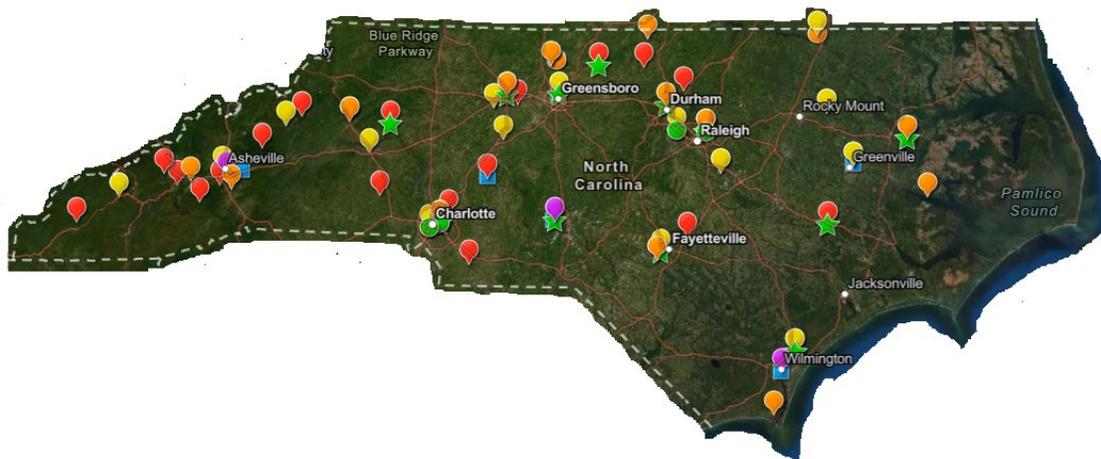


2019-2020 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 1 Network Descriptions



October 15, 2019

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

CERTIFICATION

By the signatures below, the North Carolina Division of Air Quality, or DAQ, certifies that the information contained in the 2019-2020 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. DAQ will submit a notification of change and a request for approval to EPA Region 4 at that time.

Signature Patrick Butler Date 10-14-2019
Patrick Butler
Ambient Monitoring Section Chief, DAQ

Signature Michael Abraczinskas Date 10/14/19
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, 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.

DAQ, which is part of the N.C. Department of Environmental Quality, or 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 United States Environmental Protection Agency, or EPA, has designated DAQ as the lead agency for enforcing federal laws and regulations dealing with air pollution in North Carolina.

The Ambient Monitoring Section, or AMS, of the division 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 40 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. EPA and DAQ have designed the criteria pollutant monitoring system to make measurements to assess compliance with the National Ambient Air Quality Standards, or NAAQS, as set by the EPA. The NAAQS specify concentration level thresholds for criteria air pollutants to protect the public health and welfare.

The law as defined in Title 40 of the Code of Federal Regulations, or CFR, Section 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, or 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 Part 58;
- The identification of any sites that are suitable and sites that are not suitable for comparison against the annual fine particle, or 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-PM₁₀ 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, or NO₂, monitors as either near-road or area-wide sites in accordance with Appendix D, Section 4.3 of 40 CFR Part 58; and
- The identification of any PM_{2.5} federal equivalent methods, or FEMs and/or approved regional methods, 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.

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

- II. Summary of Proposed Changes
- III. Carbon Monoxide, or 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, or PM₁₀
- VII. Fine Particle, PM_{2.5}, 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. Background Rainwater Collection Network
- XIV. EPA Approval Dates for Quality Management Plan and Quality Assurance Project Plans
- XV. 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. 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. Volume 2 includes these annual network review forms as an appendix to each regional section. 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 2019 Annual Monitoring Network Plan.

Appendix C provides the Forsyth County Office of Environmental Assistance and Protection 2019 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 located in each of the seven regional DAQ offices 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-Newport 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.

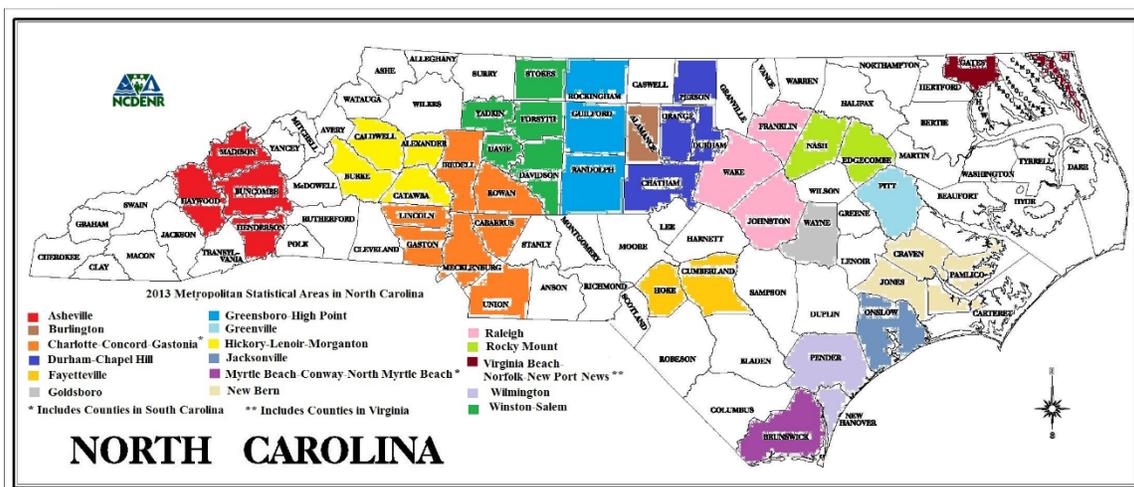


Figure 1. North Carolina metropolitan statistical areas as of February 2013

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

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.

2016, Duke Energy Progress decided to operate two sulfur dioxide sites as part of the DAQ PQA0 to meet the data requirements rule.

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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 the 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 scheduled to start-up or shut-down in 2018, 2019 or 2020 that were not included in the 2018-2019 network plan;
- Sites to be relocated, moved or upgraded in 2019 or 2020;
- 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, 2018, or July 1, 2017 and July 1, 2018.

County Name	Population Estimate July 1, 2018	State Ranking of Counties by 2018 Estimate	Reason for Selection as one of the Fastest-Growing Counties in North Carolina
Brunswick	136,744	22	Growth of 4.6 percent from 2017 to 2018 and 27.3% from April 1, 2010 to July 1, 2018. Nation's 5 th (annual) and 24 th (decade) fastest-growing county (percentagewise).
Cabarrus	211,342	11	Growth of 4,618 people (2.2%) from 2017 to 2018 and 33,255 people (18.7%) from April 1, 2010 to July 1, 2018. Nation's 76 th (decade) fastest-growing county (percentagewise).
Chatham	73,139	36	Growth of 1,891 people (2.7%) from July 1, 2017 to July 1, 2018. Nation's 78 th (annual) fastest-growing county (percentagewise).
Currituck	27,072	74	Growth of 749 people (2.8%) from 2017 to 2018 and 3,525 (15%) from April 1, 2010 to July 1, 2018. Nation's 65 th (annual) fastest-growing county (percentagewise).
Durham	316,739	6	Growth of 4,851 people (1.6%) from 2017 to 2018 and 46,740 people (17.3%) from April 1, 2010 to July 1, 2018. Nation's 89 th (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, 2018, or July 1, 2017 and July 1, 2018.

County Name	Population Estimate July 1, 2018	State Ranking of Counties by 2018 Estimate	Reason for Selection as one of the Fastest-Growing Counties in North Carolina
Franklin	67,560	40	Growth of 1,527 people (2.3%) between July 1, 2017 and July 1, 2018 and 7,007 people (11.6%) between April 1, 2010 and July 1, 2018.
Guilford	533,670	3	Growth of 4,174 people (0.8%) between July 1, 2017 and July 1, 2018, and 45,249 people (9.3%) between 4/1/2010 and 7/1/2018.
Johnston	202,675	12	Growth of 6,252 people (3.2%) from 2017 to 2018 and 33,798 (20%) from April 1, 2010 to July 1, 2018. Nation's 47 th (annual) and 62 nd (decade) fastest-growing county (percentagewise).
Mecklenburg	1,093,901	1	Growth of 16,590 people (1.5%) between July 1, 2017, and July 1, 2018 and 174,233 people (18.9%) between 4/1/2010 and 7/1/2018. Nation's 75 th (decade) fastest-growing county (percentagewise).
Pender	62,162	43	Growth of 1,394 people (2.3%) from 2017 to 2018, and 9,964 people (19.1%) from April 1, 2010, to July 1, 2018. Nation's 71 st (decade) fastest-growing county (percentagewise).
Union	235,908	8	Growth of 34,574 people (17.2%) from April 1, 2010 to July 1, 2018. Nation's 92 nd (decade) fastest-growing county.
Wake	1,092,305	2	Growth of 20,419 people (1.9%) from 2017-2018 and 191,247 people (21.2%) from April 1, 2010, to July 1, 2018. Nation's 50 th (decade) fastest-growing county (percentagewise).

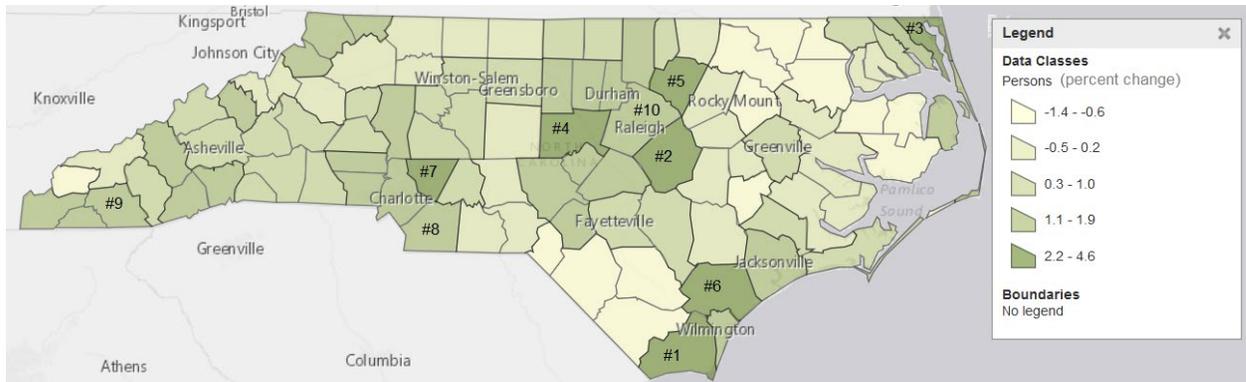


Figure 2. Estimated Percentage Growth by County from 2017 to 2018

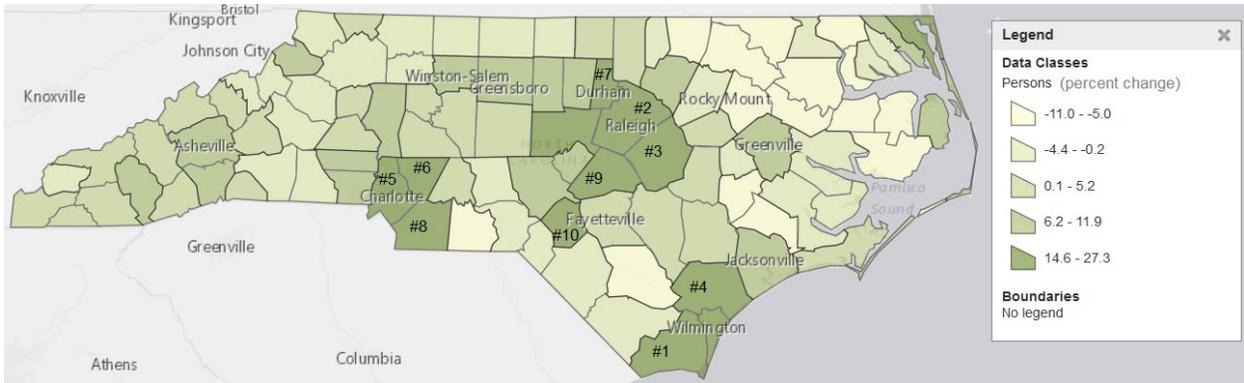


Figure 3. Estimated Rate of Growth by County from April 2010 to July 2018

A. Monitors Scheduled to Start Up or Shut Down in 2018, 2019 or 2020 that were not included in the 2018-2019 Network Plan

Table 2 presents a list of monitors DAQ either expects to, or has already, started up or shut down in 2018, 2019 or 2020 that were not included in the 2018-2019 network plan listed by metropolitan statistical area, MSA and Air Quality System, AQS, site identification number. Appendix B. 2019 Annual Monitoring Network Plan for Mecklenburg County Air Quality discusses changes to the monitors operated by Mecklenburg County Air Quality. Appendix C. 2019 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 DAQ, Duke and WNC.

Table 2. Summary of Monitors Scheduled to Start Up or Shut Down in 2018, 2019 or 2020 that were not included in the 2018-2019 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	1/1/2020
			PM _{2.5}	Monitoring will start	1/1/2020
			RCN	Monitoring started	3/12/2019
Raleigh	371830014	Millbrook	RCN	Monitoring started	4/24/2018
Greensboro-High Point	370810013	Mendenhall	RCN	Monitoring started	3/26/2019
Durham	370630015	Durham Armory	PM _{2.5}	A collocated FRM will be added to the site	10/1/2019
	371450004	Semora DRR	SO ₂	Monitoring will end	6/30/2020
			Wind speed		
			Wind direction		
Sigma					
Asheville	370210037	Skyland DRR	SO ₂	Monitoring will end	6/30/2020
			Wind speed		
			Wind direction		
			Sigma		
	370210038	Asheville	RCN	Monitoring started	11/20/2018

Table 2. Summary of Monitors Scheduled to Start Up or Shut Down in 2018, 2019 or 2020 that were not included in the 2018-2019 Network Plan

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Fayetteville	370510009	William Owen	PM _{2.5}	The collocated FRMs at the site will shut down and the BAM will become the primary monitor	12/31/2019
Hickory	370350004	Hickory	PM _{2.5}	The collocated FRM at the site was replaced with a collocated BAM 1022	6/21/2019
Wilmington	371290010	Eagles Island	RCN	Monitoring started	1/8/2019
Greenville	371470006	Pitt Co Ag Center	PM _{2.5}	The FRM at the site shut down and the BAM 1022 became the primary monitor	6/30/2019
			RCN	Monitoring started	2/12/2019
Not in an MSA	371230001	Candor	RCN	Monitoring started	10/24/2018
	371310003	Northampton County	NO ₂	Monitoring started	7/29/2019
			PM _{2.5}		7/24/2019

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. 2019 Annual Monitoring Network Plan for Mecklenburg County Air Quality. This subsection discusses the three monitors in this MSA that DAQ started or will start in 2019.

To meet the need for background data for prevention of significant deterioration modeling and permitting, DAQ will add a nitrogen dioxide and fine particle monitor to the **Rockwell** ozone monitoring station, shown in Figure 4. These monitors will start operating by Jan. 1, 2020. To meet the need for sampling rainwater throughout the state, DAQ added a rainwater collection station to the Rockwell site on March 12, 2019.



Figure 4. The Rockwell ozone-monitoring site

2. Monitoring Changes in the Raleigh MSA

To meet the need for sampling rainwater throughout the state, DAQ added a rainwater collection station to the **Millbrook** site on April 24, 2018.



Figure 5. The Millbrook NCore-monitoring site

3. Monitoring Changes in the Greensboro-High Point MSA

To meet the need for sampling rainwater throughout the state, DAQ added a rainwater collection station to the **Mendenhall** site on March 26, 2019.



Figure 6. The Mendenhall ozone- and particle-monitoring site

4. Monitoring Changes in the Durham MSA

In 2019 and 2020, DAQ and Duke Energy Progress have made and plan to make changes to the **Durham Armory** site in Durham, North Carolina and the **Semora Data Requirements Rule**, or DRR, site in Person County.

Monitoring Changes at the Durham Armory Site in Durham County

DAQ monitors for ozone, sulfur dioxide, fine particles, particles with aerodynamic diameters of 10 microns or less and coarse particles at this site. As the fine particle federal reference method network grows smaller, DAQ will need to add a collocated fine particle monitor to this site sometime before the end of 2019.



Figure 7. The Durham Armory multi-pollutant monitoring site

Monitoring Changes at the Semora DRR Site in Person County

The Semora DRR monitoring station is near the Roxboro steam station operated by Duke Energy Progress. DAQ and Duke jointly established this monitoring station in 2016 to measure sulfur dioxide in the ambient air near the facility to meet the requirements of the DRR. Duke also monitors wind speed and direction at this site. At the end of 2019, this sulfur dioxide monitor will have collected the three-years of data necessary to determine a design value. Currently, the projected design value is 31.7 parts per billion, which is less than 50% of the national ambient air quality standards. Thus, DAQ and Duke Energy Progress propose shutting down this site in 2020 after the 2019 data are certified. DAQ anticipates the site will shut down sometime during second quarter 2020.



Figure 8. The Semora DRR sulfur dioxide monitoring site

5. Monitoring Changes in the Asheville MSA

In 2019 and 2020, DAQ and Duke Energy Progress have made and plan to make changes to the monitoring networks in the Asheville MSA.

Monitoring Changes at the Skyland DRR Site in Buncombe County

The **Skyland DRR** monitoring station is near the Asheville Steam Station operated by Duke Energy Progress. DAQ, WNC and Duke jointly established this monitoring station in 2017 to measure sulfur dioxide in the ambient air near the facility to meet the requirements of the DRR. Duke also monitors wind speed and direction at this site. This sulfur dioxide monitor will have collected the three-years of data necessary to determine a design value at the end of 2019. Currently, the projected design value is 11.6 parts per billion, which is less than 50% of the national ambient air quality standards. Thus, DAQ, WNC and Duke Progress Energy propose shutting down this site in 2020 after the 2019 data are certified. The division anticipates the site will shut down sometime during second quarter 2020.



Figure 9. The Skyland DRR sulfur dioxide monitoring site

Monitoring Changes at the Asheville Rainwater Collection Network Site in Buncombe County

To meet the need for sampling rainwater throughout the state, DAQ added a rainwater collection station at the Asheville Regional Office on November 20, 2018.

6. Monitoring Changes in the Fayetteville MSA

Before the end of 2019, DAQ plans to relocate the collocated FRM fine particle monitor at **William Owen** to the Durham Armory site. On December 31, DAQ will shut down the fine particle FRM monitor and make the continuous fine particle monitor located at the site the primary fine particle monitor for the site.



Figure 10. The William Owen particle-monitoring site

7. Monitoring Changes in the Hickory MSA

To meet the need for collocated sampling for the fine-particle beta attenuation monitor (BAM) network, DAQ shut down the collocated federal reference method fine-particle monitor at the **Hickory** site and replaced it with a collocated BAM monitor on June 21, 2019.



Figure 11. The Hickory fine-particle-monitoring site

8. Monitoring Changes in the Wilmington MSA

To meet the need for sampling rainwater throughout the state, DAQ added a rainwater collection station to the **Eagles Island** site on Jan. 8, 2019.



Figure 12. The Eagles Island air-toxics monitoring site

9. Monitoring Changes in the Greenville MSA

To meet the need for sampling rainwater throughout the state, DAQ added a rainwater collection station to the **Pitt County Agricultural Center** site on Feb. 12, 2019. On June 30, 2019, DAQ shut down the collocated fine particle FRM monitor and made the continuous fine particle monitor located at the site the primary fine particle monitor.



Figure 13. The Pitt County Agricultural Center ozone and fine-particle monitoring site

1. Monitoring Changes in Areas not in MSAs

Monitoring Changes at Candor in Montgomery County

The **Candor** monitoring station is in Montgomery County. To meet the need for sampling rainwater throughout the state, DAQ added a rainwater collection station to the Candor site on Oct. 24, 2019.



Figure 14. The Candor monitoring site

Monitoring in Northampton County

Monitoring in Northampton County started in response to public comments received from county residents 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 to establish a background monitoring station in Northampton County for fine particles, or PM_{2.5}, and nitrogen dioxide, or NO₂. Thus, DAQ started operating one Northampton County background monitoring station in July 2019. The Northampton County background-monitoring project is a short-term project expected to last two to five years.

B. Sites to be Relocated or Moved

Table 3 presents a list of monitors DAQ either expects to or has already relocated or moved in 2018, 2019 or 2020 that were not included in the 2018-2019 network plan listed by MSA and AQS site identification number. Appendix B. 2019 Annual Monitoring Network Plan for Mecklenburg County Air Quality discusses changes to the monitors operated by Mecklenburg County Air Quality. Appendix C. 2019 Annual Monitoring Network Plan for Forsyth County Office of Environmental Assistance and Protection discusses changes to the monitors operated by Forsyth County. This section primarily discusses the changes listed in the table applying to monitoring sites operated by DAQ, Duke and WNC.

Table 3. Summary of Monitors Scheduled to Relocate or Move in 2018, 2019 or 2020 that were not included in the 2018-2019 Network Plan

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Charlotte-Concord-Gastonia	371190042	Montclair	PM ₁₀	Monitoring ended due to eviction from site due to construction on property	3/31/2019
			PM _{2.5}		3/31/2019
Fayetteville	370510008	Wade	Ozone	New monitoring shelter to be installed at site	1/31/2020
Hickory	370270004	Lenoir	Ozone SO ₂	New monitoring shelter to be installed at site	1/31/2020
Wilmington	371290002	Castle Hayne	PM _{2.5} Ozone	New monitoring shelter to be installed at site	10/1/2019
Greenville	371470006	Pitt Co Ag Center	PM _{2.5} Ozone	New monitoring shelter installed at site	3/29/2019

DAQ did not relocate or move any sites between the 2018 and 2019 ozone seasons. However, DAQ did replace the monitoring shelter at the Pitt County Agricultural Center site. DAQ does not anticipate moving any sites in the next 18 months. However, DAQ does anticipate replacing shelters at three additional sites during the next 18 months. The following subsections provide more information on these sites.

1. Shelter Replacements in the Fayetteville MSA

Before the start of the 2020 ozone season, DAQ plans to replace the monitoring shelter at Wade, 37-051-0008. The new shelter will either go in the same place as the existing shelter or next to it. If DAQ can place the new shelter next to the existing shelter, DAQ can transfer the power and monitor to the new shelter with minimal disruption to monitoring at the site. However, placing the shelter next to the existing shelter may locate the shelter too close to trees to the east of the monitoring site.



Figure 15. The Wade ozone-monitoring site showing possible location (red box) of the new monitoring shelter relative to the current shelter

2. Shelter Replacements in the Hickory MSA

Before the start of the 2020 ozone season, DAQ plans to replace the monitoring shelter at Lenoir, 37-027-0003. The new shelter will either go in the same place as the existing shelter or next to it. If DAQ can place the new shelter next to the existing shelter, DAQ can transfer the power and monitor to the new shelter with minimal disruption to monitoring at the site. However, placing the shelter next to the existing shelter may locate the shelter too close to trees to the south of the monitoring site.



Figure 16. The Lenoir ozone and sulfur dioxide-monitoring site showing possible location (red box) of the new monitoring shelter relative to the current shelter

3. Shelter Replacements and Sampler Relocations in the Wilmington MSA

At the end of 2019, DAQ plans to replace the monitoring shelter at Castle Hayne, 37-129-0002. The new shelter will go in front of the existing shelter. Placing the new shelter next to the existing shelter, DAQ can transfer the power and monitor to the new shelter with minimal disruption to monitoring at the site. Setting the shelter in front of the existing shelter should maintain the current distance between the shelter and the trees to the west of the monitoring site and still provide adequate space between the probe and the road.



Figure 17. The Castle Hayne ozone and particle-monitoring site showing the planned location (red box) of the new monitoring shelter relative to the current shelter

4. Shelter Replacements and Sampler Relocations in the Greenville MSA

DAQ replaced the shelter at the Pitt County Agricultural Center site, 37-147-0006, and relocated the ozone equipment into the new building on March 29, 2019. The new building is approximately 3 meters to the east of the previous building. The ozone probe is approximately 6 meters east of its previous location. DAQ will relocate the continuous fine particle monitor to the roof of the new building, approximately 9 meters east of its previous location.



Figure 18. The Pitt County Agricultural Center ozone and fine-particle monitoring site

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

From 1999 until the end of 2015, 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, DAQ switched to using an R & P Model 2025 PM_{2.5} Sequential Monitor with a very sharp cut cyclone, AQS method code 145 and EPA reference method designation RFPS-1006-145.

DAQ used a Ruprecht & Patshneck (R & P) TEOM Series 1400a for continuous, averaged on an hourly basis, measurement of fine particles until January 2016. This model of TEOM was ineligible to become a federal equivalent method or FEM, for fine particles because it did 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. In addition, the manufacturer no longer supports this model of 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 FEM. Since 2008, DAQ purchased numerous BAM 1020s. In 2014, DAQ established a site at Blackstone in Lee County, which shut down in 2018, and added BAM 1020s at the Lexington and Hickory sites. In 2015, the division added a BAM 1020 at the Durham Armory and BAM 1022s at the Hickory, Mendenhall and William Owen sites. In 2016, DAQ added BAM 1022s at the Pitt County Agricultural Center, Spruce Pine and West Johnston sites. After one-to-two-year studies, the division 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, Castle Hayne, 37-129-0002, and Bryson City, 37-173-0002, monitoring sites. DAQ replaced the Hickory R & P Model 2025 PM2.5 sequential monitor with a BAM 1022. In 2018, division 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. In 2019, WNC replaced the primary Thermo Model 2025i PM2.5 sequential monitor at the Board of Education, 37-021-0034, with a BAM 1022 and designated the sequential monitor as a collocated monitor. Also in 2019, DAQ replaced the Thermo Model 2025i PM2.5 sequential monitor at the Pitt County Agricultural Center, 37-147-0006, with a BAM 1022.

Table 4 lists the current sites where DAQ requested and received permission to exclude data from operating BAMs from comparison to the NAAQS. On Dec. 15, 2016, the EPA approved operating the Raleigh Millbrook BAM 1020 as an AQI monitor only.³ On Oct. 25, 2017, the EPA approved operating the Durham Armory BAM 1020 and the William Owen BAM 1022 as AQI monitors only.⁴

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

Metropolitan Statistical Area	AQS Site Id Number	Site Name	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
Fayetteville	370510009	William Owen	Swapped out TEOM for a BAM 1022	12/30/2015

³ 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/air/documents/DocsSearch.do?dispatch=download&documentId=8964>.

⁴ 2017 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/air/documents/DocsSearch.do?dispatch=download&documentId=9819>.

D. Rotating Background Monitors

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.⁵ Monitors for sulfur dioxide, SO₂, or PM₁₀ rotate to these sites every three years. DAQ selects these rotating sites to provide the greatest possible spatial coverage from the coastal plain to the foothills. Table 5 and Table 6 provide the background monitoring sites with their operating schedules.

E. Current Waivers and New Requests

Every five years DAQ is required to request that the EPA renew any existing waivers. Appendix D. Current Waivers Approved by the EPA provides existing waivers approved by the EPA. This subsection contains new requests for waivers and other actions.

DAQ makes the following requests:

- A continuation of the waiver for exclusion of BAM data from nonattainment determinations for the Durham Armory, 37-063-0015 and Millbrook, 37-183-0014 and T640X data for Millbrook; and
- A waiver for the trees on both sides of the monitor at the Skyland DRR monitoring station in Royal Pines/Arden, North Carolina.

1. 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 the Durham Armory, 37-063-0015, and Millbrook, 37-183-0014 and T640X data at Millbrook. Appendix E. Request for Exclusion of PM_{2.5} Continuous FEM data from Comparison to the NAAQS delineates the request for excluding these data.

2. Request for a waiver for the trees on either side at the Skyland DRR site

As stated earlier, the EPA recognizes situations may exist where some deviation from the siting criteria may be necessary. In any such case, the agency must thoroughly document the reasons in a written request for a waiver that describes how and why the proposed siting deviates from the criteria. This documentation should help to avoid later questions about the validity of the resulting monitoring data.

The regulations at 40 CFR Part 58, Appendix E, Section 4 (a) state that buildings and other obstacles may possibly scavenge SO₂ and can act to restrict airflow. To avoid this interference, the probe must have unrestricted airflow and be located away from obstacles. The distance from the obstacle to the probe must be at least twice the height that the obstacle protrudes above the probe. The EPA can make an exception to this

⁵ 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>.

requirement for measurements taken at source-oriented sites where buildings and other structures are unavoidable.

Table 5 The 2018-2021 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.			
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 40 CFR Part 58, Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of 40 CFR Part 58, Appendix C:	Yes: EQSA-0486-060	Yes: EQSA-0486-060	Yes: EQSA-0486-060	Yes: EQSA-0486-060
Meets Requirements of 40 CFR Part 58, Appendix D:	No	No	No	No
Meets Requirements of 40 CFR Part 58, Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Will operated 5/2020 to 4/2021	Operated 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 6 The 2018-2020 Rotating Background PM₁₀ Monitoring Network

AQS Site Id Number:	37-003-0005	37-129-0002	37-033-0001	37-107-0004	37-117-0001	371230001
Site Name:	Taylorville-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:	Taylorville	Castle Hayne	Reidsville	Kinston	Jamesville	Candor
Latitude:	35.9139	34.364167	36.307033	35.231459	35.810690	35.263165
Longitude:	-81.191	-77.838611	-79.467417	-77.568792	-76.897820	-79.836636
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	Hourly 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			
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	EQPM-0798-122	EQPM-0798-122	EQPM-0798-122	EQPM-0798-122	EQPM-0798-122
Meets Requirements of Part 58, Appendix D:	Yes – not required	Yes – not required	Yes – not required			
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Will operate 6/28/2019 to 6/30/2020	Will operate 11/1/2019 to 10/31/2020	Will operate 9/1/2019 to 8/31/2020	Operated 3/1/2017 to 3/2/2018 and will operate 6/1/2020 to 5/31/2021	Operated 4/1/2018 to 3/31/2019	Will operate 8/1/2020 to 7/31/2021

The regulations at 40 CFR Part 58, Appendix E, Section 5 (a) also state that trees can provide surfaces for SO₂ adsorption or reactions. Trees can also act as obstructions in cases where they are located between the air pollutant sources or source areas and the monitoring site, and where the trees are of a sufficient height and leaf canopy density to interfere with the normal airflow around the probe. To reduce this possible interference or obstruction, the probe must be at least 10 meters or further from the drip line of trees.

The regulations also say no trees or shrubs should be located between the probe and the source under investigation and there must be unrestricted airflow for 270 degrees around the probe.

The regulations at 40 CFR Part 58, Appendix E, Section 10 provide waiver provisions. The EPA acknowledges some existing sites may not meet the requirements in 40 CFR Part 58, Appendix E and still produce useful data for some purposes. In these cases, the EPA will consider a written request from the agency to waive one or more siting criteria for some monitoring sites provided that the agency can adequately demonstrate the need or purpose for monitoring or establishing a monitoring site at that location. For an existing site, the EPA may grant a waiver if the site meets either of the following criteria:

- The site can be demonstrated to be as representative of the monitoring area as it would be if the siting criteria were being met; or
- The agency cannot reasonably locate the monitor or probe 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).

DAQ requests a waiver for the trees that are on the north and south-southwest sides of the building because they obstruct airflow. DAQ also requests a waiver for having unrestricted airflow for 270 degrees around the probe. The waiver is necessary for the following reasons:

- EPA, DAQ and Duke consider the monitoring site a “source-oriented site” where the location was established specifically for detecting ambient concentrations related to the operation of the Asheville Station located to the southwest, with a direct line of site from the monitor to the facility.
- The EPA required that the monitor be located on Brown Mountain due to modeling results showing a greater impact here than at other more suitable locations:
- The trees are on private property and the owner has not provided permission to DAQ to remove the trees;
- By the time permission could be granted to remove the trees, the monitoring will have ended; and
- The facility will switch to natural gas in the immediate future eliminating the need for further monitoring.

Figure 100 is an aerial photograph and Figure 20 is a diagram of the site showing the location of the monitor and 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. DAQ identified three trees to the north and two trees to the south-southwest that act as an obstruction to air flow. Figure 20 and Table 7 provide information on these trees. Figure 21 and Figure 22 provide photographs of the obstructing trees, numbered to correspond with the information in the diagram and table.



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

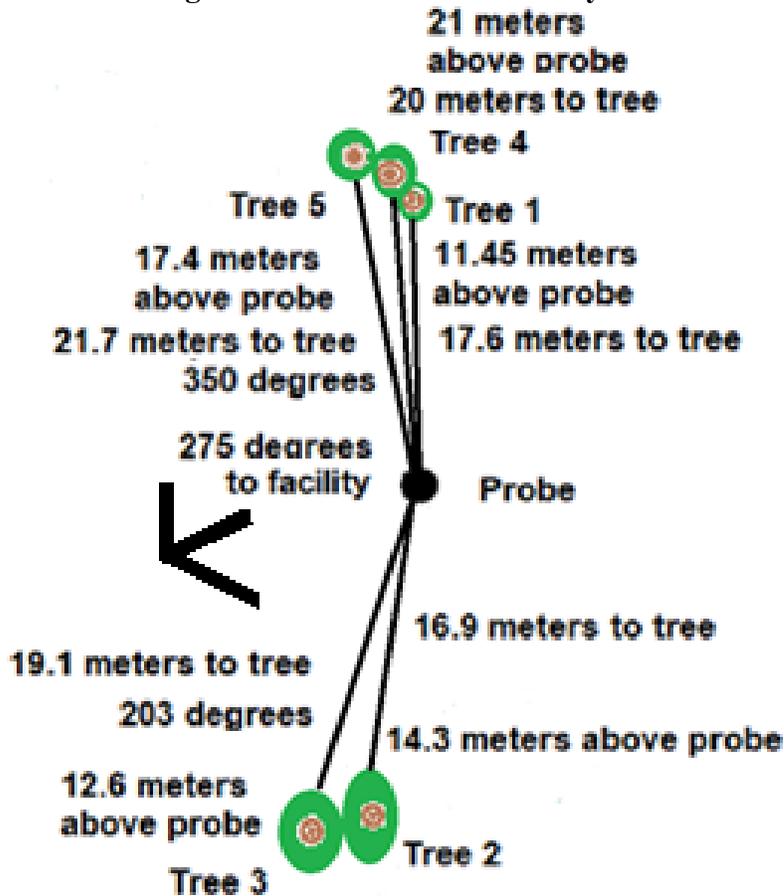


Figure 20. Diagram showing relative position of the obstructing trees and probe

Table 7. Information on Trees Acting as an Obstruction at the Skyland DRR Site

Tree Number	Direction from probe	Distance to tree (meters)	Height tree extends above probe (meters)	Ratio of Distance to Height
1	North	17.6	11.45	1.54
2	South southwest	16.9	14.3	1.18
3	South southwest (203 degrees)	19.1	12.6	1.52
4	North (350 degrees)	20	21	0.95
5	North	21.7	17.4	1.25



Figure 21. Obstructing Trees to the North of the Probe



Figure 22. Obstructing Trees to the South-southwest of the probe

Predominant winds measured at the Asheville Regional Airport are from the north and north northwest. Figure 101 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 24 provides a wind rose using the 2017 to 2019 wind data measured at the site and Figure 25 provides a pollution rose using data measured on site. Both indicate that the primary wind direction measured on Brown Mountain is from the west-northwest and west, which is the direction of the facility. There are no trees between the probe and facility as shown in Figure 26.

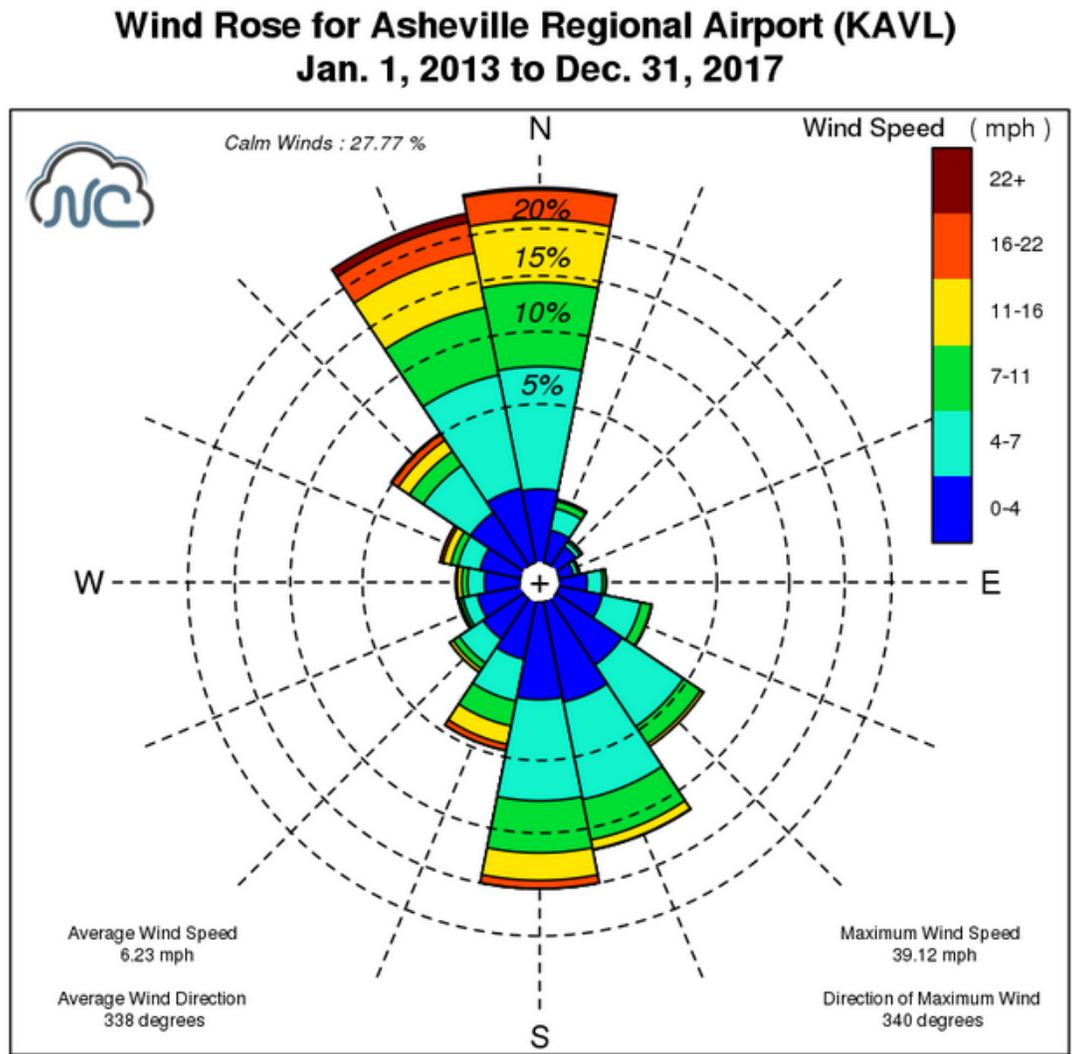


Figure 23. Wind Rose for the Asheville Regional Airport for 2013-2017.

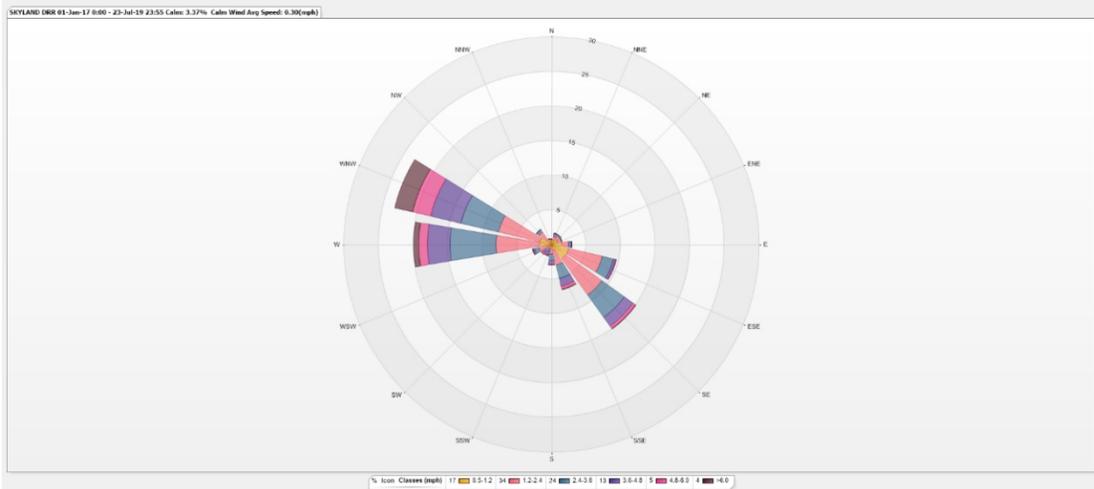


Figure 24. Wind rose using on-site meteorological data

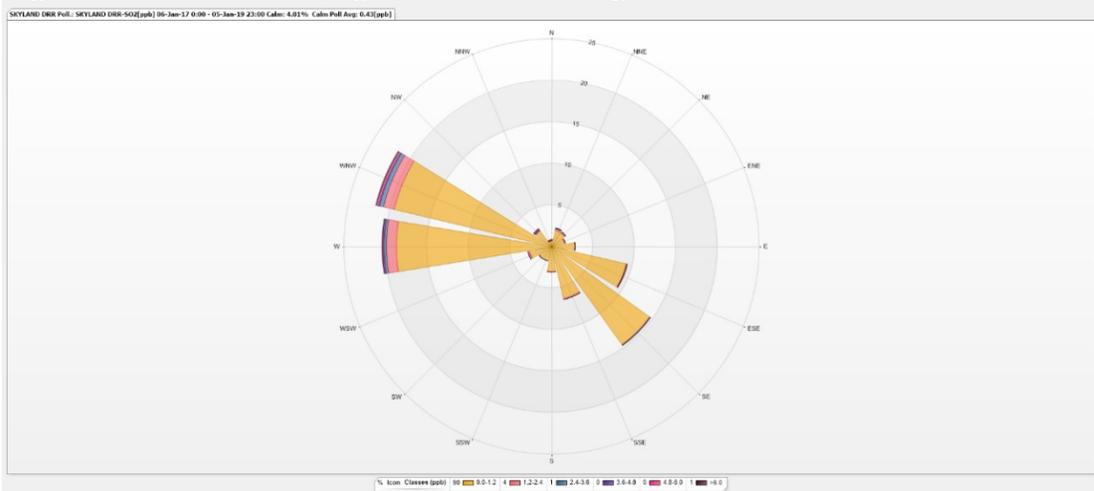


Figure 25. Skyland Pollution Rose for Sulfur Dioxide



Figure 26. Looking west toward Lake Julian 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 probe, the trees should not affect the ability of the site to monitor sulfur dioxide emissions from the facility. Thus, DAQ requests a waiver of siting criteria regarding the trees to the north and south-southwest.

III. Carbon Monoxide, or CO, Monitoring Network

The Division of Air Quality, or DAQ, and Mecklenburg County Air Quality, or MCAQ conduct carbon monoxide monitoring in two of the major urban areas of the state, the Raleigh and Charlotte-Concord-Gastonia metropolitan statistical areas, also known as MSAs. The 2019-2020 state-operated network consists of two monitors in Raleigh operated by DAQ and two monitors in Charlotte operated by 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 27, 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 Forsyth County shut down this site at the end of 2015.

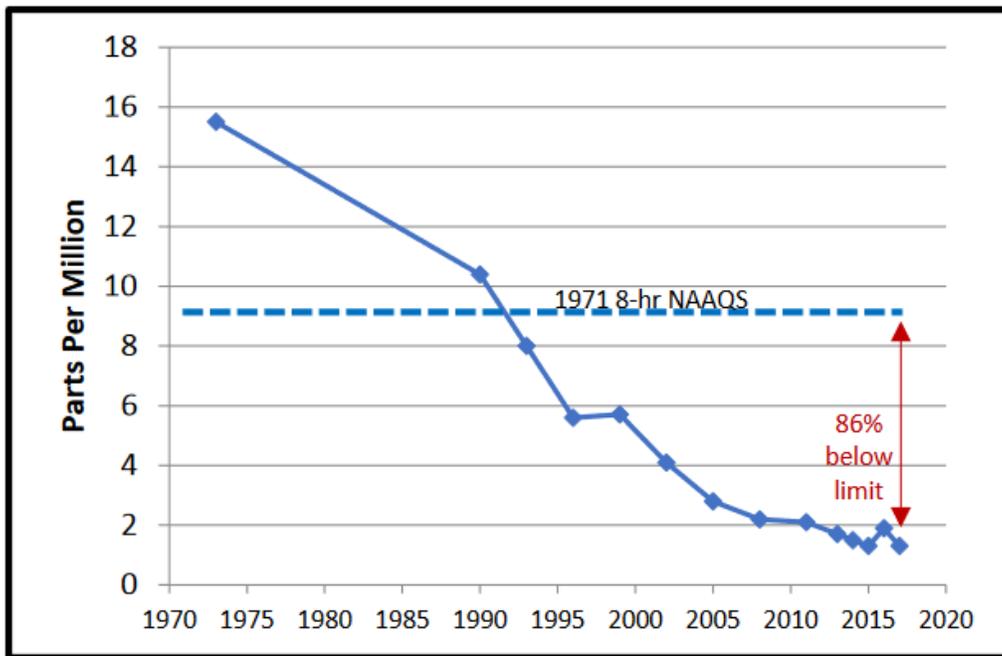


Figure 27. Statewide 8-hour carbon monoxide levels through 2017

(from *Air Quality Trends in North Carolina*, December 2018, located at https://files.nc.gov/ncdeq/Air%20Quality/Air_Quality_Trends_in_North_Carolina_122118.pdf)

One monitor in Raleigh and one monitor in Charlotte are located near the interstate 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 2014 to 2018.

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.⁶

Figure 28 provides the maximum 1-hour and Figure 29 provides the maximum 8-hour concentrations for all operating sites for 2011 through 2018. All measured carbon monoxide concentrations during the past five years have been well below 80% 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.⁷

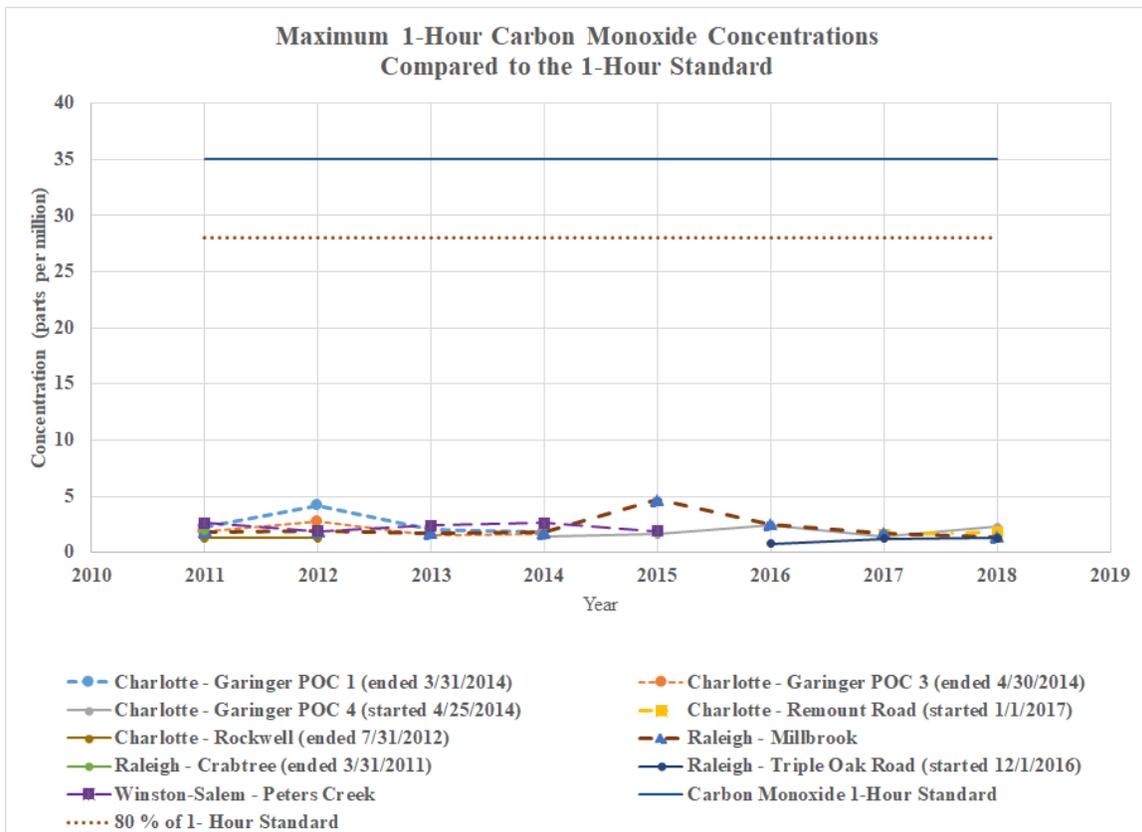


Figure 28. Maximum 1-hour carbon monoxide concentrations measured in North Carolina from 2011 to 2018

⁶ “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>.

⁷ “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.

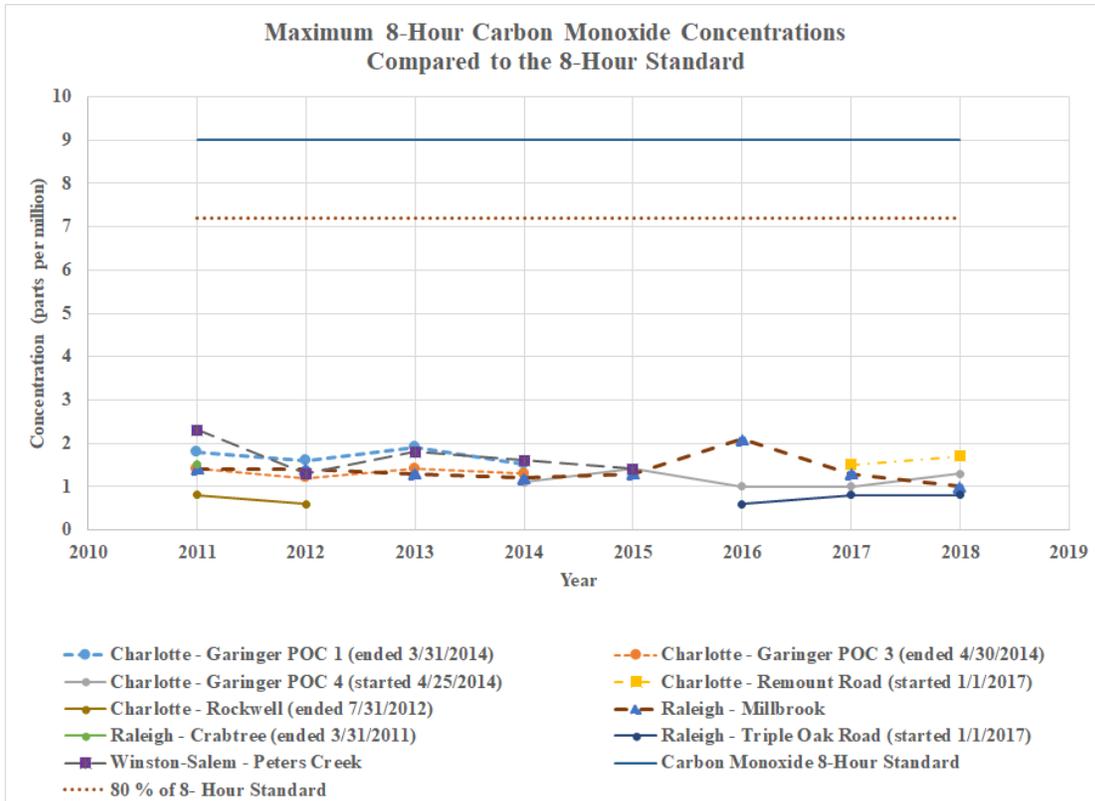


Figure 29. Maximum 8-hour carbon monoxide concentrations measured in North Carolina from 2011 to 2018

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

Table 8 The 2019-2020 Carbon Monoxide Monitoring Network for the Charlotte-Concord-Gastonia MSA ^a

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

Table 8 The 2019-2020 Carbon Monoxide Monitoring Network for the Charlotte-Concord-Gastonia MSA ^a

AQS Site Id Number:	37-119-0041	37-119-0045
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-TLE 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 9 The 2019-2020 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-TLE method, Air Quality System, AQS, method code 554

IV. Sulfur Dioxide Monitoring Network

Sulfur dioxide, or SO₂, 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, or DHEC, also operated an upwind background special purpose SO₂ monitor in York County, South Carolina, part of the Charlotte-Concord-Gastonia Metropolitan Statistical Area, MSA. At the end of 2016, DHEC moved their York County monitoring site from 2316 Chester Highway to 310 Langrum Road. They have operated the upwind background special purpose SO₂ monitor at this site since starting in 2018.

The EPA and DAQ use the data collected 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 SO₂ levels from 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 30, 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.

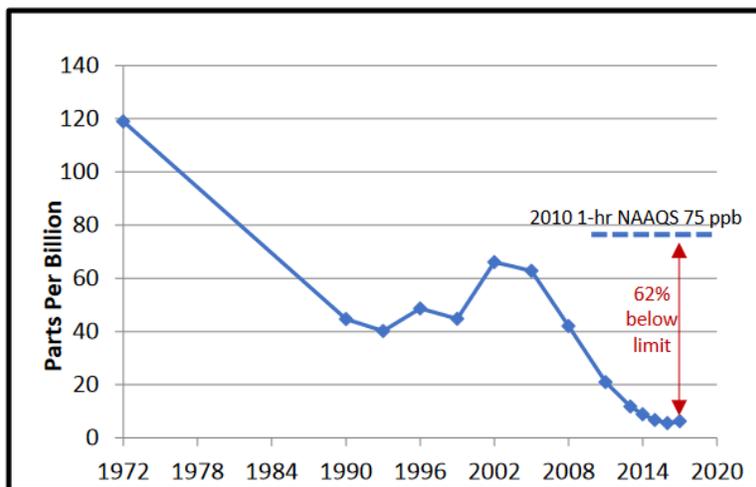


Figure 30. Statewide trends for sulfur dioxide

(from *Air Quality Trends in North Carolina*, December 2018, located at https://files.nc.gov/ncdeq/Air%20Quality/Air_Quality_Trends_in_North_Carolina_122118.pdf)

Figure 31 through Figure 33 show the design value or concentrations of sulfur dioxide measured in North Carolina between 2011 and 2018 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% of the standard. For the rotating and special purpose monitors the maximum 99-percentile 1-hour concentration during the past five years was 24% 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. DAQ is working with these two facilities to reduce their sulfur dioxide emissions.

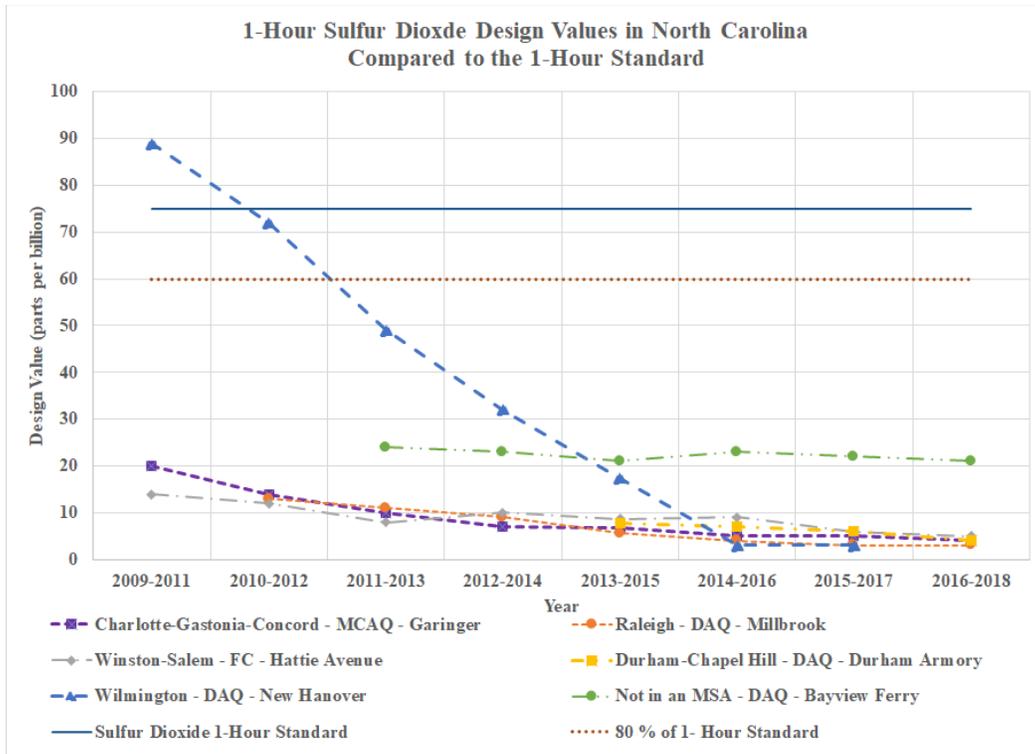


Figure 31. Sulfur dioxide 1-hour design value trends for SLAMS monitors

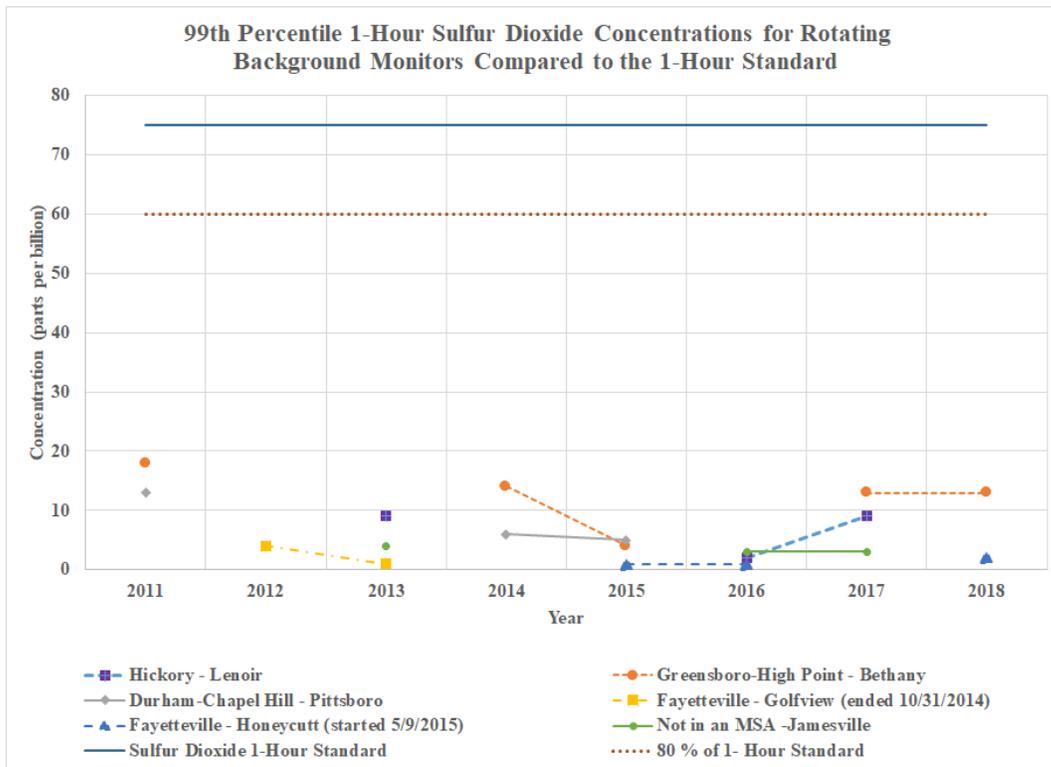


Figure 32. Background Sulfur Dioxide Concentrations

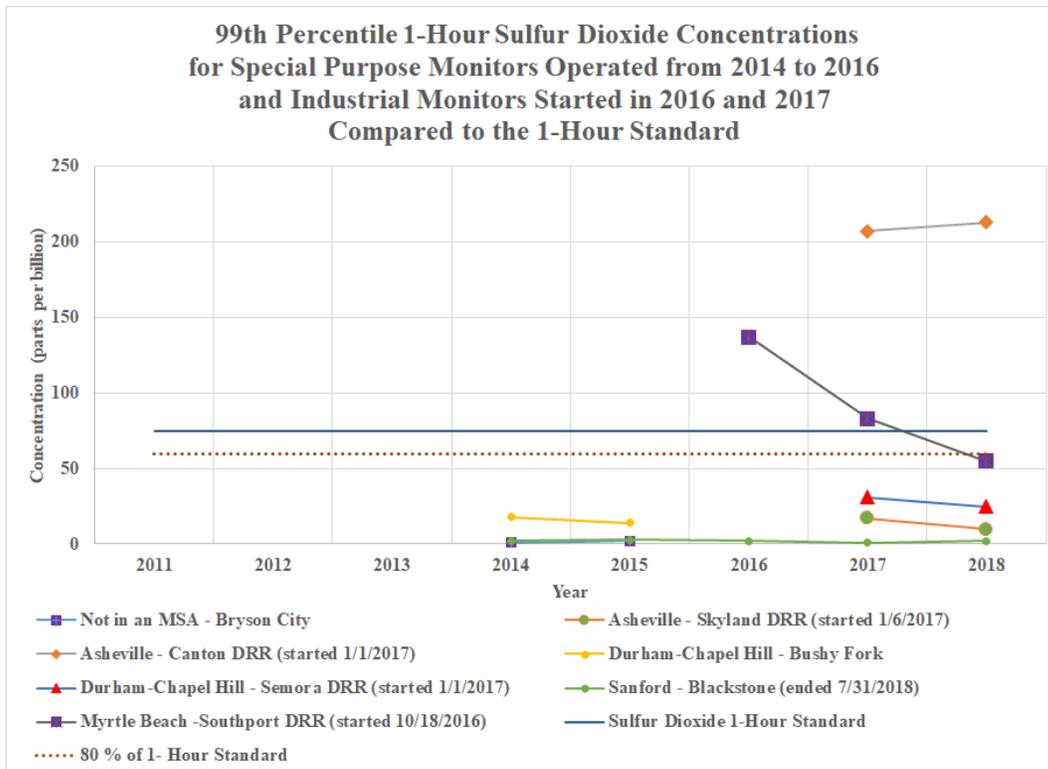


Figure 33. Sulfur Dioxide Concentrations at Special Purpose and Industrial Sites

The division operates one trace-level SO₂ monitor on a 100-ppb scale because low levels of SO₂ 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. 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 SO₂ monitor at the Garinger NCore site in Mecklenburg County.

When an industry or business wants to expand or begin operations in an area, the federal government requires the business to conduct 12 consecutive months of background monitoring to use in modeling to demonstrate the addition or expansion of their facility will not contribute to the significant deterioration of air quality in that area. In 2010, DAQ modified the rotating PSD network by shutting down the Bryson City SO₂ monitor in Swain County and adding rotating PSD SO₂ monitors at Lenoir in Caldwell County and Bethany in Rockingham County. Assessment of the SO₂ monitoring network indicated that these changes could improve the ability of DAQ to meet its obligation to provide relevant background SO₂ data for PSD modeling. In 2015, the division decided to shut down the rotating PSD SO₂ monitor at Pittsboro. DAQ no longer needed the monitor because of the monitor at the Durham Armory.

In 2011, DAQ moved the Aurora 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 34 shows the relative location of the two sites. The Bayview Ferry site began operating in January 2011.

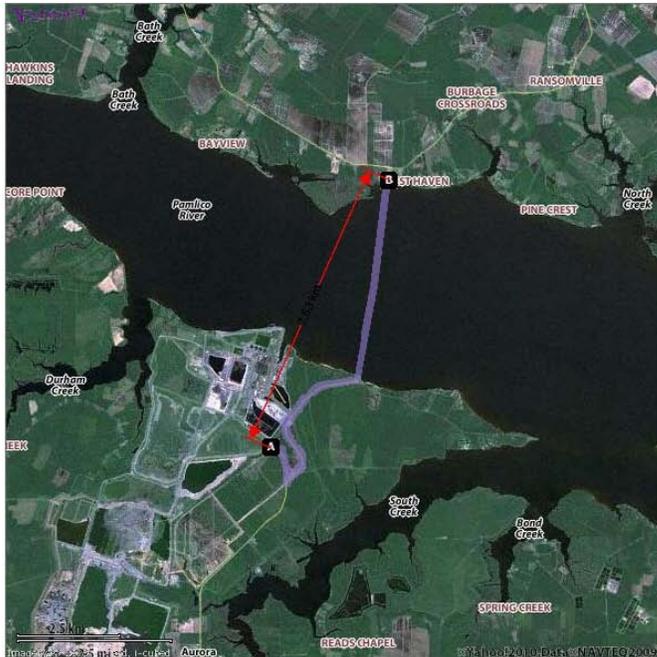


Figure 34. Location of the Bayview Ferry Site, B, Relative to the Aurora Site, A

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.⁸ For the SO₂ monitoring network the EPA developed the population weighted emissions index, PWEI. The EPA calculates a PWEI 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 SO₂ 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 EPA then divides the resulting product by 1,000,000, providing a PWEI value. The units for the PWEI value 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 SO₂ 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 SO₂ 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 SO₂ monitor is required within that CBSA.

The SO₂ 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 Part 58, Appendix D: population exposure, highest concentration, source impacts, general background or regional transport. The SO₂ 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.

⁸ 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.⁹ DAQ calculated new PWEI values for each MSA using the 2014 NEI and 2017 population estimates.¹⁰ Table 10 presents the 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 35 shows the locations of the three required PWEI sulfur dioxide monitoring sites based on the 2014 NEI and 2017 population estimates.

Table 10. 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

⁹ 2014 National Emission Inventory, Version 1, All Sectors: National-County/Tribe aggregated, Released December 2016, available online at <https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data>. Accessed Jan. 4, 2017.

¹⁰ Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016, U.S. Census Bureau, Population Division, Released March 23, 2017, available online at <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>.

Table 10. Population-Weighted Emission Indices Using the 2014 National Emissions Inventory and 2017 Population Estimates for North Carolina Metropolitan Statistical Areas

Metropolitan Statistical Area ^a	SO₂ Emissions, tons ^b	Estimated Population, July 1, 2017	Population Weighted Emission Index	Number of SO₂ 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 online 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, 2018, U.S. Census Bureau, Population Division, Released April 18, 2019, available online at <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkml>.

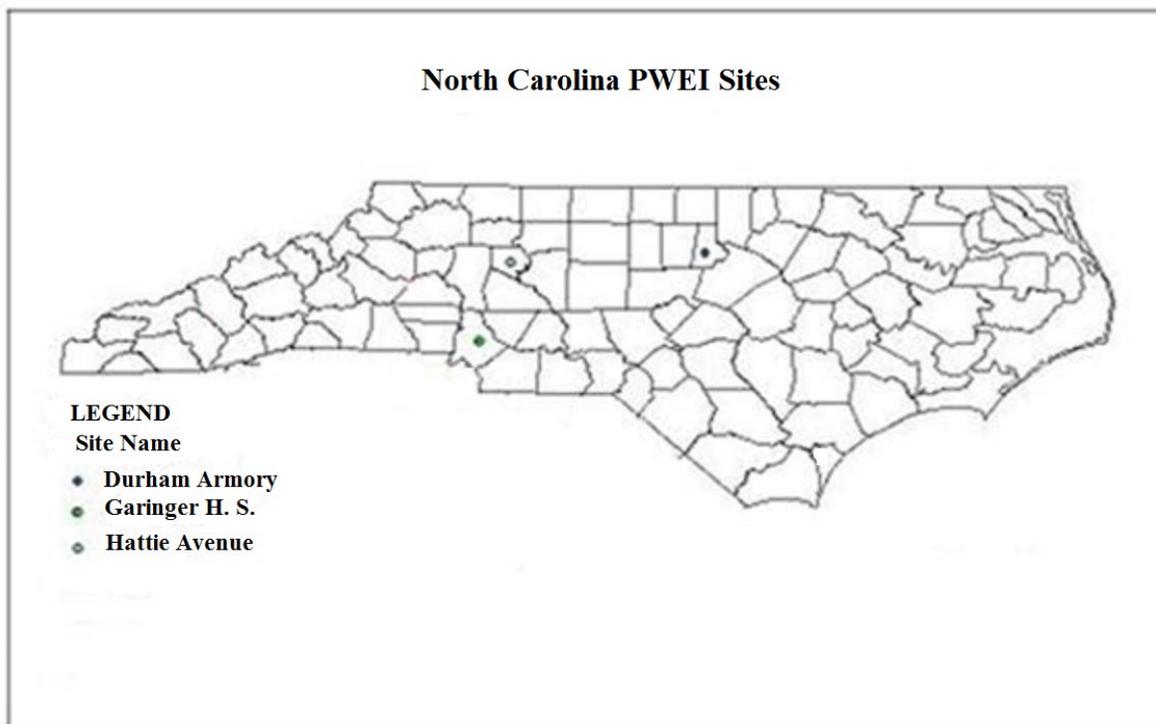


Figure 35. Location of North Carolina PWEI monitors

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 agencies to consider background levels of sulfur dioxide. DAQ

anticipated that the Roxboro coal-fired electric generating facility in Person County would require modeling. DAQ had not collected background sulfur dioxide data in Person County within the last three years. Thus, the division 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, from August 2014 through August 2015, DAQ operated a sulfur dioxide monitor at Bryson City in Swain County. The division anticipated that the Asheville coal-fired electric generating plant in Buncombe County would also be a facility for which the division would need to do modeling.

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

On Jan. 15, 2016, DAQ submitted to the EPA a list identifying all facilities within North Carolina with SO₂ emissions that exceeded the 2,000 tons per year threshold based on the most recent emissions data. The division's list also includes facilities for which DAQ received third-party SO₂ modeling information even though the emissions for the facilities were below the 2,000 tons per year threshold. By July 15, 2016, DAQ submitted to the EPA documentation specifying the compliance path, modeling or monitoring, for each of the affected facilities.

The division 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 (this facility is regulated by the Western North Carolina Regional Air Quality Agency);
- 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 SO₂ 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 Energy Progress 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 PQAQO. 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-Tech 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. DAQ provided modeling input and output files for siting the monitors to the EPA in 2016 outside of the network plan. A Region 4 representative visited each monitoring site except the existing site at Bayview. The EPA visited all of the sites including Bayview during the March 2019 EPA triennial technical systems audit.

Evergreen's Canton mill, 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.

Duke's Roxboro plant, Semora DRR

- The top 50 receptors for this facility are all within a single cluster to the northeast of the facility.
- The top 20 receptors are all located within a deep depression, in heavily wooded areas or on privately-owned property.
- The 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).

PCS Phosphate Company, Inc. – Aurora, 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 SO₂ data requirements rule and other rules regarding monitoring. Usually, if there is no three-year design value, then EPA designates the area unclassifiable until a design value is available. However, the DRR states that in the absence of a three-year design value, the EPA will designate the area 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 the division is setting the state up for a possible nonattainment designation.

Table 11 through Table 16 provide the following information for the sulfur dioxide monitoring networks in the various MSAs throughout North Carolina:

- (1) The location;
- (2) The statement of purpose;
- (3) 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 Part 58; and
- (4) A summary of proposed and planned changes.

Table 11 The 2019-2020 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 12 The 2019-2020 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; general/background
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:	Yes – not required by Appendix D	Yes - PWEI	Yes – not required by Appendix D
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Will operate 7/1/2020 to 6/31/2021	None	Monitor operated April 2018 to March 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 13 The 2019-2020 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 – Required by Data Requirements Rule
Meets Requirements of Part 58, Appendix E:	Yes	Yes
Proposal to Move or Change:	None	Monitor will shut down in 2 nd quarter 2020

^a Monitor uses an instrumental pulsed fluorescence method using a Thermo Electron 43i, Air Quality System, AQS, method code 060.

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

Table 14 The 2019-2020 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:	Yes – Required by Data Requirements Rule	Yes – Required by Data Requirements Rule	Yes – not required by Appendix D
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	Monitor will shut down in 2 nd quarter 2020	Monitor is operating 03/01/2019 to 02/28/2020

^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 Energy Progress. 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 15 The 2019-2020 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:	None

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

**Table 16 The 2019-2020 Sulfur Dioxide Monitoring Network
for areas outside MSAs ^a**

AQS Site Id Number:	370130151 ^b	37-117-0001
Site Name:	Bayview	Jamesville
Street Address:	229 NC Highway 306N	1210 Hayes Street
City:	Bath	Jamesville
Latitude:	35.428	35.810690
Longitude:	-76.74	-76.897820
MSA, CSA or CBSA represented:	None	Not in an MSA
Monitor Type:	SLAMS	Special purpose
Operating Schedule:	Hourly – every year	Hourly – every third year
Statement of Purpose:	Fenceline monitoring at PCS Phosphate facility to ensure compliance with the NAAQS	Industrial expansion monitoring for PSD modeling.
Monitoring Objective:	Source-oriented	Upwind/ background 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: EQSA-0486-060	Yes: EQSA-0486-060
Meets Requirements of Part 58, Appendix D:	Yes – DRR monitor	Yes – rotating PSD background monitor not required by Appendix D
Meets Requirements of Part 58, Appendix E:	Yes	Yes
Proposal to Move or Change:	None	Monitor is operating 3/1/2019 to 2/28/2020

^a Both 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 fenceline 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 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 36, indicate statewide levels of ozone are below the 8-hour standard established by the EPA in 2015.

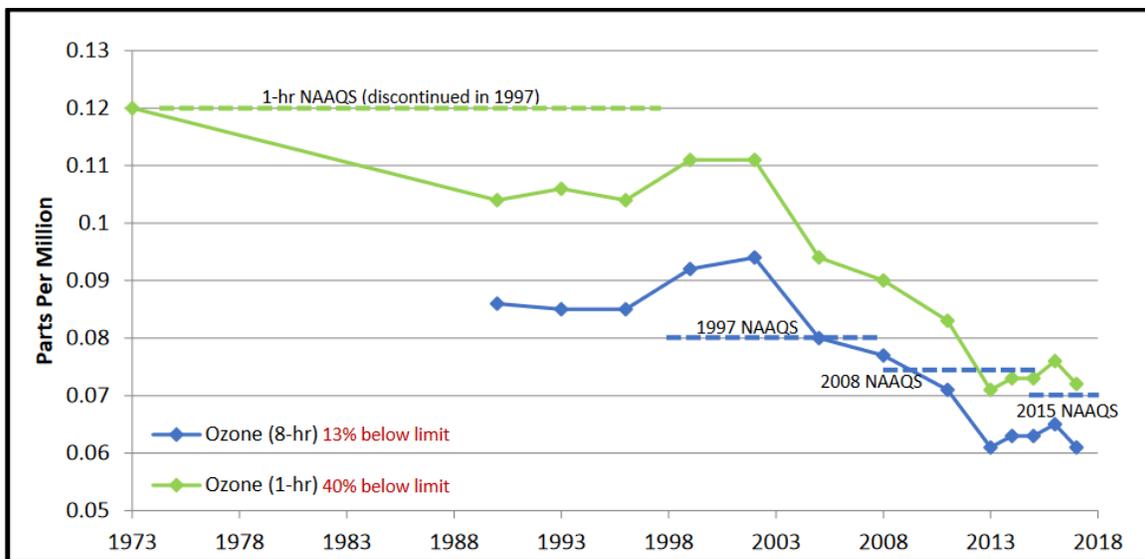


Figure 36. Statewide trends for ozone

(from *Air Quality Trends in North Carolina*, December 2018, located at https://files.nc.gov/ncdeq/Air%20Quality/Air_Quality_Trends_in_North_Carolina_122118.pdf)

A. Analysis of Existing Monitors

1. Analysis of Measured Concentrations Compared to NAAQS

Figure 37 through Figure 42 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 Section 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 all of the 33 monitors operated by the state and local programs in 2019 have met an 8-hour ozone design value of 0.070 parts per million for the past five years.

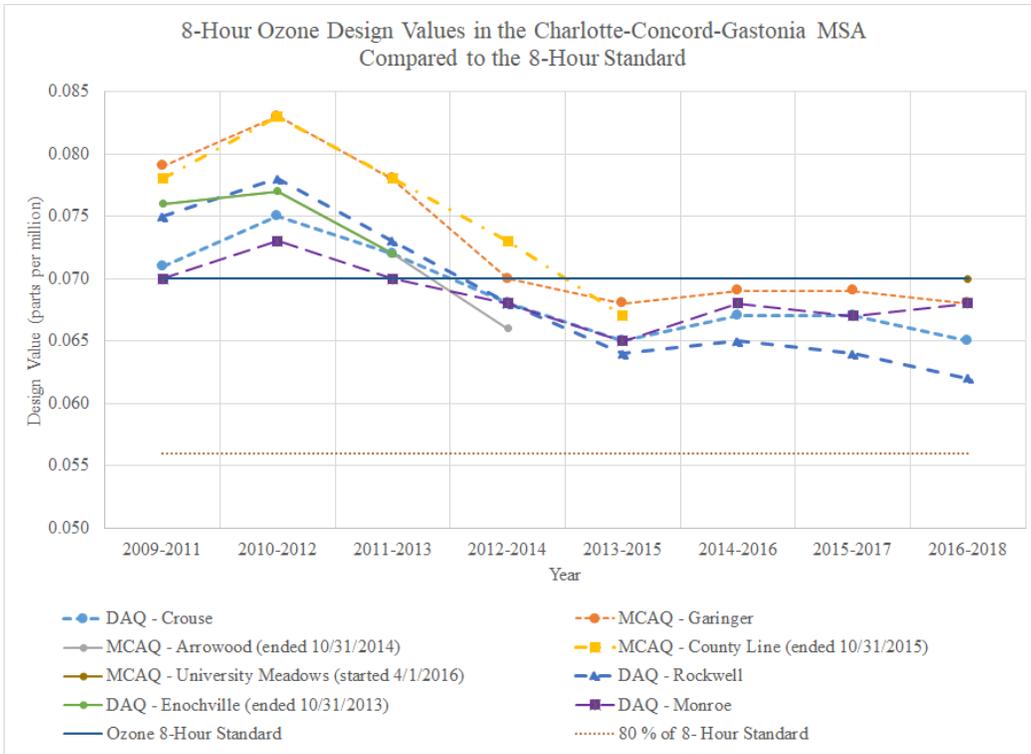


Figure 37. Ozone design values in the Charlotte-Concord-Gastonia MSA

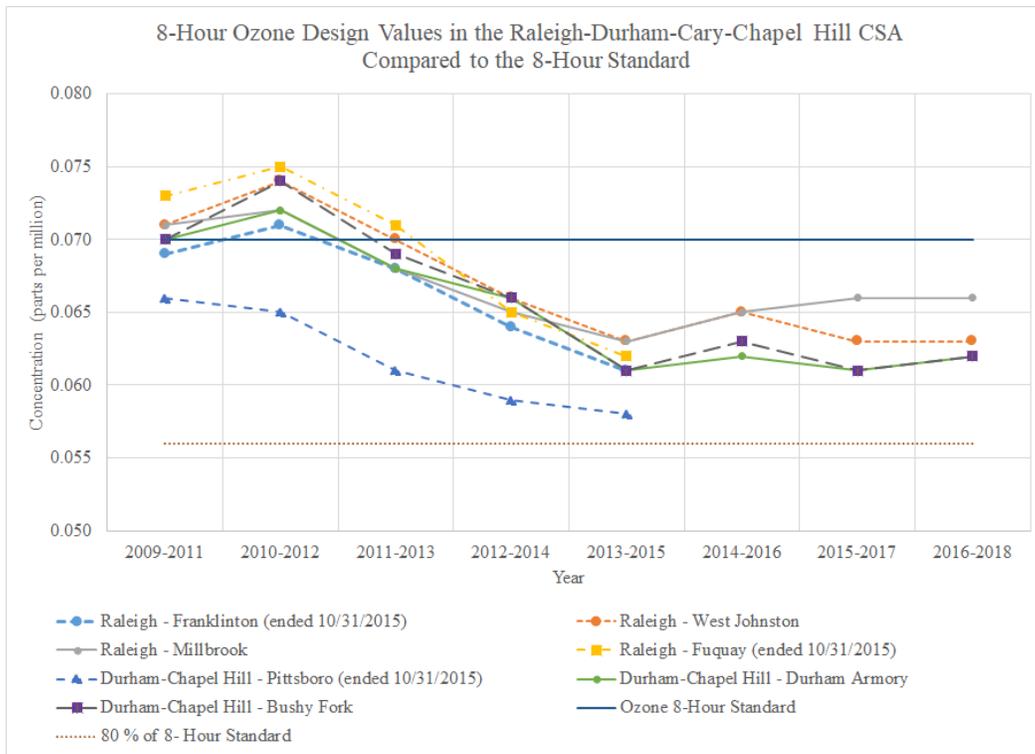


Figure 38. Ozone design values in the Raleigh and Durham-Chapel Hill MSAs

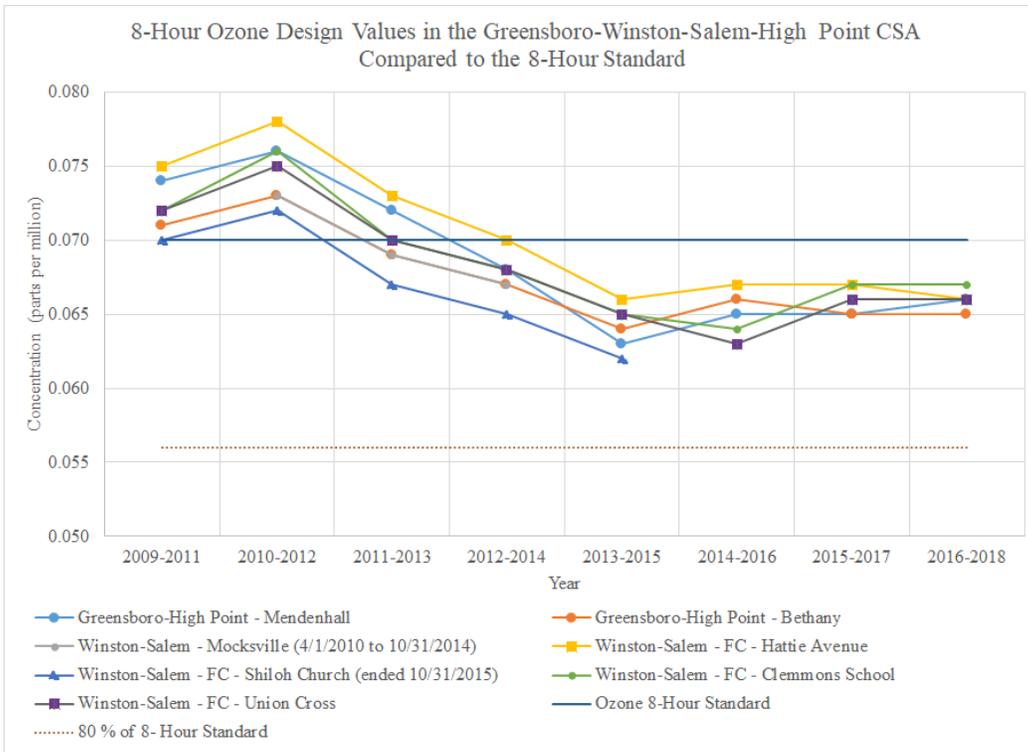


Figure 39. Ozone design values for the Greensboro-High Point and Winston-Salem MSAs

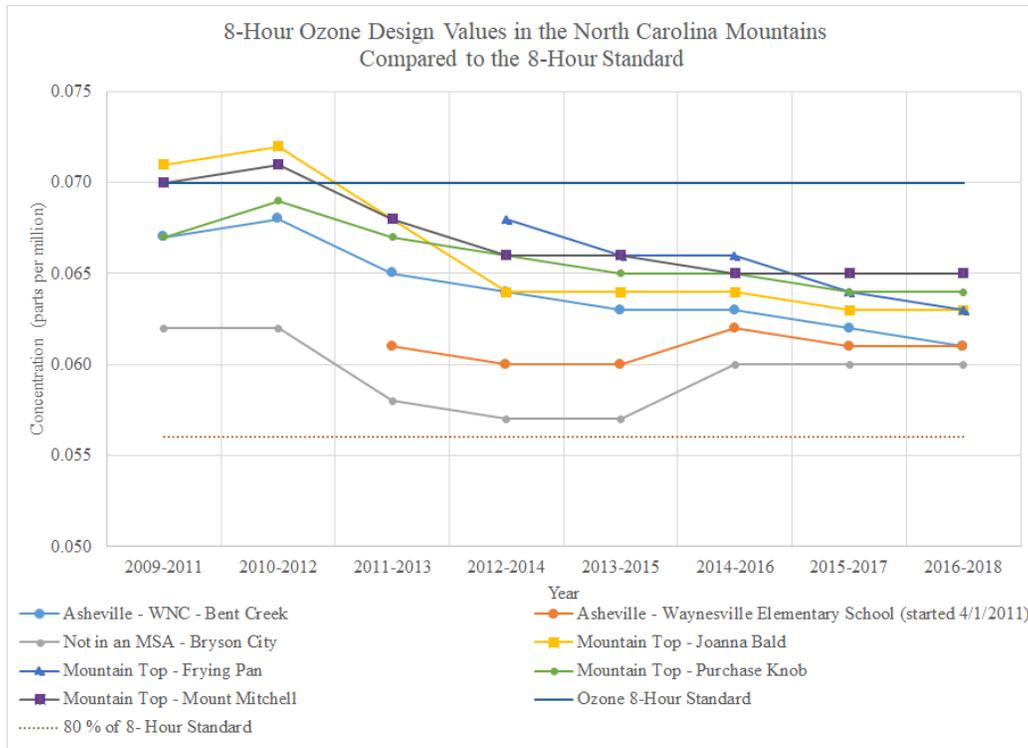


Figure 40. Ozone design values for the Asheville MSA and North Carolina mountains

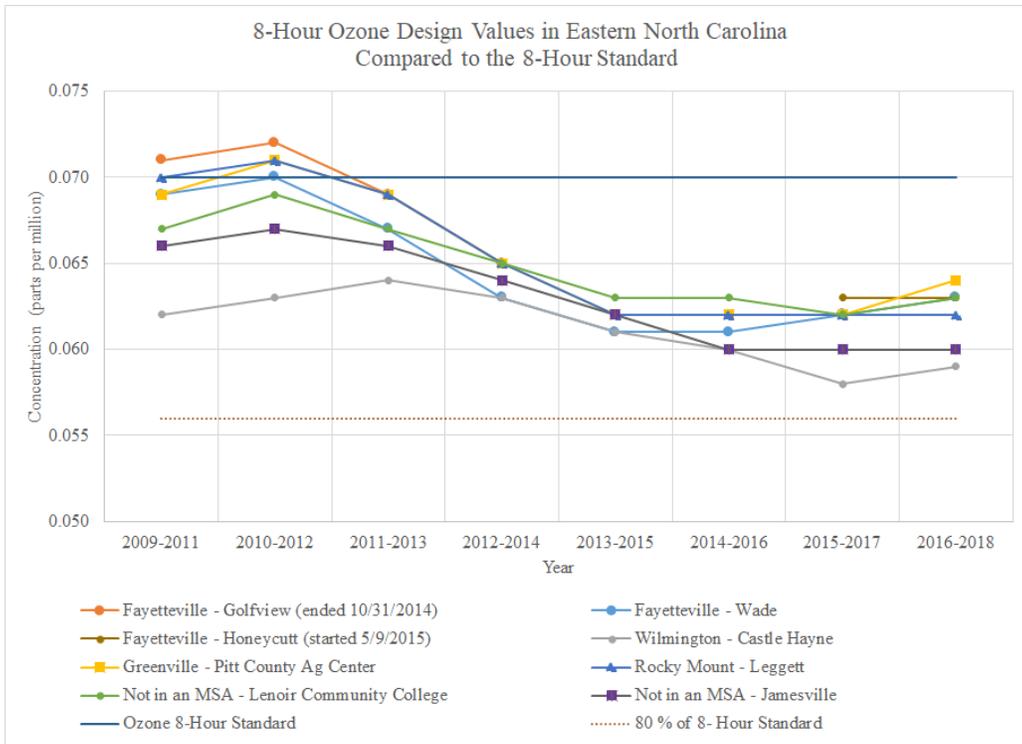


Figure 41. Ozone design values in the Fayetteville, Greenville, Rocky Mount and Wilmington MSAs and at other coastal sites

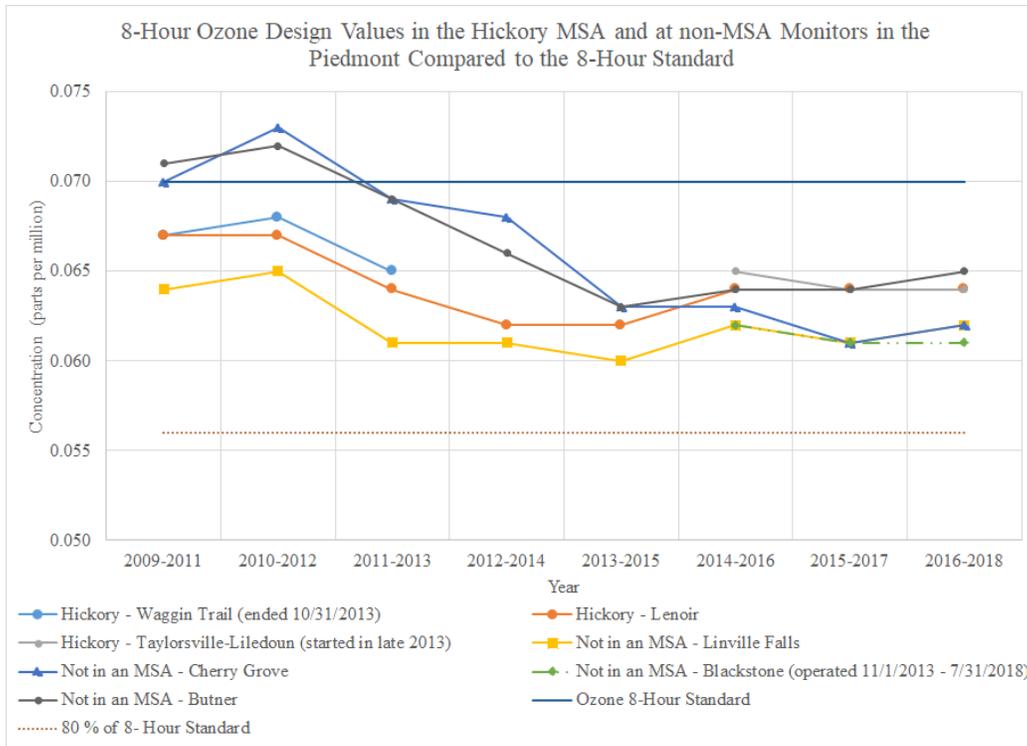


Figure 42. Ozone design values in the Hickory MSA and at other monitors in the piedmont area

None of these 33 monitors has a design value less than 80% of the NAAQS so none will meet the additional requirement of having less than 10% probability of exceeding 80% 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 Part 58, Appendix D, Table D-2 provided in Figure 43. 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 O₃ 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 (O₃) 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 43. Title 40 CFR Part 58, Appendix D, Table D-2

Table 17 provides the 2017-estimated population for the MSAs in North Carolina, the design values for 2016-2018, the number of required monitors based on Appendix D and the number of current monitors operated by DAQ and the local programs. Currently, the division 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. 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.¹¹

¹¹ See Appendix G. Monitoring Agreement between Virginia and North Carolina for the Virginia Beach-Norfolk-New Port News Metropolitan Statistical Area.

**Table 17 Design Values and Required Ozone Monitors for North Carolina
Metropolitan Statistical Areas, MSA**

MSA	Population Estimate, 2018 ^a	2016-2018 Ozone 8-Hour Design Value (As percent of NAAQS) ^b	Number of Monitors operated in North Carolina	
			Required	Current
Charlotte-Concord- Gastonia	2,569,213	100	2	5 ^c
Virginia Beach-Norfolk- Newport News, VA-NC	1,728,733	91	2	0 ^d
Raleigh	1,362,540	94	2	2
Greensboro-High Point	767,711	94	2	2
Winston-Salem	671,456	96	2	3
Durham-Chapel Hill	575,412	89	2	2
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	480,891	Estimated at 76	1	0 ^e
Asheville	459,585	87	2	2
Fayetteville	387,094	90	2	2
Hickory-Lenoir-Morganton	368,416	91	2	2
Wilmington	294,436	84	0	1
Jacksonville	197,683	Not Available	0	0
Greenville	179,914	91	1	1
Burlington	166,436	Not Available	0	0
Rocky Mount	146,021	89	1	1
New Bern	125,219	Not Available	0	0
Goldsboro	123,248	Not Available	0	0

^a Source: Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018, U.S. Census Bureau, Population Division, Released April 18, 2019, available online at <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>.

^b The national ambient air quality standard for an 8-hour period is 0.070 parts per million. The EPA bases attainment 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.

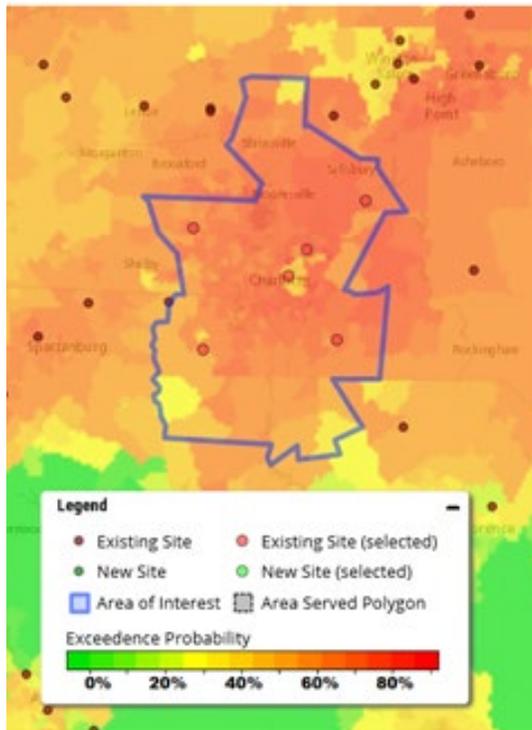
The Office of Management and Budget changed the Myrtle Beach-Conway-North Myrtle Beach MSA definition in February 2013 to include Brunswick County in North Carolina. Adding Brunswick County to the MSA resulted in the MSA exceeding the 350,000 population-threshold for a required ozone monitor. In May 2015, the South Carolina Department of Health and Environmental Control, DHEC, proposed operating a monitor in Horry County. DHEC started operating this monitor on July 27, 2016. DAQ

worked with DHEC to develop an appropriate monitoring agreement. Appendix F. 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 41, Castle Hayne’s highest design value during the past five years was 63 ppb. The Castle Hayne monitor has never violated the ozone standard.

DAQ evaluated each MSA where there are more monitors operating than required by the regulations. This evaluation determined whether 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 DAQ. Thus, DAQ considered four monitors in this evaluation.

Monroe Middle School, 37-179-0003

Monroe Middle School, shown in Figure 44, 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. DAQ will retain this site because this monitor is important for attainment and maintenance plan development for the Metrolina 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.

Figure 44. Ozone monitors in the Charlotte area

Crouse, 37-109-0004

As shown in Figure 44, 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. DAQ will retain this site because this monitor is important for attainment and maintenance plan development for the Metrolina area.

Rockwell, 37-159-0021

As shown in Figure 44, Rockwell is in the Charlotte-Concord-Gastonia MSA. The ozone concentrations measured at Rockwell are sometimes among the highest ozone concentrations measured in the MSA. DAQ believes the information collected at Rockwell is important for adding to the 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 division views this monitor as being a significant monitor for attainment and maintenance plan development. Thus, DAQ plans to retain the Rockwell monitor.

Castle Hayne, 37-129-0002

The Castle Hayne 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. DAQ believes it is important to maintain a monitor at this location. In addition, nearby Pender County grew rapidly during this decade. Pender County is the 71st fastest-growing county in the nation percentagewise for this decade.¹² Thus, DAQ plans to retain the Castle Hayne monitor.

B. Analysis of Unmonitored Areas with Rapid Population Growth

DAQ also evaluated the fastest-growing areas in the state. Of the 12 fastest-growing counties in North Carolina listed in Table 1, six of those counties do not have an ozone monitor.

1. Brunswick County

Brunswick County grew by 27.3% between April 1, 2010 and July 1, 2018. It is the 24th fastest-growing county in the nation so far during this decade and it is the 5th fastest-growing county in the nation during the past year. Growth in the Wilmington, North Carolina and North Myrtle Beach, South Carolina, areas affects 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.

¹² Resident Population Estimates for the 100 Fastest Growing U.S. Counties with 10,000 or More Population in 2010: April 1, 2010 to July 1, 2018, Source: U.S. Census Bureau, Population Division, Release Date: April 2019.

Based on ozone monitoring at Castle Hayne in the Wilmington MSA, DAQ expects the design value for the Myrtle Beach-Conway-North Myrtle Beach MSA to be around 85% of the standard. As shown in Figure 45, the probability that there would be one exceedance of the 70-ppb ozone standard in Brunswick County is less than 50%. DAQ has a monitoring agreement with the SCDHEC, which in July 2016 established the Coastal Carolina monitoring site in the Myrtle Beach-Conway-North Myrtle Beach MSA.

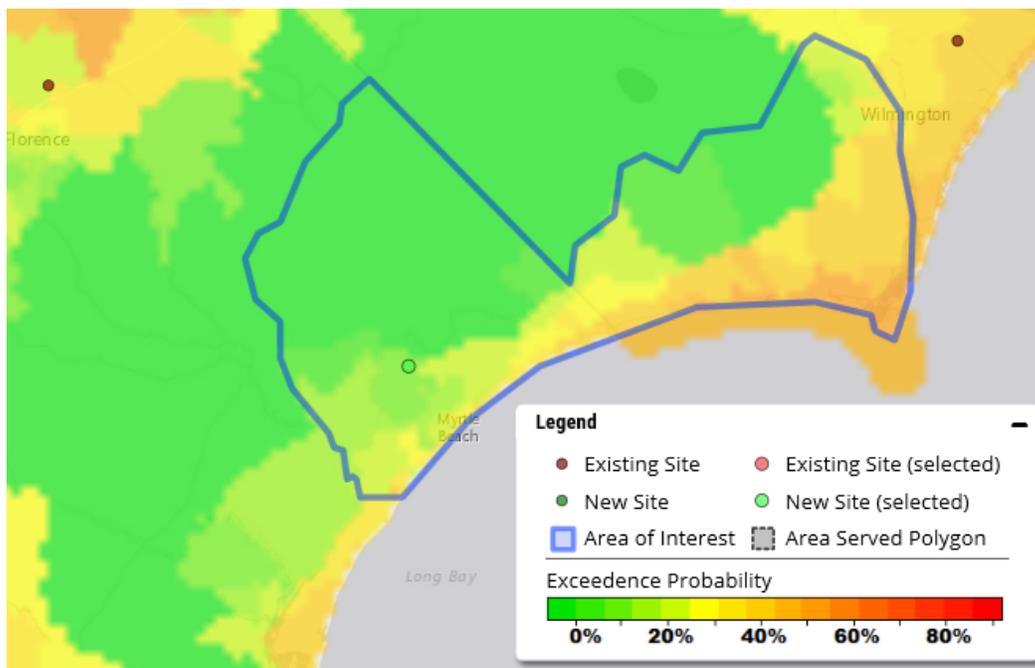


Figure 45. Probability of having one exceedance of the 70-ppb ozone standard in the Myrtle Beach-Conway-North Myrtle Beach MSA

2. Cabarrus County

Cabarrus County grew by 4,618 people or 2.2% between July 1, 2017 and July 1, 2018, according to census estimates. It is the 76th fastest-growing county in the nation during the past decade, percentagewise. Cabarrus County is in the Charlotte-Concord-Gastonia MSA. Currently, DAQ is required to operate two monitors in the MSA. As shown in Figure 44, 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 1,891 people or 2.7% between July 1, 2017 and July 1, 2018, according to census estimates. It is the 78th fastest-growing county in the nation during the past year percentagewise. Chatham County is in the Durham-Chapel Hill MSA. Currently, DAQ is required to operate two monitors in this MSA. As shown in Figure 46, 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.

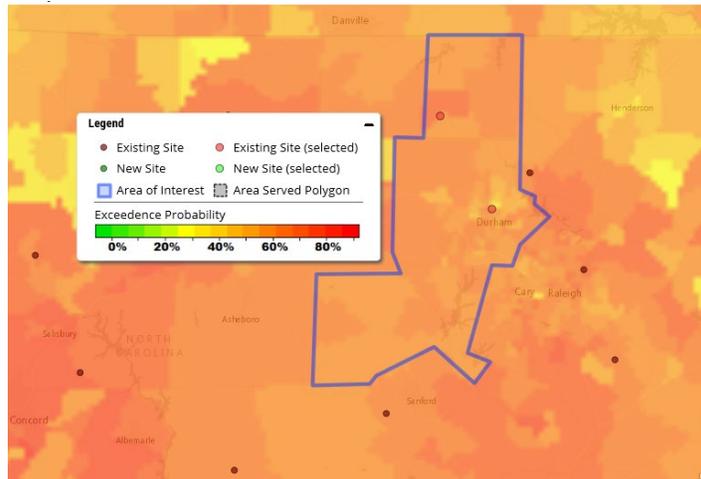


Figure 46. Probability of having one exceedance of the 70-ppb ozone standard in the Durham-Chapel Hill MSA.

4. Currituck County

The census bureau estimates Currituck County grew by 749 people or 2.8% between July 1, 2017 and July 1, 2018. It is the 89th fastest-growing county in the nation during the current decade percentagewise. Currituck County is in the Virginia Beach-Norfolk-Newport News MSA. Currently, DAQ is required to operate two monitors in this MSA. As shown in Figure 47, 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.

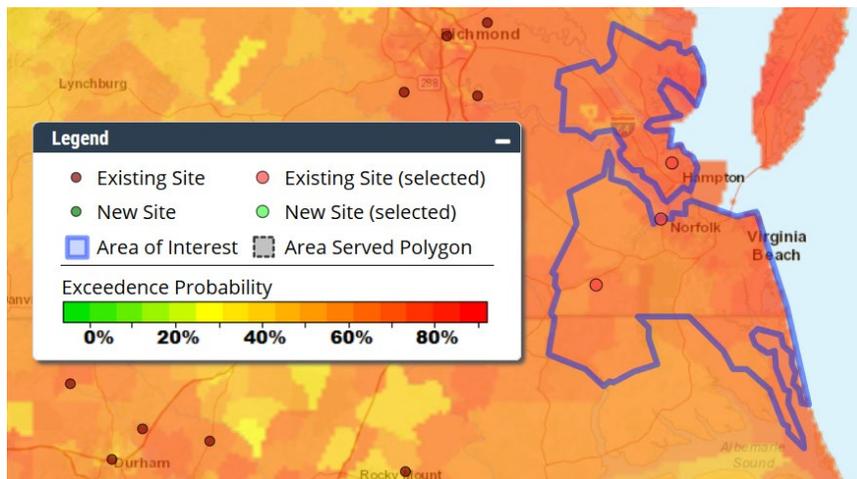


Figure 47. Probability of having one exceedance of the 70-ppb ozone standard in the Virginia Beach-Norfolk-Newport News MSA.

5. Franklin County

The census bureau estimates Franklin County to have grown by 1,527 people or 2.3% between July 1, 2017 and July 1, 2018. As shown in Figure 48, 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 2016-2018 ozone design value for the Raleigh MSA is at 94% of the standard and EPA modeling projects it to be at 85% of the standard by 2020. The division 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.

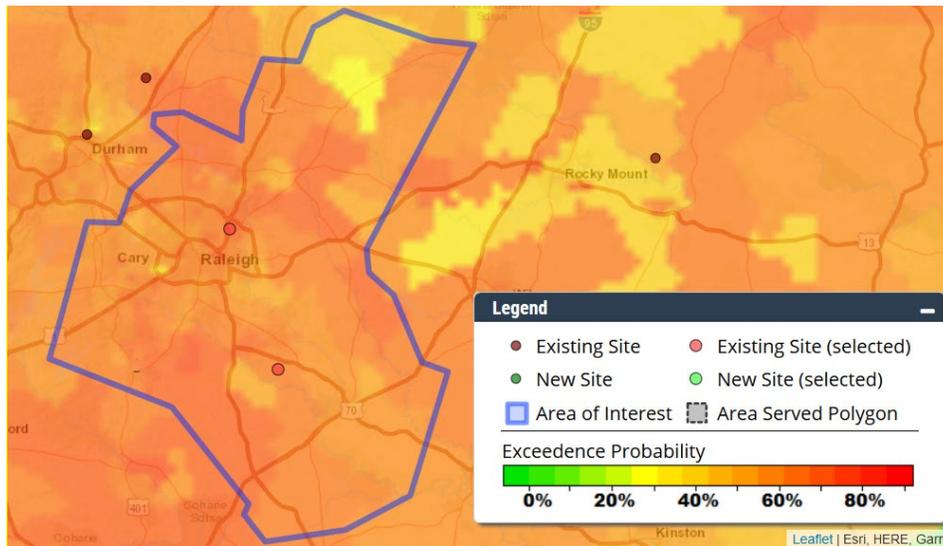


Figure 48. Ozone monitors in the Raleigh MSA

6. Pender County

Pender County grew by 1,394 people or 2.3% between July 1, 2017, and July 1, 2018, and is the 71st fastest-growing county in the nation during this decade, percentagewise. Pender County is in the Wilmington MSA. Currently, DAQ is not required to operate any ozone monitors in the MSA. However, the division 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 84% 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, DAQ has no plans to monitor for ozone in Pender County.

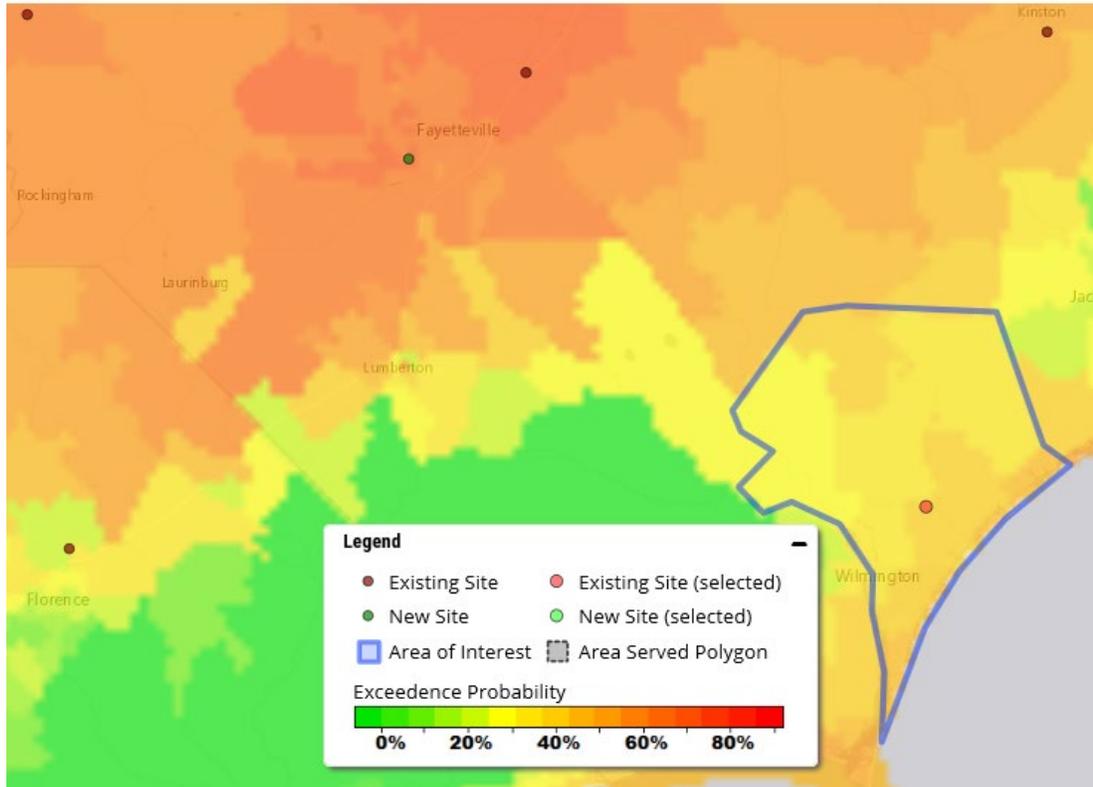


Figure 49. Probability of having one exceedance of the 70-ppb ozone standard in the Wilmington MSA

C. Changes to Existing Monitors

DAQ ended ozone monitoring at the Blackstone site on July 31, 2018. The division provided an analysis for shutting down the criteria pollutant monitors at Blackstone in the 2018-2019 network-monitoring plan. As described in Section II. Summary of Proposed Changes, DAQ has replaced the shelter at the Pitt County Agricultural Center site (see Shelter Replacements and Sampler Relocations in the Greenville MSA) and plans to replace shelters at Wade (see Shelter Replacements in the Fayetteville MSA), Lenoir (see Shelter Replacements in the Hickory MSA), and Castle Hayne (see Shelter Replacements and Sampler Relocations in the Wilmington MSA).

D. DAQ Recommendations

The division recommends:

- Maintaining the current size of the network and all the currently operating sites; and
- Not establishing any new ozone sites in 2019 or 2020.

E. Network Description

Figure 50 shows the locations of the ozone monitors operating in 2019. Table 18 through Table 29 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. DAQ requested and received a waiver for the start of the monitoring season for the mountaintop sites because authorities often close the roads going to the sites during February. Several of the monitors operate year-round.



Figure 50. Location of 2019 ozone monitoring stations

Table 18 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 w/ 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:	Yes – not required by Appendix D	Yes - NCore	Yes	Yes – not required by Appendix D	Yes – not required by Appendix D
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 19 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 20 The 2019-2020 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 20 The 2019-2020 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 21 The 2019-2020 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	Yes – not required by Appendix D	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 22 The 2019-2020 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 23 The 2019-2020 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	35.507224
Longitude:	-82.599860	-82.963625
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.
Monitoring Objective:	Maximum ozone concentration/ Highest concentration	Population exposure

Table 23 The 2019-2020 Ozone Monitoring Network for the Asheville MSA ^a

AQS Site Id Number:	37-021-0030 ^b	37-087-0008
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 24 The 2019-2020 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 w/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:	Monitoring shelter will be replaced in 2020	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 2019-2020 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	Monitoring shelter will be replaced in 2020

^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 26 The 2019-2020 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 3/1 to 10/31	Hourly 3/1 to 10/31	Hourly 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:	Monitoring shelter will be replaced in 2019	Monitoring shelter replaced 3/29/2019	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 27 The 2019-2020 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:	35.2578	35.379167	35.590000	35.765413
Longitude:	-83.7955	-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	Operated in cooperation with the	Operated in cooperation with	Provides ozone data for PSD modeling

Table 27 The 2019-2020 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
	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.	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.	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.	for industrial expansion. Provides AQI data for recreational users. Modeling. Compliance w/NAAQS.
Monitoring Objective:	Welfare related impacts/ general/ background/ regional transport	Welfare related impacts/ general/ background/regional transport	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:	ozone season will start when weather allows	ozone season will start when weather allows	ozone season will start when weather allows	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 28 The 2019-2020 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
Site Name:	Linville Falls	Cherry Grove	Butner
Street Address:	100 Linville Falls Road	7074 Cherry Grove Road	800 Central Ave

Table 28 The 2019-2020 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
Site Name:	Linville Falls	Cherry Grove	Butner
City:	Linville Falls	Reidsville	Butner
Latitude:	35.972222	36.307033	36.141111
Longitude:	-81.933056	-79.467417	-78.768056
MSA, CSA or CBSA represented:	Not in an MSA	Not in an MSA	Not in an MSA
Monitor Type:	Other	Other	SLAMS
Operating Schedule:	Hourly 4/1 to 10/31	Hourly 3/1 to 10/31	Hourly 3/1 to 10/31
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 w/ 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.
Monitoring Objective:	Welfare related impacts/ general/ background	General/ background	Highest concentration
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:	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.

^b This monitor is owned by the United States Forest Service and operated by the North Carolina Division of Air Quality.

Table 29 The 2019-2020 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

Table 29 The 2019-2020 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
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, or PM₁₀

The North Carolina Division of Air Quality, or DAQ, monitors for particles of 10 micrometers or less aerodynamic diameter, or PM₁₀, in North Carolina at six sites and the local programs operate PM₁₀ monitors at three 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. DAQ also uses PM₁₀ 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 PM₁₀ are well below the 24-hour standard.

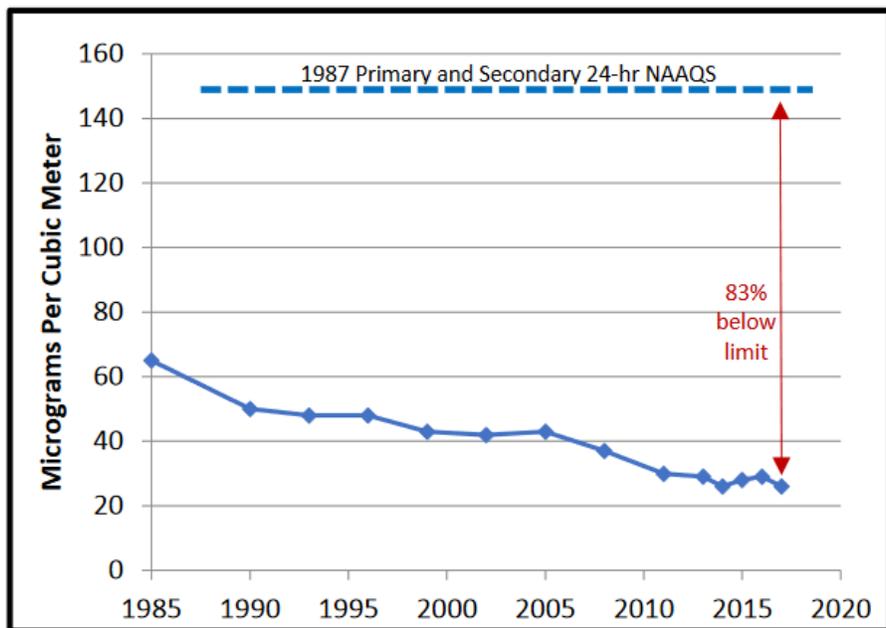


Figure 51. Statewide trends for PM₁₀

(from *Air Quality Trends in North Carolina*, December 2018, located at https://files.nc.gov/ncdeq/Air%20Quality/Air_Quality_Trends_in_North_Carolina_122118.pdf)

Figure 52 through Figure 54 provide the highest PM₁₀ concentrations measured in North Carolina for the past eight 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 PM₁₀ 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 Part 58, Appendix D, Table D-4 provided in Figure 55 and those used to provide background data for PSD modeling.

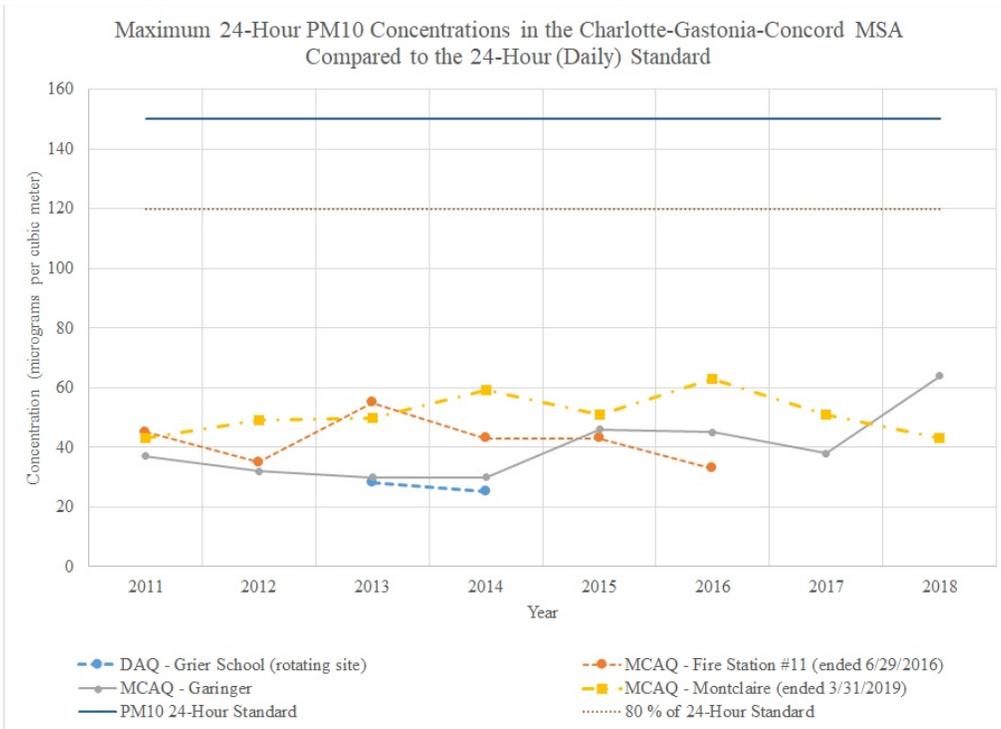


Figure 52. Maximum 24-hour PM₁₀ concentration in the Charlotte-Concord-Gastonia MSA

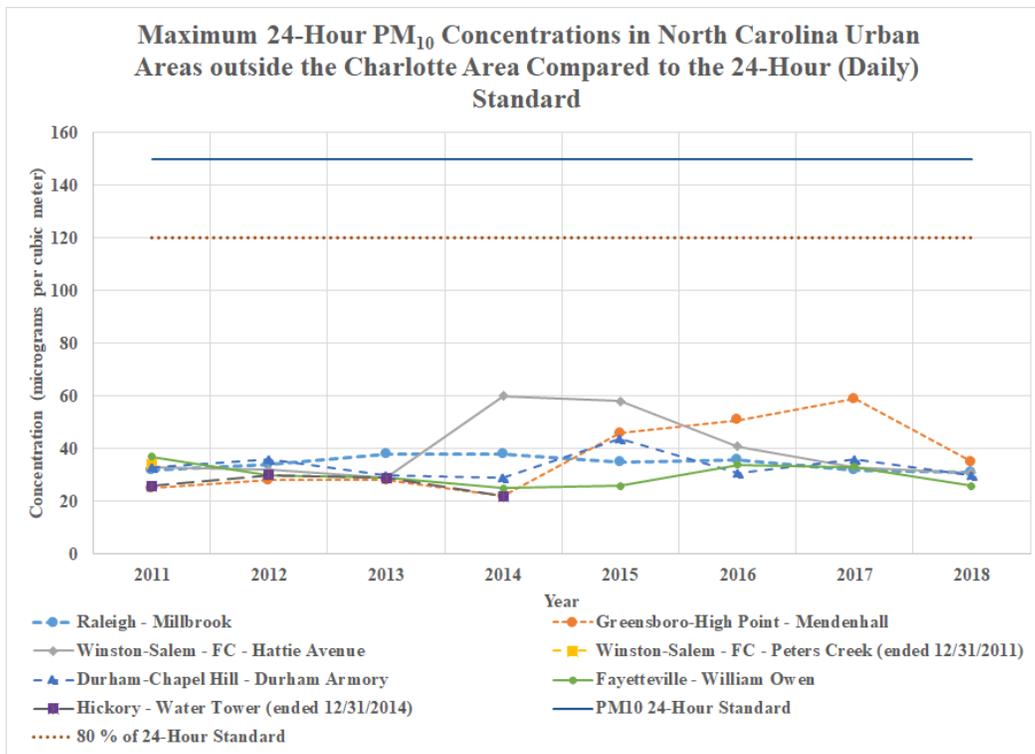


Figure 53. Maximum 24-hour PM₁₀ concentrations in North Carolina urban areas

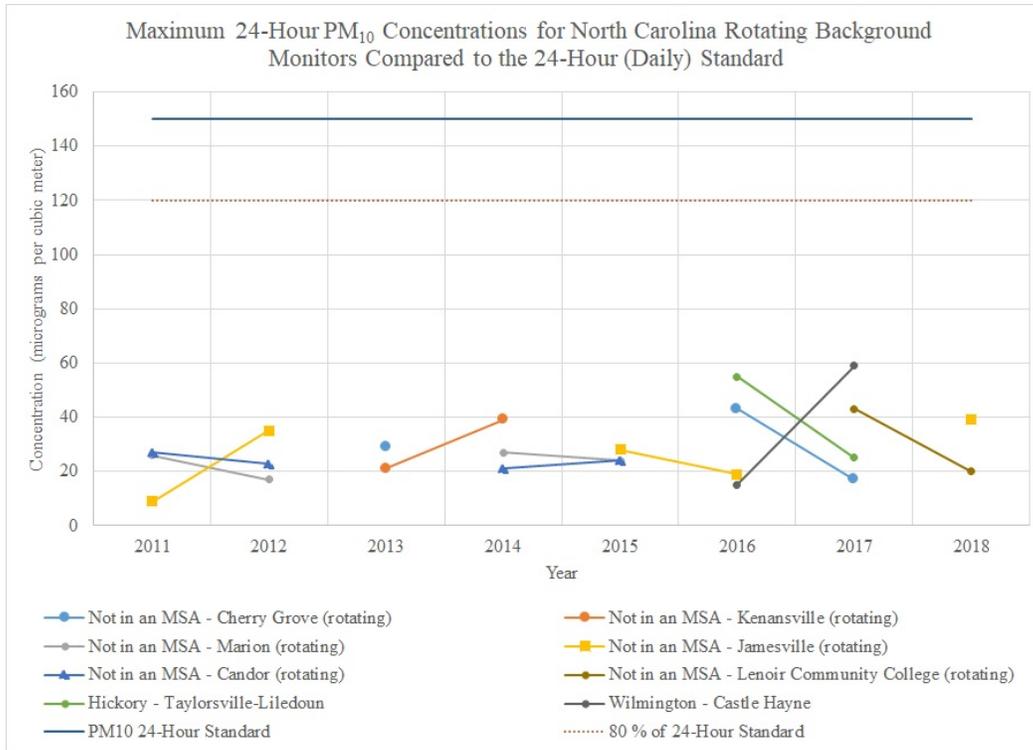


Figure 54. Maximum PM₁₀ concentrations for rotating background monitors in North Carolina

TABLE D-4 OF APPENDIX D TO PART 58. PM₁₀ 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 PM₁₀ 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 PM₁₀ NAAQS.

⁴ Low concentration areas are those for which ambient PM₁₀ data show ambient concentrations less than 80 percent of the PM₁₀ NAAQS.

⁵ These minimum monitoring requirements apply in the absence of a design value.

Figure 55. Table D-4 from 40 CFR Part 58, Appendix D

The estimated 2018 population of the MSA and the most recent PM₁₀ ambient concentration values for the area determines the number of required monitors for an area. Table 30 provides the 2018 estimated total population for the MSAs in North Carolina, the maximum ambient daily concentration values as percentage of the NAAQS for 2018, the number of required monitors based on 40 CFR Part 58, Appendix D, Table D-4 and the number of current monitors operated by DAQ and the local programs. Currently, the division 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. 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.¹³

Table 30 Ambient Concentrations and Required Number of PM₁₀ Monitors for North Carolina Metropolitan Statistical Areas, MSA

MSA	Population Estimate, 2018 ^a	2018 PM ₁₀ 24-Hour Maximum Ambient Concentration, as percent of NAAQS	Number of Monitors operated in North Carolina	
			Required ^b	Current
Charlotte-Concord-Gastonia	2,569,213	43	2-4	2
Virginia Beach-Norfolk-New Port News, VA-NC	1,728,733	15	2-4	0 ^c
Raleigh	1,362,540	21	2-4	1 ^d
Greensboro-High Point	767,711	23	1-2	1
Winston-Salem	671,456	21	1-2	1
Durham-Chapel Hill	575,412	20	1-2	1
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	480,891	Not Available	0-1	0
Asheville	459,585	20 ^e	0-1	0
Fayetteville	387,094	17	0-1	1
Hickory	368,416	37 ^f	0-1	rotating
Wilmington	294,436	39 ^g	0-1	rotating
Jacksonville	197,683	25 ^h	0	0
Greenville	179,914	Not Available	0	0
Burlington	166,436	Not Available	0	0
Rocky Mount	146,021	30 ⁱ	0	0
New Bern	125,219	Not Available	0	0
Goldsboro	123,248	21 ^h	0	0

^a Source: Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018, U.S. Census Bureau, Population Division, Released April 18, 2019, available online at

<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>.

^b 40 CFR Part 58, Appendix D, Table D-4

^c The Virginia Department of Environment operates two PM₁₀ monitors

^d DAQ received a waiver in 2008, renewed in 2015, for the second required PM₁₀ monitor

^e PM₁₀ 24-hour maximum ambient concentration is from 2009

^f PM₁₀ 24-hour maximum ambient concentration is from 2016

^g PM₁₀ 24-hour maximum ambient concentration is from 2017

^h PM₁₀ 24-hour maximum ambient concentration is from 2007

ⁱ PM₁₀ 24-hour maximum ambient concentration is from 2006

¹³ See Appendix G. Monitoring Agreement between Virginia and North Carolina for the Virginia Beach-Norfolk-New Port News Metropolitan Statistical Area.

DAQ received a waiver from the EPA for the second required monitor in the Raleigh MSA. The EPA granted the waiver because PM₁₀ values recorded in the Raleigh MSA have been less than 50% of the NAAQS except when an exceptional event on June 12, 2008, affected the existing monitor.

Currently, DAQ operates one PM₁₀ monitor that 40 CFR Part 58, Appendix D may not require. 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% of the NAAQS. The division evaluated the purpose for this monitor and the use of the data from the monitor. DAQ uses the data from the William Owen monitor for PSD modeling so the division will continue operating this monitor. DAQ shut down the PM₁₀ monitor at Hickory at the end of 2014 because the division did not use the data for PSD modeling, the measured concentrations were less than 40% of the standard and trending downward, and the population in Hickory is less than 500,000.

In 2011, DAQ modified its PM₁₀ PSD monitoring network by establishing a network of rotating background PM₁₀ sites. One to three PM₁₀ monitors operate each year and each site operates once every 39 months. Because the division decided to shut down the Grier-School particle monitoring site in Gastonia at the end of 2014, DAQ replaced the rotating PM₁₀ monitor at Grier School with a rotating PM₁₀ monitor at the Taylorsville Liledoun site. Likewise, when DAQ shut down the Marion and Kenansville particle monitoring sites, DAQ moved the rotating PM₁₀ monitors at those sites to the Lenoir Community College, or LCC, site in Kinston and the Castle Hayne site in Wilmington. Thus, the six PM₁₀ rotating background sites are:

- Candor and LCC, which will operate from mid-2020 through mid-2021;
- Jamesville, which operated from April 2018 through March 2019;
- Cherry Grove and Taylorsville Liledoun, which are operating from mid-2019 through mid-2020; and
- Castle Hayne, which will operate from late 2019 until late 2020.

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 PM₁₀ concentration and the fine particle concentration measured using the same sampling and analytical method. DAQ purchased two coarse particle BAM monitors and one coarse particle optical monitor. By mid-January 2016, the division had converted all manual PM₁₀ high volume samplers to continuous PM₁₀ low volume samplers.

Figure 56 provides the locations of the current and rotating PM₁₀-monitoring sites. In addition, Figure 56 shows the sites that measure PM_{10-2.5} also known as coarse particles. Table 31 through Table 35 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 Part 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, D and E of 40 CFR Part 58. All monitors operate year-round.

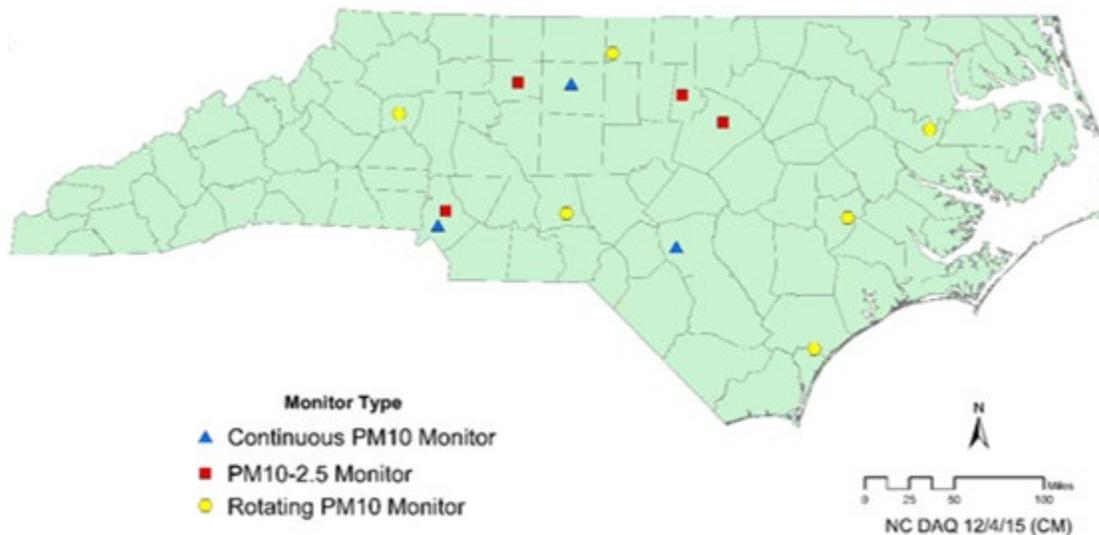


Figure 56. 2019-2020 PM₁₀ Monitor Locations

Table 31 PM₁₀ Monitoring Network for the Charlotte-Concord-Gastonia MSA ^a

AQS Site Id Number:	37-119-0041 ^d	371190042 ^{c, d}
Site Name:	Garinger	Montlaire
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
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	Monitor shut down 3/31/2019

Table 32 PM₁₀ 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. DAQ is also evaluating a Teledyne T640X monitor at Millbrook.

**Table 33 The PM₁₀ 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-0516-239	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 Teledyne API T640X at 16.67 LPM, AQS Method Code 239, U.S. EPA equivalent method designation EQPM-0516-239.

^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 34 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	EQPM-0798-122
Meets Requirements of Part 58, Appendix D:	Yes	Yes – not required by Appendix D	Yes – not required by Appendix D
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	Monitoring resumed June 28, 2019	Monitoring will resume Oct. 1, 2019

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

Table 35 The PM₁₀ Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA ^a

AQS Site Id Number:	37-033-0001	37-107-0004	37-117-0001	37-123-0001
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	35.263165
Longitude:	-79.467417	-77.568792	-76.897820	-79.836636
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:	Yes – not required by Appendix D	Yes – not required by Appendix D	Yes – not required by Appendix D	Yes – not required by Appendix D
Meets Part 58, Appendix E Requirements:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Monitoring will resume 9/1/2019	Monitoring will resume 6/1/2020 to 5/31/2021	Monitor operated 4/1/2018 to 3/31/2019	Will operate 8/1/2020 to 7/31/2021

^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. Sixteen 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 14 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. 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.

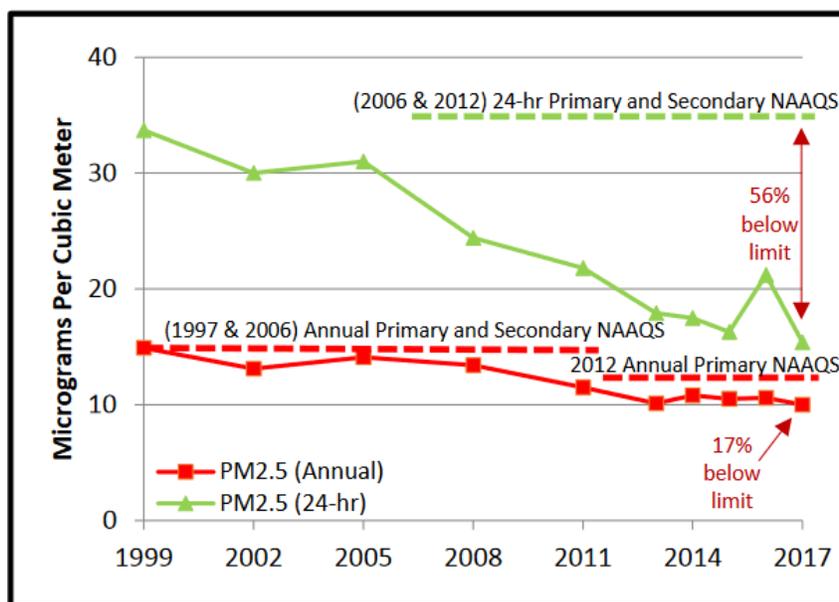


Figure 57. Statewide trends for fine particles

(from *Air Quality Trends in North Carolina*, December 2018, located at https://files.nc.gov/ncdeq/Air%20Quality/Air_Quality_Trends_in_North_Carolina_122118.pdf)

Figure 58 through Figure 69 provides the fine-particle design values for the monitors in North Carolina for the past eight 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 Section 58.14(c)(1). All the currently operating FRM/FEM monitors meet this requirement except the monitors at Millbrook, 37-183-0014, and Lexington, 37-057-0002. The regulations at 40 CFR Part 58, Appendix D Section 4.7 requires nine 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 monitors, Hickory and Lexington, are required in the December 2009 Redesignation and Maintenance Plan for Fine Particulate Matter.¹⁴

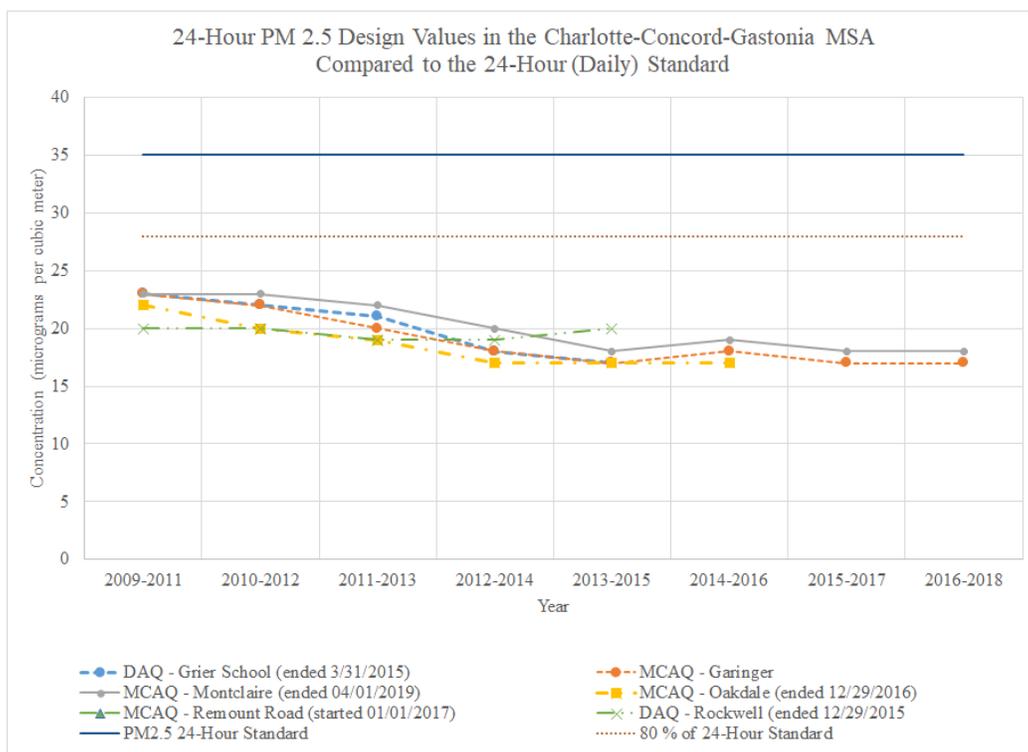


Figure 58. Measured daily fine particle design values in the Charlotte-Concord-Gastonia MSA

¹⁴ “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 online at <http://deq.nc.gov/about/divisions/air-quality/air-quality-planning/state-implementation-plans/hickory-area>.

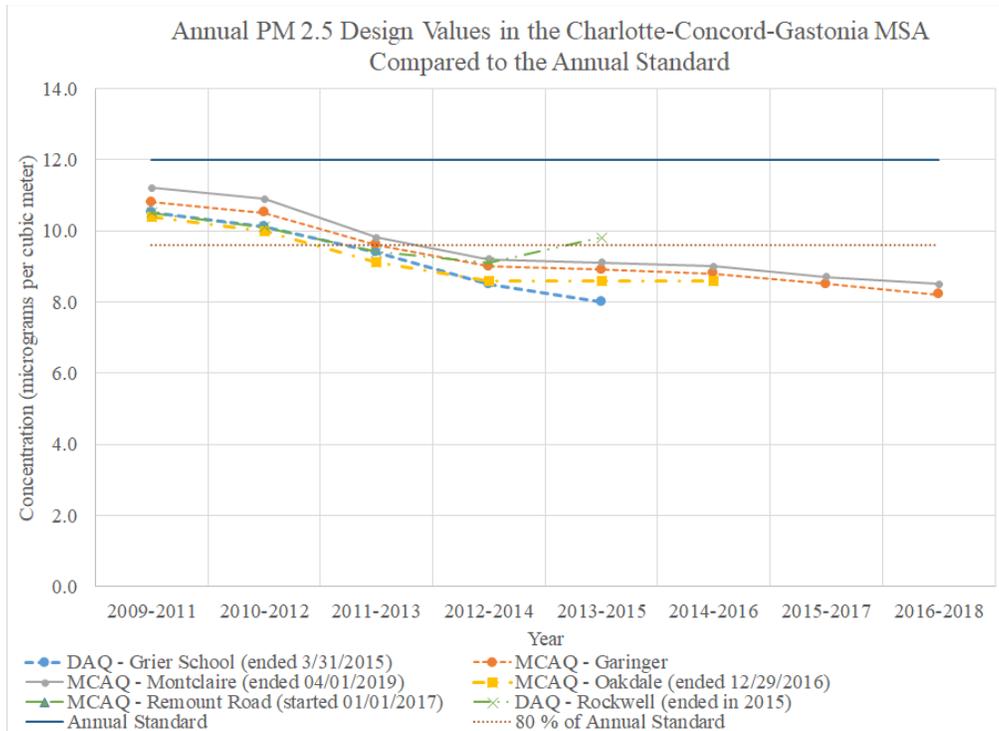


Figure 59. Annual design values measured in the Charlotte-Concord-Gastonia MSA

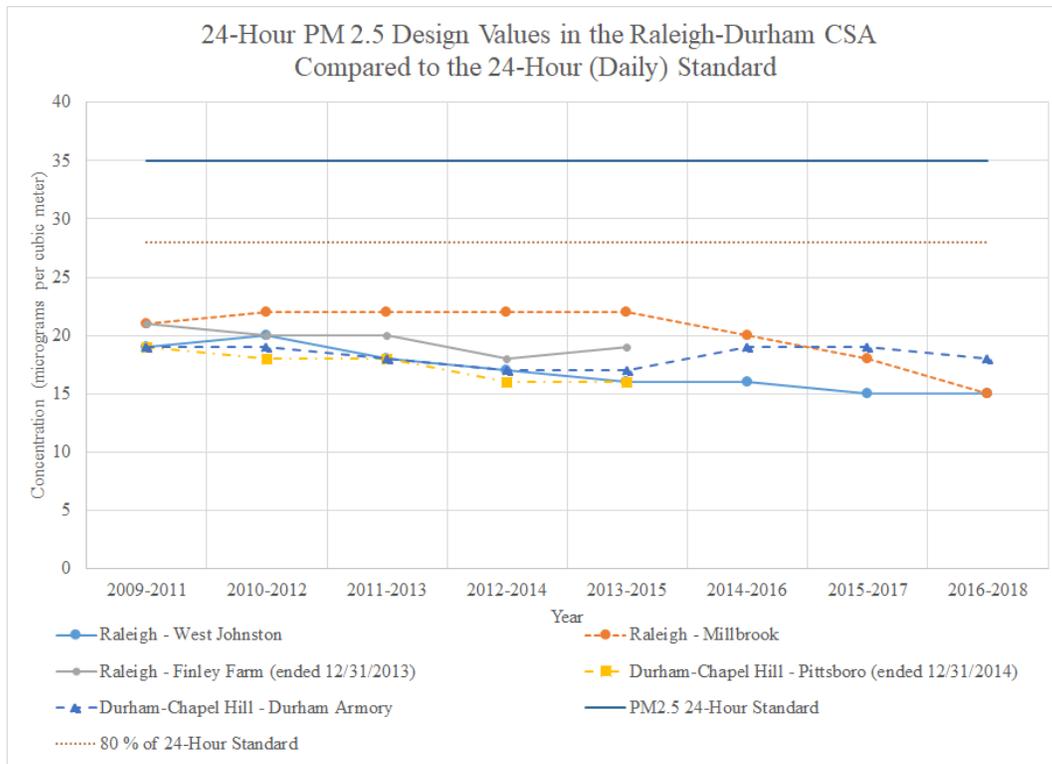


Figure 60. Daily fine-particle design values measured in the Raleigh-Durham CSA

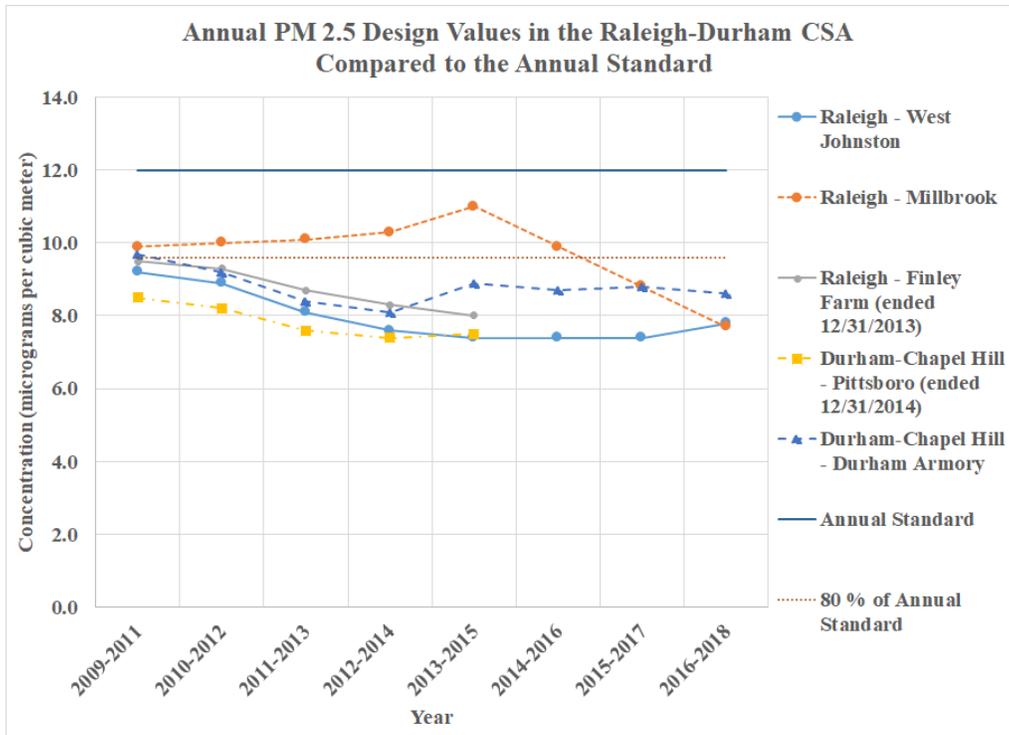


Figure 61. Annual fine-particle design values measured in the Raleigh-Durham CSA

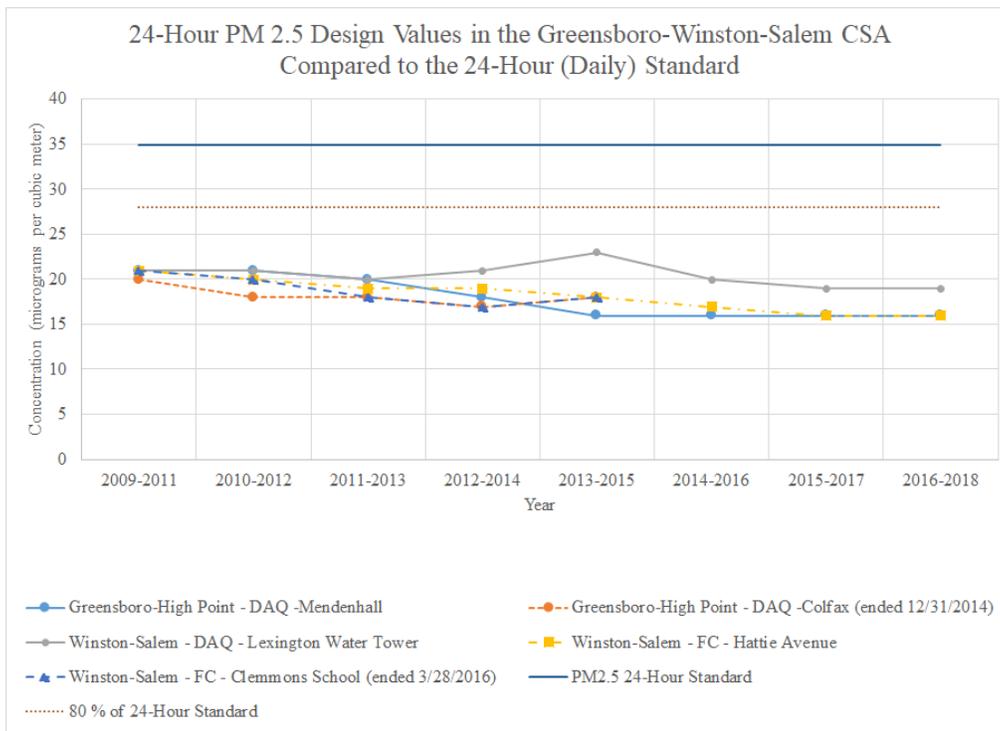


Figure 62. Daily fine-particle design values measured in the Greensboro-Winston-Salem CSA

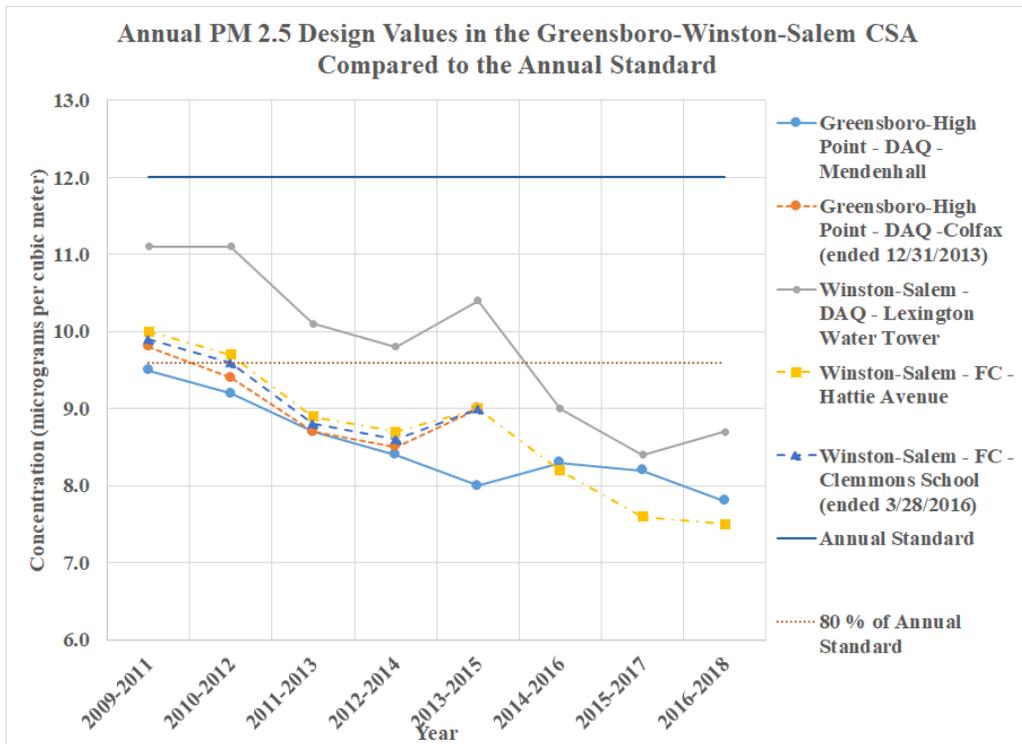


Figure 63. Annual fine-particle design values measured in the Greensboro-Winston-Salem CSA

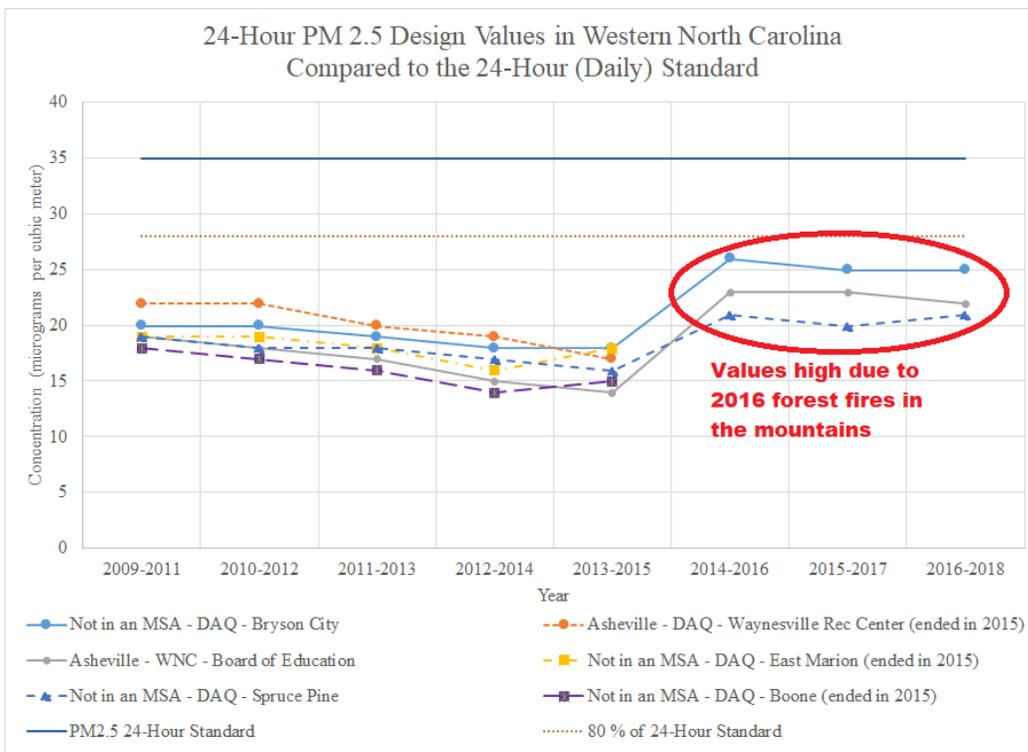


Figure 64. Daily fine-particle design values measured in western North Carolina

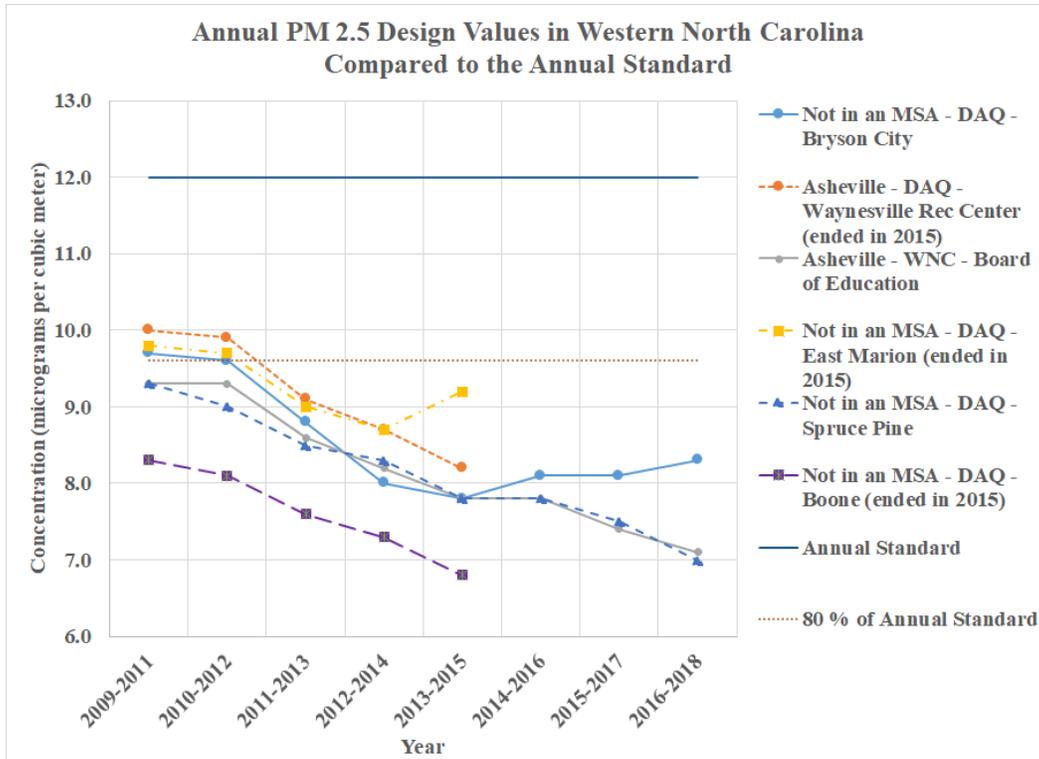


Figure 65. Annual fine-particle design values measured in western North Carolina

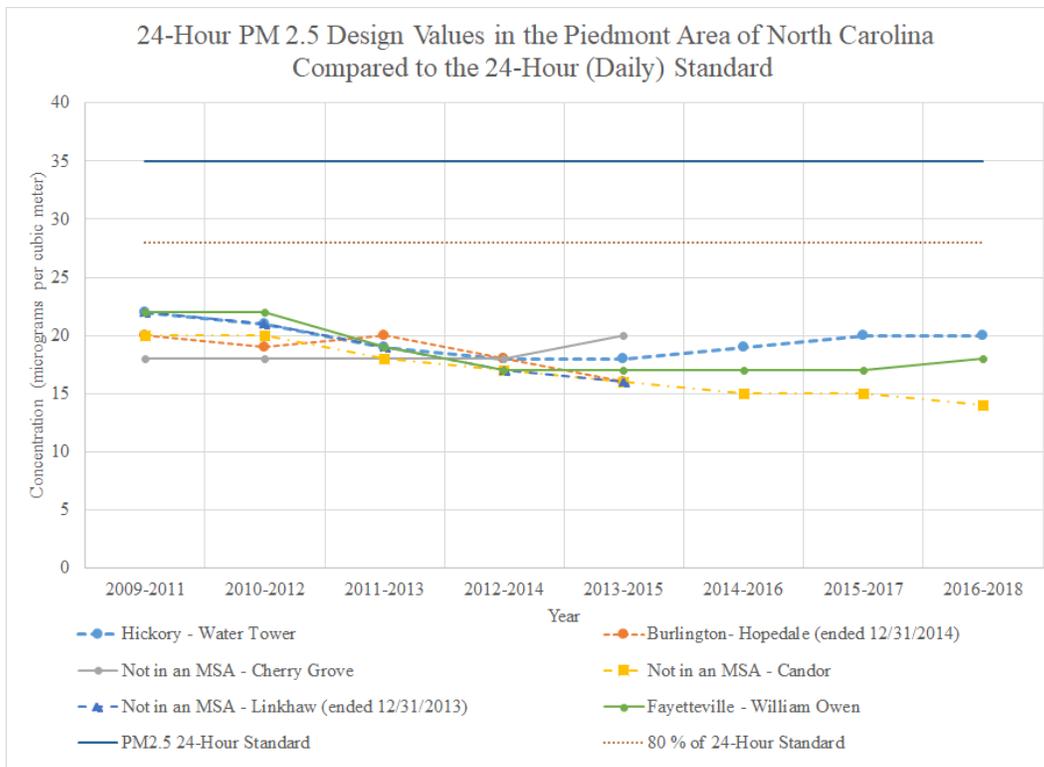


Figure 66. Daily fine-particle design values measured in central North Carolina

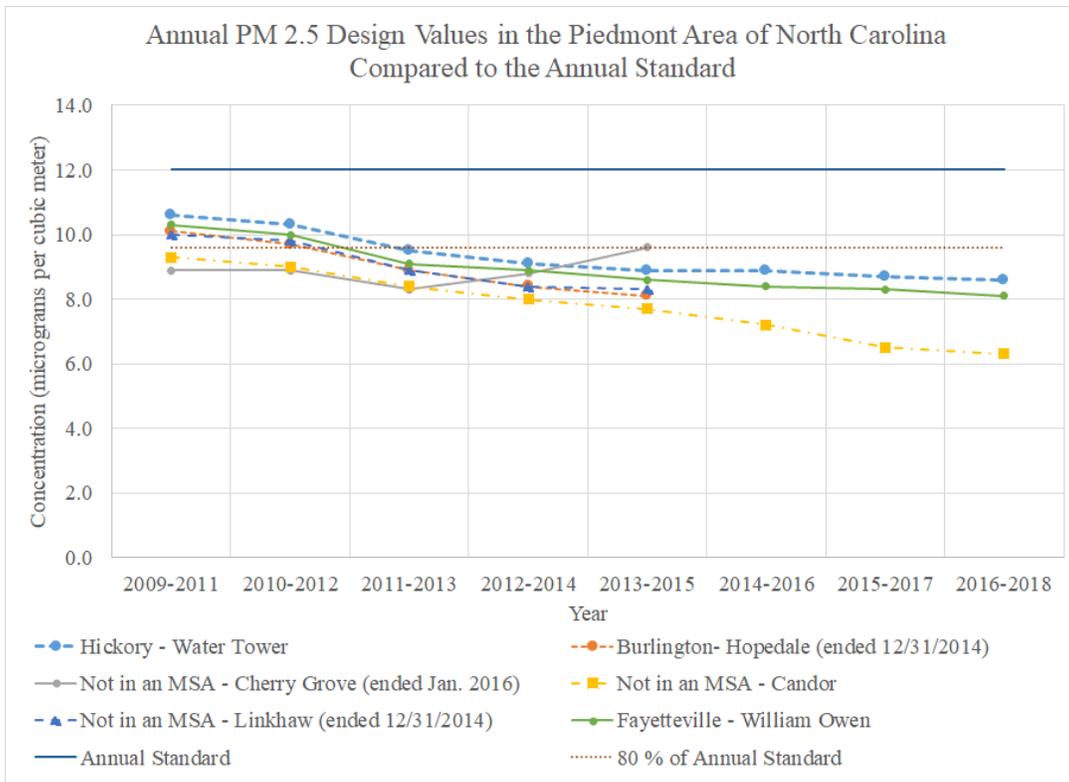


Figure 67. Annual fine-particle design values measured in central North Carolina

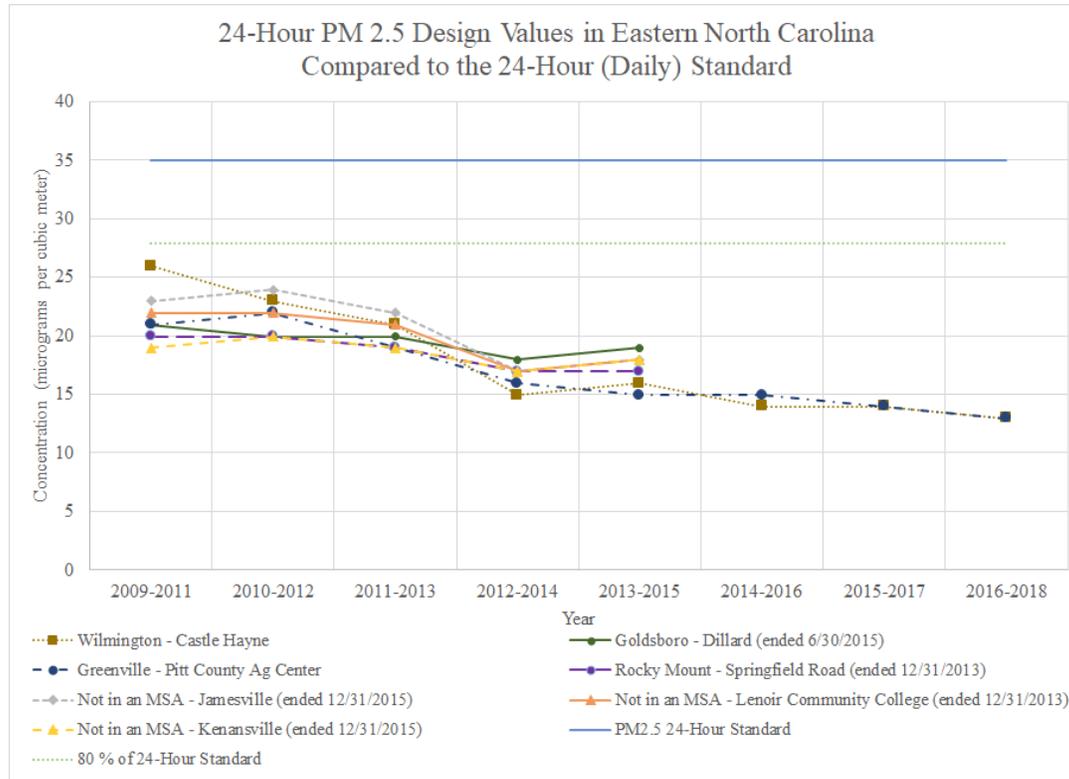


Figure 68. Daily design values measured in eastern North Carolina

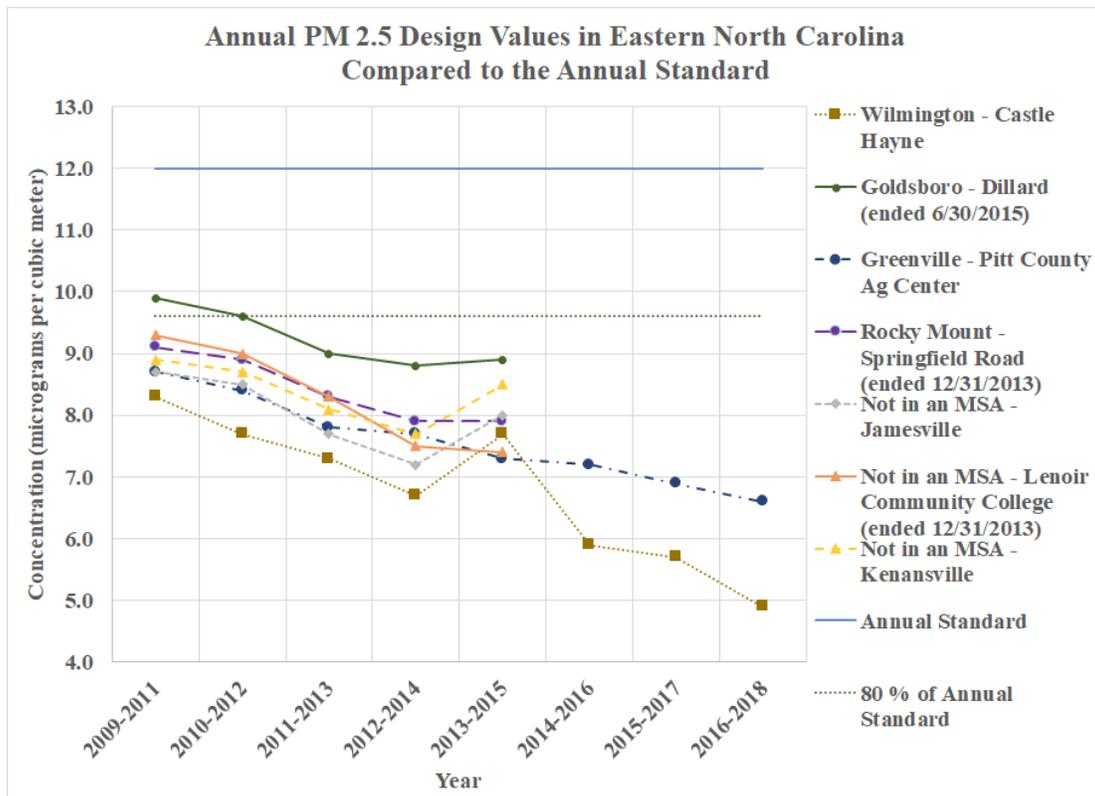


Figure 69. Annual fine-particle design values measured in eastern North Carolina

The remaining eight monitors are less than 80% of the standard and may meet the additional requirement of having less than 10% probability of exceeding 80% of the NAAQS during the next three years, as required in 40 CFR Section 58.14(c)(1), based on design value trends and model predictions. Thus, there are eight monitors, one operated by a local program that is not part of the DAQ PQAO, seven operated by the DAQ PQAO, that are not required by Appendix D or by the state implementation plan and that could potentially meet all the requirements of 40 CFR Section 58.14(c)(1) to be shut down. DAQ reviewed the seven monitors operated by the division and their current monitoring objectives and determined these seven monitors are still required to meet state objectives and provide an adequate background network for prevention of significant deterioration permitting and modeling. These seven monitors are:

- 37-021-0034 at the Board of Education in the Asheville MSA;
- 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;
- 37-131-0003 in Northampton County;
- 37-147-0006 at the Pitt County Ag Center in the Greenville MSA; and
- 37-121-0004 at Spruce Pine in Mitchell County.

DAQ and WNC decided to continue operating these seven monitors for the following reasons:

- The Board of Education, 37-021-0034, monitor is needed to provide AQI data and real time data for the Asheville MSA.

- The William Owen, 37-051-0009, monitor is needed to maintain 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. DAQ also uses the data from this monitor for PSD modeling. In addition, the Fayetteville MSA grew rapidly during this decade. Hoke County, one of two counties in the MSA, is the 10th fastest-growing county in the state percentage-wise for this decade.¹⁵
- 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 47th fastest-growing county on an annual basis¹⁶ and 62nd fastest-growing county for this decade.¹⁷
- 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. DAQ believes it is important to maintain a design value monitor at this location. In addition, nearby Pender County grew rapidly during this decade. Pender County is the 71st fastest-growing county in the nation percentage-wise for this decade.¹⁸
- The Northampton, 37-131-0003, monitor is needed to provide background data for Northampton County.
- 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, 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 Part 58, Appendix D, Section 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 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 2019 fine particle network shown in Figure 70 is an

¹⁵ Cumulative Estimates of Resident Population Change and Rankings: April 1, 2010 to July 1, 2018, Source: U.S. Census Bureau, Population Division, Release Date: April 2019.

¹⁶ Resident Population Estimates for the 100 Fastest Growing U.S. Counties with 10,000 or More Population in 2017: July 1, 2017 to July 1, 2018, Source: U.S. Census Bureau, Population Division, Release Date: April 2019.

¹⁷ Resident Population Estimates for the 100 Fastest Growing U.S. Counties with 10,000 or More Population in 2010: April 1, 2010 to July 1, 2018, Source: U.S. Census Bureau, Population Division, Release Date: April 2019.

¹⁸ Resident Population Estimates for the 100 Fastest Growing U.S. Counties with 10,000 or More Population in 2010: April 1, 2010 to July 1, 2018, Source: U.S. Census Bureau, Population Division, Release Date: April 2019.

adequate network to protect human health and environmental welfare and DAQ should continue to operate this network in 2020.

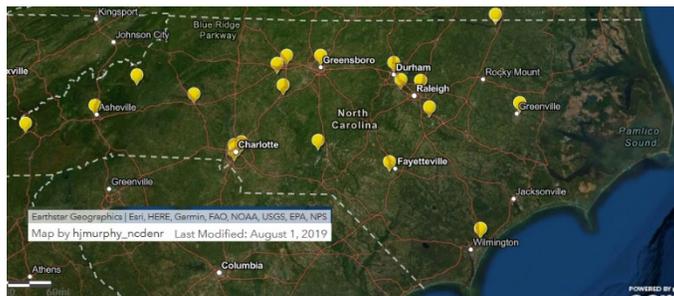


Figure 70. Current 2019 and proposed 2020 federal reference and equivalent method monitoring network

Other fine particle monitors that DAQ could consider shutting down are those monitors that exceed the minimum number of monitors required in 40 CFR Part 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 36 provides the 2018 population estimates for the MSAs in North Carolina, the design values for 2016-2018, 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. 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.¹⁹ In 2018, 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.

¹⁹ See Appendix G. Monitoring Agreement between Virginia and North Carolina for the Virginia Beach-Norfolk-New Port News Metropolitan Statistical Area.

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

MSA population ^{1,2}	Most recent 3-year design value \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. Title 40 CFR Part 58, Appendix D, Table D-5

**Table 36 Design Values and Required Fine Particle Monitors for North Carolina
Metropolitan Statistical Areas, MSA**

MSA	Population Estimate, 2018 ^a	2018 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	2,569,213	51	71	2	2
Virginia Beach-Norfolk-New Port News, VA-NC	1,728,733	40	56	2	0 ^d
Raleigh, NC	1,362,540	43	65	2	3
Greensboro-High Point	767,711	46	65	1	1
Winston-Salem	671,456	54	72	1	3
Durham- Chapel Hill	575,412	51	72	1	1
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	480,891	Not available		0	0
Asheville	459,585	63	59	0	1

**Table 36 Design Values and Required Fine Particle Monitors for North Carolina
Metropolitan Statistical Areas, MSA**

MSA	Population Estimate, 2018 ^a	2018 Fine Particle Design Value, as percent of NAAQS		Number of Monitors operated in North Carolina ^b	
		24-Hour	Annual	Required ^c	Current
Fayetteville	387,094	51	68	0	1
Hickory	368,416	57	72	0	1
Wilmington	294,436	37	41	0	1
Jacksonville	197,683	Not available		0	0
Greenville	179,914	37	55	0	1
Burlington	166,436	Not available		0	0
Rocky Mount	146,021	Not available		0	0
New Bern	125,219	Not available		0	0
Goldsboro	123,248	Not available		0	0

^a Source: Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018, U.S. Census Bureau, Population Division, Released April 18, 2019, available online at <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>.

^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.

The following tables provide the information required by 40 CFR Part 58 to be included in the network plan. Table 37 through Table 42 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 Part 58.

The monitors at the Durham Armory, 37-063-0015, Millbrook, 37-183-0014, and William Owen, 37-051-0009, use the EPA reference method designation RFPS-1006-145, AQS method code 145. These three monitors operate on a 24-hour schedule from midnight to midnight on each scheduled sampling day. Collocated FRM monitors operate at the William Owen and Durham Armory sites. On July 1, 2019, the Pitt County Agricultural Center, 37-147-0006, site stopped using the using the reference method and started using the EPA automated equivalent method EQPM-1013-209, AQS method code 209.

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 the Board of Education, 37-021-0034, 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 10 monitors collect data each hour. Collocated FRM monitors

operate at the Lexington and Board of Education sites. A collocated FEM operates at the Hickory site.

All the monitors operate year-round. Table 37 through Table 42 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 CFR Part 58, Appendices A, C, D and E. These tables also provide the proposed changes to the network.

Table 37 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	Montclair	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 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- NCore, 1 of 2 required monitors for the Charlotte-Concord-Gastonia MSA.	Yes, not required by Appendix D	Yes –near road, 1 of 2 required monitors for the Charlotte-Concord-Gastonia MSA.	Yes, not required by Appendix D
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	None	Monitoring ended 3/31/2019	None	Monitoring will start 9/1/2019

Table 37 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

^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 38 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:	Yes – not required by Appendix D	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.
Meets Requirements of Part 58, Appendix E:	Yes	Yes	No, but DAQ has a waiver for trees behind the monitor
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 39 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	37-067-0030 ^b	37-081-0013
Site Name:	Lexington Water Tower	Hattie Avenue	Clemmons Middle School	Mendenhall
Street Address:	938 South Salisbury Street	1300 block of Hattie Avenue	Fraternity Church Road	205 Willoughby Blvd.

Table 39 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	37-067-0030 ^b	37-081-0013
Site Name:	Lexington Water Tower	Hattie Avenue	Clemmons Middle School	Mendenhall
City:	Lexington	Winston-Salem	Winston-Salem	Greensboro
Latitude:	35.814444	36.110556	36.026	36.109167
Longitude:	-80.262500	-80.226667	-80.342	-79.801111
MSA, CSA or CBSA represented:	Winston-Salem	Winston-Salem	Winston-Salem	Greensboro-High Point
Monitor Type:	SLAMS	SLAMS	SLAMS	SLAMS
Operating Schedule:	Hourly Collocated w/1-in-6 day	Hourly Collocated w/1-in-3 day	Hourly Collocated w/1-in-6 day	Hourly
Statement of Purpose:	Required monitor for maintenance area & the Winston-Salem MSA. Compliance w/NAAQS	AQI reporting. Compliance w/NAAQS.	AQI reporting. Compliance w/NAAQS.	Required monitor in Greensboro-High Point MSA. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Population exposure	Population exposure	Population exposure / general / background
Scale:	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix C:	Yes – EQPM-0308-170	Yes - EQPM-0516-238	Yes - EQPM-0516-236	Yes – EQPM-1013-209
Meets Requirements of Part 58, Appendix D:	Yes- Required monitor for the Winston-Salem MSA.	Yes – not required by Appendix D	Yes – not required by Appendix D	Yes - required monitor for the Greensboro-High Point MSA.
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None	None

^a The Hattie Avenue and Clemmons Middle School monitors use either a Teledyne-API T640 at 5.0 LPM or a Teledyne-API T640X at 16.67 LPM, Air Quality System, AQS method codes 236 and 238, respectively. 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 40. 2019-2019 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	Hourly, collocated w/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 – EQPM-1013-209	Yes – EQPM-1013-209
Meets Requirements of Part 58, Appendix D:	Yes – Required monitor for the Durham-Chapel Hill MSA.	Yes – not required by Appendix D	Yes – Not required by Appendix D; Maintenance monitor for the Hickory MSA.
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Added collocated FRM on 8/12/2019	None	None

^a The Durham Armory monitor uses an R & P Model 2025i PM2.5 Sequential Monitor with a very sharp cut cyclone, Air Quality System, AQS method code 145. The Board of Education and Hickory monitors use 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 41 The 2019-2020 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:	Yes – not required by Appendix D	Yes – not required by Appendix D	Yes – not required by Appendix D
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	Method will change 1/1/2020	Monitoring shelter will move in 2019	Method changed on 7/1/2019; monitor will move to roof of shelter in 2019

^a The monitor at William Owen uses 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. The Pitt County monitor uses a Met One BAM-1022 Monitor, AQS method code 209. All monitors operate year-round.

Table 42 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	35.263165	35.434767
Longitude:	-82.062082	-79.836636	-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.

Table 42 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
Monitoring Objective:	Population exposure	Welfare related impacts/ general/ background	Regional transport/ population exposure
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:	Yes – not required by Appendix D	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.

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 seven MSAs in 2019 with more than the required number of monitors. DAQ does not operate monitors in one of these MSAs so the division did not evaluate that MSA and monitor. 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 County Agricultural Center 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. Lexington is also in a fine-particle maintenance area. Thus, 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, DAQ discussed the rationale for keeping the William Owen, Castle Hayne and Pitt Ag monitors. The Hickory monitor is also in a fine-particle maintenance area. Thus, the state implementation plan requires DAQ to operate this monitor.

B. Continuous Fine Particle Monitoring Network

DAQ currently operates 14 continuous fine-particle monitoring sites and the local programs operate five. 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 16 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 Part 58, Appendix D Section 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 36, 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 Part 58, Appendix D, Section 4.7.2, continuous fine particle monitors are also required for real-time reporting (40 CFR Part 58, Appendix D, Section 1.1(a)), air quality forecasting and air quality index reporting (40 CFR Part 58, Appendix G, Section 3). DAQ is required by 40 CFR Part 58, Appendix G to do air quality index reporting in three MSAs that are not required to have a continuous monitor by 40 CFR Part 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 11 remaining continuous monitors, eight are FEMs - Bryson City, Spruce Pine, Lexington, West Johnston, Castle Hayne, Triple Oak, Pitt Ag Center and Candor - included in the FRM/FEM network and the division evaluated them earlier as part of that network. The local programs operate two. DAQ evaluated the remaining two continuous monitors operated by the division to determine if they still add value to the network and should continue operating.

The first monitor is a Met One BAM 1022 FEM DAQ just added to the Northampton site for a background study, which started operating on July 24, 2019.

The second fine particle monitor is at Leggett. The Leggett fine particle continuous monitor is required for air quality forecasting in the Rocky Mount area, thus DAQ cannot shut this monitor down while air quality forecasting continues for this area.

In 2019, the division plans to add a continuous fine particle monitor to the Rockwell site to provide background data in the area between Charlotte and Winston-Salem.

Table 43 through Table 48 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 Part 58, Appendix A, C, D and E requirements and any proposed changes.

Table 43 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	Montclair	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	Yes – not required by Appendix D.	Yes –near road	Yes - not required by Appendix D
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	None	Monitoring ended 3/31/2019	Started 1/20/2017	Monitoring will start 7/1/2019

^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 except the Rockwell monitor.

Table 44 The 2019-2020 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 °	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	No – AQS Method Code 733	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 2019	None	None

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

Table 45 The 2019-2020 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	Yes – EQPM-0516-238	Yes – EQPM-0516-236
Meets Requirements of Part 58, Appendix D:	Yes – not required by Appendix D	Yes – required monitor	Yes – not required by Appendix D
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None

^a The Forsyth County monitors use either a Teledyne-API T640 at 5.0 LPM or a Teledyne-API T640X at 16.67 LPM. 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 46 The 2019-2020 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	Yes – not required by Appendix D	Yes – not required by Appendix D	Yes – not required by Appendix D
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None	Collocated BAM added to site in June 2019

^a The WNC monitor, the Fayetteville monitor and the Hickory monitors are BAM 1022s. The Durham 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 websites.

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

**Table 47 The 2019-2020 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:	New shelter will be installed in 2019	New shelter installed	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 48 The 2019-2020 Continuous 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	37-131-0003	37-173-0002
Site Name:	Spruce Pine	Candor	Northampton	Bryson City
Street Address:	138 Highland Avenue	112 Perry Drive	152 Hurricane Drive	Parks & Rec Building, Center Street
City:	Spruce Pine	Candor	Gaston	Bryson City
Latitude:	35.912487	35.263165	36.511708	35.434767
Longitude:	-82.062082	-79.836636	-77.655389	-83.442133
MSA, CSA or CBSA represented:	Not in an MSA	Not in an MSA	Not in an MSA	Not in an MSA
Monitor Type:	Special purpose	SLAMS	Special purpose	SLAMS
Operating Schedule:	Hourly	Hourly	Hourly	Hourly

Table 48 The 2019-2020 Continuous 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	37-131-0003	37-173-0002
Site Name:	Spruce Pine	Candor	Northampton	Bryson City
Statement of Purpose:	Real-time AQI reporting.	General background site. Real-time AQI reporting. Compliance w/NAAQS.	General/ background site for Northampton County	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:	Population exposure	General background/ population exposure	General/ background	Regional transport/ population exposure
Scale:	Neighborhood	Regional	Neighborhood	Neighborhood
Suitable for Comparison to NAAQS:	No	Yes	No	Yes
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-0308-170
Meets Requirements of Part 58, Appendix D:	Yes – not required by Appendix D	Yes –required background monitor.	Yes – not required by Appendix D	Yes – required transport monitor
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	None	None	Monitor started 7/24/2019	None

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

C. Manual Speciation Fine Particle Monitoring Network

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 regulations in 40 CFR Part 58, Appendix D, Section 4.7.4, which requires the agency to continue operating STN monitors, make the monitor at Garinger a required monitor. The monitors at Garinger and Millbrook are required by 40 CFR Part 58, Appendix D, Section 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™, malfunctioned during the first half of 2014 so DAQ shut it down in June 2014. Table 49 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 49 also indicates if the monitor is suitable for comparison to the NAAQS and meets 40 CFR Part 58, Appendix A, C, D and E requirements and proposed changes.

Table 49 The 2019-2020 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- NCore & speciation trend network site	Yes - NCore	Yes – not required by Appendix D
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. 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.

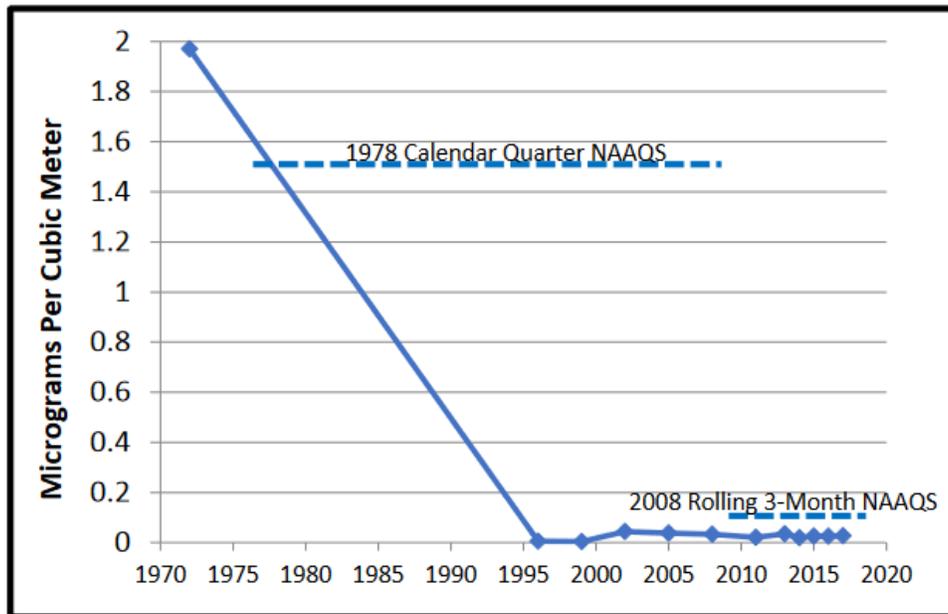


Figure 72. Statewide 24-hour lead levels through 2018

(from *Air Quality Trends in North Carolina*, located at https://files.nc.gov/ncdeq/Air%20Quality/Air_Quality_Trends_in_North_Carolina_122118.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.²⁰ On Dec. 27, 2010, the EPA finalized changes to the lead monitoring network.²¹ These changes included lowering the threshold for fence-line monitoring for lead-emitting facilities from one ton of lead per year to 0.5 ton 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

²⁰ 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>.

²¹ 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>.

facilities emitting more than 0.5 ton of lead per year and population-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 500,000.²²

In 2009, DAQ requested and received permission to forgo 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 DAQ to monitor at any of these facilities because none of the facilities emitted one ton or more of lead per year.

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

- Duke Energy Carolinas, LLC - Belews Creek Steam Station, located in Stokes County;
- Duke Energy Progress- 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, 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, DAQ received permission not to monitor at one of these facilities, Progress Energy - Roxboro Plant in 2009. In 2011, DAQ requested that this facility and six other of these facilities:

- Fort Bragg,
- Camp Lejeune,

²² 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 division 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 DAQ to monitor at any of these facilities.²³

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 measured lead concentrations by analyzing the filters from the low volume PM₁₀ monitors that operated at the site. 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 PM₁₀ lead monitoring method. Figure 73 shows the maximum PM₁₀ lead concentrations measured at the two sites.

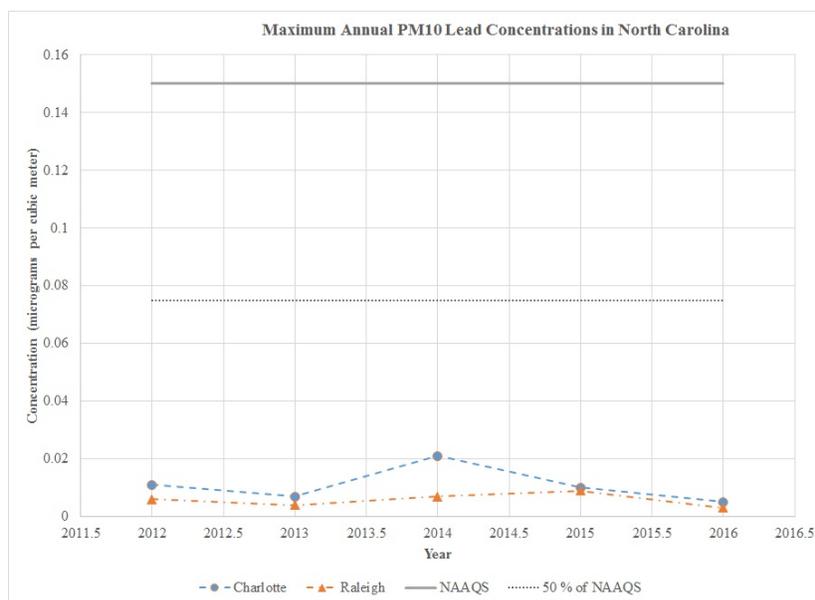


Figure 73. Maximum annual lead concentrations measured at North Carolina NCore Stations

²³ 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/daq/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% 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, or 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 division analyzes the samples using pre-concentration gas chromatography with mass-spectrometric detection, or GC/MS, via the Compendium Method for Toxic Organics, or TO, 15 for the 65 compounds in Table 50.

Table 50 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-Dichloroethane	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	

DAQ collects air samples on silica-2,4-dinitrophenylhydrazine, or DNPH, cartridges with potassium iodide, or KI, ozone scrubbing at Millbrook and Candor. The cartridges are extracted and analyzed using ultra high-performance liquid chromatography, or UHPLC, with ultraviolet, or UV, detection for the list of compounds in Table 51.

Table 51. 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 division established the UAT monitoring network in conjunction with a national program originally proposed and designed by the EPA in 1999. 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 EPA stated the following objectives for the network it proposed in 1999:

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.

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 jurisdictions. 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.

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

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

DAQ made the following changes during the last few years to the UAT monitoring network:

1. DAQ moved the Asheville site from the Health and Social Services building on Woodfin Street to a site at Asheville-Buncombe Technical College in November 2004. Sampling for VOCs occurred at the Health and Social Services building from Jan.1, 2002, through Nov. 2, 2004.
2. 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. This site operated from June 26, 2004, through Dec. 31, 2009.
3. DAQ stopped monitoring for semi-volatile organic compounds, or SVOCs, by method TO-13 at all North Carolina UAT sites.

4. DAQ monitored for carbonyl compounds by method TO-11 at all North Carolina UAT sites from Aug. 3, 2006, through Dec. 9, 2009. However, sampling for carbonyl compounds by TO-11a resumed in July 2013 at two sites – Millbrook in Raleigh and Candor. The division collected carbonyl compounds by TO-11a at the Blackstone site from Nov. 12, 2013, through July 31, 2018.
5. DAQ upgraded one GC/MS system used for VOCs analysis by method TO-15 to lower detection limits.
6. The Blackstone site was a special-purpose monitoring site for monitoring VOCs and aldehyde concentrations prior to any shale gas development in the Sanford area. DAQ operated this site from Nov. 12, 2013, until July 31, 2018.
7. DAQ added a VOC monitor in Greenville at the Pitt County Agricultural Center monitoring site in 2018.

Table 52 through Table 54 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 Part 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 or Durham. The division 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 Part 58. Appendix C of 40 CFR Part 58 requirements do not apply to UAT monitoring. All monitors meet the applicable requirements in 40 CFR Part 58, Appendix D, although this appendix does not require DAQ to operate any of these monitors. 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 52 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:	Yes – not required	Yes – not required	Yes – not required
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None

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

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

^c AQS method code 150, sample collection in a stainless steel 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 53 The Air Toxics Monitoring Network for the Asheville, Wilmington and Greenville MSAs

AQS Site Id Number:	37-021-0035 ^c	37-129-0010	37-147-0006
Site Name:	AB Tech ^a	Eagles Island	Pitt County Ag Center
Street Address:	AB Tech College	Battleship Drive	403 Government Circle
City:	Asheville	Wilmington	Greenville
Latitude:	35.572222	34.235556	35.638610
Longitude:	-82.558611	-77.955833	-77.358050
MSA, CSA or CBSA represented:	Asheville	Wilmington	Greenville
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	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 ^b	Not applicable – uses AQS method code 150 ^b	Not applicable – uses AQS method code 150 ^b
Meets Requirements of Part 58, Appendix D:	Yes – not required	Yes – not required	Yes – not required
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	This site started on Feb. 14, 2019

^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 54 The Air Toxics Monitoring Network for Areas not in MSAs

AQS Site Id Number:	37-123-0001
Site Name:	Candor
Street Address:	112 Perry Drive
City:	Candor
Latitude:	35.263165
Longitude:	-79.836636
MSA, CSA or CBSA represented:	Not in an MSA
Monitor Type:	Non-regulatory
Operating Schedule:	24-hour, midnight to midnight, 1-in-6 day
Statement of Purpose:	Monitor as many HAPs as possible.
Monitoring Objective:	General/ background
Scale:	Regional
Suitable for Comparison to NAAQS:	Not applicable
Meets Requirements of Part 58, Appendix A:	Yes
Meets Requirements of Part 58, Appendix C:	Not applicable – uses AQS method code 150 and 202 ^a
Meets Requirements of Part 58, Appendix D:	Yes – not required
Meets Requirements of Part 58, Appendix E:	Yes
Proposal to Move or Change:	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. 2019 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 DAQ is located at the East Millbrook Middle School site. Specifics for this site are provided below.

<u>Parameter</u>	<u>Description</u>
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

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 Part 58, Appendix E requirements. The school property is fully developed and the division does not anticipate that the Wake County School System will need to develop the area where the monitoring site is located or will evict DAQ from their property anytime in the next 18 months or later.

B. Monitor Siting Considerations

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

- 1) 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) DAQ installed all continuous gaseous monitors, SO₂, NO_y, CO and O₃, 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, or NO₂, 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	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}, or coarse PM, filter-based. 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 PM₁₀ lead.²⁴ As a result and with EPA permission, DAQ ended the PM₁₀ lead analysis on April 30, 2016.

D. Readiness Preparation

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

<u>Parameter</u>	<u>Status</u>
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

²⁴ 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 2019, DAQ plans to replace these sensors with an all-in-one sensor unit located at a height of 10 meters above the ground. The division 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 270° 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.

Additionally, a single tree, approximately 7 meters tall, is located 18 meters to the south southwest of the tower.



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

Since the position of the meteorological tower is free from any obstructions in a 270° 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. 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. DAQ was concerned that placing the converter box on a 10-meter 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 division decided to invest resources in the installation of 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 DAQ installed the new tower in late 2010, the height of the probe inlet was increased 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, or NO₂, monitors. Mecklenburg County Air Quality operates two NO₂ monitors and Forsyth County Office of Environmental Assistance and Protection, Forsyth County, operates one NO₂ monitor. As shown in Figure 75 statewide NO₂ levels have fallen and currently remain below the standard.

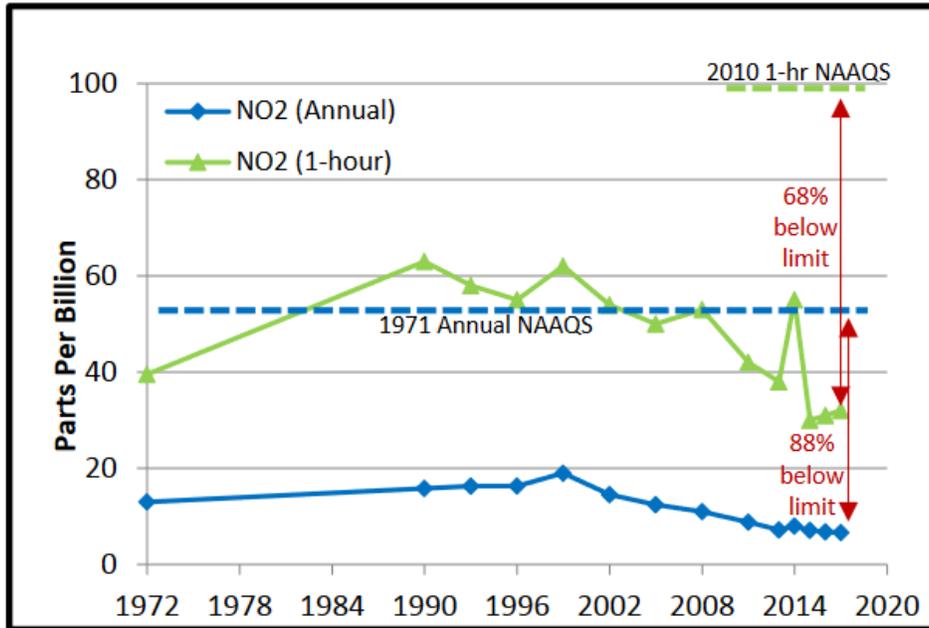


Figure 75. Statewide 1-hour and annual NO₂ levels through 2017

(from *Air Quality Trends in North Carolina*, located at https://files.nc.gov/ncdeq/Air%20Quality/Air_Quality_Trends_in_North_Carolina_122118.pdf)

In 2010, the United States Environmental Protection Agency, or EPA, changed the NO₂ primary national ambient air quality standards, or NAAQS, from an annual to an hourly standard of 100 parts per billion and established a new NO₂ monitoring network to support the new standard.²⁵ On Dec. 30, 2016, the EPA removed the requirement to establish near-road NO₂ monitoring stations in core-based statistical areas, or CBSAs, having populations between 500,000 and 1,000,000 persons.²⁶ The 2010 NO₂ network, as modified in 2016, has three types of monitoring sites:

- Near-road sites – micro-scale near-road NO₂ 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 NO₂ monitoring station is required for any CBSA with a population of 2,500,000 persons or more or in

²⁵ 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>.

²⁶ 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>.

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 NO₂ concentrations representing the neighborhood or larger spatial scales.
- Regional administrator required monitoring – additional NO₂ 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 with 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.²⁷

A. Near-Road Monitoring

For information on the near-road monitoring site in the Charlotte area, see Appendix B. 2019 Annual Monitoring Network Plan for Mecklenburg County Air Quality. The discussion below describes the Raleigh area site.

The EPA approved the Triple Oak Road near-road site for the Raleigh CBSA in 2012.²⁸ For details on the selection of Triple Oak Road and other considered locations, see the 2012 Annual Monitoring Network Plan for DAQ.²⁹ Table 55 provides the most recently available traffic information for the area from the North Carolina Department of Transportation.

Table 55. Fleet Equivalent Average Annual Daily Traffic for Selected Road Segments in the Raleigh Metropolitan Statistical Area³⁰

Station	Route	Location	Station	Percent Passenger	2017 AADT	Fleet Equivalent AADT
1	I-40	From Exit 287 to 289	09MC0031	94	181,000	278,740
813	I-40	From Exit 285 to 287	09MC0031	94	174,000	267,960
807	I-40	From Exit 283 to 284	09MC0031	94	162,000	249,480
811	I-40	From Exit 284 to 285	09MC0031	94	156,000	240,240
634	I-40	From Exit 297 to 298	09MC0033	92	128,000	220,160
895	US 1-64	West of I-40	10MC0009	95	140,000	203,000
169	I-440	From Exit 7 to 8	09MC0048	96	147,000	199,920

²⁷ The list of NO₂ monitors selected for regional administrator required monitoring is available on the worldwide web at <https://www3.epa.gov/ttn/amtic/svpop.html>.

²⁸ 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/air/documents/DocsSearch.do?dispatch=download&documentId=4599>.

²⁹ The 2012 network plan is available at <https://www3.epa.gov/ttn/amtic/files/networkplans/NCNetwork2012plan.pdf>.

³⁰ 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	2017 AADT	Fleet Equivalent AADT
889	I-40	From Exit 303 to 306	10MC0021	91	110,000	199,100

Table 56 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 56. 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 has operated a nitrogen dioxide monitor at the Garinger site since Nov. 12, 1999. 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. 2019 Annual Monitoring Network Plan for Forsyth County Office of Environmental Assistance and Protection.

D. Other Monitoring

Besides the monitoring required by 40 CFR Part 58, Appendix D, DAQ also operated a background monitor at the Blackstone monitoring site in Lee County as part of a shale-gas extraction background study from Dec. 9, 2014 to Aug. 1, 2018. Because the division finished the background study, DAQ shut down this monitor and moved it to Northampton County to collect background data there. The Northampton County monitor started collecting data on July 29, 2019. DAQ also plans to add a background monitor to the ozone-monitoring site at Rockwell.

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 Part 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 59 and Table 60 provide:

- The location,
- The statement of purpose,
- The status for each monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D and E of 40 CFR Part 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 57 The 2019-2020 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

Table 57 The 2019-2020 Nitrogen Dioxide Monitoring Network for the Charlotte-Concord-Gastonia MSA ^a

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	Yes – not required
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	Will start 1/1/2020

^a The near road and Rockwell monitors use a chemiluminescence 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 58 The 2019-2020 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

Table 58 The 2019-2020 Nitrogen Dioxide Monitoring Network for the Raleigh MSA ^a

Meets Requirements of Part 58, Appendix E:	Yes	Yes
Proposal to Move or Change:	Will change from a photolytic to a CAPS monitor 1/1/2020	None

^a Both monitors use a chemiluminescence detector with a photolytic convertor, Air Quality System, AQS, method code 200

Table 59 The Winston-Salem MSA Nitrogen Dioxide Monitoring Network ^a

AQS Site Id Number:	37-067-0022
Site Name:	Hattie Avenue
Street Address:	Corner of 13 th & 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 chemiluminescence 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 60 The 2019-2020 Nitrogen Dioxide Monitoring Network for Areas not in MSAs ^a

AQS Site Id Number:	37-131-0003
Site Name:	Northampton
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
Statement of Purpose:	General/background site for Northampton County
Monitoring Objective:	General/ background
Scale:	Urban
Suitable for Comparison to NAAQS:	Yes
Meets Requirements of Part 58, Appendix A:	Yes
Meets Requirements of Part 58, Appendix C:	Yes – EQNA-0512-200
Meets Requirements of Part 58, Appendix D:	Yes – not required
Meets Requirements of Part 58, Appendix E:	Yes

Table 60 The 2019-2020 Nitrogen Dioxide Monitoring Network for Areas not in MSAs^a

Proposal to Move or Change:	Site started July 29, 2019
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^a Monitors use a chemiluminescence 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. See 80 Federal Register 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 Federal Register 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. However, the North Carolina Division of Air Quality, or DAQ, understands that the EPA has proposed a rule that will provide state and local agencies an additional two years from the current implementation date of June 1, 2019, to implement the PAMS program requirements. The EPA needs this extension to provide all agencies the funding and equipment necessary to implement the program. DAQ will continue preparing to implement the program as funding and personnel resources allow with the goal of full implementation on or before June 1, 2021. Information on the Charlotte Garinger NCore monitoring station is available in Appendix B. 2019 Annual Monitoring Network Plan for Mecklenburg County Air Quality.

DAQ submitted a PAMS monitoring plan to the EPA regional administrator by July 1, 2018, as required by 40 CFR Section 58.10 (a) (10). The DAQ PAMS monitoring plan follows:

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

Title 40 CFR Section 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

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. EPA conducted the calls over the past 36 months. The PAMS conference calls have introduced and provided a series of guidance documents, draft quality assurance procedures and information on available systems for collecting PAMS data.

As of Aug. 12, 2019, EPA has not provided funding to DAQ for operations, maintenance, equipment or capital expenditures in support of the PAMS implementation. Therefore, the division anticipates a delay in establishment and operation of PAMS at the DAQ NCore station.

DAQ worked with EPA through the implementation process. The division will continue to work with EPA to implement the requirements as soon as it is 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 Part 58, Appendix D, Section 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 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. DAQ will work to purchase equipment and make required modifications to the monitoring station as soon as it is 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. EPA has not yet distributed the QAPP to monitoring agencies. DAQ will work to revise and adapt the EPA-provided QAPP for use in the DAQ program as soon as it is 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:

DAQ received a Markes/Agilent autoGC in late 2018. The division will work to install and operate the autoGC to collect hourly-averaged speciated-VOC measurements in the DAQ program as soon as it is practical after EPA-provided funding to purchase auxiliary 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 Aug. 12, 2019, the EPA has not provided funding for equipment, operations, maintenance or capital expenditures in support of carbonyls monitoring. 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 division will need funding to upgrade its carbonyl equipment. DAQ will work to install and operate PAMS carbonyl monitoring in the DAQ program as soon as it is practical and after EPA-provided funding and equipment becomes available to DAQ.

5. Hourly averaged ozone:

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

6. Hourly averaged nitrogen oxide, or NO, true nitrogen dioxide, or NO₂, and total reactive nitrogen, or NO_y:

As of Aug. 12, 2019, the EPA has not provided funding for operations, maintenance, equipment or capital expenditures in support of true NO₂ monitoring. During the March 28, 2018, implementation conference call for PAMS, the EPA stated that the EPA may have funding for true NO₂ monitoring in fiscal year 2020.

DAQ currently operates a photolytic NO₂ monitor at the Millbrook NCore site. 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:

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

8. Hourly vector-averaged wind direction:

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:

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

10. Hourly average atmospheric pressure:

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

11. Hourly averaged relative humidity:

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

12. Hourly precipitation:

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

13. Hourly averaged mixing-height:

As of Aug. 12, 2019, the EPA has not provided funding for operations, maintenance, equipment or capital expenditures in support of hourly averaged mixing height monitoring. DAQ will work to install and operate hourly averaged mixing height monitoring in the DAQ program as soon as it is practical and after the EPA-provided funding, equipment and training becomes available to DAQ.

14. Hourly averaged solar radiation:

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 Aug. 12, 2019, the EPA has not provided funding for operations, maintenance, equipment or capital expenditures in support of hourly averaged ultraviolet radiation monitoring. DAQ will work to install and operate hourly averaged ultraviolet radiation monitoring in the DAQ program as soon as it is 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 NO₂, 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:				
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

Parameter	Monitoring Objective	Scale of Representation	Operating Schedule	AQS Method Code
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. Background Rainwater Collection Network

In 2018, the North Carolina Division of Air Quality, or DAQ, started a background rainwater collection network. The network consists of seven sites generally oriented near DAQ's regional offices as shown in Figure 77.



Figure 77. Locations of the Background Rainwater Collection Network

(from *Background Rainwater Collections*, located at <https://files.nc.gov/ncdeq/GenX/Data/air-sampling/2019-04-09-NC-DAQ-Background-PFAS-Weekly-Rainwater-summary.pdf>)

Table 61 and Table 62 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 Part 58 and
- A summary of proposed and planned changes to the background rainwater-collection network in the Charlotte-Concord-Gastonia and Raleigh MSAs, and Greensboro and Asheville MSAs, respectively.

Table 63 and Table 64 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 Part 58 and
- A summary of proposed and planned changes to the background rainwater-collection network in the Wilmington and Greenville MSAs and in other areas in North Carolina that are outside of MSAs, respectively.

**Table 61 The 2019-2020 Rainwater Collection Network for the
Charlotte-Concord-Gastonia and Raleigh MSAs ^a**

AQS Site Id Number:	37-159-0021	37-183-0014
Site Name:	Rockwell	Millbrook
Street Address:	301 West Street	3801 Spring Forest Road
City:	Rockwell	Raleigh
Latitude:	35.551868	35.8561
Longitude:	-80.395039	-78.5742
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Raleigh
Monitor Type:	Special purpose	Special purpose
Operating Schedule:	Weekly, Tuesday to Tuesday	Weekly, Tuesday to Tuesday
Statement of Purpose:	General/ background monitor	General/ background monitor
Monitoring Objective:	General/background	Population exposure; general/ background
Scale:	Urban	Urban
Suitable for Comparison to NAAQS:	No, not applicable	No, not applicable
Meets Requirements of Part 58, Appendix A:	Not applicable	Not applicable
Meets Requirements of Part 58, Appendix C:	No – not applicable	No – not applicable
Meets Requirements of Part 58, Appendix D:	Yes – not required	Yes – not required
Meets Requirements of Part 58, Appendix E:	Yes	Yes
Proposal to Move or Change:	Started March 12, 2019	Started April 24, 2018

^a These sites use N-CON Model 125-110, wet/dry deposition samplers with ETI NOAA-IV rain gauges.

**Table 62 The 2019-2020 Background Rainwater Collection Network for the
Greensboro and Asheville MSAs ^a**

AQS Site Id Number:	37-081-0013	37-021-0038
Site Name:	Mendenhall	Asheville
Street Address:	205 Willoughby Blvd.	2826 Triple Oak Road
City:	Greensboro	Cary
Latitude:	36.109167	35.8654
Longitude:	-79.801111	-78.8195
MSA, CSA or CBSA represented:	Greensboro-High Point	Asheville
Monitor Type:	Special purpose	Special purpose
Operating Schedule:	Weekly, Tuesday to Tuesday	Weekly, Tuesday to Tuesday
Statement of Purpose:	General/ background monitor	General/ background monitor
Monitoring Objective:	Population exposure; general/ background	General/ background monitor
Scale:	Urban	Regional
Suitable for Comparison to NAAQS:	No, not applicable	No, not applicable
Meets Requirements of Part 58, Appendix A:	Not applicable	Not applicable
Meets Requirements of Part 58, Appendix C:	No – not applicable	No – not applicable
Meets Requirements of Part 58, Appendix D:	Yes – not required	Yes – not required
Meets Requirements of Part 58, Appendix E:	Yes	Yes
Proposal to Move or Change:	Started March 26, 2019	Started Nov. 20, 2018

^a These sites use N-CON Model 125-110, wet/dry deposition samplers with ETI NOAA-IV rain gauges.

**Table 63 The 2019-2020 Background Rainwater Collection Network for the
Wilmington and Greenville MSAs ^a**

AQS Site Id Number:	37-129-0010	37-147-0006
Site Name:	Eagles Island	Pitt County Ag Center
Street Address:	Battleship Drive	403 Government Circle
City:	Wilmington	Greenville
Latitude:	34.235556	35.638610
Longitude:	-77.955833	-77.358050
MSA, CSA or CBSA represented:	Battleship Drive	Greenville
Monitor Type:	Special purpose	Special purpose
Operating Schedule:	Weekly, Tuesday to Tuesday	Weekly, Tuesday to Tuesday
Statement of Purpose:	General/ background monitor	General/ background monitor
Monitoring Objective:	Population exposure; General/ background	Population exposure; General/ background
Scale:	Urban	Urban
Suitable for Comparison to NAAQS:	No, not applicable	No, not applicable
Meets Requirements of Part 58, Appendix A:	Not applicable	Not applicable
Meets Requirements of Part 58, Appendix C:	No – not applicable	No – not applicable
Meets Requirements of Part 58, Appendix D:	Yes – not required	Yes – not required
Meets Requirements of Part 58, Appendix E:	Yes	Yes
Proposal to Move or Change:	Site started Jan. 8, 2019	Site started Feb. 12, 2019

^a These sites use N-CON Model 125-110, wet/dry deposition samplers with ETI NOAA-IV rain gauges.

**Table 64 The 2019-2020 Background Rainwater Collection Network for Areas not
in MSAs ^a**

AQS Site Id Number:	37-123-0001
Site Name:	Candor
Street Address:	112 Perry Drive
City:	Candor
Latitude:	35.263165
Longitude:	-79.836636
MSA, CSA or CBSA represented:	Not in an MSA
Monitor Type:	Special purpose
Operating Schedule:	Weekly, Tuesday to Tuesday
Statement of Purpose:	General/ background monitor
Monitoring Objective:	Welfare related impacts/ general/ background
Scale:	Regional
Suitable for Comparison to NAAQS:	No, not applicable
Meets Requirements of Part 58, Appendix A:	Not applicable
Meets Requirements of Part 58, Appendix C:	No – not applicable
Meets Requirements of Part 58, Appendix D:	Yes – not required
Meets Requirements of Part 58, Appendix E:	Yes
Proposal to Move or Change:	Site started Oct. 24, 2018

^a This site uses a N-CON Model 125-110, wet/dry deposition sampler with an ETI NOAA-IV rain gauge.

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

Table 65 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 65. Dates the EPA Approved the Quality Management Plan and Quality Assurance Project Plans

Document	Date Approved by EPA
Quality Management Plan	Aug. 12, 2019
Quality Assurance Project Plan for PM Monitoring	Aug. 23, 2019
Quality Assurance Project Plan for Criteria Pollutant Monitoring	Nov. 6, 2006
Quality Assurance Project Plan for NCore Monitoring (0)	(Submitted Oct. 12, 2010)
Quality Assurance Project Plan for Urban Air Toxics Monitoring	(Submitted March 29, 2018)
Quality Assurance Project Plan for Data Requirements Rule Sulfur Dioxide Monitoring	Jan. 6, 2017
Near-road Monitoring QAPP (replaces part of the criteria pollutant monitoring QAPP)	July 9, 2019
Ozone QAPP (replaces part of the criteria pollutant monitoring QAPP)	July 11, 2019
PM 2.5 Speciation	Jan. 16, 2002

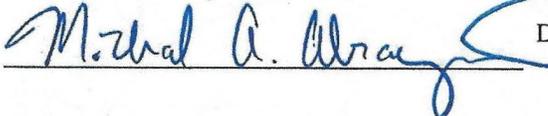
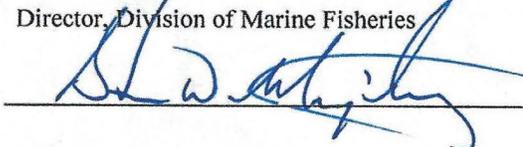
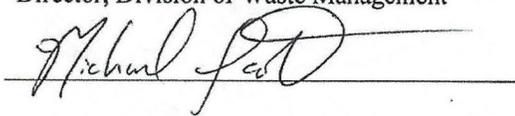
The North Carolina Department of Environmental Quality, or DEQ, submitted a preliminary QMP to EPA Region 4 in 2019. On August 6, 2019, the EPA gave preliminary approval of the QMP. DEQ is in the process of obtaining signatures on the QMP and making a formal submittal for formal approval.

In 2019, DAQ continues to work on updating all its QAPPs. Table 66 provides the status of the QAPPs that DAQ has revised and submitted to the EPA. Besides the QAPPs listed in the table, the division is revising the speciation PM_{2.5} QAPPs. DAQ is also writing QAPPs for meteorological data collection, sampling for emergent chemicals in rainwater and for PAMS monitoring. DAQ will submit any outstanding QAPPs later this year.

Table 66. Status of Updates to the Quality Assurance Project Plans

Quality Assurance Project Plan	Date Submitted to EPA	Date Comments Received from EPA
Urban Air Toxics Monitoring Program	Mar. 12, 2018	Mar. 15, 2018
Quality Assurance Project Plan for NCore Monitoring Revision 1	Feb. 18, 2019	
Particulate Matter Monitoring Program, Version 0 (replaces PM2.5 Monitoring QAPP and part of the criteria pollutant monitoring QAPP)	Aug. 12, 2019	Oct. 11, 2019
Northampton County Background Monitoring Program, Version 0	May 13, 2019	Projected July 12, 2019
Rotating Background Monitoring Program, Version 0 (replaces part of the criteria pollutant monitoring QAPP)	May 24, 2019	Projected July 23, 2019
Population-Weighted Emission Index SO ₂ QAPP (replaces part of the criteria pollutant monitoring QAPP)	July 2, 2019	Projected Aug. 31, 2019

Concurrence and Approvals

- (1) Name **Michael Abraczinskas** Phone (919) 707-8447
Title Director, Division of Air Quality
Signature  Date 8/7/19
- (2) Name **Steve Murphey** Phone (252) 808-8013
Title Director, Division of Marine Fisheries
Signature  Date 8/8/19
- (3) Name **Michael Scott** Phone (919) 707-8246
Title Director, Division of Waste Management
Signature  Date 8/7/19
- (4) Name **Linda Culpepper** Phone (919) 707-9014
Title Director, Division of Water Resources
Signature  Date 8/8/19

Approval for North Carolina Department of Environmental Quality Implementation

- (5) Name **Sheila Holman** Phone (919) 707-8619
Title Assistant Secretary for the Environment
Signature  Date 8/9/19
- (6) Name **Michael S. Regan** Phone (919) 707-8622
Title Secretary,
Signature  Date 8/9/19

Approval for United States Environmental Protection Agency

- (7) Name **Liza Montalvo** Phone (404) 562-9235
Title Quality Assurance Manager, USEPA Region 4
Signature  Date 08/12/2019

Figure 78. Signature Page from the DEQ Quality Management Plan



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

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



JAN 15 2002

Mr. Hoko P. Kimball, Chief
NCDENR
Division Of Air Quality
Ambient Monitoring Section
1641 Mail Service Center
Raleigh, North Carolina 27699-1641
Project No. 02-0223

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 700-355-8737.

Sincerely,

Gary Bennett
Office of Quality Assurance and
Data Integration

cc: Ed Carreras
Herbert Barden



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

(Book copied 11/13)

REGION 4

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

NOV 8 2006



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

SESD Project #07 0065

Dear Mr. Kimball:

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

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

EPA hereby approves this QAPP. Enclosed is the signature page of the QAPP which has been signed to indicate Region 4 approval. If you have any questions or comments, please contact Jerry W. Berger at (706) 255-8739.

Sincerely,

Marilyn Thornton, Chief
Office of Quality Assurance and
Data Integration

Enclosure

cc: Doug Neasey
Stephanie Wimpey

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

Daniel,

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

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

Thanks,
Donnie

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

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

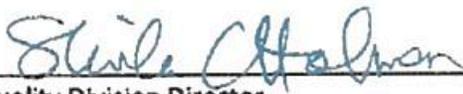
E-mail correspondence to and from this address may be subject to the
North Carolina Public Records Law and may be disclosed to third parties.

Figure 79. NCore QAPP Submittal Documentation

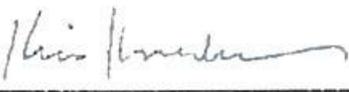
1.0 Approval Sheet

Title: Quality Assurance Project Plan for the North Carolina Division of Air Quality SO₂ Data Requirements Rule Monitoring Program

The attached *Quality Assurance Project Plan for the North Carolina Division of Air Quality SO₂ 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

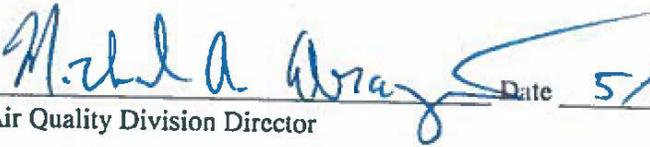
4) Signature:  Date 01/06/17
EPA Region 4 Quality Assurance Officer

Figure 80. Signature page for the Sulfur Dioxide Data Requirements Rule Quality Assurance Project Plan

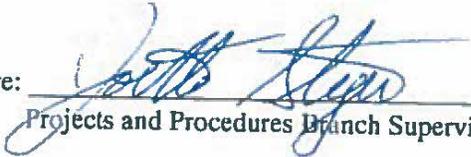
1.0 Approval Sheet

Title: Quality Assurance Project Plan for the North Carolina Division of Air Quality
Near-Road Monitoring Program (Revision 0)

The Division of Air Quality hereby recommends the attached *Quality Assurance Project Plan for the North Carolina Division of Air Quality Near-Road Monitoring Program* 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 5/29/19
Air Quality Division Director

2) Signature:  Date 5/29/19
DAQ Quality Assurance Manager
(Ambient Monitoring Section Chief)

3) Signature:  Date 5/29/2019
Projects and Procedures Branch Supervisor

4) Signature:  Date 5/29/2019
Primary QAPP Author

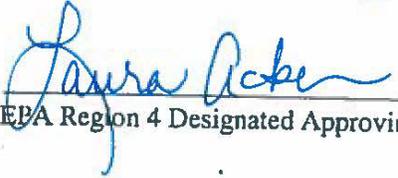
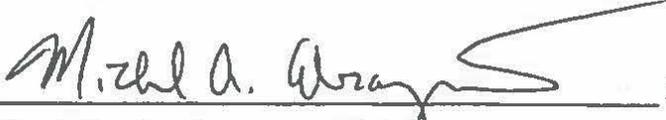
5) Signature:  Date 07/09/19
EPA Region 4 Designated Approving Official

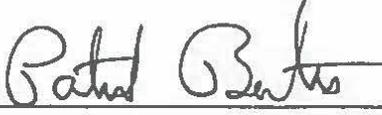
Figure 81. Signature page for the Near Road Monitoring Quality Assurance Project Plan

1.0 Approval Sheet

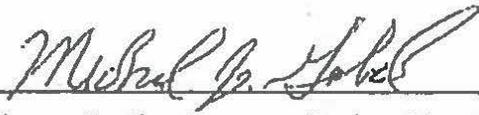
Title: Quality Assurance Project Plan for the North Carolina Division of Air Quality Ozone Ambient Air Quality Monitoring Program, Revision 0

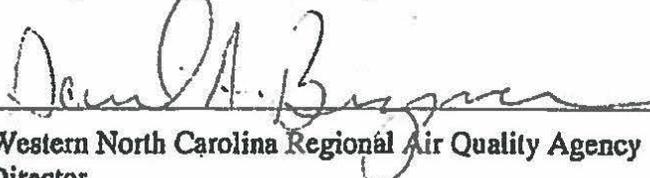
The DAQ hereby recommends this *Quality Assurance Project Plan for the North Carolina Division of Air Quality Ozone Ambient Air Quality Monitoring Program, Revision 0* for approval and commits the State of *North Carolina*, Department of Environmental Quality (Division of Air Quality) to follow the elements described within.

1) Signature:  Date 7/8/19
North Carolina Department of Environmental Quality,
Air Quality Division Director

2) Signature:  Date 7-8-19
Ambient Monitoring Section Chief and Quality
Assurance Manager

3) Signature:  Date 7/8/2019
Projects and Procedures Branch Supervisor

4) Signature:  Date 7-2-19
Primary Quality Assurance Project Plan Author

5) Signature:  Date 7-8-19
Western North Carolina Regional Air Quality Agency
Director

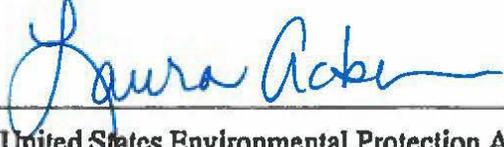
6) Signature:  Date 07/11/19
United States Environmental Protection Agency
Region 4 Designated Approving Official

Figure 82. Signature page for the Ozone Quality Assurance Project Plan

Northampton Count Background-Monitoring Program (Project ID #18-0380)

 **Butler, Patrick**
Mon 5/13, 9:37 AM
R4airqa@epa.gov; McCarthy, Stephanie <McCarthy.Stephanie@epa.gov>; Ackerman, Laura <Ackerman.Laura@epa.gov>; Brown, Ryan: +6 more

Inbox

You forwarded this message on 5/13/2019 10:12 AM

 **Northampton QAPP Rev...**
2 MB

Show all 1 attachments (2 MB) Download Save to OneDrive - State of North Carolina

To Whom it may Concern:
Attached is the revised NCDAQ Northampton County Background-Monitoring Program QAPP. After our meeting with Stephanie the week of April 22nd and an intensive internal review, we believe that this QAPP meets all of the requirements. If you need any additional information regarding this QAPP, please contact Joette Steger. Thank you...

 **Patrick Butler, P.E.**
Ambient Monitoring Section Chief
Division of Air Quality
217 West Jones Street, Raleigh NC 27603
919.707.8719 (Office)
Patrick.Butler@ncdenr.gov

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

Figure 83. Northampton County Background Monitoring QAPP Submittal Documentation

Rotating Background QAPP (Project ID #18-0381)

Butler, Patrick
Fri 5/24/2019 10:03 AM
to:R4airqa@epa.gov <R4airqa@epa.gov>;
cc:McCarthy, Stephanie <McCarthy.Stephanie@epa.gov>; Ackerman, Laura <Ackerman.Laura@epa.gov>; Brown, Ryan <Brown.Ryan@epa.gov>; Abraczinskas, Michael <michael.abraczinskas@ncdenr.gov>; Pjetraj, Michael <michael.pjetraj@ncdenr.gov>; NCDENR.DENR.DAQ.Ambient-Monitoring.PPB.CO <DENR.DAQ.Ambient-Monitoring.PPB.CO@lists.nomail.net>; Steger, Joette <jjoette.steger@ncdenr.gov>;

1 attachments (4 MB)
Rotating Background QAPP Revision 0_2 signed.pdf

To Whom it may Concern:
Attached is the revised Rotating Background QAPP, which was initially submitted March 28, 2019. After our subsequent meeting with Stephanie the week of April 22nd and an intensive internal review, we believe that this QAPP meets all of the requirements. If the assigned reviewer has begun the review of the March 28th submittal, we can send a comparison document showing the changes between the two QAPPs. If the review has not commenced, the DAQ asks that the March QAPP be withdrawn and supplanted with this one. If you need any additional information regarding this QAPP, please contact Joette Steger. Thank you...

 **Patrick Butler, P.E.**
Ambient Monitoring Section Chief
Division of Air Quality
217 West Jones Street, Raleigh NC 27603
919.707.8719 (Office)
Patrick.Butler@ncdenr.gov

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

Figure 84. Rotating Background QAPP Submittal Documentation

SO2 PWEI QAPP (Project ID #18-0687)

 **Butler, Patrick**
Tue 7/2, 10:17 AM
R4airqa@epa.gov; Steger, Joette; McCarthy, Stephanie <McCarthy.Stephanie@epa.gov>; Ackerman, Laura <Ackerman.Laura@epa.gov>; Abraczinskas, Michael; Pjetraj

Inbox

 **NCDQA_PWEI_SO2_Mo...**
1 MB

Show all 1 attachments (1 MB) Download Save to OneDrive - State of North Carolina

To Whom it may Concern:
Attached is the revised SO₂ PWEI QAPP dated July 2, 2019. After our technical systems audit in March and subsequent meeting with Stephanie the week of April 22nd along with an intensive internal review/revisions, we believe that this QAPP meets all requirements. If you need any additional information regarding this QAPP, please contact Joette Steger. Thank you...

 **Patrick Butler, P.E.**
Ambient Monitoring Section Chief
Division of Air Quality
217 West Jones Street, Raleigh NC 27603
919.707.8719 (Office)
Patrick.Butler@ncdenr.gov

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

Figure 85. Sulfur Dioxide PWEI QAPP Submittal Documentation

From: [Butler, Patrick](#)
To: R4airqa@epa.gov
Cc: [Chappin, Paul](#); [Steger, Joette](#); [McCarthy, Stephanie](#); [Ackerman, Laura](#); [Abraczinskas, Michael](#); [Pietraj, Michael](#)
Subject: RE: Particulate QAPP (Project ID #18-0292)
Date: Monday, August 12, 2019 9:10:01 AM
Attachments: 2019 PM QAPP Revision-2 DAQ-signed 8-8-19.pdf

To Whom it may Concern:

Attached is the revised Particulate QAPP dated August 8, 2019. After further communication between Paul Chappin and Stephanie McCarthy and internal review, we believe that this QAPP meets all requirements. If you need any additional information regarding this QAPP, please contact Joette Steger. Thank you...



Patrick Butler, P.E.
Ambient Monitoring Section Chief
Division of Air Quality
217 West Jones Street, Raleigh NC 27603
919.707.8719 (Office)
Patrick.Butler@ncdenr.gov

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Butler, Patrick
Sent: Thursday, June 20, 2019 3:03 PM
To: R4airqa@epa.gov
Cc: [Chappin, Paul <paul.chappin@ncdenr.gov>](mailto:paul.chappin@ncdenr.gov); [Steger, Joette <joette.steger@ncdenr.gov>](mailto:joette.steger@ncdenr.gov); [McCarthy, Stephanie <McCarthy.Stephanie@epa.gov>](mailto:McCarthy.Stephanie@epa.gov); [Ackerman, Laura <Ackerman.Laura@epa.gov>](mailto:Ackerman.Laura@epa.gov); [Abraczinskas, Michael <michael.abraczinskas@ncdenr.gov>](mailto:michael.abraczinskas@ncdenr.gov); [Pietraj, Michael <michael.pietraj@ncdenr.gov>](mailto:michael.pietraj@ncdenr.gov)
Subject: Particulate QAPP (Project ID #18-0292)

To Whom it may Concern:

Attached is the revised Particulate QAPP dated June 19, 2019. After our technical systems audit in March and subsequent meeting with Stephanie the week of April 22nd along with an intensive internal review/revisions, we believe that this QAPP meets all requirements. If you need any additional information regarding this QAPP, please contact Joette Steger. Thank you...



Patrick Butler, P.E.
Ambient Monitoring Section Chief
Division of Air Quality
217 West Jones Street, Raleigh NC 27603
919.707.8719 (Office)
Patrick.Butler@ncdenr.gov

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

Figure 86. PM QAPP Submittal Documentation

XV. Equipment Condition of North Carolina Monitoring Sites

Ozone analyzers Thermo 49i and calibrators Thermo 49i-PS are like new. DAQ purchased them in 2013 and 2014 and they are in good condition. The division acquired 45 each and have had them deployed 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. The ECB uses two 49i-PS units for primary and backup lab standards and two 49i-PS units for primary and backup audit devices. Thermo will no longer support the i-Models after 2025. DAQ no longer operates any C-Model ozone equipment. The purchase of a new Q-Model calibrator and monitor are being considered for testing and equipment succession planning.

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

API Teledyne Model 701 ZAGs are like 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 like new. 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.

SO₂ analyzers Thermo 43i are like new. 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. As of 2017, DAQ no longer operates any C-Model SO₂ equipment.

CO analyzers Thermo 48i-TLE (three in 2006, one in 2012, two in 2015) are in fair to like new condition. Parts are hard to acquire for the older 48i's. The analyzers support three sites in DAQ and Mecklenburg County. The division no longer operates any C-Model CO equipment.

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

Thermo 146i calibrators used with SO₂, CO and NO_y are new (2015) and in good condition. The division has 15 and replaced the last 146C model in 2017. DAQ no longer operates any C-Model calibrators for SO₂, CO, and NO_y.

NH₃ Ammonia monitors - Model 17C: DAQ stopped monitoring for this pollutant in June 2015. 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. The ECB has purchased 2 CAPS Monitors and is currently testing in preparation for future deployment.

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 PM₁₀ 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 2019.

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 when the old 2025 units fail.

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 in 2017 and will deploy them gradually as old 2025 units fail.

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, two are stored at the DAQ Reedy Creek lab for deployment as necessary and one is on extended loan at the

Asheville Regional Office. 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 11 units that are over 20 years old that are in service and six that DAQ purchased in 2014 for a total of 17. DAQ is working to purchase additional units in the future.

ATEC 2200-1C aldehyde samplers are in fair to poor condition. DAQ owns 4 that are in service and 6 that have been surplused or waiting to be surplused as none are serviceable and are 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. 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.

Met One AIO2 sensors were purchased in 2018. 11 units were purchased for WS, WD, BP, AT, RH, SG. Currently these units are being tested alongside current Met Towers and sensors for performance and data comparisons.

N-CON Model 125-110, wet/dry deposition samplers: DAQ owns 15 samplers, 12 are deployed at 12 rainwater collection sites across NC and one is a spare stored at the DAQ Reedy Creek Lab. There are 2 Model 00-125 at mercury deposition sites that were purchased in 2014 and others were purchased in 2018/2019.

ETI NOAH-IV rain gauge: DAQ owns 14 units, 12 are deployed at 12 rainwater collection sites across NC, two are deployed at mercury deposition sites, and one is stored at the DAQ Reedy Creek Lab. Mercury gauges were purchased in 2014 all others were purchased in 2018/2019.

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Appendix A. Summary of Monitoring Sites and Types of Monitors

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

Site ID Site Name	CO		SO ₂		NO _y		PAMS		PM _{2.5}			Meteorology				UAT	Rain- water
	T	R	T	T	NO ₂	O ₃	Auto GC	PM ₁₀	M	C	S	WS/ WD	AT/ RH	BP	RF/ SR		
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	
370210037 ^b Skyland DRR			E									E					
370210038 Asheville																	X
370270003 Lenoir		X				X											
370330001 Cherry Grove						X		X									
370350004 Hickory Water Tower										2							
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				

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				UAT	Rain-water	
	T	R	T	T		NO ₂	O ₃	Auto GC	PM ₁₀	M	C	S	WS/ WD	AT/ RH	BP	RF/ SR			
370750001 ^d Joanna Bald							X												
370770001 Butner							X												
370810013 Mendenhall							X		X		X						SR		X
370870008 Waynesville E.S.							X												
370870013 Canton DRR			X																
370870035 Fry Pan							X												
370870036 Purchase Knob							X												
371010002 West Johnston							X				X								
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	X	X	VOC	
371190042 ^e Montclair								E		E									
371190045 ^e Remount 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	X
371290002 Castle Hayne							X		X		X								
371290010 Eagles Island																		VOC	X
371310003 Northampton						X					X								
371450003 Bushy Fork							X												
371450004 ^b Semora DRR		E											E						
371470006 Pitt Co Ag Cen							X				E	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				UAT	Rain-water
	T	R	T	T	NO ₂	O ₃	Auto GC	PM ₁₀	M	C	S	WS/WD	AT/RH	BP	RF/SR		
371570099 Bethany		X				X											
371590021 Rockwell					P	X				P					SR		X
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	X
371830021 Triple Oak Rd	X				X					X							
371990004 Mt Mitchell						X											

CO = Carbon monoxide

SO₂ = Sulfur dioxide

NO_y = Reactive oxides of nitrogen

NO₂ = Nitrogen dioxide

O₃ = Ozone

PM₁₀ = 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 SO₂

T = 48i or Teledyne API (TAPI) 300EU

monitor for CO, 43i TLE monitor for SO₂

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

BP = barometric pressure

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. 2019 Annual Monitoring Network Plan for Mecklenburg County Air Quality

Available at:

https://www.mecknc.gov/LUESA/AirQuality/AirQualityData/Documents/MCAQ%20Annual%20Monitoring%20Network%20Plan_2018_2019_Final_to_EPA.pdf

Appendix C. 2019 Annual Monitoring Network Plan for Forsyth County Office of Environmental Assistance and Protection

Available at:

https://files.nc.gov/ncdeq/Air%20Quality/monitor/monitoring_plan/new_plan/Forsyth.pdf

Appendix D. Current Waivers Approved by the EPA

This appendix provides information on the current waivers that DAQ has requested and the EPA has approved.

1. Current Waivers Approved by the EPA in 2015

In 2015, the EPA approved the following waivers:³¹

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 SO₂ monitor is required within that CBSA.”³² The EPA’s previous calculations show the Asheville PWEI to be below the PWEI threshold for requiring a sulfur dioxide monitor. DAQ is electing to conduct sulfur dioxide monitoring in the Asheville CBSA beginning in 2017 under the Data Requirements Rule.³³ 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 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.³⁴ 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 2016.³⁵ 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

³¹ 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/air/documents/DocsSearch.do?dispatch=download&documentId=7450>.

³² 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=da14c4661eddf14519d93a82e410ec9&mc=true&node=ap40.6.58_161.d&rgn=div9.

³³ 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>.

³⁴ 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/air/documents/DocsSearch.do?dispatch=download&documentId=7440>.

³⁵ United States Environmental Protection Agency, 2014 National Emission Inventory, Version 1, All Sectors: National-County/Tribe aggregated, Released December 2016, available online at <https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data>. Accessed Jan. 4, 2017.

which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year ...”³⁶ Section 4.5(a)(ii) provides the following provisions for a waiver of the lead monitoring requirements:

“(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the state or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 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).”³⁷

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.³⁸ 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.³⁹ 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 2020.⁴⁰

Waiver for the Second PM₁₀ Monitor in Raleigh

In 2015, DAQ requested the EPA renew the waiver for the second PM₁₀ monitor in Raleigh. Other than changing to a low volume method in 2009 to meet NCore requirements, nothing changed with PM₁₀ in the Raleigh area within the past decade. As shown in Figure 87, 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, PM₁₀ has not been responsible for determining what the air quality index will be

³⁶ 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=da14c4661eddf14519d93a82e410ec9&mc=true&node=ap40.6.58_161.d&rgn=div9.

³⁷ *ibid.*

³⁸ 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/air/documents/DocsSearch.do?dispatch=download&documentId=7843>.

³⁹ 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>.

⁴⁰ 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/air/documents/DocsSearch.do?dispatch=download&documentId=7440>.

in the Raleigh MSA during 2012, 2013, 2014, 2015 or 2016.⁴¹ Thus, the division 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 PM₁₀ reports 131 facilities in the Raleigh MSA emitting 529.3 tons of PM₁₀ in 2015. This number is down from 143 facilities reporting 781.7 tons of PM₁₀ emissions in 2008.⁴² 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, DAQ requested that the waiver for the second PM₁₀ 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.⁴³

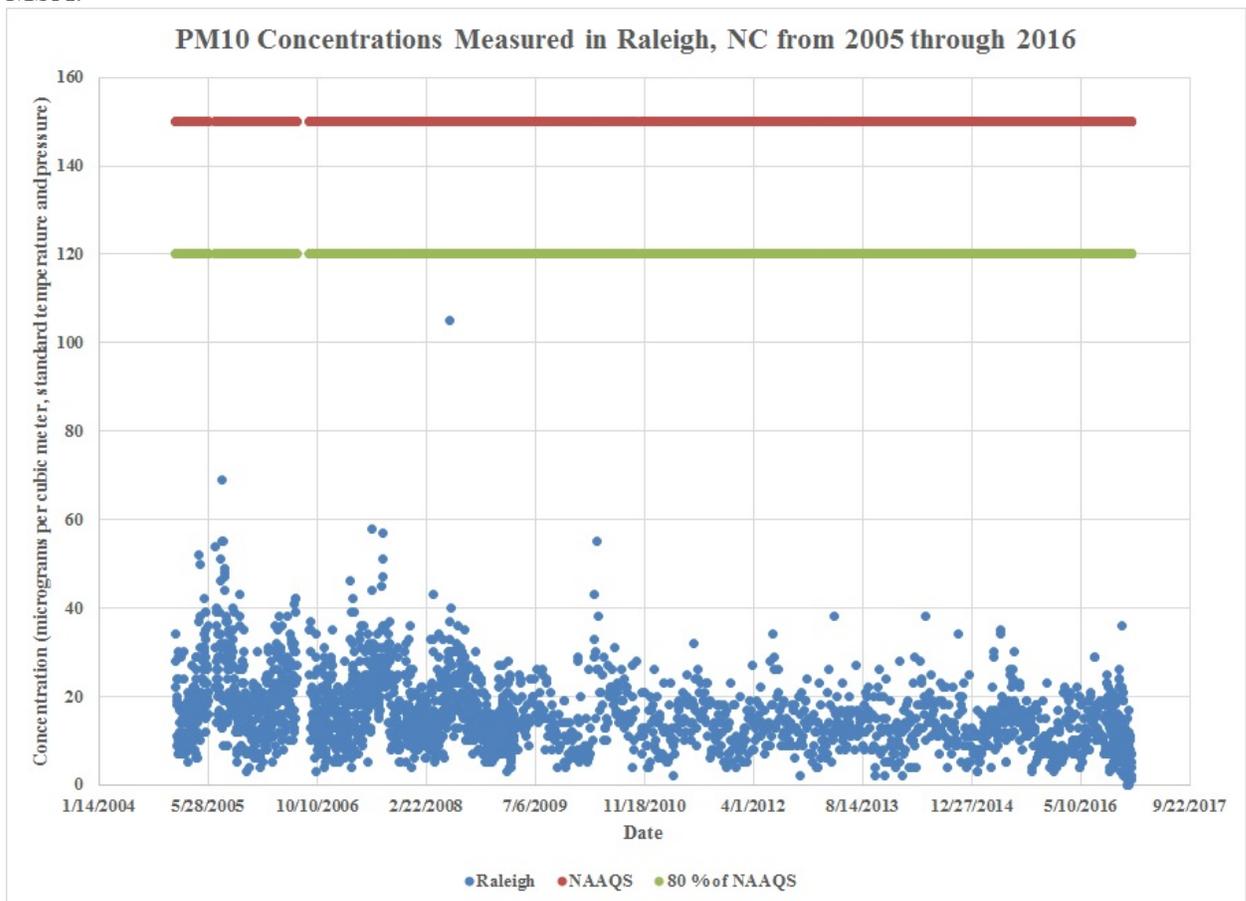


Figure 87. PM₁₀ concentrations measured in Raleigh from 2005 through 2016

⁴¹ Air quality index summary information is available on the worldwide web at <https://www.epa.gov/outdoor-air-quality-data/air-quality-index-report>.

⁴² NC DAQ - North Carolina Point Source Emissions Report, Available online at <https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&year=2014&physical=byCounty&overrideype>All&toxics=263&sortorder=103>.

⁴³ 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>.

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 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 for 2016.⁴⁴ 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, 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 88. 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 270° 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 270° 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 88. Millbrook NCore Site

⁴⁴ 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>.

(from City of Raleigh and Wake County iMAPS,
<http://maps.raleighnc.gov/iMAPS/>)

1. Current Waivers Approved by the EPA in 2016

In 2016, the EPA approved the following waiver requests:⁴⁵

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 4.1(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.

⁴⁵ 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>.

DAQ does operate three of these sites year-round, Purchase Knob, Joanna Bald and Frying Pan. However, DAQ cannot always get to the sites to perform QA functions during the winter, so 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.⁴⁶ However, the EPA requested that the division 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

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 89, 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 90 are representative of the same air shed in the Hickory area. Thus, this request meets the relocation requirements of 40 CFR § 58.14(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).

⁴⁶ 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/aa/documents/DocsSearch.do?dispatch=download&documentId=8964>.

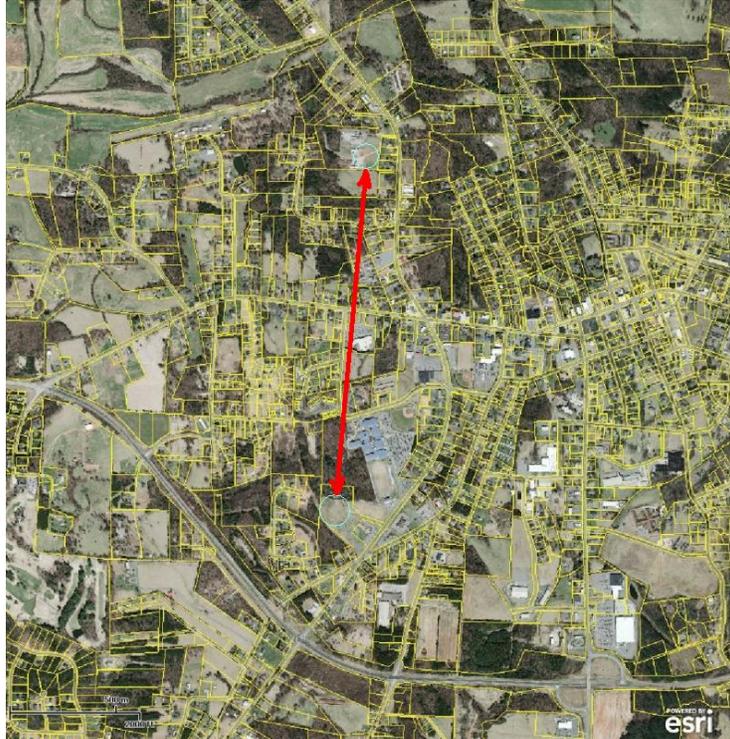


Figure 89. Relationship between Waggin Trail site and Taylorsville Liledoun Site

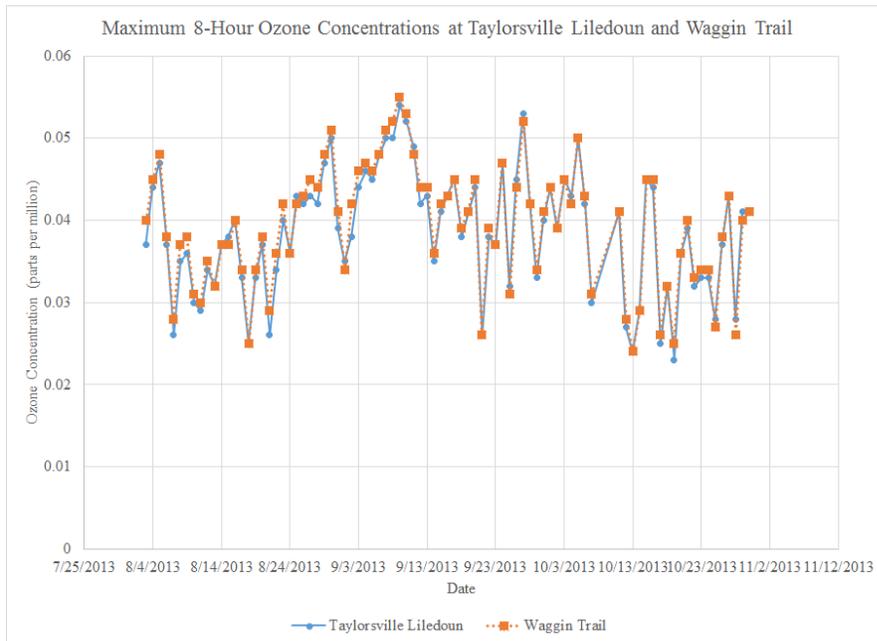


Figure 90. Comparison of maximum daily 8-hour ozone concentrations

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 91, the Honeycutt site is approximately 9 Kilometers northwest from where the Golfview site was located. Because of the timing of the request, the division 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 § 58.14(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 91. Location of Honeycutt site, no dot, in relation to Golfview, dot

2. Waiver Requests Granted in 2017

In 2017, 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 D**.

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.

DAQ believes both monitors are qualified to operate at a reduced schedule because both monitors are collocated with a continuous PM_{2.5} monitor, neither monitor is required and as shown in Figure 92 and Figure 93 both monitors have been measuring concentrations below 80% of the standard for six years or more. DAQ is requesting permission to operate the continuous PM_{2.5} monitor in Greenville as an AQI only monitor. See Appendix D. The BAM 1022 at the site currently does not match the FRM at the site. 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.

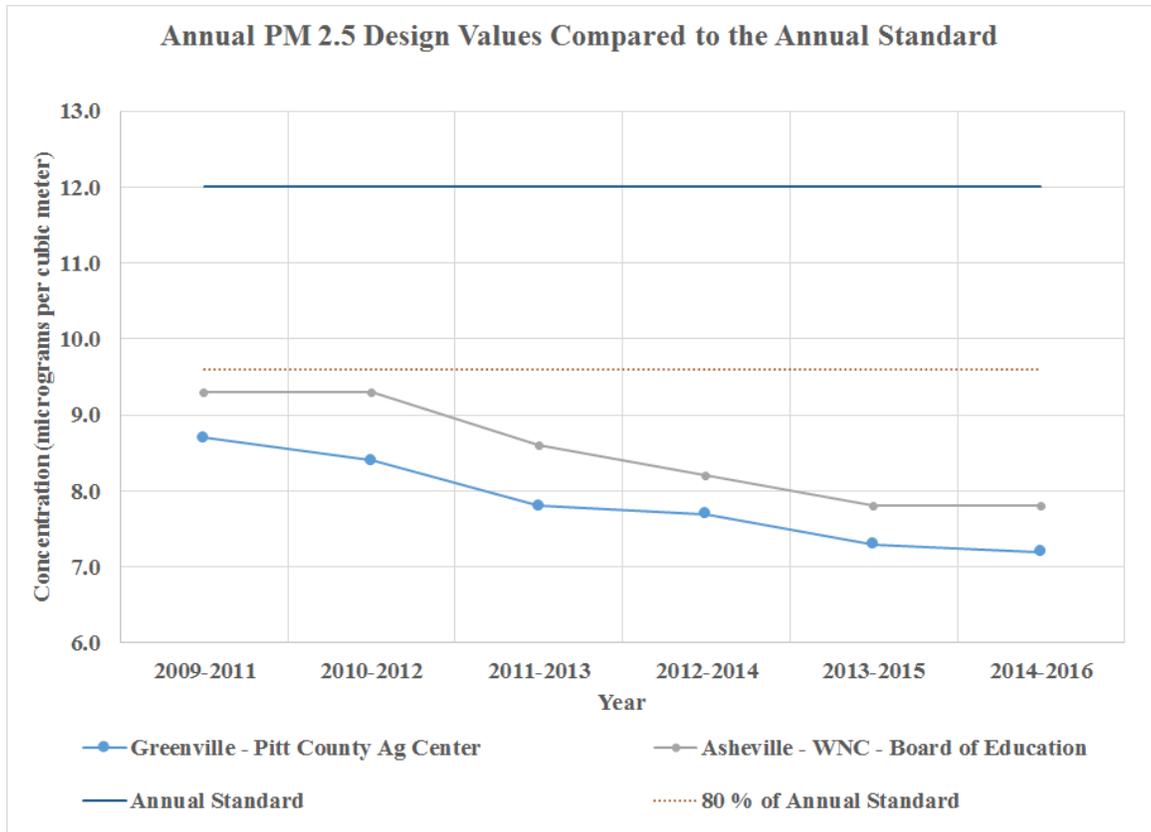


Figure 92. Annual fine particle design values for Asheville and Greenville

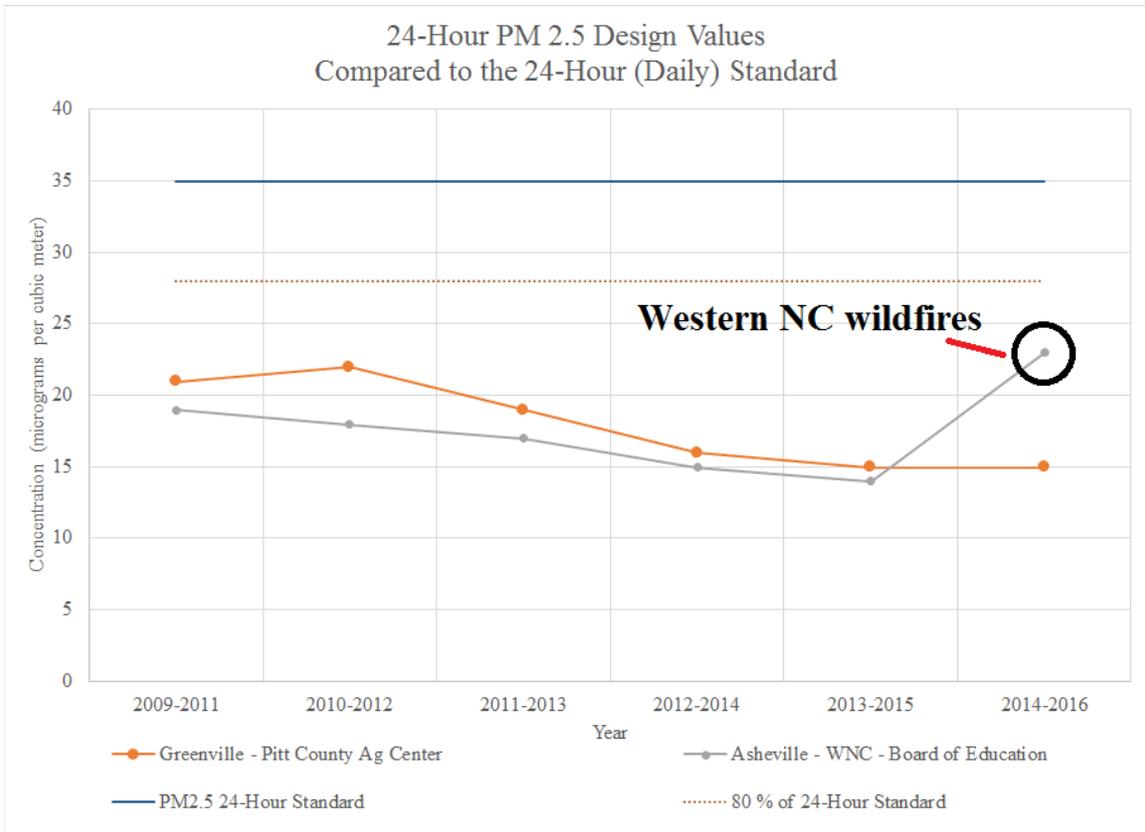


Figure 93. 24-Hour fine particle design values for Asheville and Greenville

Request for a waiver for the trees at Triple Oak Road

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 94 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 94. 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 PM_{2.5} inlet and about 18 meters tall. The inlet of the PM_{2.5} 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 95 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.

Wind Rose for Raleigh-Durham Airport (KRDU) Jan. 1, 2011 to Dec. 31, 2015

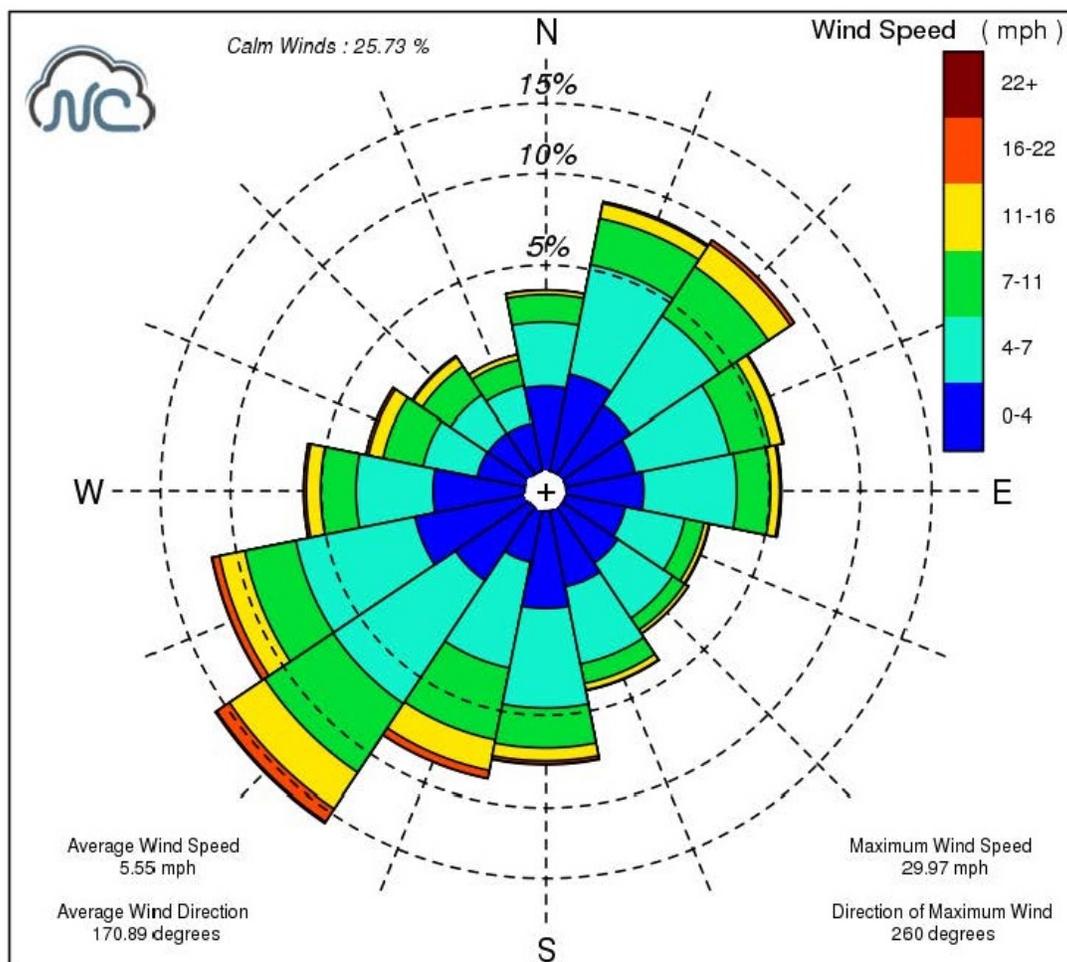


Figure 95. Wind Rose for the Raleigh-Durham Airport for 2011-2015.

Figure 96 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, 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 97 through Figure 99.



Figure 96. Trees to the north of the site.



Figure 97. Taken from the fine particle monitor towards the east, showing trees and the monitoring shelter.



Figure 98. Taken from fine particle monitor. Shows the trees to the south and the interstate highway.



Figure 99. – Taken from the fine particle monitor towards the west.

3. Waivers granted in 2018

In 2018, DAQ made and the EPA approved 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 D.** 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 division needs to make this change to the meteorological equipment because 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, DAQ requests a waiver so that one all-in-one unit at 10 meters could be used at the site.

Title 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_{10-2.5} particle mass, O₃, SO₂, CO, NO/NO_v, 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, 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

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 100 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. DAQ estimates the trees on the opposite side of the road are 12 meters tall. Thus, the division 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 100. Aerial view of the Skyland DRR monitoring site.

Predominant winds measured at the Asheville Regional Airport are from the north and north northwest. Figure 101 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 102 provides a wind rose using the 2017 to 2018 wind data measured at the site.

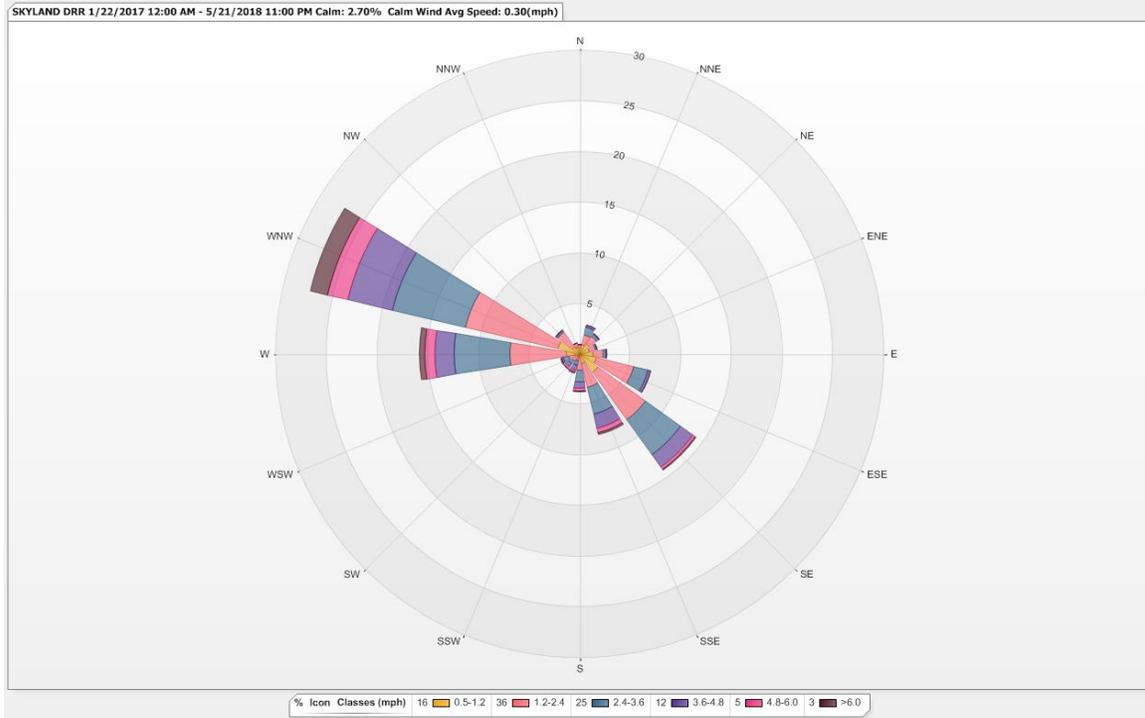


Figure 102. Wind rose using on-site meteorological data

Figure 103 shows the view looking north from the site. As Figure 103 shows, there are no obstructions to the north. Figure 104 shows the view looking from the site down the mountain toward Lake Julian and the facility. As Figure 104 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, DAQ requests a waiver of siting criteria regarding the trees to the northeast. DAQ and Duke will trim the bamboo to the northwest of the site.



Figure 103. Looking North from the Skyland DRR site.



Figure 104. Looking west toward Lake Julian and the facility.

Appendix E. Request for Exclusion of PM_{2.5} 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 website as well as on national web sites such as AIRNow (www.airnow.gov). 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 the agency uses primarily 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. The text below further explains that evaluation 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) DAQ is requesting that data from the following monitors be set aside for comparison to the NAAQS. While the division 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 DAQ obtained the information described below are included at the end of this section.

Table 67. 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)
Durham Armory	Durham	37-063-0015	3	Met One BAM-1020 Mass Monitor w/VSCC	5/29/2015	12/31/2017	Winter = 87 Spring = 56 Summer = 54 Fall = 60 Total = 257	0.92	2.35	No	0.75
Millbrook	Raleigh	37-183-0014	3	Met One BAM-1020 Mass Monitor w/VSCC	1/1/2017	3/31/2019	Winter = 86 Spring = 59 Summer = 50 Fall = 61 Total = 256	0.90	3.01	No	0.76
Millbrook	Raleigh	37-183-0014	5	Teledyne T640X at 16.67 LPM – Broadband Spectroscopy	4/1/2018	3/31/2019	Winter = 30 Spring = 27 Summer = 28 Fall = 25 Total = 110	1.18	0.61	No	0.96

Period of Exclusion of Data from the PM_{2.5} 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, 2020) 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 PM_{2.5} continuous FEMs can support.

PM_{2.5} Continuous FEM data for Reporting the AQI:

While 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 division and the EPA can use the data for AQI reporting. Therefore, with EPA Regional Office approval DAQ will report these data on our web site and to AIRNow (www.airnow.gov). Additionally, the division 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 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 division 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 105 to Figure 107 are locations where our agency has collocated PM_{2.5} FRM and continuous FEM monitors. Each of these assessments is represented in Table 67. Request for Exclusion of PM_{2.5} Continuous FEM Data above.

PM_{2.5} Continuous Monitor Comparability Assessment

Site 37-063-0015: Durham, NC

FRM: R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC - Gravimetric (118,145), 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=3

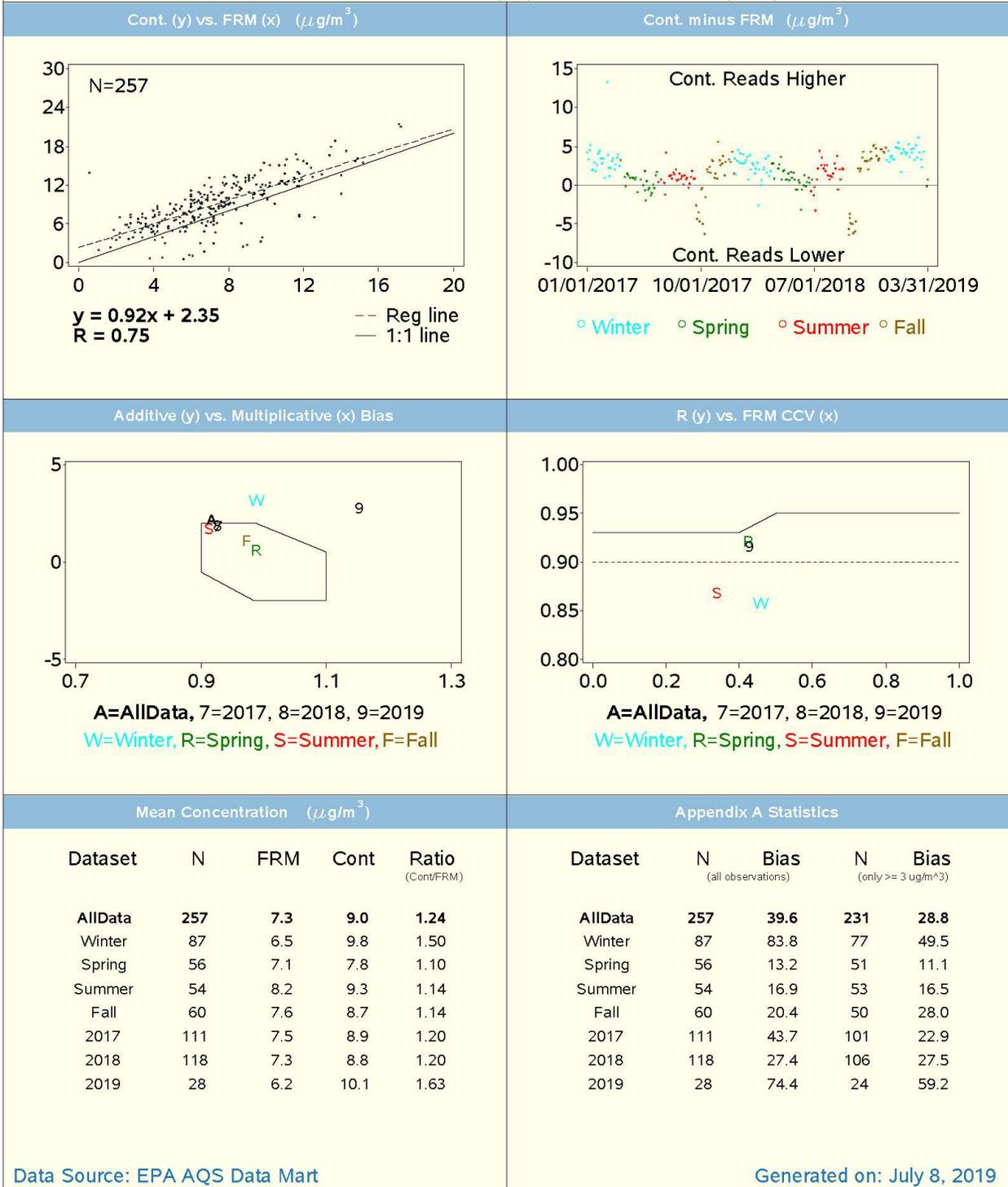


Figure 105. Comparison of the beta attenuation monitor with the federal reference monitor at Durham Armory in Durham, North Carolina

PM_{2.5} Continuous Monitor Comparability Assessment

Site 37-183-0014: Raleigh, NC

FRM: R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC - Gravimetric (118,145), PM2.5 - Local Conditions (88101), POC=1,2
 Cont: Met One BAM-1020 Mass Monitor w/VSCC - Beta Attenuation (170), PM2.5 - Local Conditions (88101), POC=3

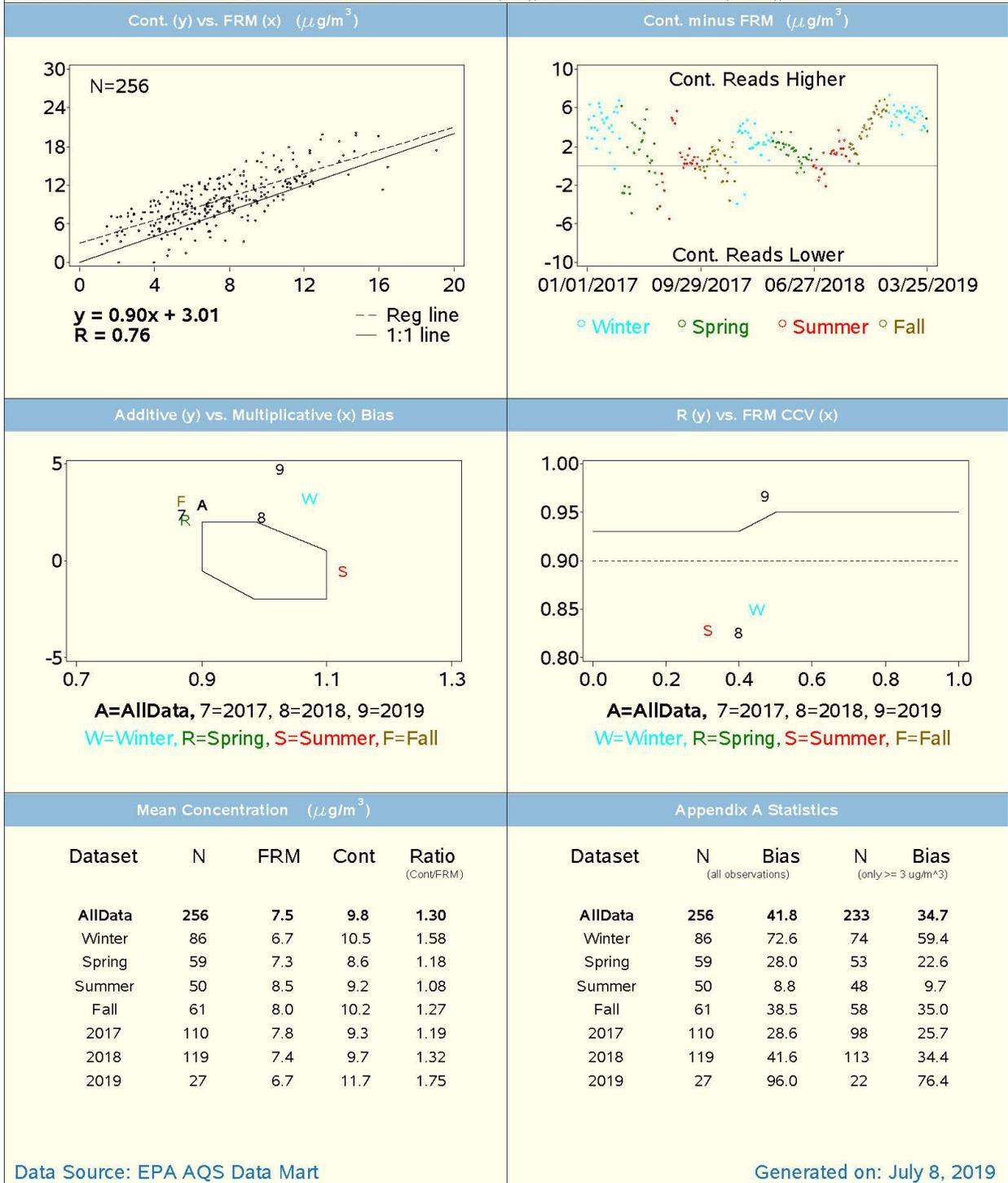
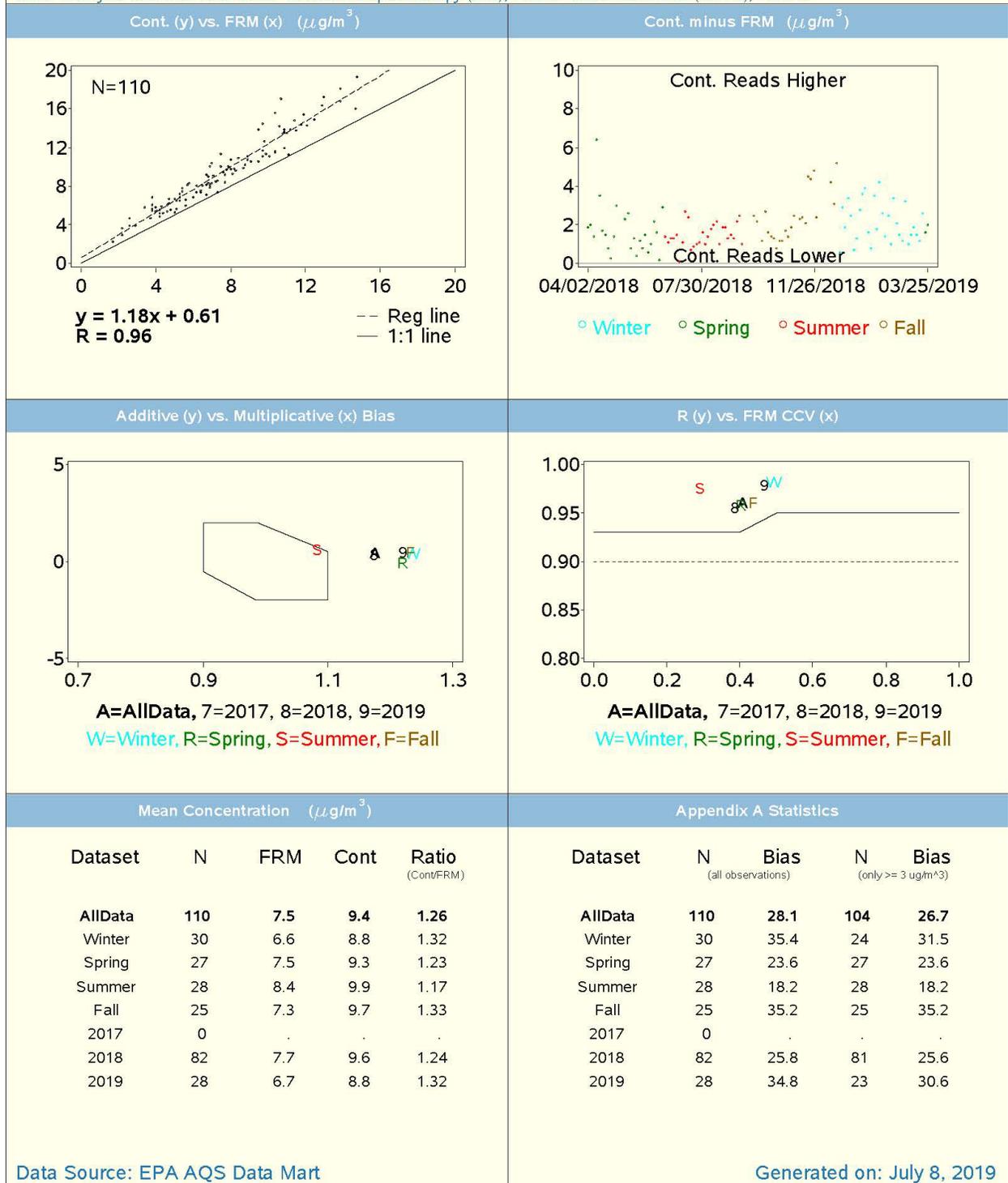


Figure 106. Comparison of the beta attenuation monitor with the federal reference monitor at Millbrook in Raleigh, North Carolina

PM_{2.5} Continuous Monitor Comparability Assessment

Site 37-183-0014: Raleigh, NC

FRM: R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC - Gravimetric (118,145), PM2.5 - Local Conditions (88101), POC=1,2
 Cont: Teledyne T640X at 16.67 LPM - Broadband spectroscopy (238), PM2.5 - Local Conditions (88101), POC=5



Data Source: EPA AQS Data Mart

Generated on: July 8, 2019

Figure 107. Comparison of the T640X monitor with the federal reference monitor at Millbrook in Raleigh, North Carolina

Appendix F. 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 INTELLECTUAL 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: Shula Chelmer
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 E. Reed
TITLE: Bureau Chief, Bureau of Air Quality
DATE: 6/22/15

Appendix G. 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:

<u>Counties</u>	<u>Cities</u>
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 INTELLECTUAL 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: Shirley C. Helmer
TITLE: Director
DATE: 4/26/2016

Virginia Department of Environmental Quality (VADEQ)
Air Quality Division

BY: [Signature]
TITLE: Director, Air Division
DATE: 5/9/16

Appendix H. 2010 Network Plan EPA Approval Letter

Demi



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 DIVISION
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,

[Signature]
/s/ Gwendolyn Keyes Fleming
Regional Administrator

Enclosure

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 (NO₂) and sulfur dioxide (SO₂) with minimum monitoring requirements effective January 1, 2013. Minimum monitoring requirements are listed for ozone (O₃), particulate matter less than 2.5 microns (PM_{2.5}), particulate matter less than 10 microns (PM₁₀), 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
Goldensboro, 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 O₃ monitoring requirements specified by 40 CFR Part 58, Appendix D, Table D-2 in all areas.

Minimum PM₁₀ 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 PM₁₀ primary monitoring network meets the minimum requirements for all areas. All PM₁₀ 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 PM₁₀ 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 PM₁₀ 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-Gastonia-Concord, Virginia Beach-Norfolk-Newport News, Raleigh-Cary, Greensboro-High Point, Durham-Chapel Hill, Winston-Salem, Asheville, Hickory-Lenoir-Morganton, Fayetteville, and Wilmington. NC-DAQ meets these AQI reporting requirements.

Monitoring Network Changes Proposed by NC-DAQ

NC-DAQ has proposed several monitoring network changes in 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 PM₁₀, PM_{2.5}, and O₃ 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 SO₂ 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 PM₁₀ 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



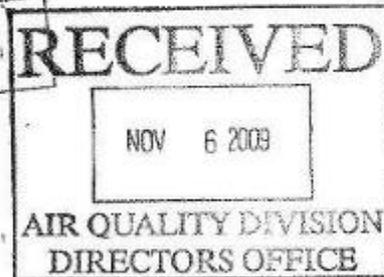
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

*Donnie
C. Skiles*



OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

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 NO_y, which is a required measurement. After assessing available NO_y observations and modeling outputs and to assure consistency across all NCore stations, we are affirming the requirement to measure NO_y at all NCore stations. Please make arrangements with your Regional Office on a schedule to implement the measurement of NO_y at your NCore station.

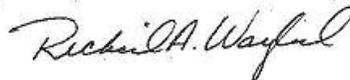
By EPA's rules (see 40 CFR 58.13), an approved NCore station is expected to be operating with all required measurements by January 1, 2011. Enclosure A provides an update on required measurements and Enclosure B provides EPA's Air Quality System instructions on coding for NCore monitors and data. Please share this information with your staff responsible for the NCore station measurements and data submission.

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

Recycled/Recyclable • Printed with Vegetable Oil Based Inks on Recycled Paper (Minimum 25% Postconsumer)

Thank you for your program's efforts in developing the NCore station plan and establishing the site. For questions, you may contact Tim Hanley at hanley.tim@epa.gov and 919-541-4417, or David Shelow at shelow.david@epa.gov and 919-541-3776.

Sincerely,



Richard A. Wayland
Director
Air Quality Assessment Division

2 Enclosures

cc: Doug Neeley, EPA Region 4

**Appendix 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

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)

RECEIVED

JUL 01 2016

BUREAU OF AIR QUALITY

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 INTELLECTUAL 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: Shirley C. Helman
TITLE: Director, Division of Air Quality
DATE: 6/27/2016

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

BY: Keith Dyer
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: Kevin H Phocan

TITLE: Director, Air Quality

DATE: 6/29/2014



Catherine E. Heigel, Director

Promoting and protecting the health of the public and the environment

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 – 2019 Annual Report for EPA’s Data Requirements Rule to Demonstrate Attainment with the 2010 1Hour SO₂ NAAQS

In accordance with EPA’s Data Requirements Rule (DRR) as found in 40 CFR 51 Subpart BB, the North Carolina Department of Environmental Quality, Division of Air Quality (DAQ) has prepared this annual report to demonstrate North Carolina’s ongoing attainment status with the 2010 sulfur dioxide (SO₂) National Ambient Air Quality Standard (NAAQS) for the four facilities for which attainment is based on air quality modeling. 40 CFR §51.1205 states in part:

For any area where modeling of actual SO₂ emissions serve as the basis for designating such area as attainment for the 2010 SO₂ NAAQS, the air agency shall submit an annual report to the EPA Regional Administrator by July 1 of each year, either as a stand-alone document made available for public inspection, or as an appendix to its Annual Monitoring Network Plan (also due on July 1 each year under 40 CFR 58.10), that documents the annual SO₂ emissions of each applicable source in each such area and provides an assessment of the cause of any emissions increase from the previous year. The first report for each such area is due by July 1 of the calendar year after the effective date of the area's initial designation.

Tables 1-4 below contain EPA’s Clean Air Markets Division (CAMD) SO₂ emissions over the last six years for each facility for which North Carolina used modeling as the basis for attainment designations with regard to the 2010 SO₂ NAAQS, along with the three-year SO₂ emissions data inputs that were used in the most recent air quality models. The slight differences between the annual SO₂ emissions data from CAMD and the modeled SO₂ emission rates can be attributed to differences in calculation methods to determine the annual SO₂ emissions. The modeling input values are a summation of the hourly SO₂ emissions data for each year. This is the first annual report submitted by DAQ for these modeled sources under the DRR; however, this report provides annual SO₂ emissions data for all years since the affected areas’ initial designations in 2017.

Table 1. Duke Energy GG Allen Plant SO₂ Emissions (2013-2018)

Calendar Year	CAMD SO ₂ Emissions (Tons/Year)	Modeled SO ₂ Emissions (Tons/Year)
2013	846.00	846.02
2014	1718.09	1718.13
2015	1127.75	1127.78
2016	676.36	
2017	353.71	
2018	245.52	

Table 2. Duke Energy Belews Creek Plant SO₂ Emissions (2013-2018)

Calendar Year	CAMD SO ₂ Emissions (Tons/Year)	Modeled SO ₂ Emissions (Tons/Year) ¹
2013	5075.01	5075.13
2014	7032.50	7032.66
2015	6794.01	6794.16
2016	5066.42	
2017	4562.83	
2018	4119.21	

¹Different sources may reference slightly different modeled SO₂ emission rates at Belews Creek for 2013 and 2014. These minor differences are due to calculation or data source variations related to the auxiliary boilers.

Table 3. Duke Energy Marshall SO₂ Emissions (2013-2018)

Calendar Year	CAMD SO ₂ Emissions (Tons/Year)	Modeled SO ₂ Emissions (Tons/Year)
2013	4703.50	4703.61
2014	5917.44	5917.58
2015	4623.80	4623.90
2016	4918.39	
2017	4361.75	
2018	3621.34	

Table 4. Duke Energy Mayo Plant SO₂ Emissions (2013-2018)

Calendar Year	CAMD SO ₂ Emissions (Tons/Year)	Modeled SO ₂ Emissions (Tons/Year)
2013	4570.21	4570.21
2014	3490.71	3490.71
2015	2484.28	2484.28
2016	2736.92	
2017	1510.98	
2018	1412.84	

Tables 1-4 above show that actual SO₂ emissions for calendar years 2017 and 2018 are well below the 2013-2015 SO₂ emissions that were modeled to demonstrate attainment with the 2010 SO₂ NAAQS. Total SO₂ emissions at all four facilities decreased in both 2017 and 2018, with the 2018 SO₂ emission levels being the lowest on record for the time period covered by the DRR. These data confirm that the 2010 SO₂ NAAQS is being attained and that no additional modeling is necessary for any of the DRR facilities for which North Carolina used modeling as the basis for its attainment designations.

DAQ has looked into the possibility of requesting an exemption from future annual reporting requirements under the DRR. 40 CFR §51.1205(b)(2) states that, “[a]n air agency will no longer be subject to the requirements of this paragraph (b) for a particular area if it provides air quality modeling demonstrating that air quality values at all receptors in the analysis are no greater than 50 percent of the 1-hour SO₂ NAAQS, and such demonstration is approved by the EPA Regional Administrator.” Table 5 below

shows where the applicable North Carolina facilities stand with regard to margin of modeled attainment with the 2010 SO₂ NAAQS.

Table 5. Comparisons of Three-year Averages at DRR Modeling Sites

Duke Energy Site Name	3-Year Average SO ₂ for DRR Modeling (2013-2015, tons/yr)	Latest 3-Year Average SO ₂ Emissions (2016-2018, tons/yr)	% of NAAQS as Originally Modeled	% Emissions Reduction Between 3-Year Cycles
G G Allen	1230.6	425.2	62%	65.4%
Belews Creek	6300.5	4582.8	62% ²	27.3%
Marshall	5081.6	4300.5	91%	15.4%
Mayo	3515.1	1886.9	96%	46.3%

²Table 8 of EPA's Round 3 Designations Technical Support Document (TSD) shows a modeled emission rate of 50% of the NAAQS. However, the modeled SO₂ concentration recorded in Table 8 of the TSD does not include background concentrations from the original modeling report.

So while SO₂ emissions are steadily decreasing at each of the facilities for which modeling of actual SO₂ emissions serve as the basis for designating the area as attainment for the 2010 SO₂ NAAQS, the emission reductions at two of North Carolina's four affected facilities are probably not yet to the level where air quality values at all receptors will be no greater than 50 percent of the 1-hour standard. DAQ will continue to monitor the SO₂ emission reductions at all affected sources and may conduct further DRR modeling analysis in the future for the affected facilities to determine if the 50 percent of the NAAQS standard threshold has been attained. But for now, North Carolina plans to continue to submit the annual DRR verification report by July 1 each year as part of its annual monitoring network plan.

A copy of this report is available for public inspection at <https://deq.nc.gov/about/divisions/air-quality/air-quality-data/annual-network-plan/annual-monitoring-network-plan-for-north-carolina-air-quality>. The report is also available for public inspection at 217 West Jones Street, Raleigh, NC 27603.

Appendix L. 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 September 11 through October 11, 2019. 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](#)
To: [Burleson, Joelle](#)
Subject: NCDAQ 2019-2020 Annual Monitoring Network Plan available for public comment
Date: Wednesday, September 11, 2019 9:55:15 AM
Attachments: [ATT00001.txt](#)

Hello Air Quality Stakeholders:

NC DAQ's annual monitoring network plan update is posted on the website and is open for public comment through October 11, 2019. Here are the links to the public notice and the summary page.

<https://deq.nc.gov/news/events/public-notice-2019-2020-annual-monitoring-network-plan>

<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

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties unless the content is exempt by statute or other regulation.

From: derr.daq.managers_supervisors-bounces@lists.ncmail.net on behalf of [Gatano, Betty](#)
To: [NCDENR.DENR.DAQ.Stakeholders.Outside_Involvement_Committee](#)
Subject: NC DAQ's annual monitoring network plan posted for public comment
Date: Thursday, September 12, 2019 12:06:34 PM
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 October 11, 2019.

Below are the links to the public notice and the summary page.

[Public Notice for Annual Monitoring Network Plan](#)

[Annual Monitoring Network Plan Summary Page](#)

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

Thank you



Betty Gatano, P.E.
Engineer III, Division of Air Quality
North Carolina Department of Environmental Quality
919.707.8736 (Office)
Betty.Gatano@ncdenr.gov

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: [Steger, Joette](#)
To: [Steger, Joette](#)
Subject: NC Division of Air Quality Annual Network Monitoring Plan available for public comment
Date: Wednesday, September 11, 2019 10:23:42 AM

Joette StegerDear Joette Steger,

NC DAQ's annual monitoring network plan update is posted on the website and is open for public comment through October 11, 2019. Here are the links to the public notice and the summary page.

<https://deq.nc.gov/news/events/public-notice-2019-2020-annual-monitoring-network-plan>

<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.

Public Information Links

– Open for Public Comment

Public notices, draft permits and draft reviews are posted in [Public Notices and Hearings](#) on the start and end date of each comment period.

Open comment periods on air permits are listed here for convenience. Instructions for submitting comments are included in the public notice document of each permit.

Comments can also be emailed to daq.publiccomments@ncdenr.gov. Please include the permit name and number in the subject.

Facility	Comment period
City of Greensboro - White Street Landfill	Public comment period begins 8/26/2019 and ends 9/25/2019
Marine Corps Air Station - Cherry Point	Public comment period beings 9/10/2019 and ends 10/10/2019
2019-2020 Annual Monitoring Network Plan	Public comment period begins 9/11/2019 and ends 10/11/2019

Title V Email List

The North Carolina Division of Air Quality Permitting Section maintains an email list for dissemination of permitting information to interested parties. These emails include public notices with draft permits and application reviews. Final permits will be distributed through this email list as well. Please note that only permitting actions that are processed through the public notice procedures will be distributed. To have your email address added to the list of recipients, please send a request to [Kathy Hash](#).



Public notice for the 2019-2020 Annual Monitoring Network Plan

Event Description

Notice of Public Comment Period: September 11, 2019 - October 11, 2019.

Changes to the division's Ambient Air Quality Monitoring Network planned during 2019 and 2020 will be available for public comments from September 11 to October 11, 2019. 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](#) starting on Wednesday, September 11, 2019. 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 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:

Wednesday, September 11, 2019 - 8:00a.m. to
Friday, October 11, 2019 - 5:00p.m.



Appendix M. Public Comments Received

No public comments were received.

The only changes made to the monitoring plan after it went out for public comment were corrections of any factual or typographical errors.

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

NO_y – reactive oxides of nitrogen

O₃ – ozone

PAMS – photochemical assessment monitoring station

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

RCN – rainwater collection network

RRO – Raleigh Regional Office

SASSTM – 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