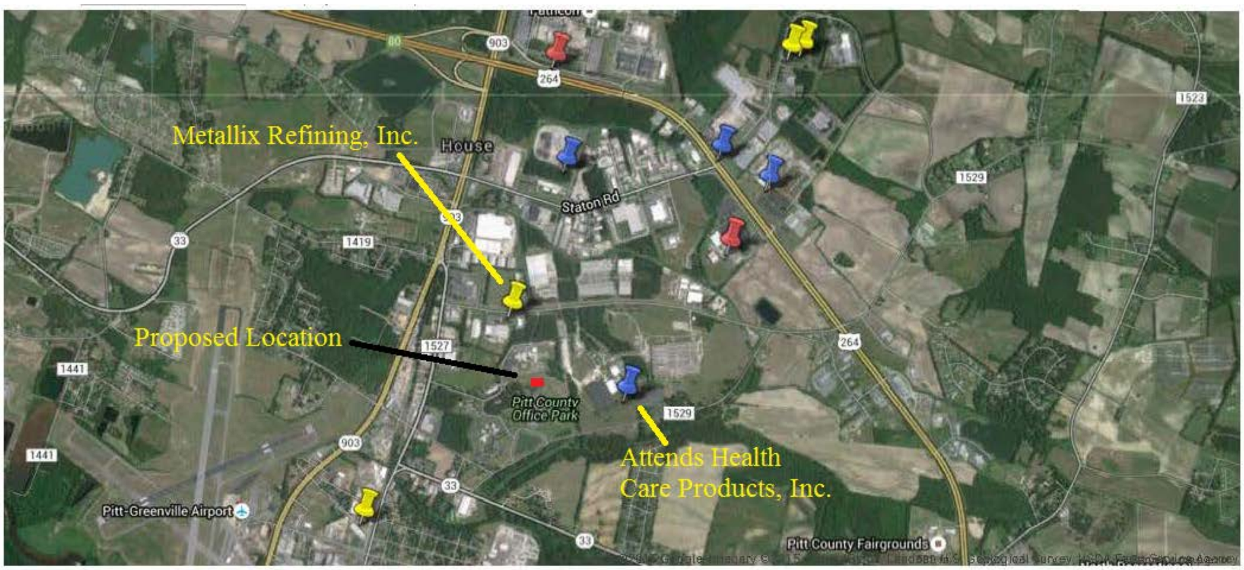

Figure 45. Location of monitoring station relative to permitted facilities
(yellow pins are small, blue pins are synthetic minor and red pins are Title V facilities)

Appendix F-4. PCS Phosphate, Inc. – Aurora Siting Analysis and Additional Site Information

Siting Analysis for the Bayview Ferry Site (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

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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 4^{th} daily highest 1-hour maximum concentration (99^{th} 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

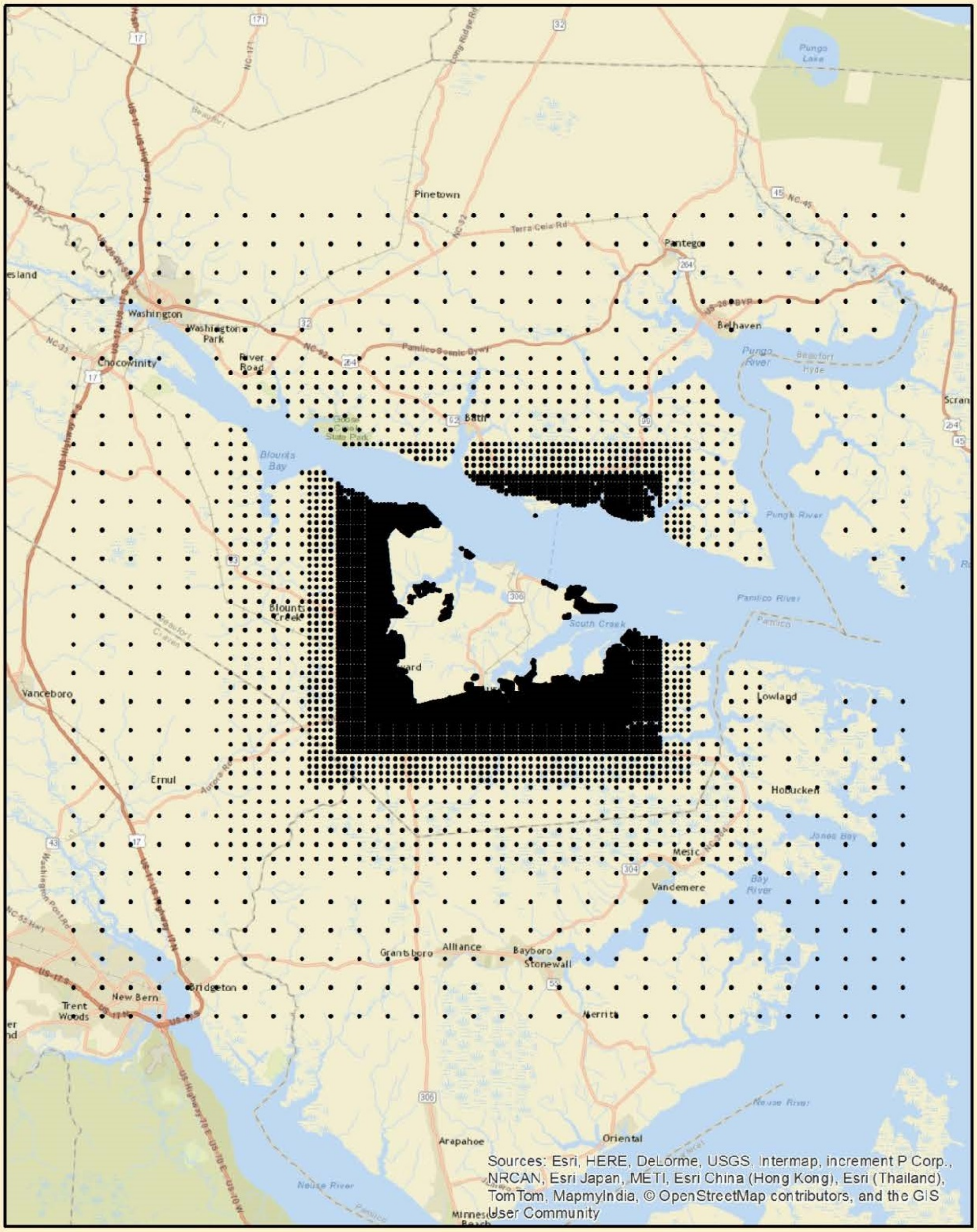


Figure 3-1
PCS Phosphate Inc. - Aurora Facility
SO_2 DRR Full Receptor Grid

AECOM

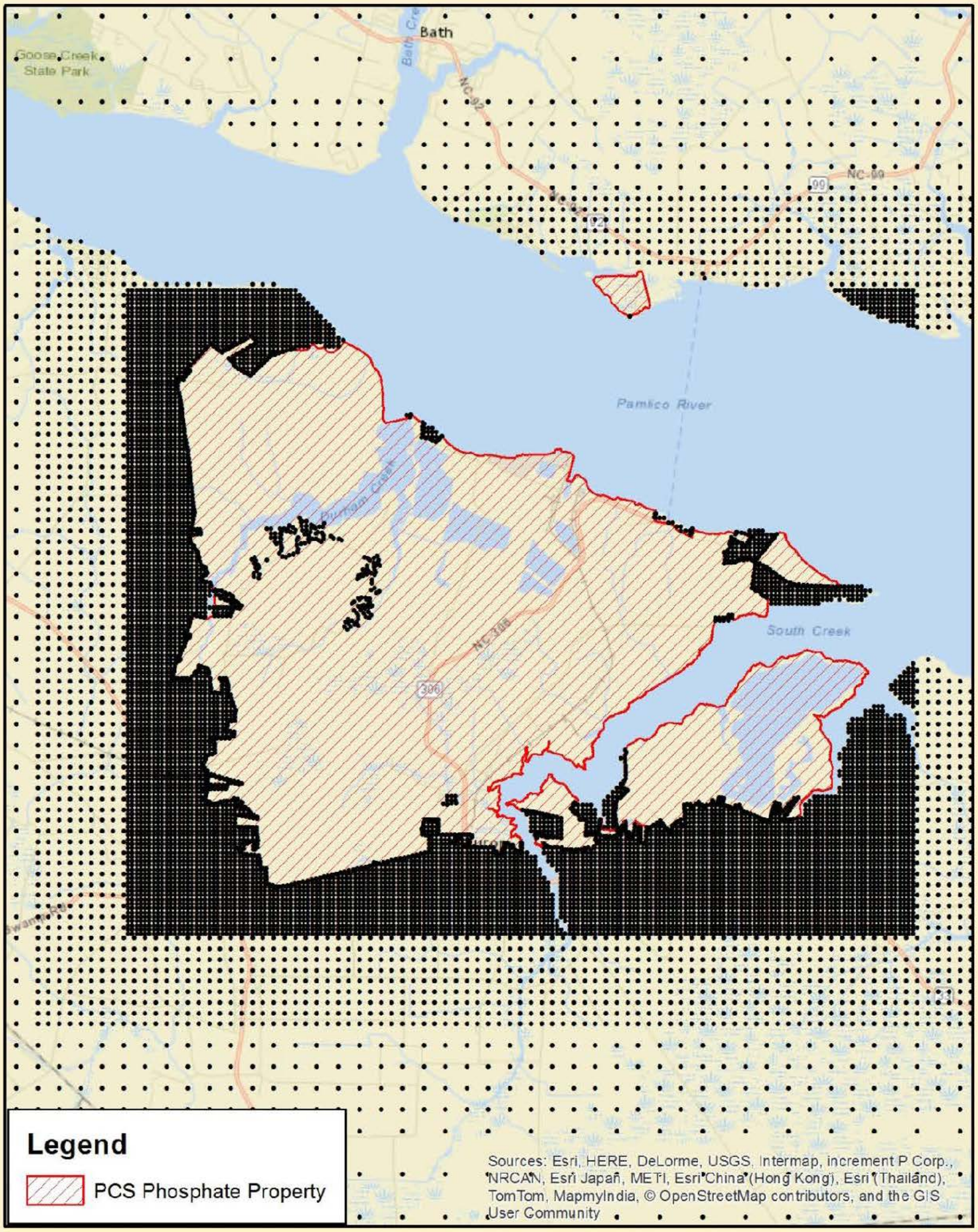


Figure 3-2
PCS Phosphate Inc. - Aurora Facility
SO_2 DRR Near Receptor Grid

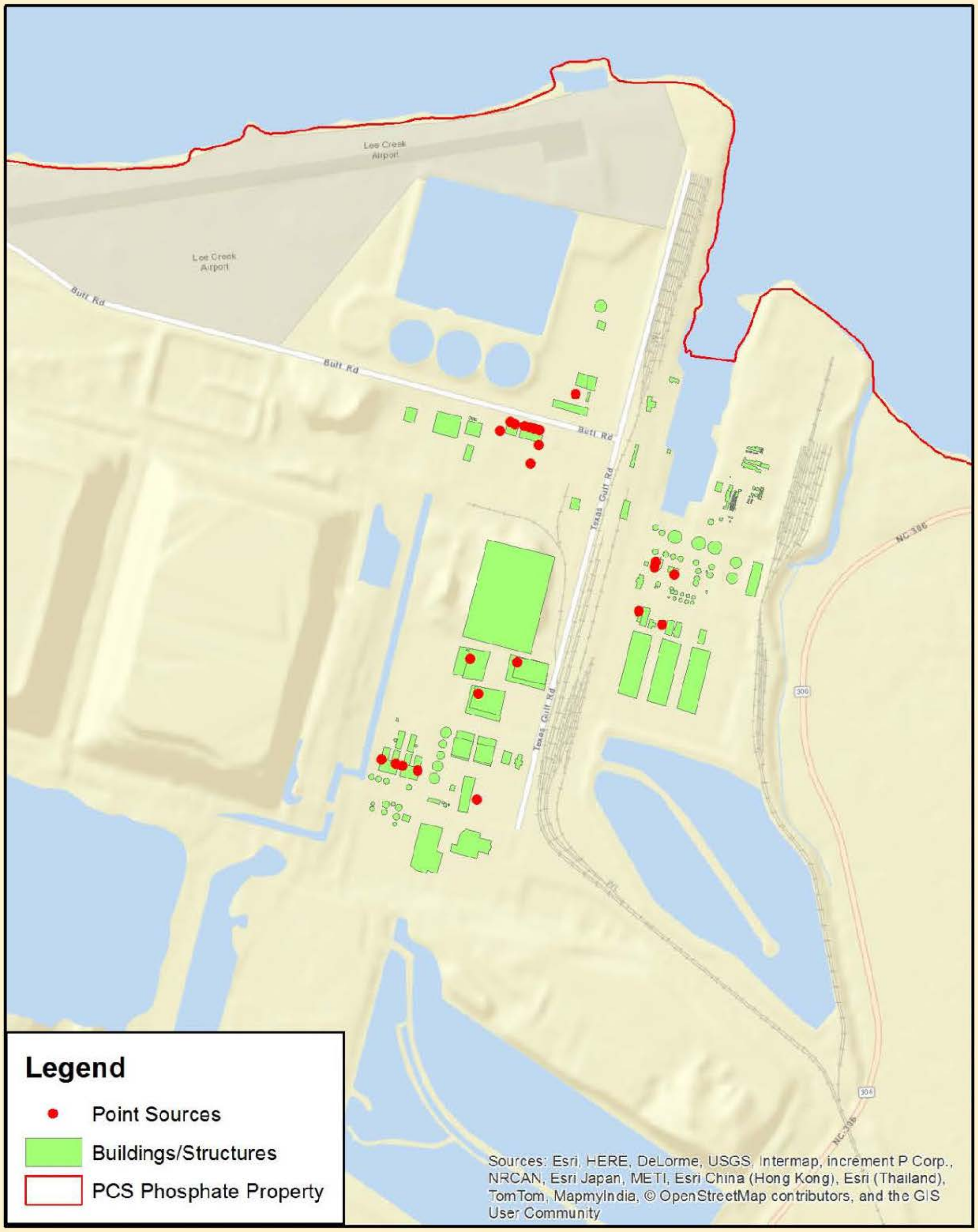


Figure 3-3
PCS Phosphate Inc. - Aurora Facility
Source and Building/Structure Layout

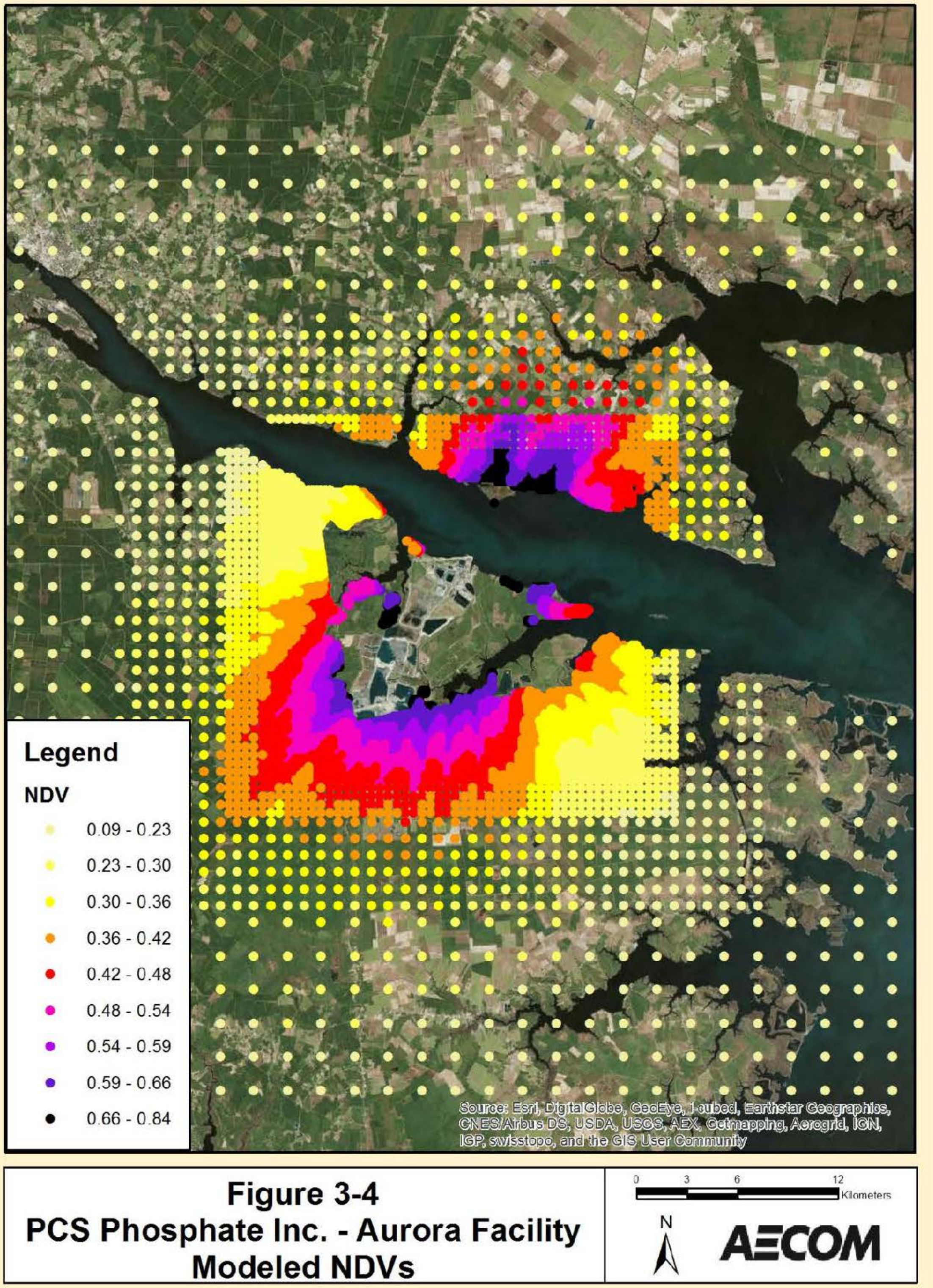


Figure 3-4
PCS Phosphate Inc. - Aurora Facility
Modeled NDVs

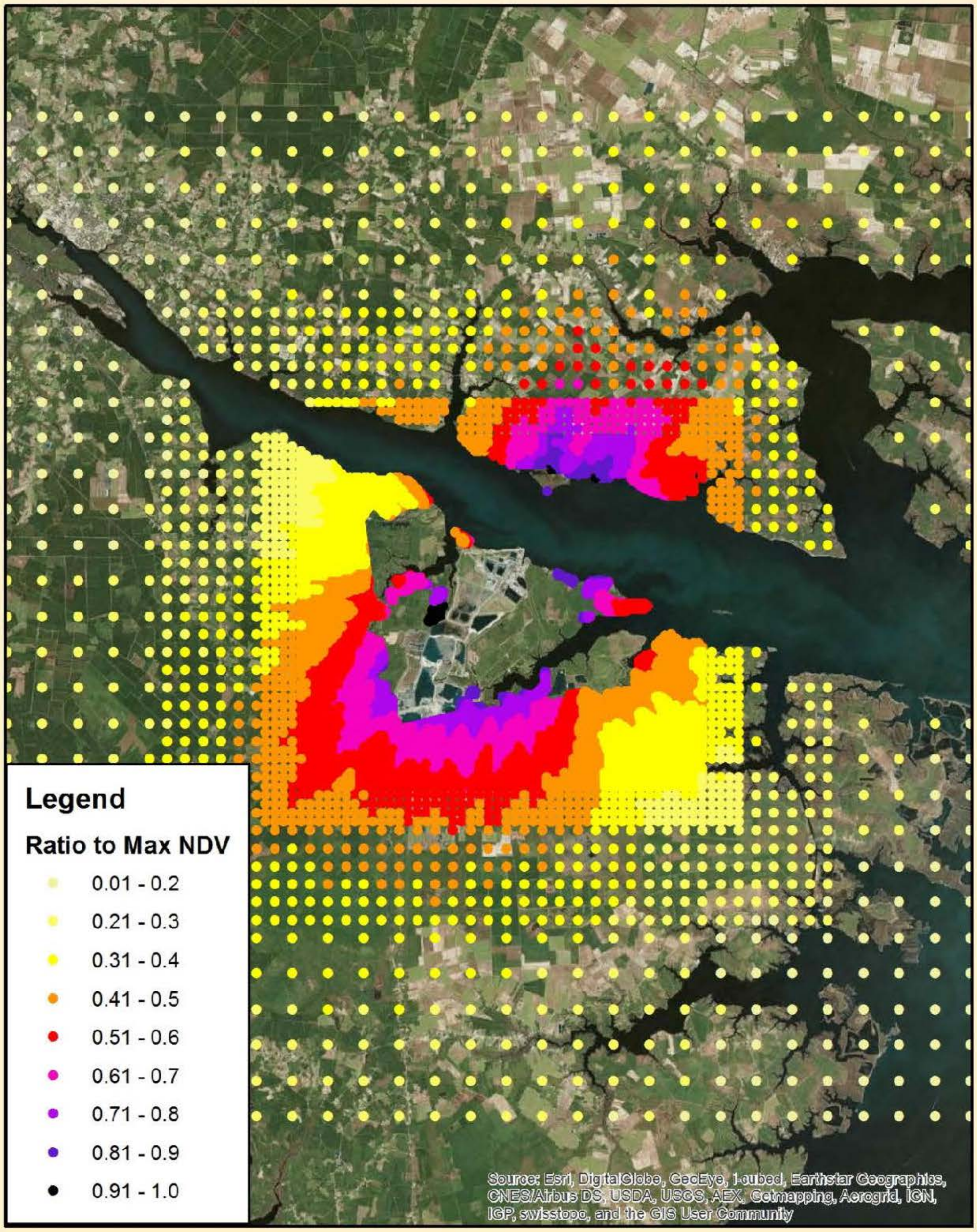


Figure 3-5
PCS Phosphate Inc. - Aurora Facility
Receptor NDV Ratio to Max NDV

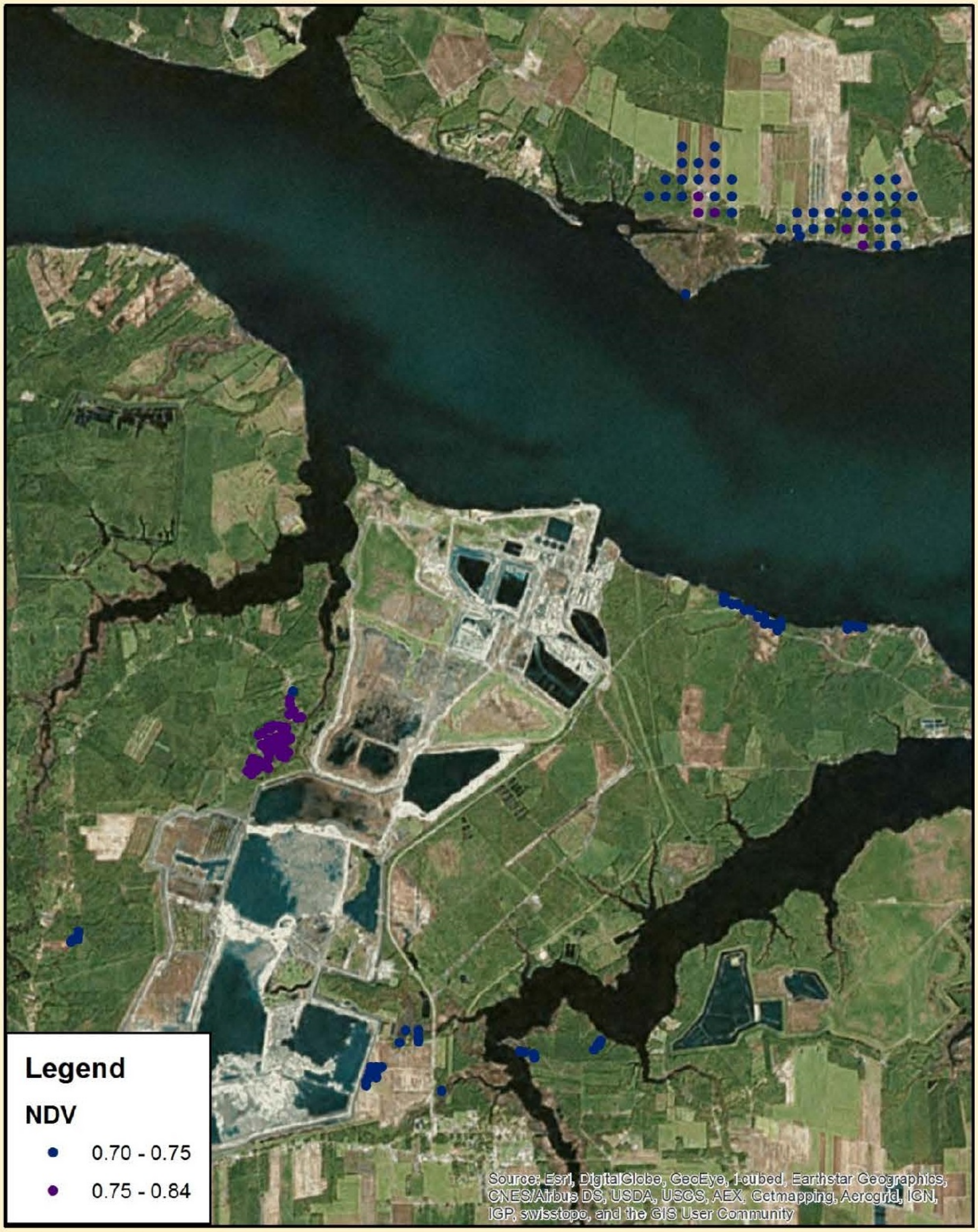


Figure 3-6
PCS Phosphate Inc. - Aurora Facility
Top 200 NDVs

0 0.75 1.5 3
Kilometers
N

Figure 3-7
PCS Phosphate Inc. - Aurora Facility
Top 50 NDVs

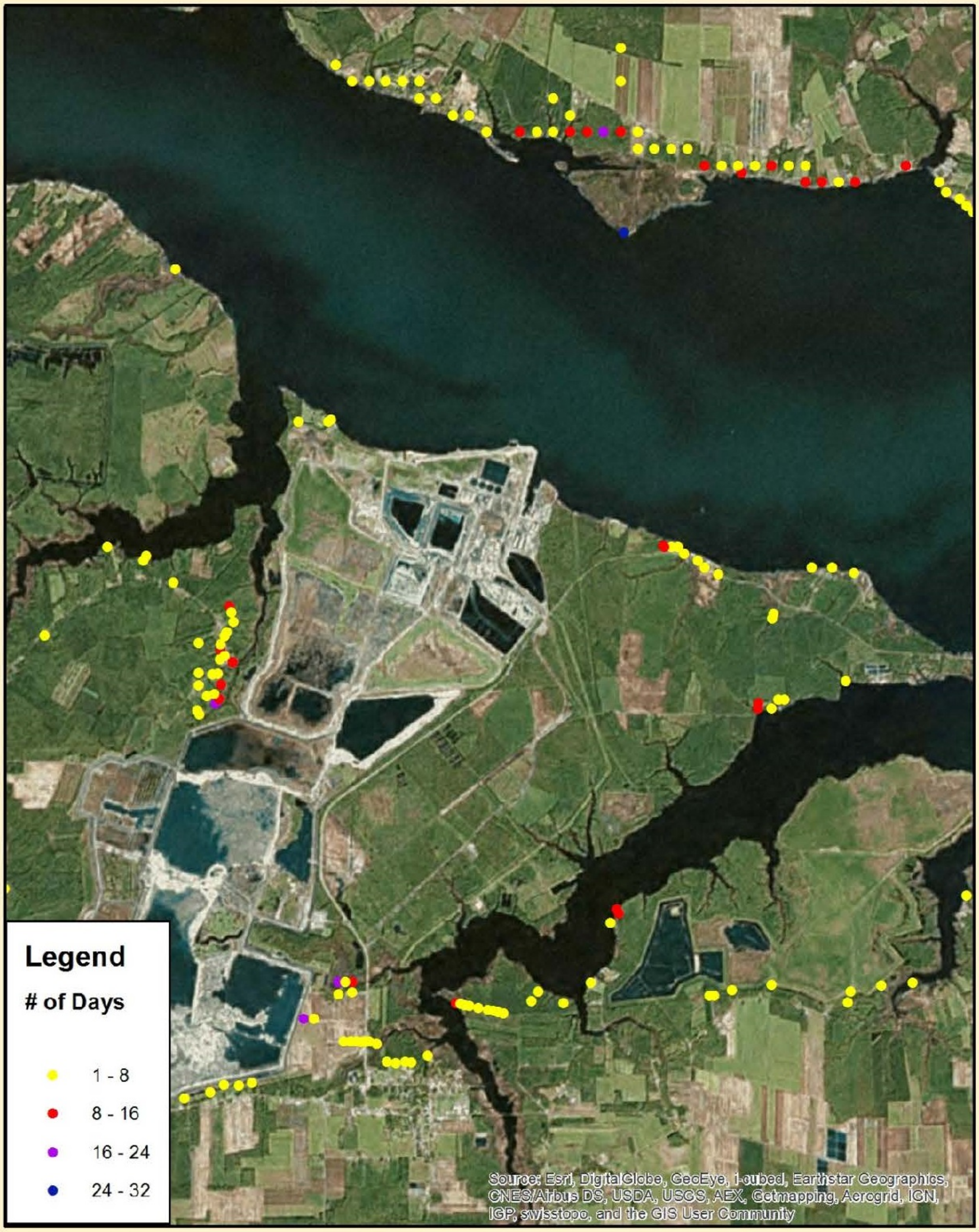


Figure 3-8
PCS Phosphate Inc. - Aurora Facility
Frequency of Daily Maximums

Figure 3-9a
PCS Phosphate Inc. - Aurora Facility
Locations of Top 50 NDVs with Rank

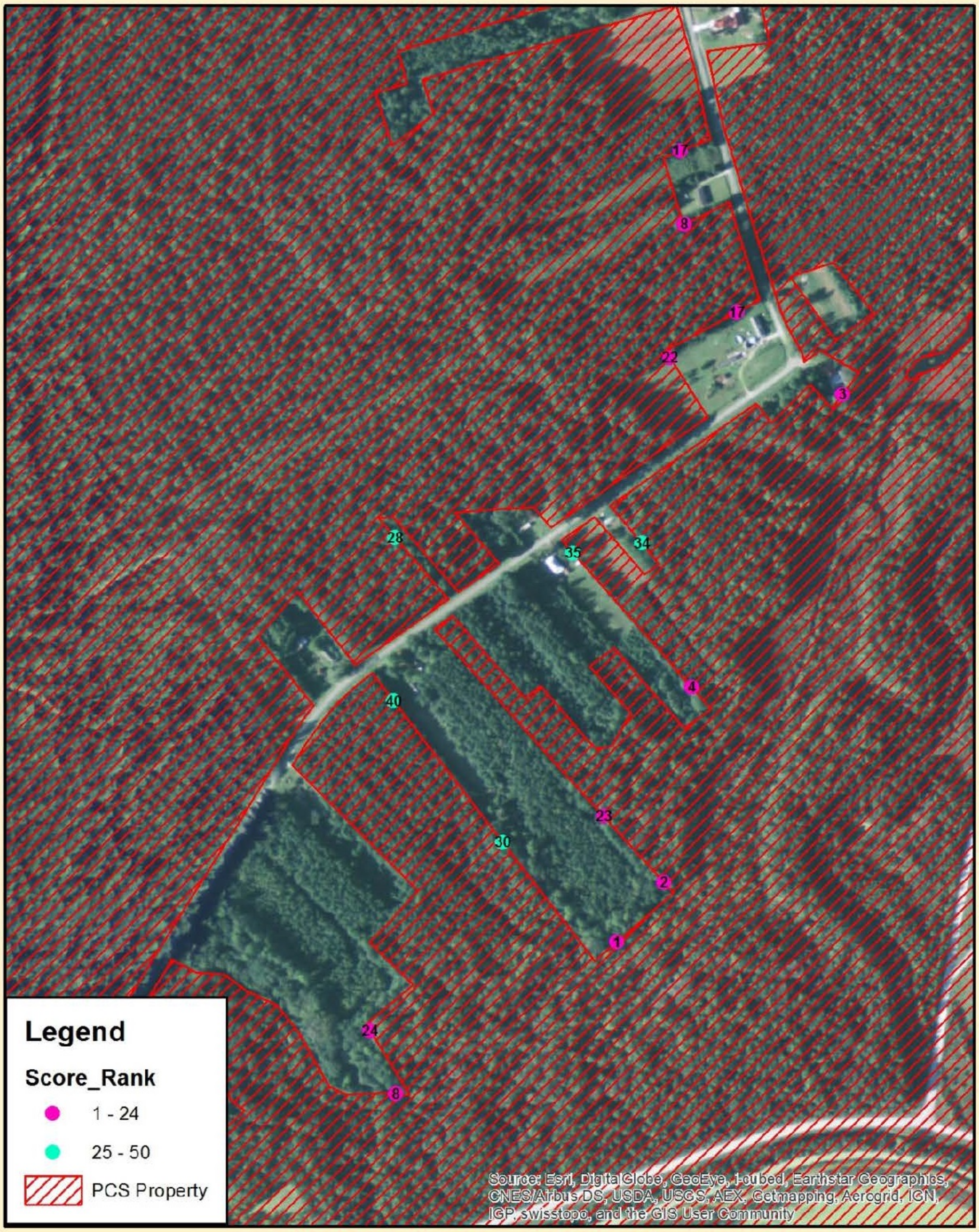


Figure 3-9b (Area 1)
PCS Phosphate Inc. - Aurora Facility
Locations of Top 50 NDVs with Rank

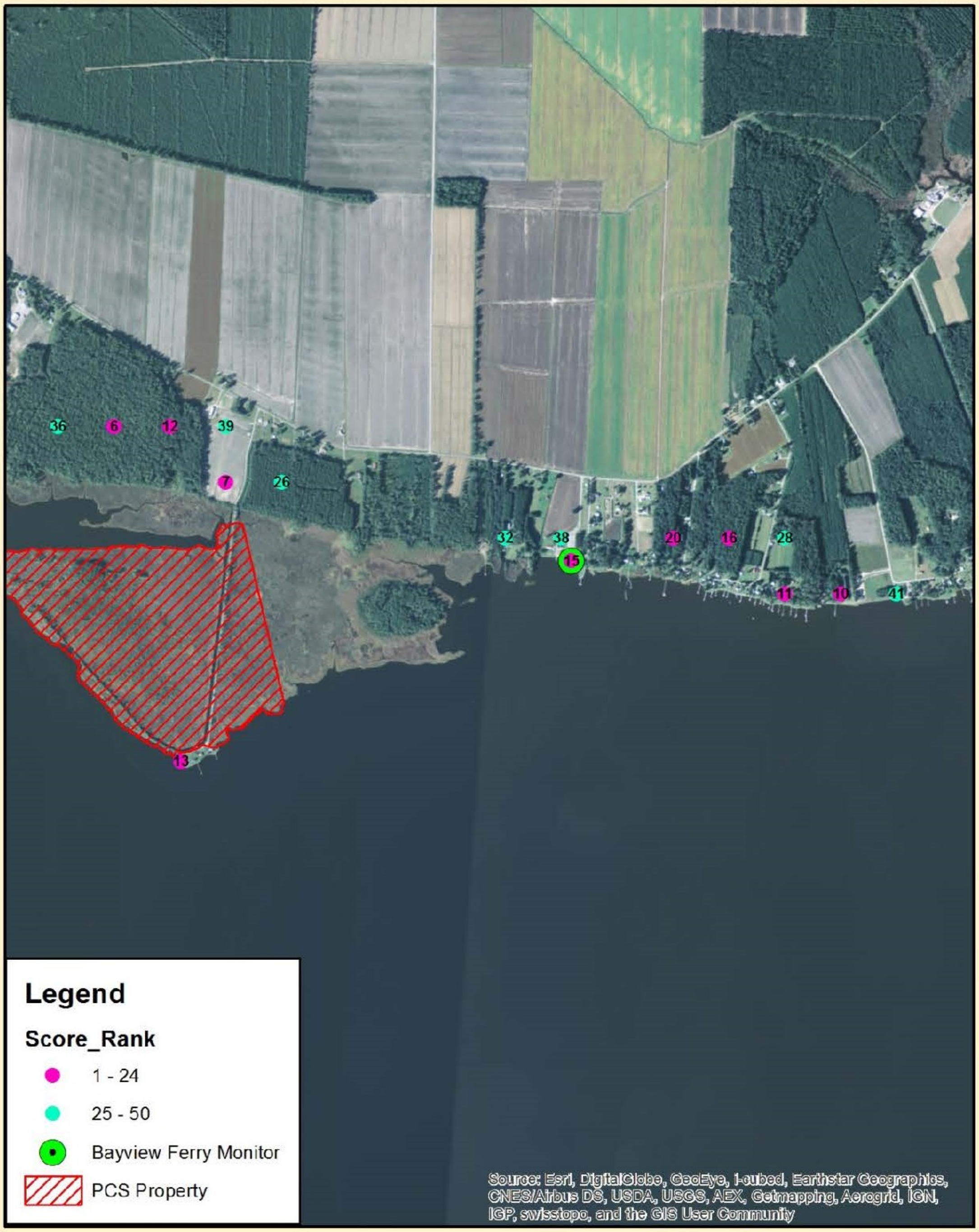


Figure 3-9c (Area 2)
PCS Phosphate Inc. - Aurora Facility
Locations of Top 50 NDVs with Rank

0 0.25 0.5 1 Kilometers

N

AECOM

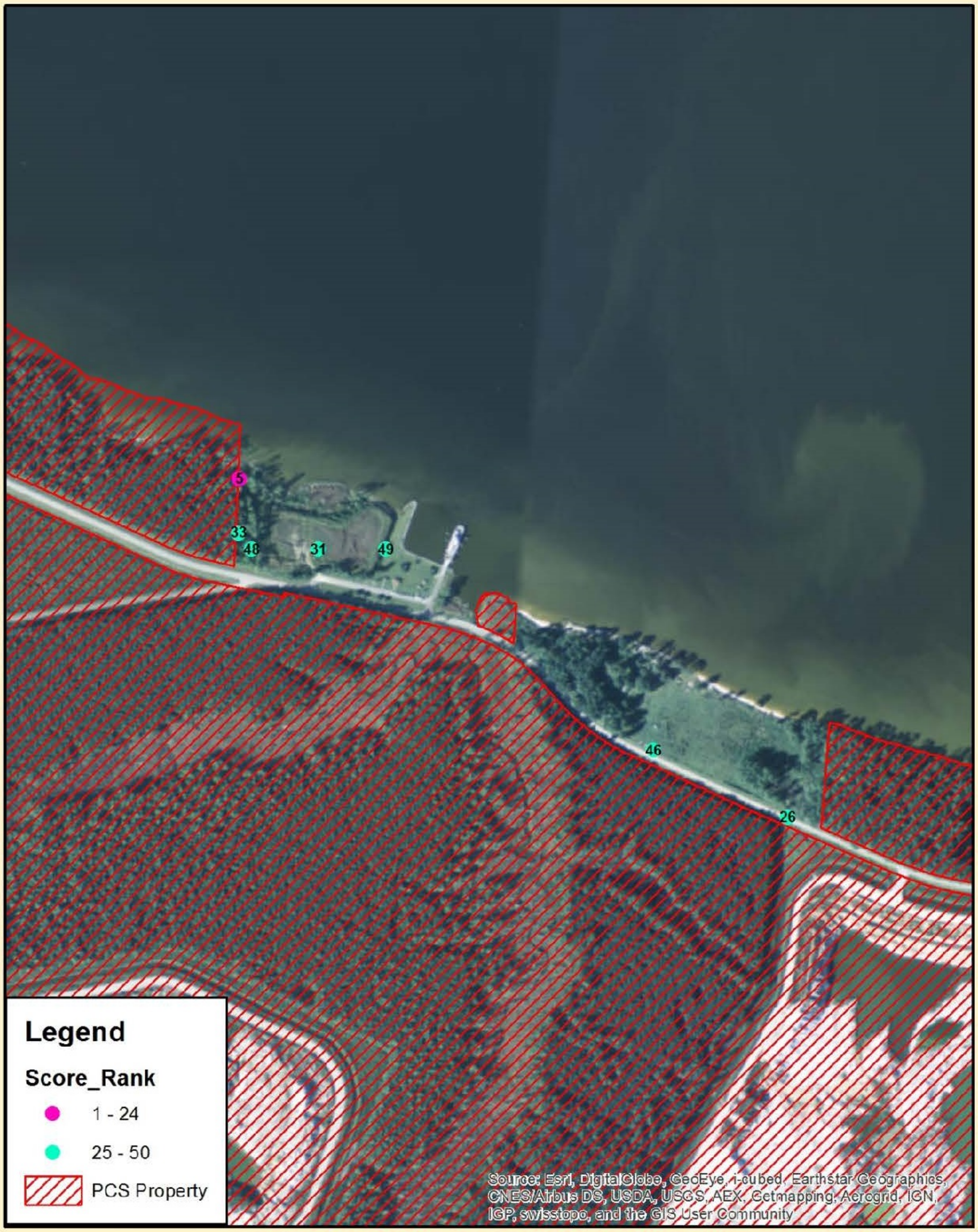
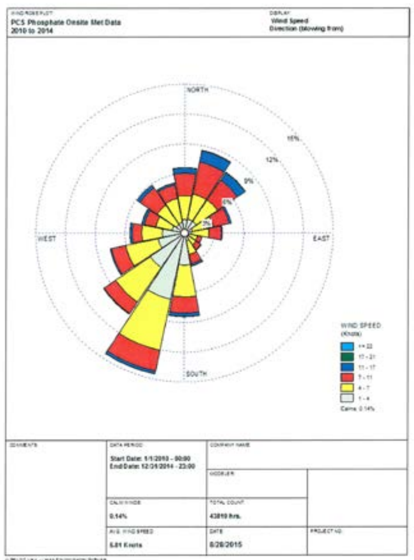


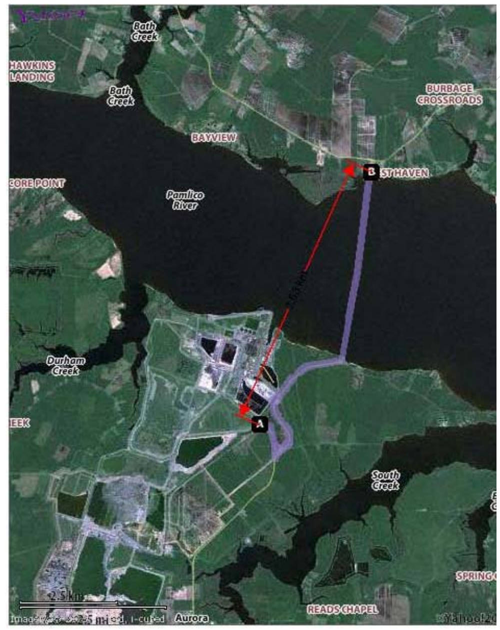
Figure 3-9d (Area 3)
PCS Phosphate Inc. - Aurora Facility
Locations of Top 50 NDVs with Rank

Region 4 Requested Information for Sites (PCS Phosphate -- Aurora)

NOTE: The 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 subsection (4) The Non-MSA Portion of the Washington Monitoring Region of this section.

The onsite wind rose and aerial photo below show the monitor to be directly downwind of the facility.





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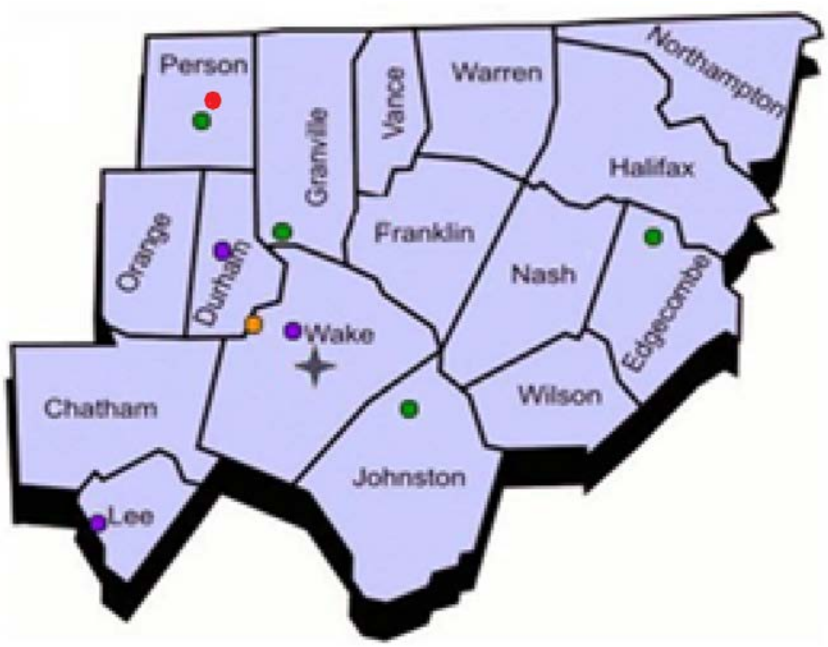
NORTH CAROLINA
Environmental Quality

2018-2019 Annual Monitoring Network Plan for the North Carolina Division Of Air Quality

Volume 2

Site Descriptions by Division of Air Quality Regional Office and Metropolitan Statistical Area

D. The Raleigh Monitoring Region



June 29, 2018

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D. The Raleigh Monitoring Region

The Raleigh monitoring region of North Carolina, shown in Figure D1, consists of six sections: (1) the Durham-Chapel Hill metropolitan statistical area, or MSA, - Chatham, Durham, Orange and Person counties, (2) the northeastern Piedmont - Granville, Halifax, Northampton, Vance and Warren counties, (3) the Raleigh MSA - Franklin, Johnston and Wake counties, (4) the Rocky Mount MSA - Edgecombe and Nash counties, (5) the Wilson micropolitan statistical area - Wilson County and (6) the Sanford micropolitan statistical area - Lee County.

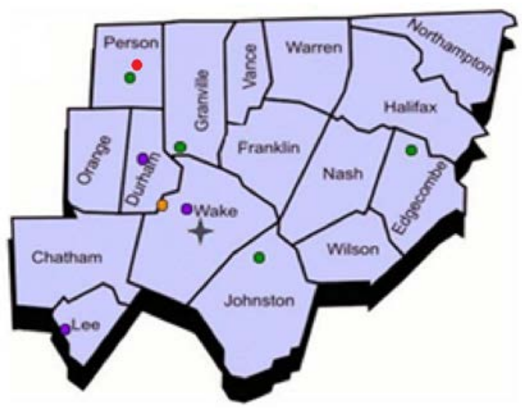

Figure D1. The Raleigh monitoring region
The dots show the approximate locations of most of the monitoring sites in this region.

(1) Durham-Chapel Hill MSA

The Durham-Chapel Hill MSA consists of four counties: Chatham, Durham, Orange and Person. The major metropolitan areas are the cities of Durham and Chapel Hill. The North Carolina Division of Air Quality, or DAQ, currently operates two monitoring sites in the Durham-Chapel Hill MSA. These sites are located at the Durham Armory in the City of Durham in Durham County and Bushy Fork in Person County. Starting on Jan. 1, 2017, DAQ in cooperation with Duke Energy Progress started operating a third site in Semora (Person County). The locations of these monitors are shown in Figure D2. The seasonal ozone monitor in Pittsboro in Chatham County was shut down on Oct. 31, 2015, at the end of ozone season and the rotating sulfur dioxide monitor was shut down on Feb. 4, 2015.

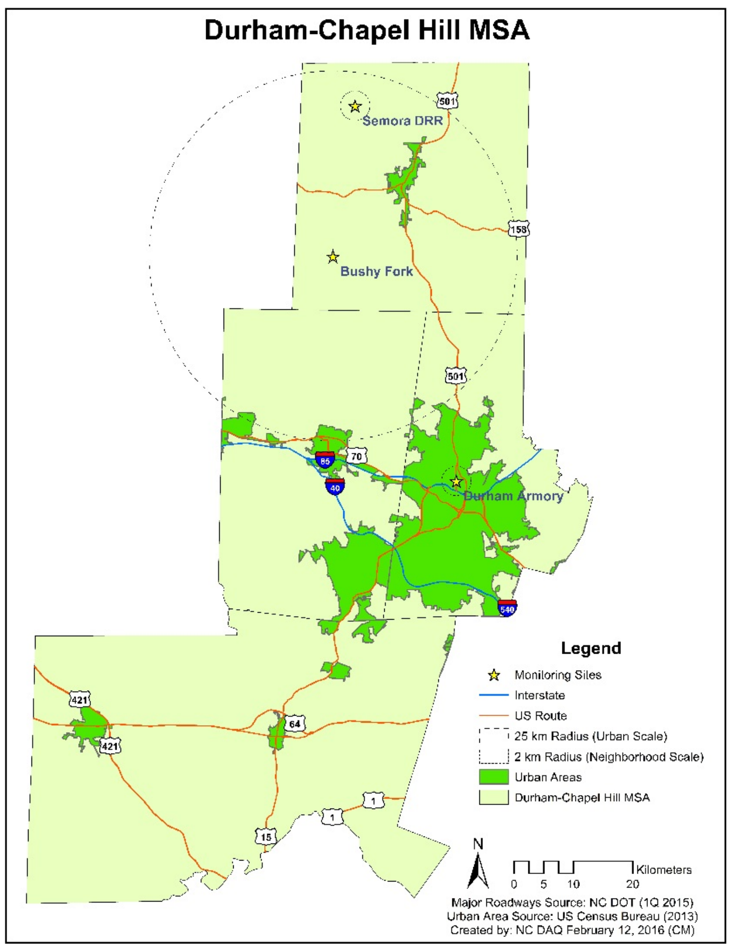

Figure D2. Location of monitors in the Durham-Chapel Hill MSA.

At the Durham Armory site, the DAQ operates a seasonal ozone monitor, a one-in-three-day fine particle FRM monitor, a continuous low volume PM_{10} monitor and a continuous fine particle monitor. The site, as well as views looking north, northeast, east, southeast, south, southwest, west and northwest, is shown in Figure D3 through Figure D11. This fine-particle monitoring site is the design value site for the MSA. On Jan. 1, 2011, the DAQ started operating a low volume PM_{10} monitor at the site to meet minimum PM_{10} monitoring requirements in the Durham-Chapel Hill MSA and to provide $PM_{10\text{-}2.5}$ data. In May 2015, this monitor was changed to a continuous low volume PM_{10} monitor.

Figure D3. The Durham Armory ozone, sulfur dioxide and particle monitoring site

Figure D4. Looking north from the Durham Armory site

Figure D5. Durham Armory site looking northeast

Figure D6. Durham Armory site looking northwest

Figure D7. Looking west from the Durham Armory site

Figure D10. Durham Armory site looking southwest

At the Bushy Fork site, the DAQ operates a seasonal ozone monitor. A special purpose sulfur dioxide monitor operated for 12 months from June 2014 through May 2015 to provide background sulfur dioxide concentrations to support modeling requirements for the sulfur dioxide national ambient air quality standard, NAAQS. Figure D12 through Figure D16 show a picture of the site as well as views looking north, east, south and west.

Figure D8. Looking east from the Durham Armory site

Figure D9. Durham Armory site looking southeast

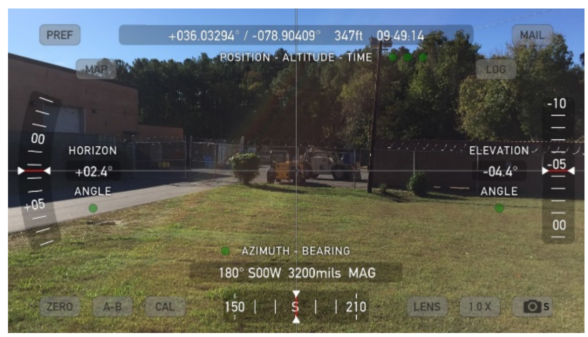

Figure D11 Looking south from the Durham Armory site

Figure 12. Bushy Fork ozone monitoring site

Figure D13. Bushy Fork site looking north

Figure D15. Bushy Fork site looking east

Figure D14. Bushy Fork site looking west

Figure D16. Bushy Fork site looking south

At the Semora DRR site, DAQ operates a source-oriented sulfur dioxide monitor to meet the requirements in the 2010 sulfur dioxide data requirements rule. The monitor will operate for a minimum of three years from 2017 to 2019 to ensure that ambient air in the proximity of the Duke Energy Progress Roxboro plant meets the national ambient air quality standards. An aerial view of the site in relationship to the Roxboro facility as well as views looking north, east, south and west from the location are provided in Figure D17 through Figure D21. Additional details on the site as well as on how the site location was chosen are provided in Appendix D-3. Duke Energy Roxboro Siting Analysis and Additional Site Information.

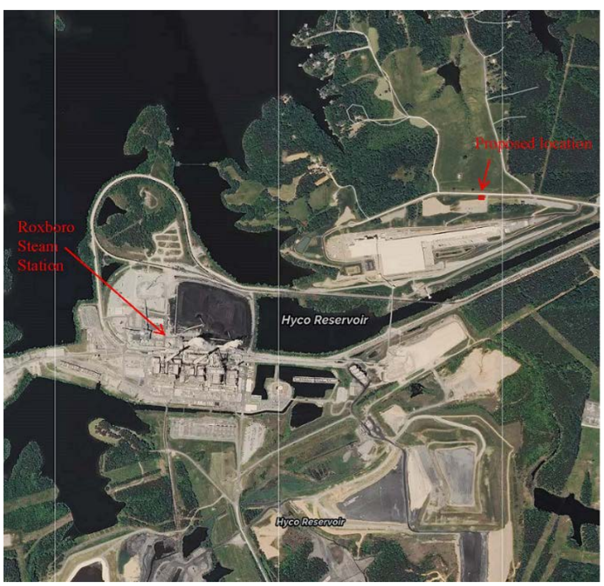

Figure D17. Aerial view showing the location of the Semora DRR monitoring station

Figure D18. Looking north from the Semora DRR monitoring station

Figure D20. Looking west from the Semora DRR site

Figure D19. Looking east from the Semora DRR site

Figure D21. Looking south from the Semora DRR site

In 2008 the United States Environmental Protection Agency, or EPA, expanded the **lead** monitoring network to support the lower lead NAAQS of 0.15 micrograms per cubic meter.[1] On Dec. 27, 2010, the EPA revised the monitoring requirements to focus on fence line monitoring located at facilities that emit 0.5 tons or more of lead per year and at National Core, NCore, monitoring sites.[2] On March 28, 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.[3] These changes to the lead monitoring network requirements did not require any lead monitoring in the Durham-Chapel Hill MSA. The Duke Progress Energy Roxboro electricity generating facility emitted 84.2 pounds of lead in 2016,[4] well below the 0.5-ton threshold. In addition, modeling performed in 2009 indicated the concentrations of lead in ambient air around the facility are less than 0.01 micrograms per cubic meter, which is far enough below the NAAQS that no fence-line monitoring is required for this facility.

Currently, the MSA is required to operate two **ozone** monitors – one at the Durham Armory, 37-063-0015, and one at Bushy Fork, 37-145-0003. Beginning in 2017, seasonal ozone monitoring starts on March 1 instead of April 1. The 2010 **nitrogen dioxide** monitoring requirements,[5] as modified in 2016, [6] do not require the Durham-Chapel Hill MSA to monitor for nitrogen dioxide.

The 2010 **sulfur dioxide monitoring** requirements added additional monitoring in this MSA. Because of power generating facilities located in Person and Chatham counties and a large population base, a population-weighted emission index, PWEI, population exposure monitor was added at the Armory site. Figure D22 shows the location of the PWEI monitor relative to where people lived based on the 2000 census. Figure D23 shows the distribution of sulfur dioxide emissions among the counties in the MSA. The closest permitted source of sulfur dioxide to the Armory site is Carolina Sunrock, located 3.25 kilometers southeast of the site, as shown in Figure D24. Carolina Sunrock reported emitting 2.7 tons of sulfur dioxide in 2016.[7] As mentioned earlier an additional source-oriented sulfur dioxide monitor was added in this MSA on Jan. 1, 2017.

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[1] 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.

[2] 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.

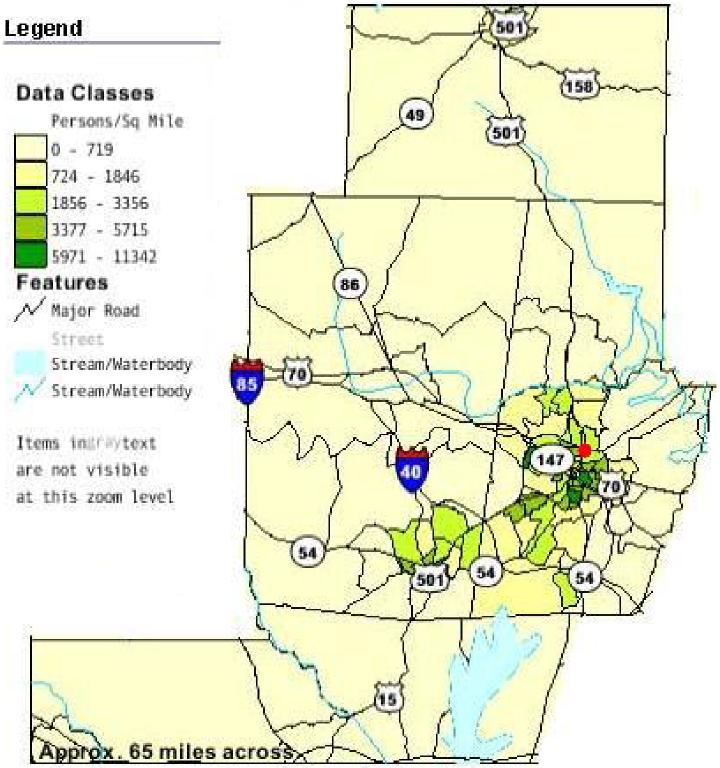
[3] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[4] North Carolina Criteria and Toxic Air Pollutant Point Source Emissions Report, available on the worldwide web at https://xapps.ncdenr.org/aq/ToxicsReport/ToxicsReportFacility.jsp?ibeam=true&county_code=145&year=2016&sorting=3&overridetype=All&pollutant=153, accessed April 20, 2018.

[5] 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.

[6] Revision to the Near-road NO2 Minimum Monitoring Requirements, Federal Register, Vol. 81, No. 251, Dec. 30, 2016, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-12-30/pdf/2016-31645.pdf.

[7] North Carolina Criteria and Toxic Air Pollutant Point Source Emissions Report, available on the worldwide web at https://xapps.ncdenr.org/aq/ToxicsReport/ToxicsReportFacility.jsp?ibeam=true&county_code=063&year=2016&sorting=3&overridetype=All&pollutant=264, accessed April 20, 2018.



Source: U.S. Census Bureau, Census 2000 Summary File 1, Matrix P1.

Figure D22. Location of Durham-Chapel Hill PWEI monitor in relationship to centers of population in 2000

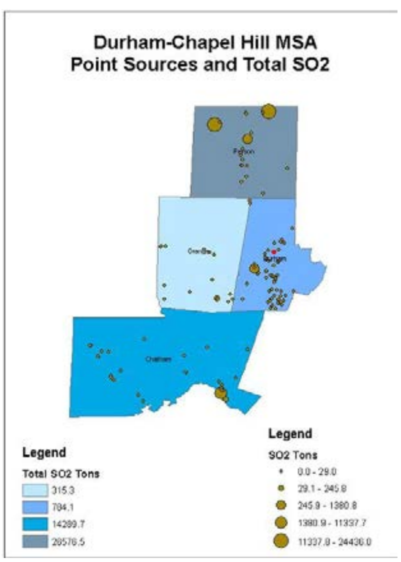


Figure D23. Location of the Durham-Chapel Hill PWEI sulfur dioxide monitor, red dot, in relationship to sulfur dioxide sources

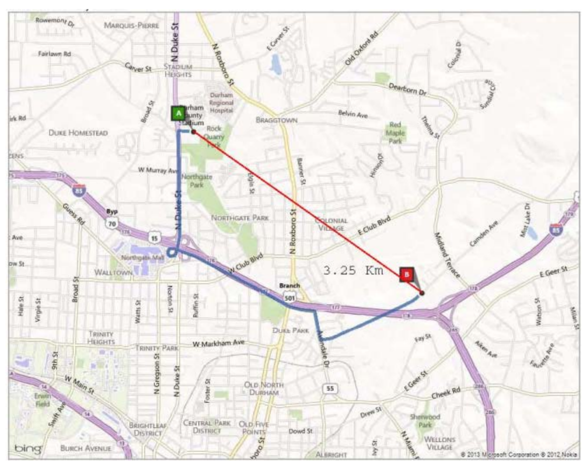


Figure D24. Location of the Armory monitoring site, A, in relationship to Carolina Sunrock, B

Changes to the **carbon monoxide monitoring** requirements did not add additional monitoring to this MSA because the population is less than one million.

(2) The Northeastern Piedmont

The northeastern Piedmont consists of five counties: Granville, Halifax, Northampton, Vance and Warren. There is not an MSA in these counties; however, Henderson micropolitan statistical area is in Vance County and the Roanoke Rapids micropolitan statistical area consists of Halifax and Northampton counties. The DAQ currently operates one monitoring site in the northeastern piedmont. This site is located at Butner (Granville County). The location of this monitoring site is shown in Figure D25.

Figure D25. Location of the Butner monitoring site

A is the Butner ozone monitoring site. The circle around the site approximates the urban scale (4 to 50 Km).

At the **Butner** site, 37-077-0001, the DAQ operates a seasonal ozone monitor. A picture of the site as well as views looking north, east, south and west are provided in Figure D26 through Figure D34. The Butner site was established as the downwind site for the Durham-Chapel Hill MSA when the wind is from the primary direction during the season of highest ozone concentrations.

Figure D26. The Butner ozone monitoring site

Figure D27. Looking north from the Butner site

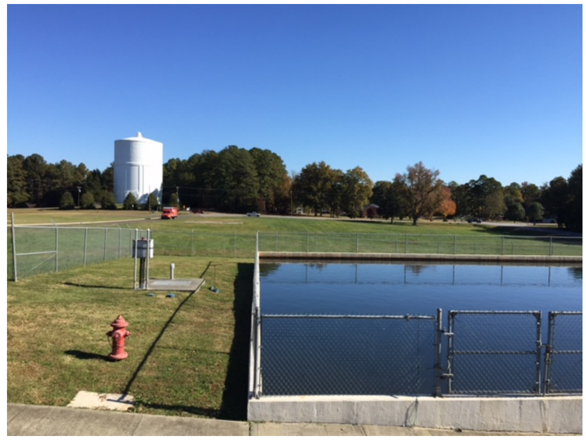


Figure D30. Looking northeast from the Butner site

Figure D28. Looking northwest from the Butner site

Figure D31. Looking east from the Butner site

Figure D29. Looking west from the Butner site

Figure D32. Looking southeast from the Butner site

Figure D33. Looking southwest from the Butner site

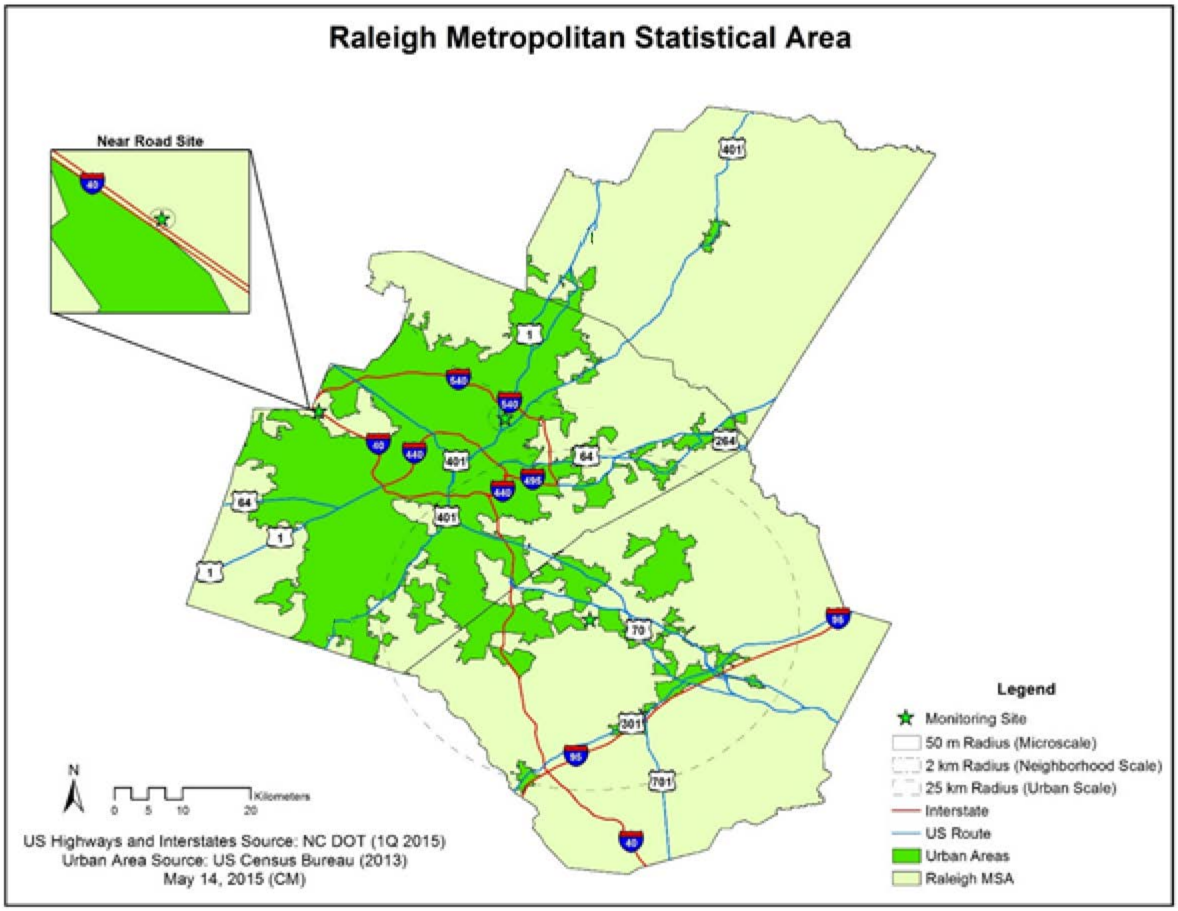
Figure D34. Looking south from the Butner site

This area was not required to add any lead monitors because of the 2010 changes made to the **lead monitoring** requirements. There are no facilities here that emit 0.5 ton or more of lead per year.

The 2015 **ozone monitoring** requirements did not require additional monitoring in the northeastern Piedmont. The area does not have any MSAs that are required by 40 CFR 58 Appendix D to conduct population exposure monitoring in urban areas. The northeastern Piedmont did not add monitors to comply with the 2010 **nitrogen dioxide** monitoring requirements because it does not have any roads exceeding the traffic threshold and does not have any MSAs that trigger nitrogen dioxide monitoring requirements. The northeastern piedmont also did not add sulfur dioxide monitors to comply with the 2010 **sulfur dioxide monitoring** requirements because there are no large sources of sulfur dioxide in this area. This area also does not need to do carbon monoxide monitoring to comply with the changes to the **carbon monoxide monitoring** requirements because the population is under one million.

(3) The Raleigh MSA

As shown in Figure D35, the Raleigh MSA consists of three counties: Franklin, Johnston and Wake. The major metropolitan areas include Raleigh and Cary. The DAQ currently operates three monitoring sites in the Raleigh MSA. These sites are located at West Johnston in Johnston County and Millbrook and Triple Oak in Wake County. The ozone monitors at Franklinton and Fuquay were shut down on Oct. 31, 2015.



Millbrook multipollutant site, center, neighborhood scale; Triple Oak near-road site, furthest west, micro scale; and West Johnston ozone and particle monitors, furthest east, urban scale.

Figure D35. Monitoring sites located in the Raleigh MSA.

At the **West Johnston** site, 37-101-0002, the DAQ operates a seasonal ozone monitor and a continuous fine particle monitor. The West Johnston ozone site was established as the upwind site for the Raleigh MSA when the wind is from the secondary direction during the season of highest ozone concentrations. This site is one of two ozone-monitoring sites in the MSA. 40 Code of Federal Regulations, CFR, 58 Appendix D requires the Raleigh MSA to have two ozone monitoring sites. The West Johnston fine particle site is the third fine particle monitoring site in the MSA. The Raleigh MSA has a population over one million people and is currently required, based on its design value, to have two fine particle monitors. The DAQ added a continuous fine particle monitor at the site in 2016 that replaced the FRM monitor at the end of 2017. A picture of the site and views looking north, east, south and west are provided in Figure D36 through Figure D40.

Figure D36. The West Johnston ozone and fine particle monitoring site

Figure D37. Looking North from the West Johnston Site

Figure D38. Looking east from the West Johnston site


Figure D39. Looking West from the West Johnston Site


Figure D40. Looking south from the West Johnston site

At the **Millbrook** site, 37-183-0014, the DAQ operates year-round ozone, one-in-three-day fine particle FRM, one-in-three-day manual SASS and URG fine particle speciation, continuous BAM fine particle, continuous PM_{10} and $PM_{10\text{-}2.5}$, nitrogen dioxide and trace-level sulfur dioxide, carbon monoxide and reactive oxide of nitrogen monitors. The manual 1-in-3-day PM_{10} and $PM_{10\text{-}2.5}$ monitors, as well as the collocated one-in-six-day PM_{10} monitor, ended in 2017 after a continuous PM_{10} and $PM_{10\text{-}2.5}$ monitor was installed at the site. The DAQ also started evaluating a Teledyne D640X $PM_{10\text{-}2.5}$ monitor at Millbrook in April 2017. The DAQ also operates continuous fine particle monitors for sulfate, nitrate and black carbon and a meteorological station at this site. A picture of the site as well as views looking north, northeast, east, southeast, south, southwest, west and northwest are provided in Figure D41 through Figure D49. The Millbrook site is an NCORE, National Community Representative, site so the probe for the reactive oxide of nitrogen monitor at this site was installed on a 10-meter tower in late 2010. Dec. 27, 2011, the DAQ began analyzing the low volume PM_{10} filters for lead on a one-in-six-day schedule to meet the 2010 monitoring requirements for lead monitoring at NCore sites. This lead monitoring ended on April 30, 2016. In 2013 the DAQ added a carbonyl sampler to the site to support a shale gas development background monitoring study in Lee County. The DAQ has monitored for VOCs at Millbrook since July 14, 2004, on a 1-in-6-day schedule.

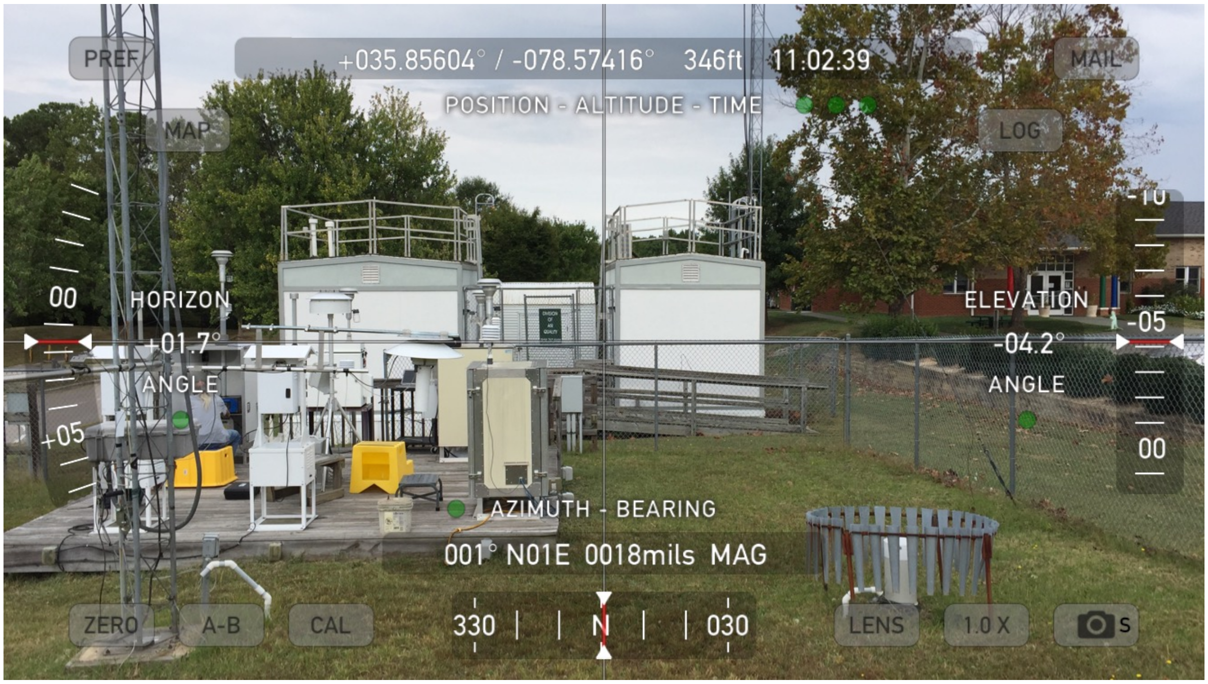


Figure D41. Millbrook NCore monitoring site

Figure D42. Looking north from the Millbrook site

Figure D43. Looking northwest from the Millbrook site

Figure D44. Looking northeast from the Millbrook site

Figure D45. Looking east from the Millbrook site

Figure D46. Looking west from the Millbrook site

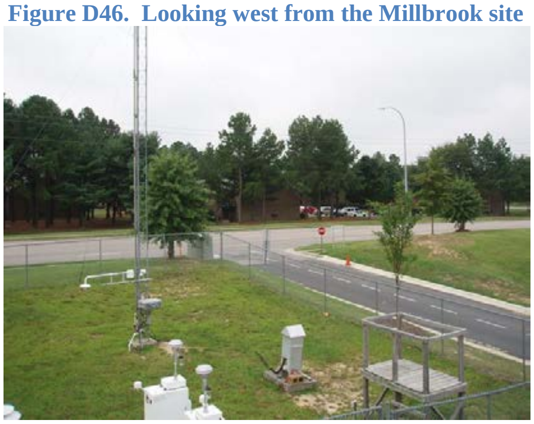


Figure D47. Looking southwest from the Millbrook site


Figure D48. Looking southeast from the Millbrook site

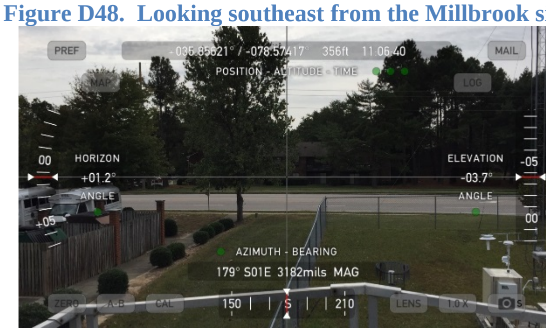


Figure D49. Looking south from the Millbrook site

At the **Triple Oak** site, 37-183-0021, the DAQ operates a near road nitrogen dioxide monitor with a photolytic convertor, trace-level carbon monoxide and continuous fine particle monitors. The nitrogen dioxide monitor started operating on Jan. 8, 2014. The carbon monoxide monitor started operating on Dec. 6, 2016, and the fine particle monitor started operating in 2017. A picture of the site as well as views looking north, east, south and west are provided in Figure D50 through Figure D54.

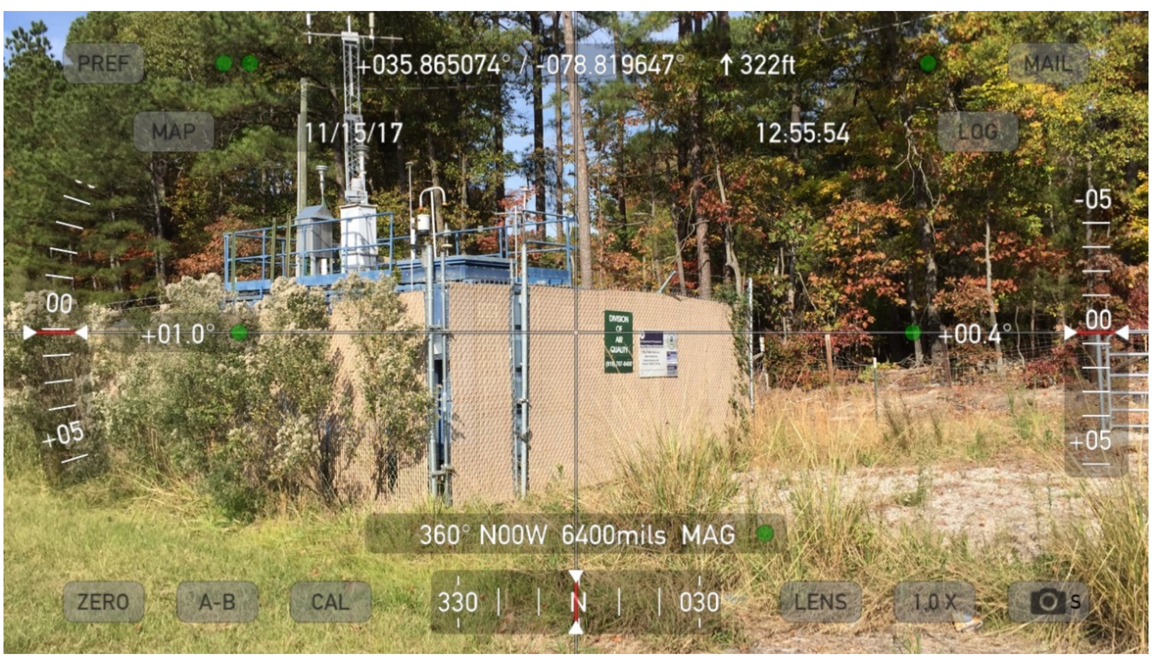


Figure D50. The Triple Oak near road nitrogen dioxide monitoring site, 37-183-0021

Figure D51. Looking north from the Triple Oak site

Figure D53. Looking east from the Triple Oak site

Figure D52. Looking west from the Triple Oak site

Figure D54. Looking south from the Triple Oak site

To comply with the December 2010 changes to the **lead monitoring** requirements,[8] the DAQ began lead monitoring at the Raleigh Millbrook NCore site on Dec. 27, 2011, using the low-volume PM_{10} monitor already at the site. This lead monitoring ended on April 30, 2016, when new monitoring regulations became effective.[9] The Raleigh MSA does not have any permitted facilities located within its bounds that emit 0.5 ton or more per year of lead so no other lead monitoring is required.

Changes to the **ozone monitoring** requirements in 2015 did not require additional monitoring in the Raleigh MSA. The MSA currently meets the minimum number of monitors required by 40 CFR 58 Appendix D for population exposure monitoring in urban areas. Seasonal ozone monitoring starts on March 1 instead of April 1 starting in 2017.

Due to the 2010 **nitrogen dioxide** monitoring requirements, DAQ added two nitrogen dioxide monitors to the Raleigh MSA. Because its population exceeds the 1,000,000-threshold, it was required to have a near road monitor starting Jan. 1, 2014. The near road monitoring station was placed on the west bound side of I-40 between Exit 283 and 284. This location was approved by the EPA in 2012. The Raleigh MSA has over one million people so it is also required to have a community or area-wide monitor. This monitor is located at the Raleigh Millbrook NCore monitoring site. The monitor was scheduled to start operating on Jan. 1, 2013. The DAQ asked for permission to delay installing the monitor so that a photolytic nitrogen dioxide monitor could be installed at the site. The photolytic nitrogen dioxide monitor is more selective for nitrogen dioxide but because it was approved as an equivalent method in

[8] Revisions to the Lead Ambient Air Monitoring Requirements, Federal Register, Vol. 75, No. 247, Monday, Dec. 27, 2010, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2010-12-27/pdf/2010-32153.pdf#page=1.
[9] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

2012 the DAQ could not purchase it and have it up and operational by the Jan. 1, 2013, scheduled start date. The DAQ began monitoring for nitrogen dioxide at Millbrook on Dec. 10, 2013.

The 2010 **sulfur dioxide monitoring** requirements did not require additional sulfur dioxide monitors in the Raleigh MSA because there are no large sources of sulfur dioxide in the MSA. This MSA was required to add a carbon monoxide monitor to comply with the changes to the **carbon monoxide monitoring** requirements. Near road carbon dioxide monitoring is required in MSAs greater than one million people starting Jan. 1, 2017. On Jan. 1, 2017, the DAQ was also required to add a fine particle monitor at the Triple Oak near road monitoring site.

(4) Rocky Mount MSA

The Rocky Mount MSA consists of two counties: Edgecombe and Nash. The major metropolitan area is the City of Rocky Mount. The DAQ currently operates one monitoring site in the Rocky Mount MSA, located in Edgecombe County at Leggett as shown in Figure D55.

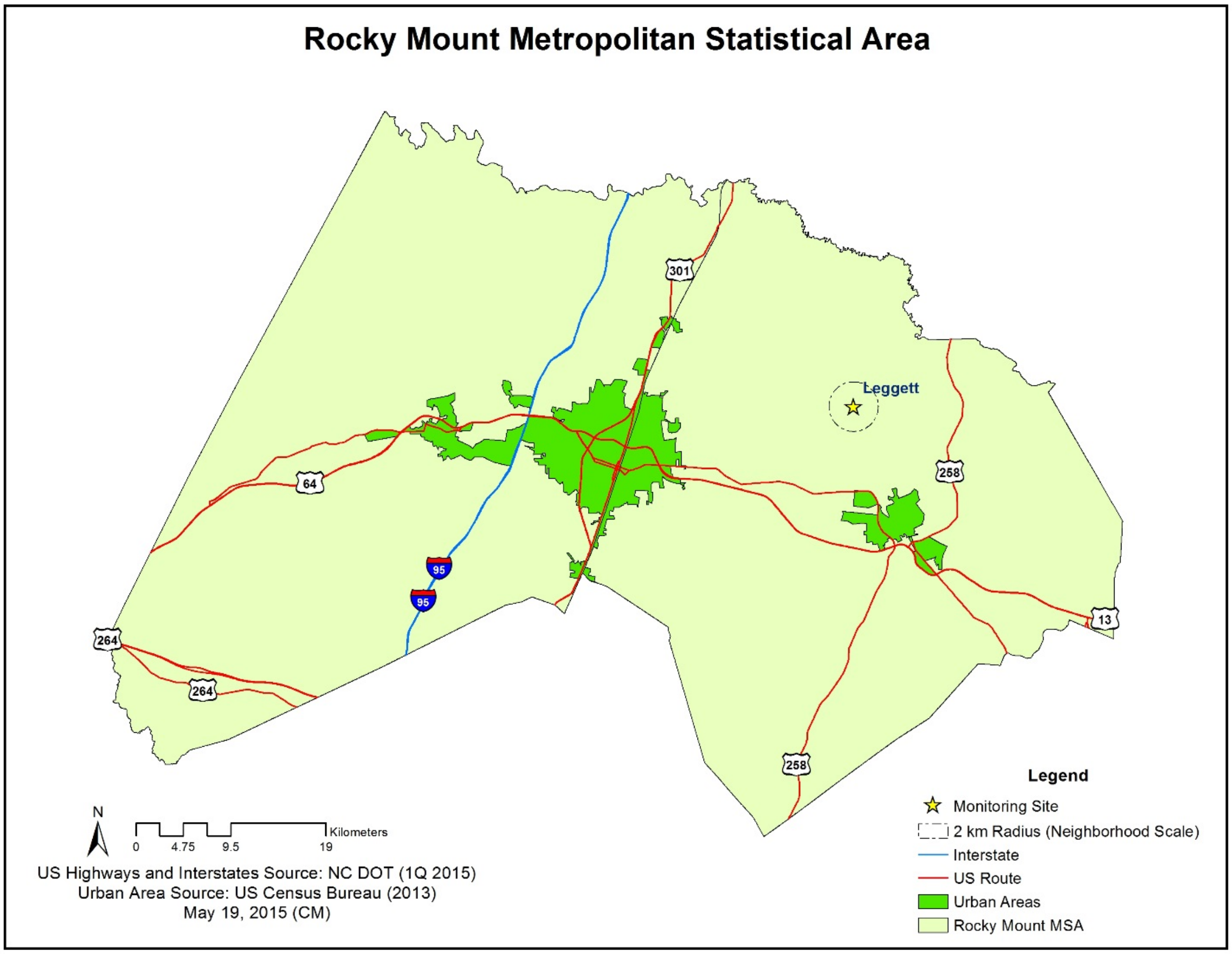


Figure D55. Monitoring site location in the Rocky Mount MSA

At the **Leggett** site, the DAQ operates a seasonal ozone monitor and a non-regulatory continuous fine particle monitor. The ozone monitor is required for the MSA. In April 2011, the DAQ added a continuous fine particle monitor to the site to enable real time fine particle air quality index reporting and fine particle forecasting. Figure D56 through Figure D64 show the site as well as views looking north, northeast, east, southeast, south, southwest, west and northwest.

Figure D56. Leggett seasonal ozone and air quality index fine particle monitoring site

Figure D57. Looking north from the Leggett site

Figure D58. Looking northeast from the Leggett site

Figure D59. Looking northwest from the Leggett site

Figure D60. Looking west from the Leggett site

Figure D61. Looking southwest from the Leggett site

Figure D62. Looking east from the Leggett site

Figure D63. Looking southeast from the Leggett site

Figure D64. Looking south from the Leggett site

Changes made to the **lead monitoring** requirements in December 2010 did not require additional monitoring in the Rocky Mount MSA. The MSA does not have any permitted facilities located within its bounds that emit 0.5 tons or more of lead per year. [10]

2015 changes to the **ozone monitoring requirements** did not require additional monitoring in the Rocky Mount MSA. The MSA already has the minimum number of monitors required by 40 CFR 58 Appendix

[10] Data obtained from the DAQ emission inventory database available on the worldwide web at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&year=2015&physical=byCounty&overridetype=All&toxics=153&sortorder=103, accessed April 26, 2017.

D for population exposure monitoring in urban areas. Starting in 2017, the seasonal ozone monitor begins a month earlier on March 1 instead of April 1.

The 2010 **nitrogen dioxide monitoring** requirements did not add any monitors to the Rocky Mount MSA because its population is less than 500,000. Additional monitors will also not be needed to meet the 2010 sulfur dioxide monitoring requirements because there are no large sources of sulfur dioxide in the MSA. This area will also not need any carbon monoxide monitors due to the changes to the **carbon monoxide monitoring** requirements because the population is under one million.

(5) The Wilson Micropolitan Statistical Area

The Wilson Micropolitan Statistical Area consists of Wilson County. There currently is no Metropolitan Statistical Area in Wilson County; however, the Wilson Micropolitan Statistical Area is located here. The Wilson area is growing. It is the 336th fastest growing municipality in North Carolina, growing at a rate of 0.5 percent.[11] It may someday, possibly around 2030, be large enough to become an MSA. The DAQ currently does not operate any monitoring sites in the Wilson Micropolitan Statistical Area.

The Wilson Micropolitan Statistical Area was impacted by changes made to the **lead monitoring** requirements in December 2010 because it had a permitted facility located within its bounds that emitted more than 0.5 tons per year of lead.[12] Saint-Gobain Containers, LLC, reported 2009 lead emissions of 0.84 tons. The DAQ requested and received a waiver for Saint-Gobain based on the results of modeling. Model results indicate the maximum ambient lead concentration in the ambient air at and beyond the fence line is 0.015 micrograms per cubic meter, well below the 0.075 micrograms per cubic meter or 50 percent of the NAAQS threshold for monitoring. The EPA renewed the waiver in 2015 based on 2011 National Emission Inventory emissions of 0.53 tons of lead. The waiver is good until 2020.[13] In 2016 Ardagh Glass, the former Saint Gobain Containers, reported 478.1 pounds of lead emissions.[14]

Changes to the **ozone monitoring** requirements in 2015 did not require additional monitoring in the Wilson Micropolitan Statistical Area. Until it becomes an MSA, it does not have to meet population exposure monitoring requirements for urban areas. The Wilson Micropolitan Statistical Area was not reclassified as an MSA in February 2013 when the MSA classifications were revised. The next scheduled revision for MSA classifications is in 2023; however, sometimes the Office of Management and Budget adjusts classifications between the scheduled revisions. Currently, the Wilson municipality is six hundred people short of being classified as a metropolitan statistical area.

[11] North Carolina Office of State Budget and Management, Municipal Growth, April 1, 2010 to July 1, 2016, last updated Sept. 25, 2017, available on the worldwide web at https://files.nc.gov/ncosbm/demog/municipalfastgrowth_2016.html, accessed April 23, 2018.
[12] Data obtained from the DAQ emission inventory database available on the worldwide web at https://xapps.ncdenr.org/aq/ToxicsReport/ToxicsReportFacility.jsp?ibeam=true&county_code=195&year=2009&sorting=103&overridetype=All&pollutant=153.
[13] 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.
[14] Data obtained from the DAQ emission inventory database available on the worldwide web at https://xapps.ncdenr.org/aq/ToxicsReport/ToxicsReportFacility.jsp?ibeam=true&year=2016&pollutant=153&county_code=195, accessed on April 23, 2018.

The Wilson Micropolitan Statistical Area was not required by the 2010 **nitrogen dioxide monitoring** rule to do any nitrogen dioxide monitoring. Its population is less than 500,000 and the annual average daily traffic measured on its roadways is below the threshold for monitoring. It also is not required to do sulfur dioxide monitoring by the 2010 **sulfur dioxide monitoring** rule because the population is too small and the sulfur dioxide emissions are too low to trigger PWEI monitoring. This area is also not required to do carbon monoxide monitoring by the changes to the **carbon monoxide monitoring** requirements because the population is under one million.

(6) The Sanford Micropolitan Statistical Area

The Sanford Micropolitan Statistical Area consists of Lee County. The DAQ started a monitoring site in the Sanford Micropolitan Statistical Area in November 2013. The location of the site is shown in Figure D65. The Blackstone monitoring station supports a special study to monitor baseline ambient air near potential shale gas development areas in Lee County.[15] Ozone monitoring started on Nov. 1, 2013 and a continuous fine particle monitor started Jan. 1, 2014. In December 2014, the DAQ added a sulfur dioxide monitor and nitrogen dioxide monitor. The site also monitors for volatile organic and carbonyl toxic compounds and hydrocarbons. Figure D66 through Figure D70 shows the site and views looking north, east, south and west. The DAQ plans to shut down this monitoring station sometime in 2018.

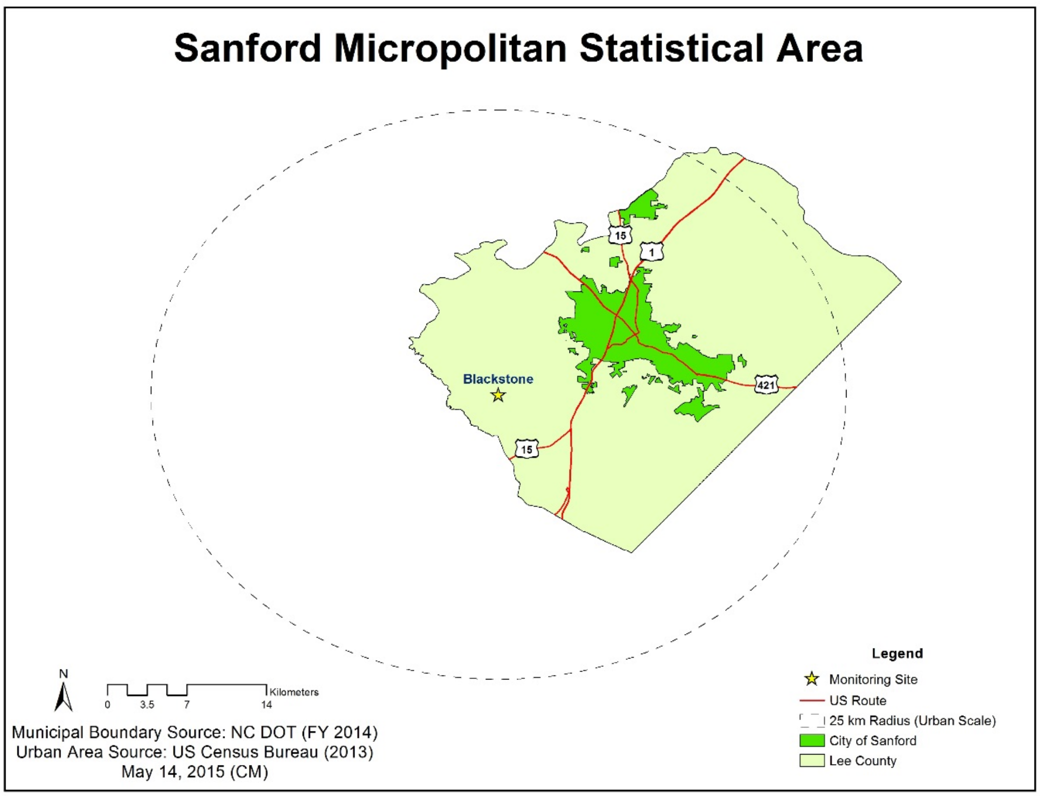


Figure D65. Monitoring site location in the Sanford micropolitan statistical area

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[15] Department of Environment and Natural Resources, Division of Air Quality, Project Plan for Baseline Ambient Air Monitoring near Potential Shale Gas Development Zones in Lee County, NC, Feb. 19, 2013. Available on the world wide web at https://ncdenr.s3.amazonaws.com/s3fs-public/Air%20Quality/monitor/specialstudies/DAQ_Project_Plan.pdf, accessed on April 26, 2017.

Figure D66. Blackstone shale gas development monitoring site

Figure D67. Looking north from the Blackstone site

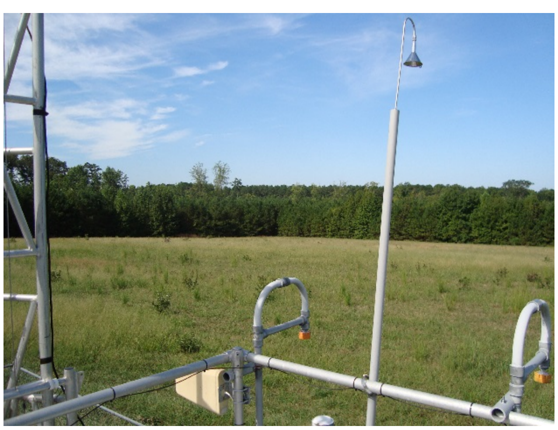


Figure D68. Looking west from the Blackstone site

Figure D69. Looking east from the Blackstone site

Figure D70. Looking south from the Blackstone site

The Sanford micropolitan statistical area was not required to do any lead monitoring to comply with the changes made to the **lead monitoring** requirements in December 2010. There are no facilities located within its bounds that emit more than 0.5 tons per year of lead.[16]

Changes to the **ozone monitoring** requirements in 2015 did not require additional ozone monitoring in the Sanford micropolitan statistical area. Until the Sanford municipality grows larger to be classified as an MSA, it does not have to meet population exposure monitoring requirements for urban areas.

The Sanford micropolitan statistical area was not required by the 2010 **nitrogen dioxide monitoring** rule to do any nitrogen dioxide monitoring. Its population is less than 500,000 and the annual average daily traffic measured on its roadways is below the threshold for monitoring. It also is not required by the 2010 **sulfur dioxide monitoring** rule to do sulfur dioxide monitoring because the population is too small and the sulfur dioxide emissions are too low to trigger PWEI monitoring. This area is also not required to do carbon monoxide monitoring by the changes to the **carbon monoxide monitoring** requirements because the population is under one million.

[16] Data obtained from the DAQ emission inventory database, available on the worldwide web at https://xapps.ncdenr.org/aq/ToxicsReport/ToxicsReportFacility.jsp?ibeam=true&year=2016&pollutant=153&county_code=105, accessed April 23, 2018.

Appendix D.1 Annual Network Site Review Forms for 2017

Durham Armory in Durham

Bushy Fork

Semora DRR

Butner

West Johnston in Johnston County

Millbrook in Raleigh

Triple Oak Road in Cary

Leggett

Blackstone in Lee County

Site Review Form Calendar Year 2017

Site Information

Region RRO	**Site Name** Durham Armory	**AQS Site #** 37-063-0015	
Street Address-801 Stadium Drive		**City** Durham	
Urban Area DURHAM	**Core-based Statistical Area** Durham, NC		
Enter Exact		**Method of Measuring**	
Longitude -78.90403	**Latitude** 36.03299		
In Decimal Degrees	In Decimal Degrees	GPS	**Explanation: GPS**
Elevation Above/below Mean Sea Level (in meters)		+106	

Name of nearest road to inlet probe Stadium Drive ADT _____ Year Choose an item _____

Comments: Stadium Drive has no ADT available in 2017

Distance of site to nearest major road (m) 130.00 Direction from site to nearest major road W

Name of nearest major road Duke Street (US 501) ADT 35000 Year 2013

Comments: None

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) _________ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) _______ Direction from site to water tower _______ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☒ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☒ Population Exposure SO2, O3 ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood_____ ☒ Urban SO2, O3 ☐ Regional_____	☒ SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.87

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☐ No ☒
Actual measured distance from outer edge of probe to supporting structure (meters) _____

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☐ No ☐ NA ☒

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 41 Direction from probe to nearest traffic lane N

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☒ PM10-2.5 BAM ☐ PM2.5 Cont. (BAM)	☐General/Background ____ ☐Highest Concentration ____ ☒Population Exposure PM 2.5 FRM, PM 10-2.5 BAM ☐Source Oriented ____ ☐Transport ____ ☐Welfare Related Impacts ____	☐Micro ____ ☐Middle ____ ☒Neighborhood PM 2.5 FRM, PM10-2.5 BAM ☐Urban ____ ☐Regional ____	☒SLAMS PM 2.5 FRM, PM10-2.5 BAM ☐SPM____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY____

Probe inlet height (from ground) ☐ < 2 m ____ ☒ 2-7m ____ ☐ 7-15 m ____ ☐ > 15 m ____
Actual measured distance from probe inlet to ground (meters) 2.7

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 0.8 Yes ☐ No ☒

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☒ (answer *'d questions) No ☐ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☒ No ☐ Give actual (meters) ____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters) ____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☒ (answer *'d questions) No ☐ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☒ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters ____
*Distance from probe to closest tree (m) ____ Direction from probe to tree ___ *Height of tree above probe (m) ____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) ____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 40 Direction from probe to nearest traffic lane N

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ____) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale) No ☐

*4) Relocate site? Yes ☐ No ☐

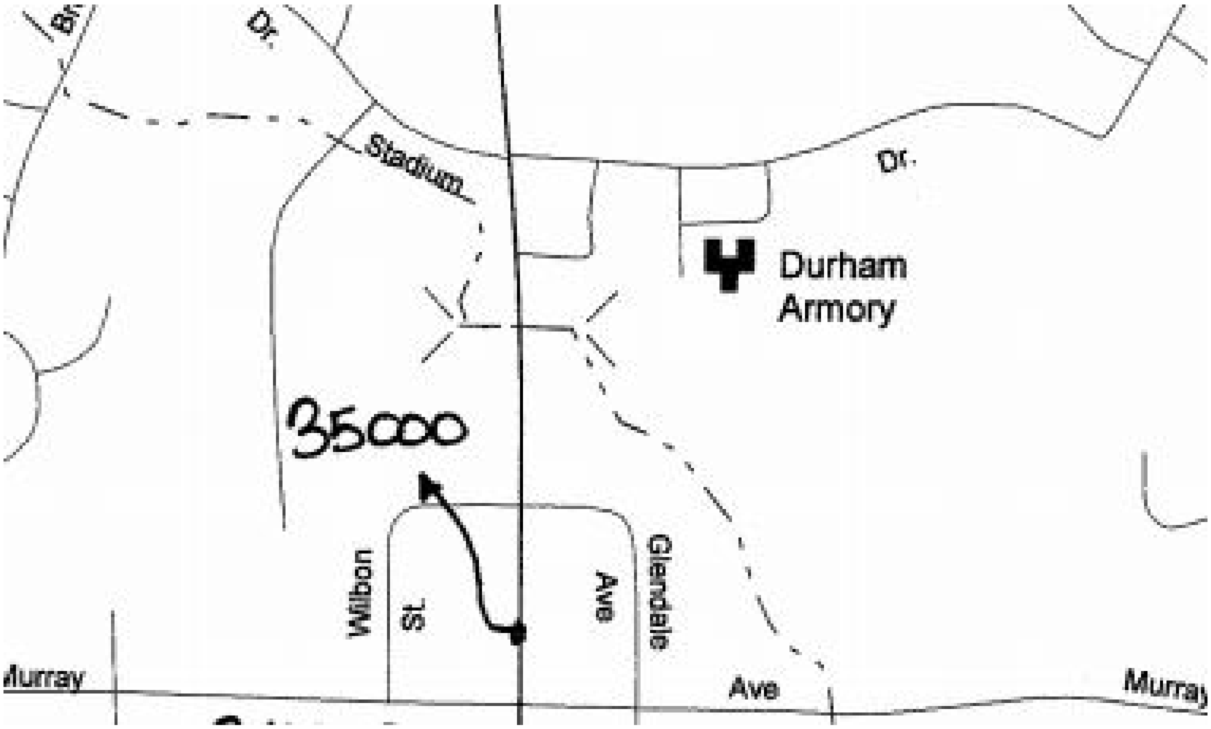
Comments:

Date of Last Site Pictures 2017 New Pictures Submitted? Yes ☒ No ☐

Reviewer Stephen S. Helms Date November 21, 2017

Ambient Monitoring Coordinator Rik Tebeau DateDecember 4, 2017

Joette Steger, April 23, 2018



2013 Average Annual Daily Traffic for the Durham Armory in Durham, North Carolina
From the NC Department of Transportation Traffic Survey Unit

Site Review Form Calendar Year 2017

Site Information

Region RRO	Site Name Bushy Fork	AQS Site # 37-145-0003
Street Address-7901 Burlington Rd.		City Hurdle Mills
Urban Area ROXBORO	Core-based Statistical Area Durham, NC	

Enter Exact				Method of Measuring
Longitude	-79.0922	Latitude	36.3069	
In Decimal Degrees		In Decimal Degrees		___ Explanation: Google Earth
Elevation Above/below Mean Sea Level (in meters)				205.00

Name of nearest road to inlet probe NC Hwy49 ADT 3500 Year latest available 2016

Distance of ozone probe to nearest traffic lane (m) 123 Direction from ozone probe to nearest traffic lane SSE

Comments: N/A

Name of nearest major road NC Hwy49 ADT 3500 Year latest available 2016

Distance of site to nearest major road (m) 123.00 Direction from site to nearest major road SSE

Comments: ______

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) __________ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) _____ Direction from site to water tower ________ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☒General/Background ☐Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☒Urban ☐Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐

Give actual measured height from ground (meters) 4.20

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.50

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☒ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☒

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☒

*4) Relocate site? Yes ☐ No ☒

Comments: ______

Date of Last Site Pictures: October 10, 2017 New Pictures Submitted? Yes ☒ No ☐

Reviewer Kari Terry Date: November 15, 2017

Ambient Monitoring Coordinator Rik Tebeau Date: December 4, 2017

Joette Steger, April 24, 2018

Instructions:

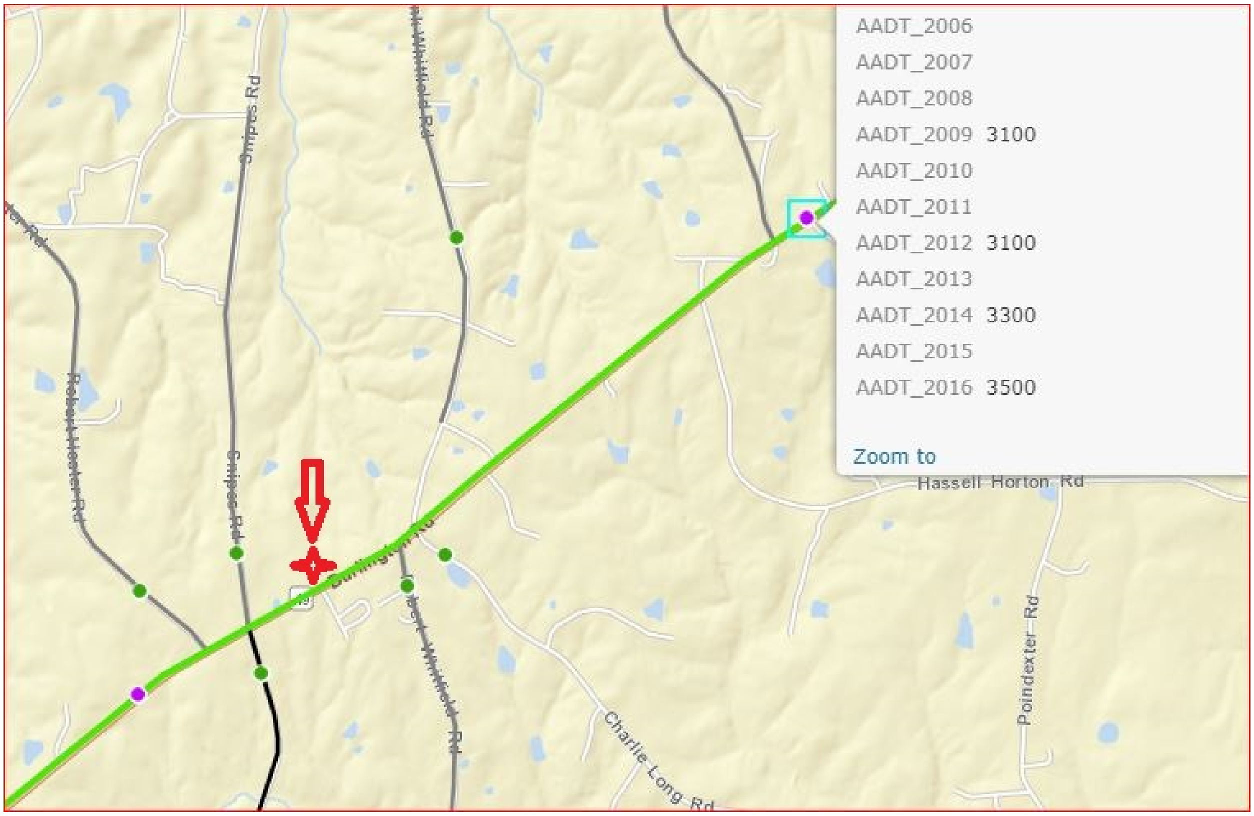
If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.



Average Annual Daily Traffic for Bushy Fork, North Carolina
From the NC Department of Transportation Traffic Survey Unit

Site Review Form Calendar Year 2016

Site Information

Region Duke Energy	**Site Name** Semora	**AQS Site # 37-** 145-0004
Street Address- 10631 Shore Rd	**City** Semora	
Urban Area Choose an item. NA	**Core-based Statistical Area** Choose an item.	

Enter Exact			**Method of Measuring**
Longitude -79.0589	**Latitude** 36.4898		Google Maps
In Decimal Degrees	In Decimal Degrees	Select one	**Explanation:** ____
Elevation Above/below Mean Sea Level (in meters) 158m			____

Name of nearest road to inlet probe ____ ADT ____ Year Choose one ____

Comments: ____

Distance of site to nearest major road (m) ____ Direction from site to nearest major road ____

Name of nearest major road ____ ADT ____ Year Choose one ____

Comments: ____

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ____ Direction to RR ____ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) ____ Direction ____

Distance between site and drip line of water tower (m) ____ Direction from site to water tower ____ ☐NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ✓SO2 DRR	☐ General/Background ☑ Highest Concentration ☐ Population Exposure ☑ Source Oriented ☐ Transport ☐ Upwind Background ☐ Welfare Related Impacts	☐ Micro ☐ Middle ☐ Neighborhood ☐ Urban ☐ Regional	☐ SLAMS ☐ SPM ✓Industrial

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4 m

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) .2

Distance of outer edge of probe inlet from other gas monitoring probe inlets > 0.25 m? Yes ☐ No ☐ NA ☒

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐

*Distance from probe to tree (m) ____ Direction from probe to tree ____ *Height of tree (m) ____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) ____ Direction from probe inlet to obstacle ____

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 35m Direction from probe to nearest traffic lane N

Site Review Form Calendar Year 2016

SULFUR DIOXIDE MONITOR RECOMMENDATIONS:

1) Maintain current monitor status? Yes ☑ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale ______) No ☐

*4) Relocate monitor? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures 2/9/16 New Pictures Submitted? Yes ☐ No ☑

Reviewer Vincent Weston Date 12/9/2016

Ambient Monitoring Coordinator ______ Date ______

Revised 2016-10-14

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Site Review Form Calendar Year 2017

Site Information

Region RRO	Site Name Butner	AQS Site # 37-077-0001	
Street Address-800 Central Avenue		City Butner	
Urban Area BUTNER		Core-based Statistical Area None	
Enter Exact		Method of Measuring	
Longitude -78.7681	Latitude 36.1412		
In Decimal Degrees	In Decimal Degrees	Interpolation	Explanation: Google Maps
Elevation Above/below Mean Sea Level (in meters)		121.00	

Name of nearest road to inlet probe West G Street ADT 5100 Year 2016

Distance of ozone probe to nearest traffic lane (m) 88 Direction from ozone probe to nearest traffic lane SE

Comments: ______

Name of nearest major road Central Ave (SR 1103) ADT 13000 Year 2016

Distance of site to nearest major road (m) 184.00 Direction from site to nearest major road NE

Comments: ______

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track	(m) 1790 Direction to RR SE ☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____ Direction ___

Distance between site and drip line of water tower (m) 250 Direction from site to water tower NE ☐NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

httttttttt

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☒General/Background ☐Highest Concentration ☒Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☒Urban ☐Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐
Give actual measured height from ground (meters) 4.00

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.10

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures: September 7, 2017 New Pictures Submitted? Yes ☒ No ☐

Reviewer James Reske Date: 11/16/17

Ambient Monitoring Coordinator Rik Tebeau Date: December 4, 2017

Joette Steger, April 24, 2018

Instructions:

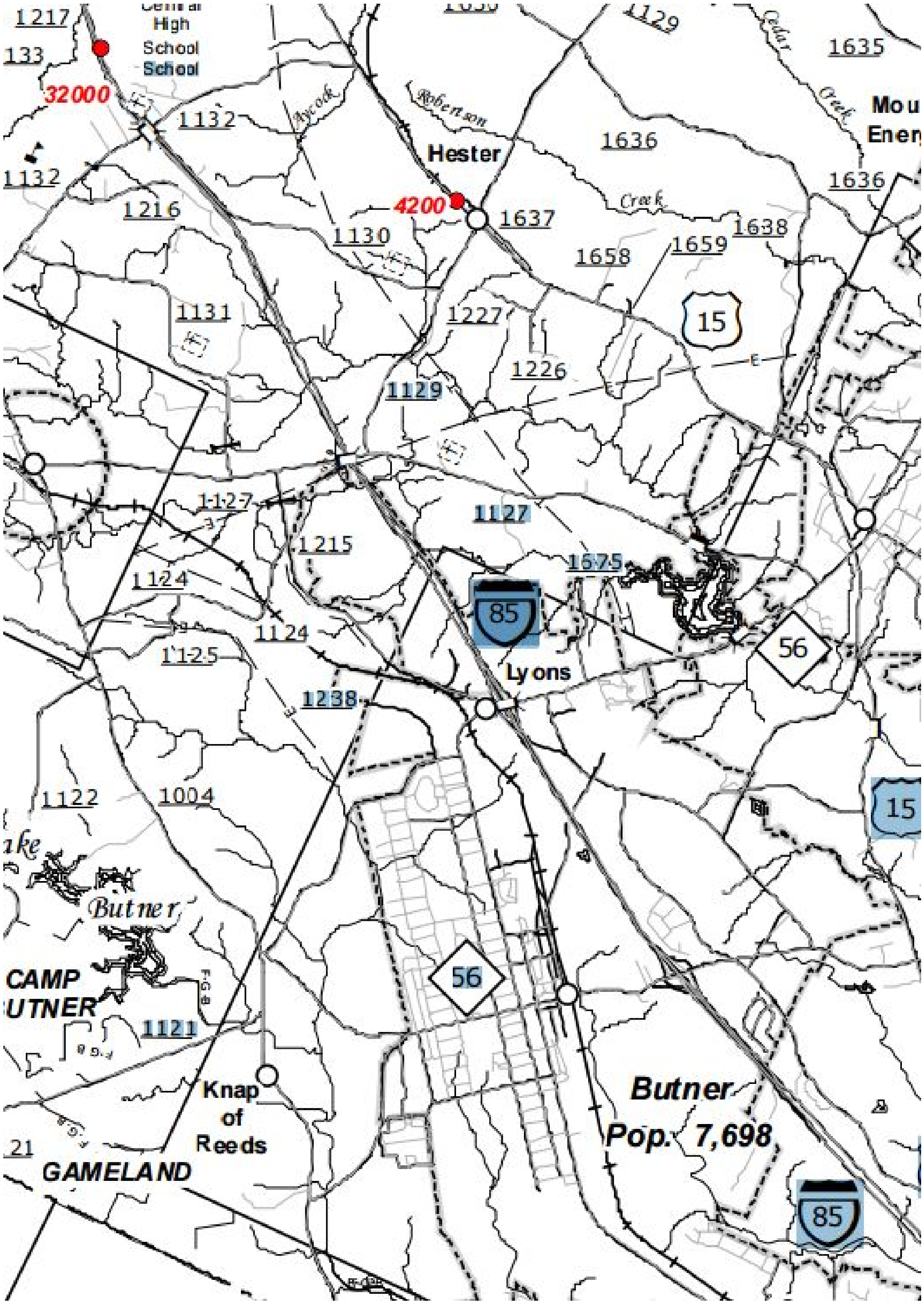
If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.



2013 Average Annual Daily Traffic for Butner, North Carolina
From the NC Department of Transportation Traffic Survey Unit

Site Review Form Calendar Year 2017

Site Information

Region RRO	**Site Name** West Johnston	**AQS Site #** 37-101-0002	
Street Address-1338 Jack Rd		**City** Clayton	
Urban Area CLAYTON		**Core-based Statistical Area** Raleigh, NC	
Enter Exact			
Longitude -78.4622	**Latitude** 35.59095	**Method of Measuring**	
In Decimal Degrees	In Decimal Degrees	**Interpolation**	**Explanation: Google Maps**
Elevation Above/below Mean Sea Level (in meters)		**80**	

Name of nearest road to inlet probe Jack Rd (SR 1557) ADT 2000 Year latest available 2015

Comments: None

Distance of site to nearest major road (m) 2010.00 Direction from site to nearest major road NNE

Name of nearest major road US Hwy 70 Bypass ADT 32000 Year latest available2015

Comments: None

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track	(m) ______ Direction to RR ___ ☒NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____ Direction ___
Distance between site and drip line of water tower (m) ______ Direction from site to water tower ______	☒**NA**

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

cultivated grass field

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (trace-level)	☒ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☒ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☒ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood_____ ☒ Urban_____ ☐ Regional_____	☒ SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.61

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.02

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 19 Direction from probe to nearest traffic lane WSW

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
[ ] NA Air flow < 200 L/min [X] PM2.5 FRM [ ] PM10 FRM [ ] PM10 Cont. (BAM) [ ] PM10-2.5 FRM [ ] PM10-2.5 BAM [X] PM2.5 Cont. (BAM)	[X] General/Background _____ [ ] Highest Concentration _____ [X] Population Exposure _____ [ ] Source Oriented _____ [ ] Transport _____ [ ] Welfare Related Impacts _____	[ ] Micro _____ [ ] Middle _____ [X] Neighborhood _____ [ ] Urban _____ [ ] Regional _____	[X] SLAMS _____ [ ] SPM_____ **Monitor NAAQS Exclusion** [ ] NONREGULATORY_____

Probe inlet height (from ground) [ ] < 2 m _____ [X] 2-7m _____ [ ] 7-15 m _____ [ ] > 15 m _____
Actual measured distance from probe inlet to ground (meters) 2.3

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.1 Yes [X] No [ ]

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes [X] No [ ] NA [ ]

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes [X] (answer *'d questions) No [ ] NA [ ]

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes [X] No [ ] Give actual (meters) 1.87
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes [X] No [ ] Give actual (meters) 0.08

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes [ ] (answer *'d questions) No [X] NA [ ]

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes [ ] No [ ]
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes [ ] No [ ]

Is probe > 20 m from the nearest tree drip line? Yes [X] *No [ ] (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes [ ] *No [ ] *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes [ ] (answer *'d questions) No [X]

*Identify obstacle ____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes [ ] No [ ]

Distance of probe to nearest traffic lane (m) 19 Direction from probe to nearest traffic lane WSW

RECOMMENDATIONS:

1) Maintain current site status? Yes [X] *No [ ] (answer *'d questions)

*2) Change monitoring objective? Yes [ ] (enter new objective ______) No [ ]-

*3) Change scale of representativeness? Yes [ ] (enter new scale _) No [ ]

*4) Relocate site? Yes [ ] No [ ]

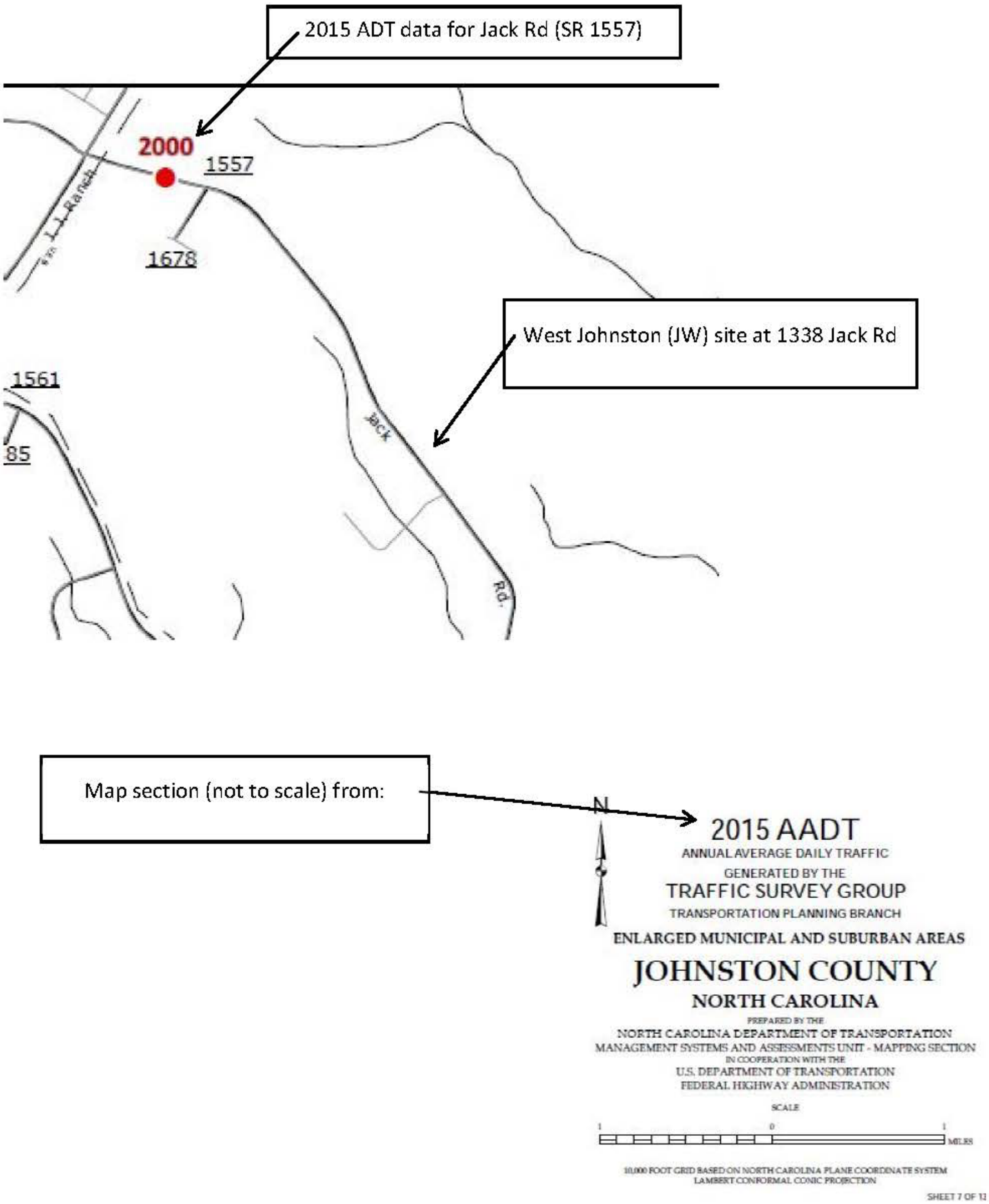
Comments:

Date of Last Site Pictures 10/4/17 New Pictures Submitted? Yes [X] No [ ]

Reviewer C. Marshall Cannon Date October 6, 2017

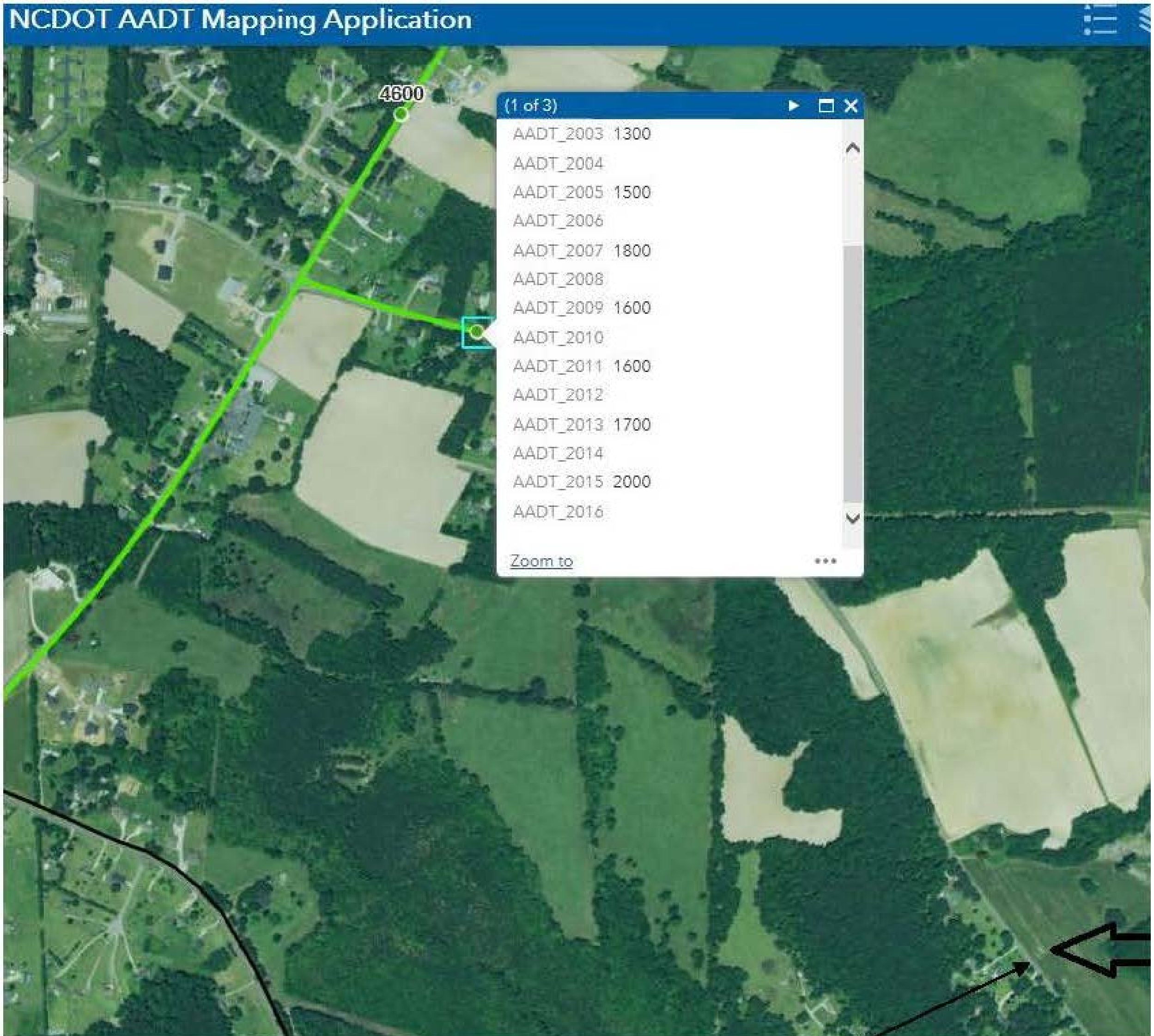
Ambient Monitoring Coordinator Rik Tebeau DateDecember 4, 2017

Joette Steger, April 24, 2018



2015 Average Annual Daily Traffic for West Johnston in Clayton, North Carolina

From the NC Department of Transportation Traffic Survey Unit



JW site at 1338 Jack Rd

2003-2015 Average Annual Daily Traffic for West Johnston in Clayton, North Carolina
From the NC Department of Transportation Traffic Survey Unit

Site Review Form Calendar Year 2017

Site Information

Region RRO	**Site Name** Millbrook-NCORE	**AQS Site #** 37-183-0014
Street Address-3801 SpringForest Rd		**City** Raleigh
Urban Area RALEIGH	**Core-based Statistical Area** Raleigh, NC	

Enter Exact		**Method of Measuring**	
Longitude -78.574147	**Latitude** 35.856214		
In Decimal Degrees	In Decimal Degrees	**Other (explain)**	**Explanation: google maps**
Elevation Above/below Mean Sea Level (in meters)		103	

Name of nearest road to inlet probe SpringForest Rd ADT 18000 Year latest available 2015

Comments: SpringForest Rd is 44 meters South of the site

Distance of site to nearest major road (m) 632.00 Direction from site to nearest major road W

Name of nearest major road Capital Blvd /US-1 ADT 52000 Year 2015 Comments: DOT ADT data N and S of Spring Forest / US-1 intersection is 50k and 53k

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ________ Direction to RR ___ ☒NA

Distance between site and drip line of water tower (m) ______ Direction from site to water tower __________ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

School carpool lane idling effects the site twice a day as hundreds of vehicles (not busses) idle for 20-60minutes (due west of inlets). Apt complex units due south of site have fireplaces. Childcare center due east receives deliveries Diesel trucks and has dumpster located with 25m of inlets, brief idling diesel truck effects are possible

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☒ SO_2 (trace-level) ☒ NO_2 (NAAQS) ☒ O_3 ☐ Hydrocarbon ☒ Air Toxics -VOC ☒ Air Toxics - Aldehydes ☒ CO (trace-level)	☒General/BackgroundCO ☒Highest ConcentrationNO2 ☒Max O3 ConcentrationCO, O3 ☒Population Exposure CO,SO2,O3,NO2 ☐Source Oriented_____ ☐Transport_____ ☐Upwind Background_____ ☐Welfare Related Impacts _____	☒MicroNO2 ☒Middle CO ☒Neighborhood SO2,NO2,O3 ☐Urban_____ ☐Regional_____	☒SLAMS CO,SO2,NO2,O3 ☒SPM NO2 **Monitor Network Affiliation** ☒NCORE CO,SO2,NO2,O3 ☐Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) SO2(4.9),NO2 (5.14),O3(4.9),Hydrocarbons(4.7), Air Toxics-Aldehyde(3.08), CO(4.9)

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No☐
Actual measured distance from outer edge of probe to supporting structure (meters)) SO2(1.3),NO2 (1.35),O3(1.3),Hydrocarbons(1.3),Air Toxics-Aldehyde(.95), CO(1.3)

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☒ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☒
*Distance from probe to tree (m) 8.30 Direction from probe to tree ENE *Height of tree (m) 33.00

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 39 Direction from probe to nearest traffic lane S

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 FRM ☒ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☒ PM10-2.5 BAM ☒ PM2.5 Cont (T640X) ☒ PM2.5 Cont. (BAM) ☒ PM2.5 Spec. (SASS) ☒ PM2.5 Spec. (URG) ☒ PM2.5 Cont. Nitrate ☒ PM2.5 Cont. Sulfate ☒ PM2.5 Aethalometer	☐General/Background _____ ☒Highest Concentration All ☒Population Exposure All ☐Source Oriented _____ ☐Transport _____ ☐Welfare Related Impacts _____	☒Micro PM2.5 Cont. NO3, SO4, Aeth ☐Middle _____ ☒Neighborhood PM2.5 FRM, PM10 Cont. (BAM), PM10-2.5 BAM, PM2.5 Cont. (BAM), PM2.5 Spec. (SASS), PM2.5 Spec. (URG), PM2.5 Cont. ☐Urban _____ ☐Regional _____	☒SLAMS PM 2.5 FRM, BAM PM2.5/PM10 ☒SPM PM2.5 Spec. (SASS), PM2.5 Spec. (URG)PM2.5 Cont. NO3, SO4, Aeth **Monitor Network Affiliation** ☒ NCORE NCORE PM 2.5 FRM, BAM PM2.5/PM10 ☒ SUPPLEMENTAL SPECIATION PM2.5 Spec. (SASS), PM2.5 Spec. (URG),PM2.5 Cont. NO3, SO4, Aeth **Monitor NAAQS Exclusion** ☒ NONREGULATORY PM2.5 Cont. NO3, SO4, Aeth

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters)) PM2.5 FRM (2.4),BAM (2.62),PM2.5 SASS(2.1), PM2.5 URG (2.3),PM2.5 Cont. (Aeth (5.47),SO4 (4.74),NO3 (4.65))

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) PM2.5 FRM (2.1),PM2.5 SASS(2.1), PM2.5 URG (2.07), PM2.5 Cont. (Aeth 1.15,SO4 0.85,NO3 0.85) Yes ☒ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☒ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM 2.5 samplers (X) within 1 to 4 m of each other? Yes ☒ No ☐ Give actual (meters) 4
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters) 3

Is an URG 3000 monitor collocated with a SASS monitor at the site? *Yes ☒ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated speciation samplers inlets (X) within 1 to 4 m of each other? Yes ☒ No ☐ Give actual (meters) 2.2
* Are collocated speciation sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters)_____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☐ NA ☒
* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 1 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☒ *No ☐
*Distance from probe to tree (m) 2.52 Direction from probe to tree ENE *Height of tree (m) 33.00

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle ____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No☐

Distance of probe to nearest traffic lane (m) _____ Direction from probe to nearest traffic lane ___

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☒ NO_y (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☒ Population Exposure NOy ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_________ ☐ Middle_________ ☒ Neighborhood NOy ☐ Urban_________ ☐ Regional_____	☒ SLAMS NOy_____ ☐ SPM _________ **Monitor Network Affiliation** ☒ NCORE NOy

Probe inlet height (from ground) 10-15 m? Yes ☒ No ☐
Actual measured distance from probe inlet to ground (meters) 10.70

Distance of outer edge of probe inlet from horizontal and/or vertical supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 7.40

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☒ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☒ *No ☐
*Distance from probe to tree (m) 11.40 Direction from probe to tree ENE *Height of tree (m) 33.00

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

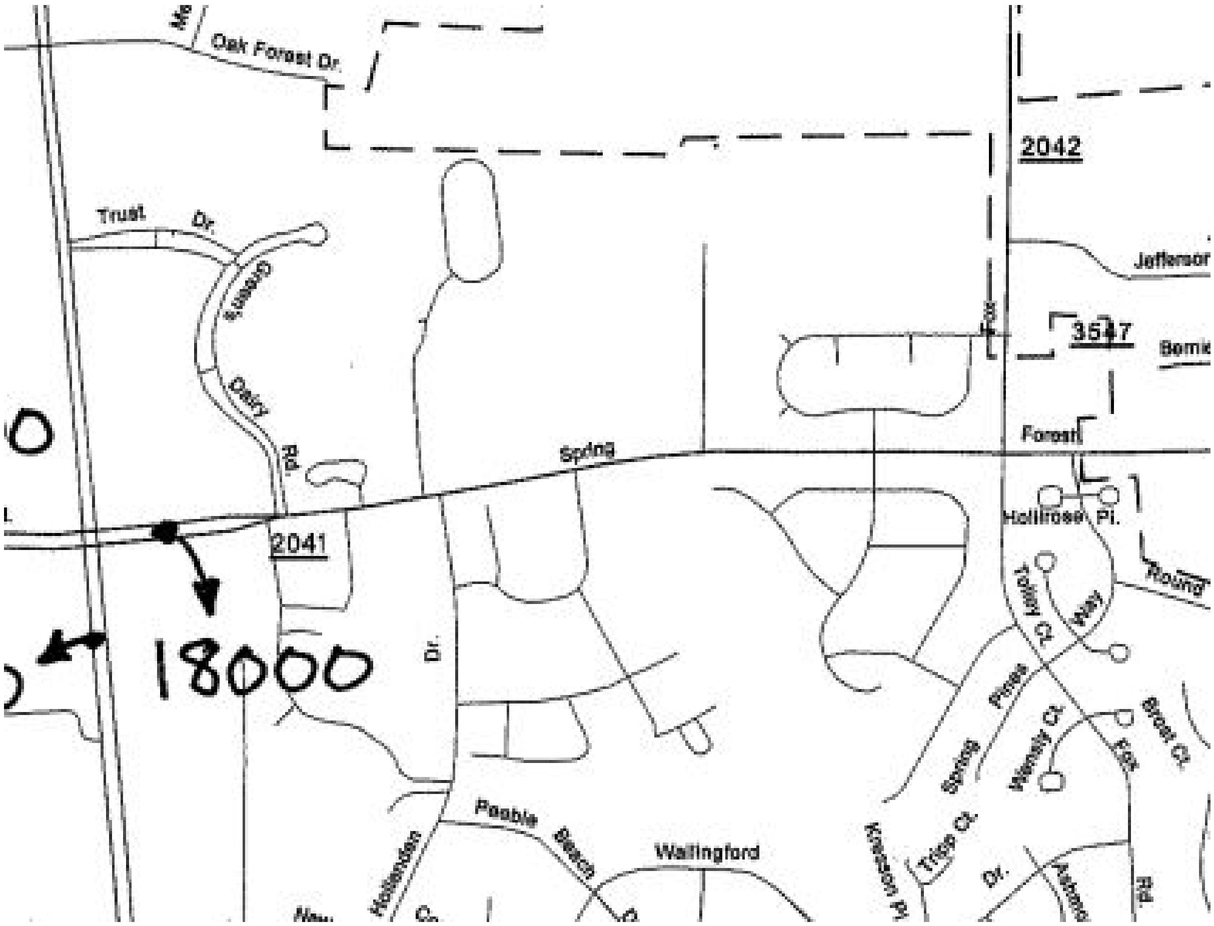
*Identify obstacle _____ Distance from probe inlet (m) 11 Direction from probe inlet to obstacle ENE
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☒ No ☐

Distance of probe to nearest traffic lane (m) 40 Direction from probe to nearest traffic lane S

RECOMMENDATIONS:
1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☒-
*3) Change scale of representativeness? Yes ☐ (enter new scale) No ☒
*4) Relocate site? Yes ☐ No ☒
Comments:

Date of Last Site Pictures 10/2/2017 New Pictures Submitted? Yes ☒ No ☐
Reviewer Tim Skelding Date December 12, 2017
Ambient Monitoring Coordinator Rik Tebeau Date December 12, 2017

Joette Steger, April 27, 2018



2013 Average Annual Daily Traffic for Millbrook in Raleigh, North Carolina
From the NC Department of Transportation Traffic Survey Unit

Site Review Form Calendar Year 2017

Site Information

Region RRO | **Site Name** TripleOak-roadside | **AQS Site #** 37-183-0021

Street Address-2826 Triple Oak Road | **City** Cary

Urban Area RALEIGH | **Core-based Statistical Area** Raleigh, NC

Enter Exact		**Method of Measuring**	
Longitude -78.819597	**Latitude** 35.865116		
In Decimal Degrees	In Decimal Degrees	**Other (explain)**	**Explanation: google maps**
Elevation Above/below Mean Sea Level (in meters)		96	

Name of nearest road to inlet probe I-40 ADT 158000 Year 2016
Comments: Nearest road and nearest MAJOR road are the same
Distance of site to nearest major road (m) 19.30 Direction from site to nearest major road SSW
Name of nearest major road I-40 ADT 158000 Year 2016
Comments: EPA maintains a continuous traffic counting camera/radar at the site.

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ________ Direction to RR ___ ☒NA

Distance between site and drip line of water tower (m) _____ Direction from site to water tower ____ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

1.9 km to NE-RDU airport runway. 320m to S-Triangle Factory Shops mall. 650m to N-multiple distribution warehouses. 620m to SE-I40 exit #284 (Airport Blvd) multiple hotels and restauraunts. 1.3km to NW-I40 exit #283 (I-540).

Parameters	Monitoring Objective	Scale	Monitor Type
☒NO_2 (Near Road only) ☒CO (Near Road only)	☐Highest Concentration_____ ☒Population Exposure_____ ☒Source Oriented interstate ☐Transport_________ ☐Welfare Related Impacts _____	☒Micro_____	☒SLAMS _________ ☐SPM_________

Probe inlet height (from ground) 2-7 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4.20
Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 1.30
Distance of outer edge of probe inlet from other monitoring probe inlets > 0.25 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☒ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☒
*Distance from probe to tree (m) 9.40 Direction from probe to tree NE *Height of tree (m) 20.00

Are there any obstacles to air flow? *Yes ☒ (answer *'d questions) No ☐
*Identify obstacle Tree Line Distance from probe inlet (m) 10.00 Direction from probe inlet to obstacle NE
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☒

Distance of probe to nearest traffic lane (m) 14 Direction from probe to nearest traffic lane SW

NO_2 and CO RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-
*3) Change scale of representativeness? Yes ☐ (enter new scale) No ☐
*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures 11/15/17 New Pictures Submitted? Yes ☒ No ☐
Reviewer Tim Skelding Date December 8, 2017
Ambient Monitoring Coordinator Rik Tebeau Date December 12, 2017

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☐General/Background _____ ☐Highest Concentration _____ ☒Population Exposure _____ ☒Source Oriented _____ ☐Transport _____ ☐Welfare Related Impacts _____	☒Micro _____	☒SLAMS _____ ☐SPM_____ **Monitor Network Affiliation** ☒ Near Road_____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) 4.4

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 1.2 Yes ☒ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA ☒

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☐ NA ☒

* Entire inlet opening of collocated PM 2.5 samplers (X) within 1 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) _____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5 samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☒ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☒ *No ☐
*Distance from probe to tree (m) 11.00 Direction from probe to tree N *Height of tree (m) 30.00

Are there any obstacles to air flow? *Yes ☒ (answer *'d questions) No ☐

*Identify obstacle tree line Distance from probe inlet (m) 11 Direction from probe inlet to obstacle N
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 20 Direction from probe to nearest traffic lane SW

PM RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

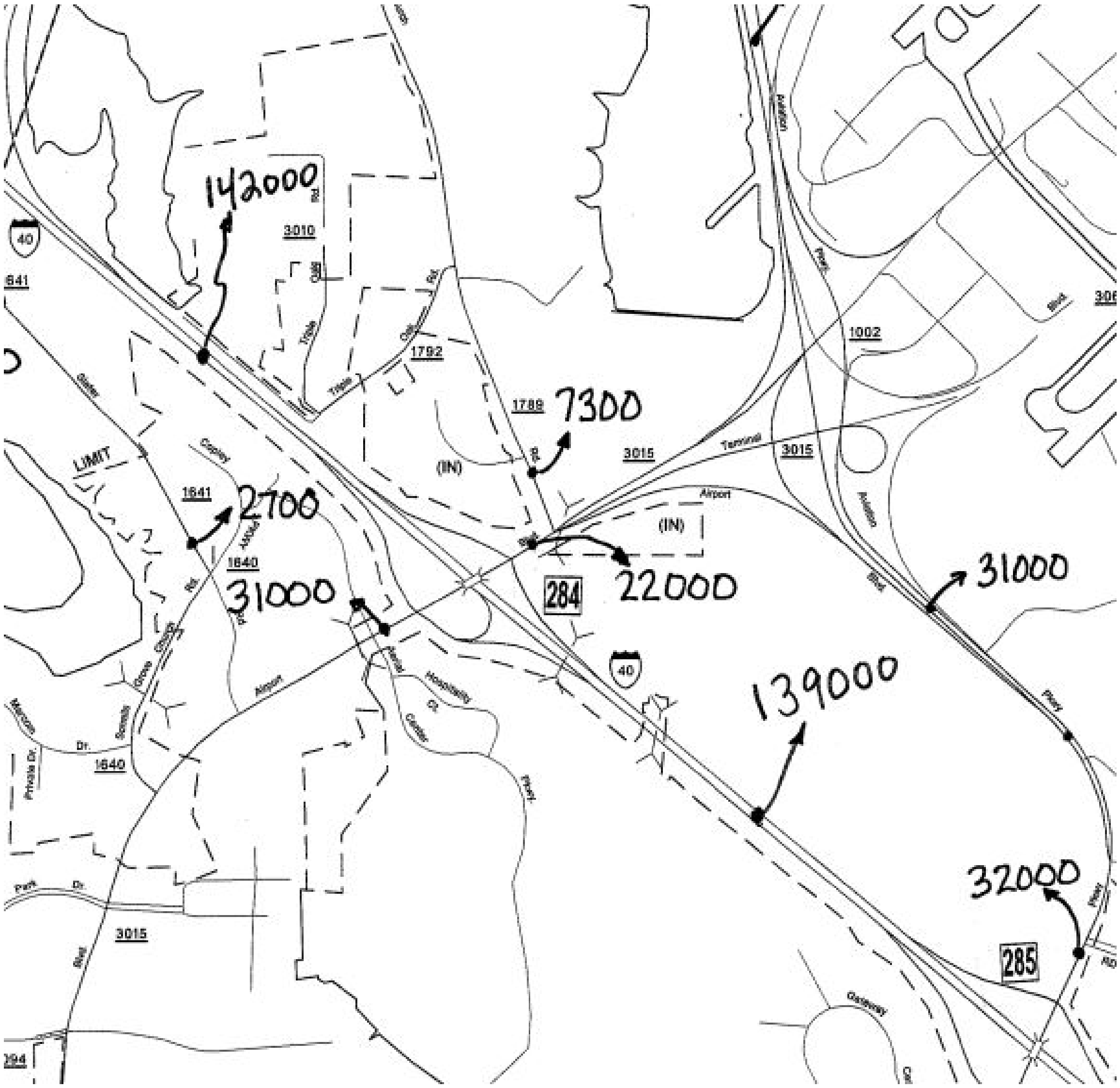
*2) Change monitoring objective? Yes ☐ (enter new objective _____) No ☒-
*3) Change scale of representativeness? Yes ☐ (enter new scale _____) No ☒
*4) Relocate site? Yes ☐ No ☒

Comments:

Reviewer Kari Terry Date December 8, 2017

Ambient Monitoring Coordinator Rik Tebeau Date December 12, 2017

Joette Steger, April 27, 2018



2013 Average Annual Daily Traffic for Triple Oak in Cary, North Carolina
From the NC Department of Transportation Traffic Survey Unit

Site Review Form Calendar Year 2017

Site Information

Region RRO	**Site Name** Leggett	**AQS Site #** 37-065-0099
Street Address-7589 NC 33 NW		**City** Leggett-:
Urban Area TARBORO	**Core-based Statistical Area** Rocky Mount, NC	

Enter Exact		**Method of Measuring**	
Longitude -77.58430	**Latitude** 35.988278		
In Decimal Degrees	In Decimal Degrees	**Interpolation**	**Explanation: Google maps**
Elevation Above/below Mean Sea Level (in meters)		20.0	

Name of nearest road to inlet probe NC 97 ADT 2200 Year 2016

Comments: _____

Distance of site to nearest major road (m) 92.00 Direction from site to nearest major road ENE

Name of nearest major road NC 33 ADT 2600 Year 2016

Comments: _____

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ________ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ____________ ☒**NA**

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (trace-level)	☒ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☒ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☒ Neighborhood_____ ☐ Urban_____ ☐ Regional_____	☒ SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.84

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 0.80

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 96 Direction from probe to nearest traffic lane ESE

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☒General/Background _____ ☐Highest Concentration _____ ☒Population Exposure _____ ☐Source Oriented _____ ☐Transport _____ ☐Welfare Related Impacts _____	☐Micro _____ ☐Middle _____ ☒Neighborhood _____ ☐Urban _____ ☐Regional _____	☒SLAMS _____ ☐SPM_____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) 2.5

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 4.0 Yes ☒ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA ☒

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) _____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle ____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 40 Direction from probe to nearest traffic lane N

RECOMMENDATIONS:
1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-
*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐
*4) Relocate site? Yes ☐ No ☐

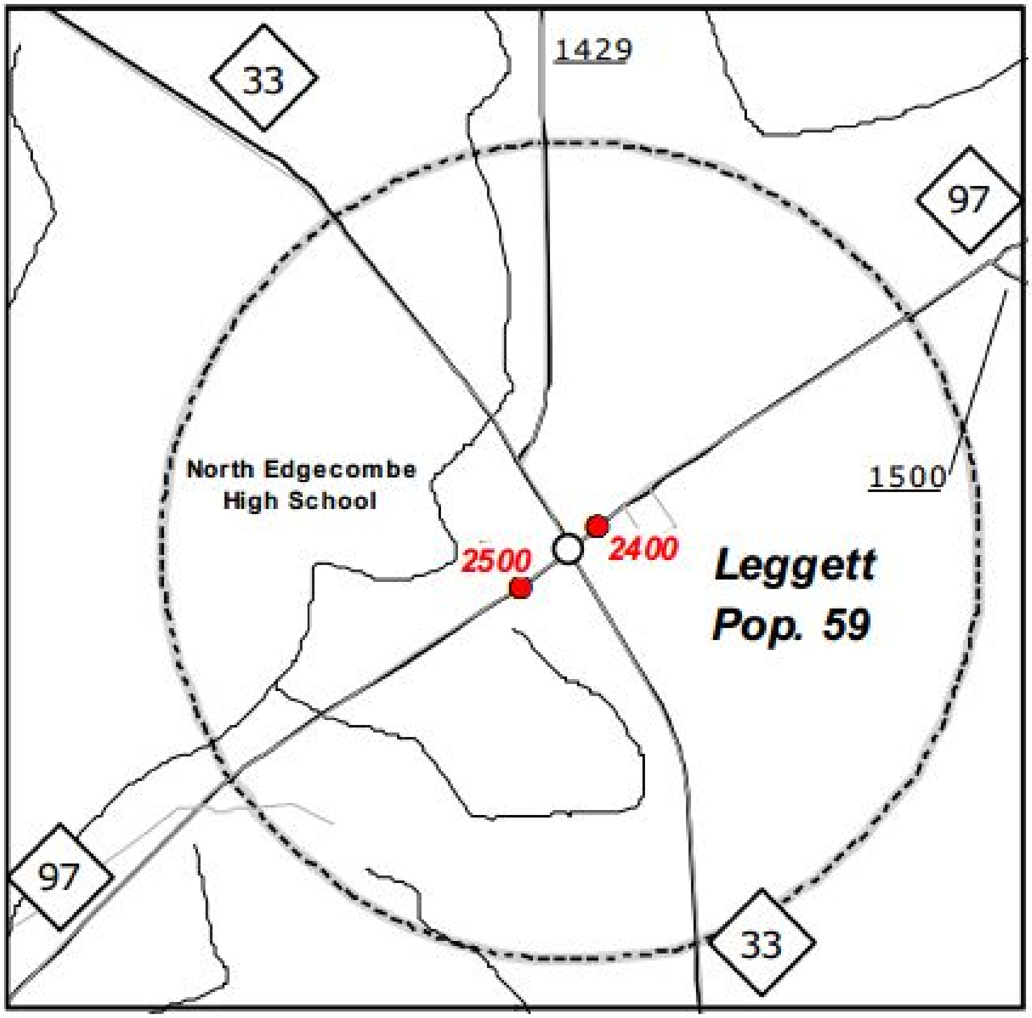
Comments:

Date of Last Site Pictures 9/8/17 New Pictures Submitted? Yes ☒ No ☐

Reviewer James Reske Date 11/16/17

Ambient Monitoring Coordinator Rik Tebeau Date December 4, 2017

Joette Steger, April 27, 2018



Leggett

2014 Average Annual Daily Traffic for Leggett, North Carolina
From the NC Department of Transportation Traffic Survey Unit

Site Review Form Calendar Year 2017

Site Information

Region RRO	**Site Name** Blackstone	**AQS Site # 37-105-0002**
Street Address-4110 Blackstone Road		**City** Sanford
Urban Area Not in an Urban Area	**Core-based Statistical Area** Sanford, NC	

Enter Exact				**Method of Measuring**	
Longitude	-79.28879	**Latitude**	35.43248		
In Decimal Degrees		In Decimal Degrees		**Interpolation**	**Explanation: Orthophoto**
Elevation Above/below Mean Sea Level (in meters)				+ 134	

Name of nearest road to inlet probe Blackstone Road ADT 390 Year latest available 2014

Comments: _____

Distance of site to nearest major road (m) 50.00 Direction from site to nearest major road E

Name of nearest major road Blackstone Road ADT 390 Year 2014

Comments: _____

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) _________ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) 35 Direction SE

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ____________ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA	☒ General/Background SO2 NO2	☐ Micro_____	☐ SLAMS _____
☒ SO_2 (NAAQS)	☐ Highest Concentration_____	☐ Middle_____	☒ SPM SO2 NO2 O3
☐ SO_2 (trace-level)	☐ Max O3 Concentration_____	☐ Neighborhood_____	**Monitor Network Affiliation**
☒ NO_2 (NAAQS)	☐ Population Exposure_____	☒ Urban SO2 NO2 O3	☐ NCORE_____
☐ $HSNO_y$	☐ Source Oriented_____	☐ Regional_____	☐ Unofficial PAMS_____
☒ O_3	☐ Transport_____		
☐ NH_3	☐ Upwind Background_____		
☒ Hydrocarbon	☐ Welfare Related Impacts _____		
☒ Air Toxics			
☐ CO (trace-level)			

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.66

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.02

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 50 Direction from probe to nearest traffic lane E

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☒General/Background _____ ☐Highest Concentration _____ ☐Population Exposure _____ ☐Source Oriented _____ ☐Transport _____ ☐Welfare Related Impacts _____	☐Micro _____ ☐Middle _____ ☐Neighborhood _____ ☒Urban _____ ☐Regional _____	☐SLAMS _____ ☒SPM_____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) 2.5

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 0.8 Yes ☐ No ☒

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) _____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 50 Direction from probe to nearest traffic lane E

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☒-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate site? Yes ☐ No ☐

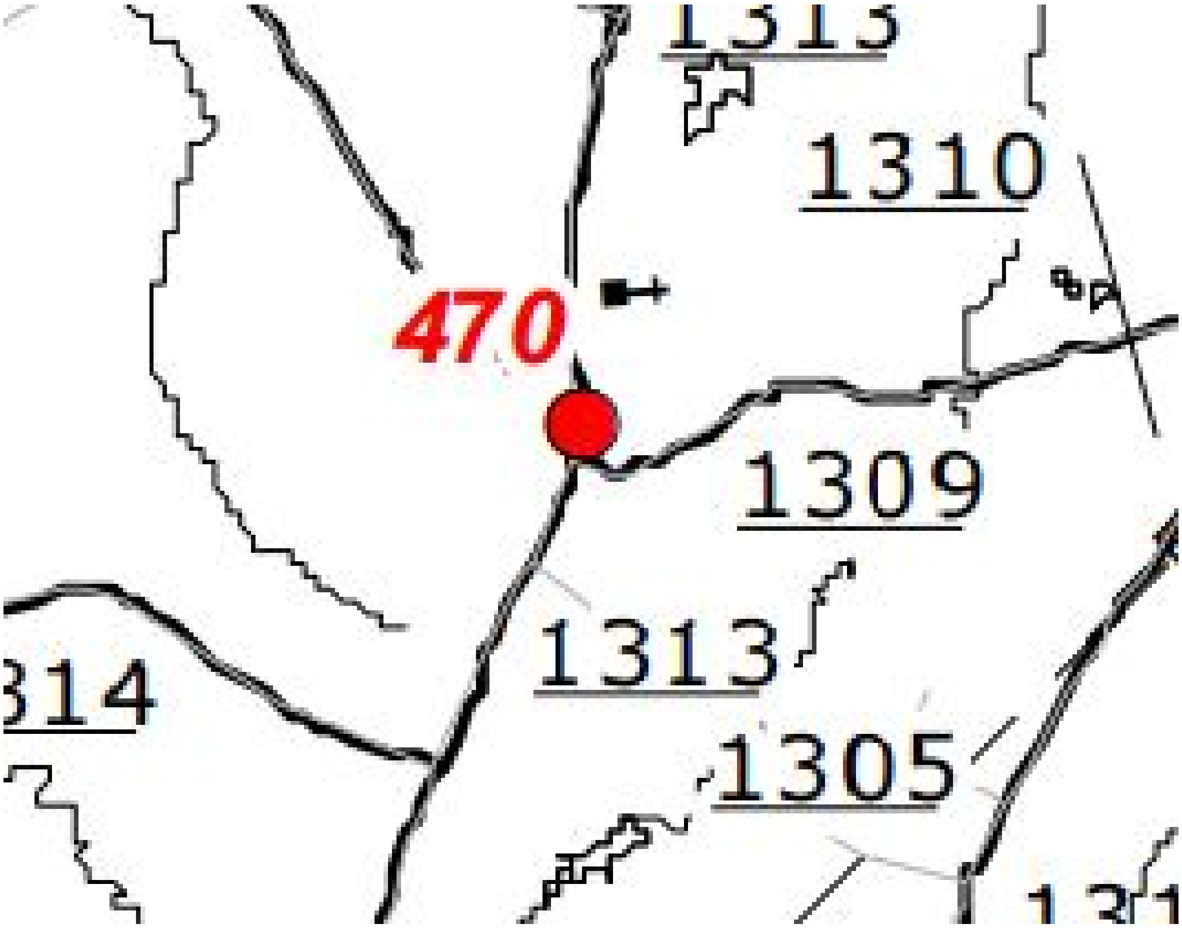
Comments:

Date of Last Site Pictures September 28, 2017 New Pictures Submitted? Yes ☒ No ☐

Reviewer Stephen Helms Date November 20, 2017

Ambient Monitoring Coordinator Rik Tebeau Date December 4, 2017

Joette Steger, April 27, 2018



2014 Average Annual Daily Traffic for Blackstone in Sanford, North Carolina
From the NC Department of Transportation Traffic Survey Unit

Appendix D-2. Scale of Representativeness

Each station in the monitoring network must be described in terms of the physical dimensions of the air parcel nearest the monitoring station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

a) Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.

b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.

c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.

d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.

e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station.

There are six basic exposures:

a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.

b) Sites located to determine representative concentrations in areas of high population density.

c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.

d) Sites located to determine general background concentration levels.

e) Sites located to determine the extent of regional pollutant transport among populated areas.

f) Sites located to measure air pollution impacts on visibility, vegetation damage or other welfare-based impacts and in support of secondary standards.

The design intent in siting stations is to correctly match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of the six basic objectives and the scales of representativeness are appropriate when siting monitoring stations:

Table D-1. Site Type Appropriate Siting Scales

1. Highest concentration	Micro, middle, neighborhood, sometimes urban or regional for secondarily formed pollutants
2. Population oriented	Neighborhood, urban
3. Source impact	Micro, middle, neighborhood
4. General/background & regional transport	Urban, regional
5. Welfare-related impacts	Urban, regional

Appendix D-3. Duke Energy Roxboro Siting Analysis and Additional Site Information

(1) 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 f 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 near 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. In 2016 when the analysis was performed, the closest SO_2 monitor with a design value was 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 over 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 near 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, or the Monitoring TAD,[17] the North Carolina Division of Air Quality's, or DAQ's, modeling

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

followed the recommendations of the SO_2 NAAQS Designations Modeling Technical Assistance Document (Modeling TAD).[18] 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-2 provides the stack parameters used in the modeling analysis.

Table D-2. Parameters for Duke Energy Roxboro SO2 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 D71 is an aerial photo of the facility, Figure D72 shows the emissions point and building locations and Figure D73 shows the receptor placement.

2016, available on the worldwide web at https://www.epa.gov/sites/production/files/2016-06/documents/so2monitoringtad.pdf, accessed on May 3, 2017

[18] U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, Air Quality Assessment Division, *SO_2 NAAQS Designations Modeling Technical Assistance Document*, Draft, August 2016, available on the worldwide web at https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf, accessed on May 3, 2017

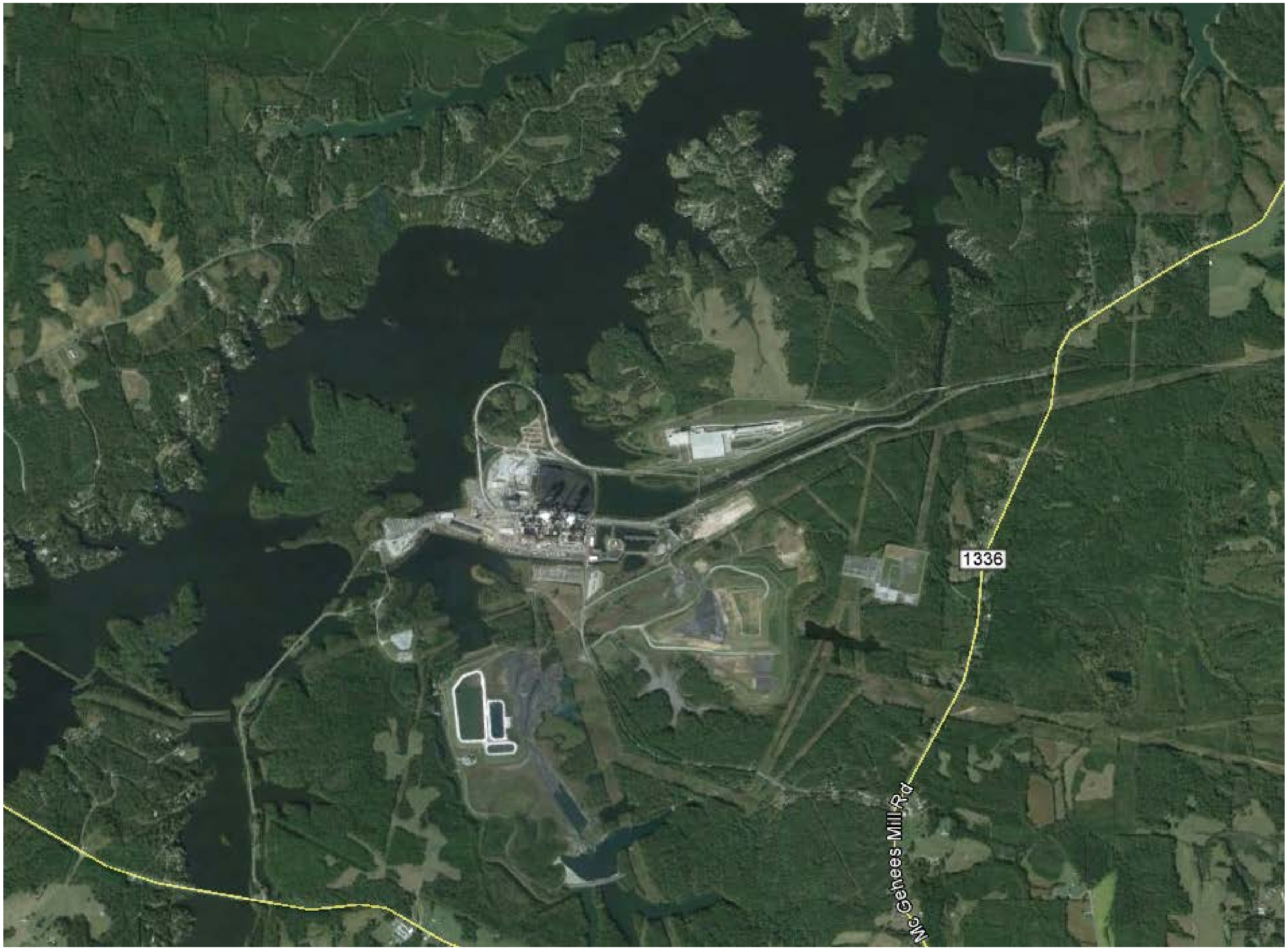


Figure D71. Aerial View of Duke Energy Roxboro and Surrounding Areas

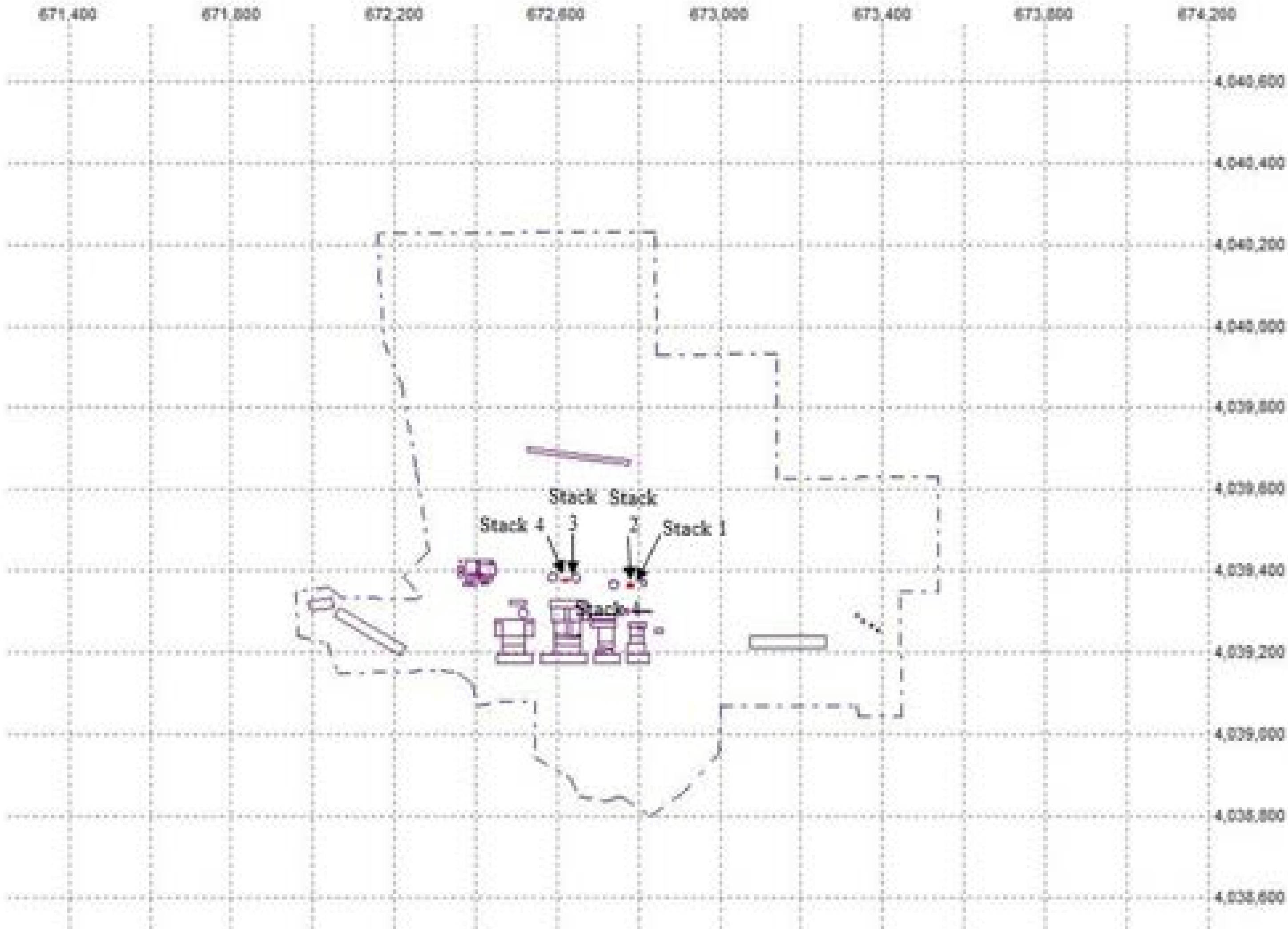


Figure D72. Locations in Duke Energy Roxboro SO2 Modeling for Monitor Placement (UTM NAD 83 Coordinates in Meters, Zone 17)

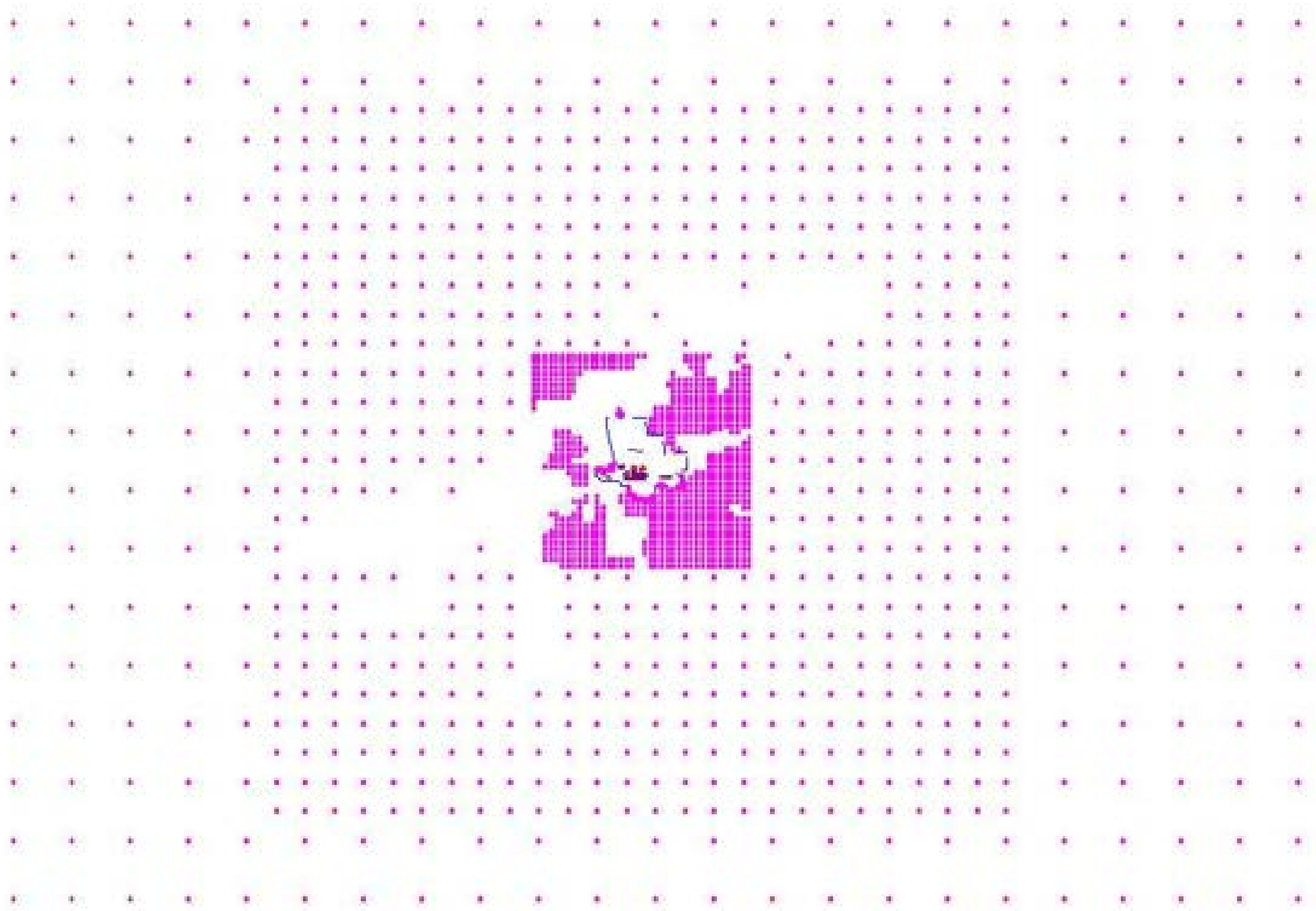


Figure D73. Receptor Grids in Duke Energy Roxboro SO2 Modeling for Monitor Placement Receptor

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 D74 shows the NDVs for the receptors near Duke Energy Roxboro. To better understand the relative difference between the NDVs, Figure D75 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 Figure D76 and Figure D77, respectively. The highest NDVs in the figures are shown in purple.

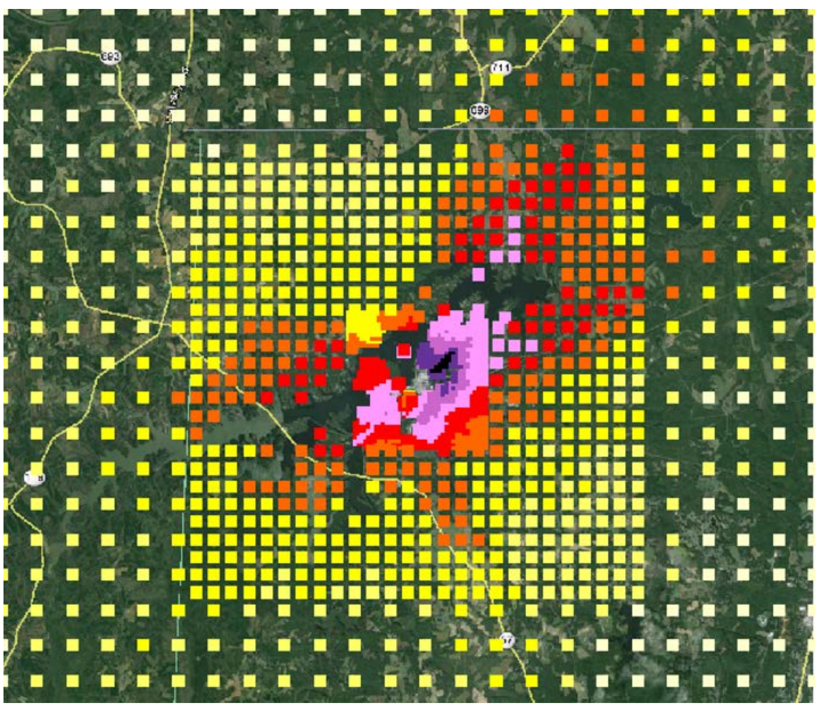


Figure D74. Modeled NDVs for Each Receptor at Duke Energy Roxboro: Values increase as colors go from yellow through red and purple

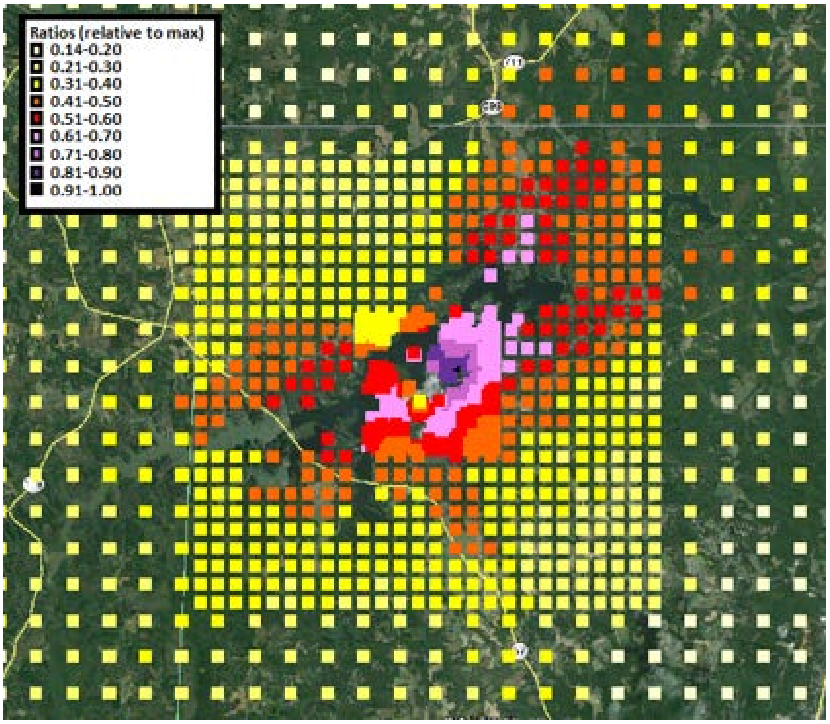


Figure D75. Ratios of Individual Receptor's NDV to the Overall Maximum NDV at Duke Energy Roxboro: Values increase as colors go from yellow through red and purple

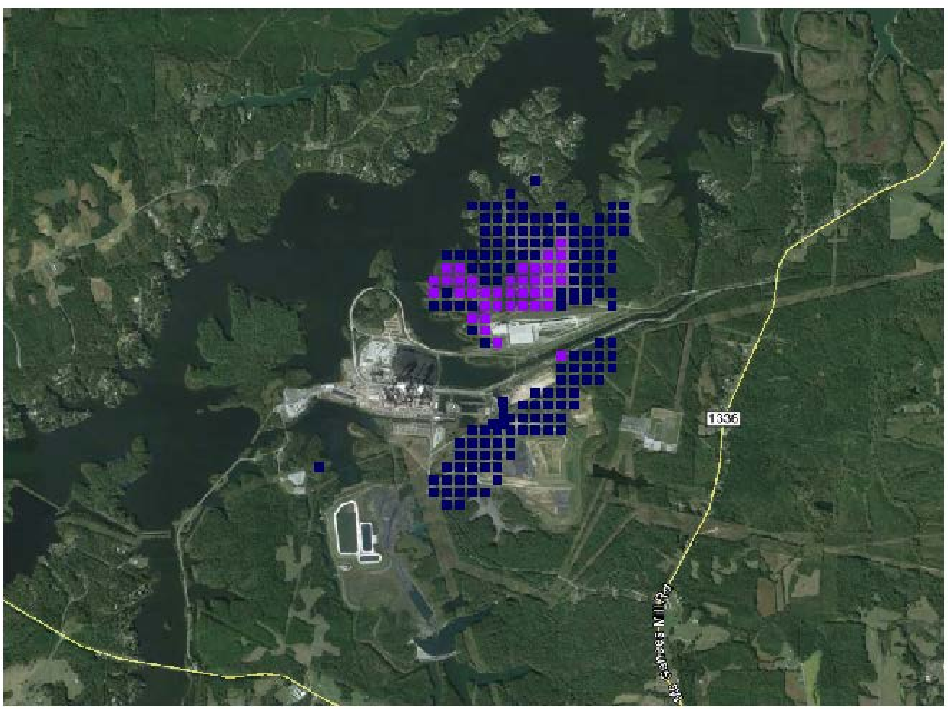


Figure D76. Locations of Top 200 NDVs for Duke Energy Roxboro: Highest Values are in Purple

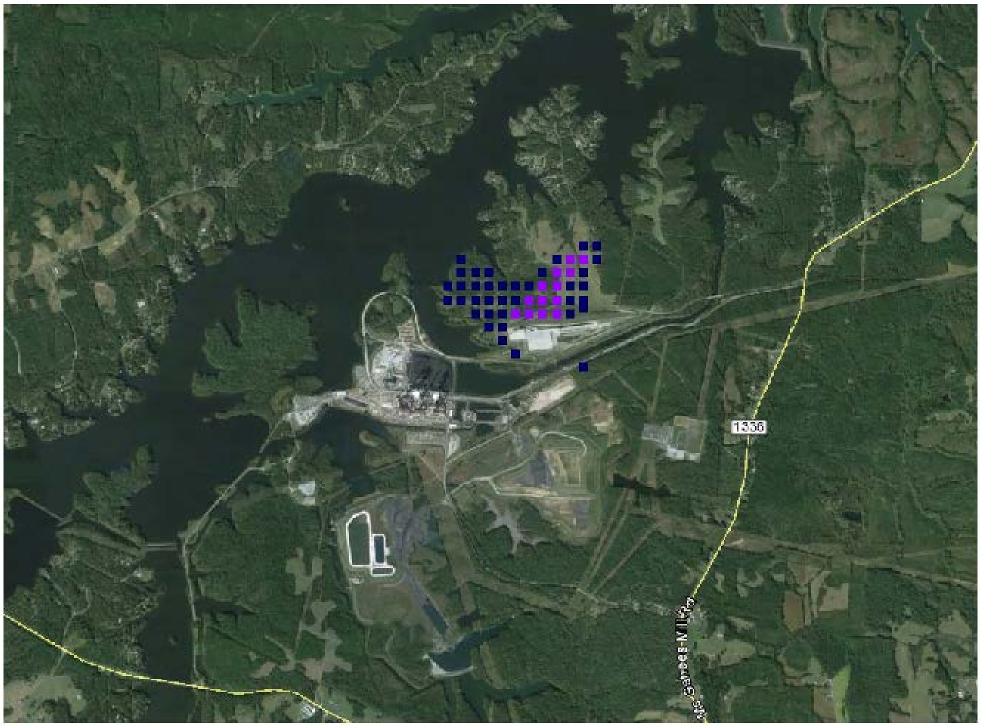


Figure D77. Locations of Top 50 NDVs for Duke Energy Roxboro: Highest Values are in Purple

Figure D76 and Figure D77 show the prioritized locations that were first evaluated to select a monitor location. The primary objective of this analysis was to find sufficient feasible locations with predicted peak and/or relatively high SO_2 concentrations where a permanent monitoring site could be located. However; Appendix A of the Monitoring TAD requires the site selection process to also 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 D78 shows the results of the frequency analysis.

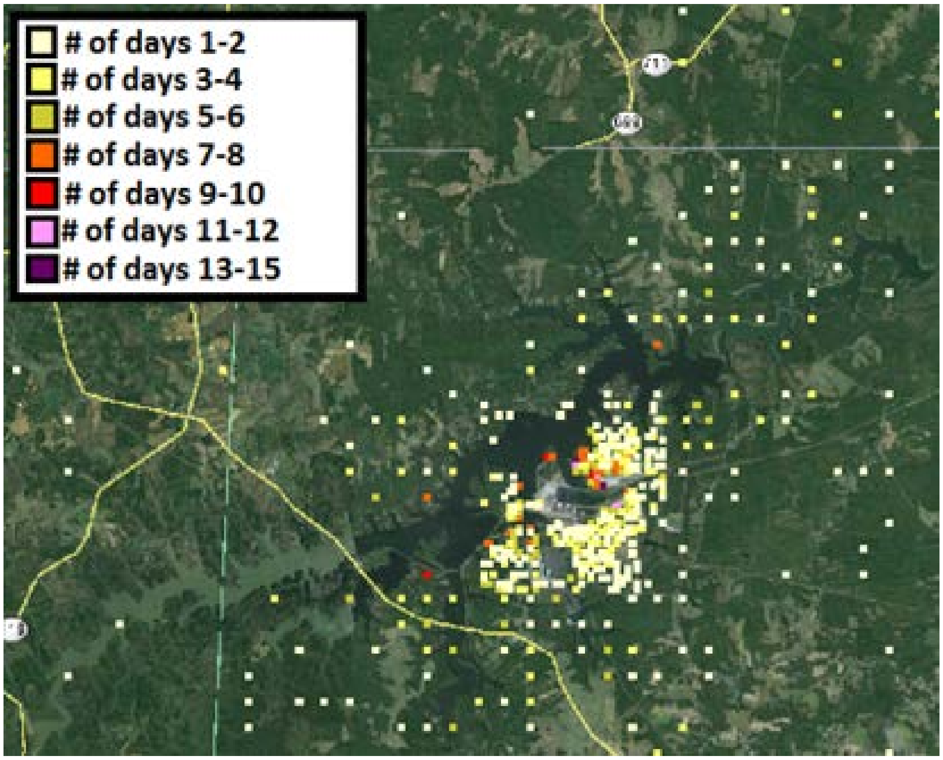


Figure D78. Frequency of Daily Maximum Concentrations for Duke Energy Roxboro

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 Chosen Monitor Site

Table 2 shows a summary of the ranking results for the top 64 receptors and the selected monitor location. Figure D79 shows the receptor locations that ranked in the top 100. The selected monitor location resulted from a site visit conducted using information from the scoring strategy.

Figure D79. Locations of Top 100 NDVs for Duke Energy Roxboro with Ranked Values

DAQ staff, in conjunction with Duke Energy staff and a representative from EPA Region 4, conducted an in-situ survey near 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 most 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 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, numerous 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 chosen site has a clear, unobstructed path, as seen in the photo shown in Figure D80.

Figure D80. View of Duke Energy Roxboro from the Monitor Location

A 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 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-3. 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 selected location is highly suitable for operating an SO_2 monitor.

Table D-3. Selected Ranking Results from the Duke Energy Roxboro SO2 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

Table D-3. Selected Ranking Results from the Duke Energy Roxboro SO2 Modeling for Monitor Placement

Easting (m)	Northing (m)	Normalized Design Value (NDV)	NDV Rank	Freq. Count	Freq. Rank	Score	Score Rank	Comments on Location
673,000	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
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

Table D-3. Selected Ranking Results from the Duke Energy Roxboro SO2 Modeling for Monitor Placement

Easting (m)	Northing (m)	Normalized Design Value (NDV)	NDV Rank	Freq. Count	Freq. Rank	Score	Score Rank	Comments on Location
673,400	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
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
Chosen 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 D79, all locations north of the road north of the chosen location were not selected because of ownership.

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

In 2015, the 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.[19] The area chosen for placement of the monitor was selected using the results of modeling done as described in the

[19] 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.

technical assistance document[20] as reported earlier. An aerial view of the monitoring location identified based on the considerations reported earlier is shown in Figure D81.

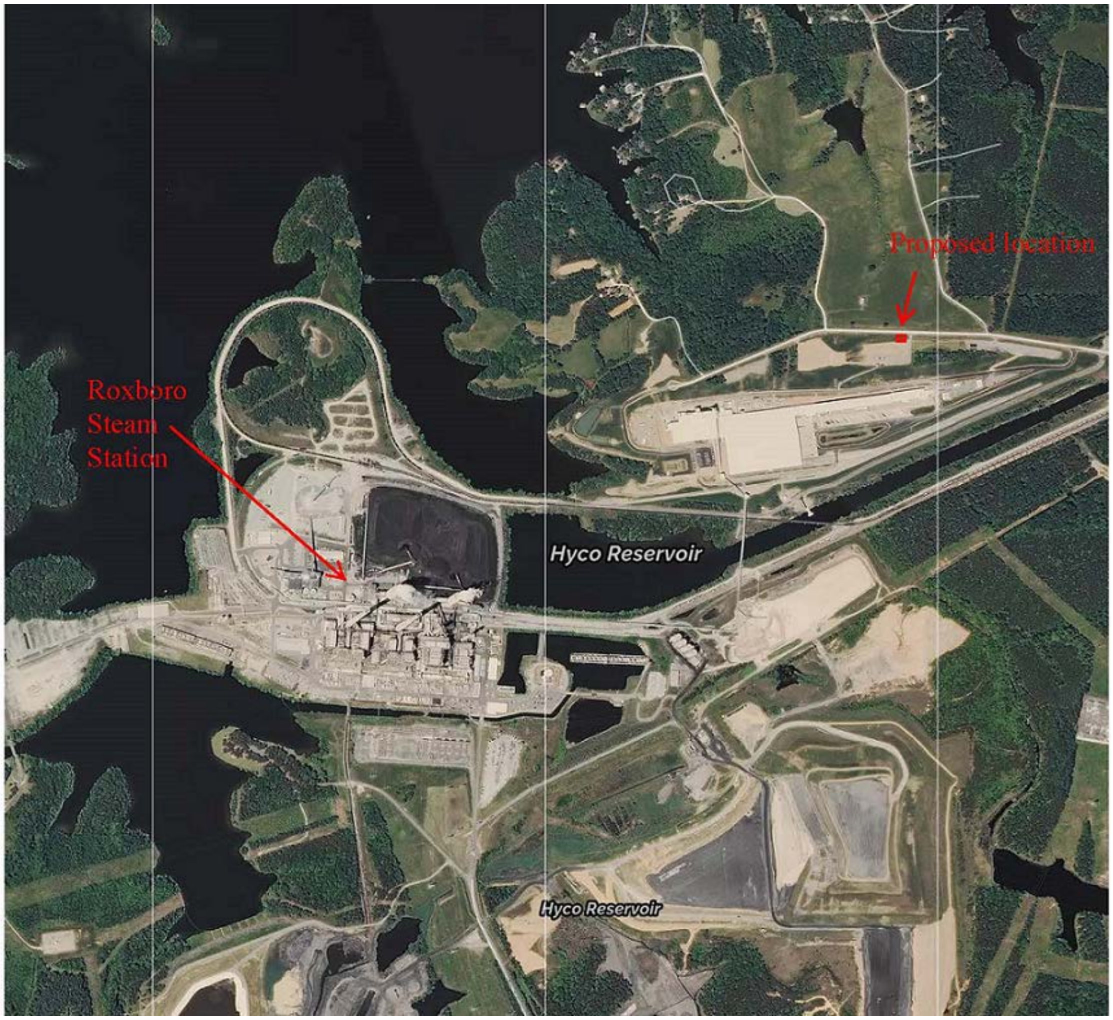


Figure D81. Aerial view showing the location of the Semora DRR monitoring station

The Air Quality System, AQS, identification number for this monitor is 37-145-0004-42401-1. DAQ operates 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 operates the monitor following the DAQ quality assurance project plan and the monitor is part of the DAQ primary quality assurance organization. Figure D82 through Figure D85 show views from the site looking north, east, south and west.

[20] 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 D82. Looking north from the Semora DRR location

Figure D84. Looking east from the Semora DRR location

Figure D83. Looking west from the Semora DRR location

Figure D85. Looking south from the Semora DRR location

The 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 D86, secondary road number 1336, Ceffo Road, had an average annual daily traffic count of 2,500 north of Ceffo in 2014. The probe height is approximately 3.6 meters.

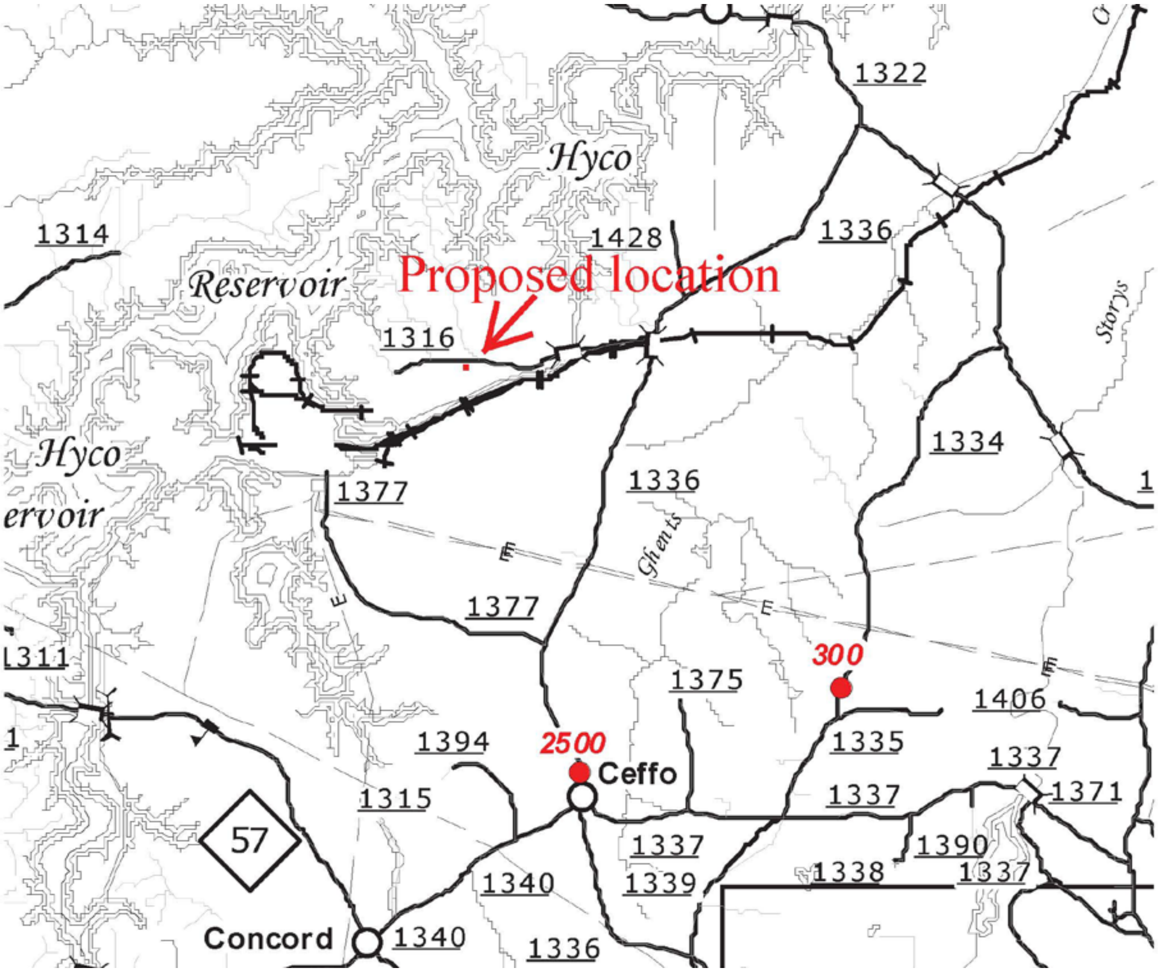


Figure D86. 2014 Traffic count map for the Semora area (from NC DOT)

The AQS identification number and street address for the site is: 37-145-0004 and Shore Drive Air Monitor, Roxboro Plant, Semora, North Carolina. The latitude and longitude is 36.489943 and -79.058523. The sampling and analysis method is AQS code 560, Thermo Electron 43i TLE pulsed fluorescent instrument, EQSA-0486-060, and the operating schedule is hourly. The monitoring objective is source oriented. Figure D87 shows the location of the monitoring station relative to the population center of Person County in the Semora area.

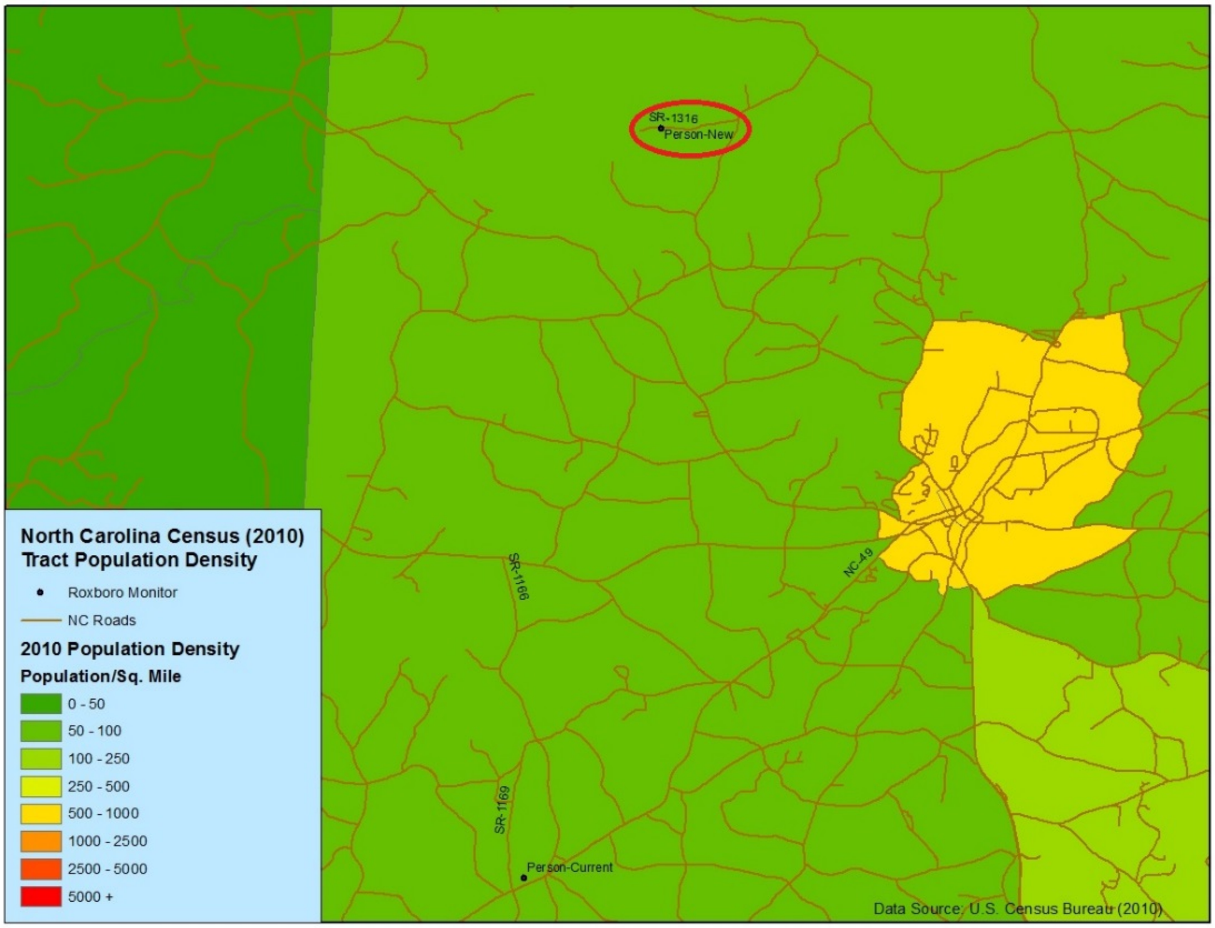


Figure D87. Location of the monitoring station relative to the population of the Semora area in Person County

Based on the wind roses in Figure D88 and Figure D89, the monitoring station is located downwind of the Roxboro plant. Figure D88 is a wind rose representing the 3-year period (2012 to 2014) for Danville, VA, surface meteorological data and for comparative purposes, Figure D89 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.

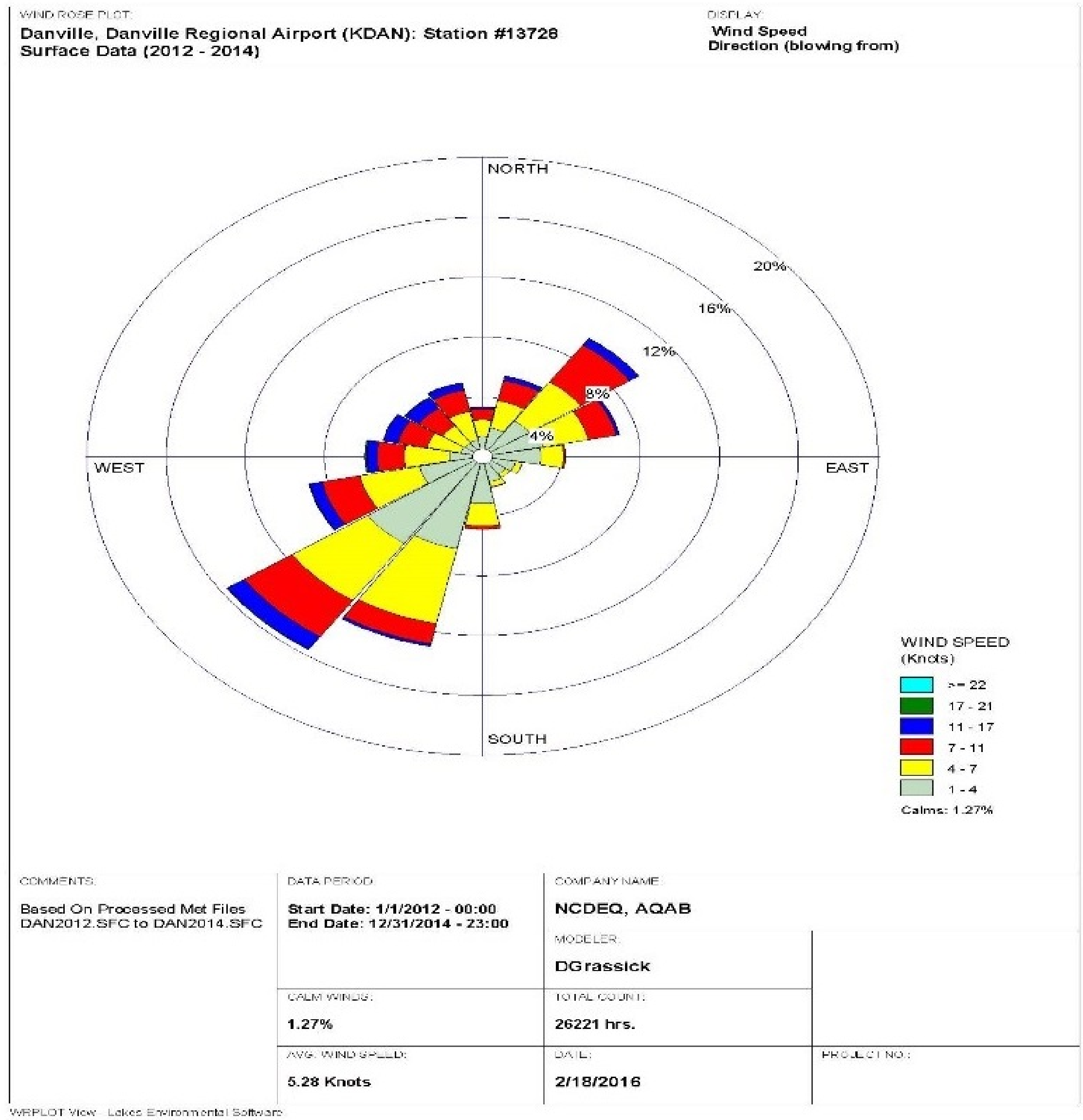


Figure D88. Wind rose from the Danville Regional Airport for 2012 to 2014

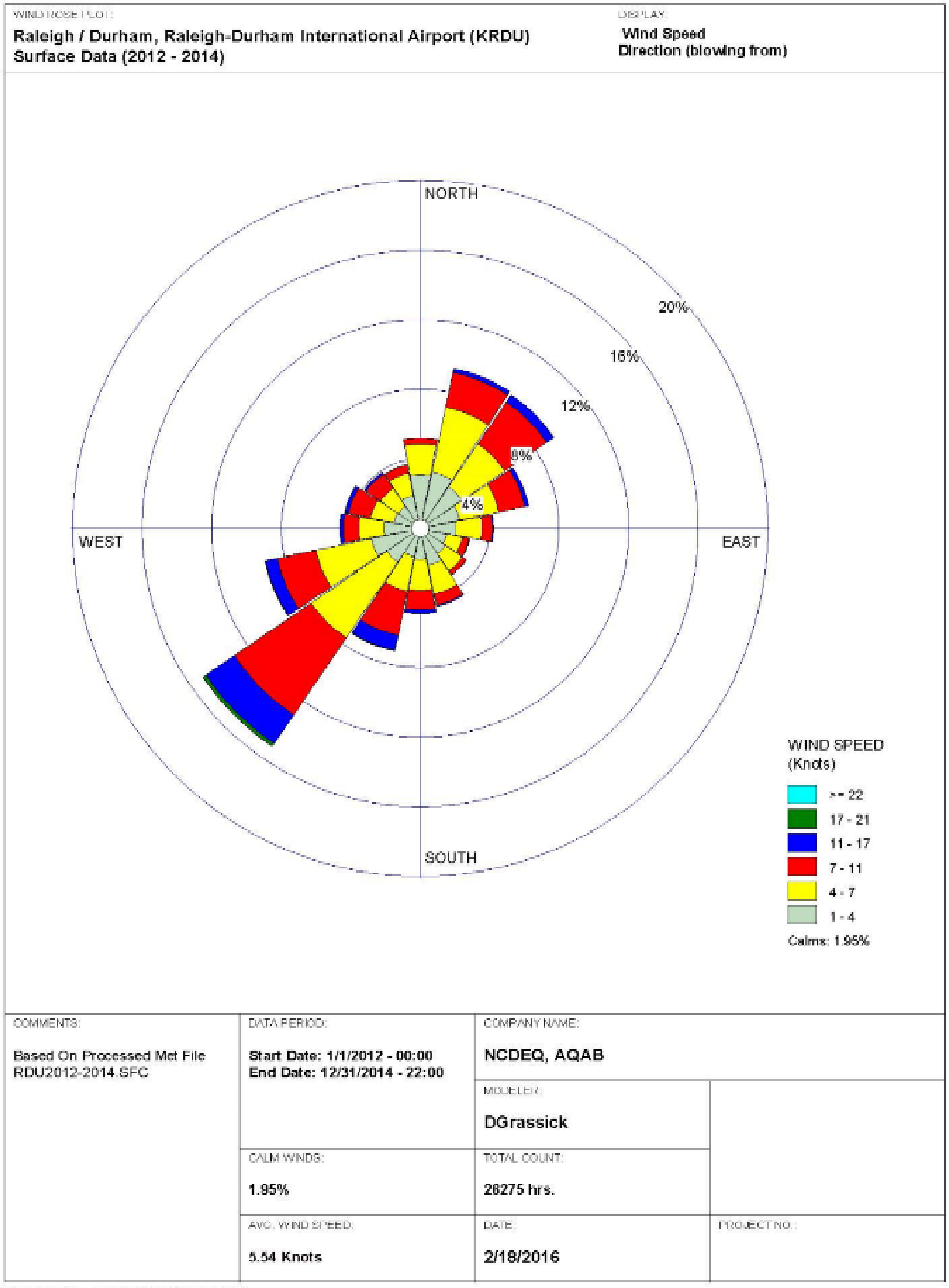


Figure D89. Raleigh Durham Airport wind rose for 2012 to 2014

The spatial scale of representativeness for the monitor is neighborhood based on the distance of the monitor from the source. The monitor is located approximately 550 meters northeast from the property line of the facility. This monitor is 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 D-4 summarizes other factors DAQ evaluated when choosing the location for the monitoring station.

Table D-4. Other considerations selection of the Semora DRR site

Factor	**Evaluation**
Long-term Site Commitment	CertainTeed was willing to provide Duke with a long-term lease agreement and has no plans 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 is inside a fenced area within the fenced area of the CertainTeed property so it is secured 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 were obtained.
Power	Overhead powerlines are located 27 meters north of the site.
Environmental Control	The monitoring shelter was placed with the door to the north so that sunlight does not shine in through the window and warm up the building.
Exposure	The monitoring station is at least 20 meters from the driplines of trees and is not 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 location: **CertainTeed Roxboro Wallboard Facility**, located at 921 Shore Road, 100 meters south of the 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 monitoring station, has not reported emitting any pollutants.
Proximity to Other Measurements	The monitoring station is located about 22 kilometers northwest of the Person County Airport and 21 kilometers north of the Bushy Fork ozone monitoring station.

ROY COOPER
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Director

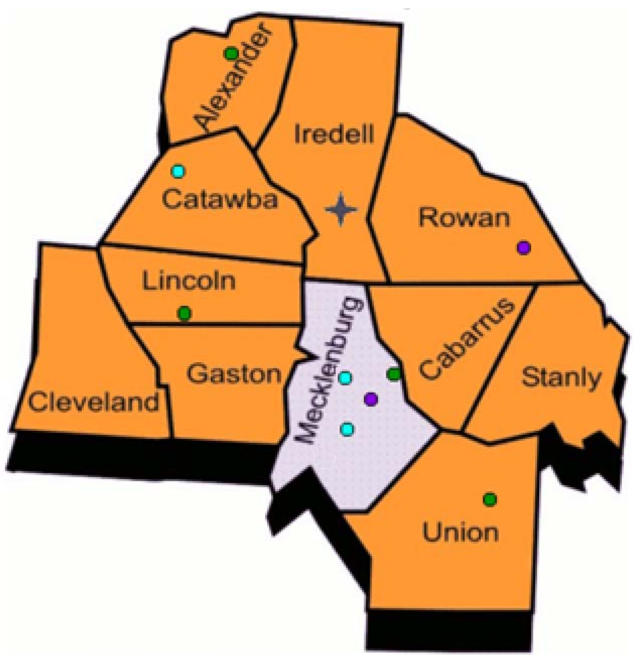
NORTH CAROLINA
Environmental Quality

2018-2019 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 2

Site Descriptions by Division of Air Quality Regional Office and Metropolitan Statistical Area

C. The Mooresville Monitoring Region



June 29, 2018

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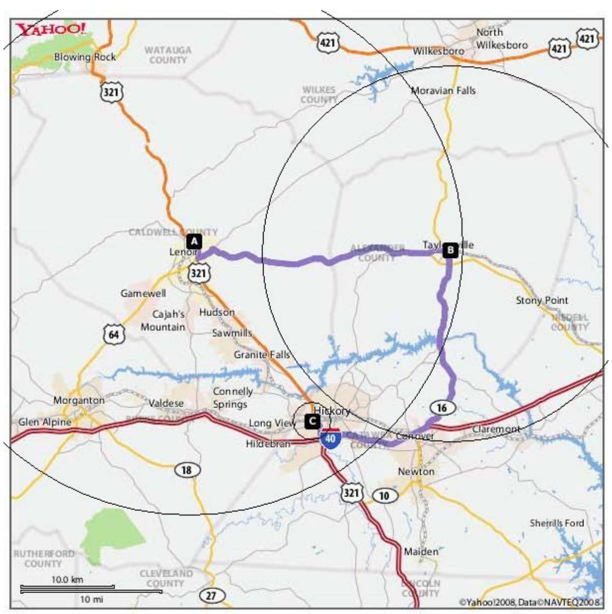
C. The Mooresville Monitoring Region

The Mooresville monitoring region, shown in Figure C1, consists of four areas: (1) the eastern portion of the Hickory-Lenoir-Morganton metropolitan statistical area, or MSA, (Alexander and Catawba counties), (2) Cleveland County, (3) the Charlotte MSA - Cabarrus, Gaston, Iredell, Lincoln, Mecklenburg, Rowan and Union counties and (4) Stanly County.

Figure C1. The Mooresville monitoring region
The dots show the approximate locations of most monitoring sites in this region

(1) Hickory-Lenoir-Morganton MSA

The Hickory-Lenoir-Morganton MSA consists of four counties: Alexander, Burke, Caldwell and Catawba County. The major urban areas are the Cities of Hickory, Lenoir and Morganton. The North Carolina Division of Air Quality, or DAQ, currently operates three monitoring sites in the Hickory-Lenoir-Morganton MSA. These sites are located at Taylorsville-Liledoun in Alexander County, Lenoir in Caldwell County and the Hickory Water Tower in Catawba County. The locations of these monitors are shown in Figure C2.



A is the Lenoir ozone monitoring site; B is the Taylorsville-Liledoun ozone monitoring site; C is the Hickory particle monitoring site. Circles around the monitors show the scale of representation: Lenoir is regional - 50 Km plus; Taylorsville Liledoun is urban - 4 to 50 Km; Hickory is neighborhood – 0.5 to 4 Km.

Figure C2. Locations of monitors in the Hickory-Lenoir-Morganton MSA

At the Taylorsville-Liledoun site, DAQ operates a seasonal ozone monitor and a rotating PM_{10} monitor that operates 12-months every third year. Figure C3 shows the site. Table C1 summarizes monitoring information for the site. Figure C4 through Figure C7 show views looking north, east, south and west. This site was established as the downwind site for the Hickory-Lenoir-Morganton MSA in 2013 to replace the Taylorsville-Waggin Trail site. The DAQ requested and received permission to combine the 2014 and 2015 data from the Liledoun site with the 2013 data from the Taylorsville site to provide a valid design value for recommended designations due in 2016. This site is the design value monitor for the MSA. 40 CFR 58 Appendix D requires the Hickory-Lenoir-Morganton MSA to have two ozone monitoring sites.

Figure C3. Taylorsville Liledoun ozone and particle monitoring site, 37-003-0005

Table C1. Site Table for Taylorsville-Liledoun

Site Name:	Taylorsville Liledoun			**AQS Site Identification Number:**		37-003-0005	
Location:	700 Liledoun Road, Taylorsville, North Carolina						
CBSA:	Hickory-Lenoir-Morganton, NC			**CBSA #:**		25860	
Latitude	35.9139	**Longitude**	-81.19	**Datum:**	WGS84	**Elevation**	365 meters
Parameter Name	**Method**			**Method Reference ID**	**Sample Duration**	**Sampling Schedule**	
Ozone	Instrumental with ultra violet photometry, 047			EQOA-0880-047	1-Hour	March 1 to Oct. 31	
PM10 total 0-10um STP	Met One Beta Attenuation BAM-1020, 122			EQPM-0798-122	1-hour	Year-round, every third year	
Date Monitor Established:	Ozone					Aug. 2, 2013	
	PM10 total 0-10um STP					March 23, 2016	

Table C1. Site Table for Taylorsville-Liledoun

Nearest Road:	Liledoun Road	Traffic Count:	7400	Year of Count:	2014

Parameter Name	Distance to Road	Direction to Road	Monitor Type	Statement of Purpose
Ozone	219 meters	Southeast	SLAMS	Real-time AQI reporting and forecasting. Compliance w/NAAQS.
PM10 total 0-10um STP	219 meters	Southeast	Special purpose	Prevention of significant deterioration, PSD, Modeling

Parameter Name	Monitoring Objective	Scale	Suitable for Comparison to NAAQS	Proposal to Move or Change
Ozone	General Background	Urban	Yes	None
PM10 total 0-10um STP	General Background	Urban	Yes	Will operate 7/1/2019 to 6/30/2020

Parameter Name	Meets Part 58 Requirements for:			
	Appendix A	Appendix C	Appendix D	Appendix E
Ozone	Yes	Yes	Yes	Yes
PM10 total 0-10um STP	Yes	Yes	No – not required	Yes

Parameter Name	Probe Height	Distance to Support	Distance to Trees	Obstacles
Ozone	3.65 meters	1.06 meters	> 20 meters	None
PM10 total 0-10um STP	2.3876 meters	2.032 meters	> 20 meters	None

Figure C4. Looking north from the Taylorsville-Liledoun site

Figure C6. Looking east from the Taylorsville-Liledoun site

Figure C5. Looking west from the Taylorsville-Liledoun site

Figure C7. Looking south from the Taylorsville-Liledoun site

The Taylorsville-Liledoun site was established on Aug. 2, 2013, after DAQ discovered in January 2013 that Alexander County planned to establish a vehicle maintenance facility at the Waggin Trail site. Because these construction plans, once implemented, made the Waggin Trail site unacceptable for ozone monitoring, DAQ identified the Taylorsville-Liledoun site for the ozone monitor. As shown in Figure C8, the Taylorsville-Liledoun site is located almost exactly one mile south of the former Waggin Trail site, behind the Alexander County Board of Education building, 700 Liledoun Road, Taylorsville. A meteorological tower is operated by the State Climate Office in the same area where the ozone monitor is located. The Waggin Trail and Taylorsville-Liledoun site operated simultaneously from Aug. 2 through Oct. 31, 2013.

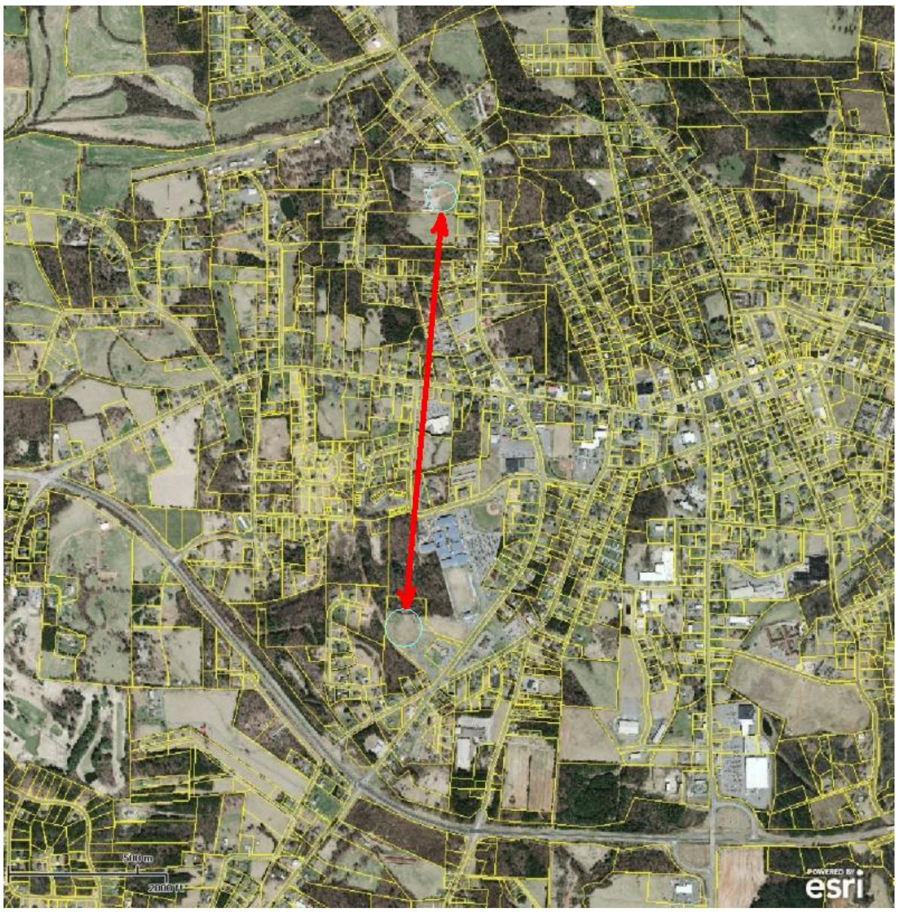


Figure C8. Relationship between old Waggin Trail site (to the north) and Taylorsville Liledoun site (to the south)

At **Lenoir,** 37-027-0003, the DAQ operates a seasonal ozone monitor, the second required ozone-monitor for the MSA. In 2013, DAQ added a special purpose sulfur dioxide monitor at Lenoir that operates every third year to provide data for prevention of significant deterioration, PSD, modeling for industrial expansion. The site is shown in Figure C9. Table C2 summarizes monitoring information for the site. Views looking north, northeast, east, southeast, south, southwest, west and northwest from the site are shown in Figure C10 to Figure C17.

Figure C9. Lenoir ozone and sulfur dioxide monitoring site

Table C2. Site Table for Lenoir

Site Name:	Lenoir	**AQS Site Identification Number:**	37-027-0003
Location:	291 Nuway Circle, Lenoir, North Carolina		
MSA:	Hickory-Lenoir-Morganton, NC	**CBSA #:**	25860

Latitude	35.935833	**Longitude**	-81.530278	**Datum:**	WGS84	**Elevation**	366 meters

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
Sulfur dioxide	Instrumental with pulsed fluorescence, 060	EQSA-0486-060	1-Hour	Year-round; every third year

Date Monitor Established:	Ozone	Jan. 1, 1981
	Sulfur dioxide	Jan. 1, 2013

Nearest Road:	Nuway Circle	**Traffic Count:**	500	**Year of Count:**	2015

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	146 meters	East	SLAMS	Real-time AQI reporting & fore-casting. Compliance w/NAAQS.
Sulfur dioxide	146 meters	East	Special purpose	Prevention of significant deterioration, PSD, Modeling

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable for Comparison to NAAQS**	**Proposal to Move or Change**
Ozone	General background	Regional	Yes	None
Sulfur dioxide	General background	Regional	Yes	None

Parameter Name	**Meets Part 58 Requirements:**			
	Appendix A	**Appendix C**	**Appendix D**	**Appendix E**
Ozone	Yes	Yes	Yes	Yes
Sulfur dioxide	Yes	Yes	Yes	Yes

Parameter Name	**Probe Height**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	4.42 meters	1.5748 meters	>20 meters	None
Sulfur dioxide	4.485 meters	1.5748 meter	>20 meters	None


Figure C10. Looking north from the Lenoir site


Figure C11. Looking northeast from the Lenoir site


Figure C12. Looking northwest from the Lenoir site


Figure C13. Looking west from the Lenoir site


Figure C14. Looking southwest from the Lenoir site


Figure C15. Looking east from the Lenoir site

Figure C16. Looking southeast from the Lenoir site

Figure C17. Looking south from the Lenoir site

Figure C18. Hickory fine particle monitoring site

At the Hickory site, the DAQ operates a one-in-six-day fine particle collocated federal reference method, FRM, monitor and a continuous fine particle monitor. The one-in-six-day speciation fine particle SASS and University Research Glass, URG, monitors and the two one-in-six-day high volume PM10 monitors were shut down in 2014. In 2015 a second continuous fine particle monitor that recently received equivalency status was added to the site so DAQ could evaluate its performance. On Jan. 1, 2017, the DAQ made the second continuous monitor the primary monitor and shut down the primary FRM monitor at the site. Figure C18 through Figure C26 show the site as well as views looking north, northeast, east, southeast, south, southwest, west and northwest. Table C3 summarizes monitoring information for the site.

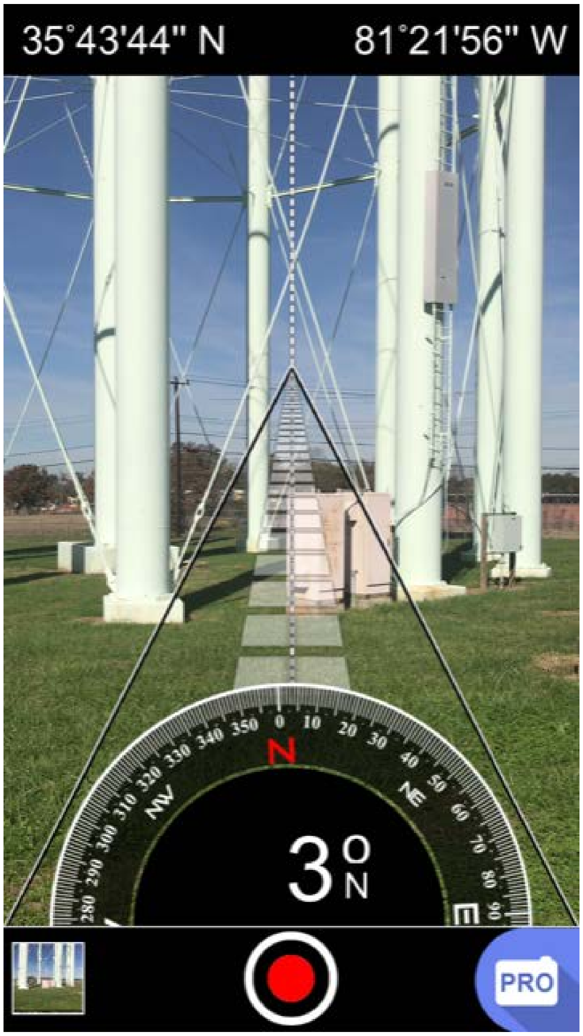


Figure C19. Looking north from the Hickory site

Figure C20. Looking northwest from the Hickory site

Figure C21. Looking northeast from the Hickory site

Figure C22. Looking east from the Hickory site

Figure C23. Looking west from the Hickory site

Figure C24. Looking southeast from the Hickory site

Figure C25. Looking southwest from the Hickory site

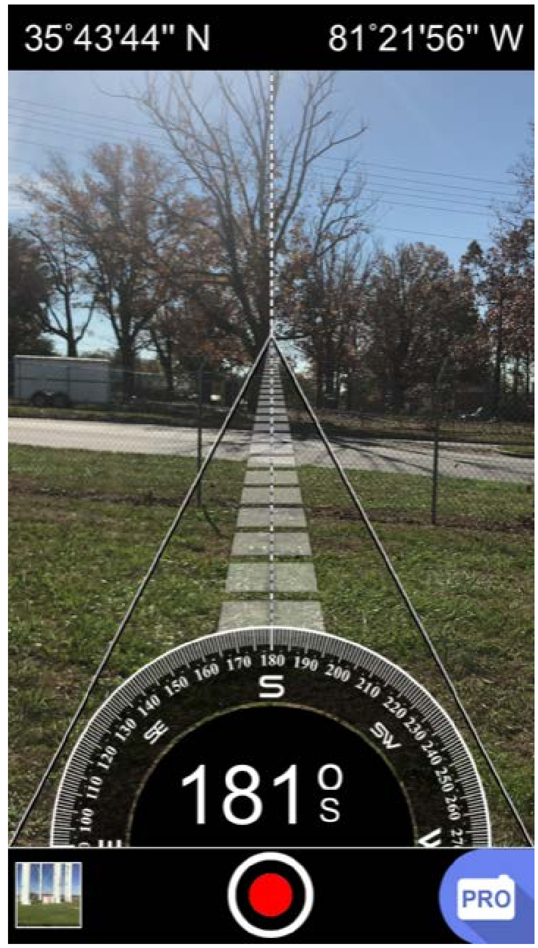


Figure C26. Looking south from the Hickory site

Table C3. Site Table for Hickory

Site Name:	Hickory		**AQS Site Identification Number**		37-035-0004
Location:	1650 1st Street, Hickory, North Carolina				
MSA:	Hickory-Lenoir-Morganton, NC			**CBSA #:**	25860
Latitude	35.728889	**Longitude**	-81.365556	**Datum:**	WGS84
Elevation	333 meters				

Table C3. Site Table for Hickory

Parameter Name	Method	Method Reference ID	Sample Duration	Sampling Schedule
PM 2.5 local conditions, FRM	R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC – Gravimetric Analysis	RFPS-1006-145	24-Hour	Every sixth day, Year-round
PM 2.5 local conditions, BAM 1022	Met One BAM-1022 Mass Monitor w/ VSCC	EQPM-1013-209	1-Hour	Year Round

Date Monitor Established:		
	PM 2.5 Local Conditions	Jan. 1, 1999
	PM 2.5 local conditions, BAM 1022	Sept. 14, 2015

Nearest Road:	2nd Avenue SW	Traffic Count:	3400	Year of Count:	2013

Parameter Name	Distance to Road	Direction to Road	Monitor Type	Statement of Purpose
PM 2.5 local conditions, FRM	22.25 meters	South southeast	SLAMS, QA Collocated	Compliance w/NAAQS. AQI reporting. SIP required monitor.
PM 2.5 local conditions, BAM 1022	21.34 meters	South southeast	SLAMS	Compliance w/NAAQS. AQI reporting. SIP required monitor.

Parameter Name	Monitoring Objective	Scale	Suitable for Comparison to NAAQS	Proposal to Move or Change
PM 2.5 local conditions, FRM	Population Exposure	Neighborhood	Yes	None
PM 2.5 local conditions, BAM 1022	Population Exposure	Neighborhood	No	None

Parameter Name	Meets Part 58 Appendix A Requirements	Meets Part 58 Appendix C Requirements	Meets Part 58 Appendix D Requirements	Meets Part 58 Appendix E Requirements
PM 2.5 local conditions, FRM	Yes	Yes	Yes	Yes
PM 2.5 local conditions, BAM 1022	Yes	Yes	Yes	Yes

Parameter Name	Probe Height	Distance to Support	Distance to Trees	Obstacles
PM 2.5 local conditions, FRM	2.3368 meters	2.0574 meters	>20 meters	None
PM 2.5 local conditions, BAM 1022	2.4892 meters	2.1082 meters	>20 meters	None

Both one-in-six-day PM_{10} monitors were shut down on Dec. 31, 2014. The PM_{10} monitor was not required by 40 CFR 58 Appendix D, the DAQ did not use the PM_{10} data from this site for permit modeling and the monitor was no longer needed to ensure an adequate PM10 network. The United States Environmental Protection Agency, or EPA, ended the funding for the analysis of the SASS and URG samples in January 2015. Thus, the DAQ also shut down these monitors in 2014. At the end of December 2015, the well impactor ninety-six, or WINS, on the FRM was replaced with a very sharp cut cyclone, or VSCC. This change was made because the VSCC is easier and less expensive to maintain.

The Hickory-Lenoir-Morganton MSA did not need to do lead monitoring to meet the 2010 **lead monitoring** requirements. It has no facilities within the MSA reporting over one half tons of lead emissions to the air. [1]

[1] United States Environmental Protection Agency. 2015 Toxic Release Inventory, released March 2017, available on the worldwide web at https://iaspub.epa.gov/triexplorer/tri_release.chemical..

The 2015 **ozone monitoring** requirements do not require additional monitors in the Hickory-Lenoir-Morganton MSA. The MSA has the minimum number of monitors required by 40 CFR 58 Appendix D for population exposure monitoring in urban areas. Seasonal ozone monitoring started on March 1 instead of April 1 beginning in 2017.

The Hickory-Lenoir-Morganton MSA did not need additional monitors to comply with the 2010 **nitrogen dioxide monitoring** requirements. It is too small to require area-wide monitors or near roadway monitoring.

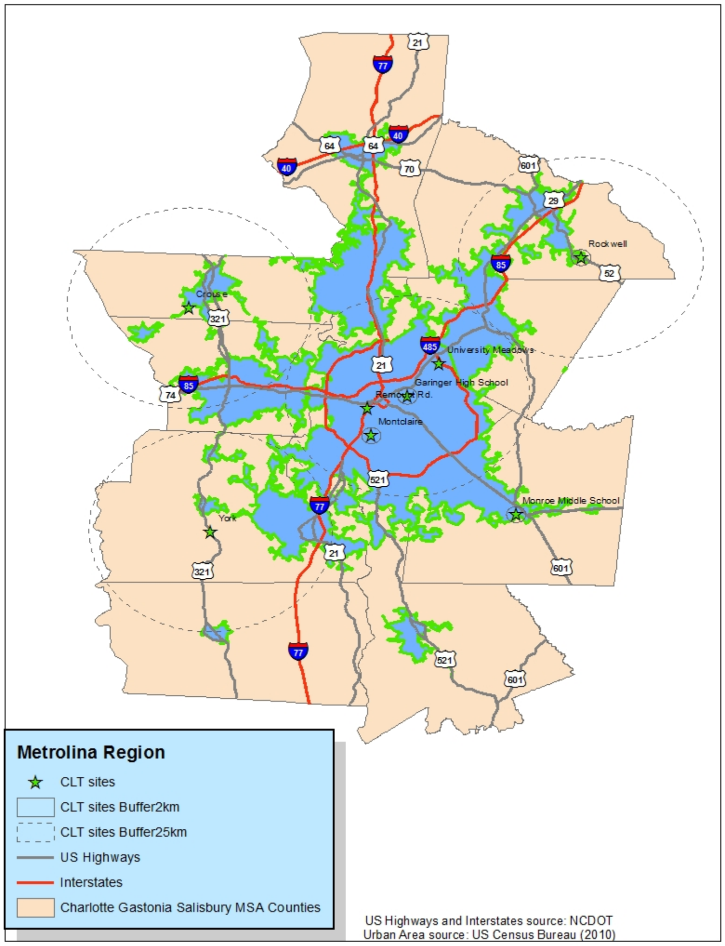
The DAQ will not need to add source-oriented monitors in the Hickory-Lenoir-Morganton MSA to comply with the 2010 **sulfur dioxide monitoring** requirements for source-oriented monitoring. No additional monitors were required to comply with the population weighted emission index, PWEI, monitoring requirements because the total sulfur dioxide emissions in this MSA multiplied by the total MSA population does not result in a high enough index to require monitoring. This area will also not be required to operate near road **carbon monoxide** and **fine particle** monitors because the population is under one million.

(2) Cleveland County – Shelby Micropolitan Statistical Area

Cleveland County is part of the Charlotte-Concord combined statistical area. The micropolitan statistical area of Shelby is in the county. The DAQ currently does not operate any monitors in Cleveland County. The December 2010 revisions to the **lead monitoring** network regulations did not result in additional monitoring in Cleveland County. This county is not required to add ozone monitors because the area does not have any MSAs that must meet the minimum number of monitors required by 40 CFR 58 Appendix D for population exposure monitoring in urban areas. Cleveland County is too small to require area-wide nitrogen dioxide monitors or near roadway monitoring for nitrogen dioxide, carbon monoxide and fine particles. The 2010 **sulfur dioxide** monitoring requirements also did not result in additional monitoring in this area because there are no large sources of sulfur dioxide in this county. This county is also not required to monitor for **carbon monoxide** because the population is too small to require near road carbon monoxide monitoring.

(3) Charlotte-Gastonia-Concord MSA

The Charlotte-Gastonia-Concord MSA consists of 10 counties: Cabarrus, Gaston, Iredell, Lincoln, Mecklenburg, Rowan and Union in North Carolina and Chester, Lancaster and York in South Carolina. The major urban areas are Charlotte, Gastonia and Concord in North Carolina and Rock Hill in South Carolina. This MSA is one of the fastest growing areas in North Carolina. Currently DAQ operates three monitoring sites in the Charlotte-Gastonia-Concord MSA, Mecklenburg County Air Quality, MCAQ, operates four and the South Carolina Department of Health and Environmental Conservation, DHEC, operates one. These sites are located at Crouse in Lincoln County, Remount Road, Garinger High School, University Meadows and Montclaire in Charlotte in Mecklenburg County, Rockwell in Rowan County, Monroe in Union County and York in York County, South Carolina. The locations of these monitors are shown in Figure C27.



University Meadows, Crouse Monroe, Rockwell and York are ozone sites; Montclaire is a particle site; Remount Road is a multipollutant near-road site; Garinger High School is a multi-pollutant site. The circles approximate the scale of representation: urban – 4 to 50 Km for Crouse, Rockwell, York and University Meadows; microscale - ~10 to 100 meters for Remount Road and neighborhood – 0.5 to 4 Km for the other sites.

Figure C27. Monitoring sites in the Charlotte-Concord-Gastonia MSA

The DAQ shut down the **Enochville** seasonal ozone monitor in Rowan County at the end of the 2013 ozone season and the Grier Middle School fine particle monitoring site in Gaston County in February 2015. At the end of the 2014 ozone season MCAQ was evicted from the Arrowood site in Mecklenburg County and at the end of the 2015 ozone season MCAQ was evicted from the County Line site also in Mecklenburg County. Mecklenburg County Air Quality established the University Meadows site on April 1, 2016, to replace the County Line site. MCAQ also shut down the Fire Station #11 PM10 site on June 29, 2016, due to issues at the site and the Oakdale fine particle monitoring site at the end of 2016 so the monitor could be moved to the Remount Road near-road site. The DAQ shut down the **Grier Middle School** site on Feb. 25, 2015. The NAAQS and AQI monitors were not required by 40 CFR 58 Appendix D, the DAQ no longer needed the continuous monitor at the site for air quality forecasting and because of the lower fine particle concentrations throughout the state, the monitors were no longer needed to ensure an adequate fine particle network. The MCAQ sites and monitors are discussed in Appendix B to

Volume 1. Only the three DAQ sites (Crouse in Lincoln County, Rockwell in Rowan County and Monroe in Union County) are further discussed in this subsection.

At the **Crouse** site in Lincoln County, the DAQ operates a seasonal ozone monitor. The site is shown in Figure C28. Monitoring information for the site is summarized in Table C4. Views looking north, northeast, east, southeast, south, southwest, west and northwest are provided in Figure C29 through Figure C36. The site was originally established in 1993 as the secondary downwind site for the Charlotte-Concord-Gastonia MSA. Today it provides valuable information on ozone concentrations in Lincoln County and could be useful for keeping parts of the county from being designated as in nonattainment with the ozone standard.

Figure C28. Crouse ozone monitoring site

Table C4. Site Table for Crouse

Site Name:	Crouse		**AQS Site Identification Number**		37-109-0004
Location:	1487 Riverview Road, Lincolnton, North Carolina				
CBSA:	Charlotte-Gastonia-Concord, NC-SC		**CBSA #:**		16740
Latitude	35.438556	**Longitude**	-81.276750	**Datum:**	WGS84
Elevation	270 meters				

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	April 1 to Oct. 31
Date Monitor Established:	Ozone			July 1, 1993

Nearest Road:	Riverview Road	**Traffic Count:**	1400	**Year of Count:**	2013

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	62 meters	Southwest	SLAMS	Compliance w/NAAQS. Real-time AQI reporting & forecasting.

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable for Comparison to NAAQS**	**Proposal to Move or Change**
Ozone	General background	Urban	Yes	Season will start March 1 in 2017

Parameter Name	**Meets Requirements of 40 CFR Part 58**			
	Appendix A	**Appendix C**	**Appendix D**	**Appendix E**
Ozone	Yes	Yes	Yes	Yes

Parameter Name	**Probe Height (m)**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	3.5	1.3 meter	>20 meters	None

Figure C29. Looking north from the Crouse site

Figure C30. Looking northwest from the Crouse site

Figure C31. Looking northeast from the Crouse site

Figure C32. Looking east from the Crouse site

Figure C33. Looking west from the Crouse site

Figure C34. Looking southwest from the Crouse site

Figure C35. Looking southeast from the Crouse site

Figure C36. Looking south from the Crouse site

At **Rockwell** DAQ operates a year-round ozone monitor. The continuous fine particle nitrate monitor and aethalometer as well as a reactive-oxides-of-nitrogen monitor that operated year-round at this site were shut down in 2016. The DAQ operated these monitors to provide information for planning purposes and to evaluate state regulations. These monitors were not required by 40 CFR 58 Appendix D or any other EPA regulations. Due to staffing considerations, the age of the equipment and the decision that additional data provided by these monitors were not needed for planning purposes, the DAQ shut down the aethalometer on Aug. 8, 2016, because the monitor was broken and removed from service, the reactive oxides of nitrogen monitor on Nov. 3, 2016, and the nitrate monitor on Nov. 4, 2016.

The one-in-three-day fine particle FRM monitor, one-in-six day collocated fine particle monitor and continuous fine particle monitor were shut down at the end of 2015. The one-in-six-day speciation fine particle monitors were shut down in January 2015 because the EPA stopped funding the sample analysis for them.

Sometime in 2018 the DAQ plans to add a nitrogen dioxide monitor and a continuous fine particle monitor to the site. Pictures of the site as well as views looking north, northeast, east, southeast, south, southwest, west and northwest are provided in Figure C37 through Figure C45. Monitoring information for the site is summarized in Table C5.

Figure C37. The Rockwell ozone site, 37-159-0021

Figure C38. Looking north from the Rockwell site


Figure C39. Looking northwest from the Rockwell site


Figure C40. Looking northeast from the Rockwell site

Figure C41. Looking east from the Rockwell site

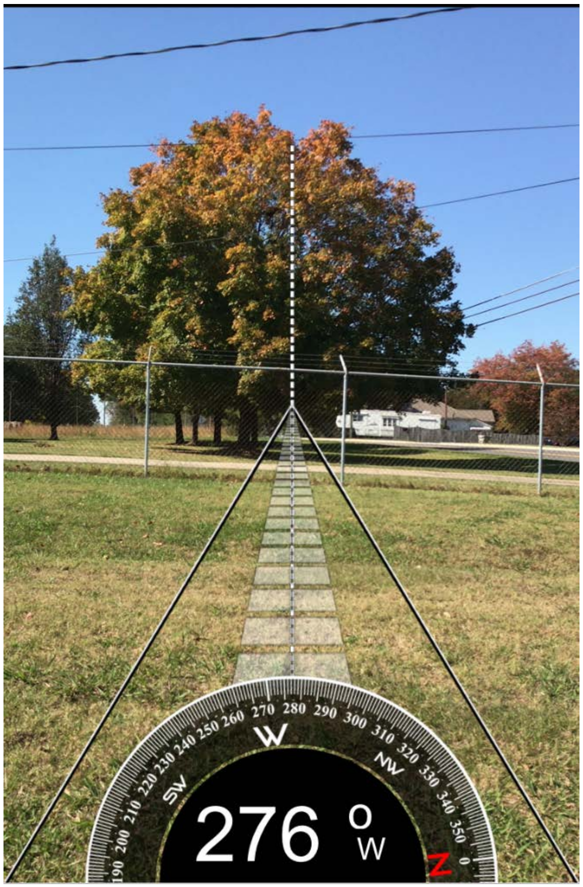


Figure C42. Looking west from the Rockwell site

Figure C43. Looking southwest from the Rockwell site

Figure C44. Looking southeast from the Rockwell site

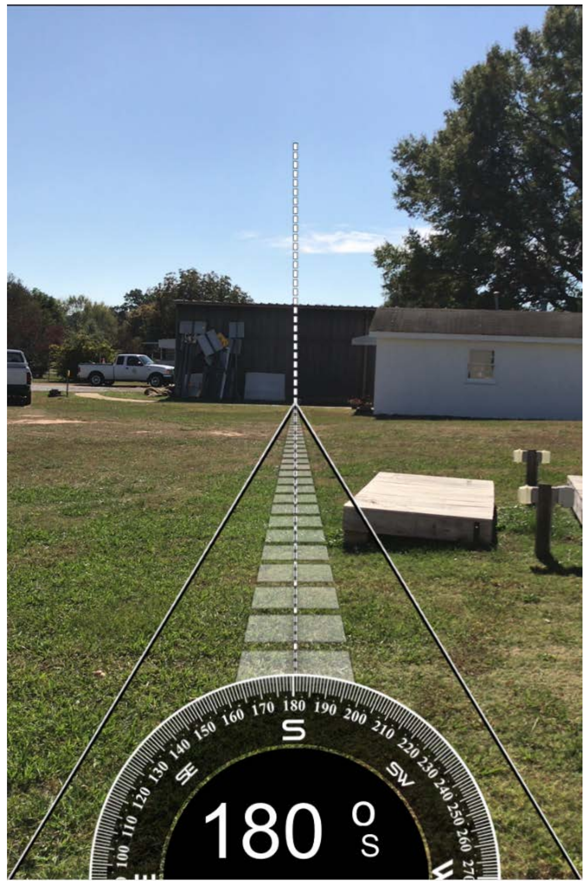


Figure C45. Looking south from the Rockwell site

Table C5. Site Table for Rockwell

Site Name:		Rockwell	**AQS Site Identification Number**		37-159-0021
Location:		316 West Street, Rockwell, North Carolina			
CBSA:	Charlotte-Gastonia-Concord, NC-SC		**CBSA #:**		16740
Latitude	35.551868	**Longitude**	-80.395039	**Datum:**	WGS84
Elevation	240 meters				

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	Year-round
Date Monitor Established:	Ozone			April 1, 1993

Nearest Road:	Gold Hill Road		
Traffic Count:	630	**Year of Count:**	2014

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	17 meters	North	Special purpose	Ozone precursor monitoring. Compliance w/NAAQS. Modeling.

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable to Compare to NAAQS**	**Proposal to Move or Change**
Ozone	Highest concentration	Urban	Yes	None

Parameter Name	**Meets Part 58 Requirements for:**			
	Appendix A	**Appendix C**	**Appendix D**	**Appendix E**
Ozone	Yes	Yes	No requirements	Yes

Parameter Name	**Probe Height (m)**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	3.5	1.1 meters	> 20 meters	None

At the **Monroe Middle School** site, the DAQ operates a seasonal ozone monitor. Figure C46 shows the site. Table C6 summarizes monitoring information for the site. Figure C47 through Figure C50 provide views looking north, east, south and west. This ozone-monitoring site is one of six for the MSA. 40 CFR 58 Appendix D requires the Charlotte-Gastonia-Concord MSA to have two ozone monitoring sites. The site is located at the goal end of a soccer field so soccer balls sometimes damage the probe. The DAQ has investigated moving the site to another part of Monroe; however, this site meets the siting criteria in 40 CFR 58 Appendix E better than any nearby alternative location. The DAQ has also added a fence on the roof of the building between the probe and soccer field to protect the probe.

Figure C46. Monroe ozone monitoring site, 37-179-0003

Table C6. Site Table for Monroe Middle School

Site Name:	Monroe Middle School			**AQS Site Identification Number**	37-179-0003
Location:	701 Charles Street, Monroe, North Carolina				
CBSA:	Charlotte-Gastonia-Concord, NC-SC			**CBSA #:**	16740
Latitude	34.973889	**Longitude**	-80.540833	**Datum:**	WGS84
Elevation	184 meters				

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31

Date Monitor Established:	Ozone	April 7, 1999

Nearest Road:	Charles Street	**Traffic Count:**	5100	**Year of Count:**	2014

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	71.3 meters	West	Special Purpose	Compliance w/NAAQS. Real-time AQI reporting & forecasting.

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable for Comparison to NAAQS**	**Proposal to Move or Change**
Ozone	Population Exposure	Neighborhood	Yes	None

Table C6. Site Table for Monroe Middle School

Parameter Name	Meets Part 58 Appendix A Requirements	Meets Part 58 Appendix C Requirements	Meets Part 58 Appendix D Requirements	Meets Part 58 Appendix E Requirements
Ozone	Yes	Yes	Yes	Yes

Parameter Name	Probe Height (m)	Distance to Support	Distance to Trees	Obstacles
Ozone	3.9	1 meter	>20 meters	None

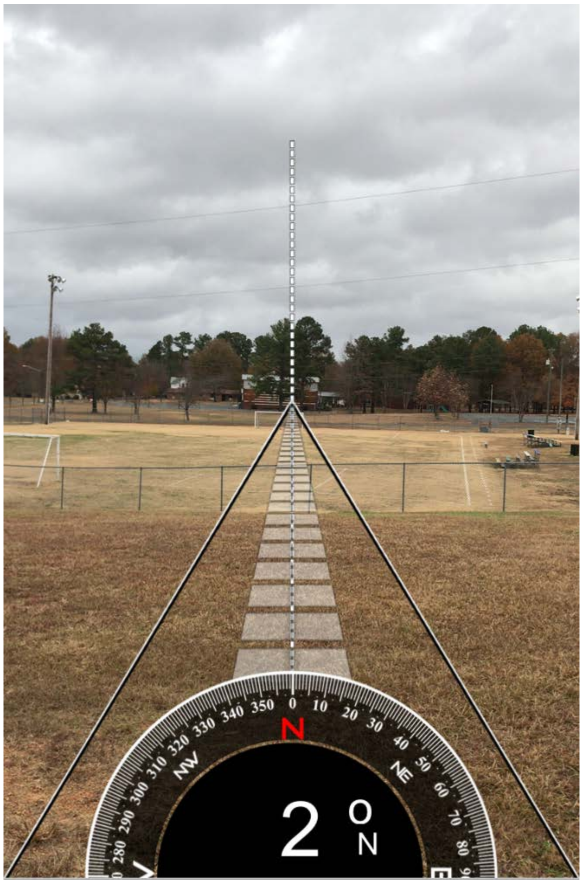


Figure C47. Looking north from the Monroe site

Figure C48. Looking east from the Monroe site

Figure C49. Looking west from the Monroe site

Figure C50. Looking south from the Monroe site

The DAQ continues to operate the Monroe site because it provides valuable information for developing nonattainment boundaries and has been used in the past to keep parts of Union County from being designated as in nonattainment with the ozone standard.

Changes to the **lead monitoring** requirements in 2010 resulted in additional monitoring in the Charlotte-Gastonia-Concord MSA. This MSA has an NCore monitoring site and began monitoring at that site for lead in the ambient air Dec. 27, 2011. This lead monitoring ended on April 30, 2016, when new monitoring regulations became effective.[2]

The 2015 **ozone monitoring** requirements did not result in additional monitoring in the Charlotte-Gastonia-Concord MSA. The MSA currently exceeds the minimum number of monitors required by 40 CFR 58 Appendix D for population exposure monitoring in urban areas. Seasonal ozone monitoring will start on March 1 instead of April 1 beginning in 2017.

The 2010 **nitrogen dioxide** monitoring requirements required additional monitoring in the Charlotte-Gastonia-Concord MSA. The MSA is required to have an area-wide monitor starting in 2013 and a near-roadway monitor starting in 2014. The 2010 **sulfur dioxide** monitoring

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

requirements also required additional monitoring in the Charlotte-Gastonia-Concord MSA. Originally, the EPA required this MSA to have two population-weighted emission index, or PWEI, monitors within the MSA because the MSA had large sources of sulfur dioxide as well as large numbers of people. These PWEI monitors were located at the Garinger High School monitoring site in Charlotte and at the York monitoring site in York, South Carolina. However, a decline in sulfur dioxide emissions result in only one PWEI monitor being required. Thus, the York sulfur dioxide monitor was shut down in June 2014. The changes in the **carbon monoxide monitoring** requirements also resulted in more monitoring in this MSA. Because the population in the MSA is over one million people, a near road carbon monoxide monitor started operating at Remount Road in 2017.

(4) Stanly County – Albemarle Micropolitan Statistical Area

Stanly County is part of the Charlotte- Concord combined statistical area. The Albemarle micropolitan statistical area is in Stanly County. The DAQ does not operate any monitoring sites in this county.

The expansion of the **lead monitoring** network to support the lower lead NAAQS did not result in monitoring in Stanly County. The 2015 **ozone monitoring** requirements also did not result in more monitoring in this area. This area does not have any MSAs requiring a minimum number of monitors by 40 CFR 58 Appendix D for population exposure monitoring in urban areas.

The 2010 **nitrogen dioxide** monitoring requirements did not result in additional monitoring in Stanly County. The area is too small to require area-wide monitors or near roadway monitoring. The 2010 **sulfur dioxide** monitoring requirements did not require any additional monitoring in this area because the population and sulfur dioxide emissions do not exceed the required threshold for monitoring. The 2011 changes to the **carbon monoxide monitoring** requirements also did not require additional monitors in this area because the population is too small.

Appendix C.1 Annual Network Site Review Forms for 2017

Taylorsville-Liledoun

Lenoir

Hickory

Crouse

Rockwell

Monroe Middle School in Monroe

Site Review Form Calendar Year 2017

Site Information

Region MRO	**Site Name** Taylorsville Liledoun	**AQS Site # 37-003-0005**
Street Address-700 Liledoun Road		**City** Taylorsville
Urban Area Not in an Urban Area	**Core-based Statistical Area** Hickory-Lenoir-Morganton, NC	
Enter Exact		
Longitude -81.1910	**Latitude** 35.9138	**Method of Measuring**
In Decimal Degrees	In Decimal Degrees	___ **Explanation: Google maps**
Elevation Above/below Mean Sea Level (in meters)		362

Name of nearest road to inlet probe Liledoun Road ADT 6400 Year Choose an item 2016

Comments: Used

http://ncdot.maps.argis.com/apps/webappviewer/index.html?id=5f6fe58c1d90482ab9107ccc()3026280

Distance of site to nearest major road (m) 526 Direction from site to nearest major road SW

Name of nearest major road Highway 64 ADT 8400 Year 2016

Comments: Used

http://ncdot.maps.argis.com/apps/webappviewer/index.html?id=5f6fe58c1d90482ab9107ccc()3026280

Site located near electrical substation/high voltage power lines?	Yes ☐ No X
Distance of site to nearest railroad track	(m) 2152 Direction to RR NE X NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) ____ Direction ___
Distance between site and drip line of water tower (m) ______ Direction from site to water tower ____________ X NA	

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

None Noted.

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ X O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (trace-level)	X General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☐ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood_____ X Urban_____ ☐ Regional_____	X SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes X No ☐ Give actual measured height from ground (meters) 3.65

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes X No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.06

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes X No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes X *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No X

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 219 Direction from probe to nearest traffic lane SE

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM X PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☐ PM2.5 Cont. (BAM)	X General/Background _____ ☐ Highest Concentration _____ ☐ Population Exposure _____ ☐ Source Oriented _____ ☐ Transport _____ ☐ Welfare Related Impacts _____	☐ Micro _____ ☐ Middle _____ ☐ Neighborhood _____ X Urban _____ ☐ Regional _____	☐ SLAMS _____ X SPM_____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ X 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) 2.3876

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.032 Yes X No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA X

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☐ NA X

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) _____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No X NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes X *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No X

*Identify obstacle ____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 219 Direction from probe to nearest traffic lane SE

RECOMMENDATIONS:

1) Maintain current site status? Yes X *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective _____) No ☐-
*3) Change scale of representativeness? Yes ☐ (enter new scale) No ☐
*4) Relocate site? Yes ☐ No ☐

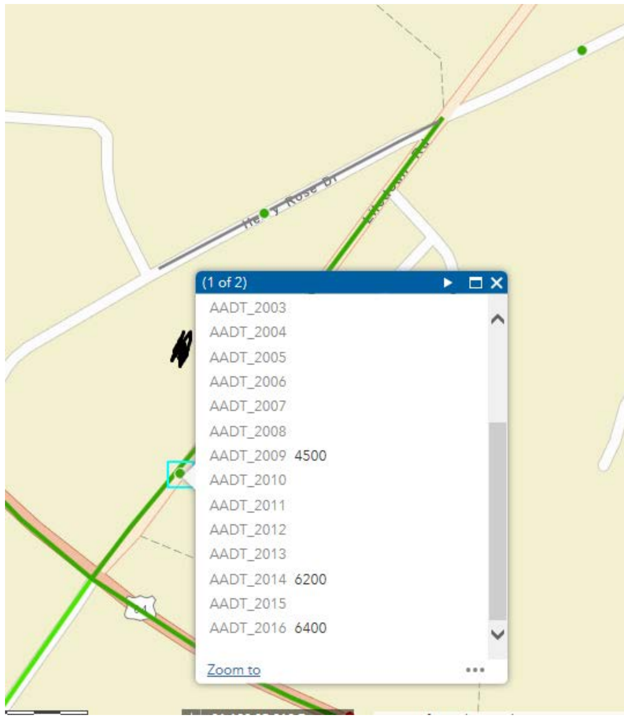
Comments: PM10 BAM shutdown was on 4/3/2017.

Date of Last Site Pictures 10/28/16 New Pictures Submitted? Yes ☐ No X

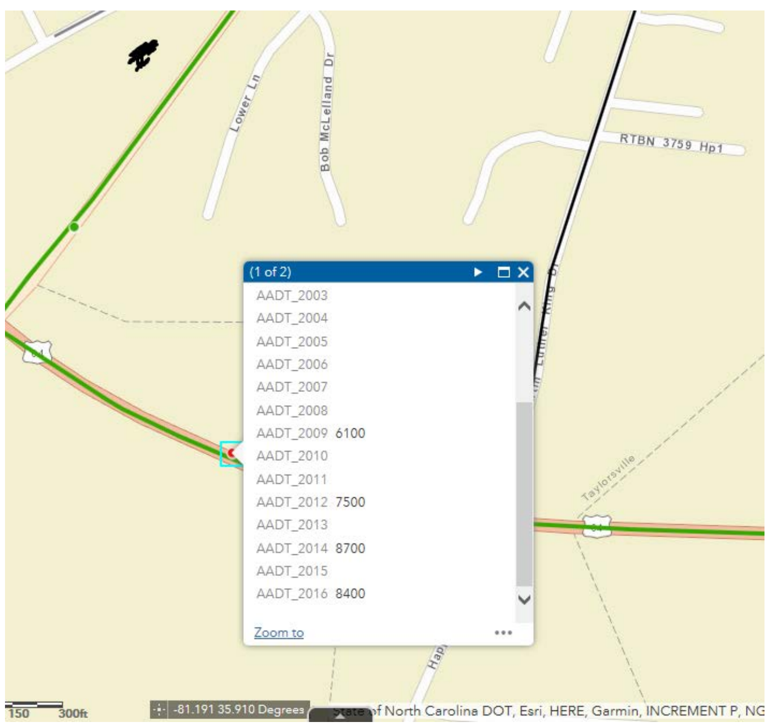
Reviewer Robert Jay Papuga Date November 8, 2017

Ambient Monitoring Coordinator D. Manning Date December 11, 2017

Joette Steger



2016 Annual Average Daily Traffic, AADT, for Liledoun Road, black mark represents the location of the Taylorsville-Liledoun monitoring station
AADT obtained from the North Carolina Department of Transportation Traffic Survey Unit



2016 Annual Average Daily Traffic, AADT, for Highway 64, black mark represents location of the Taylorsville-Liledoun monitoring station
AADT obtained from the North Carolina Department of Transportation Traffic Survey Unit

Site Review Form Calendar Year 2017

Site Information

Region ARO	**Site Name** Lenoir	**AQS Site # 37-027-0003**
Street Address-291 Nuway Circle		**City Lenoir**
Urban Area LENOIR	**Core-based Statistical Area** Hickory-Lenoir-Morganton, NC	

Enter Exact		**Method of Measuring**	
Longitude -81.530614	**Latitude** 35.935934		
In Decimal Degrees	In Decimal Degrees	___	**Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		**372**	

Name of nearest road to inlet probe Nuway Circle ADT 500 Year Choose an item2015
Comments: NCDOT Traffic volume map
Distance of site to nearest major road (m) 146.00 Direction from site to nearest major road E
Name of nearest major road Hwy 321 ADT 23000 Year Choose an item2015
Comments: NCDOT Traffic volume map

Site located near electrical substation/high voltage power lines?	Yes ☒ No ☐
Distance of site to nearest railroad track	(m) 1016 Direction to RR WSW ☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) 73 Direction ENE
Distance between site and drip line of water tower (m) ______ Direction from site to water tower ______	☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☒ Ozone (O_3)	☒General/Background ☐Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☐Urban ☒Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4.445
Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 2.1082
Distance of outer edge of probe inlet from other gas monitoring probe inlets > 0.25 m? Yes ☒ No ☐ NA ☐
Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____
Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐
Distance of probe to nearest traffic lane (m) 146 Direction from probe to nearest traffic lane E

Site Review Form Calendar Year 2017

OZONE MONITOR RECOMMENDATIONS:

1) Maintain current monitor status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate monitor? Yes ☐ No ☐

Comments: _____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ SO_2 (DRR) ☒ SO_2 (NAAQS) ☐ SO_2 (trace-level)	☐ General/Background ☐ Highest Concentration ☒ Population Exposure ☐ Source Oriented ☐ Transport ☐ Upwind Background ☐ Welfare Related Impacts	☐ Micro ☐ Middle ☐ Neighborhood ☒ Urban ☐ Regional	☐ INDUSTRIAL ☒ SLAMS ☐ SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4.4704

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 2.1082

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☐ No ☒ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 146 Direction from probe to nearest traffic lane E

SULFUR DIOXIDE MONITOR RECOMMENDATIONS:

1) Maintain current monitor status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate monitor? Yes ☐ No ☐

Comments: Distance between SO2 and O3 probes is .483 meters.

Date of Last Site Pictures 10/10/16 New Pictures Submitted? Yes ☐ No ☒

Reviewer Terri Davis Date November 6, 2017

Ambient Monitoring Coordinator ____________ Date _____

Revised 2018-05-09 Joette Steger, May 9, 2018

Site Review Form Calendar Year 2017

Site Information

Region MRO	**Site Name** Hickory	**AQS Site #** 37-035-0004	
Street Address-1st Ave. SW at 15th St.SW		**City** Hickory	
Urban Area HICKORY		**Core-based Statistical Area** Hickory-Lenoir-Morganton, NC	
Enter Exact		**Method of Measuring**	
Longitude 81.3657	**Latitude** 35.7289		
In Decimal Degrees	In Decimal Degrees	**Other (explain)**	**Explanation:** Google Maps
Elevation Above/below Mean Sea Level (in meters)		343	

Name of nearest road to inlet probe 2nd Ave.SW ADT Latest available 3400 Year 2015

Distance of ozone probe to nearest traffic lane (m) 22 Direction from inlet to nearest traffic lane SSE

Comments: Used http://ncdot.maps.argis.com/apps/webappviewer/index.html?id=5f6fe58c1d90482ab9107ccc()3026280

Name of nearest major road HWY 321 ADT 36000 Year latest available 2015

Distance of site to nearest major road (m) 162.45 Direction from site to nearest major road ENE

Comments: Used http://ncdot.maps.argis.com/apps/webappviewer/index.html?id=5f6fe58c1d90482ab9107ccc()3026280

Site located near electrical substation/high voltage power lines?	Yes ☒ No ☐
Distance of site to nearest railroad track	(m) 227Direction to RR N ☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) 32 Direction E
Distance between site and drip line of water tower (m) 15 Direction from site to water tower NW ☐NA	

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

None Noted.

Instructions:

Address: Sometimes local addresses change. Confirm the local address of the site using a 911 locator or the address used by the local utility company, community or county to identify the site location.

Urban Area: If the monitor is located within the bounds of an urban area (an incorporated area with a population of 10,000 or more people), select the appropriate urban area from the list. Otherwise select "Not in an Urban Area".

Core-Based Statistical Area (CBSA): If the monitor is located within a county that is part of a metropolitan statistical area (MSA) or a micropolitan statistical area (MiSA), then it is located within a core-based statistical area. If the monitoring station is located in a county included in a MSA or MiSA, select the appropriate CBSA from the list. Otherwise select "None".

Longitude and Latitude: The longitude and latitude should be entered in decimal degrees. Use a conversion program, such as http://transition.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html, to convert to decimal degrees.

Road Information: For the nearest road to the inlet probe, list whatever roadway that carries vehicles that is closest to the probe, whether or not it is a named or public road and even if the road has very little traffic. Use the comments space if necessary to describe the road or the source of the annual average daily traffic (AADT) counts. If the monitor is located near an unnamed, little used, private road, use the nearest major road space to list the closest named public road to the site. Include the distance and direction of the nearest major road from the site as well as the AADT if it is available. If the closest road is a small public road but there is a large major roadway such as an interstate highway, divided highway, major thoroughfare, etc., near the monitoring station use the nearest major road space to list the information about this major roadway. Include the distance and direction of the major road from the site as well as the AADT. The AADT for state roads can be obtained from the North Carolina Division of Transportation at http://www.ncdot.gov/travel/statemapping/trafficvolumemaps/default.html. For AADT values for local roadways contact the appropriate local governments.

Any Sources of Potential Bias: Use this space to record any information about the site that is not requested elsewhere. Especially note any changes to the site that occurred near the site in the past year, such as road construction, building construction, new businesses, businesses closing, or changes in traffic patterns, crops or other agricultural activities.

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Monitor Type
Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☐General/Background____ ☐Highest Concentration____ ☒Population Exposure____ ☐Source Oriented____ ☐Transport____ ☐Welfare Related Impacts ____	☐Micro____ ☐Middle____ ☒Neighborhood ____ ☐Urban____ ☐Regional____	☒SLAMS ____ ☐SPM____ ☐ Nonregulatory____

Probe inlet height (from ground) ☐ < 2 m ____ ☒ 2-7m ____ ☐ 7-15 m ____ ☐ > 15 m____
Actual measured distance from probe inlet to ground (meters) FRM 2.3368, BAM 2.4892

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) FRM 2.0574, BAM 2.1082

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☒ (answer *'d questions) No ☐ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 1 to 4 m of each other? Yes ☒ No ☐
Give actual (meters): FRM and BAM = 2.286
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐
Give actual (meters): FRM and BAM = 0.1524

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☐ NA ☒

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters ____
*Distance from probe to closest tree (m) ____ Direction from probe to tree ____ *Height of tree above probe (m) ____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) ____Direction from probe inlet to obstacle ____
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures: November 17, 2017 New Pictures Submitted? Yes ☒ No ☐

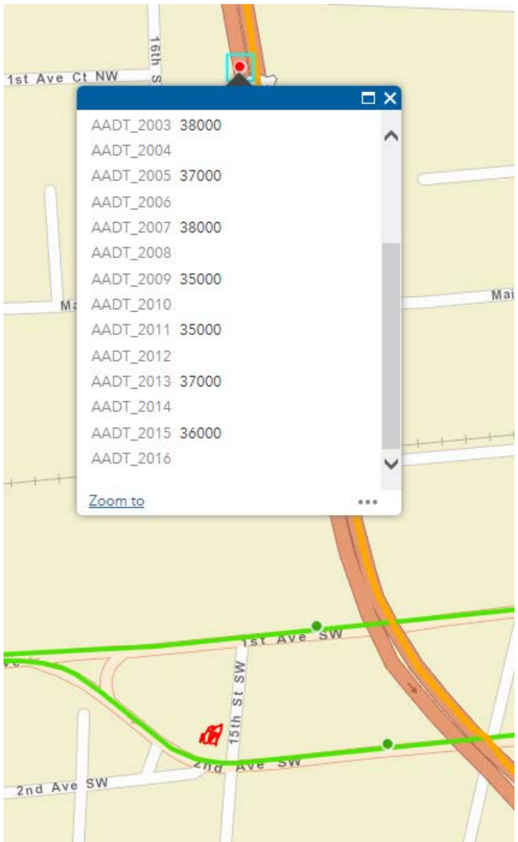
Reviewer Robert Jay Papuga Date: 11/29/2017

Ambient Monitoring Coordinator D. Manning Date: 12/14/2017

 Joette Steger

2015 Annual Average Daily Traffic, AADT, for 2nd Avenue SW, the Hickory monitoring station is located by the water tower

AADT obtained from the North Carolina Department of Transportation Traffic Survey Unit



2015 Annual Average Daily Traffic, AADT, for Highway 321, red mark represents location of the Hickory monitoring station

AADT obtained from the North Carolina Department of Transportation Traffic Survey Unit

Site Review Form Calendar Year 2017

Site Information

Region MRO	**Site Name** Crouse	**AQS Site # 37-109-0004**
Street Address-1487 Riverview Road		**City Lincolnton**
Urban Area Not in an Urban Area	**Core-based Statistical Area** Charlotte-Gastonia-Concord, NC-SC	

Enter Exact		
Longitude **81.2767**	**Latitude** **35.4385**	**Method of Measuring**
In Decimal Degrees	In Decimal Degrees	___ **Explanation: Google Maps**
Elevation Above/below Mean Sea Level (in meters)		**267**

Name of nearest road to inlet probe Riverview Road ADT 2200 Year latest available 2015

Distance of ozone probe to nearest traffic lane (m) 62 Direction from ozone probe to nearest traffic lane SW

Comments: Used http://ncdot.maps.argis.com/apps/webappviewer/index.html?id=5f6fe58c1d90482ab9107ccc()3026280

Name of nearest major road W. Hwy 150 ADT 9300 Year latest available 2016

Distance of site to nearest major road (m) 78.00 Direction from site to nearest major road N

Comments: Used http://ncdot.maps.argis.com/apps/webappviewer/index.html?id=5f6fe58c1d90482ab9107ccc()3026280

Site located near electrical substation/high voltage power lines?	Yes [ ] No [X]
Distance of site to nearest railroad track	(m) 302 Direction to RR W [ ] NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) 52 Direction SW
Distance between site and drip line of water tower (m) **28** Direction from site to water tower **NE** [ ] NA	

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

None noted

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	**Monitoring Objective**	**Scale**	**Site Type**
[X] O_3	[X] General/Background [ ] Highest Concentration [ ] Max O3 Concentration [ ] Population Exposure [ ] Source Oriented [ ] Transport [ ] Upwind Background [ ] Welfare Related Impacts	[ ] Micro [ ] Middle [ ] Neighborhood [X] Urban [ ] Regional	[X] SLAMS [ ] SPM

Probe inlet height (from ground) 2-15 m? Yes [X] No [ ]
Give actual measured height from ground (meters) 3.50

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes [X] No [ ]
Actual measured distance from outer edge of probe to supporting structure (meters) 1.30

Is probe > 20 m from the nearest tree drip line? Yes [X] *No [ ] (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes [ ] *No [ ] *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes [ ] (answer *'d questions) No [X]

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes [ ] No [ ]

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: None.

Date of Last Site Pictures: December 8, 2015 New Pictures Submitted? Yes ☐ No ☒

Reviewer Robert Jay Papuga Date: November 8, 2017

Ambient Monitoring Coordinator Deborah W. Manning Date: 11/22/2017

Instructions:

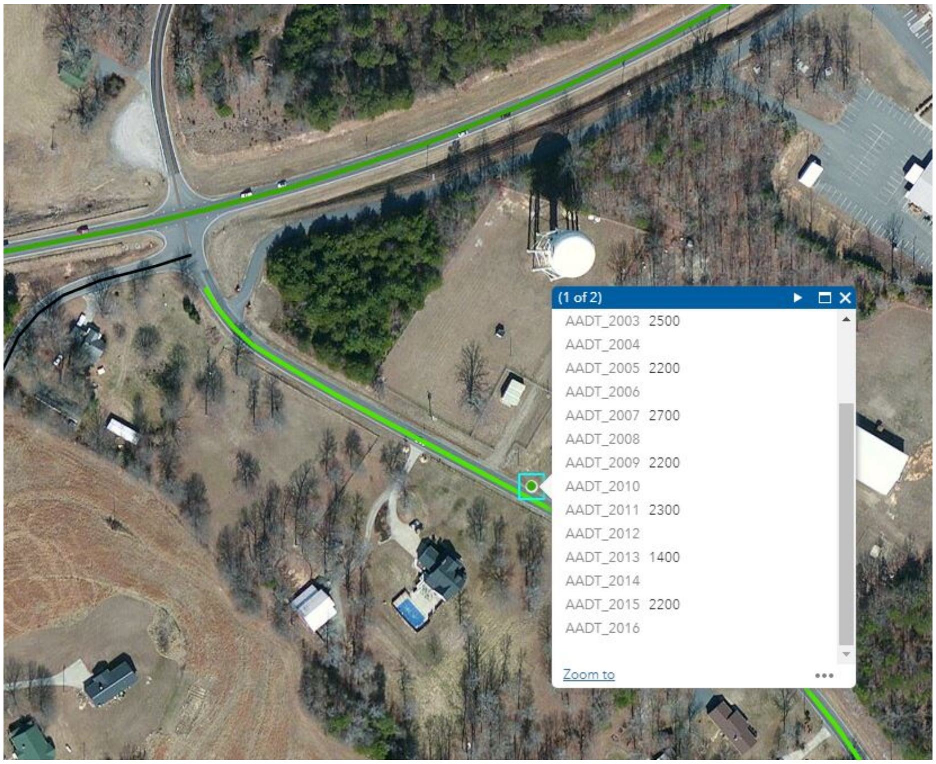
If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also, use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two-digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.



2015 Annual Average Daily Traffic, AADT, for Riverview Road, the Crouse monitoring station is located near the water tower

AADT obtained from the North Carolina Department of Transportation Traffic Survey Unit

Site Review Form Calendar Year 2017

Site Information

Region MRO	Site Name Monroe Middle School	AQS Site # 37-179-0003
Street Address-701 Charles Street		City Monroe
Urban Area MONROE	Core-based Statistical Area Charlotte-Gastonia-Concord, NC-SC	

Enter Exact		
Longitude -80.5410	Latitude 34.9739	Method of Measuring
In Decimal Degrees	In Decimal Degrees	___ Explanation: Google Maps
Elevation Above/below Mean Sea Level (in meters)		184.00

Name of nearest road to inlet probe Charles Street ADT 2900 Year latest available 2013

Distance of ozone probe to nearest traffic lane (m) 71 Direction from ozone probe to nearest traffic lane W

Comments: Used http://ncdot.maps.argis.com/apps/webappviewer/index.html?id=5f6fe58c1d90482ab9107ccc()3026280

Name of nearest major road Highway 74/601 ADT 52000 Year latest available 2016

Distance of site to nearest major road (m) 1548.00 Direction from site to nearest major road ENE

Comments: Used http://ncdot.maps.argis.com/apps/webappviewer/index.html?id=5f6fe58c1d90482ab9107ccc()3026280

Site located near electrical substation/high voltage power lines?	Yes ☒ No ☒
Distance of site to nearest railroad track	(m) 967Direction to RR NE ☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) 30 Direction NE
Distance between site and drip line of water tower (m) _____Direction from site to water tower ________ ☒NA	

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

None Noted

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☐General/Background ☐Highest Concentration ☐Max O3 Concentration ☒Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☒Neighborhood ☐Urban ☐Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐
Give actual measured height from ground (meters) 3.90

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.00

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: None.

Date of Last Site Pictures: November 29, 2016 New Pictures Submitted? Yes ☐ No ☒

Reviewer Robert Jay Papuga Date: November 8, 2017

Ambient Monitoring Coordinator D.W. Manning Date: 11/28/2017

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

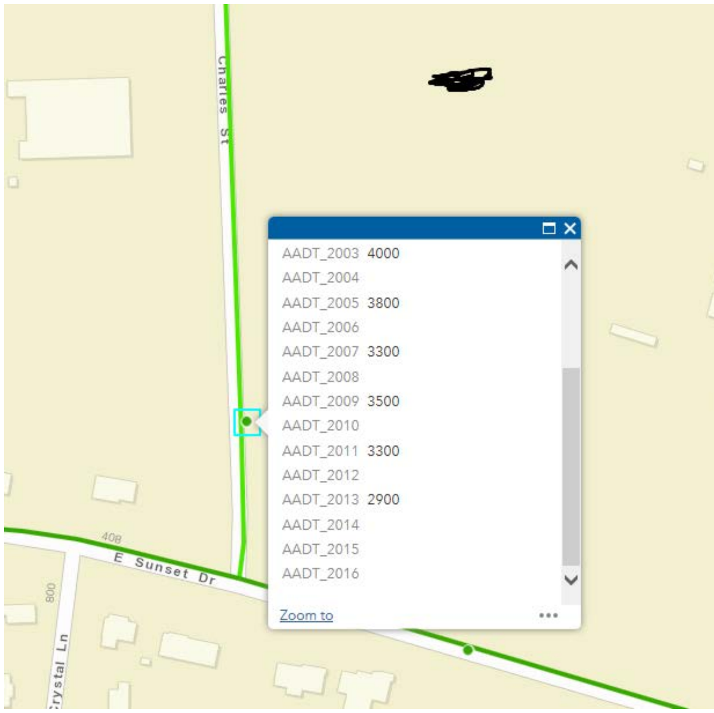
If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also, use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two-digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Joette Steger



2003-2013 Annual Average Daily Traffic, AADT, for Charles Street
Black mark represents location of the Monroe monitoring station
AADT obtained from the North Carolina Department of Transportation Traffic Survey Unit

2003-2016 Annual Average Daily Traffic, AADT, for US 74
Star represents location of the Monroe monitoring station
AADT obtained from the North Carolina Department of Transportation Traffic Survey Unit

Site Review Form Calendar Year 2017

Site Information

Region MRO	Site Name Rockwell	AQS Site # 37-159-0021	
Street Address-316 West Street		City Rockwell	
Urban Area Not in an Urban Area		Core-based Statistical Area Charlotte-Gastonia-Concord, NC-SC	
Enter Exact		Method of Measuring	
Longitude -80.3953	Latitude 35.5519		
In Decimal Degrees	In Decimal Degrees	Other (explain)	Explanation: Google Maps
Elevation Above/below Mean Sea Level (in meters)		234.00	

Name of nearest road to inlet probe Gold Hill Road ADT 610 Year latest available 2016

Distance of ozone probe to nearest traffic lane (m) 17 Direction from ozone probe to nearest traffic lane N

Comments: Used www.ncdot.gov/travel/statemapping/trafficvolumemaps

Name of nearest major road Highway 52 ADT 7800 Year 2016

Distance of site to nearest major road (m) 370.00 Direction from site to nearest major road S

Comments: Used www.ncdot.gov/travel/statemapping/trafficvolumemaps

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track	(m) 737Direction to RR SW ☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____ Direction ___
Distance between site and drip line of water tower (m) _____Direction from site to water tower ________	☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

None Noted

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☐General/Background ☒Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☒Urban ☐Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐
Give actual measured height from ground (meters) 3.50

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.10

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures: October 28, 2016 New Pictures Submitted? Yes ☐ No ☒

Reviewer Robert Jay Papuga Date: 10/04/2017

Ambient Monitoring Coordinator Deborah W. Manning Date: 10/25/2017

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also, use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

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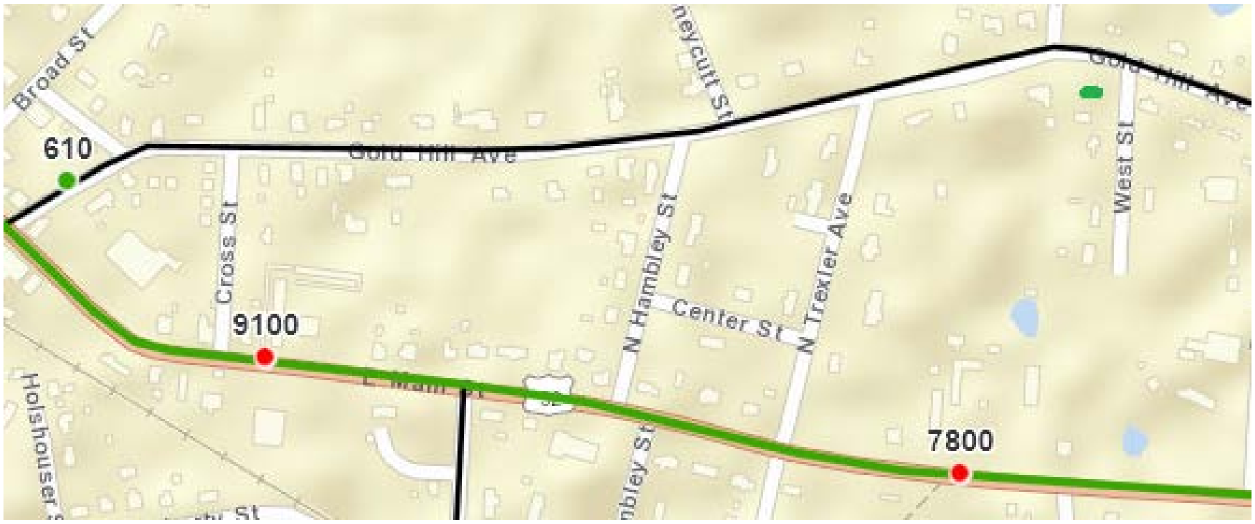
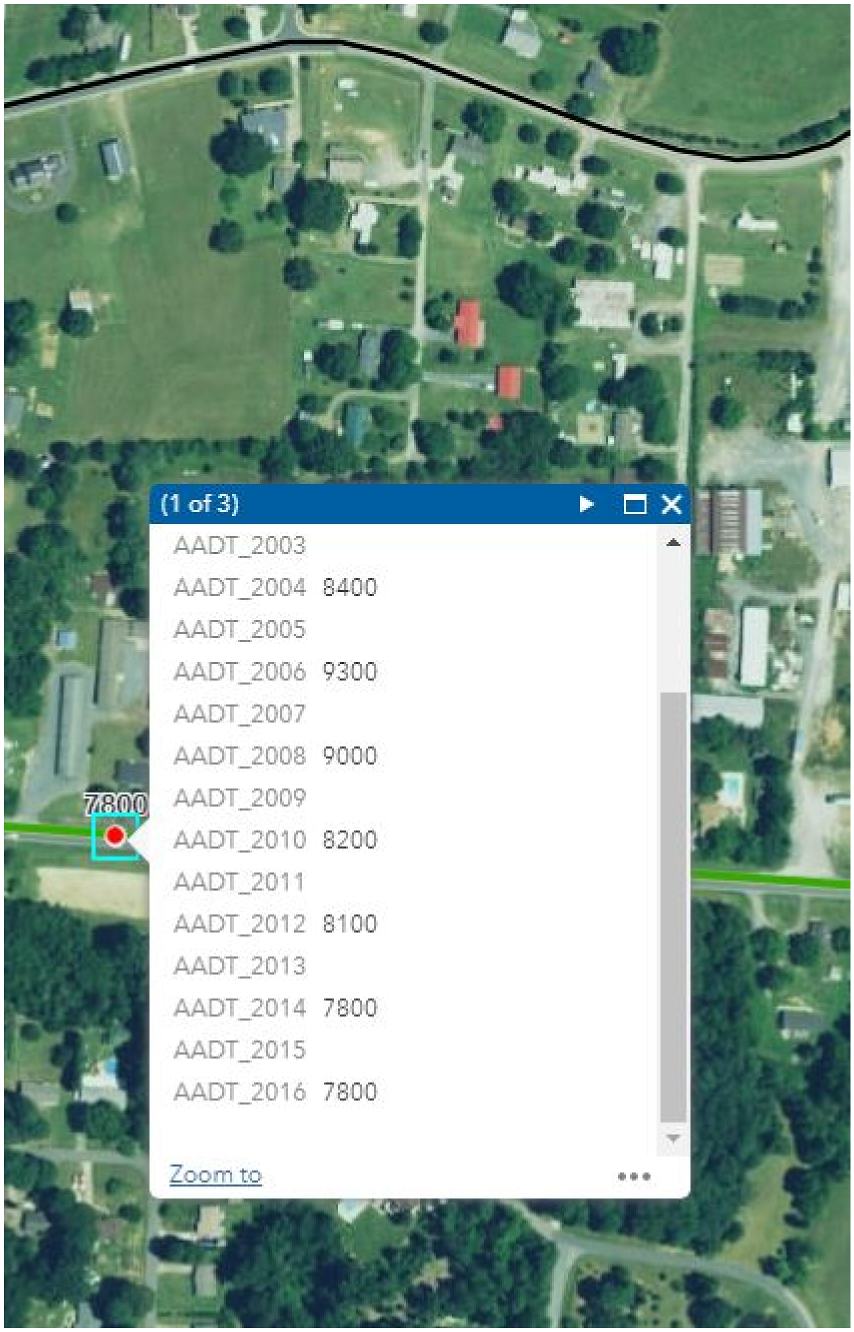
Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two-digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Joette Steger



2016 Annual Average Daily Traffic, AADT, green square represents location of the Rockwell monitoring station
AADT obtained from the North Carolina Department of Transportation Traffic Survey Unit

2004-2016 Annual Average Daily Traffic on Gold Hill Avenue
AADT obtained from the North Carolina Department of Transportation Traffic Survey Unit



2004-2016 Annual Average Daily Traffic on Highway 52
AADT obtained from the North Carolina Department of Transportation Traffic Survey Unit

Appendix C-2. Scale of Representativeness

Each station in the monitoring network must be described in terms of the physical dimensions of the air parcel nearest the monitoring station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

a) Micro-scale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.
c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.
d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.
e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station.

There are six basic exposures:

a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.
b) Sites located to determine representative concentrations in areas of high population density.
c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.
d) Sites located to determine general background concentration levels.
e) Sites located to determine the extent of regional pollutant transport among populated areas.
f) Sites located to measure air pollution impacts on visibility, vegetation damage or other welfare-based impacts and in support of secondary standards.

The design intent in siting stations is to correctly match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of the six basic objectives and the scales of representativeness are appropriate when siting monitoring stations:

Table C7. Site Type Appropriate Siting Scales

1. Highest concentration	Micro, middle, neighborhood, sometimes urban or regional for secondarily formed pollutants
2. Population oriented	Neighborhood, urban
3. Source impact	Micro, middle, neighborhood
4. General/background & regional transport	Urban, regional
5. Welfare-related impacts	Urban, regional

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL A. ABRACZINSKAS
Director

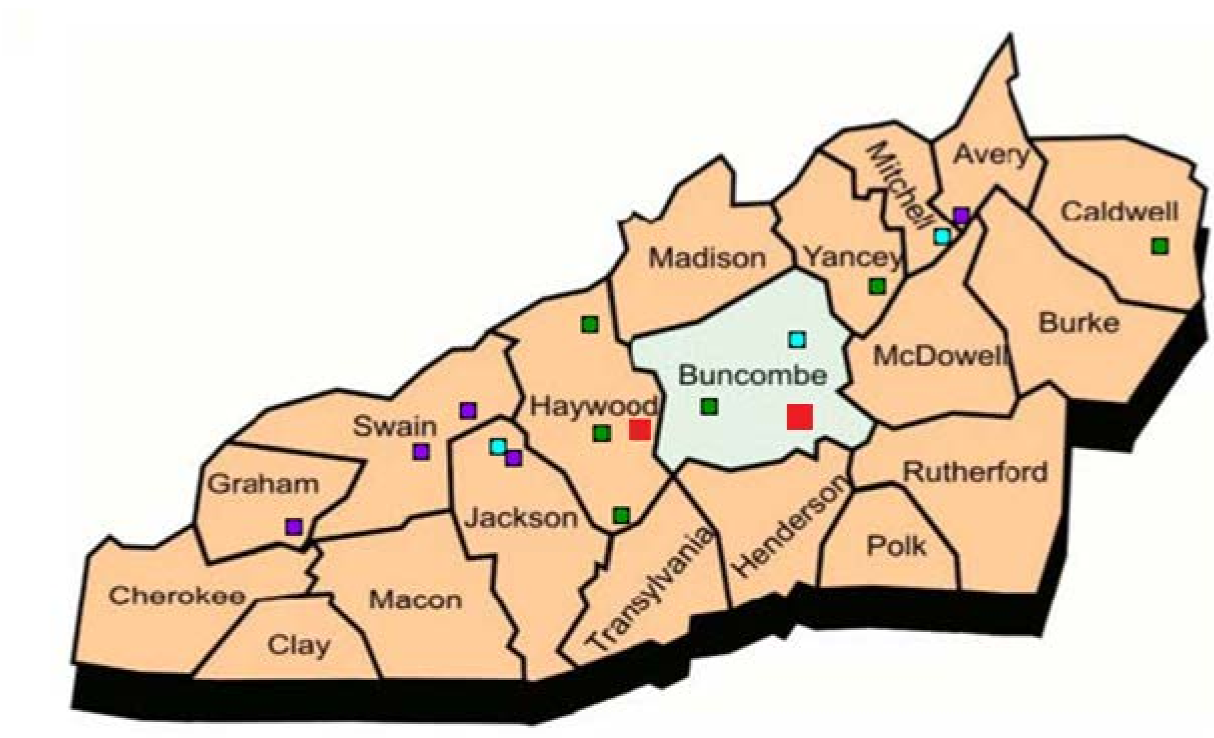
NORTH CAROLINA
Environmental Quality

2018-2019 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 2

Site Descriptions by Division of Air Quality Regional Office and Metropolitan Statistical Area

A. The Asheville Monitoring Region



June 29, 2018

North Carolina Department of Environmental Quality | Division of Air Quality
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919.707.8400

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A. The Asheville Monitoring Region

The Asheville monitoring region, shown in Figure A-1, consists of four sections: (1) the mountain-top areas, those areas above 1.2 kilometers, Km, or 4,000 feet in elevation in Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, Madison, Macon, McDowell, Mitchell, Swain, Transylvania and Yancey counties, (2) the Asheville metropolitan statistical area, or MSA, i.e., valley sites below 1.2 Km in Buncombe, Haywood, Henderson and Madison counties, (3) the non-MSA valley areas, those areas below 1.2 Km in elevation in Avery, Cherokee, Clay, Graham, Jackson, Macon, McDowell, Mitchell, Polk, Rutherford, Swain, Transylvania and Yancey counties and (4) the western portion of the Hickory-Lenoir-Morganton MSA, i.e., valley sites in Burke and Caldwell counties. This section of the monitoring plan focuses on the first three sections. Monitoring in Burke and Caldwell is covered in Section C, the Mooresville Monitoring Region.

Figure A-1. The Asheville monitoring region
The squares show the approximate locations of the monitoring sites in this region.

(1) The Mountain Top Areas

The mountain top areas consist of elevations at or above 1.2 Km or 4,000 feet in 17 counties in western North Carolina: Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, Madison, Macon, McDowell, Mitchell, Swain, Transylvania and Yancey. There are no metropolitan or micropolitan statistical areas at these elevations. The North Carolina Division of Air Quality, or DAQ, currently operates four monitoring sites and the Eastern Band of Cherokee Indians, or EBCI, operates one monitoring site on mountain tops at elevations greater than 1.2 Km. The United States Environmental Protection Agency, or EPA, also operates a Clean Air Status and Trends Network, or CASTNET, site at an elevation of 1.2 Km. The Barnett Knob tribal monitor is discussed further in the EBCI network plan. The Cranberry CASTNET site is discussed further in the CASTNET network plan.[1] One DAQ site is an ozone-monitoring site located on Joanna Bald Mountain in the Joyce Kilmer National Wilderness Area. In addition to this site, the DAQ operates two high-elevation sites in Haywood County located in or near class 1 areas: Frying Pan in the Shining Rock Wilderness Area and Purchase Knob in the Great Smoky Mountains National Park. A fourth DAQ site is in Mount Mitchell State Park. The locations of the DAQ and the tribal monitors are shown in Figure A-2.

[1] 2017 CASTNET Annual Network Plan, April 10, 2017, available on the worldwide web at https://www.epa.gov/sites/production/files/2017-04/documents/draft_castnet_2017_annual_network_plan.pdf, accessed May 1, 2017.

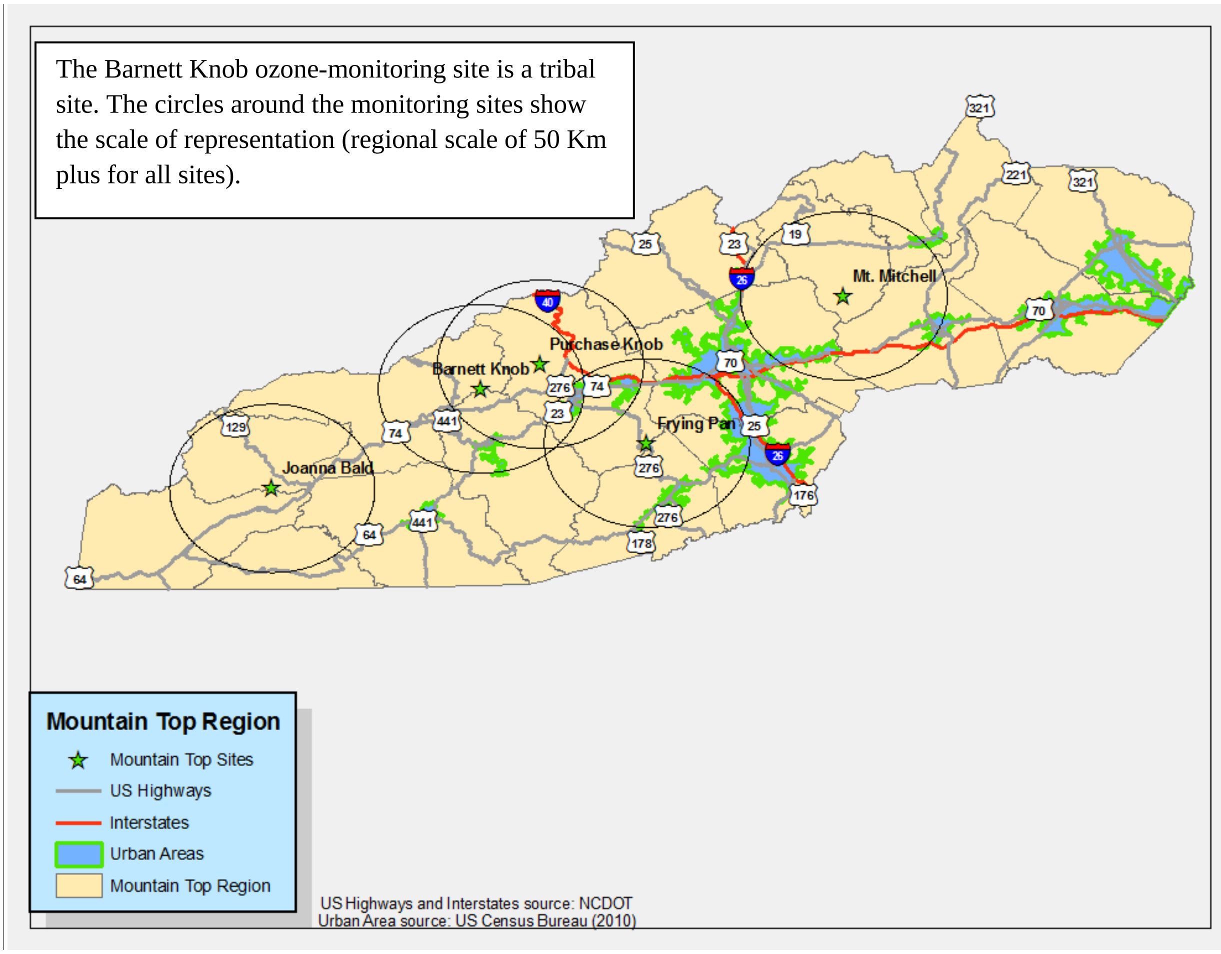

Figure A-2. Location of mountain top monitoring sites

At the **Joanna Bald** site in Graham County, the DAQ operates an ozone monitor that belongs to the United States Department of Agriculture Forest Service. The relative humidity and air temperature sensors that were installed in 2005 were shut down on Oct. 8, 2014. A picture of the site as well as views looking north, east, south and west are provided in Figure A-4 through Figure A-11. Table A1 summarizes monitoring information for the site. This monitoring site is in the Joyce Kilmer-Slickrock Wilderness Area, a class I area. This monitor is a rural monitor. The location of the monitor with regards to the flood plain is shown in Figure A-12.

Figure A-3. Joanna Bald ozone monitoring site

Figure A-4. The Joanna Bald site looking north

Figure A-8. Looking northeast from the Joanna Bald site

Figure A-5. Looking northwest from the Joanna Bald site

Figure A-9. The Joanna Bald site looking east

Figure A-6. The Joanna Bald site looking west

Figure A-10. Looking southeast from the Joanna Bald site

Figure A-7. Looking southwest from the Joanna Bald site

Figure A-11. The Joanna Bald site looking south

Table A1. Site Information Table for Joanna Bald

Site Name:	Joanna Bald	**AQS Site Identification Number:**	37-075-0001
Location:	National Forest Road 423 Spur, Robbinsville, North Carolina		

CBSA:	None			**CBSA #:**	00000
Latitude	35.257930	**Longitude**	-83.795620	**Datum:**	WGS84
Elevation	1429 meters				

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry (047)	EQOA-0880-047	1-Hour	April 1 to Oct. 31

Date Monitor Established:	Ozone	April 3, 2003

Nearest Road:	National Forest Road	**Traffic Count:**	< 10	**Year of Count:**	Estimate

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	14,323 meters	Northwest	Special purpose	Real-time AQI reporting and forecasting. Compliance w/NAAQS.

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable for Comparison to NAAQS**	**Proposal to Move or Change**
Ozone	General background	Regional	Yes	None

	Meets Part 58 Requirements for:			
Parameter Name	**Appendix A**	**Appendix C**	**Appendix D**	**Appendix E**
Ozone	Yes	Yes	Yes	Yes

Parameter Name	**Probe Height (m)**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	4.22 meters	1.7 meters	10.97 meters to northwest	None

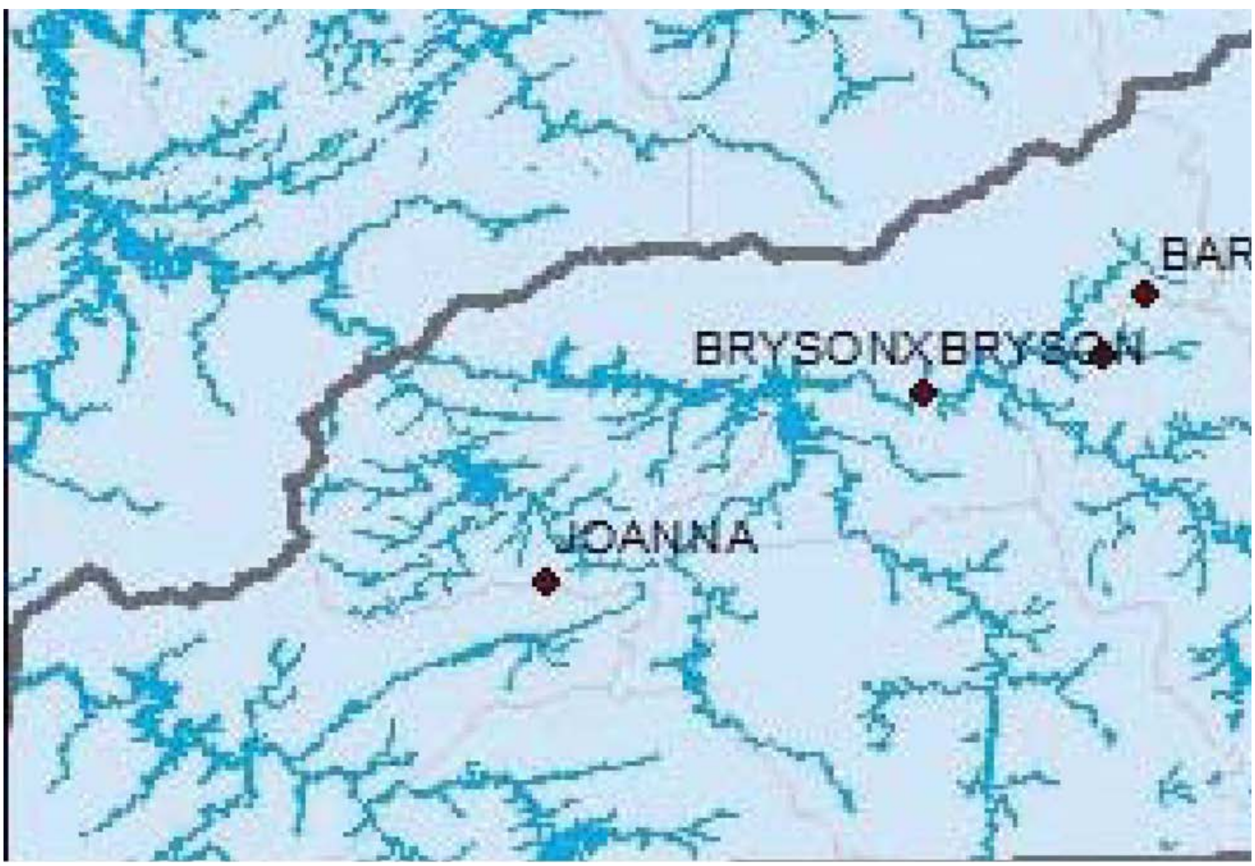

Figure A-12. Location of Joanna Bald relative to the flood plain

At the **Frying Pan Mountain** monitoring site, 37-087-0035, the DAQ operates a seasonal ozone monitor. At the end of the 2011 ozone season, a new monitoring shelter was constructed at the site. A picture of the site as well as views looking north, northeast, east, southeast, south, southwest, west and northwest are provided in Figure A-13 through Figure A-21. Table A2 provides information on the site. This site is in a class 1 area (the Shining Rock Wilderness Area) and is collocated with an Interagency Monitoring of Protected Visual Environments (IMPROVE) monitor. This monitor is a rural monitor. The location of the monitor with regards to the flood plain is shown in Figure A-22.

Figure A-13. Frying Pan Mountain ozone and IMPROVE monitoring site, 37-087-0035

Figure A-14. Looking north from the Frying Pan site

Figure A-16. Looking northeast from the Frying Pan site

Figure A-15. Looking northwest from the Frying Pan site

Figure A-17. Looking east from the Frying Pan site

Figure A-18. Looking west from the Frying Pan site

Figure A-20. Looking southeast from the Frying Pan site

Figure A-19. Looking southwest from the Frying Pan site

Figure A-21. Looking south from the Frying Pan site

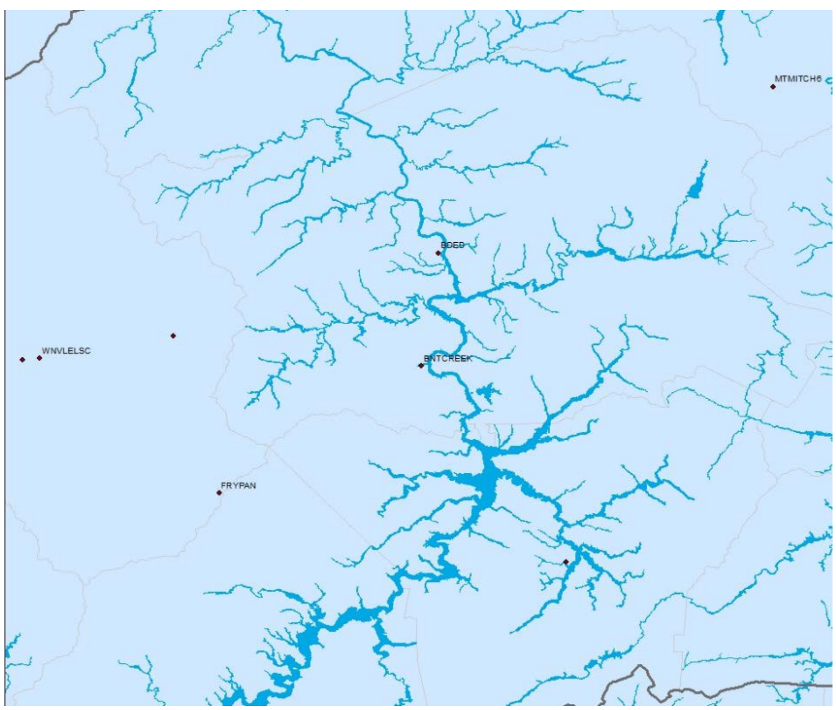

Figure A-22 Asheville area monitors in relation to the flood plain

Table A2. Site Information Table for Frying Pan Mountain

Site Name:	Frying Pan Mountain	**AQS Site Identification Number:**	37-087-0035
Location:	Tower Blue Ridge Pkwy Mile Marker 410, Canton, North Carolina		

CBSA:	None			**CBSA #:**	00000
Latitude	35.393719	**Longitude**	-82.774386	**Datum:**	WGS84
Elevation	1617.88 meters				

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	April 1 to Oct. 31

Date Monitor Established:	Ozone	May 8, 1990

Nearest Road:	Blue Ridge Parkway	**Traffic Count:**	300	**Year of Count:**	Estimated

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	315 meters	Southeast	Special purpose	Compliance w/NAAQS. Real-time AQI reporting & forecasting.

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable for Comparison to NAAQS**	**Proposal to Move or Change**
Ozone	General background	Regional	Yes	None

Parameter Name	**Meets 40 CFR Part 58 Requirements for:**			
	Appendix A	**Appendix C**	**Appendix D**	**Appendix E**
Ozone	Yes	Yes	Yes	Yes

Parameter Name	**Probe Height (m)**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	4.5	1.1 meter	> 20 meters	None

At the **Purchase Knob** monitoring site, 37-087-0036, the DAQ operates a seasonal ozone monitor. Figure A-23 shows the site. The location of the monitor with regards to the flood plain is shown in Figure A-24. Views looking north, northeast, east, southeast, south, southwest, west and northwest are provided in Figure A-25 through Figure A-32. This site is in a class 1 area (Great Smokey Mountains National Park). This monitor is a rural monitor.

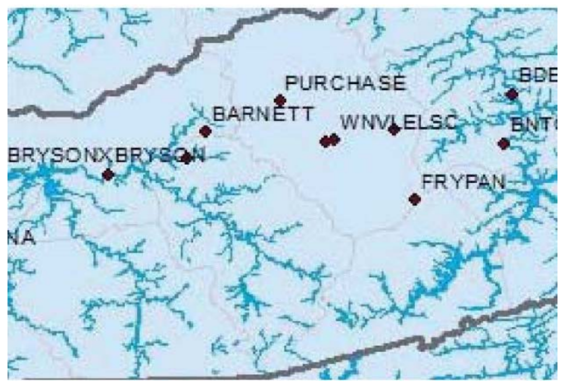

Figure A-24. Location of Purchase Knob relative to the flood plain


Figure A-23. The Purchase Knob seasonal ozone monitoring site


Figure A-25. Looking north from the Purchase Knob site


Figure A-26. Purchase Knob site looking northwest


Figure A-27. Looking west from the Purchase Knob site


Figure A-28. Purchase Knob site looking southwest


Figure A-29. Purchase Knob site looking northeast


Figure A-30. Looking east from the Purchase Knob site


Figure A-31. Looking southeast from the Purchase Knob site


Figure A-32. Looking south from the Purchase Knob site

At **Mount Mitchell,** the DAQ operates a seasonal ozone monitor. A picture of the site as well as views looking north, east, south and west are provided in Figure A-33 through Figure A-40. This site is located at the Mount Mitchell State Park visitor center. The location of the monitor with regards to the flood plain is shown in Figure A-41.

Figure A-33. The Mount Mitchell ozone monitoring site

Figure A-34. Looking north from the Mount Mitchell site

Figure A-36. Mount Mitchell looking northeast

Figure A-35. Mount Mitchell site looking northwest

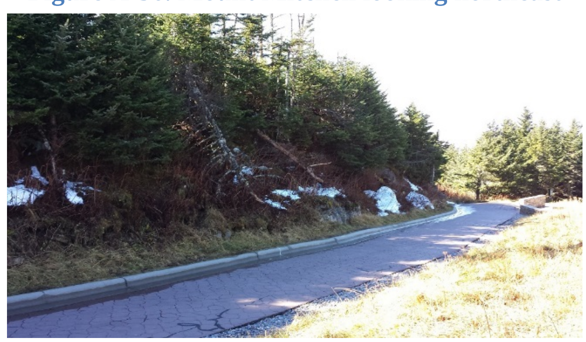

Figure A-37. Looking west from the Mount Mitchell site

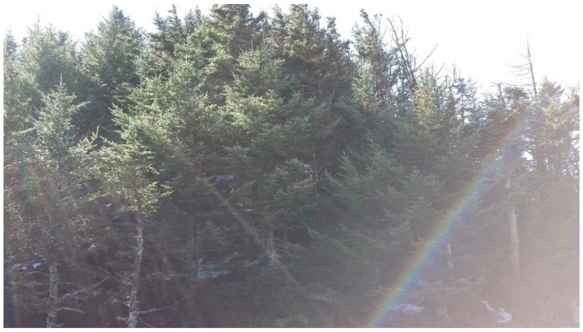

Figure A-38. Mount Mitchell looking southwest

Figure A-39. Looking east from the Mount Mitchell site

Figure A-40. Looking south from the Mount Mitchell site

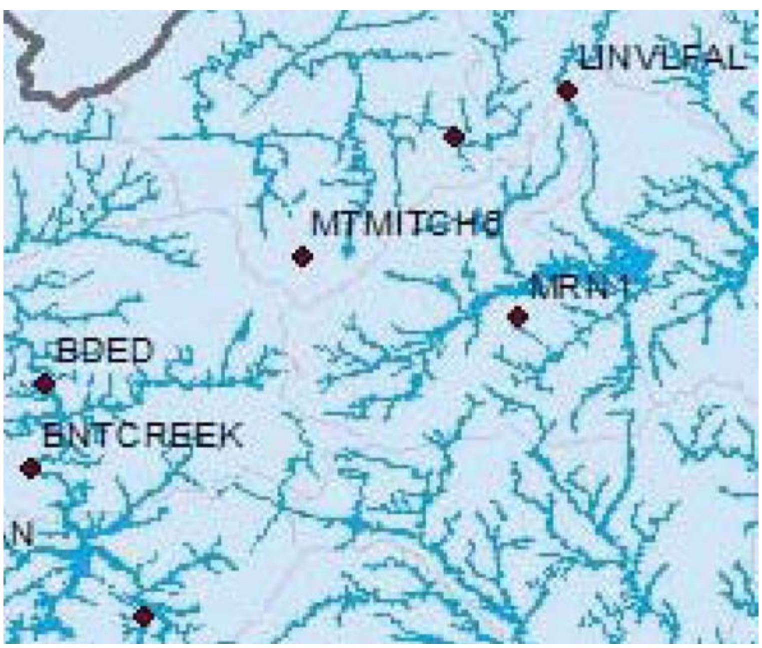

Figure A-41. Location of the Mount Mitchell site relative to the flood plain

There are no new monitoring rules that require additional monitoring in these high-elevation areas. The mountain top seasonal ozone monitors started on March 1, 2017, because the ozone monitoring season was extended to March in 2015. The DAQ requested and received a waiver for March ozone monitoring for the Joanna Bald, Frying Pan, Purchase Knob and Mount Mitchell sites in years when the weather does not allow access to these sites. Access is often limited during the winter. Sometimes these sites remain inaccessible until early to mid-April. The waiver request approval was granted by the EPA in December 2016.

(2) The Asheville MSA

The Asheville MSA consists of the valley portions (areas under the elevation of 1.2 Km or 4,000 feet) of four counties: Buncombe, Haywood, Henderson and Madison. The major urban areas are Asheville, Waynesville and Hendersonville. The DAQ currently operates two monitoring sites in the Asheville MSA, the Western North Carolina Regional Air Quality Agency, WNC, operates two, both agencies jointly operate an urban-air-toxics monitoring site and DAQ and Duke Energy Progress jointly operate a sulfur dioxide data requirements rule, DRR, site. These sites are located at the Board of Education, Bent Creek, AB Tech and Skyland in Buncombe County and the Waynesville Elementary School and Canton in Haywood County. In 2013 WNC relocated its ozone monitor at Bent Creek to another location within the park. On Dec. 31, 2015, the DAQ shut down the fine particle monitor at the Waynesville Recreation Center. On Jan. 1, 2017, two new source-oriented monitoring sites began operating in this MSA. One is operated by the DAQ in Canton near the Evergreen facility. The other is operated by Duke in Skyland near the Asheville Steam Station. The locations of these six monitoring sites are shown in Figure A-42.

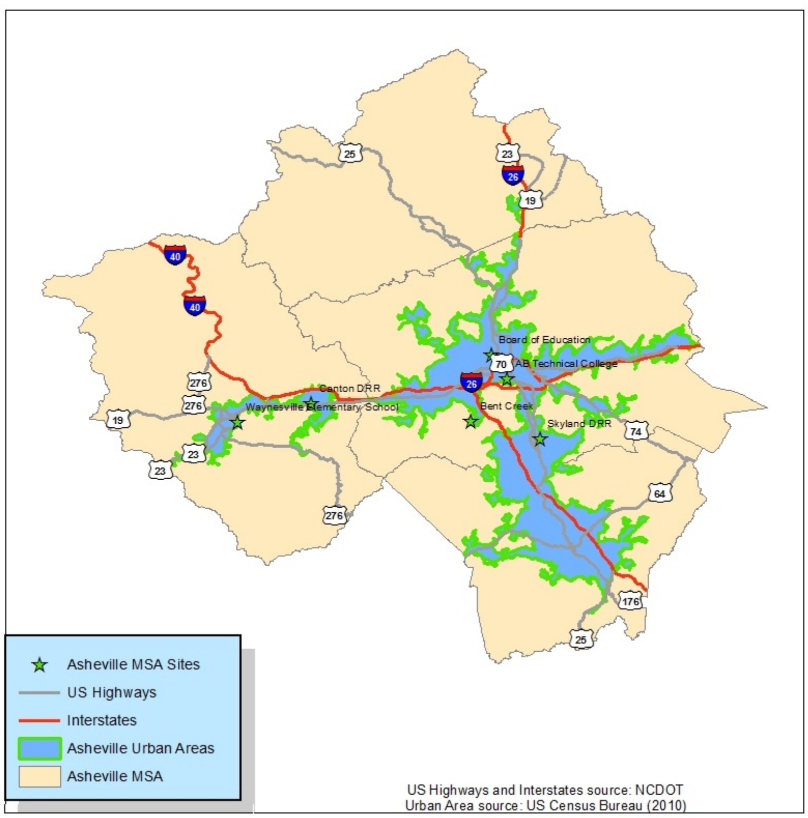

Figure A-42. Locations of Monitoring Sites in the Asheville MSA

At the **Board of Education** site, WNC operates a one-in-six-day fine particle federal reference method, or FRM, monitor, a one-in-six-day collocated precision fine particle FRM monitor and a continuous fine particle monitor. The one-in-six-day SASS and URG 3000 speciation fine particle monitors were shut down in January 2015 when the EPA stopped funding them. A picture of the site as well as views looking north, northeast, east, southeast, south, southwest, west and northwest are provided in Figure A-43 through Figure A-51. On Jan. 1, 2016, WNC changed from using the well impactor ninety-six, or WINS, to very sharp cut cyclones, or VSCC, on the FRMs. In June 2017 WNC changed the method for continuously measuring fine particles.

Figure A-43. WNC Board of Education fine particle monitoring site, 37-021-0024

Figure A-44. Board of Education site looking north

Figure A-45. Board of Education site looking northwest

Figure A-46. Board of Education site looking northeast

Figure A-47. Board of Education site looking east

Figure A-48. Board of Education site looking west

Figure A-49. Board of Education site looking southwest

Figure A-50. Board of Education site looking southeast

Figure A-51. Board of Education site looking south

At the **Bent Creek** site, 37-021-0030, WNC operates a seasonal ozone monitor. A picture of the site as well as views looking north, northeast, east, southeast, south, southwest, west and northwest are provided in Figure A-52 through Figure A-60. This site is one of two urban ozone-monitoring sites in the MSA. 40 CFR 58 Appendix D requires the Asheville MSA to have two ozone monitoring sites. Because of the growth of the trees at the old Bent Creek location, WNC moved the site to a new Bent Creek location that is within a mile of the old Bent Creek location on June 6, 2013.


Figure A-52. The Bent Creek ozone monitoring site, 37-021-0030

Figure A-53. Looking north from the Bent Creek site

Figure A-54. Looking northwest from the Bent Creek site

Figure A-55. Looking west from the Bent Creek site

Figure A-56. Looking southwest from the Bent Creek site

Figure A-57. Looking northeast from the Bent Creek site

Figure A-58. Looking east from the Bent Creek site

Figure A-59. Looking southeast from the Bent Creek site

Figure A-60. Looking south from the Bent Creek site

At the **AB Tech** site, 37-021-0035, WNC operates a year-round air toxics volatile organic compound sampler. Samples are collected in stainless steel canisters and sent to the Laboratory Analysis Branch, LAB, where they are analyzed for 68 compounds using the Compendium Method for Toxic Organics 15. A picture of the site as well as views looking north, northeast, east, southeast, south, southwest, west and northwest are provided in Figure A-61 through Figure A-69.

Figure A-61. AB Tech urban air toxics monitoring site

Figure A-62. Looking north from the AB Tech site

Figure A-64. Looking northeast from the AB Tech site

Figure A-63. Looking northwest from the AB Tech site

Figure A-65. Looking east from the AB Tech site

Figure A-66. Looking west from the AB Tech site

Figure A-68. Looking southeast from the AB Tech site

Figure A-67. Looking southwest from the AB Tech site

Figure A-69. Looking south from the AB Tech site

In 2015, the DAQ began working with Duke Energy Progress to establish a sulfur dioxide monitoring station in Skyland, North Carolina, to characterize the ambient sulfur dioxide concentrations near the Asheville steam station as required by the DRR for sulfur dioxide.[2] The area chosen for placement of the monitor was selected using the results of modeling done as described in the technical assistance document and is reported in Appendix A-3. Duke Progress Energy Skyland Siting Analysis and Additional Site Information. An aerial view of the monitoring location in Figure A-70.

[2] 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.

Figure A-70. Aerial view showing the location of the Skyland DRR monitoring station

The Air Quality System identification number for this monitor is 37-021-0036-42401-1. DAQ operates this monitor in collaboration with Duke Energy Progress to ensure the air in the Asheville area complies with the national ambient air quality standards for sulfur dioxide. Duke Energy Progress operates the monitor following the DAQ quality assurance project plan and the monitor is part of the DAQ primary quality assurance organization. Figure A-71 through Figure A-78 show views from the site looking north, east, southeast, south, west and northwest.

Figure A-71. Looking north from the Skyland DRR site

Figure A-72. Looking northeast from the Skyland DRR site

Figure A-73. Looking northwest from the Skyland DRR site

Figure A-74. Looking west from the Skyland DRR site

Figure A-75. Looking southwest from the Skyland DRR site

Figure A-76. Looking east from the Skyland DRR site

Figure A-77. Looking southeast from the Skyland DRR site

Figure A-78. Looking south from the Skyland DRR site

Figure A-79. The Waynesville elementary school ozone monitoring site

At the **Waynesville Elementary School** site, 37-087-0008, the DAQ operates a seasonal ozone monitor, one of two urban ozone monitoring sites in the MSA. 40 CFR 58 Appendix D requires the Asheville MSA to have two ozone monitoring sites. The site is shown in Figure A-79. Table A3 provides information on the site. This site started at the beginning of the 2011 ozone monitoring season and is across the street from the Haywood County Health Department where the previous site was located.

Table A3. Site Information Table for Waynesville Elementary School

Site Name:	Waynesville Elementary School	**AQS Site Identification Number:**	37-087-0008

Location:	2236 Asheville Road, Waynesville, North Carolina	**CBSA:**	Asheville, NC	**MSA #:**	11700

Latitude	35.507160	**Longitude**	-82.963370	**Datum:**	WGS84	**Elevation**	793 meters

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry (047)	EQOA-0880-047	1-Hour	March 1 to Oct. 31

Date Monitor Established:	Ozone	April 1, 2011

Nearest Road:	Asheville Road	**Traffic Count:**	8600	**Year of Count:**	2014

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	151 meters	East northeast	SLAMS	Compliance w/NAAQS. Real-time AQI reporting & forecasting.

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable for Comparison to NAAQS**	**Proposal to Move or Change**
Ozone	Population exposure	Regional	Yes	None

Parameter Name	**Meets Part 58 Requirements for:**			
	Appendix A	**Appendix C**	**Appendix D**	**Appendix E**
Ozone	Yes	Yes	Yes	Yes

Parameter Name	**Probe Height (m)**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	3.8	1.02 meters	>20 meters	None

.

The site was relocated on April 1, 2011, to Junaluska Elementary School at 2238 Asheville Road, Waynesville, NC 28786, approximately 200 meters east of the previous Waynesville health department site. An aerial view of the area is shown in Figure A-80. Figure A-81, Figure A-83, Figure A-84 and Figure A-82 provide views looking north, east, south and west from the new site.

Figure A-80. Aerial view of the Waynesville ozone monitoring site (A is the old site location)

Figure A-81. Looking north from Waynesville ozone site

Figure A-82. Waynesville ozone site looking east

Figure A-83. Waynesville ozone site looking west

Figure A-84. Waynesville ozone site looking south

At the **Canton DRR** site, 37-087-0013, DAQ operates a source-oriented sulfur dioxide monitor to meet the requirements in the 2010 sulfur dioxide data requirements rule. The monitor will operate for a minimum of three years from 2017 to 2019 to ensure ambient air in the proximity of the Evergreen/Blue Ridge Paper facility meets the national ambient air quality standards. DAQ operates this monitor to ensure the air in the Asheville area complies with the national ambient air quality standards for sulfur dioxide. Figure A-85 through Figure A-94 show an aerial view of the site in relationship to the Evergreen facility, the site and views from the site looking north, northeast, east, southeast, south, southwest, west and northwest.

Figure A-85. Aerial view showing the location of the Canton DRR monitoring station

Figure A-86. Canton DRR sulfur dioxide monitoring site

Figure A-87. Looking north from the Canton DRR site

Figure A-88. Looking northwest from the Canton DRR site

Figure A-89. Looking west from the Canton DRR site

Figure A-90. Looking southwest from the Canton DRR site

Figure A- 91. Looking northeast from the Canton DRR site

Figure A-92. Looking east from Canton DRR site

Figure A-93. Looking southeast from the Canton DRR site

Figure A-94. Looking south from the Canton DRR site

The December 2010 changes to the **lead monitoring** regulations[3] impacted the Asheville MSA because Evergreen/Blue Ridge Paper Products, located in Haywood County, emitted over 0.5 tons of lead to the air in 2009 and 2010.[4] In 2011, the DAQ requested and received a waiver for lead monitoring at Blue Ridge Paper based on results of modeling.[5] Model results indicate the maximum ambient lead concentration in the ambient air at and beyond the fence line is 0.006 micrograms per cubic meter, well below the 0.075 micrograms per cubic meter (50 percent of the NAAQS) threshold for monitoring. The DAQ did not renew the waiver in 2015 because the facility currently emits less than 0.5 tons of lead. [6]

The 2015 sulfur dioxide monitoring requirements required additional sulfur dioxide monitoring in this MSA.[7] The sulfur dioxide monitors required by this rule are discussed in detail in Appendix A-3. Duke Progress Energy Skyland Siting Analysis and Additional Site Information and Appendix A-4. Evergreen Packaging Canton Siting Analysis and Additional Site Information. Both sites started in January 2017.

(3) The Non-MSA Valley Areas

The non-MSA valley areas consist of those areas below 1.2 Km (4,000 feet) in 13 counties: Avery, Cherokee, Clay, Graham, Jackson, Macon, McDowell, Mitchell, Polk, Rutherford, Swain, Transylvania and Yancey. There are no major metropolitan areas. The Brevard micropolitan statistical area is in Transylvania County and the Forest City micropolitan statistical area is in Rutherford County. The DAQ currently operates three monitoring sites in this area and the EBCI operates two monitoring sites. The EBCI operates a fine-particle monitoring site in Cherokee, North Carolina and an ozone-monitoring site in Swain County at the old high school. Both sites are tribal monitors and not part of the DAQ monitoring network. This section focuses on the three monitoring sites operated by DAQ. These sites are located at Bryson City in Swain County, Linville Falls in Avery County and Spruce Pine in Mitchell County. The locations of these five monitoring sites are shown in Figure A-95. The Marion particle monitoring station in McDowell County was shut down on Dec. 31, 2015.

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[3] 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.

[4] **North Carolina Criteria and Toxic Air Pollutant Point Source Emissions Report, a**vailable on the worldwide web at https://xapps.ncdenr.org/aq/ToxicsReport/ToxicsReportFacility.jsp?ibeam=true&year=2009&pollutant=153&county_code=087.

[5] 2011 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p3-4, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=7843.

[6] Data obtained from the DAQ emission inventory database available on the worldwide web at https://xapps.ncdenr.org/aq/ToxicsReport/ToxicsReportFacility.jsp?ibeam=true&year=2015&pollutant=153&county_code=087, accessed on May 12, 2017

[7] 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.

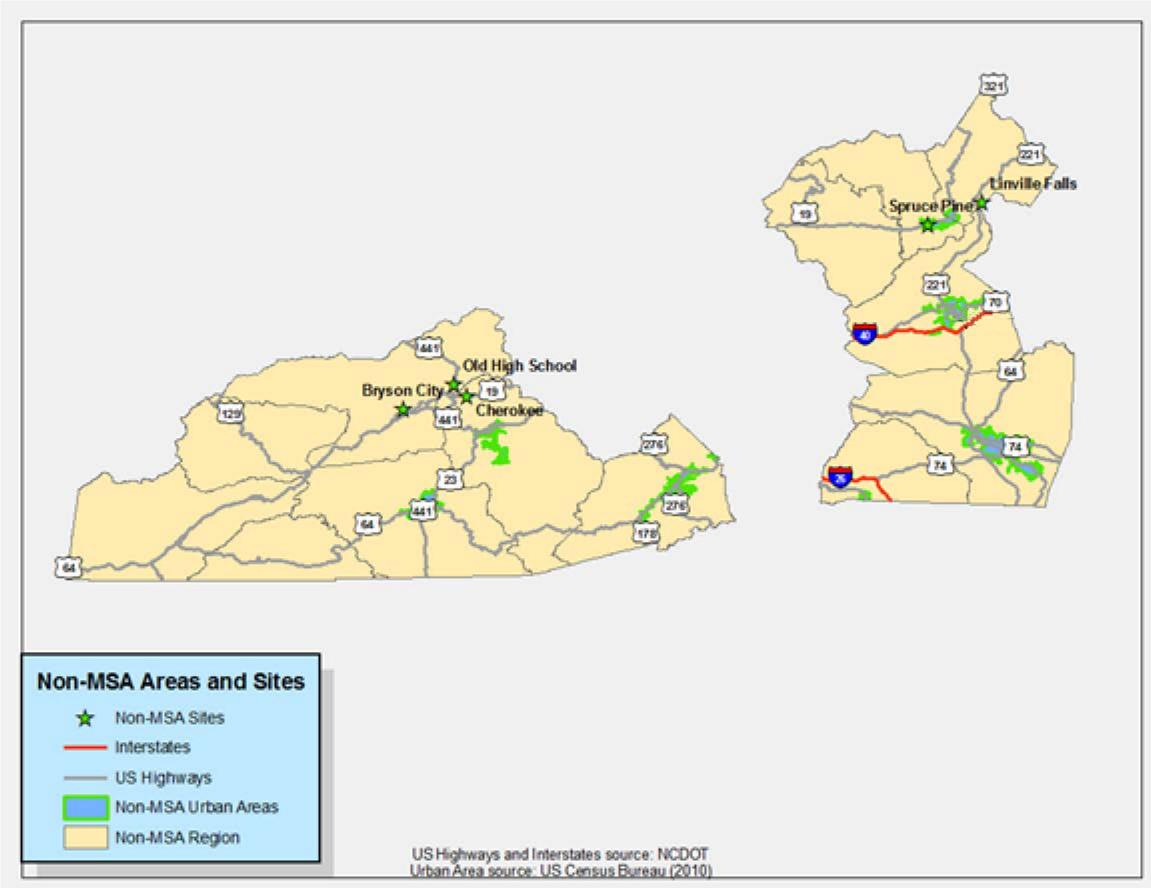

Figure A-95. Monitoring sites in the non-MSA valley areas of the Asheville monitoring region

At **Bryson City** in Swain County, 37-173-0002, DAQ operates a seasonal ozone monitor and a federal equivalent method, FEM, beta attenuation, BAM, continuous fine particle monitor. In April 2014, the Tennessee Valley Authority added a hydrologic gauging station. A 12-month special purpose sulfur dioxide monitor collected background data for modeling attainment demonstrations for the Asheville power plant from August 2014 to August 2015. Figure A-96 through Figure A-104 shows the site and views looking north, northeast, east, southeast, south, southwest, west and northwest. The site is collocated with a meteorological tower measuring wind speed, wind direction, two-meter and 10-meter ambient temperature, relative humidity, ultraviolet radiation and rain fall.

Figure A-96. The Bryson City ozone, particle and meteorological monitoring station, 37-173-0002


Figure A-97. Looking north from the Bryson site


Figure A-98. The Bryson site looking northwest


Figure A-99. Looking west from the Bryson site


Figure A-100. The Bryson site looking southwest


Figure A-101. The Bryson site looking northeast


Figure A-102. Looking east from the Bryson site


Figure A-103. The Bryson site looking southeast


Figure A-104. Looking south from the Bryson site

Table A4 summarizes monitoring information for the Bryson City site.

Table A4. Site Information Table for Bryson City

Site Name:	Bryson City	AQS Site Identification Number	37-173-0002
Location:	30 Recreation Park Drive, Bryson City, North Carolina		

CBSA:	Not in a CBSA			**CBSA #:**	00000
Latitude	35.434767	**Longitude**	-83.442133	**Datum:**	WGS84
Elevation	560 meters				

Parameter Name	Method	Method Reference ID	Sample Duration	Sampling Schedule
Ozone	Instrumental with ultra violet photometry (047)	EQOA-0880-047	1-Hour	March 1 to Oct. 31
PM 2.5 local conditions	Met One BAM-1020 Mass Monitor w/VSCC - beta attenuation	EQPM-0308-170	1-Hour	Year round
Outdoor temperature & temperature difference	Instrumental - electronic or machine avg. (041)	Not a reference method	1-Hour	Year round
Rain/melt precipitation	Bucket - continuous or incremental	Not a reference method	1-Hour	Year round
Relative humidity	Instrumental - hygrothermograph elec or mach avg (011)	Not a reference method	1-Hour	Year round
Solar radiation	Instrumental – pyranometer (011)	Not a reference method	1-Hour	Year round
Wind direction/speed	Instrumental - electronic or machine avg. (050)	Not a reference method	1-Hour	Year round

Date Monitor Established:	Ozone	April 1, 1995
	PM 2.5 local conditions	June 17, 2009
	Outdoor temperature & temperature difference	April 25, 2001
	Rain/melt precipitation	April 25, 2001
	Relative humidity	April 25, 2001
	Solar radiation	April 25, 2001
	Wind direction/speed	April 25, 2001

Nearest Road:	Recreation Park Drive	Traffic Count:	100	Year of Count:	2010

Parameter Name	Distance to Road	Direction to Road	Monitor Type	Statement of Purpose
Ozone	20 meters	Northwest	SLAMS	Compliance w/NAAQS. Real-time AQI reporting & forecasting.
PM 2.5 local conditions	25 meters	Northeast	SLAMS	Compliance w/NAAQS. Real-time AQI reporting & forecasting.
Outdoor temperature & temperature difference	25 meters	Northeast	Non-regulatory	Real-time information & modeling
Rain/melt precipitation	25 meters	Northeast	Non-regulatory	Real-time information & modeling
Relative humidity	25 meters	Northeast	Non-regulatory	Real-time information & modeling
Solar radiation	25 meters	Northeast	Non-regulatory	Real-time information & modeling
Wind direction/speed	25 meters	Northeast	Non-regulatory	Real-time information & modeling

Parameter Name	Monitoring Objective	Scale	Suitable for NAAQS Comparison	Proposal to Move or Change
Ozone	General background	Neighborhood	Yes	None
PM 2.5 local conditions	Regional transport	Regional	Yes	None
Outdoor temperature & temperature difference	Not applicable	Not applicable	Not applicable	None
Rain/melt precipitation	Not applicable	Not applicable	Not applicable	None
Relative humidity	Not applicable	Not applicable	Not applicable	None
Solar radiation	Not applicable	Not applicable	Not applicable	None
Wind direction/speed	Not applicable	Not applicable	Not applicable	None

Table A4. Site Information Table for Bryson City

Parameter Name	Meets Part 58 Requirements for: Appendix A	Appendix C	Appendix D	Appendix E
Ozone	Yes	Yes	Yes	Yes
PM 2.5 local conditions	Yes	Yes	Yes	Yes
Outdoor temperature & temperature difference	Not applicable	Not applicable	Not applicable	Not applicable
Rain/melt precipitation	Not applicable	Not applicable	Not applicable	Not applicable
Relative humidity	Not applicable	Not applicable	Not applicable	Not applicable
Solar radiation	Not applicable	Not applicable	Not applicable	Not applicable
Wind direction/speed	Not applicable	Not applicable	Not applicable	Not applicable

Parameter Name	Probe Height (m)	Distance to Support	Distance to Trees	Obstacles
Ozone	4.57	1.82 meters	15.54 meters southwest	None
PM 2.5 local conditions	2.286	2.0574 meters	10.97 meters	None
Outdoor temperature & temperature difference	2 & 10	> 1 meters	>20 meters	None
Rain/melt precipitation	Ground level	Not applicable	>20 meters	None
Relative humidity	2	> 1 meters	>20 meters	None
Solar radiation	2	> 1 meters	>20 meters	None
Wind direction/speed	10	> 1 meters	>20 meters	None

At the **Linville Falls** site, the DAQ operates a seasonal ozone monitor. A picture of the site as well as views looking north, northeast, east, southeast, south, southwest, west and northwest are provided in Figure A-105 through Figure A-113. This monitoring site is in the Linville Gorge Wilderness Area class 1 area and is collocated with an IMPROVE monitor. This monitor is a rural monitor. The collocated relative humidity and ambient temperature sensor was shut down on Oct. 30, 2014.

Figure A-105. Linville Falls ozone and IMPROVE monitoring site

Figure A-106. Looking north from the Linville site

Figure A-107. The Linville site looking northwest

Figure A-108. Looking west from the Linville site

Figure A-111. Looking east from the Linville site

Figure A-109. The Linville site looking southwest

Figure A-112. The Linville site looking southeast

Figure A-110. The Linville site looking northeast

Figure A-113. Looking south from the Linville site

Table A5. Site Information Table for Linville Falls

Site Name:	Linville Falls	**AQS Site Identification Number:**	37-011-0002		
Location:	100 Linville Falls Road, Linville Falls				
CBSA:	None	**CBSA #:**	00000		
Latitude	35.972347	**Longitude**	-81.933072	**Datum:**	WGS84
Elevation	987 meters				
Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**	
Ozone	Instrumental with ultra violet photometry (047)	EQOA-0880-047	1-Hour	March 1 to Oct. 31	
Date Monitor Established:	Ozone	Aug. 1, 1999			
Nearest Road:	Linville Falls Road	**Traffic Count:**	< 10	**Year of Count:**	Estimate
Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**	

Table A5. Site Information Table for Linville Falls

Ozone	86 meters	East	SLAMS	Compliance w/NAAQS. Real-time AQI reporting and forecasting.

Parameter Name	Monitoring Objective	Scale	Suitable for Comparison to NAAQS	Proposal to Move or Change
Ozone	General background	Urban	Yes	None

Parameter Name	Meets Part 58 Requirements for:			
	Appendix A	Appendix C	Appendix D	Appendix E
Ozone	Yes	Yes	Yes	Yes

Parameter Name	Probe Height (m)	Distance to Support	Distance to Trees	Obstacles
Ozone	3.66 meters	1.295 meters	> 20 meters	None

In the fall of 2013, DAQ was evicted from the monitoring site located in Spruce Pine on the top of town hall, 37-121-0001. Figure A-114 provides the eviction notice from the Town of Spruce Pine. The Town of Spruce Pine purchased a building and relocated their offices at the end of 2013. Thus, DAQ shut down the Spruce Pine site at the end of 2013 and established a new site at the Blue Ridge Regional Hospital, 37-121-0004. Because of the timing of the notice, DAQ was unable to include this network modification in the July 2013 network monitoring plan. Thus, the DAQ requested emergency approval from the EPA Region IV for shutting down the old site and establishing the new site. Details on the new site are provided below.

Spruce Pine is in the mountains where there are very few flat open spaces to locate a monitor. The DAQ prefers to keep the monitors on the ground for safety reasons and for ease of access. After searching around Spruce Pine within a mile of the city hall location, a new location at Blue Ridge Regional Hospital, 272 Hospital Dr., Spruce Pine, NC, was identified. As shown in Figure A-115, the hospital location is approximately 1 kilometer east southeast of the city hall site. It is approximately 75 meters southeast of Highway U.S. 19 East, which had an average annual daily traffic count of 9,500 in 2012. Based on Figure E-1 in 40 CFR 58 Appendix E, the monitor is on the edge of the neighborhood-urban scale boundary. The site is located at latitude 35.912487 and longitude -82.062082. A picture of the site and pictures taken from the site looking in 8 compass directions are provided in Figure A-116 through Figure A-124.

Town of Spruce Pine, North Carolina

Paul —
Steve —
FYI

RECEIVED
SEP 2 3 2013
DIVISION OF AIR QUALITY
ASHEVILLE REGIONAL OFFICE

September 19, 2013

Mr. Steve D. Ensley
Division of Air Quality, NCDENR
2090 US Highway 70
Swannanoa, NC 28778

Dear Mr. Ensley:

Air Quality Equipment Atop the Spruce Pine Town Hall

As you may be aware, the Town of Spruce Pine has purchased a building and plans to relocate our town hall. If all goes as anticipated, the closing on the property will be on September 27, 2013. We hope to have our offices moved by the end of the current calendar year.

No decision has been made as to the use or disposition of the existing building. I wanted to give you ample time to make your decisions regarding the location of the air quality equipment currently located on top of our building. Please feel free to contact me with questions or comments.

Sincerely,

Richard Canipe

Richard Canipe
Manager, Town of Spruce Pine

cc: Terri Davis, NCDENR Division of Air Quality

Post Office Box 189, Spruce Pine, North Carolina 28777-0189
Telephone: (828) 765-3000 Fax: (828) 765-3014 Website: www.sprucepine-nc.gov

Figure A-114. Eviction notice from the Town of Spruce Pine

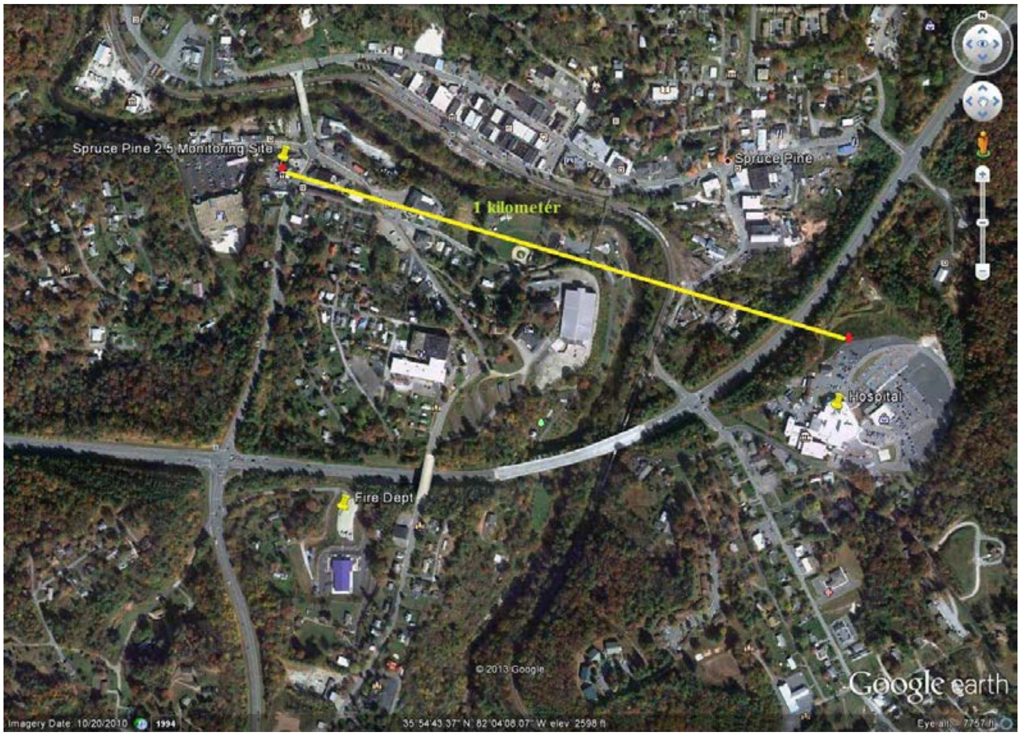

Figure A-115. Arial view of city hall and hospital monitoring sites


Figure A-116. Spruce Pine hospital, 37-121-0004, fine particle monitoring site


Figure A-117. Spruce Pine hospital site looking north


Figure A-120. Spruce Pine hospital site looking northeast


Figure A-118. Spruce Pine hospital site looking northwest

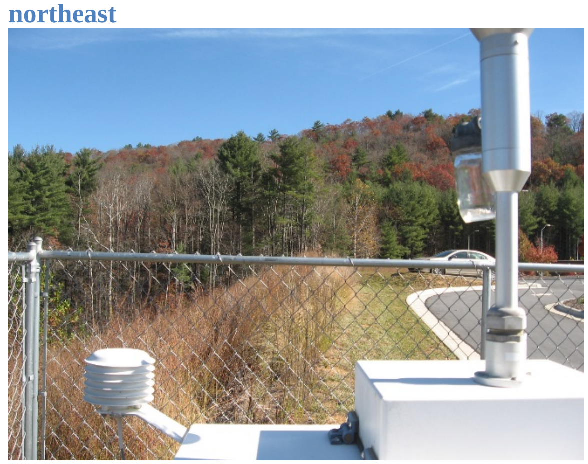
Figure A-121. Spruce Pine hospital site looking east


Figure A-119. Spruce Pine hospital site looking west


Figure A-122. Spruce Pine hospital site looking southeast


Figure A-123. Spruce Pine hospital site looking southwest


Figure A-124. Spruce Pine hospital site looking south

The hospital has a boiler house and emergency generators but the monitor is at least 200 meters northeast from them. The trees to the northeast are about 32 meters high and 80 meters from the site. The trees to the east are about 33 meters high and 86 meters away. The trees to the southeast are 60 meters tall and 140 meters away. The building to the southwest is about 11 meters high and 130 meters from the site. The trees to the west are about 38 meters tall and 90 meters away. All the trees and buildings are far enough away as to not be obstacles to the flow of the air. In 2015 the hospital expanded the parking lot. The monitor was moved 9 meters to the north on March 31, 2015.

There are no new monitoring rules that require additional monitoring in these non-MSA valley areas.

Appendix A.1 Annual Network Site Review Forms for 2017

Joanna Bald in Joyce Kilmer-Slickrock Wilderness Area

Frying Pan in the Shining Rock Wilderness Area

Purchase Knob in the Great Smoky Mountains National Park

Mount Mitchell in the Mount Mitchell State Park

Bent Creek in Asheville, operated by the WNCRAQA

Board of Education in Asheville, operated by the WNCRAQA

AB Tech Air Toxics Site, operated by WNCRAQA & the Laboratory Analysis Branch

Skyland DRR

Waynesville Health Center in Waynesville

Canton DRR in Canton

Bryson City

Linville Falls in the Linville Gorge Wilderness Area

Spruce Pine

Site Review Form Calendar Year 2017

Site Information

Region ARO	Site Name Joanna	AQS Site # 37-075-0001
Street Address-National Forest Road 423 Spur		City Robbinsville
Urban Area Not in an Urban Area	Core-based Statistical Area None	

Enter Exact		Method of Measuring	
Longitude -83.7955	Latitude 35.2578		
In Decimal Degrees	In Decimal Degrees	___	Explanation: Google earth
Elevation Above/below Mean Sea Level (in meters)		1436.00	

Name of nearest road to inlet probe National Forest Road ADT ____ Year ____________ ____

Distance of ozone probe to nearest traffic lane (m) _____ Direction from ozone probe to nearest traffic lane ___

Comments: No count available. Estimate less than 10 cars per day

Name of nearest major road Snow Bird Road (#1115) ADT 930 Year 2013

Distance of site to nearest major road (m) 6200.00 Direction from site to nearest major road NW

Comments: _____

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track	(m) _________ Direction to RR ___ ☒NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____ Direction ___
Distance between site and drip line of water tower (m) _____ Direction from site to water tower _______	☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☒General/Background ☐Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☐Urban ☒Regional	☐SLAMS ☒SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐

Give actual measured height from ground (meters) 4.24

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.80

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures: November 12, 2016 New Pictures Submitted? Yes ☐ No ☒

Reviewer Terri Davis Date: November 13, 2017

Ambient Monitoring Coordinator Steve Ensley Date: December 14, 2017

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also, use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two-digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Joette Stager

Site Review Form Calendar Year 2017

Site Information

Region ARO	**Site Name** Frypan	**AQS Site #** 37-2087-0035	
Street Address-750 Frying Pan Road		**City** Canton	
Urban Area Not in an Urban Area	**Core-based Statistical Area** None		
Enter Exact		**Method of Measuring**	
Longitude -82.7742	**Latitude** 35.3937		
In Decimal Degrees	In Decimal Degrees	___	**Explanation: Google earth**
Elevation Above/below Mean Sea Level (in meters)		**1617.88**	

Name of nearest road to inlet probe Blue Ridge Parkway ADT 300 Year ______________ ___

Distance of ozone probe to nearest traffic lane (m) 315 Direction from ozone probe to nearest traffic lane SE

Comments: _____

Name of nearest major road Blue Ridge Parkway ADT 300 Year 2014

Distance of site to nearest major road (m) 315.00 Direction from site to nearest major road SE

Comments: _____

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track	(m) ________ Direction to RR ___ ☒NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____ Direction ___
Distance between site and drip line of water tower (m) _____ Direction from site to water tower _______	☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☒General/Background ☐Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☐Urban ☒Regional	☐SLAMS ☒SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐
Give actual measured height from ground (meters) 4.50

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.30

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures: March 13, 2015 New Pictures Submitted? Yes ☐ No ☒

Reviewer Terri Davis ______ Date: 11/8/2017

Ambient Monitoring Coordinator ______ Date: _____

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also, use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two-digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Joette Steger

Site Review Form Calendar Year 2017

Site Information

Region ARO	Site Name Purchase Knob	AQS Site # 37-087-0036
Street Address-		City Waynesville
Urban Area Not in an Urban Area	Core-based Statistical Area Asheville, NC	

Enter Exact			
Longitude -83.0741	Latitude 35.5871	Method of Measuring	
In Decimal Degrees	In Decimal Degrees	Other (explain)	Explanation: Google Earth
Elevation Above/below Mean Sea Level (in meters)		1504.49	

Name of nearest road to inlet probe Purchase Road ADT 20 Year estimated ____

Distance of ozone probe to nearest traffic lane (m) 103 Direction from ozone probe to nearest traffic lane SE

Comments: ______

Name of nearest major road US-276 Jonathan Creek Road ADT 8400 Year 2016

Distance of site to nearest major road (m) 5418.00 Direction from site to nearest major road SSE

Comments: ______

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) _________ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) _____ Direction from site to water tower ________ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☒General/Background ☐Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☐Urban ☒Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☐ No ☐

Give actual measured height from ground (meters) 3.81

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.07

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☒ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☒ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree WNW *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures: 1/20/17 New Pictures Submitted? Yes ☐ No ☒

Reviewer Steve Ensley Date: December 6, 2017

Ambient Monitoring Coordinator Steve Ensley Date: December 6, 2017

Joette Steger, May 11, 2018

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also, use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two-digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Site Review Form Calendar Year 2017

Site Information

Region ARO	Site Name Mt. Mitchell		AQS Site # 37-199-0004
Street Address-2388 State Hwy 128			City ____
Urban Area Not in an Urban Area		Core-based Statistical Area None	
Enter Exact			
Longitude -82.2649	Latitude 35.765453		Method of Measuring
In Decimal Degrees	In Decimal Degrees	___	Explanation: Google Earth
Elevation Above/below Mean Sea Level (in meters) ____			

Name of nearest road to inlet probe State Hwy 128 ADT 790 Year latest available 2015

Distance of ozone probe to nearest traffic lane (m) 151 Direction from ozone probe to nearest traffic lane W

Comments: ______

Name of nearest major road State Hwy 128 ADT 790 Year 2015

Distance of site to nearest major road (m) 151.00 Direction from site to nearest major road W

Comments: ______

Site located near electrical substation/high voltage power lines?		Yes ☐ No ☒
Distance of site to nearest railroad track	(m) _________ Direction to RR ___	☒NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____ Direction ___	
Distance between site and drip line of water tower (m) _____ Direction from site to water tower ________		☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☒General/Background ☐Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☒Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☐Urban ☒Regional	☐SLAMS ☒SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐

Give actual measured height from ground (meters) t.00

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) _____

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ____ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: Unable to measure probe distance due to height from ground. Probe measurement taken from prior site review when site was installed and measured. Probe is actually within 20m of tree dripline but probe height is higher than the trees so it is recorded as not being within 20m of tree dripline. No new pictures were added even though they are older than 5 years because those were taken from the roof at the probe using a lift. We are unable to get new pictures because of the height. However they are more representative that new ground pictures. There have been no changes at the site and the trees are slow growing due to the elevation.

Date of Last Site Pictures: _____ New Pictures Submitted? Yes ☐ No ☒

Reviewer Bob Graves Date: September 11, 2017

Ambient Monitoring Coordinator Steve Ensley Date: December 12, 2017

Joette Steger, May 11, 2018

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Site Review Form Calendar Year 2017

Site Information

Region WNC	Site Name Bent Creek	AQS Site # 37-021-0030	
Street Address-125 Idlwood Drive		City Asheville	
Urban Area ASHEVILLE		Core-based Statistical Area Asheville, NC	
Enter Exact		Method of Measuring	
Longitude -82.6133	Latitude 35.5083		
In Decimal Degrees	In Decimal Degrees	___	Explanation: Google Earth
Elevation Above/below Mean Sea Level (in meters)		669.03	

Name of nearest road to inlet probe Bentcreekranch Rd. ADT 880 Year latest available 2012

Distance of ozone probe to nearest traffic lane (m) 337 Direction from ozone probe to nearest traffic lane NE

Comments: ______

Name of nearest major road Brevard Rd. (Hwy. 191) ADT 12000 Year 2012

Distance of site to nearest major road (m) 1157.64 Direction from site to nearest major road NE

Comments: ______

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) 5371 Direction to RR NE ☐NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) _____ Direction from site to water tower ________ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☐General/Background ☒Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☒Urban ☐Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐

Give actual measured height from ground (meters) 5.00

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) _____

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures: 2016 New Pictures Submitted? Yes ☐ No ☒

Reviewer ____________________ Date: _____

Ambient Monitoring Coordinator Kevin Lance ____________________ Date: November 9, 2017

Joette Steger, May 11, 2018

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also, use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two-digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Site Review Form Calendar Year 2017

Site Information

Region WNC	**Site Name** Board of Education		**AQS Site # 37-021-0034**
Street Address-175 Bingham Road			**City Asheville**
Urban Area ASHEVILLE		**Core-based Statistical Area** Asheville, NC	
Enter Exact		**Method of Measuring**	
Longitude -82.5844	**Latitude** 35.6062		
In Decimal Degrees	In Decimal Degrees	___	**Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)			662.94

Name of nearest road to inlet probe Bingham ADT Choose an Item2200 Year 2012

Distance of ozone probe to nearest traffic lane (m) _____ Direction from inlet to nearest traffic lane ___

Comments: ______

Name of nearest major road Bingham ADT 2200 Year Choose an item 2012

Distance of site to nearest major road (m) 130.56 Direction from site to nearest major road W

Comments: ______

Site located near electrical substation/high voltage power lines?		Yes ☐ No ☒
Distance of site to nearest railroad track	(m) 138Direction to RR W	☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____	Direction ___
Distance between site and drip line of water tower (m) _____	Direction from site to water tower ________	☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

Instructions:

Address: Sometimes local addresses change. Confirm the local address of the site using a 911 locator or the address used by the local utility company, community or county to identify the site location.

Urban Area: If the monitor is located within the bounds of an urban area (an incorporated area with a population of 10,000 or more people), select the appropriate urban area from the list. Otherwise select "Not in an Urban Area".

Core-Based Statistical Area (CBSA): If the monitor is located within a county that is part of a metropolitan statistical area (MSA) or a micropolitan statistical area (MiSA), then it is located within a core-based statistical area. If the monitoring station is located in a county included in a MSA or MiSA, select the appropriate CBSA from the list. Otherwise select "None".

Longitude and Latitude: The longitude and latitude should be entered in decimal degrees. Use a conversion program, such as http://transition.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html, to convert to decimal degrees.

Road Information: For the nearest road to the inlet probe, list whatever roadway that carries vehicles that is closest to the probe, whether or not it is a named or public road and even if the road has very little traffic. Use the comments space if necessary to describe the road or the source of the annual average daily traffic (AADT) counts. If the monitor is located near an unnamed, little used, private road, use the nearest major road space to list the closest named public road to the site. Include the distance and direction of the nearest major road from the site as well as the AADT if it is available. If the closest road is a small public road but there is a large major roadway such as an interstate highway, divided highway, major thoroughfare, etc., near the monitoring station use the nearest major road space to list the information about this major roadway. Include the distance and direction of the major road from the site as well as the AADT. The AADT for state roads can be obtained from the North Carolina Division of Transportation at http://www.ncdot.gov/travel/statemapping/trafficvolumemaps/default.html. For AADT values for local roadways contact the appropriate local governments.

Any Sources of Potential Bias: Use this space to record any information about the site that is not requested elsewhere. Especially note any changes to the site that occurred near the site in the past year, such as road construction, building construction, new businesses, businesses closing, or changes in traffic patterns, crops or other agricultural activities.

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Monitor Type
Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☒ PM10-2.5 BAM ☐ PM2.5 Cont. (BAM)	☐General/Background_____ ☐Highest Concentration_____ ☒Population Exposure_____ ☐Source Oriented_____ ☐Transport_____ ☐Welfare Related Impacts _____	☐Micro_____ ☐Middle_____ ☒Neighborhood _____ ☐Urban_____ ☐Regional_____	☒SLAMS _____ ☐SPM_____ ☐ Nonregulatory_____

Probe inlet height (from ground) ☐ < 2 m _____ ☐ 2-7m _____ ☒ 7-15 m _____ ☐ > 15 m_____
Actual measured distance from probe inlet to ground (meters) 8

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) _____

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☒ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM 2.5 samplers (X) within 1 to 4 m of each other? Yes ☒ No ☐ Give actual (meters): 3
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters): 1

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☐ NA ☒
* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐
*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐
*4) Relocate site? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures: 2015 New Pictures Submitted? Yes ☐ No ☒

Reviewer ________________________________ Date: _____

Ambient Monitoring Coordinator Kevin Lance ____________ Date: November 9, 2017

Joette Steger, May 11, 2018

Site Review Form Calendar Year 2017

Site Information

RegionWNC____	**Site Name** AB Tech____	**AQS Site # 37-021-0035**
Street Address-AB Technical Community College		**City** Asheville
Urban Area Choose an item.	**Core-based Statistical Area** Choose an item.	
Enter Exact		**Method of Measuring**
Longitude -82.58611	**Latitude** 35.57222	
In Decimal Degrees	In Decimal Degrees	___ **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		**647.39**

Name of nearest road to inlet probe Victoria Road ADT 2200 Year Choose an item 2010

Comments: Cul-de-sac 73 m from probe______

Distance of site to nearest major road (m) 359 Direction from site to nearest major road E___

Name of nearest major road Victoria Road ADT 2200 Year 2010

Comments: ______

Site located near electrical substation/high voltage power lines?	Yes ☐ No X☐
Distance of site to nearest railroad track (m) 341Direction to RR WSW___	☐NA
OPTIONAL Distance of site to nearest power pole w/transformer (m) _____	Direction ___
Distance between site and drip line of water tower (m) _______Direction from site to water tower ________	X☐NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☐ O_3 ☐ NH_3 ☐ Hydrocarbon X☐ Air Toxics ☐ CO (trace-level)	X☐General/Background_____ ☐Highest Concentration_____ ☐Max O3 Concentration_____ X☐Population Exposure_____ ☐Source Oriented_____ ☐Transport_____ ☐Upwind Background_____ ☐Welfare Related Impacts _____	☐Micro_____ ☐Middle_____ ☐ Neighborhood_____ X☐Urban_____ ☐Regional_____	☐SLAMS _____ X☐SPM_____ **Monitor Network Affiliation** ☐NCORE_____ ☐Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes X☐ No ☐ Give actual measured height from ground (meters) _____

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? YesX ☐ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? YesX ☐ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes X☐ (answer *'d questions) No ☐

*Identify obstacle tree Distance from probe inlet (m) 30 Direction from probe inlet to obstacle ENE___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes X☐ No ☐

Distance of probe to nearest traffic lane (m) 359 Direction from probe to nearest traffic lane E___

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
X☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☐ PM2.5 Cont. (BAM)	☐General/Background _____ ☐Highest Concentration _____ ☐Population Exposure _____ ☐Source Oriented _____ ☐Transport _____ ☐Welfare Related Impacts _____	☐Micro _____ ☐Middle _____ ☐Neighborhood _____ ☐Urban _____ ☐Regional _____	☐SLAMS _____ ☐SPM_____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☐ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) _____

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) _____ Yes ☐ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☐ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) _____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☐ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☐

*Identify obstacle ____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) _____ Direction from probe to nearest traffic lane ___

RECOMMENDATIONS:

1) Maintain current site status? Yes X☐ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-
*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐
*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures 2016New Pictures Submitted? Yes ☐ No X☐

Reviewer ______________________________ Date _____

Ambient Monitoring Coordinator Kevin Lance Date11/9/17

Joette Steger, May 11, 2018

Site Review Form Calendar Year 2017

Site Information

Region ARO	**Site Name** Waynesville School	**AQS Site #** 37-087-0008	
Street Address-2236 Asheville Road		**City** Waynesville	
Urban Area Not in an Urban Area	**Core-based Statistical Area** Asheville, NC		
Enter Exact		**Method of Measuring**	
Longitude -82.9636	**Latitude** 35.5072		
In Decimal Degrees	In Decimal Degrees	**Other (explain)**	**Explanation:** Google Earth
Elevation Above/below Mean Sea Level (in meters)		793.00	

Name of nearest road to inlet probe Asheville Road ADT 11000 Year latest available 2016

Distance of ozone probe to nearest traffic lane (m) 151 Direction from ozone probe to nearest traffic lane SW

Comments: ______

Name of nearest major road HWY 74 (Great Smoky Mountains Expressway) ADT 34000 Year 2016

Distance of site to nearest major road (m) 1056.35 Direction from site to nearest major road NW

Comments: ______

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) 771 Direction to RR NW ☐NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) _____ Direction from site to water tower ________ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☐General/Background ☐Highest Concentration ☐Max O3 Concentration ☒Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☒Neighborhood ☐Urban ☐Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐

Give actual measured height from ground (meters) 3.76

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.01

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures: January 28, 2015 New Pictures Submitted? Yes ☐ No ☒

Reviewer Steve Ensley Date: December 12, 2017

Ambient Monitoring Coordinator Steve Ensley Date: December 12, 2017

Joette Steger, May 11, 2018

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also, use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two-digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Site Review Form Calendar Year 2017

Site Information

Region ARO	**Site Name** Canton DRR	**AQS Site #** 37-087-0013
Street Address-104 Pace Street	**City** Canton	
Urban Area CANTON	**Core-based Statistical Area** Asheville, NC	
Enter Exact		**Method of Measuring**
Longitude 82.848764	**Latitude** 35.535039	
In Decimal Degrees	In Decimal Degrees	Other (explain) **Explanation:** Google Earth
Elevation Above/below Mean Sea Level (in meters)		813.5112

Name of nearest road to inlet probe Blackwell Drive (Hwy 215) ADT 10000 Year latest available 2016

Comments: ______

Distance of site to nearest major road (m) 331.00 Direction from site to nearest major road SSW

Name of nearest major road New Clyde Highway (Hwy 23) ADT 15000 Year latest available 2016

Comments: ______

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) 297 Direction to RR SSW ☐NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___

Distance between site and drip line of water tower (m) ______ Direction from site to water tower ______ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☒ SO_2 (DRR) ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level)	☐ General/Background ☐ Highest Concentration ☐ Population Exposure ☒ Source Oriented ☐ Transport ☐ Upwind Background ☐ Welfare Related Impacts	☐ Micro ☒ Middle ☐ Neighborhood ☐ Urban ☐ Regional	☒ INDUSTRIAL ☐ SLAMS ☐ SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4.67

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.88

Distance of outer edge of probe inlet from other gas monitoring probe inlets > 0.25 m? Yes ☐ No ☐ NA ☒

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 10 Direction from probe to nearest traffic lane NW

Site Review Form Calendar Year 2017

SULFUR DIOXIDE MONITOR RECOMMENDATIONS:

1) Maintain current monitor status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate monitor? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures 11/3/16 New Pictures Submitted? Yes ☐ No ☒

Reviewer Steve Ensley ______ Date December 6, 2017

Ambient Monitoring Coordinator Steve Ensley ______ Date December 6, 2017

Revised 2018-05-11 Joette Steger, May 11, 2018

Instructions:

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Site Review Form Calendar Year 2017

Site Information

Region **ARO**___	**Site Name** Bryson City	**AQS Site # 37-173-0002**
Street Address-30 Recreation Park Drive		**City** **Bryson City**
Urban Area Not in an Urban Area	**Core-based Statistical Area** None	

Enter Exact		
Longitude -83.442228	**Latitude** 35.434846	**Method of Measuring**
In Decimal Degrees	In Decimal Degrees	___ **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		559

Name of nearest road to inlet probe Recreation Park Drive ADT 100 Year Choose an item 2010

Comments: ______

Distance of site to nearest major road (m) 416 Direction from site to nearest major road SSE

Name of nearest major road US 19 ADT 6800 Year 2016

Comments: ______

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track	(m) 240Direction to RR SSE ☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____ Direction ___
Distance between site and drip line of water tower (m) ______Direction from site to water tower ____________	☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☒ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (trace-level)	☒ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☐ Population Exposure_____ ☐ Source Oriented_____ ☒ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☒ Neighborhood_____ ☐ Urban_____ ☐ Regional_____	☒ SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 4.57

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.82

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☒ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☒ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 20 Direction from probe to nearest traffic lane NW

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☐General/Background _____ ☐Highest Concentration _____ ☐Population Exposure _____ ☐Source Oriented _____ ☒Transport _____ ☐Welfare Related Impacts _____	☐Micro _____ ☐Middle _____ ☒Neighborhood _____ ☐Urban _____ ☐Regional _____	☒SLAMS _____ ☐SPM_____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) 2.286

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.0574 Yes ☒ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA ☒

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) _____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☐ NA ☒

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☐ *No ☒ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☒ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 25 Direction from probe to nearest traffic lane NE

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-
*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐
*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures 12/3/15_____ New Pictures Submitted? Yes ☐ No ☒

Reviewer Steve Ensley Date 12/14/17

Ambient Monitoring Coordinator Steve Ensley Date12/14/17

Joetta Steger

Site Review Form Calendar Year 2017

Site Information

Region ARO	Site Name Linville Falls	AQS Site # 37-011-0002	
Street Address-Linville Falls Rd		City Linville Falls	
Urban Area Not in an Urban Area		Core-based Statistical Area None	
Enter Exact		Method of Measuring	
Longitude -81.9330	Latitude 35.9723		
In Decimal Degrees	In Decimal Degrees	___	Explanation: Google earth
Elevation Above/below Mean Sea Level (in meters) ___			

Name of nearest road to inlet probe Blue Ridge Parkway ADT 0 Year ________ ___

Distance of ozone probe to nearest traffic lane (m) 270 Direction from ozone probe to nearest traffic lane NNW

Comments: ______

Name of nearest major road Hwy 221(Linville Falls Hwy) ADT 2600 Year 2016

Distance of site to nearest major road (m) 1600.00 Direction from site to nearest major road SW

Comments: ______

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track (m) ________ Direction to RR ___	☒NA
OPTIONAL Distance of site to nearest power pole w/transformer (m) _____ Direction ___	
Distance between site and drip line of water tower (m) _____ Direction from site to water tower ________	☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☒General/Background ☐Highest Concentration ☐Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☐Urban ☒Regional	☐SLAMS ☒SPM

Probe inlet height (from ground) 2-15 m? Yes ☐ No ☐

Give actual measured height from ground (meters) 3.65

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☐ No ☒

Actual measured distance from outer edge of probe to supporting structure (meters) 0.38

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2017

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: ______

Date of Last Site Pictures: October 19, 2015 New Pictures Submitted? Yes ☐ No ☒

Reviewer Terri Davis Date: November 2, 2017

Ambient Monitoring Coordinator Steve Ensley Date: 12/12/2017

Instructions: Joette Steger, May 11, 2018

If the annual network review has indicated that the monitoring objectives and scale of representativeness for the site have not changed and the siting criteria still meets those monitoring objectives and that scale of representativeness and there are no other reasons to modify the site in any way, check "Yes" to the question "Maintain current site status?" and skip the rest of the recommendations section.

If the annual network review has indicated that the monitoring objectives, scale of representativeness, or siting criteria have changed for some reason or there is another reason to modify the site in some way, check "No" to the question "Maintain current site status?" and complete the rest of the recommendations section. If the monitoring objective or scale of representativeness needs to be changed, check the "Yes" box and write in the new monitoring objective or scale of representativeness on the line. Otherwise check the "No" box. If the site needs to be relocated, check the "Yes" box. If the site needs to be shut down, write "Shut down" in the comments line. Also, use the comments line to explain any change requested.

Check the site picture archive to find out when the last set of site pictures were taken and write the date down on the line. If the pictures are more than five years old or if something at the site has changed in the past year, take new site pictures. Changes that require new site pictures include additions, removals, or movement of monitors at the site, growth or removal of trees and other shrubs at the site, and construction of roads or buildings at or in the vicinity of the site.

Pictures of the site should at a minimum include at least one picture showing the site itself and pictures standing at the probe or inlet or as close as possible to the probe or inlet looking in the four compass directions (north, east, south, and west). If meteorological data are collected at the site, pictures standing at the meteorological tower looking southwest and northeast should also be included. Sometimes pictures looking at the site from the four compass directions are also helpful.

Be sure to correctly identify the pictures as to which compass direction they show. This documentation may be achieved by using good notes when taking the pictures, holding a compass in front of the camera, or placing a sign with the appropriate direction indicated somewhere in the picture. Label the pictures with the name of the site using the two-digit logger ID (HC, JW, *etc.*), the direction (N, NE, E, SE, S, SW, W, NW), and the date taken (YYYYMMDD) and transfer the pictures to the group drive in the appropriate Incoming/Regional Office directory.

Site Review Form Calendar Year 2017

Site Information

Region ARO	Site Name Spruce Pine Hospital	AQS Site # 37-121-0004
Street Address-272 Hospital Drive		City Spruce Pine
Urban Area SPRUCE PINE	Core-based Statistical Area None	
Enter Exact		
Longitude -82.0343	Latitude 35.5444	Method of Measuring
In Decimal Degrees	In Decimal Degrees	___ Explanation: Google earth
Elevation Above/below Mean Sea Level (in meters) ___		

Name of nearest road to inlet probe Altapass Hwy ADT Latest available3300 Year 2016

Distance of ozone probe to nearest traffic lane (m) 281 Direction from inlet to nearest traffic lane SW

Comments: ______

Name of nearest major road US 19 ADT 9800 Year Choose an item 2016

Distance of site to nearest major road (m) 90.00 Direction from site to nearest major road NW

Comments: NCDOT Traffic Volume map

Site located near electrical substation/high voltage power lines?		Yes ☐ No ☒
Distance of site to nearest railroad track	(m) 327Direction to RR W	☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____	Direction ___
Distance between site and drip line of water tower (m) _____	Direction from site to water tower ________	☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

Instructions:

Address: Sometimes local addresses change. Confirm the local address of the site using a 911 locator or the address used by the local utility company, community or county to identify the site location.

Urban Area: If the monitor is located within the bounds of an urban area (an incorporated area with a population of 10,000 or more people), select the appropriate urban area from the list. Otherwise select "Not in an Urban Area".

Core-Based Statistical Area (CBSA): If the monitor is located within a county that is part of a metropolitan statistical area (MSA) or a micropolitan statistical area (MiSA), then it is located within a core-based statistical area. If the monitoring station is located in a county included in a MSA or MiSA, select the appropriate CBSA from the list. Otherwise select "None".

Longitude and Latitude: The longitude and latitude should be entered in decimal degrees. Use a conversion program, such as http://transition.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html, to convert to decimal degrees.

Road Information: For the nearest road to the inlet probe, list whatever roadway that carries vehicles that is closest to the probe, whether or not it is a named or public road and even if the road has very little traffic. Use the comments space if necessary to describe the road or the source of the annual average daily traffic (AADT) counts. If the monitor is located near an unnamed, little used, private road, use the nearest major road space to list the closest named public road to the site. Include the distance and direction of the nearest major road from the site as well as the AADT if it is available. If the closest road is a small public road but there is a large major roadway such as an interstate highway, divided highway, major thoroughfare, etc., near the monitoring station use the nearest major road space to list the information about this major roadway. Include the distance and direction of the major road from the site as well as the AADT. The AADT for state roads can be obtained from the North Carolina Division of Transportation at http://www.ncdot.gov/travel/statemapping/trafficvolumemaps/default.html. For AADT values for local roadways contact the appropriate local governments.

Any Sources of Potential Bias: Use this space to record any information about the site that is not requested elsewhere. Especially note any changes to the site that occurred near the site in the past year, such as road construction, building construction, new businesses, businesses closing, or changes in traffic patterns, crops or other agricultural activities.

Site Review Form Calendar Year 2017

Parameters	Monitoring Objective	Scale	Monitor Type
Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☐General/Background_____ ☐Highest Concentration_____ ☒Population Exposure_____ ☐Source Oriented_____ ☐Transport_____ ☐Welfare Related Impacts _____	☐Micro_____ ☐Middle_____ ☒Neighborhood _____ ☐Urban_____ ☐Regional_____	☒SLAMS _____ ☐SPM_____ ☐ Nonregulatory_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m_____
Actual measured distance from probe inlet to ground (meters) FRM&BAM 2.3368

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) FRM & BAM 2.1336

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☒ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM 2.5 samplers (X) within 1 to 4 m of each other? Yes ☒ No ☐ Give actual (meters): 1.46
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☒ Give actual (meters): _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐
* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ____ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: Y=1.2192 METERS

Date of Last Site Pictures: October 31, 2016 New Pictures Submitted? Yes ☐ No ☒

Reviewer ______________________________Date: _____

Ambient Monitoring Coordinator Steve Ensley Date: December 12, 2017

Joette Steger, May 11, 2018

Appendix A-2. Scale of Representativeness

Each station in the monitoring network must be described in terms of the physical dimensions of the air parcel nearest the monitoring station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

a) Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.
c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.
d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.
e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station.

There are six basic exposures:

a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.
b) Sites located to determine representative concentrations in areas of high population density.
c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.
d) Sites located to determine general background concentration levels.
e) Sites located to determine the extent of regional pollutant transport among populated areas.
f) Sites located to measure air pollution impacts on visibility, vegetation damage or other welfare-based impacts and in support of secondary standards.

The design intent in siting stations is to correctly match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of the six basic objectives and the scales of representativeness are appropriate when siting monitoring stations:

Table A6. Site Type Appropriate Siting Scales

1. Highest concentration	Micro, middle, neighborhood (sometimes urban or regional for secondarily formed pollutants)
2. Population oriented	Neighborhood, urban
3. Source impact	Micro, middle, neighborhood
4. General/background & regional transport	Urban, regional
5. Welfare-related impacts	Urban, regional

Appendix A-3. Duke Progress Energy Skyland Siting Analysis and Additional Site Information

Duke Energy Asheville SO_2 Modeling for Monitor Placement

Introduction

On June 22, 2010, the United States Environmental Protection Agency, or 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) [8] 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 near 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 Asheville should the facility and North Carolina Department of Environmental Quality decide to use monitoring instead of modeling to comply with the DRR. Currently, the closest SO_2 monitor is about 80 kilometers west of Duke Energy Asheville, located at 30 Recreation Park Drive, Bryson City, NC. The 1-hour background monitored air concentration for the area based on 2014 data from that monitor is 1.1 ppb or 2.9 $\mu g/m^3$.

Duke Energy Asheville

Duke Energy's Asheville Plant is a coal-fired electric generating facility located at 200 CP&L Drive in Arden, NC. The facility produces steam in two coal-fired combustion units (Units 1 and 2) and the steam is routed to steam turbines that produce electricity to sell to residential or industrial consumers. The facility is not a significant source of SO_2 emissions since it emits less than 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. However, this facility was modeled and shown to potentially violate the SO2 NAAQS by a third-party, The Sierra Club.

A part of the requirements for the DRR is the consideration of other sources of SO_2 emissions near the facility. The only other large source of SO_2 emissions in the region, Evergreen Packaging in Canton, NC, is over 25 kilometers away from Duke Energy Asheville. This facility

[8] 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.

is a significant source of SO_2 emissions since it emits more than the 2,000 tons per year threshold specified in the DRR and is being examined in a different exercise. However, the facilities are far enough apart to not impact the same areas.

AERMOD Modeling

As described in the EPA SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, or the Monitoring TAD, [9] the Division of Air Quality's, or DAQ's, modeling followed the recommendations of the SO_2 NAAQS Designations Modeling Technical Assistance Document, also known as the Modeling TAD. Based on 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 two stacks at the Duke Energy Asheville facility 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. 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 7 provides the stack parameters used in the modeling analysis.

Table 7. Parameters for Duke Energy Asheville SO2 Modeling for Monitor Placement

Source ID	Easting (X)	Northing (Y)	Base Elevation	Stack Height	Temperature	Exit Velocity	Stack Diameter
	(m)	(m)	(m)	(m)	(K)	(m/s)	(m)
UNIT1	359,957.5	3,926,328.5	662	99.7	324	17.3	5.0
UNIT2	359,963.9	3,926,328.5	662	99.7	322	17.1	5.0

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

[9] 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.

such as open water. The following figures are included to show the facility and modeling inputs. Figure A-125 is an aerial photo of the facility, Figure A-126 shows the emissions point and building locations and Figure A-127 shows the receptor placement.

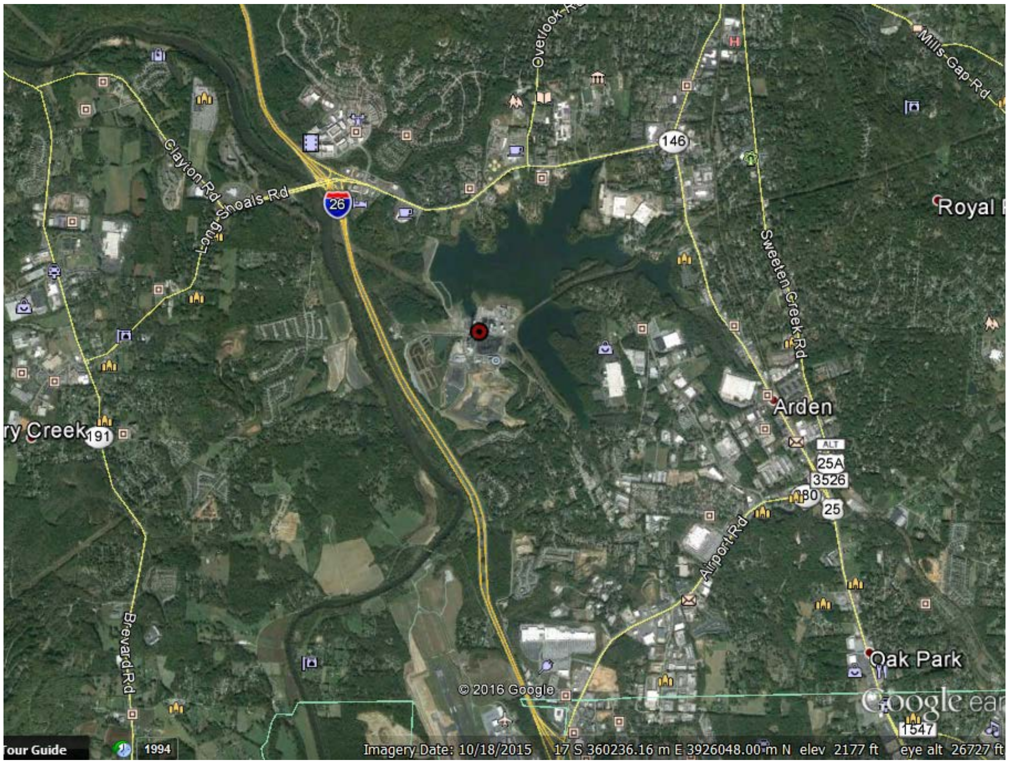

Figure A-125. Aerial View of Duke Energy Asheville and Surrounding Areas

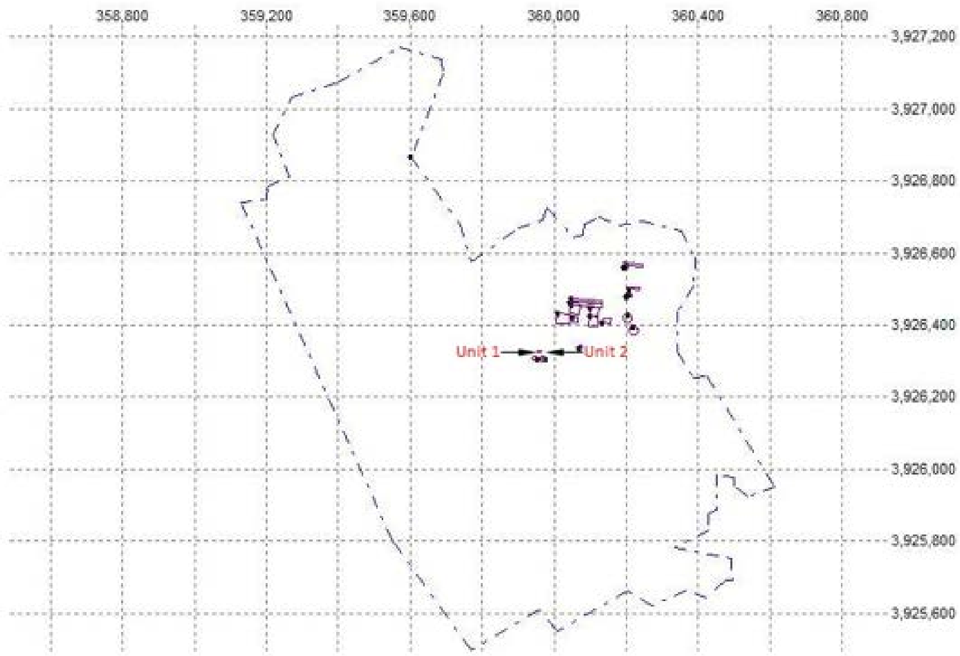

Figure A-126. Locations in Duke Energy Asheville SO2 Modeling for Monitor Placement
(UTM NAD 83 Coordinates in Meters, Zone 17)

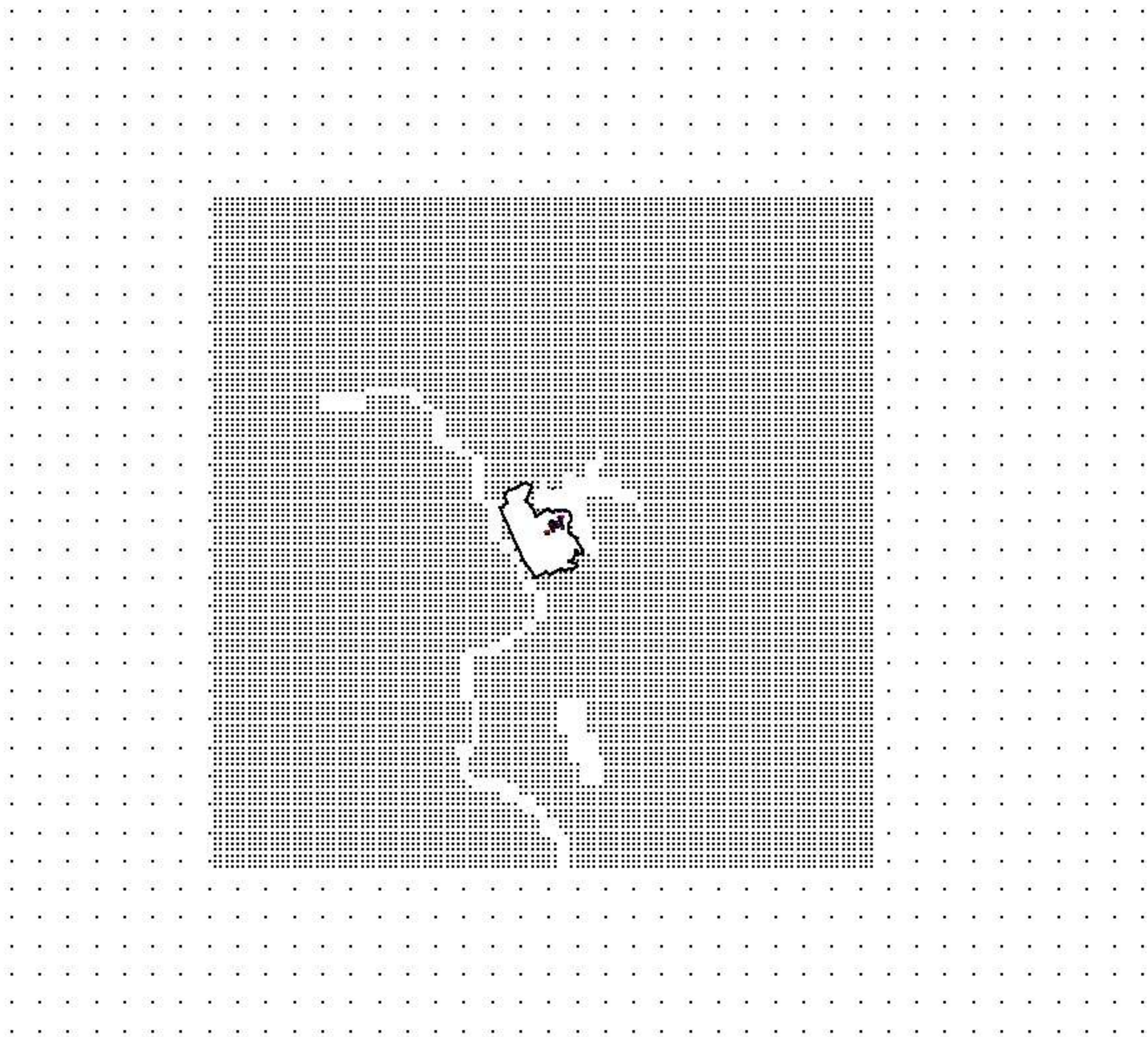

Figure A-127. Receptor Grids in Duke Energy Asheville SO2 Modeling for Monitor Placement Receptor

Terrain data used in the analysis were obtained from the USGS Seamless Data Server at http://viewer.nationalmap.gov/viewer/. The 1 arc-second NED data were 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 Asheville, NC were 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 Asheville. 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 or NDVs in this analysis.

Figure A-128 shows a contour plot of the NDVs for the receptors near Duke Energy Asheville. Individual NDV's for the higher areas are also presented. The pushpin represents the Skyland DRR monitor location.

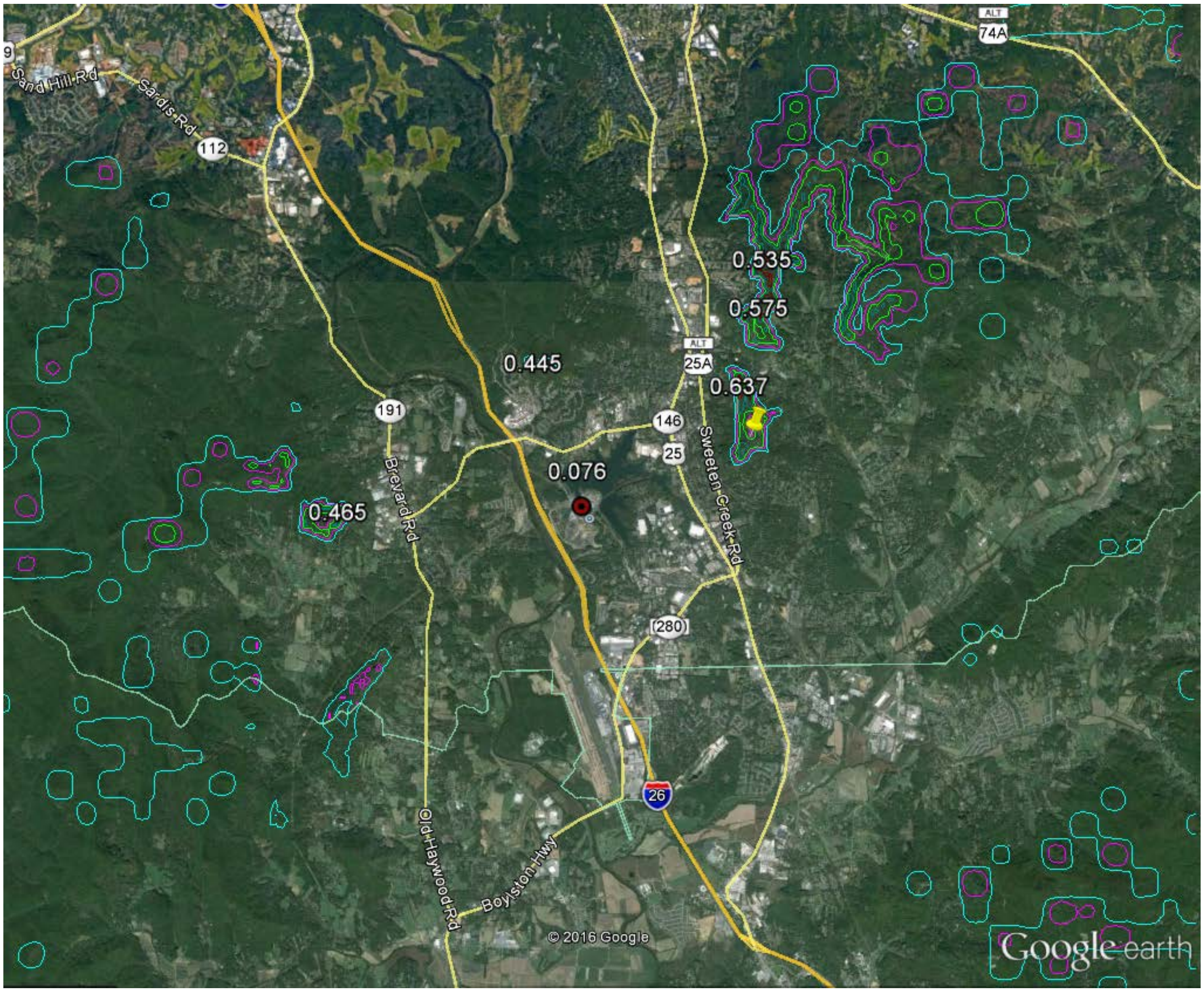

Figure A-128. Modeled NDVs for Duke Energy Asheville

Based on Appendix A of the Monitoring TAD, the site selection process also needs 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 A-129 shows the results of the frequency analysis. The pushpin represents the Skyland DRR monitor location.

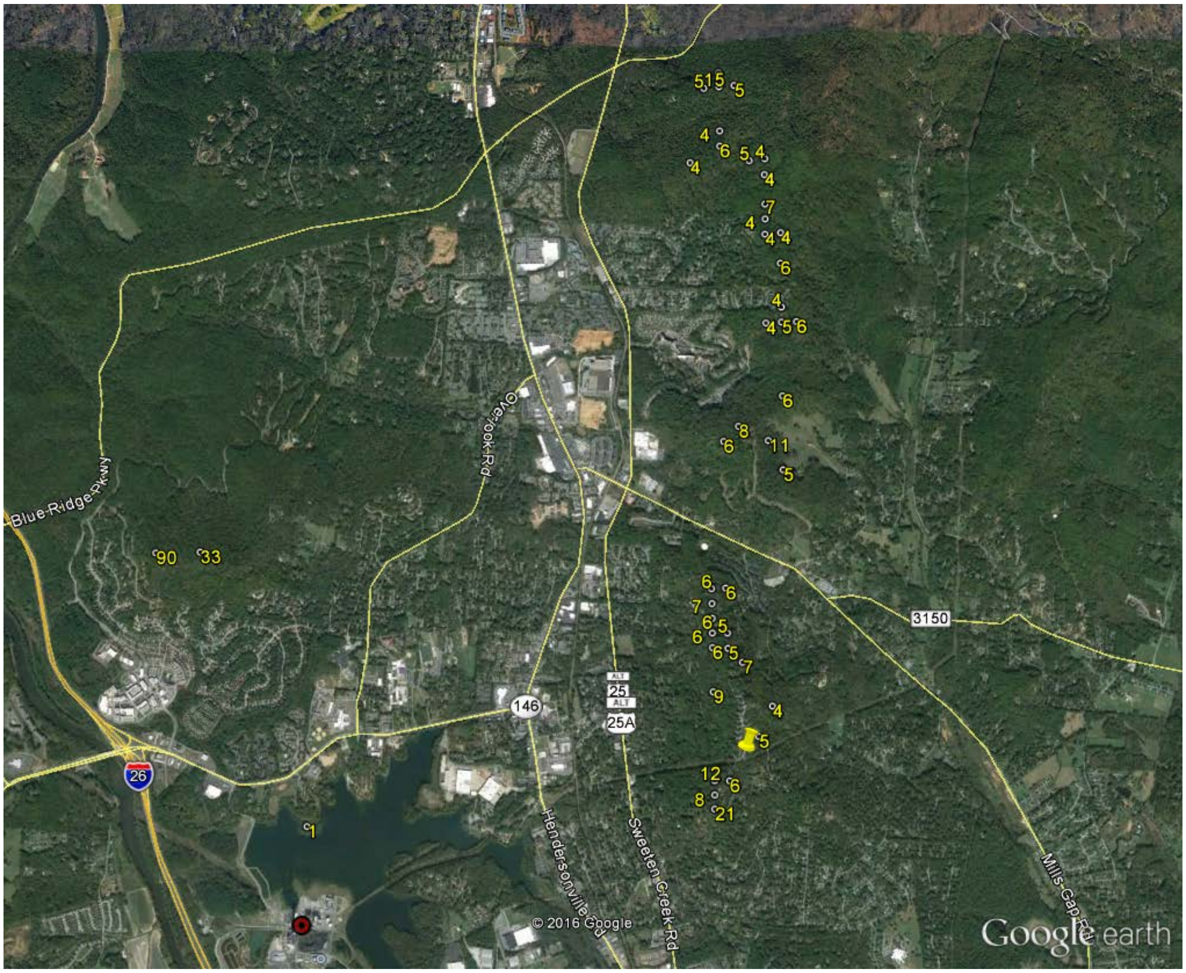

Figure A-129. Frequency of Daily Maximum Concentrations for Duke Energy Asheville

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 the Skyland DRR Monitor Site

Figure A-130 shows the receptor locations that ranked in the top 30, note that there were several ties in rankings. DAQ staff, in conjunction with Duke Energy staff and a representative from EPA Region 4, conducted an in-situ survey near the Duke Energy Asheville area to select a suitable location for SO_2 monitor placement. The survey focused on the areas to the northeast of the Asheville facility where the higher-ranking receptors are located. See Figure A-130. When selecting adequate locations for the Skyland DRR 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.

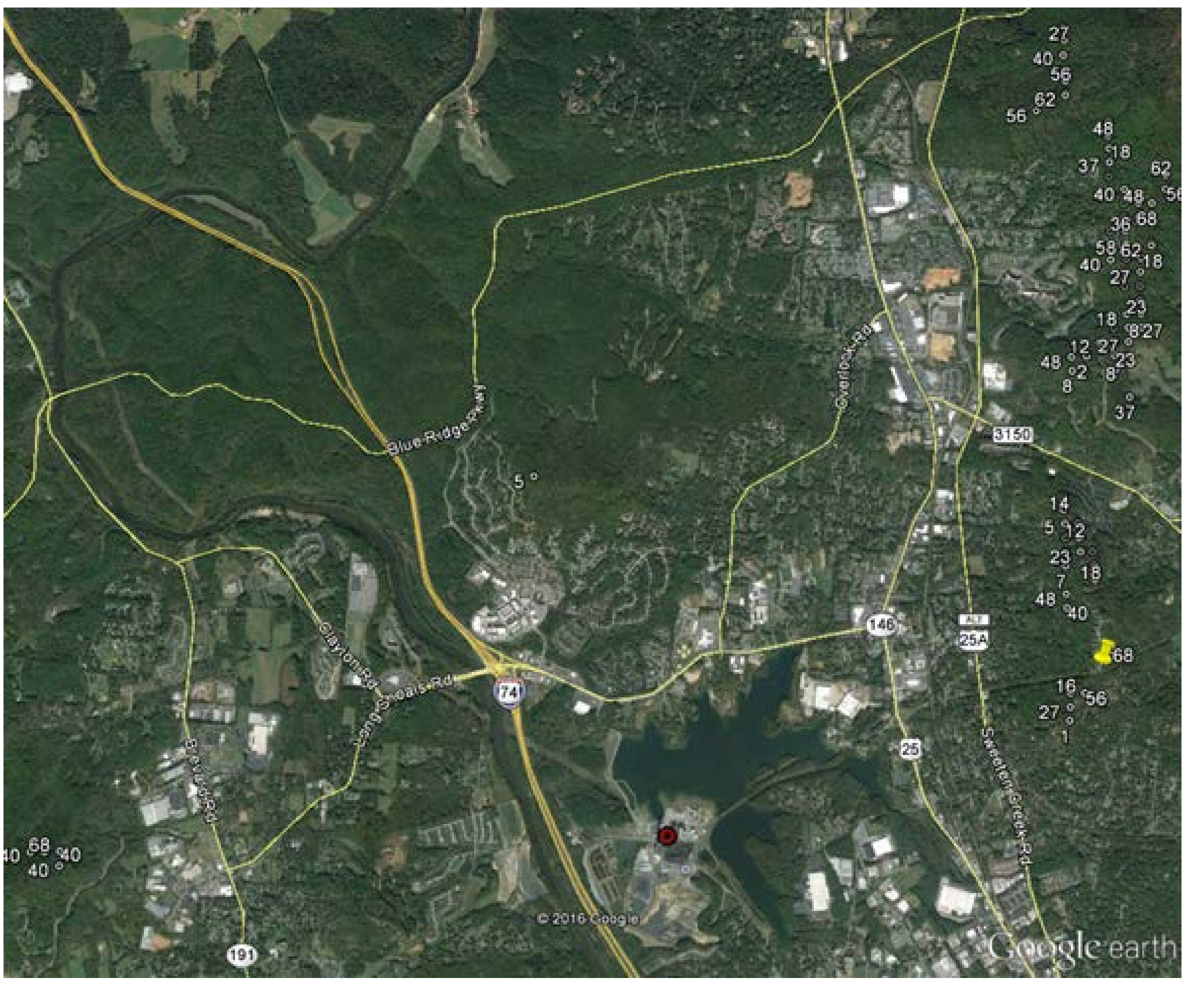

Figure A-130. Locations of Top Ranked Receptors for Duke Energy Asheville

Table 8 shows a summary of the ranking results for the top receptors and the Skyland DRR monitor location resulting from the site visit conducted using information from the scoring strategy.

Table 8. Selected Ranking Results from the Duke Energy Asheville SO2 Modeling for Monitor Placement

Easting, in meters	Northing, in meters	Normalized Design Value, NDV	NDV Ratio	NDV Rank	Freq. Count	Freq. Rank	Score	Score Rank
362,900	3,927,200	0.49	0.78	11	21	3	14	1
362,900	3,928,500	0.63	1.00	**1**	6	14	15	2
363,100	3,929,800	0.58	0.92	3	8	12	15	2
362,900	3,928,400	0.62	0.98	2	6	14	16	4
359,100	3,929,000	0.44	0.70	16	90	**1**	17	5
362,900	3,928,600	0.57	0.90	4	7	13	17	5
362,900	3,928,300	0.56	0.89	5	6	14	19	7
363,000	3,929,700	0.54	0.86	6	6	14	20	8
363,300	3,929,700	0.50	0.79	10	11	10	20	8
363,400	3,930,000	0.54	0.86	6	6	14	20	8
363,000	3,932,200	0.47	0.75	13	14	8	21	11
363,000	3,928,500	0.62	0.98	2	0	20	22	12
363,200	3,929,900	0.56	0.89	5	3	17	22	12
362,900	3,928,700	0.51	0.81	9	6	14	23	14
363,400	3,930,500	0.52	0.83	8	5	15	23	14
362,900	3,927,400	0.45	0.71	15	12	9	24	16
363,300	3,929,900	0.57	0.90	4	0	20	24	16
363,100	3,928,200	0.48	0.76	12	7	13	25	18
363,300	3,930,600	0.52	0.83	8	3	17	25	18
363,300	3,931,300	0.48	0.76	12	7	13	25	18
363,400	3,930,100	0.56	0.89	5	0	20	25	18
363,500	3,930,500	0.49	0.78	11	6	14	25	18
363,000	3,928,400	0.49	0.78	11	5	15	26	23
363,300	3,929,800	0.54	0.86	6	0	20	26	23
363,400	3,930,800	0.53	0.84	7	1	19	26	23
363,500	3,930,100	0.54	0.86	6	0	20	26	23
362,900	3,927,300	0.45	0.71	15	8	12	27	27
363,000	3,932,100	0.40	0.63	20	15	7	27	27
363,300	3,930,000	0.53	0.84	7	0	20	27	27
363,300	3,931,100	0.49	0.78	11	4	16	27	27
363,400	3,929,900	0.52	0.83	8	1	19	27	27

Table 8. Selected Ranking Results from the Duke Energy Asheville SO2 Modeling for Monitor Placement

Easting, in meters	Northing, in meters	Normalized Design Value, NDV	NDV Ratio	NDV Rank	Freq. Count	Freq. Rank	Score	Score Rank
363,400	3,930,900	0.47	0.75	13	6	14	27	27
363,500	3,930,000	0.53	0.84	7	0	20	27	27
363,500	3,930,300	0.53	0.84	7	0	20	27	27
363,500	3,930,400	0.51	0.81	9	2	18	27	27
363,400	3,930,700	0.52	0.83	8	0	20	28	36
363,100	3,928,300	0.51	0.81	9	0	20	29	37
363,300	3,931,200	0.47	0.75	13	4	16	29	37
363,400	3,929,500	0.46	0.73	14	5	15	29	37
355,500	3,926,400	0.45	0.71	15	5	15	30	40
355,700	3,926,300	0.46	0.73	14	4	16	30	40
355,700	3,926,400	0.44	0.70	16	6	14	30	40
362,900	3,928,000	0.41	0.65	19	9	11	30	40
363,000	3,932,000	0.50	0.79	10	0	20	30	40
363,300	3,930,500	0.46	0.73	14	4	16	30	40
363,300	3,930,700	0.47	0.75	13	3	17	30	40
363,400	3,931,000	0.50	0.79	10	0	20	30	40
362,900	3,928,100	0.47	0.75	13	2	18	31	48
363,000	3,929,800	0.47	0.75	13	2	18	31	48
363,100	3,928,400	0.49	0.78	11	0	20	31	48
363,300	3,931,400	0.47	0.75	13	2	18	31	48
363,300	3,931,500	0.45	0.71	15	4	16	31	48
363,400	3,929,800	0.49	0.78	11	0	20	31	48
363,500	3,930,900	0.49	0.78	11	0	20	31	48
364,900	3,929,900	0.49	0.78	11	0	20	31	48
362,800	3,931,600	0.44	0.70	16	4	16	32	56
363,000	3,927,400	0.42	0.67	18	6	14	32	56
363,000	3,931,800	0.44	0.70	16	4	16	32	56
363,400	3,930,300	0.48	0.76	12	0	20	32	56
363,500	3,930,800	0.48	0.76	12	0	20	32	56
363,700	3,931,000	0.48	0.76	12	0	20	32	56
354,100	3,927,200	0.41	0.65	19	6	14	33	62
363,000	3,931,700	0.41	0.65	19	6	14	33	62
363,600	3,930,600	0.47	0.75	13	0	20	33	62
363,700	3,931,100	0.47	0.75	13	0	20	33	62
364,800	3,929,600	0.47	0.75	13	0	20	33	62

Table 8. Selected Ranking Results from the Duke Energy Asheville SO2 Modeling for Monitor Placement

Easting, in meters	Northing, in meters	Normalized Design Value, NDV	NDV Ratio	NDV Rank	Freq. Count	Freq. Rank	Score	Score Rank
364,800	3,929,800	0.47	0.75	13	0	20	33	62
355,600	3,926,400	0.46	0.73	14	0	20	34	68
Skyland DRR Monitor Location								
362,900	**3,931,700**	**0.46**	**0.73**	**14**	**0**	**20**	**34**	**68**
363,000	3,928,600	0.44	0.70	16	2	18	34	68
363,200	3,927,700	0.41	0.65	19	5	15	34	68
363,400	3,930,400	0.44	0.70	16	2	18	34	68
363,400	3,930,600	0.42	0.67	18	4	16	34	58
363,500	3,930,200	0.46	0.73	14	0	20	34	68
363,600	3,930,900	0.46	0.73	14	0	20	34	68
364,800	3,929,700	0.46	0.73	14	0	20	34	68

The Skyland DRR location, denoted by the pushpin in Figure A-128 through Figure A-130, was selected that is approximately 3.4 km northeast of the property line of the Asheville facility. This location is underneath the high-tension line tower, in an open location free of trees or other vegetation. The selected location has a score ranking of #68 as indicated in Table 2. The location is the highest of the ranked receptors not located in densely wooded areas. Figure A-131 shows the view of the Asheville plant from near the Skyland DRR monitor location. Based on this information, DAQ believes that the Skyland DRR location is highly suitable for operating an SO_2 monitor.

Figure A-131. View of Asheville Plant from near the Skyland DRR Monitor Location

Region 4 Requested Information for Chosen Sites

In 2015, the DAQ began working with Duke Energy Progress to establish a sulfur dioxide monitoring station in Skyland, North Carolina, to characterize the ambient sulfur dioxide concentrations near the Asheville steam station as required by the data requirements rule for sulfur dioxide. [10] The area chosen for placement of the monitor was selected using the results of modeling done as described in the technical assistance document[11] and reported earlier in this appendix. An aerial view of the Skyland DRR monitoring station identified based on the earlier reported considerations is shown in Figure A-70.

The Air Quality System, AQS, identification number for this monitor is 37-021-0036-42401-1. DAQ operates this monitor in collaboration with Duke Energy Progress to ensure the air in the Asheville area complies with the national ambient air quality standards for sulfur dioxide. Duke Energy Progress operates the monitor following the DAQ quality assurance project plan and the monitor is part of the DAQ primary quality assurance organization. Figure A-71 through Figure A-78 show views from the Skyland DRR site looking north, east, southeast, south, west and northwest.

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[10] 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.

[11] 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.

The Skyland DRR monitoring site is located at least 10 meters from trees in all directions. The tallest trees are estimated to be 15.2 meters in height. The monitoring site is located approximately 30 meters from the two-story house to the north. The land slopes down to the west and up toward the east. The nearest road is Crestwood Drive located approximately 19 meters to the southeast. This road does not have traffic count data; however, as shown in Figure A-132, Royal Pines Road, had an average annual daily traffic count of 1,700 in 2014. The probe height is 3.6 meters.

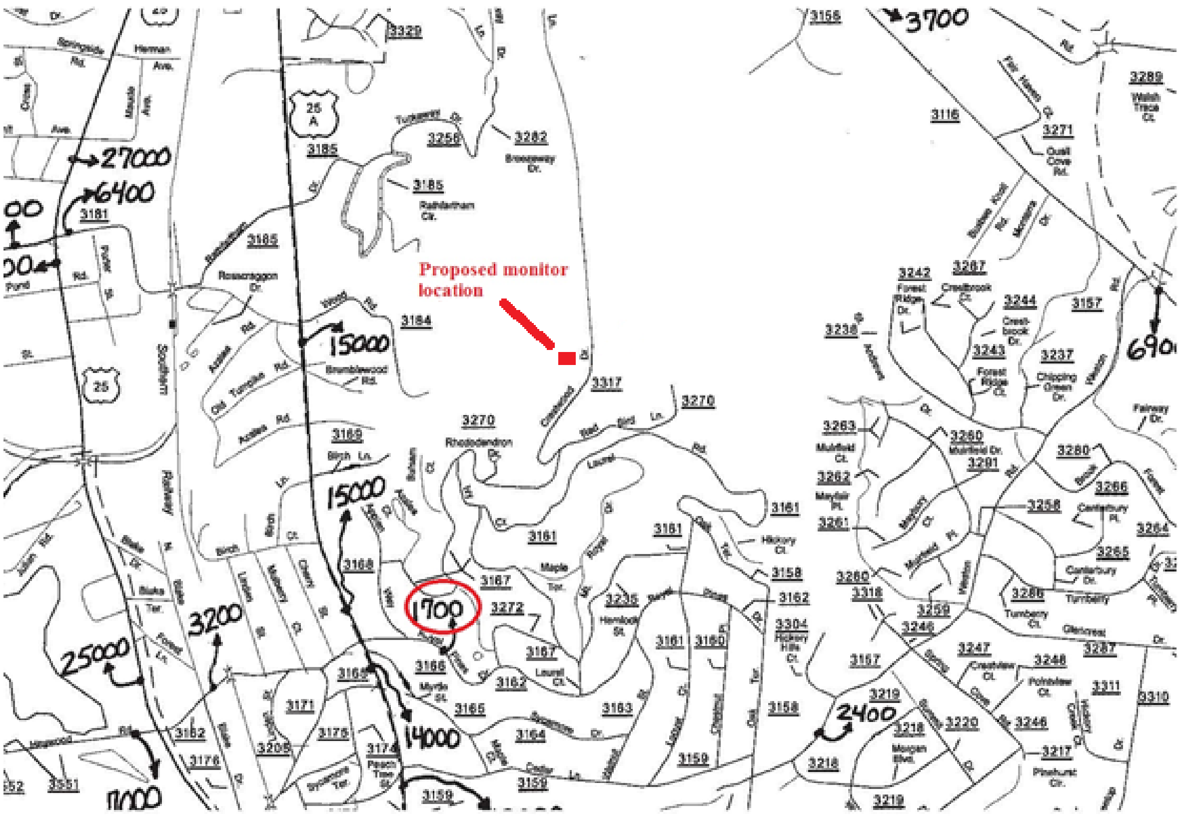

Figure A-132. 2014 Traffic count map near the Skyland DRR site (from NC DOT)

The AQS identification number and street address for the site is: 37-021-0036 and Crestwood Drive Air Monitor, Asheville Plant, Arden, North Carolina. The latitude and longitude is 35.481861 and -82.509861. The sampling and analysis method is AQS code 560, Thermo Electron 43i TLE pulsed fluorescent instrument, EQSA-0486-060, and the operating schedule is hourly. The monitoring objective is source oriented. Figure A-133 shows the location of the monitoring station relative to the population center of Buncombe County in the Arden area. Based on the wind roses in Figure A-134, the Skyland DRR monitoring station is not located downwind of the Asheville plant. However, the concentrations are higher at the Skyland DRR location than downwind from the plant because the chosen location is at a higher elevation and in the pathway of the plume. The spatial scale of representativeness for the monitor is neighborhood scale based on the distance of the monitor from the source. The monitor is located approximately 3.4 kilometers east northeast of the property line for the facility.

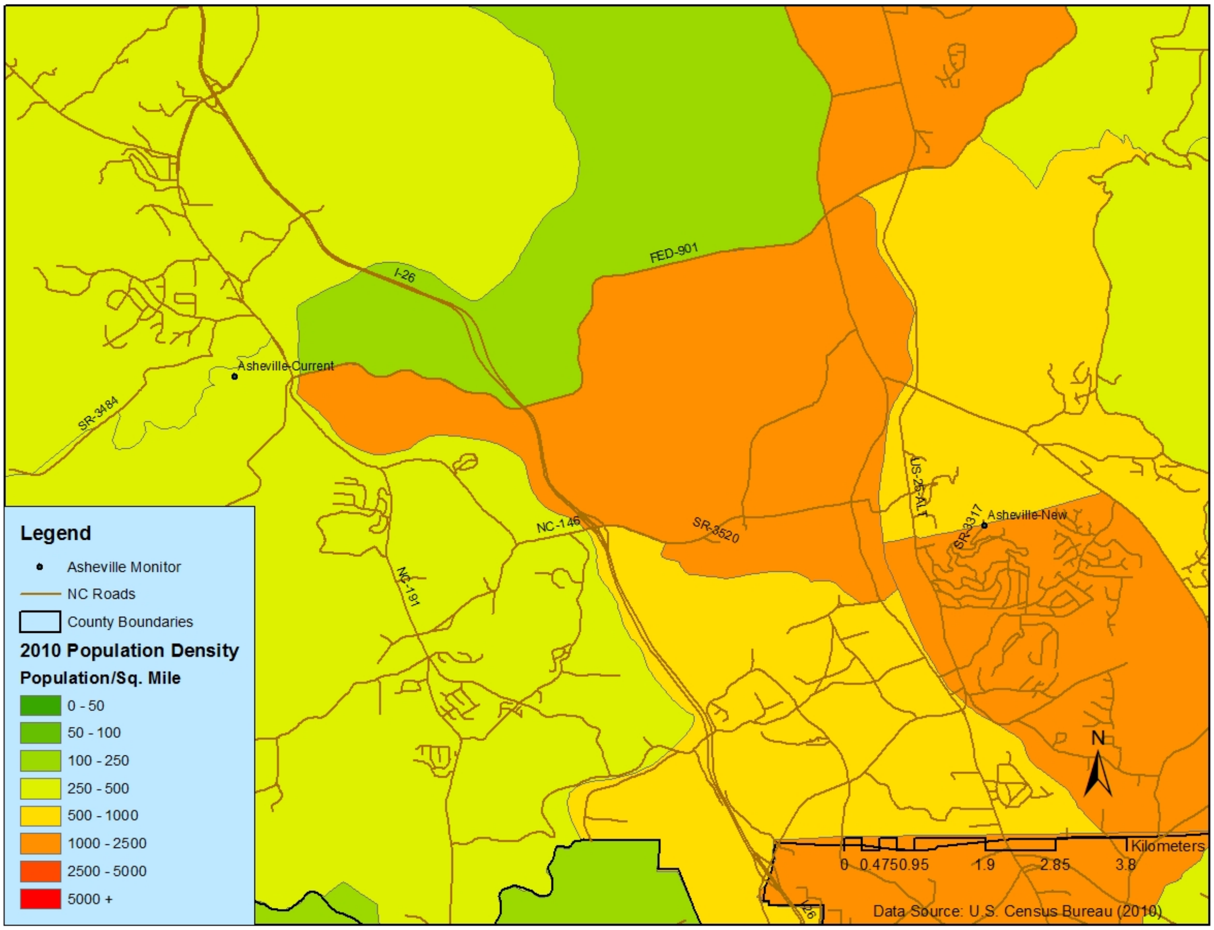

Figure A-133. Location of the Skyland DRR monitoring station relative to the population of the Arden area in Buncombe County

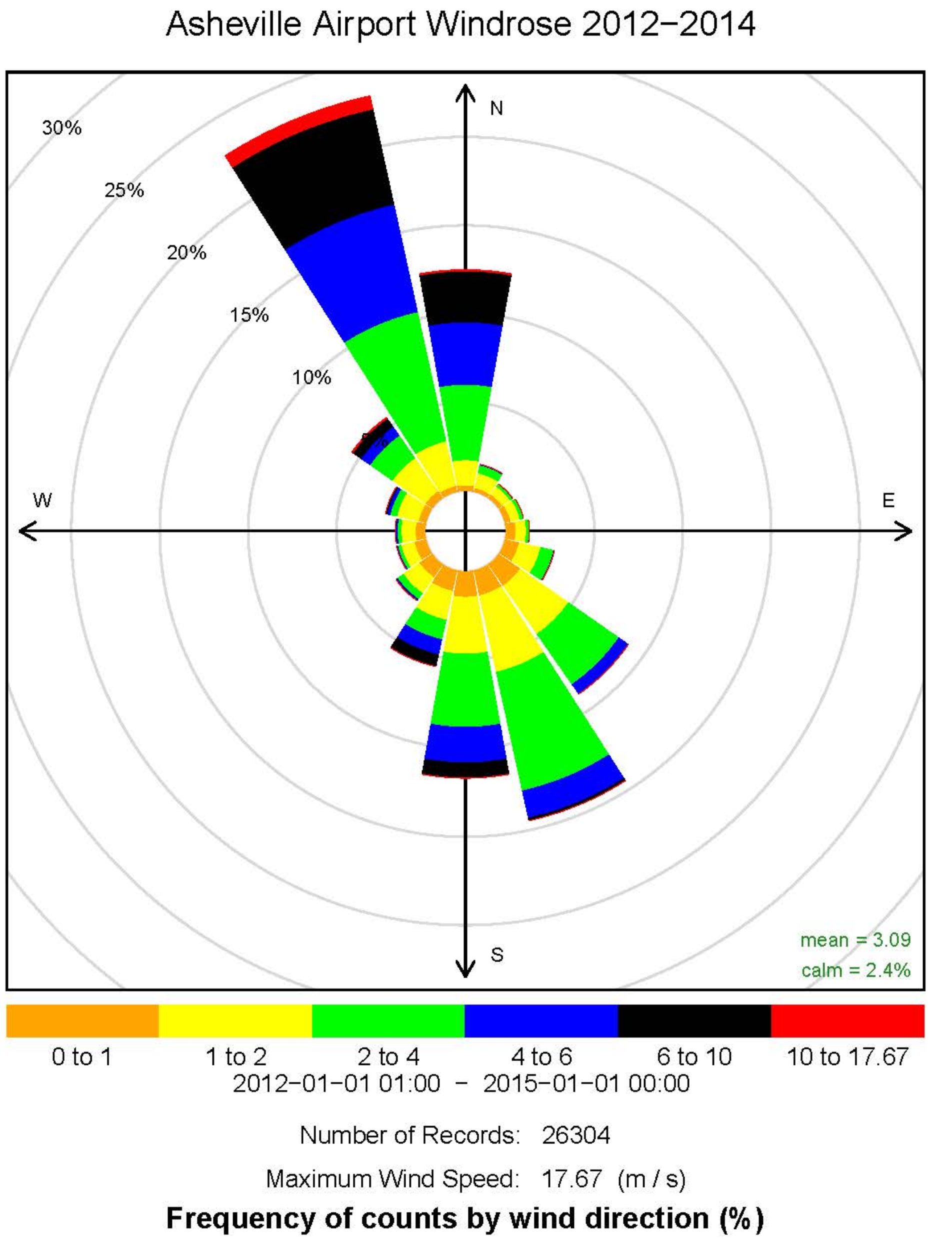

Figure A-134. Wind rose for the Asheville Airport

This monitor is in the Asheville metropolitan statistical area and is representative of the air quality downwind from the fence line of the Asheville Steam Station.

The proposed monitoring site was provided to the public for comment during 30 days in November and December as an addendum to the 2016-207 network monitoring plan.

Table 9 summarizes other factors DAQ evaluated when choosing the location for the Skyland DRR monitoring station. Table 10 summarizes the EPA-required information for the chosen Skyland DRR site.

Table 9. Other considerations in site selection

Factor	Evaluation
Long-term Site Commitment	The chosen location is on land to which Duke has obtained a lease and already has access for maintenance of power transmission lines. Because the area is needed for the power transmission lines it will not be developed any time in the next three years
Sufficient Operating Space	20-meter by 35-meter open area free of trees and buildings.
Access and Security	The building is on the right of way for the power transmission lines and underneath the tower.
Safety	Appropriate electrical permits were obtained.
Power	Location is approximately 15 meters from transformer.
Environmental Control	The monitoring shelter is a 6 foot by 6-foot trailer with the tongue of the trailer facing south.
Exposure	The monitoring station is at least 10 meters from the driplines of trees and there are no trees or buildings between the monitor and the source.
Distance from Nearby Emitters	There are no other permitted facilities within 0.5 miles of the chosen location.
Proximity to Other Measurements	The Skyland DRR monitoring station is located about 7-kilometers northeast of the Asheville Regional Airport and 11 kilometers east southeast of the Bent Creek ozone monitoring station.

Table 10. The 2016-2017 Sulfur Dioxide Monitoring Network for the Asheville MSA [a]

AQS Site Id Number:	37-021-0036
Site Name:	Skyland DRR
Street Address:	Crestwood Drive Air Monitor, Asheville Plant
City:	Arden
Latitude:	35.481861
Longitude:	-82.509861
MSA, CSA or CBSA represented:	Asheville
Monitor Type:	Industrial
Operating Schedule:	Hourly – every year
Statement of Purpose:	Maximum concentration site near the Duke Progress Energy Asheville Plant. Compliance w/NAAQS.
Monitoring Objective:	Source-oriented
Scale:	Neighborhood
Suitable for Comparison to NAAQS:	Yes
Meets Requirements of Part 58 Appendix A:	Yes
Meets Requirements of Part 58 Appendix C:	Yes: EQSA-0486-060
Meets Requirements of Part 58 Appendix D:	No – Data Requirements Rule
Meets Requirements of Part 58 Appendix E:	Yes
Proposal to Move or Change:	Monitoring started Jan. 6, 2017

[a] The monitor uses an instrumental pulsed fluorescence method using a Thermo Electron 43i-TLE, Air Quality System, AQS, method code 560.

Appendix A-4. Evergreen Packaging Canton Siting Analysis and Additional Site Information

Siting Analysis for the Canton DRR Site (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

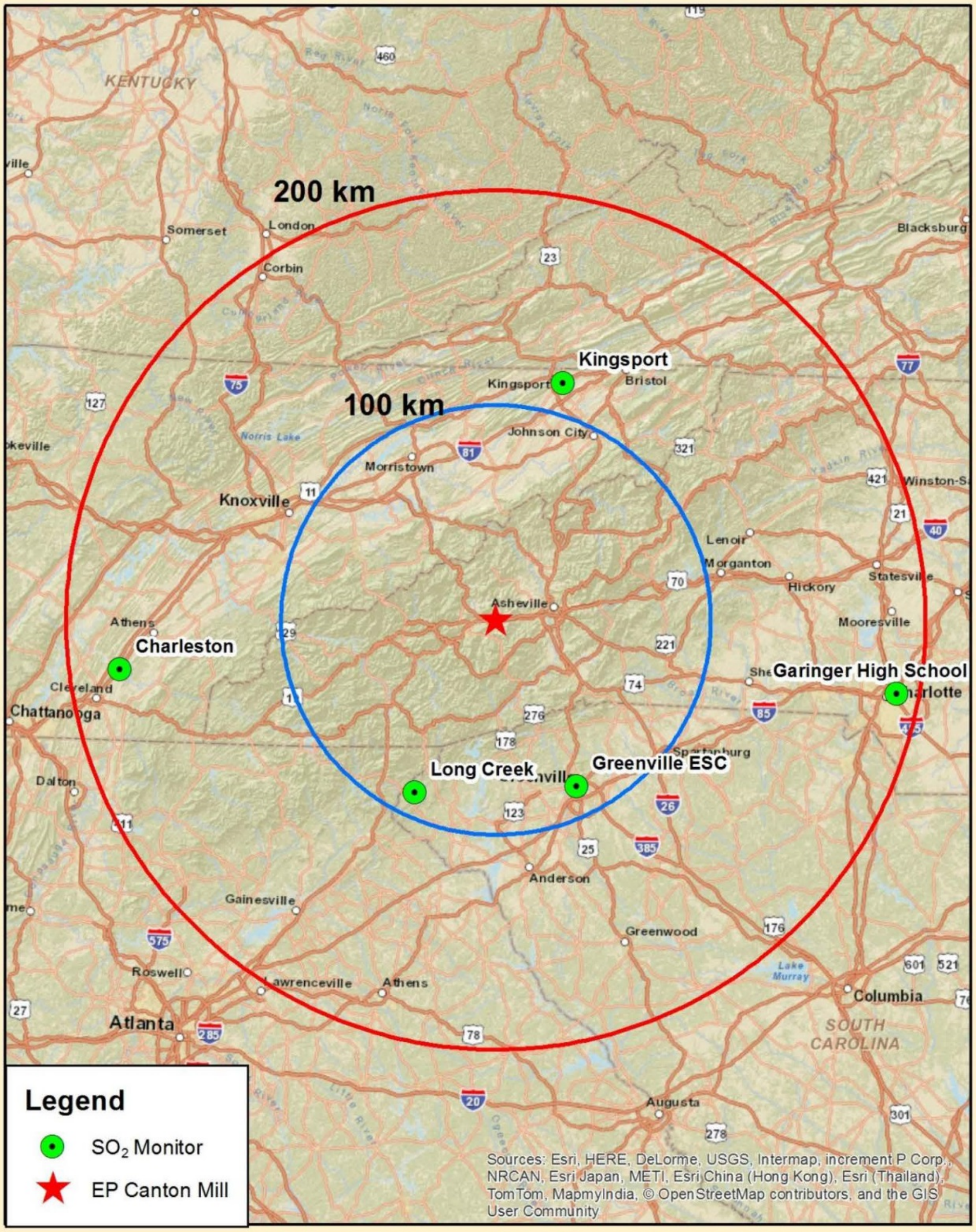

Figure 2-1
Evergreen Packaging - Canton Mill Site and SO_2 Monitor Locations

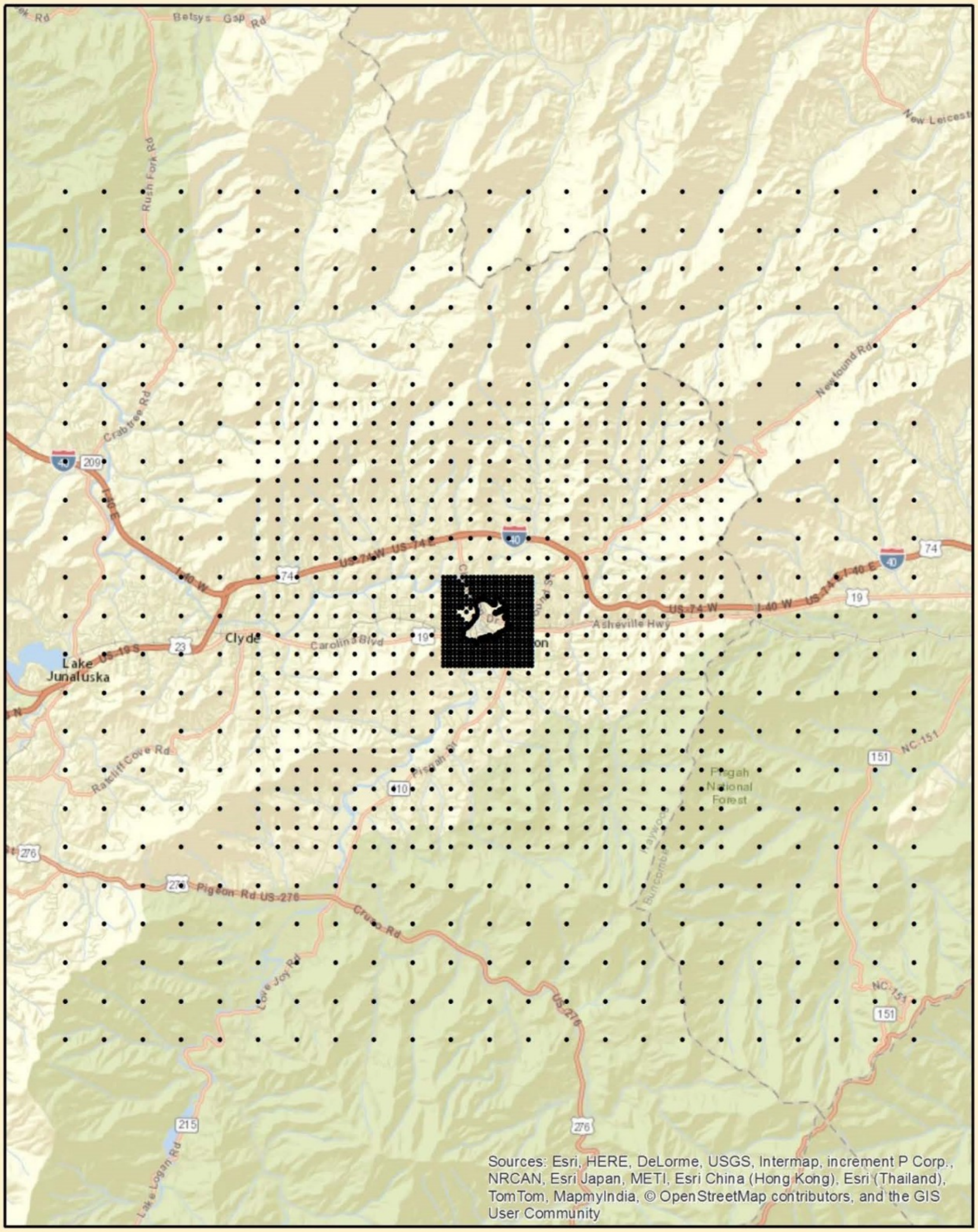

Figure 3-1
Evergreen Packaging - Canton Mill
SO_2 DRR Full Receptor Grid

0 1.25 2.5 5 Kilometers

N

AECOM

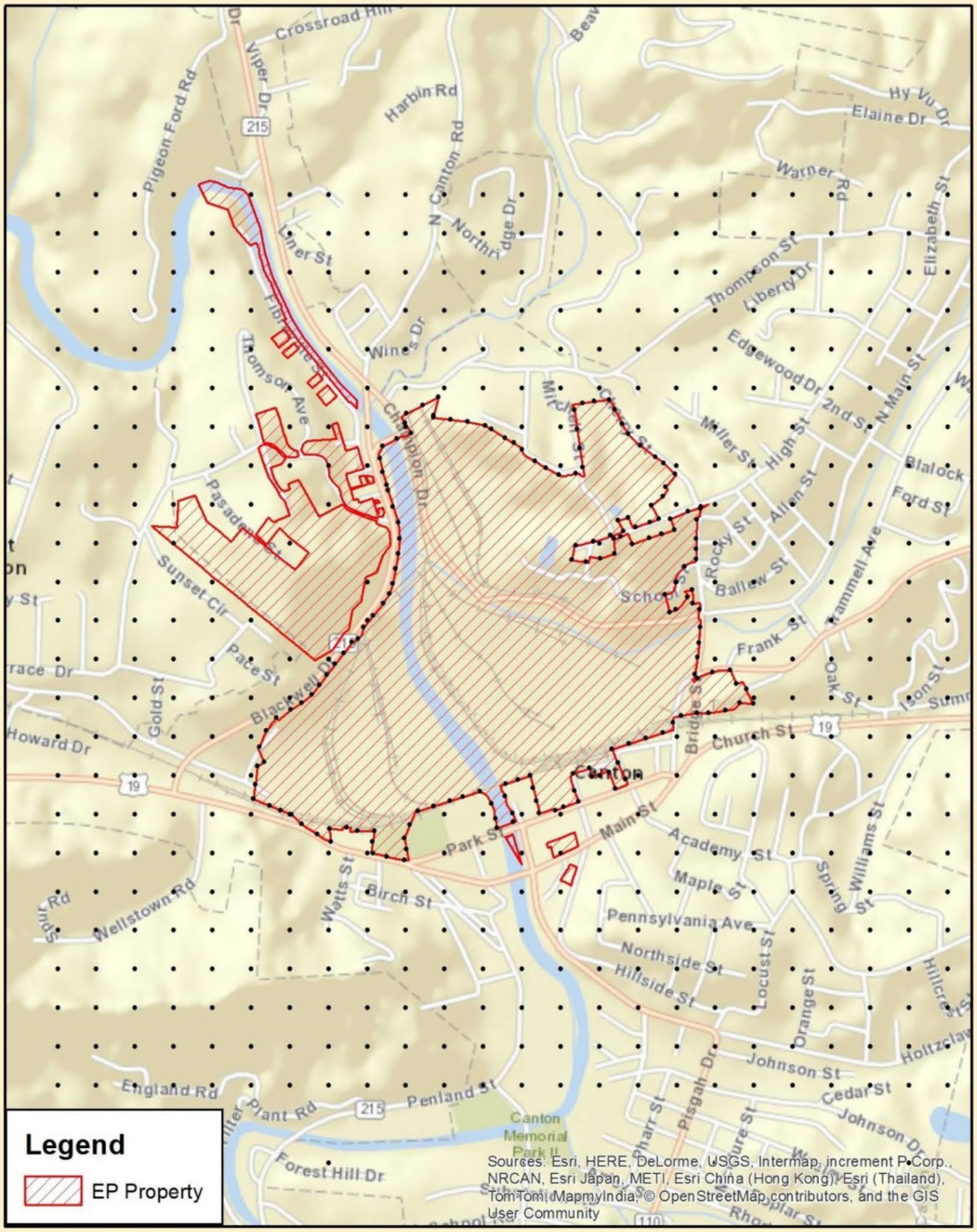

Figure 3-2
Evergreen Packaging - Canton Mill
SO_2 DRR Near Receptor Grid

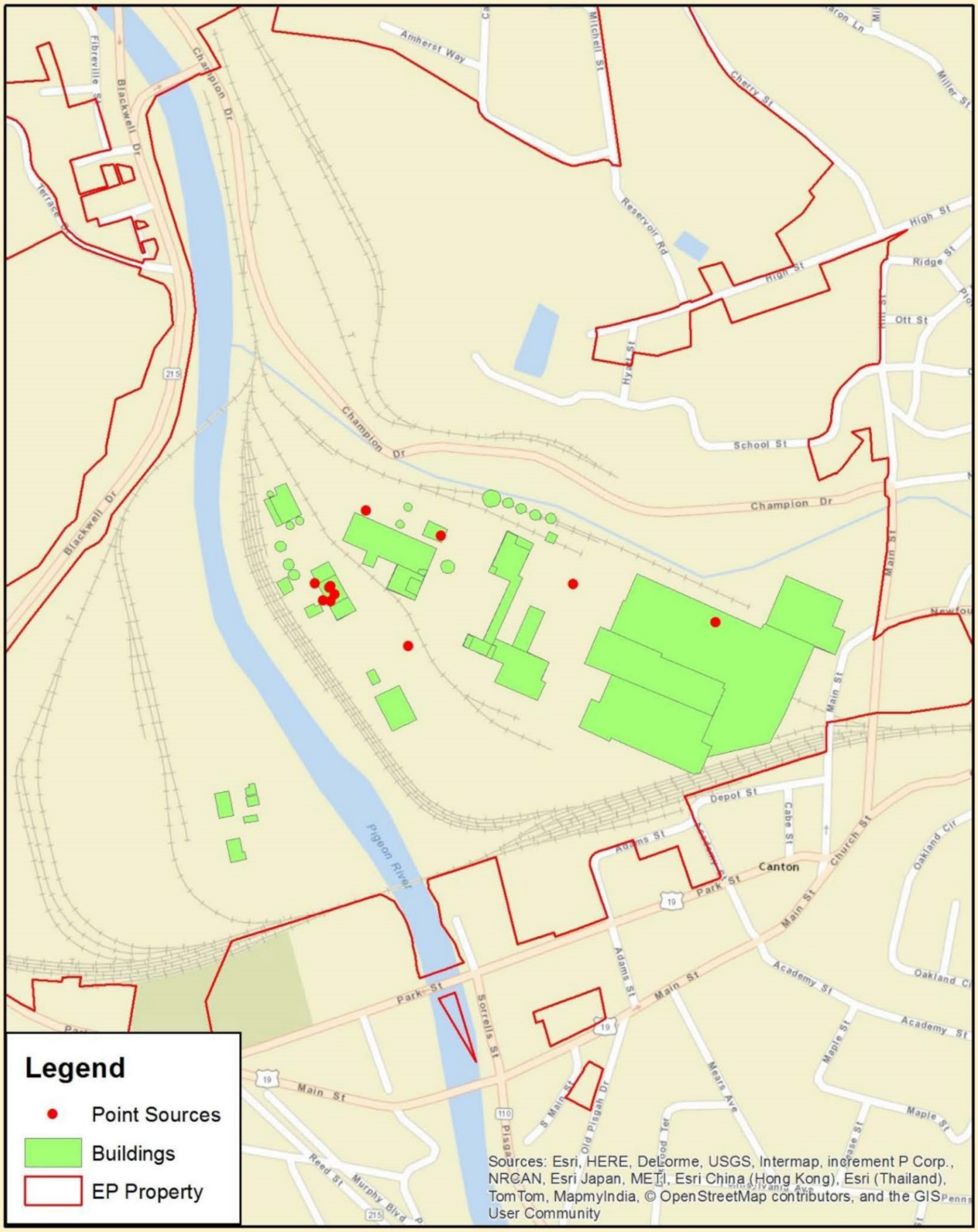

Figure 3-3
Evergreen Packaging - Canton Mill
Source and Building Layout

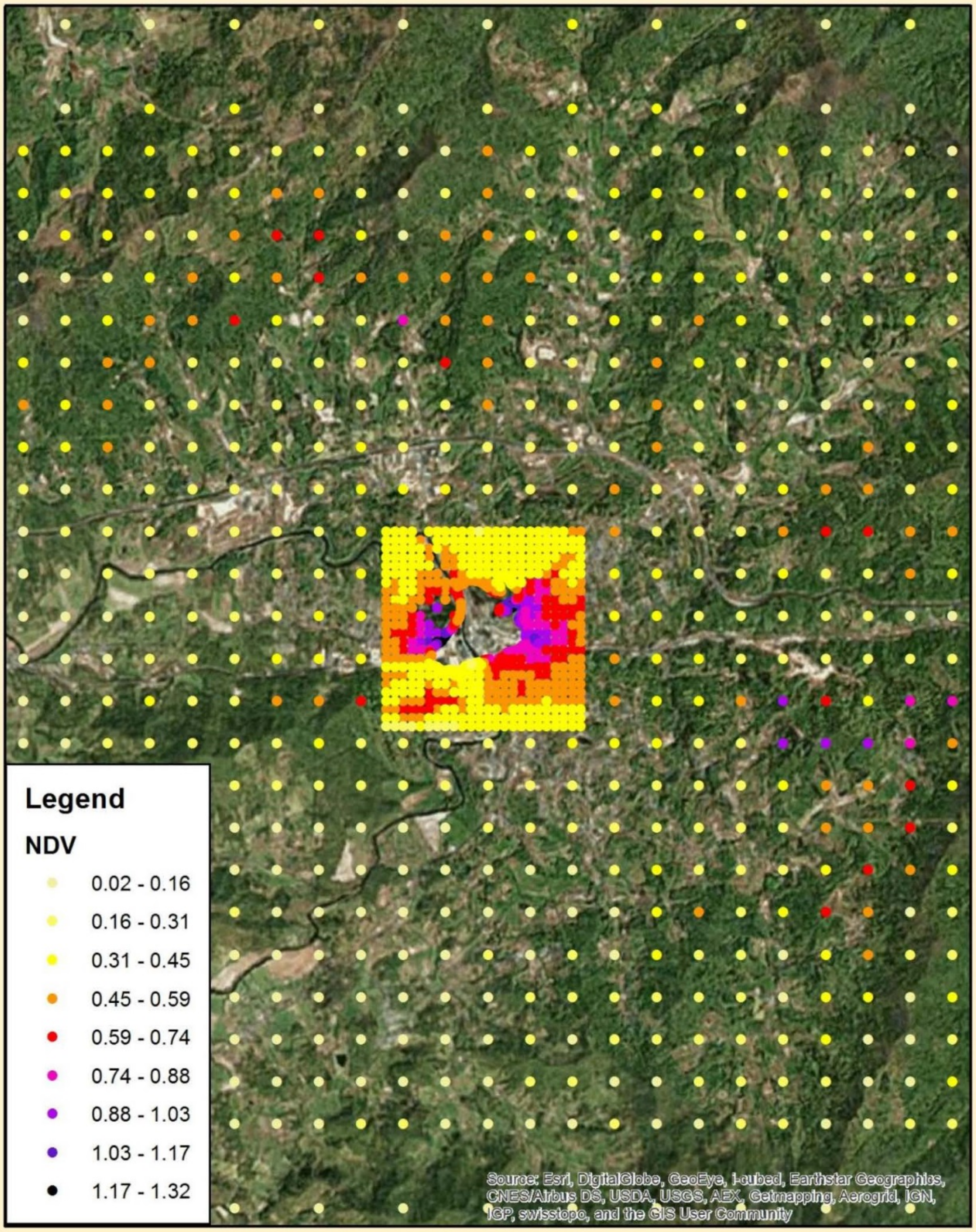

Figure 3-4
Evergreen Packaging - Canton Mill
Modeled NDVs

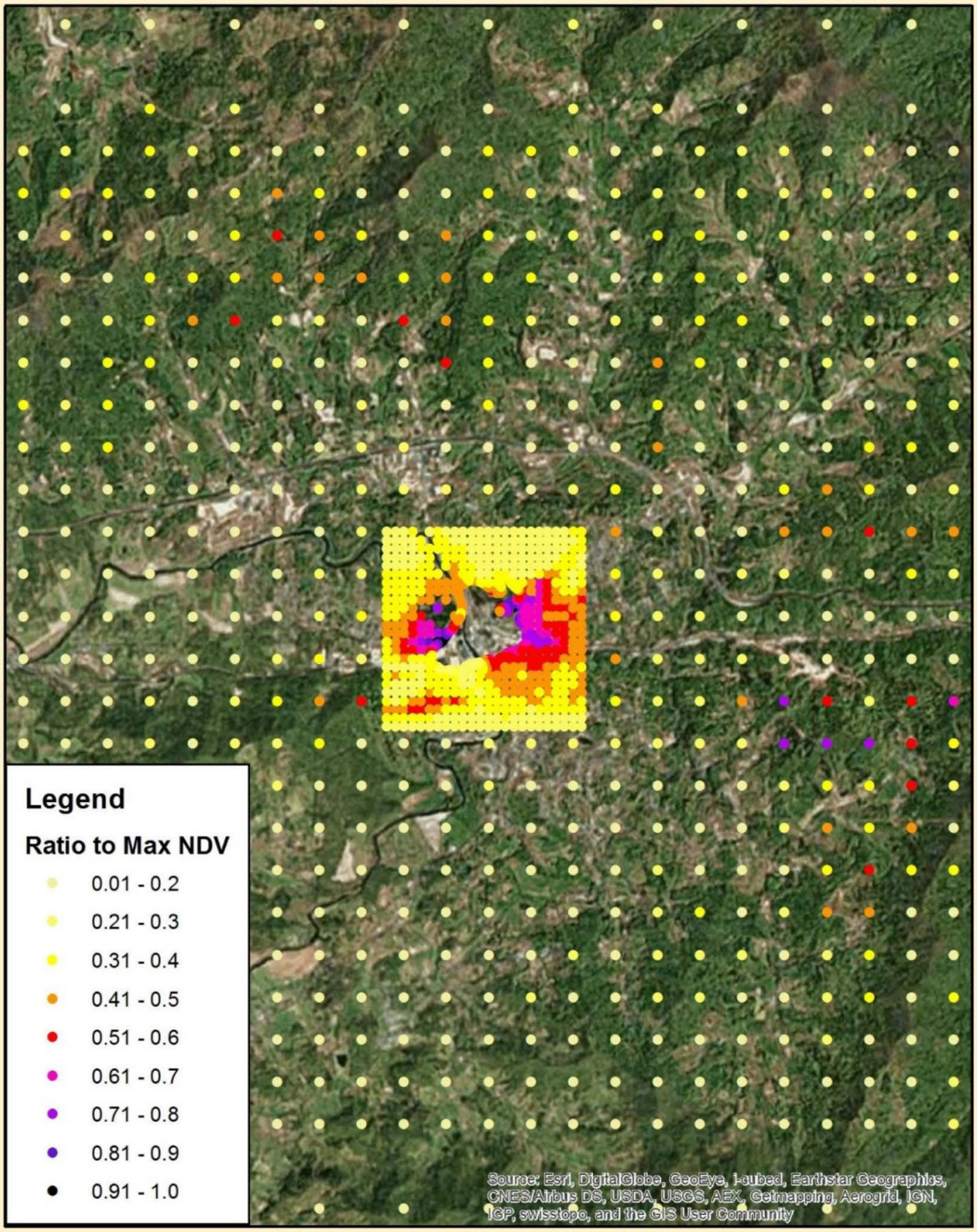

Figure 3-5
Evergreen Packaging - Canton Mill
Receptor NDV Ratio to Max NDV

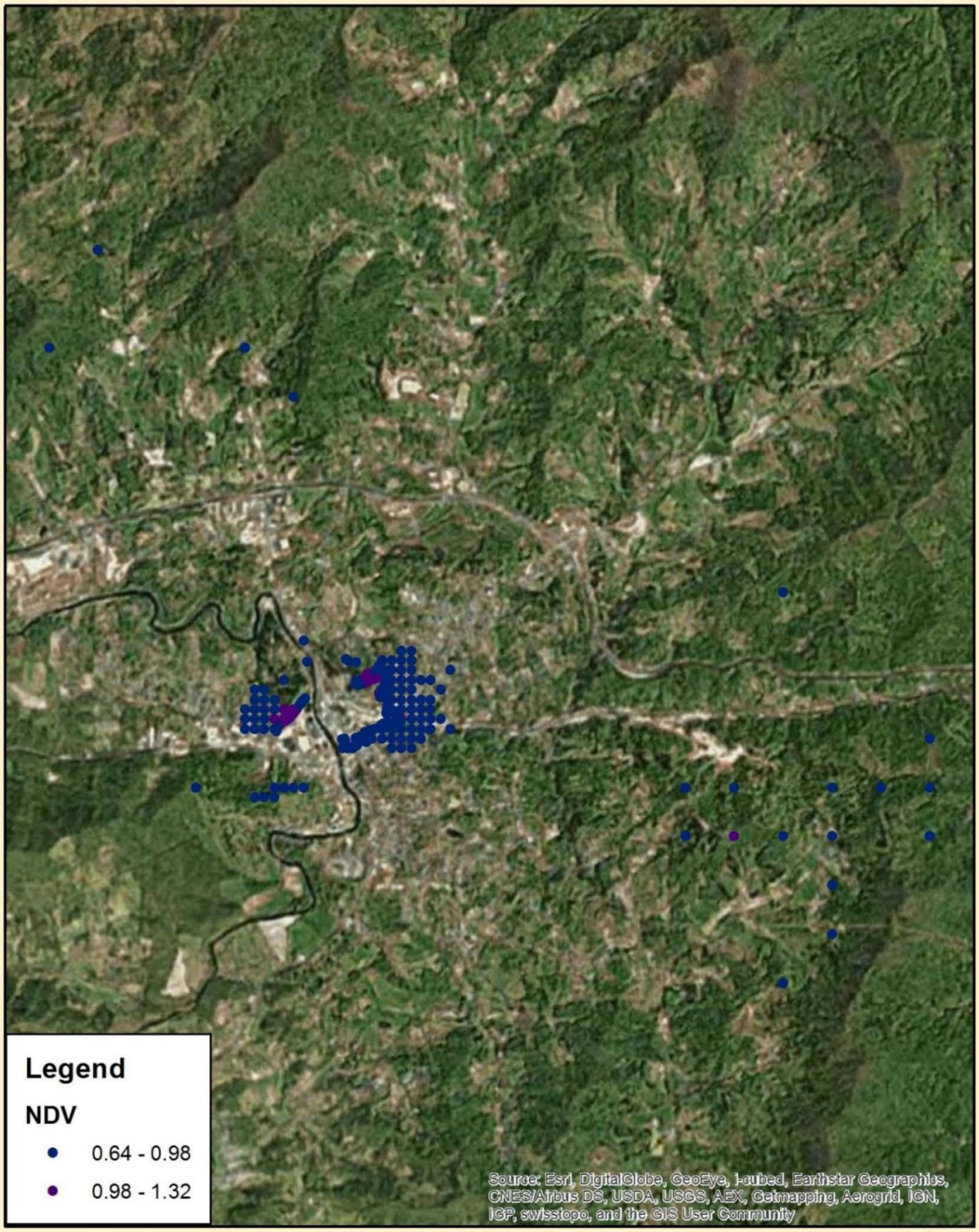

Figure 3-6
Evergreen Packaging - Canton Mill
Top 200 NDVs

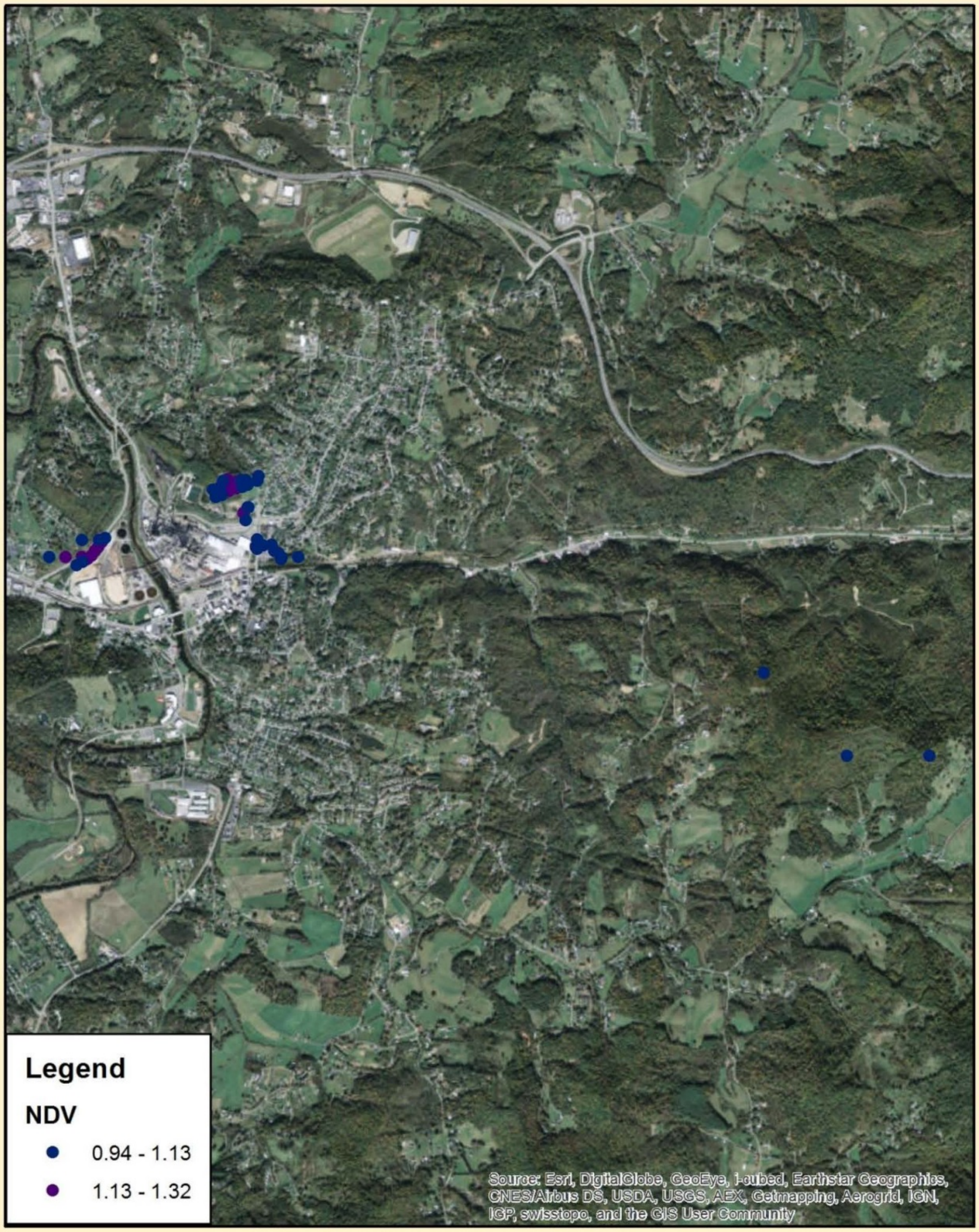

Figure 3-7
Evergreen Packaging - Canton Mill
Top 50 NDVs

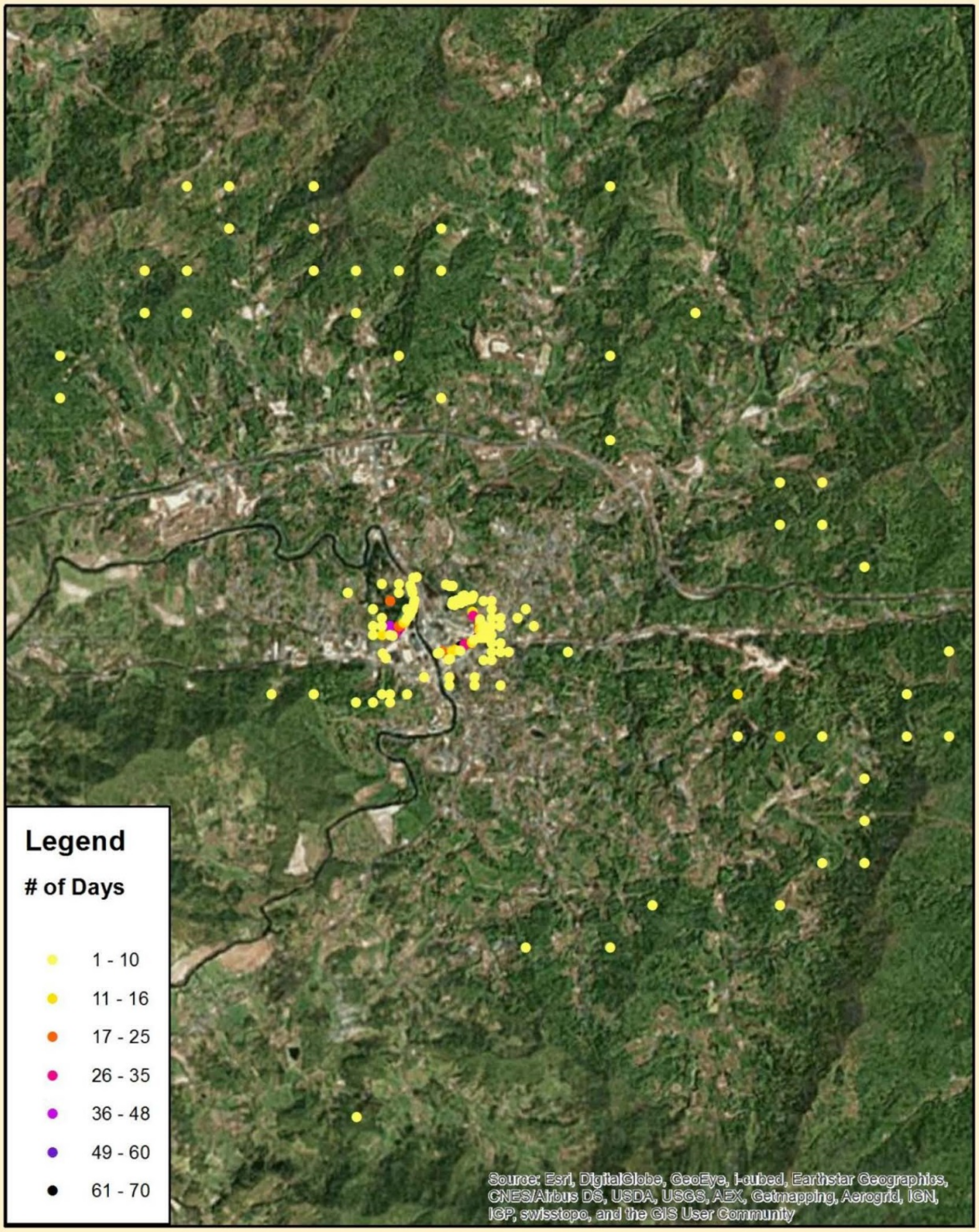

Figure 3-8
Evergreen Packaging - Canton Mill
Frequency of Daily Maximums

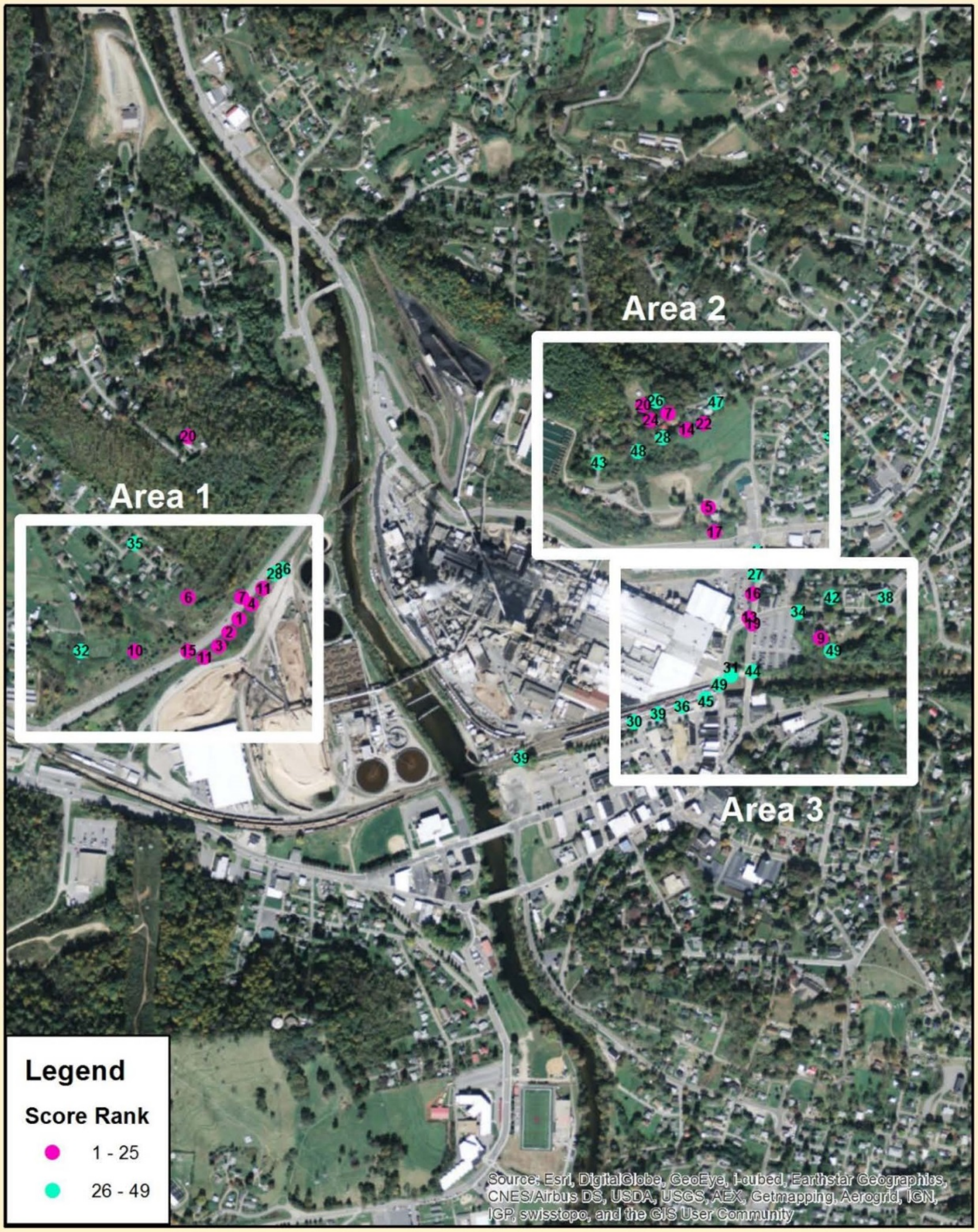

Figure 3-9
Evergreen Packaging - Canton Mill
Locations of Top 50 Ranked Receptors

0 0.1 0.2 0.4 Kilometers

N

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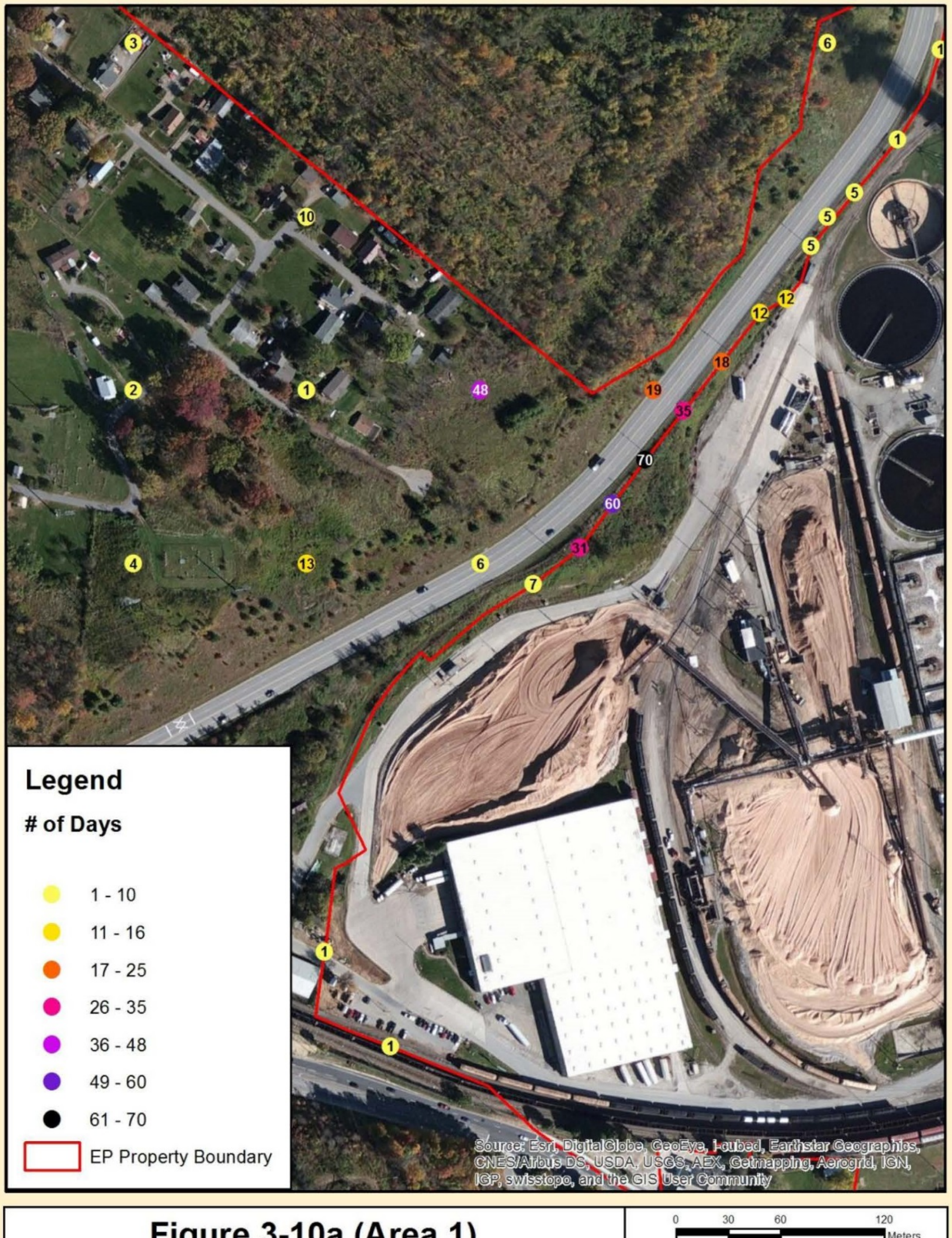

Figure 3-10a (Area 1)
Evergreen Packaging - Canton Mill
Frequency of Daily Maximums

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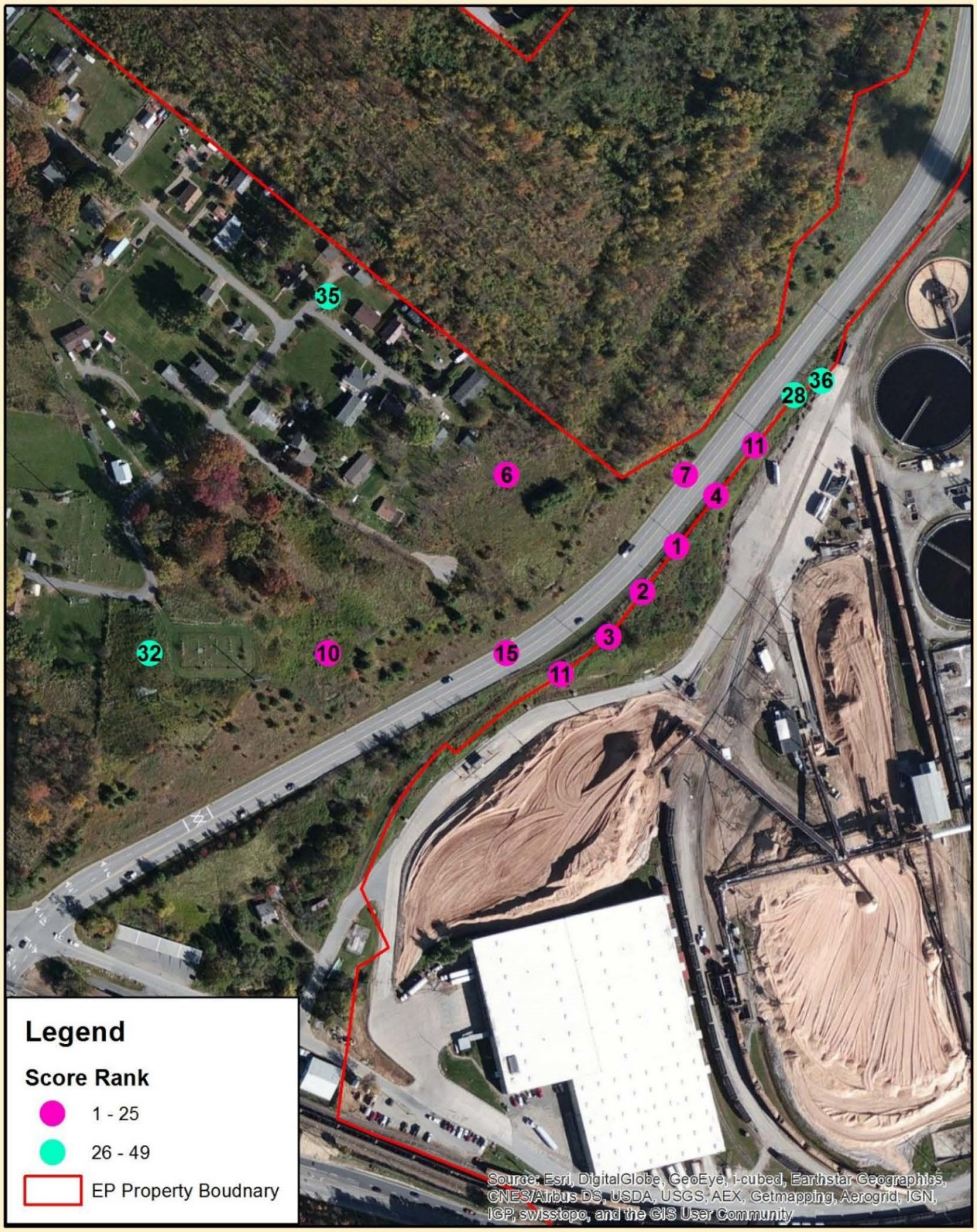

Figure 3-10b (Area 1)
Evergreen Packaging - Canton Mill
Locations of Top 50 Ranked Receptors

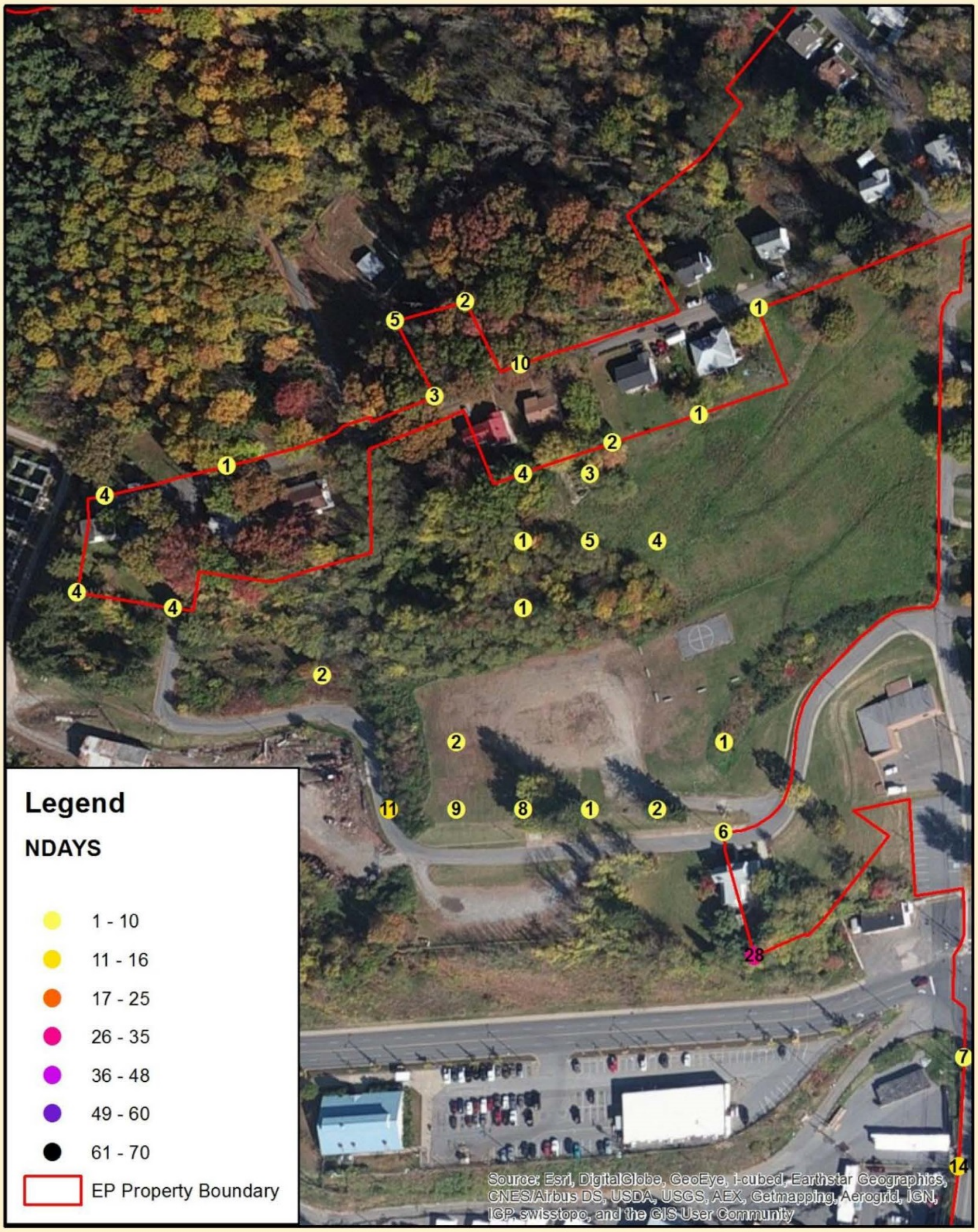

Figure 3-11a (Area 2)
Evergreen Packaging - Canton Mill
Frequency of Daily Maximums

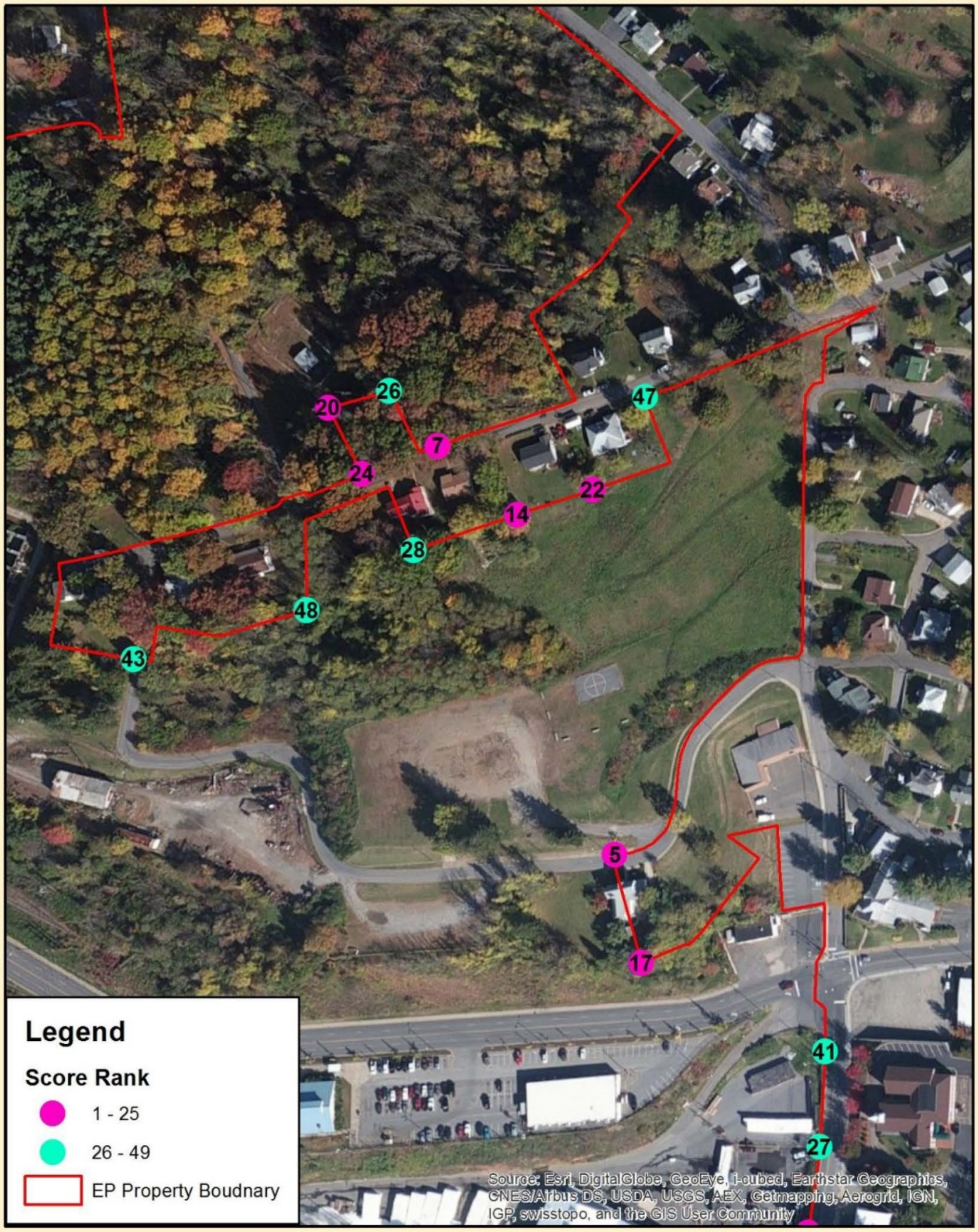

Figure 3-11b (Area 2)
Evergreen Packaging - Canton Mill
Locations of Top 50 Ranked Receptors

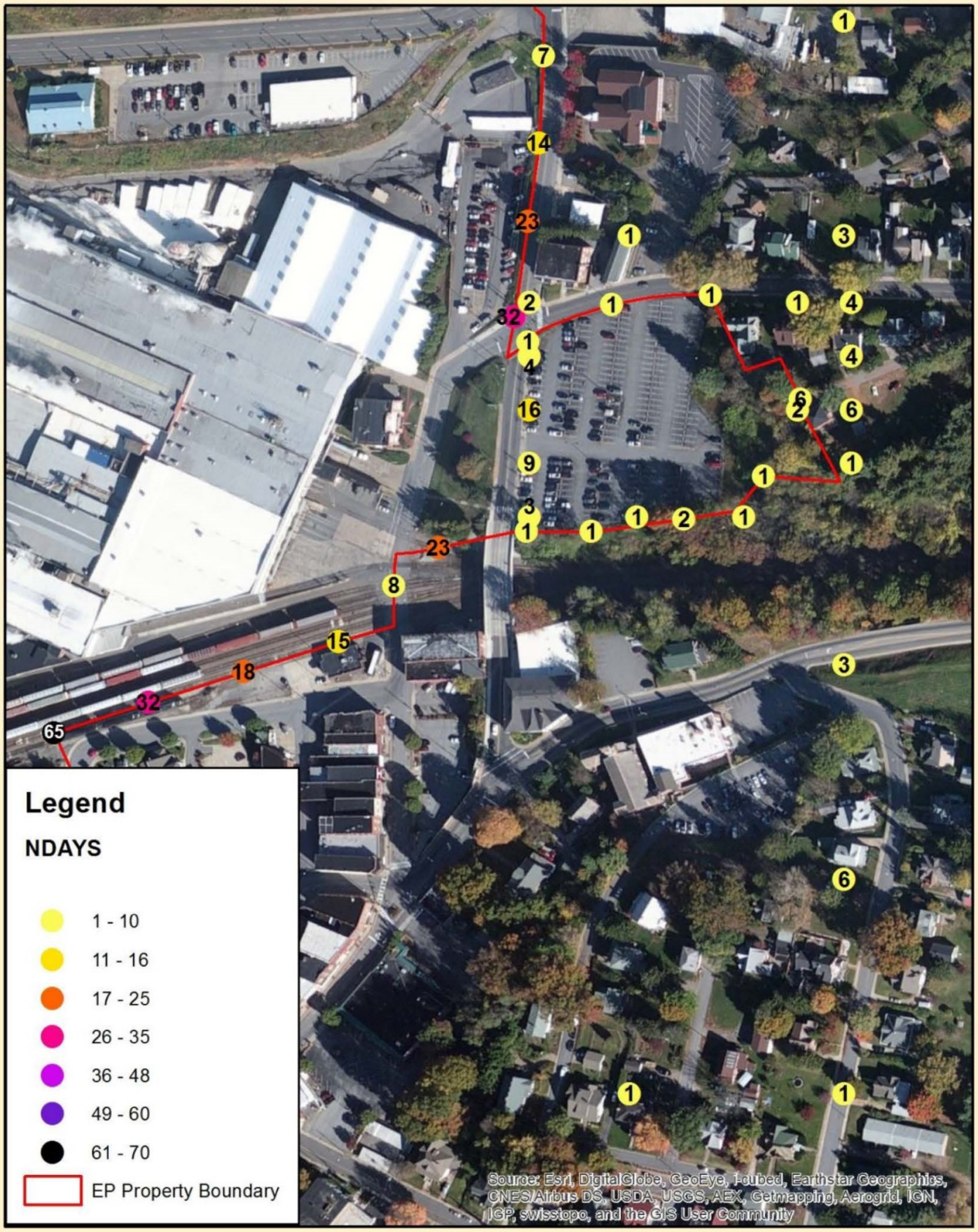

Figure 3-12a (Area 3)
Evergreen Packaging - Canton Mill
Frequency of Daily Maximums

0 25 50 100 Meters

N

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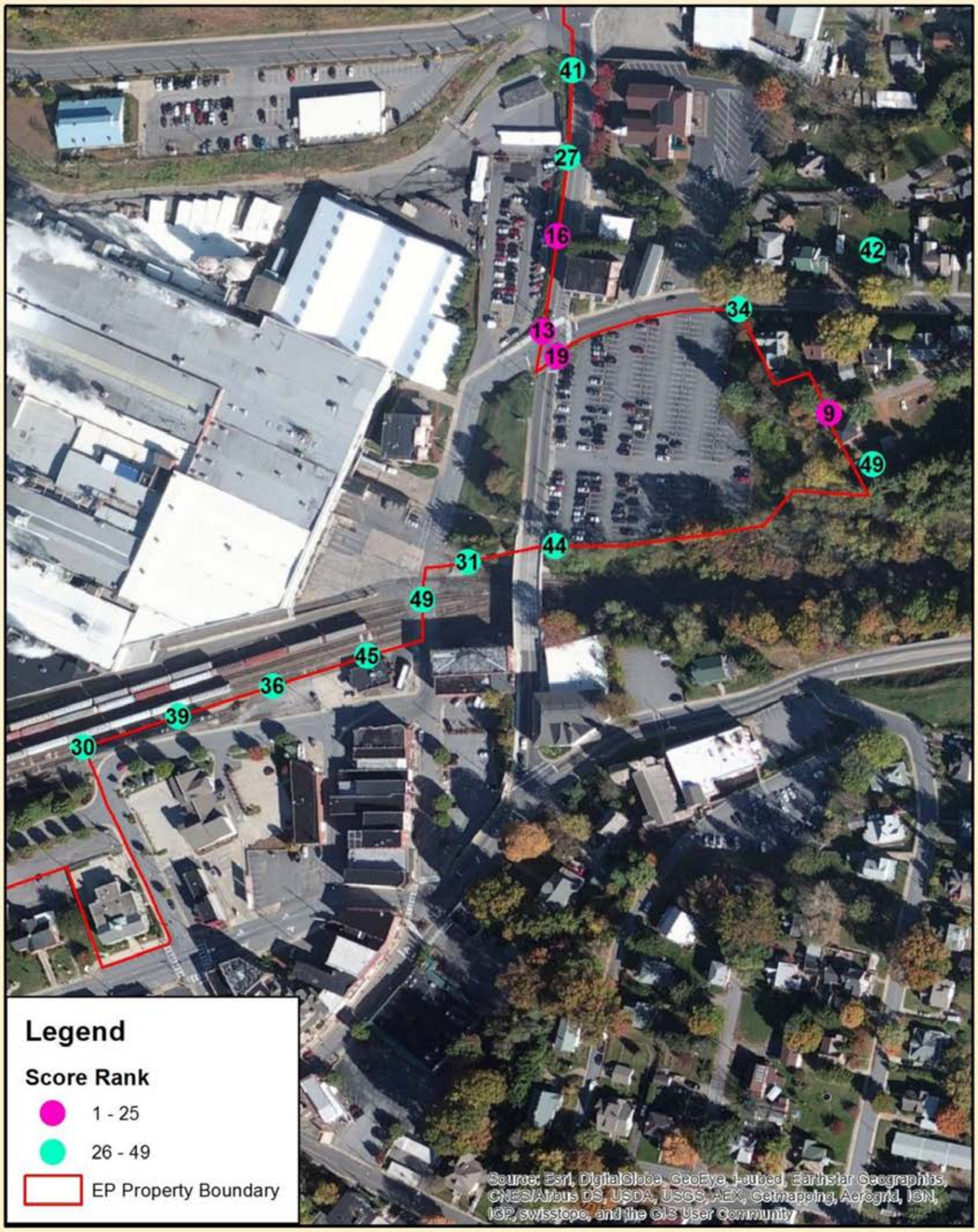

Figure 3-12b (Area 3)
Evergreen Packaging - Canton Mill
Locations of Top 50 Ranked Receptors

Region 4 Requested Information for the Canton DRR Site (Evergreen Packaging – Canton)

In 2015, the North Carolina Division of Air Quality, or 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.[12] The area chosen for placement of the monitor was selected using the results of modeling done as described in the technical assistance document[13] and is reported in the body of this document. An aerial view of the Canton DRR monitoring location identified based on the earlier reported considerations is shown in Figure A-85. The facility is located to the east.

The AQS identification number for this monitor is 37-087-0013-42401-1. DAQ operates 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 operates the monitor following the DAQ quality assurance project plan and the monitor is part of the DAQ primary quality assurance organization. Figure A-86 through Figure A-94 show the Canton DRR site and views from the site looking north, northeast, east, southeast, south southwest, west and northwest.

The DAQ removed any trees or brush within 10 meters of the Canton DRR 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 A-132**, 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 is 40 meters northwest of Blackwell Drive, which had an average annual daily traffic count of 9,500 in 2014. The probe height is 3.6 meters.

[12] 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.

[13] 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.

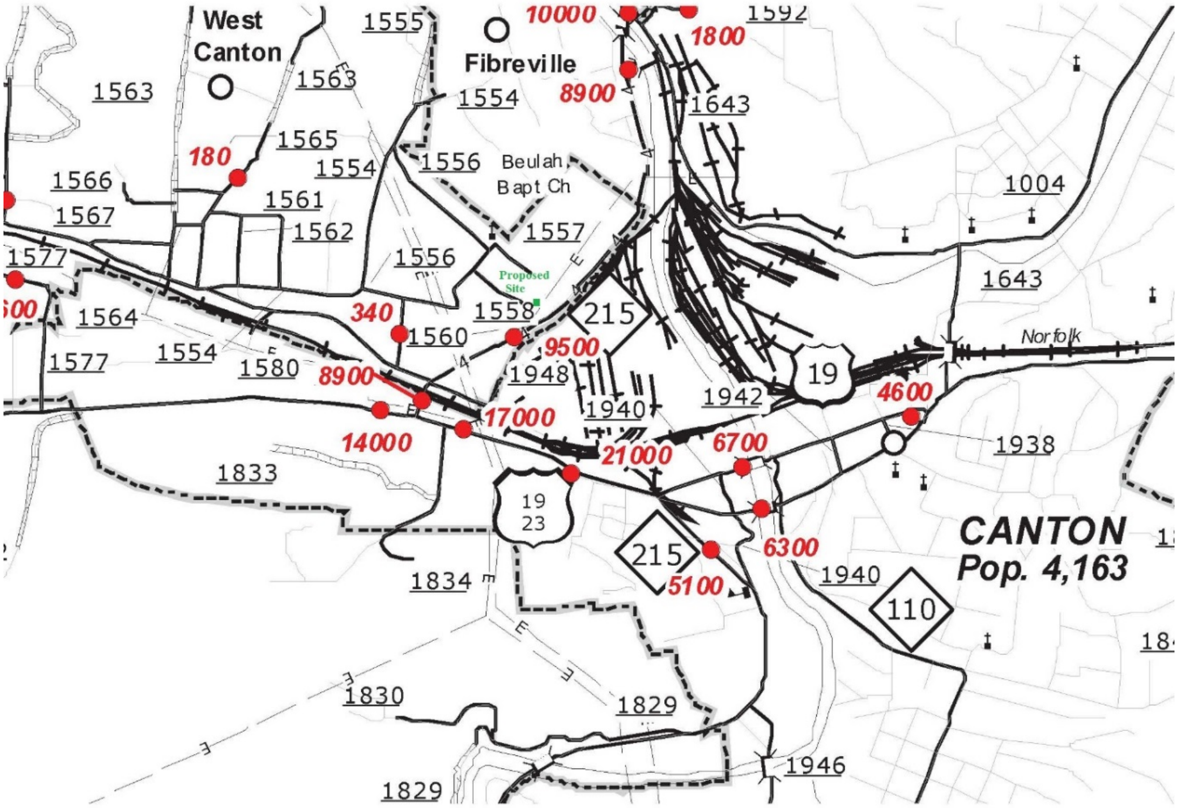

Figure A-135. 2014 Traffic count map for Canton, from NC DOT

The Air Quality System, AQS, identification number and street address for the site is: 37-087-0013 and Pace Street Air Monitor, Evergreen Plant, Canton, North Carolina. The latitude and longitude is 35.534 and -82.853. The sampling and analysis method is AQS code 060, Thermo Electron 43i pulsed fluorescent instrument, EQSA-0486-060, and the operating schedule is hourly. The monitoring objective is source oriented. Figure A-136 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 A-137 and Figure A-138, the Canton DRR monitoring station is located downwind of the Evergreen Packaging plant. The spatial scale of representativeness for the monitor is middle scale based on the distance of the monitor from the source. The monitor is located approximately 450 meters west of the property line for the facility.

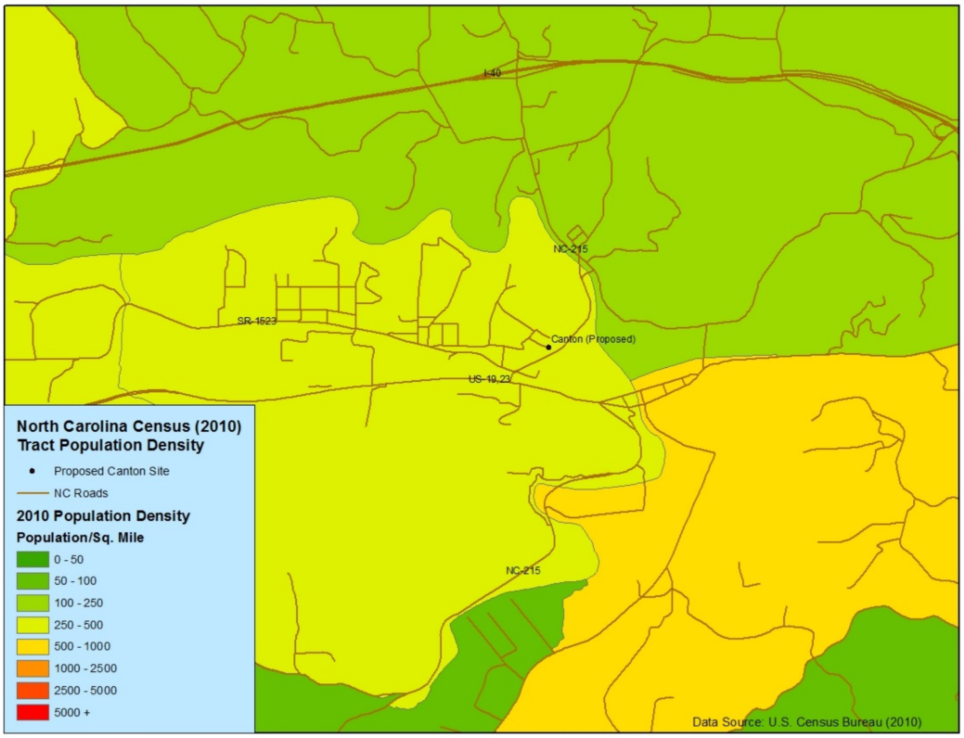

Figure A-136. Location of the Canton DRR monitoring station relative to the population of Canton in Haywood County

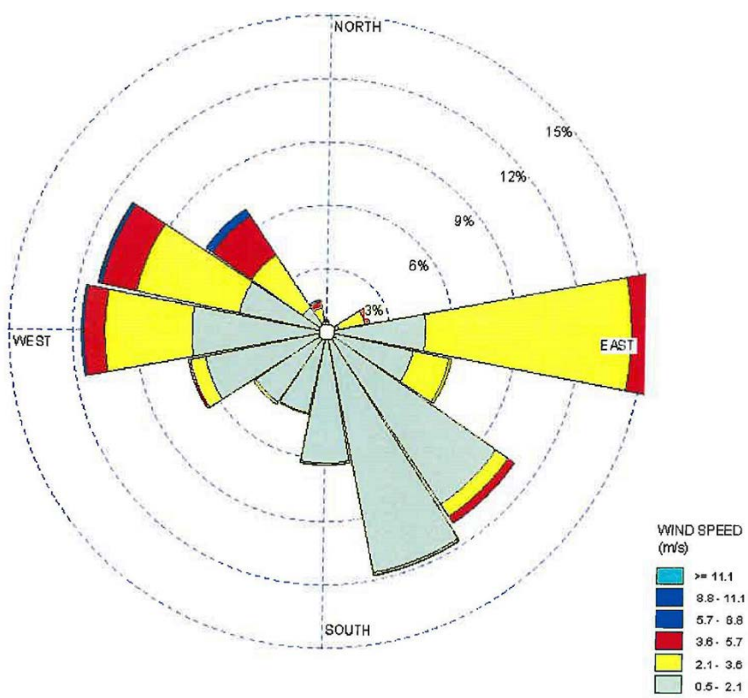

Figure A-137. Wind rose for Canton using 1993 data (from Evergreen Packaging)

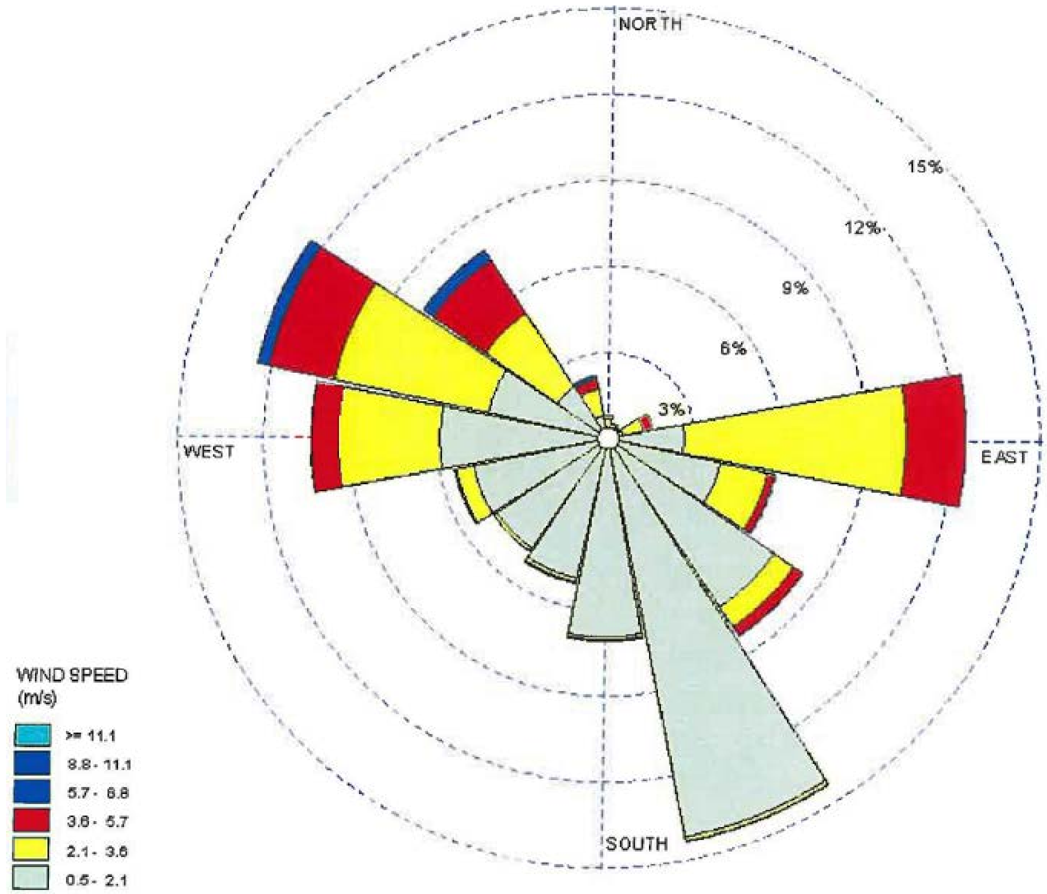

Figure A-138. Canton 2012-2014 wind rose (from Evergreen Packaging)

This monitor is in the Asheville metropolitan statistical area and is representative of the air quality downwind from the fence line of the Evergreen Packaging facility.

The monitoring site was provided to the public for comment during late May to late June 2016 as part of the 2016-2017 network monitoring plan.

Table 11 summarizes other factors DAQ evaluated when choosing the location for the monitoring station.

Table 11. Other considerations in selection of the Canton DRR site

Factor	Evaluation
Long-term Site Commitment	The 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 is inside a fenced area so it is secured from possible vandalism.
Safety	Appropriate electrical permits were obtained.
Power	Overhead powerlines are located 20 meters west of the site.
Environmental Control	The monitoring shelter is placed with the door to the north so that sunlight does not shine in through the window and warm up the building.
Exposure	The monitoring station is at least 10 meters from the driplines of trees and is not 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 Canton DRR location.
Proximity to Other Measurements	The Canton DRR monitoring station is located about 10 kilometers east of the Waynesville ozone monitoring station.

Forsyth County
Office of Environmental Assistance and Protection

June 28, 2018

Mr. Todd Rinck
U.S. Environmental Protection Agency
Region 4
Atlanta Federal Building
61 Forsyth Street
Atlanta, GA 30303-8960

Dear Mr. Rinck:

This letter and accompanying Annual Network Plan report on the status of the **Ambient Air Monitoring** commitments for the FY-18 105 Grant Work plan for Forsyth County, North Carolina (Reporting Organization 37-067). The entire Plan follows the Executive Summary, complete with staff field reviews as well as a copy of the published public notice.

Sincerely,

Jason R. Bodenhamer, Program Manager
Analysis and Monitoring Division
Forsyth County Office of Environmental Assistance and Protection

Enclosures

cc: Bob Ragland (FCEAP)
Minor Barnette (FCEAP)
Ryan Brown (EPA-Region IV)
Gregg Worley (EPA-Region IV)

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Executive Summary

Submit by July 1, 2018 an evaluation to demonstrate the requirements of 40 CFR Part 58.10 (a)(1) (Annual Network Evaluation) have been met.

This review was conducted and submitted by July 1, 2018.

Quality Assurance Procedures.

On December 5, 2017, this Office submitted the QMP and received comments on May 21, 2018. The edits were made to the QMP and resubmitted for approval on May 25, 2018. This Office has also received approval of the Criteria Pollutant QAPP on September 7, 2017. SOPs are up to date and approved within our network including: SO2, NO2, Ozone, PM 2.5 (FRM), Calibrators, and Zero Air Supplies. One document (Data Handling SOP) has been submitted to EPA but due to EPA being focused on QAPP updates, has yet to be approved.

Categorization of Ambient Monitors and Auxiliary Equipment.

The evaluation was completed in January 2018. We currently have backup equipment for each monitoring device stored in our office in the case of equipment failure. The current emphasis remains maintenance of the monitoring buildings and consolidation of the network. Capital funds are available in limited quantity and are available for proper planning for future network needs.

Notify EPA within 30 days after exceedances/violations of NAAQS.

The Forsyth County Office of Environmental Assistance and Protection remained an active participant in the AirNow program. Part of that program ensures that all local and regional exceedances/violations of the NAAQS are submitted to EPA and all others affected in a timely fashion.

Comply with Exceptional Events Policy.

No situations requiring exceptional event flagging occurred since the last Annual Network Review period.

Submit list of urban areas for which AQI is reported.

Forsyth County reports the AQI for our part of the Greensboro-Winston-Salem-High Point MSA. AQI statistics are available in local newspapers, on the Office's web site at http://www.forsyth.cc/EAP/, Real time data (updated hourly) are also available at: http://www.forsyth.cc/EAP/airmonitoringdata.aspx

Attend Region 4 QA Meeting & AIRS Conference.

Jason Bodenhamer and Cary Gentry attended the 2018 EPA Region 4 Ambient Monitoring Workshop in Athens, Georgia. Minor Barnette, Jordan Payne and Cary Gentry attended the National Air Quality Conference in Austin, Texas.

Submit air quality forecasts for MSA's >500,000 population to EPA AIRNOW.

Forsyth County has been a leader in this area and submits air quality forecasts for multiple pollutants to AIRNOW on a year-round basis. Several presentations on this program have been given at recent EPA National Forecasting and Outreach Conferences.

Changes in the SLAMS/NAMS Network

We switched from the older TEOM PM 2.5 & 10 samplers to the newer TAPI 640 PM 2.5, CR, and 10 samplers since the last annual network plan. This switch occurred on January 1, 2018.

Data Submittal Criteria

All SLAMS and PARS data were submitted to AQS within 90 days of the end of each quarter. AQS data reports were also reviewed after data submittal was completed to verify AQS data was correct. All data was certified by May 1, 2018.

National Performance Audit Program

All NPAP audits were completed by an EPA contractor and the results were submitted into AQS.

Continued-Annual Network Evaluation

Forsyth County has realigned the local monitoring network in recent years to account for changes in population, land use, and traffic patterns.

OZONE

The maximum impact downwind site is operated by the State program in Rockingham County (Bethany School, 37-157-0099). The secondary wind direction is measured by the Union Cross site (37-067-1008). In addition, the Clemmons Middle site (37-067-0030), established in 2005, monitors the southwest sector of Forsyth County. Another ozone monitor at Hattie Avenue (37-067-0022) has operated since 1993.

CARBON MONOXIDE

We no longer operate a CO monitor. The microscale Peters Creek site (37-067-0023) was shut down December 31, 2015.

SULFUR DIOXIDE/NITROGEN OXIDES

Sulfur dioxide levels have been measured at the Hattie Avenue site (37-067-0022) since 1983. Readings are considered to be characteristic of background levels in Forsyth County. On occasion, the site is impacted by plume touchdowns from the Duke Energy Belews Creek Generating Station located approximately 20 miles to the northeast in Stokes County. In compliance with the most recent monitoring data requirements, 5-minute SO2 averaged data from this site is reported along with 1-hour data.

Nitrogen oxide levels have been measured at the Hattie Avenue site (37-067-0022) since 1984. Readings represent the neighborhood impact of major transportation related emissions from inter-city and intra-city traffic on Business I-40 and U.S. 52 bisecting Winston-Salem. Both monitors satisfy the most recent monitoring criteria related to the 1-hour SO2 and NO2 standards.

PARTICULATE

Continuous PM10 (TEOM/TAPI 640X) concentrations continue to be recorded at the Hattie Avenue site (37-067-0022). These readings are representative of a maximum impact particulate site influenced by background emissions and locally generated transportation emissions.

FRM STATUS

FRM PM2.5 samplers have been established at Hattie Avenue (37-067-0022; 1/3 frequency + 1/6 collocated) as part of Forsyth County's EPA approved PM2.5 monitoring plan. Data collection has been quite successful and validated concentration and QA information has been reported to AQS through March 2017.

CONTINUOUS STATUS

A new continuous PM2.5 TAPI 640 was installed at the Hattie Avenue site in January 2018. This unit measures PM 2.5, CR, and 10. It replaced the older TEOM units from October 1999. The data set from the new 640 continues to indicate excellent agreement between the FRM PM2.5 data and 24-hour averages. An additional PM2.5 TAPI 640 unit replaced the older TEOM unit in the Clemmons area of Forsyth County.

SPECIATION STATUS

A speciated PM2.5 monitor (1/6 frequency) began operation on September 22, 2001 and a carbon speciated PM2.5 monitor (1/6 frequency) began operation on February 28, 2007 at Hattie Avenue. Validated data sets have been received from RTI through December 2016.

AIR TOXICS

A (1/6) day air toxic sampler operated in conjunction with the NCDAQ has been resident at the Hattie Avenue site since 2000. Air toxic data remains under NCDAQ control. This Office does not review or upload this data to AQS.

LEAD

No lead monitors are currently in place at any sites within Forsyth County. Based on the interpretation of the lead monitoring requirements, recent population data, and recent source emission inventory data, there are no sources that emit more than 700 lbs of lead per year. Therefore, there are no immediate plans for lead monitoring in the County.

VISIBILITY PROGRAM

With financial assistance from Region 4 and the NCDAQ, a visibility camera system was established for the Triad area during 2002. The associated web site combines pictures of two mountain scenes with hourly updated ozone and PM2.5 AQI statistics. A nephelometer was installed in 2004 to provide visual range data. The information is available at: http://www.forsyth.cc/EAP/hazecam.aspx.

2018 Annual Monitoring Network Plan

Forsyth County

Office of Environmental Assistance and Protection

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201 North Chestnut Street, 5th Floor
Winston-Salem, NC 27101
Phone 336-703-2440 • Fax 336-727-2777
May 22, 2017

CERTIFICATION

By the signatures below, the Forsyth County Office of Environmental Assistance and Protection (FCEAP) certifies that the information contained in the 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.

Print Name: Jason R.Bodenhamer Signature: Jason Bodenhamer Date: 5/25/18
Program Manager, Analysis and Monitoring Division, FCEAP

Print Name: W. Minor Barnette Signature: Minor Barnette Date: 5/25/18
Director, FCEAP

2016 ANNUAL MONITORING NETWORK PLAN

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Introduction

The Forsyth County Office of Environmental Assistance and Protection's (FCEAP) monitoring program provides air quality monitoring services in Forsyth County, NC. FCEAP is a state "certified local air pollution program" whose purpose(s) are to improve and maintain ambient air quality and reduce exposure to unhealthful air pollutants.

FCEAP has operated an air quality monitoring program since the early 1970's. The air monitoring services provided by the program are conducted to measure concentrations of criteria air pollutants (NO_2, SO_2, PM, and O_3) in accordance with USEPA regulatory requirements. Measurements are used to assess compliance with National Ambient Air Quality Standards (NAAQS). The NAAQS define air pollutant concentration level thresholds judged necessary to protect the public health and welfare.

The FCEAP air monitoring program operates a network of state and local air monitoring stations (SLAMS) in Forsyth County. The current network configuration consists of seven monitoring stations that measure concentrations of criteria air pollutants. In addition to the SLAMS network the county network also includes monitoring for meteorological parameters and visibility conditions.

The annual monitoring network plan, as provided for in 40 CFR Part 58.10, *Annual Monitoring Network Plan and Periodic Network Assessment* must contain the following information for each monitoring station in the network:

1. The Air Quality System (AQS) site identification number for existing stations.
2. The location, including the street address and geographical coordinates, for each monitoring station.
3. The sampling and analysis method used for each measured parameter.
4. The operating schedule for each monitor.
5. Any proposal to remove or move a monitoring station within a period of eighteen months following the plan submittal.
6. The monitoring objective and spatial scale of representativeness for each monitor.
7. The identification of any sites that are suitable and sites that are not suitable for comparison against the annual $PM_{2.5}$ NAAQS.
8. The Metropolitan Statistical Area (MSA), Core-Based Statistical Area (CBSA), Combined Statistical Area (CSA) or other area represented by the monitor.

The following information below replicates the Forsyth County Air Quality ambient air monitoring network plan and continues in the following sections outlined below:

II. Site Description Background Information and Definitions: An outline of the designations, parameters, monitoring methods, and the basis for site selection.

III. Network Summary: This section presents an overview of the total number of sites and monitors in Forsyth County. Also included is a listing of all proposed changes to the current network.

IV. Air Monitoring Station Description: Each air monitoring station is described in detail as per the outline in (II.) above. Modification to the network as determined by an annual review process will be made each year to maintain a current up-to-date network description document.

Site Description Background Information and Definitions

1. Site Description

Specific information is provided to show the location of the monitoring equipment at the site, if the site is located in a CSA/MSA, the AQS identification number, the GPS coordinates, and evidence that monitors and monitor probes conform to the siting criteria.

2. Date Established

The date when each existing monitoring station was established is shown in the description. For those stations, which are proposed, a date is provided when it is expected for the station to be in operation.

3. Site Approval Status

Each monitoring station in the existing network has been reviewed with the purpose of determining whether it meets all design criteria for inclusion in the SLAMS network. Stations that do not meet the criteria will either be relocated in a nearby area or, when possible, re-sited at the present location.

4. Monitoring Objectives

Per 40 CFR 58 Appendix D, Section 1.1:

> *"The ambient air monitoring networks must be designed to meet three basic monitoring objectives. These basic objectives are listed below. The appearance of any one objective in the order of this list is not based upon a prioritized scheme. Each objective is important and must be considered individually."*

The objectives are summarized below:

(a) Provide air pollution data to the general public in a timely manner.

(b) Support compliance with ambient air quality standards and emissions strategy development. Data from FRM (Federal Reference Method), FEM (Federal Equivalent Method), and ARM (Approved Regional Method) monitors for NAAQS pollutants will be used for comparing an area's air pollution levels against the NAAQS.

(c) Support for air pollution research studies.

5. Monitoring Stations' Designations

Most stations described in the air quality surveillance network are designated as State and Local Air Monitoring Stations (SLAMS). In addition, some of these stations fulfill other requirements, which must be identified. In this description of the network, designations are also made for National Air Monitoring Stations (NAMS), Special Purpose Monitors (SPM), and National Core (community oriented) stations (NCore). The following is the criteria used for each of these designations.

SLAMS

Requirements for air quality surveillance systems provide for the establishment of a network of monitoring stations designated as State and Local Air Monitoring Stations (SLAMS) that measure ambient air concentrations of those pollutants for which standards have been established. These stations must meet requirements that relate to four major areas: quality assurance, monitoring methodology, sampling interval and siting of instruments and instrument probes.

NAMS

Within the SLAMS network certain monitors are selected to provide the USEPA with timely data for use in national trends analysis. These NAMS monitors are identified in the summary of network stations.

SPM

Not all monitors and monitoring stations in the air quality surveillance network are included in the SLAMS network. In order to allow the capability of providing monitoring for various reasons such as: special studies, modeling verification and compliance status, and other objectives; certain monitors are designated as Special Purpose Monitors (SPM). These monitors are not committed to any one location or for any specified time period. They may be located as separate monitoring stations or be included at SLAMS locations. Monitoring data may be reported, provided that the monitors and stations conform to all requirements of the SLAMS network.

NCORE

National Core (community-oriented) multi-pollutant monitoring station data will be used to evaluate the regional air quality models used in developing emission strategies, and to track trends in air pollution abatement control measures' impact on improving air quality.

6. Monitoring Methods

Sampling and analytical procedures for criteria air pollutant monitoring performed in the FCEAP ambient air monitoring network are conducted in accordance with applicable USEPA Designated Federal Reference (FRM) or Equivalent (FEM) Methods unless otherwise noted. Analytical techniques for non-criteria air pollutant monitoring (methods employed that are not USEPA Designated Federal Reference (FRM) or Equivalent (FEM) Methods) are documented in the applicable FCEAP Quality Assurance Project Plans (QAPP), FCEAP Standard Operating Procedures (SOP), or the appropriate North Carolina Division of Air Quality (NCDAQ) QAPP or SOP. Methods used by FCEAP for criteria pollutant monitoring are listed below:

Particulate Matter 10 microns in size (PM_{10})

All PM_{10} samplers operated by FCEAP are operated as federal reference method (FRM) or equivalent samplers and are operated according to the requirements set forth in 40 CFR 50 and 40 CFR 53. Listed below is the USEPA Designated Reference or Equivalent Method used in the FCEAP monitoring network:

Method	Designation Number	Method Code
TAPI 640X	EQPM-0516-239	239

Particulate Matter 2.5 microns in size ($PM_{2.5}$)

With the exception of continuous samplers and speciation samplers all $PM_{2.5}$ samplers operated by FCEAP are either FRM or FEM samplers. Listed below is the USEPA Designated Reference or Equivalent Method used in the FCEAP monitoring network:

Method	Designation Number	Method Code
R & P Partisol-Plus 2025i PM-2.5 Seq.	EQPM-0202-145	145

$PM_{2.5}$ Speciation sampling and analysis

In addition to operating $PM_{2.5}$ samplers that determine only $PM_{2.5}$ mass values, FCEAP also operates $PM_{2.5}$ speciation samplers that collect samples that are analyzed to determine the chemical makeup of $PM_{2.5}$. Data collected using this method cannot be compared to the NAAQS. Listed below is the method used in the FCEAP monitoring network:

Method	Designation Number	Method Code
MetOne SASS	NA	NA
URG	NA	NA

Sulfur Dioxide

Instruments used to continuously monitor sulfur dioxide levels in the atmosphere employ the pulsed UV fluorescence method. Listed below is the USEPA Designated Reference or Equivalent Method used in the FCEAP monitoring network:

Method	Designation Number	Method Code
Thermo Electron 43A, 43C-TLE, 43i	EQSA-0486-060	060

Ozone

Ozone is monitored using the UV photometry method. Listed below is the USEPA Designated Reference or Equivalent Method used in the FCEAP monitoring network:

Method	Designation Number	Method Code
Teledyne – Advanced Pollution Instrumentation, Inc. Model 400E	EQOA-0992-087	087

Nitrogen Dioxide

The chemiluminescence method is used in monitoring the nitrogen dioxide level in the ambient air. Listed below is the USEPA Designated Reference or Equivalent Method used in the FCEAP monitoring network:

Method	Designation Number	Method Code
Teledyne – Advanced Pollution Instrumentation, Inc Model 200A, 200AU, 200E, 200EU	RFNA-1194-099	099

Air Toxics

Air toxics sampling is conducted in Forsyth County using equipment on loan from the State of North Carolina, Division of Air Quality. Listed below is the USEPA Designated Reference or Equivalent Method used in the FCEAP monitoring network:

Method	Designation Number	Method Code
Compendium Method for Toxic Organics	Compendium Method TO-15	150

7. Quality Assurance Status

FCEAP has an extensive quality assurance procedure to ensure that all air monitoring data collected meets established criteria for precision and accuracy. FCEAP operates according to EPA approved Quality Assurance Project Plans (QAPP) and Standard Operating Procedures. Staff members audit instrumentation on a scheduled basis to ensure that each instrument is calibrated and operating properly. Data validation is performed monthly to ensure data reported by each instrument is recorded accurately in the air quality monitoring database.

8. Scale of Representativeness

Each station in the monitoring network must be described in terms of the physical dimensions of the air parcel nearest the monitoring station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

(a) Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.

(b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.

(c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.

(d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.

(e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station. There are six basic exposures:

(a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.
(b) Sites located to determine representative concentrations in areas of high population density.
(c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.
(d) Sites located to determine general background concentration levels.
(e) Sites located to determine the extent of regional pollutant transport among populated areas; and in support of secondary standards.
(f) Sites located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts.

The design intent in siting stations is to correctly match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of the six basic objectives and the scales of representativeness are appropriate when siting monitoring stations:

Site Type	Appropriate Siting Scales
1. Highest concentration	Micro, middle, neighborhood (sometimes urban or regional for secondarily formed pollutants).
2. Population oriented	Neighborhood, urban.
3. Source impact	Micro, middle, neighborhood.
4. General/background & regional transport	Urban, regional.
5. Welfare-related impacts	Urban, regional.

Table 1 - Siting Objectives and Scales

9. Data Processing and Reporting

All ambient air quality data are stored in the Environmental Data Acquisition System (EDAS) database located on the 5th floor of the Forsyth County Government Center, FCEAP, 201 N. Chestnut Street, Winston-Salem, North Carolina. On a daily basis the EDAS data are backed up and maintained at an off-site location. After all monthly data validation procedures are successfully completed, data is transmitted to the USEPA's national Air Quality System (AQS) database. The AQS database is maintained by EPA as the official repository of the fully quality assured ambient air quality dataset.

Network Summary

1. Site Table and Criteria Pollutants Monitored

Site	AQS ID #	CO	NO_2	O_3	Pb	$PM_{2.5}$	PM_{10}	SO_2	Air Toxics
Clemmons Middle School	37-067-0030			X		X			
Hattie Avenue “A”	37-067-0022		X	X				X	
Hattie Avenue “B”	37-067-0022					X	X		X
Union Cross	37-067-1008			X					

Table 2 - Forsyth County Monitoring Sites

2. Site Map

AIR QUALITY MONITORING STATIONS
FORSYTH COUNTY, NC 2017

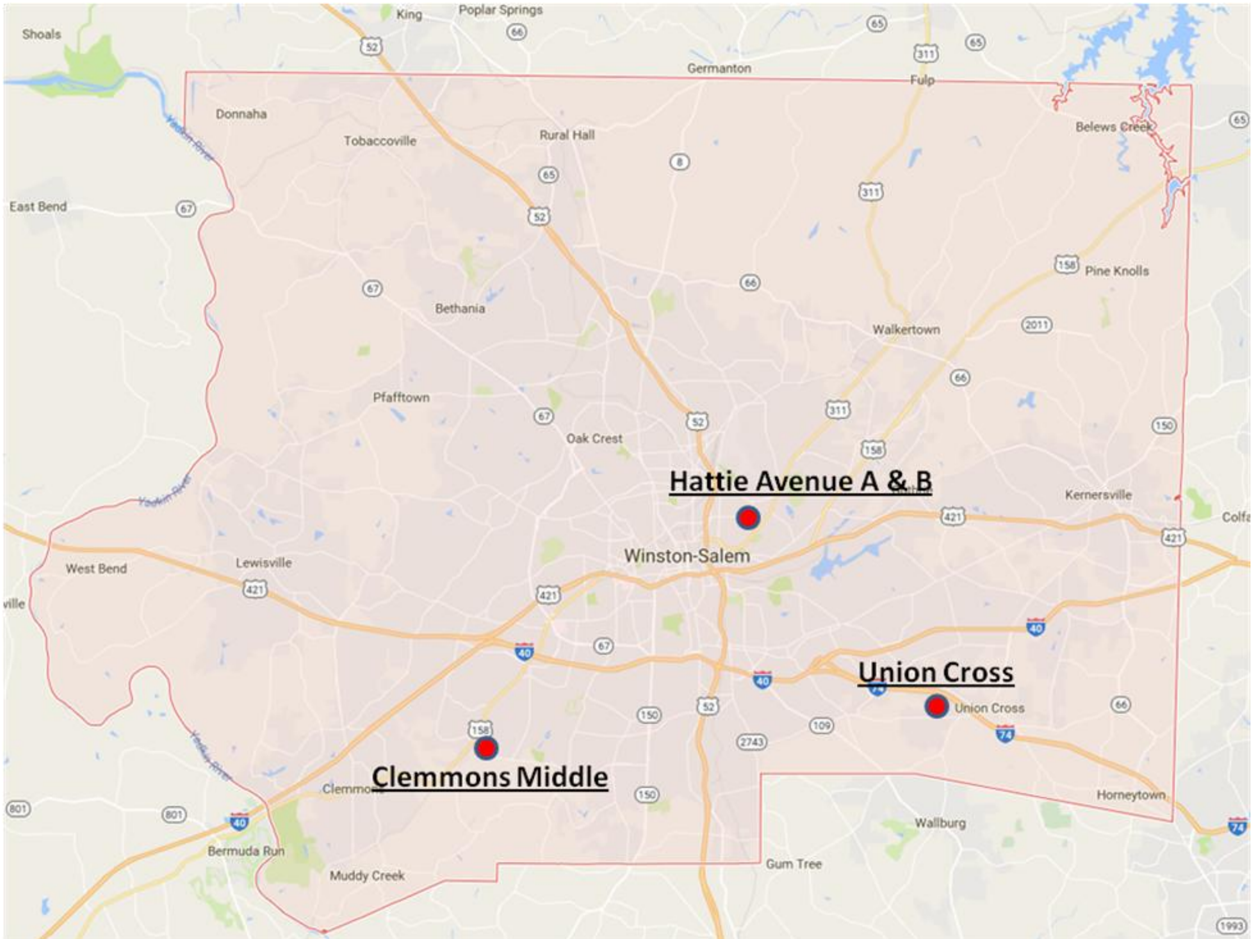

Figure 1 - Forsyth County Monitor Locations

3. Monitoring Methods

Site	Parameter	Instrument / Method	Method Number	Parameter Number	Monitor Type†	Serial Number	Purchase Date	Replace Date	Condition
37-067-0022	Ozone	UV Photometric	087	44201	SLAMS	2621	2009	2019	Good
37-067-0022	SO2	Pulsed UV Fluorescent	100	42401	SLAMS	819230552	2008	2018	Fair
37-067-0022	NO	Chemi-luminescence	099	42601	SLAMS	T200U-214	2017	2027	Good
37-067-0022	NO_2	Chemi-luminescence	099	42602	SLAMS	T200U-214	2017	2027	Good
37-067-0022	NO_x	Chemi-luminescence	099	42603	SLAMS	T200U-214	2017	2027	Good
37-067-0022	Air Toxics	Compendium Method for Toxic Organics (TO) 15	150	Multiple	NON	4518 3603	NCDENR Owned Equipment		
37-067-0022	PM2.5	FRM	145	88101	SLAMS	2025A202849805	2014	2020	Good
37-067-0022	PM2.5	Speciation	118	Multiple	SLAMS	A2591	2001	2018	Good
37-067-0022	PM2.5	T640x	238	88101	SLAMS	96	2017	2027	Good
37-067-0022	PM2.5CR	T640x	240	86101	SLAMS	96	2017	2027	Good
37-067-0022	PM2.5	Carbon Speciation	118	88101	SLAMS	3NB0191	2007	2018	Good
37-067-0022	PM10	T640x	239	81102	SLAMS	96	2017	2027	Good
37-067-0030	Ozone	UV Photometric	087	44201	SLAMS	2218	2009	2019	Good
37-067-0030	PM2.5	T640	236	88101	SLAMS		2017	2027	Good
37-067-1008	Ozone	UV Photometric	087	44201	SLAMS	2219	2009	2019	Good
37-067-1008	Temp	Climatronics	020	61101	SLAMS		2016	2026	Good
37-067-1008	Humidity	Climatronics	020	61103	SLAMS		2016	2026	Good
37-067-1008	WD	Climatronics	020	61104	SLAMS	102779	2016	2026	Good
37-067-1008	WS	Climatronics	020	61103	SLAMS	102779	2016	2026	Good
37-067-1008	Pressure	Climatronics	011	64101	SLAMS		2016	2026	Good

Table 3 - Forsyth County Monitoring Methods

†- Monitor Type:

SLAMS- State and Local Air Monitoring Station
SPM- Special Purpose
NON- Non-regulatory
TRENDS- Trends Speciation

Air Monitoring Station Descriptions

1. Clemmons Middle School

(a) Site Table

Site Name:	Clemmons Middle School		
AQS Site Identification Number:	37-067-0030		
Location:	Fraternity Church Road Winston-Salem, NC		
Latitude:	N36.025931°		
Longitude:	W80.342257°		
Elevation:	245 meters		
Date Monitor Established:	Ozone	April 27, 2005	
Date Monitor Established:	PM2.5 TEOM	April 27, 2005, T640 - Jan. 1, 2018	
Nearest Road:	Fraternity Church Road	Distance to Road:	
Traffic Count[3]:	4100	Year of Count:	40 meters
MSA[4]:	Winston-Salem, NC Metropolitan Statistical Area (2006)	MSA #:	2013

Parameter	Method	Method Number	Sampling Schedule
Ozone	UV Photometric	087	March 1 – Oct. 31, (Continuous)
PM2.5	T640	236	Continuous

Table 4 - Clemmons Middle School Monitoring Station Summary

(b) Site Description and Statement of Purpose

An ozone monitor and $PM_{2.5}$ continuous monitor have been located at a manufactured structure since April 27, 2005. The site is located in a mixed use environment at latitude N36.025931° and longitude W80.342257°. The site elevation is 245 meters above sea level. The nearest road is Fraternity Church Road with an annual traffic volume of 4100 vehicles (2013) at a distance of 40 meters from the sample inlet. This site combined the $PM_{2.5}$ equipment from site 37-067-0024 and the ozone equipment from site 37-067-0027 when these sites were forced to relocate.

The inlet of the samplers is approximately 4 meters above ground level and 1 meter above roof level. There were trees encroaching on the minimum distance from the inlet and those trees were removed during the summer of 2015. The area is a transition zone of business (~50%) to residential (~50%) within a 1 km radius. The samplers are SLAMS.

The ozone instrument is operated during the North Carolina ozone monitoring season which begins March 1 and ends October 31. The ozone instrument operates continuously during this period.

OBJECTIVE AND SPATIAL SCALE

The monitoring objectives of the instruments are to measure: 1) upwind background ambient concentrations and 2) population exposure.

The site is a neighborhood spatial scale for ozone and $PM_{2.5}$. Data from this site is used to assess compliance with the NAAQS for ozone and $PM_{2.5}$.

The site is located in the Winston-Salem, NC Metropolitan Statistical Area[4]. The principal cities and counties in the MSA are Winston-Salem, Davie County, Forsyth County, Stokes County, and Yadkin County, NC.

(c) Site Photographs

NORTH

EAST

SOUTH

WEST

2. Hattie Avenue "A"

(a) Site Table

Site Name: Hattie Avenue "A"

AQS Site Identification Number: 37-067-0022

Location: 1300 Hattie Avenue
Winston-Salem, NC

Latitude: N36.110941°

Longitude: W80.224423°

Elevation: 284 meters

Date Monitor Established: Ozone May 21, 1993

Date Monitor Established: NO_2 January 1, 1984

Date Monitor Established SO_2 January 1, 1983

Nearest Road: Hattie Avenue Distance to Road: 27 meters

Traffic Count[3]: 6000 Year of Count: 2013

MSA[4]: Winston-Salem, NC Metropolitan Statistical Area (2006) MSA #: 49180

Parameter	Method	Method Number	Sampling Schedule
Ozone	UV Photometric	087	March 1 – Oct. 31, (Continuous)
NO_2	Chemiluminescence	099	Continuous
SO_2	UV Pulsed Fluorescence	060	Continuous

Table 5 - Hattie Avenue "A" Monitoring Station Summary

(b) Description and Statement of Purpose

The Hattie Avenue A site monitors ozone, sulfur dioxide, and oxides of nitrogen. The site is located in the 1300 block of Hattie Avenue in downtown Winston-Salem. The site is located approximately 2.2 km NE of downtown, 1.1 km E of US52 and approximately 1.8 km NNW of Interstate 40 Business in a residential district at latitude N36.110941° and longitude W80.224423°. The site elevation is 284 meters. The nearest road, Hattie Avenue, is 27 meters from the inlets and has a daily traffic flow of 6000 vehicles (2003). The nearest tallest building is St. Benedict's Church (approximately 10 meters). The inlets are approximately 43 meters from the shopping center. The inlets are approximately 4 meters above the ground and 1 meter above the roof of the monitoring station. The area is residential. The ozone, sulfur dioxide, and NO_2 monitors are all SLAMS.

The ozone instrument is operated during the North Carolina ozone monitoring season which begins March 1 and ends October 31. The ozone instrument operates continuously during this period.

The SO_2 and NO_2 instruments operate continuously.

The site complies with the siting requirements of 40CFR58 for criteria air pollutants. It is recommended that the current site status be maintained.

OBJECTIVE AND SPATIAL SCALE

The monitoring objectives of the instruments are to measure: 1) background ambient concentrations and 2) population exposure.

The site is a neighborhood spatial scale. Data from this site is used to assess compliance with the NAAQS for ozone, sulfur dioxide, and nitrogen dioxide.

The site is located in the Winston-Salem, NC Metropolitan Statistical Area[4]. The principal cities and counties in the MSA are Winston-Salem, Davie County, Forsyth County, Stokes County, and Yadkin County, NC.

(c) *Site Photographs*

NORTH

EAST

SOUTH

WEST

3. Hattie Avenue "B"

(a) Site Table

Site Name:	Hattie Avenue "B"		
AQS Site Identification Number:	37-067-0022		
Location:	1300 Hattie Avenue Winston-Salem, NC		
Latitude:	N36.110892º		
Longitude:	W80.224432º		
Elevation:	284 meters		
Date Monitor Established:	$PM_{2.5}$ – FRM	January 1, 1999	
Date Monitor Established:	$PM_{2.5}$ – FRM 1/6	April 1, 2016	
Date Monitor Established	$PM_{2.5}$ - TEOM	Jun 16, 1999, T640x - Jan. 1, 2018	
Date Monitor Established	PM_{10} - TEOM	Oct 18, 1999, T640x - Jan. 1, 2018	
Date Monitor Established	Air Toxics	January 1, 2000	
Traffic Count[3]:	6000	Year of Count:	2013
MSA[4]:	Winston-Salem, NC Metropolitan Statistical Area (2006)	MSA #:	49180

Parameter	Method	Method Number	Sampling Schedule
$PM_{2.5}$	FRM Gravimetric	145	1 in 3 day
$PM_{2.5}$	FRM Gravimetric	145	1 in 6 day
$PM_{2.5}$	MetOne, Speciation	701	1 in 6 day
$PM_{2.5}$	T640x, Continuous	238	Continuous
PM_{10}	T640x, Continuous	239	Continuous
Air Toxics	Compendium Method for Toxic Organics (TO) 15	150	1 in 6 day

Table 6 - Hattie Avenue "B" Monitoring Station Summary

(b) Description and Statement of Purpose

This Hattie Avenue site monitors $PM_{2.5}$ and PM_{10}. The site is located in the 1300 block of Hattie Avenue in Winston-Salem. The site is located approximately 2.2 km NE of downtown, 1.1 km E of US52 and approximately 1.8 km NNW of Interstate 40 Business in a residential district at latitude N36.110892º and longitude W80.224432º. The site elevation is 284 meters. The nearest road, Hattie Avenue, is 27 meters from the inlets and has a daily traffic flow of 6000 vehicles (2013). The nearest tallest building is St. Benedict's Church (approximately 10 meters). The inlets are approximately 43 meters from the shopping center. The inlets are approximately 4 meters above the ground and 1 meter above the roof of the monitoring station. The area is residential. The monitors are SLAMS.

The $PM_{2.5}$ FRM sampling frequency is on the 1 in 3 day schedule and the co-located FRM is on the 1 in 6 day.. The sampling interval is 24 hours, from midnight to midnight every day.

The $PM_{2.5}$ Speciation sampling frequency is 1 in 6 days. The sampling interval is 24 hours, from midnight to midnight every six days.

The $PM_{2.5}$ and PM_{10} T640x instruments operate continuously.

Monitoring for Urban Air Toxics (UAT) is currently conducted at this site by the North Carolina Division of Air Quality (NC-DAQ), Toxics Protection Branch (TPB). Currently, the NC-DAQ TPB collects whole air samples in stainless steel 6 liter- pressurized canisters. The samples are then analyzed using cryogenic preconcentration gas chromatography with mass spectrometric detection (GC/MS) via the Compendium Method for Toxic Organics (TO) 15 for the list of 68 compounds (below).

- *Propene*
- *Freon 12*
- *Freon 22*
- *Freon 114*
- *Chloro Methane*
- *(Methylchloride)*
- *Isobutene*
- *Vinyl chloride*
- *1,3-Butadiene*
- *Bromomethane*
- *Chloroethane*
- *Freon 11*
- *Pentane*
- *Ethanol*
- *Isoprene*
- *Acrolein*
- *1,1-Dichloroethene*
- *(Vinylidene chloride)*
- *Freon 113*
- *Methyl Iodide*
- *Isopropyl Alcohol*
- *Carbon Disulfide*
- *Acetonitrile*
- *Methylene chloride*
- *Cyclopentane*
- *MTBE*
- *Hexane*
- *Methacrolein*
- *Vinyl Acetate*
- *1,1-Dichloroethane*
- *Methyl Vinyl Ketone*
- *Methyl Ethyl Ketone*
- *1,2 Dichloroethene*
- *Chloroform*
- *1,1,1-Trichloroethane*
- *(Methyl chloroform)*
- *Cyclohexane*
- *Carbon Tetrachloride*
- *Benzene*
- *1,2-Dichloroethane*
- *(ethylene dichloride)*
- *1-Butanol*
- *Trichloroethylene*
- *2-Pentanone*
- *3-Pentanone*
- *1,2-Dichloropropane*
- *1,4-Dioxane*
- *Bromodichloromethane*
- *trans-1,3 Dichloropropene*
- *Methyl Isobutyl Ketone*
- *Toluene*
- *cis-1,3 Dichloropropene*
- *1,1,2-Trichloroethane (vinyl trichloride)*
- *Ethylpropylketone*
- *Tetrachloroethylene*
- *(perchloroethylene)*
- *Methyl Butyl Ketone*
- *Dibromoethane*
- *Chlorobenzene*
- *(phenylchloride)*
- *Ethylbenzene*
- *m- & p-Xylene*
- *o-Xylene*
- *Styrene*
- *Bromoform*
- *1,1,2,2-Tetrachloroethane*
- *1,3,5-Trimethylbenzene*
- *(mesitylene)*
- *1,2,4-Trimethylbenzene*
- *(pseudocumene)*
- *m-Dichlorobenzene*
- *1,2,3-Trimethylbenzene*
- *p-Dichlorobenzene*
- *Benzylchloride*
- *o-Dichlorobenzene*
- *1,2,4-Trichlorobenzene*

The site complies with the siting requirements of 40CFR58 for criteria air pollutants. There are no proposed changes for this site. It is recommended that the current site status be maintained.

OBJECTIVE AND SPATIAL SCALE

The monitoring objective of the instruments is to measure population exposure.

The site is a neighborhood spatial scale. Data from this site is used to assess compliance with the NAAQS for $PM_{2.5}$ and PM_{10}.

The site is located in the Winston-Salem, NC Metropolitan Statistical Area[4]. The principal cities and counties in the MSA are Winston-Salem, Davie County, Forsyth County, Stokes County, and Yadkin County, NC.

(c) Site Photographs

NORTH

EAST

SOUTH

WEST

4. Union Cross

(a) Site Table

Site Name:	Union Cross			
AQS Site Identification Number:	37-067-1008			
Location:	3656 Piedmont Memorial Drive Winston-Salem, NC			
Latitude:	N36.050746º			
Longitude:	W80.143826º			
Elevation:	285 meters			
Date Monitor Established:	Ozone	April 1, 1998		
Nearest Road:	Piedmont Memorial Dr.	Distance to Road:	55 meters	
Traffic Count[3]:	650	Year of Count:	2011	
MSA[4]:	Winston-Salem, NC Metropolitan Statistical Area (2006)	MSA #:	49180	

Parameter	Method	Method Number	Sampling Schedule
Ozone	UV Photometry	087	March 1 – October 31 (Continuous)
Wind Speed	Climatronics	020	Continuous
Wind Direction	Climatronics	020	Continuous
Pressure	Climatronics	011	Continuous
Outdoor Temperature	Climatronics	020	Continuous
Relative Humidity	Climatronics	020	Continuous

Table 7 - Union Cross Monitoring Station Summary

(b) Site Description and Statement of Purpose

An ozone monitor has been located at this site since April 1, 1998 along with a meteorological tower since 1997. The site is located approximately 10 km SE of the central business district at latitude 36.050746° and longitude -80.143826°. The site elevation is 285 meters above sea level. The nearest road is Piedmont Memorial Drive with an annual traffic volume of 650 vehicles (2011) at a distance of 55 meters from the sample inlet.

The inlet is approximately 4 meters above the ground and 1 meter from the roof. The area is residential. The ozone sampler is SLAMS.

The ozone instrument is operated during the North Carolina ozone monitoring season which begins March 1 and ends October 31. The ozone instrument operates continuously during this period.

The site complies with the siting requirements of 40CFR58 for criteria air pollutants. There are no proposed changes for this site. It is recommended that the current site status be maintained. Current building replacement is scheduled for 2017 by the building placed next to it in the pictures.

OBJECTIVE AND SPATIAL SCALE

The monitoring objective of the instrument is to measure population exposure.

The site is a neighborhood spatial scale for ozone. Data from this site is used to assess compliance with the NAAQS for ozone.

The site is located in the Winston-Salem, NC Metropolitan Statistical Area[4]. The principal cities and counties in the MSA are Winston-Salem, Davie County, Forsyth County, Stokes County, and Yadkin County, NC.

(c) Site Photographs

NORTH

EAST

SOUTH

WEST

References

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, October 17, 2006/Rules and Regulations.

2. Watson, John G., Chow, Judith C., DuBois, David, Green, Mark, Frank, Neil, Pitchford, Marc. Guidance for Network Design and Optimum Site Exposure for PM2.5 and PM10. Office of Air Quality Planning and Standards, U. S. Environmental Protection Agency, Research Triangle Park, NC 27711. December 15, 1997.

3.
Winston-Salem Department of Transportation. Current Traffic Counts
Note: Traffic Count taken from nearest road providing most impact to site

4. US Census Bureau. Current Lists of Metropolitan and Micropolitan Statistical Areas and Definitions. http://www.census.gov/population/metro/data/index.html .
(301) 763-2419. 2006.

2017 Annual Monitoring Network Plan

Appendix A

No comments were received.

Air Quality Monitoring Group

2018-2019 Annual Monitoring Network Plan - Mecklenburg County Air Quality

Mecklenburg County Air Quality
A Division of the Mecklenburg County
Land Use and Environmental Services Agency
2145 Suttle Avenue
Charlotte, NC, 28208
Phone 980-314-3361 • Fax 704-336-4391
June 22, 2018

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CERTIFICATION

By the signatures below, Mecklenburg County Air Quality (MCAQ) certifies that the information contained in the "2018-2019 Annual Monitoring Network Plan for Mecklenburg County Air Quality" is complete and accurate, to the best of our knowledge, at the time of submittal to USEPA Region 4. However, due to circumstances that may arise during the sampling year, network information may change. A notification of change and a request for approval will be submitted to USEPA Region 4 at that time.

Print Name: Jeff Francis Signature: Jeff Francis Date: June 22, 2018

Air Quality Monitoring Manager, MCAQ

Print Name: Leslie Rhodes Signature: Leslie Rhodes Date: June 22, 2018

Director, MCAQ

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2018 - 2019 ANNUAL MONITORING NETWORK PLAN
MECKLENBURG COUNTY AIR QUALITY
Table of Contents

I. INTRODUCTION

The Mecklenburg County Air Quality (MCAQ) monitoring program, a division of the Mecklenburg County Land Use and Environmental Services Agency (LUESA); provides air quality monitoring services in Mecklenburg County, North Carolina. Mecklenburg County Air Quality is a state "certified local air pollution program" whose purpose is to improve and maintain ambient air quality and reduce exposure to unhealthy levels of air pollution.

MCAQ has operated an air quality monitoring program since the 1960's. The air monitoring services provided by the program measure concentrations of the criteria air pollutants (carbon monoxide - CO, nitrogen dioxide - NO_2, sulfur dioxide - SO_2, particulate matter - PM, lead - Pb, and ozone - O_3) in accordance with USEPA regulatory requirements.

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards or NAAQS (40 CFR part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards: 1) *Primary standards* set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly; and 2) *Secondary standards* set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants (criteria pollutants). The NAAQS are listed in Table 1:

National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 μg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 μg/m^3	annual mean, averaged over 3 years
		secondary	1 year	15.0 μg/m^3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 μg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.
(2) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.
(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
(4) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Table 1.

The MCAQ air monitoring program operates a network of state and local air monitoring stations (SLAMS) in Mecklenburg County. The current network configuration consists of four monitoring stations that measure concentrations of criteria air pollutants. The SLAMS network operated by MCAQ includes monitoring for criteria pollutants, meteorological parameters, NCORE multi-pollutant parameters, and speciation trends network (STN) monitoring. Occasionally, special purpose monitoring (SPM) is conducted.

The annual monitoring network plan, as stated in 40 CFR Part 58.10(b)(1-13), *Annual Monitoring Network Plan and Periodic Network Assessment;* must contain the following information for each existing and proposed site:

(1) The AQS site identification number.
(2) The location, including street address and geographical coordinates.
(3) The sampling and analysis method(s) for each measured parameter.
(4) The operating schedules for each monitor.
(5) Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.
(6) The monitoring objective and spatial scale of representativeness for each monitor as defined in appendix D to this part.
(7) The identification of any sites that are suitable and sites that are not suitable for comparison against the annual $PM_{2.5}$ NAAQS as described in §58.30.
(8) The MSA, CBSA, CSA or other area represented by the monitor.
(9) The designation of any Pb monitors as either source-oriented or non-source-oriented according to Appendix D to 40 CFR part 58.
(10) 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.
(11) 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.
(12) The identification of required NO_2 monitors as near-road, area-wide, or vulnerable and susceptible population monitors in accordance with Appendix D, section 4.3 of this part.
(13) The identification of any $PM_{2.5}$ FEMs and/or 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. For required SLAMS where the agency identifies that the $PM_{2.5}$ Class III FEM or ARM does not produce data of sufficient quality for comparison to the NAAQS, the monitoring agency must ensure that an operating FRM or filter-based FEM meeting the sample frequency requirements described in §58.12 or other Class III $PM_{2.5}$ FEM or ARM with data of sufficient quality is operating and reporting data to meet the network design criteria described in appendix D to this part.

This report constitutes the Mecklenburg County Air Quality "annual monitoring network plan" (ANP). The remaining sections of the plan are summarized below:

II. Site Description Background Information and Definitions: This section provides an overview and definition of "Site Description", "Date Site Established", "Site Approval Status", “Monitoring Objectives”, “Monitoring Station Designations”, “Monitoring Methods”, “Quality Assurance Status”, “Scale or Representativeness”, and a “Data Processing and Reporting” summarization.

III. Network Summary: This section presents an overview of the sites and monitors in Mecklenburg County. It includes **a listing of proposed changes to the current network**.

IV. Air Monitoring Station Description: In this section each air monitoring station is described in detail.

II. SITE DESCRIPTION BACKGROUND INFORMATION AND DEFINITIONS

1. Station Description

Specific information is provided to show the location of the monitoring equipment at the site, if the site is in a combined statistical area (CSA), Core-based Statistical Area (CBSA), or Metropolitan Statistical Area (MSA), the AQS identification number, the GPS coordinates, and evidence that the stations, monitors and monitor probes conform to the requirements of appendices A, B, C, D, and E of 40 CFR 58, where applicable.

2. Date Established

The date when each existing monitoring station was established is shown in the description. For those stations, which are proposed, an expected startup date is provided.

3. Site Approval Status

Each monitoring station in the existing network has been reviewed with the purpose of determining whether it meets all design criteria for inclusion in the SLAMS network.

4. Monitoring Objectives

Per 40 CFR 58 Appendix D, Section 1.1: “The ambient air monitoring networks must be designed to meet three basic monitoring objectives. These basic objectives are listed below. The appearance of any one objective in the order of this list is not based upon a prioritized scheme. Each objective is important and must be considered individually.

(a) Provide air pollution data to the general public in a timely manner. Data can be presented to the public in a number of attractive ways including through air quality maps, newspapers, internet sites, and as part of weather forecasts and public advisories.

(b) Support compliance with ambient air quality standards and emissions strategy development. Data from FRM (Federal Reference Method), FEM (Federal Equivalent Method), and ARM (Approved Regional Method) monitors for NAAQS pollutants will be used for comparing an area’s air pollution levels against the NAAQS. Data from monitors of various types can be used in the development of attainment and maintenance plans. SLAMS, and especially NCORE station data, will be used to evaluate the regional air quality models used in developing emission strategies, and to track trends in air pollution abatement control measures' impact on improving air quality. In monitoring locations near major air pollution sources, source-oriented monitoring data can provide insight into how well industrial sources are controlling their pollutant emissions.

(c) Support for air pollution research studies. Air pollution data from the NCORE network can be used to supplement data collected by researchers working on health effects assessments and atmospheric processes, or for monitoring methods development work."

5. Monitoring Station Designations

Most stations described in the air quality surveillance network are designated as State and Local Air Monitoring Stations (SLAMS). The SLAMS include the ambient air quality monitoring sites and monitors that are required by 40 CFR 58 Appendix D and are needed for the monitoring objectives of appendix D, including NAAQS comparisons, but may serve other data purposes. The SLAMS include National Core multipollutant monitoring stations (NCORE), photochemical assessment monitoring stations (PAMS), *Chemical Speciation Network (CSN)* / Speciation Trends Network stations (STN), and all other state or locally operated criteria pollutant monitors, operated in accordance with 40 CFR 58, that have not been designated and approved by the Regional Administrator as special purpose monitor (SPM) stations in an annual monitoring network plan. The following are descriptions of the SLAMS (including NCORE, PAMS, and STN) and SPM station designations.

(A) SLAMS: The SLAMS make up the ambient air quality monitoring sites that are primarily needed for NAAQS comparisons, but may serve other data purposes. SLAMS exclude special purpose monitor (SPM) stations and include NCORE, PAMS, and all other State or locally operated stations that have not been designated as SPM stations. These stations must meet requirements that relate to four major areas: quality assurance, monitoring methodology, sampling interval, and siting of instruments and instrument probes.

(B) SPM: Not all monitors and monitoring stations in the air quality surveillance network are included in the SLAMS network. In order to allow the capability of providing monitoring for various reasons such as: special studies, modeling verification and compliance status, and other objectives; certain monitors are designated as Special Purpose Monitors (SPM). These monitors are not committed to any one location or for any specified time period. They may be located as separate monitoring stations or be included at SLAMS locations. Monitoring data may be reported to AQS, provided that the monitors and stations conform to all requirements of the SLAMS network. Specific regulations regarding SPM's are contained in 40 CFR 58 §58.20.

(C) NCORE: The NCORE multipollutant sites are a subset of SLAMS. NCORE sites measure multiple pollutants to provide support to integrated air quality management data needs. NCORE sites include both neighborhood and urban scale measurements in a select number of metropolitan areas and a limited number of rural locations.

NCORE sites must measure, at a minimum, $PM_{2.5}$ particle mass using continuous and integrated/filter-based samplers, speciated $PM_{2.5}$, $PM_{10-2.5}$ particle mass, O_3, SO_2, CO, NO/NO_Y, wind speed, wind direction, relative humidity, and ambient temperature.

(D) Speciation Trends Network (STN): Speciation Trends Network stations are those stations designated to be part of the speciation trends network. These stations collect samples that are analyzed to determine the chemical makeup of $PM_{2.5}$. The STN is part of the chemical speciation network (CSN).

6. Monitoring Methods

Sampling and analytical procedures for criteria air pollutant monitoring performed in the MCAQ ambient air monitoring network and used for NAAQS comparison are conducted in accordance with applicable USEPA Designated Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM) unless otherwise noted. Analytical techniques for non-criteria air pollutant monitoring (methods employed that are not USEPA Designated Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM)) are documented in the applicable MCAQ Quality Assurance Project Plan (QAPP) and/or the applicable MCAQ Standard Operating Procedure (SOP). Methods used by MCAQ for criteria pollutant monitoring and selected non-criteria monitoring are listed below:

(A) Particulate Matter 10 microns in size (PM_{10})

PM_{10} samplers operated by MCAQ are operated as federal equivalent method (FEM) samplers and are operated according to the requirements set forth in 40 CFR 50, 40 CFR 58, and 40 CFR 53. Listed below is the USEPA Designated Reference or Equivalent Method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Met One BAM 1020 (PM_{10})-STP	EQPM-0798-122	122
Met One BAM 1020 (PM_{10})-LC	EQPM-0798-122	122

(B) Particulate Matter 2.5 microns in size and coarse ($PM_{2.5}$, PM_C)

$PM_{2.5}$ and PM_c (coarse) samplers operated by MCAQ are either FRM or FEM samplers. Listed below are the applicable USEPA Designated Reference or Equivalent Method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
R & P Partisol-Plus 2025 PM-2.5 Seq.	RFPS-0498-118	145
Met One BAM 1020 ($PM_{2.5}$)	EQPM-0308-170	170
Met One BAM 1022 ($PM_{2.5}$)	EQPM-1013-209	209
Met One BAM 1020 ($PM_{10-2.5}$)	EQPM-0709-185	185

(C) $PM_{2.5}$ Speciation sampling and analysis

In addition to operating $PM_{2.5}$ samplers that determine only $PM_{2.5}$ mass values, MCAQ operates $PM_{2.5}$ speciation samplers which collect samples that are analyzed to determine the chemical composition of the $PM_{2.5}$ fraction. Data collected using these methods cannot be compared to the NAAQS. Listed below is the method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
MetOne SuperSASS	NA	810
URG-3000N (Carbon Channel)	NA	Various

(D) Sulfur Dioxide (SO2)

Instruments used to continuously monitor sulfur dioxide levels in the atmosphere employ the pulsed UV fluorescence method. Listed below is the USEPA Designated Reference or Equivalent Method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Thermo Electron 43A, 43C-TLE, 43i, 43i-TLE	EQSA-0486-060	560

(E) Carbon Monoxide (CO)

Continuous monitoring for carbon monoxide is performed using the non-dispersive infrared (gas filter correlation) method. Listed below is the USEPA Designated Reference or Equivalent Method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Thermo Electron or Thermo Environmental Instruments 48, 48C, 48i, 48i-TLE	RFCA-0981-054	554

(F) Ozone (O_3)

Ozone is monitored using the UV photometry method. Listed below is the USEPA Designated Reference or Equivalent Method used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Thermo Electron or Thermo Environmental Instruments 49, 49C, 49i	EQOA-0880-047	047

(G) Nitrogen Dioxide (NO_2)

The chemiluminescence method is used to monitor the nitrogen dioxide level in ambient air. Listed below are the USEPA Designated Reference or Equivalent Methods used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Thermo Environmental Instr. 42, 42C, 42i, 42i-TLE	RFNA-1289-074	074
Teledyne API, T200UP	EQNA-0512-200	200

(H) Reactive Oxides of Nitrogen (NO_y)

The chemiluminescence method is used to monitor the reactive oxides of nitrogen levels in ambient air. Listed below is the instrumentation used in the MCAQ monitoring network:

Method	Designation Number	Method Code
Thermo Environmental Instr. 42C-Y, 42i-Y	NA	674

(I) Lead (Pb)

Lead (Pb) monitoring in not currently being conducted and is not currently required per 40 CFR 58 Appendix D §4.5. The most recent Pb monitoring was conducted from January 1, 2012 through April 30, 2016. Pb monitoring at the Garinger High School NCORE monitoring station (37-119-0041) was discontinued on April 30, 2016 in accordance with revisions to NCORE design criteria per 40 CFR 58, Appendix D(3). Concentrations of Pb measured at the station were well below the NAAQS (0.15 μg/m3). The maximum rolling three (3) month average for the period January 1, 2012 through April 30, 2016 was 0.003 μg/m3, approximately 2% of the NAAQS.

The Pb-PM_{10} lo-vol method was used for monitoring lead in the MCAQ monitoring network for the period from January 1, 2012 through April 30, 2016. Analysis for lead in PM_{10} collected on the filters was conducted in accordance with 40 CFR 50, Appendix Q. Listed below is the method used in the MCAQ monitoring network during the period:

Method	Designation Number	Method Code
R & P Partisol-Plus 2025 PM-10 Seq.	RFPS-1298-127	811

7. Quality Assurance Status

MCAQ operates according to EPA approved Quality Assurance Project Plans (QAPP) and Standard Operating Procedures. The MCAQ QAPP for criteria pollutants (including NCORE NOy and near-road NO_2) was approved by US EPA on October 17, 2016. The MCAQ Quality Management Plan (QMP) was approved by US EPA on August 8, 2017.

MCAQ has an extensive quality assurance program to ensure that all air monitoring data collected meets established criteria for precision and bias. Staff members perform independent audits of instrumentation on a regularly scheduled basis to ensure that each instrument is calibrated and operating properly. Data validation is performed monthly to ensure data reported by each instrument is recorded accurately in the air quality monitoring database.

8. Scale of Representativeness

Each station in the monitoring network must be described in terms of the physical dimensions of the air parcel nearest the monitoring station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

(a) Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.

(b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.

(c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.

(d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.

(e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station. There are six basic exposures:

(a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.

(b) Sites located to determine representative concentrations in areas of high population density.

(c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.

(d) Sites located to determine general background concentration levels.

(e) Sites located to determine the extent of regional pollutant transport among populated areas; and in support of secondary standards.

(f) Sites located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts.

The design intent in siting stations is to correctly match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of the six basic objectives and the scales of representativeness are appropriate when siting monitoring stations:

Site Type	Appropriate Siting Scales
1. Highest concentration.....	Micro, middle, neighborhood (sometimes urban or regional for secondarily formed pollutants).
2. Population oriented.......	Neighborhood, urban.
3. Source impact............	Micro, middle, neighborhood.
4. General/background & regional transport...........	Urban, regional.
5. Welfare-related impacts...	Urban, regional.

Table 2.

9. Data Processing and Reporting

MCAQ ambient air quality monitoring data are stored in the Agilaire AirVision SQL database and on the MCAQ local area network (LAN) server located at 2145 Suttle Avenue, Charlotte, North Carolina. On a weekly basis the AirVision SQL database is backed up to the Mecklenburg County Land Use and Environmental Services Agency LAN server. After all monthly data validation procedures are successfully completed, data is transmitted to the US EPA's national Air Quality System (AQS) database. The AQS database is maintained by US EPA as the official repository of the fully quality assured ambient air quality dataset.

III. NETWORK SUMMARY

1. Site Table - Criteria Pollutants and NCORE Parameters Monitored[1]

EPA AQS ID Station Name	CO	NO_2	O_3	$PM_{2.5}$ FRM	$PM_{2.5}$ Cont[2] FEM	PM_{10} Cont[3]	SO_2	$PM_{10-2.5}$ Cont[4]	NO_y
37-119-0041 Garinger (NCORE)	**X**	**X Area-wide**	**X**	**X**[5]	**X**	**X**	**X**	**X**	**X**
37-119-0042 Montclaire					**X**	**X**			
37-119-0045 Remount	**X**	**X Near-road**		**X**[6]	**X**				
37-119-0046 University Meadows			**X**						

1) Monitored as of July 1, 2018.
2) $PM_{2.5}$ Continuous (BAM 1020/1022).
3) PM_{10} Cont: PM_{10} Continuous.
4) $PM_{10-2.5}$ Cont: $PM_{10-2,5}$ Continuous.
5) NCORE Required 1/3 and collocated FRM.
6) Collocated FRM 1/12.

Table 3.

2. Site Map

AIR QUALITY MONITORING STATIONS
MECKLENBURG COUNTY, NC 2018

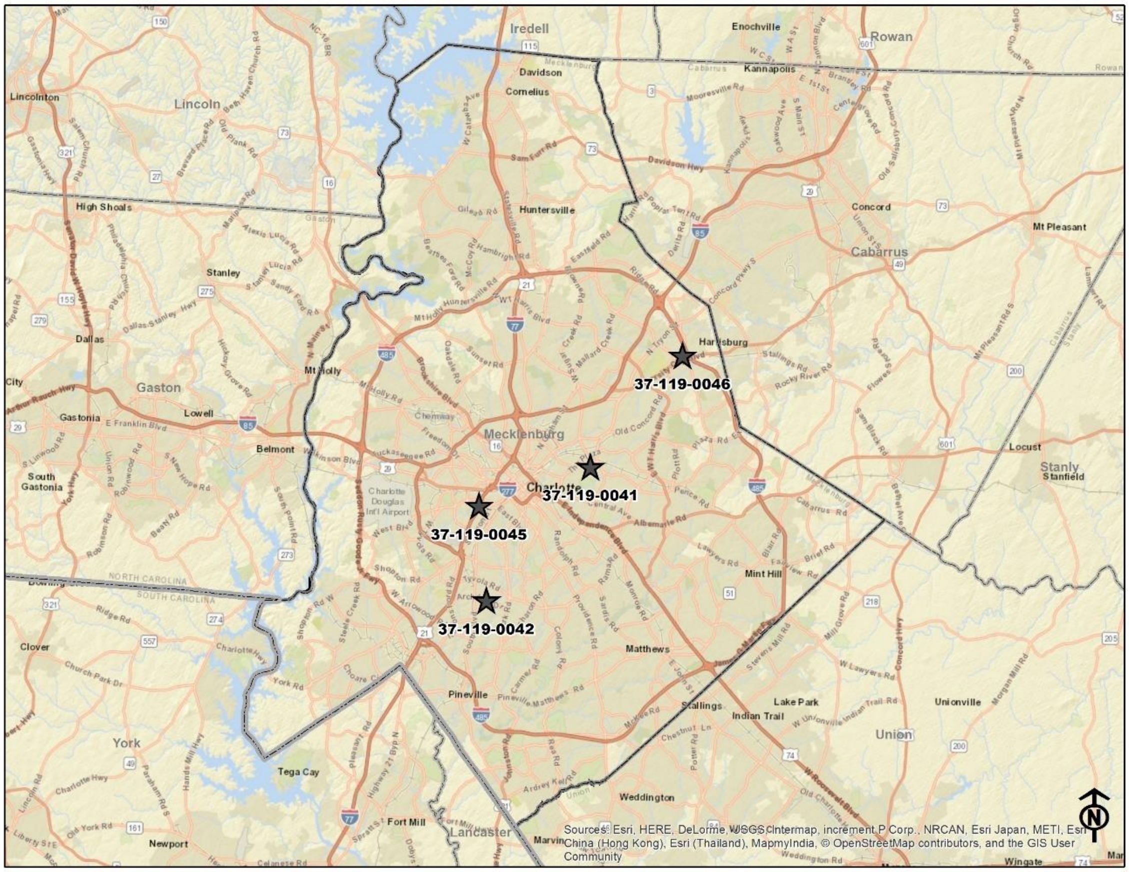


Figure 1.

3. Monitoring Methods

Site	Parameter	Instrument / Method	Meth. Num.[1]	Param. Num.[2]	POC	MT[3]
37-119-0041	SO2	Pulsed UV Fluorescent	560	42401	2	SLAMS NCORE
37-119-0041	CO	Gas Filter Correlation	554	42101	4	SLAMS NCORE
37-119-0041	NO- NO_2-NOx Area-wide	Chemi-luminescence	074	42601, 42602, 42603	1	SLAMS
37-119-0041	NO-Dif-NOy	Chemi-luminescence	674	42601, 42612, 42600	2	SLAMS NCORE
37-119-0041	PM10-2.5 Coarse	BAM 1020 System (LC)	185	86101	4	SLAMS NCORE
37-119-0041	PM10	BAM 1020 (LC)	122	85101	4	SLAMS
37-119-0041	PM10	BAM 1020 (STP)	122	81102	4	SLAMS
37-119-0041	PM2.5	MetOne (BAM 1020)	170	88101	4	SLAMS
37-119-0041	Ozone	UV Photometric	047	44201	1	SLAMS NCORE
37-119-0041	PM2.5	FRM	145	88101	1	SLAMS NCORE
37-119-0041	PM2.5	STN-MetOne/URG	810	Multiple	5	CSN NCORE
37-119-0041	Barometric Pressure	R. M. Young	011	64101	1	SLAMS
37-119-0041	Outdoor Temperature	R. M. Young	020	62101	1	SLAMS NCORE
37-119-0041	Precipitation	R. M. Young	011	65102	1	SLAMS
37-119-0041	Relative Humidity	MetOne	012	62201	1	SLAMS NCORE
37-119-0041	Solar Radiation	Matrix	011	63301	1	SLAMS
37-119-0041	Wind Direction-Resultant	MetOne	061	61104	1	SLAMS NCORE
37-119-0041	Wind Speed-Resultant	MetOne	061	61103	1	SLAMS NCORE

Site	Parameter	Instrument / Method	Meth. Num.[1]	Param. Num.[2]	POC	MT[3]
37-119-0041	Wind Direction-Scalar	MetOne	061	61102	1	SLAMS NCORE
37-119-0041	Wind Speed-Scalar	MetOne	061	61101	1	SLAMS NCORE
37-119-0042	PM10	BAM 1020 (STP)	122	81102	4	SLAMS
37-119-0042	PM2.5	MetOne (BAM 1022)	209	88101	4	SLAMS
37-119-0045	NO- NO_2-NOx Near-road	FEM	200	42601, 42602, 42603	1	SLAMS
37-119-0045	CO	Gas Filter Correlation	554	42101	1	SLAMS
37-119-0045	PM2.5	MetOne (BAM 1022)	209	88101	4	SLAMS
37-119-0045	PM2.5	FRM	145	88101	1	SLAMS
37-119-0045	Relative Humidity	MetOne	012	62201	1	SLAMS
37-119-0045	Outdoor Temperature	R. M. Young	020	62101	1	SLAMS
37-119-0045	Wind Direction-Resultant	MetOne	061	61104	1	SLAMS
37-119-0045	Wind Speed-Resultant	MetOne	061	61103	1	SLAMS
37-119-0045	Wind Direction-Scalar	MetOne	061	61102	1	SLAMS
37-119-0045	Wind Speed-Scalar	MetOne	061	61101	1	SLAMS
37-119-0046	Ozone	UV Photometric	047	44201	1	SLAMS

Table 4.

1- Meth. Num. = Method Number
2- Param. Num. = Parameter Number
3- MT = Monitor Type: SLAMS – State and Local Air Monitoring Station, NCORE – National Core, SPM – Special Purpose, NON – Non-regulatory, CSN – Chemical Speciation Network

4. Network Modifications, Waiver Requests, and MOA's

(A) Monitoring Station Siting Modifications

There are no monitoring station siting modifications currently proposed for 2018 – 2019.

(B) Instrumentation Operation Modifications

1. Integration of Continuous Particulate Matter (PM) Monitoring Methods:
MCAQ installed continuous PM monitoring instruments at filter-based (FRM) $PM_{2.5}$ and filter-based PM_{10} monitoring stations during the first and second quarter of 2017 as specified in the approved 2016-2017 Annual Monitoring Network Plan.

Filter-based PM2.5 FRM samplers were operated on a 1/3 sampling frequency during the initial 12 months of operation of the continuous PM2.5 samplers. The purpose of the collocated operation of $PM_{2.5}$ FRM and $PM_{2.5}$ continuous monitors (Class III $PM_{2.5}$ FEMs) at each site was to assess data from the $PM_{2.5}$ continuous monitors using the performance criteria described in table C-4 to subpart C of 40 CFR 53 to determine if the $PM_{2.5}$ continuous monitors operating in the MCAQ network are appropriate for comparison to the $PM_{2.5}$ NAAQS. The comparability assessments are being conducted during the first year of operation; pending the collection of the required number of collocated samples (23/quarter/site). During the assessment period (2017-2018) $PM_{2.5}$ data collected using continuous methods are not to be compared to the NAAQS.

The following table summarizes currently operating $PM_{2.5}$ FRM and $PM_{2.5}$ continuous monitors and provides an estimated timetable for transition to the use of PM2.5 continuous monitors:

Site	**Filter-based $PM_{2.5}$ Instrument Model** (filter-based sampling frequency)	**Filter-based Collocation Requirements**	**Continuous $PM_{2.5}$ Instrument Model**
Garinger 37-119-0041 (NCORE)	Thermo (R&P) 2025 (1/3) $PM_{2.5}$ – 88101 Sampling began 7/29/1999. Filter-based FRM designated as secondary sampler on 4/1/2018.	FRM will operate as a collocated sampler at a sampling frequency of 1/3 (NCORE) for BAM 1020 method 170.	Met One BAM 1020 $PM_{2.5}$ – 88101 Sampling began 3/6/2017. Method 170 designated as primary sampler on 4/1/2018 after acceptable comparability assessment.
Montclaire 37-119-0042	Thermo (R&P) 2025 (1/3) $PM_{2.5}$ – 88101 Sampling began 9/12/2000. Sampling ended on 5/1/2018 after acceptable comparability assessment.	Thermo (R&P) 2025 (1/12) Sampling began 9/15/2000. Sampling ended on 5/1/2018 after acceptable comparability assessment.	Met One 1022 $PM_{2.5}$ – 88502 Sampling began 4/3/2017. Parameter code revised to 88101 on 5/1/2018 after acceptable comparability assessment. Method 209 designated as primary sampler on 5/1/2018.
Remount 37-119-0045 (near-road)	Thermo (R&P) 2025 (1/3) $PM_{2.5}$ - 88101 Sampling began 1/1/2017. Filter-based FRM designated as secondary sampler on 4/1/2018.	Sampling frequency reduced to 1/12 on 4/1/2018. FRM will operate as a collocated sampler for method BAM 1022 method 209.	Met One 1022 $PM_{2.5}$ – 88502 Sampling began 1/20/2017. Parameter code revised to 88101 on 4/1/2018 after acceptable comparability assessment. Method 209 designated as primary sampler on 4/1/2018.

Table 5.

(C) Waivers

1. A waiver is requested from the requirement to monitor hourly averaged mixing-height as specified in 40 CFR 58, Appendix D, §5(b)(11) at the NCORE Station location.

Current regulatory requirements (40 CFR 58.13(h) and 40 CFR 58 Appendix D §5) require a Photochemical Assessment Monitoring Station (PAMS) to be operational by June 1, 2019 at the Garinger NCORE monitoring station (37-119-0041) operated by Mecklenburg County Air Quality (MCAQ).

40 CFR 58 Appendix D §5(b)(11) requires collection of "hourly averaged mixing height" at the PAMS location unless a waiver is requested and granted.

40 CFR 58 Appendix D §5(e) states: "The EPA Regional Administrator may grant a waiver to allow representative meteorological data from nearby monitoring stations to be used to meet the meteorological requirements in paragraph 5(b) where the monitoring agency can demonstrate the data is collected in a manner consistent with EPA quality assurance requirements for these measurements."

The EPA proposed analytical technique for measurement of hourly averaged mixing height is a ceilometer. Logistical constraints for the ceilometer and support equipment at the Garinger NCORE location may require the ceilometer to be located at an alternative location within Mecklenburg County.

MCAQ requests a waiver to allow the measurement of hourly averaged mixing height data to be conducted at an alternative location within Mecklenburg County in accordance with 40 CFR 58 Appendix D §5(e) to meet the requirements of 40 CFR 58 Appendix D §(5)(b)(11).

2. A waiver is requested from the requirement to operate an "...additional near-road NO_2 monitoring station... required for any CBSA with a population of 2,500,000 persons or more…" as specified in 40 CFR 58 Appendix D, §4.3.2(a).

The US Census Bureau released July 1, 2017 population estimates for the Charlotte-Concord-Gastonia, NC-SC Metro Area (Charlotte-CBSA) during March 2018. The July 1, 2017 estimate for the Charlotte-CBSA is 2,525,305. The release of the estimate marks the first year that the population estimate exceeded 2,500,000 persons.

MCAQ currently operates a near-road NO_2 monitoring station as required under 40 CFR 58 Appendix D, §4.3.2(a) for core-based statistical areas (CBSAs) with a population of 1,000,000 or more persons. The near-road NO_2 monitoring station is located at 1030 Remount Road in Charlotte, NC (Station Name: Remount) and has been in operation since July 2014. The Remount near-road NO_2 station (AQS ID: 37-119-0045) meets current regulatory requirements for siting criteria and the requirement for one station is areas with a population of 1,000,000 persons.

MCAQ requests a waiver from the requirement to site an additional station in the CBSA. The rationale to waive the requirement is based on the following criteria:

(a) Data collected at the current near-road location over the past 4 years and data collected at the Garinger NCORE area-wide monitoring location (also in the Charlotte-CBSA) indicate that 1-hour NO_2 design values (dv) measured in 2017 in Mecklenburg County are 61% below the 1-hour NO_2 NAAQS (1-hour NO_2 NAAQS = 100 ppb). Annual means are also well below the annual NO_2 NAAQS. The following table lists the design values for the two stations operated by MCAQ:

Charlotte-CBSA Sites	2017 NO_2 Annual Mean (Annual NAAQS Level = 53 ppb)	2017 NO_2 1-hr Design Value (1-hr NAAQS Level = 100 ppb)
Garinger (area-wide)	7 ppb	38 ppb
Remount (near-road)	11 ppb	39 ppb

Table 6.

(b) Data collected at near-road monitoring locations throughout the United States have reported design values below the NAAQS. The Atlanta, Georgia CBSA (Atlanta-Sandy Springs-Roswell CBSA, 2012 population = 5,457,831) was required to install 2 near-road sites; per the requirement for an additional site in CBSA's with >2,500,000 population, at the outset of the NO_2 near-road implementation (Phases 1 & 2). Those sites have been in operation since 2014. The reported 2017 1-hour NO_2 design values for the Atlanta-GA sites are 44% below the 1-hour NO_2 NAAQS. Annual means are also well below the annual NO_2 NAAQS:

Atlanta, GA-CBSA Sites	2017 NO_2 Annual Mean (Annual NAAQS Level = 53 ppb)	2017 NO_2 1-hr Design Value (1-hr NAAQS Level = 100 ppb)
Georgia Tech (near-road) I-85	18 ppb	50 ppb
DMRC (near-road) I-285	15 ppb	56 ppb

Table 7.

(c) In the December 2016 Federal Register "Revisions to the Near-road NO_2 Minimum Monitoring Requirements" Final Rule discussion (*Federal Register /Vol. 81, No. 251 / Friday, December 30, 2016 /Rules and Regulations*, page 96384, paragraph 2) EPA stated the following regarding their (EPA's) evaluation of the data collect since implementation of the 2010 NO_2 NAAQS revision:

"…these new data show that NO_2 concentrations from sites adjacent to some of the nation's highest trafficked roads in the most populated CBSAs (i.e., expected maximum concentrations sites in the near-road environment) are not exceeding or even threatening to approach the level of the NAAQS. It is, therefore, evident that the degree of geographic and spatial diversity required of the near-road network is less than originally thought..."

The Remount near-road monitoring station operating in the Charlotte-CBSA is measuring concentrations well below the annual and 1-hour NO_2 NAAQS. Concentrations measured at the Atlanta, GA-CBSA near-road monitoring stations; where the CBSA population is more than 2 times the 2,500,000 population threshold, are measuring concentrations well below the annual and 1-hour NO_2 NAAQS.

The Remount near-road monitoring station provides representative data at a monitoring location that meets the near-road requirements of 40 CFR 58 Appendix D, §4.3.2(a) for a CBSA with a population >1,000,000. The implementation of an additional station based on the >2,500,000 population threshold of the rule has shown that data collected at the additional station does not result in measurements that threaten the NO_2 NAAQS. Therefore, MCAQ requests a waiver from the requirement to implement the additional NO_2 station specified in 40 CFR 58 Appendix D, §4.3.2(a).

(D) Memorandum of Agreement

1. A Memorandum of Agreement (MOA) dated July 1, 2016 was established forming the Charlotte-Concord-Gastonia Metropolitan Statistical Area (MSA) Criteria Pollutant Air Quality Monitoring Agreement among North Carolina Division of Air Quality (NCDAQ), South Carolina Division of Health and Environmental Control (SCDHEC), and Mecklenburg County Air Quality (MCAQ). The MOA was established to collectively meet the US EPA minimum monitoring requirements for criteria pollutant monitoring deemed necessary to meet the needs of the MSA as determined by all parties.

MCAQ is submitting the MOA as an attachment to the monitoring plan to provide notification to US EPA of the purpose, agency roles and responsibilities, and limitations of the MOA. A copy of the agreement is attached as Appendix B to this plan.

(E) Plan for Making Photochemical Assessment Monitoring Station (PAMS) Measurements

A Photochemical Assessment Monitoring Plan must be submitted to the EPA Regional Administrator no later than July 1, 2018. The submittal is required per 40 CFR 58.10 §(a)(10). The MCAQ Photochemical Assessment Monitoring Station plan (PAMS plan) follows:

MCAQ operates an NCORE monitoring station in accordance with 40 CFR 58 Appendix D §3. The MCAQ NCORE station (37-119-0041) is located in a CBSA (Charlotte-Concord-Gastonia, NC-SC Metro Area) with a population of 1,000,000 or more. 40 CFR 58 appendix D, §5(a) requires PAMS at NCORE stations located in CBSA's with populations of 1,000,000 or more.

40 CFR 58.13 §(h) states "…The Photochemical Assessment Monitoring sites required under 40 CFR part 58 Appendix D, section 5(a) must be physically established and operating under all of the requirements of this part, including the requirements of appendix A, C, D, and E of this part, no later than June 1, 2019."

MCAQ is participating in the PAMS implementation process that is being directed by USEPA and associated USEPA vendors (currently USEPA and Battelle, collectively - EPA). The PAMS implementation process has consisted of a series of conference calls directed by EPA to disseminate and discuss monitoring requirements, monitoring methods, monitoring logistics, quality assurance requirements, and general implementation processes (i.e. – national contracts, funding, etc.) relevant to PAMS monitoring. The calls have been conducted over the past 24 months. The PAMS conference calls have introduced and provided a series of guidance documents, draft QA procedures, and information on available systems for the collection of PAMS data.

To date (July 1, 2018), EPA has not provided funding to MCAQ for operations, maintenance, equipment, or capital expenditures in support of the PAMS implementation. Therefore, MCAQ anticipates a delay in establishment and operation of PAMS at the MCAQ NCORE station.

MCAQ has worked with EPA through the implementation process and will continue to work with EPA to implement the requirements as soon as practical and based on the availability of resources and the ability to acquire the necessary funding, equipment, and operational expertise to begin operations within a reasonable timeframe (after June 1, 2019) for a select set of PAMS parameters.

Listed below are major objectives (40 CFR 58 Appendix D, §5(a)) of the PAMS program with a description of the objective and MCAQ's plan to implement the stated objective.

1. Expected PAMS Monitoring Location:
The expected PAMS monitoring location for selected PAMS parameters is the NCORE station operated by MCAQ at Garinger High School (AQS ID – 37-119-0041). EPA funding for required modifications and equipment for the monitoring station has not been allocated (i.e. – modifying cabinetry and shelving, ventilation for autoGC, additional electrical circuitry, etc.) MCAQ will work to purchase equipment and make required modifications to the monitoring station as soon as practical after EPA provided funding and equipment becomes available to MCAQ.

2. Development of a PAMS Quality Assurance Project Plan:
EPA has stated that a national "PAMS Quality Assurance Project Plan" (QAPP) will be provided for agencies to implement. The QAPP has not been distributed to monitoring agencies. MCAQ will work to revise and adapt the EPA provided QAPP for use in the MCAQ program as soon as practical and after EPA provided QAPP, funding, and equipment becomes available to MCAQ.

3. Measurement of hourly averaged speciated volatile organic compounds (VOCs):
MCAQ specified an autoGC system to EPA in e-mail correspondence on September 11, 2017 and further defined those specifications to EPA in e-mail correspondence dated December 13, 2017. EPA provided a list of available autoGC systems to MCAQ on January 8, 2018. MCAQ responded to the EPA with a selection on January 24, 2018.

During a March 28, 2018 PAMS implementation workgroup conference call EPA informed participants that Markes/Agilent autoGCs may be delivered by late summer. Specific timing of the delivery of the equipment was not specified. MCAQ will work to install and operate the autoGC that will be used to collect "hourly averaged speciated volatile organic compounds (VOCs)" measurements in the MCAQ program as soon as practical and after EPA provided funding and equipment becomes available to MCAQ.

4. Three 8-hour averaged carbonyl samples per day on a 1 in 3 day schedule, or hourly averaged formaldehyde (carbonyls):
To date (July 1, 2018), EPA has not provided funding for operations, maintenance, equipment or capital expenditures in support of carbonyls monitoring. MCAQ will work to install and operate carbonyls monitoring in the MCAQ program as soon as practical and after EPA provided funding and equipment becomes available to MCAQ.

5. Hourly averaged ozone (O_3):
MCAQ is currently conducting ozone monitoring at the NCORE (Garinger, 37-119-0041) monitoring location in accordance with this requirement.

6. Hourly averaged nitrogen oxide (NO), true nitrogen dioxide (NO_2 – true NO_2), and total reactive nitrogen (NO_y):
To date (July 1, 2018), EPA has not provided funding for operations, maintenance, equipment or capital expenditures in support of true NO_2 monitoring. EPA stated during the March 28, 2018 PAMS implementation conference call that funding for true NO_2 monitoring will likely be available in fiscal year 2020. MCAQ will work to install and operate true NO_2 monitoring in the MCAQ program as soon as practical and after EPA provided funding and equipment becomes available to MCAQ.

MCAQ is currently conducting NO and NOy monitoring at the NCORE (Garinger, 37-119-0041) monitoring location in accordance with this requirement.

7. Hourly averaged ambient temperature:
MCAQ is currently conducting ambient temperature monitoring at the NCORE (Garinger, 37-119-0041) monitoring location in accordance with this requirement.

8. Hourly vector-averaged wind direction:
MCAQ is currently conducting hourly vector-averaged wind direction monitoring at the NCORE (Garinger, 37-119-0041) monitoring location in accordance with this requirement.

9. Hourly vector-averaged wind speed:
MCAQ is currently conducting hourly vector-averaged wind speed monitoring at the NCORE (Garinger, 37-119-0041) monitoring location in accordance with this requirement.

10. Hourly average atmospheric pressure:
MCAQ is currently conducting hourly average atmospheric pressure monitoring at the NCORE (Garinger, 37-119-0041) monitoring location in accordance with this requirement.

11. Hourly averaged relative humidity:
MCAQ is currently conducting hourly average relative humidity monitoring at the NCORE (Garinger, 37-119-0041) monitoring location in accordance with this requirement.

12. Hourly precipitation:
MCAQ is currently conducting hourly average precipitation monitoring at the NCORE (Garinger, 37-119-0041) monitoring location in accordance with this requirement.

13. Hourly averaged mixing-height:
MCAQ requests a waiver for conducting the measurement of hourly averaged mixing-height at the NCORE (Garinger, 37-119-0041) PAMS monitoring location. The MCAQ waiver request seeks flexibility to locate the ceilometer at an alternative location within Mecklenburg County, if necessary. See the waiver request above in section III.(4)(C)(1). Upon determination of a suitable monitoring location; MCAQ will work to install and operate a ceilometer to measure hourly averaged mixing-height, when practical and after EPA provided funding and equipment becomes available to MCAQ for such monitoring.

14. Hourly averaged solar radiation:
MCAQ is currently conducting hourly averaged solar radiation monitoring at the NCORE (Garinger, 37-119-0041) monitoring location in accordance with this requirement.

15. Hourly averaged ultraviolet radiation:
To date (July 1, 2018), EPA has not provided funding for operations, maintenance, equipment or capital expenditures in support of hourly averaged ultraviolet radiation monitoring. MCAQ will work to install and operate hourly averaged ultraviolet radiation monitoring in the MCAQ program as soon as practical and after EPA provided funding and equipment becomes available to MCAQ.

IV. AIR MONITORING STATION DESCRIPTIONS

1. *Garinger*

(A) Garinger Site Table

Site Name: Garinger				
AQS Site Identification Number: 37-119-0041				
Location: 1130 Eastway Drive				
Charlotte, NC 28205				
Latitude:	N35.240100º		Datum: WGS84	
Longitude:	W80.785683º			
Elevation:	232 meters			
Parameter	Method	Method Number	Probe Height (m)	Sampling Schedule
Ozone	UV Photometry	47	4.4	Continuous
$PM_{2.5}$	FRM Gravimetric	145	5.0	1 in 3 day
$PM_{2.5}$	MetOne, Speciation	810	4.8	1 in 3 day
$PM_{2.5}$	URG-3000n, Carbon Speciation	Various	5.0	1 in 3 day
$PM_{2.5}$	BAM 1020	170	5.2	Continuous
PM_{10} (STP)	BAM 1020	122	5.1	Continuous
PM_{10} (LC)	BAM 1020	122	5.1	Continuous
$PM_{10-2.5}$	BAM 1020 Coarse	185	5.1	Continuous
NO_2	Chemiluminescence	74	4.2	Continuous
CO	NDIR, GFC	554	4.2	Continuous
SO_2 Pre-cursor Gas	UV Pulsed Fluorescence	560	4.2	Continuous
NOy Pre-cursor Gas	Chemiluminescence	674	7.0	Continuous
Wind Speed	MetOne	61	10	Continuous
Wind Direction	MetOne	61	10	Continuous
Pressure	R. M. Young	11	2	Continuous
Outdoor Temperature	R. M. Young	20	4.9	Continuous
Solar Radiation	Matrix	11	3.9	Continuous
Precipitation	R. M. Young	11	4.2	Continuous
Relative Humidity	MetOne	12	4.9	Continuous

Parameter	Date Established	Date Terminated
Ozone	March 3, 2000	NA
$PM_{2.5}$ FRM	July 30, 1999	NA
$PM_{2.5}$ Speciation (MetOne)	January 13, 2001	NA
$PM_{2.5}$ Speciation (URG)	February 27, 2009	NA
$PM_{2.5}$ BAM 1020	March 6, 2017	NA
PM_{10} BAM 1020	March 6, 2017	NA
$PM_{10-2.5}$ BAM Coarse	March 6, 2017	NA
NO_2	November 12, 1999	NA
CO	November 11, 1999	NA
SO_2 Precursor Gas	January 1, 2006	NA
CO Precursor Gas	January 1, 2006	NA
NOy Precursor Gas	May 4, 2007	NA
Meteorological Parameters	January 1, 2003 (latest)	NA

Nearest Road:	Shamrock Drive	Distance to Road:	298 meters
Traffic Count:	11000	Year of Count:	2017
MSA:	Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area (2012)	MSA #:	16740

2016 Population (15 census block groups within 1 mile of property)	Projected 2020 Population (15 census block groups within 1 mile of property)
31028	33119

Table 8.

(B) Garinger Site Description and Statement of Purpose

The Garinger High School site is an NCORE multi-pollutant site. The monitoring site is located at 1130 Eastway Drive. The site is located in a grassy area in the southwest corner of the Garinger High School property, near the left field line of the baseball field.

The site is located 5.3 kilometers ENE of the Charlotte, NC central business district at latitude N35.240100º and longitude W80.785683º. The site elevation is 232 meters above sea level. All sampler inlet probes are located at a height of 4 meters except for meteorological parameters (10m), particulate matter (5m), and reactive oxides of nitrogen (NOy – 7m). There is unrestricted airflow in at least a 270º arc of exposure, including the predominant southwest wind direction. Sample inlets are >20 meters from the nearest trees. The nearest road, Shamrock Drive, is 298 meters from the inlets and has a daily traffic flow of 11000 (ADT 2017). The station is generally oriented along the primary summer wind vector (SW to NE), downwind of the central business district of Charlotte, NC.

The site is an NCORE multi-pollutant monitoring site. NCORE parameters monitored include trace-level CO, trace-level SO_2, trace-level NO and NOy, ozone (O_3), $PM_{2.5}$, $PM_{10-2.5}$, and meteorological parameters. The $PM_{2.5}$, NO_2 and SO_2 monitors are used for NAAQS determination.

A 1/3 day $PM_{2.5}$ sequential monitor (est. 07/30/1999), a $PM_{2.5}$ Speciation monitor (MetOne SuperSASS, est. 01/13/2001), and a URG-3000n carbon sampler (est. 04/01/2009) are located on the roof of the monitoring shelter.

The NO_2 monitor is designated as the area-wide NO_2 monitor for the CBSA.

A meteorological station is also located at the site. The meteorological station monitors wind speed (est. 04/12/2000), wind direction (04/12/2000), pressure (04/14/2000), temperature (10/06/2000), solar radiation (09/26/2000), precipitation (1/11/2002), and relative humidity (1/11/2002).

A MetOne BAM PM Coarse System (BAM 1020c) began operation on 3/6/2017. $PM_{2.5}$ data from the MetOne BAM PM Coarse System will be reported as parameter 88101 and is designated as a SLAMS for AQI determination and forecasting purposes. PM_{10} (STP), PM_{10} (LC), and $PM_{10-2.5}$ reported from the BAM 1020 coarse system are designated as SLAMS.

The continuous PM_{10} BAM 1020c (81102) sampler serves as the primary PM_{10} monitor at the station. The continuous PM_{10} sampler operates as one of two required PM_{10} monitoring stations in the MSA.

The $PM_{2.5}$ speciation monitors are part of the speciation trends network (STN). Data from these monitors (STN – MetOne SuperSASS and URG-3000n) are not used for compliance determination.

The Garinger site is an NCORE site and as such must meet additional probe siting criteria. The meteorological tower at this site does not comply with the 10x rule for spacing from obstructions for meteorological measurements. Due to terrain features in the Mecklenburg County region it is difficult to locate a site that meets the requirements of the EPA Volume 4 QA/QC guidance for wind speed and wind direction measurements. Large trees are a dominant landscape feature in the area. The closest terrain feature is 2.6x and is to the southeast of the WS/WD instrument. The next closest obstructions (trees) are to the west of the sensor at 3.4x. MCAQ’s 2009 NCORE Plan was approved as acceptable for WS/WD and included documentation noting the deviation from 10x siting criteria. Therefore, WS/WD monitoring is conducted at the current location as documented in the 2009 NCORE Plan as approved by USEPA Region 4 and USEPA Office of Air Quality Planning and Standards (OAQPS).

NCORE probe siting guidance for NOy is a probe height of 10 meters. The NOy probe inlet is currently mounted at a height of 7.0 meters.

The site complies with the siting requirements of 40 CFR 58 for criteria air pollutants. There are no proposed changes for the siting of this station. It is recommended that the current site status be maintained.

Additional Monitoring at Garinger High School

Monitoring for air toxics is conducted at the Garinger High School site. The North Carolina Division of Air Quality (NCDAQ) maintains a Xontech 911 sampling device at the Garinger High School site. MCAQ operates the sampler on a 1/6 day sampling schedule as specified by NCDAQ. The sampler operates on standard time.

Whole air samples are collected in stainless steel 6 liter- pressurized canisters supplied by NCDAQ. Analysis of samples is conducted by NCDAQ. Samples are analyzed by NCDAQ using cryogenic pre-concentration gas chromatography with mass spectrometric detection (GC/MS) via the Compendium Method for Toxic Organics 15 (TO-15). The list of compounds is shown in Table 7.

Parameter	Parameter Code	Parameter	Parameter Code
Carbon Disulfide	42153	Bromodichloromethane	43828
Propene	43205	1,2 Dichloropropane (propylene dichloride)	43829
Freon 114	43208	trans-1,3 Dichloropropene	43830
Isobutene	43218	cis-1,3 Dichloropropene	43831
1,3-Butadiene	43220	1,2-Dichloroethene (ethylene dichloride)	43838
Pentane	43231	Ethylene dibromide	43843
Hexane	43242	Vinyl chloride	43860
Cyclopentane	43243	m- & p-Xylene	45109
Isoprene	43248	Benzene	45201
Cyclohexane	43270	Toluene	45202
Freon 22	43359	1,2-Dichloroethane	43815
MTBE	43372	Tetrachloro ethylene (perchloroethylene)	43817
Vinyl Acetate	43447	1,1,2,2-Tetrachloroethane	43818
Acrolein	43505	Bromomethane	43819
Methacrolein	43515	1,1,2-Trichloroethane (vinyl trichloride)	43820
Methyl Ethyl Ketone	43552	Freon 113	43821
3-Pentanone	43553	Ethylbenzene	45203
Ethylpropylketone (3-hexanone)	43557	o-Xylene	45204
Methyl Vinyl Ketone	43558	Bromodichloromethane	43828
Methyl Butyl Ketone	43559	1,2 Dichloropropane (propylene dichloride)	43829
Methyl Isobutyl Ketone	43560	trans-1,3 Dichloropropene	43830
2-Pentanone	43562	cis-1,3 Dichloropropene	43831
Acetonitrile	43702	1,2-Dichloroethene (ethylene dichloride)	43838
Methyl chloride (chloroMethane)	43801	Ethylene dibromide	43843
Methylene chloride	43802	Vinyl chloride	43860
Chloroform	43803	m- & p-Xylene	45109
Carbon tetrachloride	43804	Benzene	45201
Bromoform	43806	1,3,5-Trimethyl-benzene (mesitylene)	45207
Methyl Iodide	43808	1,2,4-Trimethyl-benzene (pseudocumene)	45208
Freon 11	43811	Styrene	45220
Chloroethane	43812	1,2,3-Trimethyl Benzene	45225
1,1-Dichloroethane (Ethylidene Chloride)	43813	Chlorobenzene (phenylchloride)	45801
1,1,1-Trichloroethane (Methyl chloroform)	43814	o-Dichlorobenzene	45805
1,2-Dichloroethane	43815	m-Dichlorobenzene	45806
Tetrachloro ethylene (perchloroethylene)	43817	p-Dichlorobenzene	45807
1,1,2,2-Tetrachloroethane	43818	Benzyl chloride	45809
Bromomethane	43819	1,2,4-Trichlorobenzene	45810
1,1,2-Trichloroethane (vinyl trichloride)	43820	1,4-Dioxane	46201
Freon 113	43821		
Freon 12	43823		
Trichloroethylene	43824		
1,1-Dichloroethene (Vinylidene chloride)	43826		

Table 9.

OBJECTIVE AND SPATIAL SCALE
The monitoring objective of the Garinger O_3, CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ (FRM) monitors is to determine representative concentrations in areas of high population density (population exposure). Maximum concentrations for ozone and $PM_{2.5}$ may be measured under stagnant meteorological conditions. The site is a neighborhood scale site for all parameters. Data from this site is used to assess compliance with the NAAQS for O_3, CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$.

The site is located in the Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area. The principal cities and counties in the MSA are Charlotte, NC; Gastonia, NC; Concord, NC; Rock Hill, SC and Cabarrus County, NC; Gaston County, NC; Iredell County, NC; Lincoln County, NC; Mecklenburg County, NC; Rowan County, NC; Union County, NC; Chester County, SC; Lancaster County, SC; and York County, SC.

STATUS AND RECOMMENDATION
The Garinger NCORE station meets the required monitoring objectives and siting criteria of 40 CFR 58 Appendices A, B, C, D, and E, where applicable for criteria pollutants.

A photochemical assessment station (PAMS) will be implemented at the Garinger NCORE station in accordance with 40 CFR 58 appendix D, §5(a) and section III.(4)(E) above as soon as practical and based on the availability of resources and the ability to acquire the necessary funding, equipment, and operational expertise to begin operations within a reasonable timeframe (after June 1, 2019) for a select set of PAMS parameters.

It is recommended that the current site status be maintained.

(C) Garinger Aerial Photograph

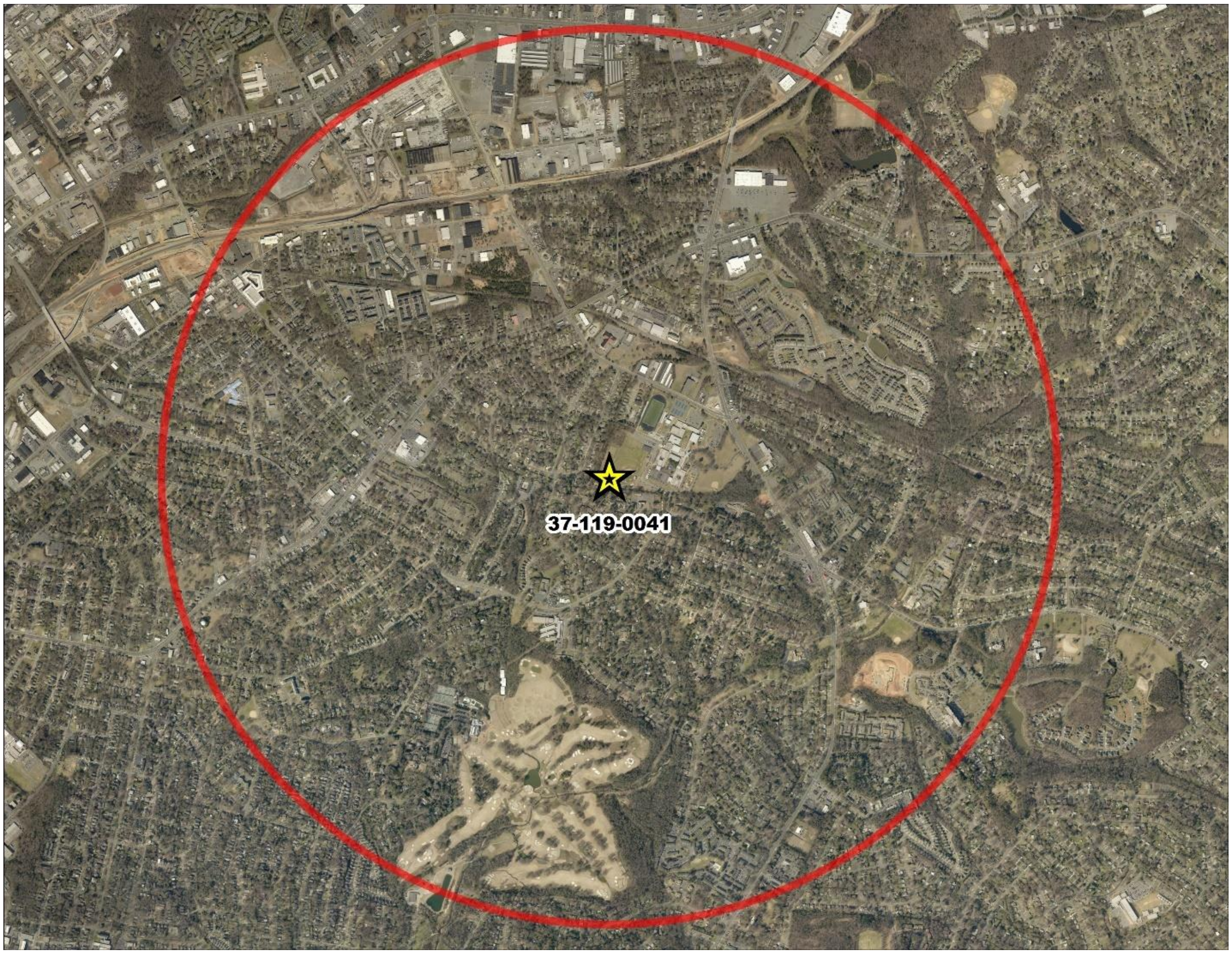


Figure 4. Garinger aerial photograph with 4 km diameter circle.

(D) Garinger Site Photographs

NORTH

NORTHEAST

EAST

SOUTHEAST

SOUTH

SOUTHWEST

WEST

NORTHWEST

2. Montclaire

(A) Montclaire Site Table

Site Name:	Montclaire			
AQS Site Identification Number:		37-119-0042		
Location:	1935 Emerywood Drive			
	Charlotte, NC 28210			
Latitude:	N35.151283º	Datum: WGS84		
Longitude:	W80.866983º			
Elevation:	209 meters			
Parameter	Method	Method Number	Probe Height (m)	Sampling Schedule
$PM_{2.5}$	FRM Gravimetric	145	2	1 in 3 day
$PM_{2.5}$	FRM Gravimetric - Collocated	145	2	1 in 12 day
$PM_{2.5}$	BAM 1022	209	2	Continuous
PM_{10} (STP)	BAM 1020	122	2	Continuous
Parameter	Date Established		Date Terminated	
$PM_{2.5}$	September 12, 2000		April 30, 2018	
$PM_{2.5}$ Collocated	September 15, 2000		April 30, 2018	
$PM_{2.5}$ BAM 1022	April 3, 2017		NA	
PM_{10} BAM 1020	March 20, 2017		NA	
Nearest Road:	Emerywood Drive	Distance to Road:	67 meters	
Traffic Count:	1700	Year of Count:	2016	
MSA:	Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area (2012)		MSA #:	16740
2016 Population (13 census block groups within 1 mile of property)		Projected 2020 Population (13 census block groups within 1 mile of property)		
22273		26047		

Table 10.

(B) Montclaire Site Description and Statement of Purpose

The site is located 8.6 kilometers SW of the central business district at latitude N35.151283º and longitude W80.866983º just southeast of the modular classrooms located along Emerywood Drive. The site elevation is 209 meters above sea level. The nearest road is Emerywood Drive (ADT=1700, 2016) at a distance of 67 meters from the sample inlets. The $PM_{2.5}$ inlets are 2 meters above the ground. The $PM_{2.5}$ FRMs were designated as SLAMS. The $PM_{2.5}$-BAM 1022, and PM_{10} BAM 1020 are designated as SLAMS.

A federal reference method (FRM) $PM_{2.5}$ sampler and a collocated FRM sampler were located at 1935 Emerywood Drive from 09/12/2000 until 04/30/2018. A BAM-1022 continuous $PM_{2.5}$ sampler was established on 4/3/2017 and designated as the primary $PM_{2.5}$ monitor effective 5/1/2018.

A BAM 1020 PM_{10} was established on 3/20/2017.

OBJECTIVE AND SPATIAL SCALE

The Montclaire PM10 and $PM_{2.5}$ sites are classified as neighborhood scale and the monitoring objective is population exposure in an area of potentially poor air quality. $PM_{2.5}$ data and PM_{10} data are used to assess compliance with the particulate NAAQS.

The site is located in the Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area. The principal cities and counties in the MSA are Charlotte, NC; Gastonia, NC; Concord, NC; Rock Hill, SC and Cabarrus County, NC; Gaston County, NC; Iredell County, NC; Lincoln County, NC; Mecklenburg County, NC; Rowan County, NC; Union County, NC; Chester County, SC; Lancaster County, SC; and York County, SC.

STATUS AND RECOMMENDATIONS

The site meets the required monitoring objectives and siting criteria of 40 CFR 58 Appendices A, B, C, D, and E; where applicable, for criteria air pollutants. It is recommended that the current site status be maintained.

(C) Montclaire Aerial Photograph

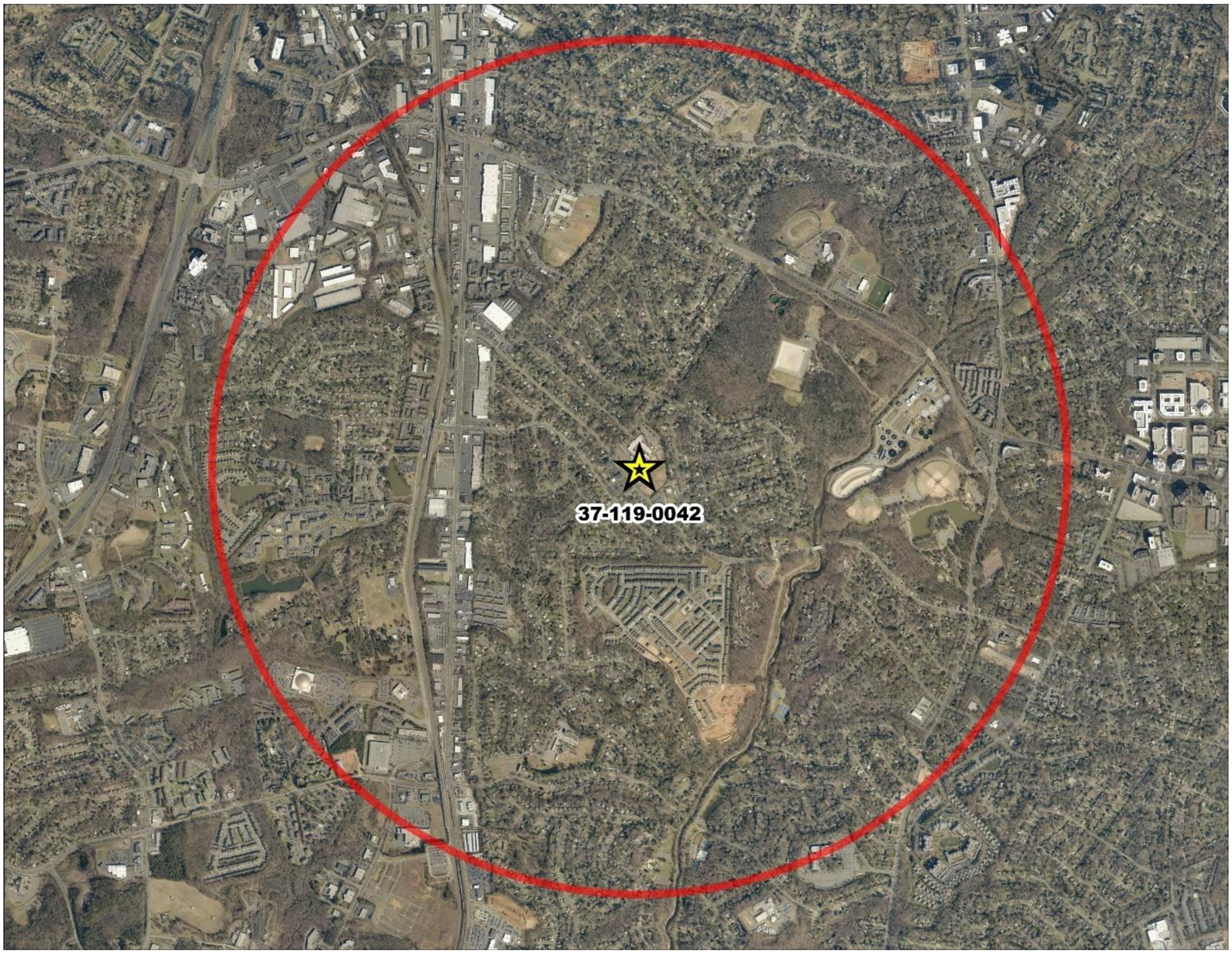


Figure 5. Montclaire aerial photograph with 4 km diameter circle.

(D) Montclaire Site Photographs


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

3. Remount

(A) Remount Site Table

Site Name:	Remount			
AQS Site Identification Number:	37-119-0045			
Location:	1030 Remount Road			
	Charlotte, NC 28208			
Latitude:	N35.213171º		Datum: WGS84	
Longitude:	W80.874084º			
Elevation:	194 meters			

Parameter	Method	Method Number	Probe Height (m)	Sampling Schedule
NO_2	FEM	200	4.6	Continuous
CO	NDIR, GFC	554	4.7	Continuous
$PM_{2.5}$	FRM - Gravimetric	145	2	1 in 3 day
$PM_{2.5}$	BAM 1022	209	2	Continuous
Wind Speed	MetOne	61	10	Continuous
Wind Direction	MetOne	61	10	Continuous
Outdoor Temperature	R. M. Young	20	4.6	Continuous
Relative Humidity	MetOne	12	4.6	Continuous

Parameter	Date Established	Date Terminated
NO_2	July17, 2014	NA
CO	January 1, 2017	NA
$PM_{2.5}$ FRM 1/3	January 1, 2017	March 30, 2018
$PM_{2.5}$ FRM Collocated 1/12	April 1, 2018	NA
$PM_{2.5}$ BAM 1022	January 20, 2017	NA

Nearest Road:	I-77 South	Distance to Road:	35 meters
Traffic Count:	154,000	Year of Count:	2016
MSA:	Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area (2013)	MSA #:	16740

2016 Population (18 census block groups within 1 mile of property)	Projected 2020 Population (18 census block groups within 1 mile of property)
16788	21335

Table 11.

(B) Remount Site Description and Statement of Purpose

The Remount monitoring station is located in a field adjacent to Interstate 77 South (I-77S) between NC Highway 160 and mile marker 8. The site is located 3.2 kilometers SW of the central business district of Charlotte, NC at latitude N35.213171º and longitude W80.874084º. The site elevation is 194 meters above sea level. The nearest road is I-77S (Annual Average Daily Traffic (AADT) 154,000 (2016) at 35 meters.

A federal equivalent method (FEM) NO_2 analyzer is located at the Remount monitoring site. The sampler has been in operation at 1030 Remount Road since 07/17/2014. The NO_2 inlet is 4.6 meters above the ground and 35 meters from the edge of the roadway. The NO_2 analyzer monitor type is SLAMS. The NO_2 monitor located at this station is designated as a near-road monitoring station for the CBSA.

A federal reference method (FRM) CO analyzer began operation at the Remount station on January 1, 2017. The CO monitor type is SLAMS.

A federal reference method (FRM) $PM_{2.5}$ sampler began operation at the Remount station on January 1, 2017. A continuous $PM_{2.5}$ BAM 1022 configured as an FEM began operation at the Remount station on January 20, 2017. The FRM $PM_{2.5}$ monitor was designated as a collocated monitor for the $PM_{2.5}$ BAM 1022 (method 209) on 4/1/2018. FRM sampling was reduced from a frequency of 1/3 to 1/12 on 4/1/2018. The FRM $PM_{2.5}$ and $PM_{2.5}$ BAM 1022 monitors are SLAMS.

OBJECTIVE AND SPATIAL SCALE

The monitoring objective of the Remount NO_2 site is to determine the highest concentrations expected to occur in the area covered by the network. The NO_2 site is classified as a microscale site. The Remount site is representative of nitrogen dioxide concentrations in the near-road environment. Data is used to assess compliance with the nitrogen dioxide NAAQS. The NO_2, CO, FRM-$PM_{2.5}$, and $PM_{2.5}$ BAM 1022 monitors are designated as SLAMS.

The site is located in the Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area. The principal cities and counties in the MSA are Charlotte, NC; Gastonia, NC; Concord, NC; Rock Hill, SC and Cabarrus County, NC; Gaston County, NC; Iredell County, NC; Lincoln County, NC; Mecklenburg County, NC; Rowan County, NC; Union County, NC; Chester County, SC; Lancaster County, SC; and York County, SC.

STATUS AND RECOMMENDATIONS

The site meets the required monitoring objectives and siting criteria of 40 CFR 58 Appendices A, B, C, D, and E; where applicable, for criteria air pollutants. It is recommended that the current site status be maintained.

(C) Remount Aerial Photograph

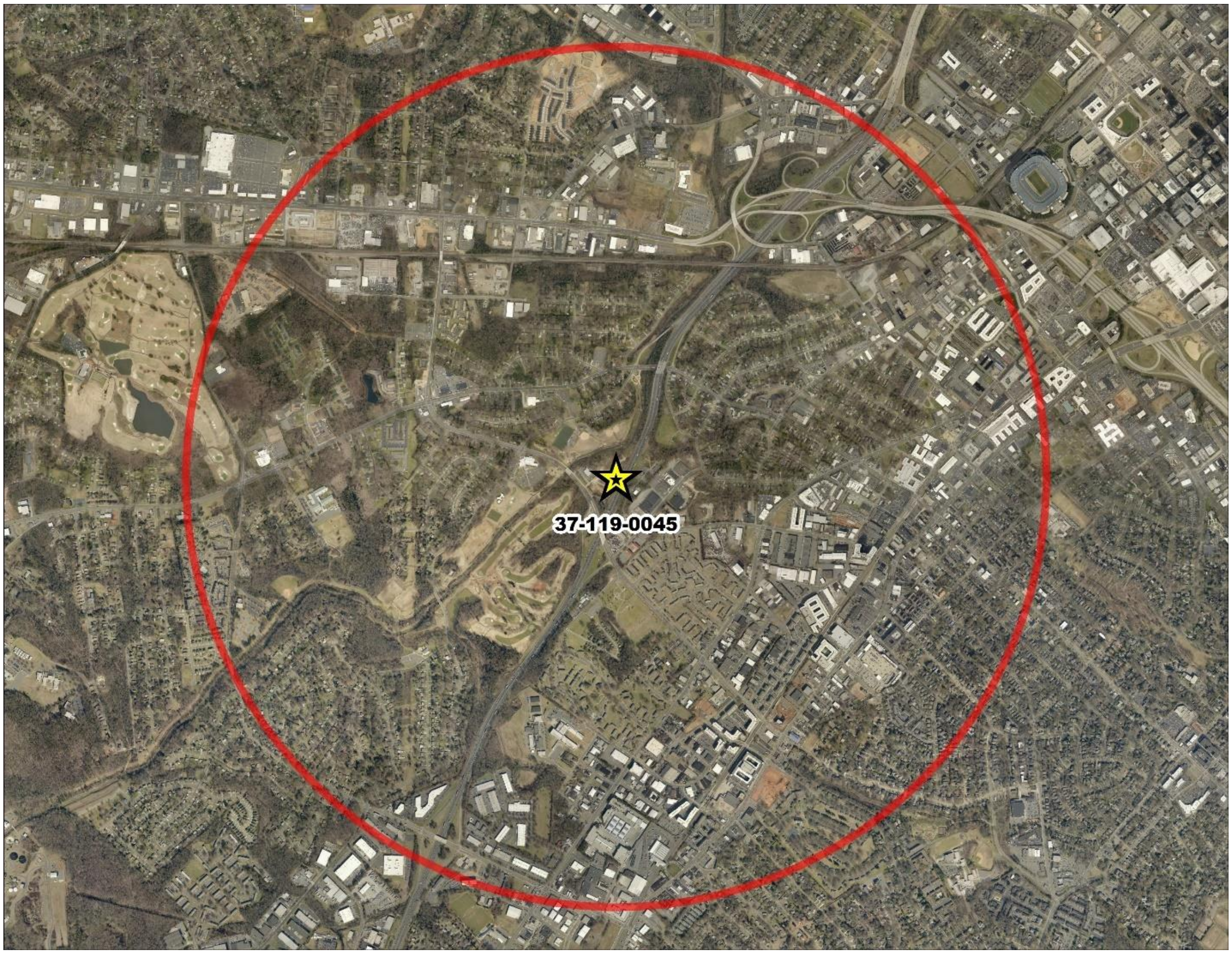


Figure 7. Remount aerial photograph with 4 km diameter circle.

(D) Remount Site Photographs


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

4. University Meadows

(A) University Meadows Site Table

Site Name:	University Meadows			
AQS Site Identification Number:	37-119-0046			
Location:	1660 Pavilion Boulevard			
	Charlotte, NC 28262			
Latitude:	N 35.314158°		Datum: WGS84	
Longitude:	W 80.713469°			
Elevation:	216 meters			

Parameter	Method	Method Number	Probe Height (m)	Sampling Schedule
Ozone	UV Photometry	47	4.3	March 1 – Oct. 31, Continuous

Parameter	Date Established	Date Terminated
Ozone	April 1, 2016	NA

Nearest Road:	Pavilion Blvd.	Distance to Road:	47 meters
Traffic Count:	9200	Year of Count:	2016
MSA:	Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area (2013)	MSA #:	16740

2016 Population (11 census block groups within 1 mile of property)	Projected 2020 Population (11 census block groups within 1 mile of property)
27548	28324

Table 12.

(B) University Meadows Site Description and Statement of Purpose

The site is located 15 kilometers northeast of the central business district of the city of Charlotte, NC at latitude N 35.314158° and longitude W 80.713469°. The site elevation is 216 meters. The University Meadows site is located approximately 325 meters north of the intersection of Highway 49 and Pavilion Boulevard in Mecklenburg County. The nearest road, Pavilion Boulevard, is 47 meters from the probe and has a daily traffic count (AADT) of 9200 (2016).

The monitoring shelter is in a large grass field at University Meadows Park. Ozone monitoring at the station began on 4/1/2016. The probe inlet is 4.3 meters above the ground and 1.3 meters from the roof of the monitoring building. There are no obstructions to air flow near the probe.

The ozone monitor is a SLAMS monitoring station. Data is used to assess compliance with the NAAQS.

The ozone instrument is operated during the North Carolina ozone monitoring season which begins March 1st and ends October 31st. The ozone instrument operates continuously during the seasonal period.

OBJECTIVE AND SPATIAL SCALE

The monitoring objective of the University Meadows ozone station is to determine the highest concentrations expected to occur in the area covered by the network. The site is an urban scale site which represents ozone levels over several kilometers. Data from this site is used to assess compliance with the NAAQS for ozone. The station is located along the primary summer wind vector in the Charlotte area which is predominated by winds from the southwest (prevailing wind direction). The site should measure peak ozone concentrations in Mecklenburg County.

The site is in the Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area. The principal cities and counties in the MSA are Charlotte, NC; Gastonia, NC; Concord, NC; Rock Hill, SC and Cabarrus County, NC; Gaston County, NC; Iredell County, NC; Lincoln County, NC; Mecklenburg County, NC; Rowan County, NC; Union County, NC; Chester County, SC; Lancaster County, SC; and York County, SC.

STATUS AND RECOMMENDATIONS

The site meets the required monitoring objectives and siting criteria of 40 CFR 58 Appendices A, B, C, D, and E; where applicable, for criteria air pollutants. It is recommended that the current site status be maintained.

(C) University Meadows Aerial Photograph

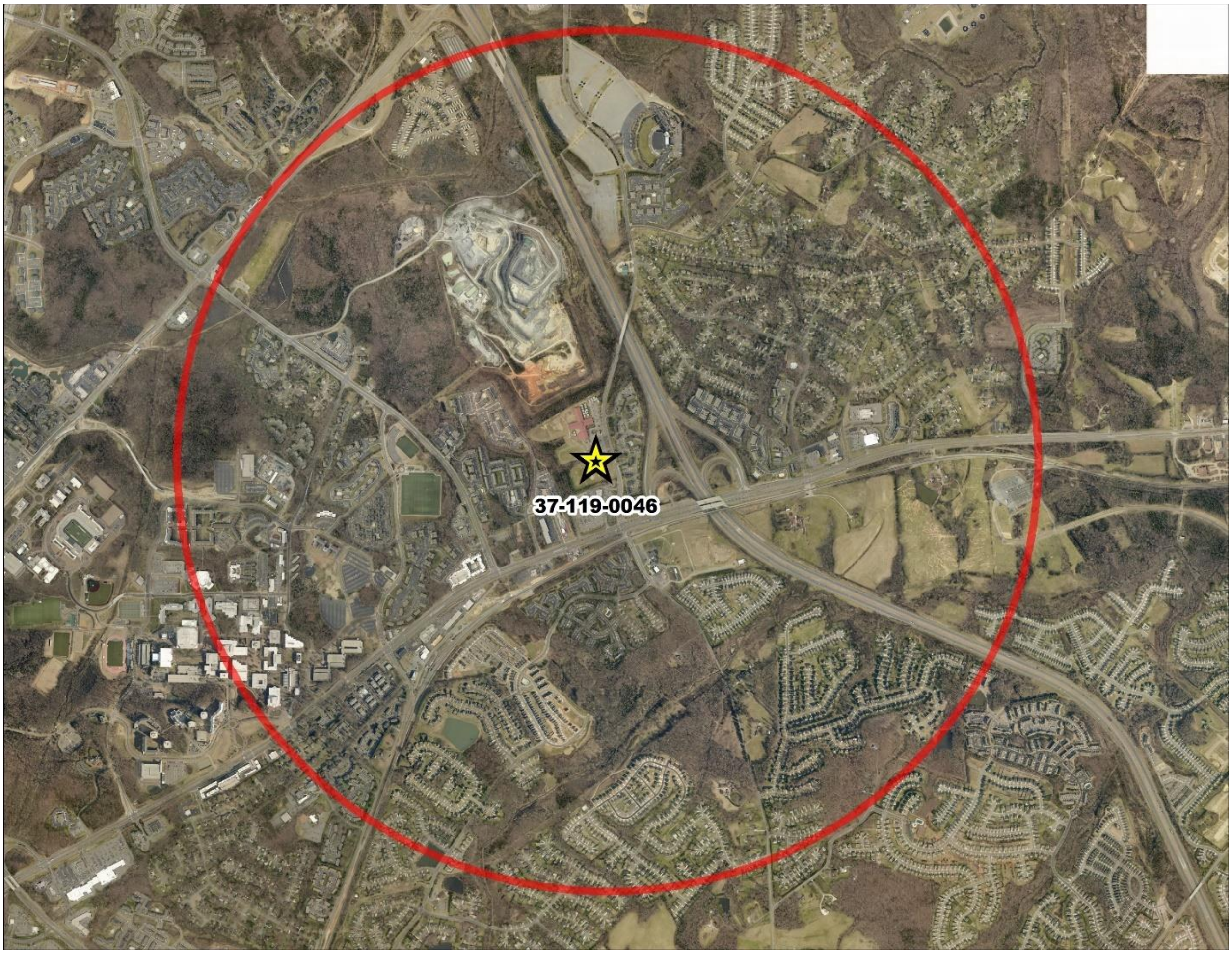


Figure 8. University Meadows aerial photograph with 4 km diameter circle.

(D) University Meadows Site Photographs


NORTH


NORTHEAST


EAST


SOUTHEAST


SOUTH


SOUTHWEST


WEST


NORTHWEST

V. REFERENCES

1. TITLE 40—Protection of Environment CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY, SUBCHAPTER C—AIR PROGRAMS, PART 58—AMBIENT AIR QUALITY SURVEILLANCE, May 7, 2018.

2. Charlotte Department of Transportation. Traffic Counts 2012-2017. http://charlottenc.gov/Transportation/PlansProjects/Pages/default.aspx Charlotte, NC. 2018.

3. Connect NCDOT. County-Area Traffic Volume Maps (By Year). https://connect.ncdot.gov/resources/State-Mapping/Pages/County-Area-Traffic-Volume-Maps-Year.aspx . North Carolina Department of Transportation, Raleigh, NC 27699-1501. 2018.

4. Connect NCDOT. Urban-Area Traffic Volume Maps. https://connect.ncdot.gov/resources/State-Mapping/Pages/Urban-Area-Traffic-Volume-Maps.aspx . North Carolina Department of Transportation, Raleigh, NC 27699-1501. 2018.

5. QA Handbook for Air Pollution Measurement Systems: "Volume IV: Meteorological Measurements Version 2.0" EPA-454/B-08-002, March 2008(PDF)

6. QA Handbook for Air Pollution Measurement Systems: "Volume II: Ambient Air Quality Monitoring Program" EPA-454/B-17-001, January 2017 - Full Document (PDF)

VI. APPENDIX A

Monitoring Equipment Replacement Tables

Type Equip.	Asset Number	Description	Manufacturer / Model #	Serial Number	Location	Date Purchased	Notes	Condition
O3 Calibrator	67658	Thermo O3 Calibrator	49C-PS	49C-PS-73996-375	Suttle Ave	04/01/02	Audit L3TS.	Good
Data Logger	67667	ESC Data Logger	8832	A0064	Suttle Ave	06/01/02		Good
Data Logger	67697	ESC Data Logger	8832	A0160	University Meadows	10/11/02		Good
Outdoor Shelters		EKTO Enclosure	432sp	3278-7	Suttle Ave	11/01/02	No county tag.	Good
Data Logger	67729	ESC Data Logger	8832	A0304	Montclaire	03/26/03		Good
Dynamic Calibrator	67771	Environics Calibrator	6103	3170	Suttle Ave	10/01/03		Good
Data Logger	67773	ESC Data Logger	8832	A0409	Garinger	10/08/03		Good
Laboratory Compressor		Jun-Air	546919		Suttle Ave	04/07/04	Laboratory zero air compressor.	Good
PM2.5 FRM	67843	Thermo 2025	2025b	2025b217200408	Oakdale	11/03/04	End use 12/31/2016 - Spare	Good
PM2.5 FRM	67844	Thermo 2025	2025b	2025b217230408	Montclaire	11/03/04		Good
Outdoor Shelters	67847	EKTO Enclosure	432SP	3577-8	Montclaire	11/23/04		Good
O3 Calibrator	67842	Thermo O3 Calibrator	49C-PS	49C-PS-0432209352	Suttle Ave	11/23/04	Laboratory L2TS	Good
Data Logger	67860	ESC Data Logger	8832	A0896	Suttle Ave	03/08/05		Good
Ozone Analyzer	67965	Thermo O3	49i	49i-0636319876	University Meadows	12/22/06		Good
O3 Calibrator	99068	Thermo O3 Calibrator	49i-PS	49i-PS-0734726810	Suttle Ave	01/14/08	Laboratory QA L2TS	Good

Type Equip.	Asset Number	Description	Manufacturer / Model #	Serial Number	Location	Date Purchased	Notes	Condition
Data Logger	63292	ESC Data Logger	8832	A2333K	Montclaire	02/07/08		Good
Dynamic Calibrator	63226	Environics Calibrator	6100	4202	Suttle Ave	04/17/08		Good
PM10 FEM Continuous	63263	MetOne BAM 1020 PM10	1020	H1935	Montclaire	04/17/08	Refurbished by MetOne 12/2015.	Good
PM2.5 FRM		Thermo 2025	2025B	2025B219590706	Garinger	05/01/08	Transition to continuous - spare. No county tag.	Good
PM2.5 FRM	68066	Thermo 2025	2025b	2025b221720804	Suttle Ave	06/11/08		Good
Zero Air System	64822	Teledyne Zero Air	M701H	2809	Garinger	10/17/08		Good
Speciation		URG Speciation	URG-3000N	3N-B0400	Garinger	02/01/09		Good
Zero Air System	67370	Teledyne Zero Air	M701H	3033	Suttle Ave	11/05/09		Good
Zero Air System	67371	Teledyne Zero Air	M701H	3035	University Meadows	11/05/09		Good
PM2.5 FRM	66044	Thermo 2025	2025B	2025B226221002	Garinger	05/13/10		Good
Zero Air System	72991	Teledyne Zero Air	M701H	98	Suttle Ave	10/26/10	Audit Zero Air System	Good
O3 Calibrator		Thermo O3 Calibrator	49i-PS	49i-PS-1027444721	Garinger	01/01/11		Good
Outdoor Shelter		Shelter One Shelter	C1152095 20053	20053-01	Garinger	12/01/11		Good

Type Equip.	Asset Number	Description	Manufacturer / Model #	Serial Number	Location	Date Purchased	Notes	Condition
PM2.5 Speciation	72214	MetOne Speciation	Super SASS	N1099	Garinger	04/11/12		Good
NOy Analyzer	72314	Thermo NOy	42i-Y	42i-Y-01213152833	Garinger	06/20/12		Good
SO2 Analyzer	72361	Thermo SO2	43i-TLE	43i-TLE-01213152834	Garinger	07/17/12		Good
CO Analyzer	72356	Thermo CO	48i-TLE	48i-TLE-01220753779	Garinger	10/17/12		Good
PM2.5 FRM	72358	Thermo 2025	2025i	2025i-0202341205	Suttle Ave	10/24/12		Good
Ozone Analyzer	72272	Thermo O3	49i	49i-01152660035	Garinger	01/13/16		Good
NO2 Analyzer	69969	Teledyne NOx	T200UP	81	Remount	08/26/13		Good
Dynamic Calibrator	64608	Teledyne Calibrator	T700U	182	Remount	01/20/14		Good
Zero Air System	64609	Teledyne Zero Air	M701H	793	Remount	01/20/14		Good
Data Logger	64603	ESC Data Logger	8832	A4829K	Remount	03/20/14		Good
Outdoor Shelters	66088	Shelter One	C101695 23053	23053-01	Remount	04/09/14		Good
Dynamic Calibrator	72399	Environics Calibrator	6100	6527	Garinger	04/30/15		Good
Outdoor Shelter	72258	Shelter One	MMS8 25040	25040-01	University Meadows	10/13/15	Frost boats trailer and shelter (6387).	Good
NO2 Analyzer	69870	Thermo NOx	42i	42i-01153170016	Garinger	01/13/16		Good
O3 Calibrator	72256	Thermo O3 Calibrator	49i-PS	49i-PS-01153380012	University Meadows	02/02/16		Good

Type Equip.	Asset Number	Description	Manufacturer / Model #	Serial Number	Location	Date Purchased	Notes	Condition
PM10 FEM Continuous	69787	MetOne BAM 1020 PM10	1020	U20337	Garinger	11/23/16		Good
PM2.5 FEM Continuous	69786	MetOne BAM 1020 PM2.5	1020	U20336	Garinger	11/23/16		Good
PM2.5 FEM	69784	MetOne BAM 1022	1022	U13546	Montclaire	11/23/16		Good
PM2.5 FEM	69785	MetOne BAM 1022	1022	U16175	Remount	11/23/16		Good
AirVision Software		Agilaire			Suttle Ave			Good
Alicat-PCU		Alicat	PCU	111448-111449-111450	Suttle Ave			Good
CO Analyzer	201077	Thermo CO	48i-TLE	48i-TLE-01502064047	Remount		On loan from NCDAQ-Near-road CO.	Good
PM2.5 FRM	300348	Thermo PM2.5 FRM	2025i	2025i-W209961603	Remount		On loan from NCDAQ-Near-road PM25.	Good
Balance	61749	Sartorius Balance	AC2105	20902085	Suttle Ave	06/14/95		Spare
PM2.5 FRM	67701	Thermo 2025	2025a	2025a202869805	Montclaire	10/01/98		Spare
PM2.5 FRM	67702	2025a	2025a	2025A204679807	Suttle Ave	10/01/98	Spare	Spare
PM2.5 FRM	67700	Thermo 2025	2025a	2025a202879805	Suttle Ave	10/01/98	End use 12/31/2016 - Spare	Spare
PM2.5 Speciation	67704	Met One	SASS	Y4594	Suttle Ave	10/01/00		Spare
PM2.5 Speciation	67849	Met One	SASS	D7162	Suttle Ave	12/07/04		Spare

Type Equip.	Asset Number	Description	Manufacturer / Model #	Serial Number	Location	Date Purchased	Notes	Condition
CO Analyzer	67861	Teledyne CO	300eu	68	Suttle Ave	03/11/05		Spare
Ozone Analyzer	67966	Thermo O3	49i	49i-0636319877	Suttle Ave	12/22/06		Spare
Dynamic Calibrator	68014	Thermo Calibrator	146i	146i-0717821846	Suttle Ave	06/30/07	Spare	Spare
Ozone Analyzer	68048	Thermo O3	49i	49i-0728225131	Suttle Ave	10/22/07		Spare
Ozone Analyzer	66331	Thermo 49C	49C	49C-56618-309	Suttle Ave	11/01/96		Spare Parts
O3 Calibrator	66332	Thermo 49C-PS	49C-PS	49C-PS-56545-309	Suttle Ave	11/01/96		Spare Parts
TEOM	67632	R&P	1400A	B244570302	Suttle Ave	10/01/01		Spare Parts
NO2 Analyzer	67629	Thermo 42C	42C	42C-70033-364	Suttle Ave	10/01/01		Spare Parts
Ozone Analyzer	67659	Thermo 49C	49C	49cps-73997-375	Suttle Ave	04/01/02		Spare Parts
O3 Calibrator	67660	Thermo O3 Calibrator	49cps	49cps-73995-375	Suttle Ave	04/01/02		Spare Parts
Ozone Analyzer	67736	Thermo 49C	49C	49C-77960-387	Suttle Ave	04/04/03		Spare Parts
CO Analyzer	67772	Thermo 48C	48C	48C-0327402211	Suttle Ave	10/03/03		Spare Parts
TEOM	67845	R&P	1400AB	B252820408	Suttle Ave	11/15/04		Spare Parts
TEOM	67846	R&P	1400AB	B252890408	Suttle Ave	11/23/04		Spare Parts
Ozone Analyzer	67841	Thermo 49C	49C	49C-0432209351	Suttle Ave	11/23/04		Spare Parts

Type Equip.	Asset Number	Description	Manufacturer / Model #	Serial Number	Location	Date Purchased	Notes	Condition
NOy Analyzer	67878	Thermo 42C-Y	42C-Y	42C-Y-0518112307	Suttle Ave	09/02/05		Spare Parts
SO2 Analyzer	67889	Thermo 43C-TLE	43C-TLE	43C-TLE_0518112303	Suttle Ave	09/02/05		Spare Parts
Outdoor Shelter	40634	EKTO Enclosure	8 X 10 Shelter	2331-1	Remount	06/01/90	SPS Shelter	Surplus
Dynamic Calibrator	63216	Environics Calibrator	S-9100	1887	Suttle Ave	11/01/93		Surplus
Outdoor Shelter	67178	EKTO Enclosure	EKTO/8 X 16	3088-1	Remount	05/01/99		Surplus
TEOM	67140	R&P	1400A	B224979903	Suttle Ave	05/01/99		Surplus

VII. APPENDIX B

Memorandum of Agreement

MEMORANDUM OF AGREEMENT

ON AIR QUALITY MONITORING FOR CRITERIA POLLUTANTS FOR

THE CHARLOTTE-CONCORD-GASTONIA

METROPOLITAN STATISTICAL AREA (MSA)

July 1, 2016

Participating Agencies:

North Carolina
Department of Environmental Quality (NCDEQ)
Division of Air Quality (NCDAQ)

South Carolina
Department of Health and Environmental Control (SCDHEC)
Bureau of Air Quality

Mecklenburg County, North Carolina
Land Use and Environmental Services Agency
Air Quality (MCAQ)

I. PURPOSE/OBJECTIVES/GOALS

The purpose of this Memorandum of Agreement (MOA) is to establish the Charlotte-Concord-Gastonia Metropolitan Statistical Area (MSA) Criteria Pollutant Air Quality Monitoring Agreement among NCDAQ, SCDHEC, and the MCAQ (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 renew the terms and conditions of this collective agreement to provide adequate criteria pollutant monitoring for the Charlotte-Concord-Gastonia MSA as required by 40 CFR 58 Appendix D, Section 2(e).

II. BACKGROUND

The Charlotte-Concord-Gastonia MSA consists of

Cabarrus County, NC
Gaston County, NC
Iredell County, NC
Lincoln County, NC
Mecklenburg County, NC
Rowan County, NC
Union County, NC
Chester County, SC
Lancaster County, SC

York County, SC

NCDAQ has jurisdiction over Cabarrus, Gaston, Iredell, Lincoln, Rowan, and Union Counties; SCDHEC has jurisdiction over Chester, Lancaster, and York Counties; MCAQ has jurisdiction over Mecklenburg County.

The NCDAQ, SCDHEC, and MCAQ are required by the Clean Air Act to measure for certain criteria pollutants in the ambient air in the Charlotte-Concord-Gastonia 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:

- NCDAQ, SCDHEC, and MCAQ (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 all 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 agencies. 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 others 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 change (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 make available 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, SCDHEC, or MCAQ 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, SCDHEC, or MCAQ, their officers or employees, or any other person. This MOA does not direct or apply to any person outside NCDAQ, SCDHEC, or MCAQ.

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: Joette Steger
NC DENR Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641

joette.steger@ncdenr.gov
Voice/fax: 919-707-8449

SCDHEC: Scott Reynolds
SCDHEC Bureau of Environmental Health Services
2600 Bull Street
Columbia, SC 29201

reynolds@dhec.sc.gov
Voice: 803-896-0902

MCAQ: Jeff Francis
Mecklenburg County Land Use and Environmental Services Agency – Air Quality
2145 Suttle Avenue
Charlotte, NC 28208-5237

Jeff.Francis@mecklenburgcountync.gov
Phone 704-336-5430
Fax 704-336-4391

In the event that a point of contact needs to be changed, notification may be made via email to the other parties.

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
Division of Air Quality (NCDAQ)

BY: Sheila C. Holman

TITLE: Director, Division of Air Quality

DATE: 6/27/2016

South Carolina Department of Health and Environmental Control (SCDHEC)
Bureau of Air Quality

BY: [signature]

TITLE: Chief, Bureau of Air Quality

DATE: 07/05/2016

Mecklenburg County Land Use and Environmental Services Agency – Air Quality (MCAQ)
Mecklenburg County Air Quality

BY: Leslie H Rhoades

TITLE: Director, Air Quality

DATE: 6/29/2016

MEMORANDUM

July 5, 2016

Subject: Change of Point of Contact for South Carolina

Memorandum of Agreement on Air Quality Monitoring for Criteria Pollutants for the Charlotte-Concord-Gastonia Metropolitan Statistical Area (MSA)

From: Rhonda B. Thompson, SC DHEC
Chief, Bureau of Air Quality

As of July 5, 2016, the Point of Contact for South Carolina will be Micheal Mattocks, instead of Scott Reynolds.

Micheal's contact information is below:

Micheal Mattocks
SC DHEC – Bureau of Environmental Health Services
2600 Bull Street
Columbia, SC 29201
(803)896-0856
mattock@dhec.sc.gov

VIII. APPENDIX C

Site Review Form Calendar Year 2018

Site Review Form Calendar Year 2018

Site Information

Region MCAQ	**Site Name** Garinger	**AQS Site #** 37-119-0041	
Street Address: 1130 Eastway Dr		**City:** Charlotte	
Urban Area CHARLOTTE		**Core-based Statistical Area** Charlotte-Concord-Gastonia, NC-SC	
Enter Exact		**Method of Measuring**	
Longitude W80.785683	**Latitude** N35.240100		
In Decimal Degrees	In Decimal Degrees	Other (explain)	**Explanation:** Google Maps
Elevation Above/below Mean Sea Level (in meters)		232	

Name of nearest road to inlet probe Shamrock Dr ADT 11000 Year latest available 2017

Comments: ______

Distance of site to nearest major road (m) 452 Direction from site to nearest major road NE

Name of nearest major road E. Sugar Creek Rd ADT 21000 Year latest available 2014

Comments: 21000 using NCDOT, 14300 using CDOT

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) 645 Direction to RR NE ☐NA

Distance of site to nearest power pole w/transformer (m) NA Direction

Distance between site and drip line of water tower (m) Direction from site to water tower ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☒ SO_2 (trace-level) ☒ NO_x (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ HSCO (Not Micro) ☒ CO (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☒ Max O3 Concentration O3 ☒ Population Exposure All ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☒ Neighborhood All ☐ Urban_____ ☐ Regional_____	☒ SLAMS NOx, ☐ SPM **Monitor Network Affiliation** ☒ NCORE SO2,O3,CO, ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) O3 -4.4 m, CO, SO2, NO2 – 4.2 m

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) O3 - 1.4 m, CO, SO2, NO2 -1.3 m

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐

*Distance from probe to tree (m) Direction from probe to tree *Height of tree (m)

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Site Review Form Calendar Year 2018

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☒ NO_y (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☒ Population Exposure NOy ☐ Source Oriented_____ ☐ Transport_____ ☐ Upwind Background_____ ☐ Welfare Related Impacts _____	☐ Micro_________ ☐ Middle_________ ☒ Neighborhood NOy ☐ Urban_________ ☐ Regional_____	☐ SLAMS _____ ☐ SPM_________ **Monitor Network Affiliation** ☒ NCORE NOY

Probe inlet height (from ground) 10-15 m? Yes ☐ No ☒
Actual measured distance from probe inlet to ground (meters) 7.0

Distance of outer edge of probe inlet from horizontal and/or vertical supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 4.1

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐
*Distance from probe to tree (m) Direction from probe to tree ____ *Height of tree (m)

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle _____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 298 Direction from probe to nearest traffic lane SE

Site Review Form Calendar Year 2018

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 FRM ☒ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☒ PM10-2.5 BAM ☐ PM10 Lead (PB) ☒ PM2.5 Cont. (BAM) ☒ PM2.5 Spec. (SASS) ☒ PM2.5 Spec. (URG) ☐ PM2.5 Cont. Spec.	☐General/Background _____ ☐Highest Concentration _____ ☒Population Exposure All ☐Source Oriented _____ ☐Transport _____ ☐Welfare Related Impacts	☐Micro _____ ☐Middle _____ ☒Neighborhood All ☐Urban _____ ☐Regional _____	☒SLAMS BAMPM10, BAM PM2.5, BAMPM10-2.5 ☐SPM **Monitor Network Affiliation** ☒ NCORE PM2.5 FRM, PM2.5 SASS, PM2.5 URG ☐ SUPPLEMENTAL SPECIATION PM2.5 SASS, PM2.5 URG are CSN **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) BAM 2.5 -5.2 m, BAM PM10 – 5.1 m, FRM 2.5, URG – 5.0 m, SASS 4.8 m

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Yes ☒ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (m) BAM 2.5 -2.3 m, BAM PM10 – 2.2 m, FRM 2.5, URG – 2.1 m, SASS 1.9 m

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater?	Yes ☒ No ☐ NA ☐
Distance (Y) between outer edge of all low volume monitor inlets and any Hi-Volume PM-10 or TSP inlet = 2 m or greater?	Yes ☐ No ☐ NA ☒

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☒ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? FRM vs BAM PM2.5 inlet Yes ☒ No ☐ Give actual (meters) 2.8
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters) 0.0

Is an URG 3000 monitor collocated with a SASS monitor at the site? *Yes ☒ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated speciation samplers inlets (X) within 1 to 4 m of each other? Yes ☒ No ☐
Give actual (meters) 1.3
* Are collocated speciation sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters) 0.0

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? BAM-1020 *Yes ☒ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Give actual (meters) 2.5 Yes ☒ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐
*Distance from probe to tree (m) Direction from probe to tree *Height of tree (m)

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 298 Direction from probe to nearest traffic lane SE

Site Review Form Calendar Year 2018

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective ______) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: Air Toxic Canister samples collected for NCDAQ. PM2.5 BAM 1020 is the primary monitor at this site.

Date of Last Site Pictures 03/23/18 New Pictures Submitted? Yes ☒ No ☐

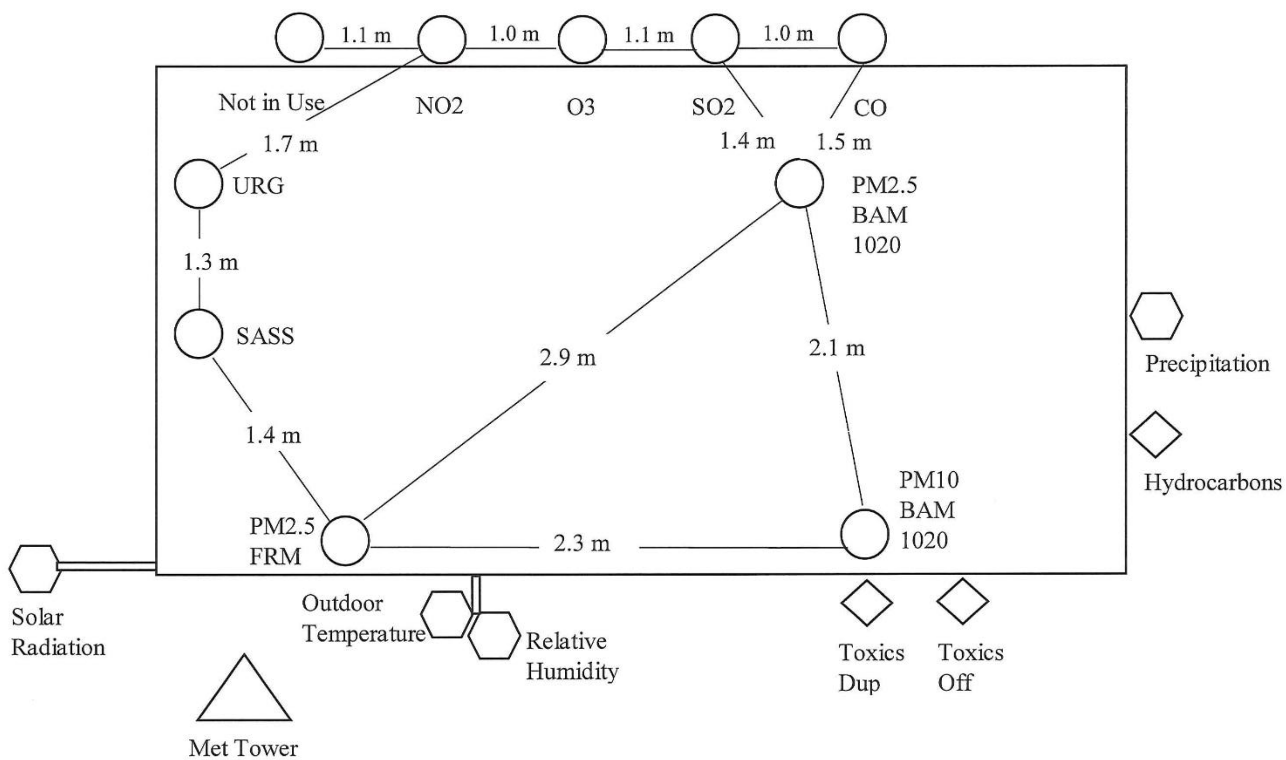
Reviewer Suzanne Holbert Date 3/26/18

Ambient Monitoring Coordinator [signature] Date 5/7/2018

Site Review Form Calendar Year 2018

Garinger

37-119-0041



Site Review Form Calendar Year 2018

Site Information

Region MCAQ	**Site Name** Montclaire	**AQS Site** # 37-119-0042	
Street Address 1935 Emerywood Drive		**City** Charlotte	
Urban Area CHARLOTTE	**Core-based Statistical Area** Charlotte-Gastonia-Concord, NC-SC		
Enter Exact		**Method of Measuring**	
Longitude W80.866983°	**Latitude** N35.151283°		
In Decimal Degrees	In Decimal Degrees	Other (explain)	**Explanation**: Google Maps
Elevation Above/below Mean Sea Level (in meters)		209	

Name of nearest road to inlet probe Emerywood Dr ADT Latest available 1700 Year latest available 2016

Distance of probe to nearest traffic lane (m) 67 Direction from inlet to nearest traffic lane SW

Comments: ______

Name of nearest major road South Blvd ADT 26900 Year latest available 2017

Distance of site to nearest major road (m) 849 Direction from site to nearest major road W

Comments:

Site located near electrical substation/high voltage power lines?	Yes ☐	No ☒
Distance of site to nearest railroad track	(m) 953 Direction to RR NW	☐NA
Distance of site to nearest power pole w/transformer	(m) NA Direction	
Distance between site and drip line of water tower (m)	Direction from site to water tower	☒**NA**

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

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Site Review Form Calendar Year 2018

Parameters	Monitoring Objective	Scale	Monitor Type
Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☒ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☐ PM10 Lead (PB) ☐ PM2.5 Cont. (TEOM) ☒ PM2.5 Cont. (BAM) ☐ PM2.5 Spec. (SASS) ☐ PM2.5 Spec. (URG) ☐ PM2.5 Cont. Spec.	☐General/Background_____ ☐Highest Concentration_____ ☒Population ExposureAll ☐Source Oriented_____ ☐Transport_____ ☐Welfare Related Impacts _____	☐Micro_____ ☐Middle_____ ☒NeighborhoodAll ☐Urban_____ ☐Regional_____	☒SLAMS All ☐SPM_____ ☐ Nonregulatory_____ ☐ Supplemental Speciation _____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m_____
Actual measured distance from probe inlet to ground (meters) 2.0

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m? Yes ☐ No ☒
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.0

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐
Distance (Y) between outer edge of all low volume monitor inlets and any Hi-Volume PM-10 or TSP inlet = 2 m or greater? Yes ☐ No ☐ NA ☒

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☒ NA ☐
* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters):
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters): 0.0

Is an URG 3000 monitor collocated with a SASS monitor at the site? *Yes ☐ (answer *'d questions) No ☒ NA ☐
* Entire inlet opening of collocated speciation samplers inlets (X) within 2 to 4 m of each other? Yes ☐ No ☐
Give actual (meters) ______
* Are collocated speciation sampler inlets within 1 m vertically of each other? Yes ☐ No ☐
Give actual (meters) _

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐
* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Give actual (meters) Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐
*Distance from probe to tree (m) Direction from probe to tree ____ *Height of tree (m)

Site Review Form Calendar Year 2018

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___ *Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: PM2.5 FRM official and PM2.5 FRM collocated have been terminated at this site.

Date of Last Site Pictures: 03/23/18 New Pictures Submitted? Yes ☒ No ☐

Reviewer Suzanne Holtfer Date: 3/26/18

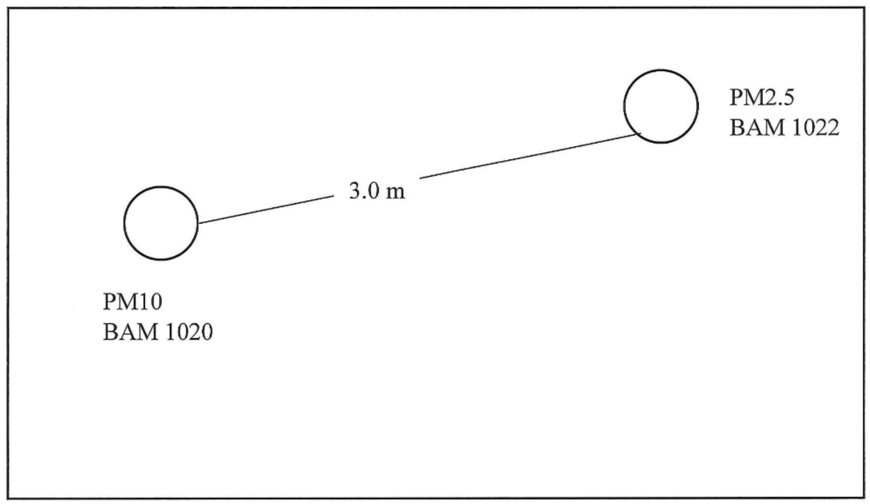
Ambient Monitoring Coordinator Jeff Francis Date: 5/7/2018

3

Site Review Form Calendar Year 2018

Montclaire

37-119-0042



Site Review Form Calendar Year 2018

Site Information

Region MCAQ	**Site Name** Remount	**AQS Site #** 37-119-0045
Street Address 1030 Remount Road		**City** Charlotte
Urban Area CHARLOTTE	**Core-based Statistical Area** Charlotte-Concord-Gastonia, NC-SC	

Enter Exact			
Longitude W80.874084°	**Latitude** N35.213171°	**Method of Measuring**	
In Decimal Degrees	In Decimal Degrees	**Other (explain)**	**Explanation:** Google Maps
Elevation Above/below Mean Sea Level (in meters)		194	

Name of nearest road to inlet probe I-77 South ADT 154000 Year latest available 2016
Comments: ______
Distance of site to nearest major road (m) 35 Direction from site to nearest major road SE
Name of nearest major road _____ ADT _____ Year _____
Comments:

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) ________ Direction to RR ___ ☒NA
Distance of site to nearest power pole w/transformer (m) NA Direction ___

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

Parameters	Monitoring Objective	Scale	Monitor Type
☒NO_2 (Near Road only) ☒CO (Near Road only)	☒Highest Concentration NO2,CO ☐Population Exposure_____ ☐Source Oriented_____ ☐Transport_________ ☐Welfare Related Impacts _____	☒Micro NO2, CO	☒SLAMS NO2, CO ☐SPM_________

Probe inlet height (from ground) 2-7 m? Yes ☒ No ☐ Give actual measured height from ground (meters) CO – 4.7 m NO2 – 4.6m
Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) CO – 1.9 m , NO2 -1.8 m
Distance of outer edge of probe inlet from other monitoring probe inlets > 0.25 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐
*Distance from probe to tree (m) _____ Direction from probe to tree ___ *Height of tree (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 35 Direction from probe to nearest traffic lane SE

Site Review Form Calendar Year 2018

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☐ PM10 Lead (PB) ☐ PM2.5 Cont. (TEOM) ☒ PM2.5 Cont. (BAM) ☐ PM2.5 Spec. (SASS) ☐ PM2.5 Spec. (URG) ☐ PM2.5 Cont. Spec.	☐General/Background _____ ☒Highest Concentration PM2.5 FRM, PM2.5 BAM ☐Population Exposure _____ ☐Source Oriented _____ ☐Transport _____ ☐Welfare Related Impacts _____	☒Micro PM2.5 FRM, PM2.5 BAM	☒SLAMS PM2.5 FRM, PM2.5 BAM ☐SPM_____ **Monitor Network Affiliation** ☐ SUPPLEMENTAL SPECIATION_____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m_____
Actual measured distance from probe inlet to ground (meters) 2.0

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m? Yes ☐ No ☒
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.0

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐
Distance (Y) between outer edge of all low volume monitor inlets and any Hi-Volume PM-10 or TSP inlet = 2 m or greater? Yes ☐ No ☐ NA ☒

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☒ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☒ No ☐ Give actual (meters) 2.1
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☒ No ☐ Give actual (meters) 0.0

Is an URG 3000 monitor collocated with a SASS monitor at the site? *Yes ☐ (answer *'d questions) No ☐ NA ☒
* Entire inlet opening of collocated speciation samplers inlets (X) within 2 to 4 m of each other? Yes ☐ No ☐
Give actual (meters) _____
* Are collocated speciation sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☐ NA ☒
* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐
*Distance from probe to tree (m) _____ Direction from probe to tree ___ *Height of tree (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 35 Direction from probe to nearest traffic lane SE

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective _____) No ☐-
*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐
*4) Relocate site? Yes ☐ No ☐

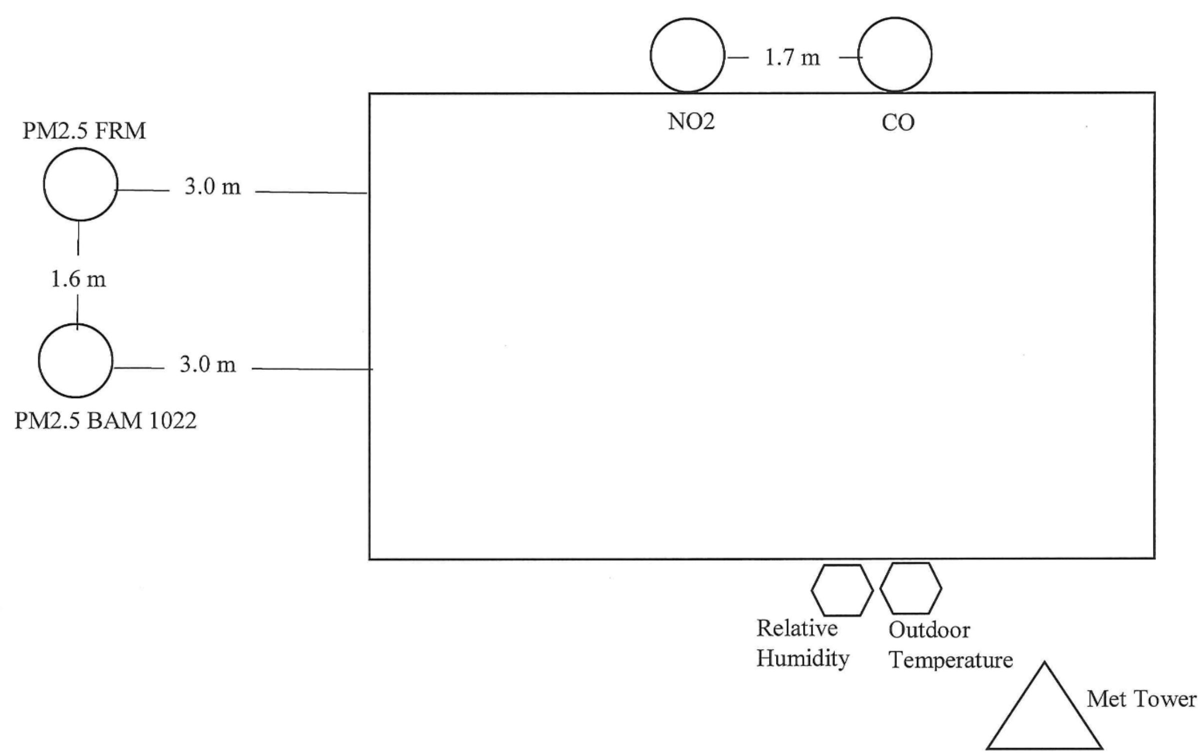
Comments: PM2.5 BAM is the primary sampler. PM2.5 FRM samples on a 1/12 day sampling schedule.

Date of Last Site Pictures, 3/23/18 New Pictures Submitted? Yes ☒ No ☐
Reviewer Suzanne Holtzer Date 3/26/18
Ambient Monitoring Coordinator [signature] Date 5/7/2018

Site Review Form Calendar Year 2018

Remount

37-119-0045



Site Review Form Calendar Year 2018

Site Information

Region MCAQ	**Site Name** University Meadows	**AQS Site #** 37-119-0046	
Street Address 1660 Pavilion Boulevard		**City** Charlotte	
Urban Area CHARLOTTE	**Core-based Statistical Area** Charlotte-Gastonia-Concord, NC-SC		
Enter Exact		**Method of Measuring**	
Longitude W 80.713469°	**Latitude** N35.314158°		
In Decimal Degrees	In Decimal Degrees	Other (explain)	**Explanation:** Google Maps
Elevation Above/below Mean Sea Level (in meters)		216	

Name of nearest road to inlet probe Pavilion Blvd ADT 9200 Year latest available 2016

Distance of ozone probe to nearest traffic lane (m) 47 Direction from ozone probe to nearest traffic lane E

Comments: ______

Name of nearest major road Hwy 49 ADT 35000 Year 2016

Distance of site to nearest major road (m) 325 Direction from site to nearest major road S

Comments: Hwy 485 is 342 m East of the site. ADT 101000 Year 2016

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) 394 Direction to RR SSW ☐NA

Distance of site to nearest power pole w/transformer (m) NA Direction

Distance between site and drip line of water tower (m) Direction from site to water tower ☒**NA**

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Site Type
☒ O_3	☐General/Background ☐Highest Concentration ☒Max O3 Concentration ☐Population Exposure ☐Source Oriented ☐Transport ☐Upwind Background ☐Welfare Related Impacts	☐Micro ☐Middle ☐Neighborhood ☒Urban ☐Regional	☒SLAMS ☐SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐
Give actual measured height from ground (meters) 4.3

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.3

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐
*Distance from probe to tree (m) Direction from probe to tree ___ *Height of tree (m)

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) ______Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

1

Site Review Form Calendar Year 2018

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: ______) No ☐

*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐

*4) Relocate site? Yes ☐ No ☐

Comments: A UV solar radiation sensor is also located at this site

Date of Last Site Pictures: 03/23/18 New Pictures Submitted? Yes ☒ No ☐

Reviewer Suzanne Hollister Date: 4/5/18

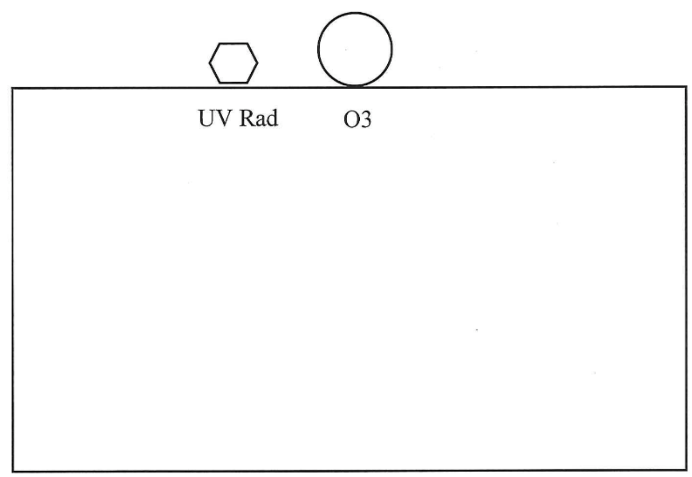
Ambient Monitoring Coordinator Jeff Francis Date: 5/7/2018

2

Site Review Form Calendar Year 2018

University Meadows

37-119-0046



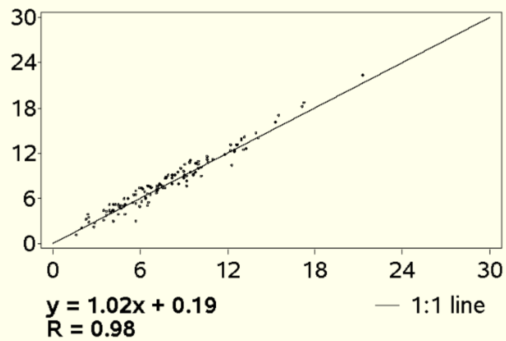
IX. APPENDIX D

PM2.5 Continuous Monitor Comparability Assessment

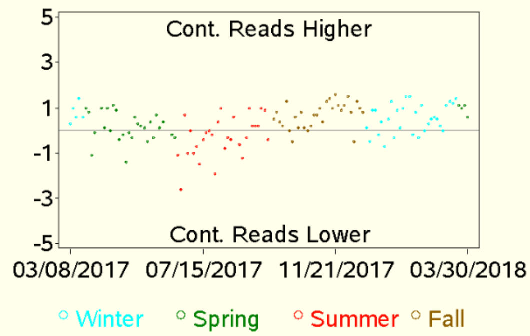
PM 2.5 Continuous Monitor Comparability Assessment
Site 37-119-0041: Charlotte, NC

FRM: R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC - Gravimetric (145,118), PM2.5 - Local Conditions (88101), POC=1
Cont: Met One BAM-1020 Mass Monitor w/VSCC - Beta Attenuation (170), PM2.5 - Local Conditions (88101), POC=4

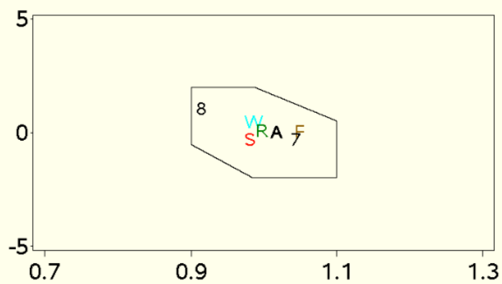
Cont. (y) vs. FRM (x) $PM_{2.5}$ ($\mu g/m^3$)



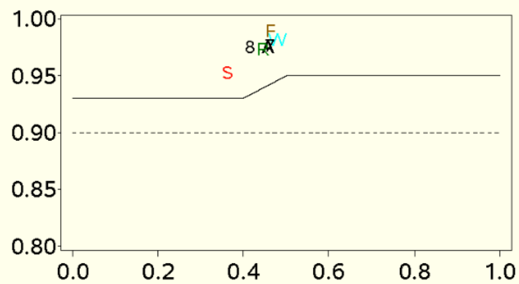
Cont. minus FRM $PM_{2.5}$ ($\mu g/m^3$)



Additive (y) vs. Multiplicate (x) Bias



R (y) vs. FRM CCV (x)



Mean $PM_{2.5}$ ($\mu g/m^3$)

Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**125**	**7.9**	**8.2**	**1.04**
Winter	35	7.5	8.1	1.08
Spring	31	6.7	7.0	1.04
Summer	29	8.2	7.9	0.96
Fall	30	9.3	10.0	1.07
2016	0	.	.	.
2017	95	8.2	8.4	1.03
2018	30	7.1	7.7	1.09

Appendix A Statistics

Dataset	N (all observations)	Bias	N (only >= 3 ug/m^3)	Bias
AllData	**125**	**5.0**	**117**	**4.3**
Winter	35	10.0	32	9.2
Spring	31	4.7	27	3.2
Summer	29	-3.5	29	-3.5
Fall	30	7.9	29	7.6
2016	0	.	.	.
2017	95	2.8	90	2.8
2018	30	12.3	27	9.3

Data Source: EPA AQS Data Mart

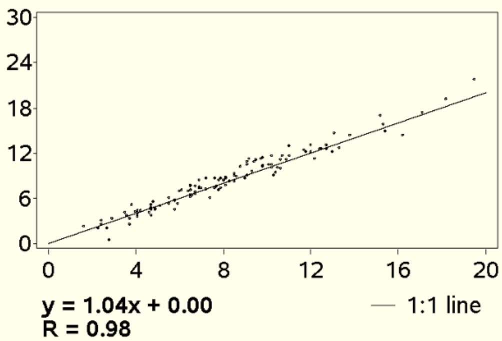
Generated on: May 7, 2018

PM 2.5 Continuous Monitor Comparability Assessment

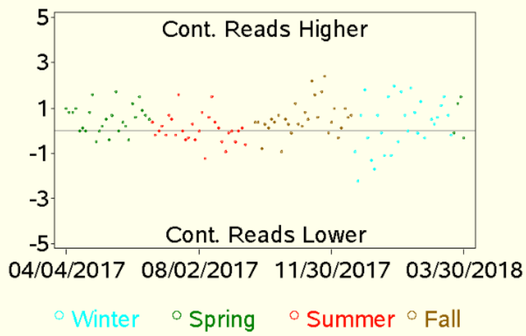
Site 37-119-0042: Charlotte, NC

FRM: R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC - Gravimetric (145,118), PM2.5 - Local Conditions (88101), POC=1
Cont: Met-One BAM W/PM2.5 VSCC - Beta Attenuation (733), Acceptable PM2.5 AQI & Speciation Mass (88502), POC=4

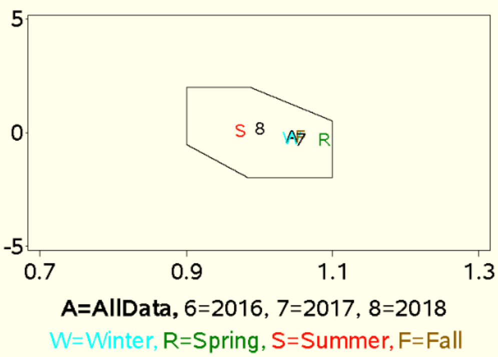
Cont. (y) vs. FRM (x) $PM_{2.5}$ ($\mu g/m^3$)



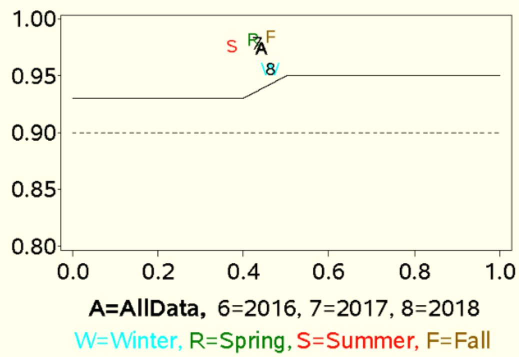
Cont. minus FRM $PM_{2.5}$ ($\mu g/m^3$)



Additive (y) vs. Multiplicate (x) Bias



R (y) vs. FRM CCV (x)



Mean $PM_{2.5}$ ($\mu g/m^3$)

Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**118**	**8.2**	**8.5**	**1.04**
Winter	29	7.9	8.1	1.04
Spring	30	7.2	7.8	1.07
Summer	29	8.2	8.3	1.01
Fall	30	9.3	9.9	1.06
2016	0	.	.	.
2017	89	8.4	8.8	1.04
2018	29	7.3	7.7	1.05

Appendix A Statistics

Dataset	N (all observations)	Bias	N (only >= 3 ug/m^3)	Bias
AllData	**118**	**4.3**	**110**	**4.8**
Winter	29	1.8	25	6.7
Spring	30	8.1	27	6.0
Summer	29	1.0	29	1.0
Fall	30	6.1	29	5.8
2016	0	.	.	.
2017	89	4.1	85	4.0
2018	29	4.9	25	7.3

Data Source: EPA AQS Data Mart

Generated on: May 7, 2018

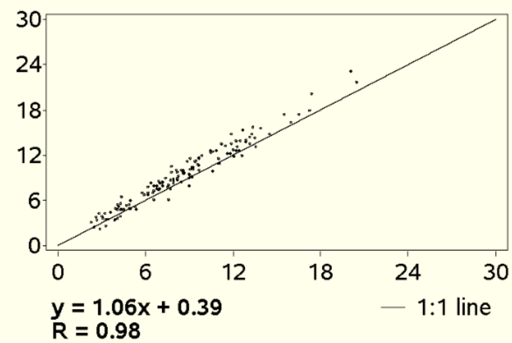
7

PM 2.5 Continuous Monitor Comparability Assessment

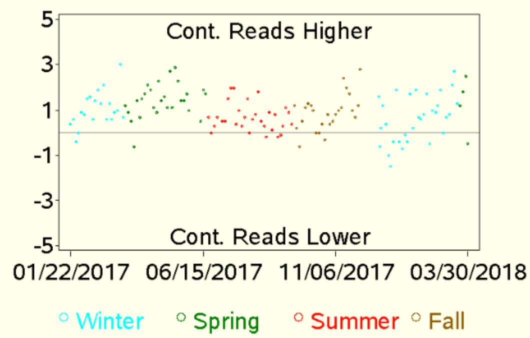
Site 37-119-0045: Charlotte, NC

FRM: R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC - Gravimetric (145), PM2.5 - Local Conditions (88101), POC=1
Cont: Met-One BAM W/PM2.5 VSCC - Beta Attenuation (733), Acceptable PM2.5 AQI & Speciation Mass (88502), POC=4

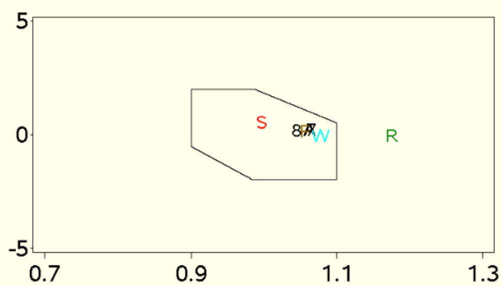
Cont. (y) vs. FRM (x) $PM_{2.5}$ ($\mu g/m^3$)



Cont. minus FRM $PM_{2.5}$ ($\mu g/m^3$)

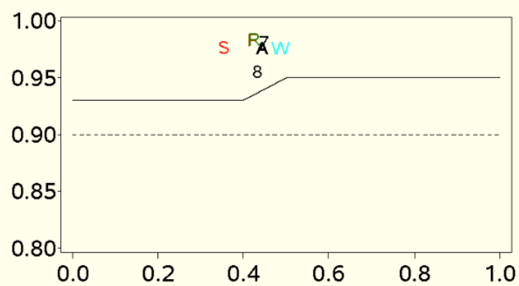


Additive (y) vs. Multiplicate (x) Bias



A=AllData, 6=2016, 7=2017, 8=2018
W=Winter, R=Spring, S=Summer, F=Fall

R (y) vs. FRM CCV (x)



A=AllData, 6=2016, 7=2017, 8=2018
W=Winter, R=Spring, S=Summer, F=Fall

Mean $PM_{2.5}$ ($\mu g/m^3$)

Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	**137**	**8.5**	**9.4**	**1.11**
Winter	51	8.4	9.2	1.09
Spring	31	7.3	8.7	1.19
Summer	30	8.6	9.2	1.08
Fall	25	10.0	10.9	1.09
2016	0	.	.	.
2017	107	8.6	9.6	1.11
2018	30	8.1	8.9	1.09

Appendix A Statistics

Dataset	N (all observations)	Bias	N (only >= 3 ug/m^3)	Bias
AllData	**137**	**12.0**	**130**	**11.6**
Winter	51	10.0	48	9.9
Spring	31	20.0	27	19.5
Summer	30	8.7	30	8.7
Fall	25	9.8	25	9.8
2016	0	.	.	.
2017	107	12.6	102	12.4
2018	30	9.8	28	8.8

Data Source: EPA AQS Data Mart

Generated on: May 7, 2018

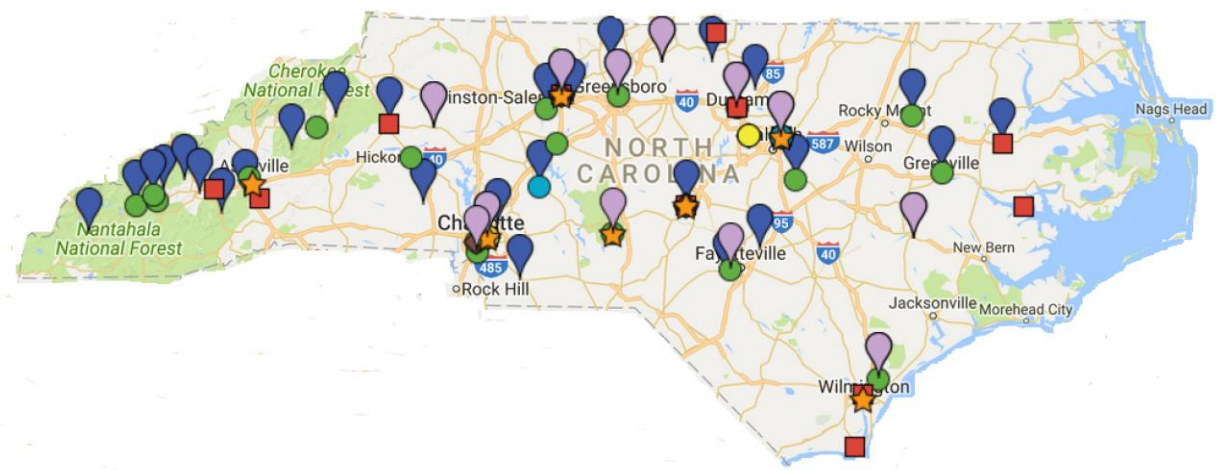
ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL A. ABRACZINSKAS
Director

NORTH CAROLINA
Environmental Quality

2018-2019 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 1

Addendum 1



December 3, 2018

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

NORTH CAROLINA
Department of Environmental Quality

CERTIFICATION

By the signatures below, the North Carolina Division of Air Quality, DAQ, certifies that the information contained in this 2018-2019 Annual Monitoring Network Plan Addendum 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 12-3-18

Patrick Butler
Ambient Monitoring Section Chief, DAQ

Signature ______________________ Date 12/3/18

Michael Abraczinskas
Director, DAQ

Addendum 1. Northampton Siting Analysis and Site Information

Introduction

Monitoring in Northampton County is starting in response to public comments received from residents of Northampton County during the Northampton Compressor Station public hearing held on Nov. 15, 2017, as part of the approval process for permits associated with the establishment of the Atlantic Coast Pipeline. Based on comments DAQ received, the director considered an analysis of the area emissions inventory, socio-economic and demographic information. As a result, the director decided DAQ will establish a background monitoring station in Northampton County for fine particles ($PM_{2.5}$) and nitrogen dioxide (NO_2). Thus, DAQ is planning to operate one Northampton County background monitoring station starting in late-2018. Information about the Northampton County background monitoring station is provided in Table 1. The Northampton County background monitoring project is a short-term project that is expected to last two to five years, but no firm end date has been established. Table 2 lists the projected schedule of activities for establishing the site and operating it.

Table 1 North Carolina Northampton County Background Monitoring Location and Monitors

Site Name	AQS Identifier	Types of Monitors	Operator
Hurricane Drive	37-131-0003	NO_2 photolytic analyzer and $PM_{2.5}$ BAM 1022	DAQ Raleigh Regional Office

Table 2 Schedule of Activities

Activity	Estimated Completion Date
Submit QAPP to EPA for Approval	March 29, 2018
Identify a Site	October 29, 2018
30-Day Public Comment Period	October 31 to November 30, 2018
Site Setup	November 29 to December 19, 2018
Submit Network Plan Addendum to EPA for Approval	December 3, 2018
Receive Comments on QAPP from EPA	December 3, 2018
Respond to EPA Comments on QAPP	December 3, 2018 – January 2, 2019
Equipment Installation and Calibration	December 20 to 30, 2018
Obtain EPA Approval of Network Plan Addendum	December 31, 2018
Submit Revised QAPP to EPA	January 3, 2019
QAPP Approved by EPA	February 2, 2019
Sample Collection / Analysis	Hourly (NO_2 every minute)
Real-time Data Reporting	Hourly to AirNow and Website
Data Verification	Monthly, by end of 3rd Week of Following Month

Table 2 Schedule of Activities

Activity	Estimated Completion Date
Data Validation	Monthly, within 59 Days after each Month
AQS Submittals	Within 90 days after each Quarter
NO_2 Performance Evaluations	First Quarter of Operation, Then Annually
Technical Systems Audit	DAQ Annually, EPA Every 3 Years
QA Report / Annual Certification	Annually by May 1 of each Year
Review of Siting Criteria	Annually in fall / winter
Summary Report of Initial Results	June 2, 2021

Figure 1 is an aerial photo of proposed site location.

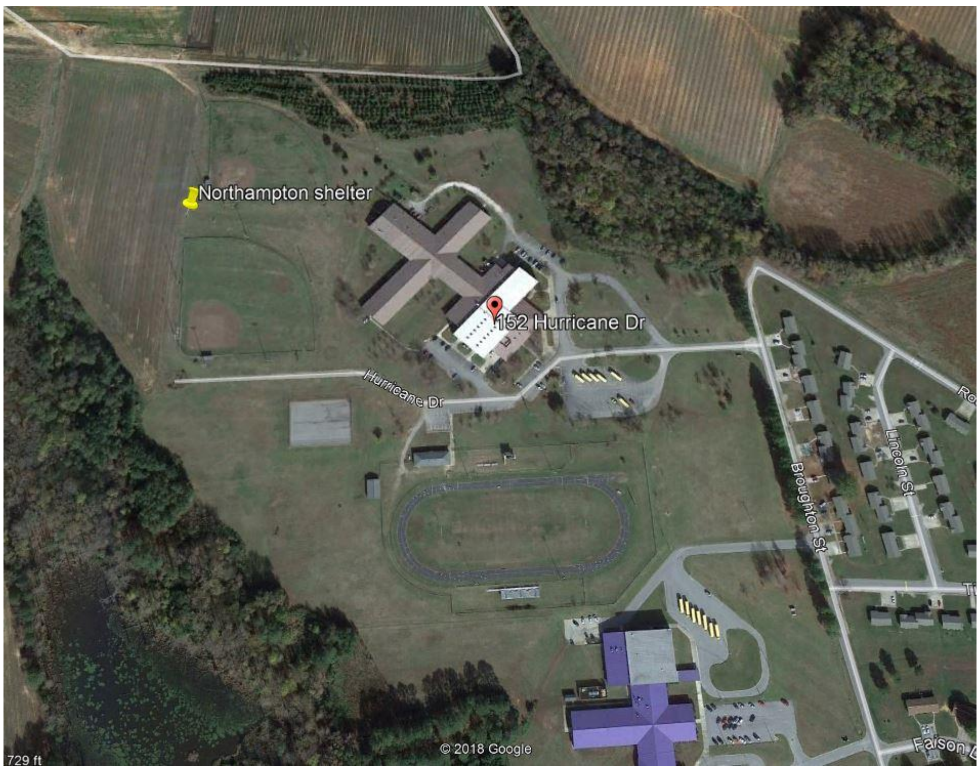


Figure 1. Aerial View of Proposed Site Location and Surrounding Areas

Region 4 Requested Information for Proposed Sites

In September 2018, the North Carolina Division of Air Quality, DAQ, began working with the Northampton County School System to establish a nitrogen dioxide and fine particle monitoring station in Northampton County, North Carolina, to characterize the ambient nitrogen dioxide and fine particle concentrations in Northampton County. The area chosen for placement of the monitor was selected based on available space at the school and ability of the area to meet 40

CFR 58 Appendix E siting criteria. An aerial view of the proposed monitoring location identified based on these considerations is shown in Figure 2.

Figure 2. Aerial view showing the location of the proposed monitoring station

The Air Quality System identification number for these monitors will be 37-131-0003-42602-1 and 37-131-0003-88101-3. DAQ will operate these monitors in Northampton County to ensure the air complies with the national ambient air quality standards for nitrogen dioxide and fine particles. The DAQ will operate these monitors following the Northampton County Monitoring Quality Assurance Project Plan and the monitor will be part of the DAQ primary quality assurance organization. Figure 3 through Figure 6 show views from the proposed site looking north, east, south and west.

Figure 3. Looking north from proposed location

Figure 4. Looking east from the proposed location

Figure 5. Looking west from the proposed location

Figure 6. Looking south from the proposed location

The proposed monitoring site is located over 100 meters from trees in all directions. The tallest trees are estimated to be 15.2 meters tall. The proposed monitoring site is located about 130 meters from the one-story school to the east. The land is relatively flat in this area. The nearest road is Hurricane Drive located approximately 150 meters to the southeast. This road does not have traffic count data; however, as shown in Figure 7, Old Emporia Road, had an average annual daily traffic count of 820 in 2017. The probe height for NO_2 will be approximately 3.6 meters. The inlet height for the $PM_{2.5}$ monitor will be approximately 2.3 meters.

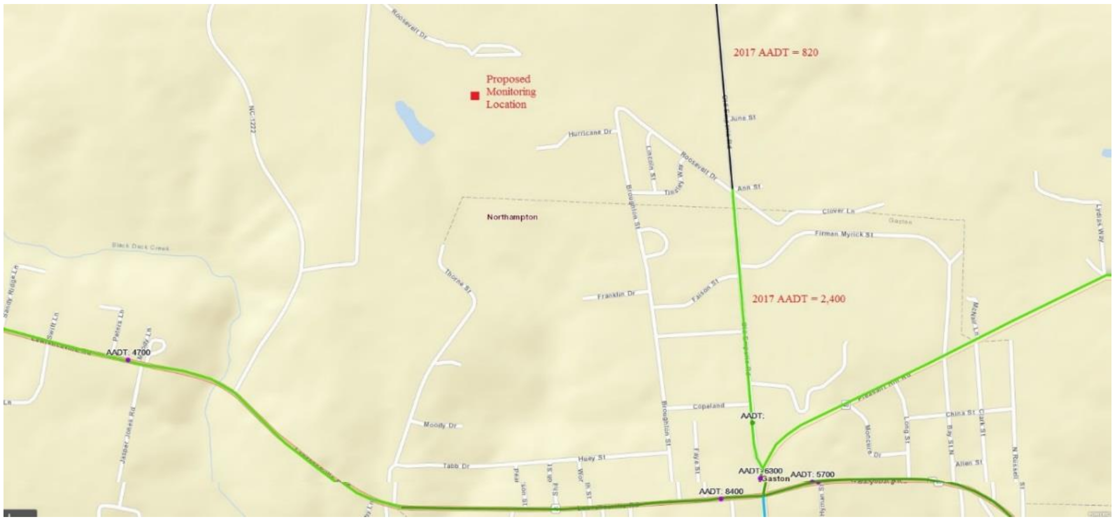


Figure 7. 2014 Traffic count map (from NC DOT)

The Air Quality System, AQS, identification number and street address for the site will be: 37-131-0003 and 152 Hurricane Drive, Gaston, North Carolina 27832. The latitude and longitude will be 36.511708 and -77.655389. The sampling and analysis method for NO_2 will be AQS code 200, Teledyne-API Model T200UP Photolytic-Chemiluminescence, EQNA-0512-200. The sampling and analysis method for $PM_{2.5}$ will be AQS code 209, Met One BAM-1022 Mass Monitor with a very sharp cut cyclone beta attenuation monitor, EQPM-1013-209. The operating schedule will be hourly for both monitors. The monitoring objective will be general background. Based on the wind rose in Figure 8, the predominant wind comes from the southwest, south southwest and south. The spatial scale of representativeness for the monitor will be urban scale based on the distance of the monitor from the road.

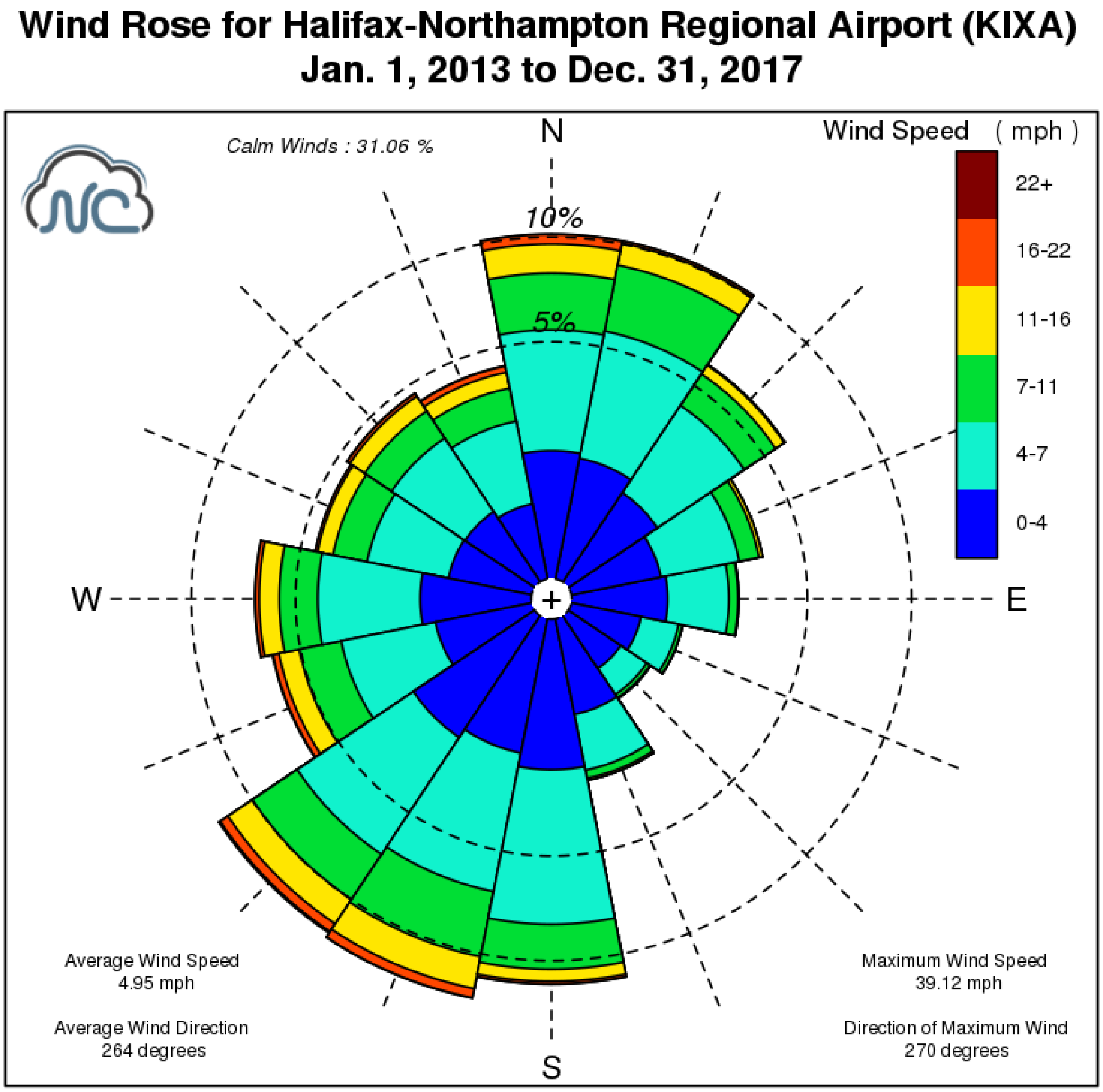


Figure 8. Wind rose for the Halifax-Northampton Regional Airport, located approximately 8 kilometers southwest of the proposed location

This monitor is in the Roanoke Rapids micro-metropolitan statistical area and is representative of the air quality in that core-based statistical area. The proposed monitoring site was provided to the public for comment during 30 days in November as an addendum to the 2018-2019 network monitoring plan. One comment was received from Clean Air Carolina supporting the proposed monitoring station in Northampton County. (The commenter also requested that monitors be added to several additional counties, which is beyond the scope of the current addendum.) Table 3 summarizes other factors DAQ evaluated when choosing the proposed location for the monitoring station. Table 4 summarizes the EPA-required information for the proposed site.

Table 3. Other considerations in site selection

Factor	Evaluation
Long-term Site Commitment	The proposed location is on school property and the school board has approved DAQ placing the monitor at this location. The school has no plans to use this land in the next three years.
Sufficient Operating Space	200-meter by 200-meter open area free of trees and buildings.
Access and Security	The building will be on school property between two baseball diamonds and next to a field of soybeans. The site is accessible via an unpaved road and will be fenced.
Safety	Appropriate electrical permits will be obtained.
Power	Location is approximately 50 meters from a power source.
Environmental Control	The monitoring shelter will be a 8 foot by 8 foot building with the door facing east.
Exposure	The monitoring station will be at least 100 meters from the driplines of trees and there will not be any trees or buildings obstructing air flow.
Distance from Nearby Emitters	There are no permitted facilities within 7 kilometers of the proposed location.
Proximity to Other Measurements	The proposed monitoring station is located about 8 kilometers northeast of the Halifax-Northampton Regional Airport.

Table 4. The 2019-2020 Nitrogen Dioxide and Fine Particle Monitoring Network for the Roanoke Rapids Micro-MSA

AQS Site Id Number:	37-131-0003	
Site Name:	Hurricane Drive	
Street Address:	152 Hurricane Drive	
City:	Gaston	
Latitude:	36.511708	
Longitude:	-77.655389	
MSA, CSA or CBSA represented:	Roanoke Rapids Micro-MSA	
Monitor Type:	Special Purpose	
Operating Schedule:	Hourly – every year	
Statement of Purpose:	To measure the general background concentrations in Northampton County	
Monitoring Objective:	General background	
Scale:	Urban	
Suitable for Comparison to NAAQS:	Yes for NO_2	No for $PM_{2.5}$
Meets Requirements of Part 58 Appendix A:	Yes	
Meets Requirements of Part 58 Appendix C:	Yes: EQNA-0512-200 for NO_2	Yes: EQPM-1013-209 for $PM_{2.5}$
Meets Requirements of Part 58 Appendix D:	No – Not required monitors	
Meets Requirements of Part 58 Appendix E:	Yes	
Proposal to Move or Change:	Monitoring will begin by Jan. 1, 2019	

Attachment A to Addendum 1 to Volume 1 of the North Carolina Division of Air Quality 2018-2019 Network Plan

Public Comments Received

Clean Air Carolina

November 30, 2018

RE: Addendum to the 2018-2019 Annual Ambient Air Quality Network Monitoring Plan

Patrick Butler
NC Division of Air Quality
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Dear Mr. Butler,

Clean Air Carolina, a statewide organization of educators, health professionals, scientists and clean air advocates dedicated to the protection of human health and the environment in North Carolina, is writing in response to the Public Notice of Ambient Air Monitoring Network Monitoring Plan Addendum. We applaud the efforts of North Carolina Division of Air Quality (DAQ) in installing an additional background monitoring station in Northampton County. We would like to especially applaud the reasoning for this additional installation, “Based on comments DAQ received, the director considered an analysis of the area emissions inventory, socio-economic and demographic information.” While we wholeheartedly support additional background air monitoring stations across the state to ensure improved air quality for all North Carolinians, we also respectfully ask DAQ to strengthen “2018-2019 Annual Monitoring Network Plan for the North Carolina Division of Air Quality Volume 1 Addendum 1” for the following reasons:

[1]. Northampton County makes a valuable site for air monitoring due to its distance from other sensors.
[2]. Agriculture, biomass, and other industries produce a disproportionate amount of Volatile Organic Compounds (VOCs) in this area. A total VOC sensor, though not required, would help to ease the concerns of residents of Northampton County and the general public.
[3]. Hertford, Sampson, Duplin, and Richmond Counties are similar in topography, demographic make-up, local industry, and lack of DAQ monitoring. If there is justification for monitoring in Northampton, then there is justification to advance in these areas equitably.

With these concerns in mind, below are the reasons that monitoring should be extended to Hertford, Sampson, Duplin, and Richmond counties in addition to Northampton.

Richmond County

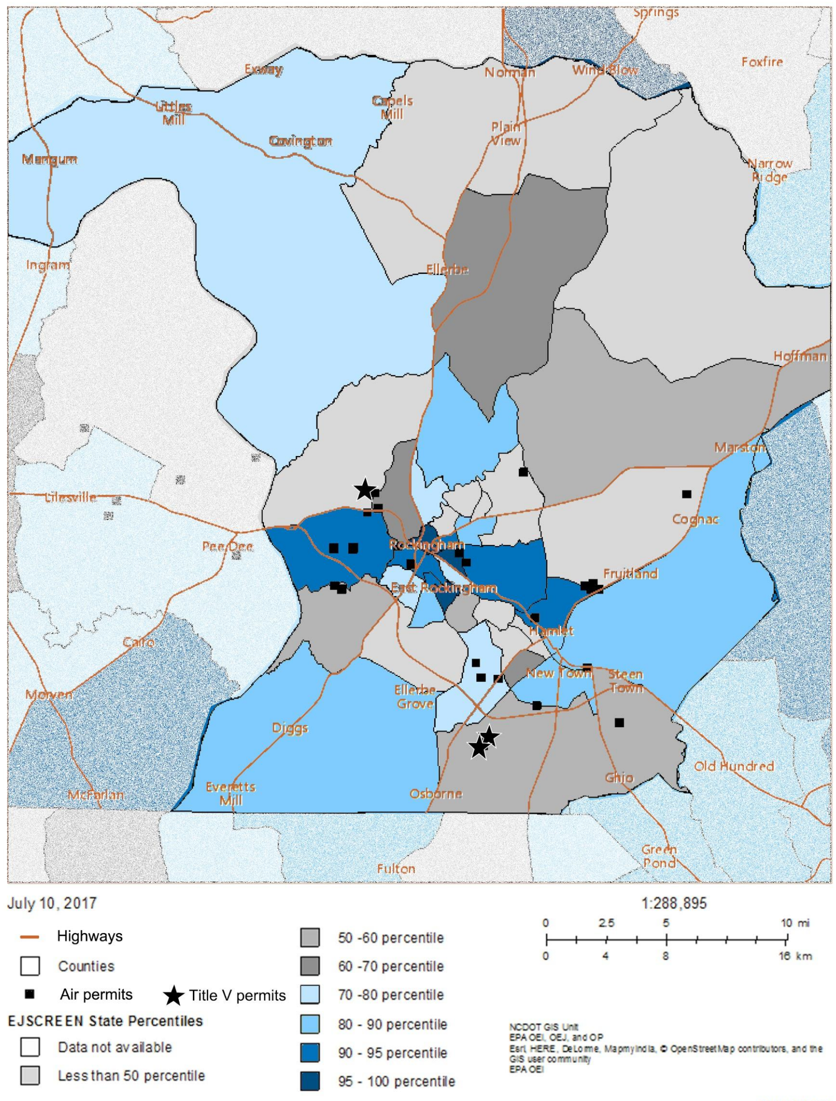
Due to the lack of air monitors in Richmond County, air pollution levels are currently uncertain. However, large quantities of air pollution are emitted from industrial facilities and high-traffic roads, particularly in Rockingham and Hamlet.

Pollution sources

A. Industrial facilities
- Proximity to facilities using extremely hazardous substances for residents of Richmond County ranks higher than 80% of NC counties.
- 23 facilities have toxic air emissions permits (black squares in Figure 1) — 115% the state average.
- Three facilities have Title V permits, meaning they emit more than 100 tons of air pollutants annually (black stars in Figure 1). In 2017, a biomass company called Enviva acquired a Title V permit to build a large wood pellet production facility in Hamlet. This will push Richmond County past the state average for Title V permits.

B. Traffic emissions
- Traffic proximity is higher than 67% of North Carolina counties. In Rockingham, individuals are exposed to traffic-related air pollution levels higher than 80-90% of North Carolinians.

Fig.1 Distribution of Low Income Population (State Percentile)



Demographic factors and susceptible populations

- Low-income communities, children, the elderly, and individuals with respiratory illnesses are more susceptible to the negative health effects of air pollution.

- At least 50% of Richmond County is economically disadvantaged and 20% of the population is elderly.
- Particularly in Hamlet and Rockingham, children living or going to school near industrial facilities and busy traffic routes are more likely to be exposed to unhealthy levels of air pollution.

Health Data Report

Air pollution is associated with an increased risk of illness and death, and poor air quality worsens respiratory diseases. No matter how low concentrations are, there is no safe threshold of air pollution.

Morbidity and mortality

- In 2014, asthma was listed as the primary diagnosis in 611 Richmond County emergency department (ED) visits. This occurred at almost 3x the rate of the state level.
- At a cost of $14,420/case, Richmond County residents spend approximately $1.4 million per year on asthma hospitalizations and approximately $3.8 million per year on COPD hospitalizations ($18,532/case) every year.

Between 2011-2015, 177 people died from respiratory diseases in Richmond County. The mortality rate due to chronic lower respiratory diseases (CLRDs) in Richmond County is consistently higher than the NC rate. Poor air quality may also increase the morbidity and mortality from cardiovascular diseases.

Hertford County

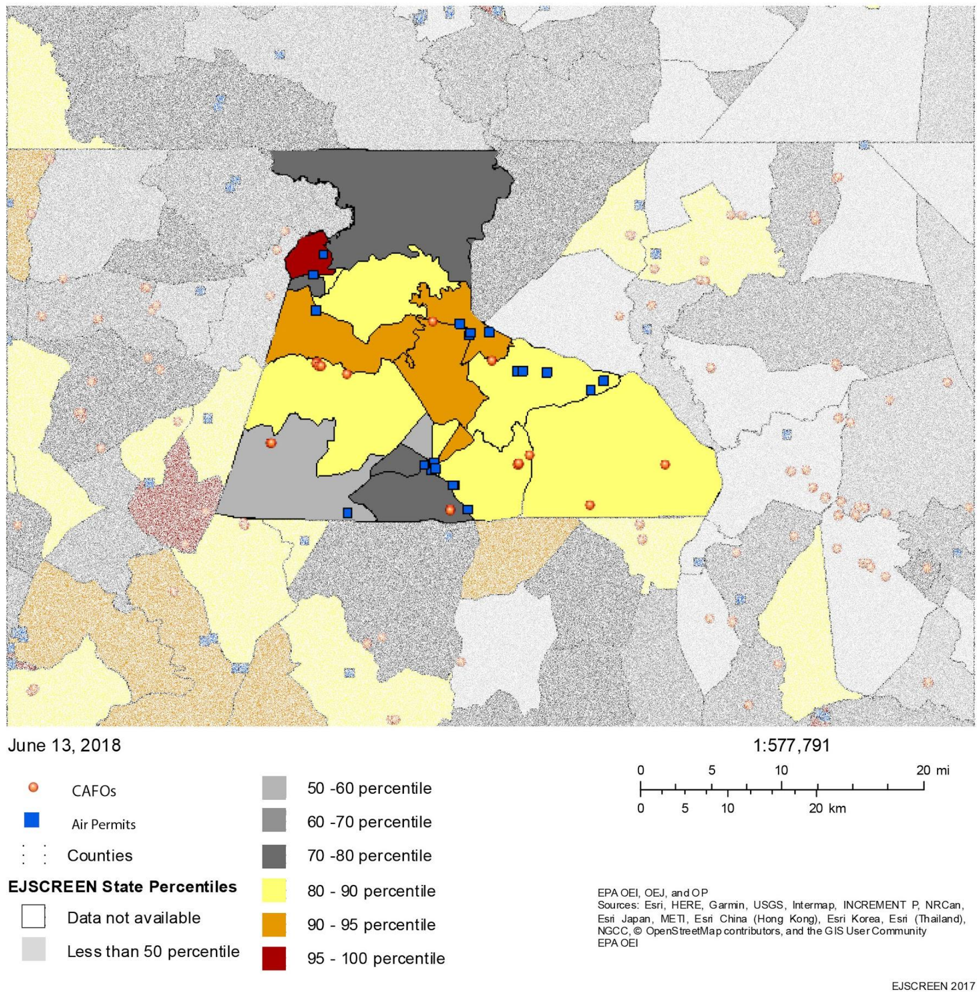
The lack of air monitors in Hertford County prevents accurate data about the levels of industrial and traffic-related air pollution from being recorded.

Pollution Sources

A. <u>Industrial facilities</u>

- Three facilities have been issued Title V permits allowing them to emit more than 100 tons of air pollutants annually. These companies include Enviva Pellets Ahoskie, LLC, Nucor Steel - Hertford, and Perdue Grain and Oilseed, LLC - Cofield.
- The major pollutants in Hertford County include nitrogen oxides (NOx), carbon monoxide (CO) and carbon dioxide (CO2).

Fig. 1 Distribution of Racial/Ethnic Minorities (State Percentiles)



B. <u>Traffic emissions</u>

- Ozone levels are higher than 37% of North Carolina counties.
- Traffic-related air pollutants include diesel particulates, NOx, and ozone.

Demographic factors and susceptible population

- Low-income communities, children, the elderly, and individuals with respiratory illnesses are more susceptible to the negative health effects of air pollution.
- 66%* of Hertford County residents identify as racial or ethnic minorities.
- 50%* of Hertford County residents are identified as low income.

*The total population of Hertford County is <25,000 residents, so percentages must be read with discretion.

Health Data Report

Air pollution is associated with an increased risk of illness and death, and poor air quality worsens respiratory diseases. No matter how low concentrations are, there is no safe threshold of air pollution.

Morbidity and Mortality

- Asthma-related emergency department visit rates for first and second diagnosis are higher than the state of North Carolina from 2013 to 2014.
- 5-year mortality rates for heart disease in the state of North Carolina have declined from 2006-2015, however, these rates have increased in Hertford county during the same time period.

At a cost of $17,886/case, Hertford County residents spent an estimated $460,124 on asthma hospitalizations and $837,094 on COPD hospitalizations ($16,698/case).

Northampton County

The lack of air monitors in Northampton County prevents accurate data surrounding particulate matter and other pollutants.

Pollution Sources

A. Industrial Facilities

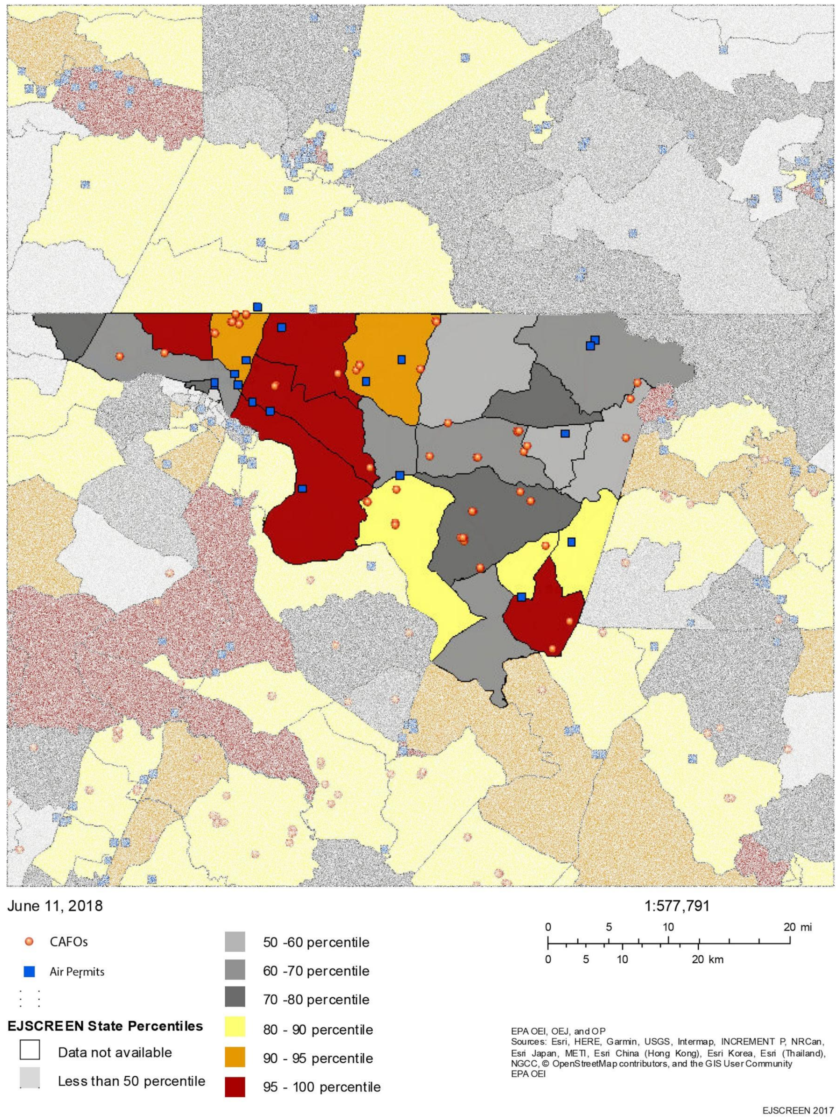
- Proximity to facilities using extremely hazardous substances for residents of Northampton County is higher than 61% of NC counties.
- There are 10 sites with toxic air permits. This includes three Title V sites, meaning they emit more than 100 tons of air pollutants annually.
- The current Title V sites are located in the central part of the county, near I-95, in an area that is heavily minority and low income.

B. Traffic Pollutants

- Interstate 95 and US-301 run north-south through the central corridor of Northampton County, and US-158 runs east-west. Many industries are located along these highways.

- Overall traffic proximity, a measure of traffic volume near residences, is higher than 42% of North Carolina counties.

Fig.1 Distribution of Minority Population (State Percentile)



Demographic factors and susceptible populations

- Low-income communities, children, the elderly, and individuals with respiratory illnesses are more susceptible to the negative health effects of air pollution.
- 55% of Northampton residents are low-income (77th percentile in NC) and nearly a quarter of residents have less than a high school education (81st percentile in NC).

Health Data Report

Air pollution is associated with an increased risk of illness and death, and poor air quality worsens respiratory diseases. No matter how low concentrations are, there is no safe threshold of air pollution.

Morbidity and Mortality

- Asthma hospitalization rates in Northampton County (all ages) from 2010-2014 were higher than the state average by about 15%.
- On average the residents of Northampton County spent $16,546/case on asthma hospitalizations and an average of $16,700/case on COPD. The median income for Northampton County residents during this time was $18,836 for individuals and $31,543 for families.
- Death from Chronic Lower Respiratory Diseases (e.g., COPD, asthma, emphysema, etc.) are elevated in Northampton County compared to the rest of the state.

Duplin County

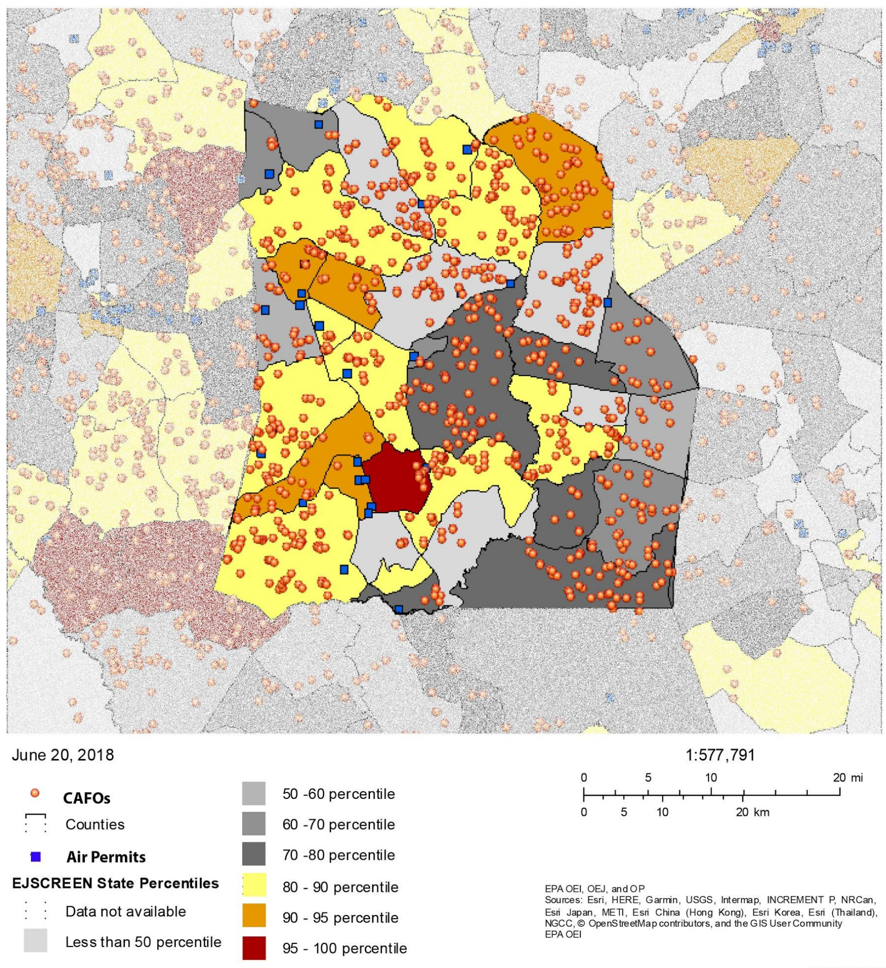
Large quantities of air pollution are emitted from industrial facilities and high-traffic volume roads, in particular, Interstate 40. The county has one of the highest concentrations of CAFOs, which emit high volumes of air pollutants from animal waste lagoons and when manure is applied by spraying on fields.

Pollution Sources

A. Industrial facilities
- Proximity to facilities using extremely hazardous substances for residents of Duplin County ranks higher than about half (54%) of NC counties.
- 25 facilities (blue squares right) have toxic air emissions permits.
- 2 facilities have Title V permits, meaning they emit more than 100 tons of air pollutants annually
- In 2016, there were 760 CAFOs in the county. These facilities release noxious odors, ammonia, hydrogen sulfide, nitrous oxides (NOx), and particulate matter (PM).

B. Traffic emissions
- Traffic proximity in Duplin County is higher than 37% of North Carolina counties.
- Traffic-related air pollutants include diesel particles, NOx, and ozone.

Fig. 1 Distribution of Low Income Population (State Percentiles)



Demographics

- Low-income communities, children, the elderly, and individuals with respiratory illnesses are more susceptible to the negative health effects of air pollution.
- 54% of Duplin County is identified as low-income, 48% of the population belongs to a racial minority.
- Particularly in Warsaw and Rose Hill, children living or going to school near industrial facilities and busy traffic routes are more likely to be exposed to unhealthy levels of air pollution.

Health Data Report

Air pollution is associated with an increased risk of illness and death, and poor air quality worsens respiratory diseases. No matter how low concentrations are, there is no safe threshold of air pollution.

Morbidity and mortality

- The rate of emergency room visits listing asthma as the first or second diagnosis have been steadily climbing, and are higher than NC rates.
- At a cost of $12,413 per case in 2014, Duplin County residents spent an estimated $719,980 on asthma hospitalizations that year and $1.4 million on COPD hospitalizations ($16,078/case) in 2016. Both of these rates are slightly lower than the NC rate for the same years.

Between 2011-2015 169 Duplin residents died of chronic lower respiratory diseases (CLRDs). The age-adjusted 5-year mortality rate from CLRDs in Duplin County exceeded the NC rates between 2010-2015.

Sampson County

The sparse air monitors limit the accuracy of the data gathered. However, large quantities of air pollution are emitted from industrial facilities and high-traffic roads.

Pollution sources

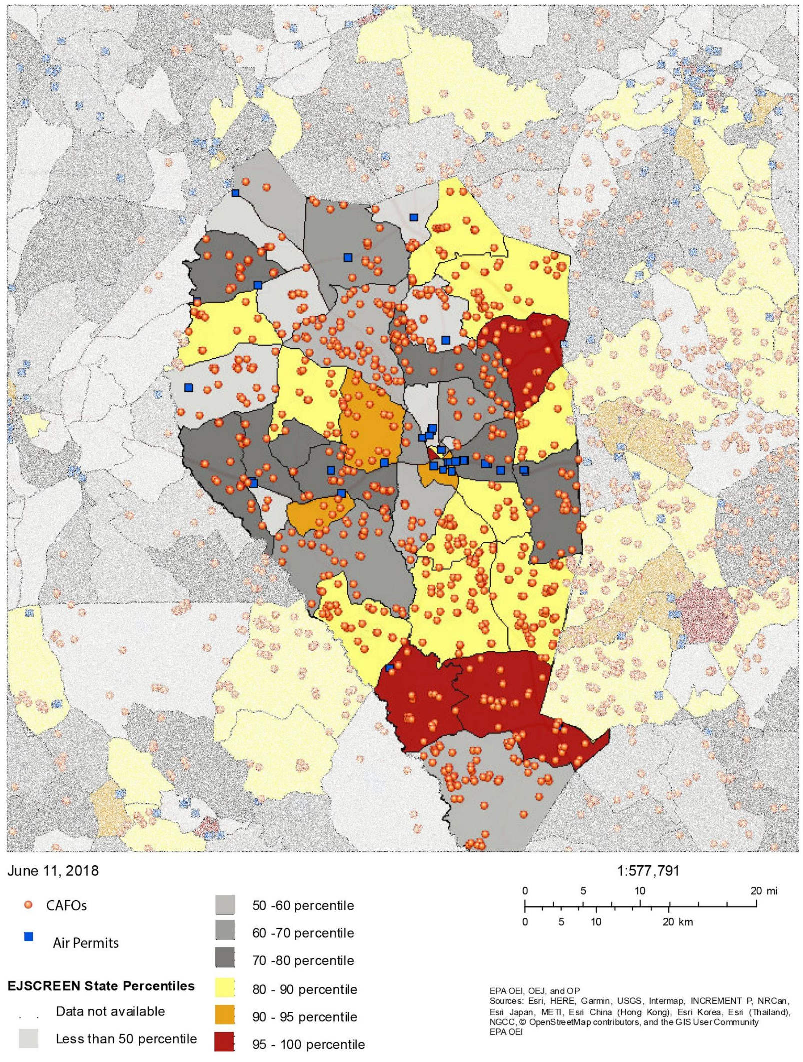
A. Industrial facilities

- Proximity to facilities using extremely hazardous substances for Sampson County is 59% higher than other NC counties.
- 6 facilities have Title V permits— 2x the state average
- A large number of animal operation permits (CAFOs) have been issued in Sampson County and release noxious odors, ammonia, hydrogen sulfide, nitrous oxides (NOx), and particulate matter (PM).

B. Traffic emissions

- Traffic proximity is higher than 53% of North Carolina counties.

Fig.1 Distribution of Low Income Population (State Percentile)



Demographic factors and susceptible population

- Low-income communities, children, the elderly, and individuals with respiratory illnesses are more susceptible to the negative health effects of air pollution.
- 52% of Sampson County residents are identified as low income; this is higher than 74% of other North Carolina counties.
- Children living or going to school near industrial facilities and busy traffic routes, particularly in Clinton, are more likely to be exposed to unhealthy levels of air pollution.

Health Data Report

Air pollution is associated with an increased risk of illness and death, and poor air quality worsens respiratory diseases. No matter how low concentrations are, there is no safe threshold of air pollution.

Morbidity and mortality

- From 2008-2014, the rate for asthma as the first or second diagnosis in emergency room visits was consistently higher than the statewide rate.
- At a cost of $12,809/case, Sampson County residents spend an estimated $698,423 on asthma hospitalizations and $2.9 million on COPD hospitalizations ($16,922/case) every year.
- Cardiovascular diseases become more prominent in areas with high air pollution. In Sampson County, the age-adjusted 5-year mortality rates of a stroke are above the NC averages.

It is the view of Clean Air Carolina that while installation of an additional background monitoring station in Northampton County is a step in the right direction, it is a step that should be extended to surrounding and similar counties of Hertford, Sampson, Duplin, and Richmond. These counties present similar concerns in the presence of pollution and emissions, environmental justice and demographics, as well as similar geographic profiles. The NC Division of Air Quality is charged with ensuring healthy air quality for all North Carolinians, and core to this effort is gathering consistent and high quality data throughout the state. Thank you for the opportunity to offer our comments.

Sincerely,

June Blotnick

June Blotnick
Executive Director

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Endnotes

1. Asthma Burden in NC by CDC: https://www.cdc.gov/asthma/stateprofiles/asthma_in_nc.pdf
2. Asthma Data in NC: http://www.asthma.ncdhhs.gov/burden.htm
3. Asthma Emergency Department Visit Data: NC DETECT http://ncdetect.org/data-elements/
4. Community Health Assessment: http://publichealth.nc.gov/lhd/cha/reports.asp
5. County Health Data Book for NC: http://www.schs.state.nc.us/data/databook2016/
6. Demographic data: https://www.census.gov/quickfacts/
7. Hospital Charge in NC (2014): http://www.schs.state.nc.us/data/databook2016/CD14%20allhosps.rtf
8. Map of air monitors in NC: https://www.google.com/maps/d/u/0/viewer?mid=120JNXp8lGxKO5aPZxv0HsZrZ5bQ&ll=35.43002381510728%2C-80.96201187500009&z=6
9. Mortality Statistics in NC: http://www.schs.state.nc.us/data/vital.cfm#vitalvol2
10. NATA Air Toxics: Diesel PM, Benzene: http://www.arcgis.com/home/item.html?id=e77a6eedb70b4f8594c9b3ff915e29e6
11. NC Air permit: https://deq.nc.gov/about/divisions/air-quality/air-quality-permitting
    Traffic Proximity: U.S. Department of Transportation National Transportation Atlas Database, Highway Performance Monitoring System, 2014.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OCT 2 2 2018

Mr. Mike Abraczinskas
Director
Division of Air Quality
North Carolina DEQ
 Environmental Quality
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Dear Mr. Abraczinskas:

Thank you for submitting the state of North Carolina's 2018 annual ambient air monitoring network plan (Network Plan), dated June 29, 2018. 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 and one comment was received. The NC-DAQ responded to the comment in the final Network Plan.

The EPA approves North Carolina's 2018 Network Plan. Comments on the Network Plan are enclosed. The EPA will continue to work with the Mecklenburg County Air Quality program on implementation of the PAMS program and the requirement for a second near-road NO_2 monitoring site in the Charlotte area. Thank you for working with the EPA Region 4 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,

K Mitchell for

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

Enclosure

cc: Ms. Leslie Rhodes, Director
 Mecklenburg County Air Quality

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

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

2018 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 comments and recommendations on the state of North Carolina's 2018 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, 2017, 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. The July 1, 2017 population estimates from the U.S. Census Bureau are shown in Table 1.

Table 1: Metropolitan Statistical Areas and July 1, 2017 Population Estimates

MSA Name	Population
Charlotte-Concord-Gastonia, NC-SC	2,525,305
Virginia Beach-Norfolk-Newport News, VA-NC	1,725,246
Raleigh, NC	1,335,079
Greensboro-High Point, NC	761,184
Winston-Salem, NC	667,733
Durham-Chapel Hill, NC	567,428
Asheville, NC	456,145
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	464,165
Fayetteville, NC	386,662
Hickory-Lenoir-Morganton, NC	366,534
Wilmington, NC	288,156
Jacksonville, NC	193,893
Greenville, NC	179,042
Burlington, NC	162,391
Rocky Mount, NC	146,738
New Bern, NC	124,864
Goldsboro, NC	124,172

Network Changes Proposed by the North Carolina Division of Air Quality (NC-DAQ)

The Network Plan proposes one monitoring site for discontinuation: Blackstone (AQS ID 37-105-0002). The Blackstone monitoring site was established in the Sanford, NC area to measure background air quality data prior to the start of shale gas extraction nearby. The NC-DAQ conducted O_3, NO_2, SO_2, $PM_{2.5}$, and air toxics monitoring at Blackstone. The NC-DAQ used this collected monitoring data to write and publish a report on air quality for the area. The Network Plan states that shale gas extraction is no longer likely to occur in this area and thus NC-DAQ plans to shut down this monitoring site sometime in 2018. These monitors and the monitoring site are not part of the required air monitoring network and do not require the EPA's approval to be shutdown. The EPA acknowledges the discontinuation of monitoring at the Blackstone site and appreciates the NC-DAQ conducting this special study of air quality in the Sanford, NC area.

The minimum monitoring requirements found in 40 CFR Part 58, Appendix D will continue to be met after this monitoring site has been discontinued. Monitors proposed for discontinuation and the EPA's acknowledgement are summarized in Table 2.

Table 2: Monitors Proposed for Discontinuation

AQS ID	Site Name	Pollutant	Type	Comments
37-105-0002	Blackstone	O_3, NO_2, SO_2, $PM_{2.5}$, Air Toxics	SPM	Acknowledge discontinuation of special purpose monitoring. This site is not in a CBSA with minimum monitoring requirements.

The EPA acknowledges the startup of two $PM_{2.5}$ and two NO_2 monitors proposed in the Network Plan, summarized below in Table 3. The state will install a NO_2 monitor and a $PM_{2.5}$ monitor at the existing Rockwell site (AQS ID 37-159-0021). This is a current O_3 site and a former $PM_{2.5}$ site. $PM_{2.5}$ was discontinued at the Rockwell site in December of 2015. The NC-DAQ is also in the process of selecting a location for NO_2 and $PM_{2.5}$ monitoring in Northampton County in response to public interest. The monitoring at both sites will be considered Special Purpose Monitors (SPM) and are not part of the required State and Local Air Monitoring Station (SLAMS) $PM_{2.5}$ and NO_2 networks. The EPA appreciates NC-DAQ's willingness to conduct additional monitoring to improve modeling and be responsive to the public's concerns.

With the promulgation of a new O_3 National Ambient Air Quality Standards (NAAQS) on October 1, 2015, the EPA finalized changes to the Photochemical Assessment Monitoring Station (PAMS) program. By June 1, 2019, PAMS monitoring will be required at the NCore sites in Raleigh and Charlotte. The EPA recognizes that there are several implementation challenges that agencies must work through and we commit to working closely with the NC-DAQ and the Mecklenburg County Air Quality (MCAQ) program to minimize the burden of implementing this new monitoring program. Monitors proposed for startup and the EPA's acknowledgement or determination are summarized in Table 3.

Table 3: Monitors Proposed for Startup

AQS ID	Site Name	Pollutant	Type	Comments
37-159-0021	Rockwell	NO_2, $PM_{2.5}$	SPM	Acknowledged. Monitors added for PSD modeling background data. Start collecting 2019.
37-131-0003	Northampton County	NO_2, $PM_{2.5}$	SPM	Acknowledged. Response to public comments in Northampton County. Final site has not been selected.
37-183-0014	Millbrook	PAMS	SLAMS	The EPA will work with the NC-DAQ to meet the PAMS monitoring requirements at the Raleigh NCore site.
37-119-0041	Garinger	PAMS	SLAMS	The EPA will work with the MCAQ to meet the PAMS monitoring requirements at the Charlotte NCore site.

Operating Schedules
40 CFR § 58.12

The EPA approved in 2017 a one-in-six-day schedule for the operation of $PM_{2.5}$ samplers at two sites: Pitt Ag Center (AQS ID 37-147-0006) and Board of Education (AQS ID 37-021-0034). These monitors and the remainder of the monitoring network proposed in the Network Plan meet the required operating schedules for all continuous analyzers and all manual Pb, PM_{10}, $PM_{2.5}$, and $PM_{2.5}$ Speciation Trends Network (STN) monitors.

Air Quality Index (AQI) Reporting
40 CFR §58.50

AQI reporting is required for MSAs with populations over 350,000 people. There are 10 MSAs in the state that are required to report an AQI: Charlotte-Gastonia-Concord, Virginia Beach-Norfolk-Newport News, Raleigh, Greensboro-High Point, Durham-Chapel Hill, Winston-Salem, Asheville, Hickory-Lenoir-Morganton, Fayetteville, and Myrtle Beach-Conway-North Myrtle Beach. The NC-DAQ reports AQI information for all 10 MSAs and, thus, meets the AQI reporting requirements.

National Core (NCore) Monitoring Network
40 CFR Part 58, Appendix D, Section 3.0

Ambient air monitoring network criteria for NCore sites are found in 40 CFR Part 58, Appendix D, Section 3. Two NCore sites are listed in the Network Plan. The first site (AQS ID 37-183-0014) is located at the Millbrook School site in Raleigh, NC and is operated by the NC-DAQ. The second site (AQS ID 37-119-0041) is located at the Garinger site in Charlotte, NC and is operated by the MCAQ. The EPA approval of these sites was granted on October 30, 2009.

In the Network Plan NC-DAQ proposes to collect the Millbrook NCore site's relative humidity and ambient temperature measurements at a ten-meter height instead of the two-meter height recommended in meteorological guidance. The NC-DAQ purchased new, all-in-one wind, temperature, and humidity sensors and proposes to operate the all-in-one sensor at the recommended height for collecting wind data, ten meters. EPA Region 4 staff discussed this meteorological measurement configuration with EPA Office of Quality Planning and Standards staff. The EPA agrees that this deviation from guidance is acceptable to meet the meteoritical objectives of the NCORE program.

The Network Plan meets the minimum monitoring requirements for NCore sites.

O_3 Monitoring Requirements
40 CFR Part 58, Appendix D, Section 4.1 and Table D-2

No changes from the previous year are proposed in the Network Plan for the North Carolina O_3 monitoring network, except the shutdown of the Blackstone site (AQS ID 37-105-0002). The SPM at this site does not require the EPA approval to be shutdown. 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.

CO Monitoring Requirements
40 CFR Part 58, Appendix D, Section 4.2

Ambient air monitoring network design criteria for CO are found in 40 CFR Part 58, Appendix D, Section 4.2. CBSAs with populations over one million are required to operate one CO monitor collocated with a near-road NO_2 site. To meet this requirement, the NC-DAQ operates a CO monitor at the Triple Oak near-road site (AQS ID 37-183-0021) in the Raleigh CBSA and MCAQ operates a CO monitor at the Remount Road near-road site (AQS ID 37-119-0045) in the Charlotte-Concord-Gastonia CBSA.

NCore sites are required by Section 3.0(b) to also operate CO monitors. The NC-DAQ operates a CO monitor in the Raleigh MSA at the Millbrook site (AQS ID 37-183-0014) and the MCAQ operates a CO monitor at the Garinger site (AQS ID 37-119-0041) in the Charlotte-Concord-Gastonia MSA. These monitors fulfill North Carolina's CO monitoring requirements.

NO_2 Monitoring Requirements
40 CFR Part 58, Appendix D, Section 4.3

Ambient air monitoring network design criteria for NO_2 are found in 40 CFR Part 58, Appendix D, Section 4.3. There are three types of required NO_2 monitoring: near-road, area-wide, and Regional Administrator. 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) to meet the near-road NO_2 requirements for the Raleigh and Charlotte-Concord-Gastonia CBSAs, respectively.

For the first time, the most recent Census population estimate lists the population of the Charlotte-Concord-Gastonia, NC-SC CBSA as more than 2.5 million people (July 1, 2017 population estimate of 2,525,305). Two near-road NO_2 sites are required in CBSAs with populations over 2.5 million people. The MCAQ in the Network Plan requested a waiver of this requirement for the second near-road NO_2 site in the Charlotte area. The EPA does not have the clear authority in the CFR to waive near-road requirements as we do for other air monitoring requirements. Thus, the EPA is not granting a waiver of the requirement for a second near-road NO_2 monitoring site in Charlotte.

However, the EPA recognizes that establishing a new near-road monitoring site is a resource intensive and a time-consuming process. We also recognize that MCAQ staff will have limited resources to establish a new near-road monitoring site at the same time as they work to meet the PAMS requirements and learn to operate the new PAMS equipment. With that in mind, the EPA will work with the MCAQ over the next couple of years to determine the optimal location and timing for establishing another near-road NO_2 site in the Charlotte area. Additionally, the EPA will provide funding for the initial establishment of a new near-road site in the area.

The EPA previously approved the selection of the Garinger (AQS ID 37-119-0041) and Millbrook (AQS ID 37-183-0014) sites to meet the area-wide NO_2 monitoring requirement for the Charlotte-Concord-Gastonia and Raleigh CBSAs, respectively.

The EPA also previously selected the Hattie Avenue site (AQS ID 37-067-0022), operated by the Forsyth County Office of Environmental Assistance and Protection (FC-OEAP), as 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 Regional Administrators can be found on the EPA's website at http://www3.epa.gov/ttnamti1/svpop.html.

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

Ambient air monitoring network design criteria for SO_2 are found in 40 CFR Part 58, Appendix D, Section 4.4. This section requires that "[t]he 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, Section 4.4.

The existing SO_2 monitoring sites described in the Network Plan meet the minimum requirements of 40 CFR Part 58 for PWEI monitoring. The NC-DAQ operates a regulatory SO_2 monitor in the Durham-Chapel Hill, NC CBSA to meet the PWEI requirements. The MCAQ operates a regulatory SO_2 monitor in the Charlotte-Gastonia-Concord, NC-SC CBSA to meet the PWEI requirements. The FC-OEAP operates a regulatory SO_2 monitor in the Winston-Salem, NC-SC CBSA to meet the PWEI requirements. The NC-DAQ has an MOA with the Virginia Department of Environmental Quality (DEQ) to share the SO_2 minimum monitoring requirements for the Virginia Beach-Norfolk-Newport News, VA-NC CBSA where the Virginia DEQ operates a regulatory SO_2 monitor to meet the PWEI requirements.

Previously, the PWEI for the Asheville, NC CBSA was above or near the 5,000 PWEI threshold for requiring SO_2 monitoring. Currently, there is a source-oriented monitor operating in the Ashville CBSA, required under the SO_2 Data Requirements Rule (DRR). However, the most recent calculation by EPA has the Asheville, CBSA PWEI at 4,179. Table 4 below summarizes the PWEI values and required monitoring for CBSAs in North Carolina. The PWEI values were calculated with the most recent version of the 2014 National Emissions Inventory and the 2017 population estimates from the Census Bureau.

Table 4: PWEI Required SO_2 Monitors in North Carolina

NC CBSA	March 2018 PWEI Value	March 2018 PWEI Required Monitors	SO_2 Monitors Operated
Virginia Beach-Norfolk-Newport News, VA-NC	43,320.12	1	1 (Operated by Virginia DEQ)
Charlotte-Concord-Gastonia, NC-SC	17,851	1	1
Durham-Chapel Hill, NC	12,092	1	1
Winston-Salem, NC	5,314	1	1
Asheville, NC	4,179	0	1

The EPA finalized the SO_2 DRR (40 CFR Part 51, Subpart BB) on August 10, 2015. This rule requires air quality near sources with SO_2 emissions greater than 2,000 tons per year (tpy) be characterized using ambient air monitoring or modeling. The NC-DAQ operates three approved monitoring sites to characterize the maximum ambient 1-hour SO_2 concentrations near facilities in North Carolina under the SO_2 DRR: the Canton DRR site (AQS ID 37-087-0013) near the Evergreen Packaging facility; the Southport DRR site (AQS ID 37-019-0005) near the CPI Southport facility; and the Bayview site (AQS ID 37-013-0151) near the PCS Phosphate facility. Duke Energy also operates two approved SO_2 DRR monitoring sites in North Carolina. These two Duke Energy sites fall under the NC-DAQ's primary quality assurance organization (PQAO) and, as such, follow the NC-DAQ's quality assurance documents and procedures. These sites are: the Semora DRR site (AQS ID 37-145-0004) near the Duke Roxboro facility and the Skyland DRR site (AQS ID 37-021-0036) near the Duke Asheville facility.

The Network Plan requests a waiver of siting requirements for the Skyland DRR site. Trees to the northeast of the monitoring probe (the Duke Asheville facility is located to the west) do not meet the spacing from obstructions discussed in 40 CFR Part 58, Appendix E, Section 4 (a)… "The distance from the obstacle to the probe, inlet, or monitoring path must be at least twice the height that the obstacle protrudes above the probe, inlet, or monitoring path…" The configuration of obstructing trees is such that the monitor probes and sampler siting does not meet Table E-4 of 40 CFR Part 58, Appendix E, Section 11, which states that a monitor's location "must have unrestricted airflow 270 degrees around the probe or sampler."

Under 40 CFR Part 58, Appendix E, Section 10, waivers of siting criteria for existing sites can be granted if either of the following criteria are met:

> 10.1.1 The site can be demonstrated to be as representative of the monitoring area as it would be if the siting criteria were being met.
>
> 10.1.2 The monitor or probe cannot reasonably be located so as to meet the siting criteria because of physical constraints (e.g., inability to locate the required type of site the necessary distance from roadways or obstructions).

The Skyland DRR monitor is sited specifically to characterize the area of maximum expected 1-hour SO_2 concentration near the Duke Asheville facility. Since the obstructing trees identified by NC-DAQ are not in the direction of the source and the direction to the source is not obstructed, the EPA believes that the concentrations measured at the site are as representative of the monitoring area as if siting criteria in 40 CFR Part 58, Appendix E were met. This waiver request meets criteria in 10.1.1 (cited above). Thus, the EPA waives the requirements of 40 CFR Part 58, Appendix E, Section 4 (a) and Table E-4 to 40 CFR Part 58, Appendix E, Section 11 regarding the trees to the northeast of the site identified by NC-DAQ in the Network Plan. This site must still meet all other siting requirements found in Appendix E to 40 CFR Part 58. This waiver should be re-evaluated in the 2020 North Carolina network assessment due to the EPA by July 1, 2020.

The EPA noted that the siting evaluation form for the Skyland DRR site was not included in the Network Plan, with the siting evaluation forms for other sites. On Page A40 of the Network Plan, NC-DAQ listed the Skyland DRR site as having been evaluated, but the evaluation form was not included. The EPA requests that siting evaluation forms for Skyland DRR be included in future network plans. Also, the EPA requests that updated pictures of the Skyland DRR site to be included in the next network plan. Based on conversations with NC-DAQ and information in the Network Plan, the EPA understands that vegetation has been trimmed since the pictures included in the Network Plan were taken.

The North Carolina SO_2 monitoring network meets the monitoring requirements in 40 CFR Part 58.

Pb Monitoring Requirements
40 CFR Part 58, Appendix D, Section 4.5

Forty (40) CFR Part 58, Appendix D, Section 4.5 requires that "[a]t 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) 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, and pursuant the provisions of the above section, the EPA granted waivers of the source-oriented ambient air monitoring requirements at two sources: Evergreen Packaging (formerly named Blue Ridge Paper Products Inc.) in Canton, NC and Saint Gobain Containers in Wilson, NC. In its 2015 Network Plan, the NC-DAQ requested a renewal of both waivers. In its response to the 2015 Network Plan, the EPA renewed the waiver for the Saint Gobain Containers facility in Wilson, NC for five years, until 2020. The EPA did not renew the waiver of source oriented Pb monitoring requirements for Evergreen Packaging in Canton, NC, since the Pb monitoring requirement for the Evergreen Packaging facility no longer applies. The most recent emissions data for Evergreen Packaging indicated that the facility currently emits less than the 0.5 tpy threshold. At this time, no facility in North Carolina other than Saint Gobain emits more than 0.5 tpy of Pb and none is subject to required Pb source-oriented monitoring. Thus, the North Carolina Pb monitoring network meets the source oriented Pb monitoring requirements.

PM_{10} Monitoring Requirements
40 CFR Part 58, Appendix A, Section 3.3
40 CFR Part 58, Appendix D, Section 4.6 and Table D-4

In 2015, the EPA approved a waiver of the requirement to operate a second PM_{10} monitor in the Raleigh MSA. Since PM_{10} levels have been significantly lower than the NAAQS for the last decade, the EPA granted this waiver. A renewal of this waiver must be requested in the 2020 network assessment.

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, Section 3.3.4 are also 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 collocation requirements are assessed at the PQAO level. Three agencies serve as PQAOs in North Carolina: the NC-DAQ, the MCAQ, and the FC-OEAP. All three North Carolina PQAOs meet these requirements.

$PM_{2.5}$ Monitoring Requirements
40 CFR Part 58, Appendix A, Section 3.2
40 CFR Part 58, Appendix D, Section 4.7 and Table D-5

No significant changes from the previous year are proposed in the Network Plan for the North Carolina $PM_{2.5}$ monitoring network, except for the shutdown of the Blackstone site (AQS ID 37-105-0002). This site is an SPM and does not require EPA approval for shutdown.

The state of North Carolina's $PM_{2.5}$ 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 3.2.3. These include the requirement that 15 percent of each network of manual $PM_{2.5}$ methods (at least one site) be collocated. The manual collocation requirements for $PM_{2.5}$ are currently being met in the monitoring networks of each PQAO: NC-DAQ, MCAQ, and FC-OEAP.

$PM_{2.5}$ Near-road Monitoring Requirements
40 CFR Part 58, Appendix D, Section 4.7.1(b)(2)

Regulatory requirements in 40 CFR Part 58, Appendix D, Section 4.7.1(b)(2) require that "[f]or 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. The NC-DAQ and the MCAQ operate $PM_{2.5}$ monitors at near-road sites in these CBSAs: Remount Road (AQS ID 37-119-0045) in Charlotte and Triple Oak (AQS ID 37-183-0021) in Raleigh.

$PM_{2.5}$ Continuous Monitoring Requirements
40 CFR Part 58, Appendix D, Section 4.7.2
40 CFR Part 58, Appendix A, Section 3.2

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."

The six MSAs listed in Table 5, below, have minimum continuous monitoring requirements. These requirements are met in all MSAs in the state.

Table 5: Continuous $PM_{2.5}$ Monitoring Requirements

NC MSA	Number of Minimally Required Continuous $PM_{2.5}$ Monitors	Number of Operated Continuous $PM_{2.5}$ Monitors
Charlotte-Concord-Gastonia, NC-SC	1	4
Durham-Chapel Hill, NC	1	1
Greensboro-High Point, NC	1	1
Raleigh, NC	1	3
Virginia Beach-Norfolk-Newport News, VA-NC	1	1 (operated by Virginia DEQ)
Winston-Salem, NC	1	2

$PM_{2.5}$ collocation requirements are found in 40 CFR Part 58, Appendix A, Section 3.2.3. For each continuous FEM designated a primary monitor in a PQAO, "the PQAO must have 15 percent of the primary monitors of each method designation collocated (values of 0.5 and greater round up); and have at least one collocated quality control monitor (if the total number of monitors is less than three). The first collocated monitor must be a designated FRM monitor."

There are three PQAOs in North Carolina: NC-DAQ; MCAQ; and FC-OEAP. The Network Plan identifies four beta attenuation monitors (BAM) 1020 (AQS method code 170) monitors and six BAM 1022 (AQS method code 209) monitors operated by the NC-DAQ as primary monitors. The NC-DAQ operates a BAM 1020 collocated with an FRM at the Lexington Water Tower site (AQS ID 37-057-0002) and a BAM 1022 collocated with an FRM at the Hickory site (AQS ID 37-035-0004) to satisfy the continuous $PM_{2.5}$ monitoring collocation requirements.

In the Network Plan, the MCAQ proposes to operate one BAM 1020 and one BAM 1022 as primary monitors. Each of these methods are proposed to be collocated with an FRM. As a result, the MCAQ PQAO is meeting its continuous $PM_{2.5}$ monitoring collocation requirements.

The FC-OEAP proposes to operate one Teledyne T640x $PM_{2.5}$ monitor (AQS method code 238) and one T640 $PM_{2.5}$ monitor (AQS method code 236) as primary monitors. After discussions with the FC-OEAP it is EPA's understanding that the FC-OEAP will operate an FRM sampler collocated with the T640 method and an FRM sampler collocated with the T640x method to meet continuous $PM_{2.5}$ monitoring collocation requirements. Operating the two collocated FRM samplers on at least a 1 in 6 day sampling schedule will meet continuous $PM_{2.5}$ monitoring collocation requirements for the FC-OEAP PQAO.

In summary, the continuous $PM_{2.5}$ design criteria and collocation requirements found in 40 CFR Part 58 will be met in all MSAs in the state.

$PM_{2.5}$ 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 §58.11(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 to not be considered comparable to the $PM_{2.5}$ NAAQS at the following sites: the former Kenansville site (AQS ID 37-061-0002); the former Jamesville site (AQS ID 37-117-0001); the Castle Hayne site (AQS ID 37-129-0002); the former Dillard School site (AQS ID 37-191-0005); and the Blackstone site (AQS ID 37-105-0002). The Dillard School, Kenansville, and Jamesville sites have since been shut down and the Castle Hayne FEM monitor data has been considered comparable to the NAAQS since 2016. The Blackstone monitor will shut down at the end of 2018, as discussed previously.

In response to the 2016 Network Plan, the EPA approved data from three additional FEM monitors not be considered comparable to the $PM_{2.5}$ NAAQS: Hickory (AQS ID 37-035-0004); Lexington Water Tower (AQS ID 37-057-0002); and Millbrook (AQS ID 37-183-0014). The NC-DAQ still considers the Hickory and Millbrook BAM 1020 (AQS method code 170) monitors not comparable to the NAAQS.

In response to the 2017 Network Plan, the EPA approved one BAM 1020 (AQS method code 170) monitor and two BAM 1022 (AQS method code 209) monitors be excluded from comparison with the NAAQS: Durham Armory (AQS ID 37-063-0015); Pitt Ag Center (AQS ID 37-147-0006); and William Owen (AQS ID 37-147-0006), respectively. These three FEM monitors are still considered not comparable to the NAAQS.

Table 6 lists the $PM_{2.5}$ FEM monitors that have been requested to be and approved to be considered not comparable to the NAAQS.

Table 6: Continuous $PM_{2.5}$ Monitors Collecting Data Not Comparable to the NAAQS

AQS ID	Site Name	AQS Method Code	Comments
37-105-0002	Blackstone	170	Approved 2015 plan. Will be discontinued at the end of 2018
37-183-0014	Millbrook	170	Approved 2016 plan
37-035-0004	Hickory	170	Approved 2016 plan. The BAM 1022 (AQS method code 209) monitor at Hickory is operated as the primary monitor comparable to the NAAQS.
37-063-0015	Durham Amory	170	Approved 2017 plan
37-051-0009	William Owen	209	Approved 2017 plan
37-147-0006	Pitt County Ag Center	209	Approved 2017 plan
37-021-0034	Board of Education	170	Operating as not comparable to collect two years of data for comparison to the FRM. Will be considered comparable to the NAAQS in 2019.

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

Forty (40) CFR Part 58, Appendix D, Section 4.7.3 requires that "[e]ach 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 the Candor site (AQS ID 37-123-0001) as a $PM_{2.5}$ general background site and the Bryson City site (AQS ID 37-173-0002) as a $PM_{2.5}$ regional transport site. 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, Section 4.7.4

The EPA currently funds three CSN monitors in North Carolina: Garinger (AQS ID 37-119-0041) operated by the MCAQ; Hattie Avenue (AQS ID 37-067-0022) operated by the FC-OEAP; and Millbrook (AQS ID 37-183-0014) operated by the NC-DAQ.

Photochemical Assessment Monitoring Station (PAMS)
40 CFR Part 58, Appendix D, Section 5.0

With the promulgation of a new O_3 NAAQS on October 1, 2015, the EPA 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 that there are several implementation challenges that agencies must to work through and we commit to working closely with the NC-DAQ and the MCAQ to minimize the burden of implementing this new monitoring program.

In the Network Plan, the MCAQ requested a waiver of the requirement to measure mixing height at its NCore site in Charlotte, collocated with the other PAMS parameters. The MCAQ requests to collect mixing height data using a ceilometer at an alternate location in Mecklenburg County. An alternate location for mixing height measurement is acceptable if it meets the requirements of 40 CFR part 58, Appendix D, Section 5 (e):

> The EPA Regional Administrator may grant a waiver to allow representative meteorological data from nearby monitoring stations to be used to meet the meteorological requirements in paragraph 5(b) where the monitoring agency can demonstrate the data is collected in a manner consistent with EPA quality assurance requirements for these measurements.

The EPA expects that mixing height measurements collected at another location in the same county would be representative of conditions at the NCore site. The EPA supports this proposal, however requests more information on the location MCAQ proposes to collect these data.

Monitoring Siting Criteria
40 CFR Part 58, Appendix E

In the Network Plan, the NC-DAQ, MCAQ, and FC-OEAP did a great job of providing detailed descriptions and photos of every monitoring site in the North Carolina monitoring network. The NC-DAQ and MCAQ also included “Site Review Forms” for the most recent year. These forms provide excellent documentation of the regular evaluation of each site. The EPA recommends that FC-OEAP also provide site evaluation forms or similar documentation in future network plans..