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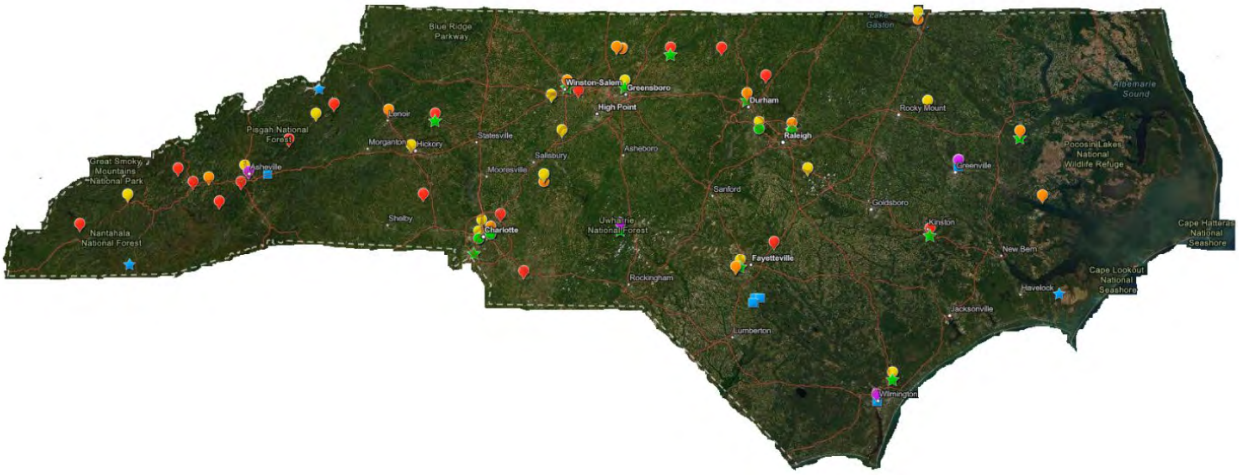
NORTH CAROLINA
Environmental Quality

2022-2023 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 1
Network Descriptions



October 24, 2022

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

NORTH CAROLINA
Department of Environmental Quality

CERTIFICATION

By the signatures below, the North Carolina Division of Air Quality, or DAQ, certifies that the information contained in the 2022-2023 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 DocuSigned by: Patrick Butler 4290A7E2D2A0429... Date 10/24/2022

Roy Patrick Butler
Ambient Monitoring Section Chief, DAQ

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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 North Carolina 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 to measure 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 Section 58.30; and
- The metropolitan statistical area, or MSA, core-based statistical area, or CBSA, combined statistical area, or CSA, or other area represented by the monitor.
- The designation of any lead, or Pb, monitors as either source-oriented or non-source-oriented as required in Appendix D to 40 CFR Part 58.

- Any source-oriented monitors for which a waiver has been requested or granted by the EPA regional administrator as allowed for under paragraph 4.5(a)(ii) of Appendix D to 40 CFR Part 58.
- Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA regional administrator for the use of Pb-PM_{10} monitoring in lieu of Pb-TSP monitoring as allowed for under paragraph 2.10 of Appendix C to 40 CFR Part 58.
- The identification of required nitrogen dioxide, or NO_2, 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, PM2.5, Monitoring Network
VIII. Lead Monitoring Network
IX. Urban Air Toxics Monitoring Network
X. DAQ NCore Monitoring Network
XI. Nitrogen Dioxide Monitoring Network
XII. Photochemical Assessment Monitoring Station, PAMS, Network
XIII. Background Atmospheric Deposition 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 and the Asheville-Buncombe Air Quality Agency 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 2022 Annual Monitoring Network Plan.

Appendix C provides the Forsyth County Office of Environmental Assistance and Protection 2022 Annual Monitoring Network Plan.

Volume II of the Annual Network Plan discusses the monitoring network by metropolitan statistical areas, or MSAs, organized by the area of the state in which they are located. Regional office monitoring personnel manage the day-to-day operations of the monitors. Monitoring personnel are in each of the seven regional DAQ offices 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.[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. In September 2018, the Office of Management and Budget revised the definitions of MSAs again as shown in Figure 1.[2] Due to these revisions four MSAs gained additional counties and, thus, additional people – Charlotte-Concord-Gastonia gained Anson County, Virginia Beach-Norfolk-Newport News gained Camden County, Durham gained Granville County and Fayetteville gained Harnett County. The discussions in this network monitoring plan use the September 2018 MSA definitions.

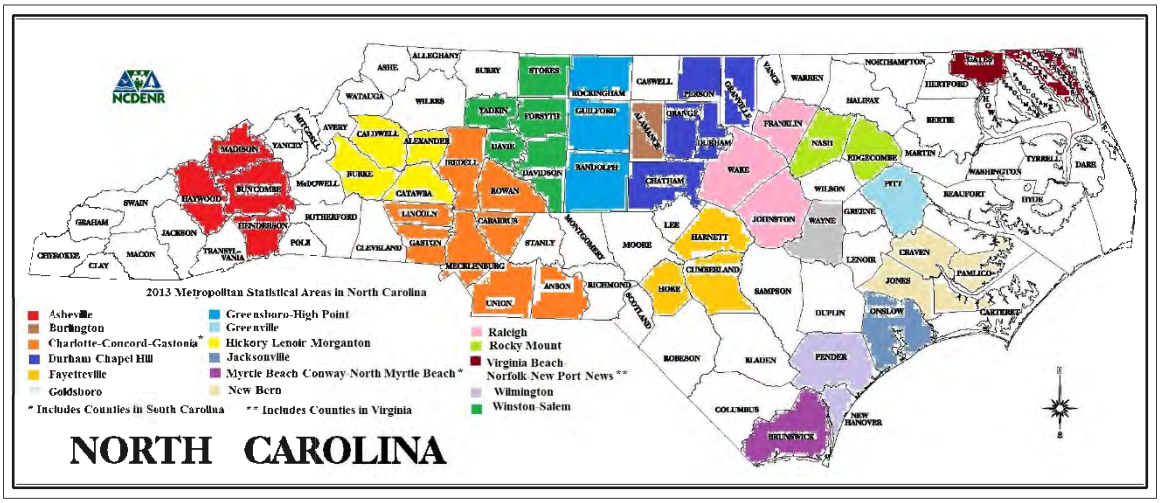

Figure 1. North Carolina metropolitan statistical areas as of September 2018

[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] Office of Management and Budget, OMB BULLETIN NO. 18-04: Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas and Combined Statistical Areas and Guidance on Uses of the Delineations of These Areas, Sept. 14, 2018, available on the worldwide web at https://www.whitehouse.gov/wp-content/uploads/2018/09/Bulletin-18-04.pdf, accessed April 25, 2020.

From 2007 through March 2015, the EPA considered DAQ and the three local programs in North Carolina to be one primary quality assurance organization, or PQAO. In 2014, the EPA determined the state and local programs did not meet the PQAO requirements listed in Section 3 of 40 CFR Part 58, Appendix A.[3] Forsyth County and MCAQ decided to become separate PQAOs starting March 19, 2015. The Asheville-Buncombe Air Quality Agency, or ABAQA, formerly known as the Western North Carolina Regional Air Quality Agency, elected to remain with DAQ as a joint PQAO. In 2016, Duke Energy Progress decided to operate two sulfur dioxide sites as part of the DAQ PQAO to meet the data requirements rule. On December 31, 2020, Duke shut down their last monitor required as part of the data requirements rule so they are no longer part of the DAQ PQAO.

In 2021, Congress provided the EPA with funds from the American Rescue Plan (ARP). The EPA was tasked with investing these funds in upgrading the fine particle monitoring network and expanding monitoring into underserved communities. DAQ applied for these funds. The North Carolina Department of Environmental Quality (NCDEQ) is committed to the principles of environmental justice, including ensuring equitable ambient air quality monitoring in communities across North Carolina, especially in underserved and overburdened communities. As a result of this commitment and applying for the grant funds, NCDEQ conducted an analysis to determine the current locations of air quality monitors across North Carolina and how many of those monitors are within potentially underserved block groups. The results of this analysis are provided in Appendix D. Current Air Quality Monitor Locations and Potentially Underserved Communities.

[3] Title 40 Code of Federal Regulations Part 58, Ambient Air Quality Surveillance. Appendix A to Part 58 – Quality Assurance Requirements for Monitors used in Evaluations of National Ambient Air Quality Standards: Electronic Code of Federal Regulations, May 21, 2020, Section 1.2, available at https://www.ecfr.gov/cgi-bin/text-idx?SID=015f68b199e846c0109ec441406fa05b&mc=true&node=ap40.6.58.0000_0nbspnbspnbsp.a&rgn=div9, accessed May 23, 2020.

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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 during the past year by percentage and Figure 3 is a map that shows which counties grew the fastest during the past decade by percentage. Appendix D. Current Air Quality Monitor Locations and Potentially Underserved Communities contains an analysis of current air quality monitors and potentially underserved communities. This section organizes the discussion as follows:

- Monitors scheduled to start up or shut down in 2021, 2022 or 2023 that were not included in the 2021-2022 network plan;
- Sites to be relocated, moved, or upgraded in 2022 or 2023;
- Changes to the methods used to measure fine particles for comparison to the NAAQS;
- Rotating background monitors and their operating schedules;
- Addition of a Nafion dryer to the Linville Falls and Monroe ozone monitoring sites; 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 April 1, 2020, or July 1, 2020, and July 1, 2021.

County Name	Population Estimate July 1, 2021	State Ranking of Counties by 2021 Estimate	Reason for Selection as one of the Fastest-Growing Counties in North Carolina
Brunswick	144,215	22	Growth of 4.4 percent from 2020 to 2021 and 27.2% from April 1, 2010, to April 1, 2020. North Carolina's 9th fastest growing county percentagewise. Annually, it's the nation's 30th (percentagewise) and 70th (in population) fastest-growing county.
Cabarrus	231,278	9	Growth of 4,213 people (1.9%) from 2020 to 2021 and 26.8% from April 1, 2010, to April 1, 2020. Annually, it's the nation's 97th fastest-growing county in population.
Camden	10,835	95	Growth of 437 people (4.2%) from 2020 to 2021 and 3.8% from April 1, 2010, to April 1, 2020. Annually, it's the nation's 39th fastest-growing county percentagewise.

Table 1 Alphabetical list of fastest-growing counties in North Carolina based on population change between April 1, 2010, and April 1, 2020, or July 1, 2020, and July 1, 2021.

County Name	Population Estimate July 1, 2021	State Ranking of Counties by 2021 Estimate	Reason for Selection as one of the Fastest-Growing Counties in North Carolina
Currituck	29,653	70	Growth of 1,268 people (4.5%) from 2020 to 2021 and 19.3% from April 1, 2010, to July 1, 2020. Annually, it's the nation's 29th fastest-growing county percentagewise.
Durham	326,126	6	Growth of 524 people (0.2%) from 2020 to 2021 and 21.4 % from April 1, 2010, to April 1, 2020.
Franklin	71,703	37	Growth of 2,643 people (3.8%) between July 1, 2020, and July 1, 2021, and 13.1% between April 1, 2010, and April 1, 2020. Annually, it's the nation's 52nd fastest-growing county percentagewise.
Iredell	191,968	14	Growth of 4,338 people (2.3%) between July 1, 2020, and July 1, 2021, and 17.1 % between April 1, 2010, and April 1, 2020. Annually, it's the nation's 94th fastest-growing county in population.
Johnston	226,504	12	Growth of 8,892 people (4.1 %) from 2020 to 2021 and 27.9 % from April 1, 2010, to April 1, 2020. North Carolina's 2nd fastest growing county percentagewise. Annually, it's the nation's 45th (percentagewise) and 38th (in population) fastest-growing county.
Lincoln	89,670	32	Growth of 2,480 people (2.8%) from 2020 to 2021, and 10.9 % from April 1, 2010, to April 1, 2020.
Mecklenburg	1,122,276	2	Growth of 3,936 people (0.4%) between July 1, 2020, and July 1, 2021, and 21.3 % between April 1, 2010, and April 1, 2020. Nation's 41st largest county in 2021.
Pender	62,815	44	Growth of 2,252 people (3.7%) from 2020 to 2021, and 15.3 % from April 1, 2010, to April 1, 2020. Annually, it's the nation's 57th fastest-growing county percentagewise.
Union	243,648	8	Growth of 4,361 people (1.8%) from 2020 to 2021 and 18.4 % from April 1, 2010, to April 1, 2020. Annually, it's the nation's 93rd fastest-growing county in population.
Wake	1,150,204	1	Growth of 16,651 people (1.5%) from 2020-2021 and 25.4 % from April 1, 2010, to April 1, 2020. North Carolina's fastest growing county based on number of people. Nation's 39th largest county in 2021. Annually, it's the nation's 14th fastest-growing county in population.

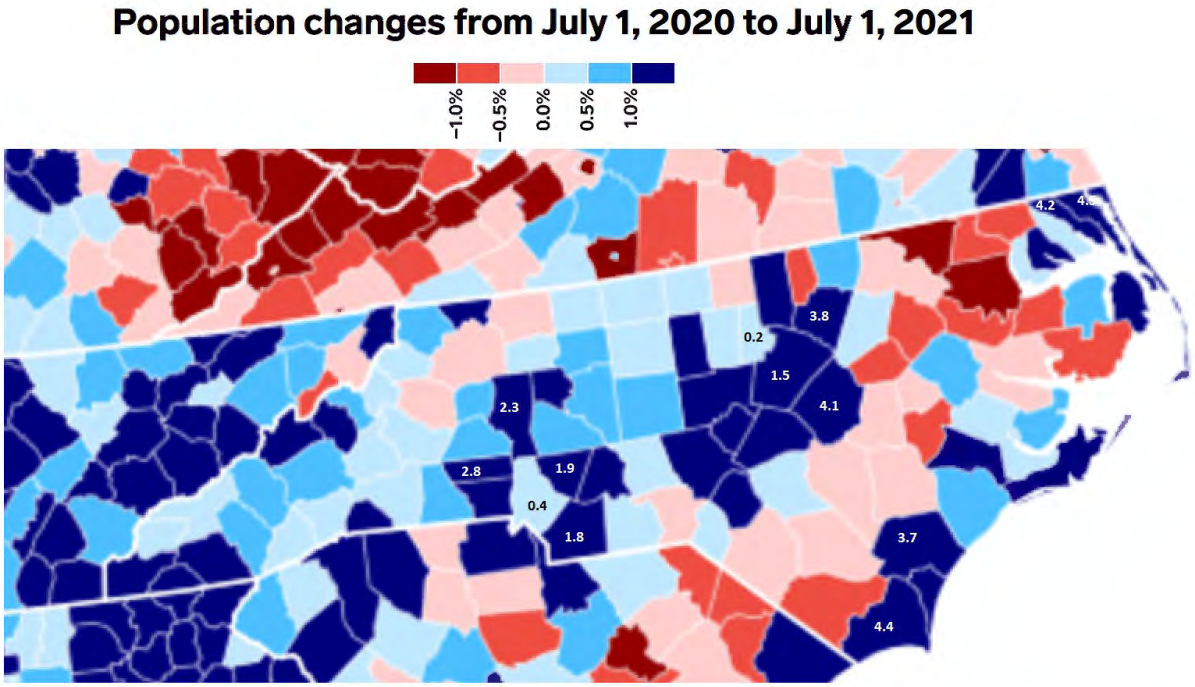

Figure 2. Estimated Growth by County from July 1, 2020, to July 1, 2021

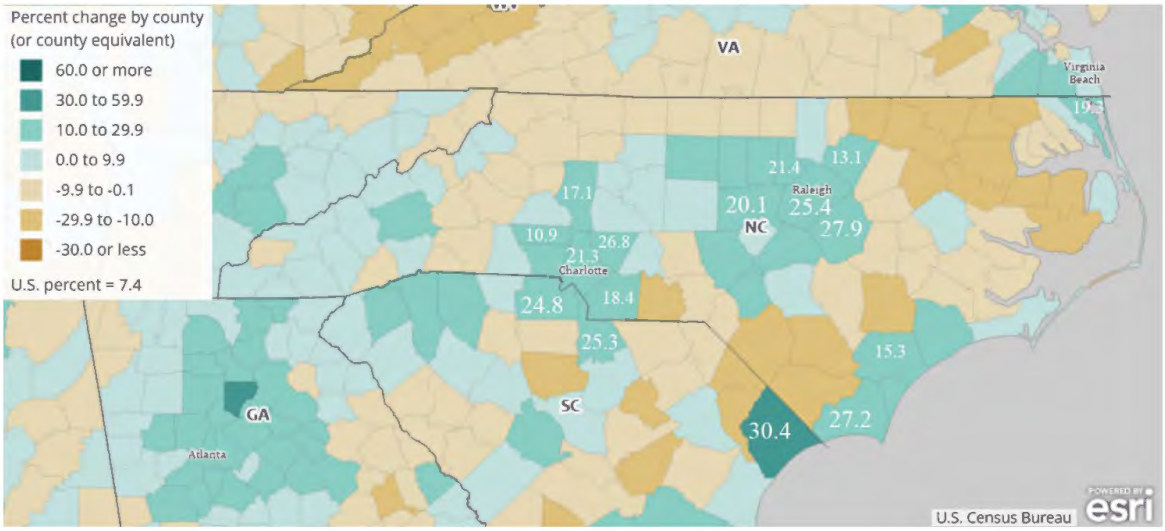

Figure 3. Estimated Rate of Growth by County from April 2010 to April 2020

A. Monitors Scheduled to Start Up or Shut Down in 2021, 2022 or 2023 that were not included in the 2021-2022 Network Plan

Table 2 presents a list of monitors DAQ either expects to, or has already, started up or shut down in 2021, 2022 or 2023 that were not included in the 2021-2022 network plan listed by metropolitan statistical area, or MSA and Air Quality System, or AQS, site identification number. Appendix B. 2022 Annual Monitoring Network Plan for Mecklenburg County Air Quality discusses changes to the monitors operated by Mecklenburg County Air Quality. Appendix C. 2022 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 ABAQA.

Table 2 Summary of Monitors Scheduled to Start Up or Shut Down in 2021, 2022 or 2023 that were not included in the 2021-2022 Network Plan

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Charlotte-Concord-Gastonia	371190041	Garinger	Air Toxics – 1-bromopropane	Added to analyte list for TO-15	1/04/2021
			PAMS Hydrocarbons	Monitoring started	5/29/2021
			PAMS Carbonyls	Monitoring started	6/1/2022
			True NO_2	Monitoring started	8/1/2022
			UV Radiation	Monitoring started	8/1/2022
	371190050	Equipment Drive	True NO_2	Monitoring will start	Around 1/1/2023
	371590021	Rockwell	Barometric Pressure	Monitoring started	6/1/2021
			Air Temperature	Monitoring started	6/01/2021
			Relative Humidity	Monitoring started	6/01/2021
Raleigh	371830014	Millbrook	Air Toxics – 1-bromopropane	Added to analyte list for TO-15	7/01/2021
			NO_2	Monitoring method changed	5/19/2021
			NO_x	Monitoring ended	7/16/2021
			PAMS Hydrocarbons	Monitoring will start	6/1/2023
			PAMS Carbonyls	Monitoring started	5/1/2021
Winston-Salem	370670022	Hattie Avenue	PM_{10}	Collocated sequential monitor added	9/1/2021
			Air Toxics – 1-bromopropane	Added to analyte list for TO-15	7/01/2021
	370570002	Lexington	$PM_{2.5}$	BAM1022 will replace BAM 1020	8/1/2023
Durham	370630015	Durham Armory	$PM_{2.5}$	When funds allow the T640X will replace the BAM 1020 coarse	6/30/2023
			PM_{10}		
			$PM_{10-2.5}$		

Table 2 Summary of Monitors Scheduled to Start Up or Shut Down in 2021, 2022 or 2023 that were not included in the 2021-2022 Network Plan

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Myrtle Beach-Conway-North Myrtle Beach	45051xxxx	To be determined	$PM_{2.5}$	South Carolina will add a T640X in Horry County	To be determined
			PM_{10}		
			$PM_{10-2.5}$		
	37019xxxx	To be determined	Ozone	If needed based on ozone design values	To be determined
Asheville	370210035	AB Tech	Air Toxics – 1-bromopropane	Added to analyte list for TO-15	7/01/2021
Wilmington	371290010	Eagles Island	Air Toxics – 1-bromopropane	Added to analyte list for TO-15	7/01/2021
Greenville	371470010	Pitt County Agricultural Center	Air Toxics – 1-bromopropane	Added to analyte list for TO-15	7/01/2021

Table 2 Summary of Monitors Scheduled to Start Up or Shut Down in 2021, 2022 or 2023 that were not included in the 2021-2022 Network Plan

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Not in an MSA	370119991	Cranberry	Ozone	Monitoring suspended	5/10/2022
	370130151	Bayview Ferry	Wind speed	Monitoring method changed to Met One All in One 2	6/01/2021
			Wind direction		
			Air Temperature	Monitoring started	6/01/2021
			Relative Humidity		
			Barometric Pressure		
	370990006	Cherokee	$PM_{2.5}$	Monitoring ended	11/01/2021
	371230001	Candor	Air Toxics – 1-bromopropane	Added to analyte list for TO-15	7/01/2021
			$PM_{2.5}$	BAM1022 will replace BAM 1020	8/1/2023
			Air Temperature	Monitoring method changed to Met One All in One 2	6/01/2021
			Relative Humidity		
			Wind speed		
			Wind direction		
			Barometric Pressure	Monitoring started	6/01/2021
	371730002	Bryson	$PM_{2.5}$	BAM1022 will replace BAM 1020	Fall 2022
			Air Temperature	Monitoring method changed to Met One All in One 2	6/01/2021
			Relative Humidity		
			Wind speed		
			Wind direction		
			Barometric Pressure	Monitoring started	6/01/2021
	371730007	Old High School	$PM_{2.5}$	Collocated monitoring started	11/1/2021

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. 2022 Annual Monitoring Network Plan for Mecklenburg County Air Quality. In addition to the

changes reported in Appendix B, DAQ added 1-bromopropane to the analyte list for toxic VOCs and MCAQ started reporting this compound at the Garinger site to AQS on Jan. 1, 2021. The rest of this subsection discusses the **Rockwell** site in this MSA where DAQ made changes in 2021 or plans to make changes in 2022 or 2023.

To meet the need for background data for prevention of significant deterioration modeling and permitting, DAQ added a nitrogen dioxide monitor on October 22, 2020. In addition, DAQ added a Met One All-in-One meteorological station to the site and started reporting the data from it on June 1, 2021. The All-in-One collects wind speed and direction data as well as air temperature, relative humidity, and barometric pressure.

Figure 4. The Rockwell ozone, nitrogen dioxide, and particle monitoring site

2. Monitoring Changes in the Raleigh MSA

Several changes occurred at the **Millbrook** site in 2021 and 2022. The DAQ purchased a CAPS monitor to replace the photolytic NO_2 monitor. The CAPS monitor was added to the monitoring shelter and started operating on May 19, 2021. The photolytic monitor was shut down on July 16, 2021.

DAQ continued to make changes to the site to prepare for PAMS seasonal monitoring from June 1 to August 31 each year. The DAQ added a gas chromatograph to collect hydrocarbon data, which should be operational by the start of the 2023 PAMS season. The sequential carbonyl sampler to collect eight-hour carbonyl samples started operating on May 1, 2021, and should operate during each subsequent PAMS season.

Another change that occurred in 2021 is the addition of 1-bromopropane to the air toxics VOC compound list. The DAQ started reporting 1-bromopropane data from the Millbrook site to AQS on July 1, 2021.

Figure 5. The Millbrook PAMS and NCore-monitoring site

3. Monitoring Changes in the Winston-Salem MSA

The changes Forsyth County made in the Winston-Salem MSA to the monitors they operate are discussed in Appendix C. 2022 Annual Monitoring Network Plan for Forsyth County Office of Environmental Assistance and Protection. In addition to the changes reported in Appendix C, DAQ added 1-bromopropane to the analyte list for toxic VOCs and started reporting this compound at the Hattie Avenue site to AQS on July 1, 2021. The rest of this subsection discusses the **Lexington** site in this MSA where DAQ plans to make changes in 2023.

To simplify the fine particle monitoring network and reduce the types of monitors used in the network to two FEMs and one FRM, DAQ requested American Rescue Plan (ARP) funds from the Environmental Protection Agency (EPA) to purchase Met One BAM 1022s to replace the standalone Met One BAM 1020s in the network. This funding request was approved by the EPA and the EPA granted the funds on August 10, 2022, to purchase a BAM 1022 to place at the Lexington site. DAQ anticipates replacing the BAM 1020 at Lexington with a BAM 1022 sometime in late 2023.

Figure 6. The Lexington particle monitoring site

4. Monitoring Changes in the Durham MSA

DAQ monitors for ozone, sulfur dioxide, fine particles, particles with aerodynamic diameters of 10 microns or less and coarse particles at the **Durham Armory** site in Durham County. To simplify the fine particle monitoring network and

reduce the types of monitors used in the network to two FEMs and one FRM, DAQ requested American Rescue Plan (ARP) funds from the EPA to purchase a Teledyne T640X to replace Met One BAM 1020 coarse unit at this site. This funding request was not approved by the EPA. The DAQ plans to replace the BAM 1020 coarse unit with a T640X monitor whenever funding to do so becomes available. This monitor must be replaced before the BAM 1020 monitor at Lexington can be replaced with a BAM 1022 because the Lexington site is the collocated BAM 1020 – FRM site.

Figure 7. The Durham Armory multi-pollutant monitoring site

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

In February 2013, the Office of Management and Budget (OMB) combined Horry County with Brunswick County, NC to establish the Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA. In conjunction with the DAQ, local government, and stakeholders, the South Carolina Department of Health and Environmental Control (DHEC) established the Coastal Carolina Monitoring Site to be representative of expected maximum ozone concentrations in northeast South Carolina. To meet the minimum monitoring criteria in 40 CFR Part 58, Appendix D, at least one ozone monitor is required in the MSA. DAQ and DHEC have started the process of finding an appropriate site for a second ozone monitor in the MSA, should it be required in accordance with Appendix D of 40 CFR Part 58. According to the U.S. Census 2021 population estimate, the population in the

MSA is above the threshold, requiring one PM_{10} and one $PM_{2.5}$ monitor. DHEC has started the process of finding an appropriate site for the PM_{10} and $PM_{2.5}$ monitor.

6. Monitoring Changes in the Asheville, Wilmington and Greenville MSAs

DAQ added 1-bromopropane to the analyte list for toxic VOCs and started reporting this compound at the A-B Tech, Eagles Island, and Pitt County Agricultural Center sites to AQS on July 1, 2021.

7. Monitoring Changes in Areas Not in MSAs

This subsection discusses the monitoring changes in areas not in MSAs, including changes to CASTNET and tribal monitors.

Monitoring Changes at the CASTNET Site in Avery County

On May 10, 2022, EPA suspended operations of several CASTNET monitoring locations throughout the country for the remainder of the federal fiscal year due to budget constraints (see https://www.epa.gov/castnet). This suspension included the **Cranberry** (37-011-9991) ozone monitor in Avery County. The EPA did not indicate if this suspension will be temporary or permanent. The DAQ believes suspending operation of the Cranberry sites will not have implications on modeling for attainment designations or for future regional haze or the $PM_{2.5}$ NAAQS and upcoming designations.

Monitoring Changes at the Bayview Ferry Site in Beaufort County

In 2021, DAQ added a Met One All-in-One meteorological station to the **Bayview Ferry** site to replace the wind sensors at the site and add relative humidity, ambient temperature and barometric pressure.

Figure 8. The Bayview Ferry sulfur dioxide monitoring site

Monitoring Changes for the Tribal Monitors in Jackson and Swain Counties

On Nov. 1, 2021, the Eastern Band of Cherokee Indians shut down the collocated sequential fine particle monitors at the **Cherokee** (37-099-0006) monitoring site in Jackson County. One of the sequential fine particle monitors was moved to the **Old School** site in Swain County and started monitoring as a collocated monitor for the T640 primary monitor at the site on Nov. 1, 2021.

Monitoring Changes at the Candor Site in Montgomery County

In 2021, DAQ added a Met One All-in-One meteorological station to the **Candor** site to replace the wind, relative humidity, and ambient temperature sensors at the site and add barometric pressure. As of June 1, 2021, the relative humidity and ambient temperature are measured at 10 meters instead of 2 meters above ground level. DAQ also added 1-bromopropane to the analyte list for toxic VOCs and started reporting this compound at the Candor site to AQS on July 1, 2021.

As stated earlier, to simplify the fine particle monitoring network and reduce the types of monitors used in the network to two FEMs and one FRM, DAQ requested ARP funds from the EPA to purchase Met One BAM 1022s to replace the standalone Met One BAM 1020s in the network. This funding request was approved by the EPA and the EPA granted the funds on August 10, 2022, to purchase a BAM 1022 to place at the Candor site. DAQ anticipates replacing the BAM 1020 at Candor with a BAM 1022 sometime in late 2023.

Figure 9. The Candor particle, air toxics and atmospheric deposition monitoring site

Monitoring Changes at the Bryson City Site in Swain County

In 2021, DAQ added a Met One All-in-One meteorological station to the **Bryson City** site to replace the wind, relative humidity, and ambient temperature sensors at the

site and add barometric pressure. As of June 1, 2021, the relative humidity and ambient temperature are measured at 10 meters instead of 2 meters above ground level.

As stated earlier, to simplify the fine particle monitoring network and reduce the types of monitors used in the network to two FEMs and one FRM, DAQ requested ARP funds from the EPA to purchase Met One BAM 1022s to replace the standalone Met One BAM 1020s in the network. This funding request was approved by the EPA and the EPA granted the funds on August 10, 2022, to purchase a BAM 1022 to place at the Bryson City site. DAQ anticipates replacing the BAM 1020 at Bryson City with a BAM 1022 sometime in late 2022.

Figure 10. The Bryson City ozone and particle monitoring site

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 2021, 2022 or 2023 that were not included in the 2021-2022 network plan listed by MSA and AQS site identification number. Appendix B. 2022 Annual Monitoring Network Plan for Mecklenburg County Air Quality discusses changes to the monitors operated by Mecklenburg County Air Quality. Appendix C. 2022 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 and ABAQA.

Table 3 Summary of Monitors Scheduled to Relocate or Move in 2021, 2022 or 2023 that were not included in the 2021-2022 Network Plan

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
Charlotte-Concord-Gastonia	371590021	Rockwell	Ozone NO_2 $PM_{2.5}$	Site will be relocated due to future development	After 12/31/2023
Greensboro	371570099	Bethany	Ozone SO_2	Site may shut down to be relocated to add new shelter	After 12/31/2023
Durham	37770001	Butner	Ozone	Site may shut down to be relocated to add new shelter	After 12/31/2023
Asheville	370210034	Board of Education	$PM_{2.5}$ Speciated $PM_{2.5}$	Site will be relocated off roof onto ground	Fall 2022
Fayetteville	370510011	Wade School	Ozone	Site started to replace Wade	3/1/2022
Hickory	370350004	Hickory	$PM_{2.5}$	Monitors will be moved	Fall 2022
Not in an MSA	371730002	Bryson	$PM_{2.5}$	Monitor will be relocated	Fall 2022

DAQ did not relocate or move any sites between the 2021 and 2022 ozone seasons. DAQ succeeded in moving the Wade site to the Wade School site before the start of the 2022 ozone season. DAQ also anticipates replacing shelters at Bethany in the Greensboro MSA and Butner in the Durham MSA during the next 18 months as funding becomes available. DAQ and ABAQA will also be relocating the PM2.5 monitors at the Board of Education, Hickory and Bryson sites. In addition, the property owners at the Rockwell site recently informed DAQ of plans to expand the facility which would require the monitoring station to be relocated. The following subsections provide more information on these sites.

1. Potential Relocation of the Rockwell site in the Charlotte MSA

During the EPA National Performance Audit Program (NPAP) audit on Aug. 22, 2022, at **Rockwell** Mr. Paul Chappin was approached by Mr. Tim Linker, head of maintenance and public works for the Town of Rockwell. Mr. Linker indicated there are ongoing discussions in Rockwell government about expanding the Rockwell maintenance facilities to the point where DAQ may need to move the entire Rockwell site. The Town of Rockwell has not made any definite plans yet. Mr. Linker also stated that there are two locations where the city could accommodate a new site within a mile of the current site. The best location would be at the abandoned waste water treatment plant in Rockwell (see Figure 11). The other was further to the West. If DAQ decides to move the site, DAQ will submit an Addendum to Volume 1 of the NC DEQ 2022-2023 Network Monitoring Plan.

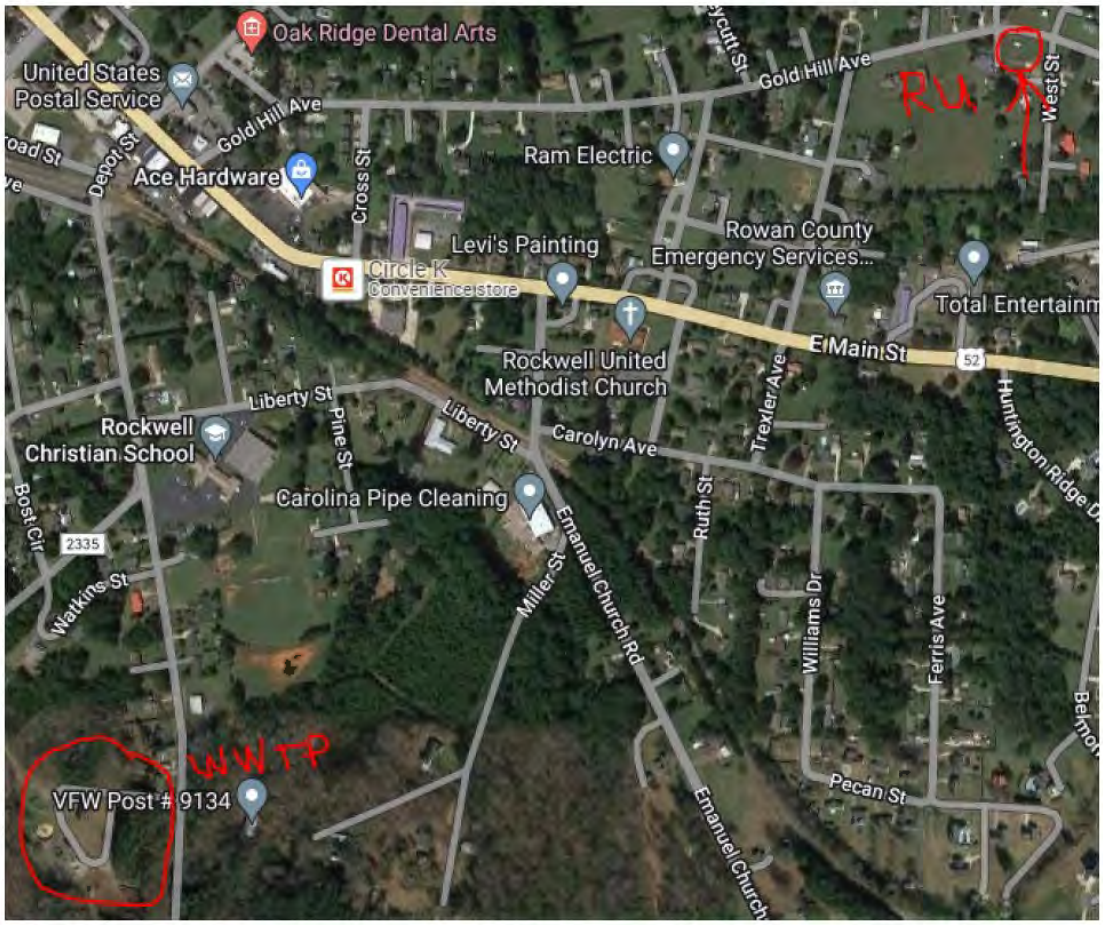

Figure 11. Aerial view of the Rockwell site (upper righthand corner) in relationship to proposed new location at the abandoned waste water treatment plant

2. *Replacement of Monitoring Shelter and Possible Relocation of the Bethany site in the Greensboro MSA*

After the 2023 ozone season, DAQ plans to replace the ozone and sulfur dioxide monitoring shelter at **Bethany**, 37-157-0099 if funding becomes available to purchase a new shelter. If a concrete pad cannot be installed at the current location or if the DAQ anticipates being unable to remain at the current location long term, DAQ may have to relocate the site. The property it is on belongs to the Rockingham County School, but the school there has been empty for many years now. If DAQ decides to move the site, DAQ will submit an Addendum to Volume 1 of the NC DEQ 2022-2023 Network Monitoring Plan.

Figure 12. Aerial view of the Bethany site (orange balloon)

3. *Replacement of Monitoring Shelter and Possible Relocation of the Butner site in the Durham MSA*

After the 2023 ozone season, DAQ plans to replace the ozone monitoring shelter at **Butner**, 37-077-0001 if funding becomes available to purchase a new shelter. If a concrete pad cannot be installed at the current location or if the DAQ anticipates being unable to remain at the current location long term, DAQ may have to relocate the site. The property it is on belongs to the South Granville Water and Sewer Authority. If DAQ decides to move the site, DAQ will submit an Addendum to Volume 1 of the NC DEQ 2022-2023 Network Monitoring Plan.

Figure 13. Aerial view of the Butner site (red balloon)

4. Relocation of the Board of Education site in the Asheville MSA

Mr. Ryan Brown, with the Air and Radiation Division (ARD) of the EPA Region 4, called the ABAQA to inform them about the availability of a collocation shelter for sensor studies for installation at the **Board of Education** site (37-021-0034) located in Asheville, North Carolina. Further conversations with Mr. Brown and the property owners at the Board of Education site indicated that for the collocation shelter to be properly installed and accessible to the public, the current monitoring site would need to be relocated from the roof of the building to the ground. As a result, ABAQA contacted the maintenance staff at the Board of Education Building to see if the rooftop monitors could be relocated on the ground approximately 168 meters east of the current location as shown in Figure 14. The Board of Education maintenance staff agreed to this location. More information on this site relocation is available in the 2021-2022 Annual Network Monitoring Plan for the North Carolina Division of Air Quality Volume 1 Addendum 1. Board of Education Information for Relocating the Fine Particle ($PM_{2.5}$) Monitors.[4]

Figure 14. Locations of current and proposed monitoring stations

5. Relocation of the Wade site in the Fayetteville MSA

After the 2021 ozone season, DAQ relocated the ozone monitoring station at Wade, 37-051-0008, to the Wade School site, 37-051-0011. More information on the Wade School site is available in Addendum 1 to Volume 1 of the NC DEQ 2019-2020

[4] North Carolina Department of Environmental Quality, 2021-2022 Annual Monitoring Network Plan for the North Carolina Division of Air Quality, Volume 1, Addendum 1 Board of Education Information for Relocating the Fine Particle ($PM_{2.5}$) Monitors, May 13, 2022, available on the worldwide web at https://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=15698

Final Network Monitoring Plan: Wade Relocation Siting Analysis and Site Information.[5] The new site at District 7 Elementary School is 2.23 kilometers southeast of the old Wade site as shown in Figure 15. After successfully obtaining power to the site, DAQ established the new Wade School site in early 2022 in time for the start of the 2022 ozone season.

Figure 15. Location of the Wade School site relative to the Wade site

6. Monitor Relocations in the Hickory MSA

On May 5, 2020, Mr. David Leonetti with the City of Hickory contacted DAQ about the monitors located at the Hickory water tower. The North Carolina Department of Transportation (DOT) is widening US-321, which will dictate some temporary changes and rerouting of traffic lanes, closure of an overpass near the site, as well as the striking of new right of ways near the site on the two roads that border the water tower property. The road itself will not increase, just the right of way distance and maybe some area for a sidewalk and improvements would increase. On May 12, 2021, Mr. Leonetti contacted DAQ again about moving the monitors approximately 38 meters northward towards 1st Avenue SW as shown in Figure 16. The monitors will remain at least 17 meters from the nearest travel lane on all sides. As shown in the wind rose in the inset of Figure 16, the predominant winds at the Hickory airport are from the south southwest and west northwest. DAQ plans to move the monitors in the fall of 2022. For additional information on the relocation of these monitors see Appendix E. Hickory Data Analysis For Relocating the Fine Particle Monitors on the Site.

[5] North Carolina Department of Environmental Quality 2019-2020 Final Network Monitoring Plan, Volume 1 Network Descriptions, Addendum 1 Wade Relocation Siting Analysis and Site Information, March 31, 2020, available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=12992.

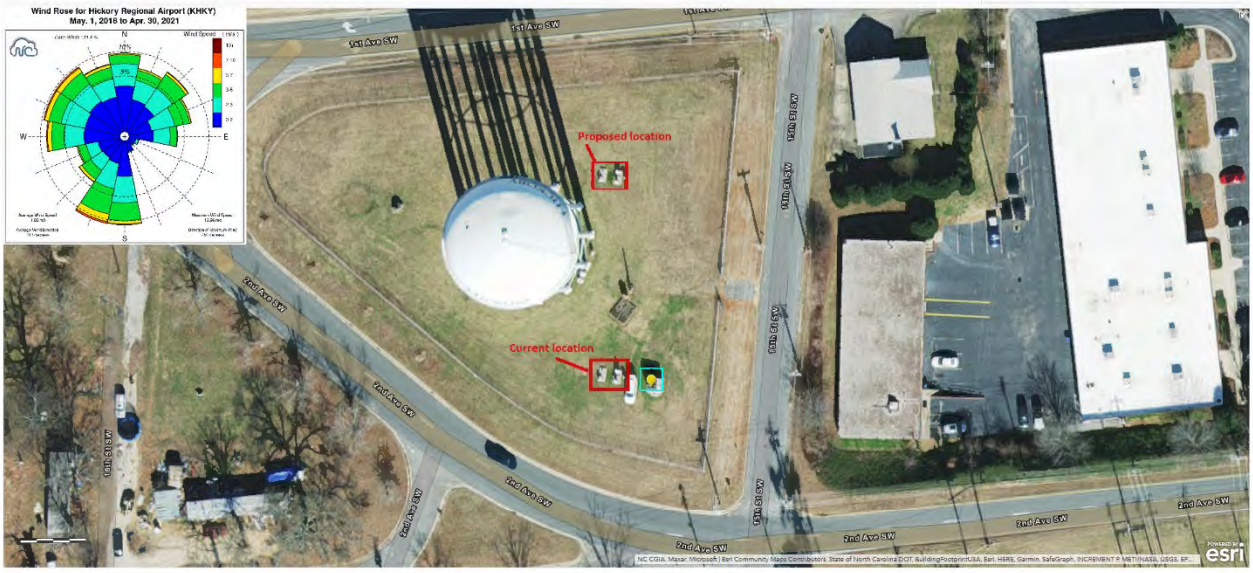

Figure 16. Aerial view of the Hickory fine particle monitoring site showing relative positions of the current location and proposed location

Monitor Relocations in the Areas Outside of MSAs

During the 2021 annual network review, Mr. Steve Ensley noted that the tree located 10.97 meters to the southwest of the continuous fine particle monitor inlet would soon become an obstacle to air flow. As a result, Mr. Ensley investigated the possibility of relocating the monitor elsewhere on the property. In the fall of 2022, DAQ plans to relocate the continuous fine particle monitor from its current location to a new location at the site placing it between the met tower and the rain gage to move the monitor further away from the dripline of a nearby tree as shown in Figure 17. When the monitor is relocated, DAQ may also change the continuous fine particle monitoring method from a BAM 1020 to a BAM 1022, if a BAM 1022 is available at that time. This relocation will not require a change in AQS identification number or address because the monitor is remaining on the same property. For more information on the relocation of this fine particle monitor see Appendix F. Bryson City Data Analysis For Relocating the Fine Particle Monitor on the Site.

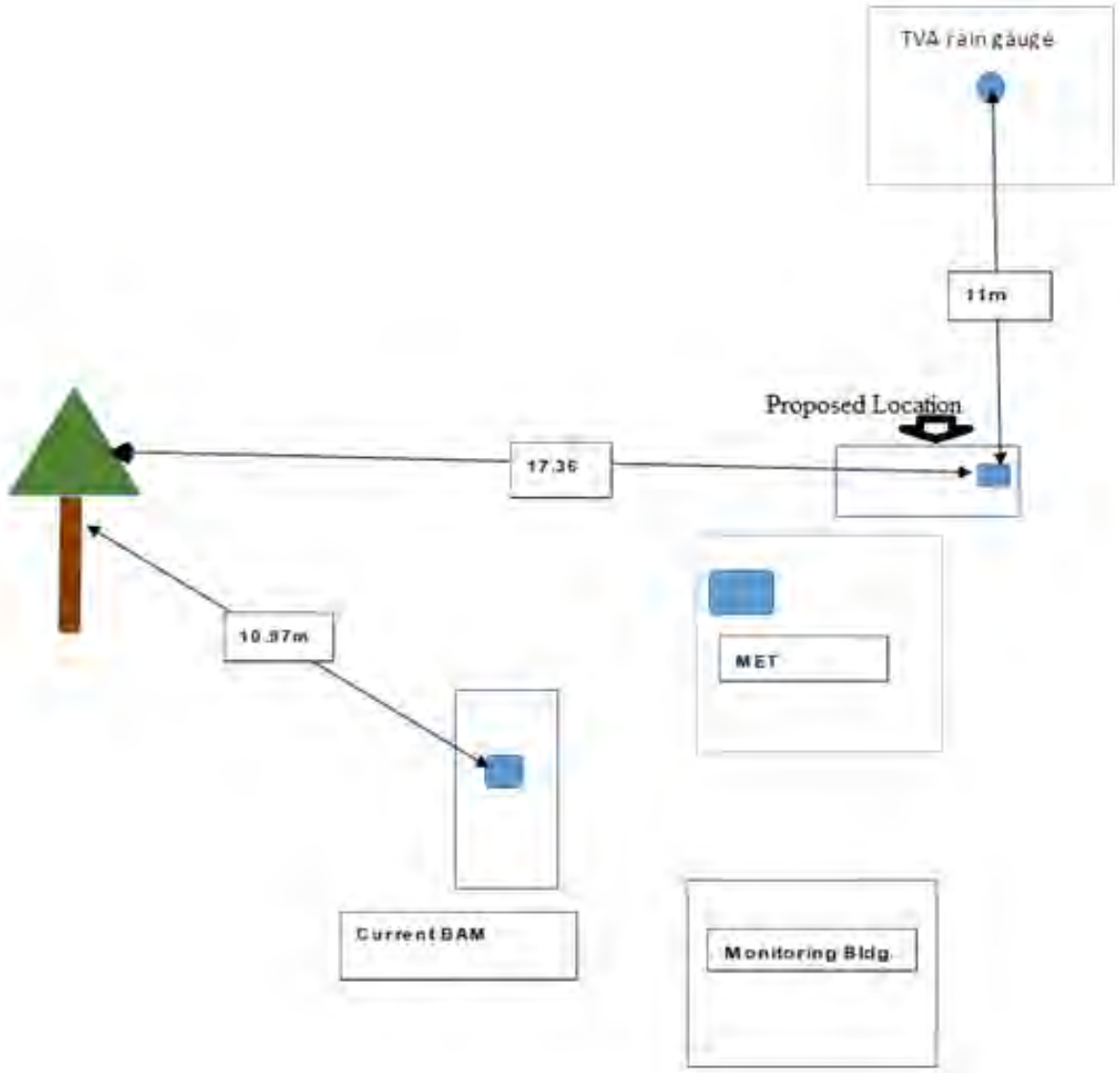

Figure 17. Relocation of the continuous fine particle monitor at Bryson City

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

Table 4 lists the primary monitoring method for fine particles at all currently operating fine particle monitoring sites for all years a fine particle monitor operated at the site. From 1999 until the end of 2015, DAQ used an Ruprecht & Patshneck (R&P) Model 2025 $PM_{2.5}$ Sequential Monitor with a well impactor ninety-six (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.

Table 4 Primary Monitoring Methods at Fine Particle Monitoring Sites

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Primary Monitor Method	Time Frame
Charlotte-Concord-Gastonia	371590021	Rockwell	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	1/1/2005 to 12/31/2015
			Met One BAM-1022 Mass Monitor with VSCC (209)	10/24/2019 to present
Raleigh	371010002	West Johnston	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	1/1/2009 to 12/30/2015
			R&P Model 2025 $PM_{2.5}$ Sequential with VSCC (145)	12/31/2015 to 12/31/2017
			Met One BAM-1022 Mass Monitor with VSCC (209)	1/1/2018 to present
	371830014	Millbrook	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	1/1/1999 to 12/31/2010
			Met One BAM-1020 Mass Monitor with VSCC (170)	1/1/2011 to 12/31/2015
			R&P Model 2025 $PM_{2.5}$ Sequential with VSCC (145)	1/1/2016 to 9/30/2020
			Teledyne T640X at 16.67 LPM (238)	10/1/2020 to present
	371830021	Triple Oak	Met One BAM-1022 Mass Monitor with VSCC (209)	1/4/2017 to present
Greensboro-High Point	370810013	Mendenhall	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	12/14/2001 to 12/29/2015
			R&P Model 2025 $PM_{2.5}$ Sequential with VSCC (145)	12/30/2015 to 12/28/2017
			Met One BAM-1022 Mass Monitor with VSCC (209)	12/29/2017 to present
Winston-Salem	370570002	Lexington	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	1/1/1999 to 12/31/2015
			Met One BAM-1020 Mass Monitor with VSCC (170)	1/1/2016 to present
Durham-Chapel Hill	370630015	Durham Armory	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	4/1/2007 to 12/30/2015
			R&P Model 2025 $PM_{2.5}$ Sequential with VSCC (145)	12/31/2015 to 9/30/2020
			Met One BAM-1020 Mass Monitor with VSCC (170)	10/1/2020 to present

Table 4 Primary Monitoring Methods at Fine Particle Monitoring Sites

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Primary Monitor Method	Time Frame
Asheville	370210034	Board of Education	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	1/1/1999 to 12/31/2015
			R&P Model 2025 $PM_{2.5}$ Sequential with VSCC (145)	1/1/2016 to 12/31/2018
			Met One BAM-1022 Mass Monitor with VSCC (209)	1/1/2019 to present
Fayetteville	370510009	William Owen	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	1/1/1999 to 12/30/2015
			R&P Model 2025 $PM_{2.5}$ Sequential with VSCC (145)	12/31/2015 to 12/31/2019
			Met One BAM-1022 Mass Monitor with VSCC (209)	1/1/2020 to present
Hickory	370350004	Hickory Water Tower	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	1/1/1999 to 12/30/2015
			R&P Model 2025 $PM_{2.5}$ Sequential with VSCC (145)	12/31/2015 to 12/31/2016
			Met One BAM-1022 Mass Monitor with VSCC (209)	1/1/2017 to present
Wilmington	371290002	Castle Hayne	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	7/1/2002 to 12/31/2015
			Met One BAM-1020 Mass Monitor with VSCC (170)	10/1/2016 to present
Greenville	371470006	Pitt County Agricultural Center	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	1/1/1999 to 12/31/2015
			R&P Model 2025 $PM_{2.5}$ Sequential with VSCC (145)	1/1/2016 to 6/30/2019
			Met One BAM-1022 Mass Monitor with VSCC (209)	7/1/2019 to present
Not in a MSA	371210004	Spruce Pine Hospital	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	1/9/2014 to 12/31/2015
			R&P Model 2025 $PM_{2.5}$ Sequential with VSCC (145)	1/1/2016 to 12/31/2017
			Met One BAM-1022 Mass Monitor with VSCC (209)	1/1/2018 to present
	371230001	Candor	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	7/16/1999 to 6/30/2015
			Met One BAM-1020 Mass Monitor with VSCC (170)	7/1/2015 to present

Table 4 Primary Monitoring Methods at Fine Particle Monitoring Sites

Metropolitan Statistical Area	AQS Site Id Number	Site Name	Primary Monitor Method	Time Frame
	371310003	Northampton County	Met One BAM-1022 Mass Monitor with VSCC (209)	7/24/2019 to present
	371730002	Bryson City	R&P Model 2025 $PM_{2.5}$ Sequential with WINS (118)	1/1/1999 to 3/31/2011
			Met One BAM-1020 Mass Monitor with VSCC (170)	4/1/2011 to present

DAQ used a R&P Tapered Element Oscillating Microbalance (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 stopped supporting this model of TEOM, so its continued operation was no longer feasible.

In early 2008, the EPA approved the Met One 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 $PM_{2.5}$ sequential monitors with BAM 1020s. Four of 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 $PM_{2.5}$ sequential monitor with a BAM 1022. In 2018, the division replaced three more R&P Model 2025 $PM_{2.5}$ sequential monitors with BAM 1022s at Mendenhall, 37-081-0013, West Johnston, 37-101-0002, and Spruce Pine, 37-121-0004. In 2019, ABAQA replaced the primary Thermo Model 2025i $PM_{2.5}$ 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 $PM_{2.5}$ sequential monitor at the Pitt County Agricultural Center, 37-147-0006, with a BAM 1022. In 2020 DAQ replaced the Thermo Model 2025i $PM_{2.5}$ sequential monitor at the William Owen site, 37-051-0009, with a BAM 1022 and the Thermo Model 2025i $PM_{2.5}$ sequential monitor at the Durham Armory, 37-063-0015, with a BAM 1020. Also in 2020, DAQ made the Teledyne T640X at Millbrook, 37-183-0014, the primary monitor.

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 air quality index, or AQI, monitor only.[6] The DAQ shut down the BAM 1020 at Millbrook in 2022.

D. Rotating Background Monitors

DAQ operates two rotating background monitoring networks to provide background concentration data for prevention of significant deterioration, PSD, modeling. PSD modeling is a federal requirement necessitating the collection of one calendar year of background data.[7] Monitors for sulfur dioxide, SO_2, or PM_{10} rotate to 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. In 2020, the DAQ decided to start operating the SO_2 rotating monitors on a calendar year schedule starting in 2022. DAQ made this change to facilitate obtaining NPAP audits for the monitors as the monitors need to be operating in January to get on the NPAP schedule.

E. Addition of Nafion Dryers to the Ozone Monitoring Probes at Linville Falls and Monroe

After extensive testing of the Nafion dryer system used by the EPA on the CASTNET sites in North Carolina, the DAQ moved forward with installing the dryer at the Linville Falls site on Sep. 26, 2019 and the Monroe site on Oct. 2, 2019. Both ozone monitoring systems were evaluated by completing through-the-probe audits before and after installation of the dryer. The addition of the Nafion dryer assembly appeared to have no impact on the ambient monitoring data. The DAQ contacted EPA Region 4 to request permission to use the Nafion dryers for the 2020 ozone season. Region 4 referred our request to the Office of Research and Development, or ORD. DAQ worked with ORD by providing them with information to help them with moving forward to grant nationwide approval for the use of the Nafion dryer system for ozone monitoring. While waiting for approval, the DAQ flagged all the ozone data collected at these two sites with a 6 flag in AQS. On Feb. 19, 2021, the EPA approved the use of the Nafion dryer nationwide. DAQ did not reinstall the Nafion dryer at these sites in 2022.

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[6] 2016 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p11, available at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=8964.

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

Table 5 The 2022-2025 Rotating Background Sulfur Dioxide Monitoring Network

AQS Site Id Number:	37-157-0099	37-051-0010	37-027-0003	37-117-0001
Site Name:	Bethany	Honeycutt E.S.	Lenoir	Jamesville
Street Address:	6371 NC 65	4665 Lakewood Drive	291 Nuway Circle	1210 Hayes Street
City:	Bethany	Fayetteville	Lenoir	Jamesville
Latitude:	36.308889	35.00	35.935833	35.810690
Longitude:	-79.859167	-78.99	-81.530278	-76.897820
MSA, CSA or CBSA represented:	Greensboro-High Point	Fayetteville	Hickory	Not in an MSA
Monitor Type:	Special purpose	Special purpose	Special purpose	Special purpose
Operating Schedule:	Hourly- every third year	Hourly- every third year	Hourly – every third year	Hourly – every third year
Statement of Purpose:	Industrial expansion monitoring for PSD modeling.	Industrial expansion monitoring for PSD modeling.	Industrial expansion monitoring for PSD modeling.	Industrial expansion monitoring for PSD modeling.
Monitoring Objective:	General/ background	Population exposure	General/ background	Upwind/ background general/ background
Scale:	Urban	Neighborhood	Regional	Urban
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes
Meets Requirements of 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 operate 1/1/2023 to 12/31/2024	Operated 3/15/2021 to 3/31/2022	Operating 1/1/2022 to 12/31/2022	Operating 1/1/2022 to 12/31/2022

Table 6 The 2022-2025 Rotating Background PM_{10} Monitoring Network

AQS Site Id Number:	37-003-0005	37-129-0002	37-033-0001	37-107-0004	37-117-0001	371230001
Site Name:	Taylorsville-Liledoun	Castle Hayne	Cherry Grove	Lenoir Community College	Jamesville	Candor
Street Address:	700 Liledoun Road	6028 Holly Shelter Road	7074 Cherry Grove Road	231 Highway 58 S	1210 Hayes Street	112 Perry Drive
City:	Taylorsville	Castle Hayne	Reidsville	Kinston	Jamesville	Candor
Latitude:	35.9139	34.364167	36.307033	35.231459	35.810690	35.263165
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	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

Table 6 The 2022-2025 Rotating Background PM_{10} Monitoring Network

AQS Site Id Number:	37-003-0005	37-129-0002	37-033-0001	37-107-0004	37-117-0001	371230001
Site Name:	Taylorsville-Liledoun	Castle Hayne	Cherry Grove	Lenoir Community College	Jamesville	Candor
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	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:	Operating 6/24/2022 to 6/30/2023	Will operate 10/23/2023 to 10/31/2024	Will operate 12/18/2022 to 01/07/2024	Will operate 10/1/2023 to 9/30/2024	Operated 7/1/2021 to 6/30/2022	Will operate 9/24/2023 to 9/30/2024

F. Waiver Requests

DAQ does not have any waiver requests currently. Waivers that were renewed or granted in 2020 are provided in Appendix G. Approved Waivers and Other Requests.

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. As shown in Figure 18, the 2022-2023 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.

Figure 18. Location of carbon monoxide monitoring sites

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 19, 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.

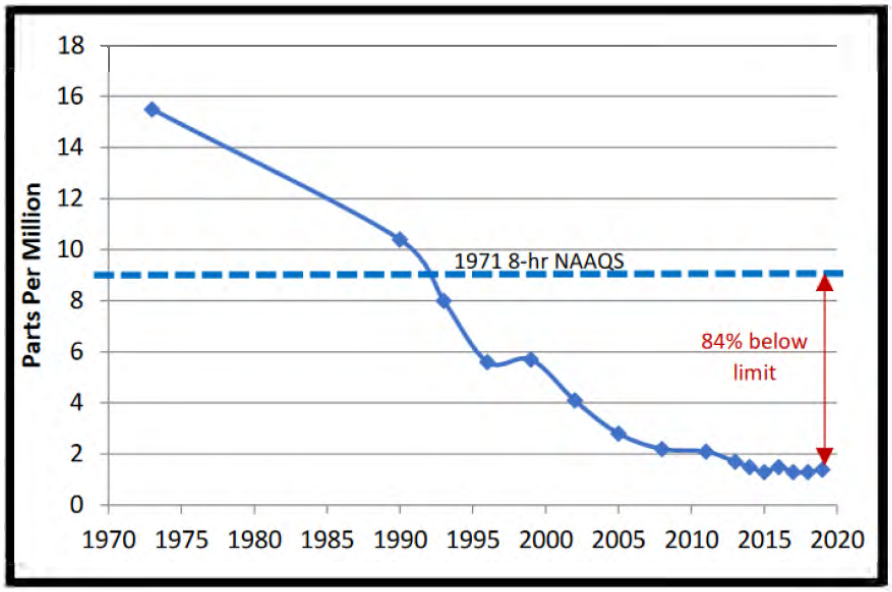


Figure 19. Statewide 8-hour carbon monoxide levels through 2019
(from *Air Quality Trends in North Carolina*, October 2020, located at https://files.nc.gov/ncdeq/Air%20Quality/planning/Air_Quality_Trends_in_North_Carolina_2020.pdf)

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. As shown in Figure 20 and Figure 21, none of the currently operating sites reported exceedances of the 1- or 8-hour ambient air quality standards from 2017 to 2021.

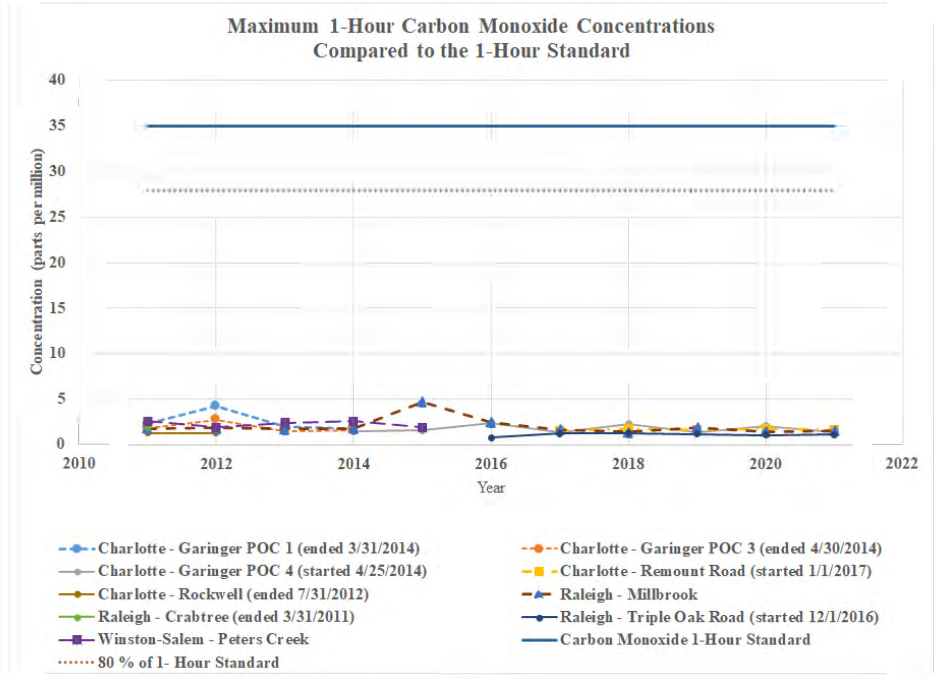


Figure 20. Maximum 1-hour carbon monoxide concentrations measured in North Carolina from 2011 to 2021

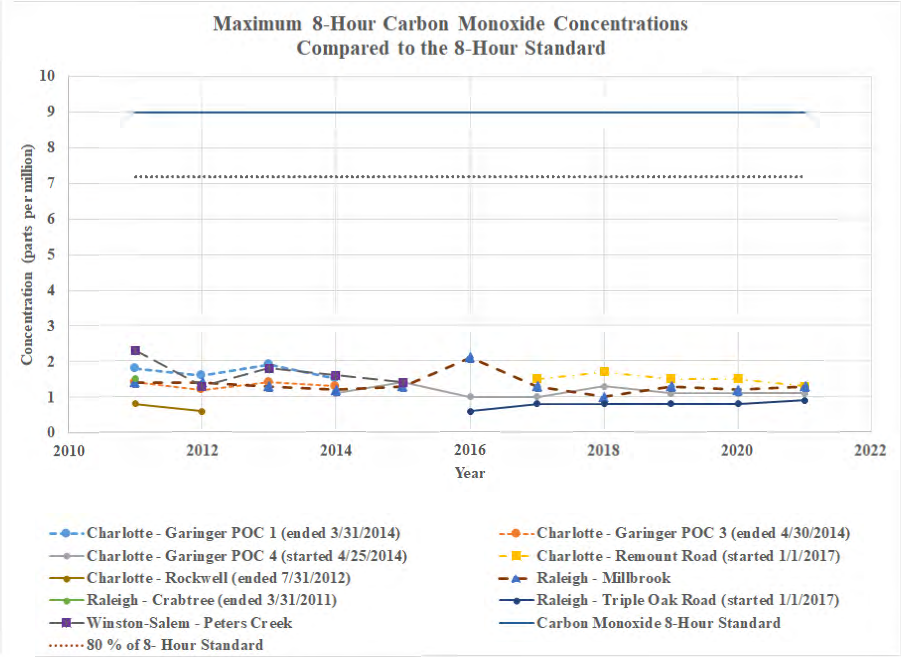


Figure 21. Maximum 8-hour carbon monoxide concentrations measured in North Carolina from 2011 to 2021

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.[8]

Figure 20 provides the maximum 1-hour and Figure 21 provides the maximum 8-hour concentrations for all operating sites for 2011 through 2021. 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 7 percent of the standard and occurred at the Garinger site in 2018. The maximum 8-hour concentration during the past five years was 19 percent of the standard and occurred at Remount Road in 2018. 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.[9]

Table 7 provides the location, the statement of purpose, the status for each monitoring site regarding whether it is suitable for comparison to the NAAQS and meets

[8] "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.

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

the 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 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 Raleigh MSA.

Table 7 The 2022-2023 Carbon Monoxide Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041	37-119-0045
Site Name:	Garinger High School	Remount
Street Address:	1130 Eastway Drive	1030 Remount Road
City:	Charlotte	Charlotte
Latitude:	35.2401	35.212657
Longitude:	-80.7857	-80.874401
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS	SLAMS
Operating Schedule:	Hourly	Hourly
Statement of Purpose:	Compliance with NAAQS; ozone and fine particle precursor monitoring	Near road monitoring site. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Highest Concentration
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 8 The 2022-2023 Carbon Monoxide Monitoring Network for the Raleigh MSA [a]

AQS Site Id Number:	37-183-0014	37-183-0021
Site Name:	Millbrook School	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; maximum ozone concentration	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, AQS method code 554

IV. Sulfur Dioxide Monitoring Network

Sulfur dioxide, or SO_2, monitoring is conducted in North Carolina at 10 sites, 8 operated by the North Carolina Division of Air Quality, or DAQ and at two sites operated by local programs.

In addition, from Jan. 1, 2012, through April 15, 2015, the South Carolina Department of Health and Environmental Control, or DHEC, operated an upwind background special purpose SO_2 monitor in York County, South Carolina, part of the Charlotte-Concord-Gastonia Metropolitan Statistical Area, MSA. At the end of 2016, DHEC moved this York County monitoring site from 2316 Chester Highway to the York Landfill at 310 Langrum Road. DHEC has operated this upwind background special purpose SO_2 monitor at the York Landfill site since starting on May 22, 2018.

The Virginia Department of Environmental Quality also operates two SO_2 monitors in the Virginia Beach-Norfolk-Newport News MSA. One monitor has operated since June 23, 2010, at the National Aeronautics and Space Administration (NASA) - Langley Research Center in Hampton City. The other monitor, located at the National Oceanic and Atmospheric Administration (NOAA) facility in Norfolk City has operated continuously since Jan. 6, 2011.

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 SO_2 levels from facilities that burn large quantities of fossil fuels or manufacture sulfuric acid. Currently, the DAQ and local programs monitor four major cities (Charlotte, Raleigh, Winston-Salem, and Durham) for SO_2. Data from previous years, as shown in Figure 22, 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.

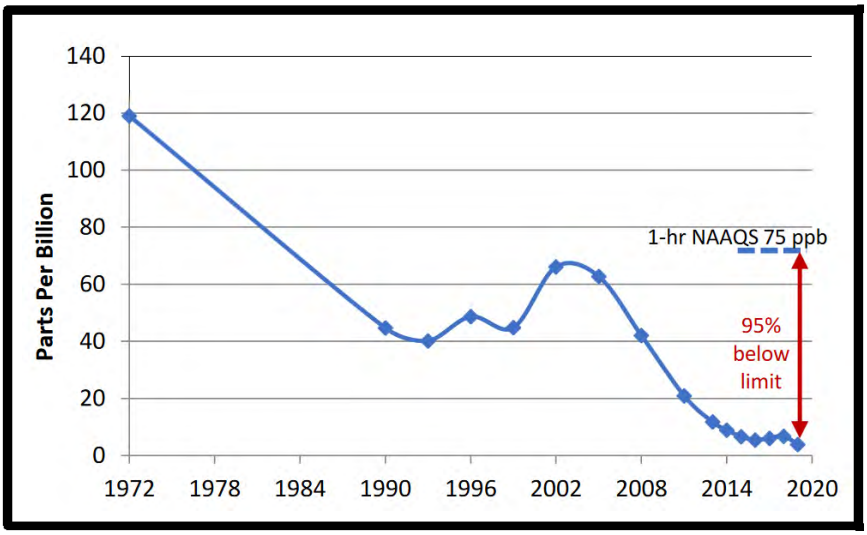


Figure 22. Statewide trends for sulfur dioxide
(from *Air Quality Trends in North Carolina*, October 2020, located at https://files.nc.gov/ncdeq/Air%20Quality/planning/Air_Quality_Trends_in_North_Carolina_2020.pdf

Figure 23 and Figure 24 show the design value or the 99th percentile of daily maximum one-hour concentrations of SO_2 measured in North Carolina between 2011 and 2021 as compared to the national ambient air quality standards, NAAQS. Although the design value exceeded the standard in Wilmington in 2011, in 2015 all measured design values in the state were less than 28 percent of the standard. The source-oriented monitor at Canton reported 2017-2019 and 2018-2020 design values over the standard. DAQ worked with this facility to reduce its SO_2 emissions so that the 2019-2021 design value is only 48 percent of the standard. For the rotating and special purpose monitors the maximum 99-percentile 1-hour concentration during the past five years was 17% of the standard and occurred at the Bethany site in 2018.

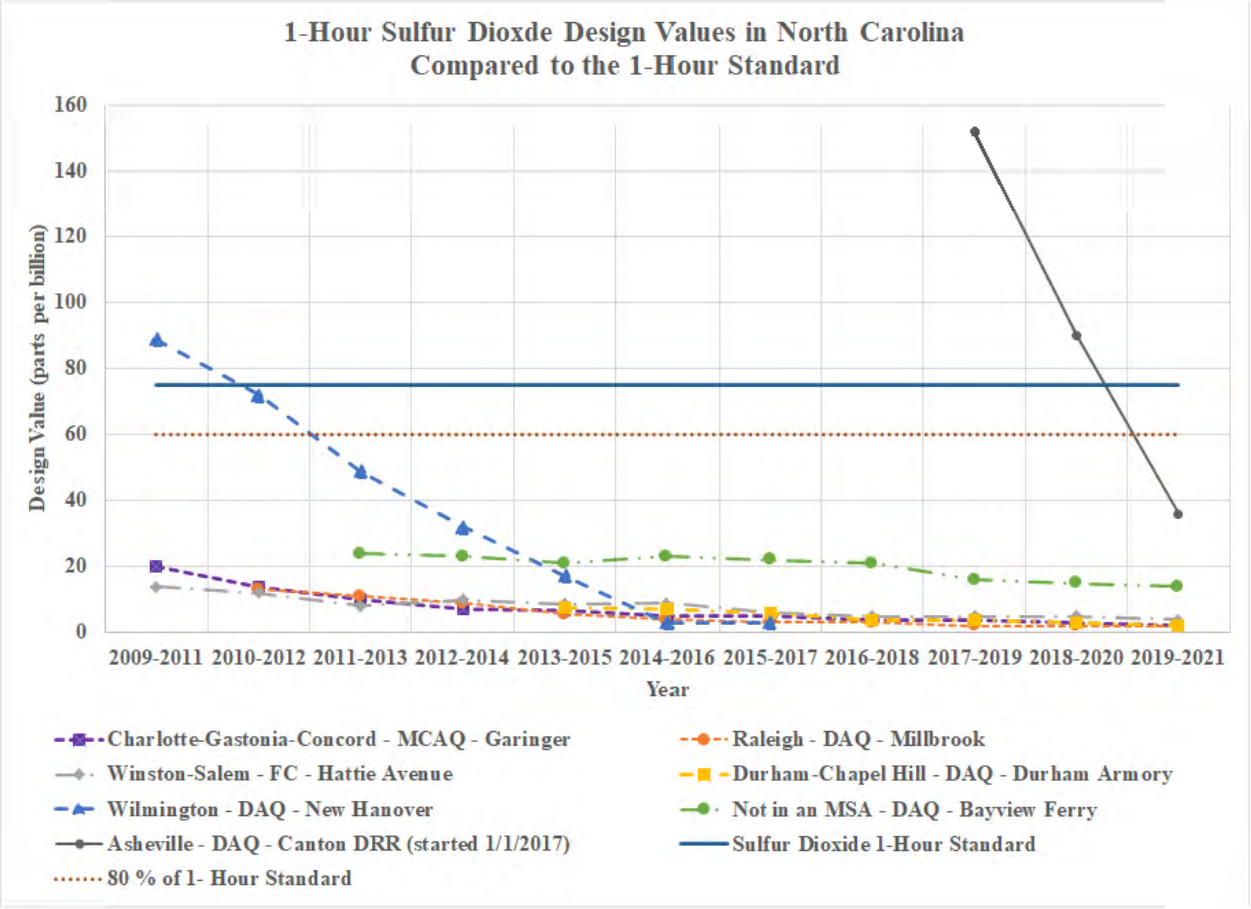


Figure 23. Sulfur dioxide 1-hour design value trends for SLAMS monitors

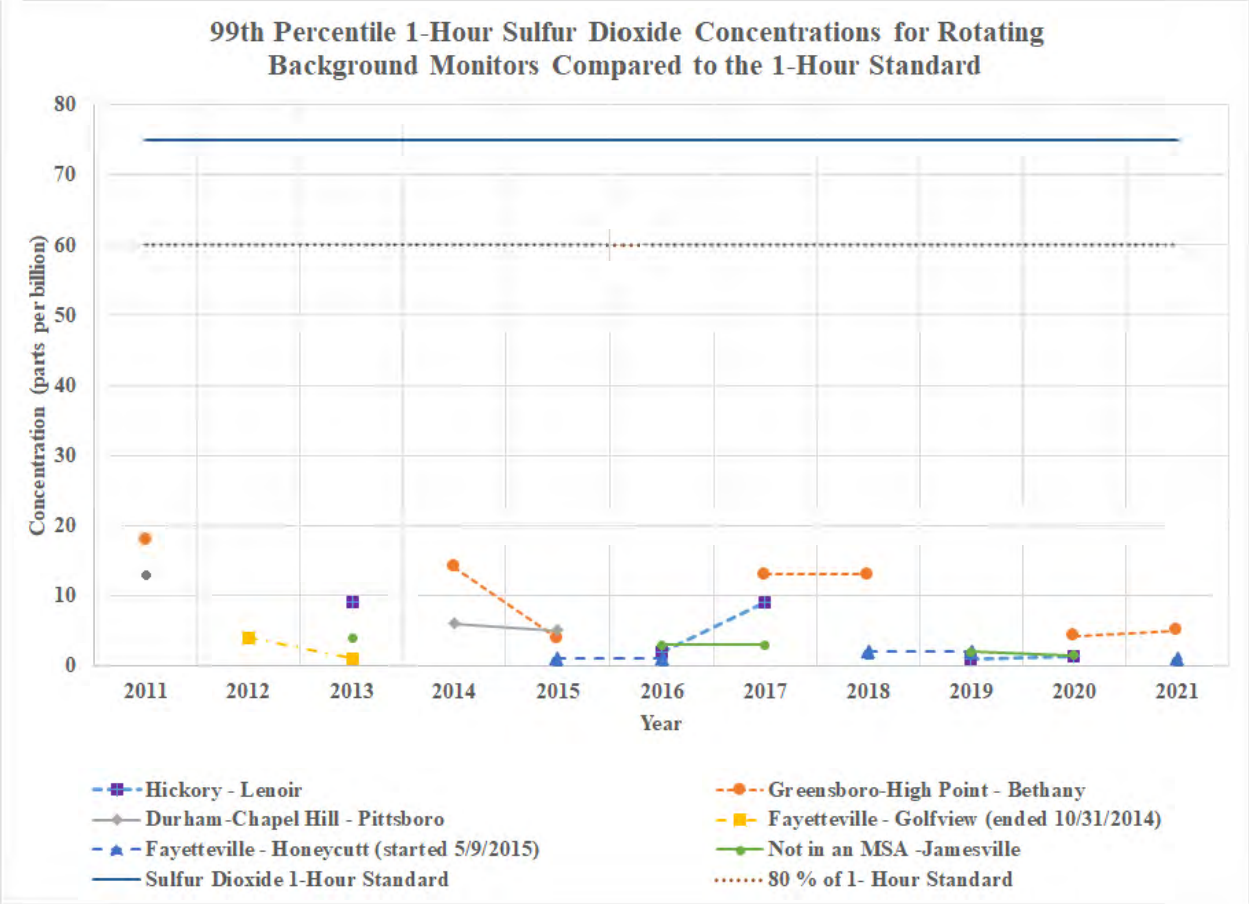


Figure 24. Background Sulfur Dioxide Concentrations

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

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 the 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 SO_2 monitor in Swain County and adding rotating PSD SO_2 monitors at Lenoir in Caldwell County and Bethany in Rockingham County. Assessment of the SO_2 monitoring network indicated that these changes could improve the ability of DAQ to meet its obligation to provide relevant background SO_2 data for PSD modeling. In 2015, the division decided to shut down the rotating PSD SO_2 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 25 shows the relative location of the two sites. The Bayview Ferry site began operating in January 2011.

Figure 25. 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.[10] For the SO_2 monitoring network the EPA developed

[10] 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.

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 SO_2 in tons per year emitted within the CBSA, using an aggregate of the most recent county level emissions data available in the national emissions inventory, or NEI, for each county in each CBSA. The 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 SO_2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO_2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000 a minimum of one SO_2 monitor is required within that CBSA.

The SO_2 monitoring site required because of the calculated PWEI in each CBSA satisfies minimum monitoring requirements if the monitor is sited within the boundaries of the parent CBSA and is one of the following site types as defined in section 1.1.1 of 40 CFR Part 58, Appendix D: population exposure, highest concentration, source impacts, general background, or regional transport. An SO2 monitor at an NCore station may satisfy minimum monitoring requirements if that monitor is located within a CBSA that is required to have one or more PWEI monitors.

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 February 2020, the EPA released updated 2017 point-source emissions and non-road emissions for the 2017 NEI.[11] DAQ calculated new PWEI values for each MSA using a combination of the 2014 and 2017 NEIs and 2021 population estimates.[12] Table 9 presents these PWEI values. Due to lower emissions in the Wilmington area, the Wilmington PWEI monitor is no longer required so DAQ shut down the monitor at the end of 2017. Figure 26 shows the locations of the two required PWEI sulfur dioxide monitoring sites based on the 2014 and 2017 NEI and 2021 population estimates.

[11] 2017 National Emission Inventory, February 2020 Version: The August 2019 point sources have been improved to include rail yards, offshore sources, and other minor updates. The released NEI now also includes nonroad sources (except commercial marine and rail lines), wildfires, and prescribed burning, available online at https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data. Accessed April 25, 2020.

[12] Cumulative Estimates of Resident Population Change and Rankings for Metropolitan Statistical Areas in the United States and Puerto Rico: April 1, 2010 to July 1, 2019, U.S. Census Bureau, Population Division, Released March 2020, available online at https://www.census.gov/newsroom/press-kits/2020/pop-estimates-county-metro.html

Table 9 Population-Weighted Emission Indices Using the 2014/2017 National Emissions Inventory and 2021 Population Estimates for North Carolina Metropolitan Statistical Areas

Metropolitan Statistical Area [a]	SO_2 Emissions, tons [b]						Estimated Population, July 1, 2021 [e]	Population Weighted Emission Index	Number of SO_2 Monitors Required
	2017 Point [b]	2017 Non-Road [b]	2014 On Road [c]	2014 Non-Point [c]	2017 Fire Events [d]	Total			
Asheville	6,706.66	2.30	56.82	196.94	9.70	6,972.42	472,341	3,293.36	0
Burlington	12.97	0.90	17.33	27.85	0.51	59.56	173,877	10.36	0
Charlotte-Gastonia-Concord	5,097.18	13.16	281.37	340.02	62.42	5,794.15	2,701,046	15,650.27	1
Durham Chapel Hill	7,778.44	2.92	65.10	78.66	27.46	7,952.57	654,012	5,201.08	1
Fayetteville	104.93	1.80	50.65	48.87	140.39	346.65	524,588	181.85	0
Goldsboro	77.14	0.60	12.63	19.50	2.19	112.07	116,835	13.09	0
Greensboro-High Point	78.17	4.02	72.33	162.68	7.35	324.55	778,848	252.78	0
Greenville	59.13	0.96	16.22	21.04	0.50	97.85	172,169	16.85	0
Hickory	4,581.36	2.21	40.75	142.63	156.20	4,923.16	366,441	1,804.05	0
Jacksonville	239.75	0.77	17.98	183.31	59.75	501.58	206,160	103.41	0
Myrtle Beach-Conway-North Myrtle Beach	3,705.14	2.75	46.48	604.51	89.38	4,448.27	509,794	2,267.70	0
New Bern	744.57	1.24	13.04	165.66	100.05	1024.56	122,273	125.28	0
Raleigh	264.39	6.64	127.57	113.37	8.73	520.71	1,448,411	754.20	0
Rocky Mount	52.24	0.84	20.23	30.24	7.53	111.09	143,535	15.95	0
Virginia Beach-Norfolk-Newport News	2,113.58	10.12	159.38	2,123.08	34.03	4,440.18	1,803,328	8,007.10	1
Wilmington	177.13	1.45	27.57	350.96	64.73	621.84	291,833	181.47	0
Winston-Salem	5,096.99	3.01	58.86	186.99	10.71	5,356.55	681,438	3,650.16	0

[a] Office of Management and Budget, OMB BULLETIN NO. 18-04: Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas and Combined Statistical Areas and Guidance on Uses of the Delineations of These Areas, Sept. 14, 2018, available on the worldwide web at https://www.whitehouse.gov/wp-content/uploads/2018/09/Bulletin-18-04.pdf, accessed April 25, 2020.

[b] Source: 2017 National Emission Inventory, February 2020 Version: The August 2019 point sources have been improved to include rail yards, offshore sources, and other minor updates. The released NEI now also includes nonroad sources (except commercial marine and rail lines), wildfires, and prescribed burning, available online at https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data. Accessed April 25, 2020.
[c] Source: 2014 National Emission Inventory, Version 2, available online at https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data. Accessed April 25, 2020.
[d] Source: 2017 National Emission Inventory, Additional Summary Data, Events-Fires, April 2020 Version, available online at https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data. Accessed April 26, 2020.
[e] Source: Annual Estimates of the Resident Population for Metropolitan Statistical Areas in the United States and Puerto Rico: April 1, 2020 to July 1, 2021 (CBSA-MET-EST2021-POP), U.S. Census Bureau, Population Division, Released March 2022, available online at https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-metro-and-micro-statistical-areas.html.

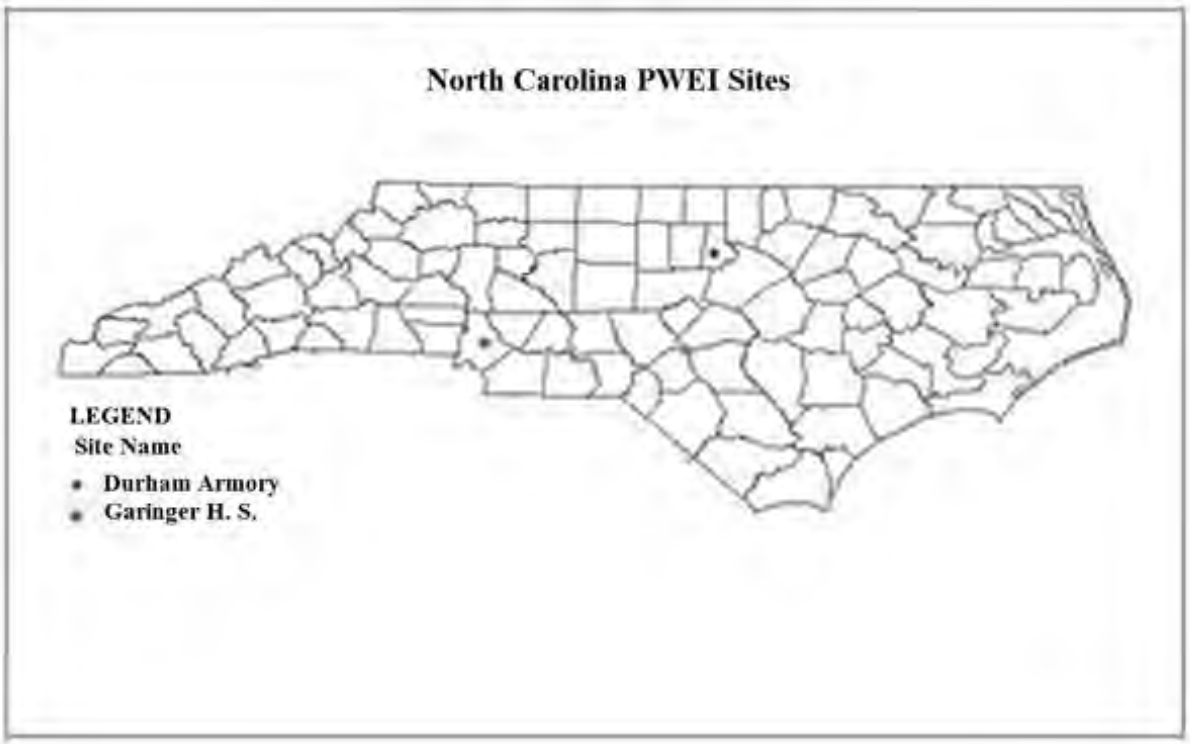


Figure 26. Location of North Carolina PWEI monitors

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 SO_2 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 SO_2 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 used 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 SO_2 monitor at each of these facilities. Specific details for each facility were included in the appendices or an addendum to Volume 1 of the 2016-2017 North Carolina Final Network Monitoring Plan.[13]

Note that:

- Duke Energy operated the monitor at Roxboro and Asheville as part of DAQ's primary quality assurance organization, or PQAO. Duke provided full access to all data on an hourly basis for reporting to AirNow and DAQ's real-time website. Duke quality assured, or QA'd, the data on a daily and monthly basis. DAQ performed additional QA activities, including performance evaluations, technical system audits and annual certification of the data. The EPA granted DAQ and Duke permission to shut down these two monitors in 2020. [14]
- DAQ operates the monitors at Evergreen's Canton mill, PCS Phosphate and CPI Southport. DAQ requested permission to shut down the monitor at CPI Southport in the 2021-2022 network plan (see section II.A.4. Monitoring Changes in the Myrtle Beach-Conway-North Myrtle Beach MSA). The EPA

[13] North Carolina Department of Environmental Quality 2016-2017 Final Network Monitoring Plan, Appendix D. Duke Energy Roxboro Siting Analysis and Additional Site Information, July 1, 2016, available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=13173; Appendix E. Evergreen Packaging Canton Siting Analysis and Additional Site Information, July 1, 2016, available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=13137; Appendix K. PCS Phosphate, Inc. - Aurora Siting Analysis and Additional Site Information, July 1, 2016, available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=13149; Appendix L. CPI Southport Siting Analysis and Additional Site Information, Sep.1, 2016, available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=9275; and Addendum 2 Duke Progress Energy Skyland Siting Analysis and Additional Site Information, Dec, 28, 2016, available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=13136.

[14] United States Environmental Protection Agency, 2020-2021 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p11, available at https://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=13593

granted DAQ permission to shut down this monitor in 2021. [15] DAQ plans to continue operating the monitors at Canton and Bayview Ferry indefinitely.

- DAQ reports the data to AirNow-Tech and EPA's Air Quality System, or AQS, and certifies data for these monitors.

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 the sites including Bayview during the March 2019 EPA triennial technical systems audit.

Table 10 through Table 13 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.

[15] United States Environmental Protection Agency, 2021-2022 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p2, available at https://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=15697

Table 10 The 2022-2023 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 11 The 2022-2023 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 – 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:	Will operate again in 2023	None	Will operate again in 2024

[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 12 The 2022-2023 Sulfur Dioxide Monitoring Network for the Durham-Chapel Hill, Asheville, and Hickory MSAs

AQS Site Id Number:	37-063-0015 [a]	37-087-0013 [b]	37-027-0003 [a]
Site Name:	Durham Armory	Canton DRR	Lenoir
Street Address:	801 Stadium Drive	Pace Street, Evergreen Plant	291 Nuway Circle
City:	Durham	Canton	Lenoir
Latitude:	36.032944	35.534	35.935833
Longitude:	-78.905417	-82.853	-81.530278
MSA, CSA or CBSA represented:	Durham-Chapel Hill	Asheville	Hickory
Monitor Type:	SLAMS	SLAMS	Special purpose
Operating Schedule:	Hourly – every year	Hourly	Hourly – every third year
Statement of Purpose:	PWEI monitor for Durham-Chapel Hill MSA. Compliance w/NAAQS.	Maximum concentration site near the Evergreen Plant. Compliance w/NAAQS.	Industrial expansion monitoring for PSD modeling.
Monitoring Objective:	Population exposure	Source-oriented	General/ background
Scale:	Urban	Middle	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 - PWEI	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	None	Operating in 2022

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

[b] Monitor uses an instrumental pulsed fluorescence method using a Thermo Electron 43i TLE, AQS method code 560.

Table 13 The 2022-2023 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:	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: 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	Operating in 2022

[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 across the river from 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 27, indicate statewide levels of ozone are below the 8-hour standard established by the EPA in 2015.

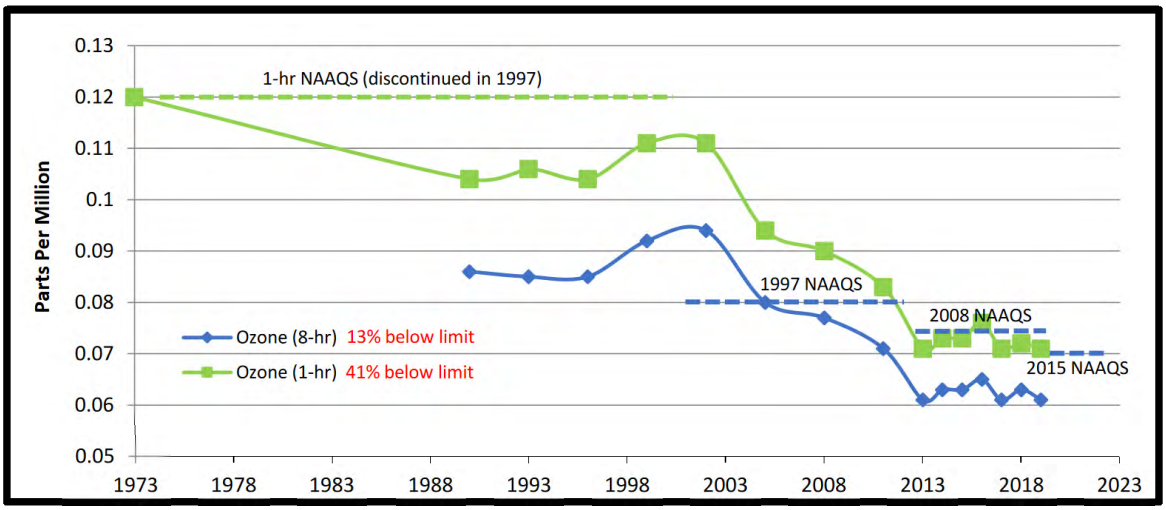


Figure 27. Statewide trends for ozone
(from *Air Quality Trends in North Carolina*, October 2020, located at https://files.nc.gov/ncdeq/Air%20Quality/planning/Air_Quality_Trends_in_North_Carolina_2020.pdf)

A. Analysis of Existing Monitors

1. Analysis of Measured Concentrations Compared to NAAQS

Figure 28 through Figure 33 graphically display the ozone design values for the monitors in the North Carolina state-operated network for at least 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 the 34 monitors operated by the state, local and tribal programs in 2021 have met an 8-hour ozone design value of 0.070 parts per million for the past five years.

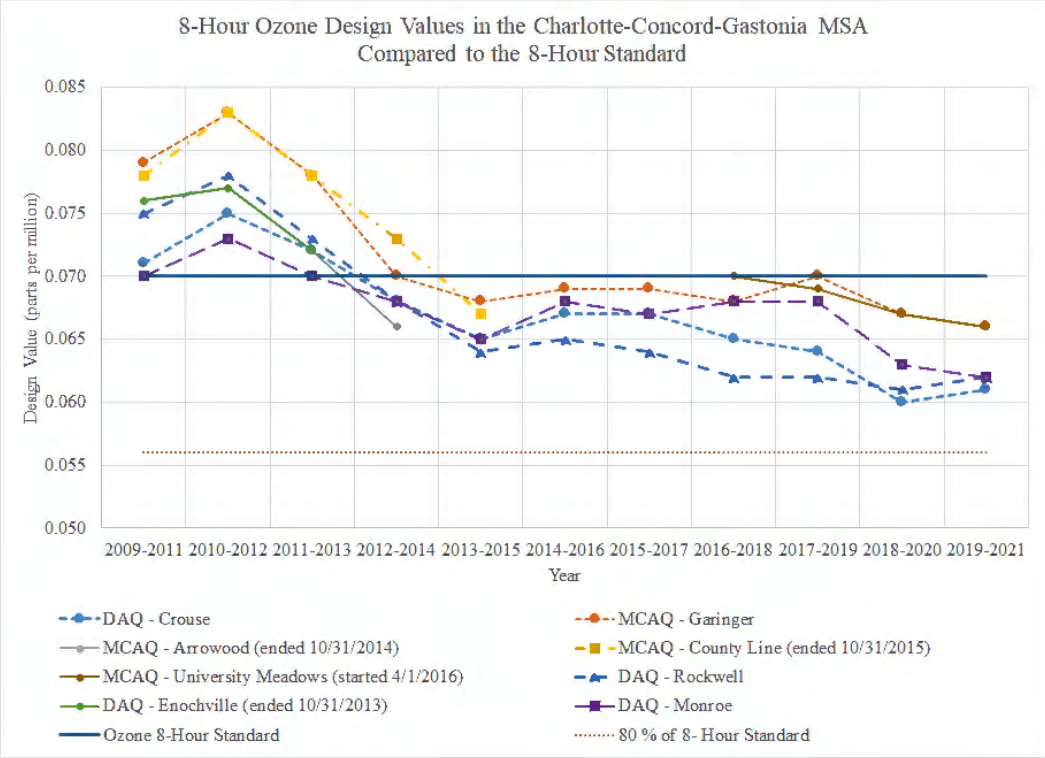


Figure 28. Ozone design values in the Charlotte-Concord-Gastonia MSA

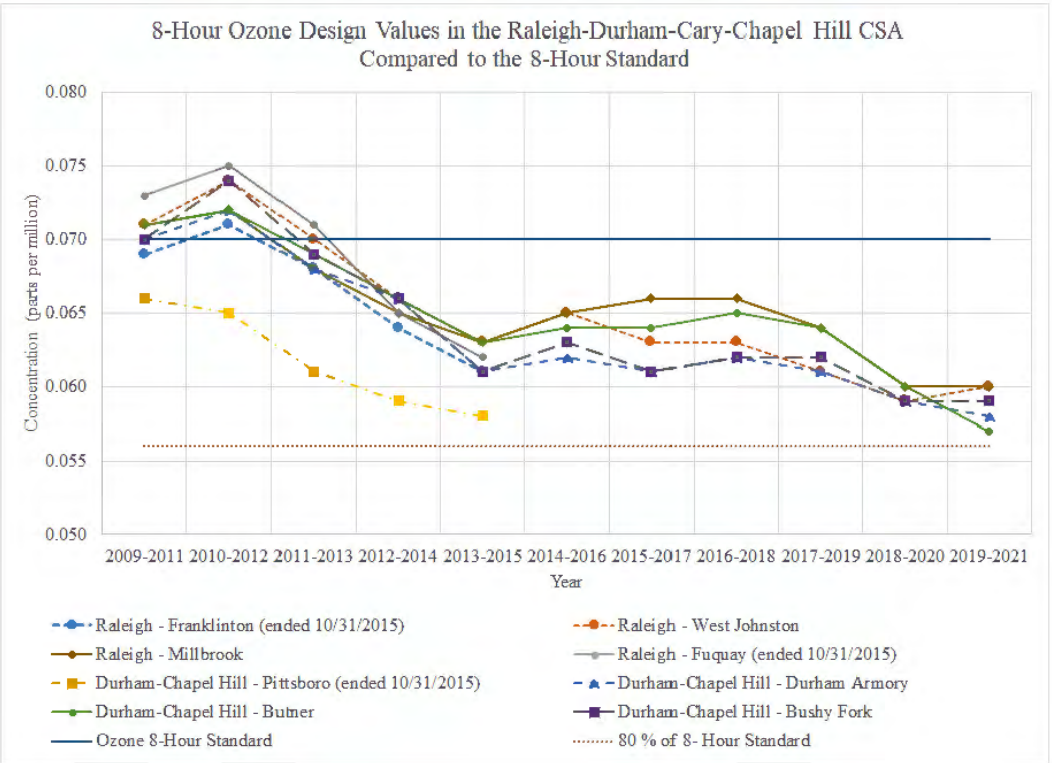


Figure 29. Ozone design values in the Raleigh and Durham-Chapel Hill MSAs

Figure 30. Ozone design values for the Greensboro-High Point and Winston-Salem MSAs

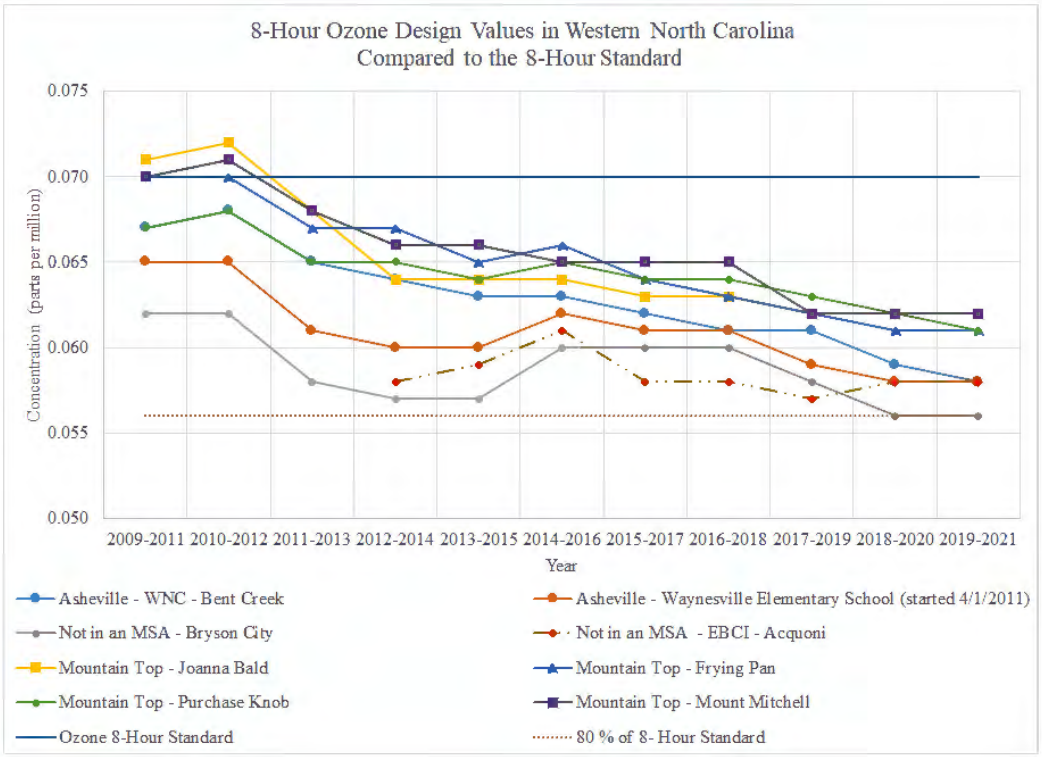


Figure 31. Ozone design values for the Asheville MSA and North Carolina mountains

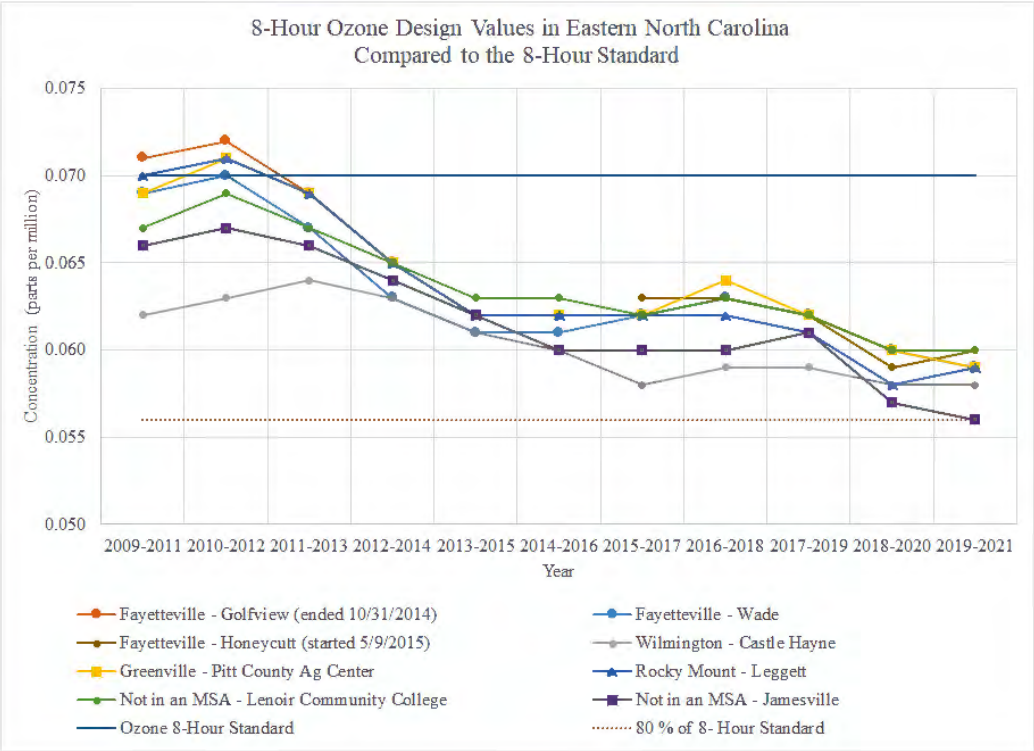


Figure 32. Ozone design values in the Fayetteville, Greenville, Rocky Mount and Wilmington MSAs and at other coastal sites

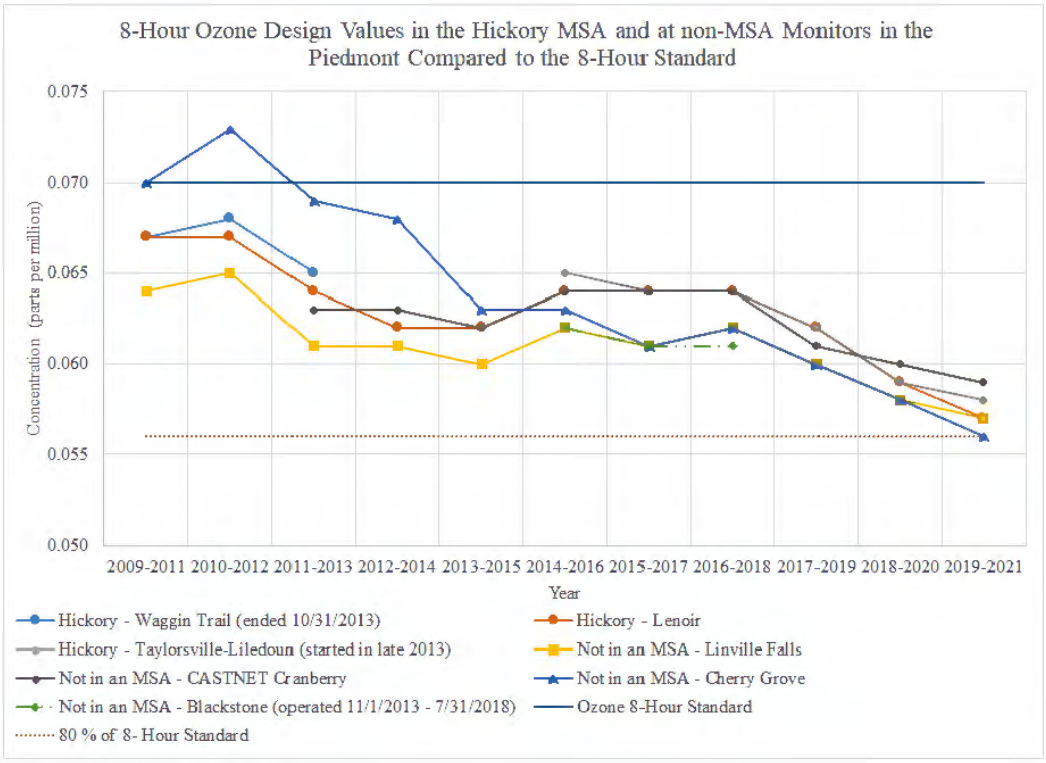


Figure 33. Ozone design values in the Hickory MSA and at other monitors in the piedmont area

None of these 34 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 34. The latest estimated population of the MSA and the most recent ozone 8-hour design value for the area determines the number of required monitors for an area.

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

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

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

Figure 34. Title 40 CFR Part 58, Appendix D, Table D-2

Table 14 provides the 2021-estimated population for the MSAs in North Carolina, the design values for 2019-2021, the number of required monitors based on Appendix D of 40 CFR Part 58 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-Newport 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-Newport News MSA.[16]

[16] See Appendix H. Monitoring Agreement between Virginia and North Carolina for the Virginia Beach-Norfolk-Newport News Metropolitan Statistical Area.

Table 14 Design Values and Required Ozone Monitors for North Carolina Metropolitan Statistical Areas, MSA

MSA	Population Estimate, 2021 [a]	2019-2021 Ozone 8-Hour Design Value (As percent of NAAQS) [b]	Number of Monitors operated in North Carolina	
			Required	Current
Charlotte-Concord- Gastonia	2,701,046	94	2	5 [c]
Virginia Beach-Norfolk-Newport News, VA-NC	1,803,328	83	1	0 [d]
Raleigh	1,448,411	86	2	2
Greensboro-High Point	778,848	89	2	2
Winston-Salem	681,438	91	2	3
Durham-Chapel Hill	654,012	84	1	3
Fayetteville	524,588	86	2	2
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	509,794	84	1	0 [e]
Asheville	472,341	83	1	2
Hickory-Lenoir-Morganton	366,441	83	1	2
Wilmington	291,833	83	0	1
Jacksonville	206,160	Not Available	0	0
Greenville	172,169	84	0	1
Burlington	173,877	Not Available	0	0
Rocky Mount	143,535	84	0	1
New Bern	122,273	Not Available	0	0
Goldsboro	116,835	Not Available	0	0

[a] Source: Annual Estimates of the Resident Population for Metropolitan Statistical Areas in the United States and Puerto Rico: April 1, 2020 to July 1, 2021 (CBSA-MET-EST2021-POP), U.S. Census Bureau, Population Division, Released March 2022, available online at https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-metro-and-micro-statistical-areas.html.

[b] The national ambient air quality standard for an 8-hour period is 0.070 parts per million. 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 Environmental Control and the Catawba Indian Nation each operate a 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 Environmental Control 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.[17] 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 32, Castle Hayne's highest design value during the past five years was 59 ppb. The Castle Hayne monitor has never violated the ozone standard.

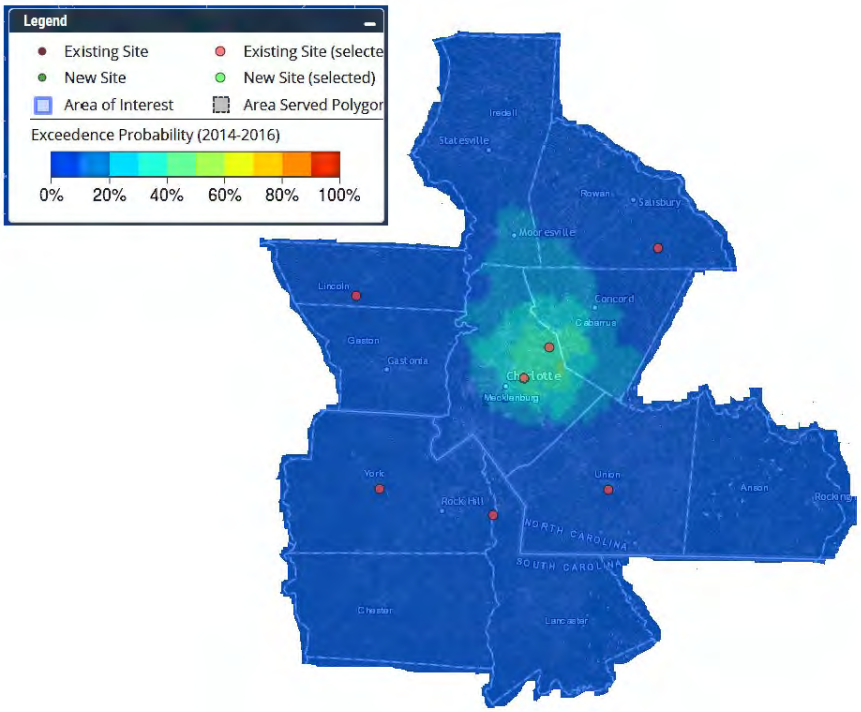
The Coastal Carolina ozone monitor in the Myrtle Beach area collected its first complete ozone design value in 2019. Its design value for 2017-2019 was at 86 percent of the NAAQS, requiring the MSA to have a second ozone monitor according to Appendix D of 40 CFR Part 58 (see Figure 34). Since this design value was the first complete design value for the monitor and the 2017-2019 design value was so close to the 85-percent threshold, DAQ and DHEC are working with EPA Region 4 to determine the appropriate ozone monitoring for this MSA. The 2018-2020 design value was at 84 percent of the NAAQS, but the design value was not valid because the three-year completeness was less than 90 percent. The 2019-2021 design value is also at 84 percent of the NAAQS and is valid. Although the EPA requested that DAQ do an analysis of this MSA in the 2021-2022 network plan to determine where to place a second ozone monitor, the DAQ has decided to delay this analysis until a valid design value above 85 percent of the standard is measured.

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 10 monitors in this evaluation.

Monroe Middle School, 37-179-0003

Monroe Middle School, shown in Figure 35, 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 especially if the ozone standard is lowered later this year.

[17] Memorandum of Agreement (MOA) on Criteria Monitoring Between SCDHEC and NCDENR DAQ, July 1, 2015, Available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=6786.



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 35. Ozone monitors in the Charlotte area

Crouse, 37-109-0004

As shown in Figure 35, 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. Lincoln 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 especially if the ozone standard is lowered later this year.

Rockwell, 37-159-0021

As shown in Figure 35, 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, especially if the ozone standard is lowered later this year. Thus, DAQ plans to retain the Rockwell monitor.

Butner, 37-077-0001

Butner, shown in Figure 36, is in the Durham-Chapel Hill MSA. This monitor is the third monitor in the Durham area. Because it is attaining the standard, not the design value monitor for the MSA and is not required by Appendix D to 40 CFR Part 58, the DAQ may consider shutting this monitor down sometime in the future. As shown in Figure 36, the exceedance probability is low and does not vary throughout this area so the Butner area is probably well represented by the other monitors in the MSA. Eventually, DAQ will need to replace the monitoring shelter and the site will need to be relocated at that time. In addition, the DAQ may decide to deploy these resources in other parts of the state where more need for ozone monitoring exists.

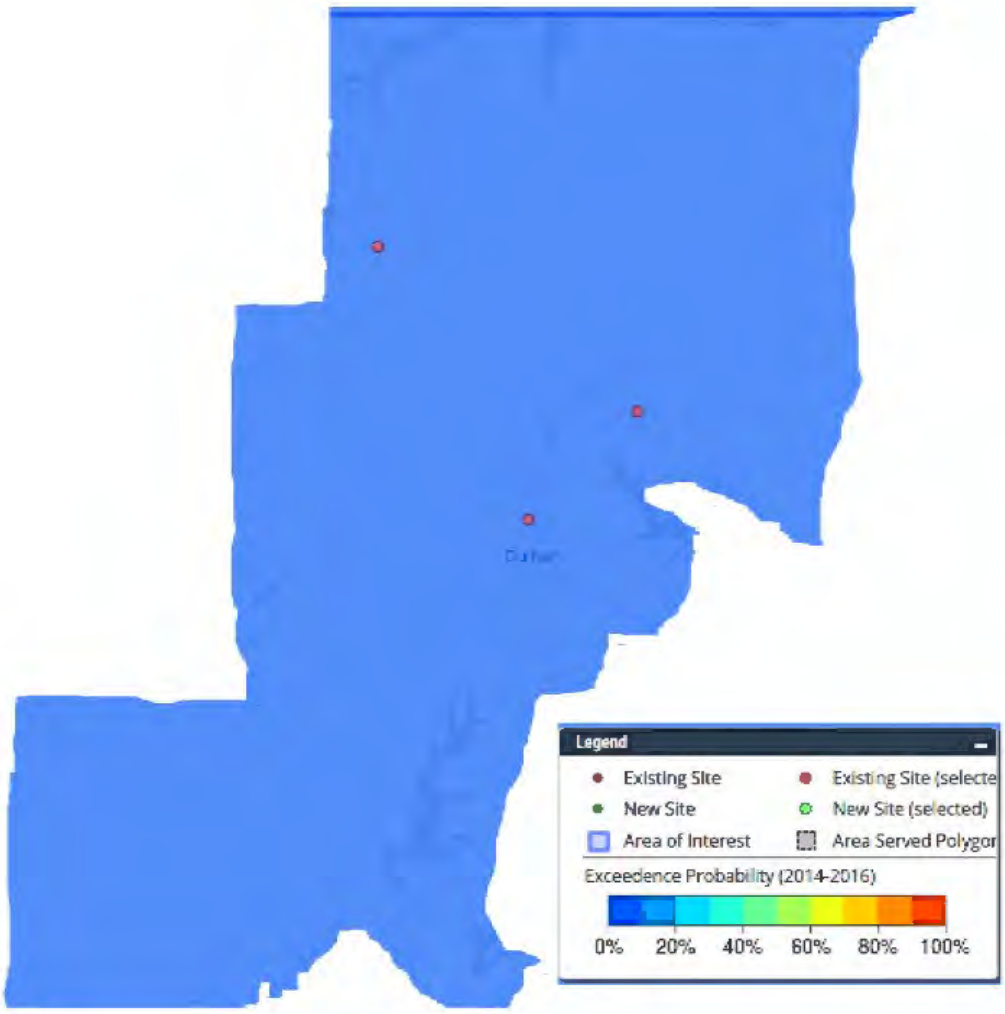


Figure 36. Ozone monitors in the Durham-Chapel Hill area

Durham Armory, 37-063-0015

As shown in Figure 36, the Durham Armory site is in the Durham-Chapel Hill MSA. The ozone concentrations measured at the Durham Armory are sometimes among the highest ozone concentrations measured in the MSA. The Durham Armory site is a multiple pollutant site located in Durham County, one of the fastest growing counties in

the state. DAQ believes the information collected at the Durham Armory monitor is important for providing real-time air quality information to the residents of Durham and for air quality forecasting. The division also views this monitor as being a significant monitor for attainment and maintenance plan development, especially if the ozone standard is lowered later this year. Thus, DAQ plans to retain the Durham Armory monitor.

Waynesville School, 37-087-0008

The Waynesville School monitor is in the Asheville MSA. This monitor is the second monitor in the Asheville area. Because the design value for this MSA is less than 85 percent of the NAAQS and is attaining the standard and usually reports a design value that is less than or equal to the design value reported by the Bent Creek monitor, DAQ could consider shutting this site down. However, since the EPA is reconsidering the ozone standard and the standard could be lowered requiring a second monitor in the MSA, DAQ does not plan to shut this site down at this time as it would be expensive to restart a site if the design value for the MSA goes back up over 85 percent of the standard next year. Thus, DAQ plans to retain the Waynesville School monitor at this time.

Lenoir, 37-027-0003

The Lenoir monitor is in the Hickory-Lenoir-Morganton MSA. This monitor is the second monitor in the Hickory area. Because the design value for this MSA is less than 85 percent of the NAAQS and the Lenoir monitor is attaining the standard and not the design value monitor, DAQ could consider shutting this site down. However, since the EPA is reconsidering the ozone standard and the standard could be lowered requiring a second monitor in the MSA, DAQ does not plan to shut this site down at this time as it would be expensive to restart a site if the design value for the MSA goes back up over 85 percent of the standard next year. Thus, DAQ plans to retain the Lenoir monitor at this time.

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 cement 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 the last decade. Pender County is the 57th fastest-growing county in the nation percentagewise for the last year. [18] Thus, DAQ plans to retain the Castle Hayne monitor.

Pitt County Agricultural Center, 37-147-0006

The Pitt County Agricultural Center monitor is in the Greenville MSA. DAQ believes it is important to maintain a monitor at this location to provide real-time air quality data to the public due to Eastern Carolina University, the medical school and hospital. Thus, DAQ plans to retain the Pitt County Agricultural Center monitor.

[18] Annual Estimates of the Resident Population for Counties in the United States: April 1, 2020 to July 1, 2021 (CO-EST2021-POP), Source: U.S. Census Bureau, Population Division, Release Date: March 2022.

Leggett, 37-065-0099

The Leggett monitor is in the Rocky Mount MSA. The monitor is valuable for forecasting and providing real-time air quality information for the area. Thus, DAQ plans to retain the Leggett monitor.

B. Analysis of Unmonitored Areas with Rapid Population Growth

DAQ also evaluated the state's fastest-growing areas based on 2021 population estimates. Of the 13 fastest-growing counties in North Carolina listed in Table 1, seven of those counties lack an ozone monitor.

1. Brunswick County

Brunswick County, the 30th fastest-growing county in the nation percentagewise during the last year, grew by 4.4 percent between July 1, 2020 and July 1, 2021. It was the 9th fastest-growing county in the North Carolina last year. This county is impacted by growth in the Wilmington, North Carolina and North Myrtle Beach, South Carolina, areas. As of February 2013, Brunswick County is one of two counties making up the Myrtle Beach-Conway-North Myrtle Beach MSA. Before then, this county was part of the Wilmington MSA. The Myrtle Beach-Conway-North Myrtle Beach MSA population exceeds 350,000, requiring an ozone monitor. The 2019 to 2021 design value for the MSA is less than 85% of the standard. As shown in Figure 37, the probability of having one exceedance of the 70-ppb ozone standard is less than 20%. DAQ has a monitoring agreement with the SCDHEC, which in July 2016 established the Coastal Carolina monitoring site in this MSA.

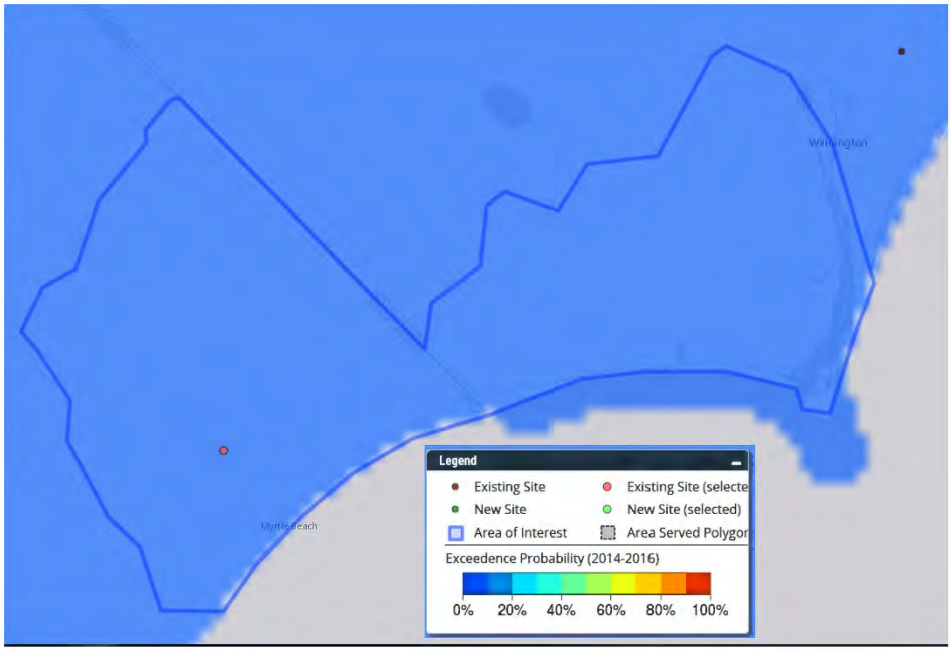


Figure 37. Probability of having one exceedance of the 70-ppb ozone standard in the Myrtle Beach-Conway-North Myrtle Beach MSA

2. Cabarrus County

Cabarrus County, the 97th fastest-growing county in the nation during the past year, percentagewise, grew by 4,213 people or 1.9 percent between July 1, 2020 and July 1, 2021, according to the 2021 census estimates. Cabarrus County is in the Charlotte-Concord-Gastonia MSA. Currently, DAQ is required to operate two monitors in the MSA. As shown in Figure 35, this MSA currently has seven ozone monitors, with one monitor to the south in Union County, one to the north in Rowan County, and two to the southwest in Mecklenburg County. The ozone exceedance probability for Cabarrus County indicates the probability of having one exceedance of the 70-ppb ozone standard in this county is as likely as the probability of having one exceedance at either of the two monitors in Mecklenburg County. Thus, the existing monitors should adequately characterize the air quality here. Currently, DAQ has no plans to monitor ozone here.

3. Camden County

The census bureau estimates Camden County grew by 437 people or 4.2% between July 1, 2020 and July 1, 2021. It is the 39th fastest-growing county in the nation during the past year percentagewise. Camden 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 38, VDEQ currently operates three ozone monitors in this MSA. The ozone exceedance probability for this county indicates the probability of having one exceedance of the 70-ppb ozone standard here is similar to the probability of having an exceedance at one of these three monitors. Thus, the existing monitors should adequately characterize the air quality in this county. DAQ has no plans to monitor ozone here.

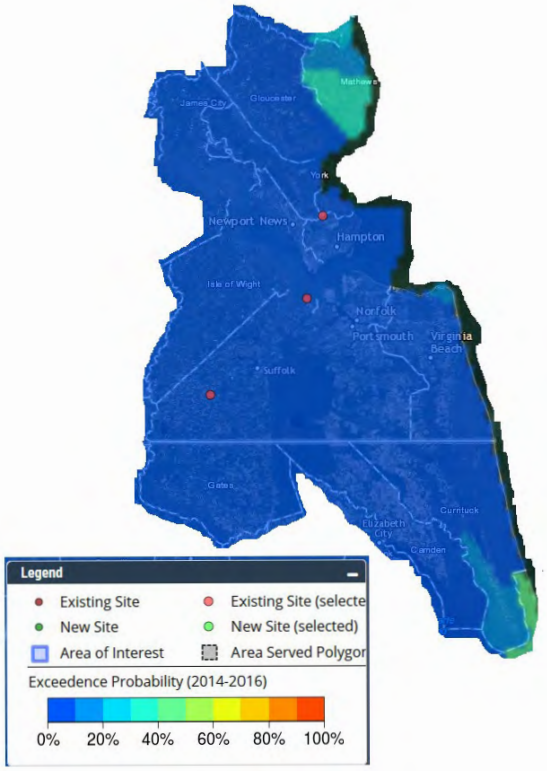


Figure 38. Probability of having one exceedance of the 70-ppb ozone standard in the Virginia Beach-Norfolk-Newport News MSA.

4. Currituck County

The census bureau estimates Currituck County grew by 1,268 people or 4.5 percent between July 1, 2020 and July 1, 2021. It is the 29th fastest-growing county in the nation during the past year percentagewise. Currituck County, like Camden County, is in the Virginia Beach-Norfolk-Newport News MSA as shown in Figure 38. Like Camden County, the ozone exceedance probability for this county indicates the probability of having one exceedance of the 70-ppb ozone standard here is similar to the probability of having an exceedance at one of the three monitors operated by VDEQ. Thus, the existing monitors should adequately characterize the air quality in this county. DAQ has no plans to monitor ozone here.

5. Franklin County

The census bureau estimates Franklin County to have grown by 2,643 people or 3.8 percent between July 1, 2020 and July 1, 2021. As shown in Figure 39, 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 2019-2021 ozone design value for the Raleigh MSA is at 86% of the standard. Based on the probability of exceeding the standard shown in Figure 39, 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.

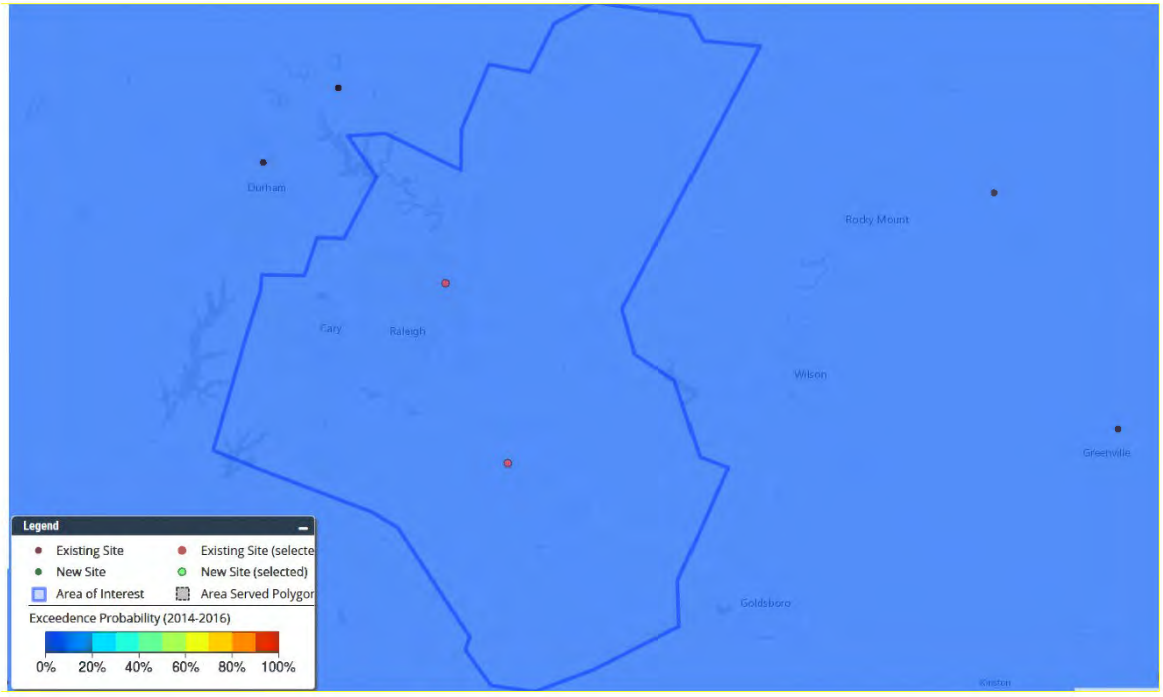


Figure 39. Ozone monitors in the Raleigh MSA

6. Iredell County

Iredell County, the 94th fastest-growing county in the nation during the past year, percentagewise, grew by 4,338 people or 2.3 percent between July 1, 2020 and July 1, 2021, according to the 2021 census estimates. Iredell County is in the Charlotte-Concord-

Gastonia MSA. Currently, DAQ is required to operate two monitors in the MSA. As shown in Figure 35, this MSA currently has seven ozone monitors, with one monitor to the southwest in Lincoln County, one to the southeast in Rowan County, and two to the south in Mecklenburg County. The ozone exceedance probability for Iredell County indicates the probability of having one exceedance of the 70-ppb ozone standard in this county is as likely or less likely as the probability of having one exceedance at either of the two monitors in Mecklenburg County. Thus, the existing monitors should adequately characterize the air quality here. Currently, DAQ has no plans to monitor ozone here.

7. Pender County

Pender County grew by 2,252 people or 3.7% between July 1, 2020, and July 1, 2021, and is the 57th fastest-growing county in the nation during the last year, 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 83% of the NAAQS. The ozone exceedance probability for Pender County shown in Figure 40 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.

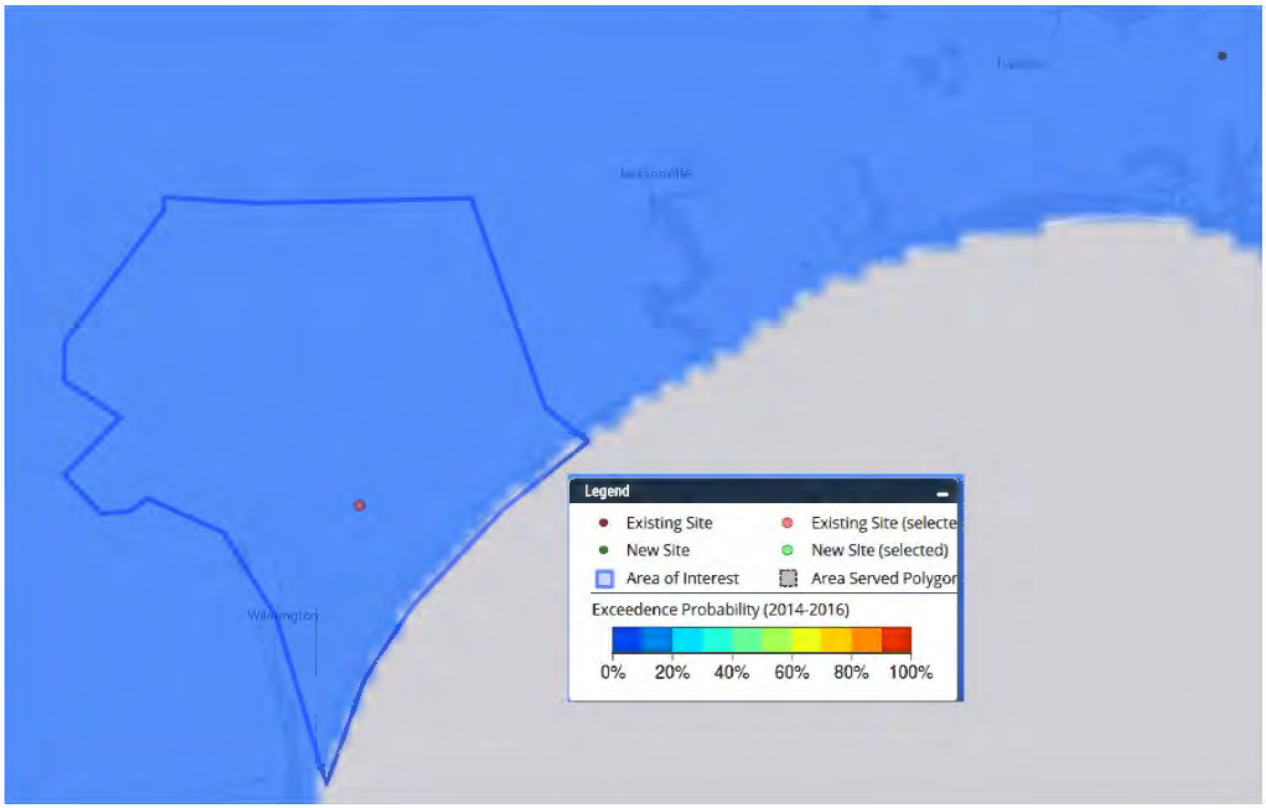


Figure 40. Probability of having one exceedance of the 70-ppb ozone standard in the Wilmington MSA

C. Changes to Existing Monitors

As described in Section II. Summary of Proposed Changes, DAQ replaced shelters at Wade and Lenoir. When funds become available, DAQ plans to replace shelters at Butner (see Replacement of Monitoring Shelter and Possible Relocation of the Butner site in the Durham MSA), and Bethany (see Replacement of Monitoring Shelter and Possible Relocation of the Bethany site in the Greensboro MSA). At the end of the 2019 ozone season, DAQ also added Nafion dryers to the ozone sampling probes at Linville Falls and Monroe. DAQ used the dryers at these sites during the 2020 and 2021 ozone seasons and discontinued their use in 2022.

D. DAQ Recommendations

The division recommends:

- Maintaining the current size of the network and all the currently operating sites until after the reconsideration of the ozone standard;
- Not establishing any new ozone sites in 2022 or 2023;
- Evaluating the Butner site to determine if it should be maintained long-term before the site is relocated and a new shelter is installed; and
- When resources allow, conducting a study around the perimeter of Mecklenburg County using appropriate ozone sensors to determine the presence of any areas with high ozone concentrations to inform any decisions to realign the Charlotte-Concord-Gastonia MSA ozone network.

E. Network Description

Figure 41 shows the locations of the ozone monitors operating in 2022. Table 15 through Table 26 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.

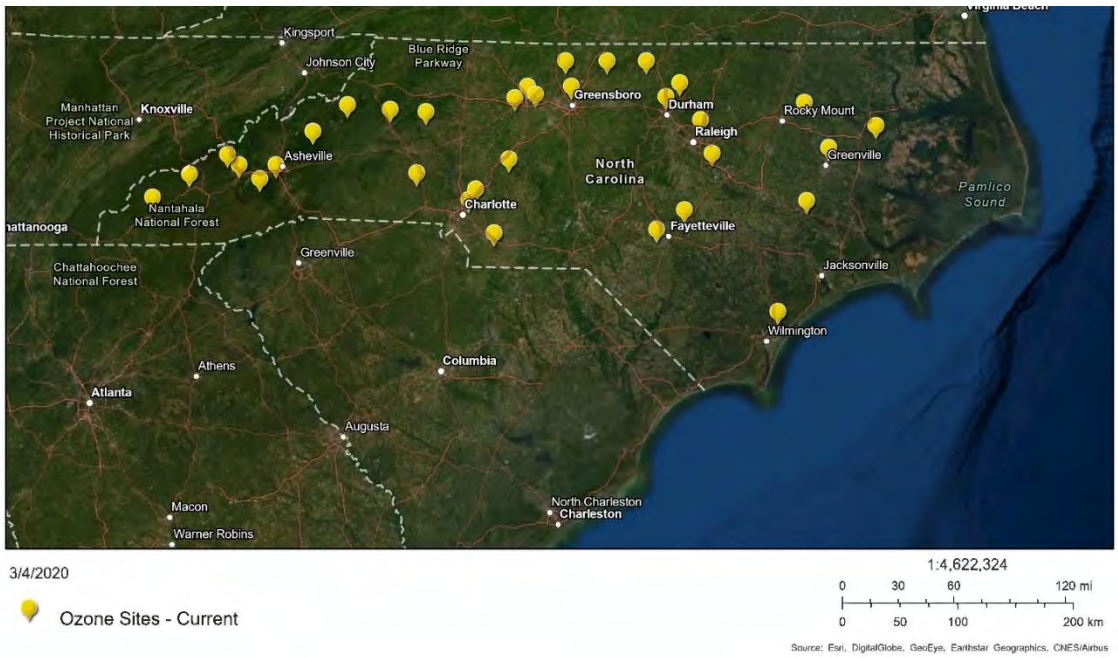


Figure 41. Location of 2022 ozone monitoring stations

Table 15 The Ozone Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

llAQS 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 3/1 to 10/31	Hourly Year round	Hourly 3/1 to 10/31	Hourly Year round	Hourly 3/1 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

Table 15 The Ozone Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None	Site may relocate after 12/31/2023	Nafion dryer removed in 2022

[a] All monitors use an instrumental ultraviolet 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 16 The 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 3/1 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 ultraviolet method, Air Quality System, AQS, method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.

Table 17 The 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 3/1 to 10/31	Hourly 3/1 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
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	Shelter will be replaced; site may be relocated to accommodate shelter

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

Table 18 The 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 ultraviolet method, 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 19 The Ozone Monitoring Network for the Durham-Chapel Hill MSA [a]

AQS Site Id Number:	37-063-0015	37-077-0001	37-145-0003
Site Name:	Durham Armory	Butner	Bushy Fork
Street Address:	801 Stadium Drive	800 Central Ave	7901 Burlington Road
City:	Durham	Butner	Hurdle Mills
Latitude:	36.032944	36.141111	36.306965
Longitude:	-78.905417	-78.768056	-79.091970
MSA, CSA or CBSA represented:	Durham-Chapel Hill	Not in an MSA	Durham-Chapel Hill
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:	Maximum concentration site in the Durham-Chapel Hill MSA. Real-time AQI reporting for the Durham-Chapel Hill MSA. 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.	Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Highest concentration	General/background
Scale:	Neighborhood	Urban	Urban
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58, Appendix D:	Yes	Yes	Yes – Not required
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	Shelter will be replaced; site may be relocated	None

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

Table 20 The 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
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 ultraviolet 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 21. The Ozone Monitoring Network for the Fayetteville MSA [a]

AQS Site Id Number:	37-051-0011	37-051-0010
Site Name:	Wade School	Honeycutt E.S.
Street Address:	5721 Smithfield Road	4665 Lakewood Drive
City:	Wade	Fayetteville
Latitude:	35.1487	35.00
Longitude:	-78.7068	-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:	Site was relocated from Wade and started on 3/1/2022	None

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

Table 22 The 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 was replaced in 2021

[a] All monitors use an instrumental ultraviolet method, AQS method code 047. All monitors use the EPA equivalent method designation EQOA-0880-047.

Table 23 The 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	Population exposure	General/ background
Scale:	Neighborhood	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: 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 was replaced in 2020	None	None

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

Table 24 The 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 the USFS. Located in a Class I area. Provides ozone data for PSD modeling for industrial expansion. Provides AQI data for recreational users. Modeling. Compliance w/NAAQS.	Operated in cooperation with the USFS. Located in a Class I area and collocated at an IMPROVE site. Provides ozone data for PSD modeling for industrial expansion. Provides AQI data for recreational users. Modeling. Compliance w/NAAQS.	Operated in cooperation with the NPS. 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.	Provides ozone data for PSD modeling for industrial expansion. Provides AQI data for recreational users. Modeling. Compliance w/NAAQS.
Monitoring Objective:	Welfare related impacts/ general/ background/ 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

Table 24 The 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
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:	Yes – not required	Yes – not required	Yes – not required	Yes – not required
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 ultraviolet 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 25 The 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
Site Name:	Linville Falls	Cherry Grove
Street Address:	100 Linville Falls Road	7074 Cherry Grove Road
City:	Linville Falls	Reidsville
Latitude:	35.972222	36.307033
Longitude:	-81.933056	-79.467417
MSA, CSA or CBSA represented:	Not in an MSA	Not in an MSA
Monitor Type:	Other	Other
Operating Schedule:	Hourly 4/1 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
Monitoring Objective:	Welfare related impacts/ general/ background	General/ background
Scale:	Urban	Urban
Suitable for Comparison to NAAQS:	Yes	Yes
Meets Requirements of Part 58, Appendix A:	Yes	Yes
Meets Requirements of Part 58, Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047
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:	Nafion dryer removed in 2022	None

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

Table 26 The Ozone Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA, Part 2 [a]

AQS Site Id Number:	37-107-0004	37-117-0001	37-173-0002
Site Name:	Lenoir Community College	Jamesville	Bryson City
Street Address:	231 Highway 58 S	1210 Hayes Street	Parks & Rec Building, Center Street
City:	Kinston	Jamesville	Bryson City
Latitude:	35.231459	35.810690	35.434767
Longitude:	-77.568792	-76.897820	-83.442133
MSA, CSA or CBSA represented:	Not in an MSA	Not in an MSA	Not in an MSA
Monitor Type:	Other	SLAMS	SLAMS
Operating Schedule:	Hourly 3/1 to 10/31	Hourly 3/1 to 10/31	Hourly 3/1 to 10/31
Statement of Purpose:	Compliance w/NAAQS.	Compliance w/NAAQS.	Regional transport and general background site. Low elevation, i.e. valley, mountain site on the NC side of the GSMNP. Modeling. Forecasting. Compliance w/NAAQS.
Monitoring Objective:	General/ background	General/ background	General/ background
Scale:	Neighborhood	Regional	Neighborhood
Suitable for Comparison to NAAQS:	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix C:	Yes: EQOA-0880-047	Yes: EQOA-0880-047	Yes: EQOA-0880-047
Meets Requirements of Part 58, Appendix D:	Yes – not required	Yes – not required	Yes – no required
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None

[a] All monitors use an instrumental ultraviolet 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 PM_{10}

The North Carolina Division of Air Quality, or DAQ, monitors for particles of 10 micrometers or less aerodynamic diameter, or PM_{10}, in North Carolina at four permanent sites (Raleigh, Greensboro, Durham and Fayetteville) and six rotating sites. The local programs operate PM_{10} monitors at three sites. In addition, the Virginia Department of Environmental Quality, or VDEQ, operates PM_{10} monitors at two sites in the Virginia Beach-Norfolk-Newport News Metropolitan Statistical area, or MSA. Analysts and modelers use these data to determine human health effect exposures in MSAs with over 500,000 people and to collect background levels for prevention of significant deterioration, also known as PSD. DAQ also uses PM_{10} as a surrogate for PSD modeling for the state standard for total suspended particulates, also known as TSP. Data from previous years, as shown in Figure 42, indicate statewide levels of PM_{10} are well below the 24-hour standard.

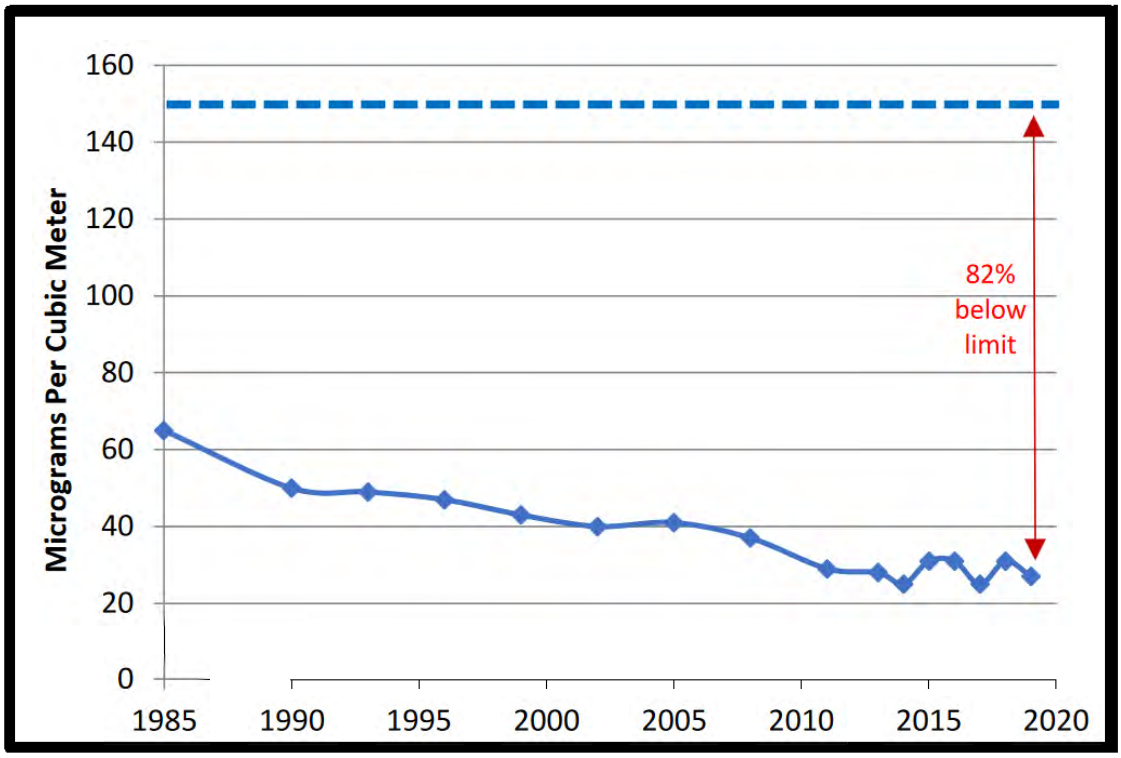


Figure 42. Statewide trends for PM_{10}
(from *Air Quality Trends in North Carolina*, October 2020, located at https://files.nc.gov/ncdeq/Air%20Quality/planning/Air_Quality_Trends_in_North_Carolina_2020.pdf)

Figure 43 through Figure 45 provide the highest PM_{10} concentrations measured in North Carolina for the past 11 years. The high values in 2020 were due to the Saharan dust storm in June. The monitoring regulations currently require a monitor to be attaining the national ambient air quality standards, NAAQS, for the past five years before the operating agency can shut down the monitor. All PM_{10} monitors operated in North Carolina in the last five years have attained the NAAQS and have reported values less than 80 percent of the standard. Thus, the only monitors the EPA requires the state to operate are the ones required to meet the minimum monitoring

requirements in 40 CFR Part 58, Appendix D, Table D-4 provided in Figure 46 and those used to provide background data for PSD modeling.

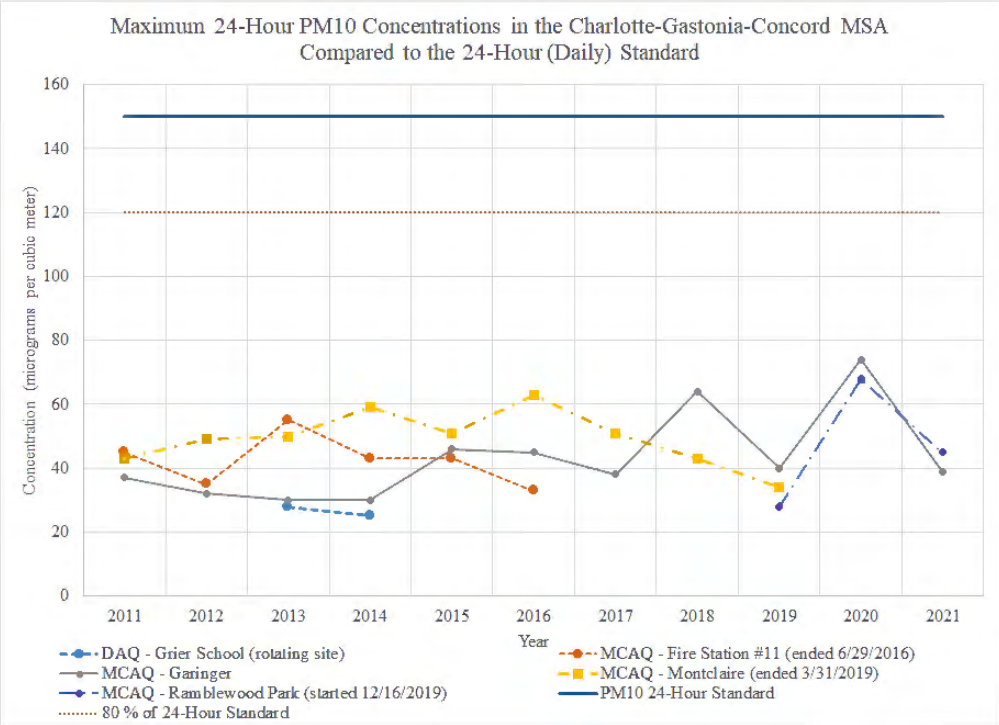


Figure 43. Maximum 24-hour PM_{10} concentration in the Charlotte-Concord-Gastonia MSA

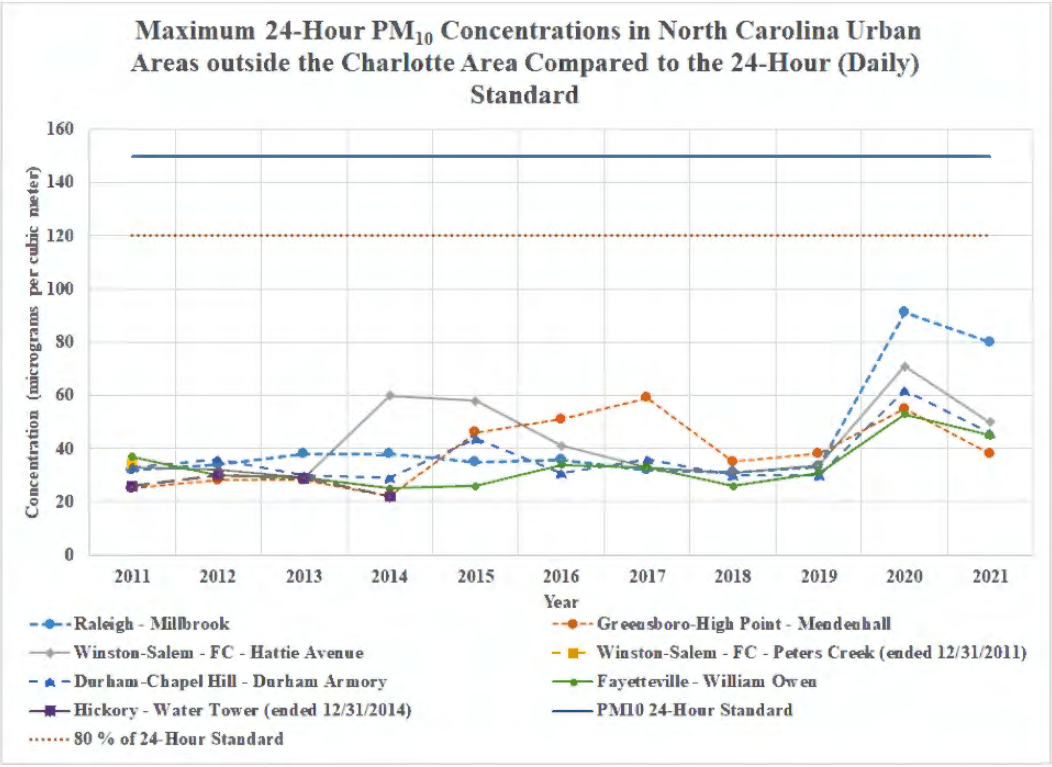


Figure 44. Maximum 24-hour PM_{10} concentrations in North Carolina urban areas

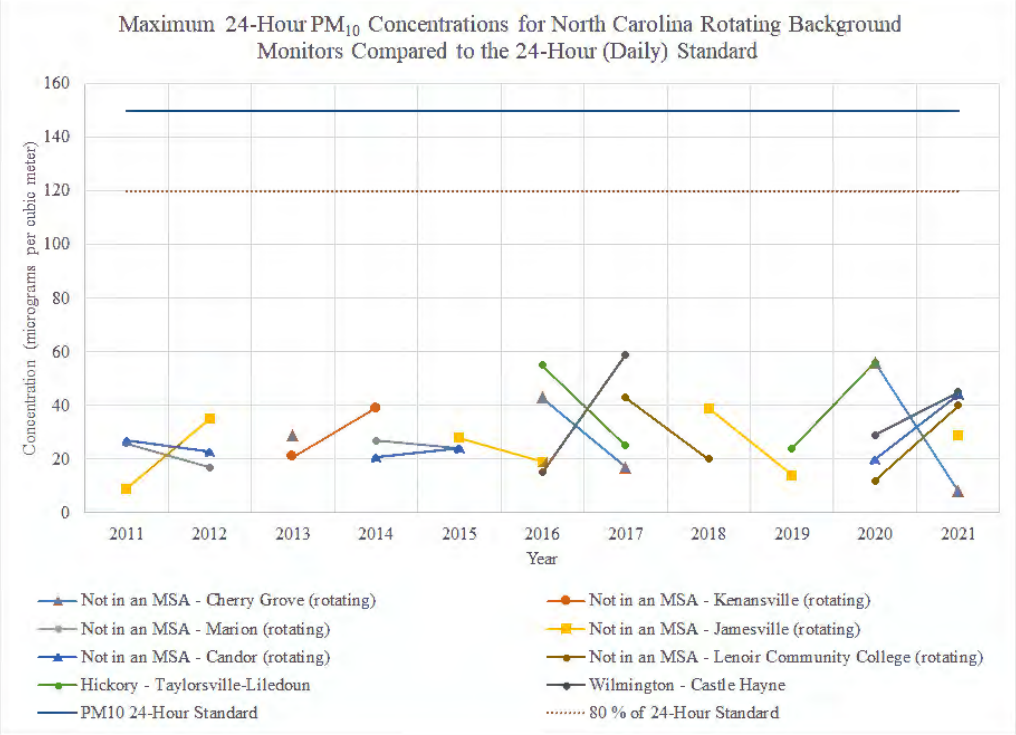


Figure 45. Maximum PM_{10} concentrations for rotating background monitors in North Carolina

TABLE D–4 OF APPENDIX D TO PART 58. PM_{10} MINIMUM MONITORING REQUIREMENTS (NUMBER OF STATIONS PER MSA) [1]

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

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

Figure 46. Table D-4 from 40 CFR Part 58, Appendix D

The estimated 2021 population of the MSA and the most recent PM_{10} ambient concentration values for the area determines the number of required monitors for an area. Table 27 provides the 2021 estimated total population for the MSAs in North Carolina, the maximum ambient daily concentration values as percentage of the NAAQS for 2021, 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-Newport News, the Myrtle Beach-Conway-North Myrtle Beach, and the Raleigh MSA. DAQ has a written agreement with the VDEQ, Office of Air Quality Monitoring, that VDEQ will maintain the minimum required number of monitors for the Virginia Beach-

Norfolk-Newport News MSA.[19] DAQ also has a monitoring agreement with the South Carolina Department of Health and Environmental Control.[20] DAQ will work with them to establish appropriate PM_{10} monitoring in the Myrtle Beach-Conway-North Myrtle Beach MSA.

Table 27 Ambient Concentrations and Required Number of PM_{10} Monitors for North Carolina Metropolitan Statistical Areas, MSA

MSA	Population Estimate, 2021 [a]	2021 PM_{10} 24-Hour Maximum Ambient Concentration, as percent of NAAQS	Number of Monitors operated in North Carolina	
			Required [b]	Current
Charlotte-Concord-Gastonia	2,701,046	30	2-4	2
Virginia Beach-Norfolk-Newport News, VA-NC	1,803,328	31	2-4	0 [c]
Raleigh	1,448,411	53	2-4	1 [d]
Greensboro-High Point	778,848	25	1-2	1
Winston-Salem	681,438	33	1-2	1
Durham-Chapel Hill	654,012	31	1-2	1
Fayetteville	524,588	30	1-2	1
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	509,794	Not Available	1-2	0
Asheville	472,341	20 [e]	0-1	0
Hickory	366,441	37 [f]	0-1	rotating
Wilmington	291,833	30	0-1	rotating
Jacksonville	206,160	25 [g]	0	0
Burlington	173,877	Not Available	0	0
Greenville	172,169	Not Available	0	0
Rocky Mount	143,535	30 [h]	0	0
New Bern	122,273	Not Available	0	0
Goldsboro	116,835	21 [g]	0	0

[a] Source: Annual Estimates of the Resident Population for Metropolitan Statistical Areas in the United States and Puerto Rico: April 1, 2020 to July 1, 2021 (CBSA-MET-EST2021-POP), U.S. Census Bureau, Population Division, Released March 2022, available online at https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-metro-and-micro-statistical-areas.html.
[b] 40 CFR Part 58, Appendix D, Table D-4
[c] The Virginia Department of Environment operates two PM_{10} monitors
[d] DAQ received a waiver in 2008, renewed in 2015 and 2020, for the second required PM_{10} monitor
[e] PM_{10} 24-hour maximum ambient concentration is from 2009
[f] PM_{10} 24-hour maximum ambient concentration is from the rotating monitor in Taylorsville which collected data for 49 percent of the days in 2020.
[g] PM_{10} 24-hour maximum ambient concentration is from 2007
[h] PM_{10} 24-hour maximum ambient concentration is from 2006

[19] See Appendix H. Monitoring Agreement between Virginia and North Carolina for the Virginia Beach-Norfolk-Newport News Metropolitan Statistical Area.
[20] Memorandum of Agreement (MOA) on Criteria Monitoring Between SCDHEC and NCDENR DAQ, July 1, 2015, Available on the worldwide web at http://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=6786.

DAQ received a waiver from the EPA for the second required monitor in the Raleigh MSA. The EPA granted the waiver because PM_{10} values recorded in the Raleigh MSA have been less than 50 percent of the NAAQS except when exceptional events on June 12, 2008 (smoke from a fire), and June 28, 2020 (dust from Africa), or asphalt paving of the next-door parking lot on April 8, 2021, affected the monitor at the Millbrook School site.

DAQ shut down the PM_{10} 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 percent of the standard and trending downward, and the population in Hickory is less than 500,000.

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

- Castle Hayne, Candor and LCC, which operated from October 1, 2020, to November 2, 2021;
- Jamesville, which is operating from July 1, 2021, through June 30, 2022;
- Cherry Grove, which operated in 2020 and will operate again in 2023; and
- Taylorsville Liledoun, which operated from July 2019 through June 2020 and will resume operating in 2022.

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

The monitoring regulations promulgated in 2006 include a method for measuring coarse particles. The coarse particle monitoring method measures coarse particles by the difference between the measured PM_{10} concentration and the fine particle concentration measured using the same sampling and analytical method. DAQ purchased two coarse particle BAM monitors and two coarse-particle optical monitors. After May 5, 2021, DAQ will shut down the coarse particle BAM monitor at Millbrook and only operate the coarse particle optical monitor at that site. Currently, DAQ is collecting coarse particle data at three sites, Millbrook (37-183-0014), Durham Armory (37-063-0015) and Castle Hayne (37-129-0002), a rotating PM_{10} site. By mid-January 2016, the division had converted all manual PM_{10} high volume samplers to continuous PM_{10} low volume samplers.

Figure 47 provides the locations of the SLAMS and rotating PM_{10}-monitoring sites. In addition, Figure 47 shows the sites that measure $PM_{10-2.5}$ also known as coarse particles. The three Interagency Monitoring of Protected Visual Environments (IMPROVE) sites in North Carolina, at Swanquarter, Frying Pan Mountain and Linville Falls, not shown on the map, also measure $PM_{10-2.5}$. Table 28 through Table 32 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.

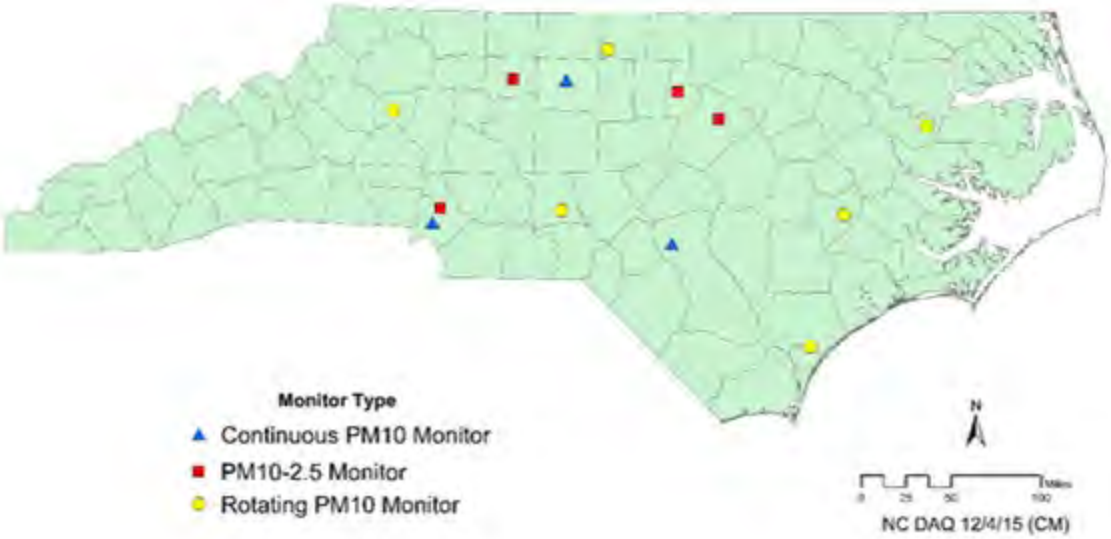


Figure 47. 2022-2023 PM_{10} Monitor Locations

Table 28 PM_{10} Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041 [b]	371190047 [b]
Site Name:	Garinger High School	Ramblewood Park
Street Address:	1130 Eastway Drive	10200 Nations Ford Road
City:	Charlotte	Charlotte
Latitude:	35.2401	35.12395
Longitude:	-80.7857	-80.90758
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
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
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
Meets Requirements of Part 58, Appendix E:	Yes	Yes
Proposal to Move or Change:	None	None

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

Table 29 PM_{10} Monitoring Network for the Raleigh-Durham-Cary CSA [a]

AQS Site Id Number:	37-063-0015	37-183-0014
Site Name:	Durham Armory	Millbrook
Street Address:	801 Stadium Drive	3801 Spring Forest Road
City:	Durham	Raleigh
Latitude:	36.032944	35.8561
Longitude:	-78.905417	-78.5742
MSA, CSA or CBSA represented:	Durham-Chapel Hill	Raleigh
Monitor Type:	SLAMS	SLAMS
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-0516-239
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] The Durham Armory monitor is a Met One 1020 beta attenuation monitor, Air Quality System, AQS, method code 122. It uses the EPA equivalent method designation EQPM-0798-122. The Millbrook monitor is a Teledyne T640X monitor. The Teledyne API T640X operates at 16.67 LPM, AQS Method Code 239, U.S. EPA equivalent method designation EQPM-0516-239. Both monitors are also used to calculate and report $PM_{10-2.5}$.

Table 30 The PM_{10} Monitoring Network for the Greensboro-Winston-Salem-High Point CSA

AQS Site Id Number:	37-067-0022[a]	37-081-0013[b]
Site Name:	Hattie Avenue	Mendenhall School
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. This monitor also reports $PM_{10-2.5}$.

[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 31 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, but only operated for one year at a time	Yes, but only operated for one year at a time
Meets Requirements of Part 58, Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix C:	EQPM-0798-122	EQPM-0798-122	EQPM-0516-239
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 ended June 30, 2020, and will resume in 2022	Monitoring resumed in 2020 and may continue indefinitely

[a] The William Owen and Taylorsville Liledoun 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. The Castle Hayne monitor is a Teledyne T640X monitor. The Teledyne API T640X operates at 16.67 LPM, AQS Method Code 239, U.S. EPA equivalent method designation EQPM-0516-239. This monitor is also used to calculate and report $PM_{10-2.5}$.

Table 32 The PM_{10} Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA [a]

AQS Site Id Number:	37-033-0001	37-107-0004	37-117-0001	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	126 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 but in the Kinston, NC Micropolitan Statistical Area	Not in an MSA	Not in an MSA
Monitor Type:	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
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:	General/ background	General/ background	General/ background	General/ background; welfare related impacts
Scale:	Urban	Urban	Urban	Regional
Suitable for Comparison to NAAQS:	Yes, but only operated for one year at a time	Yes, but only operated for one year at a time	Yes, but only operated for one year at a time	Yes, but only operated for one year at a time
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

Table 32 The PM_{10} Monitoring Network for the Valley, Piedmont and Coastal Sites that are not in an MSA [a]

AQS Site Id Number:	37-033-0001	37-107-0004	37-117-0001	37-123-0001
Site Name:	Cherry Grove	Lenoir Community College	Jamesville	Candor
Meets Part 58, Appendix E Requirements:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Monitoring ended 12/31/2020 and will resume in 2023	Monitoring occurred from Oct. 1, 2020, until Nov. 2, 2021	Monitoring resumed July 1, 2021, and will end in 2022	Monitoring occurred from Oct. 1, 2020, until Nov. 2, 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 15 FRM or FEM fine particle monitoring sites, the local programs operate six, and a tribal program operates one. 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 48, indicate statewide levels of fine particles are below the 24-hour and annual standards established by the EPA.

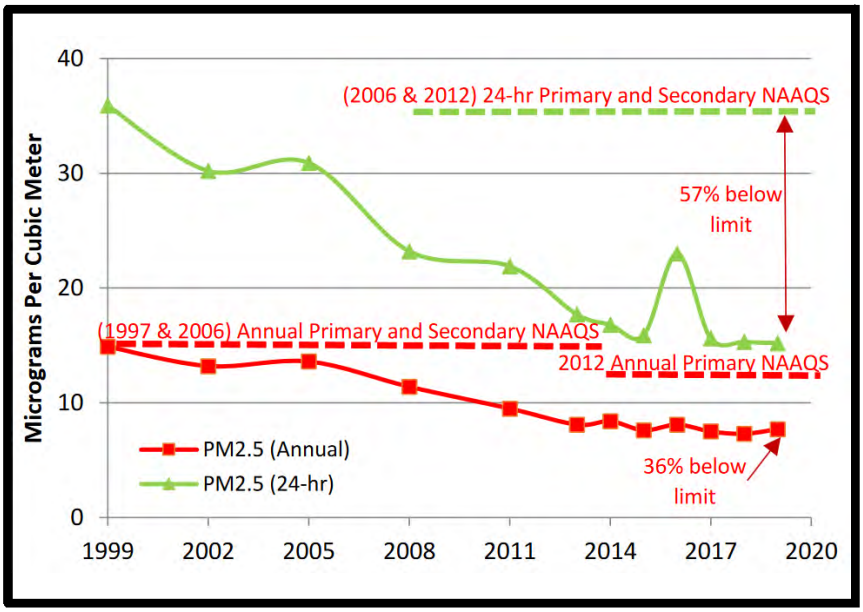


Figure 48. Statewide trends for fine particles
(from *Air Quality Trends in North Carolina*, October 2020, located at https://files.nc.gov/ncdeq/Air%20Quality/planning/Air_Quality_Trends_in_North_Carolina_2020.pdf)

Figure 49 through Figure 60 provides the fine-particle design values for the monitors in North Carolina for the past 10 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. The regulations at 40 CFR Part 58, Appendix D Section 4.7 requires ten 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;
- William Owen in the Fayetteville 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.[21]

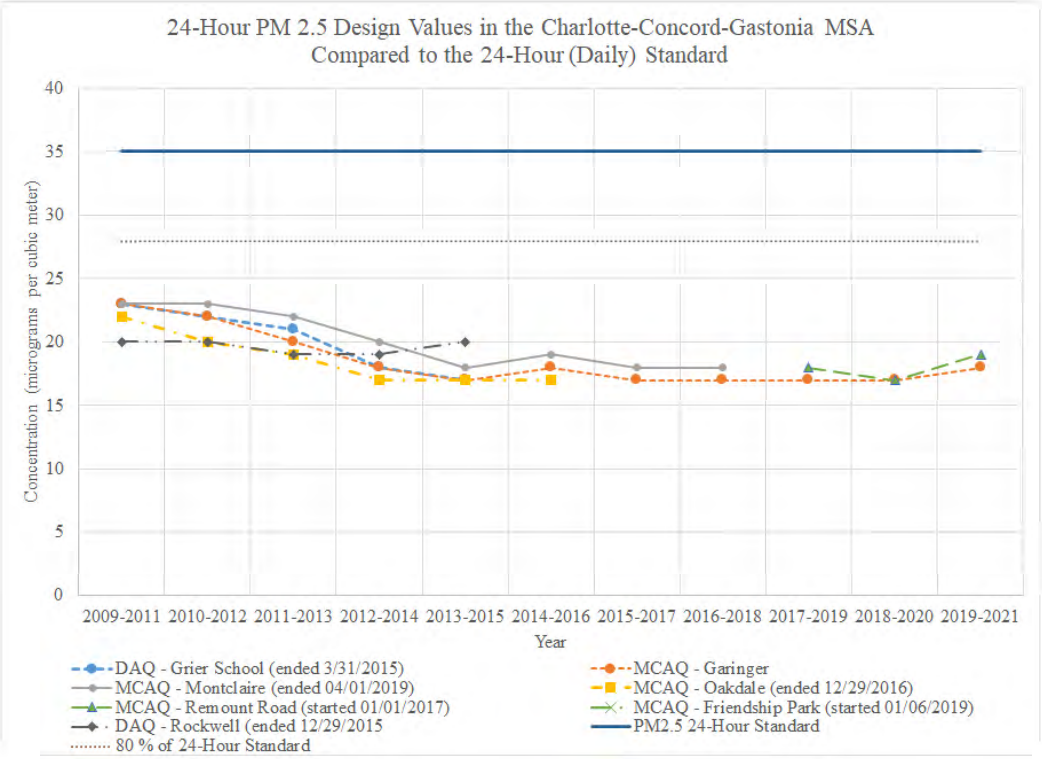


Figure 49. Measured daily fine particle design values in the Charlotte-Concord-Gastonia MSA

[21] "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.

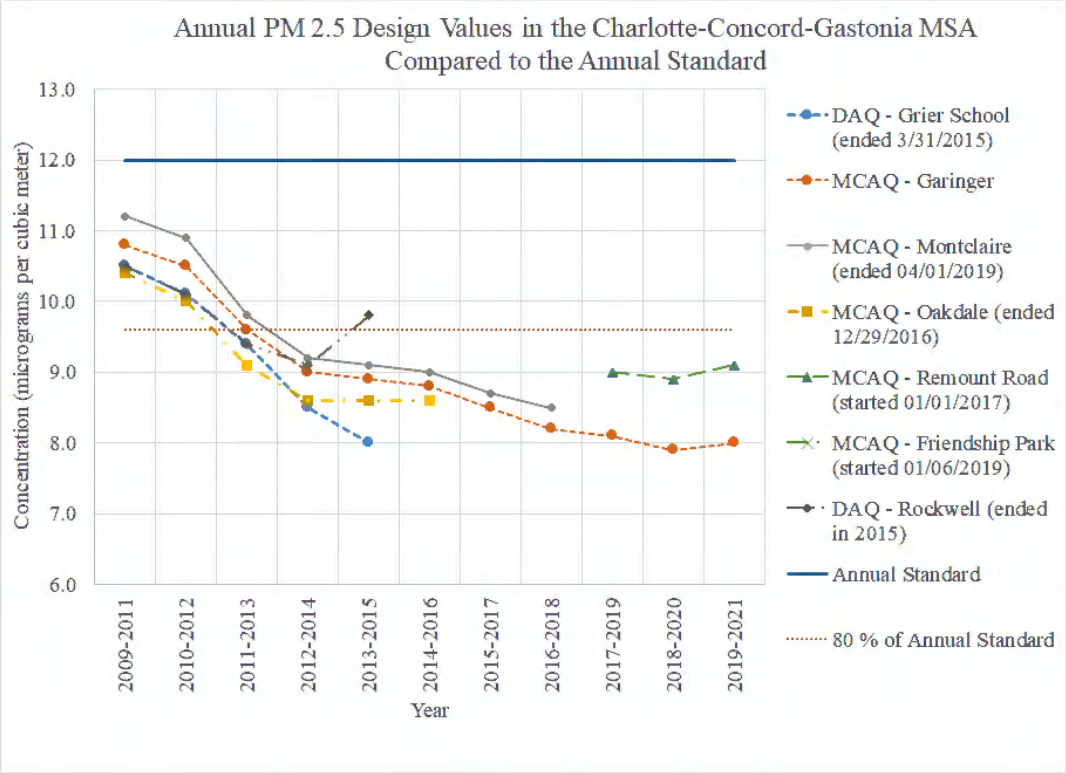


Figure 50. Annual design values measured in the Charlotte-Concord-Gastonia MSA

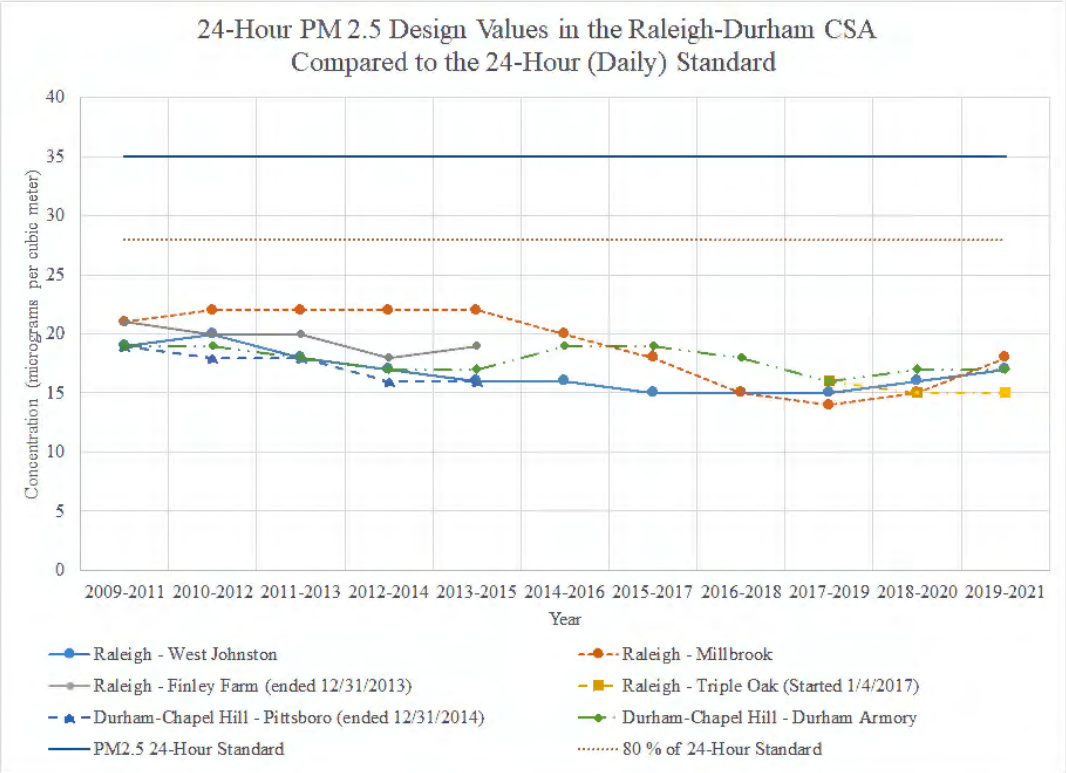


Figure 51. Daily fine-particle design values measured in the Raleigh-Durham CSA

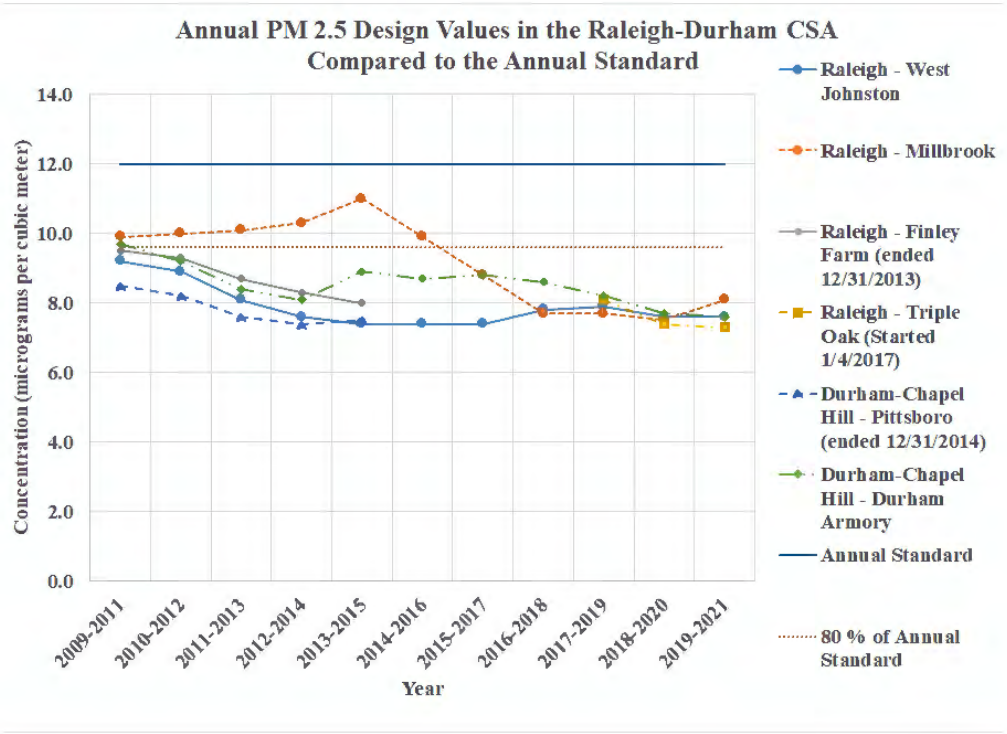


Figure 52. Annual fine-particle design values measured in the Raleigh-Durham CSA

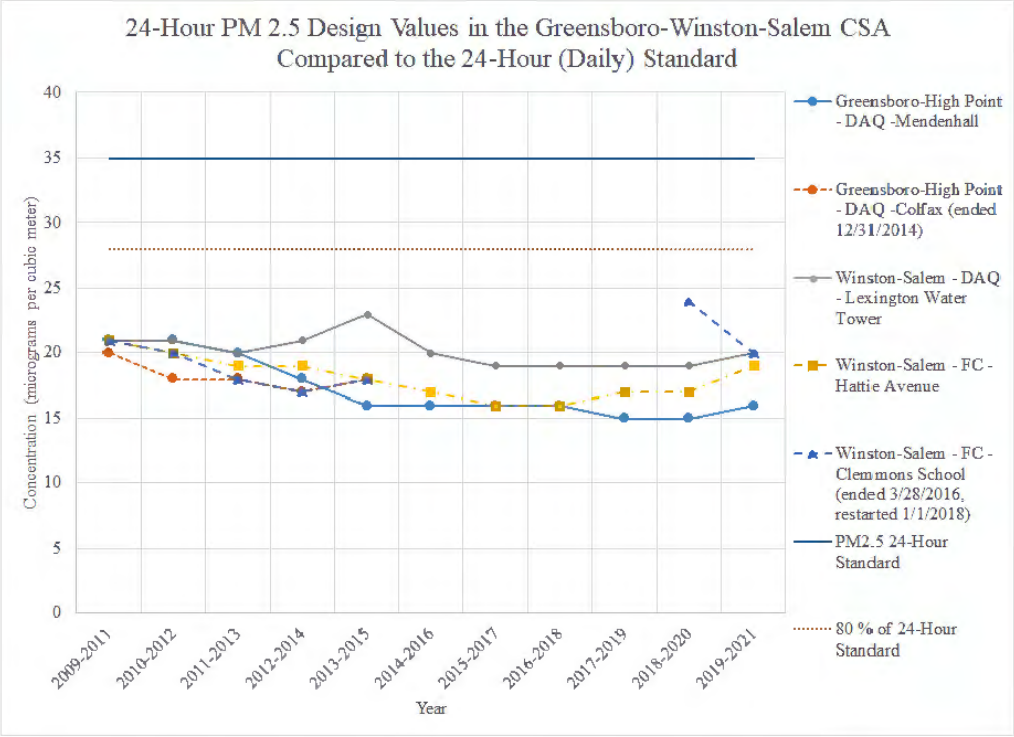


Figure 53. Daily fine-particle design values measured in the Greensboro-Winston-Salem CSA

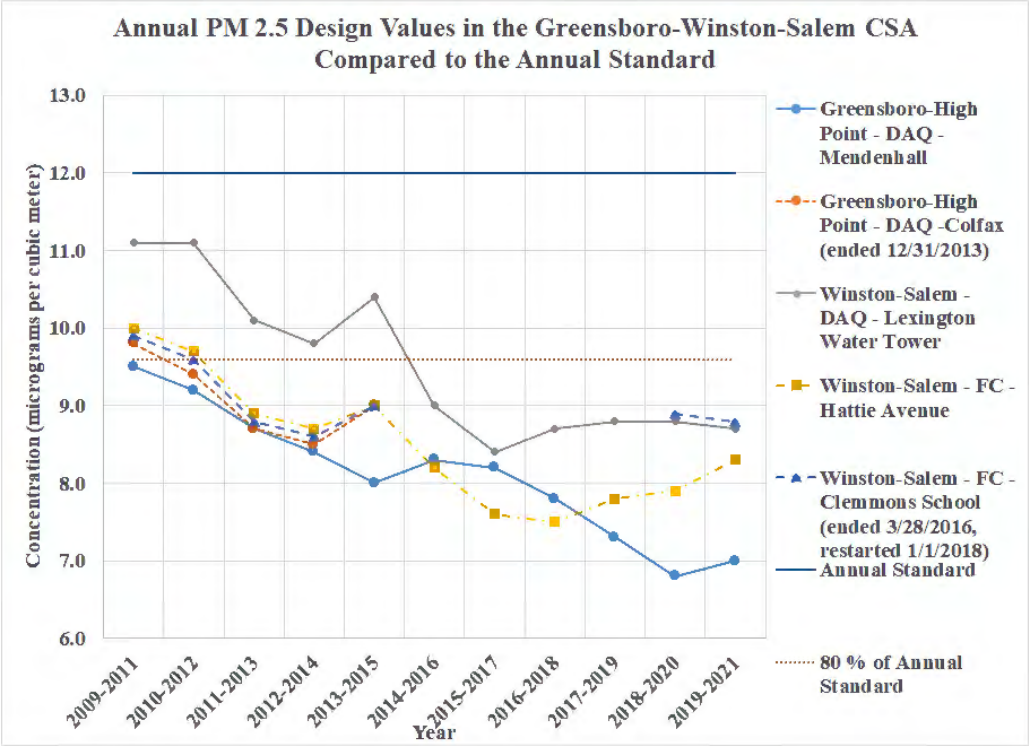


Figure 54. Annual fine-particle design values measured in the Greensboro-Winston-Salem CSA

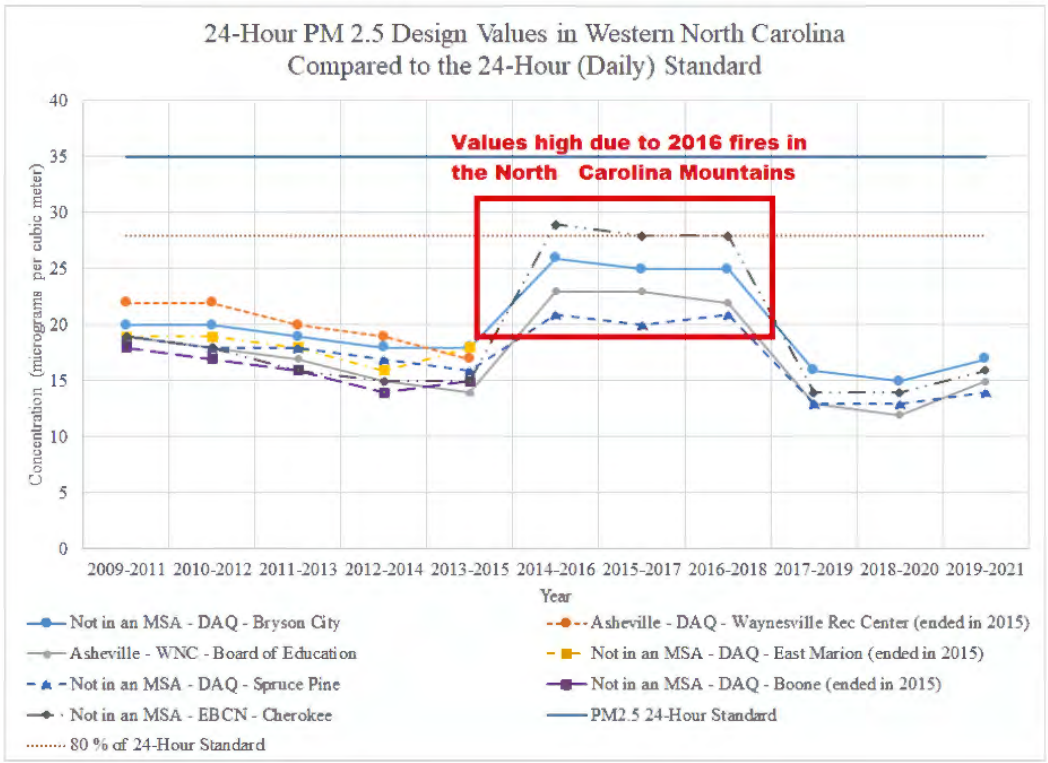


Figure 55. Daily fine-particle design values measured in western North Carolina

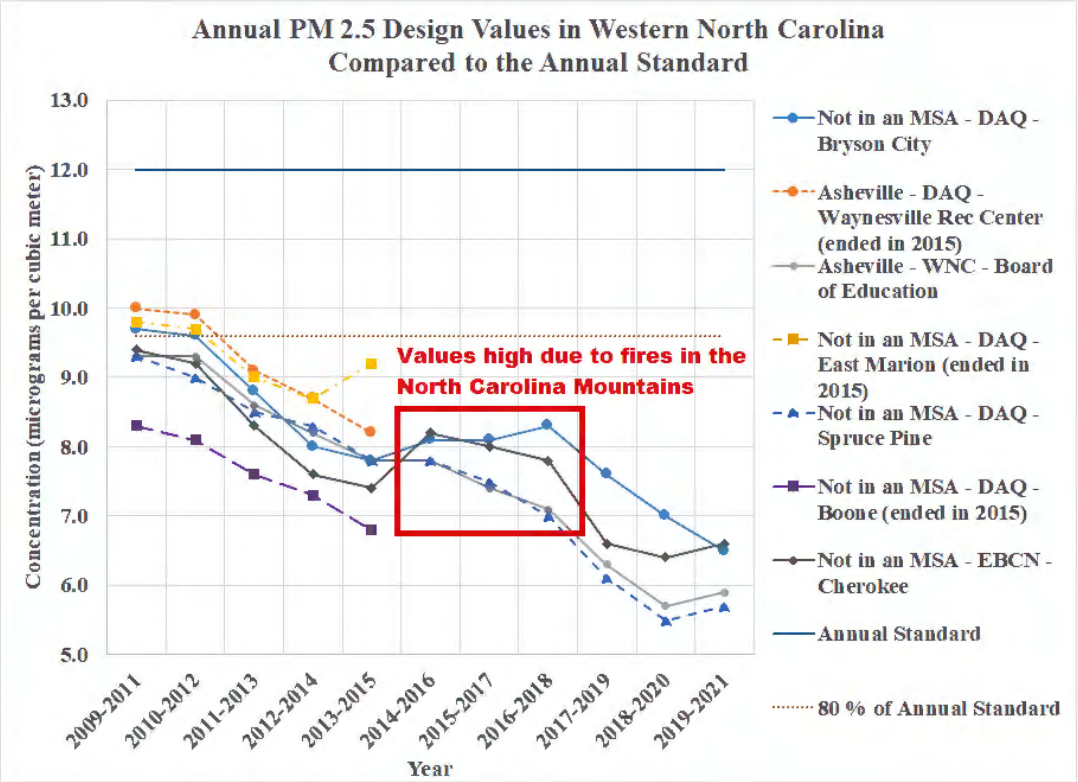


Figure 56. Annual fine-particle design values measured in western North Carolina

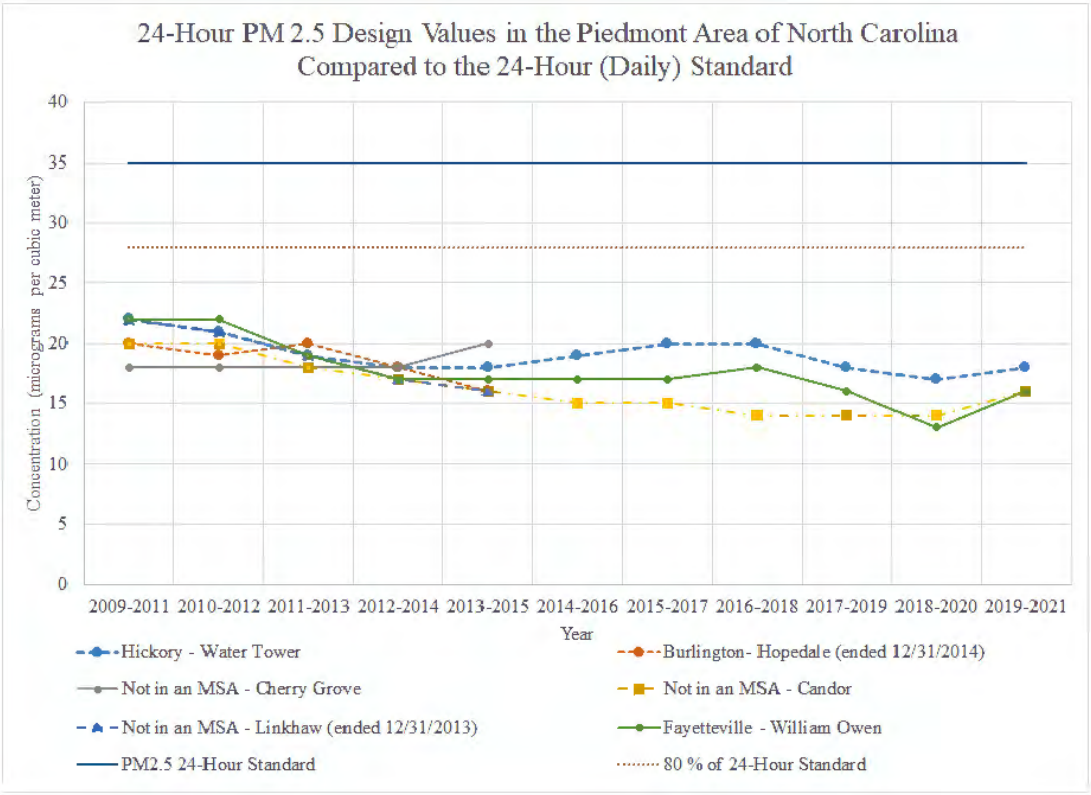


Figure 57. Daily fine-particle design values measured in central North Carolina

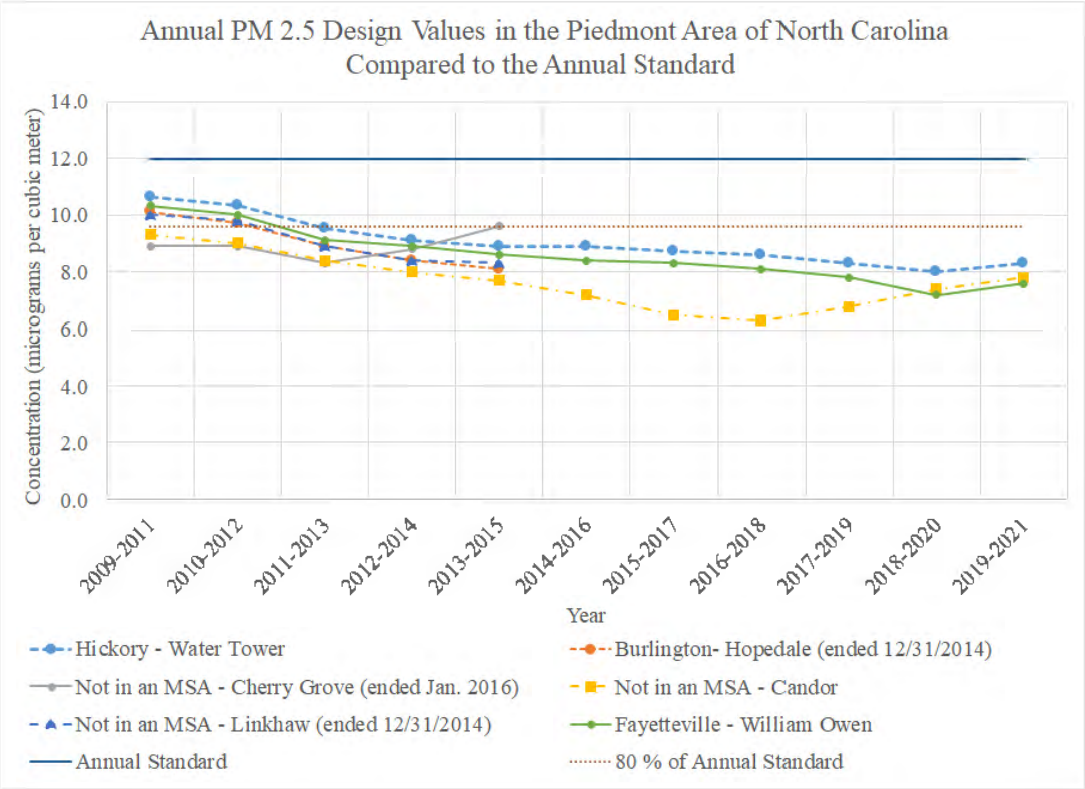


Figure 58. Annual fine-particle design values measured in central North Carolina

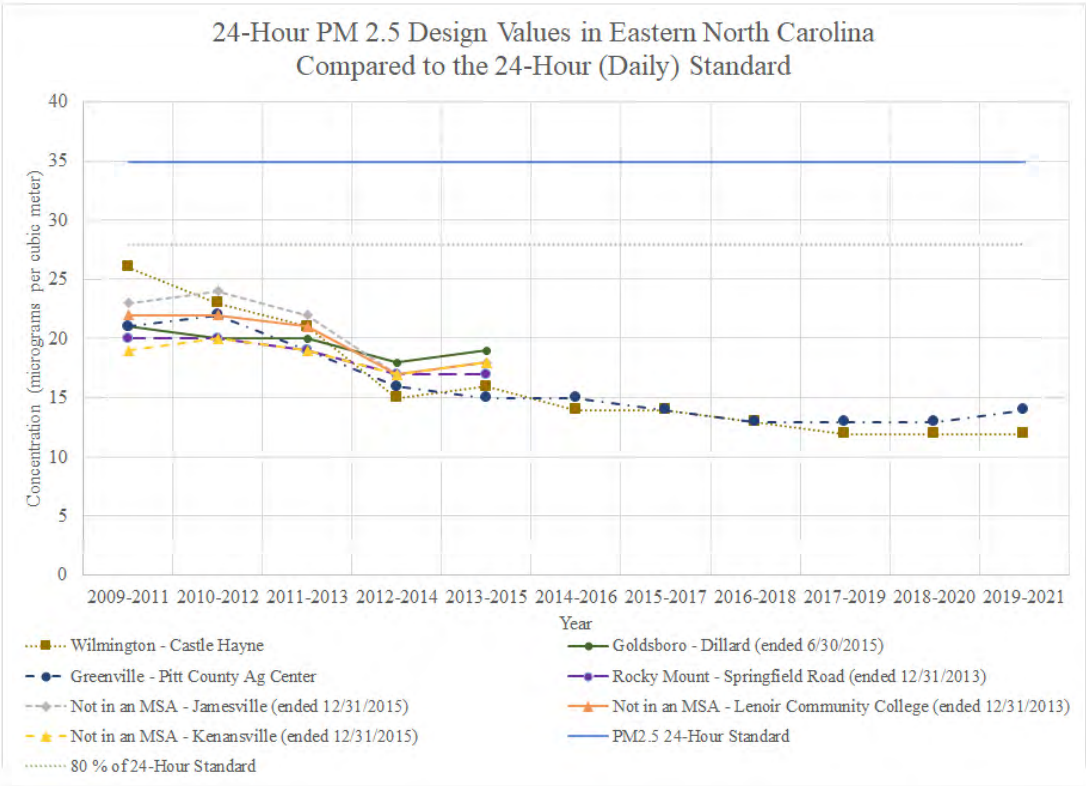


Figure 59. Daily design values measured in eastern North Carolina

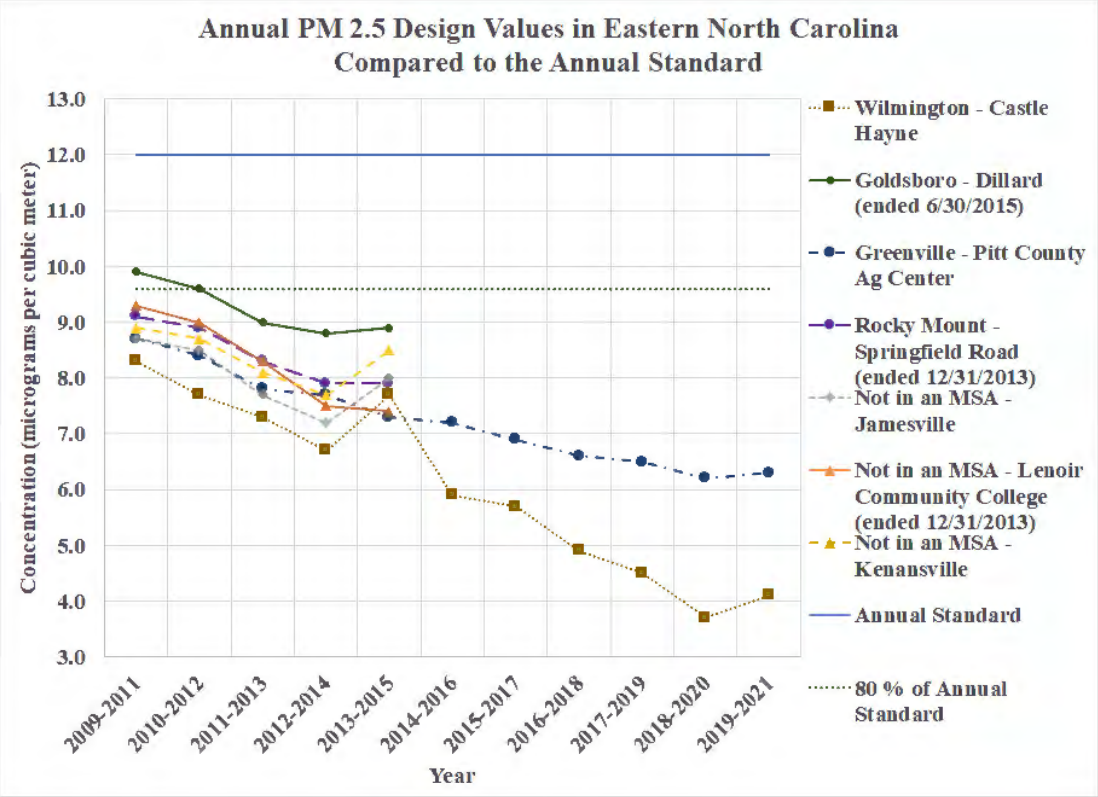


Figure 60. Annual fine-particle design values measured in eastern North Carolina

The remaining ten 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 10 monitors, two operated by local programs that are not part of the DAQ PQAO, one operated by the tribal program, and seven operated by the DAQ PQAO, that are not required by Appendix D of 40 CFR Part 58 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 ABAQA as well as 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;
- 37-101-0002 at West Johnston in the Raleigh MSA;
- 37-121-0004 at Spruce Pine in Mitchell County
- 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
- 37-159-0021 at Rockwell in Rowan County and the Charlotte-Concord-Gastonia MSA.

DAQ and ABAQA 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. Also, the Asheville MSA will soon cross the 500,000 population threshold that will require the MSA to have a monitor.
- The West Johnston, 37-101-0002, monitor is in one of the fastest-growing areas of the state as well as the nation. Johnston County is North Carolina's 2nd fastest growing count percentagewise and the nation's 45th fastest-growing county percentagewise on an annual basis and 38th fastest-growing county in population.
- The Spruce Pine, 37-121-0004, monitor is in a mining community and monitors potential mining activity impacts.
- 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 the past decade. Pender County is the 57th fastest-growing county in the nation for the last year.
- The Northampton County, 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. DAQ also does air quality forecasting for this area.
- The Rockwell, 37-159-0021, monitor is needed to maintain adequate spatial coverage for the fine particle monitoring network. Without it, there is a hole in coverage for the corridor between Charlotte and Winston-Salem. DAQ needs the data from this monitor for PSD modeling.

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 2022 fine particle network shown in Figure 61 is an adequate network to protect human health and environmental welfare and DAQ should continue to operate this network in 2022 and 2023.

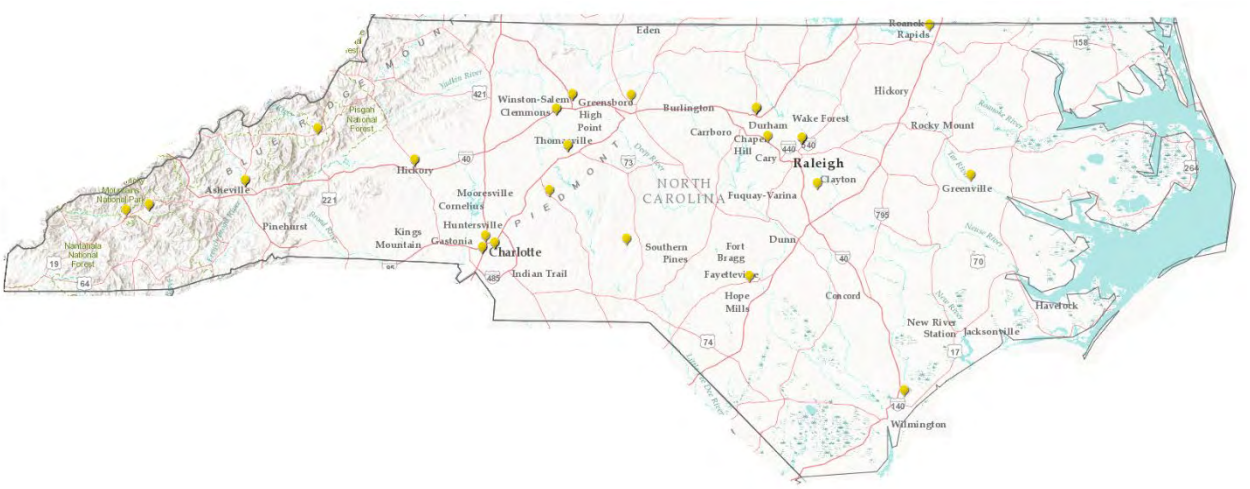


Figure 61. Current 2022 and proposed 2023 federal reference and equivalent method monitoring network

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 62. 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 33 provides the 2019 population estimates for the MSAs in North Carolina, the design values for 2018-2020, 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-Newport News MSA and the Myrtle Beach-Conway-North Myrtle Beach 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-Newport News MSA.[22] According to the U.S. Census 2021 population estimate, the population in the Myrtle Beach-Conway-North Myrtle Beach MSA is above the threshold, requiring one $PM_{2.5}$ monitor. The South Carolina Department of Health and Environmental Control has started the process of finding an appropriate Site for the $PM_{2.5}$ monitor. In 2021, the annual and daily fine-particle design values in North Carolina for the most part remained constant or continued to decline, maintaining or reducing the number of required monitors in MSAs throughout the state.

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

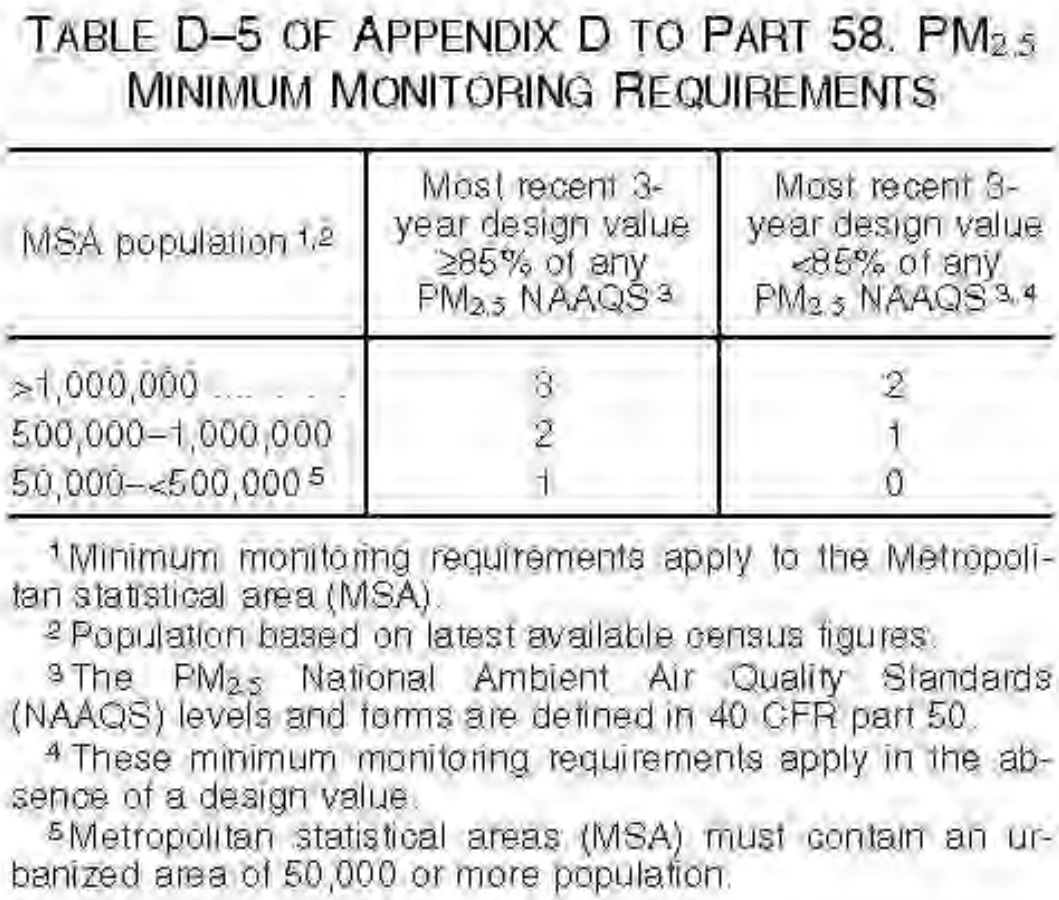


TABLE D–5 OF APPENDIX D TO PART 58. $PM_{2.5}$ MINIMUM MONITORING REQUIREMENTS

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

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

[2] Population based on latest available census figures.

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

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

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

Figure 62. Title 40 CFR Part 58, Appendix D, Table D-5

Table 33 Design Values and Required Fine Particle Monitors for North Carolina Metropolitan Statistical Areas, MSA

MSA	Population Estimate, 2021 [a]	2019-2021 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	2,701,046	54	76	2	4
Virginia Beach-Norfolk-Newport News, VA-NC	1,803,328	46	55	2	0 [d]
Raleigh, NC	1,448,411	46	63	2	3
Greensboro-High Point	778,848	43	57	1	1
Winston-Salem	681,438	69	73	1	3
Durham- Chapel Hill	654,012	49	64	1	1
Fayetteville	524,588	37	60	1	1
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	509,794	Not available		1	0
Asheville	472,341	34	48	0	1

Table 33 Design Values and Required Fine Particle Monitors for North Carolina Metropolitan Statistical Areas, MSA

MSA	Population Estimate, 2021 [a]	2019-2021 Fine Particle Design Value, as percent of NAAQS		Number of Monitors operated in North Carolina [b]	
		24-Hour	Annual	Required [c]	Current
Hickory	366,441	49	67	0	1
Wilmington	291,833	34	31	0	1
Jacksonville	206,160	Not available		0	0
Burlington	173,877	Not available		0	0
Greenville	172,169	37	52	0	1
Rocky Mount	143,535	Not available		0	0
New Bern	122,273	Not available		0	0
Goldsboro	116,835	Not available		0	0

[a] Source: Annual Estimates of the Resident Population for Metropolitan Statistical Areas in the United States and Puerto Rico: April 1, 2020 to July 1, 2021 (CBSA-MET-EST2021-POP), U.S. Census Bureau, Population Division, Released March 2022, available online at https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-metro-and-micro-statistical-areas.html.

[b] Includes monitors operated by DAQ and the local programs.

[c] Code of Federal Regulations, Title 40 Protection of the Environment, Part 58 Ambient Air Quality Surveillance, Appendix D Network Design Criteria for Ambient Air Quality Monitoring, Table D-5, available on the worldwide web at http://www.ecfr.gov/cgi-bin/text-idx?SID=f4ac6b967f32490f3a03543735a756fc&mc=true&node=ap40.6.58_161.d&rgn=div9.

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

The following tables provide the information required by 40 CFR Part 58 to be included in the network plan. Table 34 through Table 39 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.

On Oct. 1, 2020, the Durham Armory, 37-063-0015, site stopped using the EPA reference method designation RFPS-1006-145, AQS method code 145 and started using the EPA automated equivalent method EQPM-0308-170, AQS method code 170 (that is a Met One BAM 1020 monitor). Also, on Oct. 1, 2020, the Millbrook, 37-183-0014, site stopped using the EPA reference method as the primary method and started using the EPA automated equivalent method EQPM-0516-238, AQS method code 238 (that is a Teledyne T640X monitor). A collocated FRM monitor also operates at the Millbrook site.

Table 34 The NAAQS Fine Particle Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041[b]	37-119-0045 [b]	37-119-0048 [b]	37-159-0021
Site Name:	Garinger	Remount Road	Friendship Park	Rockwell
Street Address:	1130 Eastway Drive	902 Remount Road	2310 Cindy Lane	301 West Street
City:	Charlotte	Charlotte	Charlotte	Rockwell
Latitude:	35.2401	35.212657	35.281791	35.551868
Longitude:	-80.7857	-80.874401	-80.851473	-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, collocated with a 1-in-12 day	Hourly	Hourly
Statement of Purpose:	1 of 2 required monitors in Charlotte-Concord-Gastonia MSA. 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. .	AQI reporting. Compliance w/NAAQS. .
Monitoring Objective:	Population exposure	Source-oriented	Population exposure	General/background
Scale:	Neighborhood	Microscale	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-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-	Yes –near road, 1 of 2 required monitors for the Charlotte-Concord-Gastonia MSA	Yes, not required by Appendix D	Yes, not required by Appendix D

Table 34 The NAAQS Fine Particle Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041[b]	37-119-0045 [b]	37-119-0048 [b]	37-159-0021
Site Name:	Garinger	Remount Road	Friendship Park	Rockwell
	Gastonia MSA.			
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None	Site may be relocated after 12/31/2023

[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 35 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	Hourly Collocated w/1-in-3 day	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

Table 35 The NAAQS Fine Particle Monitoring Network for the Raleigh MSA [a]

AQS Site Id Number:	37-101-0002	37-183-0014	37-183-0021
Site Name:	West Johnston	Millbrook	Triple Oak Road
Meets Requirements of Part 58, Appendix A:	Yes	Yes, collocated with RFPS-1006-145	Yes
Meets Requirements of Part 58, Appendix C:	Yes – EQPM-1013-209	Yes - EQPM-0516-238	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	Monitoring method changed on 10/1/2020	None

[a] The monitor at Millbrook uses a Teledyne-API T640X at 16.67 LPM, Air Quality System, AQS method code 238. This monitor is collocated with a Thermo 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 36 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.
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

Table 36 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
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 by maintenance SIP	Yes – not required by Appendix D	Yes- Required monitor for the Winston-Salem MSA.	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:	Monitoring method will change in 2023	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 37 2022-2023 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	1501 1st Avenue, SW
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:	Hourly	Hourly, collocated w/1-in-6 day	Hourly, collocated with continuous monitor
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	Yes	Yes
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	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:	Monitoring method may change in 2023	Monitors will move off the roof to the ground	Monitors will move 38 meters north

[a] The Durham Armory monitor uses BAM 1020, AQS method code 170. 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 38 The 2022-2023 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:	hourly	hourly	hourly
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 – EQPM-1013-209	Yes – EQPM-0308-170	Yes – EQPM-1013-209
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:	None	None	None

[a] The monitors at William Owen and the Pitt County Ag Center use a Met One BAM-1022 Monitor, AQS method code 209. The Castle Hayne monitor uses a BAM 1020, AQS method code 170. All monitors operate year-round.

Table 39 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.
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 – EQPM-1013-209	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	Method will change in 2023	Monitor will be moved in 2022 & monitor method will change in 2022 or 2023

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

The monitors at the Durham Armory, 37-063-0015, 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, Rockwell, 37-159-0021; Mendenhall, 37-081-0013, Triple Oak Road, 37-183-0021; Northampton County, 37-131-0003; Pitt County Agricultural Center, 37-147-0006 and West Johnston, 37-101-0002, use the EPA automated equivalent method EQPM-1013-209, AQS method code 209. These 14 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 34 through Table 39 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.

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 2020 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 Charlotte-Concord-Gastonia, Raleigh, Winston-Salem, Hickory, Wilmington and Greenville MSAs. The monitors are the Rockwell monitor, 37-159-0021, West Johnston monitor, 37-101-0002, the Lexington monitor, 37-057-0002, 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 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 Rockwell, 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

As shown in Figure 63, DAQ currently operates 16 continuous fine-particle monitoring sites, the local programs operate six, and the tribal program operates one. 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 22 of these monitors for determining compliance with the national ambient air quality standards, or NAAQS. Six 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 33, a continuous monitor collocated with an FRM or a continuous FEM is required in:

- Charlotte, which is operated by the local program,
- Raleigh,
- Greensboro,
- Winston-Salem, which is operated by the local program,
- Fayetteville and
- Durham.

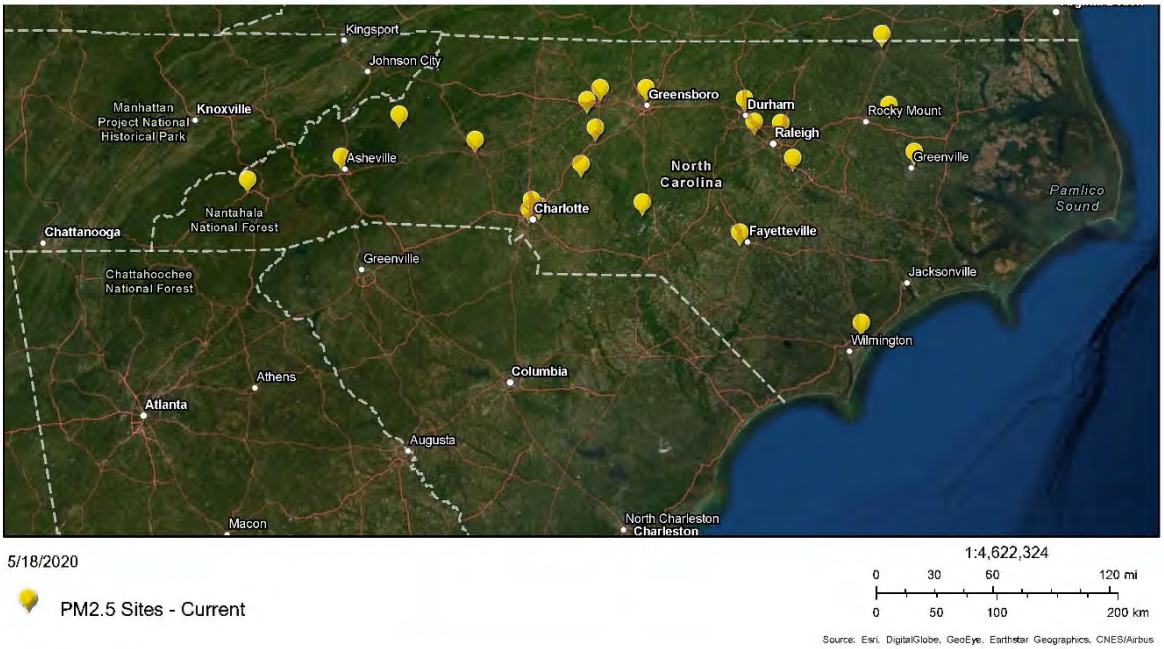


Figure 63. 2022-2023 Fine Particle Continuous Monitor Network

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 two MSAs that are not required to have a continuous monitor by 40 CFR Part 58, Appendix D: Asheville (operated by the local program) and Hickory. Thus, DAQ needs these two continuous monitors to meet Appendix G of 40 CFR Part 58 requirements. Of the 14 remaining continuous monitors, 10 are FEMs - Bryson City, Spruce Pine, Lexington, Rockwell, West Johnston, Northampton County, 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 three. DAQ evaluated the remaining continuous monitor operated by the division to determine if it still adds value to the network and should continue operating. This 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.

Table 40 through Table 45 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 40 The Continuous Fine Particle Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041	37-119-0045	37-119-0048	37-159-0021
Site Name:	Garinger	Remount Road	Friendship Park	Rockwell
Street Address:	1130 Eastway Drive	902 Remount Road	2310 Cindy Lane	301 West Street
City:	Charlotte	Charlotte	Charlotte	Rockwell
Latitude:	35.2401	35.212657	35.281791	35.551868
Longitude:	-80.7857	-80.874401	-80.851473	-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.	Near road monitoring site. AQI reporting.	AQI reporting. Compliance w/NAAQS. .	AQI reporting. Compliance w/NAAQS. .
Monitoring Objective:	Population exposure	Source-oriented	Population exposure	General/background
Scale:	Neighborhood	Microscale	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-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 –near road	Yes, not required by Appendix D	Yes, not required by Appendix D
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes	Yes

Table 40 The Continuous Fine Particle Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

Proposal to Move or Change:	None	None	None	Monitoring site may move after 12/31/2023

[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 41 The 2022-2023 Continuous Fine Particle Monitoring Network for the Raleigh and Greensboro-High Point MSA [a]

AQS Site Id Number:	37-101-0002	37-183-0014	37-183-0021	37-081-0013
Site Name:	West Johnston	Millbrook	Triple Oak Road	Mendenhall
Street Address:	1338 Jack Road [c]	3801 Spring Forest Road	2826 Triple Oak Road	205 Willoughby Blvd.
City:	Clayton	Raleigh	Cary	Greensboro
Latitude:	35.590833	35.8561	35.8654	36.109167
Longitude:	-78.461944	-78.5742	-78.8195	-79.801111
MSA, CSA or CBSA represented:	Raleigh	Raleigh	Raleigh	Greensboro-High Point
Monitor Type:	SLAMS	Special purpose / NCore	SLAMS	SLAMS
Operating Schedule:	Hourly	Hourly	Hourly	Hourly
Statement of Purpose:	Required monitor for the Raleigh MSA. Real-time AQI reporting for the Raleigh MSA. Forecasting	Required monitor for the Raleigh MSA. Real-time AQI reporting for the Raleigh MSA. Forecasting	Near road monitoring site. AQI reporting. Compliance w/NAAQS.	Required monitor for the Greensboro-High Point MSA. Real-time AQI reporting for the Greensboro-Winston-Salem-High-Point CSA. Forecasting
Monitoring Objective:	Population exposure	Population exposure	Source-oriented	Population exposure / general / background
Scale:	Neighborhood	Neighborhood	Micro-scale	Neighborhood
Suitable for Comparison to NAAQS:	No	No	Yes	No
Meets Requirements of Part 58, Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix C:	Yes – EQPM-1013-209	Yes – EQPM-0516-238	Yes – EQPM-1013-209	Yes – EQPM-1013-209
Meets Requirements of Part 58, Appendix D:	Yes	Yes - NCore	Yes –near road	Yes

Table 41 The 2022-2023 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
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None	None

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

Table 42 The 2022-2023 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:	Monitoring method may change	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 43 The 2022-2023 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	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 – 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

Table 43 The 2022-2023 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
Proposal to Move or Change:	Monitoring method may change in 2023	Monitors will move to the ground	None	Monitors will move 38 meters north

[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 Asheville-Buncombe Air Quality Agency, AQS reporting agency 0779.

Table 44 The 2022-2023 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	Yes	No
Meets Requirements of Part 58, Appendix A:	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix C:	Yes – EQPM-0308-170	Yes – EQPM-1013-209	No – AQS method code 171
Meets Requirements of Part 58, Appendix D:	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes
Proposal to Move or Change:	None	None	None

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

Table 45 The 2022-2023 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
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:	Yes	Yes	Yes	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

Table 45 The 2022-2023 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
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	Monitoring method will change in 2023	None	Monitor will move in 2022 and method will change in 2022 or 2023

[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 46 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 46 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 46 The 2022-2023 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 64 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.

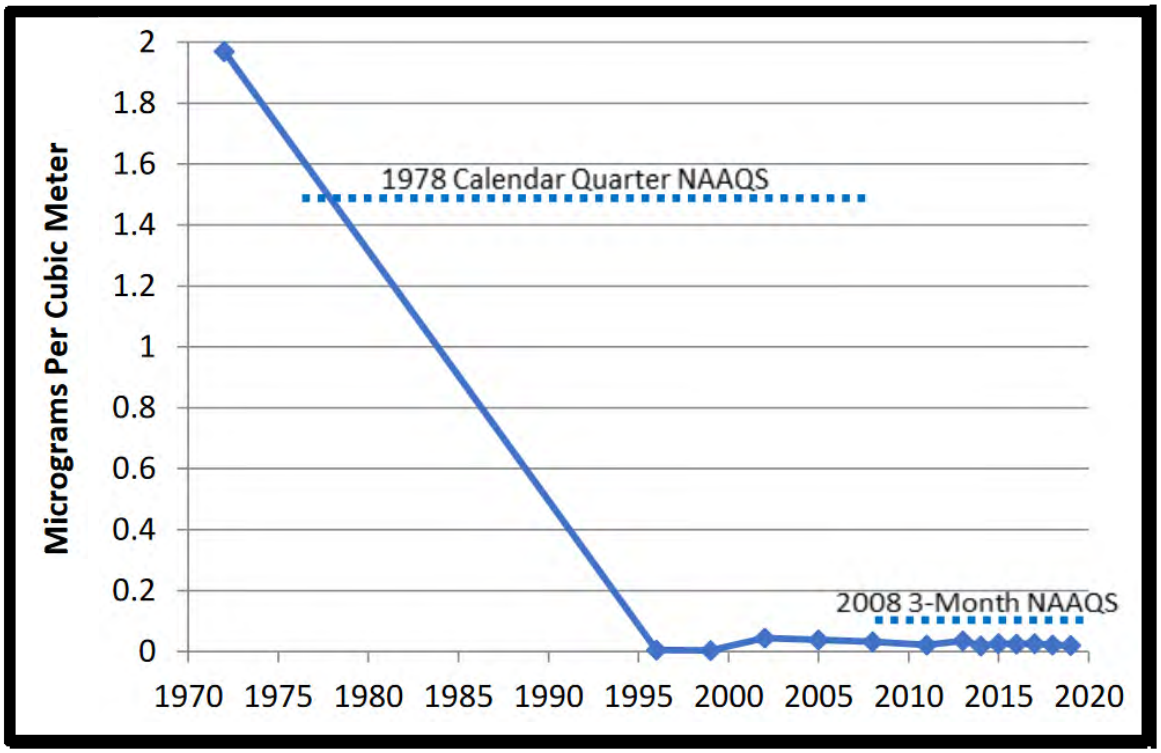


Figure 64. Statewide 24-hour lead levels through 2019
from *Air Quality Trends in North Carolina*, October 2020, located at https://files.nc.gov/ncdeq/Air%20Quality/planning/Air_Quality_Trends_in_North_Carolina_2020.pdf)

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.[23] On Dec. 27, 2010, the EPA finalized changes to the lead monitoring network.[24] 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

[23] 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.
[24] 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.

500,000. Fence line monitoring at facilities emitting more than one ton of lead per year or that impact the ambient concentrations surrounding the facility such that ambient levels are at one half of the NAAQS or greater started on Jan. 1, 2010. Fence line monitoring at facilities emitting more than 0.5 ton of lead per year and population-oriented monitoring at required NCore sites started on Dec. 27, 2011. 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.[25]

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.

[25] 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.

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,
- 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.[26]

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.

In 2018, Fort Bragg again reported over 0.5 tons of fugitive lead emissions in the TRI.[27] As a result, DAQ requested a waiver for monitoring at the facility.[28] In its response to the 2020-2021 network plan,[29] the EPA agreed with the rationale DAQ provided; however, the EPA asked to work with DAQ and Fort Bragg to further determine if base activities have the potential to cause elevated ambient lead concentrations. Thus, the EPA neither required lead monitoring nor granted a waiver of lead monitoring requirements for the area near Fort Bragg. Instead the EPA requested that DAQ work with the EPA to provide supplemental information in the next network plan on whether Fort Bragg would be expected to potentially contribute to elevated lead concentrations. DAQ met internally after receiving EPA's request and determined we have done all we have the authority to do regarding monitoring at Fort Bragg. DAQ will provide the EPA with all of the information obtained to date via a separate document.

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

[27] United States Environmental Protection Agency. (2020). TRI Explorer (2018 National Analysis Dataset (released November 12, 2019)) [Internet database]. Retrieved from https://enviro.epa.gov/triexplorer/tri_release.chemical, https://enviro.epa.gov/triexplorer/, (April 11, 2020).

[28] 2020-2021 Annual Monitoring Network Plan for the North Carolina Division of Air Quality, Volume 1, July 2, 2020, Section II.G.2, https://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=14029 (accessed May 5, 2021).

[29] United States Environmental Protection Agency, 2020-2021 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p14, available at https://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=13593

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 PM_{10} 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 PM_{10} lead monitoring method. Figure 65 shows the maximum PM_{10} lead concentrations measured at the two sites.

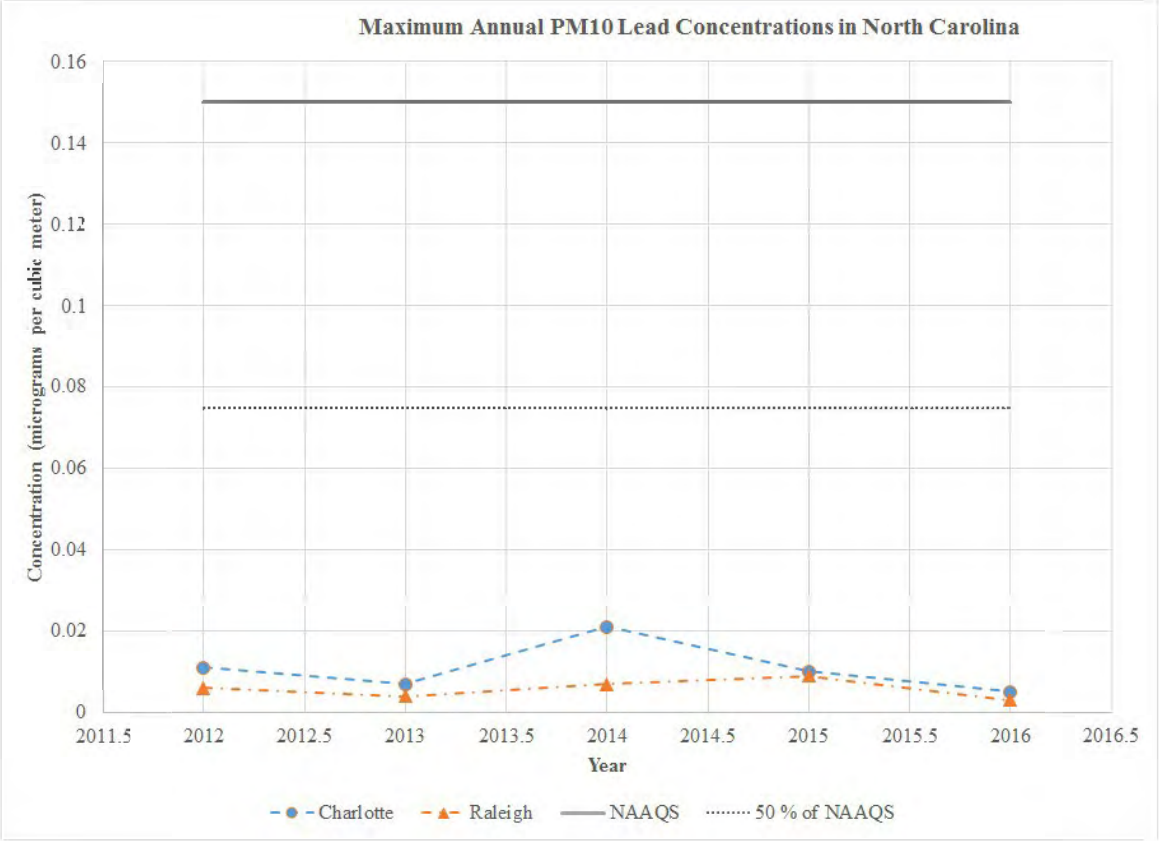

Figure 65. Maximum annual lead concentrations measured at North Carolina NCore Stations

As mentioned earlier, in 2016 the EPA finalized changes to ambient monitoring quality assurance and other requirements to remove the requirement for lead monitoring at NCore monitoring stations. The measured lead concentrations at the North Carolina NCore stations are well below 50% of the standard as Figure 65 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 15, or TO-15, for the 66 compounds in Table 47.

Table 47 List of Measured and Reported Urban Air Toxic Volatile Organic Compounds, VOC

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

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 48.

Table 48. 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. On May 4, 2022, DAQ replaced the walk-in shelter at the site with a smaller doghouse type shelter large enough to accommodate the sampler and its associated equipment.

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.
8. DAQ started reporting 1-Brompropane (AQS parameter code 43853) to AQS July 1, 2021, using AQS method code 150 at all UAT monitoring sites collecting 6-liter canisters.

Table 49 through Table 51 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 49 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 50 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:	Monitoring shelter was replaced on May 4, 2022	None	None

[a] Operated by the Western North Carolina Regional Air Quality Agency, AQS reporting agency 0779.
[b] AQS method code 150, sample collection in a stainless steel 6-liter pressurized canister and analysis using pre-concentration gas chromatography with mass spectrometric detection, for VOCs.

Table 51 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. 2022 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 in Table 52.

Table 52. Specifics for the East Millbrook Middle School NCore Site

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

DAQ has been operating monitors at this site since April 17, 1989, 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-foot by 16-foot; wooden deck constructed in 2009 and maintained as needed. 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, SO_2, NO_y, CO and O_3, in a temperature-controlled walk-in shelter, which meets all EPA siting criteria.

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

C. Monitors/Methods

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

Parameter	**Monitoring Objective**	**Scale of Representation**	**Operating Schedule**	**AQS Method Code**
Trace level sulfur dioxide, SO_2	Population exposure	Neighborhood	Hourly data year-round	560
Trace level carbon monoxide, CO	Population exposure	Middle	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	212
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	238
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	239
$PM_{10-2.5}$, coarse PM, by difference, PM_{10}-$PM_{2.5}$	Population exposure	Neighborhood	Hourly data year-round	240
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

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 PM_{10} lead.[30] As a result and with EPA permission, DAQ ended the PM_{10} lead analysis on April 30, 2016.

On June 1, 2021, the primary NO_2 monitoring method at the site changed from a Teledyne-API Model T200UP photolytic-chemiluminescence monitor to a Teledyne Model T500U cavity attenuated phase shift spectroscopy monitor to accommodate the requirements of the Photochemical Assessment Monitoring Station (PAMS) program. On Jan. 26, 2022, the cable on the tower supporting the catalytic converter for the NO_y monitor broke. The probe was at a height of approximately 5 meters instead of the desired 10 meters until the tower was repaired. The DAQ worked with a contractor to obtain the necessary parts to repair the tower. On June 21, 2022, the tower was repaired and the NO_y probe was restored to a height of 10 meters above ground level.

D. Readiness Preparation

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

Parameter	Status
A) Acquisition of trace level gaseous monitors	Completed
B) Acquisition of low concentration gas dilution calibrators	Completed
C) Certification of clean air generators	Completed
D) Method detection limit studies for trace level monitors	Completed
E) Installation of 10-meter NO_y Tower	Completed
F) Installation of filter based and continuous PM monitors	Completed
G) Installation of trace level gaseous monitors	Completed
H) Preparation of trace level gaseous monitor QAPP/SOPs	Completed
I) Meteorological tower	Existing

[30] 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.

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 66. The wind direction/speed sensors are located at a height of 10 meters above ground. Starting on June 1, 2021, the relative humidity sensor was relocated from 2 meters above ground level to 10 meters to accommodate the use of a Met One All In One (AIO2) meteorological station. At the same time, the ambient temperature sensor located at 2 meters as well as the delta temperature values were discontinued. The temperature sensor at 10 meters above ground was replaced with the AIO2. The division requested a waiver for the 2-meter height for the relative humidity and air temperature sensors in the 2021-2022 network plan. The tower is in an open, grassy area that is free from any obstructions in a 270º arc to the prevailing winds that come from the south/west direction. DAQ positioned the tower 15.5 meters from the shelters on a 3 percent uphill grade. This grade adds approximately one meter to the height of the tower above the shelters. This siting does not meet the EPA requirement for the tower being at a distance 10 times the height of the shelter, which is 3.7 meters. The EPA approved the waiver for the met tower when they approved the site as an NCore site.

Figure 66. Millbrook NCore Site
(from City of Raleigh and Wake County iMAPS, http://maps.raleighnc.gov/iMAPS/)

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

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

2. 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 four nitrogen dioxide, or NO_2, monitors. Mecklenburg County Air Quality operates two NO_2 monitors and Forsyth County Office of Environmental Assistance and Protection, or Forsyth County, operates one NO_2 monitor. As shown in Figure 67 statewide NO_2 levels have fallen and currently remain below the standard.

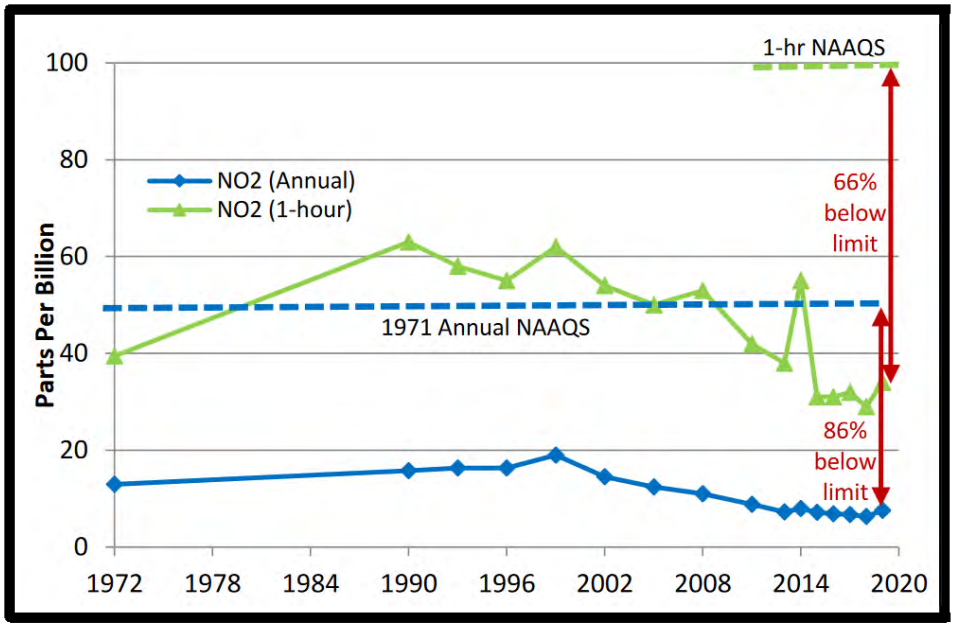

Figure 67. Statewide 1-hour and annual NO_2 levels through 2019
(from *Air Quality Trends in North Carolina*, October 2020, located at https://files.nc.gov/ncdeq/Air%20Quality/planning/Air_Quality_Trends_in_North_Carolina_2020.pdf)

In 2010, the United States Environmental Protection Agency, or EPA, changed the NO_2 primary national ambient air quality standards, or NAAQS, from an annual to an hourly standard of 100 parts per billion and established a new NO_2 monitoring network to support the new standard.[31] On Dec. 30, 2016, the EPA removed the requirement to establish near-road NO_2 monitoring stations in core-based statistical areas, or CBSAs, having populations between 500,000 and 1,000,000 persons.[32] The 2010 NO_2 network, as modified in 2016, has three types of monitoring sites:

- Near-road sites – micro-scale near-road NO_2 monitoring stations in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road with high average annual daily traffic, or AADT, counts. An additional near-road NO_2 monitoring station is required for any CBSA with a population of 2,500,000 persons or more or in any CBSA with a population of 1,000,000 or more persons that has one or more roadway segments with 250,000 or

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

greater AADT counts to monitor a second location of expected maximum hourly concentrations.

- Area-wide sites – monitoring stations in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected highest NO_2 concentrations representing the neighborhood or larger spatial scales.
- Regional administrator required monitoring – additional NO_2 monitoring stations nationwide in any area, inside or outside of CBSAs, above the minimum monitoring requirements, selected by regional administrators, in collaboration with states, with a primary focus on siting these monitors in locations to protect susceptible and vulnerable populations.

North Carolina has two CBSAs with 1,000,000 or more persons, not counting Virginia Beach-Norfolk-Newport News. 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-Newport News MSA.[33] 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.[34]

A. Near-Road Monitoring

For information on the existing and proposed near-road monitoring site in the Charlotte area, see Appendix B. 2022 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.[35] For details on the selection of Triple Oak Road and other considered locations, see the 2012 Annual Monitoring Network Plan for DAQ. Table 52 provides the 2019 traffic information for the area from the North Carolina Department of Transportation. Figure 68 presents a map showing the 2020 average annual daily traffic for the Raleigh MSA using assorted colors to depict different traffic volumes. The highest traffic volumes are shown in purple and red. The traffic volumes on the map are not adjusted for the fleet (number of diesel vehicles versus passenger vehicles).

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

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

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

Table 53. Fleet Equivalent Average Annual Daily Traffic for Selected Road Segments in the Raleigh Metropolitan Statistical Area[36]

Location ID	Route	Location	Station	Percent Passenger	2019 AADT	Fleet Equivalent AADT
920000319	I-40	From Exit 287 to 289	09MC0031	94	177,000	272,580
920000265	I-40	From Exit 285 to 287	09MC0031	94	176,000	271,040
920000971	I-40	From Exit 297 to 298	09MC0033	92	142,000	244,240
920000522	I-40	From Exit 283 to 284	09MC0031	94	157,000	241,780
920000548	I-40	From Exit 284 to 285	09MC0031	94	153,000	235,620
920001036	US 1-64	From Exit 101 to I-40	10MC0009	95	149,000	216,050
920000809	I-40	From Exit 303 to 306	10MC0021	91	112,000	202,720
920000351	I-440	From Exit 7 to 8	09MC0048	96	149,000	202,640

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

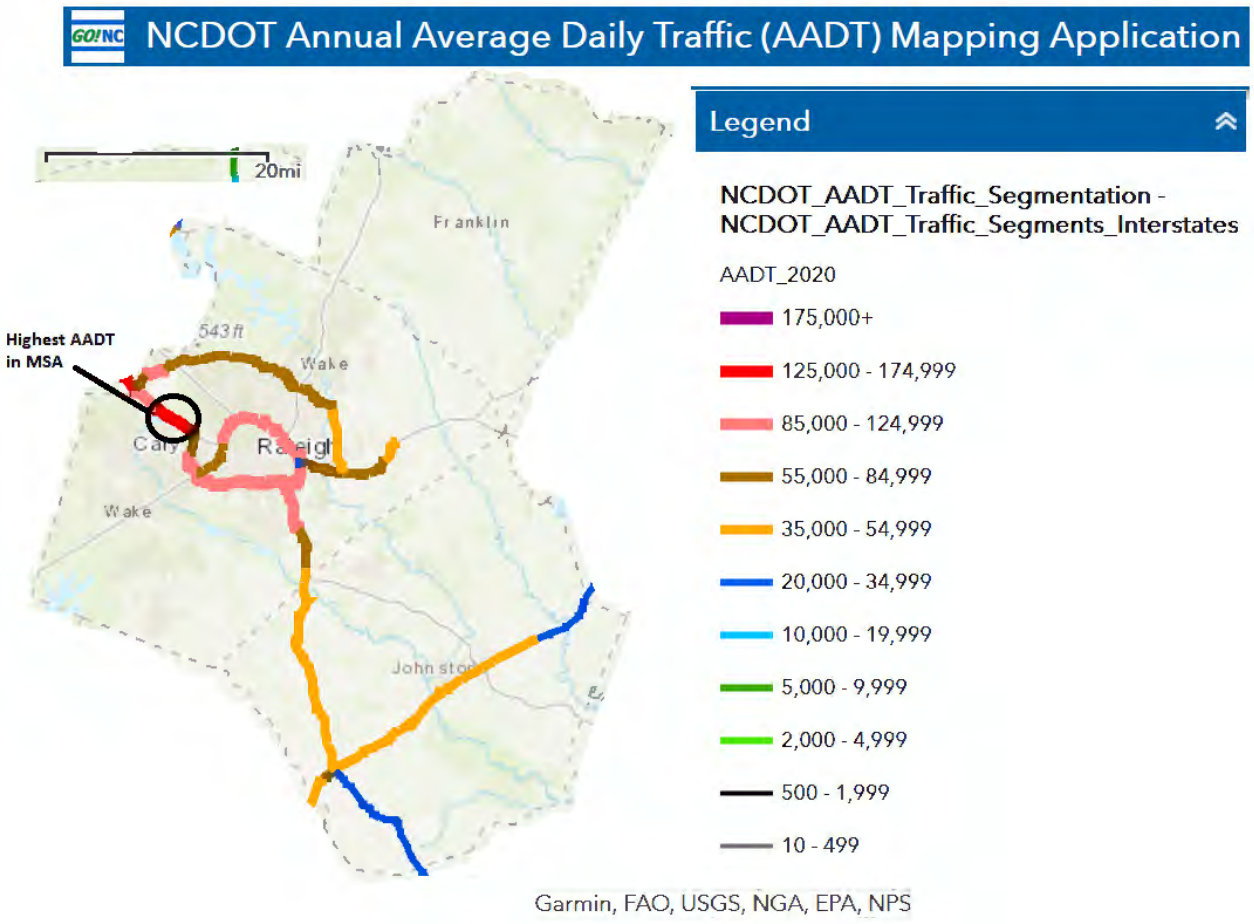

Figure 68. 2020 Map of Average Annual Daily Traffic in the Raleigh MSA

NC DOT provides DAQ with hourly traffic data for a location on I-40 east of Harrison Boulevard, between exits 287 and 289, which is about three to four miles from the monitoring site. The average daily traffic measured by this traffic sensor for 2021 was 134,294, ranging from a low of 67,554 on New Year's Day, Jan. 1, 2021, to a high of 178,633 on the Friday before Thanksgiving, Nov. 19, 2021, for 361 of the 365 days in 2021. This number is about 20,000 more than what NC DOT reported for that segment in 2020 and 40,000 less than what NC DOT reported for that segment in 2019.

Figure 69 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. There are trees behind the monitoring station for which DAQ could not receive permission from the property owner to cut down. The DAQ requested and received a waiver from the EPA for these trees. More information on the waiver is available in Appendix G. Approved Waivers and Other Requests, Waiver Renewals, Waiver renewal request for the trees at Triple Oak Road.

Figure 69 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. 2022 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 added a background monitor to the ozone-monitoring site at Rockwell on Oct. 22, 2020. Figure 70 provides the location of the nitrogen dioxide monitors throughout North Carolina.

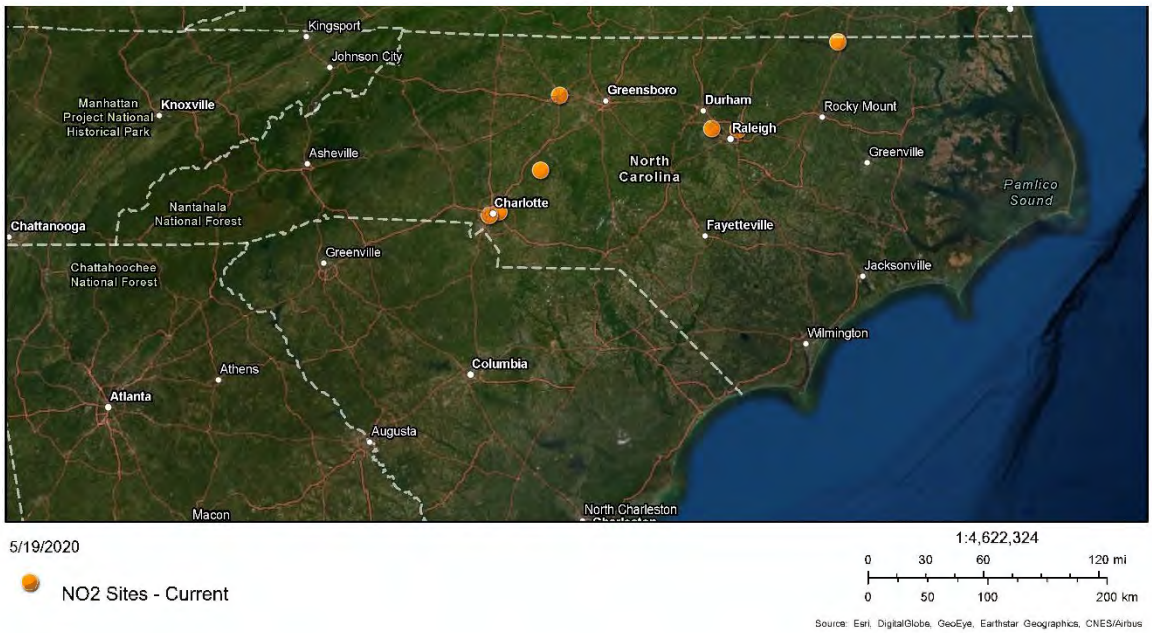

Figure 70. 2022-2023 Nitrogen Dioxide Monitoring Network

Table 53 and Table 54 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 55 and Table 56 provide:

- The location,
- The statement of purpose,
- The status for each monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D and E of 40 CFR 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 54 The 2022-2023 Nitrogen Dioxide Monitoring Network for the Charlotte-Concord-Gastonia MSA [a]

AQS Site Id Number:	37-119-0041 [b]	37-119-0045 [b]	37-119-0050 [b]	37-159-0021
Site Name:	Garinger High School	Remount	Equipment Drive	Rockwell
Street Address:	1130 Eastway Drive	1030 Remount Road	Equipment Drive	301 West Street
City:	Charlotte	Charlotte	Charlotte	Rockwell
Latitude:	35.2401	35.27831	35.212657	35.551868
Longitude:	-80.7857	-80.79698	-80.874401	-80.395039
MSA, CSA or CBSA represented:	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia	Charlotte-Concord-Gastonia
Monitor Type:	SLAMS	SLAMS	SLAMS	Special Purpose
Operating Schedule:	Hourly	Hourly	Hourly	Hourly
Statement of Purpose:	Area wide site. AQI reporting. Compliance w/NAAQS.	Near road monitoring site. AQI reporting. Compliance w/NAAQS.	Near road monitoring site. AQI reporting. Compliance w/NAAQS.	AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure	Highest concentration	Highest concentration	General/ background
Scale:	Neighborhood	Microscale	Microscale	Urban
Suitable for Comparison to NAAQS:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix A:	Yes	Yes	Yes	Yes
Meets Requirements of Part 58, Appendix C:	Yes – RFNA-1194-099	Yes – EQNA-0512-200	Yes – EQNA-0320-256	Yes – EQNA-0514-212
Meets Requirements of Part 58, Appendix D:	Yes- area wide	Yes –near road	Yes –near road	Yes – not required
Meets Requirements of Part 58, Appendix E:	Yes	Yes	Yes	Yes
Proposal to Move or Change:	Method changed in 2022	None	May start Jan. 1, 2023	Converted to a SLAMS

[a] The area-wide monitor uses a Teledyne API 200 EU/501, AQS method code 599. The Remount near road monitor uses a chemiluminescence detector with a photolytic convertor, Air Quality System, AQS, method code 200. The Equipment Drive near road monitor uses a Teledyne Model N500, AQS method code 256, which uses Cavity Attenuated Phase Shift Spectroscopy to measure NO_2 directly. The Rockwell monitor uses a Teledyne Model T500U, AQS method code 212, which uses Cavity Attenuated Phase Shift Spectroscopy to measure NO_2 directly.

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

Table 55 The 2022-2023 Nitrogen Dioxide Monitoring Network for the Raleigh MSA

AQS Site Id Number:	37-183-0014 [a]	37-183-0021 [b]
Site Name:	Millbrook School	Triple Oak
Street Address:	3801 Spring Forest Road	2826 Triple Oak Drive
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	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-0514-212	Yes – EQNA-0512-200
Meets Requirements of Part 58, Appendix D:	Yes- area wide	Yes –near road
Meets Requirements of Part 58, Appendix E:	Yes	Yes
Proposal to Move or Change:	None	None

[a] The Millbrook monitor uses a Teledyne Model T500U, Air Quality System, AQS, method code 212, which uses Cavity Attenuated Phase Shift Spectroscopy to measure NO_2 directly.

[b] The Triple Oak monitor uses a chemiluminescence detector with a photolytic convertor, AQS method code 200

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

AQS Site Id Number:	37-067-0022
Site Name:	Hattie Avenue
Street Address:	Corner of 13th & Hattie Avenue
City:	Winston-Salem
Latitude:	36.110556
Longitude:	-80.226667
MSA, CSA or CBSA represented:	Winston-Salem
Monitor Type:	SLAMS
Operating Schedule:	Hourly
Statement of Purpose:	Regional administrator required monitor for Region 4. AQI reporting. Compliance w/NAAQS.
Monitoring Objective:	Population exposure
Scale:	Neighborhood

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

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 Teledyne API chemiluminescence detector with a catalytic convertor, Air Quality System, AQS, method code 599 and is operated by Forsyth County Office of Environmental Assistance and Protection, AQS reporting agency 0403.

Table 57 The 2022-2023 Nitrogen Dioxide Monitoring Network for Areas not in MSAs [a]

AQS Site Id Number:	37-131-0003
Site Name:	Northampton County
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
Proposal to Move or Change:	None

[a] Monitor uses 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. On Jan. 8, 2020, the EPA published a rule to provide state and local agencies an additional two years until June 1, 2021, to implement the PAMS program requirements. See 85 Federal Register 834 (Jan. 8, 2020). The EPA needed this extension to provide all agencies the funding and equipment necessary to implement the program.

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, 2021. DAQ has continued preparing to implement the program as funding and personnel resources allowed 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. 2022 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 …part [58], including the requirements of appendix A, C, D and E of …part [58], no later than June 1, 2021."

A. PAMS Implementation Process

DAQ participates in the PAMS implementation process 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 from 2016 to 2022. 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.

EPA has provided a PAMS gas chromatographic instrument and limited additional funding to DAQ for operations, maintenance, other equipment, and capital expenditures in support of the PAMS implementation. The division continues to work toward implementation of all of the required parameters while continuing to anticipate a possible delay in establishment and operation of some of the PAMS requirements 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 get all of the processes, procedures and equipment up and operational so as to be able to begin operations within a reasonable timeframe for as many of the PAMS parameters as possible.

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. PAMS Monitoring Location:

The 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 all the necessary 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 has worked to purchase equipment and make required modifications to the monitoring station and as of April 20, 2022, most equipment is installed and operational at the site apart from the auto-GC, which is currently installed but not yet reporting data due to contamination problems.

2. Development of a PAMS Quality Assurance Project Plan:

The EPA provided a national "PAMS Quality Assurance Project Plan," or QAPP, for agencies to implement. EPA distributed the QAPP to monitoring agencies in 2019 and posted it on the AMTIC website. DAQ revised and adapted the EPA-provided QAPP for use in the DAQ program and the EPA-approved DAQ's QAPP on March 30, 2021.

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

DAQ received a Markes/Agilent autoGC in late 2018. The division installed the system in the shelter at Millbrook in January 2021. Currently DAQ is working on getting the autoGC up and operational to collect hourly-averaged speciated-VOC measurements. However, the system is still down due to a contamination problem in the sample collection and delivery component of the system. Also, DAQ is short-handed currently and is in the process of training an operator for the auto-GC system.

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

As of April 29, 2021, DAQ had installed the sampler and written SOPs in support of PAMS 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 upgraded its carbonyl equipment. DAQ began operation of PAMS

carbonyl monitoring in the DAQ program on May 1, 2021. The DAQ has audited the mass flow controllers in the samplers with a second source flow transfer standard to obtain an intolerance flow and documented the results in the site logbook.

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 NO_2, and total reactive nitrogen, or NO_y:

DAQ currently operates an NO and NO_y monitor at the Millbrook NCore monitoring location in accordance with this requirement. In May 2021, DAQ replaced the photolytic NO_2 monitor at the Millbrook NCore site with a CAPS monitor and conduct the MDL study as required in the PAMS QAPP.

7. Hourly averaged ambient temperature:

DAQ currently collects hourly averaged ambient temperatures at the Millbrook NCore monitoring location in accordance with this requirement. On June 1, 2021, the ambient temperature sensor was relocated from 2 meters above ground level to 10 meters above ground level. The site does not meet the requirement for the ambient temperature and relative humidity sensor to be 30 meters horizontally from a paved surface. The met tower at Millbrook is approximately 12 meters from a parking lot on one side and a driveway on the other side and 21 meters from Spring Forest Road.

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:

The division added a Met One AIO2 sensor to the site to collect this measurement and began reporting the data to AQS on June 1, 2021. The sensor is located 10 meters above ground level.

11. Hourly averaged relative humidity:

DAQ currently collects hourly averaged relative humidity at the Millbrook NCore monitoring location. On June 1, 2021, the relative humidity sensor was relocated from 2 meters above ground level to 10 meters above ground level. The site does not meet the requirement for the ambient temperature and relative humidity sensor to be 30 meters horizontally from a paved surface. The met tower at Millbrook is approximately 12 meters from a parking lot on one side and a driveway on the other side and 21 meters from Spring Forest Road.

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 April 29, 2021, DAQ has installed a ceilometer at the site and has written an SOP for its operation. DAQ continues to work with the University of Maryland Baltimore County to report the hourly averaged mixing height data.

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 April 29, 2021, DAQ has purchased and installed equipment to provide hourly averaged ultraviolet radiation monitoring. DAQ will work to get the equipment up and reporting hourly averaged ultraviolet radiation data in the DAQ program as soon as it is practical and plans to have the equipment reporting data to AQS by June 1, 2021.

C. Monitors/Methods

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

Parameter	**Monitoring Objective**	**Scale of Representation**	**Operating Schedule**	**AQS Method Code**
Trace level reactive oxides of nitrogen, NO_y, including NO	Population exposure	Neighborhood	Hourly data year-round	674
Nitrogen dioxide, NO_2, including NO	Population exposure	Neighborhood	Hourly data year-round	200
Ozone, O_3	Population exposure	Neighborhood	Hourly data year-round	047
Meteorological measurements of:				
Wind speed	Population exposure	Neighborhood	Hourly data year-round	020
Wind direction	Population exposure	Neighborhood	Hourly data year-round	020
Relative humidity	Population exposure	Neighborhood	Hourly data year-round	020
Ambient temperature	Population exposure	Neighborhood	Hourly data year-round	020
Solar radiation	Maximum ozone concentration	Neighborhood	Hourly data year-round	011
Rain melt precipitation	Maximum ozone concentration	Neighborhood	Hourly data year-round	011

XIII. Background Atmospheric Deposition Network

In 2018, the North Carolina Division of Air Quality, or DAQ, started a background atmospheric deposition network. The network consists of seven sites generally oriented near DAQ's regional offices as shown in Figure 71.

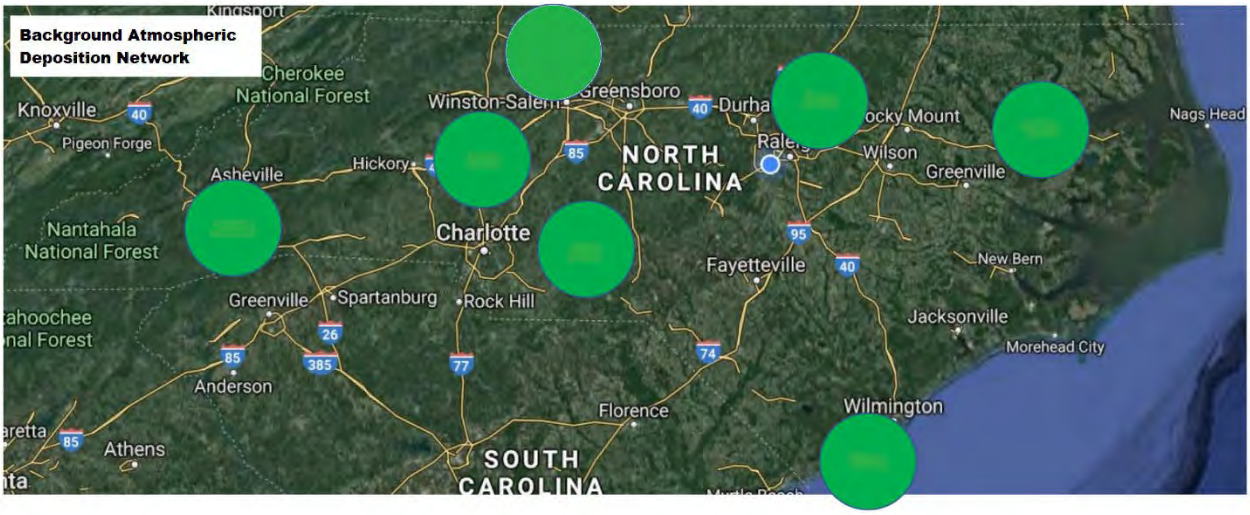

Figure 71. Locations of the Background Atmospheric Deposition Network
(*from NC DAQ Background PFAS Rainwater Network, located at* PowerPoint Presentation (nc.gov))

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 background atmosphere deposition network in the Charlotte-Concord-Gastonia and Raleigh MSAs, and Greensboro and Asheville 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 background atmospheric deposition network in the Wilmington and Greenville MSAs and in other areas in North Carolina that are outside of MSAs, respectively.

Table 58 The 2022-2023 Atmospheric Deposition 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 samples collected each month from the first to second Tuesday of the month	Weekly samples collected each month from the first to second Tuesday of the month
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:	None	None

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

Table 59 The 2022-2023 Background Atmospheric Deposition 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 samples collected each month from the first to	Weekly samples collected each month

Table 59 The 2022-2023 Background Atmospheric Deposition Network for the Greensboro and Asheville MSAs [a]

	second Tuesday of the month	from the first to second Tuesday of the month
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:	None	None

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

Table 60 The 2022-2023 Background Atmospheric Deposition 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 samples collected each month from the first to second Tuesday of the month	Weekly samples collected each month from the first to second Tuesday of the month
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

Table 60 The 2022-2023 Background Atmospheric Deposition Network for the Wilmington and Greenville MSAs [a]

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:	None	None

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

Table 61 The 2022-2023 Background Atmospheric Deposition 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 samples collected each month from the first to second Tuesday of the month
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:	None

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

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

Table 61 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 62 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	June 16, 2022
Quality Assurance Project Plan for PAMS Monitoring	March 30, 2021
Quality Assurance Project Plan for NCore Monitoring	Feb. 5, 2021
Quality Assurance Project Plan for Urban Air Toxics Monitoring	(Submitted July 19, 2022)
Quality Assurance Project Plan for SLAMS for Sulfur Dioxide and Nitrogen Dioxide Monitoring	Aug. 3, 2022
Near-road Monitoring QAPP	July 9, 2019, addendum approved July 29, 2020
Ozone QAPP	March 25, 2022
PM 2.5 Speciation	Jan. 16, 2002
Northampton County Background Monitoring QAPP	Oct. 4, 2019
Background Monitoring Program QAPP	Dec. 21, 2020

The North Carolina Department of Environmental Quality, or DEQ, submitted a QMP to EPA Region 4 in 2019. On August 12, 2019, the EPA formally approved the QMP.

In 2022, DAQ continues to work on updating its QAPPs and addressing the items where the QAPPs were conditionally approved. Table 62 provides the status of the QAPPs that DAQ is revising to submit to the EPA. The division is revising the speciation $PM_{2.5}$ QAPP to comply with the EPA's latest guidance. DAQ is also writing QAPPs for meteorological data collection and sampling for emergent chemicals in atmospheric deposition. DAQ will submit any outstanding QAPPs later this year.

Table 63 Status of Updates to the QAPPs and Conditionally Approved QAPPs

Quality Assurance Project Plan	Date Submitted to EPA	Date Comments Received from EPA	Date Due to the EPA
Urban Air Toxics Monitoring Program	July 19, 2022		
Quality Assurance Project Plan for NCore Monitoring			Feb. 5, 2023
Background Monitoring Program, QAPP			Dec. 21, 2022
Near-road Monitoring QAPP	Aug. 26, 2022	Aug. 31, 2022	Sept. 30, 2022
Northampton County Background Monitoring QAPP	Aug. 31, 2022	Sept. 1, 2022	Oct. 1, 2022

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

2

Figure 72. Signature Page from the DEQ Quality Management Plan

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

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

JAN 2 4 2002

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JAN 15 2002

Mr. Hoke P. Kimball, Chief
NCDENR
Division Of Air Quality
Ambient Monitoring Section
1641 Mail Service Center
Raleigh, North Carolina 27699-1641
Project No. 03-0025

Dear Mr. Kimball:

We have received your letter dated December 11, 2001, requesting EPA approval, and commenting the Quality Assurance Project Plan (QAPjP) for 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 Sheet for Title Page.

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

Sincerely,

Gerry Bennett
Office of Quality Assurance and
Data Integration

cc: Bill Cavender
Herbert Barden

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4

Laboratory Services and Applied Science Division
Quality Assurance and Program Services Branch
980 College Station Road
Athens, Georgia 30605-2720

March 30, 2021

Mr. Patrick Butler, Ambient Monitoring Section Chief
North Carolina Division of Air Quality (NCDAQ)
217 West Jones Street
Raleigh, NC 27603

LSASD Project Number: 21-0077

Mr. Butler:

We have reviewed the following document you submitted for approval:

Quality Assurance Project Plan for North Carolina Division of Air Quality, Photochemical Assessment Monitoring Stations (PAMS) Required Site Network for Speciated Volatile Organic Compounds, Carbonyls, and Meteorological Parameters Including Mixing Layer Height, DAQ-01-007, Revision 0, March 2021.

The quality assurance and technical elements within this QAPP were compared to the US EPA Technical Assistance Document for Sampling and Analysis of Ozone Precursors for the Photochemical Assessment Monitoring Stations Program, Revision 2, April 2019 (PAMS TAD, EPA-454/B-19-004), which addresses the collection and reporting of PAMS data. The stated procedures appear to be clear, sound, and appropriate as written, to the extent they can be evaluated. EPA approval of this document is granted. Please be aware that approval of this QAPP does not constitute a waiver from any method requirements that are not addressed within the body of this document. Your agency remains accountable for ensuring that this PAMS monitoring project adheres to all the applicable requirements detailed in the PAMS TAD. This QAPP should be reviewed internally by NCDAQ on an annual basis and revised when procedures change; at a minimum, the QAPP must be revised within five years.

Enclosed is the signature page of the QAPP which has been signed to indicate the Region 4 conditional approval. If you have any questions about these comments, please contact Adam Zachary at 706-355-8657 or via email at zachary.adam@epa.gov.

Sincerely,
LAURA ACKERMAN
Digitally signed by LAURA ACKERMAN
Date: 2021.03.30 13:48:44 -04'00'
Laura Ackerman, Chief
Quality Assurance Section

Figure 73. Approval Letter for the PAMS QAPP

1.0 Quality Assurance Project Plan Identification and Approval

Title: *Quality Assurance Project Plan for the North Carolina Division of Air Quality NCore Monitoring Program, Revision 1*

The DAQ hereby recommends the attached *Quality Assurance Project Plan for the North Carolina Division of Air Quality NCore Monitoring Program, Revision 1* for approval and commits the State of North Carolina, Department of Environmental Quality, Division of Air Quality to follow the elements described within.

Department of Environmental Quality

1) Signature: DocuSigned by: Michael Abraczinskas D5013FED0218423... Date 1/29/2021
Air Quality Division Director

2) Signature: DocuSigned by: Patrick Butler 4290A7E2C2A0429... Date 1/29/2021
Quality Assurance Manager
(Ambient Monitoring Section Chief)

3) Signature: DocuSigned by: Jim Bowyer C96894826C9B41D... Date 1/29/2021
Laboratory Analysis Branch Supervisor

4) Signature: DocuSigned by: B278F8186CEC4DC... Date 1/26/2021
Projects and Procedures Branch Supervisor

5) Signature: DocuSigned by: Kay Roberts BE4009EE242941D... Date 1/26/2021
Primary QAPP Author

6) Signature: LAURA ACKERMAN Digitally signed by LAURA ACKERMAN Date: 2021.02.05 12:58:51 -05'00' Date
EPA Region 4 Designated Approving Official

Figure 74. NCore QAPP Signature Page

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

From: McCarthy, Stephanie
To: Butler, Patrick
Cc: Ackerman, Laura; Steger, Joette; Roberts, Kay C
Subject: [External] RE: NC DAQ Near Road QAPP Approval
Date: Wednesday, July 29, 2020 1:48:28 PM
Attachments: image001.png

CAUTION: External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to report.spam@nc.gov

Patrick –
Thank you for this notification and submittal. We have reviewed the QAPP addendum and find the changes enumerated below acceptable. Please retain this email for your records; we accept the Near-Road QAPP addendum under the original conditional-approval issued on July 9, 2019 (LSASD Project Number: 18-0329). The fully revised Near-Road QAPP is due to EPA in July 2021.

If you have any questions or concerns, please feel free to reach out to me or Laura Ackerman.

Thank you!
Stephanie

Figure 76. Near-Road Monitoring QAPP Addendum Approval

1.0 Approval Sheet

Title: DAQ-01-004 Quality Assurance Project Plan for the North Carolina Division of Air Quality Ozone Ambient Air Quality Monitoring Program, Revision 1

The DAQ hereby recommends this *DAQ-01-004 Quality Assurance Project Plan for the North Carolina Division of Air Quality Ozone Ambient Air Quality Monitoring Program, Revision 1* 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: DocuSigned by: Michael Abraczinskas D5013FED0218423... Date 3/25/2022
North Carolina Department of Environmental Quality,
Air Quality Division Director

2) Signature: DocuSigned by: Patrick Butler 4290A7E2D2A0429... Date 3/24/2022
Ambient Monitoring Section Chief and Quality
Assurance Manager

3) Signature: DocuSigned by: B278F8186CEC4DC... Date 3/24/2022
Projects and Procedures Branch Supervisor

4) Signature: DocuSigned by: Jeff Gobel 98CD1C1D70B34DA... Date 3/24/2022
Primary Quality Assurance Project Plan Author
RCO Environmental Chemist

5) Signature: DocuSigned by: Ashley Featherstone 136FFC59677948E... Date 3/24/2022
Asheville-Buncombe Air Quality Agency Director

6) Signature: KEVIN SIMMONS Digitally signed by KEVIN SIMMONS Date: 2022.03.25 13:35:06 -04'00' Date 3/25/22
United States Environmental Protection Agency
Region 4 Designated Approving Official

Figure 77. Signature page for the Ozone Quality Assurance Project Plan

1.0 Approval Sheet

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

The Division of Air Quality recommends the attached *Quality Assurance Project Plan for the North Carolina Division of Air Quality Northampton County Background-Monitoring Program* for approval. This plan commits the State of *North Carolina*, Department of Environmental Quality (Division of Air Quality) to follow the elements described within.

1) Signature: _____ Date 10/4/19
DEQ, Air Quality Division Director

2) Signature: _____ Date 10-3-2019
DAQ, Ambient Monitoring Section Chief and Quality Assurance Manager

3) Signature: _____ Date 3 Oct 2019
Projects and Procedures Branch Supervisor

4) Signature: _____ Date 03 Oct. 2019
Primary QAPP Author

5) Signature: _____ Date 10/04-/19
EPA Region 4 Designated Approving Official

Figure 78. Signature Page for the Northampton County Background Monitoring QAPP

1.0 Quality Assurance Project Plan Identification and Approval

Title: *DAQ-01-003 Quality Assurance Project Plan for the North Carolina Division of Air Quality Background Monitoring Program, Revision 0*

The Division of Air Quality hereby recommends the attached *DAQ-01-003 Quality Assurance Project Plan for the North Carolino Division of Air Quality Background 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.

Department of Environmental Quality

1. Signature: DocuSigned by: Michael Abraczinskas 9E173ADB37D8492... Date 11/17/2020
   Air Quality Division Director
2. Signature: DocuSigned by: Patrick Butler 229EBE2FC84F42A... Date 11/17/2020
   Quality Assurance Manager
   (Ambient Monitoring Section Chief)
3. Signature: DocuSigned by: Joette Steger F61095C024634CD... Date 11/17/2020
   Projects and Procedures Branch Supervisor
4. Signature: DocuSigned by: Kay Roberts BE4009EE242941D... Date 11/17/2020
   Primary QAPP Author
5. Signature: LAURA ACKERMAN Digitally signed by LAURA ACKERMAN Date: 2020.12.21 12:01:29 -05'00' Date
   EPA Region 4 Designated Approving Official

Figure 79. Background Monitoring Program QAPP Signature Page

1.0 Quality Assurance Project Plan Identification and Approval Sheet

Title: DAQ-01-002 Quality Assurance Project Plan for the North Carolina Division of Air Quality State and Local Air Monitoring Stations for the Sulfur Dioxide and Nitrogen Dioxide Monitoring Program
Revision 0

The Division of Air Quality recommends the attached Q*uality Assurance Project Plan for the North Carolina Division of Air Quality State and Local Air Monitoring Stations for the Sulfur Dioxide and Nitrogen Dioxide Monitoring Program* for approval. This plan commits the State of North Carolina, Department of Environmental Quality, Division of Air Quality to follow the elements described within.

1) Signature: DocuSigned by: Michael Abraczinskas D5013FED0218423... Date 7/27/2022
DEQ, Air Quality Division Director

2) Signature: DocuSigned by: Patrick Butler 4290A7E2D2A0429... Date 7/27/2022
DAQ Quality Assurance Manager
(Ambient Monitoring Section Chief)

3) Signature: DocuSigned by: B278F8186CEC4DC... Date 7/27/2022
Projects and Procedures Branch Supervisor

4) Signature: DocuSigned by: Kay Roberts BE4009EE242941D... Date 7/26/2022
Primary Quality Assurance Project Plan Author,
RCO Environmental Chemist

5) Signature: KEITH HARRIS Digitally signed by KEITH HARRIS Date: 2022.08.03 15:20:44 -04'00' Date
EPA Region 4 Designated Approving Official

Figure 80. Signature Page for the SLAMS Sulfur Dioxide and Nitrogen Dioxide QAPP

1.0 Quality Assurance Project Plan Identification and Approval

Title: *DAQ-01-005 Quality Assurance Project Plan for the North Carolina Division of Air Quality PM Monitoring Program, Revision 3*

The Division of Air Quality hereby recommends the attached *DAQ-01-005 Quality Assurance Project Plan for the North Carolina Division of Air Quality PM Monitoring Program, Revision 3* for approval and commits the State of North Carolina, Department of Environmental Quality, Division of Air Quality to follow the elements described within.

Department of Environmental Quality:

1. **Signature:** DocuSigned by: Michael Abraczinskas D5013FED0218423... **Date** 5/25/2022
   Air Quality Division Director
2. **Signature:** DocuSigned by: Patrick Butler 4290A7E2D2A0429... **Date** 5/25/2022
   Quality Assurance Manager
   (Ambient Monitoring Section Chief)
3. **Signature:** DocuSigned by: Jim Bowyer C96894826C9B41D... **Date** 5/25/2022
   Laboratory Analysis Branch Supervisor
4. **Signature:** DocuSigned by: B278F8186CEC4DC... **Date** 5/25/2022
   Projects and Procedures Branch Supervisor
5. **Signature:** DocuSigned by: Travis Punderburk BDD86579E9314CD... **Date** 5/25/2022
   Primary QAPP Author, Environmental Chemist

Asheville-Buncombe Air Quality Agency:

1. **Signature:** DocuSigned by: Ashley Featherstone 136FFC59677948E... **Date** 5/25/2022
   Asheville-Buncombe Air Quality Agency Director

United States Environmental Protection Agency:

7. **Signature:** KEITH HARRIS Digitally signed by KEITH HARRIS Date: 2022.06.16 15:14:50 -04'00' **Date** _____
   EPA Region 4 Designated Approving Official

Figure 81. Signature Page for the PM QAPP

XV. Equipment Condition of North Carolina Monitoring Sites

Ozone analyzers Thermo 49i and calibrators Thermo 49i-PS are in good condition. DAQ purchased them in 2013 and 2014. 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 Electronics and Calibration Branch, or 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. The DAQ no longer operates any C-Model ozone equipment. Several 49i and 49-iPS have been damaged beyond repair and have been used for parts. DAQ purchased one Q-model calibrator and monitor in 2021 for testing and deployment for comparisons to the current iModels. Programming issues with the Envidas software are currently being worked through. Modbus registers are not lining up and DAQ is working with the vendor for software updates. Once operation has been verified the plan is to purchase 5-10 sets of ozone Q Models for a gradual replacement of all iModels over the next 5 to 7 years.

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

API Teledyne Model 701 ZAGs are in good condition, having been purchased in 2014 and 2015. The ECB has 74 of these ZAGs and deployed them starting in 2015 to all DAQ sites requiring zero air. The first 50 Model 701's are no longer supported by the manufacturer and will gradually be phased out when each unit fails beyond repair. Teledyne's recommendation is to upgrade to the newer supported models.

API Teledyne Model 751H Portable ZAGs are in good condition. The DAQ purchased them in 2014 and 2015. The ECB has two of these ZAGs and uses them to conduct audits. Our current model is no longer supported by the manufacturer and will gradually be phased out when each unit fails beyond repair. Teledyne's recommendation is to upgrade to the newer supported models.

SO_2 analyzers Thermo 43i are in good condition. The DAQ purchased them in 2015. The ECB has 11 - 43i's and eight - 43i-TLE analyzers. They are currently supporting five year-round sites, of which two are time-limited source-oriented sites, established to meet the data requirement rule, four 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. Q-model analyzers are being considered when funding will allow for the purchase.

CO analyzers Thermo 48i-TLE (three in 2007, one in 2012, two in 2015, two in 2016 and one in 2018) are in fair to like new condition. Parts are hard to acquire for the older 48i's. The analyzers support two sites in the DAQ and one in 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. Q-model analyzers are being considered when funding will allow for the purchase.

Thermo 146i calibrators used with SO_2, CO and NO_y are new (2015) and in good condition. The division has 15 and replaced the last 146C model in 2017. The DAQ no longer

operates any C-Model calibrators for SO_2, CO, and NO_y. Q-model calibrators are being considered when funding will allow for the purchase.

NH_3 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. The ECB has two newer units for any future requirements.

NO2 Nitrogen Dioxide Teledyne T200UP analyzers are in good condition. The DAQ has five units (three purchased in 2012, one purchased in 2013 and one purchased in 2014). The ECB has 2 CAPS monitors deployed at Rockwell and Millbrook PAMS. One new unit was purchased for the PAMS project, which allows for a spare unit at the ECB. Funding requests were made to purchase a Teledyne N500 analyzer and were denied. Future purchases will be determined by available funding.

NO_2 Nitrogen Dioxide Teledyne T700U calibrators are in good condition. The DAQ has eight (four in 2013, two in 2014 and two in 2018) units. The DAQ is working to purchase additional units in the future as funding allows.

NO3 nitrate analyzers and generators – R&P Model 8400N: DAQ owns two each (2003). The Millbrook continuous speciation site (CSS) was shut down on March 6, 2020 and both units are at the ECB. 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) and they are in fair to good condition. Thermo stopped supporting them in 2015. The 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 Millbrook CSS site has been shut down and the unit was removed in 2020.The one removed earlier from the Millbrook CSS site is on the shelf at ECB for a spare.

Anderson particulate machines: The DAQ has kept two (1987) in its inventory, they are in poor condition and the ECB will have a tough time maintaining or deploying the units due to staffing attrition.

Total suspended particulate, TSP: The DAQ has kept six (1996) in its inventory, they are in poor condition and the ECB will have a tough time maintaining or deploying the units due to staffing attrition.

Wedding PM_{10} monitors: The DAQ has kept one (1991) in its inventory and it is in poor condition the ECB will have a tough time maintaining or deploying the unit due to staffing attrition.

URG 3000N particulate monitors: The 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: The DAQ owns five older units and one (2016) is in fair condition to new condition. The ECB uses the older units as spares to maintain the remaining unit.

Met One Super SASS-110: The DAQ purchased one unit in 2018. This unit has been deployed at Millbrook to replace a faulty unit.

Thermo Partisol 2025 $PM_{2.5}$ units: DAQ owns 40 (1998 – 2001); while showing some age, they are in poor condition. These units are no longer supported by the manufacturer and will

be gradually replaced beginning in 2017. There are no units remaining in the field. The old 2025 units are ready for surplus.

Thermo Partisol 2025i $PM_{2.5}$ units: The DAQ owns four; they are in fair 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. The DAQ has purchased seven units in 2017 and has replaced all old 2025 units.

Beta attenuation monitors, BAM, Model 1020: The DAQ owns 24; units were acquired between 2008 and 2015; equipment is in good to new condition. Five touchscreen units were purchased in 2021 and will be deployed as older units fail. There is a plan to gradually replace the 1020's with 1022's when funding and siting criteria allows.

Beta attenuation monitors, BAM, Model 1022: The DAQ owns 18, equipment was new (2015 and 2016) and in good condition. The DAQ purchased four additional units in 2017. Several units have been sent back to the manufacturer for an overhaul and will be returned in like new condition. 4 new units are scheduled to be purchased in 2022 to replace some of the 1020's.

E-BAM monitors: The DAQ currently owns six E-BAMS, one is deployed at a DAQ atmospheric deposition site and four are stored at the Reedy Creek Lab ready for deployment as necessary and one is on extended loan at the Asheville Regional Office. Two units are older and in good working condition, while two units were purchased in 2017 and two were purchased in late 2020. All units are in good working condition.

Xontek 911 VOC samplers need constant reconditioning. Nearly all obsolete pumps have been replaced. Heaters for the flow controller are in desperate need. 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. The DAQ is working to purchase additional units in the future as funding allows.

ATEC 2200-1C aldehyde samplers are in good condition. The DAQ owns 4 that are in service and one 8CH-8000 sampler to support the PAMS monitoring requirements, collecting three 8-hour samples during a 24-hour period purchased in 2020. DAQ is working to purchase additional units in the future.

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

API T640x: The DAQ owns three monitors purchased between 2016 and 2017. DAQ is testing one unit at Millbrook and one at Castle Hayne. Two spare units at the ECB in good condition. One to two new units were requested to be purchased in 2022 to replace some of the BAM Coarse sites or old PM10 sites.

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. Several units have been deployed and software programming with different versions have caused issues with other types of equipment. An audit procedure is currently being worked on for future use.

N-CON Model 00-120, wet/dry deposition samplers: The DAQ owns 14 samplers, 13 are deployed at 12 atmospheric deposition 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. The model 00-120 were purchased in 2018 and 2019. All are in good working condition.

ETI NOAH-IV rain gauge: The DAQ owns 15 units, 12 are deployed at 12 atmospheric deposition sites across NC, two are deployed at mercury deposition sites, and one is stored at the DAQ Reedy Creek Lab. Mercury rain gauges were purchased in 2014; all others were purchased in 2018 and 2019. All are in good working condition.

Ceilometer: The DAQ owns one (1) Vaisala CL-51 Ceilometer and accessories purchased in 2020. The ceilometer is deployed at the PAMS site in Raleigh, NC. It is in excellent condition.

AutoGC: The DAQ owns one (1) Markes-Agilent automated gas chromatograph with dual flame ionization detectors to support PAMS monitoring. The unit was purchased by the EPA and delivered in the end of 2018. It was installed at the Reedy Creek Laboratory in 2019 for system development, training, and shakedown. In January 2021, it was deployed at the PAMS monitoring site in Raleigh, NC. Currently, maintenance repair is being negotiated by DAQ and the manufacturer due to some type of contamination.

Pyranometers: The DAQ owns one (1) MetOne Li-200R solar radiator sensor and one (1) Kipp & Zonene CUV-5 UV radiation sensor. These sensors are deployed at the PAMS monitoring site in Raleigh, NC. They are in good condition.

DAQ also owns one (1) Cooper Environmental Xact 625i Ambient Metals Monitoring System and accessories purchased in 2020. It is in good condition.

DAQ also owns one (1) Fluke Calibration Molbox and accessories. It is in good condition.

XVI. Resources

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11. Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide Primary National Ambient Air Quality Standard, Federal Register of Aug. 21, 2015, (80 FR 51052) (FRL-9928-18-OAR), 2015-20367, available at https://www.govinfo.gov/app/details/FR-2015-08-21/2015-20367.
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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_{10}	$PM_{10-2.5}$	$PM_{2.5}$			Meteorology						UAT	ADN
	T	R	T	T	NO_2	O_3	Auto GC	ALD			M	C	S	WS/ WD	AT/ RH	BP	RF	SR/ UVR	CM		
370030005 Taylorsville-Liledoun						X			X												
370110002 Linville Falls						X												SR			
370130151 Bayview Ferry		X												X	X	X					
370210030[a] Bent Creek						X															
370210034[a] Board of Ed									P	P	X	X									
370210035[a] AB Tech College																				VOC	
370210038 Asheville																					X
370270003 Lenoir		X				X															
370330001 Cherry Grove						X			X												
370350004 Hickory Water Tower												2									
370510009 Wm Owen									X	P		X									
370510010 Honeycutt		X				X															
370510011 Wade School						X															

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

Site ID Site Name	CO	SO_2		NO_y			PAMS		PM_{10}	$PM_{10-2.5}$	$PM_{2.5}$			Meteorology						UAT	ADN
	T	R	T	T	NO_2	O_3	Auto GC	ALD			M	C	S	WS/ WD	AT/ RH	BP	RF	SR/ UVR	CM		
370570002 Lexington Water Tower											X	X									
370630015 Durham Armory		X				X			X	X		X									
370650099 Leggett						X						X									
370670022[b] Hattie Ave.		X			X	X			X	X	X	X	X					SR		VOC	
370670030[b] Clemmons						X					X	X									
370671008[b] Union Cross						X								X	AT						
370750001[c] Joanna Bald						X															
370770001 Butner						X															
370810013 Mendenhall						X			X	P		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												

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

Site ID Site Name	CO	SO_2		NO_y			PAMS		PM_{10}	$PM_{10-2.5}$	$PM_{2.5}$			Meteorology						UAT	ADN
	T	R	T	T	NO_2	O_3	Auto GC	ALD			M	C	S	WS/ WD	AT/ RH	BP	RF	SR/ UVR	CM		
371090004 Crouse						X															
371170001 Jamesville		X				X			X												
371190041 [d] Garinger	X		X	X	X	X	X	P	X	X	X	X	X	X	X	X	X	X	X	VOC	
371190045 [d] Remount Rd	X				X						X	X									
371190046 [d] University Meadows						X												SR			
371190047 [d] Ramblewood Park									X												
371190048 [d] Friendship Park												X									
371190050 [d] Equipment Drive					P																
371210004 Spruce Pine Hospital												X									
371230001 Candor									X			X		X	X	X				VOC ALD	X
371290002 Castle Hayne						X			X	P		X									
371290010 Eagles Island																				VOC	X
371310003 Northampton					X							X									
371450003 Bushy Fork						X															
371470006 Pitt Co Ag Cen						X						X								VOC	X

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

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

CO = Carbon monoxide
NO_y = Reactive oxides of nitrogen
O_3 = Ozone
X = monitor operating at site
P = monitoring proposed to start at site
M = 2025 or 2025i Sequential
PM_{10} = Particles of 10 micrometers or less in aerodynamic diameter
T = 48i-TLE or Teledyne API (TAPI) 300EU monitor for CO, 43i TLE monitor for SO_2

SO_2 = Sulfur dioxide
NO_2 = Nitrogen dioxide
$PM_{2.5}$ = Fine particles
E = monitor at site will end
R = 43i monitor for SO_2
C = BAM1020 or 1022 or T640 or T640X

S = Met One SASS monitor and URG 3000N
WS/WD = Wind speed & direction
AT/RH = air temperature & relative humidity
RF = Rainfall BP = barometric pressure
SR/UVR = solar radiation & ultraviolet radiation
CM = ceilometer UAT = Urban air toxics
ADN = atmospheric deposition network
VOC = Volatile organic compounds
ALD = Aldehydes and ketones

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

Appendix B. 2022 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. 2022 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 Air Quality Monitor Locations and Potentially Underserved Communities

9/10/2022

Introduction

The purpose of this analysis is to determine the current locations of Air Quality monitors across North Carolina and how many of those monitors are within potentially underserved block groups. The North Carolina Department of Environmental Quality (NCDEQ) is committed to the principles of environmental justice, including ensuring equitable ambient air quality monitoring in communities across North Carolina, especially in underserved and overburdened communities. The following analysis looks at the locations of all regulatory air monitors across North Carolina to begin identifying potential gaps in locations of air quality monitors. This analysis has not been ground-truthed.

Methodology

The demographic data overlaid with the locations of air monitors for this analysis is the American Community Survey (ACS), 2019 block group level data. The selected block groups identified as Potentially Underserved meet the following definition/criteria:

- Racial composition:
  - Share of nonwhites is over fifty percent OR
  - Share of nonwhites is at least ten percent higher than county or state share

AND

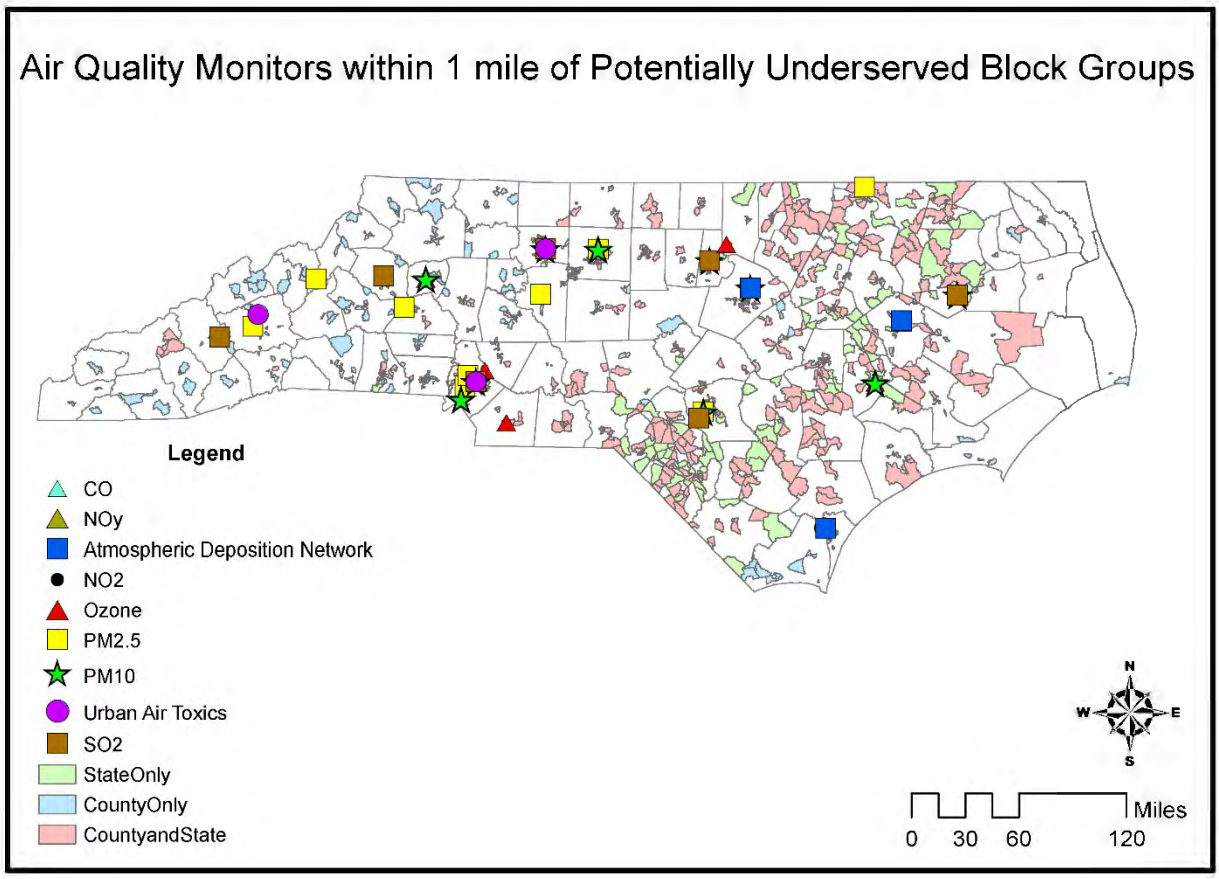
- Poverty rate:
  - Share of population experiencing poverty is over twenty percent AND
  - Share of households in poverty is at least five percent higher than the county or state share

Two different geospatial analyses were conducted. The first selected only monitors located within an underserved block group. The second selected monitors located both within the block group and within 1-mile of the block group.

A total of 114 air quality monitors across the state were included in this analysis. Of those, there are 11 types of monitors: atmospheric deposition, nitrogen dioxide (NO_2), reactive oxides of nitrogen (NO_y), Ozone, fine particles ($PM_{2.5}$), particles with aerodynamic diameters of 10 microns or less (PM_{10}), Urban Air Toxics, sulfur dioxide (SO_2), carbon monoxide (CO), Clean Air Status and Trends Network (CASTNET), and Interagency Monitoring of Protected Visual Environments (IMROVE).

Results

Out of the 114 total monitors, 25 (22%) of them are located within a potentially underserved block group. When the analysis was expanded to also include any monitors within a potentially underserved block group or within 1-mile of potentially underserved block groups, the number of monitors considered to represent air quality in or near underserved communities increased to 59% (67 of the 108). The following figure shows the locations of those monitors, sorted out by type, across the state.



The following sections includes the demographic data (obtained through EJScreen) by type of air monitor. Data included is for the one-mile radius surrounding the air monitor. Low-Income in these tables shows percent with an income level below $25,000[37].

Background Atmospheric Deposition Network

For air monitors across the state that monitor background atmospheric deposition, 4 out of 7, or 57%, of the monitors are within one-mile of a potentially underserved community (Table 63).

Table 64. Demographic overview for Background Atmospheric Deposition Monitors in North Carolina Potentially Underserved Communities

Monitoring Station	County	Percent Non-White	Percent Low-Income	Speak English "Less than very well"
Eagles Island	New Hanover	37%	34%	1%
Mendenhall	Guilford	22%	15%	5%
Millbrook	Wake	75%	18%	15%
Pitt County Ag Center	Pitt	75%	46%	5%

[37] Low-Income data obtained through EJScreen is a different dataset than the Poverty data set used for the potentially underserved communities' definition so discrepancies may occur.

NO_2

For air monitors across the state that monitor NO_2, 5 out of 9, or 55%, of the monitors are within one-mile of a potentially underserved community (Table 64).

Table 65. Demographic overview for NO_2 Ambient Air Monitors in North Carolina Potentially Underserved Communities

Monitoring Station	County	Percent Non-White	Percent Low-Income	Speak English "Less than very well"
Hattie Ave. LP Ozone	Forsyth	95%	57%	4%
Garinger	Mecklenburg	65%	26%	14%
Remount Road	Mecklenburg	58%	24%	2%
Millbrook	Wake	75%	18%	15%
Northampton	Northampton	78%	48%	0%

NO_y

For air monitors across the state that monitor NO_y, 2 out of 2, or 100%, of the monitors are within one-mile of a potentially underserved community (Table 65).

Table 66. Demographic overview for NO_y Ambient Air Monitors in North Carolina Potentially Underserved Communities

Monitoring Station	County	Percent Non-White	Percent Low-Income	Speak English "Less than very well"
Millbrook	Wake	75%	18%	15%
Garinger	Mecklenburg	65%	26%	14%

Ozone

For air monitors across the state that monitor Ozone, 14 out of 33, or 42%, of the monitors are within one-mile of a potentially underserved community (Table 66).

Table 67. Demographic overview for Ozone Ambient Air Monitors in North Carolina Potentially Underserved Communities

Monitoring Station	County	Percent Non-White	Percent Low-Income	Speak English "Less than very well"
Taylorsville Liledoun	Alexander	28%	28%	3%
Lenoir	Caldwell	23%	22%	2%
Honeycutt	Cumberland	50%	18%	4%
Durham Armory	Durham	63%	25%	0%
Hattie Ave. LP Ozone	Forsyth	95%	57%	4%
Butner	Granville	52%	22%	0%
Mendenhall	Guilford	22%	15%	5%

Table 67. Demographic overview for Ozone Ambient Air Monitors in North Carolina Potentially Underserved Communities

Monitoring Station	County	Percent Non-White	Percent Low-Income	Speak English "Less than very well"
Lenoir Community College	Lenoir	45%	14%	0%
Jamesville	Martin	44%	23%	0%
Garinger	Mecklenburg	65%	26%	14%
University Meadows	Mecklenburg	61%	34%	5%
Pitt County Ag Center	Pitt	75%	46%	5%
Monroe	Union	67%	28%	18%
Millbrook	Wake	75%	18%	15%

$PM_{2.5}$

For air monitors across the state that monitor $PM_{2.5}$, 14 out of 22, or 63%, of the monitors are within one-mile of a potentially underserved community (Table 67).

Table 68. Demographic overview for $PM_{2.5}$ Ambient Air Monitors in North Carolina Potentially Underserved Communities

Monitoring Station	County	Percent Non-White	Percent Low-Income	Speak English "Less than very well"
Board of Education Bldg	Buncombe	30%	35%	12%
Hickory Water Tower	Catawba	50%	43%	11%
William Owen School	Cumberland	55%	30%	5%
Durham Armory	Durham	63%	25%	0%
Hattie Ave. LP Ozone	Forsyth	95%	57%	4%
Lexington Water Tower	Davidson	59%	44%	9%
Mendenhall	Guilford	22%	15%	5%
Remount Road	Mecklenburg	58%	24%	2%
Spruce Pine Hospital	Mitchel	14%	37%	5%
Garinger	Mecklenburg	65%	26%	14%
Northampton	Northampton	78%	48%	0%
Pitt County Ag Center	Pitt	75%	46%	5%
Friendship Park	Mecklenburg	95%	30%	6%
Millbrook	Wake	75%	18%	15%

PM_{10}

For air monitors across the state that monitor PM_{10}, 10 out of 13, or 76%, of the monitors are within one-mile of a potentially underserved community (Table 68).

Table 69. Demographic overview for PM_{10} Ambient Air Monitors in North Carolina Potentially Underserved Communities

Monitoring Station	County	Percent Non-White	Percent Low-Income	Speak English "Less than very well"
Taylorsville Liledoun	Alexander	28%	28%	3%
William Owen School	Cumberland	55%	30%	5%
Durham Armory	Durham	63%	25%	0%
Hattie Ave. LP Ozone	Forsyth	95%	57%	4%
Mendenhall	Guilford	22%	15%	5%
Garinger	Mecklenburg	65%	26%	14%
Lenoir Community College	Lenoir	45%	14%	0%
Jamesville	Martin	44%	23%	0%
Ramblewood Park	Mecklenburg	99%	33%	12%
Millbrook	Wake	75%	18%	15%

Urban Air Toxics

For air monitors across the state that monitor Urban Air Toxics, 6 out of 7, or 85%, of the monitors are within one-mile of a potentially underserved community (Table 69).

Table 70. Demographic overview for Urban Air Toxics Ambient Air Monitors in North Carolina Potentially Underserved Communities

Monitoring Station	County	Percent Non-White	Percent Low-Income	Speak English "Less than very well"
AB Tech College	Buncombe	34%	40%	1%
Eagles Island	New Hanover	37%	34%	1%
Millbrook	Wake	75%	18%	15%
Hattie Ave. LP Ozone	Forsyth	95%	57%	4%
Pitt County Ag Center	Pitt	75%	46%	5%
Garinger	Mecklenburg	65%	26%	14%

SO_2

For air monitors across the state that monitor SO_2, 8 out of 10, or 80%, of the monitors are within one-mile of a potentially underserved community (Table 70).

Table 71. Demographic overview for SO_2 Ambient Air Monitors in North Carolina Potentially Underserved Communities

Monitoring Station	County	Percent Non-White	Percent Low-Income	Speak English "Less than very well"
Lenoir	Caldwell	23%	22%	2%
Honeycutt	Cumberland	50%	18%	4%
Durham Armory	Durham	63%	25%	0%

Table 71. Demographic overview for SO_2 Ambient Air Monitors in North Carolina Potentially Underserved Communities

Monitoring Station	County	Percent Non-White	Percent Low-Income	Speak English "Less than very well"
Hattie Ave. LP Ozone	Forsyth	95%	57%	4%
Canton DRR	Haywood	9%	26%	5%
Jamesville	Martin	44%	23%	0%
Garinger	Mecklenburg	65%	26%	14%
Millbrook	Wake	75%	18%	15%

CO

For air monitors across the state that monitor CO, 3 out of 4, or 75%, of the monitors are within one-mile of a potentially underserved community (Table 71).

Table 72. Demographic overview for CO Ambient Air Monitors in North Carolina Potentially Underserved Communities

Monitoring Station	County	Percent Non-White	Percent Low-Income	Speak English "Less than very well"
Remount Road	Mecklenburg	58%	24%	2%
Garinger	Mecklenburg	65%	26%	14%
Millbrook	Wake	75%	18%	15%

Other

The last two types of ambient monitoring station for CASNET and IMPROVE do not have any stations within 1-mile of a potentially underserved community. CASNET has 0 out of 4 monitors and IMPROVE with 0 out of 3 monitors.

Appendix E. Hickory Data Analysis For Relocating the Fine Particle Monitors on the Site

Introduction

In the future, Highway US 321 going past the site will be widened. Construction will dictate some temporary changes and rerouting of traffic lanes, closure of an overpass near the site, as well as the striking of new rights-of-way near the site on the two roads that border the water tower property. The road itself will not increase, just the right-of-way distance, and maybe some sidewalk/improvements area would increase. On May 12, 2021, the City of Hickory contacted DAQ about moving the monitors approximately 38 meters to the north towards 1st Avenue SW as shown in Figure 82. The monitors will remain at least 17 meters from the nearest travel lane on all sides. DAQ has staked out the new location for the platform and is working on getting electricity to the site.

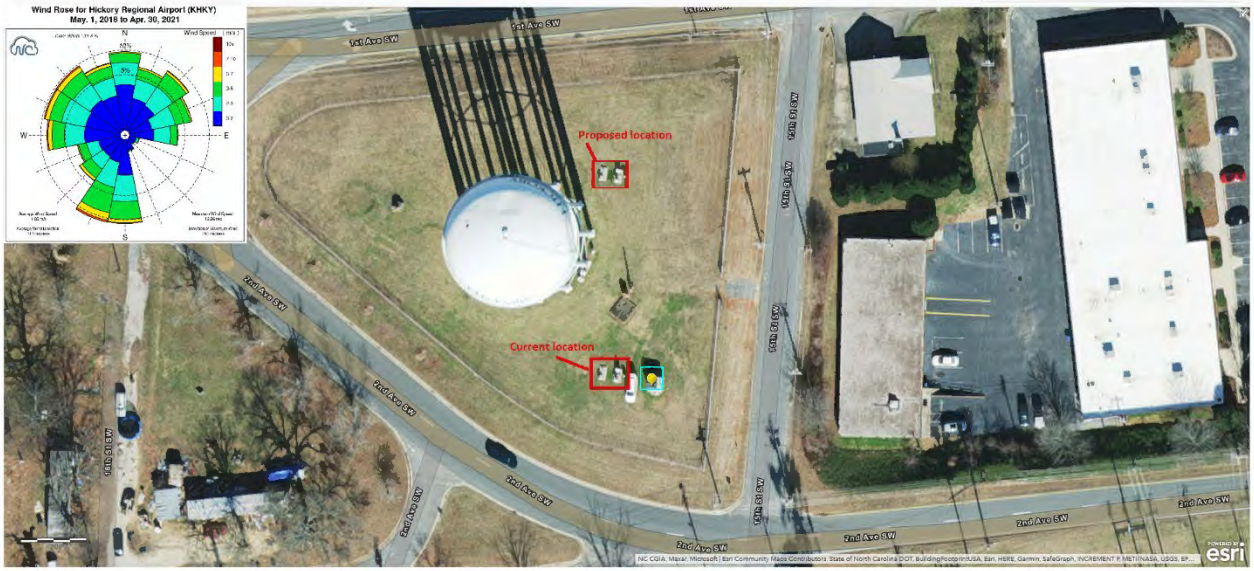


Figure 82. Aerial view of the Hickory fine particle monitoring site showing relative positions of the current location and proposed location

The monitors affected by this relocation are 37-035-0004-88101-3 and 37-035-0004-88101-4. The DAQ operates these monitors to ensure the air in the Hickory area complies with the national ambient air quality standards. Both fine particle monitors are suitable for comparison to the annual fine particle national ambient air quality standard. Figure 83 shows a view of the new location relative to the existing location at the site. Views from the proposed site looking north, south, and west are shown in Figure 84 through Figure 86.

Figure 83. New monitoring location

Figure 84. Looking north from proposed location

Figure 85. Looking west from the new location

Figure 86. Looking south from the new location

Detailed Siting Information on the Proposed Location

There are no trees within 30 meters of the new location. There are two buildings 35 meters east of the new site. One building is 6 meters tall and the other is 3 meters tall so they will also not be an obstacle to air flow. The nearest road is 15th Street SW, approximately18 meters east southeast of the new location. 1st Avenue SW is approximately 26 meters north northwest of the new location. US 321 is approximately 135 meters east northeast of the new location. As shown in Figure 87, in 2019 the average annual daily traffic (AADT) count was 4,100 to the north northeast of the new location on 1st Avenue SW, 3,200 to the southeast of the new location on 2nd

Avenue SW, and 39,500 to the southeast of the new location on US 321. The inlet heights at the new location will be the same as the inlet heights for the current monitoring location, approximately 2.3 meters.

Figure 87. 2019 Traffic count map for Hickory (from DOT)

The Air Quality System identification number and street address for the site will remain the same: 37-035-0004 and 1501 1st Avenue, SW, Hickory, North Carolina 28602. The new latitude and longitude will be 35.729358 and -81.365685 (subject to change slightly depending on the exact placement of the monitors). The sampling and analysis methods (AQS codes 209) and operating schedules (hourly) will remain the same. The monitoring objective for both monitors will continue to be population exposure. Figure 88 shows the location of the monitoring station relative to the population center of Hickory. Based on the wind roses in Figure 89 through Figure 93, the predominate winds are from the south southwest throughout the year except for in the fall when the predominate winds are from the west northwest. The spatial scale of representativeness for both monitors will remain neighborhood based on the location of the roadways and the amount of traffic on those roads. (See Figure 94.)

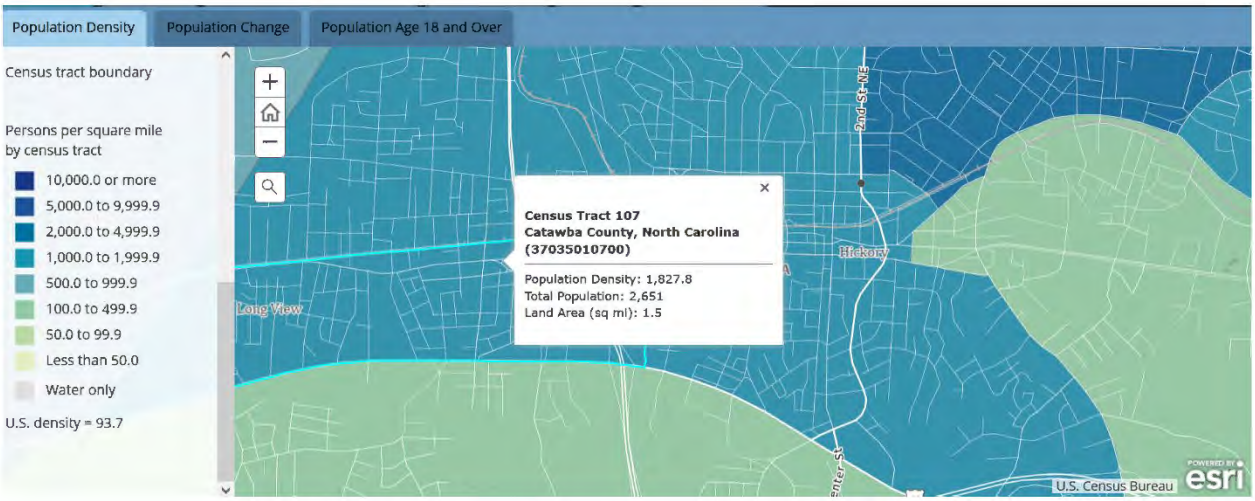


Figure 88. Location of the proposed monitoring station relative to the population of Hickory

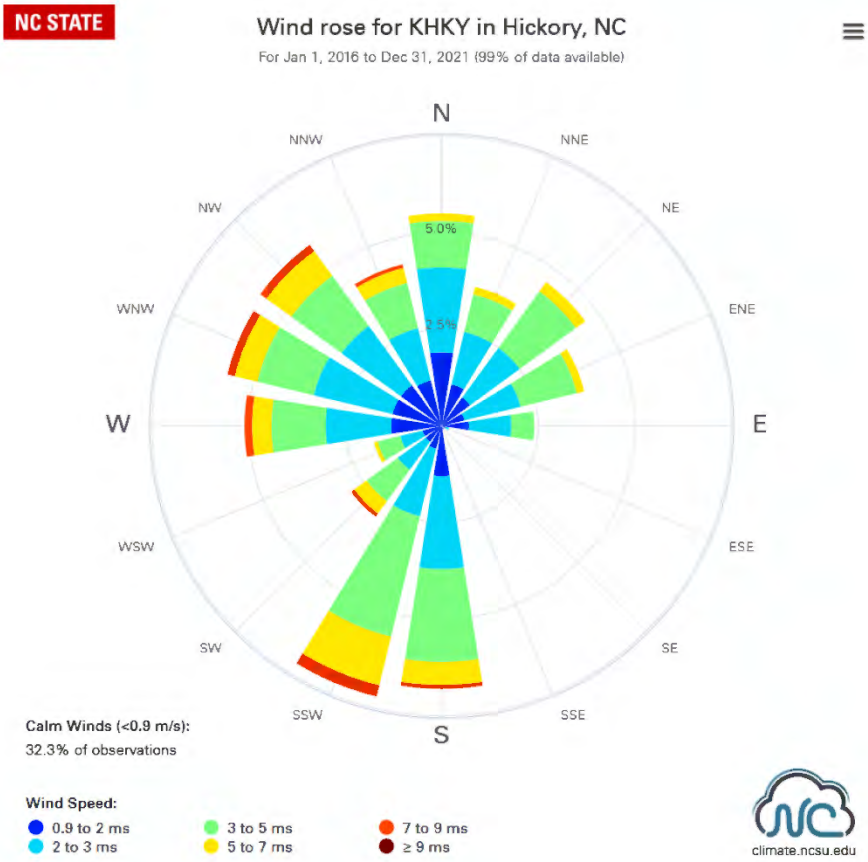


Figure 89. Wind rose for Hickory using last six years of data (from NC State Climate Office)

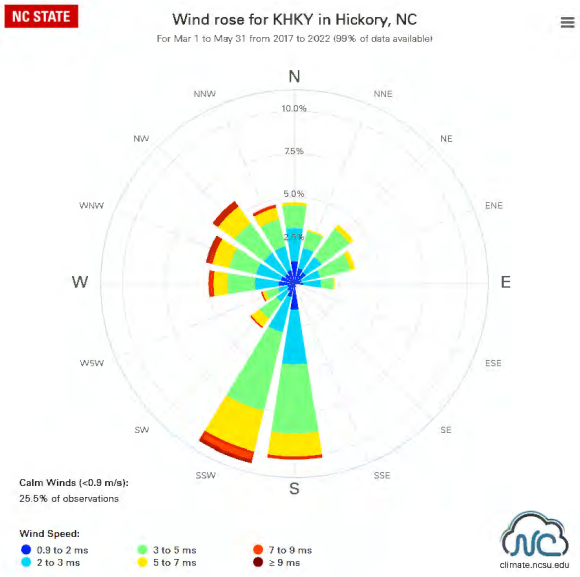


Figure 90. Hickory springtime wind rose (from NC State Climate Office)

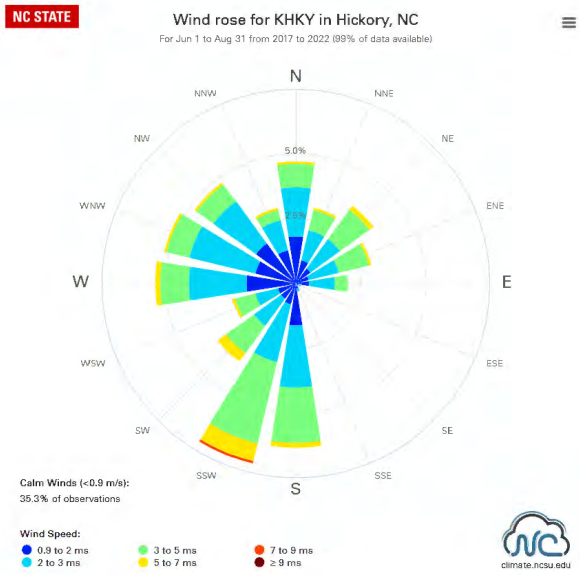


Figure 91. Hickory summertime wind rose (from NC State Climate Office)

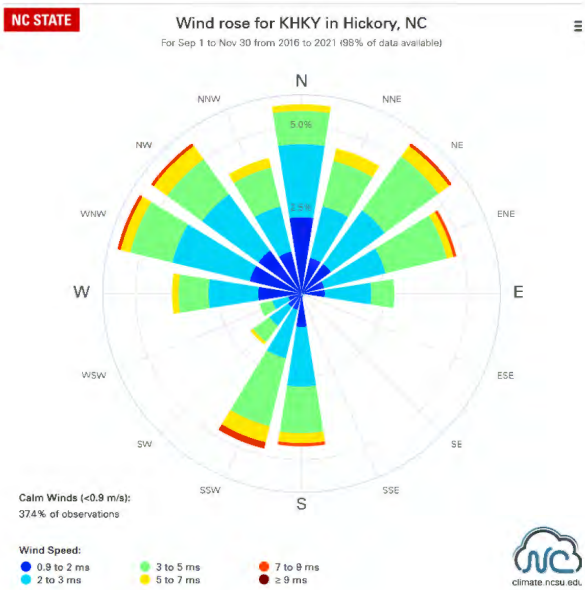


Figure 92. Hickory fall-time wind rose (from NC State Climate Office)

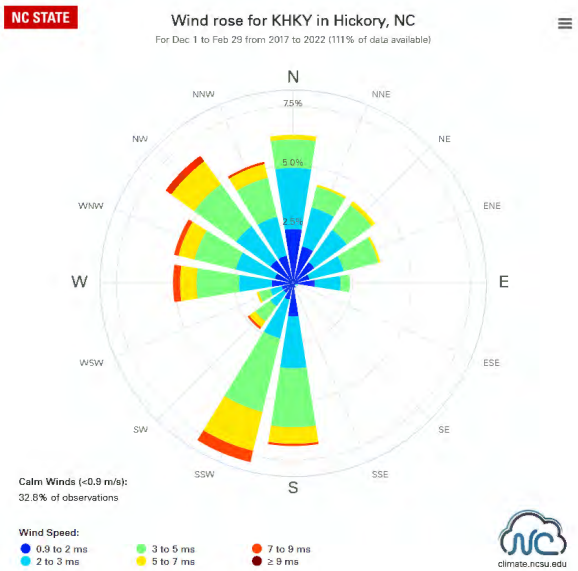


Figure 93. Hickory wintertime wind rose (from NC State Climate Office)

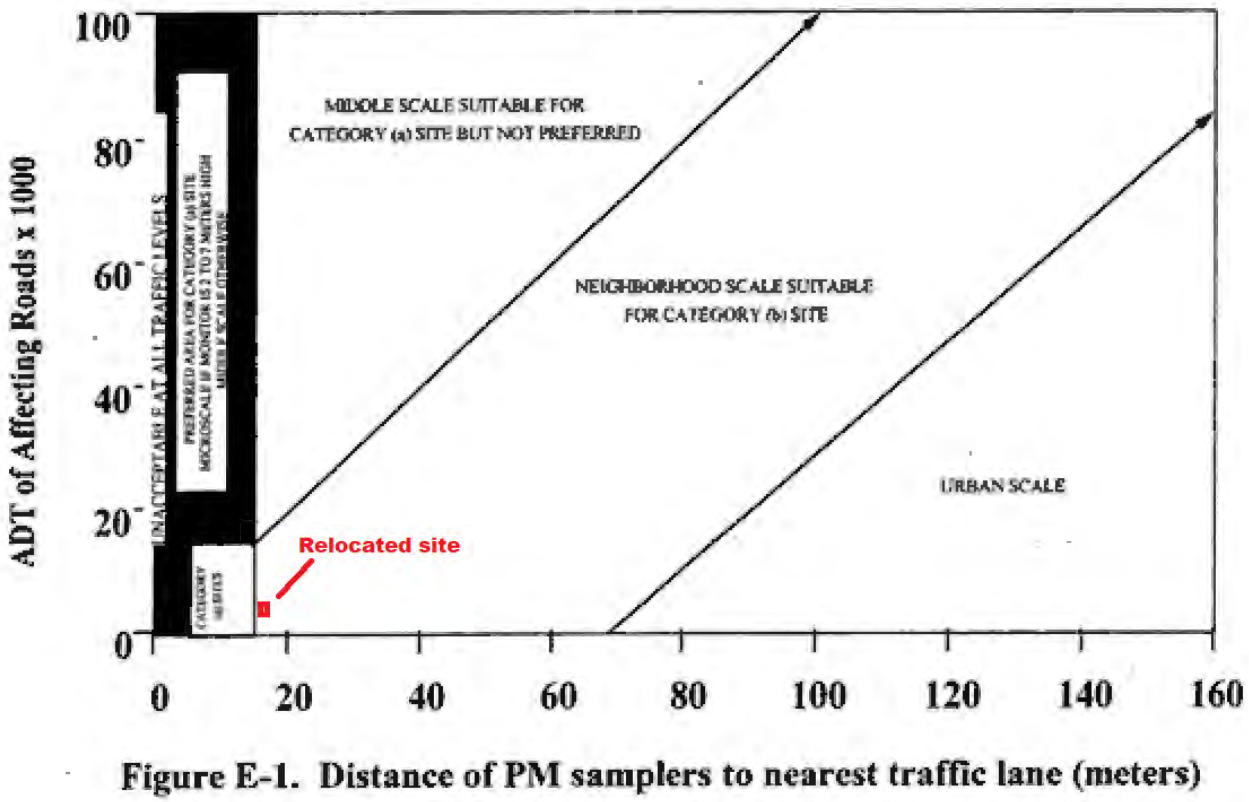


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Figure 94. Figure E-1 from Appendix E used to determine spatial scale of representativeness for particle monitors

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

Table 72 summarizes other factors DAQ evaluated when choosing the new location for the monitors. Location of permitted facilities are shown in Figure 95.

Table 73. Other considerations in site selection

Factor	Evaluation
Long-term Site Commitment	The City of Hickory is willing to provide DAQ with a long-term lease agreement and does not plan to develop the current area any time in the near future
Sufficient Operating Space	30 plus meter diameter open area free of trees and buildings
Access and Security	Current monitors have not been vandalized while within the fenced in area. The monitors will remain inside the locked fence at their new location.
Safety	Appropriate electrical permits will be obtained.
Power	Power is readily accessible from the nearby power poles.
Environmental Control	Both monitors are designed to operate in situ, so no environmental control is required at this time.

Table 73. Other considerations in site selection

Factor	Evaluation
Exposure	The monitoring station will be at least 17 meters from the roadways, 20 meters from the driplines of trees and will not be near any trees or buildings that could be an obstacle to air flow. The monitors will be placed such that the water tower will not block the predominate winds from the south and west.
Distance from Nearby Emitters	There are six facilities with air permits within 2 km of the proposed location. Traditions Woodcarvings and Frames, Inc., is located 960 meters to the northeast and reported no emissions of fine particles in 2014. Century Furniture Plant 1 is located 1090 meters to the north northeast and reported 2020 emissions of fine particles of 11 tons. Century Furniture Plant 11 is located 2 kilometers to the west northwest and did not report any pollutants. Unifour Finishers, Inc. is located 1.87 kilometers to the west and did not report any fine particle emissions. Synthetics Finishing Longview is located 1160 meters to the southwest and reported 0.3 tons of fine particle emissions in 2013. TSG Finishing, LLC – Combeau Industries is located 1230 meters to the south southwest and reported no emissions of fine particles in 2014.
Proximity to Other Measurements	The proposed monitoring station is located 2.45 kilometers southeast from the Hickory Regional Airport.

Figure 95. Location of new monitoring location relative to facilities regulated by DAQ

Summary

DAQ is requesting EPA's approval for relocating this site on the Town of Hickory property where the current site is located. This relocation of the monitors on the site property is necessary to get them out of the way of future DOT construction plans. Plus, the new location on the property meets all the necessary siting criteria in Appendices A, D and E of 40 Code of Federal Regulations Part 58. Because the proposed location is remaining on the same property and will retain the same AQS identification number, there will be no impact on the ability to determine fine particle design values for the Hickory Metropolitan Statistical Area. Thus, there are no negative impacts expected based on relocation of the monitors and only positive impacts for the community and regulatory agencies involved. If the monitors are not relocated on this property, they will need to be moved to an alternate location in Hickory. Based on past searches for alternate monitoring sites near this location, DAQ does not expect to find alternate locations that better meet the siting criteria.

Appendix F. Bryson City Data Analysis For Relocating the Fine Particle Monitor on the Site

Introduction

During the 2021 annual network review, Mr. Steve Ensley noted that the tree located 10.97 meters to the southwest of the continuous fine particle monitor inlet would soon become an obstacle to air flow. As a result, Mr. Ensley investigated the possibility of relocating the monitor elsewhere on the property. In the fall of 2022, DAQ plans to relocate the continuous fine particle monitor from its current location to a new location at the site placing it between the met tower and the rain gage to move the monitor further away from the dripline of a nearby tree as shown in Figure 96. When the monitor is relocated, DAQ may also change the continuous fine particle monitoring method from a BAM 1020 to a BAM 1022, if a BAM 1022 is available at that time. This relocation will not require a change in AQS identification number or address because the monitor is remaining on the same property.

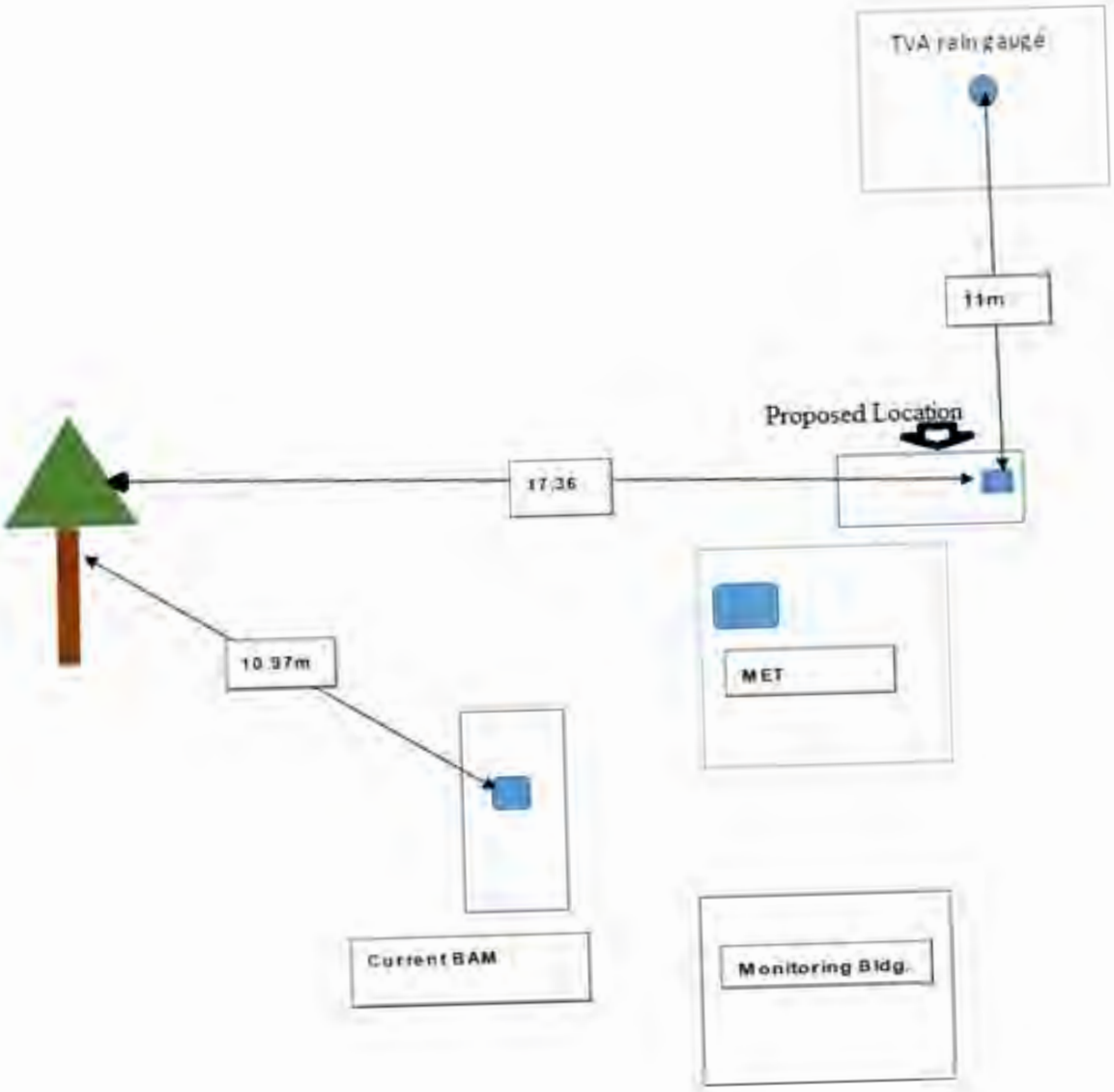


Figure 96. Relocation of the continuous fine particle monitor at Bryson City

The monitor affected by this relocation is 37-173-0002-88101-3. The DAQ operates this monitor as a transportation monitor to monitor the air leaving and entering the state and ensure the air quality complies with the national ambient air quality standards. This fine particle monitor is suitable for comparison to the annual fine particle national ambient air quality standard. Figure 97 shows a view of the current monitor inlet with the tree in the background and Figure 98 shows the new platform relative to the trees and current monitor location. A view of the new fine particle monitoring location looking west is shown in in Figure 99 and views looking northwest with and without the new platform are shown and Figure 100 and Figure 101.

Figure 97. Current fine particle monitor location with trees in the background

Figure 98. Location of new platform relative to current platform and trees of concern

Figure 100. Looking northwest at the new location

Figure 99. Looking west at the new fine particle monitoring location

Figure 101. Location of new platform relative to roadway

Detailed Siting Information on the Proposed Location

The closest tree dripline will be 17.37 meters west of the relocated fine particle monitor. This tree's approximate height is 6.61 meters so this tree will not be an obstacle to air flow. The dripline of the taller tree behind it is 21 meters away. There are no buildings within 80 meters of the site. The nearest road is Recreation Park Road, 25 meters east of the monitor location. West Deep Creek Road is 96 meters northeast of the site. US 19 is 416 meters south southeast of the site. As shown in Figure 102, in 2019 the average annual daily traffic (AADT) count was 1,500 to the southeast of the site on West Deep Creek Road, and 7200 in 2018 to the south of the site on US 19. The inlet height for the new monitoring location will be the same as for the current monitoring location, approximately 2.39 meters above ground level.

Figure 102. Traffic count map (from DOT)

The Air Quality System identification number and street address for the site will remain the same: 37-173-0002 and 30 Recreation Park Drive, Bryson City, North Carolina 28806. The latitude (35.43804) and longitude (-83.442195) for the site will not change. The sampling and analysis method AQS code 170 for the BAM 1020 will remain the same until it is replaced with the BAM 1022, which has the method code 209. The operating schedule (hourly) will remain the same. The monitoring objective for the monitor will continue to be regional transport. Figure 103 shows the location of the monitoring station relative to the population center of Bryson City. Based on the wind roses in Figure 104, the predominant winds are from the north northeast and west. The spatial scale of representativeness for the monitor will be neighborhood based on the location of the roadways and the amount of traffic on those roads. (See Figure 105.)

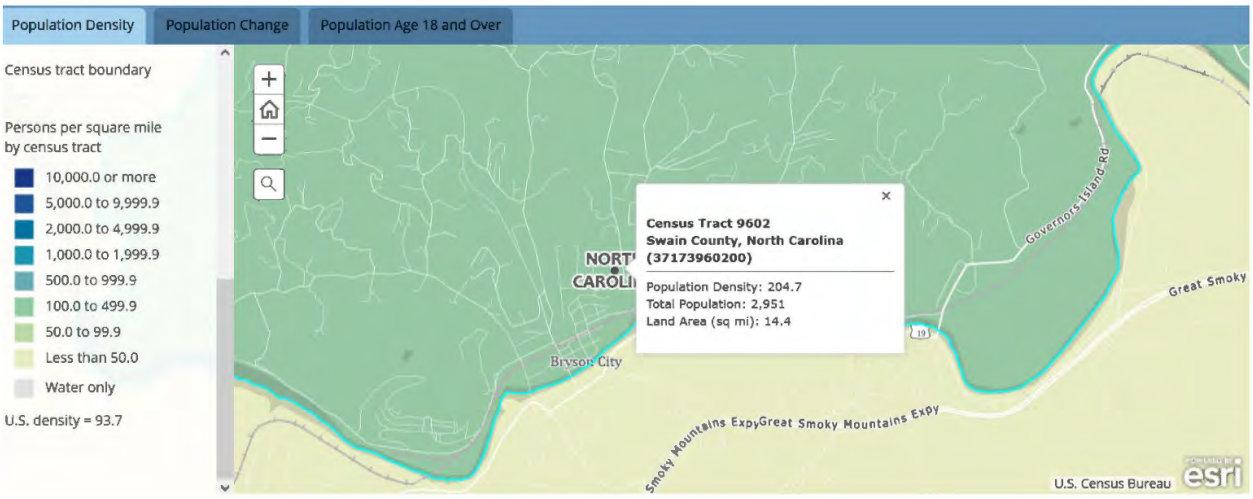


Figure 103. Location of the monitoring station relative to the population of Bryson City

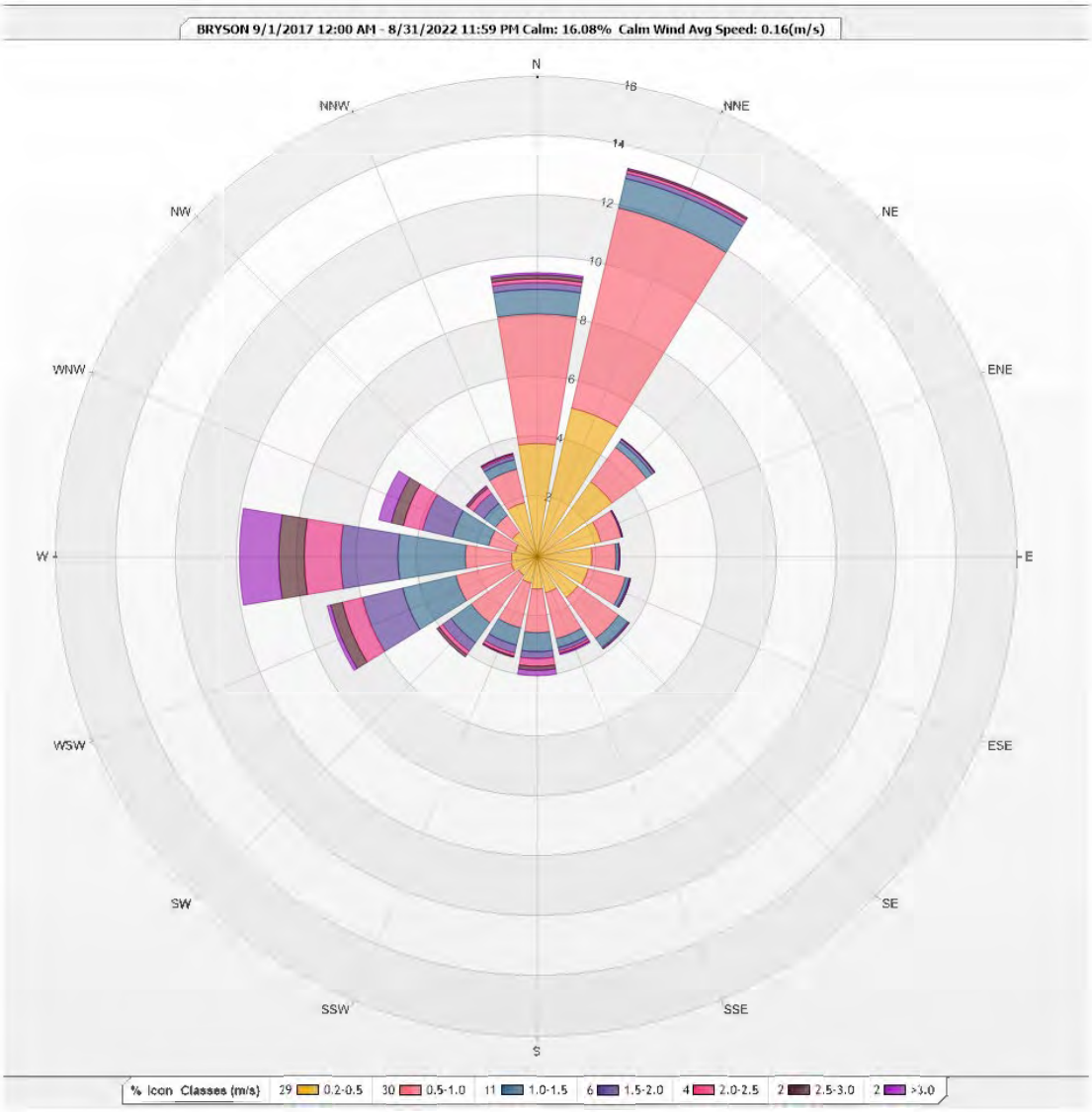


Figure 104. Wind rose for Bryson City using last five years of data

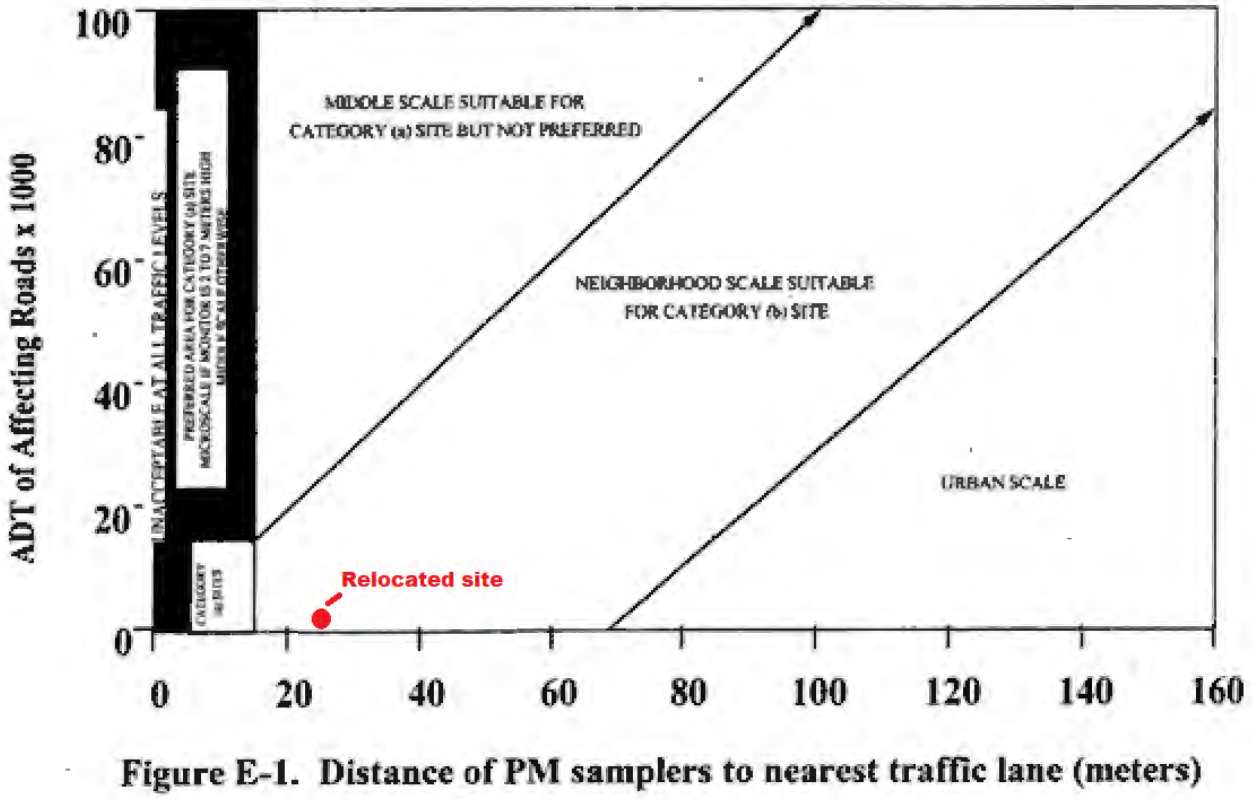


Figure E-1. Distance of PM samplers to nearest traffic lane (meters)

Figure 105. Figure E-1 from Appendix E used to determine spatial scale of representativeness for particle monitors

This fine particle monitor is DAQ's required transport monitor.

Table 73 summarizes other factors DAQ evaluated when choosing the proposed location for the fine particle monitoring station. Location of permitted facilities are shown in Figure 106.

Table 74. Other considerations in site selection for Bryson monitor relocation

Factor	Evaluation
Long-term Site Commitment	The Swain County Recreation Park is willing to provide DAQ with a long-term lease agreement and does not plan to develop the current area any time soon
Sufficient Operating Space	17-meter diameter open area free of trees and buildings
Access and Security	Current monitors at this site have not been vandalized at this site and there is no reason to expect them to be vandalized in the future.
Safety	Appropriate electrical permits will be obtained.
Power	Power is readily accessible from the nearby meter.
Environmental Control	The current monitor requires a temperature controlled shelter which can be accommodated at this location.

Table 74. Other considerations in site selection for Bryson monitor relocation

Factor	Evaluation
Exposure	The monitoring station will be at least 17 meters from the driplines of trees and will not be near any trees or buildings that could be an obstacle to air flow.
Distance from Nearby Emitters	There are three facilities with air permits within 4 km of the Swain County Recreation Park. Consolidated Metco, Inc. – Bryson City is located 3.28 kilometers to the south southwest. Beasley Flooring Company, Inc. – Bryson City Division is located 2.91 kilometers to the south southwest. Fortner Contracting Incorporated is located 3.15 kilometers to the south southwest. None of these facilities report emitting fine particles.
Proximity to Other Measurements	The new fine particle monitoring site is located 1.71 kilometers northeast from Sossamon Field in Bryson City.

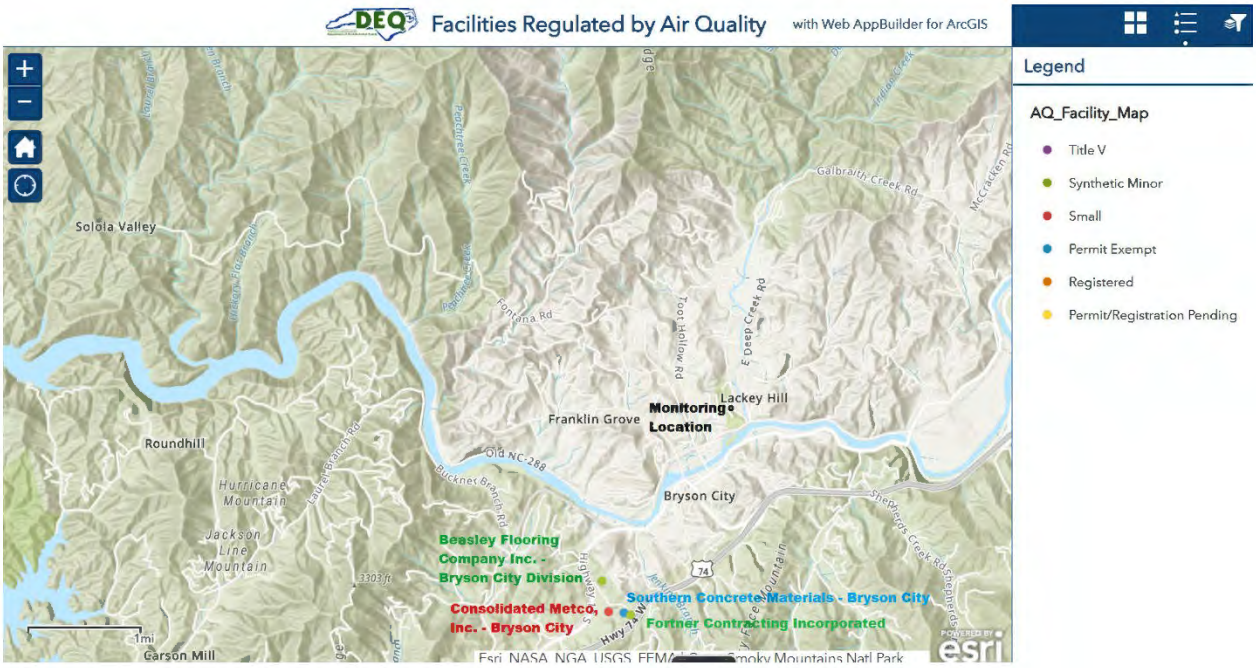


Figure 106. Location of monitoring location relative to facilities regulated by DAQ

Summary

DAQ is requesting EPA's approval for relocating this site at the Swain County Recreation Park where the current site is located. This relocation will benefit DAQ and EPA by providing a location where the fine particle monitor will be less impacted by nearby trees. The new location meets all the necessary siting criteria in Appendices A, D and E of 40 Code of Federal Regulations Part 58. Because the proposed location is remaining on the same property and will retain the same AQS identification number, there will be no impact on the ability to determine fine particle design values for the Swain County area. Thus, there are no negative impacts expected based on relocation of the monitor and only positive impacts for the community and regulatory agencies involved.

Appendix G. Approved Waivers and Other Requests

Every five years DAQ is required to request that the EPA renew any existing waivers. The first part of this subsection lists all of the waiver requests that DAQ asked the EPA to renew in 2020 and that the EPA renewed that continue to be applicable in 2021 and 2022. The second part of this subsection contains 2020 requests for waivers and other actions that the EPA approved in 2020.

1. *Waiver Renewals*

In 2020, DAQ requested, and the EPA renewed, the following waivers:

- Waiver for the second PM_{10} monitor in Raleigh;
- Waiver request of the siting requirements for the meteorological tower at the Millbrook NCore site;
- Waiver request for a late start of the ozone season at remote sites;
- Waiver for the trees behind the monitoring station at Triple Oak
- A waiver to install the relative humidity and ambient temperature sensors at 10 meters at the Millbrook NCore site;

Waiver for the Second PM_{10} Monitor in Raleigh

In 2015, DAQ requested the EPA renew the waiver for the second PM_{10} monitor in Raleigh. Other than changing to a low volume method in 2009 to meet NCore requirements and a low-volume continuous method in 2016, nothing changed with PM_{10} in the Raleigh area within the past decade. As shown in Figure 107, all the measured concentrations are less than 80 percent of the NAAQS and all but three concentrations measured in the past 15 years are less than 40 percent of the NAAQS. As such, there is no danger of exceeding the NAAQS.

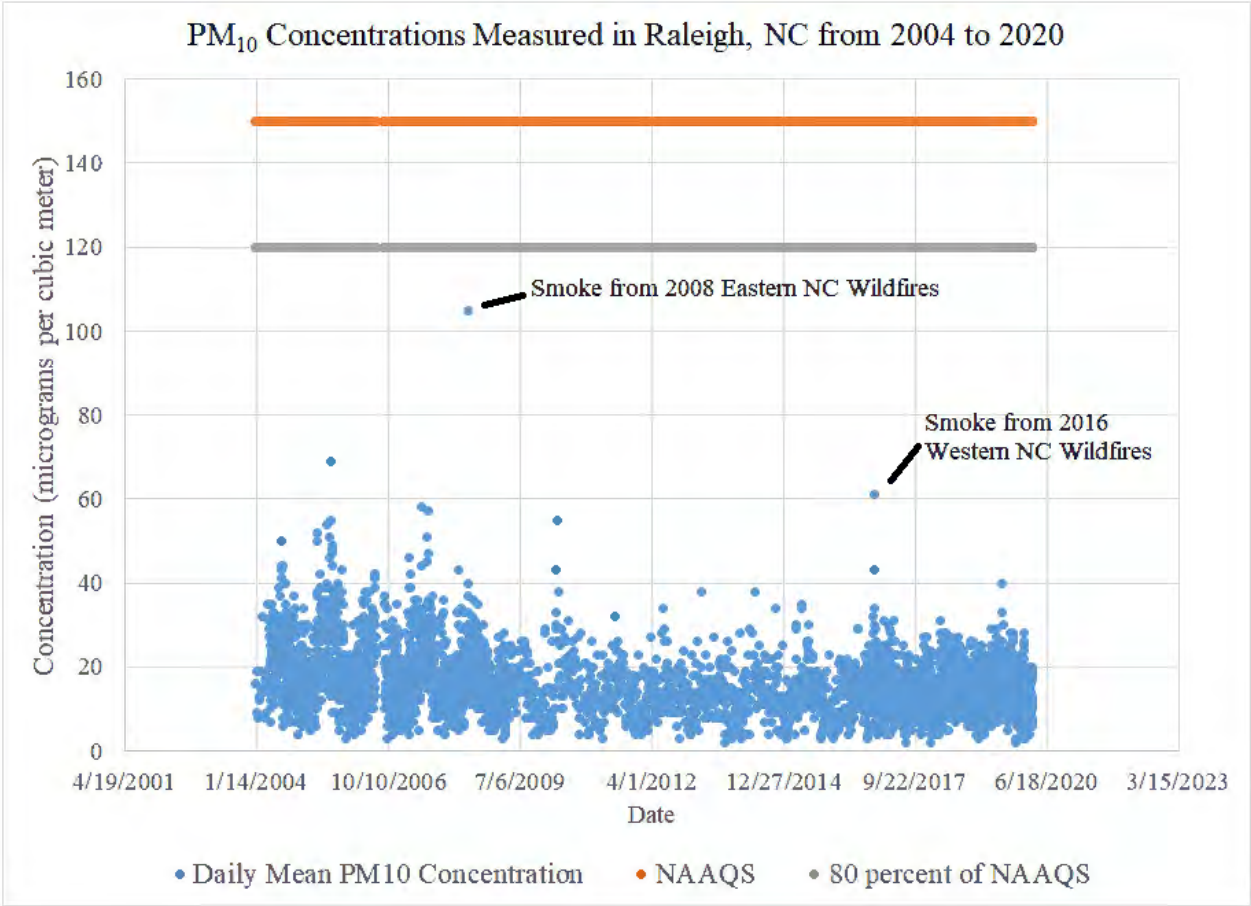


Figure 107. PM_{10} concentrations measured in Raleigh from 2004 through 2020

In addition, as shown in Table 74, PM_{10} has not been responsible for determining what the air quality index will be in the Raleigh MSA during 2011 through 2019.[38] 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 PM_{10} reports 107 facilities in the Raleigh MSA emitting 882.4 tons of PM_{10} in 2018. Figure 108 shows the fluctuation of PM_{10} emissions and facilities reporting PM_{10} emissions from 2008 to 2018.[39] Although the number of facilities reporting PM_{10} emissions is down, the

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

[39] North Carolina DAQ - North Carolina Point Source Emissions Report, Available online at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&year=2014&physical=byCounty&overridetype=All&toxics=263&sortorder=103.

Table 75 Raleigh Air Quality Index (AQI) Summary for 2011 to 2019

Year	# Days with AQI	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	AQI Maximum	AQI 90th Percentile	AQI Median	Number of Days				
									CO	NO_2	O_3	$PM_{2.5}$	PM_{10}
2011	365	202	139	22	2	156	87	47	.	.	203	162	.
2012	366	240	117	8	1	177	67	45	.	.	183	183	.
2013	365	246	119	.	.	97	64	44	.	.	129	236	.
2014	365	215	150	.	.	100	64	47	.	3	140	222	.
2015	365	228	134	3	.	105	67	46	.	2	175	188	.
2016	366	231	132	3	.	135	66	46	.	.	164	202	.
2017	365	242	123	.	.	100	61	45	.	2	156	207	.
2018	361	240	121	.	.	90	63	45	1	.	136	224	.
2019	365	239	126	.	.	93	61	46	1	.	161	203	.

CO = carbon monoxide
NO_2 = nitrogen dioxide
O_3 = ozone
$PM_{2.5}$ = fine particles
PM_{10} = particles with aerodynamic diameters of 10 microns or less

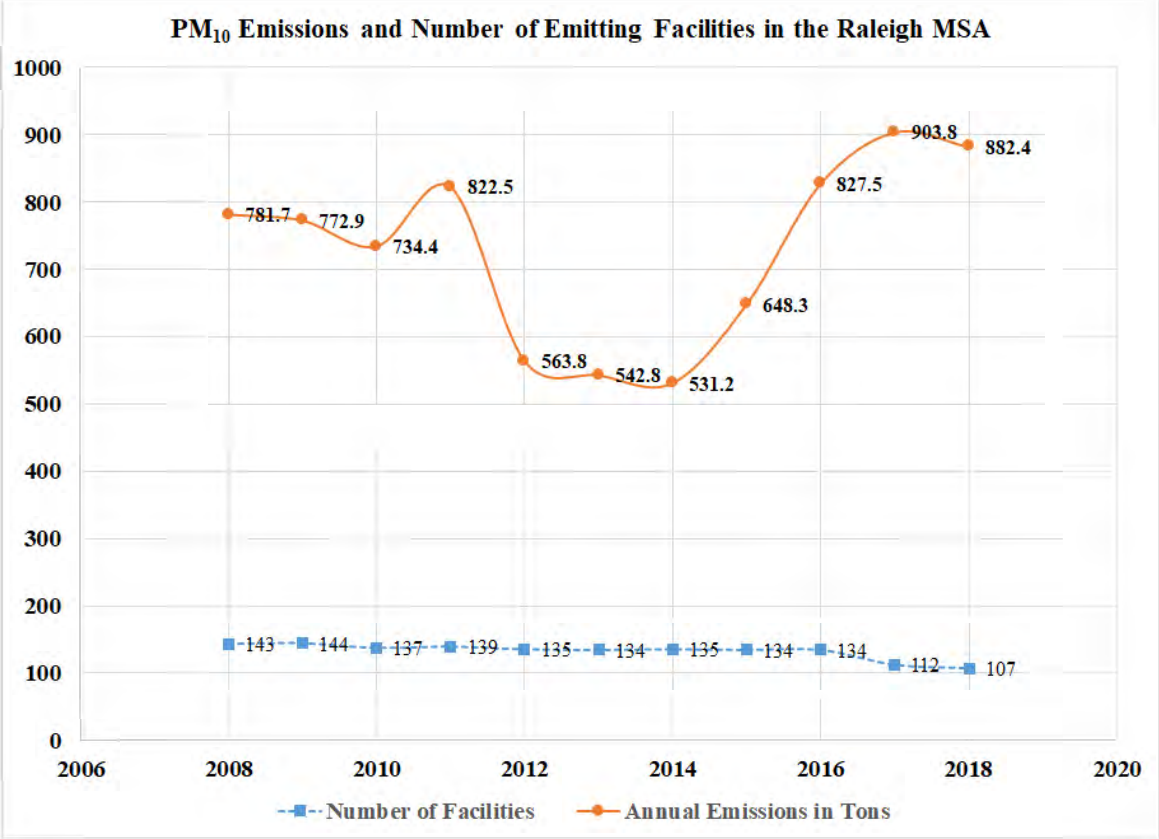


Figure 108. PM_{10} Emissions in the Raleigh MSA from 2008 to 2018

PM_{10} emissions have remained about the same as they were in 2008. For these reasons, as well as because the state is working with limited resources to meet additional monitoring requirements for PAMS in 2021, DAQ requests that the waiver for the second PM_{10} monitor in the Raleigh MSA be renewed for five more years. The EPA granted a waiver of the requirement for a second PM10 monitor in the Raleigh MSA in 2015 because the PM_{10} levels have been significantly lower than the NAAQS for many years.[40]

Waiver Request for Millbrook Meteorological Tower

As in 2015, DAQ again requests that the waiver for the meteorological tower at the East Millbrook Middle School NCore and PAMS 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 109. The wind direction/speed sensors are located at a height of 10 meters above ground. Currently the relative humidity sensor is located at 2 meters but it will be moved to 10 meters when DAQ switches to using an all-in-one meteorological sensor. Ambient temperature sensors are currently located at 2 meters and 10 meters above ground, but the 2-meter sensor will end when DAQ switches to using an all in one meteorological sensor. The tower is in an open, grassy area that is free from any obstructions in a 270º arc to the prevailing winds that come from the south/west direction. The tower is positioned 15.5 meters from the shelters

[40] United States Environmental Protection Agency, 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.

on a 3 percent uphill grade. This grade adds approximately one meter to the height of the tower above the shelters. This siting does not meet the EPA requirement for the tower being a distance 10 times the height of the shelter, which is 3.7 meters. Additionally, a single tree, approximately 7 meters tall, is located 18 meters to the south southwest of the tower. Since the position of the meteorological tower is free from any obstructions in a 270º arc to the prevailing winds that come from the south and west direction, DAQ is confident the measurements are representative of meteorological conditions at the site. The state, therefore, requests that the EPA renew the waiver and deem the position of the tower to be acceptable.

Figure 109. Millbrook NCore Site
(from City of Raleigh and Wake County iMAPS, http://maps.raleighnc.gov/iMAPS/)

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. 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.[41] 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.

Although DAQ has successfully installed the monitors and had them up and operational by March 1 for the 2017 through 2020 ozone season, DAQ requests that this waiver be renewed. DAQ's concern is that the remote high elevation sites might not be accessible for a March start date. The roads are sometimes not passable or closed by federal or local authorities well into March due to winter weather conditions, e.g., ice, snow, fallen trees or rocks, damage to the driving surface, etc. The earlier start date would require DAQ to get to the mountain tops in February to calibrate equipment and perform other quality assurance, 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 Fahrenheit colder in February

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

when DAQ would be accessing these remote mountain areas to recalibrate equipment and perform other QA functions.

DAQ does operate three of these sites year-round, Purchase Knob, Joanna Bald and Frying Pan. However, DAQ cannot always get to the sites to perform QA functions during the winter, so 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 requests that Linville Falls, Joanna Bald, Frying Pan, Purchase Knob and Mount Mitchell continue to 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.

Waiver renewal request 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 110 is an aerial photograph of the site showing the location of the monitor with regards to the surrounding trees. The building to the southeast has been removed. The trees are 20 meters from the monitoring location to the southeast and northwest and there are no trees between the monitor and the roadway.

Figure 110. Site diagram showing locations of trees relative to the fine particle monitoring location.

The monitor is 11 meters from the trees to the northeast. These trees are 30 meters tall. The inlet of the PM2.5 monitor is 4.9 meters from the ground. Thus, the trees would need to be 50.2 meters away to not act as an obstruction.

Predominant winds at the site are from the southwest most of the year. Figure 111 provides a wind rose using the 2015 to 2019 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 almost half of the time and from the north, northeast and east less than a third of the time.

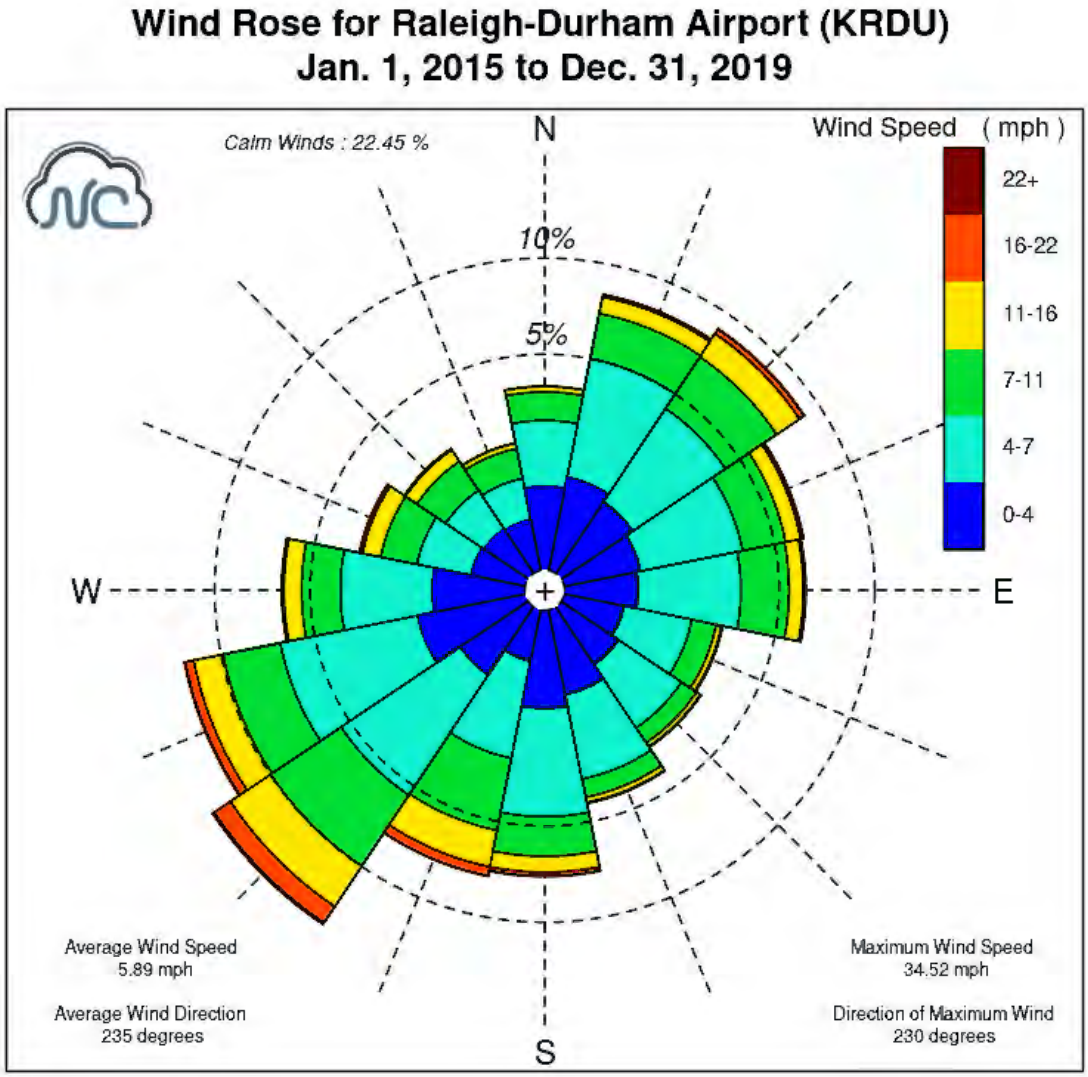


Figure 111. Wind Rose for the Raleigh-Durham Airport for 2015-2019.

Figure 112 show the trees to the north of the site. This tree line is 30 meters in height and located 11 meters from the PM 2.5 inlet. There is a berm that starts to rise about approximately 7 meters from where the monitoring station is located. The trees are growing on top of this berm. They are an obstruction because (a) they are less than twice the distance, 50.2 meters, from the monitor inlet than the difference between the height of

the probe, 4.9 meters, and the height of the trees, 30 meters and (b) they obstruct more than 90 degrees.

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 113 through Figure 115.

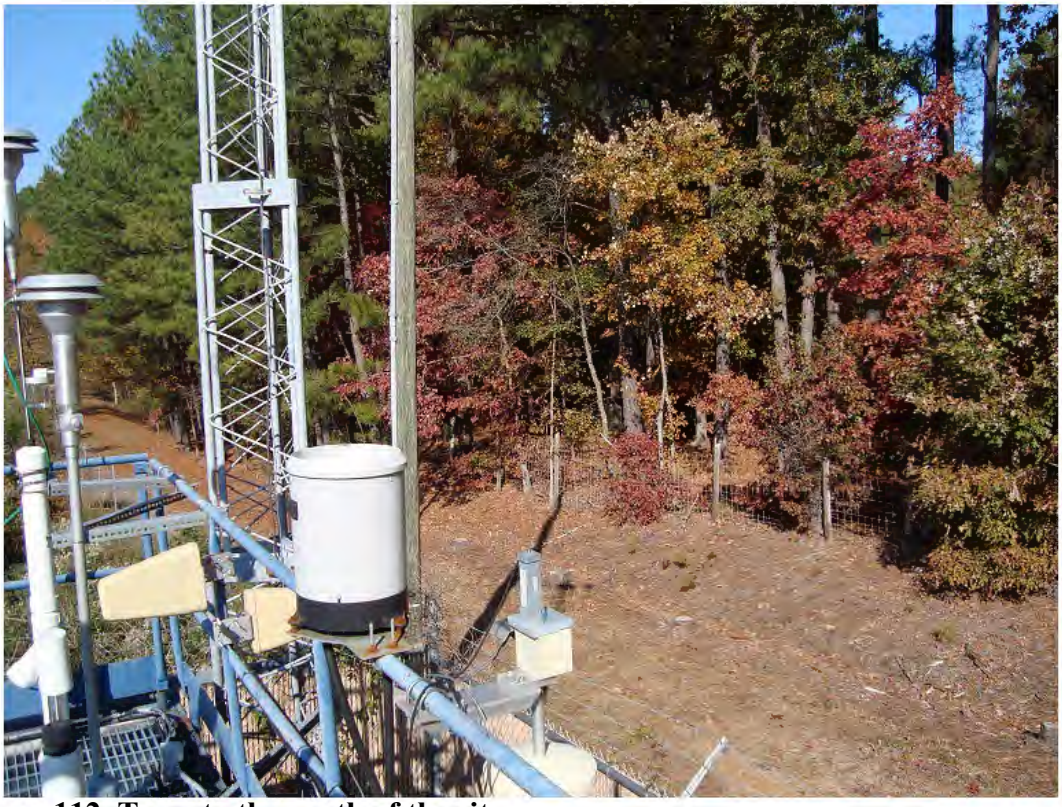


Figure 112. Trees to the north of the site.

Figure 113. Taken from the fine particle monitor towards the east, showing trees and access road.

Figure 114. Taken from fine particle monitor. Shows the trees to the south and the interstate highway.

Figure 115. Taken from the fine particle monitor towards the west.

Waiver Renewal Request to Install the Ambient Temperature and Relative Humidity Sensors at 10 Meters at the Millbrook NCore and PAMS site

DAQ requests permission to install the ambient temperature and relative humidity sensors at the Millbrook NCore and PAMS 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, O_3, SO_2, CO, NO/NO_Y, wind speed, wind direction, relative humidity and ambient temperature.
>
> 5(b) PAMS measurements include:

(5) Hourly averaged ambient temperature; …
(9) Hourly averaged relative humidity;

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.

2. *Approved 2020 Requests*

DAQ requested approval to combine data from the sites listed in Table 75 for calculating a design value for a relocated site in accordance with 40 CFR 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."

The EPA reviewed and approved or has previously approved all the NC DAQ's requested O3 data site combinations, except for the combination of data from the Farmville (AQS ID 37-147-0099) and Pitt Agricultural Center (AQS ID 37-147-0006) sites. [42] The EPA believes that the monitors from these two sites may have measured slightly different airsheds based on their distance from each other (about 14 miles) and the differences in land use near each site. The Farmville site was in a small town more than ten miles outside of Greenville, NC, whereas the Pitt Agricultural Center is located near the city center of Greenville, NC, a city of almost 100,000 people. Table 75 lists the sites numerically by county so the following discussion will follow the order in the table.

Taylorsville area in Alexander County

As shown in Figure 116, DAQ has operated three sites in the Taylorsville area, Taylorsville, Waggin Trail and Taylorsville Liledoun. All three sites are within 3 kilometers of one another. The monitors at Taylorsville and Waggin Trail operated simultaneously from Aug. 11, 2004 through Oct. 30, 2004, and the monitors at Waggin Trail and Taylorsville – Liledoun operated simultaneously from Aug. 2, 2013 through Oct. 30, 2013. Figure 117 and Figure 118 demonstrate that these three monitors are representative of the same air shed in the Hickory area. Thus, the relocation of these monitors meet the relocation requirements of 40 CFR § 58.14(c)(6) and the data from these three sites should be eligible to be combined for design value calculations as described in 40 CFR § 50 Appendix U(2)(c).

[42] United States Environmental Protection Agency, 2020-2021 State of North Carolina Ambient Air Monitoring Network Plan, The U. S. EPA Region 4 Comments and Recommendations, p14, available at https://xapps.ncdenr.org/aq/documents/DocsSearch.do?dispatch=download&documentId=13593

Table 76 Sites to be Combined for Ozone Design Value Calculations

Original Site Name	Original Monitor ID	Dates of Operation	New Site Name	New Monitor ID	Cutover Date	Status
Taylorsville	37-003-0003-44201-1	May 1, 1982 to Oct. 31, 2004	Waggin Trail	37-003-0004-44201-1	Nov. 1, 2004	Done
Waggin Trail	37-003-0004-44201-1	Aug 11, 2004 to Oct. 31, 2013	Taylorsville - Liledoun	37-003-0005-44201-1	Nov. 1, 2013	Done
Linville Falls Site	37-011-0001-44201-1	April 24, 1998 to July 31, 1999	Linville Falls	37-011-0002-44201-1	Aug. 1, 1999	Done
Hope Mills Police Department	37-051-1002-44201-1	April 1, 1989 to Oct. 31, 1996	Golfview	37-051-1003-44201-1	April 1, 1997	Not done
Golfview	37-051-1003-44201-1	April 1, 1997 to Oct. 31, 2014	Honeycutt Elementary School	37-051-0010-44201-1	May 9, 2015	Done
Cooleemee	37-059-0002-44201-1	April 15, 1996 to Oct. 31, 2009	Mocksville	37-059-0003-44201-1	March 30, 2010	Done
Duke Street	37-063-0013-44201-1-	April 1, 1993 to Oct. 31, 2006	Durham Armory	37-063-0015-44201-1	April 1, 2007	Done
McLeansville	37-081-0011-44201-1	Jan. 1, 1979 to July 6, 2005	Mendenhall	37-081-0013-44201-1	April 15, 2005	Done
Haywood County Health Department	37-087-0004-44201-1	April 1, 1999 to Oct. 31, 2010	Waynesville School	37-087-0008-44201-1	April 1, 2011	Done
West Johnston – Highway 301	37-101-0099-44201-1	Jan. 1, 1983 to Oct. 31, 1994	West Johnston – Jack Road	37-101-0002-44201-1	Jan. 1, 1995	Not done
SR1315	37-109-0099-42401-1	Jan. 1, 1982 to Oct. 31, 1993	Crouse	37-109-0004-44201-1	Nov. 1, 1993	Not done

Bushy Fork Site	37-145-0099-44201-1	Jan. 1, 1982 to Oct. 31, 1997	Bushy Fork	37-145-0003-44201-1	April 1, 1998	Done
Farmville	37-147-0099-44201-1	Jan. 1, 1982 to Oct. 31, 2007	Pitt County Agricultural Center	37-147-0006-44201-1	April 1, 2008	Not done
Mount Mitchell – State Highway 128	37-199-0003-44201-1	May 6, 1992 to May 31, 2006	Mount Mitchell Education Center	37-199-0004-44201-1	June 2, 2006	Done

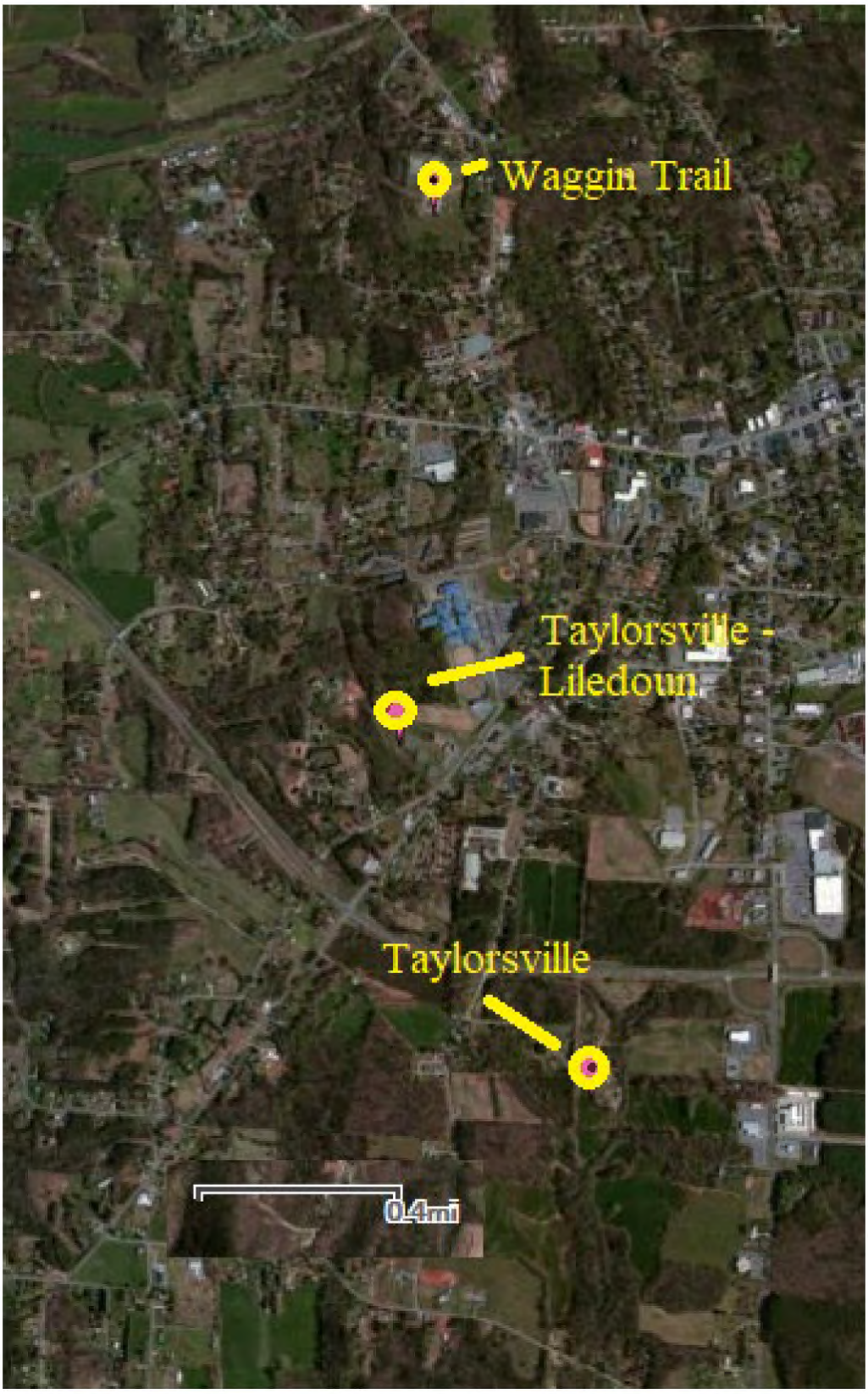


Figure 116. Relationship between the Taylorsville, Waggin Trail and Taylorsville Liledoun Sites

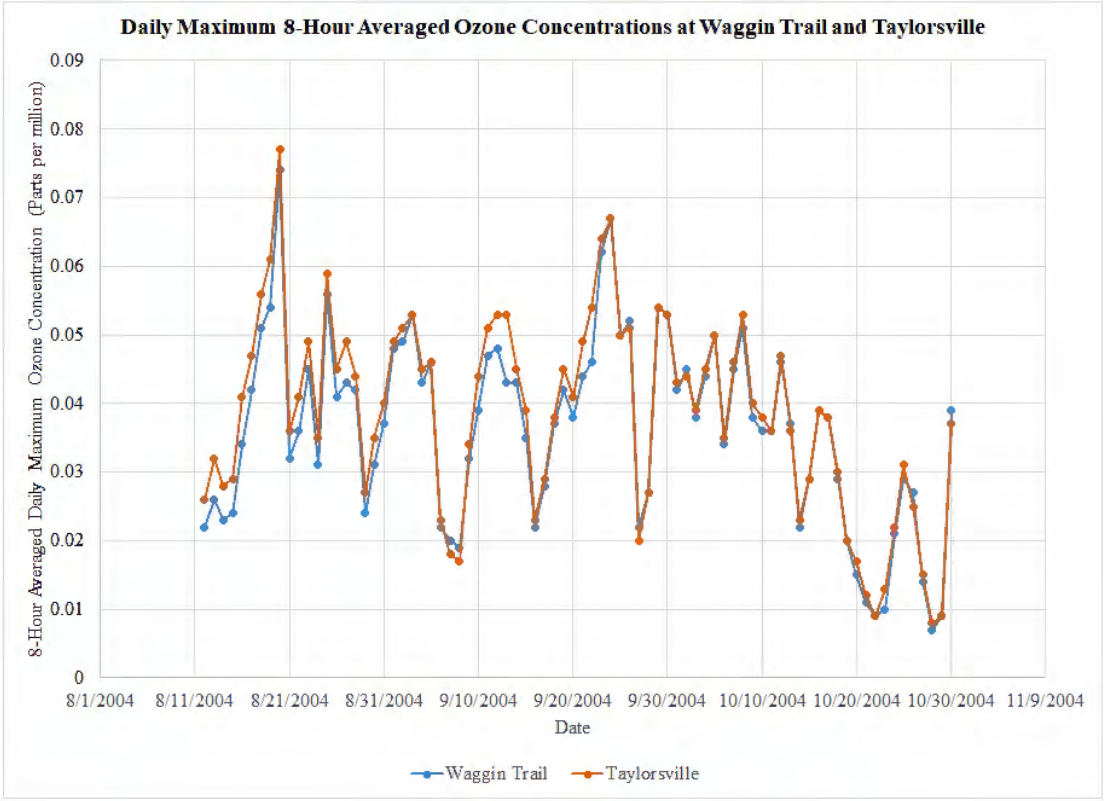


Figure 117. Comparison of Maximum 8-Hour Averaged Ozone Concentrations at Waggin Trail and Taylorsville

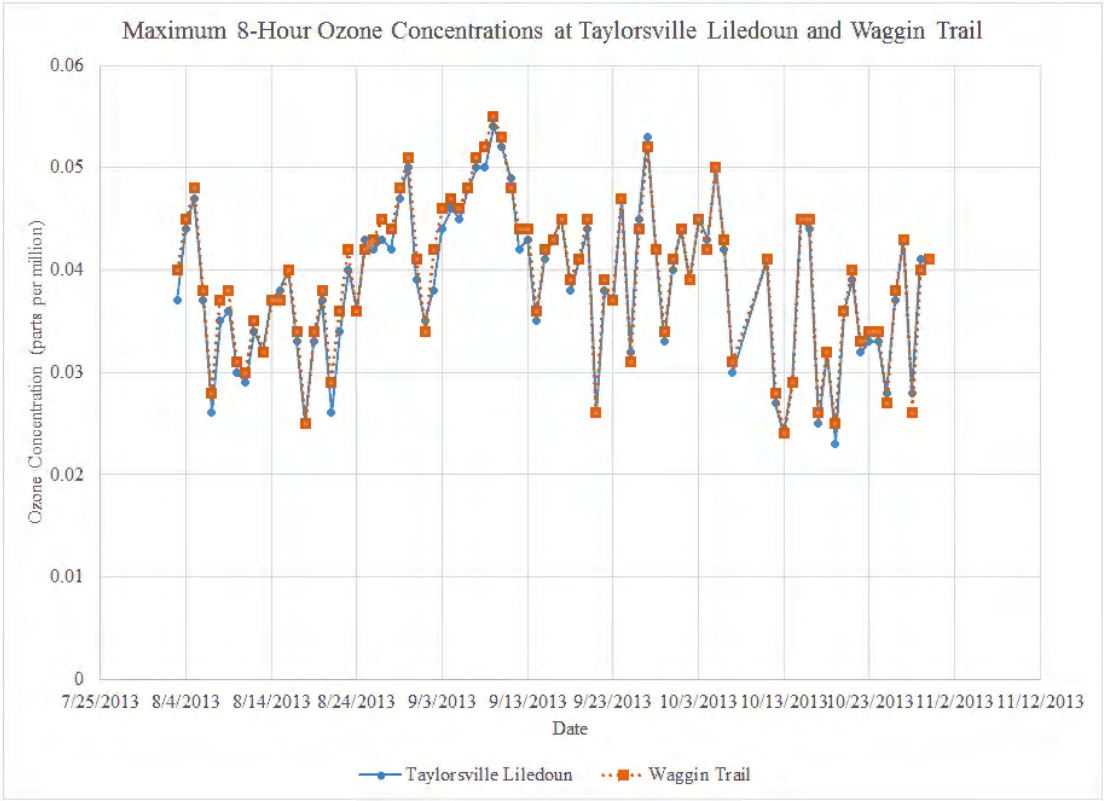


Figure 118. Comparison of maximum daily 8-hour ozone concentrations

Linville Falls in Avery County

As shown in Figure 119, DAQ has operated two sites in Linville Falls. The two sites were within about 40 meters of one another. Unfortunately, it was not possible to operate the two monitors simultaneously. However, due to the limited distance of the move, the relocation of this monitor 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 119. Location of the Linville Falls Site (old site) and Linville Falls (new site)

Hope Mills area in Cumberland County

As shown in Figure 120, DAQ has operated three sites in the Hope Mills area, the Hope Mills Police Department, Golfview and Honeycutt Elementary School. All three

sites are within 4.5 kilometers of one another. Because of the timing of the evictions and the time it took to get approval for the new sites and get the sites up and operational, the division could not operate the monitors simultaneously. However, the three monitors are representative of the same air shed in the Hope Mills area based on distance between sites, spatial and temporal patterns in air quality, local emissions and meteorology, jurisdictional boundaries and terrain features. Thus, the relocation of these monitors meet the relocation requirements of 40 CFR § 58.14(c)(6) and the data from these three sites should be eligible to be combined for design value calculations as described in 40 CFR § 50 Appendix U(2)(c).

Figure 120. Location of Honeycutt, Golfview and Hope Mills Police Department sites

Cooleemee and Mocksville in Davie County

As shown in Figure 121, DAQ operated three sites in Davie County over the years. The Mocksville site was located within 10 Kilometers of the Cooleemee site. Because of the timing of the request and the time it took to get approval for the Mocksville site and get the site up and operational, the division could not operate the two monitors simultaneously. However, the two monitors are representative of the same air shed in Davie County based on distance between sites, spatial and temporal patterns in air quality, local emissions and meteorology, jurisdictional boundaries and terrain features. Thus, these two sites meet 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).

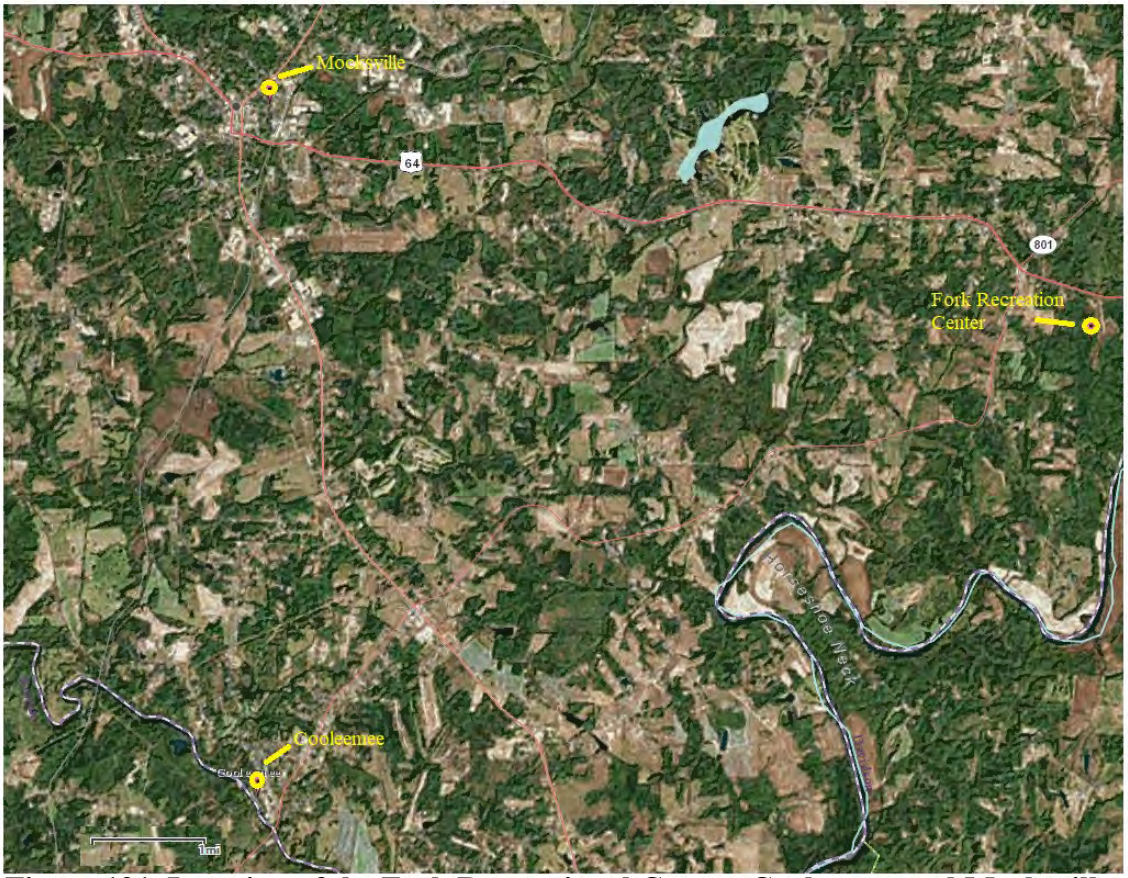


Figure 121. Location of the Fork Recreational Center, Cooleemee and Mocksville sites

Duke Street and Durham Armory in Durham County

As shown in Figure 122, the Durham Armory site is within 300 meters of the Duke Street site. Because of the timing of the request and the time required to obtain permission and set up the new site, the division could not operate the two monitors simultaneously. However, the two monitors are representative of the same air shed in the Durham 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 122. Locations of the Durham Armory and Duke Street sites in Durham County

McLeansville and Mendenhall in Guilford County

As shown in Figure 123, the Mendenhall site is within 8 Kilometers of the McLeansville site. The monitors operated simultaneously from April 15, 2005 through July 5, 2005, and as shown in Figure 124 are representative of the same air shed in the Greensboro area. Thus, these two monitors meet 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 123. Locations of the Mendenhall and McLeansville sites in Guilford County

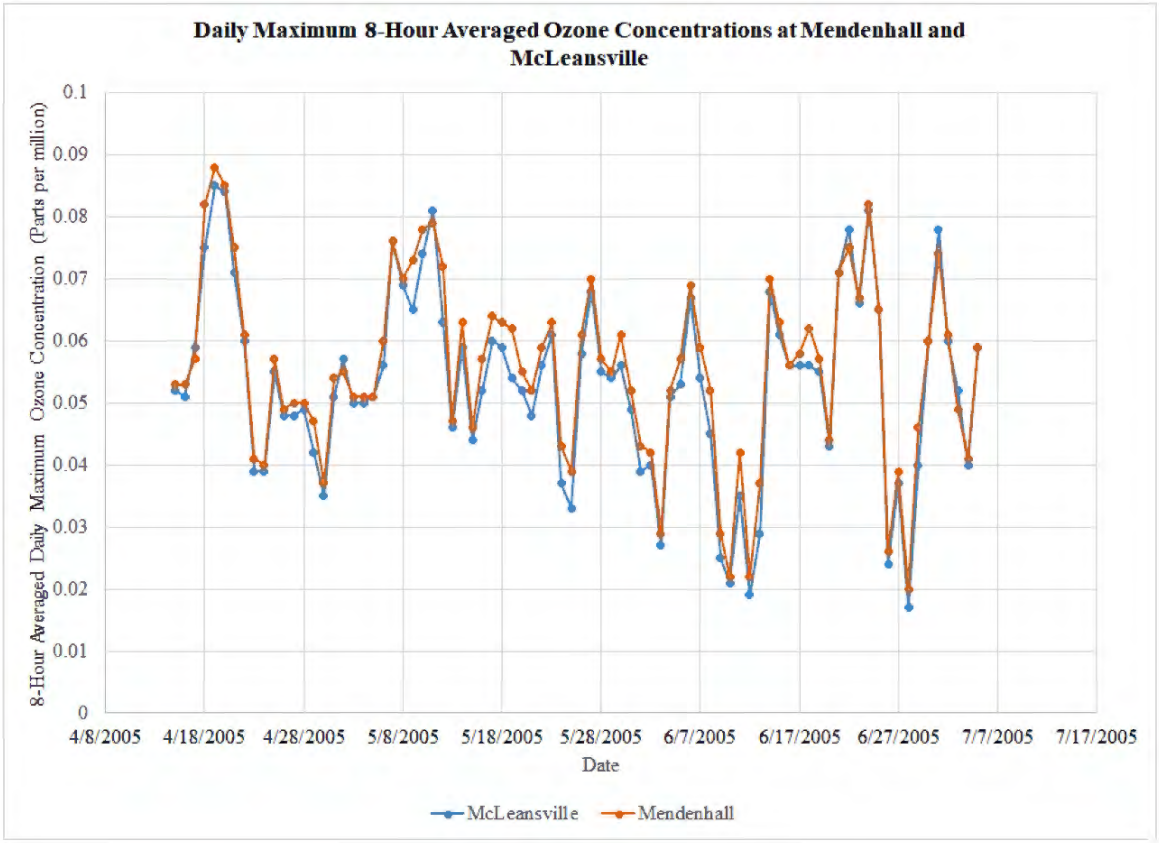


Figure 124. Comparison of 8-Hour Averaged Daily Maximum Concentrations at Mendenhall and McLeansville

Haywood County Health Department and Waynesville School in Haywood County

As shown in Figure 125, the Waynesville School site is within 150 meters from where the Haywood County Health Department site was located. Because of the timing of the eviction and the time involved in establishing a new site, the division could not operate the two monitors simultaneously. However, the two monitors are representative of the same air shed in Waynesville 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).

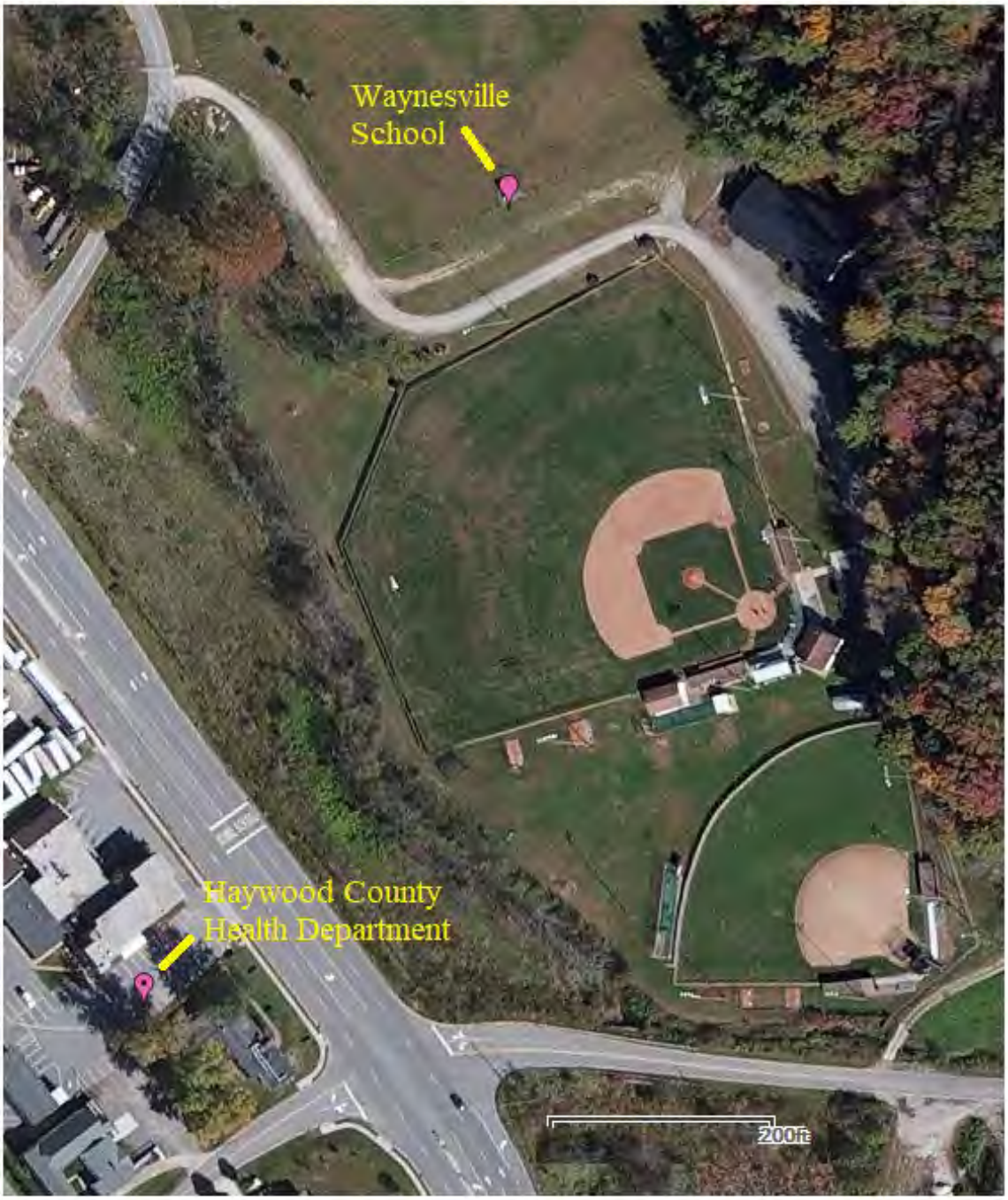


Figure 125. Locations of the Haywood County Health Department and Waynesville School sites

West Johnston Sites in Johnston County

As shown in Figure 126, the West Johnston site on Jack Road is within 25 kilometers from where the West Johnston site on Highway 301 was located. Because of the time involved in establishing a new site, the division could not operate the two monitors simultaneously. However, the two monitors are representative of the same air shed in west Johnston County based on distance between sites, spatial and temporal patterns in air quality, local emissions and meteorology, jurisdictional boundaries and

terrain features. Thus, these two monitors meet 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 126. Locations of the West Johnston Site on Highway 301 (old site) and West Johnston Site on Jack Road (new site)

State Route 1315 and Crouse Sites in Lincoln County

As shown in Figure 127, the Crouse site is 9 kilometers west from where the State Route 1315 site was located. The monitors operated simultaneously from July 11, 1993 through Oct. 30, 1993, and as shown in Figure 128 are representative of the same air shed in the Lincolnton area. Thus, these two monitors meet 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 127. Relationship between State Route 1315 site and Crouse Site

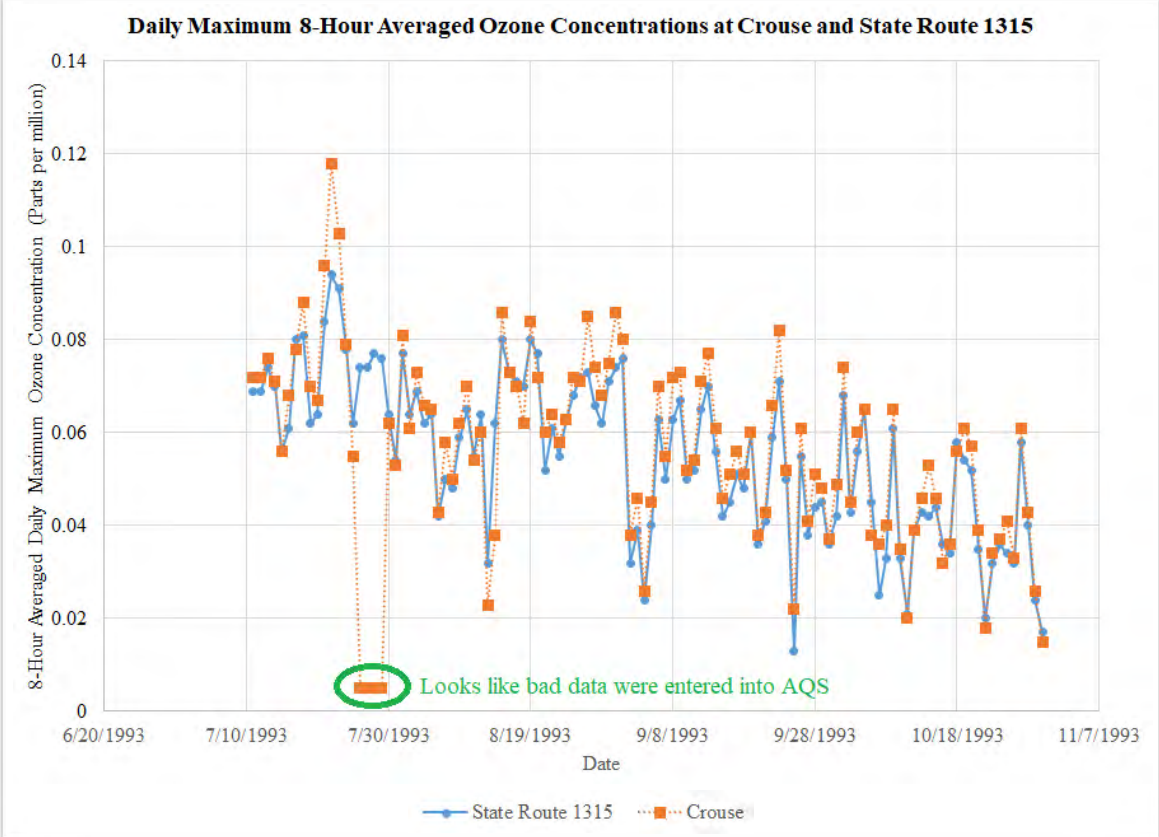


Figure 128. Comparison of 8-Hour Averaged Ozone Concentrations at the Crouse and State Route 1315 Sites

Bushy Fork Sites in Person County

As shown in Figure 131, Bushy Fork is 4.3 kilometers from where the old Bushy Fork site was located. Because of the time involved in establishing a new site, the division could not operate the two monitors simultaneously. However, the two monitors are representative of the same air shed in the Hurdle Mills area of Person County based on distance between sites, spatial and temporal patterns in air quality, local emissions and meteorology, jurisdictional boundaries and terrain features. Thus, these two monitors meet 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 129. Locations of the Bushy Fork Site (old site) and Bushy Fork (new site)

Farmville and Pitt County Agricultural Center Sites in Pitt County

As shown in Figure 130, the Pitt County Agricultural Center site is 23 Kilometers from where the Farmville site was located. Because of the time involved in establishing a new site, the division could not operate the two monitors simultaneously. However, the two monitors are representative of the same air shed in Pitt County based on distance between sites, spatial and temporal patterns in air quality, local emissions and meteorology, jurisdictional boundaries and terrain features. Thus, two monitors meet the relocation requirements of 40 CFR § 58. I 4(c)(6) and the data from these two sites should be eligible to be combined for design value calculations as described in 40 CFR § 50 Appendix U(2)(c).

Figure 130. Location of Farmville and Pitt County Agricultural Sites

Mount Mitchell Sites in Yancey County

As shown in Figure 18, the Mount Mitchell site is 3 kilometers from where the State Highway 128 site was located. Because of the timing of the request to relocate the monitor, the division could not operate the two monitors simultaneously. However, the two monitors are representative of the same air shed in the Mount Mitchell area based on distance between sites, spatial and temporal patterns in air quality, local emissions and meteorology, jurisdictional boundaries and terrain features. Thus, these two monitors meet 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 131. Locations of the State Highway 128 Site (old site) and Mount Mitchell (new site)

Appendix H. Monitoring Agreement between Virginia and North Carolina for the Virginia Beach-Norfolk-Newport News Metropolitan Statistical Area

MEMORANDUM OF AGREEMENT

ON AIR QUALITY MONITORING FOR CRITERIA POLLUTANTS FOR

THE VIRGINIA BEACH-NORFOLK-NEWPORT NEWS, VA-NC

METROPOLITAN STATISTICAL AREA (MSA)

Date: April 5, 2016

Participating Agencies:

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

Virginia
Department of Environmental Quality (VADEQ)
Air Division

I. PURPOSE/OBJECTIVES/GOALS

The purpose of this Memorandum of Agreement (MOA) is to establish the Virginia Beach-Norfolk-Newport News Metropolitan Statistical Area (MSA) Criteria Pollutant Air Quality Monitoring Agreement between NCDEQ and VADEQ (collectively referred to as the "affected agencies") to collectively meet United States Environmental Protection Agency (EPA) minimum monitoring requirements for criteria pollutants deemed necessary to meet the needs of the MSA as determined reasonable by all parties. This MOA will establish the terms and conditions of this collective agreement to provide adequate criteria pollutant monitoring for the Virginia Beach-Norfolk-Newport News MSA as required by 40 CFR 58 Appendix D, Section 2(e).

II. BACKGROUND

The Virginia Beach-Norfolk-Newport News MSA consists of:

Counties	Cities
Currituck County, NC	Chesapeake, VA
Gates County, NC	Hampton, VA
Gloucester County, VA	Newport News, VA
Isle of Wight County, VA	Norfolk, VA
James City County, VA	Poquoson, VA
Mathews County, VA	Portsmouth, VA
York County, VA	Suffolk, VA
	Virginia Beach, VA
	Williamsburg, VA

NCDEQ has jurisdiction over Currituck County and Gates County; VADEQ has jurisdiction over the others.

The NCDEQ and VADEQ are required by the Clean Air Act to measure for certain criteria pollutants in the ambient air in the Virginia Beach-Norfolk-Newport News MSA. The EPA has established minimum monitoring requirements based on the size of the MSA and the quality of the air in the MSA.

40 CFR 58 Appendix D, Section 2 (e) states (in part):

> "... The EPA recognizes that State or local agencies must consider MSA/CSA boundaries and their own political boundaries and geographical characteristics in designing their air monitoring networks. The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or to divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator."

Currently each air pollution control agency (affected agency) conducts monitoring in its respective jurisdiction and coordinates monitoring with the other air pollution control agencies within the MSA.

III. ROLES AND RESPONSIBILITIES

The parties agree to the following terms and conditions:

- NCDEQ and VADEQ (the "affected agencies") commit to conducting appropriate monitoring in their respective jurisdictions of the MSA, as needed, to collectively meet EPA minimum monitoring requirements for the entire MSA for criteria air pollutant monitoring deemed necessary to meet the needs of the MSA as determined reasonable by both affected agencies. The minimum air quality monitoring requirements for the MSA shall apply to the MSA in its entirety and shall not apply to any sole affected agency within the MSA unless agreed upon by all affected agencies.

- The affected agencies commit to coordinating monitoring responsibilities and requirements to achieve an effective network design regarding criteria air pollutant monitoring conducted in the MSA and commit to communicate unexpected or unplanned changes in monitoring activities within their jurisdictions to the other affected agency. As conditions warrant, the affected agencies may conduct telephone conference calls, meetings, or other communications to discuss monitoring activities for the MSA. Each affected party shall inform the other via telephone or e-mail of any monitoring changes occurring in its jurisdiction of the MSA at its earliest convenience after learning of the need for the change or making the changes. Such unforeseen changes may include evictions from monitoring sites, destruction of monitoring sites due to natural disaster, or similar occurrences that result in extended (greater than one quarter) or permanent change in the monitoring network. At least once a year in the second quarter or before June 15th, each agency shall deliver to the other agency a copy of its proposed monitoring plan for its jurisdiction within the MSA for the next year.

IV. LIMITATIONS

A. All commitments made in this MOA are subject to the availability of funds and each party's budget priorities. Nothing in this MOA, in and of itself, obligates NCDEQ or VADEQ to expend funds or to enter into any contract, assistance agreement, interagency agreement, or other financial obligation. Nothing herein shall be construed as a promise by either party to indemnify or hold harmless the other party.

B. This MOA is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties to this MOA will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate subsidiary agreements what will be effected in writing by representatives of the parties.

C. Except as provided in Section III, this MOA does not create any right or benefit, substantive or procedural, enforceable by law or equity against NCDEQ or VADEQ, their officers or employees, or any other person. This MOA does not direct or apply to any person outside NCDEQ or VADEQ.

V. PROPRIETARY INFORMATION AND INTELLUCTUAL PROPERTY

No proprietary information or intellectual property is anticipated to arise out of this MOA.

VI. POINTS OF CONTACT

The following individuals are designated points of contact for the MOA:

NCDEQ DAQ: Donnie Redmond, Ambient Monitoring Section Chief
NC DENR Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641

donnie.redmond@ncdenr.gov
Voice/fax: 919-707-8468

VADEQ: Chuck Turner, Director of Air Quality Monitoring
VADEQ Air Quality Division
P.O. Box 1105
Richmond, VA 23218

Charles.Turner@deq.virginia.gov
Voice: (804) 527-5178

VII. MODIFICATION/DURATION/TERMINATION

This MOA will be effective when signed by all parties. This MOA may be amended at any time by the mutual written consent of all parties. The parties will review this MOA at least once every 10 years to determine whether it should be revised, renewed, or cancelled. This MOA may be revoked

or terminated by an affected party at any time and for any reason by giving thirty (30) days written notice prior to the date of termination.

VIII. REFERENCE

United States Environmental Protection Agency, Title 40 Code of Federal Regulations, Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 2 (e), "General Monitoring Requirements"

IX. APPROVALS

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

BY: Sheila C. Holman

TITLE: Director

DATE: 4/26/2016

Virginia Department of Environmental Quality (VADEQ)
Air Quality Division

BY: _____

TITLE: Director, Air Division

DATE: 5/9/16

Appendix I. NCore Monitoring Plan Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OCT 30 2009

RECEIVED NOV 23 2009

OFFICE OF AIR QUALITY PLANNING AND STANDARDS

RECEIVED NOV 6 2009 AIR QUALITY DIVISION DIRECTORS OFFICE

Mr. Keith Overcash, Director
Division of Air Quality
NC Department of Environment & Natural Resources
1641 Mail Service Center
Raleigh, NC 27699-1641

Dear Mr. Overcash:

This letter transmits our approval of North Carolina's proposed NCore station at East Millbrook Middle School in Raleigh, AQS# 37-183-0014, as required by the Ambient Air Monitoring Regulations. According to these rules (see 40 CFR 58.11(c)), NCore network design and changes must be approved by the Environmental Protection Agency's (EPA) Administrator. This authority has been delegated to the Director of the Air Quality Assessment Division in EPA's Office of Air Quality Planning and Standards.

In considering your proposed NCore monitoring station, we worked with your Regional Office on a review of your annual monitoring network plan and an assessment of the proposed location and characteristics of the area to be monitored. After careful consideration of your proposal, we are pleased to approve this station as part of the NCore network.

In your agency's plan for NCore, a request was made to waive measuring NOy, which is a required measurement. After assessing available NOy observations and modeling outputs and to assure consistency across all NCore stations, we are affirming the requirement to measure NOy at all NCore stations. Please make arrangements with your Regional Office on a schedule to implement the measurement of NOy at your NCore station.

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

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

Richard A. Wayland
Director
Air Quality Assessment Division

2 Enclosures

cc: Doug Neeley, EPA Region 4

Appendix J. 2010 Network Plan EPA Approval Letter

Donni

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

SEP 2 2 2010

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,

/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 (NO_2) and sulfur dioxide (SO_2) with minimum monitoring requirements effective January 1, 2013. Minimum monitoring requirements are listed for ozone (O_3), particulate matter less than 2.5 microns ($PM_{2.5}$), particulate matter less than 10 microns (PM_{10}), and lead (Pb).

The minimum monitoring requirements are based on metropolitan statistical area (MSA) boundaries as defined by the U.S. Office of Management and Budget (OMB), July 1, 2009, population estimates from the U.S. Census Bureau, and historical ambient air monitoring data. OMB currently defines 15 MSAs in the State of North Carolina. These MSAs and the respective July 1, 2009, population estimates from the U.S. Census Bureau are shown in Table 1.

Table 1: Metropolitan Statistical Areas and Populations

MSA Name	Population
Charlotte-Gastonia-Concord, NC-SC	1,745,524
Virginia Beach-Norfolk-Newport News, VA-NC	1,674,498
Raleigh-Cary, NC	1,125,827
Greensboro-High Point, NC	714,765
Durham-Chapel Hill, NC	501,228
Winston-Salem, NC	484,921
Asheville, NC	412,672
Hickory-Lenoir-Morganton, NC	365,364
Fayetteville, NC	360,355
Wilmington, NC	354,525
Greenville, NC	179,715
Jacksonville, NC	173,064
Burlington, NC	150,358
Rocky Mount, NC	146,536
Goldsboro, NC	113,811

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

The network described in the 2010 Network Plan meets the minimum O_3 monitoring requirements specified by 40 CFR Part 58, Appendix D, Table D-2 in all areas.

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

The State of North Carolina's current PM_{10} primary monitoring network meets the minimum requirements for all areas. All PM_{10} collocation requirements for manual methods found in 40 CFR Part 58, Appendix A, 3.3.1 are currently being met. Fifteen percent of each network of manual PM_{10} methods (at least one site) must be collocated. Also, the sites with collocated monitors should be among those measuring annual mean concentrations in the highest 25 percent of the network. These collocation requirements are met in the Network Plan for manual PM_{10} sampling.

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

The State of North Carolina's current $PM_{2.5}$ monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-5 for all MSAs. Manual $PM_{2.5}$ collocation requirements are found in 40 CFR Part 58, Appendix A, section 3.2.5. Fifteen percent of each network of manual $PM_{2.5}$ methods (at least one site) must be collocated. The manual collocation requirement for $PM_{2.5}$ is currently being met in the Network Plan. In addition, there is a requirement for 80% of these collocated monitors to be at sites that are $\pm$ 20% of the NAAQS. Currently, only 20% of the collocated monitors are at sites $\pm$ 20% of the NAAQS. EPA recommends that the collocated sites be moved to the appropriate sites to meet this requirement. The following monitoring sites currently have $PM_{2.5}$ design values within $\pm$ 20 percent of the NAAQS and are recommended for consideration as collocation monitors: Air Quality System (AQS) ID 37-035-004, AQS ID 37-057-0002, AQS ID 37-063-0001, AQS ID 37-071-0016, AQS ID 37-087-0010, AQS ID 37-119-0041, AQS ID 37-119-0042, AQS ID 37-119-0043, AQS ID 37-135-0007, and AQS ID 37-159-0021.

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

Regulatory requirements for continuous $PM_{2.5}$ monitoring require that "...State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D–5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required [Federal Reference Method (FRM)/Federal Equivalent Method (FEM)/Approved Regional Method (ARM)] monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies." These

minimum continuous $PM_{2.5}$ monitoring requirements are currently met in the all of the MSAs in the State. Also, the continuous $PM_{2.5}$ collocation requirements are currently met in all MSAs. Therefore, the continuous $PM_{2.5}$ monitoring network described in the 2010 Network Plan meets all of the design criteria of 40 CFR Part 58.

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

40 CFR Part 58, Appendix D, 4.7.3 requires that "each State shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor for regional transport." The 2010 Network Plan identifies the $PM_{2.5}$ sites at Mendenhall (AQS ID: 37-081-0013), Cherry Grove (AQS ID: 37-033-0001), and Jamesville (AQS ID: 37-117-0001) as background sites and the $PM_{2.5}$ sites at Cherry Grove (AQS ID: 37-033-0001), Jamesville (AQS ID: 37-117-0001), and Bryson City (AQS ID: 37-173-0002) as regional transport sites. Therefore, NC-DAQ has satisfied the requirements of 40 CFR Part 58 for background and transport sites.

Lead (Pb) Monitoring Requirements
40 CFR Part 58, Appendix D 4.5

Ambient air monitoring network design criteria for Pb are found at section 4.5 of Appendix D to 40 CFR Part 58. This section requires that, at a minimum, there must be one source-oriented state and local air monitoring station (SLAMS) located to measure the maximum Pb concentration in ambient air resulting from each Pb source which emits 1.0 or more tons per year (t/yr).

NC-DAQ was not required to conduct ambient air monitoring at three sources (see list below) based upon submitted information in the 2009 and 2010 Network Plans indicating that the following sources will not contribute more than 1.0 t/yr. EPA concurs with this assessment and will not require ambient air monitoring at these sources in the 2010 Network Plan.

International Resistive Company (IRC)
736 Greenway Road
Boone, NC 28607

Nucor Steel
1505 River Road
Cofield, NC 27922

Carolina Power and Light Company (Progress Energy) Roxboro Steam Station
1700 Dunnaway Road
Semora, NC 27343

Air Quality Index (AQI) Reporting
40 CFR §58.50

AQI reporting is required in MSAs with populations over 350,000. There are 10 MSAs in the State of North Carolina required to report an AQI: Charlotte-Gasonia-Concord, Virginia Beach-Norfolk-Newport News, Raleigh-Cary, Greensboro-High Point, Durham-Chapel Hill, Winston-Salem, Asheville, Hickory-Lenoir-Morganton, Fayetteville, and Wilmington. NC-DAQ meets these AQI reporting requirements.

Monitoring Network Changes Proposed by NC-DAQ

NC-DAQ has proposed several monitoring network changes in the 2010 Network Plan. Any monitors listed in the Network Plan as possibly being relocated or discontinued are subject to a case-by-case evaluation by a letter request from NC-DAQ when NC-DAQ has a proposed shut-down date for that particular monitor or an approved regional method. Monitors proposed for discontinuation are summarized in Table 2.

Table 2: Monitors proposed for discontinuation/location change

AQS ID	Pollutant	Type	Comments
37-173-0002	SO_2	SLAMS	Monitor was shut down after EPA approval dated June 24, 2010
37-081-0013	$PM_{2.5}$	QA Collocated	Collocated monitor shut down
37-087-0004	Ozone	SLAMS	Evicted from property, moving site across the road to Junaluska Elementary School, keep AQS ID the same for 250 meter location move
37-061-0002	PM_{10}	PSD	PSD monitor shut down and convert to special purpose monitor operating every third year
37-107-0004	Ozone	SLAMS	Relocate monitor on property due to structure that obstructs air flow to monitor
37-069-0001	Ozone	SLAMS	Relocate monitor or shut down due to road construction

EPA has reviewed these requests for discontinuation or monitor relocation and determined that all of the requested monitors meet the requirements of 40 CFR §58.14(c)(6) for monitor relocation or are requests to shut down PSD or QA monitors, which are not subject to EPA Region 4 approval. EPA Region 4 encourages NC-DAQ to maintain the AQS ID 37-087-0004 instead of assigning a new AQS ID for this site because the site is only moved 250 meters. By maintaining the AQS ID, the NAAQS design values can be calculated continuously. The minimum monitoring requirements for PM_{10}, $PM_{2.5}$, and O_3 found in Appendix D to 40 CFR Part 58 will continue to be met for the respective MSAs after these monitors are discontinued or relocated.

NC-DAQ also requested to change the monitoring frequency at AQS ID 37-081-0013 (primary monitor) to 1-in-3 days. At this proposed frequency, the monitors will meet the $PM_{2.5}$ operating schedule requirements under 40 CFR §58.12(d)(1)(i). Therefore, EPA approves the change to 1-in-3 day monitoring at these sites.

National Core (NCore) Monitoring Network

NC-DAQ has designated two NCore sites, AQS ID 37-183-0014 and AQS ID 37-119-0041, in the 2010 Network Plan. The first site (AQS ID 37-183-0014) is located at the East Millbrook Middle School site in Raleigh, NC. The second site (AQS ID 37-119-0041) is located at the Garinger site in Charlotte, NC and is operated by the Mecklenburg County Land Use and Environmental Services Agency. Official EPA approval was granted on October 30, 2009. All quality assurance procedures shall be implemented in accordance with 40 CFR Part 58, Appendix A.

Air Quality System (AQS)

Based on listings of monitor types in the Network Plan, NC-DAQ has several monitors that are listed as "other." EPA encourages the State to be more specific in their monitor types in AQS. Monitors that are listed as "other" will be treated as a SLAMS monitor for regulatory evaluations. Secondly, the State should verify that monitor types in AQS match those in the Network Plan. For example, the SO_2 monitor at AQS ID 37-051-1003 is listed as a special purpose monitor in the Network Plan, but as a SLAMS monitor in AQS. A similar case exists for PM_{10} monitor AQS ID 37-081-0013, which is listed as "other" in the Network Plan, but as a SLAMS monitor in AQS. EPA uses the AQS designation for regulatory purposes and will consider both of these monitors SLAMS until approved otherwise. The State is responsible for maintaining current monitor type classifications in AQS.

Appendix K. 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)

I. PURPOSE/OBJECTIVES/GOALS

The purpose of this Memorandum of Agreement (MOA) is to establish the Charlotte-Concord-Gastonia Metropolitan Statistical Area (MSA) Criteria Pollutant Air Quality Monitoring Agreement among NCDAQ, SCDHEC, and the MCAQ (collectively referred to as the "affected agencies") to collectively meet United States Environmental Protection Agency (EPA) minimum monitoring requirements for criteria pollutants deemed necessary to meet the needs of the MSA as determined reasonable by all parties. This MOA will renew the terms and conditions of this collective agreement to provide adequate criteria pollutant monitoring for the Charlotte-Concord-Gastonia MSA as required by 40 CFR 58 Appendix D, Section 2(e).

II. BACKGROUND

The Charlotte-Concord-Gastonia MSA consists of

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

York County, SC

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

The NCDAQ, SCDHEC, and MCAQ are required by the Clean Air Act to measure for certain criteria pollutants in the ambient air in the Charlotte-Concord-Gastonia MSA. The EPA has established minimum monitoring requirements based on the size of the MSA and the quality of the air in the MSA.

40 CFR 58 Appendix D, Section 2 (e) states (in part):

> "... The EPA recognizes that State or local agencies must consider MSA/CSA boundaries and their own political boundaries and geographical characteristics in designing their air monitoring networks. The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or to divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator."

Currently each air pollution control agency (affected agency) conducts monitoring in its respective jurisdiction and coordinates monitoring with the other air pollution control agencies within the MSA.

III. ROLES AND RESPONSIBILITIES

The parties agree to the following terms and conditions:

- NCDAQ, SCDHEC, and MCAQ (the "affected agencies") commit to conducting appropriate monitoring in their respective jurisdictions of the MSA; as needed, to collectively meet EPA minimum monitoring requirements for the entire MSA for criteria air pollutant monitoring deemed necessary to meet the needs of the MSA as determined reasonable by all affected agencies. The minimum air quality monitoring requirements for the MSA shall apply to the MSA in its entirety and shall not apply to any sole affected agency within the MSA unless agreed upon by all affected agencies.

- The affected agencies commit to coordinating monitoring responsibilities and requirements to achieve an effective network design regarding criteria air pollutant monitoring conducted in the MSA and commit to communicate unexpected or unplanned changes in monitoring activities within their jurisdictions to the other affected agencies. As conditions warrant, the affected agencies may conduct telephone conference calls, meetings, or other communications to discuss monitoring activities for the MSA. Each affected party shall inform the others via telephone or e-mail of any monitoring changes occurring in its jurisdiction of the MSA at its earliest convenience after learning of the need for the change or making the changes. Such unforeseen changes may include evictions from monitoring sites, destruction of monitoring sites due to

natural disaster, or similar occurrences that result in extended change (greater than one quarter) or permanent change in the monitoring network. At least once a year in the second quarter or before June 15th, each agency shall make available to the other agency a copy of its proposed monitoring plan for its jurisdiction with the MSA for the next year.

- Each party reserves the right to revoke or terminate this MOA at any time for any reason by giving thirty (30) days written notice prior to the date of termination.

IV. LIMITATIONS

A. All commitments made in this MOA are subject to the availability of funds and each party's budget priorities. Nothing in this MOA, in and of itself, obligates NCDAQ, SCDHEC, or MCAQ to expend funds or to enter into any contract, assistance agreement, interagency agreement, or other financial obligation.

B. This MOA is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties to this MOA will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate subsidiary agreements what will be effected in writing by representatives of the parties.

C. Except as provided in Section III, this MOA does not create any right or benefit, substantive or procedural, enforceable by law or equity against NCDAQ, SCDHEC, or MCAQ, their officers or employees, or any other person. This MOA does not direct or apply to any person outside NCDAQ, SCDHEC, or MCAQ.

V. PROPRIETARY INFORMATION AND INTELLUCTUAL PROPERTY

No proprietary information or intellectual property is anticipated to arise out of this MOA.

VI. POINTS OF CONTACT

The following individuals are designated points of contact for the MOA:

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

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

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

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

MCAQ:

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

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

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

VII. MODIFICATION/DURATION/TERMINATION

This MOA will be effective when signed by all parties. This MOA may be amended at any time by the mutual written consent of all parties. The parties will review this MOA at least once every 10 years to determine whether it should be revised, renewed, or cancelled. This MOA may be revoked or terminated by an affected party at any time and for any reason by giving thirty (30) days written notice prior to the date of termination.

VIII. REFERENCE

United States Environmental Protection Agency, Title 40 Code of Federal Regulations, Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 2 (e), "General Monitoring Requirements"

IX. APPROVALS

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

BY: Sheila C. Holman

TITLE: Director, Division of Air Quality

DATE: 6/27/2016

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

BY: [signature]

TITLE: Chief, Bureau of Air Quality

DATE: 07/05/2016

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

BY: Leslie H Rhodes

TITLE: Director, Air Quality

DATE: 6/29/2016

D H E C
PROMOTE PROTECT PROSPER
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

MECKLENBURG COUNTY
Land Use and Environmental Services Agency
-AIR QUALITY-

May 19, 2021

MEMORANDUM

To: 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

From: Leslie H. Rhodes, Division Director
Mecklenburg County Air Quality (MCAQ)

Subject: Change Point of Contact for MCAQ
Memorandum of Agreement on Air Quality Monitoring for Criteria Pollutants for the Charlotte-Concord-Gastonia Metropolitan Statistical Area (MSA)

As of May 17, 2021, the Point of Contact for MCAQ will be Danielle Jones, instead of Jeff Francis. Danielle's contact information is below.

Danielle Jones
Air Monitoring Program Manager
MCAQ
2145 Suttle Avenue
Charlotte, NC 28208
980-314-3355
daniellem.jones@mecknc.gov

ROY COOPER
Governor
DIONNE DELLI-GATTI
Secretary
MICHAEL ABRACZINSKAS
Director

NORTH CAROLINA
Environmental Quality

May 20, 2021

MEMORANDUM

TO: Participating Agencies:

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

Mecklenburg County
Land Use and Environmental Services Agency
Air Quality

FROM: Michael Abraczinskas, Director DS MA 5/20/2021
North Carolina Division of Air Quality (NCDAQ)

SUBJECT: Change Point of Contact for NCDAQ
Memorandum of Agreement on Air Quality Monitoring for Criteria Pollutants for the Charlotte-Concord-Gastonia Metropolitan Statistical Area (MSA)

The Point of Contact for NCDAQ is Patrick Butler instead of Joette Steger. Patrick's contact information is below:

Patrick Butler, P.E.
Ambient Monitoring Section Chief
NCDAQ
1641 Mail Service Center
Raleigh, NC 27699-1641

Patrick.Butler@ncdenr.gov
Voice/fax: 919-707-8719

Appendix L. Scale of Representativeness

Each agency must describe each station in the monitoring network in terms of the physical dimensions of the air parcel nearest the monitoring station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

a) Micro-scale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers.
c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 kilometers.
d) Urban scale - defines an overall citywide condition with dimensions on the order of 4 to 50 kilometers.
e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of kilometers.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station. There are six basic exposures:

a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.
b) Sites located to determine representative concentrations in areas of high population density.
c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.
d) Sites located to determine general background concentration levels.
e) Sites located to determine the extent of regional pollutant transport among populated areas.
f) Sites located to measure air-pollution impacts on visibility, vegetation damage or other welfare-based impacts and in support of secondary standards.

The design intent is to match the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. When siting monitoring stations, the following relationship of the objectives and scales of representativeness are appropriate:

Table J1. Site Type Appropriate Siting Scales

1. Highest concentration	Micro, middle, neighborhood, sometimes urban or regional for secondarily formed pollutants
2. Population oriented	Neighborhood, urban
3. Source impact	Micro, middle, neighborhood
4. General/background & regional transport	Urban, regional
5. Welfare-related impacts	Urban, regional

Appendix M – 2022 Annual Report for EPA's Data Requirements Rule to Demonstrate Attainment with the 2010 1-Hour 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 (SO_2) National Ambient Air Quality Standard (NAAQS) relative to 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 SO_2 emissions serve as the basis for designating such area as attainment for the 2010 SO_2 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 SO_2 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) SO_2 emissions over the last eight years for each facility for which North Carolina used modeling as the basis for attainment designations with regard to the 2010 SO_2 NAAQS, along with the three-year SO_2 emissions data inputs that were used in the most recent air quality models. The slight differences between the annual SO_2 emissions data from CAMD and the modeled SO_2 emission rates can be attributed to differences in calculation methods to determine the annual SO_2 emissions. The modeling input values are a summation of the hourly SO_2 emissions data for each year.

Table 1. Duke Energy GG Allen Plant SO_2 Emissions (2013-2021)

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	
2019	147.79	
2020	91.12	
2021	20.89	

Table 2. Duke Energy Belews Creek Plant SO_2 Emissions (2013-2021)

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	
2019	3370.46	
2020	1873.39	
2021	2386.79	

[1]Different 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 Plant SO_2 Emissions (2013-2021)

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	
2019	4877.95	
2020	3085.41	
2021	2812.14	

Table 4. Duke Energy Mayo Plant SO_2 Emissions (2013-2021)

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	
2019	1123.26	
2020	867.26	
2021	1293.37	

Tables 1-4 above show that actual SO_2 emissions for calendar year 2021 are well below the 2013-2015 SO_2 emissions that were modeled to demonstrate attainment with the 2010 SO_2 NAAQS. While there is an overall downward trend in SO_2 emissions from year to year at all four facilities, the Belews Creek and Mayo plants did report slight increases in annual SO_2 emissions from 2020 to 2021. DAQ contacted Duke Energy to determine the reason for the increase in annual SO_2 emissions for these two facilities in 2021. Duke Energy personnel looked into the issue and determined that the SO_2 emission increases were directly due to higher operational hours and higher input for the coal-fired boilers at the Belews Creek and Mayo plants in 2021 compared to 2020. The global COVID-19 pandemic caused an overall decrease in demand for electricity by Duke Energy customers in 2020 primarily due to many businesses being shut down for some period of time. However, demand for electricity returned to more normal levels in 2021 resulting in a more normal operational schedule for the Duke Energy plants in North Carolina.

Even with the increase in emissions in 2021, the annual SO_2 emissions at both the Belews Creek and Mayo facilities for 2021 are still much lower than the three-year averages that were used in the initial DRR modeling for each facility to demonstrate compliance with the 2010 SO_2 NAAQS. Therefore, the 2021 annual data as reported confirm that the 2010 SO_2 NAAQS is being attained and that no additional modeling is necessary for any of the DDR 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 SO_2 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 SO_2 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 (2019-2021, tons/yr)	% of NAAQS as Originally Modeled	% Emissions Reduction Between 3-Year Cycles
G G Allen	1230.61	86.60	62%	93.0%
Belews Creek	6300.50	2543.55	62%[2]	59.6%
Marshall	5081.58	3591.83	91%	29.3%
Mayo	3515.06	1094.63	96%	68.9%

[2]Table 8 of EPA's Round 3 Designations Technical Support Document (TSD) shows a modeled emission rate of 50% of the NAAQS. However, the modeled SO_2 concentration recorded in Table 8 of the TSD does not include background concentrations from the original modeling report.

While SO_2 emissions are steadily decreasing at each of the facilities for which modeling of actual SO_2 emissions serve as the basis for designating the area as attainment for the 2010 SO_2 NAAQS, the emission reductions at the Marshall Plant are likely 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 evaluate the SO_2 emission reductions at all affected sources and may conduct further DRR modeling analysis in the future to determine if the 50 percent of the NAAQS standard threshold has been attained in each area. 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 N. 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 Sept. 19 through Oct. 19, 2022. In addition, notification was sent out via public e-mail distribution lists maintained for permitting and rules.

[External] Notice of Public Comment Period for NC DAQ's Annual Monitoring Network Plan

DEQ.AQ.Stakeholders.Outside_Involvement_Committee@lists.deq.nc.gov <DEQ.AQ.Stakeholders.Outside_Involvement_Committee@lists.deq.nc.gov> on behalf of Gatano, Betty <betty.gatano@ncdenr.gov>

Mon 9/19/2022 8:03 AM

To: DEQ.AQ.Stakeholders.Outside_Involvement_Committee@lists.deq.nc.gov <DEQ.AQ.Stakeholders.Outside_Involvement_Committee@lists.deq.nc.gov>

CAUTION: External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to Report Spam.

The 2022-2023 NC DAQ annual network monitoring plan is posted on the website and is open for public comment through Oct. 19, 2022. The links to the public notice and network plan summary are:

Public Notice

Network Plan Summary

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

Betty Gatano, P.E.
Engineer III, Division of Air Quality
North Carolina Department of Environmental Quality
919.707.8756 (Office)
Betty.Gatano@ncdenr.gov

Notice of Public Comment Period for NC DAQ's Annual Monitoring Network Plan

Burleson, Joelle
Mon 9/19/2022 11:34 AM
To: Burleson, Joelle <joelle.burleson@ncdenr.gov>

Hello Air Quality Stakeholders:

The 2022-2023 NC DAQ annual network monitoring plan is posted on the website and is open for public comment through Oct. 19, 2022. The links to the public notice and network plan summary are:

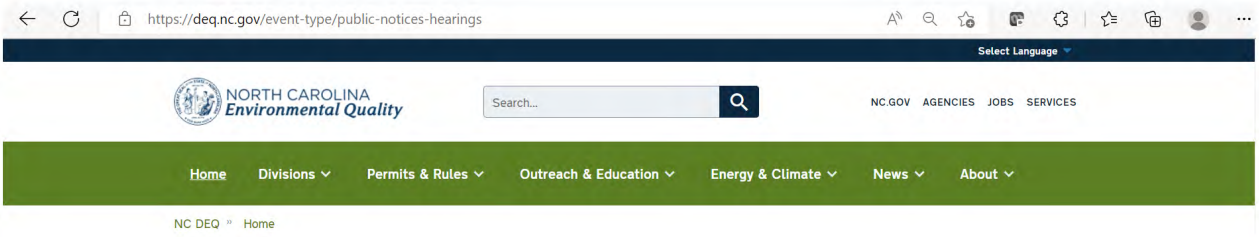
Public Notice

Network Plan Summary

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
https://deq.nc.gov/about/divisions/air-quality
joelle.burleson@ncdenr.gov



Public Comment Period: 2022-2023 Annual Monitoring Network Plan for North Carolina Air Quality

Notice of Public Comment Period

September 19, 2022 – October 19, 2022

Mon, Sep 19, 2022, 8:00am - Wed, Oct 19, 2022, 5:00pm

Notice of Intent to Issue a NPDES Wastewater Permit NC0037508 Moore County WPCF

Public Notice
North Carolina Environmental Management Commission/NPDES Unit
1617 Mail Service Center
Raleigh, NC 27699-1617
Notice of Intent to Issue a NPDES Wastewater Permit NC0037508 Moore County WPCF The North Carolina Environmental Management Commission proposes to issue a NPDES wastewater discharge permit to the person(s) listed below. Written comments regarding the proposed permit will be accepted until 30 days after the publish date of this notice. The Director of the NC Division of Water Resources (DWR) may hold a public hearing should there be a significant degree of public interest. Please mail comments and/or information requests to DWR at the above

Public Comment Period: 2022-2023 Annual Monitoring Network Plan for North Carolina Air Quality

When and Where

When:
Mon, Sep 19, 2022, 8:00am-Wed, Oct 19, 2022, 5:00pm

Contact:
Shawn Taylor
Shawn.Taylor@ncdenr.gov
(919) 707-8446

Notice of Public Comment Period

September 19, 2022 – October 19, 2022

The N.C. Department of Environmental Quality's Division of Air Quality (DAQ) is accepting public comment on changes to DAQ's 2022-2023 Ambient Air Quality Monitoring Network Plan from Sept. 19, 2022, to Oct. 19, 2022. The proposed changes are required to be submitted to the U.S. Environmental Protection Agency (EPA) annually.

DAQ posted the Annual Monitoring Network Plan on its website on Friday, Sept. 16, 2022. The plan is also available for public inspection by contacting Patrick Butler using the contact information below.

Comment Procedures

All persons interested in these matters are invited to comment. Email comments to DEQ.AQ.Ask.Ambient@ncdenr.gov or mail comments to:

Patrick Butler
NC Division of Air Quality
1641 Mail Service Center
Raleigh, North Carolina 27699-1641
(919) 707-8719
(919) 707-8402 (fax)

This event is related to

Public Notices & Hearings
Division/Office
Air Quality

Appendix O. Public Comments Received and Response

No public comments were received. The following changes were made to the monitoring plan after it went out for public comment:

- Appendices N and O were added;
- Permit Numbers cited in Volume 2 Section B were updated; and
- An update on the NTE permit in Volume 2 Section B was added.

Glossary

ADN – atmospheric deposition network
AMS – Ambient Monitoring Section
AQS - air quality system
AQI - air quality index
ARM - approved regional method
BAM - beta attenuation monitor
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
MCAQ – Mecklenburg County Air Quality
MMIF – Mesoscale Model Interface
MOA – Memorandum of Understanding
MSA - metropolitan statistical area
NAAQS - national ambient air quality standards
DAQ - North Carolina Division of Air Quality
NCore - national core ambient monitoring network station
NO2 - nitrogen dioxide
NOy – reactive oxides of nitrogen
O_3 – ozone
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
RRO – Raleigh Regional Office
SASS^{TM} – 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