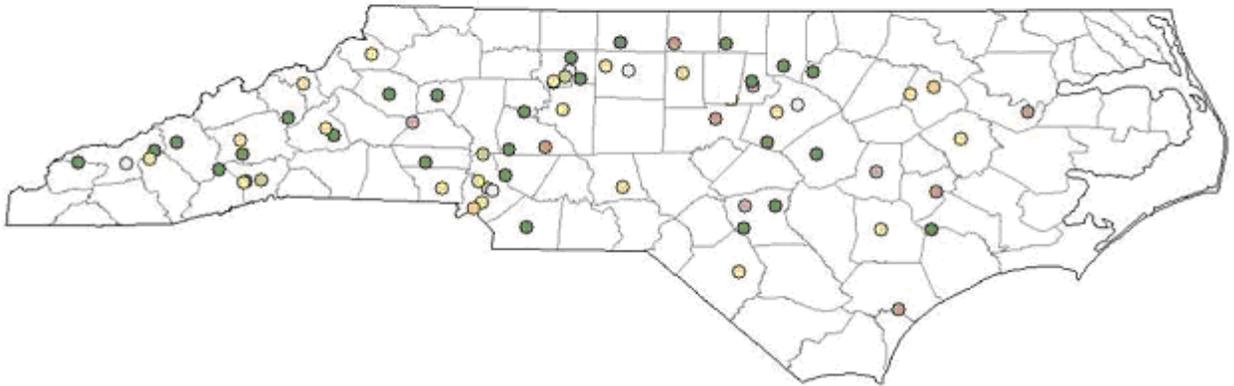


# 2012 ANNUAL MONITORING NETWORK PLAN FOR THE NORTH CAROLINA DIVISION OF AIR QUALITY

## VOLUME 1

### NETWORK DESCRIPTIONS



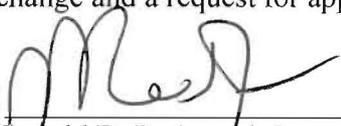
**July 2, 2012**

North Carolina Division of Air Quality  
A Division of the North Carolina Department  
of Environment and Natural Resources  
Mail Service Center 1641  
Raleigh, North Carolina 27699-1641



**CERTIFICATION**

By the signatures below, the North Carolina Division of Air Quality (NC-DAQ) certifies that the information contained in the 2012 Annual Monitoring Network Plan is complete and accurate at the time of submittal to EPA Region 4. However, due to circumstances that may arise during the sampling year, some network information may change. A notification of change and a request for approval will be submitted to EPA region 4 at that time.

Signature  \_\_\_\_\_  
Donald D. Redmond, Jr.  
Ambient Monitoring Section Chief, NC-DAQ

Date 6/29/12

Signature  \_\_\_\_\_  
Sheila C. Holman  
Director, NC-DAQ

Date 6/29/12

## I. Introduction

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

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

The Ambient Monitoring Section (AMS) of the NC-DAQ operates an air quality-monitoring program for the state. The AMS is responsible for measuring levels of regulated pollutants in the ambient (outdoor) air by maintaining a network of 60 monitoring stations across the state and measuring the concentration of pollutants such as ozone, lead, particles (dust), nitrogen oxides, sulfur dioxide, and carbon monoxide. The AMS provides these monitoring services in accordance with U.S. EPA regulatory requirements. The criteria pollutant monitoring system is designed to make measurements to assess compliance with the National Ambient Air Quality Standards (NAAQS) as set by the EPA. The NAAQS define air pollutant concentration level thresholds judged necessary to protect the public health and welfare.

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

- The Air Quality System (AQS) site identification number;
- The location, including street address and geographical coordinates;
- The sampling and analysis method(s) for each measured parameter;
- The operating schedules for each monitor;
- Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal;
- The monitoring objective and spatial scale of representativeness for each monitor as defined in appendix D to this part;
- The identification of any sites that are suitable and sites that are not suitable for comparison against the annual fine particle (PM<sub>2.5</sub>) NAAQS as described in §58.30; and
- The Metropolitan Statistical Area (MSA), Core-Based Statistical Area (CBSA), Combined Statistical Area (CSA) or other area represented by the monitor.
- The designation of any Pb monitors as either source-oriented or nonsource-oriented according to Appendix D to 40 CFR Part 58.

- Any source-oriented monitors for which a waiver has been requested or granted by the EPA Regional Administrator as allowed for under paragraph 4.5(a)(ii) of Appendix D to 40 CFR part 58.
- Any source-oriented or nonsource-oriented site for which a waiver has been requested or granted by the EPA Regional Administrator for the use of Pb-PM10 monitoring in lieu of Pb-TSP monitoring as allowed for under paragraph 2.10 of Appendix C to 40 CFR part 58.
- The identification of required NO<sub>2</sub> monitors as either near-road or area-wide sites in accordance with appendix D, section 4.3 of this part.

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

- II. Summary of Proposed Changes
- III. Carbon Monoxide (CO) Monitoring Network
- IV. Sulfur Dioxide Monitoring Network
- V. Ozone Monitoring Network
- VI. Particle Monitoring Network for Particles with Aerodynamic Diameters of 10 Micrometers or Less (PM<sub>10</sub>)
- VII. Fine Particle (PM<sub>2.5</sub>) Monitoring Network
- VIII. Lead Monitoring Network
- IX. Urban Air Toxics Monitoring Network
- X. NC-DAQ NCore Monitoring Network
- XI. Nitrogen Dioxide Monitoring Network
- XII. EPA Approval Dates for Quality Management Plan and Quality Assurance Project Plans
- XIII. Equipment Condition of North Carolina Monitoring Sites

A table summarizing the monitoring network and providing the types of monitors operated at each station is provided in Appendix A. Summary of Monitoring Sites and Types of Monitors. The annual network review forms filled out each year for each of the monitoring sites operated by the NC-DAQ and the Western North Carolina Regional Air Quality Agency are attached as an appendix to each regional section in Volume 2 and are also available for review at the Division of Air Quality, 217 West Jones Street, Raleigh, North Carolina, 27603. The Mecklenburg County Air Quality 2012 Annual Monitoring Network Plan is provided in Appendix B. The Forsyth County Office of Environmental Assistance and Protection 2012 Annual Monitoring Network Plan is provided in Appendix C.

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

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## II. Summary of Proposed Changes

Table 1 presents a summary of proposed changes listed by Metropolitan Statistical Area (MSA) and AQS Site Identification Number. Table 2 contains a list of fastest growing counties in North Carolina for reference in the discussions in this section and the following sections of the report, which described monitoring changes required because of population growth in the MSA. The discussion in this section follows the same organization as the table. The last portion of this discussion explains the projected impact on the fine particle-monitoring network of potential changes to the fine particle monitoring method used for determination of compliance with the National Ambient Air Quality Standards (NAAQS) and discusses the status of some of the special studies conducted by the NC-DAQ.

### A. Changes to Monitoring in the Charlotte-Gastonia-Rock Hill MSA

Changes to the monitors operated by Mecklenburg County Air Quality are discussed in Appendix B. 2012 Annual Monitoring Network Plan for Mecklenburg County Air Quality. The only changes discussed here are those applying to the two monitoring sites operated by the NC-DAQ: Grier Middle School (37-071-0016) and Monroe Middle School (37-179-0003).



**Figure 1. Grier Middle School Fine Particle Monitoring Site (37-071-0016)**

At **Grier Middle School** (37-071-0016), shown in Figure 1, the NC-DAQ operates a one-in-three day fine particle FRM monitor and a continuous fine particle monitor. This fine-particle monitoring site is one of four such sites for the MSA. 40 CFR 58 Appendix D requires the Charlotte-Gastonia-Rock Hill MSA to have two fine-particle monitoring sites. The site is collocated with a wind speed and direction sensor. Starting on July 1, 2011, the NC-DAQ reduced the sampling frequency at this site to one-in-six day. If resources are available in 2013, the NC-DAQ may add a background PM<sub>10</sub> or PM<sub>10-2.5</sub> monitor to the site that will run every third year to provide data for Prevention of Significant Deterioration modeling for industrial expansion.

No changes are currently planned at the Monroe Middle School (37-179-003) site.

### B. Changes to Monitoring in the Raleigh-Cary MSA

At the Franklinton (37-069-0001) site the NC-DAQ operates a seasonal ozone monitor. The site is shown in Figure 2. This ozone monitoring site is one of four sites for the MSA. 40 CFR 58 Appendix D requires the Raleigh-Cary MSA to have two ozone monitoring sites. Because of population growth and new industrial opportunities in other

**Table 1. Summary of Proposed Changes to the North Carolina Monitoring Network  
Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
370710016	Grier Middle School/ Gastonia	PM <sub>10</sub>	PM <sub>10</sub> or PM <sub>10-2.5</sub> Special Purpose Background Monitoring will begin	1/1/2013
371190041 <sup>a</sup>	Garinger	Lead	Low volume PM <sub>10</sub> lead monitoring started	12/29/2011
3711904x	Near Road Site	NO <sub>2</sub>	A near-road NO <sub>2</sub> monitor will begin operating to meet Appendix D requirements	1/01/2014
450910006 <sup>b</sup>	York	SO <sub>2</sub>	SO <sub>2</sub> PWEI monitoring started	1/1/2012

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
370690001	Franklinton	Ozone	The ozone monitor may shut down if resources are needed for other monitoring priorities	10/31/2012
371010002	West Johnston	Fine Particles (PM <sub>2.5</sub> )	Monitoring may end on 12/31/2012 if resources are needed for other monitoring priorities	12/31/2012
371830014	Millbrook	NO <sub>2</sub>	An area-wide Photolytic NO <sub>2</sub> monitor will begin operating to meet Appendix D requirements	1/01/2013
		Lead	Low volume PM <sub>10</sub> lead monitoring started	12/29/2011
371830021	Triple Oak Road	NO <sub>2</sub>	A near-road NO <sub>2</sub> monitor will begin operating to meet Appendix D requirements	1/01/2014 or earlier

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
370810013	Mendenhall	PM <sub>10</sub>	The PM <sub>10</sub> Wedding monitor may be upgraded to a 2025 sequential monitor to allow PM <sub>10</sub> and PM <sub>10-2.5</sub> measurements to be obtained.	1/1/2012 or later
		SO <sub>2</sub>	SO <sub>2</sub> PWEI monitoring may begin	1/1/2013
370830015	Knox Road	NO <sub>2</sub>	A near-road NO <sub>2</sub> monitor will begin operating to meet Appendix D requirements	1/01/2017
371570099	Bethany	SO <sub>2</sub>	Rotating SO <sub>2</sub> monitor ended and will resume operating in 2014	1/1/2014

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
370370004	Pittsboro	SO <sub>2</sub>	Rotating SO <sub>2</sub> monitor ended and will resume in 2014	1/1/2014
		Fine Particles (PM <sub>2.5</sub> )	Monitoring may end on 12/31/2012 if resources are needed for other monitoring priorities	12/31/2012
370630015	Durham Armory	SO <sub>2</sub>	SO <sub>2</sub> PWEI monitoring will begin	1/1/2013
37063016	Page Road	NO <sub>2</sub>	A near-road NO <sub>2</sub> monitor will begin operating to meet Appendix D requirements	1/01/2017
371450003	Bushy Fork	Ozone	The ozone monitor may shut down if resources needed for other monitoring priorities	10/31/2012

**Hickory Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
370270003	Lenoir	SO <sub>2</sub>	Rotating SO <sub>2</sub> monitor will begin operating in 2013	1/1/2013
370350004	Hickory	PM <sub>2.5</sub> TEOM	Will change monitor type from SLAMS to Nonregulatory	1/1/2013
			The PM <sub>10</sub> Wedding monitor may be upgraded to allow PM <sub>10</sub> and PM <sub>10-2.5</sub> measurements to be obtained.	1/1/2013 or later
			The collocated PM <sub>10</sub> may be relocated to William Owen	1/1/2013

**Table 1. Summary of Proposed Changes to the North Carolina Monitoring Network****Fayetteville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
370510009	Wm Owen	PM <sub>2.5</sub> TEOM	Will change monitor type from SLAMS to Nonregulatory	1/1/2013
370510009	Wm Owen	PM <sub>10</sub>	The PM <sub>10</sub> Wedding monitor may be upgraded to a 2025 sequential monitor to allow PM <sub>10</sub> and PM <sub>10-2.5</sub> measurements to be obtained.	1/1/2013 or later
			The collocated PM <sub>10</sub> may be relocated here from Hickory	1/1/2013

**Burlington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
370010002	Hopedale	PM <sub>2.5</sub> TEOM	Will change monitor type from SLAMS to Nonregulatory	1/1/2013

**Rocky Mount Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
370650004	Springfield Rd	Fine Particles (PM <sub>2.5</sub> )	A continuous PM <sub>2.5</sub> monitor may be added to the site	1/1/2013 or later
370650099	Leggett	Fine Particles (PM <sub>2.5</sub> )	The continuous non-regulatory fine particle monitor will be shutdown if a continuous monitor is added to the Springfield Road site.	1/1/2013 or later

**Goldsboro Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
371910005	Dillard	PM <sub>2.5</sub> TEOM	Will change monitor type from SLAMS to Nonregulatory	1/1/2013

**Not In A Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor or Pollutant	Proposed Change	Time Frame
370330001 <sup>c</sup>	Cherry Grove	PM <sub>10</sub> /PM <sub>10-2.5</sub>	PM <sub>10</sub> or PM <sub>10-2.5</sub> Special Purpose Background Monitoring will begin	1/1/2013
		Ozone	The ozone monitor may shut down if resources needed for other monitoring priorities	10/31/2012
370590002	Lexington	PM <sub>2.5</sub> TEOM	Will change monitor type from SLAMS to Nonregulatory	1/1/2013
370610002	Kenansville	Fine Particles (PM <sub>2.5</sub> )	Added a continuous PM 2.5 monitor to the site	3/1/2012
371110004	East Marion	PM <sub>10</sub> /PM <sub>10-2.5</sub>	Rotating background PM <sub>10</sub> monitoring to support PSD modeling will start	1/1/2014
371170001	Jamesville	PM <sub>10</sub> /PM <sub>10-2.5</sub>	Start rotating background PM <sub>10</sub> monitoring to support PSD modeling	1/1/2012
371590021	Rockwell	Carbon Monoxide	Shut down CO monitor	10/1/2012 or later
		Reactive Oxides of Nitrogen	Monitor will be upgraded to an i-series trace level unit	
		Sulfate	Add a continuous sulfate monitor	

<sup>a</sup> Operated by Mecklenburg County Air Quality<sup>b</sup> Operated by South Carolina DHEC

**Table 2. Alphabetical List of Fastest Growing Counties in North Carolina based on population change between April 1 or July 1, 2010 and July 1, 2011.**

<b>County Name</b>	<b>Population Estimate July 1, 2011</b>	<b>State Ranking of Counties by 2011 Estimate</b>	<b>Reason for Selection as one of the Fastest Growing Counties in North Carolina</b>
Brunswick	110,097	25	Growth of 2.5 % between April 1, 2010 and July 1, 2011. Nation's 93 <sup>rd</sup> fastest growing county.
Cumberland	324,885	5	Growth of 5,454 people between April 1, 2010, and July 1, 2011.
Durham	273,392	6	Growth of 5,805 people between April 1, 2010, and July 1, 2011.
Forsyth	354,952	4	Growth of 3,569 people between July 1, 2010, and July 1, 2011.
Guilford	495,279	3	Growth of 6,873 people between April 1, 2010, and July 1, 2011.
Harnett	119,256	24	Growth of 4,578 people (4.0 %) between 4/1/2010 and 7/1/2011. Nation's 22 <sup>nd</sup> fastest growing county.
Hoke	49,272	54	Growth of 4.9 % between April 1, 2010, and July 1, 2011. Eighth fastest growing county in the nation.
Mecklenburg	944,373	1	Growth of 24,745 people (2.7 %) between 4/1/2010 and 7/1/2011. Nation's 77 <sup>th</sup> fastest growing county.
Pender	53,399	52	Growth of 2.3 % between April 1, 2010, and July 1, 2011.
Wake	929,780	2	Growth of 28,787 people (3.2 %) between 4/1/2010 and 7/1/2011. Nation's 49 <sup>th</sup> fastest growing county.

parts of the state, the NC-DAQ may decide to shut down this monitor on October 31, 2012, and move the equipment to another location in the state.



**Figure 2. The Franklinton Ozone Monitoring Site**

At the **West Johnston** (37-101-0002) site the NC-DAQ operates a seasonal ozone monitor and a one-in-three day fine particle monitor. The site is shown in Figure 3. This ozone monitor is one of four and the fine particle monitor is one of three for the MSA. 40 CFR 58 Appendix D requires the Raleigh-Cary MSA to have two ozone and two fine particle monitoring sites. The NC-DAQ may decide to shut down the fine particle monitor at this site on 12/31/2012 if additional monitoring resources are needed elsewhere in the state because the monitor is no longer required and the measured values are less than 80 % of the standard. If the NC-DAQ decides to continue fine particle data at this site, a continuous fine particle monitor may be added to this site sometime during 2012 or 2013. This continuous fine particle monitor may eventually replace the manual fine particle monitor operating at the site.



**Figure 3. West Johnson Ozone and Fine Particle Monitoring Site**

At the **Millbrook** (37-183-0014) site the NC-DAQ operates a year-round ozone monitor, one-in-three day fine particle Federal Reference Method (FRM), low-volume manual PM<sub>10</sub>, and manual fine particle speciation monitors, one continuous fine particle Federal Equivalent Method (FEM) monitor, trace-level sulfur dioxide, carbon monoxide and reactive oxides of nitrogen monitors, and air toxics monitors. The NC-DAQ also operates continuous fine particle monitors for sulfate, nitrate and black carbon at this site. The site is shown in Figure 4. Because the Millbrook site is an NCORE site, the NC-DAQ began analyzing the low-volume PM<sub>10</sub> samples for lead, starting December 27, 2011. The NC-DAQ began operating a fine particle Beta Attenuation Monitor (BAM) at the site as an FEM in January 2011. At that time the TEOM monitor at the site was shut down. January 1, 2013 or as soon as possible thereafter, the NC-DAQ will begin operating an area wide photolytic nitrogen dioxide monitor at the site to meet the requirements in Appendix D.



**Figure 4. Millbrook Proposed NCore Monitoring Site**

At the new **Triple Oak Site** the NC-DAQ will operate a near road nitrogen dioxide monitoring site. The site is being established in collaboration with the U.S. EPA Office of Research and Development (ORD) and will be a multipollutant site. The site is scheduled to be up and operational as soon as possible but no later than January 1, 2013. The NC-DAQ will start operating a photolytic nitrogen dioxide monitor at the site. A trace level carbon monoxide monitor will be added by January 1, 2017. The NC-DAQ is also planning on purchasing an aethalometer and ultrafine particle counter to place at the site. The NC-DAQ expects these monitors to be up and operational about a year after the nitrogen dioxide monitoring begins. The NC-DOT currently operates a traffic counter at the site. The U.S. EPA also plans to operate a wide suite of monitors at this site, including air toxics monitors, continuous fine particle monitors, and meteorological sensors.

#### *C. Changes to Monitoring in the Greensboro-High Point MSA*

The Greensboro-High-Point MSA has three monitoring sites: one combined ozone and fine particle monitoring site at Mendenhall School (37-081-0013) in Greensboro, one fine particle monitoring site at Colfax (37-081-0014) and one ozone site at Bethany School in Rockingham County. The Population-Weighted-Emission-Inventory (PWEI) sulfur dioxide monitor required for the Greensboro-High-Point MSA will be a population exposure monitor located at the Mendenhall site. In 2011 the NC-DAQ added the Bethany site to the rotating industrial expansion sulfur dioxide monitoring sites. This monitor will operate every third year and is scheduled to operate again in 2014.

At the **Mendenhall** (37-081-0013) site the NC-DAQ operates a seasonal ozone monitor, a one-in-three-day fine particle monitor, a continuous fine particle monitor, and a one-in-six day PM<sub>10</sub> monitor. The site is shown in Figure 5. The one-in-six day collocated fine particle monitor was shut down September 30, 2010. On January 1, 2011, the sampling schedule at this site was reduced from one-in-one day to one-in-three day. Starting July 1, 2011, the NC-DAQ further reduced the sampling schedule at this site to one-in-six day. The NC-DAQ will add a Population Weighted Emission Index (PWEI) sulfur dioxide monitor at this site January 1, 2013. This monitor is a required population exposure PWEI monitor for the Greensboro-High-Point MSA. Eventually, the NC-DAQ

plans to convert the high volume PM<sub>10</sub> monitor at this site to a low volume PM<sub>10</sub> monitor to allow PM<sub>10-2.5</sub> measurements to be obtained.



**Figure 5. Mendenhall Ozone and Particle Monitoring Site (37-081-0013)**

In 2017 the NC-DAQ will be required to establish a near road monitoring station in the Greensboro MSA. Currently, based on average annual daily traffic counts and fleet mix information, the NC-DAQ plans to place the Greensboro near road monitoring station on Knox Road along I-85 between Greensboro and Burlington. At the new **Knox Road Site** the NC-DAQ will operate a near road nitrogen dioxide monitor starting January 1, 2017. If funds are available, the NC-DAQ may expand this site to include monitoring for other high priority near roadway pollutants.

At the **Bethany** (37-157-0099) site in Rockingham County the NC-DAQ operates a seasonal ozone monitor. In 2011 the NC-DAQ expanded the industrial expansion monitoring program for sulfur dioxide by adding a monitor to this site. The sulfur dioxide monitor at this site operated in 2011 and is scheduled to operate again in 2014. The site is shown in **Figure 6**.



**Figure 6. The Bethany Ozone and Sulfur Dioxide Monitoring Site**

#### *D. Changes to Monitoring in the Durham-Chapel Hill MSA*

The Durham-Chapel Hill MSA has three monitoring sites: one ozone-monitoring site at Bushy Fork (37-145-0003) in Person County and two combined ozone and fine particle monitoring sites at Pittsboro (37-037-0004) in Chatham County and the Durham Armory (37-063-0015) in Durham County. The 2006 monitoring regulations require the Durham-Chapel Hill MSA to have only two ozone monitors and one fine particle monitor. As a result, the NC-DAQ may shut down the ozone monitor at Bushy Fork to move it to another area of the state, if ozone monitoring is needed elsewhere to meet the strategic needs of the state. In 2013 additional monitoring in the Durham-Chapel Hill MSA will be required: a PWEI SO<sub>2</sub> population exposure monitor will be required at the Durham Armory site and a near-roadway nitrogen dioxide monitor will be required along Interstate 40 near the Page Road interchange. The United States Environmental Protection Agency is in the process of revising the near road monitoring regulations. The expected revisions would postpone the requirement for the Page Road near road monitoring site until January 1, 2017. Regardless of the timing for the site, the NC-DAQ is requesting a waiver for the Durham near road monitoring site because the siting criteria results in placement of the monitor within two miles of the Raleigh near road monitoring site.

At the **Pittsboro** (37-037-0004) site, the NC-DAQ operates a seasonal ozone monitor, a one-in-three day fine particle FRM monitor, and an every third year sulfur dioxide monitor. The site is shown in Figure 7. The rotating sulfur dioxide monitor operated during 2011 and is scheduled to operate again in 2014. If resources are needed to operate monitors in other parts of the state, the NC-DAQ may shut down the fine particle monitor at this site December 31, 2012, because it is no longer required and the values are less than 80 % of the standard.



**Figure 7. The Pittsboro Ozone, Fine Particle, and Sulfur Dioxide Monitoring Site**

At the **Durham Armory** (37-063-0015) site, the NC-DAQ operates a seasonal ozone monitor, one-in-three day fine particle FRM and PM<sub>10</sub> monitors, and a continuous fine particle monitor. The site is shown in Figure 8. This fine particle monitoring site is the design value site for the MSA. In January 2011 the N-DAQ added a low volume PM10 monitor at the Durham Armory site to measure ambient PM10 concentrations and allow coarse particle concentrations to be determined. In 2013 a PWEI SO<sub>2</sub> population exposure monitor will be added at the Durham Armory site to meet minimum SO<sub>2</sub> monitoring requirements in the Durham-Chapel Hill MSA.



**Figure 8. The Durham Armory Ozone and Fine Particle Site (37-063-0015)**

At the **Bushy Fork** (37-145-0003) site the NC-DAQ operates a seasonal ozone monitor. A picture of the site is provided in Figure 9. The Bushy Fork site was established as the downwind site for the Burlington MSA. This site is the third ozone-monitoring site in the Durham-Chapel Hill MSA. 40 CFR 58 Appendix D requires the Durham-Chapel Hill MSA to have two ozone monitoring sites. Because this site is not required by the EPA, is a single pollutant site, and the NC-DAQ may need ozone monitoring equipment, a building, and personnel for ozone monitoring in the Triassic Basin, the NC-DAQ may shut down this site October 31, 2012.



**Figure 9. Bushy Fork Ozone Monitoring Site (37-145-0003)**

### *E. Changes to Monitoring in the Hickory-Lenoir-Morganton MSA*

The Hickory MSA has three monitoring sites: two ozone-monitoring sites at Lenoir (37-027-0003) and Waggin Trail (37-051-1003) in Taylorsville and one particle monitoring site at the Hickory Water Tower (37-035-0004) in Hickory. Only the Lenoir and Hickory sites are discussed in this section.

At **Lenoir** (37-027-0003) the NC-DAQ operates a seasonal ozone monitor. In 2010 the NC-DAQ decided to expand its rotating prevention of significant deterioration sulfur dioxide network by adding a sulfur dioxide monitor to the Lenoir site. This sulfur dioxide monitor will begin operating in 2013 and will operate every three years. A picture of the site is shown in Figure 10.



**Figure 10. Lenoir Ozone and Sulfur Dioxide Monitoring Site**

At **Hickory** (37-035-0004) the NC-DAQ operates an every-day fine particle FRM monitor, a one-in-six day fine particle collocated FRM monitor, one-in-six day speciation fine particle monitors, a continuous fine particle monitor, and two one-in-six day high volume PM<sub>10</sub> monitors. The site is shown in Figure 11. Eventually, the NC-DAQ may replace the high volume PM<sub>10</sub> monitors with a low volume PM<sub>10</sub> monitor to allow coarse particle concentrations to be determined. Because the site is no longer the highest PM<sub>10</sub> site in the NC-DAQ high volume PM<sub>10</sub> network, The NC-DAQ may move the collocated high volume PM<sub>10</sub> monitor to William Owen by the end of 2012. The NC-DAQ plans to change the designation of the continuous fine particle monitor at the site from a SLAMS monitor to Nonregulatory by January 1, 2013.



**Figure 11. Hickory Particle Monitoring Site**

*F. Changes to Monitoring in the Fayetteville MSA*

The Fayetteville MSA has three monitoring sites: two ozone-monitoring sites at Wade (37-051-0008) and Golfview (37-051-1003) in Hopedale and one particle-monitoring site at William Owen School (37-051-0009) in Fayetteville. The NC-DAQ is proposing changes to the William Owen monitoring site shown in Figure 12. On July 1, 2011, the fine particle sampling schedule was reduced from one-in-three day sampling to one-in-six day. By the end of 2012 the collocated PM<sub>10</sub> Wedding sampler may be relocated to this site. The NC-DAQ plans to change the designation of the continuous fine particle monitor at the site from a SLAMS monitor to Nonregulatory by January 1, 2013.



**Figure 12. The William Owen Particle Monitoring Site (37-051-0009)**

### *G. Changes to Monitoring in the Burlington MSA*

At the **Hopedale** (37-001-0002) site in Alamance County the NC-DAQ operates a one-in-three day fine particle Federal Reference Monitor (FRM), a fine particle continuous monitor and wind speed and wind direction sensors. The NC-DAQ plans to change the designation of the continuous fine particle monitor at the site from a SLAMS monitor to Nonregulatory by January 1, 2013. Eventually, the NC-DAQ may replace the manual FRM and continuous fine particle monitor with a Federal Equivalent Method.

### *H. Changes to Monitoring in the Rocky Mount MSA*

At the **Springfield Road** (37-065-0004) site in Edgecombe County the NC-DAQ operates a one-in-three day fine particle Federal Reference Monitor (FRM). In 2013 the NC-DAQ may replace the manual FRM with a continuous fine particle monitor.

At the **Leggett** (37-065-0004) site in Edgecombe County the NC-DAQ operates an ozone monitor. During 2011, the NC-DAQ added a continuous fine particle monitor to the site to enable real time fine particle air quality index reporting and fine particle forecasting for the Rocky Mount MSA. If a continuous fine particle monitor is added to the Springfield Road site, the continuous fine particle monitor at Leggett will be shut down.

### *I. Changes to Monitoring in the Goldsboro MSA*

At the **Dillard** (37-191-0005) site in Wayne County the NC-DAQ operates a one-in-three day fine particle Federal Reference Monitor (FRM), a fine particle continuous monitor and wind speed and wind direction sensors. The NC-DAQ plans to change the designation of the continuous fine particle monitor at the site from a SLAMS monitor to Nonregulatory by January 1, 2013. Eventually, the NC-DAQ may replace the manual FRM and continuous fine particle monitor with a Federal Equivalent Method.

### *J. Changes to Monitoring in Areas that are not in an MSA*

#### *1. The Cherry Grove Site*

At the **Cherry Grove** (37-033-0001) site the NC-DAQ operates a seasonal ozone monitor, a one-in-six day fine particle FRM monitor, a continuous fine particle monitor, and wind speed and direction sensors. A picture of the site is provided in Figure 13. Eventually, the fine particle monitors at this site will be replaced with an FEM. Another change planned for this site is the addition of either a background PM<sub>10</sub> or PM<sub>10-2.5</sub> monitor that will run every third year beginning January 1, 2013. Because this site is a single pollutant site, and the NC-DAQ may need ozone monitoring equipment, a building, and personnel for other ozone monitoring priorities, the NC-DAQ may shut down this site October 31, 2012.



**Figure 13. Cherry Grove Ozone, Ozone Precursor, and Fine Particle Monitoring Site (37-033-0001)**

2. The Lexington Water Tower (37-057-0002) Site

At the **Lexington** site the NC-DAQ operates a one-in-three day fine particle manual FRM monitor, a one-in six-day manual speciation fine particle monitor, and a continuous fine particle monitor. The NC-DAQ plans to change the designation of the continuous fine particle monitor at the site from a SLAMS monitor to Nonregulatory by January 1, 2013. Eventually, the NC-DAQ may replace the manual FRM and continuous fine particle monitor with a Federal Equivalent Method.

3. The East Marion (37-111-0001) Site

At the **East Marion** site the NC-DAQ operates a one-in-three day fine particle manual FRM monitor, a one-in six-day collocated manual FRM fine particle monitor, and a continuous fine particle monitor. The site is also collocated with wind speed and wind direction sensors on a 10-meter tower. Starting on March 1, 2011, the NC-DAQ began PM<sub>10</sub> monitoring at the site to provide data for Prevention of Significant Deterioration modeling for industrial expansion. The monitor is a special purpose monitor that operates every third year. Long term plans (2013 or later) for this site are to discontinue the manual fine particle monitors and only maintain a continuous fine particle monitor at the site. At that time the one-in-six day collocated manual fine particle monitor would be shut down because it would no longer be needed.

4. The Jamesville (37-117-0001) Site

At the **Jamesville** (37-117-0001) site the NC-DAQ operates a seasonal ozone monitor, a one-in-three day fine particle FRM monitor, a continuous fine particle monitor, and a special purpose sulfur dioxide monitor that operates for 12 months every three years. This fine particle monitoring site is a regional transport site for the inner coastal plain. In 2012, the NC-DAQ expanded the amount of industrial expansion monitoring done at this

site by adding a special purpose PM<sub>10</sub> monitor to the site to provide background PM<sub>10</sub> data for PSD modeling. This monitor would operate every third year. Long term plans (2013 or later) are to discontinue the manual fine particle monitor and maintain a continuous fine particle monitor at the site. This continuous fine particle monitor would be an FEM. The site is shown in Figure 14.



**Figure 14. Jamesville Ozone, Particle, and Sulfur Dioxide Monitoring Site**

5. The Rockwell (37-159-0021) Site

At the **Rockwell** (37-159-0021) site in Rowan County the NC-DAQ operates a year-round ozone monitor, one-in-three day fine particle FRM monitor, a one-in-six day collocated fine particle monitor, a continuous fine particle monitor, and a one-in-six day speciation fine particle monitor. In addition high sensitivity reactive oxides of nitrogen and carbon monoxide monitors operate year round at this site. A continuous fine particle nitrate monitor and aethalometer also operate year-round at this site. In early 2012 the NC-DAQ decided to add a continuous sulfate monitor to this site. To make resources available to operate the continuous sulfate monitor, the NC-DAQ decided to shut down the carbon monoxide monitor as soon as permission is obtained from the EPA (October 31, 2012, or earlier). The site is shown in Figure 15.



**Figure 15. The Rockwell Ozone, Particle, and Precursor Monitoring Site**

### *K. Changes to the Methods Used to Measure Fine Particles for Comparison to the NAAQS and the Projected Impact on the NC-DAQ Fine Particle Network*

Currently the NC-DAQ uses an R & P Model 2025 PM<sub>2.5</sub> Sequential Monitor with a WINS impactor (Air Quality System (AQS) Method Code 118) and U.S. EPA reference method designation RFPS-0498-118 for determining compliance with the fine particle NAAQS for most of its sites. The NC-DAQ uses a Ruprecht & Patshneck TEOM Series 1400a for continuous (averaged on an hourly basis) measurement of fine particles for most of its sites. The TEOM is ineligible to become an equivalent method for fine particles because it does not work as well in other parts of the nation as it does in North Carolina. Reference and equivalent methods need to work the same throughout the nation.

In early 2008 the Met One Beta Attenuation Monitor (BAM) was approved as a Federal Equivalent Method (FEM). As a result, the NC-DAQ received a demonstration BAM from Met One to evaluate at the Millbrook monitoring site. The unit was installed and began operation in January 2008 for a brief period of time. However, it turned out this demonstration BAM was not a FEM. The MCAQ ordered a BAM early in 2008. The NC-DAQ also ordered two BAMs in March and purchased the demonstration model installed at the Millbrook site after it was upgraded to a FEM.

In 2009 the NC-DAQ began a BAM study to evaluate the operation of the BAM in North Carolina. The NC-DAQ deployed one of the three new BAM monitors at the Millbrook (37-183-0014) site in Raleigh in late June 2009. The second BAM was deployed at the Castle Hayne site in Wilmington in early 2010. The third BAM was deployed at Bryson City in late June 2009. All three BAMs were collocated with an FRM fine particle monitor and a TEOM with a very sharp cut cyclone and were operated for 20 to 23 months to provide comparative data to determine how well the BAM functions in the mountains, piedmont, and coastal areas of North Carolina. At the end of the BAM study in early 2011 the NC-DAQ decided to continue using the BAM at Millbrook and Bryson City. The TEOM and one FRM at both sites were shut down. The BAM located at Castle Hayne was replaced by the manufacturer because it could not match the collocated BAM when it was collocated with a BAM at the Millbrook site in Raleigh.

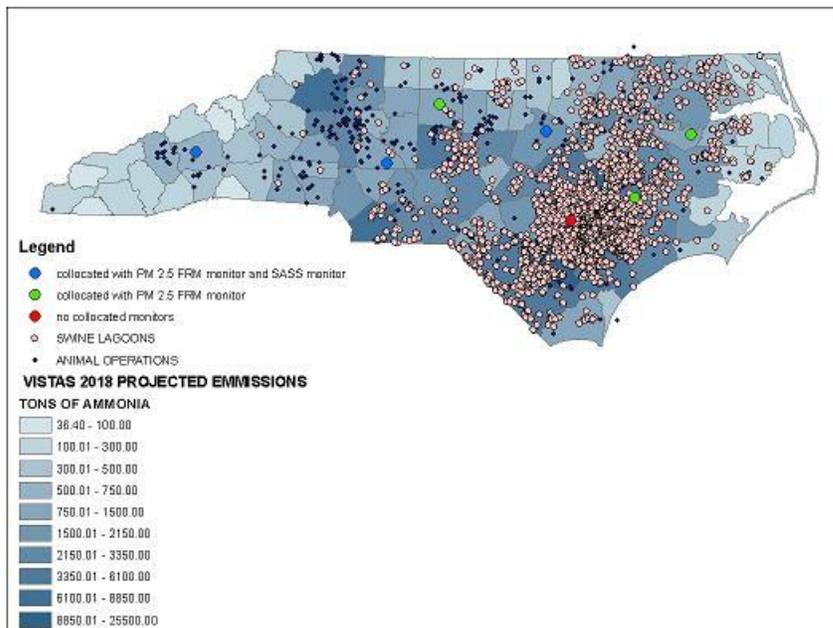
The NC-DAQ purchased three additional BAMs in 2011 and plans to purchase three more BAMs. So far BAMs have been added to the Kenansville and Cherry Grove sites. The locations for the rest of these BAMs have not yet been determined.

### *L. Special Studies*

Ammonia monitoring was established at three sites in 2000 to support a five-year NC-DAQ study on ambient ammonia concentration levels in the inner coastal plain as a result of the expansion of the hog industry in the area. Sites were established at Clinton Crops in Sampson County, at Lenoir Community College (LCC) in Lenoir County, and at Jamesville (371170001) in Martin County. The Jamesville site was established as a background site. The study was extended when the moratorium on hog lagoons was extended. When the hog lagoon moratorium was made permanent in 2007, the NC-DAQ shut down the ammonia monitor at LCC on December 31, 2007. The Clinton Crop and

Jamesville site were continued for two additional years. The NC-DAQ shut down the background site at Jamesville in late 2009.

The NC-DAQ is considering the feasibility of establishing a passive monitoring network at seven sites throughout NC in the second half of 2011. The proposed locations overlaid on the locations of animal operations, lagoons, and 2018 VISTA ammonia inventory projections are shown in Figure 16 and listed in Table 3. The use of the passive Alpha samplers for one to two years would provide the NC-DAQ with a relatively inexpensive way to monitor for ammonia in the ambient air in several areas of the state, while the EPA continues their work on developing other methods for measuring ammonia in ambient air. Sometime after the passive ammonia network is established, the NC-DAQ may move forward with terminating the ammonia monitor at Clinton Crops, perhaps as early as June 30, 2013.



**Figure 16. Proposed Passive Ammonia Monitoring Sites for 2010-2011**

**Table 3. Proposed Passive Ammonia Monitoring Sites for 2010-2011**

<b>Proposed Site</b>	<b>Location</b>	<b>Reason for Selection</b>	<b>Exposure Time</b>
Clinton Crops	Sampson County	Area of Highest Concentration of Animal Operations	1 week
Jamesville	Martin County	Background Rural Site	2 weeks
Millbrook	Wake County	Urban/Suburban Area	2 weeks
Rockwell	Rowan County	Nonurban area subject to pollutant transport from large urban areas	2 weeks
Board of Education	Buncombe County	Urban area in mountains with high occurrence of wood burning	2 weeks
LCC	Lenoir County	Nonurban area with large concentrations of animal operations	2 weeks
Greensboro	Guilford County	Urban area downwind from Rockwell area	2 weeks

### III. Carbon Monoxide (CO) Monitoring Network

Carbon Monoxide monitoring is conducted in several major urban areas of the State. The 2011-2012 State-operated Network consists of a monitor in the Raleigh-Durham-Cary-Chapel Hill Combined Statistical Area that collects data using a Federal Reference Method for comparison to the National Ambient Air Quality Standards (NAAQS). Local program agencies operate carbon monoxide monitors in Charlotte and Winston-Salem. These state and local agency sites are in three of the five largest urban areas in North Carolina. The Peters Creek Winston-Salem location is a micro-scale site that provides maximum carbon monoxide concentrations for the monitoring area. The Raleigh and Charlotte sites are neighborhood scale National Core (NCore) sites. These sites did not report any exceedances of the one or eight hour ambient air quality standard from 2007 to 2011. The State also operates a high sensitivity carbon monoxide non-reference method monitor at Rockwell in Rowan County.

The Crabtree micro-scale maximum concentration CO site in Raleigh (Wake County) operated to meet requirements in the NC DAQ CO maintenance State Implementation Plan (SIP). The SIP requires the state to operate at least one CO monitor in either Durham or Wake Counties so that the data from the monitor can be used to trigger contingency requirements. In 2009 the NC DAQ started operating the NCore trace-level CO monitor at the Millbrook site in Raleigh. This trace level monitor is classified by EPA as a Federal Reference Method and is therefore suitable to be compared to the NAAQS. The 2<sup>nd</sup>-highest 8-hour average for both monitors in 2010 was 2 parts per million, which is less than 25 % of the NAAQS (see Figure 17). Because the monitors had the same design value in 2010 and the design value was so far below the standard, the NC DAQ shut down the Crabtree site on March 31, 2011, and is now using the Millbrook CO monitor to meet the requirements in the SIP.

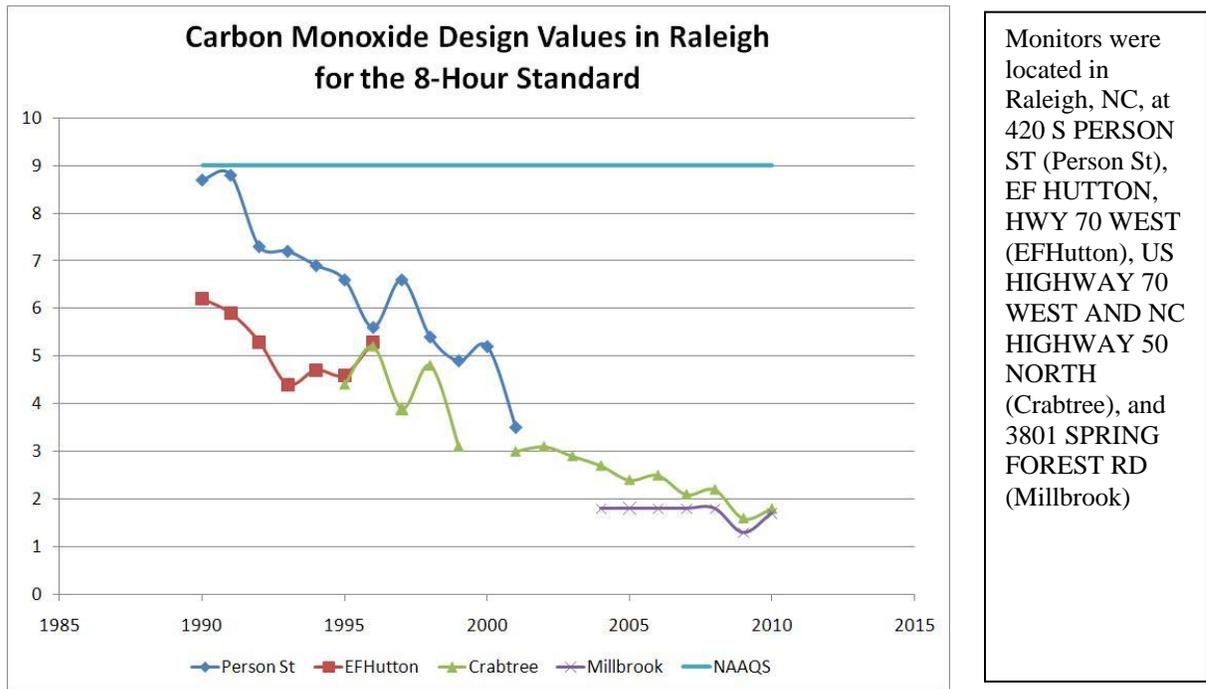


Figure 17. Carbon Monoxide 8-Hour Design Values for Raleigh, NC

In 2012 the NC-DAQ evaluated the ozone and fine particle precursor monitoring at Rockwell and decided that the carbon monoxide monitor provided information that was less needed than information from other monitors that have been planned for the site but not installed because of limited resources. As a result, the NC-DAQ plans to shut down the non-regulatory carbon monoxide monitor at the site by November 1, 2012, and replace it with a continuous fine particle sulfate monitor.

Table 4 provides the highest maximum 1-hour and 8-hour concentrations for each operating site for 2007 through 2011. Table 5 provides the locations of the sites for the North Carolina Carbon Monoxide Monitoring Network. Table 6 provides the statement of purpose for each current and proposed monitoring site in the North Carolina Carbon Monoxide Monitoring Network. Table 7 summarizes the 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 40CFR58. Table 7 also provides a summary of proposed and planned changes to the carbon monoxide monitoring network.

**Table 4 Carbon Monoxide Concentrations Measured by the North Carolina Carbon Monoxide Monitoring Network 2007 to 2011 <sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr 1 <sup>st</sup> max for 2007-2011			Highest 8-hr 1 <sup>st</sup> max for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
371190041 <sup>c, d</sup>	Garinger	2.7	7.7 %	2007	2.6	29 %	2007
371190041 <sup>c, e</sup>	Garinger	2.3	-	2010	2.1	-	2007

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr 1 <sup>st</sup> max for 2007-2011			Highest 8-hr 1 <sup>st</sup> max for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
371830014 <sup>c, f</sup>	Millbrook	4.0	-	2007	2.4	-	2007
371830018 <sup>d, g</sup>	Crabtree	3.5	10 %	2008	2.2	24 %	2008

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr 1 <sup>st</sup> max for 2007-2011			Highest 8-hr 1 <sup>st</sup> max for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
370811011 <sup>d, g</sup>	Latham Park	4.2	12 %	2007	2.0	22 %	2007

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr 1 <sup>st</sup> max for 2007-2011			Highest 8-hr 1 <sup>st</sup> max for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
370630015 <sup>e, g</sup>	Durham Armory	1.9	-	2008	1.5	-	2008

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr 1 <sup>st</sup> max for 2007-2011			Highest 8-hr 1 <sup>st</sup> max for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
370670023 <sup>d, h</sup>	Peters Creek	3.9	11 %	2009	2.3	26 %	2011

**Table 4 Carbon Monoxide Concentrations Measured by the North Carolina Carbon Monoxide Monitoring Network 2007 to 2011 <sup>a</sup>**

**Fayetteville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr 1 <sup>st</sup> max for 2007-2011			Highest 8-hr 1 <sup>st</sup> max for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
370510007 <sup>d, g</sup>	Fayetteville ABC	3.3	9.4 %	2007	2.5	28 %	2007

**Not in an Metropolitan Statistical Area**

QS Site Identification Number	Site Name	Highest 1-hr 1 <sup>st</sup> max for 2007-2011			Highest 8-hr 1 <sup>st</sup> max for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
370330001 <sup>e, g, i</sup>	Cherry Grove	3.0	-	2007	1.3	-	2008
371590021 <sup>e, f, j</sup>	Rockwell	1.6	-	2008	0.9	-	2008

<sup>a</sup> All monitors use an Instrumental Nondispersive Infrared Thermo Electron 48C Method (Air Quality System (AQS) Method Code 054) except one of the monitors operated by the Mecklenburg County Air Quality which uses an Instrumental Gas Filter Correlation Teledyne API 300 EU (AQS Method Code 593)

<sup>b</sup> The National Ambient Air Quality Standard (NAAQS) for a 1-hour period is 35 parts per million and 9 for an 8-hour period. Attainment is based on the second highest average for the calendar year.

<sup>c</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>d</sup> Monitor method suitable for comparing to the NAAQS

<sup>e</sup> Monitor method unsuitable for comparing to the NAAQS

<sup>f</sup> Year-round trace-level CO

<sup>g</sup> This monitor was shut down

<sup>h</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>i</sup> The Cherry Grove monitor was located in Caswell County and was a downwind monitor for the Greensboro-High Point Metropolitan Statistical Area (MSA).

<sup>j</sup> The Rockwell monitor is located in Rowan County and is a downwind site for the Charlotte MSA and an upwind site for the Greensboro-High Point MSA.

**Table 5 North Carolina Carbon Monoxide Monitoring Network – Monitor Locations<sup>a</sup>**  
**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Site Location				MSA, CSA, or CBSA represented
		Street Address	City	Longitude	Latitude	
371190041 <sup>b</sup>	Garinger	1130 Eastway Drive	Charlotte	-80.7857	35.2401	Charlotte
371190041 <sup>b</sup>	Garinger	1130 Eastway Drive	Charlotte	-80.7857	35.2401	Charlotte

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Site Location				MSA, CSA, or CBSA represented
		Street Address	City	Longitude	Latitude	
371830014	Millbrook	3801 Spring Forest Road	Raleigh	-78.5742	35.8561	Raleigh

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Site Location				MSA, CSA, or CBSA represented
		Street Address	City	Longitude	Latitude	
370670023 <sup>c</sup>	Peters Creek	1401 Silas Creek Parkway	Winston-Salem	-80.2583	36.0658	Winston-Salem

**Not in an Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Site Location				MSA, CSA, or CBSA represented
		Street Address	City	Longitude	Latitude	
371590021 <sup>d</sup>	Rockwell	301 West Street	Rockwell	-80.3950	35.5519	None

<sup>a</sup> All monitors use an Instrumental Nondispersive Infrared Thermo Electron 48C or 48 i Method (Air Quality System (AQS) Method Code 054) except one of the monitors operated by the Mecklenburg County Air Quality which uses an Instrumental Gas Filter Correlation Teledyne API 300 EU (AQS Method Code 593)

<sup>b</sup> Operated by the Mecklenburg County Air Quality (Air Quality System (AQS) Reporting Agency 0669)

<sup>c</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>d</sup> The Rockwell monitor is located in Rowan County and is a downwind site for the Charlotte MSA and an upwind site for the Greensboro-High Point MSA.

**Table 6 Statement of Purpose for North Carolina Carbon Monoxide Monitoring Network <sup>a</sup>**

<b>Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area</b>						
<b>AQS Site Identification Number</b>	<b>Site Name</b>	<b>Monitor Type</b>	<b>Operating Schedule <sup>b</sup></b>	<b>Statement of Purpose</b>	<b>Monitoring Objective</b>	<b>Scale</b>
371190041 <sup>c</sup>	Garinger	SLAMS	1/1 to 12/31	Required in SIP. Compliance with the NAAQS	Population Exposure	Neighborhood
371190041 <sup>c</sup>	Garinger	NCORE	1/1 to 12/31	Ozone and fine particle precursor monitoring	Population Exposure	Neighborhood

<b>Raleigh-Cary Metropolitan Statistical Area</b>						
<b>AQS Site Identification Number</b>	<b>Site Name</b>	<b>Monitor Type</b>	<b>Operating Schedule <sup>b</sup></b>	<b>Statement of Purpose</b>	<b>Monitoring Objective</b>	<b>Scale</b>
371830014	Millbrook	NCORE	1/1 to 12/31	Ozone and fine particle precursor monitoring. Required in SIP. Compliance with the NAAQS.	General/ Background	Middle

<b>Winston-Salem Metropolitan Statistical Area</b>						
<b>AQS Site Identification Number</b>	<b>Site Name</b>	<b>Monitor Type</b>	<b>Operating Schedule <sup>b</sup></b>	<b>Statement of Purpose</b>	<b>Monitoring Objective</b>	<b>Scale</b>
370670023 <sup>d</sup>	Peters Creek	SLAMS	1/1 to 12/31	Required in SIP. Compliance with the NAAQS	Highest Concentration	Micro

<b>Not in an Metropolitan Statistical Area</b>						
<b>AQS Site Identification Number</b>	<b>Site Name</b>	<b>Monitor Type</b>	<b>Operating Schedule <sup>b</sup></b>	<b>Statement of Purpose</b>	<b>Monitoring Objective</b>	<b>Scale</b>
371590021 <sup>e</sup>	Rockwell	SLAMS	1/1 to 12/31	Ozone and fine particle precursor monitoring.	General/ Background	Urban

<sup>a</sup> All monitors use an Instrumental Nondispersive Infrared Thermo Electron 48C or 48i Method (Air Quality System (AQS) Method Code 054) except one of the monitors operated by the Mecklenburg County Air Quality which uses an Instrumental Gas Filter Correlation Teledyne API 300 EU (AQS Method Code 593)

<sup>b</sup> All monitors operate on an hourly schedule and operate every year during the time frames indicated.

<sup>c</sup> Operated by the Mecklenburg County Air Quality (Air Quality System (AQS) Reporting Agency 0669)

<sup>d</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>e</sup> The Rockwell monitor is located in Rowan County and is a downwind site for the Charlotte MSA and an upwind site for the Greensboro-High Point MSA.

**Table 7 Status of North Carolina Carbon Monoxide Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D & E <sup>b</sup>		Proposal to Move or Change
			C <sup>c</sup>	D	
371190041 <sup>d</sup>	Garinger	Yes	Yes: RFCA-0981-054	No Criteria	Shut down when trace analyzer is set up to run dual levels.
371190041 <sup>d</sup>	Garinger	Yes	RFCA-1093-093	Yes - NCore	None

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D & E <sup>b</sup>		Proposal to Move or Change
			C <sup>c</sup>	D	
371830014	Millbrook	No	Yes RFCA-0981-054	Yes - NCore	None

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D & E <sup>b</sup>		Proposal to Move or Change
			C <sup>c</sup>	D	
370670023 <sup>e</sup>	Peters Creek	Yes	Yes: RFCA-0981-054	No Criteria	None

**Not in an Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D & E <sup>b</sup>		Proposal to Move or Change
			C <sup>c</sup>	D <sup>c</sup>	
371590021 <sup>f</sup>	Rockwell	No	No: Not FEM	No Criteria	Monitor will shut down as soon as approval is received from EPA Region 4

<sup>a</sup> All monitors use an Instrumental Nondispersive Infrared Thermo Electron 48C or 48i Method (Air Quality System (AQS) Method Code 054) except one of the monitors operated by the Mecklenburg County Air Quality which uses an Instrumental Gas Filter Correlation Teledyne API 300 EU (AQS Method Code 593)

<sup>b</sup> All monitors meet the requirements of 40CFR58 Appendix A. The only monitors required in Appendix D are for NCore. All sites meet the appropriate siting criteria in Appendix E of 40CFR58 promulgated in 2006.

<sup>c</sup> RFCA-0981-054 is the code assigned by the U.S. EPA to reference and equivalent methods that are suitable for comparison to the National Ambient Air Quality Standards. The list of reference and equivalent methods is available at <http://www.epa.gov/ttn/amtic/files/ambient/criteria/reference-equivalent-methods-list.pdf>.

<sup>d</sup> Operated by the Mecklenburg County Air Quality (Air Quality System (AQS) Reporting Agency 0669)

<sup>e</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>f</sup> The Rockwell monitor is located in Rowan County and is a downwind site for the Charlotte MSA and an upwind site for the Greensboro-High Point MSA.

#### IV. Sulfur Dioxide Monitoring Network

Sulfur Dioxide (SO<sub>2</sub>) monitoring is currently conducted in North Carolina at eight sites operated by the North Carolina Division of Air Quality (NC-DAQ) and at two sites operated by local programs. In addition, the South Carolina Department of Health and Environmental Control operates a background SO<sub>2</sub> monitor in York County, South Carolina [part of the Charlotte- Gastonia-Rock Hill Metropolitan Statistical Area (MSA)]

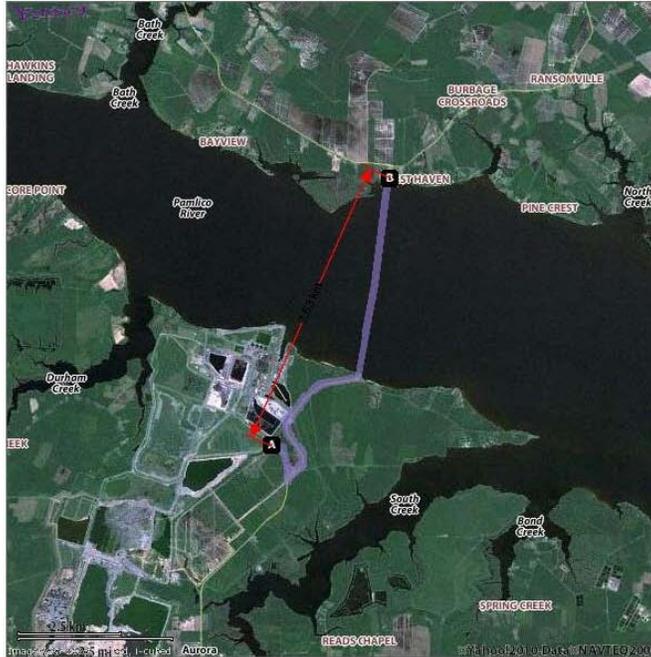
The data collected is used to determine human health effect exposures in MSAs with over one million people, to collect background levels for Prevention of Significant Deterioration (PSD) permit modeling, and to determine the impact on SO<sub>2</sub> levels due to facilities that burn large quantities of fossil fuels or manufacture sulfuric acid. Though few major cities are being monitored for sulfur dioxide, data from previous years show these cities to have sulfur dioxide concentrations less than 40 % of the limits established by the U.S. Environmental Protection Agency (EPA) for all areas except Wilmington (the SO<sub>2</sub> monitor in New Hanover County is currently violating the one-hour SO<sub>2</sub> standard).

Table 8 lists the highest concentrations of sulfur dioxide measured in North Carolina between 2007 and 2011 as compared to the National Ambient Air Quality Standards (NAAQS). Table 9 provides the locations of the current and proposed sites through 2014 for the North Carolina Sulfur Dioxide Monitoring Network. Table 10 provides the statement of purpose for each current and proposed monitoring site in the North Carolina Sulfur Dioxide Monitoring Network. Table 11 summarizes the status of each current and proposed monitoring site regarding the suitability for comparison to the NAAQS and whether or not it meets the requirements as outlined in Appendices A, C, D, and E of 40CFR58. Table 11 also provides a summary of proposed and planned changes to the sulfur dioxide monitoring network.

The NC-DAQ also operates one trace-level SO<sub>2</sub> monitor on a 100 ppb scale because low levels of SO<sub>2</sub> are a precursor for fine particle formation. The current network consists of one site in Wake County. Sometime in the future, the trace-level network may expand to a second site in Rowan County. The Wake County site is a National Core (NCore) monitoring site. The NC 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<sub>2</sub> monitor at the Garinger NCore site in Mecklenburg County.

In 2010, the NC-DAQ modified the rotating PSD network by shutting down the Bryson City SO<sub>2</sub> monitor (Swain County) and adding rotating PSD SO<sub>2</sub> monitors at Lenoir (Caldwell County) and Bethany (Rockingham County). Assessment of the SO<sub>2</sub> monitoring network indicated that the ability of NC-DAQ to meet its obligation to provide relevant background SO<sub>2</sub> data for PSD modeling could be improved by these changes.

In 2011 the NC-DAQ moved the Aurora monitor across the Pamlico River to the Bayview Ferry station because more people live over there and the new site is downwind of the PCS facility. Figure 18 shows the relative locations of the two sites. The Bayview Ferry site began operating January 2011



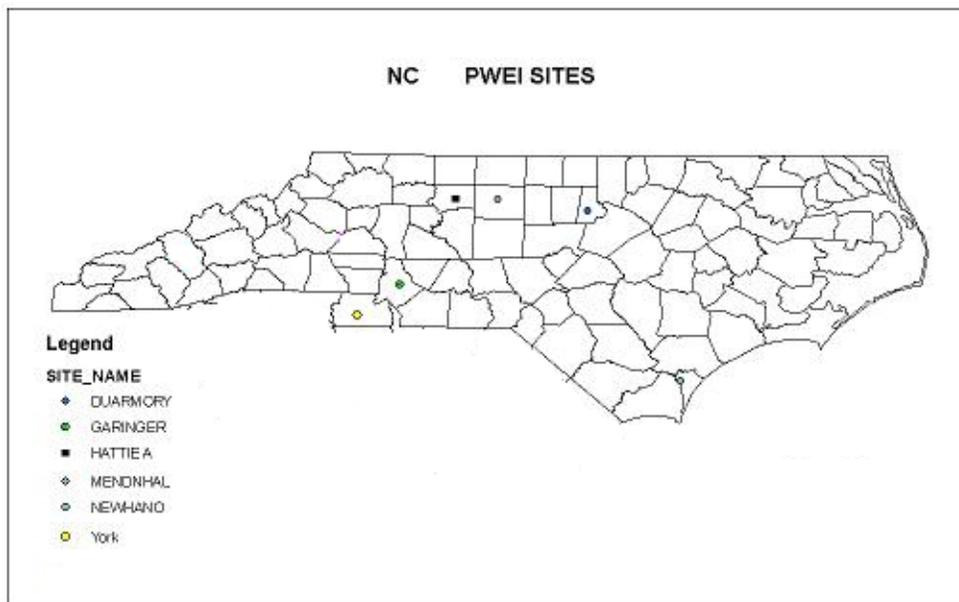
**Figure 18. Location of New Bayview Ferry Site (B) Relative to Old Aurora Site (A)**

In 2010 the EPA changed the monitoring regulations for sulfur dioxide to support the lower sulfur dioxide NAAQS. For the SO<sub>2</sub> monitoring network the EPA developed the population weighted emissions index (PWEI). The PWEI is calculated for each Core-Based Statistical Area (CBSA) by multiplying the population of each CBSA, using the most current census data or estimates, by the total amount of SO<sub>2</sub> in tons per year emitted within the CBSA, using an aggregate of the most recent county level emissions data available in the National Emissions Inventory for each county in each CBSA. The resulting product is divided by 1,000,000, providing a PWEI value, the units of which are million persons-tons per year. For any CBSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> monitor is required within that CBSA. The new sulfur dioxide monitoring requirements require North Carolina to add six PWEI sulfur dioxide monitors to five MSAs in North Carolina: Charlotte-Gastonia-Rock Hill, Winston-Salem, Greensboro-High Point, Durham-Chapel-Hill, and Wilmington.

The SO<sub>2</sub> monitoring site(s) required as a result of the calculated PWEI in each CBSA shall satisfy minimum monitoring requirements if the monitor is sited within the boundaries of the parent CBSA and is one of the following site types (as defined in section 1.1.1 of 40 CFR 58 Appendix D): population exposure, highest concentration, source impacts, general background, or regional transport. SO<sub>2</sub> monitors at NCore stations may satisfy minimum monitoring requirements if that monitor is located within a CBSA that is required to have one or more PWEI monitors.

The 2010 regulations require the NC-DAQ to include a monitoring plan for the sulfur dioxide PWEI network with the Network Monitoring Plan due on July 1, 2011, and

allow that monitoring plan to be revised in 2012. Figure 19 shows the proposed locations of these six required PWEI sulfur dioxide monitoring sites.



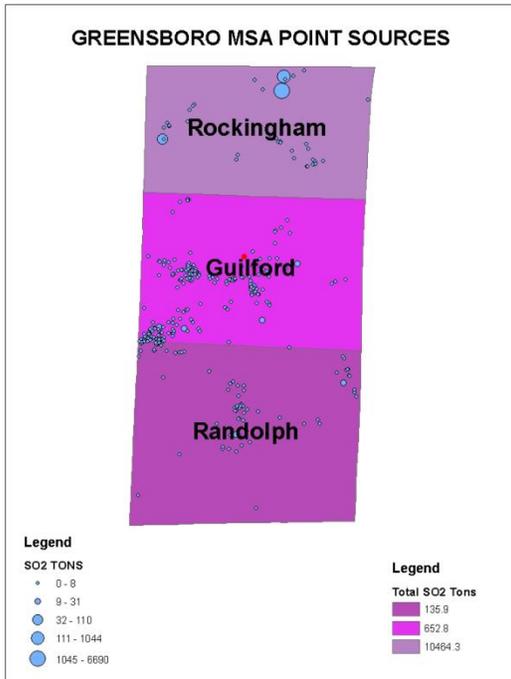
**Figure 19. Location of North Carolina PWEI monitors**

In 2011 the NC-DAQ, the local programs and the South Carolina Department of Health and Environmental Control (SC-DHEC) proposed the following monitoring sites to meet the PWEI requirements:

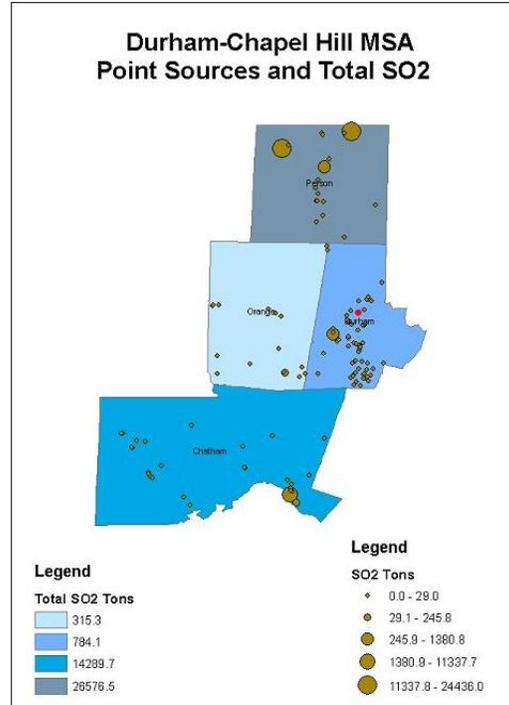
- York as a general background monitor in the Charlotte-Gastonia-Rock Hill MSA;
- Garinger as a population exposure monitor in the Charlotte-Gastonia-Rock Hill MSA;
- Hattie Avenue as a population exposure monitor in the Winston-Salem MSA;
- Mendenhall as a population exposure monitor in the Greensboro MSA;
- Durham Armory as a population exposure monitor in the Durham MSA; and
- New Hanover as a population exposure/highest concentration monitor in the Wilmington MSA.

These locations were approved by EPA Region 4 in 2011 (see Appendix E. 2011 Network Plan EPA Approval Letter). The locations of three of these sites in relationship to sulfur dioxide emissions are shown in Figure 20 through Figure 22.

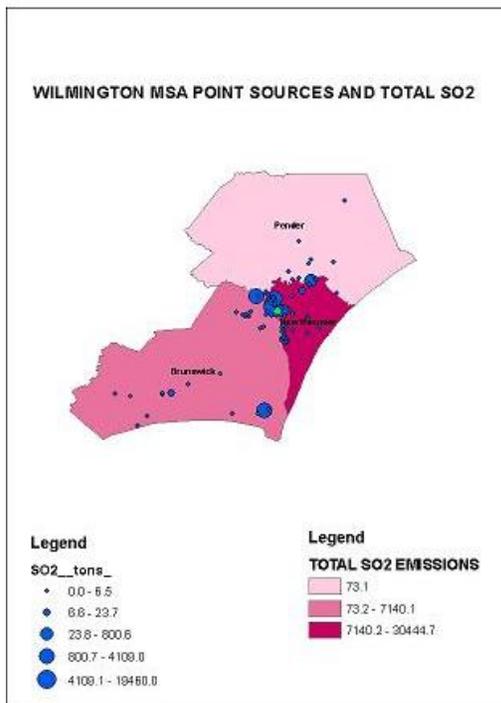
In the Greensboro-High Point MSA the point source emissions in 2010 are 2,500 tons lower than in 2008. Using these lower emission values result in a PWEI index of 4,800, which is below the 5,000 threshold for monitoring. As a result of the lower calculated PWEI index and the shutting down of coal fired units #1 and #2 at the Dan River Steam Station in October 2012, the NC-DAQ believes a PWEI monitor is not needed and recommends that no PWEI monitoring be done in the Greensboro MSA.



**Figure 20. Location of the proposed Greensboro-High Point PWEI Sulfur Dioxide Monitor (red dot) in Relationship to Sulfur Dioxide Sources**



**Figure 21. Location of the proposed Durham-Chapel Hill PWEI Sulfur Dioxide Monitor (red dot) in Relationship to Sulfur Dioxide Sources**



**Figure 22. Location of Proposed Wilmington PWEI Monitor (green dot) in Relationship to Sources of Sulfur Dioxide**

In the 2011 network plan the NC-DAQ proposed doing PWEI monitoring at two additional sites, located in the Asheville and Hickory MSAs. After the network plan was written the EPA developed a revised PWEI list, which no longer included required PWEI monitors for those two areas. As a result, the NC-DAQ no longer plans to add PWEI monitors to the Waynesville Elementary School and Hickory sites and has revised the 2012 network plan to reflect a smaller PWEI network.

**Table 8 Highest Sulfur Dioxide Concentration and Year Measured by the North Carolina Sulfur Dioxide Monitoring Network (2007 through 2011) <sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr Design Value Observed for 2007 to 2011			Highest 3-hr average observed (1 <sup>st</sup> max) for 2007 to 2011		
		Value (parts per billion)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
371190041 <sup>c</sup>	Garinger	80	107%	2005-2007	0.074	15%	2007

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr Design Value Observed for 2007 to 2011			Highest 3-hr average observed (1 <sup>st</sup> max) for 2007 to 2011		
		Value (parts per billion)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
371830014	Millbrook	22.7	30 %	2005-2007	0.035	7 %	2009

**Greensboro-High-Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr Design Value Observed for 2007 to 2011			Highest 3-hr average observed (1 <sup>st</sup> max) for 2007 to 2011		
		Value (parts per billion)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
371570099 <sup>d</sup>	Bethany	17.5	-	2009-2011	0.013	2.6 %	2011

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr Design Value Observed for 2007 to 2011			Highest 3-hr average observed (1 <sup>st</sup> max) for 2007 to 2011		
		Value (parts per billion)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
370370004 <sup>d</sup>	Pittsboro	22.0	-	2006-2008	0.017	3.4 %	2008

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr Design Value Observed for 2007 to 2011			Highest 3-hr average observed (1 <sup>st</sup> max) for 2007 to 2011		
		Value (parts per billion)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
370670022 <sup>e</sup>	Hattie Avenue	73.0	97 %	2005-2007	0.083	17 %	2007

**Fayetteville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr Design Value Observed for 2007 to 2011			Highest 3-hr average observed (1 <sup>st</sup> max) for 2007 to 2011		
		Value (parts per billion)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
370511003 <sup>d</sup>	Golfview	10.0	-	2007-2009	0.0086	2 %	2009

**Table 8 Highest Sulfur Dioxide Concentration and Year Measured by the North Carolina Sulfur Dioxide Monitoring Network (2007 through 2011) <sup>a</sup>**

**Wilmington Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr Design Value Observed for 2007 to 2011			Highest 3-hr average observed (1 <sup>st</sup> max) for 2007 to 2011		
		Value (parts per billion)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
371290006	New Hanover	108.7	145 %	2006-2008	0.142	28 %	2008

**Not in an Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 1-hr Design Value Observed for 2007 to 2011			Highest 3-hr average observed (1 <sup>st</sup> max) for 2007 to 2011		
		Value (parts per billion)	Percent of NAAQS <sup>b</sup>	Year	Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
370130007 <sup>f</sup>	New Aurora	32.7	44 %	2006-2008	0.033	7 %	2008
370130151	Bayview	26.0	35 %	2009-2011	0.020	4 %	2011
371170001 <sup>d</sup>	Jamesville	13	-	2005-2007	0.017	3 %	2007
371170002	Plymouth	27	-	2005-2007	0.022	4 %	2007
371730002 <sup>d, g</sup>	Bryson City	7	-	2005-2007	0.007	1 %	2007

<sup>a</sup> Monitors at all sites use an Automated Equivalent Method. The NC-DAQ monitors use an Instrumental Pulsed Fluorescence method using a Thermo Electron 43C (Air Quality System (AQS) Method Code 009). The monitor operated by Mecklenburg County Air Quality uses an Instrumental Pulsed Fluorescence method using a Thermo Electron 43C-TLE (AQS Method Code 560). The monitor operated by Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403) uses an Instrumental Ultraviolet Fluorescence method using an API Model 100 A SO<sub>2</sub> Analyzer (AQS Method Code 100).

<sup>b</sup> The National Ambient Air Quality Standard for the 99<sup>th</sup> percentile maximum one hour concentration during a 24-hour period is 75 parts per billion averaged over 3 years and 0.5 parts per million for a 3-hour period. Attainment of the secondary standard is based on the second highest average for the calendar year.

<sup>c</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>d</sup> Three years of data are not available to calculate a design value.

<sup>e</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>f</sup> The New Aurora monitor was located in Beaufort County on the fence line of the PCS Phosphate facility. It began operation in September 2005 and stopped in January 2011.

<sup>g</sup> The Bryson City monitor was located in Swain County and was operated every three years to provide background data for permit modeling to meet requirements for prevention of significant deterioration. The monitor was shut down in April 2010 because the site was moved, the monitor broke during the site move, the NC-DAQ learned that the data was not required for PSD modeling because of the terrain, the measured values were low, and no users of the data could be identified.

**Table 9 North Carolina Sulfur Dioxide Monitoring Network – 2012 and Proposed Monitor Locations<sup>a</sup>**

<b>Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area</b>						
AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371190041 <sup>b</sup>	Garinger	1130 Eastway Drive	Charlotte	-80.785683	35.24028	Charlotte
450910006 <sup>c</sup>	York	2316 Chester Highway (US 321)	York, SC	-81.228409	34.935817	Charlotte
<b>Raleigh-Cary Metropolitan Statistical Area</b>						
AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371830014	Millbrook	3801 Spring Forest Road	Raleigh	-78.574167	35.856111	Raleigh-Cary
<b>Greensboro-High Point Metropolitan Statistical Area</b>						
AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370810013	Mendenhall	205 Wiloughby Blvd.	Greensboro	-79.801111	36.109167	Greensboro
371570099 <sup>d</sup>	Bethany	6371 NC 65	Bethany	-79.859167	36.308889	Greensboro
<b>Durham-Chapel Hill Metropolitan Statistical Area</b>						
AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370370004	Pittsboro	Route 4, Box 62 Russett Run Road	Pittsboro	-79.159722	35.757222	Durham-Chapel Hill
370630015	Durham Armory	801 Stadium Drive	Durham	-78.905417	36.032944	Durham-Chapel Hill
<b>Winston-Salem Metropolitan Statistical Area</b>						
AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370670022 <sup>d</sup>	Hattie Avenue	Corner of 13 <sup>th</sup> & Hattie Avenue	Winston-Salem	-80.226667	36.110556	Winston-Salem
<b>Hickory Metropolitan Statistical Area</b>						
AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370270003 <sup>f</sup>	Lenoir	110 Nuway Circle NE	Lenoir	-81.530278	35.935833	Hickory
<b>Fayetteville Metropolitan Statistical Area</b>						
AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370511003	Golfview	3625 Golfview Road	Hope Mills	-78.9625	34.968889	Fayetteville
<b>Wilmington Metropolitan Statistical Area</b>						
AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371290006	New Hanover	2400 US Highway 421 N	Wilmington	-77.956529	34.268403	Wilmington

**Table 9 North Carolina Sulfur Dioxide Monitoring Network – 2012 and Proposed Monitor Locations<sup>a</sup>**

**Not in an Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370130151 <sup>g</sup>	Bayview	229 NC Highway 306N	Bath	-76.74	35.428	None
371170001	Jamesville	1210 Hayes Street	Jamesville	-76.89782	35.81069	None
371590021 <sup>h</sup>	Rockwell	301 West Street	Rockwell	-80.395039	35.551868	None

<sup>a</sup> Monitors at all sites use an Automated Equivalent Method. The NC-DAQ monitors, except the monitor at the Millbrook NCore site, use an Instrumental Pulsed Fluorescence method using a Thermo Electron 43C (Air Quality System (AQS) Method Code 009). The monitor at the Millbrook NCore site and the monitor operated by Mecklenburg County Air Quality use an Instrumental Pulsed Fluorescence method using a Thermo Electron 43C-TLE (AQS Method Code 560). The monitor operated by Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403) uses an Instrumental Ultraviolet Fluorescence method using an API Model 100 A SO<sub>2</sub> Analyzer (AQS Method Code 100).

<sup>b</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>c</sup> Operated by the South Carolina Department of Health and Environmental Control (AQS Reporting Agency 0971).

<sup>d</sup> This monitor will start operating on 1/1/2011 on a 1-in-3 year schedule.

<sup>e</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>f</sup> This monitor will start operating on 1/1/2013 on a 1-in-3 year schedule. It will replace the Bryson monitor.

<sup>g</sup> This monitor is located in Beaufort County on the fence line of the PCS Phosphate facility. It replaced the New Aurora Site (37013007) that was dislocated by nearby current land clearing and future mining activities.

<sup>h</sup> This monitor has been proposed for several years to support fine particle precursor monitoring at this site.

**Table 10 Statement of Purpose for North Carolina Sulfur Dioxide Monitoring Network<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
371190041 <sup>c</sup>	Garinger	NCORE	1/1 to 12/31, every year	Required monitor for NCore. Compliance with the NAAQS	Population Exposure	Neighborhood
450910006 <sup>d</sup>	York	Special Purpose	1/1 to 12/31, every year	Second required PWEI monitor for the MSA	Extreme Downwind	Urban

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
371830014	Millbrook	NCORE	1/1 to 12/31, every year;	Required monitor for NCore. SO <sub>2</sub> fine particle precursor monitoring. Compliance w/NAAQS.	General/ Background	Neighborhood

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
37-081-0013	Mendenhall	SLAMS	1/1 to 12/31, every year	PWEI Monitor for Greensboro-High Point MSA	Population Exposure	Urban
37-157-0099 <sup>e</sup>	Bethany	Special	1/1 to 12/31, every	Industrial expansion monitoring	General/	Urban

**Table 10 Statement of Purpose for North Carolina Sulfur Dioxide Monitoring Network<sup>a</sup>**

		Purpose	3rd year.	for PSD modeling.	Background	
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**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370370004	Pittsboro	Special Purpose	1/1 to 12/31, every 3rd year. Site operated in '08 & '11	Industrial expansion monitoring for PSD modeling. Compliance w/NAAQS.	Upwind/ Background General/ Background	Urban
370630015	Durham Armory	SLAMS	1/1 to 12/31, every year;	PWEI Monitor for Durham-Chapel Hill MSA	Population Exposure	Neighborhood

**Winston-Salem Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370670022 <sup>f</sup>	Hattie Avenue	SLAMS	1/1 to 12/31, every year	Compliance with the NAAQS	Population Exposure	Neighborhood

**Hickory Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370270003 <sup>g</sup>	Lenoir	Special Purpose	1/1 to 12/31, every 3rd year. Site will operate in 2013	Industrial expansion monitoring for PSD modeling.	General/ Background	Regional

**Fayetteville Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370511003	Golfview	Special Purpose	1/1 to 12/31, every 3rd year. Site is operating in '09 & will operate in '12	Industrial expansion monitoring for PSD modeling. Compliance with the NAAQS.	General/ Background	Urban

**Wilmington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
371290006	New Hanover	SLAMS	1/1 to 12/31, every year	Maximum concentration site to ensure compliance w/NAAQS	Population Exposure/ Highest Concentration	Urban

**Not in an Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370130151 <sup>h</sup>	Bayview	SLAMS	1/1 to 12/31, every year	Fence-line monitoring at PCS Phosphate facility to ensure compliance with the NAAQS	Source Oriented	Neighborhood
371170001	Jamesville	Special Purpose	1/1 to 12/31, every 3rd year. Site operated in '07 & will operate in '10.	Industrial expansion monitoring for PSD modeling. Compliance with the NAAQS.	Upwind/ Background General/ Background	Urban
371590021 <sup>i</sup>	Rockwell	Proposed SLAMS	1/1 to 12/31, every year; Will begin trace-level monitoring in 2013	SO <sub>2</sub> fine particle precursor monitoring. Compliance with the NAAQS.	General/ Background	Urban

<sup>a</sup> Monitors at all sites use an Automated Equivalent Method. The NC-DAQ monitors use an Instrumental Pulsed Fluorescence method using a Thermo Electron 43C (Air Quality System (AQS) Method Code 009). The monitor

**Table 10 Statement of Purpose for North Carolina Sulfur Dioxide Monitoring Network<sup>a</sup>**

operated by Mecklenburg County Air Quality uses an Instrumental Pulsed Fluorescence method using a Thermo Electron 43C-TLE (AQS Method Code 560). The monitor operated by Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403) uses an Instrumental Ultraviolet Fluorescence method using an API Model 100 A SO<sub>2</sub> Analyzer (AQS Method Code 100).

<sup>b</sup> All monitors operate on an hourly schedule.

<sup>c</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>d</sup> Operated by the South Carolina Department of Health and Environmental Control (AQS Reporting Agency 0971).

<sup>e</sup> This monitor started operating on 1/1/2011 on a 1-in-3 year schedule.

<sup>f</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>g</sup> This monitor will start operating on 1/1/2013 on a 1-in-3 year schedule. It will replace the Bryson monitor.

<sup>h</sup> This monitor is located in Beaufort County on the fence line of the PCS Phosphate facility. It replaced the New Aurora site (37013007) that was dislocated by nearby land clearing and future mining activities.

<sup>i</sup> This monitor has been proposed for several years to support fine particle precursor monitoring at this site.

**Table 11 Status of North Carolina Sulfur Dioxide Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D, & E <sup>b, c</sup>	Proposal to Move or Change
371190041 <sup>d</sup>	Garinger	Yes	Yes: EQSA-0486-060	None
450910006 <sup>e</sup>	York	Yes	Yes: EQSA-0486-060	None

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D, & E <sup>b, c</sup>	Proposal to Move or Change
371830014	Millbrook	Yes	Yes: EQSA-0486-060	None

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D, & E <sup>b, c</sup>	Proposal to Move or Change
37-081-0013	Mendenhall	Yes	Yes: EQSA-0486-060	Site will begin operating 1/1/2013 as PWEI site
371570099 <sup>f</sup>	Bethany	Yes	Yes: EQSA-0486-060	Site operated in 2011 and will operate again in 2014

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D, & E <sup>b, c</sup>	Proposal to Move or Change
370370004	Pittsboro	Yes	Yes: EQSA-0486-060	Site operated in 2011 and will operate again in 2014
370630015	Durham Armory	Yes	Yes: EQSA-0486-060	Site will begin operating 1/1/2013 as PWEI site

**Winston-Salem Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D, & E <sup>b, c</sup>	Proposal to Move or Change
370670022 <sup>g</sup>	Hattie Avenue	Yes	Yes: EQSA-0495-100	None

**Hickory Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D, & E <sup>b, c</sup>	Proposal to Move or Change
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**Table 11 Status of North Carolina Sulfur Dioxide Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network<sup>a</sup>**

370270003 <sup>h</sup>	Lenoir	Yes	Yes: EQSA-0486-060	Site will begin operating in 2013
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**Fayetteville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D, & E <sup>b,c</sup>	Proposal to Move or Change
370511003	Golfview	Yes	Yes: EQSA-0486-060	Site operated in 2009 and is operating in 2012

**Wilmington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D, & E <sup>b,c</sup>	Proposal to Move or Change
371290006	New Hanover	Yes	Yes: EQSA-0486-060	None

**Not in an Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices A, C, D, & E <sup>b,c</sup>	Proposal to Move or Change
370130151 <sup>i</sup>	Bayview Ferry	Yes	Yes: EQSA-0486-060	Site started 1/2011 to replace the New Aurora site.
371170001	Jamesville	Yes	Yes: EQSA-0486-060	Site operated in 2010 & will operate again in 2013
371590021 <sup>j</sup>	Rockwell	Yes	Yes: EQSA-0486-060	Site not yet operating; will begin trace-level monitoring 1/1/2013 or later

<sup>a</sup> Monitors at all sites use an Automated Equivalent Method. The NC-DAQ monitors use an Instrumental Pulsed Fluorescence method using a Thermo Electron 43C (Air Quality System (AQS) Method Code 009). The monitor operated by Mecklenburg County Air Quality uses an Instrumental Pulsed Fluorescence method using a Thermo Electron 43C-TLE (AQS Method Code 560). The monitor operated by Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403) uses an Instrumental Ultraviolet Fluorescence method using an API Model 100 A SO<sub>2</sub> Analyzer (AQS Method Code 100).

<sup>b</sup> All monitors meet the requirements of 40CFR58 Appendix A. The Quality Assurance Project Plan and Standard Operating Procedures are being revised to reflect the changes to Appendix A of Part 58 promulgated in 2006. Appendix D has no minimum requirements for Sulfur Dioxide Monitoring. All sites meet the appropriate siting criteria in Appendix E of 40CFR58 promulgated in 2006.

<sup>c</sup> EQSA-0486-060 and EQSA-0495-100 are codes assigned by the U.S. EPA to reference and equivalent methods that are suitable for comparison to the National Ambient Air Quality Standards. The list of reference and equivalent methods is available <http://www.epa.gov/ttn/amtic/files/ambient/criteria/reference-equivalent-methods-list.pdf>.

<sup>d</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>e</sup> Operated by the South Carolina Department of Health and Environmental Control (AQS Reporting Agency 0971).

<sup>f</sup> This monitor started operating on 1/1/2011 on a 1-in-3 year schedule.

<sup>g</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>h</sup> This monitor will start operating on 1/1/2013 on a 1-in-3 year schedule. It will replace the Bryson monitor.

<sup>i</sup> This monitor is located in Beaufort County across the river from the PCS Phosphate facility. It replaced the Aurora site (37013007) that was dislocated by nearby land clearing and future mining activities.

<sup>j</sup> This monitor has been proposed for several years to support fine particle precursor monitoring at this site.

## V. Ozone Monitoring Network

The North Carolina Division of Air Quality (NC-DAQ) currently operates one of the largest ozone monitoring networks in the Southeast. This strong network has greatly benefited the state by enabling the NC-DAQ to learn about 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, NC-DAQ was able to make strong arguments with the United States Environmental Protection Agency (EPA) to prevent certain areas of the state from being designated as nonattainment and was able to develop effective implementation plans.

Table 12 provides the highest ozone design values for the monitors in North Carolina for the past five years. This information is important because the monitoring regulations promulgated by the U.S. EPA in 2006 require a monitor to be attaining the NAAQS for the past five years before the monitor can be shut down. On March 12, 2007, the U.S. EPA lowered the 8-hour ozone standard to 0.075 parts per million. Only 8 of the 40 monitors currently operating statewide have met an 8-hour ozone design value of 0.075 parts per million for the past five years (see Figure 23). Those monitors are located at Bryson City (37-173-0002) in Swain County, Waynesville (37-087-0004) in Haywood County, Shiloh Church in Forsyth County, Bent Creek in Buncombe County, Jamesville in Martin County, Linville Falls (37-011-0002) in Avery County, Pittsboro (37-037-0004) in Chatham County, and Castle Hayne (37-129-0002) in New Hanover County. However, none of these monitors meets the additional requirement of having less than 10 % probability of exceeding 80 % of the NAAQS during the next three years. Thus, they are not eligible to be shut down.

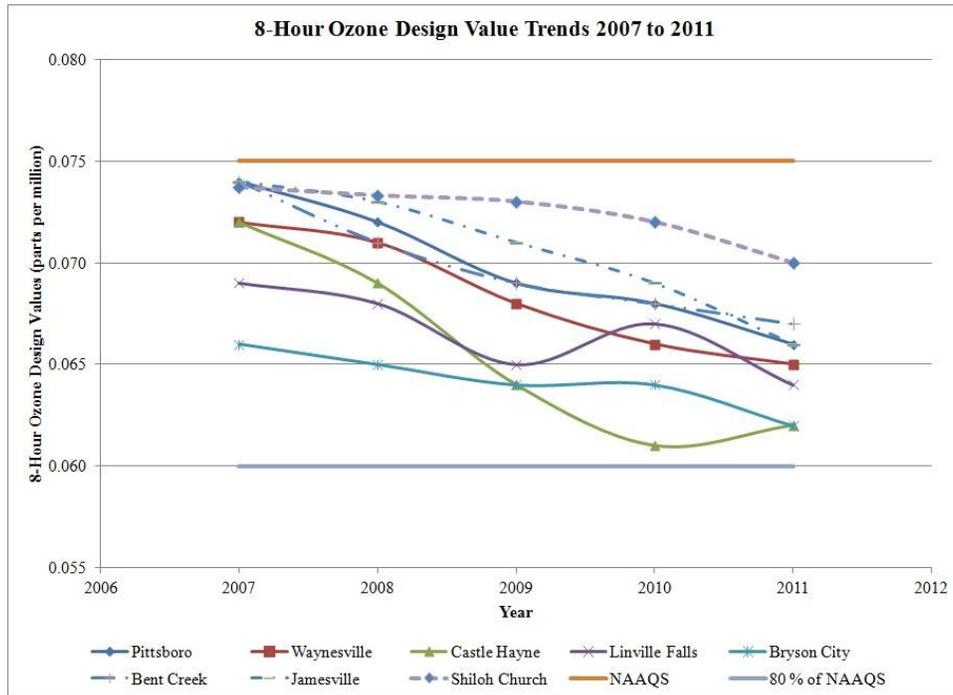


Figure 23. 8-Hour Ozone Design Value Trends.

**Table 12 Summary of Ozone Concentrations Measured by the North Carolina Ozone Monitoring Network (2007 through 2011)<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-119-0041 <sup>c</sup>	Garinger	0.090	120%	2005-2007
37-119-1005 <sup>c</sup>	Arrowood	0.083	111%	2005-2007
37-119-1009 <sup>c</sup>	County Line (U)	0.094	125%	2006-2008
37-179-0003	Monroe Middle School	0.081	108%	2005-2007

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-069-0001	Franklinton	0.078	104%	2005-2007
37-101-0002	West Johnston	0.077	103%	2005-2007
37-183-0014	Millbrook	0.081	108%	2005-2007
37-183-0016	Fuquay	0.079	105%	2005-2007

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-081-0011 <sup>d</sup>	McLeansville	0.081	-	2005-2007
37-081-0013 <sup>e</sup>	Mendenhall	0.082	109%	2006-2008
37-157-0099	Bethany	0.080	107%	2006-2008

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-037-0004	Pittsboro	0.074	99%	2005-2007
37-063-0013 <sup>f</sup>	Duke Street	0.078	104%	2006-2008
37-063-0015 <sup>g</sup>	Durham Armory	0.074	99%	2007-2009
37-145-0003	Bushy Fork	0.077	103%	2006-2008

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-059-0002	Cooleemee	0.083	111%	2005-2007
37-067-0022 <sup>h</sup>	Hattie Ave. (U)	0.081	108%	2006-2008
37-067-0028 <sup>h</sup>	Shiloh Church	0.073	97%	2007-2009
37-067-0030 <sup>h</sup>	Clemmons	0.078	104%	2006-2008
37-067-1008 <sup>h</sup>	Union Cross	0.081	108%	2006-2008

**Asheville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-021-0030 <sup>i</sup>	Bent Creek	0.074	99%	2005-2007
37-087-0004	Waynesville	0.072	96%	2005-2007

**Table 12 Summary of Ozone Concentrations Measured by the North Carolina Ozone Monitoring Network (2007 through 2011)<sup>a</sup>**

**Hickory Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-003-0004 <sup>j</sup>	Waggin Trail	0.079	105%	2005-2007
37-027-0003	Lenoir	0.076	101%	2005-2007

**Fayetteville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-051-0008	Wade	0.078	104%	2005-2007
37-051-1003	Golfview	0.082	109%	2005-2007

**Wilmington Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-129-0002	Castle Hayne	0.072	96%	2005-2007

**Greenville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-147-0006 <sup>k</sup>	Pitt Co. Ag Center	0.077 <sup>lo</sup>	103%	2006-2008
37-147-0099 <sup>m</sup>	Farmville	0.077	103%	2005-2007

**Rocky Mount Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-065-0099	Leggett	0.077	103%	2005-2007

**Not in an Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 8-Hour Ozone Design Value for 2007-2011		
		Value (parts per million)	Percent of NAAQS <sup>b</sup>	Year
37-011-0002	Linville Falls	0.069	92%	2005-2007
37-033-0001	Cherry Grove	0.079	105%	2006-2008
37-075-0001 <sup>n</sup>	Joanna Bald	0.078	104%	2006-2008
37-077-0001	Butner	0.081	108%	2005-2007
37-087-0035	Fry Pan	0.079	105%	2005-2007
37-087-0036	Purchase knob	0.078	104%	2005-2007
37-107-0004	Lenoir community College	0.076	101%	2005-2007
37-109-0004	Crouse	0.083	111%	2005-2007
37-117-0001	Jamesville	0.074	99%	2005-2007
37-159-0021	Rockwell	0.089	119%	2005-2007
37-159-0022	Enochville	0.090	120%	2005-2007
37-173-0002	Bryson City	0.066	88%	2005-2007
37-199-0003 <sup>o</sup>	Mount Mitchell	0.074	99%	2005-2007
37-199-0004 <sup>p</sup>	Mount Mitchell	0.078 <sup>q</sup>	104%	2005-2007

<sup>a</sup> All monitors use an Instrumental Ultra Violet method (Air Quality System (AQS) Method Code 047).

<sup>b</sup> The National Ambient Air Quality Standard for an 8-hour period is 0.075 parts per million. Attainment is

**Table 12 Summary of Ozone Concentrations Measured by the North Carolina Ozone Monitoring Network (2007 through 2011)<sup>a</sup>**

based on the average of the fourth highest values for three consecutive ozone seasons. The ozone season for North Carolina is from April 1 through October 31.

<sup>c</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>d</sup> This monitor was shut down on July 6, 2005, to move it to the Mendenhall monitoring site. This move was made because of site deficiencies identified at the McLeansville site in the annual network review and to combine the Guilford County/Greensboro ozone and particle monitoring sites into one multi-pollutant site.

<sup>e</sup> This monitor started on April 15, 2005, to replace the McLeansville monitor.

<sup>f</sup> This monitor was shut down on October 31, 2006, to move it across the street to a site more suitable for particle monitoring so that the Durham ozone and particle sites can be combined into one multi-pollutant site.

<sup>g</sup> This monitor started on April 1, 2007, to replace the Duke Street monitor.

<sup>h</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403).

<sup>i</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

<sup>j</sup> This monitor started on August 11, 2004, to replace the Taylorsville monitor.

<sup>k</sup> This monitor started on April 1, 2008, to replace the Farmville monitor.

<sup>l</sup> Average of the fourth highest value for one year only (2008).

<sup>m</sup> This monitor was shut down on October 31, 2007, and replaced by the Pitt Co. Ag Center monitor.

<sup>n</sup> This monitor started on April 3, 2003. The monitor is owned by the United States Forest Service and operated by the North Carolina Division of Air Quality (NC-DAQ).

<sup>o</sup> This monitor was shut down on June 2, 2006, because the building was no longer suitable for monitoring due to weather damage and infestation by vermin. The building was owned by North Carolina State University (NCSU). When contacted, NCSU expressed no desire to repair the building. The NC-DAQ investigated the options for replacing the building. The road was inadequate to allow a building to be brought in and building a new building on site was too labor intensive.

<sup>p</sup> This monitor started on June 2, 2006, at Mount Mitchell State Park to replace a monitor located at a NCSU research site on Mount Mitchell.

<sup>q</sup> Average of the fourth highest value for two years only (2006 and 2007).

Other ozone monitors that could be considered for shut down are those monitors that exceed the minimum number of monitors required in 40CFR58 Appendix D Table D-2 provided in Figure 24. The latest estimated population of the Metropolitan Statistical Area (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<sub>3</sub> MONITORING REQUIREMENTS

MSA population <sup>1,2</sup>	Most recent 3-year design value concentrations ≥85% of any O <sub>3</sub> NAAQS <sup>3</sup>	Most recent 3-year design value concentrations <85% of any O <sub>3</sub> NAAQS <sup>3,4</sup>
>10 million .....	4	2
4–10 million .....	3	1
350,000–<4 million	2	1
50,000–<350,000 <sup>5</sup>	1	0

<sup>1</sup> Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

<sup>2</sup> Population based on latest available census figures.

<sup>3</sup> The ozone (O<sub>3</sub>) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

<sup>4</sup> These minimum monitoring requirements apply in the absence of a design value.

<sup>5</sup> Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

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

Table 13 provides the 2011 estimated population for the MSAs in North Carolina, the design values for 2009-2011, the number of required monitors based on Appendix D and the number of current monitors operated by the NC-DAQ and the local programs. Currently, the NC-DAQ and the local programs are operating at least the minimum number of required monitors in every MSA except for Virginia Beach-Norfolk-New Port News MSA. The NC-DAQ has a written agreement with the Virginia Department of Environmental Quality (VDEQ), Office of Air Quality Monitoring, that VDEQ will maintain the minimum required number of monitors for the Virginia Beach-Norfolk-New Port News MSA (see Appendix F. Monitoring Agreement Between Virginia and North Carolina for the Virginia Beach-Norfolk-New Port News Metropolitan Statistical Area).

**Table 13 Design Values and Required Ozone Monitors for North Carolina Metropolitan Statistical Areas (MSA)**

MSA	Population Estimate (2011) <sup>a</sup>	2011 Ozone 8-Hour Design Value (As percent of NAAQS) <sup>b</sup>	Number of Monitors operated in North Carolina	
			Required	Current
Charlotte-Gastonia-Rock Hill	1,795,472	105	2	4 <sup>e</sup>
Virginia Beach-Norfolk-Newport News, VA	1,662,535	96 <sup>c</sup>	2	0 <sup>d</sup>
Raleigh-Cary	1,163,515	96	2	4
Greensboro-High Point	730,966	99	2	2
Durham-Chapel Hill	512,979	93	2	3
Winston-Salem	482,025	100	2	5
Asheville	429,017	93	2	4
Fayetteville	374,157	95	2	2
Wilmington	369,685	83	1	1
Hickory	364,567	89	2	2
Greenville	192,690	91	1	1
Jacksonville	179,719	Not Available	0	0
Burlington	153,291	Not Available	0	0
Rocky Mount	152,157	93	1	1
Goldsboro	123,697	Not Available	0	0

<sup>a</sup> Source: U.S. Census Bureau, Population Division, Released April 2012, available on the world wide web at <http://www.census.gov/popest/data/counties/totals/2011/index.html>

<sup>b</sup> The National Ambient Air Quality Standard for an 8-hour period is 0.075 parts per million. Attainment is based on the average of the 4th highest value over three consecutive ozone seasons. Values of 0.075 (100 %) and below are considered to be attaining the National Ambient Air Quality Standard.

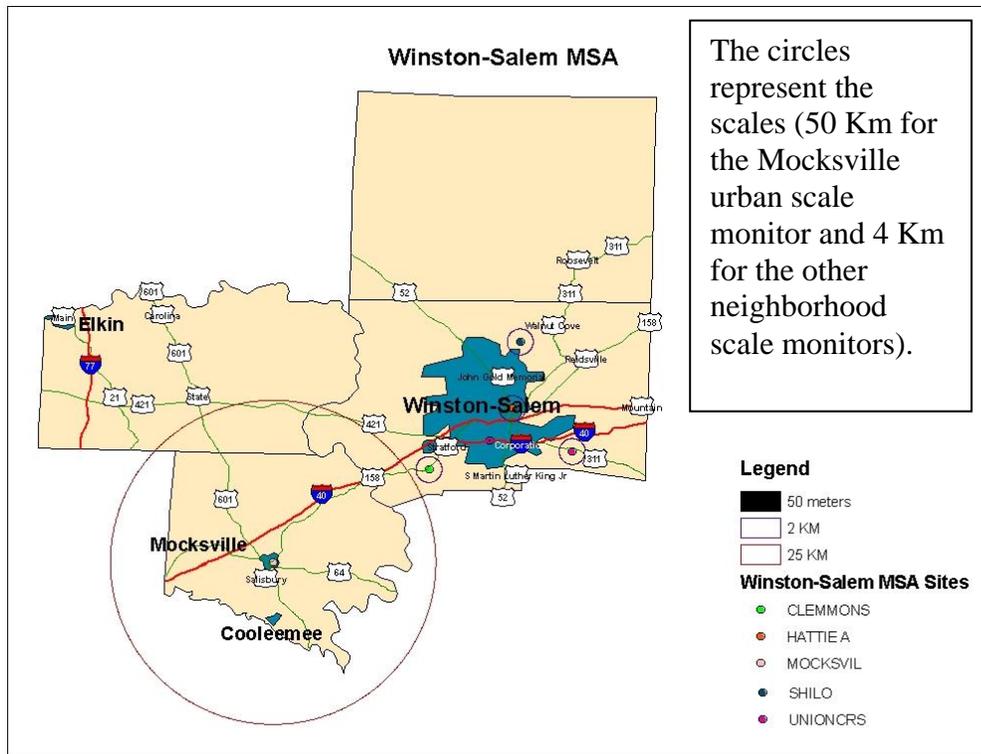
<sup>c</sup> Design value for 2008-2010.

<sup>d</sup> Virginia Department of Environmental Quality (VDEQ), Office of Air Quality Monitoring operates three monitors in this MSA.

<sup>e</sup> South Carolina Department of Health and Environment operates an additional monitor in York County, South Carolina.

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

- Mocksville (37-059-0003) in the Winston-Salem MSA (see Figure 25) – this monitor was established in 2010 to replace the Cooleemee monitor which was the 8-hour ozone design value monitor in the MSA. Model results indicate that the Mocksville monitor will also measure maximum ozone concentrations. Because of its potential higher readings and its strategic location between the Charlotte and Winston-Salem MSAs, this monitor provides valuable information for planning and forecasting.



**Figure 25. Winston Salem MSA Ozone Monitor Locations.**

- Franklinton (37-069-0001) in the Raleigh-Cary MSA (see Figure 26)– this monitor is the downwind monitor for the Raleigh-Cary MSA when the wind is coming from the primary wind direction during the third quarter of the year when measured ozone concentrations are usually the highest. Its 2009-2011 design value is 0.069 parts per million. Although the NC-DAQ views this monitor as valuable, this monitoring site is one the NC-DAQ may consider sacrificing if monitors are required in other parts of the state and additional resources are unavailable.



A is the Franklinton monitor; B is the West Johnston monitor; C is the Millbrook monitor; D is the Fuquay monitor. Circles represent the urban and neighborhood scales (4 to 50 Km for Franklinton and West Johnston and 0.5 to 4 Km for Millbrook and Fuquay).

**Figure 26. Raleigh MSA Ozone Monitor Locations.**

- West Johnston (37-101-0002) in the Raleigh-Cary MSA (see Figure 26) – this monitor is the upwind ozone monitor for the Raleigh-Cary MSA when the wind is coming from the secondary wind direction during the third quarter of the year when measured ozone concentrations are usually the highest. Its 2009-2011 design value is 0.071 parts per million. In the past, Johnston County has been one of the fastest growing counties in North Carolina as well as one of the fastest growing counties in the nation, although it did not make it on either list this year.
- Bushy Fork (37-145-0003) in the Durham-Chapel Hill MSA (see Figure 27) – although this monitor provides valuable information on model performance, the NC-DAQ may need to shut down this monitoring site if monitors are required in other parts of the state and additional resources are not available.



A is the Bushy Fork monitoring site; B is the the Durham Armory monitoring site; C is the Pittsboro monitoring site. Circles show the scale of representation for the monitor: urban scale for Pittsboro and Bushy Fork (4 to 50 kilometers) and neighborhood scale for Durham Armory (0.5 to 4 kilometers).

**Figure 27. Location of Ozone Monitors in the Durham-Chapel Hill MSA.**

The NC-DAQ believes the Durham Armory monitor adequately represents the Durham-Chapel Hill MSA. As shown in Figure 28 at the end of the 2011 ozone season, both monitors had a design value of 70 parts per billion. Figure 29 and Figure 30 show comparisons of the 8-hour daily maximum concentrations measured at each site during 2011. The values track and are well correlated with one another.

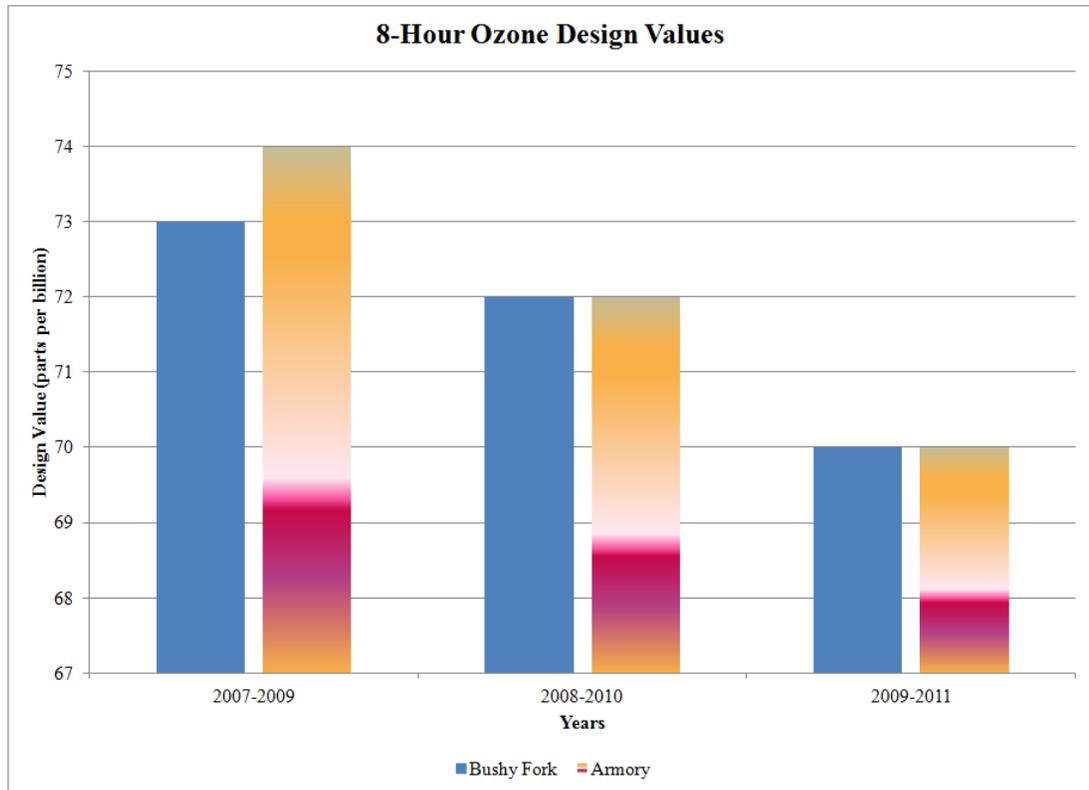


Figure 28. 8-Hour Ozone Design Values at Bushy Fork and Durham Armory

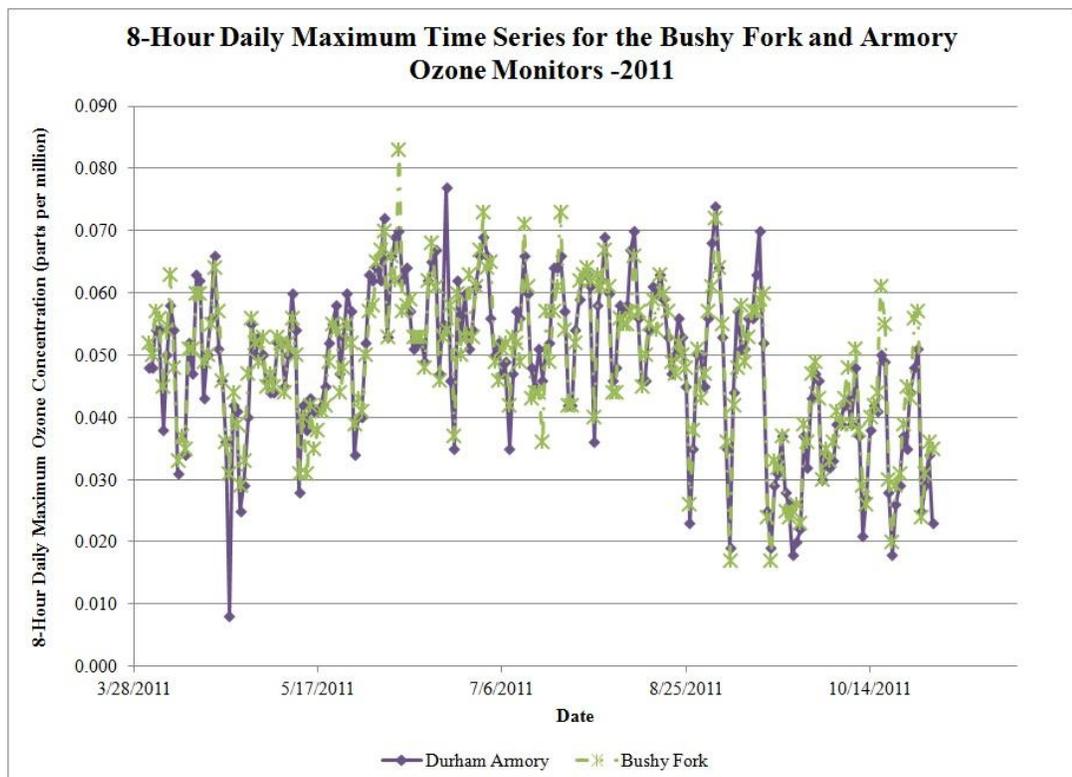
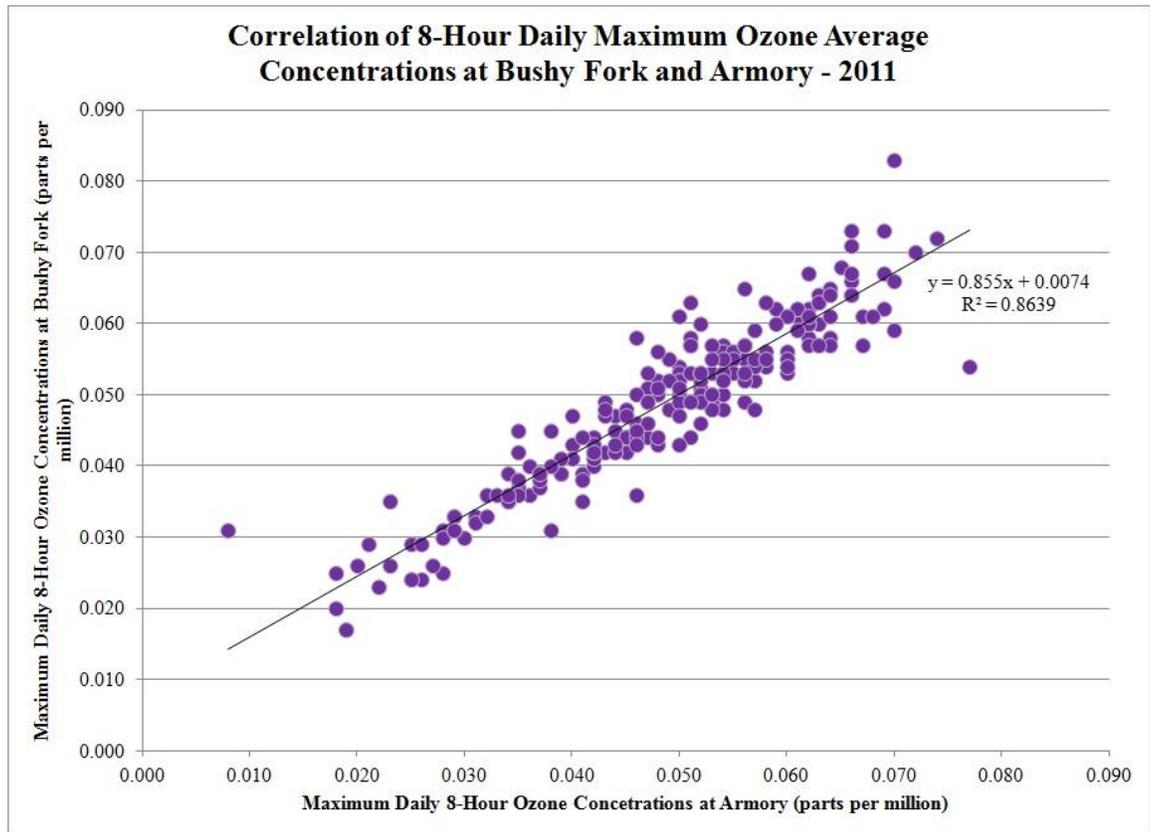


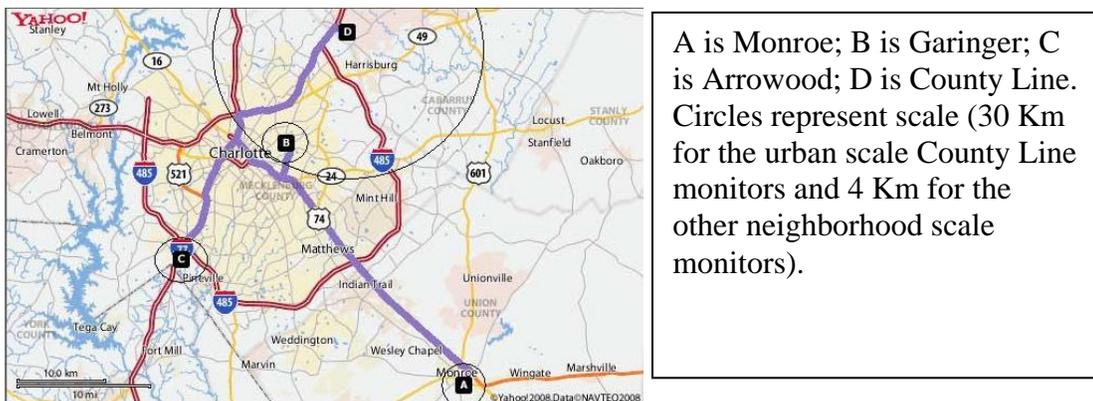
Figure 29. Maximum Daily 8-Hour Ozone Concentrations at Bushy Fork and Durham Armory in 2011



**Figure 30. Maximum Daily 8-Hour Ozone Concentration Correlation for Bushy Fork and Durham Armory**

For these reasons as well as the potential need for additional ozone monitoring in other areas of the state in 2013, the NC-DAQ may shut down the Bushy Fork ozone monitor on October 31, 2012.

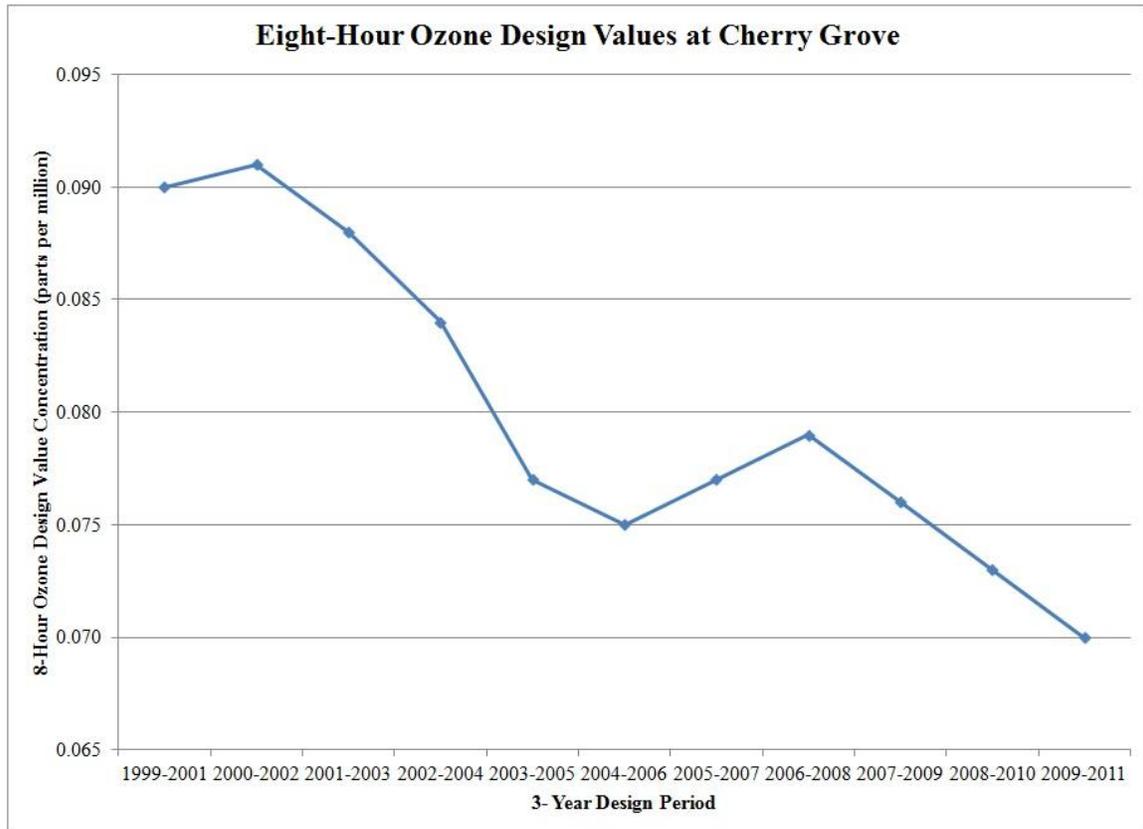
- Monroe Middle School (37-179-0003) in the Charlotte-Gastonia-Rock Hill MSA (see Figure 31) – this monitor provides valuable information for ozone forecasting in the Charlotte area. In the past, Union County has been one of the fastest growing counties in North Carolina as well as one of the fastest growing counties in the nation, although it did not make it on either list this year. It is also located in the state’s largest MSA.



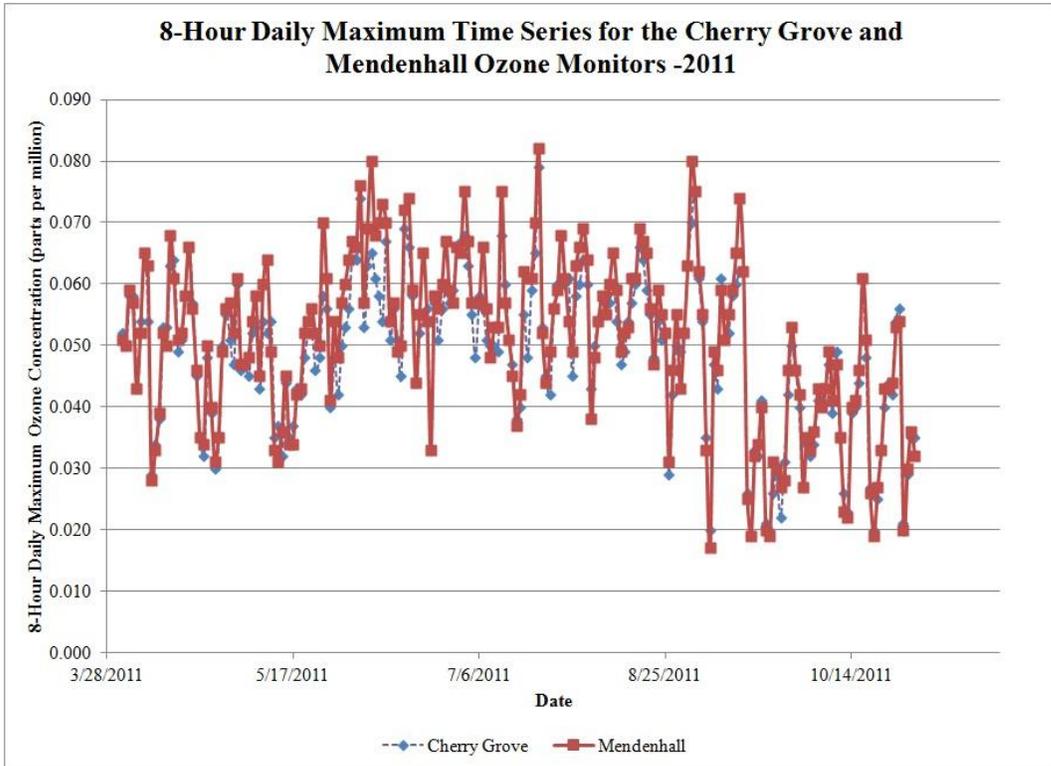
**Figure 31. Charlotte MSA North Carolina Ozone Monitors.**

Although all of the current monitors above the minimum requirements in these MSAs are continuing to provide important and necessary information to help the NC-DAQ effectively perform its job, the NC-DAQ may decide to shut down the Bushy Fork and Franklinton monitors if ozone monitoring is required in other areas of the state and additional resources are not available.

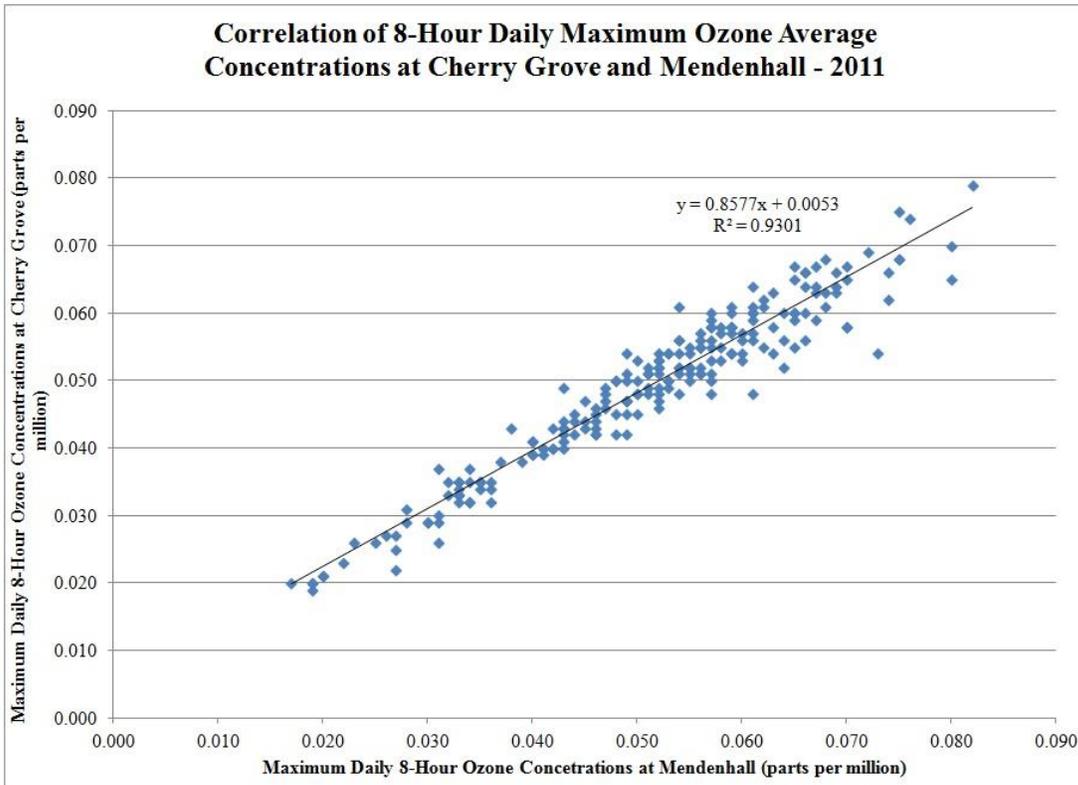
Besides the Bushy Fork and Franklinton monitors, the NC-DAQ is also considering shutting down the Cherry Grove monitor to relocate it to other unmonitored areas of the state. The NC-DAQ may want to realign its ozone network to reflect twenty-first century needs such as population growth and new industrial opportunities. If ozone monitors are required to measure ozone concentrations in other areas of the state, the Cherry Grove monitor could potentially be moved to another location. As shown in Figure 28 the ozone design value has declined over the past 11 years and the NC-DAQ expects this pattern to continue. Figure 29 and Figure 30 show comparisons of the 8-hour maximum concentrations measured at the Cherry Grove and Mendenhall sites during 2011. The values track and are well correlated with one another, indicating the monitors provide similar information.



**Figure 32. 8-Hour Ozone Design Values at Cherry Grove**



**Figure 33. Maximum Daily 8-Hour Ozone Concentrations at Cherry Grove and Mendenhall in 2011**

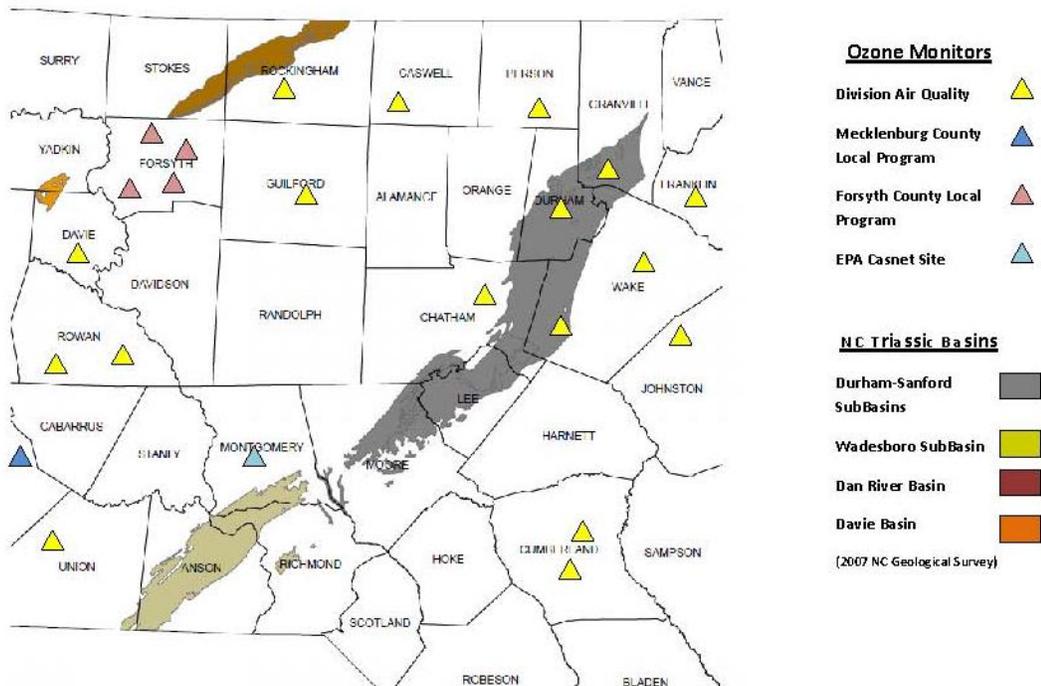


**Figure 34. Maximum Daily 8-Hour Ozone Concentration Correlation for Cherry Grove and Mendenhall**

For these reasons as well as the need for additional ozone monitoring in other areas of the state in 2013, the NC-DAQ may shut down the Cherry Grove ozone monitor on October 31, 2012.

The NC DAQ also evaluated the fastest growing areas in the state. Of the 11 fastest growing counties in North Carolina listed in Table 2, four of those counties currently do not have an ozone monitor:

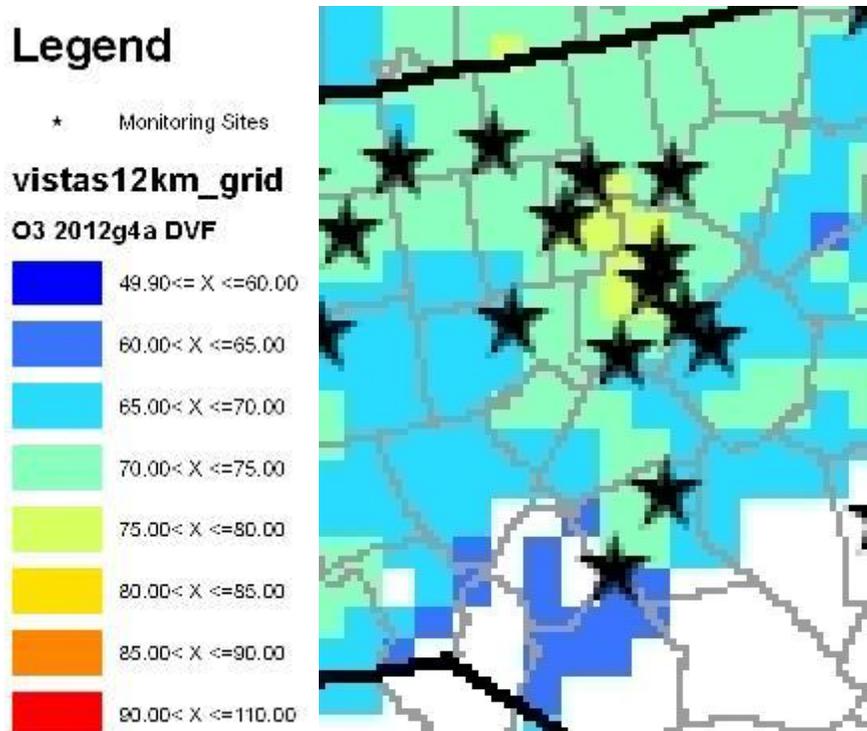
- Brunswick County (growth of 2.5 % between April 1, 2010, and July 1, 2011 and one of the top 100 fastest growing counties in the nation) – This county is impacted by growth in the Wilmington, North Carolina, and North Myrtle Beach, South Carolina, areas. Brunswick County is one of the three counties making up the Wilmington MSA, which now has a population exceeding the 350,000 threshold. The Castle Hayne monitor in the Wilmington MSA currently has a design value that is less than 85 percent of the standard.
- Harnett County (growth of 4,578 people and 4.0 % between April 1, 2010, and July 1, 2011 and one of the top 25 fastest growing counties in the nation) – This county is located between Raleigh to the north and Fort Bragg and the Fayetteville area to the south, two rapidly growing areas. As shown in Figure 35 there are four ozone monitors surrounding Harnett County (West Johnston to the northeast, Wade to the south, Pittsboro to the northwest, and Fuquay to the north). As a result, the NC-DAQ has no plans to monitor for ozone in Harnett County at this time. However, because of the potential for natural gas extraction to occur in the Triassic Basin to the west of Harnett County, the NC-DAQ may consider adding an ozone monitor in Lee County to provide background data.



Map by C. O. Davis, May 2012

**Figure 35. Ozone monitors surrounding Harnett County**

- Hoke County (growth of 4.9 % between April 1, 2010, and July 1, 2011 and one of the top 10 fastest growing counties in the nation) – This county is part of the Fayetteville MSA. The NC DAQ currently operates two ozone monitors in the Fayetteville MSA as required by 40 CFR 58 Appendix D. The VISTAS Unmonitored Areas Analysis for ozone in 2012 (see Figure 36) indicates that expected ozone levels in Hoke County would be similar to the concentrations measured by the Wade monitor in Cumberland County. Currently this monitor has a design value of 0.070 parts per million. As a result the NC DAQ has no plans to monitor for ozone in Hoke County at this time.



**Figure 36. VISTAS Unmonitored Areas Analysis Map for Harnett and Hoke Counties**

- Pender County (growth of 2.3 % between April 1, 2010, and July 1, 2011) – This county is part of the Wilmington MSA. The NC DAQ currently operates one ozone monitor in the Wilmington MSA as required by 40 CFR 58 Appendix D. Currently this monitor has a design value of 0.062 parts per million. As a result the NC DAQ has no plans to monitor for ozone in Hoke County at this time.

At this time, the NC DAQ believes the current ozone network is adequate and does not recommend the addition of any new ozone monitors or the removal of any current ozone monitors. However, changes in the state population distribution and the state's economy may result in the NC DAQ adding additional monitors in the Triassic basin in the Lee County area to provide background air quality data. To accomplish this objective with the existing resources the NC DAQ would need to relocate existing ozone monitoring equipment and shelters to this area. In 2011 the NC DAQ did move one existing ozone monitor because the landowner evicted us from the site. This monitor,

located in Waynesville, was moved across the street from the Haywood County Health Department to an elementary school.

The NC DAQ requested an exemption to any longer ozone season for the high-altitude ozone sites located in the mountains of North Carolina (see . This exemption would be necessary because sometimes the sites are not accessible during the first quarter of the year because of snow and ice, which can cause the roads to the sites to be closed to traffic.

The locations of the current ozone-monitoring sites are provided in Table 14. All monitors listed in Table 14 are suitable for comparison to the National Ambient Air Quality Standards and meet the requirements of Appendices A, C, D, and E of Part 58. All of these monitors use the U.S. EPA equivalent method designation EQOA-0880-047. The locations of the monitors are shown in Figure 37.

Table 15 provides the monitor type, operating schedules, monitoring objectives, and scales for all of the current and proposed monitors in the North Carolina Ozone Monitoring Network. All monitors operate on an hourly schedule from April 1 through October 31 each year. Several of the monitors operate year-round. Table 16 lists the statement of purpose for each monitor in the North Carolina Ozone Monitoring Network and also provides any proposed changes to the network.

**Table 14 North Carolina Ozone Monitoring Network – Monitor Locations<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-119-0041 <sup>b</sup>	Garinger	1130 Eastway Drive	Charlotte	W 080 46' 59"	N 35 14' 28"
37-119-1005 <sup>b</sup>	Arrowood	400 Westinghouse Blvd.	Charlotte	W 080 55' 11"	N 35 06' 47"
37-119-1009 <sup>b</sup>	County Line	29 N@ Mecklenburg Cab Co	Charlotte	W 080 41' 37"	N 35 20' 55"
37-179-0003	Monroe Middle School	701 Charles Street	Monroe	W 080 32' 27"	N 34 58' 26"

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-069-0001	Franklinton	431 South Hillsborough Street	Franklinton	W 078 27' 44"	N 36 05' 51"
37-101-0002	West Johnston	3411 Jack Road <sup>c</sup>	Clayton	W 078 26' 15"	N 35 30' 0"
37-183-0014	Millbrook	3801 Spring Forest Road	Raleigh	W 078 34' 27"	N 35 51' 22"
37-183-0016	Fuquay	201 North Broad Street	Raleigh	W 078 47' 41"	N 35 35' 06"

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-081-0013	Mendenhall	205 Wiloughby Blvd.	Greensboro	W 079 48' 04"	N 36 06' 33"
37-157-0099	Bethany	6371 NC 65	Bethany	W 079 51' 31"	N 36 18' 32"

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-037-0004	Pittsboro	325 Russett Run Road	Pittsboro	W 079 09' 55"	N 35 45' 32"
37-063-0015	Durham Armory	801 Stadium Drive	Durham	W 078 54' 14"	N 36 01' 58"
37-145-0003	BushyFork	Highway 49 South	BushyFork	W 079 05' 29"	N 36 18' 21"

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-059-0003	Mocksville	220 Cherry Street	Mocksville	W 080 33' 26"	N 35 53' 49"
37-067-0022 <sup>d</sup>	Hattie Ave.	Corner of 13 <sup>th</sup> & Hattie Avenue	Winston-Salem	W 080 13' 36"	N 36 6' 38"
37-067-0028 <sup>d</sup>	Shiloh Church	6496 Baux Mountain Road		W 080 12' 57"	N 36 12' 11.0"
37-067-0030 <sup>d</sup>	Clemmons	Fraternity Church Road	Clemmons	W 080 20' 31"	N 36 01' 33.6"
37-067-1008 <sup>d</sup>	Union Cross	3656 Piedmont Memorial Drive		W 080 08' 38"	N 36 03' 03"

**Asheville Metropolitan Statistical Area**

AQS Site Id Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-021-0030 <sup>e</sup>	Bent Creek	Route 191 South	Asheville	W 082 35' 50"	N 35 30' 19"
37-087-0008 <sup>f</sup>	Waynesville E.S.	2236 Asheville Road	Waynesville	W 082 57' 48"	N35 30' 26"

**Table 14 North Carolina Ozone Monitoring Network – Monitor Locations <sup>a</sup>**

**Hickory Metropolitan Statistical Area**

AQS Site Identification Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-003-0004	Waggin Trail	116 Waggin Trail Road	Not in a City	W 081 11' 22"	N 35 55' 44"
37-027-0003	Lenoir	110 Nuway Circle NE	Lenoir	W081 32' 00"	N35 56' 10"

**Fayetteville Metropolitan Statistical Area**

AQS Site Identification Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-051-0008	Wade	7112 Covington Lane	Wade	W 078 43' 53"	N 35 7' 51"
37-051-1003	Golfview	3625 Golfview Road	Hope Mills	W 078 57' 45"	N 34 58' 8"

**Wilmington Metropolitan Statistical Area**

AQS Site Identification Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-129-0002	Castle Hayne	6028 Holly Shelter Road	Castle Hayne	W 077 50' 36"	N 34 21' 87"

**Greenville Metropolitan Statistical Area**

AQS Site Identification Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-147-0006 <sup>g</sup>	Pitt County	403 Government Cir	Greenville	W 077 21' 00"	N 35 38' 00"

**Rocky Mount Metropolitan Statistical Area**

AQS Site Identification Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-065-0099	Leggett	Route 2, Box 195	Leggett	W 077 35' 06"	N 35 59' 30"

**Not in an Metropolitan Statistical Area**

AQS Site Identification Number	Site Location				
	Site Name	Street Address	City	Longitude	Latitude
37-011-0002	Linville Falls	112 Blue Ridge Pkwy Spur Mile Marker 316	Linville Falls	W 081 55' 59"	N35 58' 20"
37-033-0001	Cherry Grove	7074 Cherry Grove Road	Reidsville	W 079 28' 05"	N 36 18' 25"
37-075-0001 <sup>h</sup>	Joanna Bald	Forest Road 423 Spur	Robbinsville	W 083 47' 44"	N 35 15' 28.5"
37-077-0001	Butner	Water Treatment Plant	Butner	W 078 46' 05"	N 36 08' 29"
37-087-0035	Fry Pan	State Rd 450, Blue Ridge Pkwy Mile 409	Pisgah Forest	W082 46' 28"	N35 23' 37"
37-087-0036	Purchase knob	6905 Purchase Road	Waynesville (GSMNP)	W083 04' 27"	N35 35' 13"
37-107-0004	Lenoir community College	231 Highway 58 S	Kinston	W 077 34' 11"	N 35 13' 58"
37-109-0004	Crouse	1487 Riverview Road	Not in a City	W 081 16' 31"	N 35 26' 18"
37-117-0001	Jamesville	33215 US Highway 64	Jamesville	W 076 54' 23"	N 35 48' 38.3"
37-159-0021	Rockwell	301 West Street	Rockwell	W 080 23' 72"	N 35 33' 11"
37-159-0022	Enochville	925 North Enochville Avenue	Not in a City	W 080 40' 3"	N 35 32' 05"
37-173-0002	Bryson City	Parks & Rec Bldg, Center Street	Bryson City	W 083 26' 38"	N35 26' 06"
37-199-0004	Mount Mitchell	State Highway 128	Pisgah Forest	W 082 15' 54"	N 35 45' 53"

<sup>a</sup> All monitors use an Instrumental Ultra Violet method (Air Quality System (AQS) Method Code 047). All monitors listed in this table are suitable for comparison to the National Ambient Air Quality Standards. All monitors in this

**Table 14 North Carolina Ozone Monitoring Network – Monitor Locations<sup>a</sup>**

table meet the requirements of Appendices A, C, D, and E of Part 58. All monitors use the U.S. EPA equivalent method designation EQOA-0880-047.

<sup>b</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>c</sup> The monitor is located 10 meters South of Jack Road, which had a 2002 average daily traffic count of 3,700. This location meets the requirements in Table E-1 for spacing between roadways and probes for neighborhood and urban scale monitors in operation before December 18, 2006, but does not meet the spacing requirements for a new monitoring site.

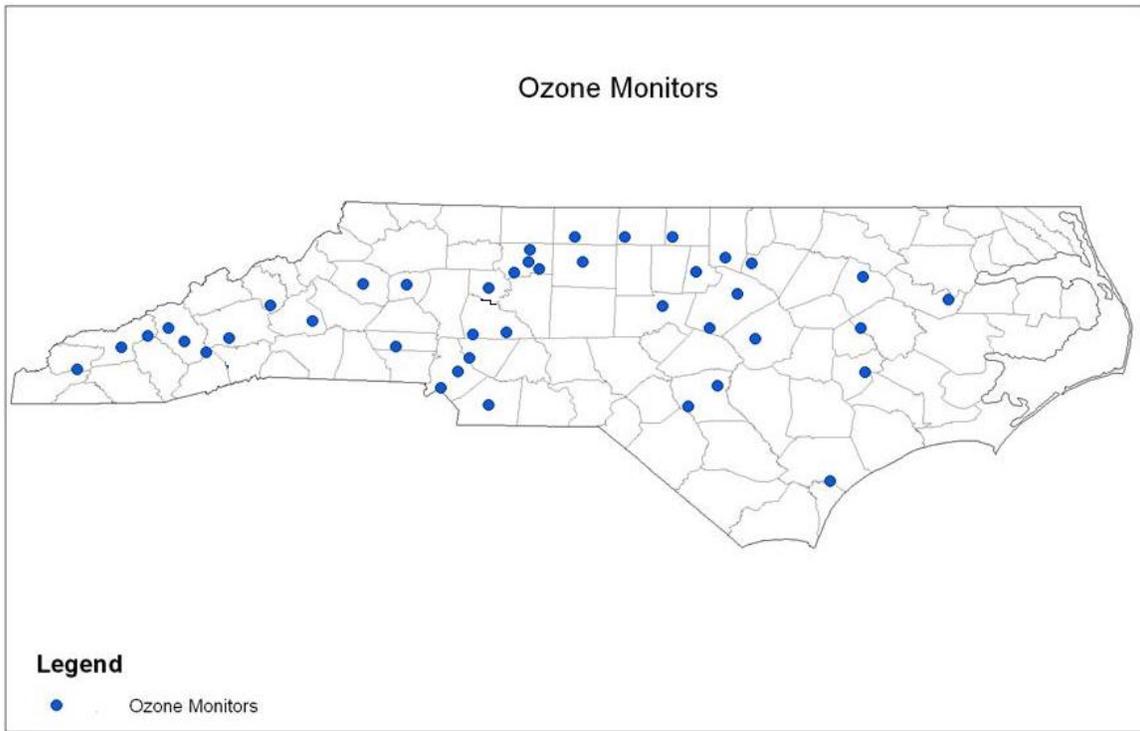
<sup>d</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403).

<sup>e</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

<sup>f</sup> This monitor started on April 1, 2011 to replace the ozone monitor at the Waynesville Health Department.

<sup>g</sup> This monitor started on April 1, 2008, to replace the Farmville monitor.

<sup>h</sup> This monitor started on April 3, 2003. The monitor is owned by the United States Forest Service and operated by the North Carolina Division of Air Quality (NC DAQ).



**Figure 37. Location of 2010 Ozone Monitoring Stations**

**Table 15 Monitor Type, Operating Schedules, Monitoring Objectives, and Scales for the North Carolina Ozone Monitoring Network <sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
37-119-0041 <sup>c</sup>	Garinger	NCORE	1/1 to 12/31	Highest Concentration	Neighborhood
37-119-1005 <sup>c</sup>	Arrowood	SLAMS	4/1 to 10/31	Highest Concentration	Neighborhood
37-119-1009 <sup>c</sup>	County Line	SLAMS	4/1 to 10/31	Highest Concentration	Urban
37-179-0003	Monroe Middle School	Special Purpose	4/1 to 10/31	Population Exposure	Neighborhood

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
37-069-0001	Franklinton	SLAMS	4/1 to 10/31	Population Exposure	Urban
37-101-0002	West Johnston	SLAMS	4/1 to 10/31	General/Background	Urban
37-183-0014	Millbrook	NCORE	1/1 to 12/31	Maximum Ozone Concentration/ Population Exposure	Neighborhood
37-183-0016	Fuquay	Other	4/1 to 10/31	Highest Concentration	Neighborhood

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
37-081-0013	Mendenhall	SLAMS	4/1 to 10/31	Population Exposure	Urban
37-157-0099	Bethany	SLAMS	4/1 to 10/31	Highest Concentration	Urban

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
37-037-0004	Pittsboro	SLAMS	4/1 to 10/31	Upwind Background/ General/Background	Urban
37-063-0015	Durham Armory	SLAMS	4/1 to 10/31	Population Exposure	Neighborhood
37-145-0003	Bushy Fork	SLAMS	4/1 to 10/31	Background/ Highest Concentration	Urban

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
37-067-0022 <sup>d</sup>	Hattie Ave.	Other	4/1 to 10/31	Population Exposure	Neighborhood
37-067-0028 <sup>d</sup>	Shiloh Church	SLAMS	4/1 to 10/31	Population Exposure	Neighborhood
37-067-0030 <sup>d</sup>	Clemmons	SLAMS	4/1 to 10/31	Population Exposure	Neighborhood
37-067-1008 <sup>d</sup>	Union Cross	SLAMS	4/1 to 10/31	Population Exposure	Neighborhood
37-059-0003	Mocksville	SLAMS	4/1 to 10/31	Population Exposure	Urban

**Asheville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
37-021-0030 <sup>e</sup>	Bent Creek	SLAMS	4/1 to 10/31	Maximum Ozone Concentration/ Highest Concentration	Urban
39-087-0013 <sup>f</sup>	Waynesville E.S.	SLAMS	4/1 to 10/31	Population Exposure	Urban

**Hickory Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
37-003-0004	Waggin Trail	Other	4/1 to 10/31	General/ Background	Urban
37-027-0003	Lenoir	SLAMS	4/1 to 10/31	General/ Background	Regional

**Table 15 Monitor Type, Operating Schedules, Monitoring Objectives, and Scales for the North Carolina Ozone Monitoring Network <sup>a</sup>**

**Fayetteville Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
37-051-0008	Wade	SLAMS	4/1 to 10/31	Highest Concentration	Urban
37-051-1003	Golfview	SLAMS	4/1 to 10/31	Population Exposure	Neighborhood

**Wilmington Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
37-129-0002	Castle Hayne	SLAMS	4/1 to 10/31	Population Exposure	Neighborhood

**Greenville Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
371470006 <sup>g</sup>	Pitt Ag Extension	SLAMS	4/1 to 10/31	General/Background	Regional

**Rocky Mount Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
37-065-0099	Leggett	SLAMS	4/1 to 10/31	General/ Background	Regional

**Not in an Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Monitoring Objective	Scale
37-011-0002	Linville Falls	Other	4/1 to 10/31	Welfare Related Impacts/ General/Background	Urban
37-033-0001	Cherry Grove	Other	4/1 to 10/31	General/Background	Urban
37-075-0001 <sup>h</sup>	Joanna Bald	Other	4/1 to 10/31	Welfare Related Impacts/ General/Background	Regional
37-077-0001	Butner	SLAMS	4/1 to 10/31	Highest Concentration	Urban
37-087-0035	Fry Pan	Other	4/1 to 10/31	Welfare Related Impacts/ General/Background	Regional
37-087-0036	Purchase Knob	Other	4/1 to 10/31	Welfare Related Impacts/ General/Background	Regional
37-107-0004	Lenoir community College	Other	4/1 to 10/31	General/ Background	Neighborhood
37-109-0004	Crouse	SLAMS	4/1 to 10/31	General/Background	Urban
37-117-0001	Jamesville	SLAMS	4/1 to 10/31	General/Background	Regional
37-159-0021	Rockwell	Proposed NCORE	1/1 to 12/31	Highest Concentration	Urban
37-159-0022	Enochville	Other	4/1 to 10/31	Highest Concentration	Urban
37-173-0002	Bryson City	SLAMS	4/1 to 10/31	General/ Background	Neighborhood
37-199-0004	Mount Mitchell	Special Purpose	4/1 to 10/31	Welfare Related Impacts/ General/ Background/ Regional Transport	Regional

<sup>a</sup> All monitors use an Instrumental Ultra Violet method (Air Quality System (AQS) Method Code 047).

<sup>b</sup> All monitors operate on an hourly schedule.

<sup>c</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>d</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403).

<sup>e</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

<sup>f</sup> This monitor started on April 1, 2011 to replace the ozone monitor at the Waynesville Health Department.

<sup>g</sup> This monitor started on April 1, 2008, to replace the Farmville monitor.

<sup>h</sup> This monitor started on April 3, 2003. The monitor is owned by the United States Forest Service and operated

**Table 15 Monitor Type, Operating Schedules, Monitoring Objectives, and Scales for the North Carolina Ozone Monitoring Network <sup>a</sup>**

by the North Carolina Division of Air Quality (NC DAQ).

**Table 16 Statement of Purpose for the North Carolina Ozone Monitoring Network and Proposed Changes to the Network <sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-119-0041 <sup>b</sup>	Garinger	Compliance w/NAAQS.	None
37-119-1005 <sup>b</sup>	Arrowood	Compliance w/NAAQS.	None
37-119-1009 <sup>b</sup>	County Line	Compliance w/NAAQS.	None
37-179-0003	Monroe Middle School	Forecasting. Compliance w/NAAQS.	None

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-069-0001	Franklinton	Downwind site for Raleigh-Cary MSA. Modeling. Real-time AQI reporting for the Raleigh-Cary MSA. Compliance w/NAAQS	Monitoring may end 10/31/2012 so equipment can be used elsewhere
37-101-0002	West Johnston	Real-time AQI reporting for the Raleigh-Cary MSA. Compliance w/NAAQS.	None
37-183-0014	Millbrook	Maximum Concentration Site for Raleigh-Cary MSA. Ozone Precursor Monitoring Site. Real-time AQI reporting for the Raleigh-Cary MSA. Compliance w/NAAQS.	None
37-183-0016	Fuquay	Upwind Site for Raleigh-Cary MSA. Modeling. Real-time AQI reporting for the Raleigh-Cary MSA. Compliance w/NAAQS.	None

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-081-0013	Mendenhall	Maximum concentration site downwind of the Greensboro-High Point MSA. Real-time AQI reporting for the Greensboro-Winston-Salem-High-Point CMSA. Compliance w/NAAQS.	None
37-157-0099	Bethany	Maximum ozone concentration site downwind of the Winston-Salem MSA. Modeling. Real-time AQI reporting for the Greensboro-Winston-Salem-High-Point CMSA. Compliance w/NAAQS.	None

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-037-0004	Pittsboro	Upwind Background site for Durham-Chapel Hill MSA. Modeling. Real-time AQI reporting for the Durham-Chapel Hill MSA. Compliance with the NAAQS.	None
37-063-0015	Durham Armory	Maximum concentration site in the Durham-Chapel Hill MSA. Ozone precursor monitoring site. Real-time AQI reporting for the Durham-Chapel Hill MSA. Compliance w/NAAQS.	None
37-145-0003	BushyFork	Compliance w/NAAQS.	Monitoring may end 10/31/2012 so equipment can be used elsewhere

**Table 15 Monitor Type, Operating Schedules, Monitoring Objectives, and Scales for the North Carolina Ozone Monitoring Network <sup>a</sup>**

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-067-0022 <sup>c</sup>	Hattie Ave.	Urban Center City Site for Modeling. Real-time AQI reporting for the Greensboro-Winston-Salem-High-Point CMSA. Compliance w/NAAQS.	None
37-067-0028 <sup>c</sup>	Shiloh Church	Compliance w/NAAQS.	None
37-067-0030 <sup>c</sup>	Clemmons	Real-time AQI reporting for the Greensboro-Winston-Salem-High-Point CMSA. Compliance w/NAAQS.	None
37-067-1008 <sup>c</sup>	Union Cross	Compliance w/NAAQS.	None
37-059-0003	Mocksville	Upwind site for the Greensboro-High Point MSA. Real-time AQI reporting. Compliance w/NAAQS.	None

**Asheville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-021-0030 <sup>d</sup>	Bent Creek	Industrial expansion monitoring for PSD modeling. Real-time AQI reporting. Compliance with the NAAQS.	None
37-087-0013	Waynesville E.S.	Low elevation (valley) site for Haywood County. Real-time AQI reporting. Modeling. Compliance w/NAAQS.	None

**Hickory Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-003-0004	Waggin Trail	Compliance w/NAAQS.	None
37-027-0003	Lenoir	Highest Ozone Precursor Concentration Site for Hickory MSA. Real-time AQI reporting. Compliance w/NAAQS.	None

**Fayetteville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-051-0008	Wade	Maximum concentration site in the Fayetteville MSA. Real-time AQI reporting for the Fayetteville MSA. Compliance w/NAAQS.	None
37-051-1003	Golfview	Upwind site in the Fayetteville MSA. Real-time AQI reporting for the Fayetteville MSA. Compliance with the NAAQS	None

**Wilmington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-129-0002	Castle Hayne	Real-time AQI reporting. Compliance w/NAAQS.	None

**Greenville Metropolitan Statistical Area**

**Table 15 Monitor Type, Operating Schedules, Monitoring Objectives, and Scales for the North Carolina Ozone Monitoring Network <sup>a</sup>**

AQS Site Id Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-147-0006 <sup>c</sup>	Ag Extension	Real-time AQI reporting. Compliance w/NAAQS.	None

**Rocky Mount Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-065-0099	Leggett	Real-time AQI reporting. Compliance with the NAAQS.	None

**Not in an Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Statement of Purpose	Proposal to Move or Change
37-011-0002	Linville Falls	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.	None
37-033-0001	Cherry Grove	Extreme downwind site for the Greensboro-High Point MSA. Modeling. Ozone Precursor monitoring site. Real-time AQI reporting for the Greensboro-Winston-Salem-High-Point CMSA. Compliance with the NAAQS	Monitoring may end 10/31/2012 so equipment can be used elsewhere
37-075-0001 <sup>f</sup>	Joanna Bald	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.	None
37-077-0001	Butner	Maximum concentration site downwind for the Durham-Chapel Hill MSA. Modeling. Real-time AQI reporting for the Raleigh-Durham-Chapel Hill CMSA. Compliance w/NAAQS.	None
37-087-0035	Fry Pan	Operated in cooperation with the USFS. Located in a Class I area and collocated at an IMPROVE site. Provides ozone data for PSD modeling for industrial expansion. Provides AQI data for recreational users. Real-time AQI reporting for the Asheville MSA. Modeling. Compliance w/NAAQS.	None
37-087-0036	Purchase Knob	Operated in cooperation with the USFS. Located in a Class I area. Provides ozone data for PSD modeling for industrial expansion. Provides AQI data for recreational users. Real-time AQI reporting for the Asheville MSA. Modeling. Compliance w/NAAQS.	None
37-107-0004	Lenoir Community College	Compliance w/NAAQS.	None
37-109-0004	Crouse	Compliance w/NAAQS.	None
37-117-0001	Jamesville	Compliance w/NAAQS.	None
37-159-0021	Rockwell	Modeling. Ozone Precursor Monitoring. Compliance w/NAAQS.	None
37-159-0022	Enochville	Compliance w/NAAQS.	None
37-173-0002	Bryson City	Regional Transport and General Background Site. Low elevation (valley) mountain site on the NC side of the Great Smokey Mountains National Park. Modeling. Forecasting. Compliance w/NAAQS.	None

**Table 15 Monitor Type, Operating Schedules, Monitoring Objectives, and Scales for the North Carolina Ozone Monitoring Network <sup>a</sup>**

37-199-0004	Mount Mitchell	Provides ozone data for PSD modeling for industrial expansion. Provides AQI data for recreational users. Modeling. Compliance w/NAAQS.	None
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<sup>a</sup> All monitors use an Instrumental Ultra Violet method (Air Quality System (AQS) Method Code 047).

<sup>b</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>c</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403).

<sup>d</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

<sup>e</sup> This monitor started on April 1, 2008, to replace the Farmville monitor.

<sup>f</sup> This monitor started on April 3, 2003. The monitor is owned by the United States Forest Service and operated by the North Carolina Division of Air Quality (NC-DAQ).

**VI. Particle Monitoring Network for Particles with Aerodynamic Diameters of 10 Micrometers or Less (PM<sub>10</sub>)**

Monitoring for particles of 10 micrometers or less aerodynamic diameter (PM<sub>10</sub>) is currently being conducted in North Carolina at seven sites operated by the North Carolina Division of Air Quality (NC-DAQ) and at five sites operated by local programs. The data collected are used to determine human health effect exposures in Metropolitan Statistical Areas (MSAs) with over 500,000 people and to collect background levels for Prevention of Significant Deterioration (PSD) purposes.

Table 17 provides the highest PM<sub>10</sub> concentrations measured in North Carolina for the past five years. The monitoring regulations promulgated by the U.S. EPA in 2006 require a monitor to be attaining the NAAQS for the past five years before the monitor can be shut down. All PM<sub>10</sub> monitors operated in North Carolina in the last five years have attained the NAAQS and have reported values less than 80 % of the standard. Thus, the only monitors that the U.S. EPA requires the state to operate are the ones required to meet the minimum monitoring requirements in 40CFR58 Appendix D Table D-4 provided in Figure 38.

TABLE D-4 OF APPENDIX D TO PART 58. PM<sub>10</sub> MINIMUM MONITORING REQUIREMENTS (NUMBER OF STATIONS PER MSA) <sup>1</sup>

Population category	High concentration <sup>2</sup>	Medium concentration <sup>3</sup>	Low concentration <sup>4,5</sup>
>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

<sup>1</sup> 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.

<sup>2</sup> High concentration areas are those for which ambient PM<sub>10</sub> data show ambient concentrations exceeding the PM<sub>10</sub> NAAQS by 20 percent or more.

<sup>3</sup> Medium concentration areas are those for which ambient PM<sub>10</sub> data show ambient concentrations exceeding 80 percent of the PM<sub>10</sub> NAAQS.

<sup>4</sup> Low concentration areas are those for which ambient PM<sub>10</sub> data show ambient concentrations less than 80 percent of the PM<sub>10</sub> NAAQS.

<sup>5</sup> These minimum monitoring requirements apply in the absence of a design value.

**Figure 38. Table D-4 from 40CFR58 Appendix D**

The 2011 estimated population of the Metropolitan Statistical Area (MSA) and the most recent PM<sub>10</sub> ambient concentration values for the area determines the number of required monitors for an area. Table 18 provides the 2011 estimated total population for the MSAs in North Carolina, the maximum ambient daily concentration values as percentage of the NAAQS for 2011, the number of required monitors based on 40CFR58 Appendix D Table D-4 and the number of current monitors operated by the NC-DAQ and the local programs.

Currently, the NC-DAQ and the local programs are operating the minimum number of required monitors in every MSA except for the Virginia Beach-Norfolk-New Port News, and the Raleigh MSA. The NC-DAQ has a written agreement with the Virginia Department of Environmental Quality (VDEQ), Office of Air Quality Monitoring, that VDEQ will maintain the minimum required number of monitors for the Virginia Beach-Norfolk-New Port News MSA (see Appendix F. Monitoring Agreement Between Virginia and North Carolina for the Virginia Beach-Norfolk-New Port News

Metropolitan Statistical Area). The NC-DAQ received a waiver from the EPA for the second required monitor in the Raleigh MSA. The EPA granted the waiver because PM<sub>10</sub> values recorded in the Raleigh MSA have been less than 50 % of the NAAQS except for when the existing monitor was impacted by an exceptional event on June 12, 2008.

The Durham-Chapel Hill MSA is required to operate 1 to 2 PM<sub>10</sub> monitors. According to footnote 1 in 40CFR58 Appendix D Table D-4 the number of monitors to operate in the Durham-Chapel Hill MSA is jointly decided upon by the EPA and the operating agency. In 2007 the NC-DAQ shut down its PM<sub>10</sub> monitoring site at the Durham Health Building. The high-volume PM<sub>10</sub> monitor was not moved to the new Durham Armory site because the Durham-Chapel Hill MSA was not yet large enough to require 1 to 2 PM<sub>10</sub> monitors and the NC-DAQ planned to convert the high volume PM<sub>10</sub> monitor at the Durham site to a low-volume PM<sub>10</sub> monitor sometime in the near future when additional low-volume monitors became available from the fine particle monitoring network. The NC-DAQ decided that it was inefficient to install the high-volume PM<sub>10</sub> monitor and then replace it in a year or two with a low-volume PM<sub>10</sub> monitor. The Durham-Chapel Hill MSA contains two of the fastest growing counties in the state (Chatham and Durham). In the 2010 Census the population of the MSA exceeded 500,000 people. As a result, the NC-DAQ began operating a low-volume PM<sub>10</sub> monitor at the Durham Armory site in the Durham-Chapel Hill MSA on January 1, 2011.

In 2011 the NC-DAQ modified its PM<sub>10</sub> PSD monitoring network by establishing a network of rotating background PM<sub>10</sub> sites. Two PM<sub>10</sub> monitors will operate each year and each site will operate once every three years. The six PM<sub>10</sub> background sites are:

- Candor and Marion, operating in 2011;
- Jamesville operating in 2012; and
- Kenansville, Cherry Grove, and Grier School (Gastonia), operating in 2013.

These six sites are also fine particle monitoring sites. Recent political events have made it clear that no changes will be made to the PM<sub>10</sub> standard until it is eventually replaced with a PM<sub>coarse</sub> standard sometime in 2018 or later. As a result, the NC-DAQ plans to revisit the rotating PM<sub>10</sub> network to evaluate its objectives and either change it to a rotating PM<sub>10-2.5</sub> network or a rotating PM<sub>10</sub> urban network.

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<sub>10</sub> concentration and the fine particle concentration measured using the same sampling and analytical method. As fine particle FRM monitors become available in 2012 and 2013, the NC-DAQ plans to gradually convert the current manual PM<sub>10</sub> high volume samplers to PM<sub>10</sub> low volume samplers that can be used to measure both PM<sub>10</sub> and coarse particles.

The locations of the current and proposed PM<sub>10</sub>-monitoring sites are provided in Table 19. All monitors listed in Table 19 are suitable for comparison to the NAAQS. All of the monitors meet the requirements of Appendices C and E of 40CFR58. Two of the monitors currently do not meet Appendix A requirements. The monitor at Millbrook (37-183-0014) and the monitor at the Durham Armory do not meet Appendix A requirements because they do not have an approved QA/SOP.

Table 20 provides the monitor type, operating schedules, monitoring objectives, scales, and statement of purpose for all of the current and proposed monitors in the North Carolina PM<sub>10</sub> Monitoring Network. All of the monitors operate year-round. Table 21 summarizes the 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 40CFR58 and also provides the proposed changes to the network.

**Table 17 Ambient PM<sub>10</sub> Concentrations Measured in North Carolina**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>a</sup>	Year
371190003 <sup>b,c</sup>	Fire Station #11	50	33 %	2010
371190041 <sup>b,d</sup>	Garinger	40	27 %	2010
371190042 <sup>b,d</sup>	Montclair	57	38 %	2010
371191001 <sup>b,c</sup>	Davidson	49	33 %	2007
371191005 <sup>b,c</sup>	Arrowood	70	47 %	2007

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
371830014 <sup>e</sup>	Millbrook	105	71%	2008

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
370810013 <sup>f</sup>	Mendenhall	63	42 %	2010

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
370630001 <sup>f,g</sup>	Durham Health	50	33 %	2007
370630015 <sup>d</sup>	Durham Armory	33	22 %	2011

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
370670022 <sup>h,i</sup>	Hattie Avenue	73	49 %	2008
370670023 <sup>h,i</sup>	Peter's Creek	83	55 %	2008

**Asheville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
370891006 <sup>f</sup>	Allen Street	38	25 %	2007

**Hickory Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
370350004 <sup>f</sup>	Hickory	44	29 %	2007

**Fayetteville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
370510009 <sup>f</sup>	William Owen	51	34 %	2010

**Table 17 Ambient PM<sub>10</sub> Concentrations Measured in North Carolina**

**Wilmington Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
371290002 <sup>f</sup>	Castle Hayne	14.8	10 %	2008

**Jacksonville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
371330005 <sup>f, g</sup>	Jacksonville	37	25 %	2007

**Rocky Mount Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
370650099 <sup>f, j</sup>	Leggett	14	9.3 %	2007

**Goldsboro Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
371910005 <sup>f, h</sup>	Goldsboro	39	26 %	2007

**Not in an Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr 1 <sup>st</sup> max for 2007-2011		
		Value (micrograms per cubic meter, standard conditions)	Percent of NAAQS <sup>b</sup>	Year
370610002 <sup>f</sup>	Kenansville	30	20 %	2010
371730002 <sup>f, g</sup>	Bryson City	37	25%	2006

<sup>a</sup> The National Ambient Air Quality Standard for a 24-hour period is 150 micrograms per cubic meter. The standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 micrograms per cubic meter is equal to or less than one averaged over 3 years.

<sup>b</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>c</sup> Monitor uses a high-volume SA/GMW-1200 (AQS Method Code 063), U.S. EPA reference method designation RFPS-1087-063

<sup>d</sup> Monitor uses a low-volume Thermo R&P 2025 (AQS Method Code 127), U.S. EPA reference method designation RFPS-1298-127

<sup>e</sup> Monitor used a Ruprecht & Patshneck TEOM Series 1400 (AQS Method Code 079), U.S. EPA equivalent method designation EQPM-1090-079 until 3/31/2009 when it was replaced with a low-volume Thermo R&P 2025 (AQS Method Code 127), U.S. EPA reference method designation RFPS-1298-127

<sup>f</sup> Monitor uses a high-volume-Wedding-inlet (AQS Method Code 062), U.S. EPA reference method designation RFPS-1087-062

<sup>g</sup> Monitor was shut down on 12/31/2007

<sup>h</sup> Monitor used a Ruprecht & Patshneck TEOM Series 1400 (AQS Method Code 079), U.S. EPA equivalent method designation EQPM-1090-079

<sup>i</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>j</sup> Special Purpose Monitor - was shut down on 2/28/2007

**Table 18 Ambient Concentrations and Required Number of PM<sub>10</sub> Monitors for North Carolina Metropolitan Statistical Areas (MSA)**

MSA	Population Estimate (2011) <sup>a</sup>	2011 PM <sub>10</sub> 24-Hour Maximum Ambient Concentration As percent of NAAQS	Number of Monitors operated in North Carolina	
			Required <sup>b</sup>	Current
Charlotte-Gastonia-Rock Hill	1,795,472	30	2-4	3
Virginia Beach-Norfolk-New Port News	1,662,535	30	2-4	0
Raleigh-Cary	1,163,515	21	2-4	1 <sup>c</sup>
Greensboro-High Point	730,966	17	1-2	1
Durham-Chapel Hill	512,979	22	1-2	1
Winston-Salem	482,025	23	0-1	2
Asheville	429,017	20 <sup>e</sup>	0-1	0
Fayetteville	374,157	25	0-1	1
Wilmington	369,685	10 <sup>f</sup>	0-1	0
Hickory	364,567	19	0-1	1
Greenville	192,690	Not Available	0	0
Jacksonville	179,719	25 <sup>d</sup>	0	0
Burlington	153,291	Not Available	0	0
Rocky Mount	152,157	30 <sup>g</sup>	0	0
Goldsboro	123,697	21 <sup>d</sup>	0	0

<sup>a</sup> Source: U.S. Census Bureau, Population Division, Released April 2012, available on the world wide web at <http://www.census.gov/popest/data/counties/totals/2011/index.html>

<sup>b</sup> 40 CFR 58 Appendix D Table D-4

<sup>c</sup> The NC-DAQ received a waiver in 2008 for the second required PM<sub>10</sub> monitor

<sup>d</sup> PM<sub>10</sub> 24-hour maximum ambient concentration is from 2007

<sup>e</sup> PM<sub>10</sub> 24-hour maximum ambient concentration is from 2009

<sup>f</sup> Only 8 samples were collected from mid February to the end of March 2008.

<sup>g</sup> PM<sub>10</sub> 24-hour maximum ambient concentration is from 2006

**Table 19 North Carolina PM<sub>10</sub> Monitoring Network – Monitor Locations**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370710016	Grier Middle School	1622 East Garrison Blvd.	Gastonia	W 081 09' 20"	N 35 15' 16"	Charlotte-Gastonia-Rock Hill
371190003 <sup>a</sup>	#11 Fire Station	Fire Station #11, 620 Moretz Avenue	Charlotte	W 080 49' 29"	N 35 15' 06"	Charlotte-Gastonia-Rock Hill
371190041 <sup>a</sup>	Garinger	1130 Eastway Drive	Charlotte	W 080 46' 59"	N 35 14' 28"	Charlotte-Gastonia-Rock Hill
371190042 <sup>a, b</sup>	Montclair	1935 Emerywood Drive	Charlotte	W 080 52' 01"	N 35 09' 05"	Charlotte-Gastonia-Rock Hill

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Id Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371830014	Millbrook	3801 Spring Forest Road	Raleigh	W 078 34' 27"	N 35 51' 22"	Raleigh-Cary

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Id Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370810013	Mendenhall	205 Willoughby Blvd.	Greensboro	W 079 48' 04"	N 36 06' 33"	Greensboro-High Point

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370630015 <sup>d</sup>	Durham Armory	801 Stadium Drive	Durham	W 078 54' 14"	N 36 01' 58"	Durham-Chapel Hill

**Winston-Salem Metropolitan Statistical Area**

AQS Site Id Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370670022 <sup>e</sup>	Hattie Avenue	Corner of 13 <sup>th</sup> & Hattie Avenue	Winston-Salem	W 080 13' 36"	N 36 06' 38"	Winston-Salem
370670023 <sup>e</sup>	Peters Creek	1401 Silas Creek Parkway	Winston-Salem	W 080 15' 35"	N 36 03' 58"	Winston-Salem

**Hickory Metropolitan Statistical Area**

AQS Site Id Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370350004 <sup>f</sup>	Hickory Water Tower	Water Tank 15 First Avenue	Hickory	W 081 21' 58"	N 35 43' 45"	Hickory

**Fayetteville Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370510009	William Owens	4533 Raeford Road	Fayetteville	W 078 57' 19"	N 35 07' 49"	Fayetteville

**Not in a Metropolitan Statistical Area**

**Table 19 North Carolina PM<sub>10</sub> Monitoring Network – Monitor Locations**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370330001 <sup>c</sup>	Cherry Grove	7074 Cherry Grove Road	Reidsville	W 079 28' 5"	N 36 18' 25"	None
370610002 <sup>c</sup>	Kenansville	328 Limestone Road	Kenansville	W 077 57' 65"	N 34 57' 29"	None
371110004 <sup>c</sup>	East Marion	700 State Street	Marion	W 081 59' 38"	N35 41' 15"	None
371170001 <sup>c</sup>	Jamesville	33215 US Highway 64	Jamesville	W 076 54' 23"	N 35 48' 38"	None
371230001 <sup>c</sup>	Candor	112 Perry Drive	Candor	W 079 50' 11"	N 35 15' 47"	None

<sup>a</sup> Operated by Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>b</sup> This site has a collocated low volume PM<sub>10</sub> monitor.

<sup>c</sup> One of six background PM<sub>10</sub> monitors that operates for one year every three years.

<sup>d</sup> Monitor started in 2011 to meet minimum PM<sub>10</sub> monitoring requirements in the Durham-Chapel Hill MSA.

<sup>e</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>f</sup> This site has a collocated high volume PM<sub>10</sub> monitor.

**Table 20 Statement of Purpose for North Carolina PM<sub>10</sub> Monitoring Network**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370710016	Grier Middle School	SPECIAL PURPOSE	24-hour, midnight to midnight, 1 in 6 day <sup>c</sup>	Industrial expansion monitoring for PSD modeling.	Background	Neighborhood
371190003 <sup>a</sup>	#11 Fire Station	SLAMS	24-hour, midnight to midnight, 1 in 6 day	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Highest Concentration/Population Exposure	Neighborhood
371190041 <sup>a</sup>	Garinger	NCORE	24-hour, midnight to midnight, 1 in 3 day	Required by Appendix D for NCore sites in 2011. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Population Exposure	Neighborhood
371190042 <sup>a, b</sup>	Montclaire	SLAMS	24-hour, midnight to midnight, 1 in 3 day	Required by Appendix D. Collocated low volume PM10 site required by Appendix A. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Population Exposure	Neighborhood

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
371830014	Millbrook	NCORE	24-hour, midnight to midnight, 1 in 3 day	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Population Exposure	Neighborhood

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370810013	Mendenhall	SLAMS	24-hour, midnight to midnight, 1 in 6 day	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Population Exposure/General/Background	Neighborhood /Urban

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370630015 <sup>c</sup>	Durham Armory	SLAMS	24-hour, midnight to midnight, 1 in 3 day	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Population Exposure	Neighborhood

**Winston-Salem Metropolitan Statistical Area**

**Table 20 Statement of Purpose for North Carolina PM<sub>10</sub> Monitoring Network**

AQS Site Identification Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370670022 <sup>d</sup>	Hattie Avenue	SLAMS	Hourly	Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Population Exposure	Neighborhood
370670023 <sup>d</sup>	Peters Creek	SLAMS	Hourly	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Highest Concentration	Microscale

**Hickory Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370350004 <sup>e</sup>	Hickory Water Tower	SLAMS	24-hour, midnight to midnight, 1 in 6 day	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	General/Background	Neighborhood

**Fayetteville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370510009	William Owens	SLAMS	24-hour, midnight to midnight, 1 in 6 day	Required by Appendix D. Compliance w/NAAQS. Industrial expansion monitoring for PSD modeling.	Population Exposure	Urban

**Not in a Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370330001	Cherry Grove	Special Purpose	24-hour, midnight to midnight, 1 in 6 day	Industrial expansion monitoring for PSD modeling for northern piedmont areas	General/Background	Urban
370610002 <sup>f</sup>	Kenansville	Special Purpose	24-hour, midnight to midnight, 1 in 6 day	Industrial expansion monitoring for PSD modeling for coastal areas	General/Background	Neighborhood
371110004	East Marion	Special Purpose	24-hour, midnight to midnight, 1 in 6 day	Industrial expansion monitoring for PSD modeling for foothill areas	General/Background	Neighborhood
371170001	Jamesville	Special Purpose	24-hour, midnight to midnight, 1 in 6 day	Industrial expansion monitoring for PSD modeling for northern coastal areas	General/Background	Urban
371230001	Candor	Special Purpose	24-hour, midnight to midnight, 1 in 6 day	Industrial expansion monitoring for PSD modeling for sand hill areas	General/Background	Regional

**Table 20 Statement of Purpose for North Carolina PM<sub>10</sub> Monitoring Network**

<sup>a</sup> Operated by Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>b</sup> This site has a collocated low volume PM<sub>10</sub> monitor.

<sup>c</sup> Monitor started January 1, 2011.

<sup>d</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>e</sup> This site has a collocated high volume PM<sub>10</sub> monitor

**Table 21 Status of North Carolina PM<sub>10</sub> Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Meets Requirements of Part 58 Appendices <sup>b</sup>			Proposal to Move or Change
		A	C	D	
370710016	Grier Middle School	Yes	Yes: RFPS-1087-062	No	Will start in 2013 and operate every third year
371190003 <sup>c</sup>	#11 Fire Station	Yes	Yes: RFPS-1287-063	Yes	None
371190041 <sup>c</sup>	Garinger	Yes	Yes: RFPS-1298-127	Yes	None
371190042 <sup>c</sup>	Montclair	Yes	Yes: RFPS-1298-127	Yes	None

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Meets Requirements of Part 58 Appendices <sup>d</sup>			Proposal to Move or Change
		A	C	D	
371830014	Millbrook	No	Yes: RFPS-1298-127	Yes	None

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Meets Requirements of Part 58 Appendices <sup>e</sup>			Proposal to Move or Change
		A	C	D	
370810013	Mendenhall	Yes	Yes: RFPS-1087-062	Yes	None

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Meets Requirements of Part 58 Appendices <sup>d</sup>			Proposal to Move or Change
		A	C	D	
370630015	Durham Armory	No	Yes: RFPS-1298-127	Yes	None

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Meets Requirements of Part 58 Appendices <sup>f</sup>			Proposal to Move or Change
		A	C	D	
370670022 <sup>g</sup>	Hattie Avenue	Yes	Yes: EQPM-1090-079	Yes	None
370670023 <sup>g</sup>	Peters Creek	Yes	Yes: EQPM-1090-079	Yes	None

**Hickory Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Meets Requirements of Part 58 Appendices <sup>e</sup>			Proposal to Move or Change
		A	C	D	
370350004	Hickory Water Tower	Yes	Yes: RFPS-1087-062	Yes	May relocate collocated monitor to William Owen in Fayetteville

**Fayetteville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Meets Requirements of Part 58 Appendices <sup>e</sup>			Proposal to Move or Change
		A	C	D	

**Table 21 Status of North Carolina PM<sub>10</sub> Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network<sup>a</sup>**

370510009	William Owens	Yes	Yes: RFPS-1087-062	Yes	May add collocated monitor from Hickory
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**Not in a Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Meets Requirements of Part 58 Appendices <sup>e</sup>			Proposal to Move or Change
		A	C	D	
370330001	Cherry Grove	Yes	Yes: RFPS-1087-062	Not Required	Monitor will start on 1/1/2013 and operate every third year
370610002	Kenansville	Yes	Yes: RFPS-1087-062	Not Required	Monitor operated in 2010 and will operate again in 2013
371110004	East Marion	Yes	Yes: RFPS-1087-062	Not Required	Monitor operated in 2011 and will operate again in 2014
371170001	Jamesville	Yes	Yes: RFPS-1087-062	Not Required	Monitor started on 1/1/2012 and will operate every third year
371230001	Candor	Yes	Yes: RFPS-1087-062	Not Required	Monitor operated in 2011 and will operate again in 2014

<sup>a</sup> All monitors provide data that are suitable for comparing to the NAAQS.

<sup>b</sup> All monitors meet the requirements of Appendix E of 40CFR58.

<sup>c</sup> Operated by Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>d</sup> The Quality Assurance Project Plan and Standard Operating Procedures are being written for the low volume PM<sub>10</sub> monitor operated by the NC-DAQ. The monitor meets the requirements of Appendix E of 40CFR58.

<sup>e</sup> The Quality Assurance Project Plan and Standard Operating Procedures are being revised to reflect changes made to the monitoring regulations in 2006. All monitors meet the requirements of Appendix E of 40 CFR 58.

<sup>f</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

## VII. Fine Particle (PM<sub>2.5</sub>) Monitoring Network

The North Carolina Division of Air Quality (NC-DAQ) currently operates one of the largest fine particle monitoring networks in the Southeast. This strong network has greatly benefited the state by enabling the NC-DAQ to learn 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 National Ambient Air Quality Standards (NAAQS).

Table 22 provides the highest fine particle design values for the monitors in North Carolina for the past five years. This information is important because the monitoring regulations promulgated by the U.S. EPA in 2006 require a monitor to be attaining the NAAQS for the past five years before the monitor can be shut down. A total of 28 of the currently operating monitors, listed in Table 23, meet this requirement. However, as indicated in Table 23, 40CFR58 Appendix D requires 10 of these 28 monitors. All 28 of these monitors, as indicated in Table 23, meet the additional requirement of having less than 10 % probability of exceeding 80 % of the NAAQS during the next three years. Thus, there are 18 monitors that are not required by Appendix D that meet all of the requirements of 40CFR58 to be shut down. The NC-DAQ has not pursued shutting down any of these monitors because of expected changes to the particle standards and monitoring requirements that are scheduled to occur later this year.

The locations of the current fine particle-monitoring sites are provided in Table 25. All monitors listed in Table 25 except for the Kenansville and the Candor monitors are suitable for comparison to the National Ambient Air Quality Standards (NAAQS). The Kenansville and Candor monitors are rural general/ background sites rather than population oriented monitoring sites. All of the monitors meet the requirements of Appendices A, C, D, and E of 40CFR58. All of these monitors except the monitor at Bryson and Millbrook use the U.S. EPA reference method designation RFPS-0498-118. The monitors at Bryson and Millbrook use the U.S. EPA Automated Equivalent Method: EQPM-0308-170. Figure 39 shows the locations of the currently operating monitors.

Table 26 provides the monitor type, operating schedules, monitoring objectives, scales, and statement of purpose for all of the current and proposed monitors in the North Carolina Fine Particle Monitoring Network. All monitors except the Millbrook and Bryson monitor operate on a 24-hour schedule from midnight to midnight on each scheduled sampling day. The Millbrook and Bryson monitors collect data each hour. All of the monitors operate year-round. Table 27 summarizes the status for each current and proposed monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in 40 CFR58 Appendices A, C, D, and E and also provides the proposed changes to the network.

Table 28 lists the sites in the North Carolina Fine Particle monitoring network with continuous monitors, their sampling schedules, monitoring objectives, scale of representation, statement of purpose and whether 40CFR58 Appendix D requires them.

**Table 22 Fine Particle Concentrations Measured by the North Carolina Fine Particle Monitoring Network in the Last Five Years (2007-2011) <sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
370710016	Grier Middle School	31	89 %	2005-2007	14.1	94 %	2005-2007
371190010 <sup>b, c</sup>	Fire Station 10	34	97 %	2005-2007	15.8	105 %	2005-2007
371190041 <sup>b</sup>	Garinger	33	95 %	2006-2008	14.8	98 %	2004-2006
371190042 <sup>b</sup>	Montclair	31	89 %	2005-2007	14.8	98 %	2005-2007
371190043 <sup>b</sup>	Oakdale	31	89 %	2006-2008	13.5	90 %	2006-2008

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
37101000	West Johnston	17	49 %	2007-2009	8.8	59 %	2007-2009
371830014	Millbrook	32	91 %	2005-2007	13.5	90 %	2005-2007
371830020	Finley Farm	22.4	64 %	2006-2008	11.4	76 %	2006-2008

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value for			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
370810013	Mendenhall	30	86 %	2005-2007	13.9	93 %	2005-2007
370810014	Colfax	24.1	69 %	2006-2008	12.3	83 %	2006-2008

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
370370004	Pittsboro	27	77 %	2005-2007	12.0	80%	2005-2007
370630001	Durham Health	30	86 %	2005-2007	13.4	89 %	2005-2007
370630015	Durham Armory	25	71 %	2005-2007	12.1	81 %	2005-2007
371350007	HR	29	83 %	2005-2007	12.9	86 %	2005-2007

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
370670022 <sup>e</sup>	Hattie Ave.	32	91 %	2005-2007	14.1	94 %	2005-2007
370670024 <sup>e, f</sup>	North Forsyth	21	60 %	2005-2007	11.6	77 %	2005-2007
370670030 <sup>e</sup>	Clemmons School	32	91 %	2005-2007	14.1	94 %	2005-2007

**Asheville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
370210034 <sup>g</sup>	Board of Ed	30	86 %	2005-2007	12.6	84 %	2005-2007
370870010	Waynesville Fire Station	28	81 %	2005-2007	13.7	91 %	2005-2007
370870012	Waynesville Recreation	25	71 %	2005-2007	11.7	78 %	2005-2007

**Table 22 Fine Particle Concentrations Measured by the North Carolina Fine Particle Monitoring Network in the Last Five Years (2007-2011) <sup>a</sup>**

**Hickory Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
370350004	Hickory Water Tower	34	97 %	2005-2007	15.2	101 %	2005-2007

**Fayetteville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
370510009	William Owen	31	89 %	2005-2007	13.6	91 %	2005-2007

**Wilmington Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
371290002	Castle Hayne	27	77 %	2009-2011	9.7	65 %	2005-2007

**Greenville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
371470005	Greenville South	25	71 %	2005-2007	11.3	75 %	2005-2007
371470006	Pitt Co Ag Center	26	74 %	2007-2009	11.7	78 %	2006-2008

**Jacksonville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
371330005	Northwoods	25	71 %	2005-2007	10.5	70 %	2005-2007

**Rocky Mount Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
370650004	Springfield Rd	27	77 %	2005-2007	12.4	83 %	2005-2007

**Burlington Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
370010002	Hopedale	32	91 %	2005-2007	13.8	92 %	2005-2007

**Goldsboro Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
371910005	Dillard	30	86 %	2005-2007	12.6	84 %	2005-2007

**Table 22 Fine Particle Concentrations Measured by the North Carolina Fine Particle Monitoring Network in the Last Five Years (2007-2011) <sup>a</sup>**

**Not in an Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Highest 24-hr design value			Highest annual design value		
		Value ( $\mu/m^3$ )	% of NAAQS	Year	Value ( $\mu/m^3$ )	% of NAAQS	Year
370330001	Cherry Grove	30	86 %	2005-2007	13.1	87 %	2005-2007
370570002	Lexington Water Tower	31	89 %	2005-2007	15.1	101 %	2005-2007
370610002	Kenansville	38	80 %	2005-2007	10.9	73 %	2005-2007
371070004	Lenoir Community College	25	71 %	2005-2007	10.9	73 %	2005-2007
371110004	East Marion	32	91 %	2005-2007	14.3	95 %	2005-2007
371170001	Jamesville	23	66 %	2006-2008	10.6	71 %	2005-2007
371210001	Spruce Pine	32	91 %	2005-2007	13.0	87 %	2005-2007
371230001	Candor	29	83 %	2005-2007	12.3	82 %	2005-2007
371550005	Linkhaw	30	86 %	2005-2007	12.8	85 %	2005-2007
371590021	Rockwell	30	86 %	2005-2007	14.0	93 %	2005-2007
371730002	Bryson City	28	81 %	2005-2007	12.8	85 %	2005-2007
371890003	Boone	30	86 %	2005-2007	12.0	80 %	2005-2007

<sup>a</sup> All monitors use an R & P Model 2025 PM2.5 Sequential Monitor with a WINS impactor (Air Quality System (AQS) Method Code 118). All monitors listed in this table except the Kenansville and Candor monitors are suitable for comparison to the National Ambient Air Quality Standards. All monitors in this table meet the requirements of Appendices A, C, D, and E of 40CFR58. All monitors use the U.S. EPA reference method designation RFPS-0498-118.

<sup>b</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>c</sup> This monitor shut down on December 31, 2005.

<sup>d</sup> This monitor was shut down in 2003.

<sup>e</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403).

<sup>f</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

**Table 23 Fine Particle Monitors that Have Demonstrated Attainment of the National Ambient Air Quality Standards for the Past Five Years**

<b>Site Code</b>	<b>Site Name</b>	<b>County</b>	<b>Required by 40CFR58 Appendix D?</b>	<b>Less than 10% probability of exceeding 80% of NAAQS in next 3 years?</b>
37-001-0002	Hopedale/ Burlington	Alamance	No	Yes
37-021-0034 <sup>b</sup>	Board of Ed	Buncombe	No –	Yes
37-033-0001	Cherry Grove	Caswell	Yes - Required regional transport monitor for the piedmont and central area of the state	Yes
37-037-0004	Pittsboro	Chatham	No	Yes
37-051-0009	William Owen/ Fayetteville	Cumberland	No	Yes
37-061-0002	Kenansville	Duplin	Yes - general/ background monitor for the coastal part of the state	Yes
37-063-0015	Durham Armory	Durham	Yes – for the Durham-Chapel Hill MSA	Yes
37-065-0004	Springfield Road/ Rocky Mount	Edgecombe	No	Yes
37-071-0016	Grier Middle School/ Gastonia	Gaston	No	Yes
37-081-0013	Mendenhall/ Greensboro	Guilford	Yes - for the Greensboro MSA	Yes
370810014	Colfax	Guilford	Not at this time	Yes
370870012	Waynesville Recreation	Haywood	No – design value monitor for the Asheville MSA	Yes
371010002	West Johnston	Johnston	Yes – 1 of 2 required monitors for the Raleigh Cary MSA	Yes
37-107-0004	Lenoir Community College	Lenoir	No	Yes
371110004	East Marion	McDowell	No	Yes
37-117-0001	Jamesville	Martin	Yes - regional transport monitor for the coastal part of the state, providing information on the fine particle concentrations entering the state from Virginia and leaving the state toward Virginia	Yes
37-121-0001	Spruce Pine	Mitchell	No	Yes
37-123-0001	Candor	Montgomery	Yes - general/ background monitor for the central piedmont area of the state	Yes
37-129-0002	Castle Hayne	New Hanover	No	Yes
37-147-0006	Pitt Co Ag Center	Pitt	No	Yes
37-155-0005	Linkhaw/ Lumberton	Robeson	No	Yes
37-159-0021	Rockwell	Rowan	No	Yes

**Table 23 Fine Particle Monitors that Have Demonstrated Attainment of the National Ambient Air Quality Standards for the Past Five Years**

<b>Site Code</b>	<b>Site Name</b>	<b>County</b>	<b>Required by 40CFR58 Appendix D?</b>	<b>Less than 10% probability of exceeding 80% of NAAQS in next 3 years?</b>
37-173-0002	Bryson City	Swain	Yes- regional transport monitor for the western mountain area of the state, providing information on the fine particle concentrations entering the state from the Tennessee/ Georgia area and leaving the state toward Tennessee/ Georgia	Yes
37-183-0014	Millbrook/ Raleigh	Wake	Yes - 1 of 2 required monitors for the Raleigh-Cary MSA <sup>a</sup>	Yes
37-183-0020	Finley Farm	Wake	Not at this time	Yes
37-189-0003	Boone	Watauga	Yes	Yes
37-191-0005	Dillard/ Goldsboro	Wayne	No	Yes

**Table 24 Design Values and Required Fine Particle Monitors for North Carolina Metropolitan Statistical Areas (MSA)**

MSA	Population Estimate (2011) <sup>a</sup>	2011 Fine Particle Design Value (As percent of NAAQS)		Number of Monitors operated in North Carolina	
		24-Hour	Annual	Required	Current
Charlotte-Gastonia-Rock Hill, NC	1,795,472	69	75	2	4
Virginia Beach-Norfolk-New Port News, VA	1,662,535	80 <sup>b</sup>	74 <sup>b</sup>	2	0 <sup>c</sup>
Raleigh-Cary, NC	1,163,515	63	66	2	3
Greensboro-High Point	730,966	60	65	1	2
Durham- Chapel Hill	512,979	57	65	1	2
Winston-Salem	482,025	60	67	0	2
Asheville	429,017	63	67	0	2
Wilmington	374,157	77	55	0	0
Fayetteville	369,685	63	68	0	1
Hickory	364,567	63	71	0	1
Greenville	192,690	60	58	0	1
Jacksonville	179,719	71 <sup>e</sup>	70 <sup>c</sup>	0	0
Burlington	153,291	57	67	0	1
Rocky Mount	152,157	57	61	0	1
Goldsboro	123,697	60	66	0	1

<sup>a</sup> Source: U.S. Census Bureau, Population Division, Released April 2012, available on the world wide web at <http://www.census.gov/popest/data/counties/totals/2011/index.html>

<sup>b</sup> Design value for 2008-2010.

<sup>c</sup> Virginia Department of Environmental Quality (VDEQ), Office of Air Quality Monitoring operates three monitors in this MSA.

**Table 25 North Carolina Fine Particle Monitoring Network – Monitor Locations <sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370710016	Grier Middle School	1622 East Garrison Blvd.	Gastonia	W 081 09' 20"	N 35 15' 16"	Charlotte-Gastonia-Rock Hill
371190041 <sup>b</sup>	Garinger	1130 Eastway Drive	Charlotte	W 080 46' 59"	N 35 14' 28"	Charlotte-Gastonia-Rock Hill
371190042 <sup>b</sup>	Montclair	1935 Emerywood Drive	Charlotte	W 080 52' 01"	N 35 09' 05"	Charlotte-Gastonia-Rock Hill
371190043 <sup>b</sup>	Oakdale	513 Radio Road	Charlotte	W 080 53' 15"	N 35 18' 15"	Charlotte-Gastonia-Rock Hill

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371010002	West Johnston	3411 Jack Road <sup>c</sup>	Clayton	W 078 26' 15"	N 35 30' 0"	Raleigh-Cary
371830014	Millbrook	3801 Spring Forest Road	Raleigh	W 078 34' 27"	N 35 51' 22"	Raleigh-Cary
371830020 <sup>c</sup>	Finley Farm	Lake Wheeler Road Field Lab	Raleigh	W 078 40' 47"	N 35 43' 41"	Raleigh-Cary

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370810013	Mendenhall	205 Wiloughby Blvd.	Greensboro	W 079 48' 04"	N 36 06' 33"	Greensboro
370810014 <sup>c</sup>	Colfax	2171 Sandy Ridge Road	High Point	W 080 01' 00"	N 36 00' 00"	Greensboro

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370370004	Pittsboro	325 Russett Run Road	Pittsboro	W 079 09' 55"	N 35 45' 32"	Durham-Chapel Hill
370630015 <sup>d</sup>	Durham Armory	801 Stadium Drive	Durham	W 078 54' 14"	N 36 01' 58"	Durham-Chapel Hill

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370670022 <sup>e</sup>	Hattie Ave.	Corner of 13 <sup>th</sup> & Hattie Avenue	Winston-Salem	W 080 13' 36"	N 36 06' 38"	Winston-Salem
370670030 <sup>e</sup>	Clemmons	Fraternity Church Road	Clemmons	W 080 20' 31"	N 36 01' 34"	Winston-Salem

**Table 25 North Carolina Fine Particle Monitoring Network – Monitor Locations <sup>a</sup>**

**Asheville Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370210034 <sup>f</sup>	Board of Ed	175 Bingham Road	Asheville	W 082 37' 7"	N 35 36' 27"	Asheville
370870012 <sup>g</sup>	Waynesville Recreation Center	550 Vance Street	Waynesville	W 082 58' 45"	N 35 30' 21"	Asheville

**Hickory Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370350004	Hickory Water Tower	Water Tank 15 First Avenue	Hickory	W 081 21' 58"	N 35 43' 45"	Hickory

**Fayetteville Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370510009	William Owen	4533 Raeford Road	Fayetteville	W 078 57' 19"	N 35 07' 49"	Fayetteville

**Wilmington Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371290002	Castle Hayne	6028 Holly Shelter Road	Castle Hayne	W 077 50' 36"	N 34 21' 87"	Wilmington

**Greenville Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371470006 <sup>h</sup>	Pitt County	403 Government Cir	Greenville	W 077 21' 00"	N 35 38' 00"	Greenville

**Rocky Mount Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370650004	Springfield Rd	900 Springfield Road	Rocky Mount	W 077 45' 0"	N 35 56' 00"	Rocky Mount

**Burlington Metropolitan Statistical Area**

370010002	Hopedale	827 South Graham-Hopedale Road	Burlington	W 079 24' 30"	N 36 05' 20"	Burlington
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**Goldsboro Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371910005	Dillard	1101 South Devereau Street	Goldsboro	W 077 59' 63"	N 35 22' 16"	Goldsboro

**Table 25 North Carolina Fine Particle Monitoring Network – Monitor Locations <sup>a</sup>**

**Not in an Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370330001	Cherry Grove	7074 Cherry Grove Road	Reidsville	W 079 28' 5"	N 36 18' 25"	None
370570002	Lexington Water Tower	938 South Salisbury Street	Lexington	W 080 15' 77"	N 35 48' 87"	None
370610002	Kenansville	328 Limestone Road	Kenansville	W 077 57' 65"	N 34 57' 29"	None
371070004	Lenoir Community College	231 Highway 58 S	Kinston	W 077 34' 11"	N 35 13' 58"	None
371110004	East Marion	700 State Street	Marion	W 081 59' 38"	N35 41' 15"	None
371170001	Jamesville	33215 US Highway 64	Jamesville	W 076 54' 23"	N 35 48' 38"	None
371210001	Spruce Pine	138 Highland Avenue	Spruce Pine	W 082 04' 24"	N 35 54' 55"	None
371230001	Candor	112 Perry Drive	Candor	W 079 50' 11"	N 35 15' 47"	None
371550005	Linkhaw	1170 Linkhaw Road	Lumberton	W 078 59' 25"	N 34 38' 33"	None
371590021	Rockwell	301 West Street	Rockwell	W 080 23' 72"	N 35 33' 11"	None
371730002	Bryson City	Parks & Rec Bldg, Center Street	Bryson City	W083 26' 38"	N35 26' 06"	None
371890003	Boone	361 Jefferson Road	Boone	W 081 39' 47"	N 36 13' 19"	None

<sup>a</sup> All monitors use an R & P Model 2025 PM2.5 Sequential Monitor with a WINS impactor (Air Quality System (AQS) Method Code 118) except the Bryson and Millbrook monitors which use a Met One BAM-1020 Monitor (Air Quality System (AQS) Method Code 170). All monitors listed in this table except the Kenansville and Candor monitors are suitable for comparison to the National Ambient Air Quality Standards. All monitors in this table meet the requirements of Appendices A, C, D, and E of 40CFR58. All monitors except the Bryson and Millbrook monitors use the U.S. EPA reference method designation RFPS-0498-118. Millbrook and Bryson monitors use the U.S. EPA Automated Equivalent Method: EQPM-0308-170.

<sup>b</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>c</sup> This monitor started on January 1, 2008, to meet minimum monitoring requirements in 40CFR58 Appendix D.

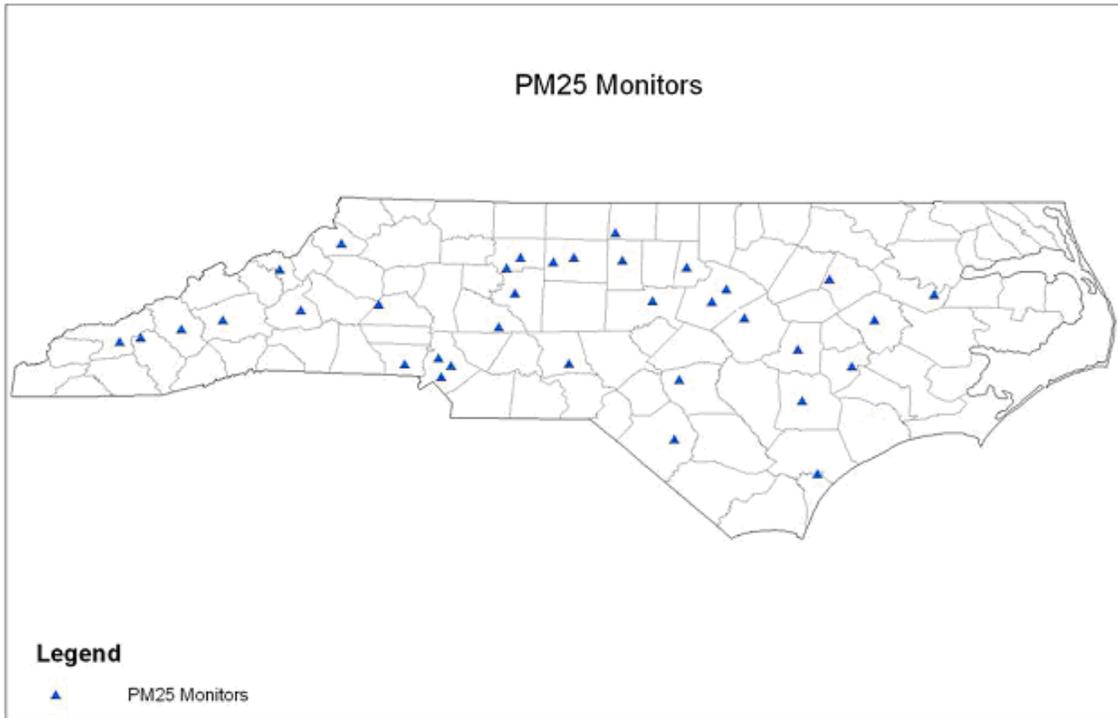
<sup>d</sup> This monitor started on January 1, 2008, to replace the Durham Health monitor.

<sup>e</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403).

<sup>f</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

<sup>g</sup> This monitor started on January 1, 2008, to replace the Waynesville Fire Station monitor.

<sup>h</sup> This monitor started on January 1, 2008, to replace the South Greenville monitor. This site is a collocated fine particle and ozone monitoring site.



**Figure 39. Locations of 2011 Fine Particle Monitoring Stations**

**Table 26 Statement of Purpose for North Carolina Fine Particle Monitoring Network<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370710016	Grier Middle School	SLAMS	1-in-6 day <sup>c</sup>	AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood
371190041 <sup>d</sup>	Garinger	NCORE	1-in-1 day <sup>e</sup>	1 of 2 Required Monitors in Charlotte-Gastonia-Rock Hill MSA. AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood
371190042 <sup>d</sup>	Montclaire	SLAMS	1-in-3 day <sup>f</sup>	AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood
371190043 <sup>d</sup>	Oakdale	SLAMS	1-in-1 day	1 of 2 Required Monitors in Charlotte-Gastonia-Rock Hill MSA. AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
371010002	West Johnston <sup>c</sup>	SLAMS	1-in-3 day	AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood
371830014	Millbrook	NCORE	Hourly; collocated 1-in-3 day <sup>g</sup>	1 of 2 Required Monitors in Raleigh-Cary MSA. AQI Reporting. Compliance w/NAAQS. Air Quality Forecasting	Population Exposure	Neighbor-hood
371830020 <sup>h</sup>	Finley Farm	SLAMS	1-in-3 day	1 of 2 required Monitors in Raleigh-Cary MSA. AQI Reporting; Compliance w/NAAQS.	Population Exposure	Neighbor-hood

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370810013	Mendenhall	SLAMS	1-in-6 day <sup>c</sup>	Required Monitor in Greensboro-High Point MSA. AQI Reporting. Compliance w/NAAQS.	Population Exposure/ General/ Background	Neighbor-hood
370810014 <sup>h</sup>	Colfax	SLAMS	1-in-3 day	AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370370004	Pittsboro	SLAMS	1-in-3 day	AQI Reporting. Compliance w/NAAQS	Population Exposure	Regional
370630015 <sup>i</sup>	Durham Armory	SLAMS	1-in-3 day <sup>c</sup>	Design Value monitor for the Durham-Chapel Hill MSA. AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood

**Winston-Salem Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370670022 <sup>j</sup>	Hattie Ave.	SLAMS	1-in-1 day <sup>l</sup>	Design Value monitor for the Winston-Salem MSA. AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood
370670030 <sup>j</sup>	Clemmons	SLAMS	1-in-3 day <sup>f</sup>	AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood

**Table 26 Statement of Purpose for North Carolina Fine Particle Monitoring Network<sup>a</sup>**

**Asheville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370210034 <sup>m</sup>	Board of Ed	SLAMS	1-in-3 day <sup>n</sup>	AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood
370870012 <sup>o</sup>	Waynesville Recreation Center	SLAMS	1-in-3 day	Design Value monitor for the Asheville MSA. AQI Reporting. Compliance with NAAQS.	Population Exposure	Neighbor-hood

**Hickory Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370350004	Hickory Water Tower	SLAMS	1-in-3 day <sup>n</sup>	Required monitor for the Hickory MSA. AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood

**Fayetteville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370510009	William Owen	SLAMS	1-in-6 day <sup>c</sup>	AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood

**Wilmington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
371290002	Castle Hayne	SPECIAL PURPOSE	1-in-3 day <sup>c</sup>	To evaluate performance of the BAM in the coastal Carolina area	Population Exposure	Neighbor-hood

**Greenville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
371470006 <sup>p</sup>	Agricultural Extension	SLAMS	1-in-3 day	Compliance with NAAQS.	Population Exposure	Neighbor-hood

**Rocky Mount Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370650004	Springfield Rd	SLAMS	1-in-3 day	Compliance with the NAAQS.	Population Exposure/ General/ Background	Neighbor-hood

**Burlington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370010002	Hopedale	SLAMS	1-in-6 day <sup>c</sup>	Compliance w/NAAQS.	Population Exposure	Neighbor-hood

**Goldsboro Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
371910005	Dillard	SLAMS	1-in-6 day <sup>c</sup>	Compliance w/NAAQS.	Population Exposure	Urban

**Table 26 Statement of Purpose for North Carolina Fine Particle Monitoring Network<sup>a</sup>**

**Not in an Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
370330001	Cherry Grove	SLAMS	1-in-6 day <sup>c</sup>	Required regional transport monitor for the piedmont and central area of the state. Compliance w/NAAQS.	Population Exposure/ Regional Transport/ General/ Background	Urban
370570002	Lexington	SLAMS	1-in-3 day <sup>l</sup>	Required monitor for Nonattainment area. Compliance w/NAAQS	Population Exposure	Neighborhood
370610002	Kenansville	SLAMS	1-in-3 day	Required General/ Background monitor for the coastal area	Welfare Related Impacts/ General/ Background	Regional
371070004	Lenoir Community College	SLAMS	1-in-3 day	Compliance with NAAQS.	Population Exposure	Neighborhood
371110004	East Marion	SLAMS	1-in-3 day <sup>f</sup>	Compliance with NAAQS.	Population Exposure	Neighborhood
371170001	Jamesville	SLAMS	1-in-3 day <sup>c</sup>	Required regional transport monitor for coastal region, providing information on fine particle concentrations entering & leaving state. Compliance w/NAAQS.	Regional Transport/ General/ Background/ Population Exposure	Urban
371210001	Spruce Pine	SLAMS	1-in-3 day	Compliance with NAAQS.	Population Exposure	Neighborhood
371230001	Candor	SLAMS	1-in-3 day	Required General/ Background monitor for piedmont/central region	Welfare Related Impacts/General/ Background	Regional
371550005	Linkhaw	SLAMS	1-in-3 day	Compliance with NAAQS.	Population Exposure	Neighborhood
371590021	Rockwell	SLAMS	1-in-3 day <sup>n</sup>	Compliance with NAAQS.	Population Exposure	Neighborhood
371730002	Bryson City	SLAMS	Hourly	Required Transport Monitor for Western Mountain Area. Compliance w/NAAQS. Air Quality Forecasting.	Regional Transport/ Population Exposure	Neighborhood
371890003	Boone	SLAMS	1-in-3 day	Required general/background monitor for western mountain area. Compliance w/NAAQS.	General/Background/ Population Exposure	Neighborhood

<sup>a</sup> All monitors use an R & P Model 2025 PM2.5 Sequential Monitor with a WINS impactor (Air Quality System (AQS) Method Code 118) except the Bryson and Millbrook monitors which use a Met One BAM-1020 Monitor (Air Quality System (AQS) Method Code 170). All monitors listed in this table except the Kenansville and Candor monitors are suitable for comparison to the National Ambient Air Quality Standards. All monitors in this table meet the requirements of Appendices A, C, D, and E of 40CFR58. All monitors except the Bryson and Millbrook monitors use the U.S. EPA reference method designation RFPS-0498-118. Millbrook and Bryson monitors use the U.S. EPA Automated Equivalent Method: EQPM-0308-170.

<sup>b</sup> All monitors operate on a 24-hour schedule, collecting a sample from midnight to midnight, Eastern Standard Time except the Bryson and Millbrook monitors, which operate hourly.

<sup>c</sup> Collocated with a continuous fine particle monitor.

<sup>d</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>e</sup> Collocated with an every 3<sup>rd</sup> day speciation monitor and a continuous fine particle monitor.

<sup>f</sup> Collocated with an every 6<sup>th</sup> day precision monitor and a continuous fine particle monitor.

<sup>g</sup> Collocated with a 1-in-3 day manual monitor and 1-in-3 day speciation monitor.

<sup>h</sup> This monitor started on January 1, 2008, to meet minimum monitoring requirements in 40CFR58 Appendix D.

<sup>i</sup> This monitor started on January 1, 2008, to replace the Durham Health monitor.

<sup>j</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403).

**Table 26 Statement of Purpose for North Carolina Fine Particle Monitoring Network<sup>a</sup>**

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<sup>l</sup> Collocated with an every 6<sup>th</sup> day speciation monitor and a continuous fine particle monitor.

<sup>m</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

<sup>n</sup> Collocated with an every 6<sup>th</sup> day precision monitor, an every 6<sup>th</sup> day speciation monitor, and a continuous fine particle monitor.

<sup>o</sup> This monitor started on January 1, 2008, to replace the Waynesville Fire Station monitor.

<sup>p</sup> This monitor started on January 1, 2008, to replace the South Greenville monitor. This site is a collocated fine particle and ozone-monitoring site.

**Table 27 Status of North Carolina Fine Particle Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network <sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>b</sup> D	Proposal to Move or Change
370710016	Grier Middle School	Yes	No – not a required monitor.	None
371190041 <sup>c</sup>	Garinger	Yes	Yes- 1 of 2 Required Monitors for the Charlotte-Gastonia-Rock Hill MSA.	None
371190042 <sup>c</sup>	Montclair	Yes	Yes- 1 of 2 Required Monitors for the Charlotte-Gastonia-Rock Hill MSA.	None
371190043 <sup>c</sup>	Oakdale	Yes	No – not a required monitor.	None

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>b</sup> D	Proposal to Move or Change
371010002	West Johnston	Yes	No – not a required monitor.	May shut down the FRM 12/31/12.
371830014	Millbrook	Yes	Yes - 1 of 2 Required Monitors for the Raleigh-Cary MSA.	None
371830020 <sup>d</sup>	Finley Farm	Yes	Yes - 1 of 2 Required Monitors for the Raleigh-Cary MSA.	None

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>b</sup> D	Proposal to Move or Change
370810013	Mendenhall	Yes	Yes - Required Monitor for the Greensboro-High Point MSA.	None
370810014 <sup>d</sup>	Colfax	Yes	No – not a required monitor.	None

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>b</sup> D	Proposal to Move or Change
370370004	Pittsboro	Yes	No – not a required monitor.	May shut down the FRM 12/31/12.
370630015 <sup>e</sup>	Durham Armory	Yes	No – not a required monitor.	None

**Winston-Salem Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>b</sup> D	Proposal to Move or Change
370670022 <sup>f</sup>	Hattie Ave.	Yes	Yes- Design Value monitor for the Winston-Salem MSA.	None
370670030 <sup>f</sup>	Clemmons	Yes	No – not a required monitor.	None

**Asheville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>b</sup> D	Proposal to Move or Change
370210034 <sup>g</sup>	Board of Ed	Yes	No – not a required monitor.	None
370870012 <sup>h</sup>	Waynesville Recreation Center	Yes	No – not a required monitor.	None

**Table 27 Status of North Carolina Fine Particle Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network <sup>a</sup>**

**Hickory Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of <u>Part 58 Appendices</u> <sup>b</sup> D	Proposal to Move or Change
370350004	Hickory Water Tower	Yes	Yes - Required monitor for the Hickory MSA.	None

**Fayetteville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of <u>Part 58 Appendices</u> <sup>b</sup> D	Proposal to Move or Change
370510009	William Owen	Yes	No – not a required monitor.	None

**Wilmington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of <u>Part 58 Appendices</u> <sup>b</sup> D	Proposal to Move or Change
371290002	Castle Hayne	Yes	No – not a required monitor.	Sampling frequency will change to 1-in-6 day on January 1, 2013

**Greenville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of <u>Part 58 Appendices</u> <sup>b</sup> D	Proposal to Move or Change
371470006 <sup>i</sup>	Pitt County Agricultural Center	Yes	No – not a required monitor.	None

**Rocky Mount Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of <u>Part 58 Appendices</u> <sup>b</sup> D	Proposal to Move or Change
370650004	Springfield Rd	Yes	No – not a required monitor.	None

**Burlington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of <u>Part 58 Appendices</u> <sup>b</sup> D	Proposal to Move or Change
370010002	Hopedale	Yes	No – not a required monitor.	None

**Goldsboro Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of <u>Part 58 Appendices</u> <sup>b</sup> D	Proposal to Move or Change
371910005	Dillard	Yes	No – not a required monitor.	None

**Table 27 Status of North Carolina Fine Particle Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network <sup>a</sup>**

<b>Not in an Metropolitan Statistical Area</b>				
<b>AQS Site Id Number</b>	<b>Site Name</b>	<b>Suitable for Comparison to NAAQS</b>	<b>Meets Requirements of Part 58 Appendices <sup>b</sup> D</b>	<b>Proposal to Move or Change</b>
370330001	Cherry Grove	Yes	Yes - Required regional transport monitor for the piedmont and central area of the state.	Manual PM <sub>2.5</sub> FRM monitor may be discontinued and replaced with a BAM
370570002	Lexington Water Tower	Yes	Yes- Required monitor for Lexington non-attainment area.	None
370610002	Kenansville	No	Yes - Required General/ Background monitor for the coastal area	None
371070004	Lenoir Community College	Yes	No – not a required monitor.	None
371110004	East Marion	Yes	No – not a required monitor.	None
371170001	Jamesville	Yes	Yes - Required regional transport monitor for the coastal part of the state	None
371210001	Spruce Pine	Yes	No – not a required monitor.	None
371230001	Candor	No	Yes - Required General/ Background monitor for the piedmont/central area of state	Manual PM <sub>2.5</sub> FRM monitor may be discontinued and replaced with a BAM
371550005	Linkhaw	Yes	No – not a required monitor.	None
371590021	Rockwell	Yes	No – not a required monitor.	None
371730002	Bryson City	Yes	Yes - Required Transport Monitor for Western Mountain Area.	None
371890003	Boone	Yes	Yes- Required general/ background monitor for the western mountain area.	None

**Table 27 Status of North Carolina Fine Particle Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network <sup>a</sup>**

<sup>a</sup> All monitors use an R & P Model 2025 PM2.5 Sequential Monitor with a WINS impactor (Air Quality System (AQS) Method Code 118) except the Bryson and Millbrook monitors which use a Met One BAM-1020 Monitor (Air Quality System (AQS) Method Code 170). All monitors except the Bryson and Millbrook monitors use the U.S. EPA reference method designation RFPS-0498-118. Millbrook and Bryson monitors use the U.S. EPA Automated Equivalent Method: EQPM-0308-170.

<sup>b</sup> All monitors meet the requirements of Appendix A to 40CFR58. The Quality Assurance Project Plan and Standard Operating Procedures are being revised to reflect the changes to Appendix A of 40CFR58 promulgated in 2006. All monitors meet the requirements of Appendix C to 40CFR58. All monitors use the U.S. EPA reference method designation RFPS-0498-118. All monitors meet the requirements of Appendix E of 40CFR58.

<sup>c</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>d</sup> This monitor started on January 1, 2008, to meet minimum monitoring requirements in 40CFR58 Appendix D.

<sup>e</sup> This monitor started on January 1, 2008, to replace the Durham Health monitor. It is collocated with a continuous fine particle monitor.

<sup>f</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>g</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

<sup>h</sup> This monitor started on January 1, 2008, to replace the Waynesville Fire Station monitor.

<sup>i</sup> This monitor started on April 1, 2008, to replace the South Greenville monitor. This site is a collocated fine particle and ozone-monitoring site.

**Table 28 Locations and Schedules for Continuous Monitors in the North Carolina Fine Particle Monitoring Network<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
370710016	Grier Middle School	SLAMS	Hourly	Fine Particle Forecasting. Not required.	Population Exposure	Neighborhood
371190041 <sup>d</sup>	Garinger	NCORE	Hourly	Required Monitor for the Charlotte-Gastonia-Rock Hill MSA.	Population Exposure	Neighborhood
371190042 <sup>d</sup>	Montclaire	SLAMS	Hourly	Fine Particle Forecasting. Not required.	Population Exposure	Neighborhood

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
371830014	Millbrook	NCORE	Hourly	Required Monitor for the Raleigh-Cary MSA.	Population Exposure	Neighborhood

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
370810013	Mendenhall	SLAMS	Hourly	Required Monitor for the Greensboro-High Point MSA.	Population Exposure/General/ Background	Neighborhood

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
370630015	Durham Armory	SLAMS	Hourly	Required monitor for the Durham-Chapel Hill MSA	Population Exposure	Neighborhood

**Winston-Salem Metropolitan Statistical Area**

AQS Site Id	Site Name	Monitor	Operating	Statement of Purpose/Appendix D	Monitoring	Scale
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**Table 28 Locations and Schedules for Continuous Monitors in the North Carolina Fine Particle Monitoring Network<sup>a</sup>**

Number		Type	Schedule <sup>b</sup>	Requirements <sup>c</sup>	Objective	
370670022 <sup>e</sup>	Hattie Ave.	SLAMS	Hourly	Not required	Population Exposure	Neighborhood
370670030 <sup>e</sup>	Clemmons	SLAMS	Hourly	Not required	Population Exposure	Neighborhood

**Asheville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
370210034 <sup>f</sup>	Board of Ed	SLAMS	Hourly	Not required	Population Exposure	Neighborhood

**Hickory Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
370350004	Hickory Water Tower	SLAMS	Hourly	Not required	Population Exposure	Neighborhood

**Fayetteville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
370510009	William Owen	SLAMS	Hourly	Not Required.	Population Exposure	Neighborhood

**Wilmington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
371290002	Castle Hayne	NONREG-ULATORY	Hourly	Not Required.	Population Exposure	Neighborhood

**Rocky Mount Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
370650099	Leggett	NONREG-ULATORY	Hourly	Not Required.	General Background	Urban

**Burlington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
370010002 <sup>d</sup>	Hopedale	SLAMS	Hourly	Not Required.	Population Exposure	Neighborhood

**Goldsboro Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
371910005	Dillard	SLAMS	Hourly	Not Required.	Population Exposure	Urban

**Not in an Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose/Appendix D Requirements <sup>c</sup>	Monitoring Objective	Scale
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**Table 28 Locations and Schedules for Continuous Monitors in the North Carolina Fine Particle Monitoring Network<sup>a</sup>**

370330001	Cherry Grove	NONREG-ULATORY	Hourly	Regional transport monitor for the piedmont and central area of the state. Not required	Population Exposure/ Regional Transport/ General/ Background	Urban
370570002	Lexington Water Tower	SLAMS	Hourly	Not required.	Population Exposure	Neighborhood
371110004	East Marion	NONREG-ULATORY	Hourly	Not required.	Population Exposure	Neighborhood
371170001	Jamesville	NONREG-ULATORY	Hourly	Regional transport monitor for the coastal part of the state. Not required.	Regional Transport/ General/ Background /Population Exposure	Urban
371590021	Rockwell	NONREG-ULATORY	Hourly	Not Required.	Population Exposure	Neighborhood
371730002	Bryson City	NONREG-ULATORY	Hourly	Transport Monitor for Western Mountain Area. Not Required.	Regional Transport/ Population Exposure	Neighborhood

<sup>a</sup> All monitors use an R & P Model 1400A PM2.5 Tapered-Element Oscillating Microbalance operated with the inlet heated to 50 degrees except the monitors at Bryson and Millbrook which use a Met One BAM-1020 Monitor. All monitors in this table meet the requirements of 40CFR58 Appendices A and E.

<sup>b</sup> All monitors operate year-round.

<sup>c</sup> All monitors provide real-time air quality data to the public through AirNow and the state and local program websites.

<sup>d</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669).

<sup>e</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403).

<sup>f</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

**Table 29 Status of North Carolina Continuous Fine Particle Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370710016	Grier Middle School	No	No – AQS Method Code 702	No – not a required monitor.	None
371190041 <sup>b</sup>	Garinger	No	No – AQS Method Code 717	Yes- 1 of 1 Required Monitors for the Charlotte-Gastonia-Rock Hill MSA.	None
371190042 <sup>b</sup>	Montclair	No	No – AQS Method Code 717	No – not a required monitor.	None

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
371830014	Millbrook	Yes	Yes – AQS Method Code 170	Yes - 1 of 1 Required Monitors for the Raleigh-Cary MSA	None

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370810013 <sup>c</sup>	Mendenhall	No	No – AQS Method Code 702	Yes - Required Monitor	None

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370630015 <sup>c</sup>	Durham Armory	No	No – AQS Method Code 702	Yes - Required Monitor	None

**Winston-Salem Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370670022 <sup>d</sup>	Hattie Ave.	No	No – AQS Method Code 702	No – not a required monitor.	None
370670030 <sup>d</sup>	Clemmons	No	No – AQS Method Code 702	No – not a required monitor.	None

**Asheville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370210034 <sup>e</sup>	Board of Ed	No	No – AQS Method Code 702	No – not a required monitor.	None

**Hickory Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370350004 <sup>c</sup>	Hickory Water Tower	No	No – AQS Method Code 702	No – not a required monitor.	Will change monitor type from SLAMS to Nonregulatory

**Table 29 Status of North Carolina Continuous Fine Particle Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network**

**Fayetteville Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370510009 <sup>c</sup>	William Owen	No	No – AQS Method Code 702.	No – not a required monitor	Will change monitor type from SLAMS to Nonregulatory

**Wilmington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
371290002	Castle Hayne	No	No – AQS Method Code 717	No – not a required monitor.	None

**Rocky Mount Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370650099	Leggett	Yes	No – AQS Method Code 717	No – not a required monitor.	Added in 2011

**Burlington Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370010002	Hopedale	No	No – AQS Method Code 702	No – not a required monitor	Will change monitor type from SLAMS to Nonregulatory

**Goldsboro Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
371910005	Dillard	No	No – AQS Method Code 702	No – Not a required monitor	Will change monitor type from SLAMS to Nonregulatory

**Not in an Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370330001	Cherry Grove	No	No – AQS Method Code 702	No – Not a required monitor	Replaced the TEOM with a BAM in March 2012.
370570002	Lexington Water Tower	No	No – AQS Method Code 702	Yes- Required monitor for Lexington non-attainment area.	Will change monitor type from SLAMS to Nonregulatory
371110004	East Marion	No	No – AQS Method Code 702	No – not a required monitor.	None
371170001	Jamesville	No	No – AQS Method Code 717	No – not a required monitor.	None
371590021	Rockwell	No	No – AQS Method Code 702	No – not a required monitor.	None
371730002	Bryson City	Yes	Yes – AQS Method Code 170	No – not a required monitor.	None

**Table 29 Status of North Carolina Continuous Fine Particle Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network**

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<sup>a</sup> All monitors meet the requirements of Appendix A to 40CFR58 except as noted below. The Quality Assurance Project Plan and Standard Operating Procedures have been revised to reflect the changes to Appendix A of 40CFR58 promulgated in 2006. Except for at Bryson and Millbrook, these monitors are not reference or equivalent methods and do not meet the requirements of Appendix C to 40CFR58. All monitors meet the requirements of Appendix E of 40CFR58.

<sup>b</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>c</sup> These monitors do not meet the requirements in Appendix A for the inlets of collocated monitors to be within 1 meter of each other vertically.

<sup>d</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>e</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

## VIII. Lead Monitoring Network

The North Carolina Division of Air Quality (NC-DAQ) currently operates one lead monitor located at the Raleigh Millbrook National Core (NCore) monitoring site. In 2008 the United States Environmental Protection Agency (EPA) lowered the lead National Ambient Air Quality Standard (NAAQS) to 0.15 micrograms per cubic meter and expanded the lead monitoring network to support the new standard. In December 2010, the EPA finalized changes to the lead monitoring network. These changes included lowering the threshold for fence line monitoring for lead-emitting facilities from 1 ton of lead per year to 0.5 tons of lead per year and changing the population oriented monitoring from urban areas with populations greater than 500,000 to NCore monitoring sites in urban areas with populations greater than 500,000. Fence line monitoring at facilities emitting more than 1 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 January 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 December 27, 2011.

In 2009 the NC-DAQ requested and received permission to not do fence-line lead monitoring at three facilities which were listed in the 2005 National Emission Inventory (NEI) or the 2007 Toxic Release Inventory (TRI) as emitting over 1 ton of lead per year. These facilities are:

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

The EPA granted the request and did not require the NCDAQ to monitor at any of these facilities because none of the facilities actually emitted 1 ton or more of lead per year. A copy of the EPA approval letter is provided in Appendix D. 2010 Network Plan EPA Approval Letter.

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

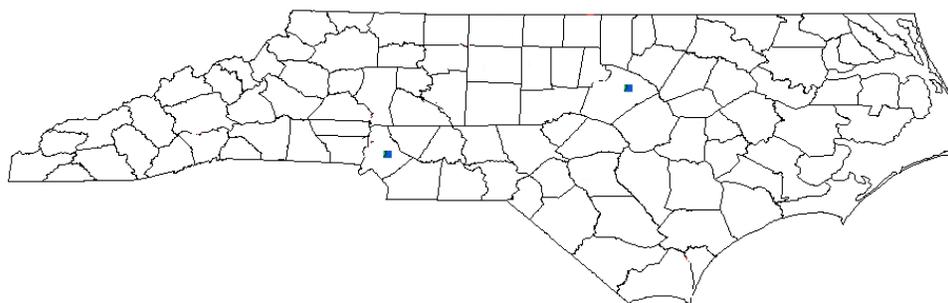
- Duke Energy Carolinas, LLC - Belews Creek Steam Station, located in Stokes County;
- Progress Energy - Roxboro Plant, located in Person County;
- Duke Energy Carolinas, LLC - Marshall Steam Station, in Catawba County;
- U.S. Army Fort Bragg, located in Cumberland County;
- Blue Ridge Paper Products Inc, located in Canton, North Carolina (Haywood County);
- Duke Power Company, LLC - Allen Steam Station, located in Gaston County;

- Royal Development Co., located in High Point, North Carolina (Guilford County); and
- U.S. Marine Corps Camp Lejeune Marine Corps Base, located in Onslow County.

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

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

Under the 2010 lead monitoring rule, North Carolina is required to operate two population-oriented lead monitors as shown in Figure 40. These monitors are located at the NCore monitoring sites—in Charlotte at Garinger High School and in Raleigh at Millbrook East Middle School. The monitors at Millbrook and Garinger started operation on December 27, 2011. The first sampling day was December 29. These monitors operate on a 1-in-6 day schedule and measure lead concentrations by analyzing the filters from the low volume PM<sub>10</sub> monitors that operate at the site. The samples will be analyzed in batches of 50-80 using x-ray fluorescence, which is the Federal Reference Method for the low-volume PM<sub>10</sub> lead monitoring method.



**Legend**

■ required Pb monitoring

**Figure 40. Location of Required Population-Exposure Lead Monitors in North Carolina**

The locations of the required PM<sub>10</sub> lead-monitoring sites are provided in Table 30. All monitors listed in Table 30 are suitable for determining a violation of the National Ambient Air Quality Standards (NAAQS). Both of the monitors meet the requirements

of Appendices A, C, D, and E of 40CFR58 after the Quality Assurance Project Plan and Standard Operating Procedures are submitted to the EPA, and the procedures are approved by the EPA. Both of these monitors use the U.S. EPA reference method designations RFPS-1298-127 and RFLQ-1108-804.

Table 31 provides the monitor type, operating schedules, monitoring objectives, scales, and statement of purpose for all of the required monitors in the North Carolina PM<sub>10</sub> Lead Monitoring Network. Both monitors operate on a 24-hour schedule from midnight to midnight on each scheduled sampling day. Both of the monitors operate year-round. Table 32 summarizes the status for each required monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in 40 CFR58 Appendices A, C, D, and E and also provides the proposed changes to the network.

**Table 30 North Carolina Lead Monitoring Network – Monitor Locations <sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371190041 <sup>b</sup>	Garinger	1130 Eastway Drive	Charlotte	W 080 46' 59"	N 35 14' 28"	Charlotte-Gastonia-Rock Hill

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371830014	Millbrook	3801 Spring Forest Road	Raleigh	W 078 34' 27"	N 35 51' 22"	Raleigh-Cary

<sup>a</sup> All monitors use an R & P Model 2025 PM<sub>2.5</sub> Sequential Monitor with a PM<sub>10</sub> down tube (Air Quality System (AQS) Method Code 811). All monitors listed in this table are suitable for comparison to the National Ambient Air Quality Standards. All monitors in this table meet the requirements of Appendices A, C, D, and E of 40CFR58. All monitors use the U.S. EPA reference method designations RFPS-1298-127 and RFLQ-1108-804.

<sup>b</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

**Table 31 Statement of Purpose for North Carolina Lead Monitoring Network<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
371190041 <sup>c</sup>	Garinger	NCORE	1-in-6 day <sup>c</sup>	1 of 2 Required Population Exposure Monitors in North Carolina. AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighborhood

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule <sup>b</sup>	Statement of Purpose	Monitoring Objective	Scale
371830014	Millbrook	NCORE	1-in-6 day	1 of 2 Required Population Exposure Monitors in North Carolina. AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighborhood

<sup>a</sup> All monitors use an R & P Model 2025 PM2.5 Sequential Monitor with a PM<sub>10</sub> down tube (Air Quality System (AQS) Method Code 811) All monitors in this table meet the requirements of Appendices A, C, and E of Part 58. All monitors use the U.S. EPA reference method designations RFPS-1298-127 and RFLQ-1108-804.

<sup>b</sup> All monitors operate on a 24-hour schedule, collecting a sample from midnight to midnight, Eastern Standard Time.

<sup>c</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669).

**Table 32 Status of North Carolina Lead Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>b</sup>	Proposal to Move or Change
			D	
371190041 <sup>c</sup>	Garinger	Yes	Yes- 1 of 2 Required Monitors for North Carolina.	None

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>b</sup>	Proposal to Move or Change
			D	
371830014	Millbrook	Yes	Yes - 1 of 2 Required Monitors for North Carolina.	None

<sup>a</sup> All monitors use an R & P Model 2025 PM2.5 Sequential Monitor with a PM<sub>10</sub> down tube (Air Quality System (AQS) Method Code 811).

<sup>b</sup> All monitors meet the requirements of Appendix A to 40CFR58. The Quality Assurance Project Plan and Standard Operating Procedures are being written to reflect the new PM<sub>10</sub> lead method established by the EPA. All monitors use the U.S. EPA reference method designations RFPS-1298-127 and RFLQ-1108-804. All monitors meet the requirements of Appendix E of 40CFR58.

<sup>c</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

## IX. Urban Air Toxics Monitoring Network

Monitoring for Urban Air Toxics (UAT) is currently conducted in North Carolina by the North Carolina Division of Air Quality (NC-DAQ), Toxics Protection Branch (TPB) at three sites operated by the NC-DAQ and at three sites operated by local programs. Currently, the NC-DAQ TPB collects whole air samples in stainless steel 6 liter- pressurized canisters. The samples are then analyzed using cryogenic pre-concentration gas chromatography with mass spectrometric detection (GC/MS) via the Compendium Method for Toxic Organics (TO) 15 for the list of 68 compounds shown in Table 33.

**Table 33 List of Urban Air Toxic Compounds Measured in North Carolina**

Propene	Hexane	1,1,2-Trichloroethane (vinyl trichloride)
Freon 12	Methacrolein	Ethylpropylketone
Freon 22	Vinyl Acetate	Tetrachloroethylene (perchloroethylene)
Freon 114	1,1-Dichloroethane	Methyl Butyl Ketone
Chloro Methane (Methylchloride)	Methyl Vinyl Ketone	Dibromoethane
Isobutene	Methyl Ethyl Ketone	Chlorobenzene (phenylchloride)
Vinyl chloride	1,2 Dichloroethene	Ethylbenzene
1,3-Butadiene	Chloroform	m- & p-Xylene
Bromomethane	1,1,1-Trichloroethane (Methyl chloroform)	o-Xylene
Chloroethane	Cyclohexane	Styrene
Freon 11	Carbon Tetrachloride	Bromoform
Pentane	Benzene	1,1,2,2-Tetrachloroethane
Ethanol	1,2-Dichloroethane (ethylene dichloride)	1,3,5-Trimethylbenzene (mesitylene)
Isoprene	1-Butanol	1,2,4-Trimethylbenzene (pseudocumene)
Acrolein	Trichloroethylene	m-Dichlorobenzene
1,1-Dichloroethene (Vinylidene chloride)	2-Pentanone	1,2,3-Trimethylbenzene
Freon 113	3-Pentanone	p-Dichlorobenzene
Methyl Iodide	1,2-Dichloropropane	Benzylchloride
Isopropyl Alcohol	1,4-Dioxane	o-Dichlorobenzene
Carbon Disulfide	Bromodichloromethane	1,2,4-Trichlorobenzene
Acetonitrile	trans-1,3 Dichloropropene	
Methylene chloride	Methyl Isobutyl Ketone	
Cyclopentane	Toluene	
MTBE	cis-1,3 Dichloropropene	

The TPB established and operates an urban air toxics 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 5 urban sites and 1 rural site. The objectives of the network proposed by the EPA in 1999 were stated as follows:

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

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

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

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

Because there are no National Ambient Air Quality Standards (NAAQS) for UAT, the Environmental Protection Agency (EPA) does not require the NC-DAQ and the local programs to operate a minimum number of required monitors.

The NC-DAQ, TPB has made the following changes during the last few years to the UAT monitoring network. The Research Triangle Park (RTP) site shared with EPA was closed because EPA was forced to close and move the building for a major road project. When EPA re-established the site a safe distance from the road construction, a decision was made to seek other possibly better located sites for the UAT monitoring that might be more representative of urban populations in NC. Adding one or two sites in urban areas not currently monitored is being considered. At all NC UAT sites monitoring has been discontinued for Semi-Volatile Organic Compounds (SVOCs) and carbonyl compounds by methods TO-13 and TO-11, respectively. One GC/MS system used for Volatile Organic Compound (VOC) analysis by method TO-15 is in the process of being upgraded to lower detection limits especially for acrolein. No special studies are on-going or anticipated at this time.

The locations of the current air toxic-monitoring sites are provided in Table 34. Sometime in the future the NCDAQ may add a VOC monitoring site in Greensboro, Durham or Greenville. Because a specific location has not yet been identified, the proposed site is not included in the table. All of the monitors meet the requirements of

Appendices A and E of 40CFR58. Appendix C and D requirements do not apply to air toxics monitoring. All of the monitors are non-regulatory because there are no NAAQS for toxic compounds.

Table 35 provides the monitor type, operating schedules, monitoring objectives, scales, and statement of purpose for all of the current monitors in the NC UAT Monitoring Network. All of the monitors operate year-round. Table 36 summarizes the status for each current monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in Appendices A, C, D, and E of 40CFR58 and also provides the proposed changes to the existing network.

**Table 34 NC UAT Monitoring Network – Monitor Locations**

<b>Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area</b>						
AQS Site Id Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371190041 <sup>a</sup>	Garinger	1130 Eastway Drive	Charlotte	W 080 47' 08"	N 35 14' 24"	Charlotte-Gastonia-Rock Hill
<b>Raleigh-Cary Metropolitan Statistical Area</b>						
AQS Site Id Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371830014	Millbrook	3801 Spring Forest Road	Raleigh	W 078 34' 27"	N 35 51' 22"	Raleigh-Cary
<b>Winston-Salem Metropolitan Statistical Area</b>						
AQS Site Id Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370670022 <sup>b</sup>	Hattie Avenue	Corner of 13 <sup>th</sup> & Hattie Avenue	Winston-Salem	W 080 13' 28"	N 36 06' 39"	Winston-Salem
<b>Asheville Metropolitan Statistical Area</b>						
AQS Site Id Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370210035 <sup>c</sup>	AB Tech	AB Tech College	Asheville	W 082 33' 31"	N 35 34' 20"	Asheville
<b>Wilmington Metropolitan Statistical Area</b>						
AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371290010	Battleship Site	Battleship Drive	Wilmington	W 077 57' 21"	N 34 14' 8"	Wilmington
<b>Not in a Metropolitan Statistical Area</b>						
AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371230001	Candor	112 Perry Drive	Candor	W 079 50' 12"	N 35 15' 47"	None

<sup>a</sup> Operated by Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>b</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>c</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

**Table 35 Statement of Purpose for NC UAT Monitoring Network**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
371190041 <sup>a</sup>	Garinger	Non-regulatory	24-hour, midnight to midnight, 1 in 6 day	Monitor as many HAPs as possible.	Population Exposure	Neighborhood

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
371830014	Millbrook	Non-regulatory	24-hour, midnight to midnight, 1 in 6 day	Monitor as many HAPs as possible.	Population Exposure General/ Background	Neighborhood

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370670022 <sup>b</sup>	Hattie Avenue	Non-regulatory	24-hour, midnight to midnight, 1 in 6 day	Monitor as many HAPs as possible	Population Exposure	Neighborhood

**Asheville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370210035 <sup>c</sup>	AB Tech	Non-regulatory	24-hour, midnight to midnight, 1 in 6 day	Monitor as many HAPs as possible	Population Exposure	Neighborhood

**Wilmington Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
371290010	Battleship Site	Non-regulatory	24-hour, midnight to midnight, 1 in 6 day	Monitor as many HAPs as possible.	Population Exposure	Neighborhood

**Not in a Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
371230001	Candor	Non-regulatory	24-hour, midnight to midnight, 1 in 6 day	Monitor as many HAPs as possible	General/ Background	Regional

<sup>a</sup> Operated by Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>b</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>c</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

**Table 36 Status of NC UAT Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Meets Requirements of Part 58 Appendices <sup>b</sup>			Proposal to Move or Change
		A	C	D	
371190041 <sup>c</sup>	Garinger	Yes	Not Applicable – Uses AQS Method Code 150 <sup>d</sup>	Not Applicable	None

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Meets Requirements of Part 58 Appendices <sup>b</sup>			Proposal to Move or Change
		A	C	D	
371830014	Millbrook	Yes	Not Applicable – Uses AQS Method Code 150 <sup>d</sup>	Not Applicable	None

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Meets Requirements of Part 58 Appendices <sup>b</sup>			Proposal to Move or Change
		A	C	D	
370670022 <sup>e</sup>	Hattie Avenue	Yes	Not Applicable – Uses AQS Method Code 150 <sup>d</sup>	Not Applicable	None

**Asheville Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Meets Requirements of Part 58 Appendices <sup>b</sup>			Proposal to Move or Change
		A	C	D	
370210035 <sup>f</sup>	AB Tech	Yes	Not Applicable – Uses AQS Method Code 150 <sup>d</sup>	Not Applicable	None

**Wilmington Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Meets Requirements of Part 58 Appendices <sup>b</sup>			Proposal to Move or Change
		A	C	D	
371290010	Battleship Site	Yes	Not Applicable – Uses AQS Method Code 150 <sup>d</sup>	Not Applicable	None

**Not in a Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Meets Requirements of Part 58 Appendices <sup>b</sup>			Proposal to Move or Change
		A	C	D	
371230001	Candor	Yes	Not Applicable – Uses AQS Method Code 150 <sup>b</sup>	Not Applicable	None

<sup>a</sup> There is no NAAQS for air toxics so none of the monitors provide data suitable for comparing to the NAAQS.

<sup>b</sup> All monitors meet the requirements of Appendix E of 40CFR58.

<sup>c</sup> Operated by Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>d</sup> AQS Method Code 150 (sample collection in a stainless steel 6 liter- pressurized canister and analysis using cryogenic pre-concentration gas chromatography with mass spectrometric detection)

All monitors meet the requirements of Appendix E of 40CFR58.

<sup>e</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403)

<sup>f</sup> Operated by the Western North Carolina Regional Air Quality Agency (AQS Reporting Agency 0779).

## X. NC-DAQ NCore Monitoring Network

This section provides information on the North Carolina Division of Air Quality National Core (NCore) monitoring network. For information on the NCore site operated by the Mecklenburg County of Air Quality, see Appendix B. 2012 Annual Monitoring Network Plan for Mecklenburg County Air Quality.

### A. Overview

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

<u>Parameter</u>	<u>Description</u>
A) AQS identification number	37-183-0014
B) Site Name	Millbrook
C) Address	3801 Spring Forest Road, Raleigh, N.C.
D) Longitude/Latitude	W 078 34' 27"/N 35 51' 22"
E) Scale of Representation	Neighborhood
F) Monitoring Objective	Population Oriented
G) Proximity to Local Emissions	None within 500 meters
H) MSA Description	Raleigh-Cary
I) Land Use	Urban

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

### B. Monitor Siting Considerations

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

- 1) Trees were removed or trimmed such that all probe inlets are > 10 meters from any tree drip line.
- 2) All particulate matter monitors (filter based and continuous) are located on a 16'x16' wooden deck constructed in 2009. All inlets are within 1-4 meters of each other, all inlets are within 1 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) All continuous gaseous monitors (SO<sub>2</sub>, NO<sub>y</sub>, CO and O<sub>3</sub>) are housed in a temperature controlled walk-in shelter, which meets all of the EPA siting criteria.

With the changes made to the monitoring site by removing the trees and building the deck, the site will be suitable for monitoring for fine particles for the purpose of comparing the measured concentrations to the National Ambient Air Quality Standards. The platform is far enough from the road so that the site will meet the necessary neighborhood scale requirements for population oriented monitoring.

*C. Monitors/Methods*

This NCore site has the following monitors in place and operating since January 1, 2011, or before, except for lead, which began December 27, 2011:

<b>Parameter</b>	<b>Monitoring Objective</b>	<b>Scale of Representation</b>	<b>Operating Schedule</b>	<b>AQS Method Code</b>
Trace Level Sulfur Dioxide (SO <sub>2</sub> )	Population Exposure	Neighborhood	Hourly data year round	560
Trace Level Carbon Monoxide (CO)	Population Exposure	Neighborhood	Hourly data year round	554
Trace level Reactive oxides of Nitrogen (NO <sub>y</sub> )	Population Exposure	Neighborhood	Hourly data year round	574
Ozone (O <sub>3</sub> )	Population Exposure	Neighborhood	Hourly data year round	047
PM <sub>2.5</sub> (fine PM), filter based	Population Exposure	Neighborhood	24-hour data on a 1-in-3 day schedule year round	118
PM <sub>2.5</sub> (fine PM), continuous	Population Exposure	Neighborhood	Hourly data year round	170
Speciated PM <sub>2.5</sub> , filter based	Population Exposure	Neighborhood	24-hour data on a 1-in-3 day schedule year round	810
PM <sub>10</sub> , filter based low volume sampler	Population Exposure	Neighborhood	24-hour data on a 1-in-3 day schedule year round	127
PM <sub>10-2.5</sub> (coarse PM), by difference, PM <sub>10</sub> -PM <sub>2.5</sub>	Population Exposure	Neighborhood	24-hour data on a 1-in-3 day schedule year round	176

<b>Parameter</b>	<b>Monitoring Objective</b>	<b>Scale of Representation</b>	<b>Operating Schedule</b>	<b>AQS Method Code</b>
PM <sub>10</sub> Lead, filter-based low volume sampler	Population Exposure	Neighborhood	24-hour data on a 1-in-6 day schedule year round	811
<b>Meteorological measurements of:</b>				
Wind speed	Population Exposure	Neighborhood	Hourly data year round	020
Wind direction	Population Exposure	Neighborhood	Hourly data year round	020
Relative humidity	Population Exposure	Neighborhood	Hourly data year round	020
Ambient temperature	Population Exposure	Neighborhood	Hourly data year round	020

The monitor regulations currently specify that all NCore sites monitor for Speciated PM<sub>10-2.5</sub> (course PM) Filter based; however, the EPA may reconsider that requirement and modify the monitoring regulations to require Speciated PM<sub>10-2.5</sub> monitoring only at selected NCore sites. The EPA has not yet specified a method or the sites that will be required to monitor for Speciated PM<sub>10-2.5</sub>. If required by the EPA, the NC-DAQ will add a Speciated PM<sub>10-2.5</sub> monitor to the site.

#### *D. Readiness Preparation*

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

<u>Parameter</u>	<u>Status</u>
A) Acquisition of trace level gaseous monitors	Completed
B) Acquisition of low concentration gas dilution calibrators	Completed
C) Certification of clean air generators	Completed
D) Method Detection Limit studies for trace level monitors	Completed
E) Installation of 10 meter NO <sub>y</sub> Tower	Completed
F) Installation of filter based and continuous PM monitors	Completed, except as noted earlier
G) Installation of trace level gaseous monitors	Completed

H) Preparation of trace level gaseous monitor QAP/SOPs	Completed
I) Meteorological tower	existing
J) Ozone monitor	existing

*E. Waiver Requests*

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

1. Millbrook Meteorological Tower

The sampling site located at the Millbrook Middle School has been designated as an EPA NCore site. In addition to specified monitor types, the collection of meteorological data is also required and will include, 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 41). The wind direction/speed sensors are located at a height of 10 meters above ground and the relative humidity sensor is located at 2 meters. Ambient temperature sensors (2) are located at 2 meters and 10 meters above ground. The tower is located in an open, grassy area that is free from any obstructions in a 270° arc to the prevailing winds that come from the South/West direction. The tower is positioned 15.5 meters from the shelters on a 3% uphill grade. This grade adds approximately 1 meter to the height of the tower above the shelters. This siting does not meet the EPA requirement for the tower being a distance of 10 times the height of the shelter (3.7 meters). Additionally, a single tree, approximately 7 meters tall, is located 18 meters to the South/East of the tower.



**Figure 41. Millbrook NCore Site**

Since the position of the meteorological tower is free from any obstructions in a 270° arc to the prevailing winds that come from the South/West direction, the State of North Carolina is confident that 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<sub>y</sub> probe inlet placement

NCore probe siting guidance for NO<sub>y</sub> is a suggested probe inlet height of 10 meters. The NO<sub>y</sub> probe inlet is currently mounted at a height of 5.08 meters from the ground at the proposed NCore site. NC-DAQ requested and received a waiver of the 10 meter probe height requirement primarily for safety considerations and also to facilitate maintenance on the sampling inlet (cleaning of the cross fitting) and to provide access for performance of calibration test points under reduced multi-gas calibrator system pressures (near ambient conditions).

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

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

## **XI. Nitrogen Dioxide Monitoring Network**

The North Carolina Division of Air Quality (NC-DAQ) currently does not operate any nitrogen dioxide monitors. Mecklenburg County Air Quality and Forsyth County Office of Environmental Assistance and Protection (FCOEAP) each operate one nitrogen dioxide monitor. In 2010 the United States Environmental Protection Agency (EPA) changed the nitrogen dioxide primary National Ambient Air Quality Standard (NAAQS) from an annual to an hourly standard of 100 parts per billion and established a new nitrogen dioxide monitoring network to support the new standard. The new network has three types of monitoring sites:

- Near road sites – micro-scale near-road NO<sub>2</sub> monitoring stations in each Core-Based Statistical Area (CBSA) with a population of 500,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road with high Average Annual Daily Traffic (AADT) counts.
- Area wide sites – monitoring stations in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected highest NO<sub>2</sub> concentrations representing the neighborhood or larger spatial scales.
- Regional Administrator Required Monitoring – additional NO<sub>2</sub> monitoring stations nationwide in any area, inside or outside of CBSAs, above the minimum monitoring requirements, selected by the Regional Administrators, in collaboration with States, with a primary focus on siting these monitors in locations to protect susceptible and vulnerable populations.

North Carolina has four CBSAs that are larger than 500,000 or more persons and two CBSAs that are larger than 1,000,000 or more persons (not counting Virginia Beach-Norfolk-New Port News). Thus, North Carolina is required to have near road monitoring stations in the Charlotte, Raleigh, Greensboro, and Durham areas and area wide sites in the Charlotte and Raleigh areas. In addition the site operated by the FCOEAP at Hattie Avenue was selected by the Region 4 Administrator for Regional Administrator Required Monitoring.

### *A. Near Road Monitoring*

For a discussion of the selection of the near road monitoring site in the Charlotte area see Appendix B. 2012 Annual Monitoring Network Plan for Mecklenburg County Air Quality. Site selection for the Raleigh, Greensboro, and Durham areas are described in the following subsections.

#### *1. Raleigh-Cary Core Based Statistical Area*

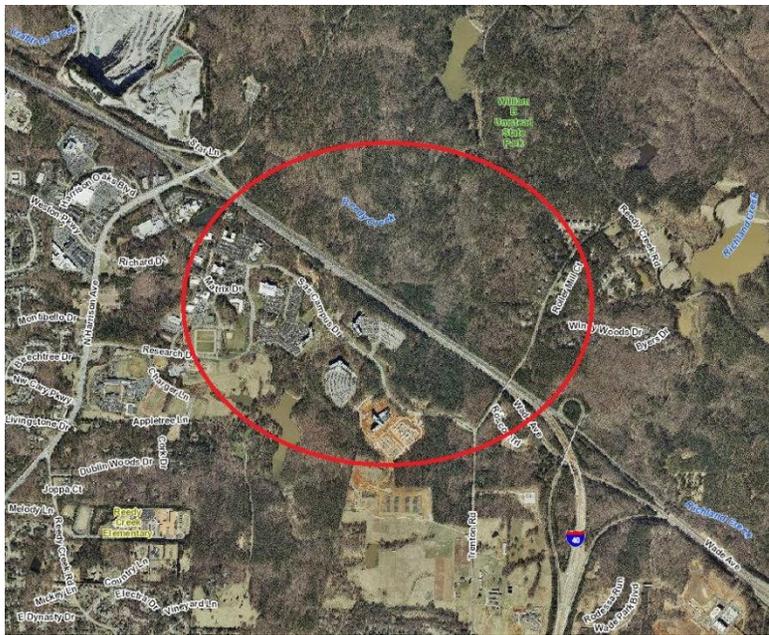
##### **Step 1 Using Annual Average Daily Traffic to Initially Rank Road Segments**

There are 2,581 road segments in the Raleigh-Cary Core Based Statistical Area (CBSA) with annual average daily traffic (AADT) counts. For this analysis the NC-DAQ ranked segments with 2010 (2009 if 2010, and 2007 if both 2010 and 2009 values are unavailable) AADT values of 17,000 or greater in order of from highest AADT to lowest. The cutoff value of 17,000 was selected because the lowest measured AADT along the

interstate highways in the Raleigh-Cary CBSA was 17,000 (I-40 in Johnston County). Most of these segments are in Wake County, with 48 in Johnston County (AADT from 17,000 to 53,000) and seven in Franklin County (AADT from 17,000 to 31,000). Table 37 lists the segments with the highest AADTs. The highest ranked segment is the portion of I-40 between exit 287 (Harrison Avenue) and 289 (Wade Avenue) with a 2010 AADT of 147,000. This segment, shown in Figure 42, is located between Raleigh and the Research Triangle Park and is the last segment before I-40 splits into I-40 going to south Raleigh and Garner and Wade Avenue, which goes to north Raleigh and Wake Forest. Most of the traffic on this road is from people commuting from home to work. The northeast side of the road is bordered by Umstead State Park.

**Table 37. 2010 Annual Average Daily Traffic (AADT) for Raleigh-Cary Road Segments with AADTs Above 100,000**

Station	County	Route	Location	2010 AADT	2010 Rank	2009 Rank
1	Wake	I-40	FROM EXIT 287 TO EXIT 289	147,000	1	1
813	Wake	I-40	FROM EXIT 285 TO EXIT 287	141,000	2	2
807	Wake	I-40	FROM EXIT 283 TO EXIT 284	132,000	3	3
811	Wake	I-40	FROM EXIT 284 TO EXIT 285	128,000	4	4
169	Wake	I-440	FROM EXIT 7 TO EXIT 8	128,000	4	6
208	Wake	I-440	FROM EXIT 8 TO EXIT 10	116,000	6	9
634	Wake	I-40	FROM EXIT 297 TO EXIT 298	113,000	7	7
874	Wake	US 1	FROM EXIT 99 TO EXIT 101	113,000	7	7
210	Wake	I-440	FROM EXIT 10 TO EXIT 11	112,000	9	11
172	Wake	I-440	FROM EXIT 5 TO EXIT 7	110,000	10	15
630	Wake	I-40	FROM EXIT 299 TO EXIT 300	108,000	11	10
635	Wake	I-40	FROM EXIT 295 TO EXIT 297	107,000	12	11
186	Wake	I-440	FROM EXIT 4 TO EXIT 5	107,000	12	17
637	Wake	I-40	FROM EXIT 293 TO EXIT 295	106,000	14	11
633	Wake	I-40	FROM EXIT 298 TO EXIT 299	106,000	14	14
889	Wake	I-40	FROM EXIT 300 TO EXIT 301	101,000	16	16
871	Wake	I-40	FROM EXIT 301 TO EXIT 303	100,000	17	18



Map is from the Wake County GIS available at <http://maps.raleighnc.gov/imapsraleigh/>

**Figure 42 I-40 Segment in the Raleigh-Cary Core Based Statistical Area with the Highest Annual Average Daily Traffic**

**Step 2 Combining Manual Classification Data and Annual Average Daily Traffic Data to Rank Road Segments**

Manual classification reports from 2009 and 2010 were obtained from the North Carolina Division of Transportation (NC DOT) for 11 road segments in Wake County and used to calculate heavy duty traffic for adjoining road segments. The percentage of heavy duty vehicles on these 11 segments ranged from 2.4 to 8.7. The estimated urban interstate statewide average percent of heavy duty vehicles for 2010 based on 2008 numbers is 18.91 (see Table 38); thus, the most heavily travelled interstate segments of road in Wake County have much lower percentages of heavy duty vehicles than do the segments in the rest of the state on average.

**Table 38. 2010 North Carolina Statewide Heavy Duty Traffic for Different Road Types**

Road Segment Classification	Light Duty Vehicles (Percent)	Heavy Duty Vehicles (Percent)
Rural Interstate	74.25	25.75
Urban Interstate	81.10	18.90
Rural Principal Artery	86.38	13.62
Urban Expressway	87.65	12.35
Rural Minor Artery	87.69	12.31
Urban Principal Artery	92.05	7.95
Urban Minor Artery	94.58	5.42
Urban Collector	95.27	4.73

Note: Values were extrapolated to 2010 based on 2008 measured values. Light duty vehicles are cars, light duty trucks, and motor cycles.

Additional manual classification data from 2008 and 2010 were obtained from the NC DOT for five road segments in Johnston County along I-95 and I-40. Heavy duty

fleet AADT values were estimated for the remaining segments with AADT of 17,000 or greater using the following assumptions or calculations:

- Roads were classified into eight types (Urban Interstate, Rural Interstate, Urban Expressway, Urban Principal Artery, Rural Principal Artery, Urban Minor Artery, Rural Minor Artery, and Urban Collector) based on their classification on a road map and whether they were located within the limits of a city or other urban area.
- The percentage of heavy duty vehicles on I-540 in Wake County was estimated at 9 % based on the highest measured percentage of heavy duty vehicles on I-40;
- For I-440, the manual classification data available for the closest nearby segment was used;
- The percentage of heavy duty vehicles on Wade Avenue between I-40 and I-440 was calculated to be 5.2 % by taking the difference between the heavy duty vehicles measured on I-40 before (8,967) and after (5,780) Exit 289 (Wade Avenue Exit)
- For the other road segments the estimated 2010 state average extrapolated from 2008 data was used for each road type (See Table 38).

The NC-DAQ ranked all segments with an AADT of 17,000 or greater in order of heavy duty vehicle AADT (either actual or estimated). Table 39 shows the segments with heavy duty AADT of 7,400 or greater. The highest ranked segment for heavy duty vehicle traffic, shown in Figure 43, is the section of I-95 in Johnston County between exit 79 (NC 50 and 242) and 81 (I-40). The percentage of heavy duty traffic on I-95 is greater than 20. This segment of I-95 is just south of where I-95 and I-40 intersect.



Map is from the Johnston County GIS available at [http://www.johnstonnc.com/mainpage.cfm?category\\_level\\_id=420](http://www.johnstonnc.com/mainpage.cfm?category_level_id=420)

**Figure 43. Highest Annual Average Daily Heavy Duty Traffic Segment in the Raleigh-Cary Core Based Statistical Area on I-95**

**Table 39. Segments with Heavy Duty (HD) Vehicle Average Annual Daily Traffic Greater Than 7,400**

Station	County	Route	Location	2010		Station or Assumption	HD Vehicle	
				AADT	Rank		AADT	Rank
12	Johnston	I-95	From Exit 79 To Exit 81	53,000	69	10MC0026	11,766	1
13	Johnston	I-95	From Exit 77 To Exit 79	49,000	78	10MC0026	10,878	2
889	Wake	I-40	From Exit 300 To Exit 301	101,000	16	10MC0021	9,090	3
634	Wake	I-40	From Exit 297 To Exit 298	113,000	7	09MC0033	9,040	4
1	Wake	I-40	From Exit 287 To Exit 289	147,000	1	09MC0031	8,967	5
813	Wake	I-40	From Exit 285 To Exit 287	141,000	2	09MC0031	8,460	6
872	Wake	I-40	From Exit 303 To Exit 306	94,000	22	10MC0021	8,178	7
9	Johnston	I-95	From Exit 90 To Exit 93	40,000	108	10CM0050	8,000	8
976	Wake	I-540	From Exit 2 To Exit 3	88,000	25	Use 9 %	7,920	9
807	Wake	I-40	From Exit 283 To Exit 284	132,000	3	09MC0031	7,920	10
3493	Wake	US 64/264	From Exit 422 To Exit 423	58,000	58	Use 13.62 %	7,900	11
3401	Wake	I-540	From Exit 11 To Exit 14	87,000	27	Use 9 %	7,830	12
3400	Wake	I-540	From Exit 9 To Exit 11	87,000	27	Use 9 %	7,830	12
811	Wake	I-40	From Exit 284 To Exit 285	128,000	4	09MC0031	7,680	14
8	Johnston	I-95	From Exit 93 To Exit 95	38,000	117	10CM0050	7,600	15
630	Wake	I-40	From Exit 299 To Exit 300	108,000	11	09MC0034	7,560	16
2235	Wake	I-540	From Exit 4 To Exit 7	84,000	33	Use 9 %	7,560	16
3472	Wake	US 64 BYP	From Exit 423 To Exit 425	61,000	51	Use 12.35 %	7,534	18
635	Wake	I-40	From Exit 295 To Exit 297	107,000	12	09MC0032	7490	19
637	Wake	I-40	From Exit 293 To Exit 295	106,000	14	09MC0032	7,420	20
633	Wake	I-40	From Exit 298 To Exit 299	106,000	14	09MC0034	7,420	20
3492	Wake	US 64/264	From Exit 420 To Exit 422	60,000	55	Use 12.35 %	7,410	22
3492	Wake	US 64/264	From Exit 420 To Exit 422	60,000	55	Use 12.35 %	7,410	22
10	Johnston	I-95	From Exit 87 To Exit 90	37,000	123	10CM0050	7,400	24

**Step 3 Calculating Fleet Equivalent Annual Average Daily Traffic Data**

A fleet equivalent AADT was calculated for each of the segments with an AADT of 17,000 or greater using the nationwide multiplier of 10 (supplied by the EPA based on using the Motor Vehicle Emission Simulator Model (MOVES) for the entire nation) for the ratio of emissions from heavy duty vehicles as compared to light duty vehicles. Thus, using the national default value from MOVES the fleet equivalent AADT equals the AADT for light duty vehicles plus 10 times the AADT for heavy duty vehicles. The NC-DAQ ranked road segments with an AADT of 17,000 or more according to the fleet equivalent AADT in order from highest to lowest. Table 40 shows the segments with fleet equivalent AADT of 140,000 or greater using the nationwide default ratio of 10. The highest four ranked segments are the same highest four ranked segments based on AADT, indicating that traffic along this portion of I-40 in Wake County is dominated by light duty vehicles commuting from Raleigh to the Research Triangle Park, Chapel Hill and Durham (or vice versa). The magnitude of the commuting traffic in this area outweighs the contribution of the heavy duty vehicles also travelling along this portion of I-40 as well as the larger number of heavy duty vehicles travelling along the I-95 corridor.

**Table 40. National Default Fleet Equivalent AADT Above 140,000 for Segments with Greater Than 17,000 AADT**

County	Route	Location	2010		Heavy Duty Vehicle		Fleet Equivalent	
			AADT	Rank	AADT	Rank	AADT	Rank
Wake	I-40	From Exit 287 To 289	147000	1	8967	5	227703	1
Wake	I-40	From Exit 285 To 287	141000	2	8460	6	217140	2
Wake	I-40	From Exit 283 To 284	132000	3	7920	9	203280	3
Wake	I-40	From Exit 284 To 285	128000	4	7680	14	197120	4
Wake	I-40	From Exit 297 To 298	113000	7	9040	4	194360	5
Wake	I-40	From Exit 300 To 301	101000	16	9090	3	182810	6
Wake	I-40	From Exit 299 To 300	108000	11	7560	16	176040	7
Wake	I-40	From Exit 295 To 297	107000	12	7490	19	174410	8
Wake	I-40	From Exit 293 To 295	106000	14	7420	20	172780	9
Wake	I-40	From Exit 298 To 299	106000	14	7420	20	172780	9
Wake	I-40	From Exit 303 To 306	94000	22	8178	7	167602	11
Wake	I-440	From Exit 7 To 8	128000	4	4352	80	167168	12
Wake	US 1	From Exit 99 To 101	113000	7	5650	51	163850	13
Wake	I-40	From Exit 291 To 293	99000	18	6930	30	161370	14
Wake	I-440	From Exit 8 To 10	116000	6	4988	63	160892	15
Wake	I-40	From Exit 301 To 303	100000	17	6700	40	160300	16
Wake	I-540	From Exit 2 To 3	88000	25	7920	9	159280	17
Johnston	I-95	From Exit 79 To 81	53000	69	11766	1	158894	18
Wake	I-540	From Exit 11 To 14	87000	27	7830	12	157470	19
Wake	I-540	From Exit 9 To 11	87000	27	7830	12	157470	19
Wake	I-40	From Exit 290 To 291	96000	20	6720	39	156480	21
Wake	I-440	From Exit 10 To 11	112000	9	4480	68	152320	22
Wake	I-540	From Exit 4 To 7	84000	33	7560	17	152040	23
Wake	I-540	From Exit 7 To 9	82,000	35	7380	25	148420	24

To further evaluate where the highest nitrogen oxide emissions are occurring, the data were also evaluated using emission factors obtained from a MOBILE6.2 model run performed to determine transportation conformity for 2015.<sup>1</sup> Emission factors were obtained for the eight different road types as well as for eight different types of vehicles (light duty gasoline vehicles, small light duty gasoline trucks, large light duty gasoline trucks, heavy duty gasoline vehicles, light duty diesel vehicles, light duty diesel trucks, heavy duty diesel vehicles, and motor cycles). In addition, emission factors were calculated for peak morning and afternoon traffic as well as for off peak traffic. Separate emission factors were also available for vehicles subject to inspection and maintenance programs and those not subject to inspection and maintenance programs. Thus, there were 48 emission factors for each road type.

<sup>1</sup> See the Triangle Region Transportation Conformity: Pre-Analysis Consensus Plan, 2035 Long Range Transportation Plans July 22, 2011, version for a description of how the emission factors were derived.

In addition, the model provided the fraction of vehicle miles traveled for each type of vehicle on each type of road (see Table 41). The fraction of vehicles subject to inspection and maintenance programs was determined using 2007 accident data from the NCDOT and was determined to be 95 % for Wake County, 91 % for Johnston County, and 90 % for Franklin County. The vehicle miles traveled were also apportioned between the morning (AM) peak, afternoon (PM) peak, and off peak hours as shown in Table 42 for each road type. The 2010 AADT for each road segment was then divided into six groups (AM I&M, AM non I&M, PM I&M, PM non I&M, Off Peak I&M, and Off Peak non I&M) by multiplying the AADT by the appropriate percentages. Then the AADT for each group was divided into vehicle types and the relative emissions for each segment was then calculated by multiplying the AADT for each vehicle type in each group by the emission factor for that vehicle type and group and summing the resulting products. The NC-DAQ ranked results for road segments with AADT greater than 17,000 lists those segments with calculated nitrogen oxide emissions greater than 50,000 grams per mile. The highest ranked segment is the segment ranked highest for heavy duty vehicle traffic, the section of I-95 in Johnston County between exit 79 (NC 50 and 242) and 81 (I-40).

**Table 41 2015 Percentages of Vehicle Type on Each Road Type Based on MOBILE6.2**

Type of Road	LDGV	LDGT12	LDGT34	HDGV	LDDV	LDDT	HDDV	MC
Rural Interstate	27.52%	37.70%	12.85%	6.29%	0.02%	0.19%	14.96%	0.47%
Rural Principal Artery	30.01%	41.13%	14.01%	4.14%	0.03%	0.21%	9.96%	0.51%
Rural Minor Artery	31.20%	42.74%	14.58%	3.17%	0.03%	0.21%	7.54%	0.53%
Urban Interstate	30.42%	41.73%	14.23%	3.77%	0.03%	0.21%	9.09%	0.52%
Urban Freeway	31.32%	42.90%	14.61%	3.05%	0.03%	0.22%	7.34%	0.53%
Urban Principal Artery	31.92%	43.76%	14.92%	2.53%	0.03%	0.22%	6.08%	0.54%
Urban Minor Artery	32.58%	44.63%	15.20%	1.99%	0.03%	0.23%	4.79%	0.55%
Urban Collector	33.00%	45.21%	15.41%	1.63%	0.03%	0.23%	3.93%	0.56%

LDGV = Light Duty Gasoline Vehicle  
 LDGT12 = Light Duty Gasoline Truck (small)  
 LDGT34 = Light Duty Gasoline Truck (large)  
 HDGV = Heavy Duty Gasoline Vehicle

LDDV = Light Duty Diesel Vehicle  
 LDDT = Light Duty Diesel Truck  
 HDDV = Heavy Duty Diesel Vehicle  
 MC = Motorcycle

**Table 42 2015 Percentages of Vehicle Miles Traveled Per Time Period For Each Road Type Based on MOBILE6.2**

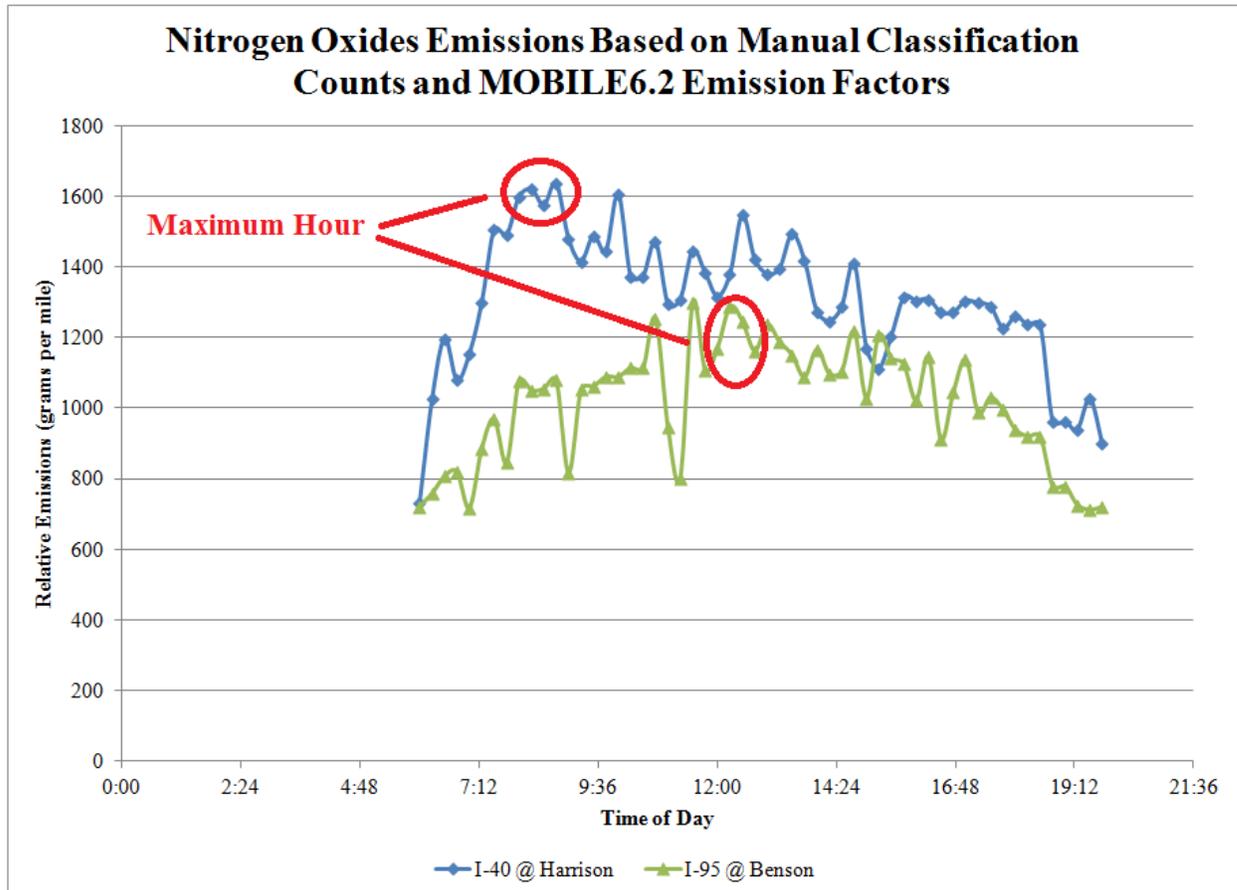
Type of Road	Morning (AM) Peak	Afternoon (PM) Peak	Off Peak
Rural Interstate	23.0%	30.7%	46.3%
Rural Principal Artery	24.2%	32.6%	43.2%
Rural Minor Artery	24.1%	31.1%	44.9%
Urban Interstate	22.6%	31.2%	46.2%
Urban Freeway	23.1%	33.5%	43.4%
Urban Principal Artery	21.6%	31.1%	47.3%
Urban Minor Artery	20.6%	33.0%	46.4%
Urban Collector	20.9%	34.9%	44.1%

**Table 43 Segments with MOBILE6.2 Nitrogen Oxide Emissions Greater Than 50,000 g/mile**

COUNTY	ROUTE	LOCATION	Fleet Equivalent		Sum of NO <sub>x</sub> Emissions (g/mile)	Rank
			AADT	Rank		
Johnston	I-95	From Exit 79 To Exit 81	158,894	18	76467.39	1
Wake	I-40	From Exit 287 To Exit 289	227,703	1	73413.48	2
Johnston	I-95	From Exit 77 To Exit 79	146,902	25	70696.26	3
Wake	I-40	From Exit 285 To Exit 287	217,140	2	70087.24	4
Wake	I-40	From Exit 283 To Exit 284	203,280	3	65613.58	5
Wake	I-40	From Exit 284 To Exit 285	197,120	4	63625.29	6
Wake	I-40	From Exit 297 To Exit 298	194,360	5	61454.91	7
Wake	I-40	From Exit 300 To Exit 301	182,810	6	57290.92	8
Wake	I-40	From Exit 299 To Exit 300	176,040	7	56209.75	9
Wake	I-440	From Exit 7 To Exit 8	167,168	12	55841.74	10
Wake	I-40	From Exit 295 To Exit 297	174,410	8	55689.29	11
Wake	I-40	From Exit 293 To Exit 295	172,780	9	55168.83	12
Wake	I-40	From Exit 298 To Exit 299	172,780	9	55168.83	12
Wake	I-440	From Exit 8 To Exit 10	160,892	15	53048.29	14
Wake	I-40	From Exit 303 To Exit 306	167,602	11	52660.72	15
Wake	I-40	From Exit 291 To Exit 293	161,370	14	51525.61	16
Wake	US 1	From Exit 99 To Exit 101	163,850	13	51442.85	17
Wake	I-40	From Exit 301 To Exit 303	160,300	16	51344.42	18
Wake	I-440	From Exit 10 To Exit 11	155,344	22	51219.04	19
Johnston	I-95	From Exit 90 To Exit 93	112,000	52	50550.41	20
Wake	I-40	From Exit 290 To Exit 291	156,480	21	49964.22	21
Wake	I-540	From Exit 2 To Exit 3	159,280	17	49916.84	22
Johnston	I-95	From Exit 87 To Exit 90	103,600	62	49791.48	23
Wake	I-540	From Exit 11 To Exit 14	157,470	19	49349.60	24
Wake	I-540	From Exit 9 To Exit 11	157,470	19	49349.60	24
Johnston	I-95	From Exit 93 To Exit 95	106,400	59	48022.89	26
Wake	I-440	From Exit 5 To Exit 7	143,660	26	47989.00	27
Wake	I-540	From Exit 4 To Exit 7	152,040	23	47647.89	28
Johnston	I-95	From Exit 81 To Exit 87	98,000	69	47100.05	29
Wake	I-440	From Exit 4 To Exit 5	139742	27	46680.21	30
Wake	I-540	From Exit 7 To Exit 9	148420	24	46513.42	31
Johnston	I-95	From Exit 102 To Exit 105	95200	73	45754.33	32

Next, to evaluate whether higher nitrogen oxide emissions will occur along I-40 in Wake County or along I-95 in Johnston County, the manual classification data, which has traffic counts broken out into 15 minute periods was used with the MOBILE6.2 emission factors to calculate relative emissions over one hour time frames at the 16 locations with available manual classification data. For the two 30 minute periods where traffic counts were unavailable, the counts were assumed to be the same for the 15 minute period before for the first 15-minute period or the 15-minute period after for the second

15-minute period of the 30 minute break. The sub-hourly emissions of nitrogen oxides on I-40 west of Harrison Avenue based on traffic measured October 20 and 22, 2009, and I-95 at Benson south of NC 50 for traffic measured on May 4 and 6, 2010, are shown in Figure 44. The maximum relative hourly emissions occur at 8 AM during the morning peak on I-40 and exceed 6,000 grams of NO<sub>x</sub> per mile. On I-95 the maximum relative hourly emissions occur at noon and are less than 5,000 grams of NO<sub>x</sub> per mile. Thus, these two segments when looked at on an hourly basis are very similar.



**Figure 44 Comparison of Sub-hourly Emissions of Nitrogen Oxides on I-40 and I-95**

#### Step 4 Add the Congestion Indicator

For congestion data, the number of lanes and the current capacity for each segment was obtained from the NCDOT. Using the number of lanes the congestion measure of AADT per lane was calculated. Using the capacity the volume to capacity ratio was calculated. These values are provided in Table 44 for the top seven ranked fleet equivalent AADTs. The most congested segment of these seven is the stretch of I-40 between Exits 187 and 189 (Harrison Avenue and Wade Avenue) because it has the highest traffic volume and the capacity and number of lanes are the same for all seven segments. The highest ranked segment for heavy duty vehicle traffic, shown in Figure 43, is the section of I-95 in Johnston County between exit 79 (NC 50 and 242) and 81 (I-40). The percentage of heavy duty traffic on I-95 is greater than 20. This segment of I-95 is just south of where I-95 and I-40 intersect.

**Table 44. Congestion Estimates for the 7 Segments in the Raleigh Metropolitan Statistical Area with the Highest Fleet Equivalent AADT**

ROUTE	LOCATION	Fleet Equivalent (FE)		Number of Lanes	Current Capacity	v/c Ratio	AADT/#Lanes
		AADT	RANK				
I-40	From Exit 287 To Exit 289	226,380	1	8	148,000	0.99	18,375
I-40	From Exit 285 To Exit 287	217,140	2	8	148,000	0.95	17,625
I-40	From Exit 283 To Exit 284	203,280	3	8	148,000	0.89	16,500
I-40	From Exit 284 To Exit 285	197,120	4	8	148,000	0.86	16,000
I-40	From Exit 297 To Exit 298	194,360	5	8	148,000	0.76	14,125
I-40	From Exit 300 To Exit 301	182,810	6	8	148,000	0.68	12,625
I-40	From Exit 299 To Exit 300	176,040	7	8	148,000	0.73	13,500

**Step 5 Physical Considerations for Candidate Near-Road Monitoring Sites**

Many of these seven segments were investigated for their potential suitability to host a near road monitoring station. Considerations taken in to account included location of ramps, intersections, lane merge locations, nearby interchanges, grade relative to the surrounding terrain, barriers, road signs, overpasses, number of trees between the roadway and potential shelter location, availability of non-interstate access roadways and utilities, and relative downwind locations such that the winds would predominately blow from the road to the monitor.

The predominate winds, based on data from the Raleigh Durham Airport, are from the southwest (50 to 60 percent of the time the wind comes from the south southwest, southwest, or the west southwest), meaning ideally the monitoring station should be located on the northeast side of the road. Several locations were investigated for locating a monitoring station. These locations are listed in Table 45 and shown on a map in Figure 45.

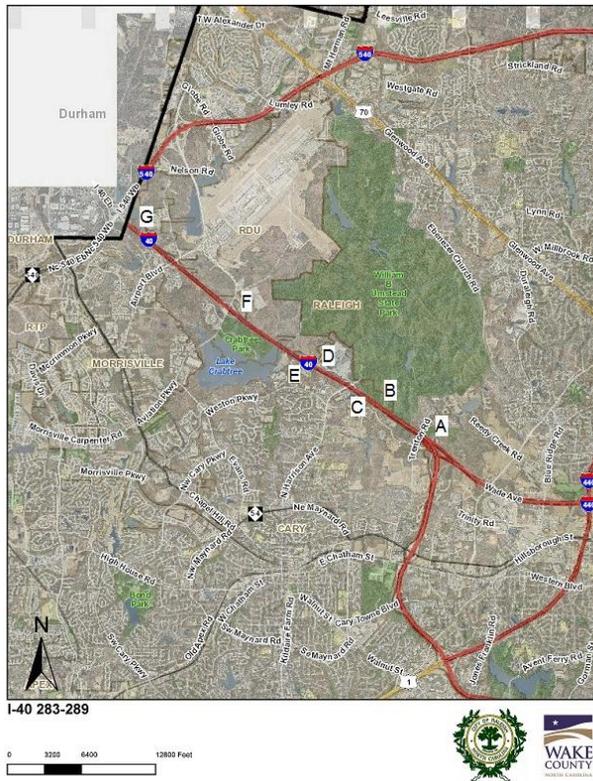
**Table 45. Investigated Locations for Near Road Monitoring Station on I-40**

Key	Road Segment	Location	Comments
A	I-40 Exit 287 to 289	Trent Road	The overpass results in the area being significantly above the grade of I-40. Access down the hill to the I-40 right-of-way would be difficult because of the trees and grade.
B	I-40 Exit 287 to 289	Umstead Park	No access is believed to be available within the park.
C	I-40 Exit 287 to 289	Umstead Motel	Located on upwind side of road, no suitable location found, too far from I-40.

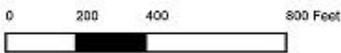
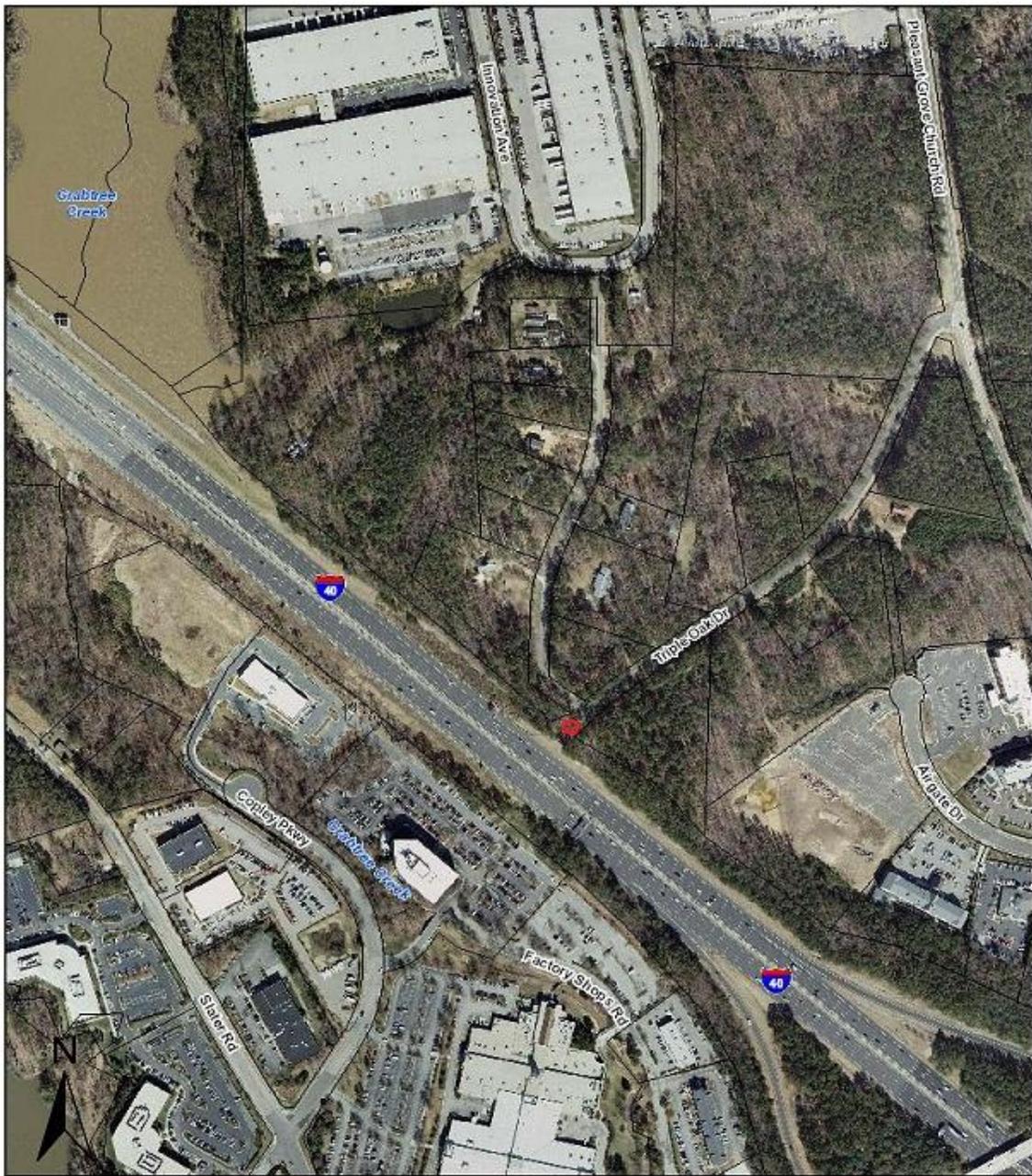
**Table 45. Investigated Locations for Near Road Monitoring Station on I-40**

Key	Road Segment	Location	Comments
D	I-40 Exit 285 to 287	Quarry	Located on downwind side of road, access may be possible through the quarry access road, no nearby power source. Location is on same grade as I-40. Monitor could be impacted by the quarry trucks and dust.
E	I-40 Exit 285 to 287	Reedy Creek Road	Access to I-40 may be possible at Lake Crabtree Park near the Reedy Creek overpass. Site would be located on the upwind side of the road. Would need a road from the overpass area down to road level.
F	I-40 Exit 285 to 287	RDU Center Drive	Would be on the downwind side of the road. Site would be significantly above the grade of the roadway. Many trees would need to be cleared and an access road built from the parking lot.
G	I-40 Exit 283 to 284	Triple Oak Drive	On the downwind side of the road. Site would be on grade with I-40. Easy access from Triple Oak Drive. Power available nearby. Limited number of trees would need to be cleared.

The location investigated with the most potential for becoming a near road monitoring site is Location G off of Triple Oak Drive. An aerial view of the location is shown in Figure 2. The monitoring probe would be located about 25 to 30 meters from the edge of I-40. The monitoring station would be approximately 1 kilometer from I-540 and 0.5 kilometers from Airport Boulevard. The Airport Boulevard ramp ends approximately 300 meters southeast from the proposed monitoring site. The proposed location would be at grade with the roadway. There would be no barriers between the road and the monitoring station.



**Figure 45 Locations Investigated for Near Road Monitoring Station**



**Figure 46 Proposed Wake County Near Road Monitoring Station Location (red circle)**

**Step 6 Location of Other Potential Sources of Pollution**

The proposed location is located in the flight path for airplanes landing at the Raleigh Durham Airport. It is located more than 2 kilometers away from any stationary

point sources with active air permits. There are five permitted facilities within 3 kilometers of the proposed monitoring station. There are 12 permitted facilities within 6 kilometers of the proposed monitoring station that emit nitrogen oxides. The amount of nitrogen oxides emitted from these 12 facilities ranges from 0.6 to 23.8 tons per year. The predominant wind comes from the southwest. The facility emitted the largest amount of nitrogen dioxide is located about 4.5 kilometers to the northwest of the site. There are three facilities within 3 kilometers of the proposed site that emit less than 8.4 tons per year of nitrogen dioxide. The facility located to the east emits more than the other two facilities, which are located to the southwest.

The EPA has also indicated that they plan to extend monitoring at these near road sites to include carbon monoxide, particle pollution (black carbon and ultrafine particles), and possibly air toxics. There are 12 permitted facilities within 6 kilometers of the proposed monitoring station that emit carbon monoxide. The carbon monoxide emissions are very similar to the emissions of nitrogen oxides. The largest emissions of 32.6 tons per year come from a facility located about 4.5 kilometers to the northwest of the site. There are three facilities within 3 kilometers of the proposed site that emit much smaller amounts of carbon monoxide. One facility is located to the east and the other two facilities are located to the southwest.

There are 10 permitted facilities within 6 kilometers of the proposed monitoring station that emit fine particles. No emission data is available for ultrafine particles so the fine particle data was substituted as a surrogate to provide limited information about the possibility of ultrafine particle emissions in the area. The fine particle emissions are different from the emissions of nitrogen oxides and carbon monoxides in that all of the facilities emit similar amounts of fine particles (between 0 and 0.8 tons per year). The largest emitter is located about 5 kilometers to the south and emits 0.8 tons per year.

There are 10 permitted facilities within 6 kilometers of the proposed monitoring station that emit VOCs. The VOC data are being used as a surrogate to provide limited information about the possibility of air toxic emissions in the area. The VOC emissions are different from the emissions of nitrogen oxides, carbon monoxide, and fine particles in that most of the emissions come from two facilities, located about 5 kilometers away to the south and west, and the other facilities emit very small amounts of VOC (between 0 and 12.6 tons per year). The closest facilities are about 3 kilometers away, one to the east and the other to the southwest and emit very little VOC.

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

Preliminary analysis of the road segments in the Greensboro-High Point MSA using highest average annual daily traffic values adjusted for fleet mix indicates the monitoring station should be located along Knox Road near Exit 132. The segments in the Greensboro-High Point MSA with the highest average annual daily traffic adjusted for fleet mix are shown in Table 47.

**Table 46. Fleet Equivalent Average Annual Daily Traffic for Selected Road Segments in the Greensboro-High Point MSA**

STATION	ROUTE	LOCATION	Station	Percent Passenger	2010 AADT	Fleet Equivalent AADT
(B) 3400	I-85	From Exit 131 To Exit 132	Extrapolate	85%	106,000	249,100
(C) 697	I-85	From Exit 132 To Exit 135	Extrapolate	85%	106,000	249,100
(D) 811	I-85	From Exit 135 To Exit 138	Extrapolate	85%	106,000	249,100
(E) 813	I-85	From Exit 138 To Exit 140	10MC0001	85%	104,000	244,400
(A) 340	I-85 BUS	From Exit 37 To Exit 39	09MC0066	88%	117,000	243,360
(F) 341	I-85 BUS	From Exit 36b To Exit 37	09MC0065	90%	118,000	224,200
(G) 508	I-40	From Exit 211 To Exit 212	09MC0023	89%	112,000	222,840
(H) 902	I-40	From Exit 206 To Exit 208	09MC0022	88%	103,000	214,240

The locations of these segments are shown with lettered black squares in Figure 48. They stretch from the eastern part of Guilford County to the western part with heaviest fleet adjusted average annual daily traffic being from central Greensboro going east toward Burlington. At this time, the NC-DAQ is considering placing the monitor along Knox Road by exit 132 on I-85 (Square B). This location is desirable because it is one of the segments with the highest fleet adjusted average annual daily traffic and it is easily accessible from Knox Road. This monitoring station is not required to start monitoring until January 1, 2017.



**Figure B47. Possible Locations of Future Greensboro Near-Roadway Nitrogen Dioxide Monitoring Sites**

At this time due to lack of funds, the United States Environmental Protection Agency is revising the regulation to require near road monitors in MSAs with less than one million people to start operating on January 1, 2017. The NC-DAQ will do a more thorough analysis of road segments in the Greensboro-High Point MSA using 2014 traffic data to determine the best location for the monitoring station in 2017. At that time the NC-DAQ will also evaluate any potential sites based on congestion patterns, roadway design, terrain, and meteorology.

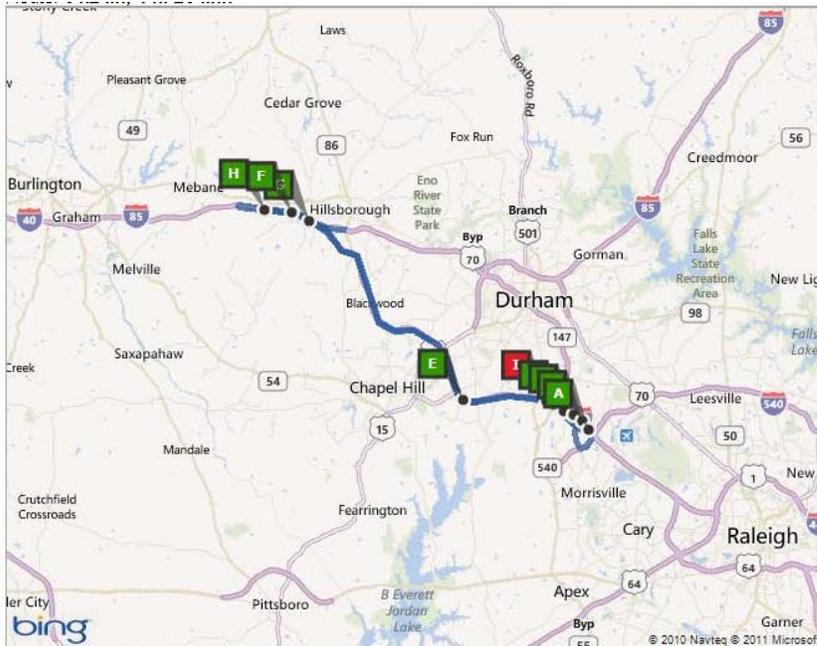
3. Durham-Chapel Hill Core Based Statistical Area

Preliminary analysis of the road segments in the Durham-Chapel Hill MSA using highest average annual daily traffic values adjusted for fleet mix indicates the monitoring station should be located near the Page Road exit along I-40. The segments in the Durham-Chapel Hill MSA with the highest average annual daily traffic adjusted for fleet mix are shown in Table 47.

**Table 47. Fleet Equivalent Average Annual Daily Traffic for Road Segments in the Durham-Chapel Hill Metropolitan Statistical Area**

<b>STATION</b>	<b>ROUTE</b>	<b>LOCATION</b>	<b>Station</b>	<b>Percent Passenger</b>	<b>2010 AADT</b>	<b>Fleet Equivalent AADT</b>
(A) 1011	I-40	FROM EXIT 282 TO EXIT 283	09MC0030	90%	163000	309,700
(B) 947	I-40	FROM EXIT 281 TO EXIT 282	09MC0030	90%	159000	302,100
(C) 547	I-40	FROM EXIT 280 TO EXIT 281	09MC0030	90%	152000	288,800
(D) 553	I-40	FROM EXIT 279 TO EXIT 280	10MC0005	94%	151000	239,335
(E) 942	I-40	FROM EXIT 273 TO EXIT 274	09MC0028	90%	112000	208,768
(F) 6	I-85	FROM EXIT 160 TO EXIT 161	09MC0069	88%	97000	206,125
(G) 91	I-85	FROM EXIT 161 TO EXIT 163	09MC0069	88%	94000	199,750
(H) 5	I-85	FROM EXIT 157 to EXIT 160	09MC0069	88%	92000	195,500
(I) 727	I-40	FROM EXIT 278 TO EXIT 279	10MC0005	94%	121000	191,785

The locations of these segments are shown with lettered green and red squares in Figure 48. They stretch from the eastern part of Durham County into central Orange County with heaviest fleet adjusted average annual daily traffic being along I-40 near the Durham-Wake County line. Because the highest ranked sites are within two miles of the Raleigh-Cary near road monitoring site off of Triple Oak Road along I-40 between Exit 283 and Exit 284 and have similar traffic counts and heavy duty vehicle make-up, the NC-DAQ is requesting a waiver for the near road Durham-Chapel Hill monitoring site.



**Figure 48. Locations of Segments with Highest Fleet Adjusted AADT in the Durham-Chapel Hill MSA**

At this time due to lack of funds, the United States Environmental Protection Agency is revising the regulation to require near road monitors in MSAs with less than one million people to start operating on January 1, 2017. Thus, if the EPA does not provide a waiver for this monitoring site, the NC-DAQ will do a more thorough analysis of road segments in the Durham-Chapel Hill MSA using 2014 traffic data to determine the best location for the monitoring station in 2017. At that time the NC-DAQ will also evaluate any potential sites based on congestion patterns, roadway design, terrain, and meteorology.

*B. Area wide sites*

The area wide sites will be located at the NCore sites in Charlotte and Raleigh. Mecklenburg County Air Quality already operates a nitrogen dioxide monitor at the Garinger NCore site. The NC-DAQ currently does not operate a nitrogen dioxide monitor and currently does not own any nitrogen dioxide monitors.

The area wide sites are required to be up and operational by January 1, 2013. Although the NC-DAQ is making every effort to have the area wide nitrogen dioxide monitor up and operational by the required time, it is possible that the January 1 start date may not be met for the following reasons:

- Office of Research and Development (ORD) approved a new method for measuring nitrogen dioxide in May 2012. The new method uses a photolytic convertor rather than a high temperature molybdenum convertor. The photolytic convertor is much more selective for nitrogen dioxide and suffers from less interference than the molybdenum convertor. As a result the United States Environmental Protection Agency is strongly encouraging agencies to purchase equipment that uses this new method.

- The State of North Carolina is on a July 1 to June 30 Fiscal Year so no major purchases of equipment were allowed after April 16, 2012. Purchases will once again be allowed sometime after July 1. However, the NC-DAQ does not own a nitrogen dioxide monitor and was unable to purchase any type of nitrogen dioxide monitor before the cut off date for major purchases.
- Because the equipment is new, there are many people ordering the equipment all at one time. This rush of orders could result in the equipment being back-ordered, resulting in a longer delivery time than the standard six to eight week schedule.
- The State of North Carolina has no experience operating nitrogen dioxide monitors. Thus, NC-DAQ will need to receive training on the equipment and learn how to use it before it can be used in the field.
- The new equipment requires different calibration procedures than any of the existing equipment currently being used by NC-DAQ. The calibration equipment currently owned by NC-DAQ may not be capable of providing the necessary calibrations to the needed level of accuracy. Thus, the NC-DAQ may need to purchase new calibration equipment. Investigating this situation and purchasing the needed equipment will take time and could delay installation and use of the equipment in the field.
- The State of North Carolina does not have a quality assurance project plan or standard operating procedure for nitrogen dioxide. These documents will need to be written before monitoring can begin.
- The equipment will need to be incorporated into an existing site which will require time to integrate the new equipment without causing problems for the existing equipment.

For all of these reasons, despite the NC-DAQ's best efforts, a high probability exists that the area wide nitrogen dioxide monitor in the Raleigh-Cary MSA may not be up and operational by January 1, 2013. Should this situation occur and the nitrogen dioxide monitor is not operational by January 1, 2013, the NC-DAQ requests that the requirement for an area wide nitrogen dioxide monitor in the Raleigh-Cary MSA be waived for up to three to six months until all of these issues are satisfactorily resolved. The NC-DAQ believes this request is in the best interest of all parties because the monitor is expected to have a lifetime of 10 years and provides data in which the users of the data can have greater confidence that the numbers reported actually represent nitrogen dioxide. A potential loss of a few months of data in exchange for having higher quality for the next 10 years is a reasonable tradeoff.

### *C. Regional Administrator Required Monitoring*

For information on the selection of Hattie Avenue as a regional administrator required monitoring site see Appendix C. 2012 Annual Monitoring Network Plan for Forsyth County Office of Environmental Assistance and Protection.

The locations of the required nitrogen dioxide monitoring sites are provided in Table 48. All monitors listed in Table 48 are suitable for determining a violation of the National Ambient Air Quality Standards (NAAQS). All of the monitors either currently or will meet the requirements of Appendices A, C, D, and E of 40CFR58 after the Quality Assurance Project Plan and Standard Operating Procedures are submitted to the EPA for new procedures, and the procedures are approved by the EPA. All near road monitors and the Raleigh-Cary area wide monitor will use a chemiluminescence detector with a photolytic convertor. The Charlotte area wide monitor uses the U.S. EPA reference method designation RFNA-1289-074 (Air Quality System (AQS) Method Code 074). The Winston-Salem Regional Administrator Required monitor uses the U.S. EPA reference method designation RFNA-1194-099 (Air Quality System (AQS) Method Code 099).

Table 49 provides the monitor type, operating schedules, monitoring objectives, scales, and statement of purpose for all of the required monitors in the North Carolina nitrogen dioxide Monitoring Network. All monitors operate on an hourly year-round schedule. Table 50 summarizes the status for each required monitoring site regarding whether it is suitable for comparison to the NAAQS and meets the requirements in 40 CFR58 Appendices A, C, D, and E and also provides the proposed changes to the network.

**Table 48 North Carolina Nitrogen Dioxide Monitoring Network – Monitor Locations <sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371190041 <sup>b</sup>	Garinger	1130 Eastway Drive	Charlotte	-80.785683	35.240100	Charlotte-Gastonia-Rock Hill
37119004x <sup>b</sup>	New Near Road Site	To be determined	Charlotte	To be determined	To be determined	Charlotte-Gastonia-Rock Hill

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
371830014	Millbrook	3801 Spring Forest Road	Raleigh	-78.574167	35.856111	Raleigh-Cary
371830021 <sup>c</sup>	Triple Oak Road	Triple Oak Road	Raleigh	-78.8195	35.8654	Raleigh-Cary

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370810015	Knox Road	Knox Road	Greensboro	-79.6627	36.0598	Greensboro

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370630016 <sup>d</sup>	Page Road	Page Road	Durham	-78.8425	35.8858	Durham-Chapel Hill

**Winston-Salem Metropolitan Statistical Area**

AQS Site Identification Number	Site Location					MSA, CSA, or CBSA represented
	Site Name	Street Address	City	Longitude	Latitude	
370670022 <sup>e</sup>	Hattie Ave.	Corner of 13 <sup>th</sup> & Hattie Avenue	Winston-Salem	-80.226667	36.110556	Winston-Salem

<sup>a</sup> All near road monitors and the Raleigh-Cary area wide monitor will use a chemiluminescence detector with a photolytic convertor. The Charlotte area wide monitor uses the U.S. EPA reference method designation RFNA-1289-074 (Air Quality System (AQS) Method Code 074). The Winston-Salem Regional Administrator Required monitor uses the U.S. EPA reference method designation RFNA-1194-099 (Air Quality System (AQS) Method Code 099). All monitors listed in this table are suitable for comparison to the National Ambient Air Quality Standards. All monitors in this table meet the requirements of Appendices A, C, D, and E of 40CFR58.

<sup>b</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>c</sup> This monitor will start in 2013.

<sup>d</sup> This monitor will start in 2017.

<sup>e</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403).

**Table 49 Statement of Purpose for the North Carolina Nitrogen Dioxide Monitoring Network<sup>a</sup>**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
371190041 <sup>b</sup>	Garinger	SLAMS	Hourly	Area Wide site in Charlotte-Gastonia-Rock Hill MSA. AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood
3711900xx <sup>b</sup>	New Near Road Site	SLAMS	Hourly	Near Road monitoring site. AQI Reporting. Compliance w/NAAQS.	Source Oriented	Micro-scale

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
371830014 <sup>c</sup>	Millbrook	SLAMS	Hourly	Area Wide site in Raleigh-Cary MSA. AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood
371830021 <sup>c</sup>	Triple Oak Road	SLAMS	Hourly	Near Road monitoring site. AQI Reporting. Compliance w/NAAQS.	Source Oriented	Micro-scale

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370810015 <sup>d</sup>		SLAMS	Hourly	Near Road monitoring site. AQI Reporting. Compliance w/NAAQS.	Source Oriented	Micro-scale

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370630016 <sup>d</sup>	Page Road	SLAMS	Hourly	Near Road monitoring site. AQI Reporting. Compliance w/NAAQS.	Source Oriented	Micro-scale

**Winston-Salem Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Monitor Type	Operating Schedule	Statement of Purpose	Monitoring Objective	Scale
370670022 <sup>e</sup>	Hattie Ave.	SLAMS	Hourly	Regional Administrator required monitor for the Winston-Salem MSA. AQI Reporting. Compliance w/NAAQS.	Population Exposure	Neighbor-hood

<sup>a</sup> All near road monitors and the Raleigh-Cary area wide monitor will use a chemiluminescence detector with a photolytic convertor. The Charlotte area wide monitor uses the U.S. EPA reference method designation RFNA-1289-074 (Air Quality System (AQS) Method Code 074). The Winston-Salem Regional Administrator Required monitor uses the U.S. EPA reference method designation RFNA-1194-099 (Air Quality System (AQS) Method Code 099). All monitors listed in this table are suitable for comparison to the National Ambient Air Quality Standards. All monitors in this table meet the requirements of Appendices A, C, D, and E of 40CFR58.

<sup>b</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>c</sup> This monitor will start in 2013.

<sup>d</sup> This monitor will start in 2017.

<sup>e</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403).

**Table 50 Status of North Carolina Nitrogen Dioxide Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network**

**Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
371190041 <sup>b</sup>	Garinger	Yes	Yes – AQS Method Code 074	Yes- Required Area Wide Monitor for the Charlotte-Gastonia-Rock Hill MSA.	None
3711900xx <sup>b</sup>	New Near Road Site	Yes	Yes – AQS Method Code to be assigned	Yes- Required Near Road Monitor for the Charlotte-Gastonia-Rock Hill MSA.	Monitor will be up and operational by 1/1/2014

**Raleigh-Cary Metropolitan Statistical Area**

AQS Site ID Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
371830014	Millbrook	Yes	Yes – AQS Method Code to be assigned	Yes- Required Area Wide Monitor for the Raleigh-Cary MSA.	Monitor will be up and operational by 7/1/2013
371830021	Triple Oak Road	Yes	Yes – AQS Method Code to be assigned	Yes- Required Near Road Monitor for the Raleigh-Cary MSA.	Monitor will be up and operational by 1/1/2014

**Greensboro-High Point Metropolitan Statistical Area**

AQS Site Identification Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370810015 <sup>c</sup>		Yes	Yes – AQS Method Code to be assigned	Yes- Required Near Road Monitor for the Raleigh-Cary MSA.	Monitor will be up and operational by 1/1/2017

**Durham-Chapel Hill Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370630015 <sup>c</sup>	Durham Armory	No	No – AQS Method Code 702	Yes - Required Monitor	None

**Winston-Salem Metropolitan Statistical Area**

AQS Site Id Number	Site Name	Suitable for Comparison to NAAQS	Meets Requirements of Part 58 Appendices <sup>a</sup>		Proposal to Move or Change
			C	D	
370670022 <sup>d</sup>	Hattie Ave.	No	No – AQS Method Code 702	No – not a required monitor.	None
370670030 <sup>d</sup>	Clemmons	No	No – AQS Method Code 702	No – not a required monitor.	None

**Table 50 Status of North Carolina Nitrogen Dioxide Monitoring Network in Meeting the Requirements of Part 58 and Proposed Changes to the Network**

<sup>a</sup> All near road monitors and the Raleigh-Cary area wide monitor will use a chemiluminescence detector with a photolytic convertor. The Charlotte area wide monitor uses the U.S. EPA reference method designation RFNA-1289-074 (Air Quality System (AQS) Method Code 074). The Winston-Salem Regional Administrator Required monitor uses the U.S. EPA reference method designation RFNA-1194-099 (Air Quality System (AQS) Method Code 099). All monitors listed in this table are suitable for comparison to the National Ambient Air Quality Standards. All monitors in this table meet the requirements of Appendices A, C, D, and E of 40CFR58.

<sup>b</sup> Operated by the Mecklenburg County Air Quality (AQS Reporting Agency 0669)

<sup>c</sup> This monitor will start in 2013.

<sup>d</sup> This monitor will start in 2017.

<sup>e</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection (AQS Reporting Agency 0403).

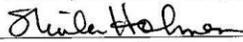
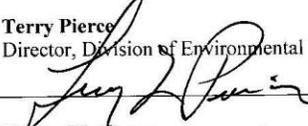
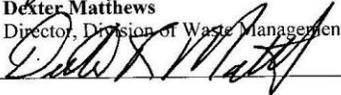
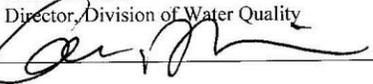
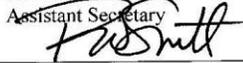
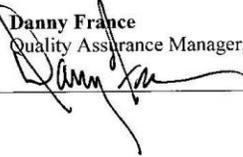
## **XII. EPA Approval Dates for Quality Management Plan and Quality Assurance Project Plans**

The dates that the Environmental Protection Agency approved the Quality Management Plan and Quality Assurance Project Plans for the North Carolina Division of Air Quality are provided in Table 51

**Table 51. Dates the EPA Approved the Quality Management Plan and Quality Assurance Project Plans**

<b>Document</b>	<b>Date Approved by EPA</b>
Quality Management Plan	August 18, 2011
Quality Assurance Project Plan for PM 2.5 Monitoring	January 16, 2002
Quality Assurance Project Plan for Criteria Pollutant Monitoring	November 6, 2006
Quality Assurance Project Plan for NCore Monitoring	(submitted October 12, 2010)

Concurrence and Approvals

- |   |           |  |       |                 |
|---|-----------|--|-------|-----------------|
| (1)   | Name      | <b>Sheila Holman</b>   | Phone | (919) 733-3340  |
|   | Title     | Director, Division of Air Quality  |       |                 |
|   | Signature |     | Date  | <u>6-13-11</u>  |
| (2)   | Name      | <b>Terry Pierce</b>  | Phone | (919) 733-0711  |
|   | Title     | Director, Division of Environmental Health   |       |                 |
|   | Signature |     | Date  | <u>06/15/11</u> |
| (3)   | Name      | <b>Dexter Matthews</b>   | Phone | (919) 508-8414  |
|   | Title     | Director, Division of Waste Management   |       |                 |
|   | Signature |     | Date  | <u>6-7-11</u>   |
| (4)   | Name      | <b>Coleen Sullins</b>  | Phone | (919) 807-6300  |
|   | Title     | Director, Division of Water Quality  |       |                 |
|   | Signature |     | Date  | <u>6/23/11</u>  |
| <u>Approval for Departmental Implementation</u>     |           |  |       |                 |
| (8)   | Name      | <b>Robin Smith</b>   | Phone | (919) 715-4141  |
|   | Title     | Assistant Secretary  |       |                 |
|   | Signature |     | Date  | <u>7/15/11</u>  |
| (9)   | Name      | <b>Dee Freeman</b>   | Phone | (919) 733-4984  |
|   | Title     | Secretary, Department of Environment and Natural Resources                           |       |                 |
|   | Signature |  | Date  | <u>7.15.11</u>  |
| <u>Approval for Environmental Protection Agency</u> |           |  |       |                 |
| (10)  | Name      | <b>Danny France</b>  | Phone | (706) 355-8738  |
|   | Title     | Quality Assurance Manager, EPA Region 4  |       |                 |
|   | Signature |   | Date  | <u>8/18/11</u>  |

**Figure 49. Signature Page from the DENR Quality Management Plan**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

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



JAN 15 2002

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

Dear Mr. Kimball:

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

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

Sincerely,

Gary Bennett  
Office of Quality Assurance and  
Data Integration

cc: Ed Carreras  
Herbert Barden



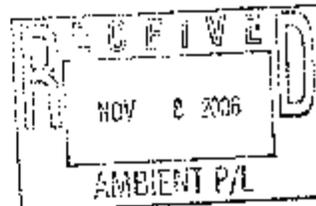
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

*(Brook copied 11/13)*

REGION 4

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

NOV 6 2006



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

SESD Project #07 0065

Dear Mr. Kimball:

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

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

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

Sincerely,

Marilyn Thornton, Chief  
Office of Quality Assurance and  
Data Integration

Enclosure

cc: Doug Nealey  
Stephanie Wimpey

**From:** Redmond, Donnie  
**Sent:** Tuesday, October 12, 2010 8:16 AM  
**To:** Garver.daniel@epa.gov; Sciera.Katherine@epamail.epa.gov  
**Cc:** Steger, Joette  
**Subject:** NCDAQ NCore QAPP  
**Attachments:** NCore QAPP\_final 10\_08\_2010.pdf

Daniel,

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

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

Thanks,  
Donnie

**Please note new email address: [donnie.redmond@ncdenr.gov](mailto:donnie.redmond@ncdenr.gov)**

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

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

**Figure 50. NCore QAPP Submittal Documentation**

### **XIII. Equipment Condition of North Carolina Monitoring Sites**

Ozone monitors and Calibrators Thermo 49C and 49CPS are in good condition. Manufacturer supports this equipment until August 2015.

SO<sub>2</sub> monitors Thermo 43C and CO Thermo 48C are in good condition and support until August 2015.

NO<sub>y</sub> Thermo 42s and CO Thermo 48s are in poor condition and only used at Rockwell site. These are due to be replaced with new monitors, as manufacturer does not support these.

NCORE site equipment are new and good condition.

Site buildings are in fair to good condition. They are maintained by ECB. Plans are to replace several buildings over next 3 to 5 years as needed.

TSP and PM<sub>10</sub> are in fair condition and can be maintained by ECB.

BAM equipment is new and good condition.

TEOM monitors are in poor condition, no longer supported by the manufacturer, and need to be replaced.

Met One SASS 9800 units are in fair condition.

URG particulate monitors are in good condition.

Met towers, wind speed and direction sensors are in good condition.

Thermo 146C calibrators used with SO<sub>2</sub>, CO and NO<sub>y</sub> are in good condition and supported until August 2015.

All other equipment used at monitoring sites is also in good condition and can be maintained by Electronics and Calibration Branch (ECB).

#### **XIV. References**

1. Title 40 Code of Federal Regulations Part 58, Ambient Air Quality Surveillance. Part 58 and Part 58 Amended: Federal Register/Vol. 71 No. 200/Tuesday, October 17, 2006/Rules and Regulations.
2. State of North Carolina, Department of Transportation. Traffic Count Information. <http://www.ncdot.org/travel/statemapping/trafficvolumemaps/default.html>. 1500 Mail Service Center, Raleigh, NC, 27699-1500.
3. List of Designated Reference and Equivalent Methods. Issue Date: April 1, 2011. <http://www.epa.gov/ttn/amtic/files/ambient/criteria/reference-equivalent-methods-list.pdf>. United States Environmental Protection Agency, National Exposure Research Laboratory, Human Exposure & Atmospheric Sciences Division (MD-D205-03), Research Triangle Park, NC 27711.

**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 <sub>2</sub>		NO <sub>y</sub>		NO <sub>2</sub>	O <sub>3</sub>	Pb	PM <sub>10</sub>		PM <sub>2.5</sub>			Meteorology			UAT	
	R	H	T	R	T	H	T				M	C	M	C	S	WS/WD	AT/RH	RF/SR		
370010002 Hopedale														X	X		X			
370030004 Waggin Trail									X											
370110002 Linville Falls									X									X		
370130151 Bayview Ferry				X																
370210030 <sup>a</sup> Bent Creek									X											
370210034 <sup>a</sup> Board of Ed													X	X	X					
370210035 <sup>a</sup> AB Tech College																				VOC
370270003 Lenoir				P					X											
370330001 Cherry Grove									E		P		X	X		X				
370350004 Hickory Water Tower				P							X		X	X	X					
370370004 Pittsboro				X					X				X							
370510008 Wade									X											
370510009 Wm Owen											X		X	X		X	X	X		
370511003 Golfview				X					X											
370570002 Lexington Water Tower													X	X	X					
370590003 Mocksville									X											
370610002 Kenansville											X		X							
370630015 Durham Armory									X		X		X	X		P				
370650004 Springfield Rd													X							
370650099 Leggett									X				X							
370670022 <sup>b</sup> Hattie Ave.				X				X	X			X	X	X	X					VOC
370670023 <sup>b</sup> Peters Creek	X											X								

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

Site ID Site Name	CO			SO <sub>2</sub>		NO <sub>v</sub>		NO <sub>2</sub>	O <sub>3</sub>	Pb	PM <sub>10</sub>		PM <sub>2.5</sub>			Meteorology			UAT	
	R	H	T	R	T	H	T				M	C	M	C	S	WS/WD	AT/RH	RF/SR		
370670028 <sup>b</sup> Shiloh Church									X											
370670030 <sup>b</sup> Clemmons									X				X	X						
370671008 <sup>b</sup> Union Cross									X						X		AT			
370690001 Franklinton									E											
370710016 Grier M. S.											P		X	X		X				
370750001 <sup>c</sup> Joanna Bald									X									X		
370770001 Butner									X											
370810013 Mendenhall					P				X		X		X	X		X		X	X	
370810014 Colfax													X			X				
370870008 Waynesville E.S.									X											
370870012 Waynesville Recreation Center													X							
370870035 Fry Pan									X											
370870036 Purchase Knob									X											
371010002 West Johnston									X				X	P						
371070004 Lenoir Community College									X				X			X		X	X	
371090004 Crouse									X											
371110004 East Marion											X		X	X		X				
371170001 Jamesville					X				X				X	X						
371190003 <sup>d</sup> #11 Fire Station											X									
371190041 <sup>d</sup> Garinger	X		X		X		X	X	X	P	X		X	X	X	X		X	X	VOC
371190042 <sup>d</sup> Montclair										P	X		X	X						
371190043 <sup>d</sup> Oakdale													X							
371191005 <sup>d</sup> Arrowood									X											

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

Site ID Site Name	CO			SO <sub>2</sub>		NO <sub>y</sub>		NO <sub>2</sub>	O <sub>3</sub>	Pb	PM <sub>10</sub>		PM <sub>2.5</sub>			Meteorology			UAT	
	R	H	T	R	T	H	T				M	C	M	C	S	WS/WD	AT/RH	RF/SR		
371191009 <sup>d</sup> County Line									X											
371210001 Spruce Pine													X							
371230001 Candor											X		X							VOC
371290002 Castle Hayne									X				X	X			P			
371290006 New Hanover				X																
371290010 Battleship																				VOC
371450003 BushyFork									E											
371470006 Pitt Co Ag Cen									X				X							
371550005 Linkhaw													X							
371570099 Bethany				X					X											
371590021 Rockwell		X	P		P	X	P		X				X	X	X		X		P	
371590022 Enochville									E											
371730002 Bryson City									X				E	X			X		X	X
371790003 Monroe M. S.									X											
371830014 Millbrook			X		X		X	P	X	P	X		X	X	X		X		X	VOC
371830016 Fuquay									X											
371830018 Crabtree	E																			
371830020 Finley Farm													X							
371890003 Boone													X							
371910005 Dillard													X	X			X			
371990004 Mt Mitchell									X											

CO = Carbon Monoxide  
 SO<sub>2</sub> = Sulfur Dioxide  
 NO<sub>y</sub> = Reactive Oxides of Nitrogen  
 O<sub>3</sub> = Ozone  
 Pb = Lead  
 PM<sub>10</sub> = Particles of 10 micrometers or less in aerodynamic diameter  
 PM<sub>2.5</sub> = Fine Particles  
 X = monitor operating at site  
 E = monitor at site will end by 12/31/2011 or 12

H = 48S monitor for CO  
 T = 48i or Teledyne API (TAPI) 300EU monitor for CO, 43 TLE monitor for SO<sub>2</sub>  
 M = Wedding or GMW 1200 for PM<sub>10</sub>, 2025 Sequential for PM<sub>2.5</sub>  
 C = TEOM or BAM  
 S = Met One SASS monitor and URG 3000N  
 WS/WD = Wind speed & direction  
 AT/RH = air temperature & relative humidity  
 RF/SR = Rainfall & solar radiation

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

Site ID Site Name	CO			SO <sub>2</sub>		NO <sub>v</sub>		NO <sub>2</sub>	O <sub>3</sub>	Pb	PM <sub>10</sub>		PM <sub>2.5</sub>			Meteorology			UAT
	R	H	T	R	T	H	T				M	C	M	C	S	WS/WD	AT/RH	RF/SR	

P = monitoring proposed to start at site

UAT = Urban Air Toxics

R = 48C monitor for CO, 43C monitor for SO<sub>2</sub>

VOC = Volatile Organic Compounds

<sup>a</sup> Operated by the Western North Carolina Regional Air Quality Agency

<sup>b</sup> Operated by the Forsyth County Office of Environmental Assistance and Protection

<sup>c</sup> This monitor is owned by the United States Forest Service and operated by the North Carolina Division of Air Quality

<sup>d</sup> Operated by the Mecklenburg County Air Quality

## **Appendix B. 2012 Annual Monitoring Network Plan for Mecklenburg County Air Quality**

Please see the following internet web address:

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

**Appendix C. 2012 Annual Monitoring Network Plan for Forsyth County Office of Environmental Assistance and Protection**

Please see the following internet web address:

**[http://daq.state.nc.us/monitor/monitoring\\_plan/Forsyth\\_2011\\_Plan.pdf](http://daq.state.nc.us/monitor/monitoring_plan/Forsyth_2011_Plan.pdf)**

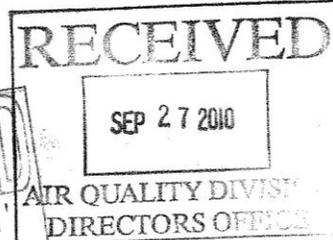
Appendix D. 2010 Network Plan EPA Approval Letter

*Demi*



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

SEP 22 2010



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

Dear Ms. Holman/ *Sheila* :

Thank you for submitting the State of North Carolina's 2010 annual ambient air monitoring network plan (Network Plan), dated July 1, 2010. The Network Plan is required by 40 Code of Federal Regulations (CFR) §58.10. The Network Plan covers the ambient air monitoring network for the North Carolina Division of Air Quality (NC-DAQ) and its local agencies.

The Environmental Protection Agency (EPA) Region 4 understands that the NC-DAQ provided a 30-day public comment period and received comments from PCS Phosphate Company, Inc. and Mr. Clayton Moore. EPA found that NC-DAQ sufficiently considered and responded to the comments. According to 40 CFR §58.10(a)(2), since public inspection and comment have already been solicited, the EPA Region 4 is not required to offer another comment period.

Based upon our review of the Network Plan, EPA Region 4 has determined that the document satisfies the applicable requirements of 40 CFR Part 58. The Network Plan is approved. Comments and recommendations are enclosed.

Thank you for your work with us to monitor air pollution and promote healthy air quality in North Carolina and the nation. If you have any questions or concerns, please contact Doug Neeley at (404) 562-9097 or Katherine Sciera at (404) 562-9840.

Sincerely,

Gwendolyn Keyes Fleming  
Regional Administrator

Enclosure

233

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<sub>2</sub>) and sulfur dioxide (SO<sub>2</sub>) with minimum monitoring requirements effective January 1, 2013. Minimum monitoring requirements are listed for ozone (O<sub>3</sub>), particulate matter less than 2.5 microns (PM<sub>2.5</sub>), particulate matter less than 10 microns (PM<sub>10</sub>), 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**

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

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

The network described in the 2010 Network Plan meets the minimum O<sub>3</sub> monitoring requirements specified by 40 CFR Part 58, Appendix D, Table D-2 in all areas.

**Minimum PM<sub>10</sub> 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<sub>10</sub> primary monitoring network meets the minimum requirements for all areas. All PM<sub>10</sub> 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<sub>10</sub> 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<sub>10</sub> sampling.

**Minimum PM<sub>2.5</sub> 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<sub>2.5</sub> monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-5 for all MSAs. Manual PM<sub>2.5</sub> collocation requirements are found in 40 CFR Part 58, Appendix A, section 3.2.5. Fifteen percent of each network of manual PM<sub>2.5</sub> methods (at least one site) must be collocated. The manual collocation requirement for PM<sub>2.5</sub> 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<sub>2.5</sub> 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<sub>2.5</sub> Continuous Monitoring Requirements**  
**40 CFR Part 58, Appendix D 4.7.2**

Regulatory requirements for continuous PM<sub>2.5</sub> monitoring require that "...State, or where appropriate, local agencies must operate continuous PM<sub>2.5</sub> 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<sub>2.5</sub> monitoring requirements are currently met in the all of the MSAs in the State. Also, the continuous PM<sub>2.5</sub> collocation requirements are currently met in all MSAs. Therefore, the continuous PM<sub>2.5</sub> monitoring network described in the 2010 Network Plan meets all of the design criteria of 40 CFR Part 58.

**PM<sub>2.5</sub> 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<sub>2.5</sub> site to monitor for regional background and at least one PM<sub>2.5</sub> site to monitor for regional transport.” The 2010 Network Plan identifies the PM<sub>2.5</sub> 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<sub>2.5</sub> sites at Cherry Grove (AQS ID: 37-033-0001), Jamesville (AQS ID: 37-117-0001), and Bryson City (AQS ID: 37-173-0002) as regional transport sites. Therefore, NC-DAQ has satisfied the requirements of 40 CFR Part 58 for background and transport sites.

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

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

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

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

Nucor Steel  
1505 River Road  
Cofield, NC 27922

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

**Air Quality Index (AQI) Reporting  
40 CFR §58.50**

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

**Monitoring Network Changes Proposed by NC-DAQ**

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

**Table 2: Monitors proposed for discontinuation/location change**

AQS ID	Pollutant	Type	Comments
37-173-0002	SO <sub>2</sub>	SLAMS	Monitor was shut down after EPA approval dated June 24, 2010
37-081-0013	PM <sub>2.5</sub>	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 <sub>10</sub>	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<sub>10</sub>, PM<sub>2.5</sub>, and O<sub>3</sub> 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<sub>2.5</sub> 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<sub>2</sub> 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<sub>10</sub> 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 E. 2011 Network Plan EPA Approval Letter



### UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4  
ATLANTA FEDERAL CENTER  
61 FORSYTH STREET  
ATLANTA, GEORGIA 30303-8960

OCT 20 2011

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

RECEIVED OCT 31 2011

Dear Ms. Holman:

Thank you for submitting the State of North Carolina's 2011 annual ambient air monitoring network plan (Network Plan), dated July 1, 2011. The Network Plan is required by 40 Code of Federal Regulations (CFR) §58.10. The Network Plan covers the ambient air monitoring network for the North Carolina Division of Air Quality and its local agencies.

The U. S. Environmental Protection Agency Region 4 understands that the NC-DAQ provided a 30-day public comment period and did not receive any public comments. According to 40 CFR §58.10(a)(2), since public inspection and comment have already been solicited, EPA Region 4 is not required to offer another comment period.

Based upon our review of the Network Plan, EPA Region 4 has determined that the plan satisfies the applicable requirements of 40 CFR part 58. Therefore the Network Plan is approved.

Thank you for working with us to monitor air pollution and promote healthy air quality in North Carolina and the nation. If you have any questions or concerns, please contact Doug Neeley at (404) 562-9097 or Katherine Snyder at (404) 562-9840.

Sincerely,

A handwritten signature in black ink, appearing to read "Gwendolyn Keyes Fleming".

Gwendolyn Keyes Fleming  
Regional Administrator

Enclosures

cc: Mr. Donnie Redmond  
Supervisor IV, North Carolina Dept. of Air Quality

Mr. Don R. Willard  
Director, Mecklenburg County Land Use and Environmental Services Agency

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

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

FY 2011 State of North Carolina Ambient Air Monitoring Network Plan  
U.S. EPA Region 4 Comments and Recommendations

This document contains U.S. EPA Region 4 comments and recommendations on the State of North Carolina's 2011 ambient air monitoring network plan (Network Plan). Ambient air monitoring rules, which include regulatory requirements that address network plans, data certification, and minimum monitoring requirements, among other requirements, are found in 40 CFR Part 58. Minimum monitoring requirements for criteria pollutants are listed in 40 CFR Part 58, Appendix D. Minimum monitoring requirements do not exist for carbon monoxide (CO) unless required by the establishment of a National Core (NCore) multi-pollutant monitoring station, and/or a state implementation plan. However, new national ambient air quality standards (NAAQS) were promulgated in 2010 for nitrogen dioxide (NO<sub>2</sub>) and sulfur dioxide (SO<sub>2</sub>) with minimum monitoring requirements effective January 1, 2013. Minimum monitoring requirements for nitrogen dioxide (NO<sub>2</sub>) will be addressed in the 2012 network plans. Minimum monitoring requirements are listed in this document for ozone (O<sub>3</sub>), particulate matter less than 2.5 microns (PM<sub>2.5</sub>), particulate matter less than 10 microns (PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), 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
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Asheville, NC	412,672
Hickory-Lenoir-Morganton, NC	365,364
Fayetteville, NC	360,355
Wilmington, NC	354,525
Greenville, NC	179,715
Jacksonville, NC	173,064
Burlington, NC	150,358
Rocky Mount, NC	146,536
Goldensboro, NC	113,811

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

The network described in the 2011 Network Plan meets the minimum O<sub>3</sub> monitoring requirements specified by 40 CFR Part 58, Appendix D, Table D-2 in all areas except for the Asheville and Hickory MSAs. The Asheville and Hickory MSAs each have the correct number of required ozone monitors

(two), but only one of those is designated as a State and Local Air Monitoring Station (SLAMS) and the second monitor is designated as “other.” For a monitor to contribute to the minimum monitoring requirement, it must be classified as a SLAMS monitor in EPA’s Air Quality System (AQS), thus the monitor classifications should be updated in AQS.

In addition, a supplemental request to the Network Plan was submitted via email on August 23, 2011 seeking to shutdown the Frying Pan monitor (AQS ID: 37-087-0035) 2-3 weeks prior to October 31. The Frying Pan monitor is operated year round by the National Park Service (NPS) in Great Smoky Mountains National Park. The NPS wants to shutdown the monitor because it needs to replace the monitor’s shelter. Replacing the shelter needs to be done before winter weather in the mountainous area makes the task too difficult. Getting this work done in October will help ensure that the monitor is operational by the beginning of the 2012 ozone monitoring season. EPA concurs that this is necessary and any impact to data completeness during this time frame will be noted appropriately by EPA.

**Minimum PM<sub>10</sub> 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<sub>10</sub> primary monitoring network meets the minimum requirements for all areas. All PM<sub>10</sub> collocation requirements for manual methods found in 40 CFR Part 58, Appendix A, 3.3.1 are currently being met. These include the requirement that fifteen percent of each network of manual PM<sub>10</sub> methods (at least one site) must be collocated.

**Minimum PM<sub>2.5</sub> 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<sub>2.5</sub> monitoring network meets the minimum requirements found in 40 CFR Part 58, Appendix D, Table D-5 for all MSAs. Manual PM<sub>2.5</sub> collocation requirements are found in 40 CFR Part 58, Appendix A, 3.2.5. These include the requirement that fifteen percent of each network of manual PM<sub>2.5</sub> methods (at least one site) must be collocated. The manual collocation requirements for PM<sub>2.5</sub> are currently being met in the Network Plan.

**PM<sub>2.5</sub> Continuous Monitoring Requirements**

**40 CFR Part 58, Appendix D, 4.7.2**

Regulatory requirements for continuous PM<sub>2.5</sub> monitoring require that “...State, or where appropriate, local agencies must operate continuous PM<sub>2.5</sub> analyzers equal to at least one-half (round up) the minimum required sites listed in Table D–5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM [Federal Reference Method/Federal Equivalent Method/Approved Regional Method] monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies.” These minimum continuous PM<sub>2.5</sub> monitoring requirements are currently met in the all of the MSAs in the State. Also, the continuous PM<sub>2.5</sub> collocation requirements are currently met in all MSAs. Therefore, the continuous PM<sub>2.5</sub> monitoring network described in the 2011 Network Plan meets all of the design criteria of 40 CFR Part 58.

**PM<sub>2.5</sub> 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<sub>2.5</sub> site to monitor for regional background and at least one PM<sub>2.5</sub> site to monitor for regional transport.” The 2011 Network Plan identifies seven PM<sub>2.5</sub> sites as regional transport sites that include: Mendenhall (AQS ID: 37-081-0013), Cherry Grove (AQS ID: 37-033-0001), Springfield Road (AQS ID: 37-065-0004), Kenansville (AQS ID: 37-061-0002), Boone (AQS ID: 37-189-0003), Candor (AQS ID: 37-123-0001), and Jamesville (AQS ID: 37-117-0001). The Network Plan identifies three regional transport sites for PM<sub>2.5</sub> identified as: Cherry Grove (AQS ID: 37-033-0001), Jamesville (AQS ID: 37-117-0001), and Bryson City (AQS ID: 37-173-0002). Therefore, NC-DAQ has satisfied the requirements of 40 CFR Part 58 for background and transport sites.

**Lead Monitoring Requirements**  
**40 CFR Part 58, Appendix D, 4.5**

EPA recently revised the monitoring requirements for Pb found at 40 CFR Part 58, Appendix D, Section 4.5 (see 75 Federal Register 81126). These revisions reduced the emissions threshold for facilities near which source oriented Pb monitoring is required from 1.0 tons per year (tpy) to 0.5 tpy. The rule also removed population-based monitoring requirements for Pb and replaced them with a requirement to monitor for Pb at urban NCore sites.

40 CFR Part 58, Appendix D, 4.5 requires that “At a minimum, there must be one source-oriented SLAMS [state and local air monitoring station] site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year...”

In its network plan, North Carolina has requested that EPA grant a waiver of source-oriented Pb monitoring requirements for two sources. Section 4.5(a)(ii) of Appendix D to 40 CFR Part 58 provides the following provisions for a waiver of the Pb monitoring requirements:

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

North Carolina has submitted air modeling indicating that the following sources will not contribute to a maximum Pb concentration in the ambient air in excess of 50% the NAAQS:

Blue Ridge Paper Products, Inc.  
Canton, North Carolina

Saint Gobain Containers  
Wilson, North Carolina

EPA has reviewed this information and concurs that the Pb emissions from each of these sources will not contribute to a maximum Pb concentration in the ambient air in excess of 50% of the NAAQS. Therefore, EPA is granting the waivers of the source-oriented ambient air monitoring requirements at these sources. The waivers must be renewed once every five years as part of the network assessment required under 40 CFR §58.10(d).

North Carolina has also requested that EPA consider revised emissions data related to source-oriented Pb monitoring requirements. North Carolina has submitted information indicating that the actual Pb emissions from the following sources are below 0.50 tpy:

Duke Energy Carolinas, LLC Belews Creek Steam Station Belews Creek, NC	Progress Energy Roxboro Plant Semora, NC
Duke Energy Carolinas, LLC Marshall Steam Station Terrell, NC	Royal Development Co High Point, NC
Duke Energy Carolinas, LLC Allen Steam Station Belmont, NC	U.S. Army Fort Bragg Cumberland County, NC
	U.S. Marine Corps Camp Lejeune Onslow County, NC

EPA has reviewed this information and concurs that the actual Pb emissions from these sources are below 0.50 tpy. Therefore, ambient air monitoring is not required at these sources. Population oriented monitoring is still required at urban NCore sites beginning on December 27, 2011. Based on the 2011 Network Plan, North Carolina will satisfy the minimum monitoring requirements for Pb.

**Sulfur Dioxide Monitoring Requirements**  
**40 CFR Part 58, Appendix D, 4.4**

Ambient air monitoring network design criteria for SO<sub>2</sub> are found in Section 4.4 of Appendix D to 40 CFR Part 58. This section requires that “The population weighted emissions index (PWEI) shall be calculated by States for each core based statistical area (CBSA).” As a result, the SO<sub>2</sub> monitoring site(s) required in each CBSA will satisfy minimum monitoring requirements if the monitor(s) is sited within the boundaries of the parent CBSA and is one of the following site types: population exposure, maximum concentration, source-oriented, general background, or regional transport. An SO<sub>2</sub> monitor at a NCore station may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors consistent with Appendix D, 4.4.

The SO<sub>2</sub> network is to be operational beginning January 1, 2013. The Charlotte-Gastonia-Concord CBSA is required to have a total of two SO<sub>2</sub> monitors. Currently, there is only one operating SO<sub>2</sub> monitor in the CBSA, located at the Garinger site (AQS ID: 37-119-0041). In an e-mail dated September 20, 2011, South Carolina Department of Health and Environmental Control committed to establishing a SO<sub>2</sub> monitor at the York site (AQS ID: 45-091-0006) to assist in meeting the minimum monitoring requirements for this CBSA. Once the SO<sub>2</sub> monitor at the York monitoring site in South

Carolina becomes operational, the Charlotte-Gastonia-Concord CBSA will meet the minimum monitoring requirements under 40 CFR Part 58. Similarly, once the additional SO<sub>2</sub> monitor at Mendenhall (AQS ID: 37-081-0013) becomes operational, the Greensboro-High Point CBSA will meet the minimum monitoring requirements under 40 CFR Part 58. All the other CBSAs meet the minimum monitoring requirements based on the information provided in the 2011 Network Plan.

**Air Quality Index (AQI) Reporting  
40 CFR §58.50**

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

**Monitoring Network Changes Proposed by NC-DAQ**

NC-DAQ has proposed several monitoring network changes in its 2011 Network Plan. Monitors proposed for discontinuation are summarized in Table 2.

**Table 2: Monitors proposed for discontinuation/location change**

AQS ID	Pollutant	Type	Comments
37-183-0018	Carbon Monoxide	SLAMS	Will use the FRM CO monitor at the Millbrook site to fulfill the SIP requirements
37-173-0002	PM <sub>2.5</sub>	SLAMS – Regional transport	Monitor will be shut down at completion of 20 month BAM study (5/2011)

EPA has reviewed these requests for discontinuation or monitor relocation and determined that all of the requested monitors, in Table 2, meet the requirements of 40 CFR §58.14(c)(6) for monitor discontinuation. The minimum monitoring requirements for PM<sub>2.5</sub> and O<sub>3</sub> found in Appendix D to 40 CFR Part 58 will continue to be met for the respective MSAs after these monitors are discontinued.

NC-DAQ also requested to change the monitoring frequency at AQS IDs 37-081-0013, 37-071-0016, 37-051-0009, and 37-001-0001 to 1 in 6 day for PM<sub>2.5</sub> sampling. At this proposed frequency, the monitors will meet the PM<sub>2.5</sub> operating schedule requirements under 40 CFR §58.12(d)(1)(i). Therefore, EPA approves the change in monitoring frequency at these sites.

**National Core (NCore) Monitoring Network**

Ambient air monitoring network criteria for NCore sites are found in Section 3 of Appendix D to 40 CFR Part 58. NC-DAQ has designated two NCore sites in the 2011 Network Plan. The first site (AQS ID 37-183-0014) is located at the East Millbrook Middle School site in Raleigh, NC. The second site (AQS ID 37-119-0041) is located at the Garinger site in Charlotte, NC and is operated by the Mecklenburg County Land Use and Environmental Services Agency. Official EPA approval was granted for these sites on October 30, 2009. The 2011 Network Plan meets the minimum monitoring requirements for NCore sites.

### **Air Quality System (AQS)**

During the review of the 2011 Network Plan, there were a few discrepancies identified between information in the Network Plan and in AQS. The State is responsible for updating monitor type classifications in AQS. Based on listings of monitor types in the Network Plan, NC-DAQ has several monitors that are listed as "other." EPA encourages the State to be more specific in their monitor types in AQS. Monitors that are listed as "other" will be treated as a SLAMS monitor for regulatory evaluations. For a monitor to count toward the minimum monitoring requirement (e.g. ozone requirements above), it must be classified as a SLAMS monitor in AQS, thus the monitor classifications should be updated in AQS (Waggin Trail AQS ID: 37-003-0004).

Also, the State should verify that monitor types in AQS match those in the Network Plan. For example, the ozone monitor at Waynesville (AQS ID 37-087-0004) is listed as a SLAMS monitor in the Network Plan, but as "other" in AQS. In addition, there are discrepancies in monitor type in AQS and the Network Plan for the following sites, AQS IDs: 31-159-0021-42101-1, 37-159-0021-44201-1, and 37-179-003-44201-1.

In addition, the State should verify the PM<sub>2.5</sub> background monitor designations in AQS. There are two sites in AQS designated as PM<sub>2.5</sub> background sites that are not designated in the network plan as background sites. These sites include: Pittsboro (AQS ID: 37-037-0004) and West Johnston (AQS ID: 37-101-0002).

**Appendix F. Monitoring Agreement Between Virginia and North Carolina for the Virginia Beach-Norfolk-New Port News Metropolitan Statistical Area**



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

*Don't forget your file K*

MAR 06 2007

4APT-ATMB

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



Dear Mr. Overcash:

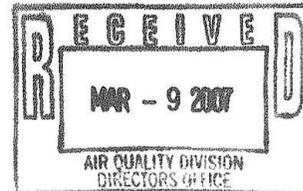
This correspondence is in response to two letters from the North Carolina Department of Environment and Natural Resources, Division of Air Quality (NCDAQ). The first letter dated January 4, 2007; "40 CFR Part 58.12(d)(1) Daily PM<sub>2.5</sub> Sampling - Catawba County", and the second letter dated January 11, 2007; "Virginia/North Carolina MSA Agreement" are discussed in this letter.

40 CFR Part 58.12(d)(1) Daily PM<sub>2.5</sub> Sampling - Catawba County

Your letter stated that the Catawba site Air Quality System (AQS) site, 37-035-0004, met the operational requirement for everyday sampling frequency effective January 1, 2007. Region 4 acknowledges your concerns regarding the increase of the 103 Grant Operations and Maintenance funding that will be the result of the increased PM<sub>2.5</sub> sampling frequency. Funds will be allocated for new monitoring requirements mandated in the revisions to the ambient air monitoring regulations in the FY07 103 Grant. These funds will be distributed to the State and Local Agencies as expeditiously as possible. However, a definitive date cannot be given at this time.

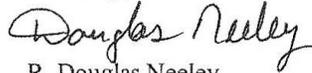
Virginia/North Carolina MSA Agreement

Region 4 approves the agreement between the Commonwealth of Virginia Department of Environmental Quality (VADEQ) and NCDAQ in respect to North Carolina's and Virginia's ambient air monitor network design for the Norfolk-Newport News, VA-NC Metropolitan Statistical Area (MSA) in accordance with 40 CFR Part 58 Appendix D Section 2 (e). Region 4 concurs with VADEQ's assessment that their PM<sub>2.5</sub> and ozone monitoring network meet the minimum requirement for this MSA. Region 4 also concurs that the addition of a PM<sub>10</sub> monitor at the proposed Hampton, Virginia site will be sufficient to meet applicable PM<sub>10</sub> network design criteria for this area.



If you have further questions, please contact Artra B. Cooper of EPA Region 4 at (404) 562-9047.

Sincerely,



R. Douglas Neeley

Chief

Air Toxics and Monitoring Branch

Air Pesticides & Toxics Management Division

cc: Hoke Kimball, NCDAQ  
Charles Valerie, NCDAQ  
James E. Sydnor, Director. VADEQ  
Walter Wilkie, US EPA Region III Air Division



*Handwritten initials/signature*

North Carolina Department of Environment and Natural Resources  
Division of Air Quality

Michael F. Easley, Governor

William G. Ross, Jr., Secretary  
B. Keith Overcash, P.E., Director

January 11, 2007

Mr. R. Douglas Neeley, Chief  
Air Toxics and Monitoring Branch  
US EPA Region IV  
Atlanta Federal Center  
61 Forsyth Street  
Atlanta, GA 30303-8960

Subject: Norfolk-Virginia Beach-Newport News, Virginia/North Carolina MSA agreement

Dear Mr. Neeley:

Attached you will find a copy of the December 21, 2006 agreement between Virginia and North Carolina addressing the September 2006 revisions to the Ambient Air Monitoring Regulations from 40 CFR Part 58 Appendix D listed under EPA-HQ-OAR-2004-0018; FRL-RIN 2060-AJ25. The Norfolk-Virginia Beach- Newport News, Virginia/NC MSA includes Currituck County, North Carolina as part of this MSA.

This letter requests your approval of the attached agreement letter between Virginia and North Carolina with respect to the following passage under Network Design Criteria page 451 2 (e):

"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."

Sincerely,

B. Keith Overcash, P.E.

Attachments

CC: James E. Sydnor, Dir. Virginia DEQ Air Quality, PO Box 1105, Richmond VA 32318  
Hoke Kimball, NC DAQ  
Charles Valrie, NC DAQ  
Norfolk\_Va Beach-Newport New, VFA-NC MSA agreement

**Ambient Monitoring Section**  
1641 Mail Service Center, Raleigh, North Carolina 27699-1641  
2728 Capital Blvd., Raleigh, North Carolina 27604  
Phone: 919-715-0665 / FAX 919-733-1812 / Internet: www.ncair.org

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*Mailed Jan. 11*

North Carolina Department of Environment and Natural Resources  
Division of Air Quality

Michael F. Easley, Governor

William G. Ross, Jr., Secretary  
B. Keith Overcash, P.E., Director

January 11, 2007

Mr. James E. Sydnor, Director  
Air Quality Division  
Virginia Department of Environmental Quality  
Richmond, Virginia 23218

Subject: Norfolk-Virginia Beach-Newport News, Virginia/North Carolina MSA agreement

Dear Jim:

We are in receipt of your letter of December 21, 2006 which addresses the September 2006 revisions to the Ambient Air Monitoring Regulations from 40 CFR Part 58 Appendix D listed under EPA-HQ-OAR-2004-0018; FRL-RIN 2060-AJ25 on the following topic:

"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."

Thank you for the invitation to participate in Virginia's annual ambient air monitoring network review. Please know that the North Carolina annual monitoring network review is available for your staff to use at any time also. We are in agreement with your letter and will have a copy sent to our EPA representative in Region IV to represent the fulfillment of the above requirement and also for their approval.

Please let us know if you have any questions regarding our monitoring as part of the Norfolk-Virginia Beach-Newport News MSA.

Sincerely,

B. Keith Overcash, P.E.

CC: Hoke Kimball, NC DAQ  
Charles Valrie, NC DAQ  
Joette Steger, NC DAQ

Norfolk\_Va Beach-Newport News, VEA-NC MSA agreement?

**Ambient Monitoring Section**  
1641 Mail Service Center, Raleigh, North Carolina 27699-1641  
2728 Capital Blvd., Raleigh, North Carolina 27604  
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DEPARTMENT OF ENVIRONMENTAL QUALITY

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Mailing address: P.O. Box 1105, Richmond, Virginia 23218

Fax (804) 698-4500 TDD (804) 698-4021

www.deq.virginia.gov

L. Preston Bryant, Jr.  
Secretary of Natural Resources

David K. Paylor  
Director

(804) 698-4000  
1-800-592-5482

December 21, 2006

Mr. B. Keith Overcash  
Division of Air Quality  
North Carolina Department of Environment and Natural Resources  
2728 Capital Boulevard (1641 MSC)  
Raleigh, North Carolina 27699

Mr. Overcash: *Keith*

The September 2006 Revisions to the NAAQS for Particulate Matter ((FLR-RIN 2060-AJ25, page 451), states that "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." The document also gives minimum requirements for monitoring ozone, PM2.5 and PM10 with regard to MSA population (tables attached). Virginia and North Carolina share the Norfolk-VA Beach-Newport News, VA-NC MSA, which is comprised of the following areas:

Counties

- Currituck County, NC
- Gloucester County, VA
- Isle of Wight County, VA
- James City County, VA
- Mathews County, VA
- Surry County, VA
- York County, VA

Cities

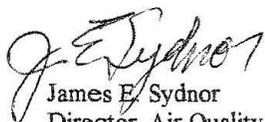
- Chesapeake, VA
- Hampton, VA
- Newport News, VA
- Norfolk, VA
- Poquoson, VA
- Portsmouth, VA
- Suffolk, VA
- VA Beach, VA
- Williamsburg, VA

The US Census Bureau does not include Surry County, VA in the Norfolk-VA Beach-Newport News, VA-NC MSA. Other listings include Surry County and Southampton County. The most prevalent listing (as shown) is from the US Office of Management and Budget.

The Norfolk-VA Beach-Newport News, VA-NC MSA 2000 population as given by the Brookings Institute is 1.6 million. The Virginia air monitoring network meets the minimum number of monitors in this MSA for ozone and PM2.5. However, where the table calls for two PM10 monitors, there is only one PM10 monitoring site in the MSA. A second PM10 is scheduled to be installed in the Hampton, VA area this month.

The VA DEQ suggests that the ambient air monitoring network (Hampton PM10 included) is sufficient to reflect proper characterization air pollution in the Norfolk-Virginia Beach-Newport News, VA-NC MSA. However it is also the intent of this letter to assure North Carolina that the VA DEQ will share any and all quality assured ambient air data collected in the Virginia portion of this MSA. It is also the intent of the VA DEQ that the North Carolina Department of Environment is notified and invited to participate in Virginia's annual ambient air monitoring network review.

Sincerely,



James E. Sydnor  
Director, Air Quality Division  
Virginia Department of Environmental Quality

JES/tj

Attachments

cc: Walter Wilkie, US EPA III

Hoke Kimball, Ambient Monitoring Section, NC DENR

Thomas Jennings, Air Quality Monitoring, VA DEQ

Table D-2 of Appendix D to Part 58. SLAMS Minimum O<sub>3</sub> Monitoring Requirements.

MSA population <sup>1,2</sup>	Most recent 3-year design value concentrations $\geq 85\%$ of any O <sub>3</sub> NAAQS <sup>3</sup>	Most recent 3-year design value concentrations $< 85\%$ of any O <sub>3</sub> NAAQS <sup>3,4</sup>
>10 million	4	2
4 - 10 million	3	1
350,000 - <4 million	2	1
50,000 - <350,000 <sup>5</sup>	1	0

<sup>1</sup> Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

<sup>2</sup> Population based on latest available census figures.

<sup>3</sup> The ozone (O<sub>3</sub>) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

<sup>4</sup> These minimum monitoring requirements apply in the absence of a design value.

<sup>5</sup> Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

Table D-4 of Appendix D to Part 58.  $PM_{10}$  Minimum Monitoring Requirements (Number of Stations per MSA)<sup>1</sup>

Population Category	High Concentration <sup>2</sup>	Medium Concentration <sup>3</sup>	Low Concentration <sup>4,5</sup>
> 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

<sup>1</sup> 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.

<sup>2</sup> High concentration areas are those for which ambient PM10 data show ambient concentrations exceeding the PM10 NAAQS by 20 percent or more.

<sup>3</sup> Medium concentration areas are those for which ambient PM10 data show ambient concentrations exceeding 80 percent of the PM10 NAAQS.

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

<sup>5</sup> These minimum monitoring requirements apply in the absence of a design value.

Table D-5 of Appendix D to Part 58. PM<sub>2.5</sub> Minimum

## Monitoring Requirements

MSA population <sup>1,2</sup>	Most recent 3-year design value $\geq 85\%$ of any PM <sub>2.5</sub> NAAQS <sup>3</sup>	Most recent 3-year design value $< 85\%$ of any PM <sub>2.5</sub> NAAQS <sup>3,4</sup>
> 1,000,000	3	2
500,000 - 1,000,000	2	1
50,000 - < 500,000 <sup>5</sup>	1	0

<sup>1</sup> Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

<sup>2</sup> Population based on latest available census figures.

<sup>3</sup> The PM<sub>2.5</sub> National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

<sup>4</sup> These minimum monitoring requirements apply in the absence of a design value.

<sup>5</sup> Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

## Appendix G. Waiver for Second Wilmington Ozone Monitor



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

NOV - 9 2011

Ms. Shelia 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:

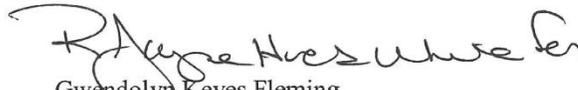
In a December 21, 2010, letter to you, the U.S. Environmental Protection Agency approved a waiver of the requirement that the state operate two ozone monitors in the Wilmington Metropolitan Statistical Area (MSA). At that time, EPA stated that it would re-evaluate the appropriateness of the waiver once EPA completed its reconsideration of the Ozone National Ambient Air Quality Standard (NAAQS).

On September 22, 2011, the Agency completed its reconsideration of the Ozone NAAQS and announced that the NAAQS would not change. This action left the Ozone NAAQS, which was promulgated in 2008, at a level of 0.075 parts per million (ppm).

Because the Wilmington MSA has a low risk for exceeding the 0.075 ppm NAAQS due to ambient air ozone concentrations which have been trending lower (i.e., decreasing design value), sea breezes, attainment status, and a population total that is only slightly over the threshold requirement for a second ozone monitor, EPA believes that the waiver of the second monitor is appropriate. The waiver is in effect until the next 5-year network assessment is completed and approved in 2015.

If you have any questions relating to this matter, please contact Katherine Snyder of my staff at (404) 562-9840.

Sincerely,

  
Gwendolyn Keyes Fleming  
Regional Administrator

cc: Archie Lee, SESD



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

## Appendix H. Request for Waiver from Longer Ozone Season for Mountain Sites



North Carolina Department of Environment and Natural Resources

Division of Air Quality

Beverly Eaves Perdue  
Governor

Sheila C. Holman  
Director

Dee Freeman  
Secretary

December 21, 2011

Mr. Doug Neeley  
Chief, Air Toxics and Monitoring Branch  
U.S. Environmental Protection Agency Region IV  
Sam Nunn Atlanta Federal Center  
61 Forsyth Street S.W.  
Atlanta, GA 30303-8960

Subject: Ozone Monitoring Season Exemption for High Elevation Sites

Dear Mr. <sup>Doug</sup>Neeley,

The current ozone monitoring season for North Carolina is April through October. EPA's proposed ozone rule would extend this season from March through October. Although the earlier start date is still just a proposal, North Carolina requests that the ozone season for our high elevation mountain sites remain at April through October.

Our 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 us to get to the mountain tops in February to calibrate equipment and perform other quality assurance (QA) functions. Depending on the weather it may be possible in some years. In other years it is questionable whether we could do it safely, if at all.

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

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

The current regulation, 40 CFR Part 58, Appendix D, Section 4.1(i) gives Region IV the authority to approve a deviation to the ozone monitoring season.

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

1641 Mail Service Center, Raleigh, North Carolina 27699-1641  
217 West Jones Street, Raleigh, NC 27603  
Phone: 919-707-8401 / FAX 919-715-0718 / Internet: www.ncair.org

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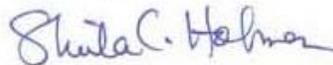
“For the initial formulation of the ozone monitoring seasons ... The basic premise was that areas with monthly mean maximum temperatures predominantly below 55 degrees Fahrenheit (F) are expected to have hourly concentrations less than 0.08 ppm ...”

North Carolina operates meteorology stations at two of the five sites, Joanna Bald and Linville. The monthly mean maximum temperature for March for 2007-2011 was 53°F at Joanna Bald and 55°F at Linville (the lowest elevation of the five sites). Additionally, data from the North Carolina State Climate Office shows the highest monthly mean maximum temperatures during the past four years to be to 44°F at Mt. Mitchell (the highest elevation). These maximum temperatures are about 9°F colder in February when we would be accessing these remote mountain areas to recalibrate equipment and perform other QA functions.

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

Thank you in advance for considering this request to exempt Joanna Bald, Purchase Knob, Frying Pan, Mt. Mitchell, and Linville from ozone monitoring earlier than April. Although the rule is not yet final, having this exemption in hand will ensure a measure of safety to our staff, and assist us in planning and managing our limited resources.

Sincerely,



Sheila C. Holman

cc:  
Mike Abraczinskas  
Donnie Redmond  
Ryan Brown, EPA

## Appendix I. NCore Monitoring Plan Approval Letter



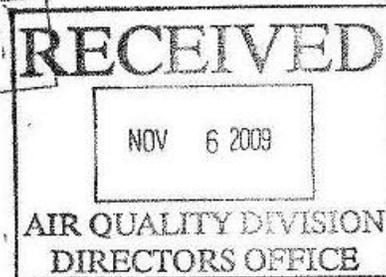
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
RESEARCH TRIANGLE PARK, NC 27711

*Donnie  
C. Steile*



OFFICE OF  
AIR QUALITY PLANNING  
AND STANDARDS

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



Dear Mr. Overcash:

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

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

In your agency's plan for NCore, a request was made to waive measuring NO<sub>y</sub>, which is a required measurement. After assessing available NO<sub>y</sub> observations and modeling outputs and to assure consistency across all NCore stations, we are affirming the requirement to measure NO<sub>y</sub> at all NCore stations. Please make arrangements with your Regional Office on a schedule to implement the measurement of NO<sub>y</sub> at your NCore station.

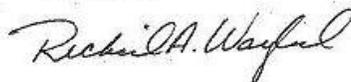
By EPA's rules (see 40 CFR 58.13), an approved NCore station is expected to be operating with all required measurements by January 1, 2011. Enclosure A provides an update on required measurements and Enclosure B provides EPA's Air Quality System instructions on coding for NCore monitors and data. Please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

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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](mailto:hanley.tim@epa.gov) and 919-541-4417, or David Shelow at [shelow.david@epa.gov](mailto:shelow.david@epa.gov) and 919-541-3776.

Sincerely,



Richard A. Wayland  
Director  
Air Quality Assessment Division

2 Enclosures

cc: Doug Neeley, EPA Region 4

## Appendix J. Affidavit of Publication of Notice of Availability of Network Plan

Public notice of availability of the network was plan was published in five newspapers throughout North Carolina. In addition, notification was sent out via public e-mail distribution lists maintained for permitting, rules, ambient monitoring, and air toxics.

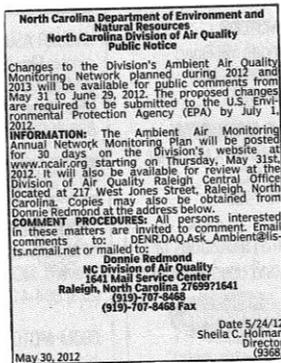
ASHEVILLE  
**CITIZEN-TIMES**  
VOICE OF THE MOUNTAINS • CITIZEN-TIMES.com

### AFFIDAVIT OF PUBLICATION

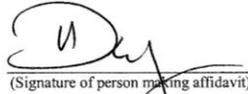
BUNCOMBE COUNTY

SS.  
NORTH CAROLINA

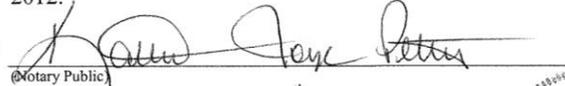
Before the undersigned, a Notary Public of said County and State, duly commissioned, qualified and authorized by law to administer oaths, personally appeared **Velene Fagan**, who, being first duly sworn, deposes and says: that she is the **Legal Billing Clerk of The Asheville Citizen-Times**, engaged in publication of a newspaper known as **The Asheville Citizen-Times**, published, issued, and entered as first class mail in the City of Asheville, in said County and State; that she is authorized to make this affidavit and sworn statement; that the notice or other legal advertisement, a true copy of which is attached hereto, was published in **The Asheville Citizen-Times** on the following date: May 30<sup>th</sup>, 2012. And that the said newspaper in which said notice, paper, document or legal advertisement was published was, at the time of each and every publication, a newspaper meeting all of the requirements and qualifications of Section 1-597 of the General Statutes of North Carolina and was a qualified newspaper within the meaning of Section 1-597 of the General Statutes of North Carolina.



Signed this 30<sup>th</sup>, day of May, 2012

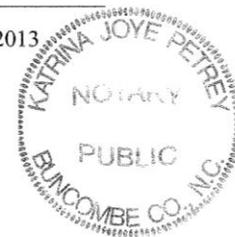
  
(Signature of person making affidavit)

Sworn to and subscribed before me the 30<sup>th</sup>, day of May, 2012.

  
(Notary Public)

My Commission expires the 5<sup>th</sup> day of October, 2013

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14 O. HENRY AVE. | P.O. BOX 2090 | ASHEVILLE, NC 28802 | (800) 800-4204



News & Record

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Greensboro, North Carolina

AFFIDAVIT OF

North Carolina, Guilford County

Before the undersigned, a Notary Public of said County and State, duly commissioned, qualified and authorized by law to administer oaths, personally appeared the Publisher's Representative who being first duly sworn, deposed and says:

1. That he/she is the Publisher's Representative of the Greensboro News & Record, Inc. a corporation, engaged in the publication of newspapers known as "News & Record", published, issued and entered as second class mail in the City of Greensboro in said County and State.
2. That he/she is authorized to make this affidavit and sworn statement; that the notice or other legal advertisement, a copy of which is attached hereto, was published in the News & Record on the dates listed below.
3. That the said newspaper (or newspapers) in which such notice, paper, document, or legal advertisement was published was, at the time of each and every such publication, a newspaper meeting all of the requirements and qualifications of Section 1-597 of the General Statutes of North Carolina and was a qualified newspaper within the meaning of Section 1-597 of the General Statutes of North Carolina.

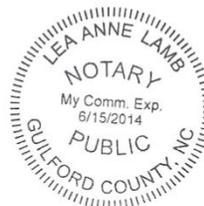
Publisher's Representative

*Quil Helms*

Sworn to and subscribed before me, this 30 day of May, 2012

*LeAnne Lamb*

Notary Public



<u>Name</u>	<u>Ad #</u>	<u>Date</u>	<u>Edition</u>	<u>Class</u>	<u>PO</u>	<u>Ad Copy</u>
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Ad ID 34645146

Date 05/25/2012

Time 10:23 AM

North Carolina Department of  
Environment and Natural Resources  
North Carolina Division of Air Quality  
Public Notice

Changes to the Division's Ambient Air  
Quality Monitoring Network planned  
during 2012 and 2013 will be  
available for public comments from  
May 31 to June 29, 2012. The  
proposed changes are required to be  
submitted to the U.S. Environmental  
Protection Agency (EPA) by July 1,  
2012.

INFORMATION: The Ambient Air  
Monitoring Annual Network  
Monitoring Plan will be posted for 30  
days on the Division's website at  
[www.ncair.org](http://www.ncair.org) starting on Thursday,  
May 31st, 2012. It will also be  
available for review at the Division of  
Air Quality Raleigh Central Office  
located at 217 West Jones Street,  
Raleigh, North Carolina. Copies may  
also be obtained from Donnie  
Redmond at the address below.

COMMENT PROCEDURES: All persons  
interested in these matters are invited  
to comment. Email comments to:  
[DENR.DAQ.Ask.Ambient@lists.ncmail.net](mailto:DENR.DAQ.Ask.Ambient@lists.ncmail.net)  
or mailed to:

Donnie Redmond  
NC Division of Air Quality  
1641 Mail Service Center  
Raleigh, North Carolina 27699-1641  
(919)7707-7848  
(919)7707-7848 Fax

Date 5/24/12

Sheila C. Holman  
Director

**Ad shown is not actual print size**

AFFIDAVIT OF PUBLICATION

STATE OF NORTH CAROLINA
COUNTY OF NEW HANOVER

North Carolina Department of Environment and Natural Resources North Carolina Division of Air Quality Public Notice
Changes to the Division's Ambient Air Quality Monitoring Network planned during 2012 and 2013 will be available for public comments from May 31 to June 29, 2012. The proposed changes are required to be submitted to the U.S. Environmental Protection Agency (EPA) by July 1, 2012.
INFORMATION: The Ambient Air Monitoring Annual Network Monitoring Plan will be posted for 30 days on the Division's website at www.ncair.org starting on Thursday, May 31st, 2012. It will also be available for review at the Division of Air Quality Raleigh Central Office located at 217 West Jones Street, Raleigh, North Carolina. Copies may also be obtained from Donnie Redmond at the address below.
COMMENT PROCEDURES: All persons interested in these matters are invited to comment. Email comments to: DENR.DAQ.Ask.Ambient@lists.ncm.all.net or mailed to: Donnie Redmond, NC Division of Air Quality, 1641 Mail Service Center, Raleigh, North Carolina 27699. \*1541 (919)\*707\*8468 (919)\*707\*8468 Fax Date 5/24/12 Sheila C. Holman, Director

Before the undersigned, a Notary Public of Said County and State,

Keith Raffone

Who, being duly sworn or affirmed, according to the law, says that he/she is

Controller

of THE STAR-NEWS, a corporation organized and doing business under the Laws of the State of North Carolina, and publishing a newspaper known as STAR-NEWS in the City of Wilmington

North Carolina Department of Environment and Natural Resources North Carolina Division of Air Quality Public Notice Changes to the Division's Ambient Air Quality Monitoring Network planned during 2012 and 2013 will be available for public comments from Ma

was inserted in the aforesaid newspaper in space, and on dates as follows:

5/30 1x

And at the time of such publication Star-News was a newspaper meeting all the requirements and qualifications prescribed by Sec. No. 1-597 G.S. of N.C.

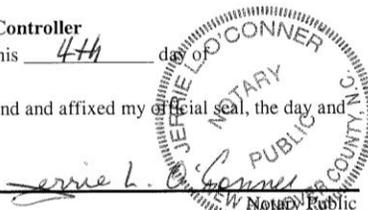
[Handwritten signature]

Title: Controller

Sworn or affirmed to, and subscribed before me this 4th day

June, A.D., 2012

In Testimony Whereof, I have hereunto set my hand and affixed my official seal, the day and year aforesaid.



My commission expires \_\_\_ day of \_\_\_, 20\_\_

Upon reading the foregoing affidavit with the advertisement thereto annexed it is adjudged by the Court that the said publication was duly and properly made and that the summons has been duly and legally served on the defendant(s).

This \_\_\_ day of \_\_\_, \_\_\_

Clerk of Superior Court

MAIL TO:

AFFIDAVIT OF PUBLICATION

RECEIVED

JUN 4 2012

AIR QUALITY DIVISION  
BUDGET OFFICE

STATE OF NORTH CAROLINA  
COUNTY OF WAKE

Ad Number  
0000070399

Advertiser Name: DENR DIVISION OF AIR QUALITY  
Address: 1641 MAIL SERVICE CENTER  
RALEIGH, NC 276991641

Before the undersigned, a Notary Public of Wake County North Carolina, duly commissioned and authorized to administer oaths, affirmations, etc., personally appeared Barbara Brown, who being duly sworn or affirmed, according to law, doth depose and say that he or she is Accounts Receivable Specialist of The News & Observer a corporation organized and doing business under the Laws of the State of North Carolina, and publishing a newspaper known as The News & Observer, in the City of Raleigh, Wake County and State aforesaid, the said newspaper in which such notice, paper, document, or legal advertisement was published was, at the time of each and every such publication, a newspaper meeting all of the requirements and qualifications of Section 1-597 of the General Statutes of North Carolina and was a qualified newspaper within the meaning of Section 1-597 of the General Statutes of North Carolina, and that as such he or she makes this affidavit; and is familiar with the books, files and business of said corporation and by reference to the files of said publication the attached advertisement for DENR DIVISION OF AIR QUALITY was inserted in the aforesaid newspaper on dates as follows:

05/30/2012

Barbara Brown

Barbara Brown, Accounts Receivable Specialist  
Wake County, North Carolina

Sworn to and subscribed before me  
This 31st day of May, 2012

My Commission Expires: 06/01/2013

Timothy R Winslow  
Notary Signature

North Carolina Department of Environment and Natural Resources  
North Carolina Division of Air Quality  
Public Notice

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Donnie Redmond  
NC Division of Air Quality  
1641 Mail Service Center  
Raleigh, North Carolina 27699-1641  
(919) 707-8468  
(919) 707-8468 Fax  
Date 5/24/12  
Sheila C. Holman  
Director  
N&O: May 30, 2012



## Appendix K. Public Comments Received

Only one public comment was received. It was from the Forsyth County Office of Environmental Assistance and Protection noting that their agency name had changed and should be corrected in the network plan. This correction was made. No other comments were received or changes made to the network plan after it went out for public comment.

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**From:** Reagan, Patrick A [reaganpa@forsyth.cc]  
**Sent:** Tuesday, June 05, 2012 2:22 PM  
**To:** NCDENR.DENR.DAQ.Ask\_Ambient  
**Cc:** Elkins, Lorelei; Bodenhamer, Jason R; Gentry, Cary D; Barnette, William M (Minor); Russ, Robert O (Rob); Sullivan, Van K; Young, Milton D (Deane); Akoje, Lawrence G  
**Subject:** Comments on the Annual Network Plan  
**Attachments:** ATT00001.c

Donnie, in the 2012 Annual Network Plan, our agency is referred to as the Forsyth County Environmental Affairs Department. In October 2011, we underwent a name change. We are now referred to as the Forsyth County Office of Environmental Assistance and Protection. Our mission to ambient monitoring remains the same and the references to the monitoring sites and the monitoring network are still accurate. Future reports should be corrected to reflect our new name. Thank you for the opportunity to provide these comments. Great work by you and your staff for such a thorough document...PAR

---

**Patrick A. Reagan**

*Monitoring and Mobile Sources Program Manager*

**Forsyth County Office of Environmental Assistance and Protection**



201 N. Chestnut Street, 5th Floor  
Winston-Salem, NC 27101-4120  
Phone: (336) 703-2440  
Direct: (336) 703-2447  
Fax: (336) 727-2777  
Email: [reaganpa@forsyth.cc](mailto:reaganpa@forsyth.cc)

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NOTE: This is a Forsyth County operated e-mail system. ALL e-Mail communication is subject to be accessed by the news media and the public pursuant to the Public Records Law of North Carolina.

## **Glossary**

AQS - Air Quality System  
AQI - Air Quality Index  
ARM - Approved Regional Method  
BAM - Beta Attenuation Method  
CO - Carbon Monoxide  
CFR - Code of Federal Regulations  
EPA - Environmental Protection Agency  
FEM – Federal Equivalent Method  
FRM - Federal Reference Method  
IMPROVE - Interagency Monitoring of Protected Visual Environments  
MSA - Metropolitan Statistical Area  
NAAQS - National Ambient Air Quality Standards  
NC-DAQ - North Carolina Division of Air Quality  
NCore - National Core (Ambient Monitoring Network Station)  
NO<sub>2</sub> - Nitrogen Dioxide  
NO<sub>y</sub> - Oxides of Nitrogen  
O<sub>3</sub> - Ozone  
Pb - Lead  
PM - Particulate Matter  
PM 2.5 - Fine Particulate (particles of 2.5 microns aerodynamic diameter and below)  
PM 10 - Particles of 10 microns aerodynamic diameter and below  
PSD - Prevention of Significant Deterioration  
SLAMs - State and Local Air Monitoring Station  
SIP – State Implementation Plan  
SO<sub>2</sub> - Sulfur Dioxide  
SPM - Special Purpose Monitor  
TECO - Thermo Environmental, Incorporated  
TEOM - Tapered Element Oscillating Microbalance  
TLE - Trace Level (monitor)  
VDEQ - Virginia Department of Environmental Quality  
WINS - Well Impactor Ninety Six (PM 2.5 separator)